

Adapting to Climate Change: Food Security Policy Strategies in Makassar City, Indonesia

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ABSTRACT

Food is one of the crucial elements in supporting the sustainability of life and is a fundamental component in supporting Sustainable Development in Indonesia. The current Food Condition of Makassar City still faces several obstacles in its implementation. Several factors include the unfulfilled diversity of existing food, insufficient public understanding of food diversification, consumption and diversity, suboptimal fulfilment of family food and nutritional needs, food availability which is still predominantly plant-based, and suboptimal public health. This study aims to analyze how the Food Security Policy Strategy is implemented in addressing Climate Change in Makassar City. The research method employed in this study is a qualitative approach with data collection techniques through in-depth interviews and document reviews. The results of the study were processed through the stages of data reduction, data presentation, and drawing conclusions. The findings of this study indicate that the policy strategies implemented in addressing climate change in Makassar City are: 1) The Tourism Corridor Program (Longwis) utilizing the Urban Farming method, 2) Implementing climate change adaptation policies through Accelerating the flow of climate information in Makassar City, 3) Makassar City Food Diversification Policy with the development of superior commodities that are appropriate for the Makassar City area. The results of this study are expected to serve as a reference for the government, particularly the Makassar City government and other regions in Indonesia, to develop a Food Security Policy Strategy in Facing Climate Change that can occur at any time, ensuring that sufficient food is met, both in terms of quantity and quality, so that people live healthily and productively in a sustainable manner.

Introduction

Food security has become a challenging worldwide matter due to climate change and requires global consideration and action plans from public administrators. Food production systems are threatened as climate patterns change and extreme weather events increase (Nes et al., 2025; Verma et al., 2024). Such a global challenge requires unbiased collective actions beyond borders and new policymaking and resource mobilization approaches. With climate-induced uncertainties around food availability, accessibility, and sustainability, public administrators play a critical role in developing and implementing strategies to respond to these global challenges. This includes cooperation with international bodies, adaptive governance structures, and embedding climate resilience across agriculture policy. The food security crisis colliding with climate change is a complex, cross-cutting issue – failed our existing systems to adapt and deal with the evolving environmental and social issues (Naheed and Ruksana, 2024; Khurshid and Abid, 2024).

The impact of climate change on food security is particularly evident in Indonesia, where population growth continues to increase the demand for food while global food availability declines (Rachmini, 2006). Climate change in Indonesia manifests as rising temperatures, decreased rainfall, and increased extreme rainfall events in certain regions (Arsyad, 2021). These changes have increased erosion potential, reduced coastal wetlands, seawater intrusion, decreased food production, diminished clean water sources, and more frequent hydrological disasters such as droughts and floods (Rochmayanto, 2014). These local challenges mirror the global food security crisis, highlighting the urgent need for adaptive strategies both at international and local levels.

Although national food availability currently exceeds energy and protein adequacy standards, household and individual consumption levels remain suboptimal. Food production has stagnated, with a high risk of decline. The recent El Nino phenomenon and climate change, particularly the prolonged drought in 2023, have further threatened Indonesia's food security (Sumayanti, 2023). This instability can lead to high inflation and necessitate food imports, as evidenced by Indonesia's recurring need to import rice despite having extensive rice farming lands in Sumatra, West Java, South Sulawesi, and West Nusa Tenggara (Kusumastuti et al., 2024). In 2018, Indonesia imported 2,253,600 tons of rice, the highest recorded amount during 2014-2022, despite domestic production reaching 34 million tons against a demand of 30 million tons (Saragih, 2023).

In the local context, Makassar City, a metro coastal city in Indonesia, has experienced climate-related disasters over the past two decades. The El Nino phenomenon has exacerbated drought conditions, threatening rice production and regional food security (Damayanti, 2021; Maulana, 2019). The city's food system faces several challenges, including insufficient food diversity, suboptimal fulfillment of family nutritional needs, limited public understanding of dietary diversity, vegetable-dominated food availability, and volatile prices of essential goods (Piry, 2024; Irfanji, 2022).

Furthermore, food security policies in Makassar City lack comprehensive integration across the agricultural sector, food distribution networks, and supporting infrastructure. This fragmented approach hinders the long-term effectiveness of food security programs in maintaining consistent food availability (Irfanji, 2022). Addressing these challenges requires a more holistic and coordinated strategy to ensure sustainable food security in Makassar City and throughout Indonesia.

Urban farming has emerged as a critical initiative to tackle climate change's impact on urban food security (Pillai, 2025; Riaño-Herrera et al., 2023). However, research on the effectiveness and implementation of community-based urban agriculture in responding to climate change issues remains limited, particularly from the Global South perspective (Irfanji, 2022; Kanosvambhira and Shade, 2024; Khumalo et al., 2024). This study addresses this gap by examining strategies, potentials, and constraints in developing urban farming in Makassar City and analyzing its contribution to local food security. The research emphasizes the importance of community participation in optimizing food security strategies, particularly in climate change.

This study delves deeper into the role of local communities in urban farming practices, food management initiatives, and climate change education. It analyzes how these factors impact food availability in Makassar City. The research also aims to identify and examine the effects of climate change patterns, such as temperature increases, rainfall changes, and extreme weather events, on food production, distribution, and availability in the city.

By providing an empirical picture of climate change's impact on Makassar City's food system, this research seeks to contribute to formulating climate-responsive food security policies. Climate change adaptation and food diversification are potential solutions to address food security challenges in uncertain climate conditions (Šola et al., 2025; Kandel et al., 2024). The ultimate goal is to meet community needs by ensuring sufficient, nutritious, diverse, equitable, safe, and affordable food, enabling residents to lead healthy, active, and productive lives sustainably

This research addresses the central question: What are the most effective food security policy strategies for Makassar City in the face of climate change? By exploring this question, the study aims to provide valuable insights for policymakers and stakeholders in developing robust and adaptive food security measures for the city. This research is essential to answer the "How does the City Government of Makassar's food security policy strategy respond to climate change in Makassar City?"

Literature Review

Food security is a multifaceted concept that extends beyond mere quantity, encompassing quality, safety, variety, and nutritional value in meeting household needs (Farid, 2018; Indah, 2020). The government's commitment plays a crucial role

in shaping the dynamic landscape of food security. National strategies should focus on achieving food sufficiency, independence, and sovereignty and enhancing the competitiveness of domestic food products (Miyasto, 2014).

Policy strategies are comprehensive frameworks comprising strategic plans, actions, agreements, provisions, and decisions formulated by the government. These strategies serve as alternative courses of action to realize desired objectives (Latisuro, 2016). Food security, as a system, consists of interconnected sub-systems: distribution, availability, and consumption. The food sub-system ensures an adequate supply that meets community needs regarding safety, quality, diversity, and quantity (Virginia, 2021).

Climate change, defined as long-term alterations in temperature or weather patterns, has significant implications for food security (Ainurrohmah, 2022). It results from internal and external natural processes and human-induced land use changes that increase atmospheric CO₂ emissions. Scientists have been monitoring the periodic increase in carbon dioxide and other greenhouse gases, gradually accumulating in the Earth's atmosphere (Gernowo et al., 2012). These climatic shifts have far-reaching impacts on human life, particularly in food production and security.

The problem-solving approach utilizes Quinn's (1997) concept, which posits that effective public policy strategies encompass three critical elements: goals, policies, and programs (Nurhikmah, 2021). Goals represent the desired outcomes for an organization or agency, directly informing the strategies employed to achieve them. Policies guide and constrain actions, setting the direction for goal attainment and facilitating strategy implementation. Programs comprise a sequence of actions designed to achieve predetermined objectives, organizing efforts to maximize the effectiveness of implemented strategies.

This study employs these strategic dimensions to analyze food security policy strategies in Makassar City, particularly in response to climate change. The analysis focuses on goals, policies, and programs as key indicators to address the research questions and formulate effective policy strategies (Wahyuningsih, 2019). The study aims to develop comprehensive food security policy strategies for Makassar City by emphasizing adaptation to environmental changes and food diversification.

The findings are expected to assist the Makassar City Food Security Office and related stakeholders formulate robust food security policy strategies. These strategies will enable the Makassar City Government to implement effective measures, considering the challenges of unpredictable climate change. Ultimately, the goal is to organize and optimize all actions taken to ensure the successful implementation of food security policy strategies in Makassar City.

Research Methods

This research, conducted at the Makassar City Food Security Office, employed a descriptive qualitative approach. The study spanned six months to one year in

2024, acknowledging the gradual nature of climate change and the extended timeframe required to effectively analyze food security policies and their societal and environmental impacts.

Thematic analysis was utilized to examine community experiences, perceptions, attitudes, and responses to food security policies and assess the impact of these policies on local food security and climate change adaptation. Data collection methods included observations, interviews, documentation, and focus group discussions (FGDs) with stakeholders involved in Makassar City's food security policy strategy.

The research process comprised several stages: preparation, data collection, data processing and analysis, result compilation, and reporting. Eight informants were selected, including the Head of the Makassar City Food Security Office, Staff from the Food Distribution and Reserve Insecurity Division, Tamalanrea Indah Urban Village Head, two Lorong Councils (D'lor), and three community members.

During the preparation stage, research instruments, including interview guidelines, were developed to facilitate in-depth interviews with informants directly involved in food security strategies addressing climate change in Makassar City. The data collection stage involved interviews, documentation, and document review. Data processing and analysis included data presentation, coding, reduction, and conclusion drawing. Data validation was ensured through triangulation.

The research findings were structured, beginning with an introduction and ending with a literature review, research methodology, results and discussion, conclusions, and policy recommendations for food security policy strategies in Makassar City. The final research report was prepared for publication in relevant scientific journals focusing on public policy, public services, food security, or climate change, aiming to contribute to scientific literature and enhance research credibility in food security policy strategies.

Supporting documents examined included the Strategic Plan (Rencana Strategis), Annual Work Plan (Rencana Kerja Tahunan), the Makassar City Food Security Office's action plan, and government program documents related to food security. An in-depth review of report documents and relevant regulations was conducted, including the Indonesian Republic Law Number 18 of 2012 on Food and Makassar City Mayor Regulation Number 92 of 2016 concerning the position, organizational structure, duties, and functions of the Food Security Office.

Results and Discussion

Food Security Policy Strategies in Facing Climate Change in Makassar City

The Makassar City Government, specifically the Food Security Office, is implementing a comprehensive food security policy strategy to address the challenges of climate change. This initiative aims to strengthen the city's food security by ensuring the fulfillment of basic nutritional needs for its residents. The strategy focuses on providing sufficient, high-quality, diverse, equitable, safe, and

affordable food to promote healthy, active, and productive lifestyles among the population. This approach is particularly crucial in the face of uncertain climate change impacts, which are expected to affect food production, distribution, and consumption patterns.

To analyze the effectiveness of this food security policy strategy, the research employs a problem-solving approach based on James Brian Quinn's concept (Nurhikmah, 2021). This framework posits that an effective public policy strategy comprises Goals, Policies, and Programs. By examining these components, the study aims to evaluate the robustness and adaptability of Makassar City's food security measures in response to the evolving challenges presented by climate change.

Goals

The Makassar City Food Security Service has implemented a comprehensive strategy to address food security challenges in the face of climate change. This approach encompasses several key dimensions: goal-setting, policy implementation, and community engagement.

The primary objective of the Makassar City food security policy strategy is to ensure food availability and accessibility for all residents. This goal is pursued through a multi-faceted approach that includes securing sufficient food supply, promoting food self-sufficiency, and developing an early warning system for climate-related risks. The Head of the Makassar City Food Security Service emphasized the importance of these efforts in light of recent climate change impacts:

"In recent times, Makassar City has faced climate change, which has an impact on the condition of Food Security. We actively go to the field to ensure that the Food Security Condition is sufficient for consumption of basic needs, checking supplies such as rice and several commodities; we conduct inspections of markets to ensure that the availability of basic foodstuffs and their prices are affordable by the people of Makassar City. Policy strategies ensure food availability by securing sufficient supply, promoting food self-sufficiency by encouraging local food production, socializing substitute staple foods to reduce dependence on certain types of staple foods, and building an early warning system for weather changes and potential climate disasters that will occur" (Interview on August 5, 2024)

This statement highlights the proactive measures the Food Security Service took to monitor and maintain food security in Makassar City. Regular field visits and market inspections assess food availability and affordability, demonstrating a hands-on approach to policy implementation.

Local market observations corroborate the effectiveness of these strategies. A vendor at a local market, Mr. A, noted:

"For basic needs such as rice, there is still a lot of stock available, and prices are stable in the market. The Makassar City Government also often visits this local market to conduct inspections on the availability of staples and prices" (Interview on August 6, 2024)

This testimony suggests that the government's efforts to maintain stable food supplies and prices yield positive local results.

Table 1. Food and Nutrition Indicators and Targets (2022-2024)

No.	Food sector indicators (<i>intermediate outcome</i>)	Nasional		Makassar City			
		Baseline	Target 2024	Baseline	Target estimate		
					2022	2023	2024
1.	Expected food pattern Score (PPH)	86,4 b)	95,2	78,8	80	82	85
2.	Energy adequacy rate (AKE) (Kkal/Kapita/hari)	2.121 b)	2,1				
3.	Protein sufficiency rate (AKP) (gram/kapita/hari)	62,9 b)	57	71,5	N/A	N/A	N/A
4.	Prevalence of inadequate food consumption/ <i>prevalence of undernourishment</i> (PoU)	6,7 b)	5	1,56	1,46	1,36	1,26
5.	Prevalence of population with moderate or severe food insecurity/ <i>Food insecurity experience scale</i> (FIES)	5,8 b)	4		N/A	N/A	N/A
6.	Fish consumption (kg/capita/year)	50,7 c)	62	108,78	111,58	111,91	113,73
7.	Meat consumption (kg/capita/year)	13,2 b)	14,6				
8.	Consumption of protein from livestock (kg/capita/year)	10,9 b)	11				
9.	Vegetable and fruit consumption (gram/capita/day)	244,3 b)	316,3		N/A	N/A	N/A
10.	Percentage of fresh food that meets food safety requirements (%)	94 a) *)	85-95				
11.	Access to biofortified and fortified rice for poor and malnourished families (% of BPNT recipients)	48 ton **)	100%	0	N/A	N/A	N/A
12.	Percentage of food that meets food safety requirements (%)	76 (BPOM, 2019)	86				

Source: Makassar City Food Security System Report (Irfanji, 2022)

The Makassar City Food Security Service's approach aligns with broader food security indicators and targets. Table 1 outlines the city's food and nutrition indicators and targets. Notably, the expected food pattern (PPH) score of 85 is approaching the national target of 95.2 for 2024, indicating progress in improving dietary diversity and nutritional quality.

This study reveals two critical strengths of Makassar City's food security strategy. First, the multi-pronged approach addresses immediate concerns (e.g., market inspections) and long-term challenges (e.g., promoting food self-sufficiency). This balanced strategy enhances resilience to climate-related disruptions. Second, focusing on local food production and diversification of staple foods reduces dependence on external sources, potentially mitigating supply chain vulnerabilities.

However, the strategy could benefit from further development in certain areas. While the early warning system for climate-related risks is mentioned, more details on its implementation and integration with food security measures would be valuable. Additionally, the role of technology and data analytics in monitoring and predicting food security challenges could be explored further to enhance the city's preparedness.

In conclusion, the Makassar City Food Security Service has demonstrated a comprehensive and proactive approach to ensuring food security in the face of climate change. The service has created a robust framework for maintaining food availability and affordability by aligning policy objectives with on-the-ground actions and engaging with local communities. As climate-related challenges continue to evolve, ongoing assessment and adaptation of these strategies will be crucial to sustain and improve food security outcomes for the residents of Makassar City.

Policy

The Makassar City Government has implemented a comprehensive food security policy strategy that addresses multiple aspects of food availability, accessibility, and sustainability. This strategy primarily focuses on two key areas: food diversification and climate change adaptation.

Food diversification is a central policy component aimed at reducing the city's dependence on rice as the primary staple food. The Head of the Makassar City Food Security Service emphasized this approach:

"The Makassar City Food Security Policy Strategy [includes] implementing food diversification policies, developing superior commodities that also help the City Government in predicting the availability of basic needs such as rice and socializing the diversification of staple foods so that they do not only depend on rice but can use alternatives to meet the needs of rice substitutes such as corn" (Interview on August 5, 2024).

This policy ensures a more stable food supply by promoting alternative food sources such as corn and sweet potatoes. By encouraging the consumption of varied

local foods, the government aims to create a more resilient food system that can withstand potential shortages or disruptions in rice production.

Complementing the food diversification efforts, the Makassar City Government has also implemented a climate change adaptation strategy. This approach recognizes the significant impact that climate variability can have on food production and security. A key aspect of this strategy involves improving the dissemination of climate information to farmers and the general public. As stated by a staff member of the Food Insecurity, Distribution and Reserves Division:

"Information media utilization is carried out optimally to ensure that the people of Makassar City get information about climate change and weather that occurs in Makassar City. This is related to coordinating various agencies, namely the Environment Agency, the Spatial Planning Agency, and the Makassar City Communication and Information Agency" (Interview on August 10, 2024).

This coordinated effort to provide timely and accurate climate information through various media channels, including radio, local television broadcasts, and official social media platforms, enables farmers to make informed decisions about planting and harvesting schedules. Moreover, it allows the general public to prepare for potential climate-related disruptions to food supply chains.

In addition to information dissemination, the climate change adaptation strategy includes increasing urban green spaces through the "lorong garden" program. This initiative serves multiple purposes, including mitigating the urban heat island effect, improving air quality, and potentially providing small-scale urban agriculture opportunities.

The multi-faceted approach of the Makassar City Food Security Policy Strategy demonstrates a recognition of the complex and interconnected nature of food security challenges. By addressing both immediate concerns (such as overreliance on a single staple crop) and long-term threats (like climate change), the policy aims to create a more resilient and sustainable food system for the city.

However, the effectiveness of these policies will depend on their successful implementation and the ability to overcome potential challenges. For instance, changing dietary habits to include more diverse staple foods may face cultural resistance and require sustained educational efforts. Similarly, the success of climate adaptation strategies will rely on continued inter-agency cooperation and the ability to translate climate information into actionable advice for farmers and citizens.

Future research could focus on evaluating the impact of these policies on food security indicators in Makassar City, as well as assessing public reception and adoption of the promoted food diversification measures. Studying the long-term effects of increased urban green spaces on local food production and climate resilience could provide valuable insights for other cities facing similar challenges.

Program

The Lorong Wisata (Tourism Alley) program, initiated by the Makassar City Government, represents an innovative approach to urban development and

community-based economic recovery. This program aims to transform residential alleys into attractive, productive, and valuable tourist spaces, addressing multiple objectives simultaneously: improving environmental quality, enhancing community economic empowerment, and elevating Makassar City's image by showcasing local potential.

At its core, the Lorong Wisata program applies urban farming methods to optimize limited open spaces in urban areas. This strategy contributes to food security and provides residents with additional income opportunities. The program's multifaceted approach encompasses agro-tourism, cultivating various food crops, urban fisheries on restricted land, and promoting local cultural practices.

One exemplary model of this initiative is the Lorong Wisata Zurich in Tamalanrea Village. This pilot project has demonstrated tangible benefits for the local community by creating new business opportunities in agriculture and fisheries. As evidenced by an interview with the Dewan Lorong (Alley Council or D'Lor) of Lorong Wisata Zurich:

"Lorong Wisata Zurich is one of the pilot models of Lorong Wisata (longwis) that has been visited by the Mayor of Makassar and guests from abroad when promoting tourism hallways. Makassar City Government fully supports this Lorong Wisata program, and we can see it by providing facilities and infrastructure in developing this Lorong Wisata Zurich. Another advantage is the integration of technology in food crop cultivation. Commodities that have been produced, such as pakcoy and passion fruit, are processed and produced into juice. In addition, the cultivation of chili plants and cauliflower. The mayor's visit also took the time to harvest catfish with residents in this Lorong Wisata Zurich. In addition, in Longwis we also cultivate tilapia and crayfish" (Interview on October 17, 2024)

This testimony highlights the program's success in integrating technology into food crop cultivation, diversifying produce, and engaging high-level government support. Culturing various crops and aquaculture products contributes to food self-sufficiency. It creates potential for value-added processing, as seen with juices from Chinese cabbage and passion fruit production.

The program's impact extends beyond mere food production. As the Head of the Makassar City Food Security Service stated:

"One of the things we do is to support food self-sufficiency through tourism programs by empowering the Women Farmers Group (KWVT). On several occasions, we socialize the importance of food self-sufficiency and support the tourist aisle program by providing facilities and infrastructure for planting cultivation. Some successful tourist aisles such as Lorong Wisata Haderslev and Lorong Wisata Zurich have succeeded in selling the results of their plant commodities in several retail outlets, such as vegetables and aquaculture are well managed so that they have a high selling value. We hope that with various collaborations and the full support of the Makassar City Government, Lorong Wisata can continue to grow and can become an example for other cities in Indonesia in terms of food self-sufficiency" (Interview on 05 August 2024)

This statement underscores the program's role in empowering local communities, particularly women, through the Women Farmers Group (KWT). It also highlights the success of some Lorong Wisata in commercializing their produce, indicating the program's potential for economic sustainability.

Critical analysis of the data reveals several key strengths of the Lorong Wisata program. Firstly, it addresses multiple urban challenges simultaneously, including food security, economic empowerment, and environmental improvement. Secondly, the program's success in integrating technology and diversifying produce demonstrates its adaptability and potential for innovation. Thirdly, the involvement of various stakeholders, from local communities to high-level government officials, suggests a strong foundation for sustained support and growth.

However, the program's long-term success will depend on several factors. These include the consistent provision of resources and support from the government, the ability to scale successful models like Lorong Wisata Zurich to other areas, and the development of robust market linkages for the produce. The program's impact on broader urban issues such as land use, water management, and social cohesion should be carefully monitored and evaluated.

In conclusion, the Lorong Wisata program represents a promising approach to community-based economic recovery and urban development in Makassar City. Transforming underutilized spaces into productive, attractive areas contributes to food security and economic empowerment and enhances the city's livability and tourism potential. As the program continues to evolve, it has the potential to serve as a model for other Indonesian cities facing similar urban challenges.

Conclusion

Analyzing food security policy strategies in Makassar City reveals a multifaceted approach to addressing climate change impacts. The strategy dimension encompasses three key indicators: goals, policies, and programs, each contributing to a comprehensive framework for enhancing food security in the face of environmental challenges.

The goals of Makassar City's food security policy align with those of the Food Security Service, emphasizing collaboration with stakeholders to achieve broader objectives. This alignment demonstrates a cohesive approach to policy implementation, ensuring efforts are coordinated and directed towards common aims.

In terms of policy, the city has adopted a two-pronged approach. First, the food diversification policy focuses on developing superior commodities, which aids in predicting the availability of basic needs such as rice. This strategy is complemented by efforts to promote alternative staple foods, reduce dependence on rice, and encourage the use of substitutes like corn. Second, the climate change adaptation policy accelerates the dissemination of climate information through local media channels and official government platforms. This approach is further

reinforced by expanding urban green spaces through the "lorong garden" program, addressing environmental and social needs.

The program dimension is exemplified by the "Lorong wisata" initiative, which employs urban farming methods to support food self-sufficiency. This innovative approach serves multiple purposes: improving the local economy, creating safer and more comfortable public interaction spaces, and enhancing urban tourism potential. The integration of these objectives demonstrates a holistic approach to urban development that simultaneously addresses food security, social cohesion, and economic growth.

The theoretical implications of this research are significant, offering a novel framework for analyzing food security policies that are sustainable, inclusive, and adaptive to climate change. This framework provides valuable insights into the design of public policies responsive to the complex interplay of environmental, social, and economic factors in the context of climate change. This research contributes to the broader discourse on effective governance in the face of global environmental challenges by highlighting the importance of adaptability and inclusivity in policy design.

From a practical standpoint, the study yields important policy strategy recommendations for local governments. These recommendations are a foundation for developing agricultural policies adaptive to climate change, such as food diversification programs and urban farming initiatives. This research offers actionable insights for policymakers seeking to enhance food security and climate resilience in urban environments by providing concrete examples of successful strategies.

However, it is essential to acknowledge the limitations of this study. The available food security and climate data do not cover a sufficiently extended period to comprehensively analyze climate change trends and their long-term impacts. This constraint highlights the need for continued data collection and analysis to inform future policy decisions.

Further research is recommended to address these limitations and build upon the current findings. Future studies should focus on developing policy strategies incorporating greater community participation, ensuring that local knowledge and needs are fully integrated into policy design. Additionally, research into ecosystem-based approaches to climate change adaptation in the food sector is crucial. Such approaches should prioritize preserving environmental resources that underpin food security, fostering a more sustainable and resilient food system.

In conclusion, while the Makassar City case study provides valuable insights into effective food security policy strategies in the face of climate change, it also underscores the need for ongoing research and policy development. By continuing to refine and expand upon these strategies, cities can enhance their resilience to climate change impacts and ensure long-term food security for their populations.

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