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Sustainable Food Security in Kathmandu: Policy Review and Actions Recommendations

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ABSTRACT

Sustainable food security has become a key area of focus, highlighting the need to balance food availability with environmental preservation, economic sustainability, and social equity. This research assesses the effectiveness of systems supporting sustainable food security, aiming to identify successful strategies and challenges by reviewing existing policies, regulations, and consumer perceptions. A mixed-method approach was used combining policy reviews, interviews, and survey data analysis adapting a normative survey framework. The study encompasses three main components: the first evaluates policy provisions related to food availability, access, utilization, and stability; the second examines consumer perceptions of food security in Kathmandu; and the third proposes strategies to improve food security. The findings indicate that while policies and regulations align with global standards, their implementation remains ineffective. The study concludes that Nepalese policies and regulations align with global priorities; however, there are insufficient support mechanisms for sustainable food security in Kathmandu. The study offers immediate and long-term strategies to enhance food security in Kathmandu, considering the city's emergency and average population growth rate.

1. INTRODUCTION

Food security continues to be one of the most urgent global challenges, specially in light of rising population, climate change, and increasing socio-economic disparities. Food security ensures health, well-being, and development, ensuring sustainable development

goals. Ensuring food security requires sufficient food production and effective systems for distribution, access, and the sustainable management of resources. In addition, there is a need to improve the behavior of consumers regarding responsible consumption.

In recent years, sustainable food security has gained significant attention, stressing the importance of balancing food availability with environmental protection, economic sustainability, and social equity. Consequently, there is increasing recognition of the critical role of supporting systems—such as policies, institutions, technologies, and community-driven initiatives—in fostering sustainable food security.

This research evaluates the effectiveness of such supporting systems in advancing sustainable food security. The study aims to identify successful practices and challenges based on a review of existing policies and regulations, including the perception of consumers. Understanding how these systems contribute to immediate food security and long-term sustainability is essential for formulating policies adaptable to diverse regions, climates, and socio-economic conditions. These definitions focus on different aspects, i.e., physical availability of food, economic and physical access to food, concern about insufficient food access, food utilization with necessary nutrients, and stability. Modern policy considerations regarding food security increasingly encompass income, land, expenditure, market dynamics, and pricing factors (Hamad & Khashroum, 2016; Maxwell & Smith, 1992; Xie et al., 2021). FAO's latest definition of food security includes four dimensions (McGuire, 2015): food supply, access, utilization, and stability. These dimensions are interconnected and possess inherent hierarchical characteristics. The first three dimensions concern grain supply, people's ability to acquire food, and an individual's use of grain, while the fourth-dimension concerns sustainability. Effective policy formulation, implementation, and regulation should be implemented to ensure adequate food security.

Food security sustainability is a vital issue in Kathmandu as the average population growth rate of the capital city has been 3.97% over the past 23 years (UN, 2022). The constant increase in the Consumer Price Index in food and beverage over the last ten years creates a challenge to ensure sustainable food security in Kathmandu. External factors such as the COVID-19 pandemic and the war between Russia and Ukraine have hit Kathmandu's food supply system and prices, challenging food security. In addition, in recent years, it has been noticed that there have been fast changes in the socio-economic dimension in Kathmandu, causing changes in food behavior. Such changes created a pressing demand for sustainable food systems, necessitating a thorough assessment of existing support mechanisms and the development of innovative approaches that integrate food security with environmental and social sustainability objectives. This study provides valuable insights that can guide strategies for addressing food insecurity in an ever-changing world.

2. LITERATURE REVIEW

The concept of 'Food Security' originated from the combined focus of the FAO and GATT (later WTO) on food production and availability. Initially, FAO emphasized adequate food

production for nutrition and economic growth, promoting agricultural advancements like irrigation, fertilizers, and hybrid seeds in the 1960s. In response to hunger in the 1970s, FAO coined the term 'Food Security,' focusing on national self-sufficiency. By the mid-1980s, it evolved to emphasize access to affordable food. The WTO, established in 1995, aligned with GATT's goal of trade liberalization and redefined food security as the right to access safe, nutritious food, aiming for a fair, market-driven global trade system.

Although food security was initially intended to ensure consistent access to quality food at reasonable prices through fair support and subsidies in developed countries, it had negative consequences for developing and underdeveloped nations (Brooks, 2014). This led to restricted market access for agricultural products from these countries due to high tariffs, creating historical inequalities in food production and trade (Sutherland, 2010). The Doha Development Agenda (DDA) of 2001 outlined three key negotiation goals: 1) reducing export subsidies and trade-distorting domestic supports to improve market access, 2) providing special treatment to developing countries based on their food security and rural development needs, and 3) addressing non-trade concerns in negotiations (WTO, 2001). FAO supported the DDA and urged members to implement reforms in international agricultural trade (FAO, 2002).

Despite the WTO's advocacy for fair agricultural trade and policy support, the 2007-2008 global food crisis highlighted the issue of export bans to control local food prices. Governments responded by increasing export restrictions and taxes (Farsund et al., 2015). In 2003, the Special and Differential Treatment for developing nations was introduced, though the negotiations faltered, and the food security-trade link remained unresolved. The Special Safeguard Measures (SSM) failed to ensure stable domestic production or controlled food prices. However, FAO supported WTO's trade liberalization agenda, encouraging policies to help small farmers in developing countries become more competitive globally (FAO, 2009). The 2009 FAO World Summit on Food Security in Doha significantly aimed to reduce hunger and malnutrition. However, developing nations continue to challenge trade liberalization as a key factor in solving food security issues.

Global food demand continues to rise, with a growing need for diverse food options. Production systems, supply chains, and trade practices must be more efficient to meet this demand. However, the sustainability of food production is in question due to the depletion of natural resources and decreasing productivity (Kumar et al., 2019; Raju et al., 2019; Singh, 2018; Singh et al., 2020). This could lead to challenges in food availability, access, and affordability. Consumer food consumption patterns, which affect food quality and quantity, also influence availability and access. Efficient production processes help reduce dependence on external food sources (Dewi, 2023), while effective trade and market regulation mechanisms ensure food availability, access, stability, and price control. Based on this analysis, a study framework is proposed to evaluate Kathmandu's current state of food security.

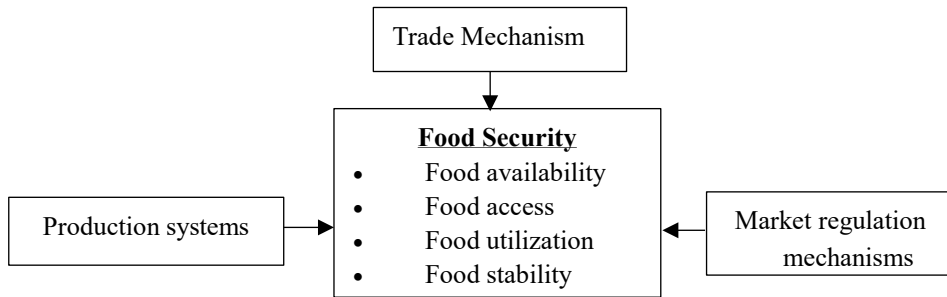


Figure 1: *Conceptual framework*

The framework incorporated support provisions and practices on production systems, trade mechanisms, and market regulation mechanisms as the support system. The support to the producers, i.e., farmers in terms of providing seeds, fertilizers, irrigation, and machinery support; management of supply chain and market mechanism as the support to trade mechanism; and the market regulation to control price and supply were considered the market regulation mechanism.

3. RESEARCH METHODS

This study focuses on normative analysis to evaluate food security policies, an area with limited theoretical empirical research. The normative analysis examines policies' evaluative and deontic aspects, such as what is right or wrong and the allocation of rights and responsibilities. The process involves identifying evidence and arguments related to governance goals, resource distribution, and policy objectives. The study analyzes food production systems, trade mechanisms, and market regulations through policy reviews, interviews, and descriptive survey data analysis. The study employed a mixed-method approach to gather the necessary data to achieve its objectives.

This study involves a three-pronged analysis: the first aims to assess policy provisions related to food availability, access, utilization, and stability; the second focuses on analyzing consumer perceptions of food security in Kathmandu; and the third seeks to develop strategies to enhance food security. Thirty policy documents were collected and analyzed to address the first objective. For the second objective, a survey was designed and distributed to 500 residents who had lived in the Kathmandu Valley (Kathmandu, Lalitpur, and Bhaktapur) for at least one year to assess their views on the effectiveness of food security provisions in the region. The survey also gathered data on food utilization behaviors and suggestions for improving market regulations to ensure food security. Four hundred forty-six household surveys were completed in Kathmandu, Bhaktapur, and Lalitpur, covering food availability, access, utilization, stability, and consumer perceptions of food security. Interviews were conducted with farmers, subject experts, and administrators to evaluate policy outcomes and identify gaps in support systems.

3.1 Instrumentation

Various policy documents and articles were selected based on the research focus. Any documents containing terms related to food safety, food security, right to food, market regulations, production support, farming, free trade, food agreements, etc., were included for review. In total, thirty documents were analyzed. These provisions related to food production, pricing, distribution, and ensuring food availability were identified. Survey data were gathered through a questionnaire about practices and perceptions regarding food availability, pricing, and utilization. In-depth interviews, followed by thematic analysis, were used to assess the food security status and the effectiveness of the support system. The survey questionnaire was also employed to collect consumer perceptions of food security in Kathmandu.

3.2 Research procedure

The research followed a mixed-method approach, combining qualitative and quantitative techniques. It began with identifying the research topic, formulating questions and objectives, reviewing relevant literature, and developing a research framework. The study aimed to examine whether the support mechanisms in Kathmandu are sufficient to ensure current and future food security. Policy documents were reviewed to identify key food security and support system provisions. A survey questionnaire was created to assess consumer perceptions and behaviors related to food availability, access, utilization, and stability. Data were collected through physical surveys and Google Forms. Interviews with farmers, policy administrators, and experts were conducted to understand support provisions and identify gaps. Data analysis included descriptive statistics for survey data and content analysis for interview responses.

4. RESULTS AND DISCUSSION

Thirty policy documents were reviewed to identify Nepal's food security provisions, strategies, and action plans. The analysis focused on different thematic areas, and policies for each area were identified. The documents were downloaded from government websites such as the Law Commission, National Planning Commission, Ministry of Agricultural and Livestock Development, Department of Food Technology and Quality Control, Ministry of Health and Population, and Department of Health Services. These documents included nine policies, five strategies, eight acts, five strategic plans, and three guidelines. The analysis used the framework method, guided by a deductive approach based on the definition of food security and the study objectives, to develop and match inductive concepts. Information on these themes was manually collected and recorded in an Excel spreadsheet, and conclusions were drawn based on the thematic categories in the framework.

Table 1

List of policies, acts, regulations, and plans related to food and nutrition security in Nepal

SN	Policy name	Objectives	Policy/Strategy to attain objectives	Provision for Support System
1	National Dairy Development Policy (2021)	The goal is to achieve self-sufficiency in dairy production by enhancing milk production and productivity through partnerships and collaboration among the government, cooperative, and private sectors.	Identifying, categorizing, and registering farmers/producers to boost production. Enhancing the professionalism and competitiveness of major producers. Enhancing the pricing structure by improving collection, processing, and market development to promote professionalism and industrialization in dairy products.	Ensuring producers receive protection, support, and incentives from all levels of government. Identifying markets to empower small farmers through supply chains by linking them with producer groups or cooperatives. Establishing a fund dedicated to dairy development. Providing agriculture loans at favorable interest rates.
2	Integrated Management of Acute Malnutrition Guideline - 2020	Preventing immediate malnutrition by quickly identifying, referring, monitoring, and linking individuals with health and nutrition assistance and tackling acute malnutrition to reduce its associated illness and mortality rates.	Integration of effective management of acute malnutrition into the ongoing routine health services at all levels of the health facilities while still striving for maximum coverage.	Assessing food security within district households, even during emergencies, involves two primary approaches: ensuring children have access to a nutritious diet composed of locally available foods, which includes distributing fortified blended foods along with providing nutrition counseling and conducting community outreach or mobilization to ensure effective program supervision.
3	National Nutrition Policy-2004	To improve the nutritional health of newborns, children, adolescents, and women, it is essential to broaden access to interventions that focus on health and broader aspects such as agriculture, education, social welfare, and hygiene. This would enhance the quality of these services and provide providers with training to deliver effective nutrition support.	Supporting community-based programs and advocating for suitable and sufficient locally available complementary foods. Educate community members on proper home food storage and preservation techniques and improve food hygiene practices. Ensure that nutrition is integrated as a key component of the Emergency Preparedness Plan (EPP).	Develop mandatory standards for commercial production of CF, fortification, and marketing practices. Develop guidelines for food supplementation. Advocate among community members on how to manage their food allocation. Advocate for appropriate food safety legislation and regulations.

4 National Food Safety Policy-2019	<p>Implementing a risk-based strategy for food safety and quality assurance is vital to safeguard consumers from potential hazards in food products. Enacting legal and institutional reforms geared towards elevating food safety standards. Comprehensive education on food hygiene and quality should be provided to all stakeholders within the food supply chain, ensuring widespread access to information and promoting effective communication. Uphold the integrity of food products and facilitate seamless trade in the food industry. Enhancing consumer awareness and education regarding food safety and quality standards.</p>	<p>Enhancing legal provisions concerning food quality control systems is imperative to safeguard consumers from the risks associated with substandard food. Implementing food security and quality management systems based on scientific principles, achieved through educating, communicating, and promoting food safety and security to all stakeholders in the food supply chain. Facilitate the provision of foodstuffs and services with robust food safety and quality assurance measures. Ensuring quality food, food security, and quality management. Promoting research and innovation in food security, safety, and quality assurance.</p>	<p>Establishing an independent food safety and quality assurance authority for setting vertical and horizontal standards for food safety and quality. Encouraging the adoption of Good Health Practices (GHP) and Good Manufacturing Practices (GMP) in small and medium-sized manufacturing firms, as well as Hazard Analysis and Critical Control Points (HACCP) in larger organizations producing food products. Building the capacity of regulatory authorities, food traders, farmers, and other stakeholders. Establishing a National Food Reference Laboratory for identifying and effectively controlling chemical and human risks. Discouraging the consumption of junk food through collaborative educational and promotional activities. Promoting local foods, food habits, and cultural crops through innovation and technology.</p>
5 National Health Policy -2019	<p>Improve nutritional status by discouraging consuming and promoting contaminated hazardous foods while expanding the availability and accessibility of nutritious and wholesome food choices.</p>	<p>Strengthen the multi-sectoral coordination with institutions related to drinking water, environmental cleanliness, food security, education, and others. Discouraging the use of harmful readymade, and packaged food items, and tightening the control mechanism for the production, distribution, and trade the hazardous and adulterated food.</p>	<p>Federal, province, and local level governments will coordinate and cooperate in investment for the establishment of effective mechanisms of health services, monitoring, and controlling the activities at their responsibility level.</p>

6	Fifteenth Development Plan 2019/2020 – 2023/2024	Implement the multisector nutrition plan through coordination and partnership.	<p>Advance agriculture production by mechanizing, modernizing, commercializing, and industrializing the sector. Prioritizing rapid and extensive expansion of irrigation facilities, implementing land use policies effectively, promoting land consolidation and pooling, providing access to advanced seeds, adopting fertilizers and modern technologies; and focusing on organic agricultural production and processing, emphasizing high-value, low-weight/ volume products. Self-sufficiency in fisheries, animal products, and major food crops.</p>	<p>Agricultural research and technology development, concessional agriculture loans, agricultural insurance, agricultural extension services, a guarantee of the availability of fertilizers and seeds, promotion of agriculture at the province and local level, investment, and market management. The advance fixed minimum support price of agricultural products in the production of crops.</p>
7	Multi-sector Nutrition Plan 2018–2022	<ul style="list-style-type: none"> • To increase the number of service delivery institutions to improve access to and the use of nutrition-specific services. • To increase access to and the use of nutrition-sensitive services, including improving health-related behavior. • To improve policies, plans, and multi-sectoral coordination at federal, provincial, and local government levels to create an enabling environment to improve nutrition. 	<p>1. Scale up multisector nutrition programs across Nepal to ensure qualitative, equitable, and gender-informed nutrition services for all. 2. Develop positive nutrition behavior by running advocacy, communication, and participation campaigns and through public engagement programs. 3. Foster cooperation, partnership, coordination, and sharing lessons learned and best practices for improving nutrition. 4. Promote and use innovative technologies and initiatives for improving nutrition. 5. Internalize and implement nutrition interventions in federal, provincial, and local government policies and plans. 6. Strengthen monitoring, evaluation, study, and research for evidence-based planning, decision-making, and implementation.</p>	<p>The leadership and management skills of women and disadvantaged communities will be improved. The government's commitments include improving nutrition, restructuring the state, and engaging line agencies with communities to improve the delivery of public goods and services. Civic awareness about chronic malnutrition and actions needed to improve maternal and child nutrition, focusing on reaching the most marginalized, poorest segments and considering gender-related factors by mobilizing civil society organizations, parliamentarians, other elected representatives, and decision-makers.</p>

8	Consumer Protection Act (2018)	<p>Make amendments to and consolidate the legal provisions relating to consumer protection to protect and promote the constitutional rights of consumers to obtain quality goods and services; provide a judicial remedy for the enforcement of the rights obtained by consumers; provide compensation for harm and injury likely to be caused to consumers</p>	<p>The Government of Nepal shall regulate the supplies, price, quality, measurement, label, and advertisement of the goods and services regularly to protect the rights of the consumers.</p>	<p>To protect the rights of the consumers, regulate the supply system, control the price and quality of the goods and services, and make necessary policy and institutional provisions from time to time.</p>
9	The Right to Food and Food Sovereignty Act (2018)	<p>Create legal measures to enforce the fundamental rights concerning food, food security, and food sovereignty for citizens, and establish mechanisms to guarantee citizens' access to food.</p>	<p>The Government of Nepal, Provincial Government, and Local level shall make necessary arrangements, with mutual coordination, for the respect, protection, and fulfillment of the right. The Local Level shall issue food support identity cards in the prescribed form based on updated details of the targeted households. The Government of Nepal, Provincial Government, or Local Level shall provide food support to the targeted households for concessional price and to the targeted households of a particular nature for free as prescribed.</p>	<p>Respect, protection, and fulfillment of the right to food sovereignty. Protection of agricultural occupation and promotion of livelihood of the farmer. Suppose a food crisis arises in any zone due to earthquakes, excessive rainfall, low rainfall, flood, landslide, inferno, epidemic, or famine. In that case, the government of Nepal may declare such a zone a food crisis zone for a certain period. Sustainable use of agricultural land, promotion of local agro-crops and livestock products, and targeted agricultural development program operation. Mitigation of impact likely to be caused by climate change. If a person's crops do not get produced or crop production decreases substantially after farming with the recommended method, process, or manner in the recommended area and time with the seeds recommended by any government institution, body, company, or firm, or after the use of seeds, method, process or fertilizers recommended by such an institution, body, company or firm as per recommended manner, the institution, agency, company or firm which makes a recommendation of such seeds, method, process or fertilizers shall provide compensation.</p>

10	Local Government Operation Act (2017)	Formulate, implement, monitor, evaluate, and regulate policy, legislation, standards, and norms related to food and nutrition security.	Developing local-level policies, laws, standards, plans, implementation, supervision, and regulation regarding agriculture and animal husbandry, agriculture production management, and animal health. Developing agriculture and animal markets, infrastructure, small irrigation projects, training, technology transfer, technical support, import of agro-based machinery and materials, and conducting farmers' capacity enhancing programs. Protection and promotion of biodiversity. Promotion, development, and marketing of high-priced agricultural products. Quality control of animal farming. Provision of insurance and agro-based loans.	Determination of base rate regarding labor, and production. Promoting incentives for collaboration with stakeholders, private sectors, community-based organizations, cooperatives, and non-governmental agencies.
11	Nepal Zero Hunger Challenges National Action Plan (2016–2025)	Ensure the right to food by improving food and nutrition security of people to achieve a society free of hunger and malnutrition by 2025	100% access to adequate food all year round. Zero stunted children less than 2 years. All food systems are sustainable. 100% increase in smallholder productivity and income. Zero loss or waste of food.	Enhanced food production and productivity. Physical infrastructure development. Localization of food availability. Agri-business development. Increased employment opportunities. Make agricultural occupation attractive for youths. Support smallholder and landless producers with access to productive resources. Safety net support for vulnerable groups. Improved food governance.

12	Nepal Health Sector Strategy (2016–2021)	Emphasizes better implementation of the nutrition-related existing plans, policies, and strategies	In collaboration with the Ministry of Education, review/revise current approaches for the School Health Programme emphasizing health promotion, nutrition, sports, resilience from substance use, and sexual health. Maternal, infant, and young child nutrition, micronutrient supplementation, growth monitoring and promotion, integrated management of acute malnutrition, prevention and control of soil-transmitted helminths, school health and nutrition, and multisector nutrition plan (MSNP). Nutrition capacity enhanced for human resources recruited under the NNC NRH and HWs at all levels. Finalize and/or revise national policy, strategy, and guidelines (National Nutrition Policy and Strategy, National IYCF Strategy, Food Based Dietary Guidelines, National IMAM Guidelines, Adolescent Girls IFA Supplementation, National Anaemia Prevention and Implementation Strategy and multi-sector nutrition plan).	Collaborate with other sectors to enforce standards for air, water, and food quality. Develop/update standardized comprehensive nutrition package for capacity enhancing activities (new and refresher). Enhance capacity on nutrition at all levels- (new and refresher). Assign a focal person for nutrition at the district level. Functionalize Nutrition Cluster coordination mechanism and inter-cluster coordination.
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13	<p>Food-Based Dietary Guideline -2016</p> <p>Individuals across all age groups should obtain essential nutrients from their daily diet to promote a vibrant and energetic lifestyle.</p> <p>Develop regulations against advertising of harmful products. Individuals across all age groups should obtain essential nutrients from their daily diet to promote a vibrant and energetic lifestyle. Prohibition of use as a mixture of hormones, steroids, and psychotropics in food items. The department can ask to verify the quality ingredients of food items and food supplements. Provision of adequate information regarding product ingredients, date of production, date of expiry, methods of use, and probable adverse effects of use of products. Compulsory adaption of quality production system.</p>	
14	<p>Sustainable Development Goals (2015–2030)</p> <p>End hunger, achieve food security and improved nutrition, and promote sustainable agriculture</p>	<p>Improvements in food & nutrition security of the most disadvantaged groups. Strengthened agricultural extension system. Expansion of year-round irrigation. Improvements in the distribution of seeds and fertilizers. Expansion of rural roads. Commercialization of modern food production systems, and implementing resilient agricultural practices. Maintaining genetic diversity of crops and farmed animals and their related species, including through soundly managed and diversified seed and plant banks at the national, regional, and international levels.</p>
15	<p>Constitution of Nepal (2015)</p> <p>Food is a fundamental human right</p>	

16 Strategy for Infant and Young Child Feeding (2014)	To provide a framework of essential actions to improve infant and young children's feeding and caring practices. To improve optimal breastfeeding practices; To improve age-appropriate optimal complementary feeding practices; To ensure enforcement of national legislation related to infant and young child feeding (such as marketing of breast milk substitutes and maternity protection); To improve the consumption of essential micronutrients (such as vitamin A, especially among 6-24 months, and deworming tablet, especially among 12-24 months).	Advocacy, policy, partnership, and coordination; Legislation and standards; IYCF in the health system; National communication plan on MIVCN, including IYCF; Community-based IYCF; Additional complementary feeding interventions, including non-health sector strategic support in line with MSNP; IYCF under challenging circumstances; Capacity building on IYCF and BFHI/CBFI - including pre-and in-service training for health and non-health sectors, in line with MSNP, and Research, Monitoring, and Evaluation of IYCF.	Review the latest qualitative and quantitative evidence on community IYCF integrated with small-scale agricultural and livestock production and communication for behavior change. Promote recipes of improved complementary foods using locally available foods to serve as input to future policy decisions.
17 Food and Nutrition Security Plan of Action (2013)	Vision Statement (A competitive, sustainable, and inclusive agricultural sector that contributes to economic growth, improved livelihoods, and food and nutrition security) Reduce hunger, malnutrition, and poverty among the poorest households by promoting sustainable, agriculture-based livelihoods.	Fertilizer trade and pricing policies, Value chain development and strategic crop, Capacity and institution building, Seed security and development, Large and medium-scale irrigation infrastructure, Rural infrastructure, access roads, community centers, and others, Agricultural insurance and finance, among others	The Nepal Food Corporation (NFC) is a government agency that distributes food with insecure availability or access. Local government administration to provide technical support, empower producer groups, introduce farmers and producer groups to the value of hiring private advisers, reduce or eliminate fraud and corruption in a free market, and make proper budgetary provisions to extend agriculture and another extension – collaboration of ten different institutions for food security.

18	<p>Agriculture Development Strategy (2015-2035)</p> <p>Increase food and nutrition security; reduce poverty and increase competitiveness; ensure higher and more equitable income of rural households; strengthen farmers' rights.</p>	<p>A self-reliant, sustainable, competitive, and inclusive agricultural sector that drives economic growth and contributes to improved livelihoods and food and nutrition security leading to food sovereignty. ADS will accelerate agricultural sector growth through four strategic components related to governance, productivity, profitable commercialization, and competitiveness while promoting inclusiveness (both social and geographic), sustainability (both natural resources and economic), development of private sector and cooperative sector, and connectivity to market infrastructure (e.g., agricultural roads, collection centers, packing houses, market centers), information infrastructure and ICT, and power infrastructure (e.g., rural electrification, renewable and alternative energy sources).</p>	<p>National ADS Coordination Committee. ADS implementation Trust Fund. The ADS will focus on generation and adoption of sustainable technologies and practices and will pilot a voucher system to empower farmers in their choice of inputs and extension services. the ADS supports the improvement of physical and institutional infrastructure to promote commercial agriculture (agricultural roads, market information, and market intelligence systems).</p>
19	<p>Nutrition-Related Legislation on Flour Fortification (2011)</p> <p>Flour processed at large-scale roller mills must contain iron, folic acid, and vitamin A.</p>	<p>Bringing people into a shared space for action (the multi-stakeholder platform); Ensuring a coherent policy and legal framework; Aligning programs around a Common Results Framework; Financial tracking and resource mobilization around a Common Results Framework</p>	

20	Agribusiness Promotion Policy -2006	Reduce poverty by encouraging production of market-oriented and competitive agricultural products.	Enforce development of Comprehensive Growth Center based on geographic, technical, and economic feasibility; Encouraging production quantity and quality of agriculture products to match the market demands in coordination with of Special Economic Zone (SEZ);	To ensure all required facilities including production materials, technology and technical supports, infrastructure like road, irrigation, electricity, agro-loan, agro-insurance, information communication, market mechanism through the coordinated effort of government, non-governmental agencies, cooperatives, and private sector.
21	School Health and Nutrition Strategy -2006	Improve use of school health and nutrition services by school children; improve healthful school environment; Improve health and nutrition behaviors and habits; improve and strengthen community support systems (linkage and networking between ministry of health and population and ministry of education) and policy environment	Improve use of SHN services by school children; Improve healthful school environment; Healthful school environment; Improve health, nutrition behavior, and habits; Improve, strengthen community support system and policy environment.	Regular physical checkup, Midday Meal Program (cash, kind and tiffin box support with parental orientation), Institutionalize SHN Program in MoHP and MoE at central and district level
22	National Policy on Skilled Birth Attendance (2006)	Initiating and establishing early and exclusive breastfeeding; educating mothers, families, and caretakers about maintaining successful breastfeeding.		
24	National Agriculture Policy (2004)	Achieving food security and poverty irradiation by high and sustainable economic growth through commercial and competitive agricultural systems.	Increase agricultural production and productivity; make agriculture productivity competitive with regional and world markets by developing the bases of commercial and competitive agricultural systems; conserve, promote, and use natural resources, environment, and biodiversity. Promoting local products and increasing productivity,	Advancement of technology, training to farmers; developing and promoting scientific use of cultivable land; developing and implementing agricultural plans; policies and control based on local needs and priority; Special incentive package to priority sector; development Large Production Packets for the demanding products;

25	Animal Slaughterhouse and Meat Inspection Act (1999)	Provide necessary arrangements to establish slaughterhouses and arrange for meat inspection to safeguard the health and welfare of the people in general; control adulteration in meat and meat products; and maintain reasonable standards of meat by protecting the wholesomeness, quality, and adequacy of meat.
26	Iodized Salt (Production, Sale and Distribution) Act, 1998, Amendment Act, 2010	Make provision for the production, import, supply, sale, and distribution of iodized salt in a proper quantity and for mixing iodine with salt to prevent and eradicate extensive and serious effects caused to public health from iodine deficiency
27	National Safe Motherhood Policy (1998)	Promotion of breastfeeding through counseling during antenatal care
28	The Mother's Milk Substitution Act and regulation 2049 (1992), 2051 (1994)	Provide safe and adequate nutrition to infant by protecting and promoting breastfeeding and regulating the mother's milk substitutes, regulating the sale and distribution of infant foods
29	Black-Marketing and Some Other Social Offenses and Punishment Act, 2032 (1975)	Control black-marketing, profiteering, adulteration, and some other social offenses to maintain health, convenience, and economic interests of the general public
30	Food Act, Food Rules 1970, 1995, 5th amendment 2007	Make legal provisions to maintain proper standards of foodstuffs; prevent any undesirable adulteration in foodstuffs; prevent reducing or extracting any natural quality or utility from foodstuffs.

Findings in policy

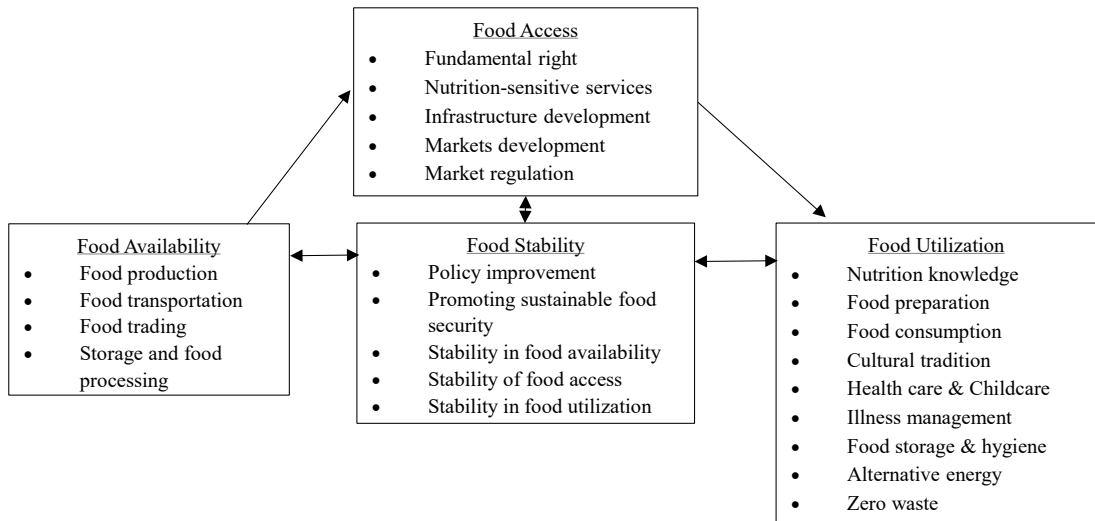
Food production and availability. Nepal's food security policies focus on food production, transportation, trading, and storage, aiming for self-sufficiency and economic growth. Key policies empower farmers, promote market-oriented agriculture, and aim to modernize and industrialize the sector. The country emphasizes sustainable food production, improved supply chains, and better market access through infrastructure and service delivery. Policies address food trade, price regulation, and value chain development to boost rural incomes. Additionally, efforts are made to establish storage, processing centers, and community support systems for sustainable food security and economic development.

Food access. Nepal recognizes food security as a fundamental right, with policies ensuring access to quality food and nutrition. Key provisions include consumer protection, nutrition-sensitive services, and food rights. Strategies to enhance food access focus on reducing poverty through sustainable, agriculture-based livelihoods, increasing rural household incomes, and improving agricultural infrastructure. These include expanding agricultural roads, developing market intelligence systems, and promoting market-driven agricultural production in coordination with Special Economic Zones (SEZ) while ensuring a corruption-free market and proper budgeting for agricultural development.

Food utilization. Nepal's food utilization policies emphasize good dietary practices, food safety, and nutrition. Key areas include improving nutrition knowledge for all age groups, ensuring safe food preparation standards, promoting wise consumption of local and cultural foods, and improving health and childcare practices. Policies focus on reducing malnutrition through better food storage, hygiene, and illness management. They also encourage using alternative energy for cooking and aim to eliminate food waste, aligning with sustainable development goals. These initiatives aim to improve food quality and health behaviors and reduce food-related risks across the population.

Food stability. Nepal's food stability policies focus on ensuring sustainable access to food by improving existing strategies in response to changing contexts. These include enhancing agricultural infrastructure, market development, and farmers' conditions. Key areas include policy improvement through multi-sector coordination, promoting sustainable agriculture practices, and adopting new technologies. Efforts to stabilize food availability aim to minimize shortages and enhance food production while improving food access, which involves better governance. Additionally, policies focus on stable food utilization, ensuring continuous access to healthcare, clean water, and sanitation, and minimizing food waste. These strategies aim to achieve long-term food security and stability. The following framework has been developed based on the empirical findings of policies, strategies, and plan documents.

Figure 2. Food security framework



The support system in food security provisions in Nepalese policies

- Nepalese policies aim to ensure sustainable food security by strengthening the support system through various provisions. These provisions cover all aspects necessary for achieving sustainable food security in Nepal. These provisions highlight the following key strategies.
- Research and technology development for agricultural production (Fifteenth Development Plan 2019-2023).
- Infrastructure development, market creation, and farmer support programs (Local Government Operation Act – 2017).
- Public-private partnerships (Fifteenth Development Plan 2019-2023).
- Promoting land consolidation (Fifteenth Development Plan 2019-2023).
- Farmer assistance through loans, insurance, and guaranteed minimum support prices (Fifteenth Development Plan 2019-2023, Local Government Operation Act – 2017).
- Promotion of local and cash crop production and food processing (Fifteenth Development Plan 2019-2023).
- Collaboration with various stakeholders for nutrition programs (Multi-sector Nutrition Plan 2018-2022, Local Government Operation Act – 2017).
- Establishment of funds for dairy development (National Dairy Development Policy - 2021).
- Food hygiene campaigns and creating a food safety and quality assurance authority (National Nutrition Policy - 2004, National Food Safety Policy - 2019).

- Consumer protection measures and regulatory improvements (Consumer Protection Act - 2018).

Consumers' perception regarding food security in Kathmandu

A survey was conducted with 446 consumers living in Kathmandu for at least one year to assess their perceptions of food security in the city. Using descriptive statistics, the study focused on consumers' confidence in food security, explicitly examining food availability, market prices, consumption behavior, and suggestions for improving food security in Kathmandu. Most respondents were male (58.5%), with 49.3% aged 20-30, 35% aged 41-60, and 14.6% aged 31-40. Most respondents (74%) were from Kathmandu, while 26% had moved there within the past year. More than half (54.9%) lived in joint families. All respondents earned their income, though 29% were students. Most consumers reported not having a fixed schedule or designated person for household goods, indicating they tend to buy items when available.

Table 1

Perception regarding food availability

		Frequency	Percent
Fear of food unavailability	Never	55	12.33
	Rarely	151	33.85
	Usually	135	30.27
	Always	105	23.54
	Total	446	100
Discussions with friends, relatives, and sellers		Frequency	Percent
	Yes	246	55.2
	No	200	44.8
Total	446	100	
Food unavailability in the market within the last 12 months		Frequency	Percent
	Never	40	9
	Sometimes	215	48.21
	Almost always	130	29.15
	Always	61	13.68
Total	446	100	

Table 1 shows that most respondents (88%) expressed concerns about food unavailability in Kathmandu, with 55.2% discussing these fears with friends, relatives, and sellers. Additionally, 91% of respondents reported experiencing varying degrees of food unavailability in the past year, highlighting widespread fear and uncertainty about food access in the city.

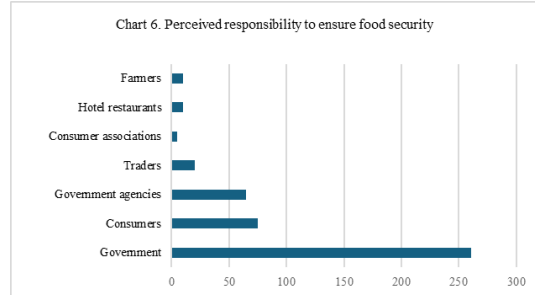
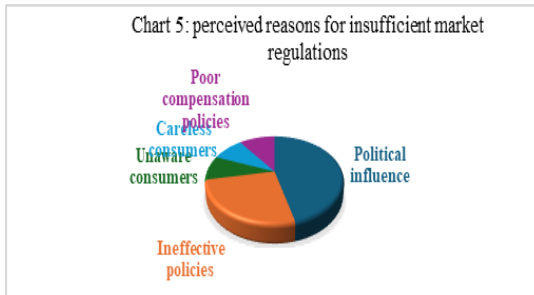
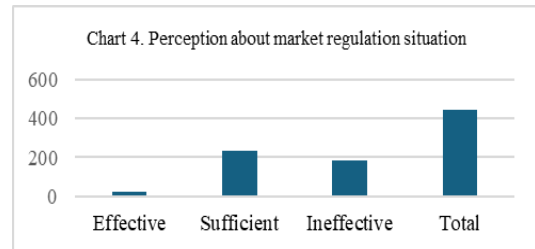
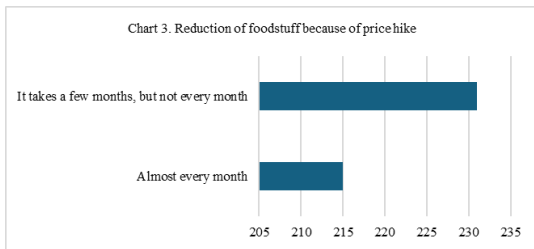
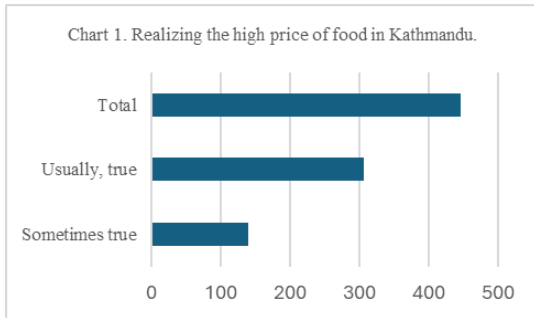


Chart 1 reveals that most consumers (68.6%) perceive food prices in Kathmandu as high. Additionally, 91% of respondents (chart 2) reported that purchasing food and nutrition was costly over the past 12 months. Of these, around 53% reduced their food intake (chart 3) during certain months due to the high prices.

Most respondents (chart 4) in Kathmandu (95%) believe that market regulations are either ineffective or barely sufficient. Most (46%) attribute the weak regulations to political influence, followed by ineffective policies (26%), poor communication (10%), and both unaware and careless consumers (9% each) (chart 5). Respondents (chart 6) also suggest that the government should take greater responsibility for improving market regulations (58.5%), with consumers (16.8%), government agencies (14.6%), and traders (4.5%) also seen as accountable.

The study also surveyed to assess the food waste behavior and food waste centers. The findings indicate that the respondents are conscious of food waste and cook only the food needed at home. A quarter of respondents (25.80%) reported that they store leftover food for future meals compared to others. Further, they noted that food waste is most common at

parties, ceremonies, and restaurants, attributed to a lack of awareness about food security and a general sense of low responsibility. Most respondents recommended incorporating food security education into school curriculums when asked about strategies to discourage food-wasting behaviors. They also suggested launching regular consumer awareness programs.

To develop a further understanding of food security in Kathmandu and the effectiveness of the support system, three interviews were conducted: two with interviews and one with an expert. The analysis of the interview data revealed key insights regarding agricultural practices, policy gaps, and food security issues:

- Most producers rely on intermediaries to sell their products.
- While farmers are aware of government support provisions, these are often untimely and insufficient, particularly for small-scale farmers.
- Farmers expect regular supplies of seeds, fertilizers, and pesticides, as well as improved infrastructure such as roads, cold storage, and irrigation facilities. They also seek prompt disaster relief support.
- Financial support with low interest rates and agricultural insurance are crucial for farmers, helping to reduce risks.
- The Nepalese food market is poorly regulated due to political instability and ineffective compensation policies.
- Awareness and training programs are essential to equip farmers with modern technologies and production methods.
- Nepal's commitment to the WTO's Agriculture Agreement (AoA), which promotes free market access and reduces domestic support for farmers, poses challenges, especially for small-scale producers.
- Despite numerous food security policies, there is a lack of integrated efforts and adequate government support for small farmers.
- An open market without proper self-development has increased market vulnerability, threatening long-term food security in Nepal.
- The government needs to invest in agricultural infrastructure, including irrigation, cold storage, and road connectivity.
- Establishing a reliable support system for seeds, fertilizers, insecticides, market development, and supply chain management is essential.
- Nepal should reassess its position on the AoA and advocate for increased government support for farmers.
- It is urgent to create a food storage policy and establish infrastructure to manage food security issues in the future.
- Limited resources and manpower hinder effective market price regulation and inspections.
- A collaborative approach is needed to develop more informed strategies to address food security and pricing challenges.

- Technology should be utilized for better monitoring, data analysis, process efficiency, and stronger stakeholder collaboration.
- The government must protect against market manipulation and promote innovation and entrepreneurship.

There are multiple policies to ensure food security in Nepal; hence, there is unanimity in policy provisions to ensure food security in Kathmandu, the capital city. As a member of the World Trade Organization (WTO), Nepal has formulated many policies, strategies, and operational guidelines to follow the provisions of the WTO to ensure food security. These policy documents connect these structural levels to the nation's political structure. Nepal has effective policies following the international provisions, practices, and national commitment to different agreements. However, the effectiveness of such policies needs to be judged based on how the stakeholders perceive and behave. The study identified that the policies are formulated effectively, but the consumers feel that implementing such policies is inadequate.

Political influence and ineffective policies are the main reasons for poor market regulations affecting food availability and affordability. WTO agreements like the Agreement on Agriculture (AoA) present challenges, particularly for small farmers (Adhikari et al., 2023), which decreases the competitiveness of the local producers. However, the AoA aims to ensure the human rights for food and nutrition globally by protecting and promoting the free flow of food items and discouraging nations from dumping exported foods (Agreement of Agriculture and Food (AoAF), 2019). Small producers who lack sufficient capital, technical ability, and knowledge (Deka & Goswami, 2020) and Nepalese farmers are of small scale in every aspect. So, Nepalese farmers may not benefit from the membership of WTO, which can be why consumers feel insecure about getting quality food and nutrition at a time of need, at an affordable price, or at sound quality. Nepal possesses policy efficiencies, but the study finds institutional and infrastructure development weaknesses.

Study finds that producers often rely on intermediaries to sell their products. This is why small farmers do not get the most benefits from farming. This justifies how the sustainable production and distribution issue is a global challenge (Li et al., 2014) in food security. This situation demands a sustainable local food system (Laforge et al., 2017). Farmers seek timely and substantial support, especially small farmers, including regular supply of inputs, infrastructure development, financial assistance, and risk reduction measures like agriculture insurance.

Effective regulation of the agriculture market (regulation of production, distribution, and consumption) ensures equal access to agricultural products (Kvasha & Vakulenko, 2023) regarding the quality and price of the food. Therefore, the effective regulation of the agricultural market is one of the primary requirements of food security. However, the Nepalese agriculture market lacks effective and regular regulation due to political instability, which poses challenges. A developed, autonomous, and dedicated institutional setting is essential for effective market regulation, food security awareness programs, and modernization efforts.

Technological advancements in monitoring, data analysis, and streamlining administrative processes are the most important interventions in this process. Immediate and maximum legal action must be taken against any actions against market manipulation and unfair practices, alongside fostering innovation and entrepreneurship.

The study explores the lack of integration of food security policies and the limited government support for small farmers. Without adequate support for production, distribution network, and appropriate infrastructure development, the open market has just made the short-term availability of food. However, it has increased domestic farmers' market vulnerability and balanced quality with productivity. Thus, it is recommended that investment in agriculture infrastructure, establishment of reliable support systems, refocusing on AoA understanding, and collaborative approaches be recommended for informed strategies.

5. CONCLUSION AND IMPLICATION

Nepal has developed multiple policies to ensure food security, particularly in Kathmandu. Although Nepal's policies align with international provisions, such as those under the World Trade Organization (WTO), stakeholders' perceptions reveal significant gaps in execution, particularly in market regulations that affect food availability and affordability. The challenges posed by the WTO's Agreement on Agriculture (AoA), especially for small-scale farmers, exacerbate the issue, as these farmers often lack the resources, knowledge, and support needed to compete effectively in the global market. This results in a sense of insecurity among consumers regarding the accessibility of quality food at affordable prices.

The study highlights that small farmers often rely on intermediaries, reducing their profitability and contributing to the broader challenge of sustainable production and distribution in food security. A more sustainable local food system is needed, which includes regular input supplies, infrastructure development, financial assistance, and risk reduction measures such as agricultural insurance. Additionally, the lack of effective agricultural market regulation due to political instability further compounds the problem, making equal access to farm products difficult.

To address these issues, the study recommends investing in agricultural infrastructure, enhancing support systems for small farmers, and adopting collaborative approaches to food security. Legal actions against market manipulation, technological advancements, and policy integration are essential to creating a more resilient and equitable food system for Nepal.

Action Recommendations

This study recommends immediate and long-term strategic actions to address food security issues in Kathmandu.

Immediate actions

- Improve market regulations to ensure food availability and affordability.

- Launch awareness campaigns to reduce food wastage and promote proper nutrition.
- Establish a supply chain support system to aid food distribution and sales.
- Set a fair base price for food items to encourage agricultural participation and future food security.

Long-term actions

- Develop food storage policies, improve infrastructure, and enhance inspection capabilities.
- Foster collaboration and holistic strategies to address food security and pricing.
- Promote optimal land use and agroecological practices for soil health, water conservation, and biodiversity.
- Support climate-resilient crops and diversified agriculture to mitigate climate change impacts.
- Reduce food waste and losses through better post-harvest management and storage.
- Improve market access for smallholder farmers through rural infrastructure development.
- Strengthen social protection programs for vulnerable populations through an integrated Agri-support system.
- Promote nutrition-sensitive agriculture for a diverse nutritious food supply.
- Establish early warning systems for natural disasters and invest in resilient infrastructure to protect agriculture and food distribution.
- Create emergency response plans, including food reserves for crises.

Implication of the study

This study provides valuable insights for evidence-based interventions with several implications. It offers a contextual understanding of how supporting systems can enhance food security, highlighting the impact of social and political factors on market regulations. The study also suggests future research on increasing productivity, conserving resources, and promoting equity to optimize sustainability.

The findings can guide policy design and program implementation to promote sustainable food security. It will help policymakers develop targeted interventions and foster partnerships across sectors, contributing to policy advocacy and mobilizing support for sustainable food security initiatives.

Critique of the study

The study on food security in Kathmandu highlights important issues but has areas for improvement. The small sample size and lack of diverse respondents limit its representativeness. While the descriptive research design sheds light on consumers' perceptions, more advanced methods could strengthen the findings. The study focuses on four food security dimensions but should also incorporate sustainability. It overlooks potential confounding variables like socio-economic status and access to education or healthcare, which influence food security. Lastly, the study should suggest future research to explore gaps, long-term impacts, and alternative approaches to food security.

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Conflict of Interest

Author declare the absence of conflict of interest in publishing this article.

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