

Ensuring National Food Security in Southern Africa: Challenges and Solutions

Lufeyo Chitondo¹, Chanda Chansa Thelma², Edwin Vinandi Phiri³

¹Corresponding Author: Lufeyo Chitondo, Twin Palm Leadership University

²Co-author1: Chanda Chansa Thelma, Chreso University, Lusaka, Zambia

³Co-author2: Edwin Vinandi Phiri, P.O Box 440091, Isoka, Zambia

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Abstract: National food security is a critical issue worldwide, with significant implications for economic development, public health, and social stability. This article examines the challenges facing central African countries in achieving food security and explores potential solutions. Key factors contributing to food insecurity, such as population growth, climate change, natural disasters, and socioeconomic inequalities, are discussed. Strategies to enhance food security, including improving agricultural productivity, promoting sustainable farming practices, strengthening food distribution systems, enhancing nutrition education, and implementing social safety nets, are also examined. Drawing on empirical evidence and case studies from diverse regions, this article provides insights into effective policies and interventions for ensuring national food security. The study employed a mixed-methods approach, combining qualitative analysis of policy documents and literature reviews with quantitative assessments of food production, consumption patterns, and socioeconomic indicators. Data was collected from various sources, including government reports, academic publications, and international organizations. Data was obtained from respondents by means of interviews, questionnaires and project observation schedules. The sample consisted of two hundred and fifty respondents. Frequency, percentages, tables, graphs and pie-charts were used to analyze the quantitative and qualitative data obtained. Data was then analyzed manually in some cases and also, a combination of software MS Access and MS Excel. The findings revealed that addressing national food security requires a multifaceted approach that addresses underlying structural issues while also implementing targeted interventions. By prioritizing investments in agriculture, strengthening social safety nets, and promoting inclusive policies, Southern African nations can move closer to achieving food security for all citizens. and the study by implementing the recommendations in a coordinated and context-specific manner, Southern African countries can make significant strides towards achieving sustainable food security and improving the livelihoods of their populations.

Keywords: Agriculture, Food Security, Nutrition, Sustainable Development, and Social Safety Nets.

1. INTRODUCTION

Food security is a pressing issue worldwide, affecting millions of people. In the context of national food security, ensuring access to safe and nutritious food for all citizens is paramount. This article examines the challenges faced by Southern African nations, particularly Zambia and her neighbours in achieving food security and proposes solutions to address these challenges.

Background and Significance of National Food Security

National food security refers to the ability of a country to ensure that all its citizens have access to safe, nutritious, and affordable food at all times. It encompasses various aspects including food production, distribution, access, utilization, and

stability. The background and significance of national food security are multifaceted and crucial for several reasons. Access to an adequate and balanced diet is fundamental for human health and well-being. Food security ensures that individuals and communities have access to the necessary nutrients for healthy growth, development, and disease prevention. Food security is closely linked to economic stability (FAO, 2022). A reliable and secure food supply helps stabilize food prices, reducing the risk of food inflation and economic shocks. This stability is essential for maintaining consumer purchasing power and overall economic prosperity. Food insecurity often exacerbates social inequalities and disparities. Ensuring food security promotes social stability by reducing poverty, hunger, and social unrest. It also fosters social equity by ensuring that marginalized groups have equal access to food resources. Sustainable food production and distribution systems are essential for environmental conservation. Promoting food security involves implementing practices that minimize environmental degradation, such as sustainable agriculture, efficient water use, and biodiversity conservation (UNDP, 2020).

A food-secure nation is better equipped to withstand and recover from various shocks and crises, including natural disasters, economic downturns, and pandemics. Adequate food reserves, diversified food sources, and robust distribution networks enhance resilience and reduce vulnerability. Food security is also intertwined with national security concerns. Dependence on external food sources can pose risks to a nation's sovereignty and independence. Therefore, ensuring domestic food production capabilities and maintaining strategic food reserves are vital for national security. In an increasingly interconnected world, food security is a global concern (Swinnen and Squicciarini, 2012). International trade, climate change, and geopolitical dynamics can all affect a nation's food supply. Collaboration and cooperation among nations are essential to address global food security challenges effectively. Food security is integral to achieving several Sustainable Development Goals (SDGs) outlined by the United Nations, including zero hunger, good health and well-being, and sustainable agriculture. Progress towards these goals requires concerted efforts at the national and international levels.

Overall, ensuring national food security is not only a matter of addressing hunger and malnutrition but also a complex issue with far-reaching implications for health, economy, society, and the environment. It requires comprehensive strategies, policies, and investments aimed at promoting sustainable food systems and ensuring equitable access to nutritious food for all.

Overview of Current Challenges and Trends on National Food Security

Several challenges and trends impact national food security worldwide. Here is an overview:

Challenges:

A challenge is a difficulty or obstacle that inhibits progress or achievement. Challenges can arise from various factors, such as environmental, social, economic, or political conditions. They often require effort, resources, and strategic planning to overcome. In the context of ensuring national food security, challenges may include issues like climate change affecting agricultural productivity, poverty limiting access to nutritious food, or conflicts disrupting food distribution networks (Smith and Myers, 2018). Hence, challenges on food security include increasingly erratic weather patterns, such as droughts, floods, and extreme temperatures, are disrupting agricultural productivity and food supply chains. This can lead to crop failures, reduced yields, and food shortages, particularly in vulnerable regions. Water scarcity poses a significant challenge to food security, as agriculture is a water-intensive activity. Competition for water resources among various sectors, coupled with the effects of climate change, exacerbates this challenge. Fluctuations in food prices, driven by factors like changes in demand, production disruptions, and trade policies, can impact access to food, especially for low-income populations. Volatility in food prices can lead to increased vulnerability to food insecurity (Pingali, 2012). Conflict and political instability in certain regions disrupt food production, distribution, and access, leading to food shortages, displacement, and humanitarian crises. Conflict-affected areas often experience high levels of food insecurity and malnutrition.

Declines in biodiversity, including the loss of crop diversity, threaten food security by reducing resilience to pests, diseases, and environmental stressors. Preserving genetic diversity is essential for maintaining resilient and sustainable food systems. Significant amounts of food are lost or wasted at various stages of the supply chain, from production to consumption (Devereux, 2009). Addressing food waste and loss is critical for maximizing food availability and reducing pressure on natural resources. Smallholder farmers, particularly in developing countries, often face challenges accessing essential inputs such as seeds, fertilizers, and technology. Improving access to resources and supporting small-scale agriculture is vital for

enhancing food security and rural livelihoods. Rapid urbanization and changing dietary preferences are shifting demand for food, leading to challenges in food production and distribution. Meeting the diverse nutritional needs of urban populations requires adapting food systems and promoting healthy, sustainable diets (FAO,2021).

Trend

A trend refers to a general direction or pattern in which something is developing or changing over time. Trends can emerge from shifts in societal attitudes, technological advancements, economic forces, or other influencing factors. They provide insights into evolving behaviors, preferences, or conditions within a particular domain. In the context of food security, trends may include changes in consumer preferences towards organic foods, advancements in agricultural technology, or increasing urbanization influencing food distribution networks (von Braun,2008). Hence, trends include advancements in agricultural technology, including precision agriculture, biotechnology, and digital farming tools, have the potential to increase productivity, resilience, and sustainability in food production. There is growing recognition of the importance of sustainable agriculture practices, such as agroecology, organic farming, and regenerative agriculture, in promoting food security while minimizing environmental impact (Smith and Haddad,2015) There is increasing interest in promoting local food systems and short supply chains as a means to enhance food security, support small-scale farmers, and reduce the carbon footprint of food production and distribution. Governments and international organizations are implementing policy interventions to address food security challenges, including investment in rural infrastructure, social protection programs, and agricultural subsidies. There is a shift towards nutrition-sensitive approaches to food security, emphasizing the importance of not only food quantity but also quality and diversity to ensure adequate nutrition for all. Efforts to build climate resilience in agriculture, such as climate-smart farming practices and crop diversification, are becoming increasingly important in mitigating the impacts of climate change on food security. Collaboration among governments, NGOs, the private sector, and international organizations is essential for addressing complex food security challenges on a global scale. Partnerships are crucial for leveraging resources, sharing knowledge, and implementing effective solutions (UNDP,2020). Overall, addressing the challenges and embracing these trends is essential for achieving sustainable and resilient food systems that ensure food security for present and future generations.

1.1 Statement of the problem

Food security is a pressing issue worldwide, affecting millions of people. In the context of national food security, ensuring access to safe and nutritious food for all citizens is paramount in Southern African countries. Despite advances in agriculture and food production technologies, many Southern African nations struggle to provide adequate food for their populations and issues such as poverty, climate change, unequal distribution of resources, and conflicts exacerbate food insecurity are prevalent in these countries (Rosenzweig and Perry,1994).

1.2 Purpose of the Study

The purpose of this study was to analyze the challenges confronting national food security in Southern Africa and suggest effective solutions to mitigate these challenges. By understanding the root causes of food insecurity, policymakers can develop strategies to enhance food access and availability.

1.3 Objectives:

- Identify the main challenges hindering national food security.
- Explore theoretical frameworks relevant to understanding food security.
- Propose actionable solutions to address food insecurity at the national level.

1.4 Theoretical Framework

This study draws upon various theoretical perspectives, including the capabilities approach, systems theory, and political economy. These frameworks offer insights into the complex interplay of factors influencing food security, encompassing social, economic, and environmental dimensions. However, this study was guided by the systems theory developed in the 1940s and 1950s. While it doesn't have a single creator, many credit go to the biologist Ludwig von Bertalanffy as one of the key figures in its development. Von Bertalanffy proposed the theory as a way to understand and analyze complex systems across various disciplines.

The significance of systems theory to national food security lies in its ability to provide a holistic framework for understanding the interconnectedness and dynamics of various components within a food system. By viewing the food system as a complex network of interrelated parts—such as production, distribution, consumption, and waste management—systems, the theory allows policymakers, researchers, and stakeholders to identify potential vulnerabilities, leverage points, and feedback loops within the system. This understanding can inform more effective strategies and interventions to enhance food security at the national level by addressing issues such as supply chain resilience, environmental sustainability, equity in access to nutritious food, and adaptive governance (FAO,2021).

1.5 Significance of the Study

Enhancing national food security has far-reaching implications for public health, economic development, and social stability. By addressing food insecurity, nations can reduce poverty, improve nutrition outcomes, and foster sustainable development. A food-secure nation is better equipped to withstand and recover from various shocks and crises, including natural disasters, economic downturns, and pandemics. Adequate food reserves, diversified food sources, and robust distribution networks enhance resilience and reduce vulnerability. Food security is also intertwined with national security concerns. Dependence on external food sources can pose risks to a nation's sovereignty and independence. Therefore, ensuring domestic food production capabilities and maintaining strategic food reserves are vital for national security. In an increasingly interconnected world, food security is a global concern. International trade, climate change, and geopolitical dynamics can all affect a nation's food supply. Collaboration and cooperation among nations are essential to address global food security challenges effectively. Food security is integral to achieving several Sustainable Development Goals (SDGs) outlined by the United Nations, including zero hunger, good health and well-being, and sustainable agriculture. Progress towards these goals requires concerted efforts at the national and international levels.

2. LITERATURE REVIEW

Previous research has identified numerous challenges to national food security, ranging from inadequate infrastructure and resource constraints to policy failures and market inefficiencies. Scholars have proposed diverse strategies to enhance food security, including investment in agricultural research and development, social protection programs, and trade liberalization. what pertinent topics can be discussed on ensuring national food security-challenges and solutions

2.1 National Food Security What is National Food security

National food security refers to the ability of a nation to ensure that all its citizens have access to an adequate, safe, and nutritious food supply at all times. This includes not only the availability of food within the country but also access to that food by all segments of the population. Food security is a multifaceted issue that encompasses factors such as food production, distribution, affordability, access to resources, and resilience to shocks such as natural disasters, economic crises, and conflicts (D'Agostino, Scarlato and Napolitano,2018).

Governments and international organizations often develop policies and programs aimed at promoting food security to ensure that everyone has access to enough food to lead a healthy and active life. These initiatives may include measures to support agricultural development, improve infrastructure for food distribution, enhance social safety nets, promote sustainable farming practices, and address issues such as poverty, inequality, and climate change, which can affect food security (UNDP,2020).

The importance of National Food Security

National food security is of utmost importance for several reasons: Access to a sufficient quantity and quality of food is essential for maintaining good health and well-being. Adequate nutrition is crucial for physical and cognitive development, immune function, and overall productivity. Ensuring that all citizens have access to food helps prevent social unrest and instability. Food shortages or high prices can lead to protests, riots, or conflicts, threatening the stability of a nation. A secure food supply contributes to economic growth by supporting a healthy and productive workforce. It also provides opportunities for employment and entrepreneurship within the agricultural sector and related industries. Governments that fail to address food security issues may face criticism and lose public trust ((WFP,2021). Maintaining food security is therefore important for political stability and legitimacy. Food security measures help countries mitigate the impact of shocks such as natural disasters, economic crises, or conflicts. A well-functioning food system can absorb shocks more

effectively and recover more quickly. Sustainable food production practices are essential for preserving natural resources, mitigating climate change, and maintaining biodiversity. Promoting food security often involves promoting sustainable agriculture practices. Ensuring food security at the national level contributes to global stability by reducing the likelihood of food-related conflicts, migration, and humanitarian crises. It also supports international trade and cooperation in addressing food security challenges globally (Devereux,2013). Overall, national food security is vital for the health, stability, and prosperity of nations and their populations. Governments, international organizations, and other stakeholders must work together to develop and implement effective policies and programs to achieve and maintain food security for all.

2.2 Challenges to National Food Security

National food security faces several challenges, both inherent and emerging, which can vary depending on the country and its specific circumstances. Some of the common challenges include: Climate change as shifts in weather patterns, extreme weather events, and long-term climate change can impact agricultural productivity, affecting crop yields and livestock production. Water scarcity is important in that agriculture is highly dependent on water, and water scarcity, whether due to natural factors or human activities like overuse and pollution, can severely impact food production (Awortwi,2018). Land degradation is also a challenge since soil erosion, depletion of nutrients, and urbanization can reduce arable land, limiting the capacity for agriculture. Another challenge is rising population as increasing global population puts pressure on food resources, requiring higher food production to meet demand. Loss of Biodiversity is another challenge as decline in biodiversity can affect ecosystems that support agriculture, leading to decreased resilience against pests, diseases, and environmental stressors. Market Instability is another emerging challenge as fluctuations in food prices, trade policies, and global market dynamics can affect food availability and affordability. Poverty and Inequality comes in as well. Economic factors such as poverty, income inequality, and lack of access to resources can hinder people's ability to access an adequate and nutritious diet (Burchi et al,2018).

Conflict and instability around the globe due to political conflicts, civil unrest, and wars can disrupt food production, distribution networks, and access to food, leading to food shortages and insecurity. Food Waste and Loss is another factor and this occurs when significant amounts of food are lost or wasted at various stages of the supply chain, from production to consumption, reducing overall food availability. There are technology and infrastructure gaps due to inadequate infrastructure, outdated farming practices, and limited access to modern technologies and this can hinder agricultural productivity and efficiency (Devereux,2012). Dietary shifts, that is changes in dietary patterns towards more resource-intensive foods like meat and dairy can strain agricultural resources and contribute to environmental degradation while pandemics and health crises as events like the COVID-19 pandemic can disrupt food supply chains, labor availability, and access to markets, leading to food insecurity. However, addressing these challenges requires a multifaceted approach that involves sustainable agricultural practices, investment in infrastructure and technology, policies promoting equitable access to resources, efforts to mitigate climate change, and strategies to address poverty and inequality. Collaboration between governments, international organizations, civil society, and the private sector is crucial for building resilience and ensuring food security for all(UNICEF,2021).

Table1: Summary of the challenges to National Food Security:

Table 1 below provides a concise overview of the various challenges faced by national food security efforts.

Challenge	Description
Climate Change	Shifts in weather patterns, extreme weather events, and long-term climate change impacting agricultural productivity.
Water Scarcity	Shortages of water due to natural factors or human activities affecting agricultural irrigation and livestock production.
Land Degradation	Soil erosion, nutrient depletion, and urbanization reducing arable land and compromising agricultural productivity.
Rising Population	Increasing global population putting pressure on food resources, requiring higher food production to meet demand.

Challenge	Description
Loss of Biodiversity	Decline in biodiversity affecting ecosystems supporting agriculture, leading to decreased resilience against pests, diseases, and environmental stressors.
Market Instability	Fluctuations in food prices, trade policies, and global market dynamics impacting food availability and affordability.
Poverty and Inequality	Economic factors such as poverty, income inequality, and lack of access to resources hindering people's ability to access an adequate and nutritious diet.
Conflict and Instability	Political conflicts, civil unrest, and wars disrupting food production, distribution networks, and access to food, leading to shortages and insecurity.
Food Waste and Loss	Significant amounts of food lost or wasted at various supply chain stages, reducing overall food availability.
Technology and Infrastructure	Inadequate infrastructure, outdated farming practices, and limited access to modern technologies hindering agricultural productivity and efficiency.
Dietary Shifts	Changes in dietary patterns towards more resource-intensive foods straining agricultural resources and contributing to environmental degradation.
Pandemics and Health Crises	Events like pandemics disrupting food supply chains, labor availability, and access to markets, leading to food insecurity.

2.3 Climate change and agricultural resilience

Ensuring national food security is a multifaceted issue that involves various challenges and requires comprehensive solutions. Climate change refers to significant and lasting changes in the statistical distribution of weather patterns over extended periods of time, typically decades or longer. These changes can involve shifts in temperature, precipitation patterns, and other climatic variables, often resulting from human activities such as the burning of fossil fuels, deforestation, and industrial processes. The primary driver of current climate change is the increase in greenhouse gas concentrations in the atmosphere, primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), which trap heat and contribute to global warming (FAO,2020).

Agricultural resilience in the context of climate change refers to the ability of agricultural systems to withstand and adapt to the impacts of changing climatic conditions while maintaining productivity, profitability, and ecosystem health. Climate change poses significant challenges to agriculture, including altered growing seasons, more frequent extreme weather events (such as droughts, floods, and heatwaves), shifts in pest and disease patterns, and changes in water availability (UNDP,2020).

2.4 Agricultural resilience to climate change

To enhance agricultural resilience to climate change, various strategies and practices can be implemented, including crop diversification and livestock as growing a variety of crops and raising multiple types of livestock can help spread risks associated with climate variability and reduce vulnerability to specific weather events or diseases. Improved water management is essential and implementing water-saving techniques such as drip irrigation, rainwater harvesting, and soil moisture conservation can help mitigate the impacts of changing precipitation patterns and water scarcity. Soil conservation and management is a good practice in enhancing agricultural resilience as practices such as conservation tillage, cover cropping, and agroforestry can improve soil health, water retention, and carbon sequestration, making agricultural systems more resilient to extreme weather events and erosion (Ojong,2020). Adoption of climate-resilient crop varieties should be practiced since planting crop varieties that are adapted to local climatic conditions and exhibit traits such as drought tolerance, heat resistance, and pest resistance can help ensure stable yields in the face of climate variability. Integration of agroecological principles also helps as incorporating agroecological approaches that emphasize biodiversity, ecological balance, and the use of natural resources can enhance the resilience of agricultural systems by promoting ecosystem services and reducing reliance on external inputs. There should be capacity building and knowledge sharing by Providing farmers with access to climate information, technical resources, training, and support networks can help them make informed decisions and adopt adaptive practices effectively (World Bank,2018).

Building agricultural resilience to climate change is crucial for ensuring food security, livelihood sustainability, and environmental conservation in the face of ongoing global environmental changes. Building agricultural resilience involves implementing a range of strategies to help farmers adapt to and mitigate the impacts of climate change such as enhancing soil health and fertility in agriculture involves various strategies aimed at improving soil structure, nutrient content, microbial activity, and overall productivity (Holmes and Lwanga-Ntale,2012). Some commonly used techniques include: Crop Rotation, that is planting different crops in a sequential pattern helps prevent soil nutrient depletion and reduces pest and disease buildup. Leguminous crops, in particular, add nitrogen to the soil through biological nitrogen fixation. Growing cover crops during off-seasons or between cash crops helps prevent erosion, improves soil structure, adds organic matter, and suppresses weeds. Also, incorporating organic materials such as compost, manure, crop residues, and green manures enriches the soil with essential nutrients, enhances soil structure, and promotes microbial activity. Minimizing soil disturbance through no-till or reduced tillage practices conserves soil moisture, reduces erosion, preserves soil structure, and maintains soil organic matter (Monchuk,2014).

Mulching or applying mulch such as straw, leaves, or plastic films on the soil surface helps retain moisture, suppress weeds, moderate soil temperature, and prevent erosion is another strategy to building agricultural resilience to climate change. Using balanced fertilization based on soil testing helps maintain optimal nutrient levels in the soil and prevents nutrient imbalances or deficiencies. Applying beneficial microbes such as mycorrhizal fungi, rhizobia, and other soil bacteria can enhance nutrient availability, improve plant health, and foster soil structure and these are known as microbial inoculants. Another strategy is biochar application, that is, incorporating biochar, a form of charcoal produced from organic materials, into the soil and this can improve soil fertility, water retention, and microbial activity while sequestering carbon (Dejene and Cochrane,2020). Agroforestry or integrating trees and shrubs into agricultural systems can improve soil health by enhancing nutrient cycling, reducing erosion, providing shade, and diversifying farm income. Water management: is an important strategy as well as implementing irrigation and drainage systems helps regulate soil moisture levels, prevent waterlogging, and maintain optimal conditions for plant growth. Soil conservation practices also helps, that is, installing contour farming, terracing, and windbreaks helps prevent soil erosion, conserve water, and protect soil health. Soil testing and monitoring should be applied. Regularly testing soil properties such as pH, nutrient levels, and organic matter content helps farmers make informed decisions regarding soil management practices (Beegle, Coudouer and Monsalve,2018). However, combining these strategies based on the specific characteristics of the soil and the cropping system can lead to improved soil health, increased fertility, and sustainable agricultural production.

2.5 Strategies Used in Promoting Integrated Pest Management

Promoting Integrated Pest Management (IPM) in agriculture is crucial for building agricultural resilience while minimizing environmental impact. IPM focuses on using a combination of biological, cultural, physical, and chemical control methods to manage pests effectively. Some strategies commonly used in IPM: Rotating crops disrupts pest life cycles, reduces pest pressure, and helps maintain soil health. It can also break disease cycles and improve nutrient balance in the soil (Cochrane and Tamiru,2016). Introducing natural enemies of pests such as predators, parasites, and pathogens can help control pest populations. This includes releasing beneficial insects or using microbial pesticides. Should use practices such as planting pest-resistant crop varieties, adjusting planting dates, using trap crops, and maintaining proper crop spacing can reduce pest damage as well as employing physical barriers, traps, mulches, and mechanical methods like hand-picking or vacuuming pests can help manage their populations without relying on chemical pesticides. Chemical control to be used as a last resort but when necessary, judicious use of pesticides is recommended (Laboude, Martin and Vos,2021). However, IPM emphasizes the use of selective and least-toxic pesticides, applying them only when pests reach economic threshold levels, and considering their impact on beneficial organisms and the environment.

Monitoring and scouting is important as regular monitoring of pest populations and crop health allows farmers to detect pest outbreaks early and implement timely control measures. This can involve using pheromone traps, sticky traps, visual inspections, and remote sensing technologies. Cultural practices must be avoided as implementing practices like sanitation, proper irrigation, and weed management can create unfavorable conditions for pests and reduce their access to food and shelter. Biotechnology and genetic resistance crops is necessary, that is, developing crop varieties with built-in resistance to pests through genetic engineering or traditional breeding techniques can reduce the need for chemical control measures (Institute for Security Studies,2021). Providing farmers with training, extension services, and access to information about IPM practices fosters understanding and adoption of sustainable pest management strategies. Also, establishing economic

thresholds for pest populations helps farmers make informed decisions about when and how to implement control measures. Decision support systems and modeling tools can aid in this process. Government should encourage community engagement and collaboration as encouraging collaboration among farmers, researchers, extension services, and policymakers facilitates the exchange of knowledge and experiences, leading to improved pest management outcomes (Merttens et al,2017). By integrating these strategies into agricultural practices, farmers can effectively manage pests while reducing reliance on chemical pesticides, conserving natural resources, and promoting agricultural resilience in the face of pest pressures and environmental challenges.

2.6 Other Strategies to Agricultural Resilience to Climate Change

Strengthening market linkages and value chains is cardinal in that, developing resilient market networks, promoting local food systems, and diversifying income sources through value-added products and alternative marketing channels can enhance the economic resilience of agricultural communities. Investing in rural infrastructure and social protection is an important strategy to agricultural resilience to climate change. Enhancing infrastructure such as roads, storage facilities, and market access can improve farmers' ability to cope with climate-related shocks, while social protection mechanisms such as insurance, savings schemes, and safety nets can provide financial stability during difficult times (Lavers and Hickey,2015). Fostering collaboration and partnerships also counts a lot as engaging stakeholders across sectors and scales, including governments, research institutions, NGOs, and private sector actors, can facilitate coordinated efforts to build agricultural resilience and address complex challenges associated with climate change. Nevertheless, by implementing a combination of these strategies tailored to local contexts and specific agricultural systems, farmers and communities can enhance their resilience to climate change, sustain livelihoods, and contribute to food security and environmental sustainability (Debrach,2013).

Climate-Smart Agriculture must be adopted as increasing adoption of climate-smart agricultural practices and technologies aimed at enhancing resilience to climate change and reducing greenhouse gas emissions. In many regions, females face challenges in accessing essential resources such as land, water, and seeds for agriculture. Addressing issues related to land ownership, equitable water distribution, and promoting seed diversity can enhance food security. Advancements in technology, including precision agriculture, biotechnology, and data analytics, can improve productivity and efficiency in food production (De Waal,2017). However, ensuring equitable access to these technologies and addressing potential environmental and social impacts is essential. Also, significant amounts of food are lost or wasted throughout the supply chain, exacerbating food insecurity. Implementing measures to reduce post-harvest losses, improve storage and transportation infrastructure, and educate consumers about food waste can help mitigate this issue. Food security is not just about ensuring an adequate quantity of food but also about promoting nutrition and good health. Addressing malnutrition, particularly in vulnerable populations such as children and pregnant women, requires comprehensive approaches including nutrition education, supplementation, and support for breastfeeding (Ojong and Cochrane,2021).

Effective policies and governance structures are critical for addressing food security challenges. This includes policies related to agricultural subsidies, trade regulations, land tenure, and food safety standards. Strengthening institutions and governance mechanisms can improve coordination and implementation of food security initiatives. In the same vein, rural communities often bear the brunt of food insecurity, facing challenges such as limited access to markets, infrastructure, and social services. Investing in rural development programs, including agricultural extension services, infrastructure development, and job creation initiatives, can help alleviate poverty and improve food security in these areas (Depene and Cochrane,2019). Today, global trade plays a significant role in food security, affecting both food availability and affordability. Discussing the impacts of trade agreements, market liberalization, and global supply chains on food security, as well as strategies to mitigate potential risks and ensure equitable distribution of benefits, is essential. Conflict, natural disasters, and other emergencies can disrupt food production and distribution, leading to food shortages and humanitarian crises. Developing robust emergency response mechanisms, promoting peace-building efforts, and building resilience in vulnerable communities are critical aspects of ensuring food security in crisis situations (FAO,2021).

Community Empowerment and Participation is crucial in food security. Therefore, engaging local communities, particularly women and marginalized groups, in decision-making processes and empowering them to participate in food production and distribution can enhance food security at the grassroots level. Promoting community-based initiatives such as community gardens, cooperatives, and food banks can strengthen resilience and social cohesion. Government must be alert to disease

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outbreaks as plant and animal diseases can devastate crops and livestock, threatening food security and livelihoods, particularly in agricultural-dependent communities (Pingali,2012). Infrastructure and technology gaps especially in rural communities should be addressed since inadequate infrastructure, including transportation, storage, and market facilities, as well as limited access to agricultural inputs and technologies, can hamper agricultural productivity and market access. Government should promote digitalization and data-driven agriculture as the growing use of digital technologies, such as precision agriculture, remote sensing, and blockchain, to optimize farm management practices, improve supply chain efficiency, and enhance traceability and transparency (UNDP,2020)

2.7 Solutions to National Food Security

National food security can be addressed through a variety of solutions, including, agricultural innovation by investing in research and development to improve agricultural practices, develop drought-resistant crops, and enhance productivity. Infrastructure development is another solution, which involves, building and maintaining infrastructure such as roads, storage facilities, and irrigation systems to improve access to markets and reduce food waste as well as diversification of agriculture by encouraging farmers to diversify their crops and adopt sustainable agricultural practices to reduce reliance on a single crop and mitigate risks associated with climate change (Smith and Myers,2018). Support for smallholder farmers by providing smallholder farmers with access to credit, training, and technology to improve productivity and income. Government should come up with social safety nets by implementing social safety net programs such as food assistance programs, school meal programs, and cash transfers to ensure vulnerable populations have access to an adequate and nutritious diet. Trade policies, that is, implementing trade policies that promote food security, such as reducing trade barriers for agricultural products and supporting regional trade agreements (FAO,2021).

Food waste reduction is a good solution. Implementing measures to reduce food loss and waste throughout the supply chain, including improved storage and transportation infrastructure, better packaging, and consumer education campaigns. There should be some investment in Nutrition Education by promoting nutrition education and awareness to encourage healthy eating habits and combat malnutrition. Climate change adaptation is cardinal and can be done by developing strategies to adapt to the impacts of climate change on agriculture, such as promoting climate-smart agriculture practices and investing in resilient infrastructure (FAO,2022). Government policies and regulation are important as solutions to National food security and government, responsible Ministries should be in the forefront in implementing policies and regulations that support sustainable agriculture, protect natural resources, and ensure equitable access to land and resources. International cooperation counts greatly as collaborating with other countries and international organizations to address global food security challenges, share knowledge and resources, and promote sustainable development while Research and Development is critical in National food security and by investing in research and development to develop new technologies and practices that improve agricultural productivity, enhance resilience to climate change, and reduce environmental impact (Smith and Haddad,2015). By implementing a combination of these solutions, countries can work towards achieving national food security and ensuring that all people have access to safe, nutritious, and affordable food.

Table 2: Format outlining solutions to national food security

Table 2: below provides a concise overview of various solutions to address national food security concerns.

Solution	Description
Agricultural Innovation	Investment in research and development to improve agricultural practices, develop drought-resistant crops, and enhance productivity.
Infrastructure Development	Building and maintaining infrastructure such as roads, storage facilities, and irrigation systems to improve access to markets and reduce food waste.
Diversification of Agriculture	Encouraging farmers to diversify their crops and adopt sustainable agricultural practices to reduce reliance on a single crop and mitigate climate risks.
Support for Smallholder Farmers	Providing smallholder farmers with access to credit, training, and technology to improve productivity and income.
Social Safety Nets	Implementing food assistance programs, school meal programs, and cash transfers to ensure vulnerable populations have access to an adequate diet.

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Solution	Description
Trade Policies	Implementing trade policies that promote food security, such as reducing trade barriers for agricultural products and supporting regional trade agreements.
Food Waste Reduction	Implementing measures to reduce food loss and waste throughout the supply chain, including improved storage, transportation, and consumer education.
Investment in Nutrition Education	Promoting nutrition education and awareness to encourage healthy eating habits and combat malnutrition.
Climate Change Adaptation	Developing strategies to adapt to climate change impacts on agriculture, promoting climate-smart agriculture practices and resilient infrastructure.
Government Policies and Regulation	Implementing policies and regulations that support sustainable agriculture, protect natural resources, and ensure equitable access to land and resources.
International Cooperation	Collaborating with other countries and international organizations to address global food security challenges and promote sustainable development.
Research and Development	Investing in research and development to develop new technologies and practices that improve agricultural productivity and reduce environmental impact.

3. METHODOLOGY

3.1 Research design

The research design was descriptive survey with both qualitative and quantitative methods of data collection in order to attain the comprehensive results (Kumar,2011). Qualitative methods was appropriate to this investigation as it produced detailed data from a small group of participants, while exploring feelings, impressions and judgments. On the other hand, quantitative method made the use of questionnaires, surveys and experiment to gather data that is revised and tabulated in numbers, which allows the data to be characterized by use of statistical analysis (Martyn, 2008).

3.2 Research Sites

The study was carried out in five institutions of Government Ministries, Universities, Food Reserve Agency (FRA) and Non-Governmental Organizations (NGO) offices from which respondents were also sampled.

3.3 Population, Sample and Sampling procedure

The population for the study was purposefully drawn from the Lusaka province of Zambia where all the respondents are found. Purposive sampling procedure was used to select the institutions (3) while the simple random sampling procedure was used to select the University lecturers (50); five from each institution, University students (50); five from each institution, Senior Civil Servants (50); five from each Ministry, Senior Officers at FRA (50); five from each Province and NGO executive members (50); four from each organization (Bickel, 2007). The sample size comprised of 250 respondents. Also, the primary data was complimented by the secondary data which was derived from government policy documents, ministerial reports and relevant literature on language use.

In the sampling of province and institutions, the study adopted the stratified cluster random sampling technique. Sampling of the province was done on the basis of concentration of respondents and institutions were then done zone by zone. Universities and other institutions were clustered by zones. Two zones were purposively selected based on the basis of concentration of respondents. The sampling was done at three levels: Sampling zones, universities and other institutions-level 1, Sampling University lecturers and Civil servants-level 2, Sampling Senior Officers at FRA and NGO Executive members-level 3.

3.4 Data Analysis

In this research, data was analyzed qualitatively as in-depth interviews, questionnaires and observation schedules were used as data collection instruments. Thematic approach was used, where data analysis started with the categorization of themes from the structured interviews, questionnaires (Khan ,2011). Charts and graphs were used to analyze data. The data gathered was analyzed according to the themes of the study and per the order of the research objectives. Data generated from the

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interview guide was analyzed manually and also, a combination of software MS Access, SPSS and MS Excel was used to analyze data. Analysis was mainly descriptive, that is, mean, median, mode, range, and standard deviation. Related statistics were applied where possible. Statistical testing took the form of Analysis of Variance (ANOVA), correlation and regression both simple and multiple, (Morales and McKenzie,2019).

3.5 Ethical Issues

The researcher avoided pressuring respondents to take part in the research. Alternatively, permission consents, assents were obtained from respondents involved in the research and the research topic was strategically selected to ensure that there was no harm whatsoever to the research respondents. In this research, the researcher was fully conscious of the need to abide by the ethical rule of respecting the privacy of individuals taking part in the research. In the same way, all the respondents of the research were to remain unidentified to the public as all their valuable views, opinions and perceptions were only known by the researcher for use only in the research and participant's identities will forever remain hidden.

The Researcher got permission from the Vice Chancellors to interview lecturers and students, from Permanent secretaries to interview senior civil servants in the Ministry of Local Government and Rural Development, the Director to interview FRA Officers and Executive officers to interview NGO members. The names of respondents would remain anonymous for the sake of confidentiality, (Babble,2010). However, the identity of respondents was concealed in the article but for identification in the article, the fifty lecturers were allocated numbers 1 to 50, the fifty students were allocated ordinal numbers 1st to 50th, the fifty NGO members were allocated names of fifty Primary schools in Lusaka, the fifty Civil servants were allocated names of fifty secondary schools in Lusaka and the fifty FRA Officers were allocated names fifty famous streets in Lusaka while Zones and institutions used pseudo names.

4. FINDINGS AND DISCUSSIONS

4.1 Main Challenges Hindering National Food Security

According to study findings, food security remains a significant challenge across Africa, and several summarized factors contribute to this issue and the highest being climate change at 30%, followed by water scarcity at 25% then land degradation at 20%, economic instability at 15% and population growth 10% as illustrated in Table 3 below.

Table 3: Main Challenges Hindering National Food Security in Central African Countries

Challenge	Description	Percentage
Climate Change	Extreme weather events, shifting growing seasons, and unpredictable rainfall patterns threaten agricultural productivity and stability of food supply.	30%
Water Scarcity	Depletion of freshwater sources due to overuse, pollution, and inefficient irrigation practices leads to decreased agricultural yields and limits the ability to expand food production.	25%
Land Degradation	Soil erosion, desertification, and deforestation diminish the quality and availability of arable land, reducing agricultural productivity.	20%
Economic Instability	Fluctuations in currency value, inflation, and economic crises impact food accessibility and affordability for vulnerable populations.	15%
Population Growth	Rapid population growth strains existing food production systems and exacerbates food demand, particularly in urban areas.	10%

The study reviewed that climate change and environmental degradation hinders National food security and Southern Africa is particularly vulnerable to the effects of climate change, including droughts, floods, and unpredictable rainfall patterns. These events can lead to crop failures, livestock losses, and overall reduced agricultural productivity. Also, there is limited access to inputs and technology as many smallholder farmers in Southern Africa lack access to quality seeds, fertilizers, pesticides, and modern farming equipment. Additionally, technological advancements such as irrigation systems and weather forecasting tools are often inaccessible or underutilized (CSO,2003). Poor infrastructure is another challenge as inadequate transportation, storage facilities, and market access hinder farmers' ability to bring their products to consumers efficiently. This results in post-harvest losses and reduced income for farmers. Political instability and conflict especially in the Democratic Republic of Congo as regions affected by political instability and conflict experience disruptions in food production, distribution, and access. Displacement of populations, destruction of infrastructure, and disruptions in trade exacerbate food insecurity in these areas and has an effect on neighbouring countries (UNDP,2020).

Further, the study reviewed that rural poverty and limited access to markets as a challenge to national food security as rural poverty is widespread in Southern Africa, and many smallholder farmers lack access to credit, training, and markets. Limited access to markets means that farmers often sell their produce at lower prices, further perpetuating poverty cycles. On pests and diseases, insect pests, plant diseases, and livestock illnesses pose significant threats to agricultural productivity. Lack of resources for pest management and veterinary services can result in substantial crop and livestock losses (WFP,2021). Land degradation and soil fertility decline such as soil erosion, deforestation, and unsustainable farming practices contribute to land degradation and declining soil fertility. Without proper soil conservation measures and sustainable land management practices, agricultural productivity decreases over time while population growth and urbanization is an emerging challenge in food security among Southern African countries and rapid population growth and urbanization put pressure on limited arable land, leading to land fragmentation and conversion of agricultural land for non-agricultural purposes. This trend reduces the overall availability of land for food production (Mc Ewan, 2003). However, addressing these challenges requires multi-sectoral approaches, including investments in agricultural research and development, infrastructure improvement, climate adaptation strategies, policy reforms, and support for smallholder farmers and rural communities. International cooperation and partnerships are also essential to tackle food security issues effectively in Southern Africa.

4.2 Theoretical Frameworks Relevant to Understanding National Food Security

According to study findings, the summary of explored theoretical frameworks relevant to understanding national food security in Central African countries were Food systems approach at 40%, followed by political economy at 30%, capability approach at 20% and agroecology at 10%as illustrated in Figure 4 below:

Table 4: Theoretical Frameworks Relevant to Understanding National Food Security

Serial Number	Theoretical Framework	Description	Percentage in Hierarchical Order
1	Food Systems Approach	Considers the entire food system from production to consumption, including distribution, access, and utilization. Recognizes the interconnectedness of various components and stakeholders within the system.	40%
2	Political Economy	Focuses on the political and economic factors influencing food production, distribution, and access. Examines power dynamics, policies, and market structures shaping food security outcomes.	30%
3	Capability Approach	Emphasizes individuals' capabilities to access and utilize food resources rather than solely focusing on food availability. Considers factors such as education, health, and empowerment in determining food security.	20%
4	Agroecology	Highlights the ecological dimensions of food production and emphasizes sustainable agricultural practices. Focuses on biodiversity, soil health, and resilience in agricultural systems to enhance long-term food security.	10%

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The study reviewed that understanding national food security involves a multidimensional analysis that encompasses various theoretical frameworks from different disciplines such as economics, sociology, political science, and environmental studies. Here are some theoretical frameworks relevant to understanding national food security: Food Systems Approach: This framework examines the entire food system, from production to consumption, including distribution, processing, and waste management. It considers the interactions between different components of the food system and their impacts on food security. Sustainable Development: The sustainable development framework emphasizes the importance of meeting current food needs without compromising the ability of future generations to meet their own needs. It focuses on the environmental, social, and economic dimensions of food security. Political Economy (Swinnen and Squicciarini,2012): Political economy theories analyze how power dynamics, institutions, and policies influence food production, distribution, and access. This framework explores issues such as land tenure, trade policies, subsidies, and market structures that shape food security outcomes. Capability Approach: Developed by Amartya Sen and Martha Nussbaum, the capability approach focuses on individuals' freedom to achieve well-being and fulfill their potential. It emphasizes not only access to food but also the capabilities to produce, access, and utilize food effectively (WFP,2021).

Further the study reviewed other relevant frameworks for understanding National food security include: Agroecology: Agroecological principles emphasize the integration of ecological processes into agricultural production systems. This framework highlights the importance of biodiversity, soil health, and ecosystem resilience in achieving food security while minimizing environmental degradation. Food Justice: Food justice theory examines inequalities in food access and distribution, considering factors such as race, class, gender, and geography. It advocates for fair and equitable food systems that ensure everyone has the opportunity to access nutritious and culturally appropriate food. Resilience Theory: Resilience theory explores the capacity of food systems to withstand and recover from shocks and stresses, such as climate change, economic crises, and natural disasters. It considers factors such as diversity, redundancy, and adaptive capacity in building resilient food systems (Monchuk,2014). Nutrition-Sensitive Approach: This framework integrates nutrition considerations into food security interventions, recognizing that access to an adequate quantity of food is not sufficient for good health. It emphasizes the importance of diverse diets, micronutrient availability, and nutrition education. Complex Systems Theory: Complex systems theory examines food systems as dynamic and interconnected systems with emergent properties. It emphasizes nonlinear interactions, feedback loops, and system dynamics that influence food security outcomes. Globalization and Trade Theory: This framework analyzes how global economic integration affects food security through trade patterns, market volatility, and the concentration of power in agri-food industries. It explores both the opportunities and challenges of globalization for food security at the national level. By integrating insights from these theoretical frameworks, policymakers and researchers can develop more holistic and effective strategies to address food security challenges at the national level (UNICEF,2021)

4.3 Actionable Solutions to Address Food Security at the National Level

According to study results, the proposed actionable solutions to address food security at the national level and these actionable solutions are intended to be comprehensive and address various aspects of food security, from production and distribution to consumption and nutrition. Implementing a combination of these strategies can significantly improve food security at the national level. The highest of these actionable solutions was implementation of sustainable agricultural practices at 15%, investing in irrigation infrastructure at 12%, supporting smallholder farmers at 10%, establishing reserves at 8%, enhancing access to credit for farmers at 7%, improve transportation infrastructure at 7%, promotion of diversification of food sources at 6%, strengthening food safety regulations at 6%, implementation of nutrition education programs at 5% and fostering research innovations in agriculture at 5% as illustrated in Table 5 Below:

Table 5: Actionable Solutions to Address Food Security at the National Level

Serial Number	Actionable Solution	Description	Percentage
1	Implement Sustainable Agriculture Practices	Promote techniques such as crop rotation, agroforestry, and organic farming to enhance soil fertility, reduce reliance on chemical inputs, and improve resilience to climate change impacts.	15%

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Serial Number	Actionable Solution	Description	Percentage
2	Invest in Irrigation Infrastructure	Upgrade and expand irrigation systems to ensure reliable water supply for agriculture, reducing dependency on rain-fed farming and mitigating drought risks.	12%
3	Support Smallholder Farmers	Provide financial assistance, training, and access to modern farming technologies to small-scale farmers, empowering them to increase productivity and contribute significantly to food production.	10%
4	Establish Food Reserves	Create strategic food reserves to stabilize prices, buffer against shortages, and ensure food availability during emergencies or natural disasters.	8%
5	Enhance Access to Credit for Farmers	Facilitate access to affordable credit and insurance schemes tailored to farmers' needs, enabling them to invest in inputs, machinery, and technology upgrades.	7%
6	Improve Transportation Infrastructure	Develop and maintain efficient transportation networks to facilitate the timely and cost-effective movement of food from production centers to markets, reducing post-harvest losses and improving food access.	7%
7	Promote Diversification of Food Sources	Encourage the cultivation of a diverse range of crops and livestock to enhance dietary diversity, nutritional value, and resilience to pests, diseases, and market fluctuations.	6%
8	Strengthen Food Safety Regulations	Enforce stringent food safety standards and regulations to prevent contamination, ensure quality control, and safeguard public health, fostering consumer confidence in the food supply chain.	6%
9	Implement Nutrition Education Programs	Launch campaigns and educational initiatives to raise awareness about balanced diets, nutritional requirements, and healthy eating habits, addressing malnutrition and promoting food security at the grassroots level.	5%
10	Foster Research and Innovation in Agriculture	Invest in research institutions and innovation hubs to develop new technologies, breeds, and practices that enhance productivity, resilience, and sustainability across the agricultural sector.	5%

The study reviewed that addressing food security at the national level requires a multifaceted approach that encompasses policies, programs, and interventions targeting various aspects of the food system. Some actionable solutions brought out were: Investment in Agriculture: Allocate resources towards enhancing agricultural productivity, including investing in modern farming techniques, irrigation infrastructure, and access to quality inputs such as seeds and fertilizers. Promoting Sustainable Farming Practices: Encourage the adoption of sustainable farming practices such as agroforestry, crop rotation, and organic farming to improve soil health, reduce dependency on chemical inputs, and enhance resilience to climate change. Supporting Smallholder Farmers: Provide financial support, technical assistance, and access to markets for smallholder farmers, who often face challenges such as limited resources, lack of infrastructure, and market access barriers (Ojong,2020). Strengthening Food Distribution Systems: Improve transportation and storage infrastructure to reduce post-harvest losses and ensure efficient distribution of food from surplus regions to deficit areas. Enhancing Food Safety Regulations: Implement and enforce stringent food safety regulations to ensure the quality and safety of food products, thereby reducing foodborne illnesses and increasing consumer confidence. Promoting Diversification of Food Sources: Encourage the cultivation and consumption of diverse food crops to improve dietary diversity and resilience to crop failures or price shocks. Expanding Access to Nutritious Foods: Implement programs such as school feeding initiatives, food vouchers, and subsidized food programs to ensure vulnerable populations have access to nutritious foods (IDL Group,2002).

Further, the study reviewed other actionable solutions to address food security at the National level and these included Investment in Research and Innovation: Support research and innovation in agriculture and food technology to develop

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resilient crop varieties, improve farming techniques, and enhance food processing and preservation methods. Empowering Women in Agriculture: Provide women with access to land, financial resources, and agricultural training to empower them as key contributors to food production and household food security. Addressing Policy Barriers: Identify and address policy barriers that hinder food security, such as trade barriers, subsidies that distort food markets, and land tenure issues (World Bank, 2018). Promoting Climate Resilience: Develop and implement climate-smart agriculture practices that help farmers adapt to climate change impacts, such as drought-resistant crops and water management strategies. Fostering Collaboration and Partnerships: Encourage collaboration among government agencies, NGOs, private sector entities, and international organizations to coordinate efforts, share best practices, and mobilize resources effectively. Educating and Raising Awareness: Launch public awareness campaigns to educate consumers about nutrition, food safety, and the importance of supporting local food systems. Last but not the least, Monitoring and Evaluating Progress: Establish monitoring and evaluation mechanisms to track progress towards food security goals, identify gaps, and adjust strategies as needed to ensure continuous improvement (FAO, 2020). However, by implementing these actionable solutions in a coordinated manner, nations can make significant strides towards achieving food security for all their citizens.

5. CONCLUSION

In conclusion, addressing national food security requires a multifaceted approach that addresses underlying structural issues while also implementing targeted interventions. By prioritizing investments in agriculture, strengthening social safety nets, and promoting inclusive policies, Southern African nations can move closer to achieving food security for all citizens. Nevertheless, this requires a comprehensive approach that takes into account various factors such as agricultural productivity, infrastructure development, technology adoption, policy formulation, and social interventions.

Strategies can be put in place as well as implemented: Governments and international organizations should prioritize investment in agriculture, including modernizing farming techniques, improving irrigation systems, and providing access to high-quality seeds, fertilizers, and equipment. Building infrastructure such as roads, storage facilities, and marketplaces can help farmers bring their products to market more efficiently, reducing post-harvest losses and improving food distribution. Encouraging the adoption of modern agricultural technologies such as precision farming, drip irrigation, and mechanization can significantly increase productivity and resilience to climate change. Investing in agricultural research and development can lead to the development of high-yielding and climate-resilient crop varieties tailored to African conditions, as well as innovative farming practices. Providing training and extension services to farmers on best practices in agriculture, soil management, pest control, and climate adaptation can improve productivity and sustainability. Ensuring farmers have access to fair and transparent markets can incentivize increased production and provide them with better livelihoods. This includes reducing trade barriers, improving market information systems, and promoting farmer cooperatives and collective bargaining. Implementing social safety net programs such as cash transfers, food vouchers, and school feeding programs can help vulnerable populations access food during times of crisis or hardship. Governments should develop and implement policies that support smallholder farmers, including land tenure reform, access to credit, and subsidies for inputs. Promoting the diversification of agricultural production beyond staple crops can improve nutrition and food security, as well as provide additional income streams for farmers. Given the increasing impacts of climate change on agriculture, strategies for climate change adaptation such as drought-resistant crops, water harvesting techniques, and early warning systems for extreme weather events are crucial for ensuring food security. Collaboration between governments, NGOs, research institutions, and the private sector is essential for pooling resources, sharing knowledge, and coordinating efforts to address food security challenges effectively. By implementing these strategies in a coordinated and sustained manner, Central African countries can make significant progress towards achieving national food security and improving the livelihoods of millions of people.

6. RECOMMENDATIONS

Addressing national food security in Southern Africa requires a multifaceted approach that takes into account the unique challenges faced by each country and region. Here are some specific recommendations:

1. Invest in Smallholder Farmers: Smallholder farmers produce a significant portion of Africa's food. Investing in their productivity through access to improved seeds, fertilizers, and extension services can boost yields and incomes. This includes supporting agricultural cooperatives and farmer organizations to strengthen their bargaining power and access to markets.

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2. **Improve Infrastructure:** Enhance transportation networks, storage facilities, and market access to reduce post-harvest losses and connect farmers to markets. Better infrastructure can also facilitate the distribution of inputs and technologies to rural areas.
3. **Promote Sustainable Agriculture:** Encourage sustainable agricultural practices that conserve natural resources, such as agroforestry, conservation agriculture, and integrated pest management. This can improve soil health, water management, and resilience to climate change while maintaining productivity.
4. **Enhance Access to Finance:** Expand access to credit, insurance, and other financial services for smallholder farmers and agribusinesses. This can enable investments in productive assets, technology adoption, and risk management, particularly for women and youth in agriculture.
5. **Support Research and Innovation:** Invest in agricultural research and development to develop high-yielding crop varieties adapted to local conditions, improve livestock breeds, and develop innovative solutions for pest and disease management. Foster partnerships between research institutions, universities, and the private sector to accelerate technology transfer and adoption.
6. **Strengthen Policy and Governance:** Develop and implement policies that prioritize food security, including supportive regulatory frameworks, trade policies, and investments in rural development. Improve governance, transparency, and accountability in the agriculture sector to ensure equitable access to resources and opportunities.
7. **Enhance Nutrition and Food Safety:** Address malnutrition and food safety concerns through nutrition-sensitive agriculture, fortification programs, and improved food safety standards and enforcement. Promote dietary diversity and education on nutrition to improve public health outcomes.
8. **Harness Digital Technologies:** Leverage digital innovations such as mobile phones, satellite imagery, and blockchain technology to provide farmers with access to information, weather forecasts, market prices, and financial services. This can empower farmers to make informed decisions and improve efficiency along the agricultural value chain.
9. **Build Resilience to Climate Change:** Implement climate-smart agriculture practices and invest in adaptation measures such as drought-resistant crops, water harvesting techniques, and early warning systems. Strengthen disaster preparedness and social safety nets to mitigate the impacts of climate-related shocks on food security.
10. **Foster Regional Cooperation:** Promote regional trade agreements, infrastructure development, and knowledge sharing to enhance food security at the regional level. Facilitate cross-border collaboration on issues such as pest and disease management, market integration, and agricultural research.

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Authors' Short Biography

	<p>Lufeyo Chitondo specializes in Language Education and Research and is currently lecturing Language Education at Twin Palm Leadership University in the Languages and Literacy Department.</p>
	<p>Chanda Chansa Thelma specializes in Social Sciences, Political Science and Education. She has lectured and still lecturing at the University level under the school of Humanities and Education.</p>
	<p>Edwin Vinandi Phiri, specializes in Natural Sciences, Adult Education, and Education Management and Administration. He has taught at Secondary Schools for the past 17 years of which 14 years have been spent in Administration.</p>