Food Relief by Winter Maize Production in Chisamba District of Zambia

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Abstract

The study examines the potential of winter maize production as a food relief strategy in Chisamba District, Zambia. A total of 100 participants were selected using a multistage sampling technique, representing a subset of 750 households in the district. Data was collected through structured surveys on production yields, food security, and economic benefits, alongside qualitative interviews and focus groups to explore farmers' perceptions. Regression analysis was used to assess the relationship between maize production and food security, with a statistically significant p-value of 0.02, indicating that maize production positively impacts food security. The study also utilized thematic and content analysis to interpret qualitative data, providing insights into the feasibility of winter maize as a food relief strategy. The findings suggest that winter maize adoption contributes to food security, with potential for long-term economic benefits. However, challenges related to climate variability, access to farming inputs, and technical training remain. It is recommended that further research be conducted to identify the best agricultural practices, suitable seed varieties, and effective irrigation methods, as well as government support for farming implements and financial assistance to enhance productivity and commercialize winter maize production.

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Introduction:

Droughts affect approximately 55 million people worldwide every year and cause global economic losses of about $7 billion/year. Severe and long-term droughts are becoming more common, further threatening lives and livelihoods worldwide. In the past decade, prolonged dryness has exposed farmers, communities and wildlife throughout Southern African countries to severe drought. Zambians suffered from water shortages and related socio-economic issues due to the abnormally severe drought of 2023–2024. Zambia has been going through environmental challenges that are beyond human control. There is a need to examine measures that could assist in adapting to natural hazards such as earthquakes, flooding, drought and epidemic diseases that have a negative effect on all nations. There is a need to have an in-depth look at the socio-economic impact of these disasters on both farmers and communities for policymakers to come up with relevant coping mechanisms. Drought happens frequently in Southern Africa and Zambia is among the countries that are frequently affected by drought. The impact of drought has brought serious damage to society, the economy and the environment. Further, because of the natural variability of climate, water supply is ample in some years but unable to meet human and environmental needs in other years. Socioeconomic drought occurs when the demand for economic goods exceeds supply because of a weather-related shortfall in water supply (Bruwer, 2014).

Objectives:

To examine the impact of winter maize production on food security in Chisamba District, Zambia, and identify strategies to optimize its production for long-term food relief and economic growth.

Research Questions:

i. What factors can enhance its productivity to improve food security and economic outcomes for local farmers?
ii. How does winter maize production influence food security in Chisamba District, Zambia?

Literature Review:

The most immediate consequence of drought is a fall in crop production due to inadequate and poorly distributed rainfall, which may also lead to a decline in fodder supplies from crop residues. This further reduces the capacity of the farming sector, leading to lower crop output in the subsequent farming season. In terms of environmental problems, drought can result in insect infestations and plant diseases, increased erosion, habitat and landscape degradation, a decrease in air quality and that of what water is present, as well as an increased risk of fire because of drier vegetation. Socioeconomic droughts are one of the easiest to prevent through charitable donations, as these droughts hinge on organizing water systems and on the financial capability to construct more efficient water delivery systems.

List of Economic and Social Impacts due to Drought: Major economic and social impacts due to drought in Zambia (Environmental Health News, n. d.; Mainza, n.d.; The Guardian, 2024a & b;

Reuters, 2025; UNICEF Zambia, 2025; ACAPS, 2024) were observed as follows:

i. Farmers lose money when the drought destroys their crops.
ii. Ranchers may have to spend more money on feed and water for their animals.
iii. Losses or destruction of fish and wildlife habitat.
iv. Lack of food and drinking water for wild animals.
v. Lower water levels in reservoirs, lakes and ponds.
vi. Loss of wetlands.
vii. Increase in diseases in wild animals, because of reduced food and water supplies.
viii. Drought can stunt the growth of crops, resulting in a decline in the size and quality of produce.
ix. Higher prices for local food as farmers cope with lower yields and higher expenses
x. Loss of human life.
xi. People may have to move from farms into cities or from one city to another.

Winter Maize Production as the Food Relief to the People in Chisamba District: Winter maize production involves growing maize during the winter season, which is typically the off-season for maize in many areas. This practice requires specific conditions, such as sufficient irrigation, as maize generally requires warmth and sunlight to thrive. Winter maize is especially common in countries with mild winters or in regions where irrigation can supplement low rainfall. The process can help farmers maximize land use, diversify cropping patterns and potentially boost overall production by taking advantage of the winter season which would otherwise be fallow (Lal, 2004) During the drought which hit the country in the 2023 to 2024 farming season, many farmers in Chisamba district would like to engage in winter maize production as the sure source of food security at household, district, province and nation level.

Winter maize production in the area will provide the following benefits to farmers and citizens:

i. **Increased Crop Yield and Income:** By utilizing the off-season, farmers would achieve an additional crop cycle, leading to increased yields and potential income. This allows farmers to make better use of their land and resources throughout the year.
ii. **Efficient Land Use:** Winter maize production enables farmers to use land that would otherwise lay fallow off-season, making agricultural land more productive and sustainable over time.
iii. **Employment Opportunities:** The production of winter maize can create additional labour opportunities in rural areas, supporting livelihoods and economic stability.
iv. **Food Security:** Producing an extra maize crop in the winter can help improve food availability, especially in regions where maize is a staple food, contributing to better food security at the local and national levels.
v. **Market Advantage:** winter maize is predominantly harvested earlier than traditional maize, allowing farmers to access the market when demand is high, often resulting in better prices.
vi. **Improved Soil Health:** Planting a winter crop can prevent soil erosion and nutrient leaching during the offseason. Additionally, crop residues from winter maize can enhance soil organic matter, supporting soil health for future crops.
vii. **Reduced Pest and Disease Pressure:** Winter maize is often less susceptible to

certain pests and diseases that are more active in warmer seasons, potentially reducing the need for pesticides and lowering costs.

The government of the Republic of Zambia has assigned priority to agriculture as one of the sectors in which to diversify the economy and offset its overdependence on copper, which accounts for 77 per cent of national exports. Winter maize production offers several benefits to the government, particularly in agricultural economies, as it supports national food security, rural development and economic stability. Here are some key benefits:

i. **Enhanced Food Security:** By promoting winter maize production, the government can help increase the nation's food supply and reduce dependency on imports, contributing to greater food security.
ii. **Economic Growth:** The increased maize production could lead to higher agricultural output, boosting the agriculture sector's contribution to the national GDP. The surplus from winter maize can also open export opportunities, generating foreign exchange earnings.
iii. **Employment Generation:** Winter cropping creates additional seasonal employment opportunities in rural areas, supporting livelihoods, reducing poverty and helping prevent rural-to-urban migration by providing rural communities with income-generating activities.
iv. **Stabilized Commodity Prices:** The increasing winter maize supply during the off-season, and winter maize production can help moderate price fluctuations in the market, benefiting consumers and helping governments maintain stable commodity prices for their citizens.
v. **Support for Rural Infrastructure Development:** With higher demand for irrigation, transportation and storage facilities during winter cropping, the government may invest in improving rural infrastructure, which has long-term benefits for rural communities and overall agricultural productivity.
vi. **Environmental Benefits:** By encouraging winter crops in the country, the government can promote practices that prevent soil erosion and maintain soil health during the offseason, aligning with goals for sustainable agricultural practices and environmental conservation.

Several studies have explored the potential of winter maize production as a strategy to address this. Winter maize production has emerged as a promising strategy to address food insecurity in regions affected by drought and climate change. Several studies have highlighted its potential to enhance food security, support smallholder livelihoods, and provide a sustainable alternative to conventional crop production, particularly in areas that experience erratic rainfall and prolonged drought conditions. Hampf et al. (2020) explored the future yields of double-cropping systems in the Southern Amazon, Brazil, under the influence of climate change and technological development. Their study assessed how these factors could impact agricultural productivity, specifically focusing on the viability and sustainability of double-cropping systems in this ecologically sensitive region. By evaluating the potential effects of climate change, the research provided insights into how agricultural practices in the Southern Amazon could adapt to environmental changes and technological advancements to ensure continued productivity and food security.

In parallel, several studies have examined strategies such as winter maize production as a climate adaptation measure, particularly in areas vulnerable to drought and climate variability. Winter maize has been identified as a promising approach to addressing food insecurity in regions affected by irregular rainfall and prolonged droughts. Cairns et al. (2013) highlighted the potential of winter maize in Sub-Saharan Africa, where it could serve as a reliable food source during off-seasons when conventional crops are adversely affected by seasonal droughts. Their research emphasized that when coupled with effective water management practices and improved seed varieties, winter maize could play a pivotal role in enhancing food security and buffering against the unpredictable impacts of climate change. Similarly, Miyanze (2007) underscored the importance of integrating winter maize into broader climate resilience strategies to mitigate the negative effects of seasonal droughts.

Additionally, studies in diverse environmental contexts have illustrated the role of innovative agricultural and environmental practices in resilience strategies. For example, Irit et al. (2019) studied the bacterial communities associated with petroglyph sites in the Negev Desert, Israel, revealing how microbial communities can adapt to arid conditions. Their research in arid environments provides insights that could inform agricultural resilience strategies in drought-prone regions by highlighting the potential for adaptive, ecosystem-based approaches to support sustainability. Liu et al. (2018) further emphasize the importance of understanding market dynamics in agricultural systems. Their study explored how retail market power and state regulations affect the price transmission between farm and retail markets for both private-label and branded products. This research highlights the role of market factors in shaping the economic viability of farming systems, which is essential for understanding the broader context of agricultural resilience and sustainability. Both Hampf et al. (2020) and other studies on winter maize production underscore the significance of adaptive agricultural practices in response to climate change. In the Southern Amazon, integrating double-cropping systems, such as winter maize, could be an effective strategy to maintain agricultural productivity and sustainability amidst environmental and climatic challenges. These studies collectively highlight the need for innovative approaches that incorporate climate resilience, technological advancements, market dynamics, and sustainable farming practices to ensure long-term food security and agricultural viability in the face of climate change.

Furthermore, to these findings, other studies have reinforced the viability of winter maize as a strategic response to the challenges posed by climate change. Research on maize production in Zambia highlights that shifting rainfall patterns have significantly reduced maize yields, with current production levels falling to approximately 40% of the long-term average (Kwesiga et al., 2005). This reduction in yield underscores the urgent need for alternative farming practices like winter maize cultivation, which can ensure a steady food supply during the off-season, reducing vulnerability to climate-related shocks. The integration of winter maize into farming systems can thus provide a safety net, especially in areas that rely heavily on rain-fed agriculture. Furthermore, studies have shown that the use of conservation farming techniques, such as biochar application, can improve soil fertility and maize yields. A study on farmer-led biochar trials indicated that biochar significantly enhanced soil health, which, in turn, boosted maize productivity (Zeng et al., 2015). This is particularly important for winter maize, as the colder months typically pose challenges to soil temperature and moisture retention. By improving soil conditions, biochar application can enhance the resilience of winter maize production to adverse climatic conditions.

In addition to agronomic strategies, financial management practices also play a critical role in ensuring the sustainability of winter maize production. Research conducted by Russell (2023) examined how improved budgeting and financial planning among maize farmers could help them extend the availability of food and agricultural inputs, particularly during the "hungry season" when food scarcity is most severe. Such financial strategies, when combined with winter maize cultivation, can provide farmers with the tools to better manage resources and sustain agricultural productivity year-round.

These studies collectively emphasize the multifaceted benefits of winter maize production as part of broader climate resilience strategies. By combining improved agronomic practices, financial management, and climate adaptation strategies, winter maize has the potential to enhance food security and provide a sustainable farming alternative in drought-prone regions, such as Chisamba District.

In Zambia, focused on enhancing winter maize production among smallholder farmers. They found that while winter maize could significantly improve food security, farmers faced challenges such as limited access to seed, irrigation infrastructure, and technical support. The study underscored the need for policy interventions, including government support for inputs and farmer training programs, to facilitate the broader adoption of winter maize farming (Hamazakaza et al., 2022). The authors concluded that targeted interventions could significantly boost the resilience of smallholder farmers to climate-related shocks. Different scholars explored the economic viability of winter maize production in Malawi, highlighting its potential to increase farm income for smallholders. The study found that winter maize could provide an economic cushion, especially during years of poor rainfall, thus enhancing household food security and diversifying sources of income (Chipanshi et al., 2003). However, it also pointed out that financial support and training in agricultural practices were critical for maximizing the economic benefits of winter maize farming, particularly for vulnerable populations. In Zimbabwe, Gumbo et al. (2021) investigated the impact of winter maize on the livelihoods of rural communities. Their study revealed that winter maize farming had contributed to improved food availability and income diversification, helping communities cope with the adverse effects of drought. The research highlighted the importance of access to irrigation and quality seeds, recommending further investments in these areas to ensure the scalability and sustainability of winter maize production.

Finally, Martinsen et al. (2013) conducted a comprehensive review of winter maize production across Sub-Saharan Africa, evaluating its benefits and challenges. The review found that winter maize holds significant potential to improve food security, particularly in regions prone to drought, by providing an off-season crop. However, challenges such as high input costs, limited irrigation, and the need for better farmer education on climate-resilient farming practices were identified. The authors called for increased investment in irrigation infrastructure and capacity-building to unlock the full potential of winter maize farming in the region. Collectively, these studies underscore the promising role of winter maize in addressing food insecurity and supporting the livelihoods of smallholder farmers in drought-prone regions. However, they also highlight the necessity of government intervention, improved access to resources, and farmer training to optimize the benefits of winter maize production. By addressing these challenges, winter maize farming could be scaled up to enhance food security and foster resilience to climate change across Southern Africa and beyond (Martinsen et al. 2013).

Methodology:

This study utilized a mixed-methods research design to comprehensively assess the socio-

economic impacts of drought on subsistence farmers in Chisamba District, Zambia, and to examine the potential of winter maize production as a food relief strategy. The integration of both qualitative and quantitative methodologies facilitated a robust analysis of the challenges faced by farmers and the opportunities for enhancing food security through winter maize cultivation.

Data was collected using a combination of structured surveys and qualitative interviews. The structured surveys focused on key variables, including production yields, food security, and the economic benefits associated with winter maize cultivation. In parallel, semi-structured interviews and focus group discussions were conducted to capture farmers' perceptions and experiences with winter maize production. A total of 100 participants were selected through a multistage sampling technique, representing a subset of 750 households in the district.

Regression analysis was employed to assess the relationship between maize production and food security. The analysis revealed a statistically significant p-value of 0.02, indicating that maize production has a positive and meaningful impact on food security in the region. Additionally, thematic and content analyses were utilized to analyze qualitative data, which provided valuable insights into the feasibility of winter maize as a sustainable food relief strategy. Descriptive statistics were employed to summarize the demographic characteristics of the sample, while content analysis was applied to interpret open-ended survey responses, further enriching the study's findings.

Result and Discussion:

The results suggest that winter maize adoption has the potential to significantly contribute to food security in Chisamba District, with promising long-term economic benefits. However, the study also identifies several challenges that must be addressed, including climate variability, limited access to agricultural inputs, and the need for enhanced technical training among farmers. These barriers must be overcome to optimize the potential of winter maize as a viable food security strategy in the region.

This part of the article presents the actual findings from the fieldwork, analysis and discussion of data presented in both qualitative and quantitative status. The results were based on the study which was conducted in Chisamba District.

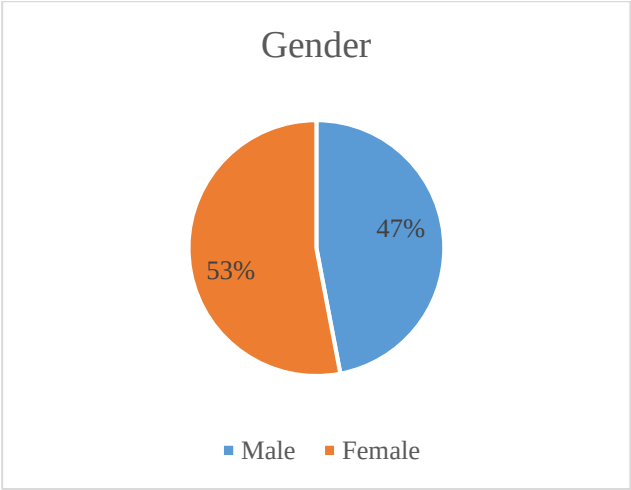

Figure 1: Pie Chart Representation of the Respondents by Gender

Winter Maize Production: The graph above shows that 60% of respondents supported the growth of winter maize as the best way of eradicating hunger in their homes due to the drought which the country experienced in 2024. The respondents further said that winter maize could create additional labour opportunities in rural areas, supporting livelihoods and economic stability because the farmers could be selling their produce, thereby having money for their use.

Table 1: Respondents on Winter Maize Production

Category	Number	Valid Percentage
Winter maize	60	60
Rain-fed	35	35
Other crops	5	5
Grand Total	**100**	**100**

Rain Fed Production: 35% of the respondents supported the rain-fed production of maize because they felt that winter maize production was expensive to the input and implement costs. They pointed out that the rain-fed production was the best, it only required seed maize and bags of fertilizer.

Other Crops: 5% of the respondents backed the cultivation of the crops rather than maize. The third category pointed out that farmers should plant other crops which were drought resistant unlike depending on one crop for consumption. In conclusion, the research highlighted that 60% of the farmers were in favour of winter maize production, 35% of the farmers supported rain-fed agriculture and 5% were ready to grow different crops which were drought-resistant, unlike maize.

Practical Implications:

From the survey conducted, 98% of the farmers in the area were all affected by drought which was recorded in Eastern, Southern, Lusaka, Western and Central Provinces for the farming season 2023 to 2024 agricultural seasons as aforementioned. The drought situation has far-reaching effects such as reduced yields for agricultural food production due to lack of rainfall. This has consequently devastated households with hunger, poverty and a decline in livelihood, thereby posing little or no chances for coping with strategies. The drought highlighted the critical importance of winter maize production in Zambia, particularly in Chisamba District. Even in the face of future adverse rainfall patterns, winter maize cultivation ensures that farmers will have a reliable food source for their families, as well as a surplus for sale, thereby generating income to support household livelihoods.

Limitations of the Research:

This work had some limitations as listed below:

i. The study was restricted to one district only due to financial constraints.
ii. Some of the farmers were not so open to sharing farming experiences.
iii. The study took into consideration the language of the respondents.
iv. Some farmers never wanted to share information because they wanted to be paid.
v. Some farmers had difficulties answering questions because they could not read the English language.

Recommendations:

Based on the study and its findings, it is recommended that further research be conducted to explore how winter maize production can be optimized in Chisamba District to enhance crop yields. Such studies should focus on identifying the best agricultural practices, suitable seed varieties, and effective irrigation methods that could improve winter maize productivity. Additionally, it is crucial to investigate ways in which the government can assist farmers with the provision of farming implements, such as improved machinery and tools, as well as financial support for inputs like seeds and fertilizers. This would not only enable farmers to scale up winter maize production but also pave the way for transitioning it into a more commercial agricultural practice, thus contributing to long-term food security and economic growth in the region.

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