

Evaluation of Implementation Strategies of Food Security in Pakistan

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Abstract:

Food security is a critical concern for Pakistan, as it is intricately linked to national security and the well-being of its citizens. Despite being one of the top producers of essential crops, Pakistan faces significant food insecurity challenges due to inefficiencies in agriculture, damaged infrastructure, and inadequate policy implementation. This paper explores the current state of food security in Pakistan, identifying key determinants such as food availability, accessibility, utilization, and stability. It examines the systemic issues within the agricultural sector, including outdated technologies, lack of training, and insufficient linkages between producers and agricultural industries. The paper further investigates the impacts of urbanization, climate change, and external shocks on food production and distribution. Drawing on these challenges, the study proposes practical policy recommendations, including the integration of national programs, market regulation through technology, and targeted subsidies to improve food security. Emphasizing the need for coherent federal-provincial policies, the research highlights how modern technology and climate-smart agricultural practices can revolutionize the sector and ensure long-term food security for Pakistan.

Key words:

Food Security, Agriculture, Policy Recommendations, Malnutrition, Climate Change.

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Introduction

Food security has become an important determinant of our national security discourse since it has been made part/ constituent of our national security policy 2022-26 (Haq, 2022). Food Security which can be defined as access to sufficient, ample availability of essential food items for all the sections of the society in any polity is an important function of public policy. Food security is essential to all human beings for living a healthy, active and contented life as well as a measure of insurance against any shortage, disruption of food chain because of unforeseen situations such as droughts, famines, natural calamities, etc. In contrast to Food security, food insecurity refers to a situation where there is uncertainty or case of limited availability of adequate supply of food to certain or major portion of population. According to S. de Pee, Food secure status refers to a situation when all the people, at all times, have physical and economic access to sufficient, safe, reliable and nutritious food supply to meet their dietary needs and food preferences for an active and healthy life (Pee, 2013). The research on the notion of Food Security points to the following four factors as important determinants of a sound and efficient food secure system viz. the availability of food in a polity, an effective and ease of access to food, the utilization of food to meet dietary, nutritious requirements and lastly, the stability of food supply which is linked to livelihood security.

Food insecurity has been a constant trouble for our policy makers despite the fact that country ranks in top ten countries in the world in major cash/ staple crops in terms of production. The country has a huge agricultural infrastructure including massive irrigation networks, skilled human force, vast and the most fertile cultivable lands across the length and breadth of the country as well as institutional and legal framework to support and promote agricultural practices. More than thirty seven (37) percent of labour force of the country is involved in agricultural sector which speaks volumes of the historical and societal connect between the agriculture as a revenue generation entity but also as a common bonding point between the people and their attachment with the sector (Pakistan, 2022). However, problems such as damaged irrigation structures, lack of technological investments, absence of training and innovation for farmers and researchers and their linkages with agriculture industry leading to mal-nutrition, below par productivity impacting growth rate of the country, etc. are impacting the overall food security regime in the country. According to World Hunger Index, Pakistan stood at 102nd position amongst 128 countries ranked for the purpose and the rating is carried out by assessing indicators/ factors such as undernourishment, child stunting, child wasting, child mortality against each country (Index, 2024).

The above mentioned situation warrants a thorough examination of our food security framework including the policy/ institutional framework, the infrastructural arrangements in place for securing the goal of food secure Pakistan, the factors responsible for non-performance of certain areas in agriculture sector, the interests of various stake-holders and to assess their impact on the overall food security chain/ cycle. This research paper will identify and explore the challenges faced by main stake-holders, the cross-connects between various components in agriculture sector, and factors that impede in materializing the dream of food secure Pakistan and will propose sound and practical options/ recommendations for informed policy decisions.

Terms of Reference

The terms of reference for the study will be as follows:

- Undertake the situational analysis of food security regime in Pakistan
- Outline the policy/ institutional and infrastructural frameworks responsible for ensuring food security
- Evaluate the implementation strategies as to assess their strengths and weaknesses
- Examine and study some international best practices to contextualize lessons for Pakistan
- Propose practical and effective actionable insights for Policy makers for informed decisions
- Formulate an operational plan to achieve the desired objectives

Statement of the Problem

Despite the availability of a vast infrastructural and human capital, Pakistan has been faced with an acute and ever encompassing issue of food insecurity. This has resulted in slowing down economic growth and development at macro-level and malnutrition, food shortages, healthcare disarray and deprivation at micro-levels. This warrants examination and analysis of existing policy, institutional frameworks and infrastructural arrangements in place in agriculture sector for framing policy options for informed decision-making.

Scope of the Study

The Scope of the study will include a comprehensive analysis of legal, institutional and infrastructural frameworks in Agriculture and Food sectors responsible for ensuring food security in the country. It will also be an endeavor to understand the implementation of strategies, analyze the challenges and issue faced by the food security regime in the country. The study will be an endeavor to recommend practical policy options for achieving food security and self-sufficiency in Pakistan.

Significance of the Study

Ensuring food security is an insurance to development and improvement in growth rate in any polity. A close examination of existing policy and institutional frameworks as well as implementation strategies have proved to be ineffective in ensuring food security in Pakistan. The Food Security regime is based on unrealistic targets and goals as it fails to take into account possible investment scenarios in agricultural sectors, barriers to innovation through Research and development, the impact of climate change on crop patterns and productivity, the interests and outlook of key stake-holders and finally, its linkages with Health, GDP and development of the nation. This makes the examination of these implementation strategies significant in relation to provide action plans and policy options for respective stake-holders to address the issue in a more practical and integrated manner.

Literature Review

Effective policies, reliable and efficient institutional frameworks, realistic assessment and use of available infrastructures, aligning and integrating the interests of various stakeholders as well as robust and practical implementation of strategies ensure food security around the world. The Governments intervene in agriculture and food markets both as a matter of regulation as well as achieving the desired goals of policy; from inputs, outputs but also to market the products for international trade. The Government's intervention carries immense significance both for the government and public but also for market itself especially when it comes to ensuring food security. Therefore, the impacts and effects of the government's interventions, implementation strategies, etc. have been studied extensively. Rahman (2021) provides for a comparison of Pakistan with other regional countries such as members of SAARC as well as the average rating of food security vis-à-vis other developing countries. The analysis reveal that Pakistan is a food insecure country in relation to SAARC and other developing countries in Asia and Africa, etc. The study further states that Pakistan also fares poor in two of the most important pillars of food security paradigm viz. food availability and utilization as well as stability in supplies. The study points out malnutrition, unsafe water and sanitation facilities are the big hurdles in the front of achieving the best utilization profile. In (Ishaq, 2016), an exhaustive household expenditure survey has been conducted measuring the dietary consumption of energy as a measure of food security as well as the region wise incidence of food insecurity all across Pakistan. The results of the survey reflect food insecurity trends fluctuating across regions and it also underlines external shocks such as floods, earthquakes, global warming/ climate change and its impact on crop productions on food security regime.

The study posits that only sustainable solutions to protect both physical and economic access to food are required to cope up with food shortages, hunger and reduce threats/ vulnerability of shocks.

In (Ahmad, 2022), which applies the Foster, Greer and Thornback (FGT) index to estimate food and nutrition security dimensions through primary and secondary data in Pakistan, revealed that food utilization and sustainability of supply dynamics have destabilized and deteriorated in Pakistan. It further revealed that the non-farmers are more food insecure than farmers and this ratio has increased from 2008 to 2018. Food insecurity in terms of food availability and food accessibility has decreased. A holistic approach in public policies toward food security is essential to ameliorate the existing situation. Ahmad Ramay (2014) has observed in his study that the food, water and energy sectors are closely interlinked. And therefore, the policy frameworks shall be designed in a manner that harnesses both the essential sectors for ensuring food security in Pakistan. Hence, it is imperative that integrated policy approaches and strategies be adopted for achieving the desired goals of policy.

Research Methodology

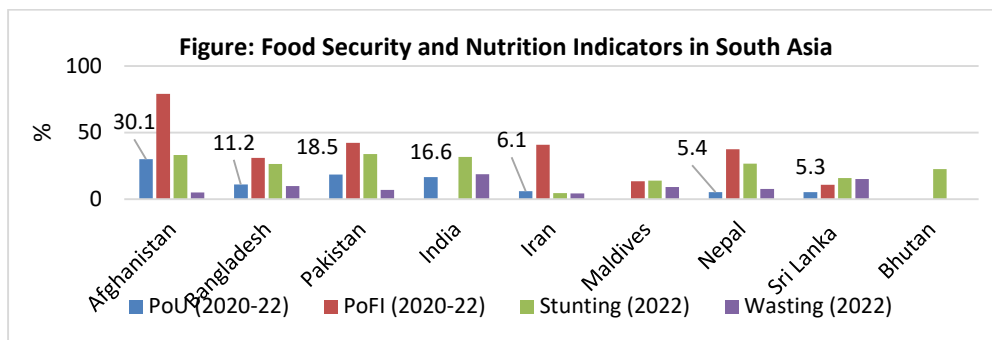
The data for this study was collected both from primary and secondary sources. Primary data include interviews of Public officials at Agriculture Department Khyber Pakhtunkhwa, Directorate of Livestock and Dairy Development, Directorates of Agriculture Research/ Extension and Fisheries Khyber Pakhtunkhwa. Secondary sources include analysis of legal instruments such as National Security Policy 2022-26, National Food Security Policy 2018, Provincial Agriculture Policies, National Tariff Policy 2019-24, etc. Articles/Policy briefs issued by PIDE, Ministry of Food Security and Agriculture, World Food Program, Food and Agriculture Organization, UNICEF, WHO, PARC, HDI/ Hunger Index, Economic Survey of Pakistan, Pakistan Labour Force Survey, Pakistan Bureau of Statistics and some publications of WTO as well as articles published in various renowned journals. The group adopted mixed methods research approach for carrying out the study. Strategic and Policy Planning tools such as PESTEL Analysis, Stake-holders Analysis, Cause and Effect Analysis, Gap Analysis and Logical Framework Matrix have been very meticulously used to arrive at practical and pragmatic policy and institutional remedial measures.

Situational Analysis

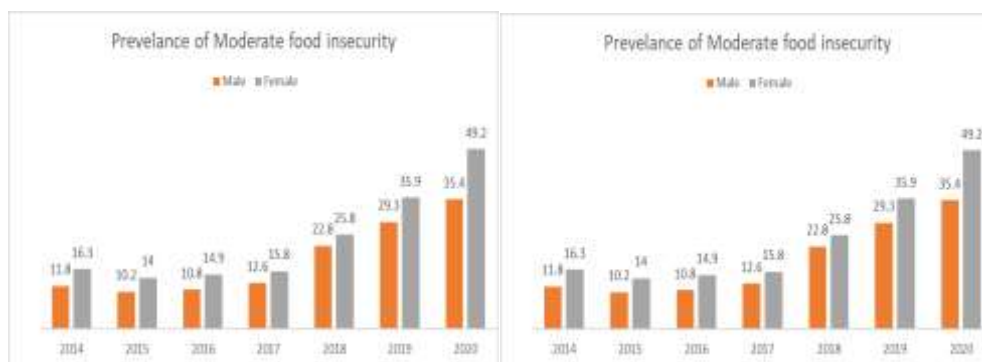
Agriculture sector constitutes as the largest sector of our economy in the sense of involvement of not only more than 38 percent of our labor force but also contributes more than 20 percent on average to national GDP (Finance, n.d.). However, the agricultural sector despite the availability of huge infrastructure and HR has failed to ensure food security in the country.

There is a huge potential of the country both in terms of agriculture/ livestock production. The country ranks 04th in Cotton production in the world, 5th in Sugar-cane, 09th in Wheat, 5th largest producer of milk, 03rd largest in Buffalos (hides/ skin), etc. However, every year the nation is faced with acute shortages specially in wheat and sugarcane impacting real-time food security in the country (FAO, 2024).

As a result of food insecurity which is caused by several factors such as production distribution, climate change and natural disasters, massive urbanization, Pakistan's nutrition, health and other principal indicators have fared poor vis-à-vis other nations. The country ranks 102 out of 128 countries on International Hunger Index (Index, 2024). Other indicators also point to below par performance in the benchmarks set by the World Health Assembly (WHA) and SDGs. The prevalence of stunting in the country ranks highest in the region, underscoring a critical area for attention. Furthermore, the country stands second only to Afghanistan in the prevalence of undernourishment (PoU) and prevalence of moderate or severe food insecurity (PoFI) (Figure 2).



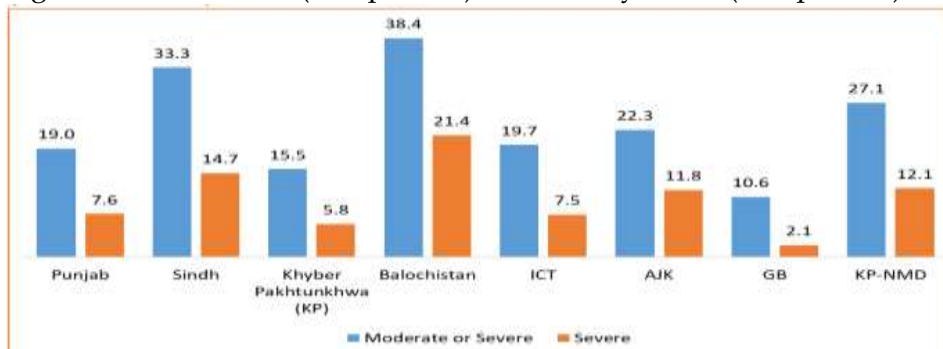
It is noteworthy that food insecurity has increased in Pakistan over the course of time. Food insecurity is more evident in women in comparison to men.



Source: FAO Database

The prevalence of moderate or severe food insecurity is highest in Baluchistan (38.4 percent) followed by Sindh (33.3 percent) and by the Newly Merged Districts of KP.

The prevalence of severe food insecurity also follows the same trend and is highest in Baluchistan (21.4 percent) followed by Sindh (14.7 percent).



Source: FAO Database

Legal Framework of Food Security in Pakistan

National Food Security Policy 2018

The legal framework ensuring food security in Pakistan is multifaceted, consisting of various laws, regulations, and policies at both the federal and provincial levels. The National Food Security Policy of 2018 serves as a comprehensive strategy aimed at guaranteeing food security for all segments of the population. It delineates a roadmap for achieving this goal through measures such as agricultural development, price stabilization, and the provision of safety nets. However, the policy has yet to be fully materialized due to changes in government, and the incumbent government has not fully adopted it.

Provincial Agriculture Policies

Provincial governments have developed their own agriculture policies tailored to the specific needs and circumstances of their regions. These policies, such as the Agriculture Policy 2018 in Punjab and the Agriculture Policy (2015-25) in KP, outline strategies and programs for the advancement of the agriculture sector. They address various issues, including crop production, land utilization, water management, and the adoption of technology (FAO, Agriculture Policy - Khyber Pakhtunkhwa - A Ten-Year Perspective, n.d.).

Other Laws

Laws such as the Seed Law of 1976 and the Seed (Business Regulation) Rules of 2016, the Agricultural Pesticides Ordinance of 1971, Pakistan's Prevention of Cruelty to Animals Act (1890), the Halal Authority Act (2015), Pure Food Ordinance of 1960, the Cantonments Pure Food Act of 1966, and the Pakistan Hotels and Restaurants Act of 1976 are also part of the legal framework.

Other laws, such as land tenure laws, including the Agricultural Produce (Grading and Marketing) Act of 1937 and the Land Reforms Regulation of 1972, the Pakistan Water and Power Development Authority Act of 1958, the National Tariff Policy 2019-24, and the Strategic Trade Policy Framework 2020-25, further contribute to food security efforts (Shah, 2020).

Pakistan is a signatory to various international agreements and treaties related to food security, trade, and agricultural development, including agreements under the World Trade Organization (WTO). Following the devolution of agriculture post the 18th Constitutional Amendment, coordination challenges have arisen between the federal and provincial governments. This has affected the setting of uniform and profitable support prices, with differing policies across provinces leading to market instability and inflation in food prices.

An initial assessment of all relevant federal and provincial laws on food security, agricultural extension, and regulatory frameworks reveals that most of these laws have been framed without taking into consideration the positions and interests of various stakeholders, including farmers, associations, and support organizations such as FAO, WFP, etc. Moreover, no inherent linkages have been established to augment the work and implementation of policies and strategies through the respective institutional frameworks (Schilizzi, May 2012). One of the findings from various writings on the subject, as well as interviews with officials of the Agriculture and Livestock Department, is that policy assessments are rarely carried out by the relevant stakeholders, especially at the levels that require specific attention in terms of geography, population's economic and social activities, poverty, availability of required resources, political attention, and agricultural practices. For example, areas in Baluchistan and Khyber Pakhtunkhwa are often overlooked in assessment exercises, resulting in policies that lack universal coverage and appeal.

Institutional Framework(s) of Food Security Regime

An institutional analysis of the agriculture sector in Pakistan involves examining the various organizations, government bodies, and entities that play crucial roles in shaping agricultural policies, practices, and outcomes (MoNFSR, 2024). An overview of key agricultural institutions in Pakistan is as follows:

Ministry of National Food Security and Research

The Ministry of National Food Security & Research is primarily responsible for policy formulation, economic coordination, and planning regarding food grain and agriculture. It is responsible for the overall coordination of policies related to agriculture and food security in Pakistan.

It also works on strategies for enhancing agricultural productivity, ensuring food safety, and promoting sustainable practices.

Provincial Agriculture Departments

After the 18th Amendment, each province in Pakistan has its own Agriculture Department. The provincial agricultural departments prepare their own provincial agricultural policies. These provincial setups are responsible for implementing and regulating agricultural policies and programs at the provincial level. These departments oversee crop management, pest control, price control, and extension services.

Pakistan Agricultural Research Council (PARC)

PARC is the apex agricultural research organization in Pakistan. It undertakes, promotes, and coordinates agricultural research. It also helps farmers in utilizing research results. In order to boost the research culture in agriculture, PARC trains high-level scientific personnel. The main areas of research include crops, livestock, and agro-based industries. It also conducts research to improve agricultural practices and technologies.

Agriculture Credit Institutions

Various agricultural development banks, particularly Zarai Taraqati Bank Limited (ZTBL) and Khushali Bank, provide financial support to farmers through credit facilities and technical know-how. These institutions help farmers access the necessary funds for agricultural inputs.

Pakistan Agricultural Storage and Services Corporation (PASSCO)

PASSCO plays a crucial role in maintaining food security by conserving strategic reserves of food commodities. It manages the procurement and storage of grains.

Pakistan Council of Research in Water Resources (PCRWR)

PCRWR focuses on water resource management, which is critical for irrigation and agriculture. It provides data and research on water quality and availability.

Provincial Agriculture Marketing Boards

Each province has its own marketing board responsible for the regulation and promotion of agricultural marketing. These boards determine the cost of production for preparation of production and price policies and fixation of prices. These boards also coordinate with the Pakistan Tobacco Board, Sugarcane Control Board, financial institutions, agricultural research and crop reporting services, and farmers' organizations in relevant matters. These boards facilitate the marketing of agricultural products.

Agricultural Census Organization

The Agricultural Census Organization conducts agriculture-related censuses in Pakistan to fulfill the requirements of the Agricultural Census Act of 1958. The Agricultural Census, Livestock Census, Agricultural Machinery Census, and Mauza/Village Census are the main activities of ACO. This data is used for policy formulation and resource allocation.

Provincial Agricultural Extension Services

New technologies are developed through research for development in the agriculture sector, but these technologies can only be effective if they reach the end users and are applied accordingly. Each province has its own extension service responsible for disseminating information and best practices to farmers. These services play a vital role in educating and training farmers.

UN Agencies

As a member of the United Nations, Pakistan has committed itself to achieving the Sustainable Development Goals, specifically SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being). SDG 2 and SDG 3 share the objective of eliminating hunger, attaining food security, enhancing nutrition, promoting sustainable agriculture, and ensuring the overall health and well-being of citizens of all ages. FAO, UNICEF, and UNDP provide consultancy and capacity-building services in areas related to food security.

Benazir Nashunuma Program

The Benazir Nashunuma Program is a public sector health/nutrition program aimed at minimizing malnutrition in women and children facing acute deficiencies in essential food requirements (MoPASS, 2024). The objectives of the implementation strategies include preventing stunting in children under two years of age, improving weight gain, reducing anemia, and preventing low birth weight, etc.

The program aims to address stunting among pregnant and lactating women (PLW) and their children under two years of age by providing an additional cash benefit of PKR 2,000 per quarter for each PLW and boy child, and PKR 2,500 per quarter for each girl child of BISP beneficiary families. In return, mothers must commit to attending regular antenatal health checks and awareness sessions during pregnancy, consuming specialized nutritious food (SNF), and taking their children for immunization and regular health checks (MoPASS, 2024).

A study of the program's implementation in District Khyber, based on data from the DHO Office and Coordinator of the Nashunuma Program, reveals that around 28,156 women and 21,525 children have benefited from the program.

While this is a significant achievement in a place like Khyber, it is modest considering the population of 1.2 million, of which women constitute more than 46 percent and live in some of the most impoverished areas. The data and findings indicate an absence of linkages with ancillary programs, the non-utilization of LHWs for the program, a lack of awareness campaigns, and, most importantly, the absence of any assessment or impact studies. These issues reveal that the implementation strategies lack coherence, synergy, focus, and prioritization.

Impact of Fertilizer Subsidy in Pakistan

One of the key strategic interventions to boost agricultural production is the subsidized availability of fertilizers to farmers in Pakistan, especially in Punjab and Sindh. As a result of the fertilizer subsidy, more than 60% of farmers increased their fertilizer application. This increased fertilizer application has positively impacted the yield of two of the most important food crops, wheat and rice, as well as household income levels (Ali, 2019, 11(19)). Wheat yields have increased to 65-71 kg per hectare, while rice yields have reached 34-43 kg per hectare.

The initial results have been encouraging for the government over the policy. However, in the absence of a solid knowledge base, training, access to machinery, and guidance, the fields have suffered in terms of production and fertility levels due to the excessive use of fertilizers. Furthermore, it has resulted in the loss of natural/local practices that used to preserve the fertility and richness of the soil.

The fertilizer subsidy program needs to be linked with training from extension workers and other agricultural agents on the four principles (4Rs) of fertilizer application: the right fertilizer source, the right rate, at the right time, and in the right place.

Wheat Support Price

Another important implementation strategy for the government to support relevant stakeholders, such as farmers, in boosting productivity and ensuring food security in the country is the Wheat Support Price. To ensure a steady supply of agricultural commodities, especially wheat, the Ministry of National Food Security and Research, upon receiving approval from the ECC, declares the support price. The Pakistan Agricultural Storage and Services Corporation (PASSCO) then purchases wheat at this minimum support price (MSP). This pricing is determined by the surplus or deficit of wheat supply in Pakistan. Through the MSP, farmers receive equitable compensation for their crops, enabling them to invest in agricultural production (Jalil, 2020).

However, decentralization has presented significant challenges for the MNFSR in establishing a consistent and profitable support price, as it no longer holds authority over this issue, which now falls under provincial jurisdiction. For example, in 2022, the MNFSR had to set the profitable support price for wheat at 3900/40 kg merely to align with the price of 4000/40 kg announced by the Sindh government, leading to increased inflation in food products (Abdullah, 2022). The MSP is not aligned with domestic prices but is rather a byproduct of a non-existent National Food Security Policy 2018. Moreover, it discourages farmers from diverting their attention to other profitable cash crops. The MSP only helps a small percentage of farmers in reality, with 80 percent or more having no information or access to it.

Situation of Malnutrition in Children

Pakistan has a higher prevalence of stunted children than any other country in South Asia, even surpassing Afghanistan. The burden of stunted children in Pakistan is estimated at 12 million, making it the third highest in the world (FAO, The State of Food Security and Nutrition in the World (Global SOFI), 2023). The country faces a triple burden of malnutrition, characterized by rising rates of childhood obesity, alongside increased micronutrient deficiencies (Table 1).

Table 1: Nutritional Status of Children (under five years of age) (Percent)

Indicators	National	Punjab	Sindh	KP	Balochistan	KP-NMD	AJK	GB
Underweight	28.9	23.5	41.3	23.1	31	33.7	21.9	21.3
Stunting	40.2	36.4	45.5	40	46.6	48.3	39.3	46.6
Wasting	17.7	15.3	23.3	15	18.9	23.1	16.1	9.4
Anemia	53.7	52.1	51.1	39.2	29.4	68.3	55.7	26.9

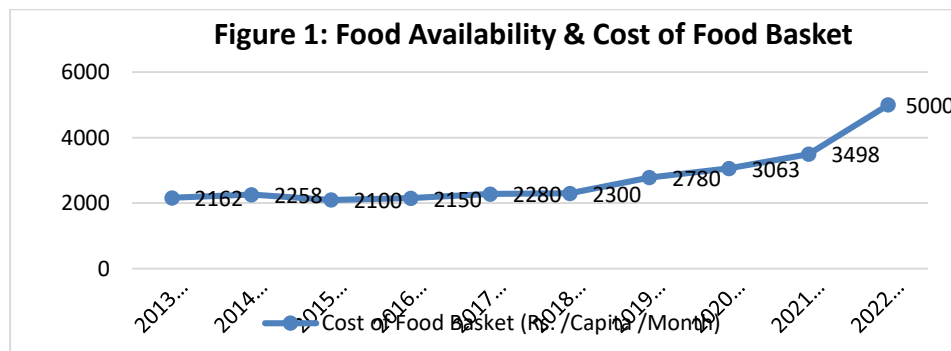
Source: National Nutrition Survey 2018

According to the National Nutrition Survey 2018 (the latest available national-level survey), the prevalence of stunting in Pakistan is 40.2 percent. Stunting is slightly more prevalent in boys (40.9 percent) compared to girls (39.4 percent). The prevalence is significantly higher in rural areas (43.2 percent) compared to urban areas (34.8 percent). In terms of age distribution, stunting is lowest (28.6 percent) at 0 to 5 months of age and highest (46.6 percent) at 18 to 23 months of age. This suggests that stunting in newborns likely increases with exposure to environmental factors such as poor WASH (Water, Sanitation, and Hygiene) conditions and a lack of a healthy diet. Stunting is highest (51.4 percent) among children from households in the poorest quintile (WHO).

Similar trends are observed in other indicators of children's health. As mentioned, one of the reasons for the poor nutritional status of children is inadequate WASH conditions. Therefore, it seems appropriate to analyze the latest WASH conditions.

Out of 20.5 million children under the age of five in Pakistan, 71.6% live in rural areas. About 24.9% of children benefit from pipe-borne drinking water; 15.5% of children have toilets connected to the public sewerage system; 62.6% of children have mothers with no education; and 50.5% of children live in households with three or more children. It appears that 57.5% of children are at high risk of poor water and sanitation, compared to only 1.3% of children at low risk. Approximately 69.9% of children in rural areas are at high risk, compared to 24.6% of children in urban areas (Murtza et al., 2021).

Over the past ten years, from 2013 to 2023, the availability of per capita calories has increased from 2,484 to 2,567 kcal/day. However, due to food inflation, the cost of purchasing the basic food basket has risen substantially. The Planning Commission of Pakistan estimated that the cost of the food basket to meet basic caloric needs was PKR 3,498 per person/month in 2021-22, and it increased to PKR 5,000 in 2022-23 (MoPD&SI).



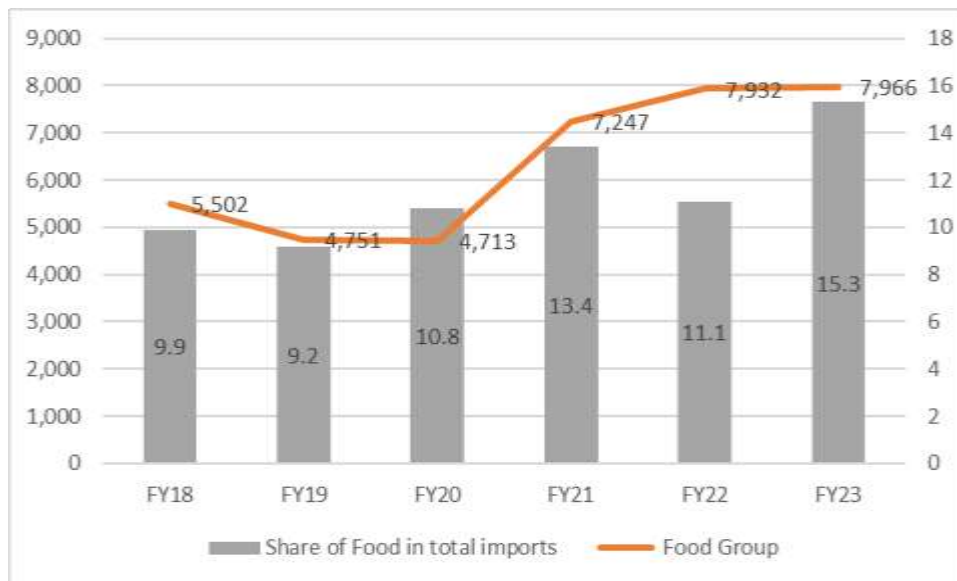
Source: Ministry of Planning, Development and Special Initiatives

The main reason for the increase in the cost of the food basket is the ever-rising food inflation in Pakistan. Food inflation sharply rose, reaching 48% in May 2023; however, it has decreased to some extent, reducing to 29% in December 2023, which has impacted household budgets.

Although there are numerous causes of food inflation in Pakistan, some of the key factors are highlighted below:

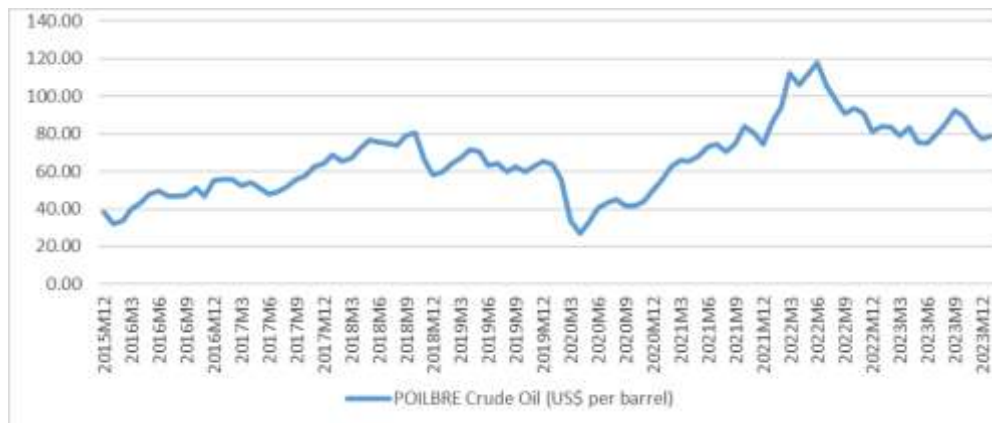
1. Increasing import of food items
2. Rising prices in commodity markets
3. Currency depreciation
4. Impact of floods in 2022/Climate change

Increasing import of food items and unfavorable global conditions

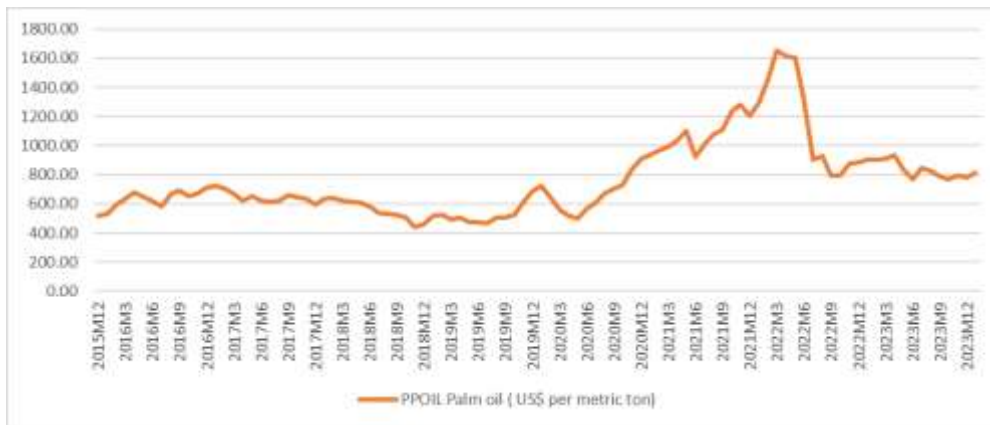


Source SBP

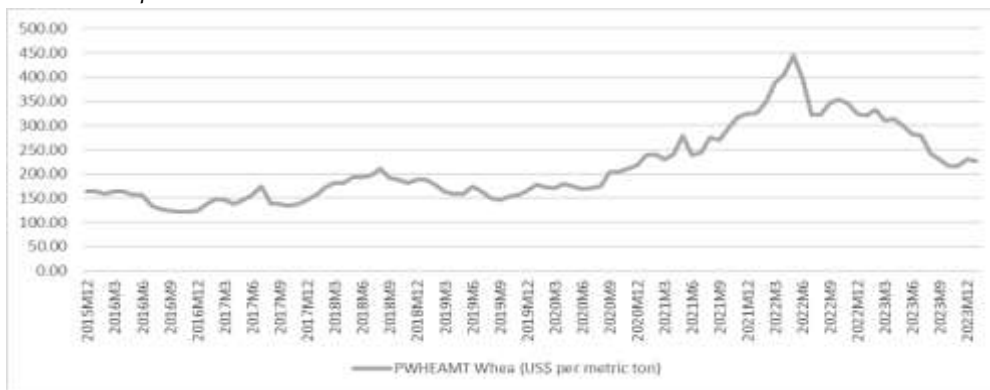
In Pakistan, the share of food items in total imports was 9.2% in 2019, but it has jumped to 15.3% in 2023. Since 2021, we have been importing more than 7 billion USD worth of food items. In FY 2023, major imports from the food group include palm oil (USD 3.3 billion), wheat (USD 958 million), pulses (USD 748 million), and tea (USD 495 million) (State Bank of Pakistan). However, due to supply disruptions, prices of commodities in the international market are witnessing an upward trend.



Source IMF pink sheets



Source IMF pink sheets



Source IMF pink sheet

Recent attacks by the Houthis in the Red Sea are also putting pressure on international trade, as approximately 12% of global trade and 10% of maritime oil pass through the Red Sea (Keating, 2024). It is expected that global inflation will experience a 5% to 10% increase due to this disruption (STAFF, 2023).

Issues in Nutrition and Food Security

Addressing malnutrition presents multifaceted challenges that span household, societal, and systemic realms. Key issues and challenges impacting efforts to combat malnutrition include:

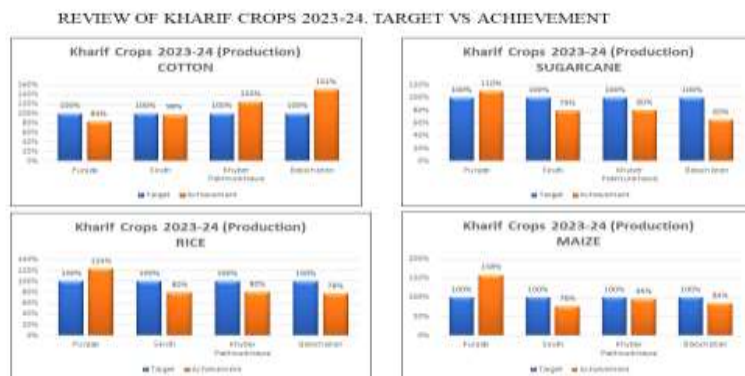
- Insufficient cooperation across various sectors to address malnutrition comprehensively, along with limited availability and allocation of public resources for implementing robust nutritional programs, as total health expenditure accounts for only 2-3% of GDP.
- Lack of comprehensive and up-to-date data on nutritional status, hindering timely and informed decision-making, particularly for emergency preparedness and response.

- Persistent poverty, inequality, poor sanitation and hygiene, and a high prevalence of diseases, which contribute significantly to malnutrition rates and perpetuate the cycle.
- Suboptimal child feeding practices, compounded by inappropriate, aggressive, and unregulated marketing of unhealthy processed foods, including breastmilk substitutes.
- Increasing population growth and a large number of out-of-school children, contributing to early marriage and teenage pregnancy, thus perpetuating the intergenerational cycle of malnutrition.
- Climate vulnerabilities and the economic situation, which significantly affect food security and the nutrition situation in the country.

Agriculture and Livestock Production

The agriculture sector, contributing 22.9% to GDP and 37.4% to employment generation, plays a critical role in ensuring food security and providing raw materials to the industrial sector (Finance, n.d.). It is also a source of foreign exchange earnings and crucial for sustainable growth. However, in recent years, the country has faced climatic shocks that have adversely affected the performance of the agriculture sector. This sector's productivity is highly sensitive to the frequency of adverse climatic events such as floods, droughts, abnormal heat waves, rainfall irregularities, and glacial melt. Thus, flood hazards and climate change have severely impacted human, socio-economic, and politico-cultural domains.

To understand this in more detail, the main crops of the country, their production mechanisms, their impact on ensuring self-sufficiency for national requirements, and their contribution to enhancing agricultural exports will be discussed.



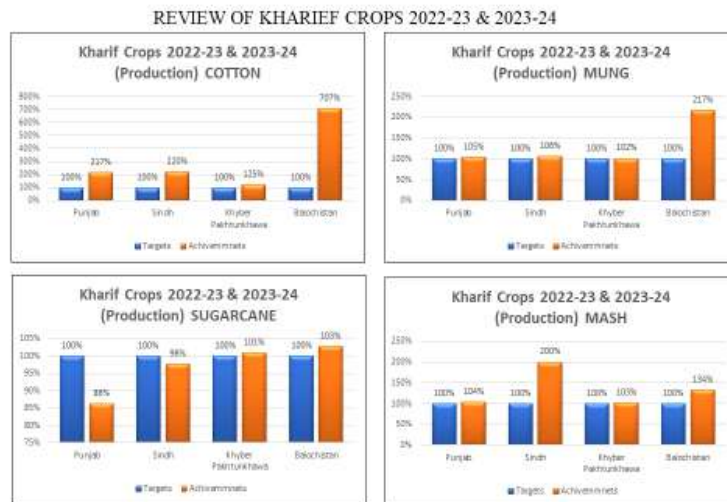


Figure I (Source: Ministry of National Food Security and Research, Pakistan)

Wheat

During July-August 2022, Pakistan witnessed an unprecedented episode of torrential rains followed by flash flooding that primarily damaged the two main subsector crops and livestock. Wheat production recorded 27.63 million tonnes compared to 26.21 million tonnes last year, showing an increase of 5.4%.

Sugarcane

Sugarcane production for 2023-24 is estimated at 78.5 million tons from an area of 1.17 million hectares, compared to 87.98 million tons from an area of 1.3 million hectares. Hence, production decreased by 10.7% compared to last year and by 0.07% against the target. The targets and estimated production of sugarcane for 2023-24 are shown in Figure I, whereas a comparison of Kharif 2023-24 with Kharif 2022-23 is also shown in Figure I.

Rice

Rice production for 2023-24 is estimated at 9.35 million tons from an area of 3.6 million hectares. In the year 2022-23, rice production was reported at 7.3 million tons from an area of 2.97 million hectares. This production level reflects an increase of 27.76% compared to last year and 3.46% over the target. The targets and estimated production of rice for 2023 are shown in Figure I, whereas a comparison of Kharif 2023-24 with Kharif 2022-23 is also shown in Figure I.

Maize

Maize production for the year 2023-24 is estimated at 11.3 million tons from an area of 1.8 million hectares. In the year 2022-23, maize production was reported at 10.98 million tons from an area of 1.72 million hectares. This production level reflects an increase of 3% compared to last year and a 49.7% increase over the target. The targets and estimated production of maize for the year 2023-24 are shown in Figure I, whereas a comparison of Kharif 2023-24 with Kharif 2022-23 is shown in Figure I.

Mung

Mung production for the year 2023-24 is estimated at 143.65 thousand tons from an area of 198 thousand hectares. In the year 2022-23, mung production was reported at 134.99 thousand tons from an area of 218 thousand hectares. This production level reflects an increase of 6.4% compared to last year. However, it is a 20% decrease compared to the target. The targets and estimated production of mung for the year 2023-24 are shown in Figure I, whereas a comparison of Kharif 2023-24 with Kharif 2022-23 is shown in Figure I.

Mash

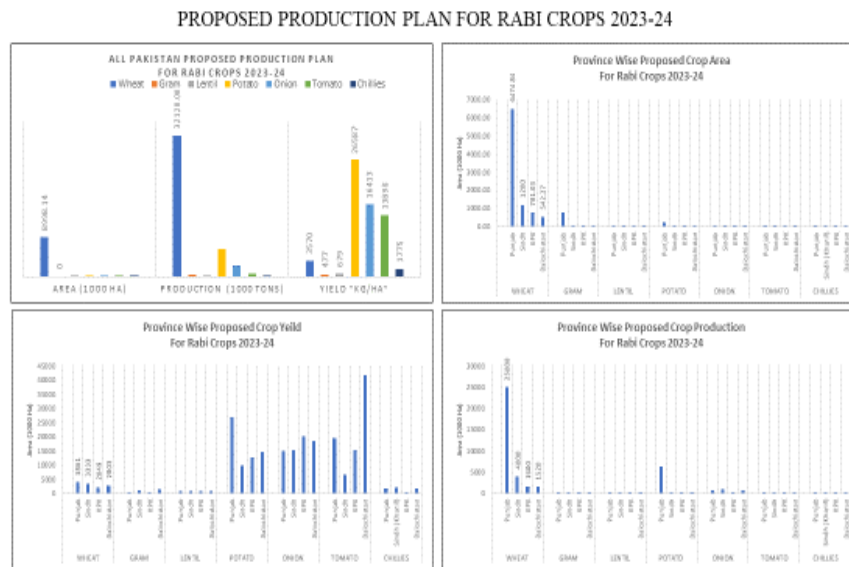
Mash production for 2023-24 is estimated at 5.26 thousand tons from an area of 6.94 thousand hectares. In the year 2022-23, mash production was reported at 4.24 thousand tons from an area of 6.96 thousand hectares. This production level reflects an increase of 24.16% compared to last year. However, there is a 53.47% decrease compared to the target. The targets and estimated production of mash for the year 2023-24 are shown in Figure I, whereas a comparison of Kharif 2023-24 with Kharif 2022-23 is shown in Figure I.

Cotton

Cotton production for 2023-24 is estimated at 11.5 million bales from an area of 2.4 million hectares. In the year 2022-23, cotton production was reported at 5.1 million bales from an area of 2.15 million hectares. This production level reflects an increase of 126.6% compared to last year. However, there is a 9% decrease compared to the target. The targets and estimated production of cotton for the year 2023-24 are shown in Figure I, whereas a comparison of Kharif 2023-24 with Kharif 2022-23 is shown in Figure I.

Oilseed

For oilseed crops, production targets for the year 2023-24 are respectively fixed at 207 thousand tons for canola, 186 thousand tons for sunflower, and 648 thousand tons for rapeseed/mustard, from an area of 109 thousand hectares, 91 thousand hectares, and 435 thousand hectares. Both area and production targets for canola and sunflower are set based on the recommendations of the National Oilseed Enhancement Program (NOEP).



(Source: Ministry of National Food Security and Research, Pakistan)

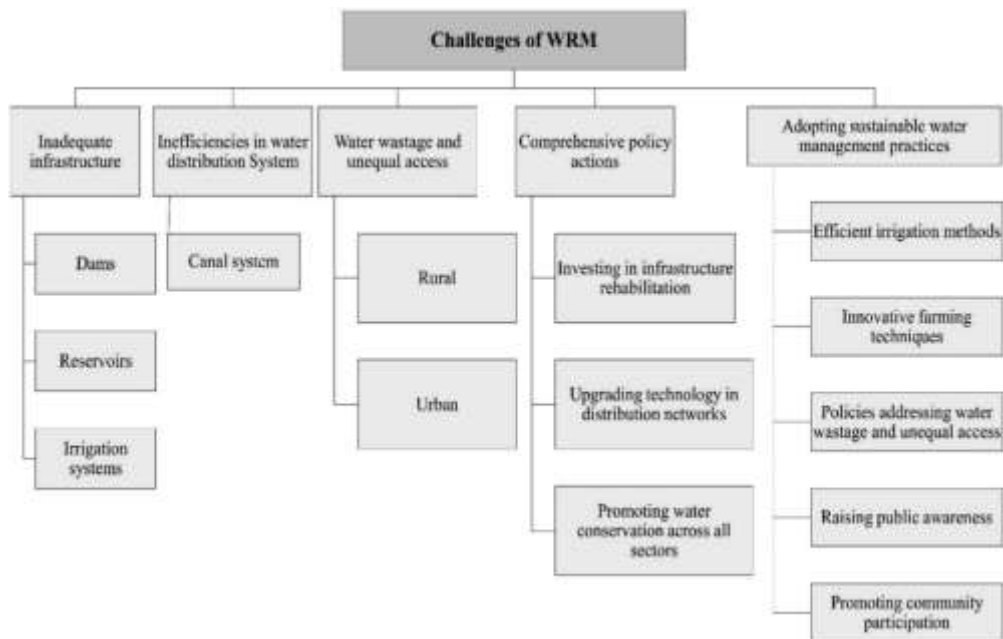
Effective Land Utilization

The demand for food products is increasing with the rise in population, as evidenced by a three-fold increase in population growth from 1972 to 2017, while agricultural production has shown only nominal growth. Around 20% to 40% of agricultural land has been converted into residential areas due to the spread of cooperative housing societies. Additionally, there is insufficient consideration for the efficient use of remaining agricultural land, which could lead to a reasonable increase in agricultural productivity. Furthermore, no holistic approach to preserving available land has been adopted (Zahoor, 2023).

Despite having abundant water resources, millions of Pakistanis still lack secure access to water. Pakistan is blessed with significant water resources, particularly through the Indus Basin Irrigation System, which has an annual flow of 146 million acre-feet (MAF), of which 106 MAF is diverted to canals. However, 40 MAF is wasted and flows into the sea. The Indus Basin contributes more than 25% of Pakistan's GDP, providing a critical water supply to almost 90% of the country's food production crops (IRSA, 2024).

Challenges in Water Resource Management

The challenges in water resource management contribute to ineffective land use and exacerbate food shortages.



(Ahmed, 2023)

Gaps in Utilization of Water Resources and Their Impact on Urbanization and Food Security

The gaps in the utilization of water resources will lead to urbanization and food insecurity. The gaps are highlighted as follows: Unplanned urbanization and its associated sprawl go hand-in-hand with environmental degradation. Deforestation, land erosion, and unsustainable land-use practices weaken the natural environment's ability to cope with stresses like extreme weather events, leading to increased risks of flooding, landslides, and water scarcity. This, in turn, amplifies the vulnerabilities of communities residing in these rapidly expanding urban landscapes, and all these factors contribute to food insecurity. This suggests that an additional 20.39 million acres can be brought under irrigation for agricultural purposes through infrastructure enhancement (Khan, 2021).

Balance between Construction of Housing Societies and Agriculture

One of the main debates concerning food security in Pakistan revolves around the continuous encroachment on agricultural and fertile lands due to massive urbanization, which is driven by the boom in construction of housing societies. This boom has been caused by various factors, including the massive increase in population, poorly planned and disorganized urbanization in all mega urban areas of the country, the demand for housing units, and the availability of essential utilities in urban areas to cater to the needs of the emergent middle/earning classes in rural areas.

The results of Pakistan's first-ever Digital Population and Housing Census 2023 show a massive increase in population across the country, with a shrinkage of population in rural/agricultural areas. For instance, the urban population comprised only 32.8% in 1998, which has now increased by six percentage points to almost 39%. Meanwhile, the rural/agricultural population has shrunk from 68% to 61.7%. This shift is a push-and-pull factor for the construction of these societies, creating a demand for housing units for incoming residents from rural areas (Gondal, 2023). This phenomenon, supported by government policies (for revenue generation) through tax exemptions, subsidies, etc., has a massive impact on the country's food security. It is estimated that due to massive urbanization, population explosion, and the construction of housing societies, the country has lost between 20% to 40% of agricultural land to residential areas over a span of 45 years, from 1972 to 2017 (Zahoor, 2023). The arrival of people from rural areas and the population explosion in urban areas has created a massive demand for housing units, which, according to a study, has increased to 800,000 units per year, while there is still a shortage of 350,000 per year (Zahoor, 2023).

The dearth of proactive and realistic legislation on urban planning, managing urbanization, and agricultural production has a direct bearing on the food security/insecurity paradox in the country. The absence of a sound urban policy on land use, building control, urban agriculture, and, most importantly, master plans for mega-cities has a direct bearing on health, nutrition, and food security in the country. Due to the lack of focus and attention to such policy gaps and implementation regimes, massive changes have been observed in food security matters, land use due to the construction of these societies, and the loss of biodiversity – ultimately threatening food security by converting natural areas into built-up areas. The loss of urban agriculture, resulting from these massive housing activities in the absence of proactive and effective land use and building control policies, has a direct bearing on the food security/insecurity paradox (Anwar, 2023). Research has shown that the massive population bulge, urbanization, and construction of these ill-planned housing societies on agricultural lands have increased pressure on the demand side (production), and it is believed that non-farmers, especially people in urban areas, are more food insecure than farmers (Ahmad, 2022).

Reduction of Food Shortages and Food Self-Sufficiency

Compared to a few decades ago, the challenges of reducing global poverty and food insecurity are becoming increasingly complex. The current obstacles to achieving food security include fluctuations in food prices combined with rising energy costs, the effects of climate change, and uncertainties in the financial markets (FAO, Climate change and food security: risks and responses, 2015).

Pakistan's food shortages are caused by a complicated web of interrelated factors that impact agricultural output, distribution, and accessibility throughout the nation. The agriculture sector's low production, which is hampered by a number of issues, is one major factor. These include antiquated farming methods that don't maximize yields, low-quality seeds, and a lack of modern machinery. Food shortages are further exacerbated by Pakistan's vulnerability to the negative effects of climate change. Droughts, floods, and heat waves are examples of extreme weather events that interfere with agricultural production, causing crop failures and lower harvests. These factors lead to a rise in the prevalence of hunger, particularly in the least developed nations. Nearly half of the population of Pakistan, the second-largest country in South Asia, still struggles with hunger and food insecurity (Sajid Ali, 2017).

In 2020, Pakistan encountered a diverse landscape of demand-supply dynamics across various food commodities. Wheat, pulses, and vegetables suffered from shortages, with supply deficits of -7.00%, -21.00%, and -55.40%, respectively. The deficit was particularly stark for edible oils, registering at -336.80%, indicating a substantial shortfall compared to demand. Conversely, rice, fruits, and milk showcased surpluses, with supply surpassing demand by 40.90%, 33.20%, and 43.90%, respectively. Meats also exhibited a slight surplus, with a gap of -3.00%, indicating a marginally higher supply than demand. Notably, maize faced a significant shortage, with a gap of 92.10%, indicating a substantial deficit in supply compared to demand.

These varied patterns highlight the complex challenges in ensuring food security in Pakistan, calling for targeted interventions to address deficits in production, distribution, and access across different food sectors. Efforts to enhance agricultural productivity, improve supply chain efficiency, and promote sustainable practices are essential to bridging these gaps and ensuring adequate food availability for the population (Ahmad T. S., 2022).

Food shortages in Pakistan are exacerbated by insufficient water management, heavy reliance on primary crops, restricted food availability in rural areas, and economic challenges like poverty and income inequality. Dependence on food imports and fluctuating global prices worsens the situation. Political factors and inadequate funding in agriculture also contribute. Addressing these problems requires comprehensive strategies, including improved water management, agricultural reforms, poverty reduction efforts, and collaboration between stakeholders. Supporting smallholder farmers, investing in infrastructure, and implementing policies for family planning and socioeconomic development are essential steps toward achieving food security.

Food Demand- Supply Gaps (% of Prod.)									
Year	Wheat			Rice			Maize		
	Demand	Supply	Gap(%)	Demand	Supply	Gap(%)	Demand	Supply	Gap(%)
2020	30.00	28.00	-7.00	3.39	6.60	40.90	0.26	3.34	92.10
	Edible Oils			Pulses			Vegetables		
	Demand	Supply	Gap(%)	Demand	Supply	Gap(%)	Demand	Supply	Gap(%)
2020	2.97	0.62	-336.80	1.97	1.63	-21.00	16.29	10.48	-55.40
	Fruits			Meats			Milk		
	Demand	Supply	Gap(%)	Demand	Supply	Gap(%)	Demand	Supply	Gap(%)
2020	5.13	7.69	33.20	3.38	3.72	-3.00	25.44	45.35	43.90

(Masood, 2014)

Food Security as a National Security Concern

Food security is also a national security concern due to the potential for social unrest from food price spikes or shortages, which could lead to tensions between provinces. The federal government must maintain its role in policy coordination and national-level planning, despite provinces taking on greater responsibilities in agriculture since the 18th amendment. Collaboration and accountability among all stakeholders are crucial to addressing these challenges effectively.

Analysis

PESTEL Analysis of Food Security

In Pakistan, the political landscape significantly influences the agriculture sector, with the government providing crucial subsidies and support. Political stability and security, particularly in rural areas, are vital for ensuring uninterrupted farming activities. Moreover, international trade relations and import policies play a significant role in shaping the availability and prices of agricultural inputs and products, impacting farmers' profitability. Additionally, government food aid and assistance programs are essential for addressing food security issues in the country.

Economically, Pakistan faces challenges such as high poverty rates and income inequality, affecting consumers' purchasing power and investment in agricultural inputs. Inflation and rising food prices add to production costs, while the country's reliance on imports for certain agricultural inputs exposes farmers to global commodity price fluctuations. Exchange rate fluctuations further complicate matters, influencing the cost of imported inputs and the competitiveness of Pakistani agricultural exports. Food price inflation has emerged as a major challenge in Pakistan's economy as well as on a global level in recent years. Sharp rises in food prices have increased the cost of living, which particularly hurts the poor, as they spend more than 60 percent of their income on food (Awan, 2015).

Social factors also play a crucial role in Pakistan's agriculture sector. The country's high population growth and large household sizes present challenges for resource management and food security. Cultural preferences for specific crops and foods influence agricultural production and market demand, while high rates of malnutrition and stunting underscore the need for targeted interventions to improve nutrition outcomes. The nexus of concentrated power, land ownership, unequal land distribution, and the state's inability to protect the rights of farmers has been a source of low agricultural productivity. Despite the agriculture sector's critical importance to growth, exports, and food security, it faces many challenges that lower agricultural yields (Satta, 2012). Education levels, particularly in rural areas, impact farmers' adoption of modern techniques and access to market information.

Technologically, Pakistan lags behind in the adoption of modern farming techniques, which hampers productivity and efficiency. Poor infrastructure for storage, processing, and transportation contributes to post-harvest losses and limits market access for farmers. Limited access to market information, especially in rural areas, further inhibits farmers' ability to make informed decisions. Agriculture largely depends on better infrastructure, the flow of information, quality inputs, the availability of funds, and farmers' managerial capabilities (Faiz Ahmad, 2013).

Legally, regulations around land ownership and tenancy rights shape land use patterns and investment decisions in agriculture. Compliance with food quality and safety standards is crucial for Pakistani agricultural products to access domestic and international markets. Intellectual property laws related to seeds also affect farmers' access to improved varieties and technologies. Laws and regulations for irrigation, soft loans, and other microfinance credit schemes for farmers are complete but need to be reviewed. Agriculture policymaking is a challenging task; it necessitates a thorough understanding of agricultural economics, sociology, political science, law, and the technical aspects of agriculture on the part of policymakers. To make policy decisions, reasonable accuracy and sufficient data are also required (Soomro, 2022).

On the environmental front, water scarcity and poor irrigation infrastructure pose significant challenges to agricultural productivity. Degrading soil quality and land resources threaten the sector's long-term sustainability, while climate change impacts such as heatwaves, floods, and pest attacks further worsen these challenges. There is a need to educate farmers on using new varieties with adaptive capacity to climate change and on crop management practices, ultimately leading to higher crop income from the land. To achieve this, extension staff can arrange training programs for farmers. Investing more in agriculture would increase food security in the country (Tariq, 2014).

In navigating these complexities, Pakistan's agriculture sector continues to strive for resilience and sustainability, addressing both internal and external factors to ensure food security and economic stability for its populace.

Causes and Effect Analysis (Ishikawa Approach) of Food Security in Pakistan

Achieving food security in Pakistan poses a multifaceted challenge, influenced by diverse factors impacting agricultural productivity and supply chains. A prominent obstacle involves the plateauing of crop yields, indicating that despite efforts to enhance production, output isn't expanding rapidly enough to satisfy the needs of a growing population. This stagnation is exacerbated by disparities between progressive and average farmers, highlighting the need for more equitable access to resources and knowledge.

Moreover, the poor quality and inadequate supply of inputs like seeds and fertilizers, coupled with a lack of infrastructure, lead to inefficiencies and losses throughout the agricultural value chain. Farmers often struggle to access markets due to underperforming rural markets and inadequate transportation networks, resulting in high pre- and post-harvest losses.

Another critical concern is the decline in investment in research, development, and extension services. Without adequate funding and support for innovation, farmers are unable to adopt modern technologies and practices to boost productivity and resilience. Additionally, frequent pest attacks and diseases further undermine agricultural productivity, threatening food security for millions of people who depend on agriculture for their livelihoods.

The knowledge gap among farmers and stakeholders exacerbates these challenges, as outdated practices persist due to limited access to information and training. Insufficient capital and financial resources also hinder investment in agriculture, limiting the sector's potential to drive economic growth and alleviate poverty.

To compound matters, poor infrastructure and low value addition prevent the agriculture sector from reaching its full potential, while the lack of international competitiveness in certain commodities limits export opportunities. Climate change-induced water scarcity and inefficient water use further strain resources, highlighting the urgent need for sustainable water management practices.

Addressing these multifaceted challenges requires a coordinated effort from the government, civil society, and the private sector. Investments in research, infrastructure, and extension services are crucial to modernizing the agriculture sector and enhancing productivity.

Additionally, policies that promote equitable access to resources and markets, as well as sustainable farming practices, are essential for ensuring food security for all Pakistanis.

Stakeholders Analysis of Food Security in Pakistan

Stake Holder	Contact Person	Power	Interest	Engagement Strategy
Stake Holder#1	Federal Government <ul style="list-style-type: none"> • Ministry of Food Security • Planning Commission of Pakistan • Ministry of Commerce • Parliament • PM Task Force • IRSA • PMD • PASSCO • SUPARCO • NDMA • Agriculture Banks 	High	High	Coordination Legislation Policy Advocacy Planning Risk Prevention Investment Facilitation Border Control
Stake Holder#2	Provincial Government <ul style="list-style-type: none"> • Agriculture & Food Department • Health Department • Irrigation Department • Fisheries Department • Livestock Department • PDMA's 	High	High	Coordination Legislation Policy Advocacy Training HR Management Accountability & Transparency Alliance Building Risk Prevention
Stake Holder#3	Interest Groups <ul style="list-style-type: none"> • Land Holders • Cooperative Societies • Housing Societies 	High	High	Implementation of Policies / Regulations Conflict of Interest
Stake Holder#4	Academia & Research Institutions <ul style="list-style-type: none"> • PCSIR • PARC • NIFA • Agricultural Universities 	Low	Medium	Research & innovation Technology Transfer Linkages with Industries and Farmers Training & Capacity Building
Stake Holder#5	Private Sector <ul style="list-style-type: none"> • Chambers of Commerce and Industry • Business and Trade Associations (Local, Provincial and National) • National and multi-national corporations 	Low	High	Investment attraction Policy Advocacy Awareness Legislation
Stake Holder#6	International aid agencies and multilateral organizations/donors	Low	Medium	Donation /Funds Technical Assistance

	<ul style="list-style-type: none"> UN agencies (UNICEF, WFP, FAO, WHO, UNFPA) & Their implemented partner. Donor agencies (including DFID, USAID, ECHO/EU) 			Reviews Feasibilities
Stake Holder#7	People <ul style="list-style-type: none"> General Public (Consumers) Farmers 	Low	High	Subsidies Exemptions Access & Availability Fair Price

GAP Analysis of Food Security in Pakistan

Current Situation	Desired Status (10 Years)	Plan of Action
Malnutrition <ul style="list-style-type: none"> Child stunting (40.2 %) Child Wasting (17.7%) Under Weigh (20.9%) Child Mortality (45%) Breast Feeding (48%) 	<ul style="list-style-type: none"> Food Security of all people Access, availability and supply side of Food cycle Supply of clean water Child Stunting (< 30 %) Child Wasting (< 13%) Child Mortality (< 35%) Breast Feeding (< 25%) 	<ul style="list-style-type: none"> Maximum outreach of EPI program through LHWs Formulation of National Nutrition Regulations (Food Manufacturers to be bound to include essential nutrient requirement in food product) Conducting of National Nutrition survey on regular intervals Advocacy & Awareness Programs Integration of National Nashunama Program, Federal/Provincial EPI PPP Mode of Agriculture Investment.
Food Inflation <ul style="list-style-type: none"> Food Inflation (28.8%) Food Imports (8 bn \$) Wheat (1 Bn \$), Pulses (748 Mn \$), Edible Oils (3.3 bn \$) Smuggling, Hoarding of essential commodities 	<ul style="list-style-type: none"> Food Self-sufficiency Minimizing Food Imports (<2 bn \$) Zero pilferage/Smuggling Enhancing Agricultural Productivity Single Digit Food inflation 	<ul style="list-style-type: none"> Effective Border Control/Management to prevent Hoarding/Smuggling (Invoicing, Tracking, End user certification) Maintenance of strategic reserves 25% above the national requirements Elimination of Middle Man <ul style="list-style-type: none"> Creation of Retail outlets/ Model Farms Services Centers. Establishment of sustainable Sasta Bazar Development of Agriculture Cloud Model <ul style="list-style-type: none"> Registering Farmers Registered Market SMS based Information Other relevant information Call center Services
Agriculture/Livestock Production <ul style="list-style-type: none"> 12th in Wheat Production 9th in Rice Production 5th in Sugarcane 13th in Sheep 2nd in Buffalos 3rd in Goats 	<ul style="list-style-type: none"> Export Quality Seed Production Self-sufficiency in Wheat, Rice, Sugar, Pulses Modern Mechanized Farming Export-based Livestock Development 	General Rule <ul style="list-style-type: none"> Apply 4Rs (Right Source, Right Rate, Right Time & Right Place) through Agriculture Cloud Livestock Production <ul style="list-style-type: none"> Breed Improvement through Artificial Insemination and Embryo transfer technology and Genetic Improvement through pedigree record keeping.

		<ul style="list-style-type: none"> - Certified Fodder seed coverage - Prevention of diseases through outreach of veterinary activities and mapping of hotspots through GIS for localization - Promotion of soybean as feed for fisheries sector - Establishment of Fisheries Research and Training Centre <p>Agricultural Production</p> <ul style="list-style-type: none"> - High Quality Seed distribution through Farm Services Centers and awareness about the same - Establishment of all-encompassing Farm Services Centers, Farmer Communes, and joint machinery models - Mechanization/ Automation through subsidized incentivization - Credit Availability not on interest lines but on investment lines (Islamic Finance/ ZTBL) - Integrated Pest Management through local practices (for natural sustenance of land) and modern pesticides for eradication - Inter-plant model (Mountainous areas) for utilization of minimum land for profit maximization and capacity enhancement - Introduction of Tissue culture practices in Rice, tomato, potato (low investment crops) - Fertilizer balance (information, awareness, availability including subsidy to farmers having land less than 12 acres)
<p>Land Utilization</p> <ul style="list-style-type: none"> - Agriculture land reduced by 40% (1972-2017) - Massive Pressure on land because of Urbanization - Conversion of Agriculture Land into buildup Areas. - Non-Productive use of Agriculture land. - Salinity Control/ Management 	<ul style="list-style-type: none"> - Effective Land Utilization for Agriculture/ Housing sector - Enhancing Productivity - Wheat (from 2.8 tn/ ha to 3.5 tn/ hac) - Sugarcane (from 45 tn/ ha to 65) - Rice (from 4 tn/ ha to 08 tn/ ha) - Salinity Control and Rehabilitation of land (>30 %) 	<ul style="list-style-type: none"> - Formulation of National/ Provincial Land Use Plans - Notification of Land Oversight bodies including membership of Agriculture, Livestock, Local Government Departments - Extensive Land Mapping through GIS for monitoring and control over land utilization - Promotion of vertical housing units Development - Salinity Control through Leaching, extensive vegetation and involving farmers as co-sharers in the exercise - Promotion of Crop Rotation Cultures through farmer

		Incentivization and access to markets approach (domestic and international through BITs/ FTAs)
Housing Societies and Agriculture <ul style="list-style-type: none"> - Encroachment on urban Agriculture Land - Food insecurity in Urban Areas - Dearth of effective Urban Plans/Policies - Incentivization for Real estate 	<ul style="list-style-type: none"> - Periphery Development - Infrastructure/ Utilities Availability in rural areas - Balancing urbanization with Food Security - Incentivization of Vertical structures 	<ul style="list-style-type: none"> - Formulation of National/ Provincial Land Use/ Zoning Laws - Implementation of Environmental Laws through excessive use of GIS/ GPS tools and enforcements - Introduction of Agriculture Impact Assessment techniques for evaluation - Proportionate Taxation on Housing sector operations - Improvement in civic amenities in urban areas through municipal agencies for reduction in pull/ push factors - Alternate investment opportunities for real estate investors (e.g. Mines and Minerals, Transportation, Agriculture Seed/ Technology, etc.)
Food Shortage & Self-Sufficiency <ul style="list-style-type: none"> - National Food Security (45% food insecure) - Absence of coordination between Federal & Provincial Food Department - Non Implementation of NFS 2018 - Heavy reliance on Imports - Inequitable Access/ Availability of Food - Vulnerability to External shocks such as flood, Extreme weather patterns, Wars, etc. - Lack of R&D Infrastructure (including Tech Transfer, linkage with industries, Capacity building of farmers) 	<ul style="list-style-type: none"> - Food security and food self-sufficiency - Access, Availability, Affordability and Stability of Food Supply - Reduction in Food Imports (<2 bn \$) - Indigenous seed, machinery and technology production - Export quality/ high yielding seed/ fertilizer production - Mechanized/ Corporate Farming - Climate Smart/ Resilient Agricultural Practices 	<ul style="list-style-type: none"> - Declaration of Right to Food for all those people who are below poverty line in National matrix - Determination of Minimum Support Price (MSP) based on realistic input cost and its timely announcement - Indigenize building of user requirement based inventory of certified seeds structuring supply chain enabling access to farmers - GIS Mapping as a best tool for estimation, production, transfer and monitoring of crops - Subsidized availability of machinery and technology to farmers - Coherence of National and Provincial Food Security Policies - Alliance building, BITs/ FTAs with major producers in the world for technology transfer, capacity building, seed imports/ exports, etc. - Diversification in agricultural harvests other than essential cash crops specially in hilly/ unirrigated areas

Model Cases

Though Pakistan has a vast and fertile land tract that could help it become the global grain basket, in reality, the country has failed to materialize the full potential of its resource base. There are countries in the world with much smaller areas and human resources but with astounding stories of success and growth in the food production sectors. We will list here two countries whose best practices and working models can be studied for analyzing low-performing areas, issues, challenges, and policy options for informed decision-making.

The Case of the Netherlands

The Netherlands has become one of the best models for modern farming practices aimed at sustainable and productivity-driven agriculture. With a total land area of 41,500 sq. km, of which 33,670 sq. km is land area and only 18,016 sq. km is under cultivation, the country exported agricultural goods worth 122.3 billion Euros to other countries, making it one of the largest exporting countries in the world (Utrecht, 2024).

Despite having a population of just over 17 million people, it has developed one of the best agricultural practices aimed at ensuring food self-sufficiency and sustainability. Even the United Nations recognizes the crucial role of sustainable agriculture in reducing poverty and promoting food security worldwide. According to the United Nations, sustainable agriculture in the Netherlands holds the key to helping the world meet the food needs of more than 9.7 billion people by 2050 (Project, 2023). The Netherlands supports the industry primarily in two fundamental ways: technological advancements through grants for R&D and providing farmers with access to machinery, early warning systems, etc.

The success story of the Netherlands revolves around the following key interventions aimed at achieving sustainable agriculture and food security in the country, while at the same time translating these practices into novel models for the rest of the world. The Netherlands adopted the extensive use of technology as a model concept in precision farming to optimize agricultural production. This involves collecting data on various factors that affect crop growth, such as soil moisture, nutrient levels, and pest populations, and using that data to make decisions about how to manage crops. Another key success was the introduction of controlled environment-based growth of crops using hydroponics and green nurseries. These nurseries require minimal water intake, aeroponics, and can achieve outstanding yields. Furthermore, Dutch farms use only half a gallon of water to grow about a pound of tomatoes, while the global average is more than 28 gallons. The Netherlands also utilizes the best integrated pest management practices aimed at reducing the use of pesticides but still effectively controlling hazards.

Last but not least, the Dutch government adopted Sustainable Animal Agriculture as a means to become one of the largest exporters of meat and dairy products in the world. For example, many Dutch farmers use anaerobic digesters to convert animal waste into biogas, which can be used to generate renewable energy. The Netherlands is also working to reduce resource use to produce animal feed by using algae or insects as a protein source, which can reduce the environmental impact of livestock production (Herrerac, 2022).

The Case of India

With over 1.4 billion people, India is the world's second-most populous nation. The United Nations projects its population to reach 1.5 billion by 2030 and 1.6 billion by 2050 (Hertog, 2023). Ensuring food security for India's growing population remains a great success story. The Indian government has implemented several policies to improve food security and address hunger in the country. The National Food Security Act of 2013 ensures food and nutritional security by providing affordable high-quality food through the Targeted Public Distribution System, playing a crucial role in food security. This Act supports the rights to health and nutrition, especially for children and pregnant/lactating mothers, and emphasizes malnutrition prevention.

Due to the impact of various government initiatives, there has been a reduction in levels of child under-nutrition over the last decade. Among these efforts, the Pradhan Mantri Matru Vandana Yojana (PMMVY) and the establishment of Poshan Vatikas at Anganwadi Centers are just two examples of multiple programs aimed at enhancing the nutritional status in India (McKay, 2023).

Initiatives to Enhance Agricultural Output: The Indian government has implemented a range of programs to elevate the income and productivity of farmers. The country is geographically divided into 32 Crop Zones, and the central government is responsible for determining the Central Issue Prices. Agricultural subsidies and schemes play a pivotal role in rural India, with the central authorities establishing Minimum Support Prices (MSPs) for 23 different agricultural commodities. Initiatives such as the Rashtriya Krishi Vikas Yojana and the National Food Security Mission offer subsidies for agricultural inputs, ensuring that production costs remain competitive in international markets.

India also prioritizes research and development, integrating technology like biotechnology and micro-irrigation to improve agricultural productivity. Pakistan could learn from India's experience by investing more in research, ensuring functional agricultural markets, enacting strong legislation, developing infrastructure, and improving water management to ensure food security (Hassan Danish, 2017).

Conclusion

Pakistan is faced with an acute food security crisis, which has resulted in malnutrition among children, high food inflation, and carries negative connotations for national development and growth. Despite being a leading producer of essential crops, the country is experiencing food shortages, food insecurity, and the rising population and urbanization are adding additional pressures on the existing mechanisms. External shocks such as floods, changing crop patterns due to the impacts of climate change, reduced water supply for both agriculture and drinking purposes, and poor management have further exacerbated the situation.

Malnutrition among children is a grave concern, with the country facing the highest prevalence of stunted children in South Asia. The State of Food Security and Nutrition in the World (SOFI) report of 2023 highlights that Pakistan harbors 12 million stunted children, ranking third globally. This has necessitated addressing the main factors responsible for the current malaise in order to tackle the issue in a holistic and integrated manner.

Urbanization, especially the construction of housing societies on urban agricultural lands, has disrupted the existing food supply chains in urban areas, leading to food insecurity. The population bulge, massive pressure on cities to provide amenities, and inefficient use of land available for agriculture impact the production cycle in the country. Ancient agricultural practices, the absence of modern farm machinery, the lack of capacity building for farmers, and impractical, non-consensus-based policy decisions impede the road to achieving the goal of food security in the country.

Lack of coherence between federal and provincial structures, lack of incentives for innovation, absence of linkages between producers and agricultural industries, and the capacity issue to change the social behavior of farmers for more productive crops point to systemic problems in the agricultural sector. Productivity is directly proportional to food security, and the state must prioritize the agricultural sector as a main area of investment to foster growth and development.

Recommendations

Agriculture is the locomotive of rural development in Pakistan. In the past, agricultural development and rural development were used interchangeably because agricultural development propels rural development in terms of output, employment, consumption, and land usage, etc. However, agricultural productivity has decreased due to several reasons, such as poverty, non-participation of the government, and implementation problems.

The agricultural sector is the main source of foreign exchange earnings in Pakistan. The export of cotton, cotton-based products, rice, etc., fetches about 65% of our total export earnings. The nexus of concentrated power, land ownership, unequal land distribution, and the state's inability to protect the rights of farmers has been a source of low agricultural productivity. Despite the fact that the agricultural sector has critical importance for growth, exports, and food security, it is facing many challenges that lower its agricultural yield. These impediments include the use of obsolete farming technology, outdated infrastructure, lack of irrigation facilities, and water salinity, etc. The following policy measures must be implemented by the government to cope with the various challenges that farmers are facing in the agricultural sector of Pakistan.

1. Integration of National Nashunuma Program, Federal/Provincial EPI

The integration of the Federal/Provincial EPI program to assist the Nashunuma program without expending any budgets from the government will be a big step toward the eradication of malnutrition by at least 40 percent of malnourished children/women in Pakistan by 2035. The EPI program has a vast outreach in Pakistan, and utilizing the highly trained HR of LHWs/CHWs for awareness, supplement distribution, and extending the network of Nashunuma beneficiaries will provide the government with necessary access and a database to alter the program in a manner that achieves the desired goals.

2. Market Regulation through Technology

One of the most important interventions in ending the exploitation of farmers by market forces and incentivizing their investments in agriculture, leading to increased productivity, is the elimination of the middleman in the process. This can be done through two possible policy interventions:

- Creation of retail outlets/model farm services centers
- Development of an agriculture cloud model
- Registering farmers
- Registered markets
- SMS-based information
- Other relevant information
- Call center services

3. Maintenance/Export of Strategic Reserves 25% Above National

Requirements

As part of general international practice, as well as keeping in view the historical context, the government must never export any fundamental food basket commodity before ensuring that 25 percent or more is declared as a national reserve. Secondly, anything that is 25 percent or above the national requirement must be allowed to be exported to increase our export base and invite investment in the agricultural production sector.

4. Legislative Framework

A detailed study of some regional countries revealed that those countries have framed practical and need-based national legal frameworks. These frameworks are aimed at assigning duties to national/provincial governments for the regulation of agricultural markets in the truest sense, supporting research and innovation, and protecting farmers against exploitative market forces. The government has to formulate a national food security act with a clear vision and enforcement mechanism, aligning the interests of all relevant stakeholders.

5. Provision of Targeted Subsidies

The government should provide subsidies for farmers, predominantly for purchasing agricultural tools, input usage, provision of microcredit, and on the cost of diesel and electricity. However, the subsidies on fertilizers, pesticides, and seeds shall be technology-driven, monitored for use, and impact assessments should be carried out for alterations or changes in the nature and degree of subsidies. Most importantly, subsidies should be given to the neediest and already assessed farmers to control pilferage and hoarding, thereby managing affordability and availability.

6. Urban Planning/Control Laws

The national and provincial governments shall take immediate steps to control the two most important contributors to food insecurity in Pakistan: population explosion and massive urbanization. Population control shall be the number one priority of both federal and provincial structures, and programs such as family planning, EPI, and Nashunuma shall be linked for lasting impact. National and provincial laws on land use, along with enforcement bodies, shall be immediately put in place to stop the surge of illegal societies, prevent haphazard urban growth, and improve the performance of civic agencies responsible for providing civic amenities.

7. Provision of Microcredit to Farmers

Microcredit can be a great boon for all farmers with small landholdings, as it provides the necessary support to maximize productivity. However, the microcredit system has fundamental issues such as processing time for lending, and due to inflationary pressures, the standard amount of credit may be less than the requirements of the farmer, which is discouraging. Additionally, a higher interest rate is also a discouraging factor. This can be addressed by State Bank regulations that provide micro-lending on a fast-track basis with bare minimum interest on loans. Another important intervention could be a subsidy on interest on loans, which can lower the barriers for farmers to access credit.

Minimum Support Prices

The government's minimum support price (MSP) is another major intervention that can be a game changer in ensuring that farmers are given incentives to maximize productivity. However, the existing model of MSP is far from the ground realities. The government must increase the MSP, and the increase should reflect retail wheat prices to compensate for the pass-on effect. The MSP will be a tool for encouraging farmers to enhance their productivity, increase revenue, and focus more on improving agricultural practices.

8. Climate-Smart Agricultural Practices

One of the most important aspects of our policy intervention shall be the adoption of climate-smart agricultural practices. Pakistan has seen massive disruptions in agricultural production cycles due to floods, climate change impacts on crop patterns, and water use, etc. The government has already prioritized climate response mechanisms through its engagement in COPs and domestic legislation, with special focus on conservation of cultivable soil, forest cover, etc. The government, through the Climate Investment Fund and resilience strategies, focuses on mitigating the consequences of climate change and floods, protecting farming communities from potential devastation.

9. Technology as a Revolutionary Tool for Transforming Agriculture

Technology can be the most revolutionary tool in transforming agriculture in Pakistan and ensuring food security. Technology assists stakeholders at all levels (farmers, markets, government, support organizations, etc.) for knowledge sharing, machinery use, crop patterns, and most importantly, precision farming and sustainability. The government must invest in technology transfer and dissemination, as well as encourage investment from the private sector on a PPP model. Agricultural IT wings should be established in farm services centers as an interface between farmers and government agencies for troubleshooting issues.

Logical Framework Matrix

S#.	Proposed Actions	Responsibilities	Resources	Timeline	Key Performance Indicators (KPIs). KPIs must be (SMART)
1	Conducting National Nutrition survey on regular intervals Issuance of National Nutrition Regulations (NNR).	<ul style="list-style-type: none"> Ministry of National Health Services, regulations and Coordination. PSQCA Planning Commission of Pakistan Halal Food Authorities, District Administration 	Food Security is SDGs so funds may be allocated from the SDG component of PSDP	18 Months	<ul style="list-style-type: none"> i. Undertaking food Security Assessment in context of Urban, Rural and regional Food poverty. ii. Analysis the determinants of under nourishment. iii. Analyze & monitor the house hold food consumption Patterns iv. Align the intervention with the result of research v. Finalization of National Nutrition Regulations (NNR). vi. Manufacturers to be bound to include essential nutrient requirement in food production. v. Campaign to promote healthy and safe nutrition practices.
2	Development of Modern Agriculture/ livestock Farming in PPP mode through SPV.	<ul style="list-style-type: none"> Finance Division BOI Ministry of Food Security and Research Provincial Governments 	<ul style="list-style-type: none"> Finance Division Planning Commission of Pakistan through PSDP Provincial ADP 	36 Months	<ul style="list-style-type: none"> i. Identification of feasible Regions e.g. CRBC (L&G), Tankzam dam, Daraban Dam Zam, Chaudwan Zam Dam, Shaikhaider Zam Dam, KoraNala Dam with potential cultivable command (CCA) appro: more than 400,000 Acres in south of KP. ii. Financial & Economical feasibilities iii. Approval from PPP Authority iv. Establishment and Registration of SPV with SECP. v. Finalization of TORS (Shareholders, Investors Profit/losses, dividend will be determined) vi. Transaction Advisory vii. Identification of potential Investors & International Advertisement

Why Intervention No. 2?

If a proper plan is envisaged through a Special Purpose Vehicle (SPV), we can achieve the following results:

A. Agricultural Production

- Wheat: approx. 600,000 tons
- Sugar Cane: approx. 10.5 million tons

B. Allied Infrastructure

A massive irrigation network (dams and canals) that has been approved and is in the implementation stage, including CRBC (L&G), Tank Zam, Sheikh Haider, Chaudwan, Darabaand, and Kora Nullah Dams (DI Khan Division).

C. Electricity Provision

Electricity can be generated from the Tankzam Dam (25.5 MW).

D. Employment Generation

E. Industrial/Agro-Food Development/Food Processing Zone

F. Research and Innovation Development

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