CHAPTER 2

Evolution of Food Security Policy in Developing Economies

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Abstract:

This chapter focuses on food security policies in emerging countries, with consideration of the changes in food security policies from production-focused policies to holistic approaches. The policies regarding food security in the initial years after gaining their independence were concerned with improving food production by adopting Green Revolution technology. While such policies succeeded in bringing about self-sufficiency and improved food security, they had some limitations, including regional disparity, natural resource disparities, and environmental degradation. In the transitional period of food security policy development (1980s and 1990s), emphasis shifted to policies that ensured food accessibility. Measures such as food subsidies and poverty alleviation schemes were implemented to ensure that vulnerable groups had access to affordable food items. This period has seen an evolution of food security policies to include nutrition and sustainable approaches. Despite all these developments, there still exist some constraints like poor governance, bureaucratic inefficiency, political economy considerations, and inadequate information, which hamper the effectiveness of policies designed to deal with food insecurity. In conclusion of the chapter, it is made clear that sustainable food security cannot be achieved unless an integrated policy strategy is adopted.

https://doi.org/10.66529/book.9786277945039.2026.ch02
Received: 05-March 2026 Revised: 30-June 2026 Accepted: 30-June-2026

Keywords: Developing Economies; Policy Evolution; Green Revolution; Agricultural Productivity; Food Subsidy Programs; Poverty Alleviation; Nutrition-Sensitive Agriculture; Sustainable Food Systems

1. Introduction

Food is a basic need of a human being, but the problem of sufficient, safe, and nutritious access to food is one of the most acute worldwide issues. This is a major problem especially in the developing economies where high population growth, chronic poverty as well as structural inequalities remain barriers to access to food. Although a significant economic development in most low- and middle-income nations, food insecurity is pervasive with over two billion people in the world, most of whom reside in these areas. These circumstances underscore the structural aspect of food insecurity and its close links with income limitation and resource lack (FAO et al., 2019). Food insecurity is a multidimensional phenomenon that is not limited to food availability. It is not only affected by the socio-economic status of individuals and households, but also by the larger structural issues of economic growth patterns, income inequality, and the capacity of institutions. The relationship between macroeconomic performance and individual well-being is multifaceted, as in most developing economies, economic growth has failed to translate into equitable access to food. This paradox has led to a growing academic interest in the quest to get to know the underlying causes of food insecurity (Holleman & Conti, 2020). There is an emerging literature that highlights the importance of macroeconomic factors in influencing the outcome of food security, but empirical evidence is inconclusive. As an example, other studies indicate that there is no significant correlation between economic growth and declines in child undernutrition, whereas others indicate only minor positive food security outcomes. The cross-country analysis indicates that determinants of food insecurity differ according to the

economic development levels, and education, employment, social capital, and household income are some of the determinants that have a significant role to play. These results imply that economic growth on its own cannot help mitigating food insecurity unless it is accompanied by underlying socio-economic inequalities (Subramanyam et al., 2011; Harttgen et al., 2013; Smith et al., 2017a; Smith et al., 2017b).

Recent studies have been paying more attention to the role of income inequality and national income levels in determining the outcome of food security. There is evidence that although an increase in GDP per capita is usually found to be linked to a decrease in food insecurity, the association is much weaker in high-income inequality countries. In this case, the unequal distribution of income inhibits the capacity of vulnerable populations to enjoy the fruits of economic growth, and in this regard, it limits the enhancement of food access. This highlights the need to incorporate equity issues in food security policy frameworks (Holleman & Conti, 2020). The issue of food security is also highly relevant to the process of economic development and social stability. The availability of appropriate quantities of food results in good health, higher productivity and quality human resource development. On the contrary, the problem of food insecurity results in malnutrition, lack of productivity, poverty and ultimately social unrest. There have been examples where food scarcity and rising food prices have even caused political instability, which demonstrates the significance of food security in promoting economic and social stability (Manap & Ismail, 2019).

The concept of food security has evolved significantly over the years. Food production increase and food self-sufficiency at the national level were the initial objectives in the post-World War II government actions. The focus then expanded from food production to food distribution and availability problems, particularly since the entitlement strategy was introduced, which emphasized the importance of income on food availability. Given rising concerns over climate change and environmental degradation, as well as the vulnerability of the international food supply chain, the concept has evolved further to encompass resilience, sustainability, and nutrition (Akbari et al., 2022). The chapter aims to answer the following research question: How have food security policies developed in developing economies and what policy lessons can be learned for more resilient, inclusive and sustainable food systems? To answer this question, the chapter reviews the historical development of food security policies, discusses key policy shifts, contrasts regional experiences in Asia, Africa and Latin America, and summarizes the implications for future policy design.

2. Theoretical perspectives on food security policy evolution

The evolution of food security policy in developing economies is best understood through several complementary theoretical perspectives. These frameworks illustrate how policy priorities have shifted from a narrow focus on agricultural production to encompassing broader concerns such as food access**,** nutrition, sustainability, governance, and **r**esilience. Grasping these theoretical foundations is crucial for interpreting the historical transformation of food security policies and assessing their effectiveness**s**.

2.1 Modernization theory and the production-centered paradigm

Early food security policies in developing countries were largely shaped by modernization theory, which emphasized economic growth and technological advancement as the main drivers of development. Within this framework, increasing agricultural productivity was seen as the most effective way to reduce hunger and poverty. This perspective strongly influenced the Green Revolution of the 1960s and 1970s, which promoted the adoption of high-yielding crop varieties, irrigation systems**,** chemical fertilizers, and mechanization (Evenson & Gollin, 2003). The Green Revolution significantly boosted food grain production in many developing countries, notably India and Mexico. However, critics argue that while production rose, the benefits were unevenly distributed, often favoring large landowners with better access to resources and credit. Additionally, intensive agricultural practices led to environmental degradation, including soil nutrient depletion and groundwater overexploitation (Patel, 2013; Ladha et al., 2003). These challenges underscored the need to move beyond a purely production-oriented view of food security.

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2.2 Entitlement theory and food access

A major shift in food security thinking emerged with Sen's Entitlement Theory, which challenged the assumption that hunger is solely caused by inadequate food production. Sen (1981) argued that famines and food insecurity often occur despite sufficient food availability because individuals lack the economic, social, or legal means to access food. This perspective shifted policy focus toward poverty reduction, income generation, employment programs, food subsidies, and social protection measures. As a result, many developing countries expanded public distribution systems, cash transfer programs, and targeted food assistance initiatives. The growing recognition of food access as a critical dimension of food security played a significant role in shaping the multidimensional definition adopted by the Food and Agriculture Organization (FAO).

2.3 Rights-based approaches to food security

The rights-based approach to food security gained prominence after the international recognition of the right to adequate food as a fundamental human right. The FAO Voluntary Guidelines (2004) encouraged governments to embed food security within national legal and policy frameworks, emphasizing accountability, participation, non-discrimination, and access to food as a legal entitlement rather than a welfare provision (FAO, 2004). This approach stresses government accountability, legal guarantees, and social justice in food security policies. A notable example is India's National Food Security Act (NFSA) of 2013, which legally guarantees subsidized food access to a large segment of the population. Proponents argue that rights-based policies enhance social protection and reduce vulnerability, though concerns about fiscal sustainability and implementation effectiveness persist (George & McKay, 2019).

2.4 Food sovereignty and political ecology perspectives

The food sovereignty perspective emerged as a critique of globalization and market-oriented agricultural policies. Advocates argue that communities and nations should have the right to define their own food systems, prioritize local production, and protect smallholder farmers from unequal global market forces (Patel, 2009). Similarly, political ecology focuses on the role of power relations, governance structures, and economic inequalities in shaping food security outcomes. From this view, food insecurity is not just a technical or production issue but also results from unequal access to resources, land ownership patterns, trade arrangements, and political decision-making processes (Clapp, 2014). These perspectives are crucial for understanding why similar food security policies often produce different outcomes across regions.

2.5 Resilience theory and sustainable food systems

Recent food security research increasingly incorporates resilience theory and sustainable food systems approaches. Resilience refers to the capacity of food systems to absorb shocks and adapt to disturbances such as climate change, economic crises, pandemics, and geopolitical disruptions (Tendall et al., 2015). The sustainable food systems perspective broadens the food security agenda beyond availability and access to include environmental sustainability, nutrition, resource conservation, and long-term system stability. This approach aligns closely with Sustainable Development Goal 2 (Zero Hunger), which emphasizes not only ending hunger but also promoting sustainable agriculture and resilient food systems (United Nations, 2015).

3. Methodology (Narrative Review Approach Aligned with AI-Driven Food Security)

This study adopts a narrative literature review methodology to synthesize interdisciplinary and evolving research on food security policy and the integration of artificial intelligence (AI) into food systems. Narrative reviews are particularly appropriate for conceptual integration and thematic interpretation rather than statistical aggregation, allowing critical examination of policy evolution, governance structures, and technological transformation (Grant & Booth, 2009). Given the increasing application of AI in agriculture and food security, this approach facilitates the integration of evidence from agriculture, policy studies, sustainability science, and data science into a coherent analytical framework.

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The literature was collected from reputable academic and institutional sources, including Google Scholar, Scopus, Web of Science, PubMed, FAO, WHO, World Bank databases, United Nations SDG reports, and OECD food security reports. Grey literature, such as policy briefs, technical reports, and AI-agriculture white papers, was also included to capture emerging developments in digital food systems and governance. Using multiple sources enabled triangulation of evidence across scientific, policy, and technological domains (FAO, 2021).

A structured keyword search strategy was employed using combinations of terms such as *food security policy evolution*, *AI in agriculture and food systems*, *precision agriculture and machine learning*, *climate change and food security governance*, *digital transformation of agriculture*, *sustainable food systems and artificial intelligence*, and *early warning systems and food insecurity*. Boolean operators (AND, OR) refined the searches and ensured retrieval of relevant interdisciplinary studies. AI-related keywords were intentionally incorporated to reflect the growing role of digital technologies in food security policy and agricultural transformation (Liakos et al., 2018; Klerkx et al., 2019).

The review included peer-reviewed journal articles and reports published by FAO, WHO, the United Nations, and the World Bank that addressed food security policy, governance, sustainability, AI, machine learning, and digital agriculture. Only English-language publications were considered. Studies unrelated to food systems or policy, clinical nutrition research lacking system-level implications, duplicate records, and non-peer-reviewed sources without policy or AI relevance were excluded to maintain analytical rigor and policy relevance.

The review covers literature published between 2000 and 2025, encompassing major transitions from the post-Millennium Development Goals (MDGs) era to the Sustainable Development Goals (SDGs), alongside developments in climate-resilient agriculture and AI-enabled food systems. Foundational works published before 2000, including Sen's entitlement theory, were selectively incorporated because of their enduring theoretical significance (Sen, 1981). This timeframe also captures the rapid digitalization of agriculture and the emergence of AI-based analytics for food systems (Wolfert et al., 2017).

A thematic synthesis approach was used to identify recurring patterns and conceptual relationships across literature. Five interrelated themes guided the analysis: (i) the evolution of food security policy frameworks, (ii) governance and institutional mechanisms, (iii) climate change and resilience in food systems, (iv) nutrition-sensitive food security approaches, and (v) digital technologies and AI-driven innovation in agriculture. This thematic framework links traditional food security theories with contemporary digital approaches and provides a basis for understanding policy evolution in developing countries.

Building on this synthesis, the chapter proposes a four-stage analytical framework encompassing production-centric approaches, access-and-distribution transitions, nutrition-sensitive and rights-based frameworks, and contemporary sustainable, digitally enabled food systems. Comparative analysis across Asia, Africa, and Latin America demonstrates that governance quality and institutional capacity largely determine policy outcomes. This supports recent evidence showing that implementation gaps, rather than policy design alone, are the primary determinants of food security performance across 120 countries between 2000 and 2022 (Mumah et al., 2025). The framework therefore reconceptualizes food security challenges as institutional and political economy issues rather than merely technical policy failures.

4. Conceptual Foundations of Food Security

When everyone has physical, social, and financial access to enough safe, nourishing food that satisfies their dietary needs and food choices for an active and healthy life, it's food security. In 2002, the 1996 definition was expanded to include the term "Social." According to WFP, hunger is "a condition that exists when all people, at all times, are free from hunger" (WFP, 2009). We will refer to the original WFS definition even if WFP utilizes a definition that appears to be much simpler because it contains many crucial components for the analysis.

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4.1 The Four Dimensions of Food Security

Food security is built upon four interrelated dimensions i.e. availability, access, utilization, and stability, derived from the definition adopted by the World Food Summit (WFS). Together, these dimensions provide a comprehensive framework for assessing food security at household, community, national, and global levels.

Availability refers to the physical presence of sufficient food through domestic production, imports, food stocks, and food aid. The World Food Program (WFP) defines food availability as "the amount of food that is present in a country or area through all forms of domestic production, imports, food stocks, and food aid" (WFP, 2009). Historically, food security was equated with food availability despite recognition by the FAO that poverty is the primary cause of hunger and malnutrition (Shaw, 2007). This production-oriented perspective encouraged policies focused on increasing agricultural output. Although global agricultural production has consistently outpaced population growth over the past five decades, food insecurity persists because adequate food supplies do not guarantee that all people can obtain food. Consequently, availability is necessary but not sufficient to ensure food security.

Access is the second dimension and refers to having physical, economic, and social access to food. Inspired by Sen's entitlement approach, food access extends beyond production to include the ability of individuals and households to obtain adequate food. The WFP defines access as "a household's ability to acquire an adequate amount of food regularly through a combination of purchases, barter, borrowings, food assistance or gifts" (WFP, 2009). Food access comprises three components. Physical access depends on transportation infrastructure, market connectivity, and information systems that ensure food reaches consumers. Economic access relates to households' purchasing power and affordability, an issue that gained prominence following the 2005 Niger food crisis and the 2008 global food price crisis. Increasingly, researchers recognize that hunger often results from unaffordable food rather than insufficient production. Market systems therefore play a crucial role in food security, as "most people, especially the poor, rely on market systems to provide food and essential goods and services" (Simon, 2012). The third component, social or socio-cultural access, recognizes that gender, cultural norms, and social exclusion may limit access even when food is physically available and affordable. Although research in this area remains limited, existing studies highlight the importance of addressing social inequalities in food security policies (Simon, 2012).

Figure 2.1: The four components of food system with their major elements

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Utilization represents the third dimension and emphasizes the consumption of safe and nutritious food that meets dietary requirements. The WFS definition highlights that food must not only be available and accessible but also be effectively utilized through appropriate dietary choices, preparation, storage, and nutrient absorption. Health care, sanitation, clean water, and food safety are integral to this dimension. Evidence shows that malnutrition can persist even where food is abundant because of poor dietary practices or inadequate utilization (Conte & Morrow, 2002). Consequently, nutrition education, food safety, and public health interventions are essential components of food security. Growing research also emphasizes the close relationship between food security and food safety, although conceptual confusion persists in some languages where both concepts share the same terminology (Simon, 2012).

Stability is the fourth dimension and refers to maintaining availability, access, and utilization always. Food security must be sustained over time rather than achieved temporarily. Stability distinguishes between chronic food insecurity, characterized by persistent inability to meet food needs, and transitory food insecurity caused by short-term shocks such as economic crises, conflicts, natural disasters, or seasonal fluctuations. Seasonality represents a common form of cyclical food insecurity that particularly affects vulnerable populations (Simon, 2012). Together, these four dimensions provide a holistic framework for understanding food security and designing effective policies that address both immediate needs and long-term resilience.

5. Historical Evolution of Food Security Policies

5.1 Early Phase: Production-Centric Policies (1950s–1970s)

Focus on Increasing Agricultural Output

The initial stage of food security policies mainly focused on the need to boost agricultural output to solve food shortages in the newly independent states. In India, the government had initiated programs like the Grow More Food Campaign, Community Development Programs, and Agricultural Technical Assistance Programs with investments made in irrigation, fertilizers, research, and rural infrastructure. The purpose of these interventions was to enhance domestic production systems and increase food supply, alongside changing the types of crops to suit various ecological conditions (Balaguru, 2013; Bjornlund & Bjornlund, 2025). These production-oriented policies led to a huge increase in agricultural production. India experienced about 7 per cent growth in food production in the initial five-year plan (1951 1956), and the increase in irrigation rose to 20 per cent of the cropped area between 1950 and 1960. Moreover, there was a 20-30 percent increase in yields of a variety of crops, such as barley, tobacco, jute, chickpeas, tea, and cotton, which proved the efficiency of policies aimed at improving yields (Patel, 2013; Bjornlund & Bjornlund, 2025).

Role of the Green Revolution

The Green Revolution further supported production-oriented approaches by introducing high-yield seeds, chemicals, irrigation, and mechanization. In Mexico, the significant investments made for the construction of irrigation infrastructure, where more than 55% of investments came from public funds, contributed towards the expansion of irrigated land and the adoption of intensive cultivation methods like double cropping. Credit facilities, subsidies, and the provision of agricultural input also aided in boosting agricultural intensification and production (Evenson & Gollin, 2002; Bjornlund & Bjornlund, 2025). Therefore, there was a rapid increase in agricultural output in those regions that could benefit from these innovations. For instance, in northern Mexico, the number of cultivated areas increased from 2.2 million hectares in 1940 to 4.3 million hectares in 1960, while there was consistent improvement in the output of crops such as wheat and cotton. The favorable price of the products offered by the government compared to the international market price of up to 33% facilitated exports (Bjornlund & Bjornlund, 2025).

Production-Centric Nature of Policies

The Green Revolution method was fundamentally concerned with production and therefore made investments only in high potential areas and commercial farmers. This meant that islands of agricultural development were created with access to irrigation, credit, and infrastructure, while others, especially those

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that practiced rain-fed agriculture, were marginalized. This kind of development model was because the Green Revolution had a limited scope as far as production was concerned and failed to distribute agricultural resources equally to all regions and people (Matchett, 2006; Patel, 2013; Bjornlund & Bjornlund, 2025). In many developing countries, the policy of agriculture had its primary focus on producing goods for export and supplying cheap staple foods to urban populations. In most cases, governments were in control of production and prices and utilized external sources such as food aid and loans (Bjornlund & Bjornlund, 2025).

Limitations of the Production-Centric Approach

Notwithstanding the increased production levels, production-oriented agriculture had its fair share of problems, such as inequality. The main beneficiaries of the Green Revolution included large and commercial farmers who, through the process of consolidation, evicted small-scale farmers from their lands. This resulted in a polarized agricultural sector where there were few rich farmers and many poor or landless rural households (Patel, 2013; Bjornlund & Bjornlund, 2025). In addition, since less diverse crops were being grown but with higher yields, the agricultural diversity was lost, and hence, traditional food systems were neglected. Initiatives directed towards improving agricultural production did not consider the indigenous crops and farming practices that are used locally to build resilient food systems (Matchett, 2006; Bjornlund & Bjornlund, 2025). Lastly, environmental degradation was an issue associated with production-oriented agriculture. This included the heavy usage of chemicals in the form of fertilizers, monoculture planting of crops, and indiscriminate exploitation of water resources. These factors culminated in low agricultural yields due to depleted soil and water quality (Ladha et al., 2003; Ray et al., 2012; Bhattacharyya et al., 2015; Bjornlund & Bjornlund, 2025).

Overall Assessment

In all, the initial stages of the food security policy were successful in ensuring higher food production levels but did not consider other aspects of food security. The focus on the production of food was partly responsible for the development of regional imbalances, problems in environmental conservation, and over-reliance on other markets. This shows that even though production plays an important role, it alone cannot guarantee food security (Giller, 2020; Bjornlund & Bjornlund, 2025).

Table 2.1: Agricultural Growth and Structural Outcomes under Production-Centric Policies and the Green Revolution (1950s–1970s)

Indicator	Country/Region	Time Period	Change/Value	Implication
Food output growth	India	1951–1956	~7% per annum	Significant increase in agricultural production
Irrigated area	India	1950–1960	7% → 20% of cropped area	Expansion of irrigation infrastructure
Crop yield increase	India	Late 1960s	20–30% increase	Improved productivity due to policy support
Harvested land	Mexico	1940–1960	2.2 → 4.3 million hectares	Expansion of cultivated land
Irrigated land	Mexico	Green Revolution period	+50% increase	Intensification of agriculture
Export crop production	Mexico	1950s–1960s	+85% increase (wheat & cotton)	Growth of export-oriented agriculture
Credit & investment distribution	Mexico	Green Revolution period	Majority to commercial farms	Unequal access to resources
Fertilizer & input access	Mexico	Green Revolution period	Controlled & targeted	Favored large-scale producers

Source: Bjornlund & Bjornlund, 2025

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5.2 Transition Phase: Access and Distribution (1980s–1990s)

Emergence of Poverty Alleviation and Food Subsidy Programs

In the period between the 1980s and 1990s, food security policies experienced an important change from production-oriented policies to those concerned with the improvement of accessibility to food. This change came about after acknowledging the fact that increased food supplies at the national level may not always lead to food security within households because of poverty, lack of employment opportunities, and income disparity. Therefore, poverty reduction became an integral part of food security policy approaches (Giller, 2020; FAO, 2019). In consequence, the governments developed food subsidies and other policies with the aim of reducing the cost of accessing food products. Such policies include subsidizing food supplies, income assistance policies, and programs concerned with the nutritional requirements of people (Devereux et al., 2020; Clapp, 2020).

Public Distribution Systems and Safety Nets

This was when Public Distribution Systems (PDS) and safety nets were made key aspects of food security policies. The government created systems that were able to deliver basic foodstuff like cereals to poor groups at affordable prices. This move was intended to help control the level of food intake by ensuring the effects of poverty were alleviated, especially among impoverished communities (George & McKay, 2019). Furthermore, food safety nets such as cash transfer projects and nutrition support measures were initiated to improve food security in poor communities. Such safety nets provided a cushion against temporary food insecurity but also contributed significantly to alleviating poverty in the long term. Despite the success, there were numerous challenges related to inefficiencies, leakage, and budgetary constraints associated with the implementation of these measures (Devereux et al., 2020; FAO, 2021).

5.3 Modern Phase: Nutrition-Sensitive and Sustainable Policies (2000s–Present)

Issues that the nutrition-sensitive agriculture approach aims to solve include:

(i) Raising the level of agricultural production is so that more food becomes available and accessible to all people.
(ii) Ensuring that the food produced is diverse and sustainable through environmentally friendly practices such as conservation agriculture, irrigation, and integrated pest management (IPM).
(iii) Nutritional enrichment through fortification so that micronutrient deficiencies are eliminated due to increased micronutrient density in the products (Hossain & Simi, 2024).\

6. Food Security Policies: Instruments and Implementation Mechanisms

Developing economies have food security policies that are executed using various policy instruments to deal with availability, access, and utilization. Although these instruments have been transformed greatly, they are not effective enough because of structural, institutional, and political limitations. Critical analysis of these policies shows that, even though these interventions have achieved significant success, most of them have design and implementation issues, which restrict their effectiveness in the long run.

6.1 Food Subsidies and Price Control Mechanisms

Price controls and food subsidies are common to make food more affordable and cushion the vulnerable groups against market uncertainty. The interventions are effective in boosting consumption in the short term and stabilizing prices. India, particularly the National Food Security Act, illustrates how price-based subsidies can contribute to providing the most food to low-income families dramatically (Debnath et al., 2018). However, it is important to note that subsidy schemes are likely to result in market inefficiencies and budget obligations, and they are not sustainable in the long run. Universal or poorly targeted subsidies can result in leakages and inclusion errors, in which benefits do not end up with the most vulnerable groups. Additionally, price controls may deter the involvement of the private sector and motivate producers, which may have an impact on long-term supply (FAO, 2021; Pinstrup-Andersen, 2009). Thus, although subsidies

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are needed to provide direct access to food, the design of subsidies should be enhanced by making them more targeted and aligned with social protection systems in general.

6.2 Agricultural Support Programs

The agricultural support programs are very important in boosting food supply through boosting productivity and assisting farmers. Such interventions have been especially effective in areas where the institutions are well-established, which led to higher crop yield and incomes in rural areas (World Bank, 2022). Nevertheless, globalization has transformed the way agricultural production is carried out, with systems encouraging export-based systems that are not necessarily sustainable. More importantly, these systems have resulted in monoculture, the destruction of the environment, and a higher reliance on chemical inputs, especially in developing nations (Robinson, 2018; Jorgenson & Kuykendall, 2008). Moreover, export crops may compromise domestic food security because the focus on export crops may result in the diversion of resources to the production of staple food. These issues underscore one major shortcoming of agricultural support policies; that they tend to focus on productivity rather than sustainability and equity. The design of effective policies should therefore be balanced in terms of productivity, environmental protection, and inclusive development (Lencucha et al., 2020).

6.3 Social Safety Nets and Nutrition Interventions

Nutrition interventions and social safety nets play a crucial role in resolving the problem of food access and food use, especially among vulnerable groups. The cash transfer and feeding at schools' interventions have shown tremendous success in improving food consumption and diversification (FAO, 2021). Most importantly, however, is the problem of sustainability and efficiency in the allocation of resources for these programs, as well as the risks of creating dependency on such aid. Safety nets in some cases can simply be a temporary remedy and fail to address underlying problems of food insecurity, such as unemployment and low agricultural productivity. Poorly coordinated implementation of these policies may limit their effectiveness (Ruel & Alderman, 2013). Such interventions must be linked to broader development initiatives, such as employment generation and agriculture reforms, to ensure their sustainability.

6.4 Public Distribution Systems (PDS)

Public Distribution Systems play an important role in ensuring food security policy in nations like India, where subsidized food is provided to millions of families. These are crucial for reducing hunger and stabilizing consumption (George & McKay, 2019). Nonetheless, PDS is normally faulted for inefficiency, corruption, and poor administrative control, including leakage and errors in exclusion. This leads to reduced efficiency of the process and increases the cost of implementation. Further, the centralized distribution system may lack flexibility to cater to regional demand and food preferences. Therefore, reforms will target areas of digitalization, decentralization, and improved targeting strategies.

6.5 Public–Private Partnerships (PPPs)

The potential for change in food systems through public-private partnerships is vast since the private sector operates in an efficient and innovative way. It enables investment in infrastructure, value chain, and technology, which results in higher productivity and less post-harvest loss (IFAD, 2020). However, PPPs also create significant issues of equity and governance. Unless there is proper regulation, the participation of the private sector can be determined by profit motives at the expense of social goals, which can exclude smallholder farmers. Inequality may also be enhanced by power imbalances between the state institutions and the business corporations. Thus, it is important to have proper governance structures so that PPPs can lead to inclusive and sustainable food security (World Bank, 2022; FAO, 2021).

6.6 Case Study Spotlight: Pakistan

Pakistan provides an important case for examining the evolution of food security policies in developing economies, given its strong dependence on agriculture, high vulnerability to climate change, and ongoing policy reforms. Over time, the country's food security approach has shifted from a narrow focus on

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production to a more comprehensive framework that incorporates access, nutrition, and sustainability. In earlier phases, Pakistan placed significant emphasis on agricultural production support policies, including input subsidies, expansion of irrigation systems, and price support mechanisms for key crops such as wheat and rice. These measures contributed to increased agricultural output and helped ensure national food availability. However, despite these gains in production, food insecurity continues to persist, largely due to unequal access, widespread poverty, and regional disparities (Mughal & Fontan Sers, 2020).

In recent years, there has been a noticeable transition toward a more integrated policy framework, particularly with the introduction of the National Food Security Policy (2018). This policy aims to strengthen food availability, improve access, enhance nutritional outcomes, and promote sustainability. It also places considerable emphasis on climate-resilient agriculture and institutional reforms to address emerging challenges such as population growth and environmental pressures (Parveen et al., 2023). Despite these advancements, several critical gaps remain. Weak governance structures limited institutional capacity, and shortcomings in implementation continue to constrain policy effectiveness. Empirical studies indicate that poverty, exposure to climate-related shocks, and limited market access significantly influence household food security, especially in rural areas (Khan et al., 2025). Moreover, inefficiencies in subsidy programs and the absence of well-targeted safety nets further reduce the overall impact of policy interventions. Overall, the case of Pakistan illustrates that while food security policies have evolved considerably, persistent challenges related to implementation, governance, and inclusiveness remain. This experience highlights the importance of adopting integrated and well-coordinated policies that combine agricultural development with social protection measures and institutional strengthening.

6.7 Case Study Spotlight: India

India represents one of the most comprehensive and well-established food security frameworks among developing economies. The country's approach has evolved considerably from a production-oriented strategy during the Green Revolution to a rights-based framework with the introduction of the National Food Security Act (NFSA), 2013, which legally guarantees access to subsidized food grains for nearly two-thirds of the population (Government of India, 2013). This transition reflects a broader shift in policy thinking—from a primary focus on food availability to a more inclusive approach that emphasizes food access and social protection. A key component of India's food security system is the Public Distribution System (PDS), which provides essential food commodities such as rice and wheat at subsidized prices. This system has played a significant role in reducing hunger and ensuring stable food consumption among low-income households. In addition, India has implemented several complementary nutrition-oriented interventions, including the Mid-Day Meal Scheme and the Integrated Child Development Services (ICDS), which aim to address malnutrition and improve dietary outcomes, particularly among children and women (Ruel & Alderman, 2013; FAO, 2021).

Despite its extensive coverage and strong institutional foundation, India's food security system continues to face many challenges. Research highlights concerns related to inefficiencies, leakage, corruption, and the substantial fiscal burden associated with large-scale subsidy programs (Petrikova, 2019). Moreover, questions have been raised about the sustainability of procurement and price support policies, especially considering environmental pressures and resource limitations (Kishore et al., 2025). These issues point to the need for better targeting, improved governance, and greater efficiency in policy implementation. Overall, India's experience shows that while large-scale public interventions can significantly improve food access, their long-term success depends on strong institutional capacity, transparency, and fiscal sustainability. The Indian case offers important lessons for other developing economies, particularly in achieving a balance between wide coverage and efficient, accountable delivery systems.

7. Comparative Analysis of Food Security Policies in Developing Economies

Food security can be defined as a condition where all people are assured of continuous availability of adequate, safe, and nutritious food that is sufficient in meeting their nutritional requirements and preferences for leading a healthy lifestyle. Following the food crisis in 2008, food security became a high-profile issue

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for consideration in several countries, such as Bangladesh, India, and Myanmar. With a large population of each country, together forming 21% of the world's population and consuming 32% and 39% of the world's rice and pulse production, food security has become a top priority for them since their independence. China proposed the Bangladesh-China-India-Myanmar Economic Corridor initiative in 2013 for promoting economic cooperation between these countries. Agricultural cooperation may be considered among other areas of cooperation under these initiatives. For such a purpose, a study is needed regarding food security and the main determinants of food security in these countries (Chen & Lu, 2018).

Around 1990, Bangladesh, India, and Myanmar also launched economic reforms that helped them liberalize their food economy and international trade, leading to an increase in the domestic production of food commodities (Del Ninno et al., 2007; Kurosaki, 2008). Self-sufficiency in rice has been attained in Bangladesh because of the fast growth of rice production due to sustained rice growth since the 1970s (Bell et al., 2015; Fiedler, 2014; Ganesh-Kumar et al., 2012). The growth in cereal production in India is more than 70% between 1980 and 2007 (Dev & Sharma, 2010), while the growth in rice, pulses, and maize production in Myanmar since 1988 has been very encouraging (Haggblade et al., 2014). Other than economic reforms and proper policies, there has been the adoption of improved agricultural inputs and land use that have contributed significantly to the growth of grain production (Chen & Lu, 2018). A comparative analysis of the food security situation in the developing countries can be used to provide empirical evidence on the relationships between production and consumption. The Food Security Index (FSI) is based on the proportion of domestic production to consumption and serves as an indicator of food security in any given nation. The table below and chart illustrate the trend and causes of food security in Bangladesh, India, and Myanmar from 1990 to 2013 (Chen & Lu, 2018).

Table 2.2 Food Security Index and Contributing Factors (1990–2013)

Country	FSI (1990)	FSI (2013)	Production Growth (%)	Consumption Growth (%)	Main Production Driver	Main Consumption Driver
Bangladesh	0.88	1.02	92.55%	66.6%	Crop Yield (≈88%)	Population Growth
India	1.01	1.09	52.68%	39.89%	Crop Yield (≈98%)	Population Growth
Myanmar	1.06	1.09	165.73%	158.11%	Land Expansion (≈81%)	Per Capita Consumption

From the results obtained from the comparative analysis, food security gains achieved in developing nations have been achieved mainly through improvement in agricultural productivity instead of the extent of cultivation of arable land. For example, for India and Bangladesh, there was almost 98% and 88%, respectively, contribution to production increase from yield increase. Nevertheless, the population increase has led to higher demand for food.

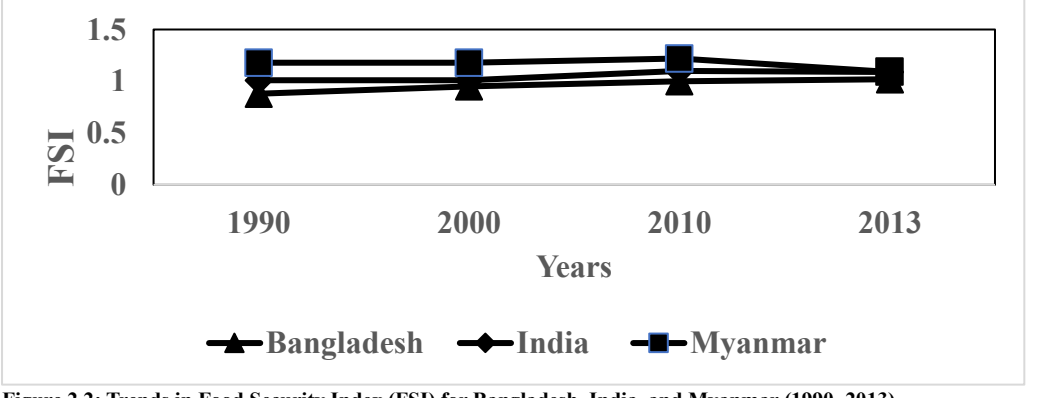

Figure 2.2: Trends in Food Security Index (FSI) for Bangladesh, India, and Myanmar (1990–2013)

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On the other hand, for Myanmar, food production increase was mainly due to the extent of cultivated arable land, while per capita food increase was responsible for demand increase (Chen & Lu, 2018).The developing countries in Asia and Africa continuously experience problems related to food security as a large portion of the undernourished global population resides in such countries. The concept of food security has been extensively reviewed based on three basic dimensions, which include food availability, food access, and food use. The comparative meta-review by these researchers indicates that despite similarities between policies implemented in both regions, their results vary greatly owing to the differences in the quality of institutions and economic development in the two continents. It is worth noting that 88% of the undernourished people live in Asia and Africa (Bashir & Schilizzi, 2013).

Comparative evidence demonstrates that food security outcomes vary considerably across regions because of differences in governance, institutional capacity, agricultural investment, and policy design. While Asia, Africa, and Latin America have all implemented food security strategies, their priorities and levels of success differ substantially.

In terms of **food availability**, many Asian countries have achieved stronger outcomes through productivity-oriented policies supported by substantial public investment in irrigation, high-yield seed varieties, agricultural research, and rural infrastructure. These interventions have significantly increased agricultural productivity and strengthened domestic food supplies. African countries have also prioritized agricultural production and increased public investment in the sector; however, productivity gains have generally been constrained by weaker infrastructure, institutional limitations, and climate vulnerability (Bashir & Schilizzi, 2013; World Bank, 2022).

Regarding **food access**, Asian countries have complemented production policies with public distribution systems, agricultural subsidies, and cash transfer programs that enhance purchasing power and reduce poverty. Such integrated approaches have expanded food access across socioeconomic groups. In contrast, many African countries have relied more heavily on food aid and international assistance to address recurrent food shortages. Although humanitarian assistance provides essential short-term relief, it does not offer a sustainable long-term solution to structural food insecurity (Bashir & Schilizzi, 2013; FAO, 2021). With respect to **food utilization**, several Asian countries have increasingly incorporated nutrition-sensitive interventions that improve dietary quality and health outcomes. In many African countries, however, food security policies continue to emphasize production while giving comparatively less attention to nutrition, food safety, and health, contributing to persistent malnutrition despite improvements in agricultural output (Bashir & Schilizzi, 2013; FAO, 2021).

Nevertheless, Asia's stronger performance should not be interpreted as evidence of universally superior institutions. Policy effectiveness depends on a combination of governance quality, political commitment, agricultural investment, social protection systems, and country-specific socioeconomic conditions. Moreover, considerable variation exists within both Asia and Africa, indicating that institutional capacity alone cannot fully explain food security outcomes (World Bank, 2022).

Within Asia, countries such as India and China illustrate the importance of active state involvement in food security. India has strengthened food access through its Public Distribution System (PDS), while China has pursued food self-sufficiency through coordinated agricultural policies and strategic planning. Although these interventions have improved food security, challenges remain, including implementation inefficiencies, food losses, and fiscal pressures (Smith, 2013).

In Africa, food security policies have been shaped by political instability, weak governance, dependence on rain-fed agriculture, and high exposure to climate-related shocks such as droughts and floods. Governments have emphasized emergency food assistance, agricultural development, and resilience-building; however, inadequate infrastructure, poor market connectivity, institutional weaknesses, and armed conflicts continue to undermine policy effectiveness (Smith, 2013; FAO, 2021).

Latin America presents a different policy model by placing greater emphasis on poverty reduction and social protection. Conditional cash transfer (CCT) programs, including Brazil's *Bolsa Família* and Mexico's

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Prospera, have linked financial assistance to education and healthcare participation, improving household food access, reducing poverty, and strengthening human capital. These policies have contributed significantly to regional food security improvements (Smith, 2013; World Bank, 2022).

Overall, cross-regional comparisons indicate that no single policy model guarantees food security. Rather, successful outcomes emerge from the interaction of sound governance, institutional capacity, sustained agricultural investment, effective social protection, and context-specific policy implementation. Asian experiences highlight the importance of combining productivity growth with social protection, African experiences underscore the need for stronger institutions and resilience, while Latin America demonstrates the value of inclusive social welfare programs. These lessons suggest that integrated, context-sensitive policies are more effective than reliance on any single intervention (Clapp, 2020; FAO et al., 2023; World Bank, 2022).

8. Role of International Organizations in Food Security

8.1 Contributions of FAO, World Bank, and IFAD

The international organizations play a critical part in the provision of solutions to food security problems faced in developing countries by means of offering financial aid and technical expertise in addition to policy advice. The primary mandate of FAO in tackling food insecurity lies in its efforts towards global leadership in the field of food security where it gathers information, develops standards, and helps nations to formulate appropriate agriculture and nutrition policies. Additionally, it provides technical and professional knowledge about how to boost the level of agriculture production sustainably. On the other hand, the role of the World Bank lies in offering financing of agriculture and rural development projects as well as implementing infrastructural development projects aimed at poverty reduction. Lastly, IFAD's main role involves helping smallholder farmers alleviate rural poverty and improve their access to agriculture products markets (FAO, 2021). IFAD complements these efforts by investing in rural development, improving smallholder farmers' access to finance and markets, and supporting inclusive agricultural growth. These interventions contribute to poverty reduction and strengthen food security, particularly in regions where agriculture remains the primary source of livelihood (IFAD, 2020). In summary, all these entities are involved in the governance of food security from various angles such as availability, accessibility, and consumption of food sources.

8.2 Global Initiatives (e.g., SDGs, Zero Hunger)

The efforts by international organizations have played a vital role in shaping the policies of food security for nations and regions. For instance, the SDGs by the UN included Goal 2 that was aimed at "Zero Hunger." It is designed in such a way as to end all forms of hunger, attain food security, improve nutrition, and ensure sustainable agriculture before 2030. Examples of the programs under SDGs include the Zero Hunger Challenge. The emphasis here is on the integration approach such as improving production efficiencies, minimizing food waste, and improving nutrition outcomes. These programs have led to many countries aligning their policies with those at the global levels as a way of promoting international collaboration (United Nations, 2015). Moreover, international organizations like CFS and various global nutrition initiatives are instrumental in making the policies more coherent and accountable through international cooperation. Such programs encourage countries to integrate their policies with global goals, leading to better monitoring and evaluation measures. Countries adopting the SDGs framework show improved results when it comes to ending hunger and malnutrition (FAO, 2021; von Braun et al., 2021).

8.3 Influence of International Funding and Policy Guidance

The role played by international financing is vital in ensuring that developing nations have sufficient means to implement their food security initiatives. With the financing provided by international institutions such as the World Bank and IFAD, developing countries can invest in agriculture, rural development, and research. Such investments enable the improvement of production efficiency, climate change resiliency, and food distribution mechanisms. In addition, international agencies offer technical guidance on how to develop national food security policies. The problem that might be encountered in using international financing includes the dependency issue and the lack of national policy autonomy. Research studies reveal that

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international funding might result in dependency due to a divergence between the priorities of donors and the needs of recipient nations. Nonetheless, international funding is necessary to address some structural challenges that include poverty, volatility in food prices, and climatic risk (World Bank, 2022; FAO, 2021). International policy guidance also ensures that decision-makers adopt evidence-based policymaking (Bashir & Schilizzi, 2013). While international organizations have bolstered food security policy through financial support and technical assistance, successful implementation ultimately depends on domestic institutional capacity. The following section discusses the principal challenges affecting policy implementation in developing economies.

9. Challenges in Food Security Policy Implementation

9.1 Governance and Institutional Limitations

However, the implementation of food security policies is hampered by poor governance and institutional weaknesses, especially in developing nations. The study notes that most of the sub-Saharan countries continue to rely heavily on the export of agricultural produce without any value addition to the commodity, exposing such countries to vagaries in the global market environment and undermining the efforts at implementing such policies successfully. Such reliance has undermined their efforts at achieving food sovereignty (Dietz, 2018; Giller, 2020; Bjornlund & Bjornlund, 2025). Also, shortcomings within institutions for implementing agricultural policies, such as the absence of coordination, poor support services, and inadequate regulation, have impeded the effectiveness of the Green Revolution approaches in areas like Africa. The failure to establish effective institutions to assist small-scale farmers and ensure market regulation has led to agricultural policies that prioritize commercial agriculture (Bjornlund & Bjornlund, 2025).

9.2 Inefficiencies in Targeting and Distribution

It is evident that inefficiencies occur in the allocation of resources towards agricultural subsidies and inputs. According to the study presented, it shows that subsidy schemes are unable to reach their target audiences, especially for the small-scale farmer. In Nigeria for instance, only 11% of the subsidized fertilizers went to the farmers, whereas the remainder was sold to middlemen at a price (Asante & Mullard, 2021; Bjornlund & Bjornlund, 2025). In addition, the operations of the distribution system can also be hampered by market distortions and opportunistic behaviors. Agro-dealers and middlemen capitalize on the weaknesses in regulations to monopolize supply and pricing to sell their products at higher costs while requiring farmers to sell at lower prices (Ragasa et al., 2018; Bjornlund & Bjornlund, 2025).

9.3 Political Economy Constraints

Political economy plays a crucial role in shaping food security policy implementation. The paper notes that the Green Revolution and later agricultural policies were formulated through the interests of the Global North and multinational companies, which led to unfair trade practices and market systems at the expense of developing countries (Magdoff, 2013; Bjornlund & Bjornlund, 2025). Furthermore, the liberalization of financial institutions and regulations resulted in more speculative activities within agricultural markets and price volatility, thereby reducing the capability of governments to regulate food prices. This posed serious effects on food security, especially during times of global food crisis, whereby price increases would adversely affect the poor and provoke civil unrest in several countries (Collier & Rohner, 2008; Bjornlund & Bjornlund, 2025).

9.4 Data Gaps and Monitoring Issues

The article indirectly shows issues surrounding data and monitoring due to the ineffectiveness of policy evaluation and accountability in implementation processes. As stated in the article, in Africa, there was the implementation of subsidies on fertilizers, which was done without proper monitoring measures in place, resulting in issues such as rent-seeking behavior, corruption, and even smuggling of the input across the borders. Lack of proper mechanisms for monitoring meant there was difficulty in following how the fertilizer was used by the targeted individuals (Asante & Mullard, 2021; Bjornlund & Bjornlund, 2025). In addition,

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lack of relevant data on how the farmer had fared made it difficult for policymakers to come up with appropriate measures that would address food insecurity especially amongst small farmers (Ragasa et al., 2018; Bjornlund & Bjornlund, 2025).

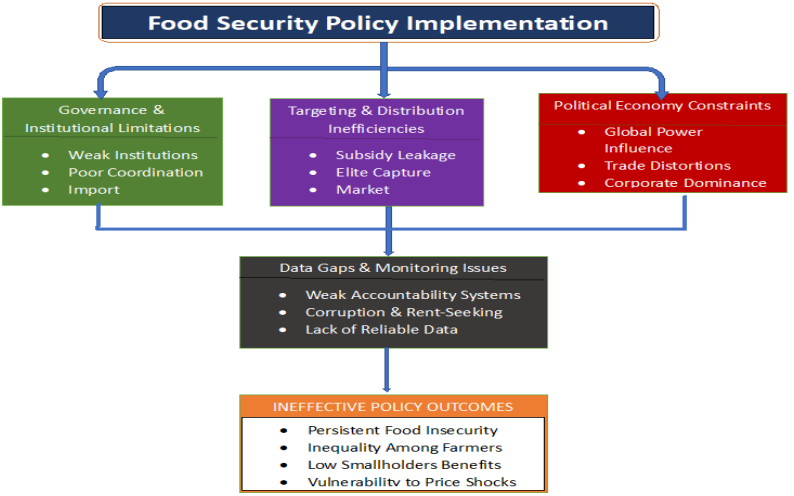

Figure 2.3: Conceptual Framework of Challenges in Food Security Policy Implementation

Table 2.3: Challenges in Food Security Policy Implementation and Supporting Evidence

Challenges	Key issues identified	Evidence from the paper	References
Governance and Institutional Limitations	Institutional incapacity, reliance on international markets, and inadequate policy coordination	The economy of Sub-Saharan Africa continues to rely on the export of basic products without much value added, leaving it vulnerable to any external shock and undermining its food security	Dietz (2018); Giller (2020); Bjornlund & Bjornlund (2025)
Inefficiencies in Targeting and Distribution	Ineffective subsidy distribution, diversion by middlemen, and uneven fertilizer distribution	Just 11% of the subsidized fertilizers got to the farmers in Nigeria, most being absorbed by the intermediaries who sold the fertilizers at the market prices	Asante & Mullard (2021); Bjornlund & Bjornlund (2025)
	Distorted markets and exploitative marketing mechanisms	Prices were manipulated in favor of agro-dealers who compelled farmers to sell their produce at low prices but retained high retail prices	Ragasa et al. (2018); Bjornlund & Bjornlund (2025)
Political Economy Constraints	Role of global powers and corporations; Imbalance in trade relations	The policies for agricultural development and Green Revolution were formulated keeping in view the interest of Global North, restricting balanced development in Global South	Bjornlund & Bjornlund (2025)
	Volatility in prices and limited government control	Due to deregulation and speculation, food prices became more volatile, making prices go up while cutting farmers' profits	Magdoff (2013); Collier & Rohner (2008); Bjornlund & Bjornlund (2025)
Data Gaps and Monitoring Issues	Corruption and poor monitoring systems	Fertilizers subsidy programs were carried out without any monitoring, resulting in corruption, favoritism, and smuggling of fertilizers	Asante & Mullard (2021); Bjornlund & Bjornlund (2025)
	Data inadequacy for policy formulation	Lack of monitoring and evaluation made it impossible to develop sound policies based on empirical evidence	Ragasa et al. (2018); Bjornlund & Bjornlund (2025)

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The conceptual framework demonstrates the interconnected difficulties associated with the implementation of policies aimed at improving food security. Poor governance and institutions, together with inefficiencies related to the targeting and delivery processes, make the structure of policy implementation weak. This is additionally complicated by problems with political economy, such as those associated with global market forces and corporatism. In addition to this, information deficiencies and poor monitoring make it difficult to ensure effectiveness due to a lack of transparency and accountability (Figure 1.3).

10. Future Directions for Food Security Policy

Future policies are likely to focus on building sustainable, resilient, and inclusive food systems. According to recent research, there is a need to incorporate climate-smart agriculture and sustainable environmental practices to solve problems such as climate change and depletion of natural resources (Bodirsky et al., 2020; Galanakis, 2024). A shift from food security towards nutrition security is anticipated as future policies aim to tackle issues of poor nutrition and unhealthy diets. As a result, future policies will have to be nutrition-sensitive to ensure good health (Adhikari et al., 2023; Thorndike et al., 2022). Finally, future policies are likely to adopt digital technology to improve the efficiency of agricultural productivity and governance. Other themes of future food security policies include effective governance and institutions, inclusive development, especially for vulnerable communities, and tackling the challenges posed by urban environments and changing consumption patterns (Ikudayisi & Adejumo, 2025).

11. Conclusion

Food security policies in developing countries have evolved from production-centered approaches to comprehensive frameworks that recognize food security as a multidimensional concept encompassing food availability, access, utilization, sustainability, and effective institutions. This evolution demonstrates that increasing agricultural production alone is insufficient to eliminate hunger unless accompanied by measures that address poverty, inequality, nutrition, governance, and institutional capacity. While earlier policies succeeded in boosting food production, they were less effective in achieving sustainable food security because they overlooked the socioeconomic and institutional factors that determine equitable access to food.

These findings have important implications for policymakers seeking to achieve Sustainable Development Goal 2 (Zero Hunger). Future food security strategies should adopt integrated policy frameworks that extend beyond increasing agricultural output to include improved food access, nutrition, environmental sustainability, and institutional effectiveness (United Nations, 2015). As climate change increasingly threatens agricultural productivity and food systems, greater investment is required in climate-smart agriculture, climate-resilient crop varieties, sustainable water resource management, and disaster risk reduction to strengthen resilience and ensure long-term food security (FAO et al., 2021). At the same time, the rapid advancement of digital technologies presents significant opportunities to improve agricultural productivity, optimize resource use, strengthen market integration, and enhance evidence-based decision-making through digital agriculture and artificial intelligence (Wolfert et al., 2017; Galanakis, 2024). These technological innovations, however, must be supported by effective governance reforms, including stronger institutions, transparent policy implementation, inter-agency coordination, and robust monitoring and evaluation mechanisms to maximize their impact.

Looking ahead, further research is needed to examine how emerging global challenges, including climate change, digital transformation, and geopolitical developments, affect the effectiveness of food security policies in developing countries. Comparative studies evaluating governance systems, institutional arrangements, and policy instruments across different regions would provide valuable insights into designing more effective interventions for achieving SDG 2. Future research should also investigate how digital technologies, institutional reforms, and climate adaptation strategies can be integrated to build resilient, inclusive, and sustainable food systems capable of responding to evolving environmental and socioeconomic challenges.

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Declaration: AI-assisted tools (LLMs) were used to improve the language and grammar of this chapter. The authors reviewed and approved all content and assume full responsibility for its accuracy.

 | https://doi.org/10.66529/book.9786277945039.2026.ch2