*Review Article*

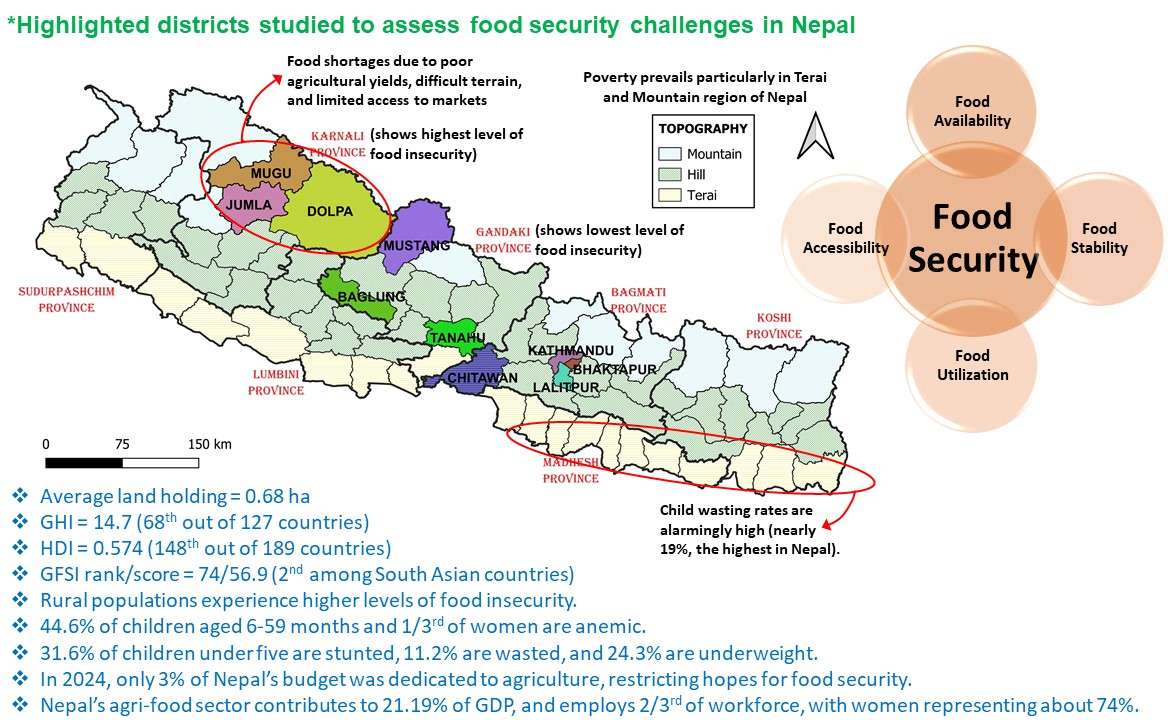
Food security challenges in Nepal: assessing the existing situation and policy-level strategies for mitigation and resilience

ABSTRACT

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| The review critically examines the multifaceted challenges of food security in Nepal, focusing on the interplay of socio-economic, environmental, and governance factors. Despite an improvement in the Global Hunger Index from 37.1 in 2000 to 14.7 in 2024, approximately 13% of Nepal’s population still faces moderate to severe food insecurity, with Karnali Province experiencing the highest rates at 32%. The agri-food sector, contributing 21.19% to GDP and employing two-thirds of the workforce, is severely impacted by climate change, soil degradation, and inadequate infrastructure. Climate-induced disasters, such as floods and droughts, have caused annual economic losses of 1.5-2% of GDP, further exacerbating food shortages. Malnutrition remains a critical issue, with 31.6% of children under five stunted, 11.2% wasted, and 44.6% anemic. Moreover, one in three pregnant women suffer from anemia. The review highlights the inefficacy of existing policies, such as the Climate Change Policy (2019) and the National Adaptation Program of Action (2010), due to weak governance and political instability. Emigration has led to labor shortages and a decline in agricultural productivity, while remittances, contributing 26.6% to GDP, have shifted food practices towards market dependency, reducing food sovereignty. The review concludes that achieving food security in Nepal requires a holistic approach, prioritizing climate-resilient agriculture, equitable resource distribution, and inclusive policy implementation. Strengthening local food systems, empowering women, and enhancing education are essential for long-term resilience. Without addressing these systemic issues, Nepal’s progress towards food security will remain precarious, leaving vulnerable populations, particularly in rural and marginalized regions, at continued risk. |

*Keywords: Food security, Food insecurity, Nepal, National, Agriculture, Government, Policies*

*Graphical abstract*



1. INTRODUCTION

A food system constitutes an intricate web of interconnected activities and stakeholders engaged in producing, transporting, distributing, consuming, and disposing food, along with its influence on health, nutrition, environmental sustainability, and overall welfare of society. When effectively functioning, food systems serve as a unifying force for families, communities, and nations, fostering collective resilience, prosperity, and economic and cultural dynamics [1,2]. However, many food systems globally remain fragile and susceptible to disruptions, as evidenced by recent pandemics of Coronavirus Disease 2019 (COVID-19). Systemic failures can trigger cascading consequences, undermining education, well-being, economic stability, human rights, and peace, with marginalized populations disproportionately bearing the impact of such challenges. The vulnerabilities of these systems highlight the critical need for comprehensive examination and robust strategies to enhance their resilience and sustainability [2].

As defined by the Food and Agriculture Organization, [FAO](https://www.fao.org/4/y1500e/y1500e.pdf) [3], food security is achieved when every individual consistently possesses adequate physical, economic, and social access to sufficient, safe, and nutritionally appropriate food that fulfils their dietary requirements and cultural preferences, thereby supporting an active and healthy lifestyle [4,5,6]. Food security is analyzed with the help of four fundamental dimensions: availability, accessibility, utilization, and stability [7,8].

* Food availability: It is a fundamental requirement for food security, emphasizing the need for a consistent supply of food through local cultivation, international trade, and humanitarian assistance. It represents the “supply side” of food distribution mechanisms.
* Food accessibility: National and global food security does not inherently guarantee food security at the household level. Although food may be available in markets, individuals with low purchasing power may struggle to access it.
* Food utilization: It deals with optimum utilization of food resources in beneficial and effective manner. In addition to food availability and its accessibility, its biological utilization, encompassing nutrient assimilation and food safety, is crucial to fulfil nutritional requirements.
* Food stability: Food availability, accessibility, and utilization can ensure lasting food security only when these components are sustained over time, absenting significant variations or disturbances [9].

This review paper focuses on the thorough assessment of reasons behind food insecurity, a pressing issue that is affecting the lifestyle and welfare of people, in Nepal. Its objective is to integrate and analyze the existing literature of research on the several elements contributing to food security, such as climate change, natural disasters, demographic aspects, emigration, governance, and many more. The review aims to evaluate the effectiveness of existing policies and strategies, identifying gaps and offering suggestions for improvement of food security status.

2. Agri-Food System in Nepal

Nepal’s agri-food sector (agriculture, forestry, fishery, value added) is essential to its economy and supports the livelihoods of a large part of its population. This sector, which contributes about 21.19% of Gross Domestic Product (GDP) [10], employs two-thirds of Nepal's workforce, with women representation around 74% [11]. Spanning a range of agro-ecological zones, the sector showcases Nepal's varied agricultural potential across different regions. Agricultural land accounts for 28% of the country's total area, where 21% is actively cultivated, with smallholders being the dominant ones with average landholding merely 0.68 hectares [12]. The vulnerability of food production, especially in mountainous areas (Fig. 1), prompted Nepal to initiate formal food aid programs in 1974 [13]. As a result, Nepal continues to be a significant recipient of food assistance to this day with the cereals import accounting for 15% of the national consumption needs [14]. Despite these limitations, Nepal has made considerable progress in reducing hunger; its [Global Hunger Index](https://www.cesvi.eu/news/global-hunger-index-2024-how-gender-justice-can-advance-climate-resilience-and-zero-hunger/#:~:text=The%20GHI%20shows%20that%20gender,gap%20in%20women's%20participation%20in) (GHI) score decreased from 37.1 in 2000 to 14.7 in 2024, placing it 68th among 127 evaluated nations showing an improvement of approximately 30% [15]. However, there is a need for greater competitiveness to grow at its full potential. Some of the key challenges confronting Nepal’s agri-food system include [16,17]-

* Climate change and natural disasters: Nepal's susceptibility to climate change leads to unpredictable rainfall patterns, droughts, flooding, and landslides, which negatively affect agriculture, obstruct economic development, and contribute to food shortages. It results in an annual economic loss of approximately 1.5-2% of the country’s GDP, emphasizing on an urgency for climate-resilient farming methods [12,15].
* Water and soil depletion and degradation: Excessive application of synthetic inputs, inefficient irrigation practices, and unchecked deforestation lead to significant soil and water resources degradation and depletion, ultimately hampering agricultural production in long run.
* Limited availability of modern farming resources: Majority of farmers struggle with acquisition of modern farming tools and inputs, such as efficient fertilizers, high-yielding varieties, advanced irrigation systems, and machinery. Due to these obstacles, they are not able to increase the productivity and efficiency.
* Policy and governance barriers: Inconsistent regulations, weak enforcement, and lack of coordination among the governing bodies obstruct the effective execution of agricultural initiatives, reducing their overall impact.
* Limited financial support for agriculture: Farmers face immense obstacles in obtaining credit and financial assistance, hindering their ability to purchase essential inputs and invest in modern agricultural equipment.
* Inadequate and poor infrastructure, and limited market connectivity: A shortage of well-constructed roads, storage services, and effective supply chain, limit the mobility and distribution of agricultural produce, resulting in increased post-harvest losses, which lowers farmers’ income and overall agricultural growth.
* Limited infrastructure for processing and value addition: Lack of adequate cold storage, processing, and value-addition facilities restricts the ability of farmers to access premium markets, hindering export and overall profit.
* Unsatisfactory agricultural advisory and extension services: Due to inefficient agricultural extension services, farmers face difficulty in accessing and understanding crucial information on modern farming techniques, crop management, and market trends. This restricts their ability to adopt modern farming strategies and shifting trends in agriculture.

3. Food insecurity in nepal

Food insecurity is defined as the inadequate and inconsistent access to safe and nutritious food necessary for healthy growth, development, and maintaining an active, healthy lifestyle [18]. Food insecurity has adverse effects on physical and mental health, educational attainment, and economic performance, thus serving as a substantial barrier to socioeconomic progress [19,20,21,22,23,24]. The Food Insecurity Experience Scale (FIES), created by FAO [18], is a tool used to assess levels of food insecurity. FIES assesses food insecurity on a spectrum of severity. In the [Nepal Demographic and Health Survey (NDHS) 2022](https://dhsprogram.com/pubs/pdf/PR142/PR142.pdf), households responded to eight questions regarding difficulties in accessing sufficient food over the previous 12 months [25]. These responses were analyzed to determine the prevalence and intensity of food insecurity across the household population. The food insecurity levels were categorized as-

* Moderate food insecurity: Characterized by the need to compromise on food quality and/or quantity and experiencing uncertainty about acquiring sufficient food due to limited finances or resources over the past year. Moderate food insecurity can increase the risk of various forms of malnutrition, including stunting in children, deficiencies of essential micronutrients, and even obesity in adults.
* Severe food insecurity: Characterized by exhausting food supplies and, in the most extreme cases, enduring one or more days without eating during the last 12 months. Severe food insecurity leads to intense and prolonged hunger.

[NDHS 2022](https://dhsprogram.com/pubs/pdf/PR142/PR142.pdf) highlights that 13% of the sample population experienced moderate to severe food insecurity in the year before the survey, with 1% facing severe levels [25]. Food insecurity varies significantly by demographic factors. Rural populations experience higher levels of food insecurity than urban ones, with 16% in rural areas facing moderate to severe insecurity compared to 11% in urban areas. Regional disparities are prominent, with Karnali Province (Fig. 1) showing the highest rates, where 32% of residents face moderate to severe food insecurity, and 5% experience severe food insecurity, while Gandaki Province (Fig. 1) reports the lowest at 8% (Table 1).

Poverty further worsens the situation by restricting people’s affordability to nutritious food, accessibility to healthcare, and awareness about dietary requirements. This issue is particularly observed in Terai and mountainous regions of the country (Fig. 1). Nepal, categorized as one of the poorest countries in the world, ranking 148th out of 189 countries in the Human Development Index (HDI) in 2019 with a score of 0.574 [26], faces amplified challenges, such as market price violations, civil unrest, and high susceptibility to both natural and infectious diseases like COVID-19 and dengue, all of which further intensify food insecurity. The Zero Hunger Strategic Review of 2017-18 emphasized the persistence of malnutrition and intense food shortages, primarily impacting children, adolescents, and new mothers [7]. Economic status greatly affects food security; individuals in the lowest wealth quintile have the highest food insecurity levels, with 27% experiencing moderate to severe insecurity and 4% severe insecurity, while both rates decrease substantially with rising wealth (Table 1).

**Table 1.** Food insecurity; Proportion of the de jure population experiencing moderate to severe food insecurity and the proportion facing severe food insecurity, categorized by background characteristics [25]

|  |  |  |  |
| --- | --- | --- | --- |
| **Background characteristic** | **Percentage with moderate to severe food insecurity (\*,\*\*)** | **Percentage with severe food insecurity (\*,\*\*)** | **Number of persons** |
| **Residence** | | | |
| Urban | 10.6 | 1.0 | 36090 |
| Rural | 16.2 | 1.9 | 18054 |
| **Ecological zone** | | | |
| Mountain | 21.3 | 3.2 | 3181 |
| Hill | 11.9 | 1.3 | 21377 |
| Terai | 12.0 | 1.1 | 29586 |
| **Province** | | | |
| Koshi Province | 13.1 | 1.6 | 9351 |
| Urban | 11.9 | 1.5 | 6041 |
| Rural | 15.4 | 1.9 | 3310 |
| Madhesh Province | 14.3 | 1.1 | 11480 |
| Urban | 13.2 | 0.9 | 8515 |
| Rural | 17.4 | 1.9 | 2966 |
| Bagmati Province | 9.0 | 0.9 | 11076 |
| Urban | 6.1 | 0.5 | 8574 |
| Rural | 19.0 | 2.2 | 2503 |
| Gandaki Province | 7.9 | 0.8 | 4860 |
| Urban | 7.7 | 1.1 | 3272 |
| Rural | 8.3 | 0.3 | 1588 |
| Lumbini Province | 9.7 | 0.8 | 9451 |
| Urban | 8.4 | 0.6 | 5153 |
| Rural | 11.3 | 1.0 | 4298 |
| Karnali Province | 31.5 | 5.1 | 3331 |
| Urban | 27.8 | 4.5 | 1755 |
| Rural | 35.7 | 5.8 | 1576 |
| Sudurpaschim Province | 11.8 | 1.3 | 4595 |
| Urban | 10.9 | 1.0 | 2781 |
| Rural | 13.2 | 1.6 | 1814 |
| **Wealth quintile** | | | |
| Lowest | 27.2 | 3.6 | 10839 |
| Second | 16.3 | 1.5 | 10836 |
| Middle | 10.3 | 0.9 | 10839 |
| Fourth | 6.7 | 0.5 | 10829 |
| Highest | 1.8 | 0.1 | 10802 |
| **Total** | 12.5 | 1.3 | 54114 |

*\* Food insecurity assessments rely on the Food Insecurity Experience Scale (FIES), a tool created by the Food and Agriculture Organization (FAO) of the United Nations to gauge levels of food access limitations.*

*\*\* Household members are excluded from FIES analysis if the respondent either declines to answer or is unsure of the responses to any of the FIES items.*

Nepal, once self-sufficient in food grains during the 1980s, now relies heavily on food imports, costing billions annually. In the 1960s, the country led South Asia in cereal production, achieving yields 198% above those in Bangladesh and 212% above those in Sri Lanka. However, this lead has diminished, and Nepal now trails many of its South Asian neighbors in average yields of staple crops like rice, wheat, and maize [7].

The [Global Food Security Index (GFSI) 2022](https://impact.economist.com/sustainability/project/food-security-index/reports/Economist_Impact_GFSI_2022_Global_Report_Sep_2022.pdf) evaluates critical elements such as affordability, availability, quality, and safety across 113 countries, highlighting a comparatively lower food security standing in Southeast Asia than in more developed nations. This multidimensional index uses 34 specific indicators to analyze food security factors across both developed and developing regions [27]. Among South Asian Association for Regional Cooperation (SAARC) countries, India holds the highest rankings in both overall and individual category scores, while Pakistan ranks the lowest (Table 2). Each score is assessed on a 0–100 scale, where 100 represents optimal food security [28].

**Table 2.** Global Food Security Index ([GFSI](https://impact.economist.com/sustainability/project/food-security-index/reports/Economist_Impact_GFSI_2022_Global_Report_Sep_2022.pdf)) of SAARC countries [28]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Country | GFSI Rank/Score | Category Rank/Score | | |
| Affordability | Availability | Quality and Safety |
| India | 68/58.9 | 80/59.3 | 42/62.3 | 67/62.1 |
| **Nepal** | **74/56.9** | **85/52.7** | **13/70.9** | **72/57.8** |
| Sri Lanka | 79/55.2 | 74/61 | 64/57.2 | 81/55 |
| Bangladesh | 80/54 | 87/52.1 | 46/61.5 | 71/58.4 |
| Pakistan | 84/52.2 | 75/59.9 | 61/58.3 | 97/49.4 |

*Note: The data of Afghanistan, Bhutan, and Maldives are not available in the* [*GFSI 2022*](https://impact.economist.com/sustainability/project/food-security-index/reports/Economist_Impact_GFSI_2022_Global_Report_Sep_2022.pdf)*.*

*Abbreviations: GFSI, Global Food Security Index.*

4. Malnutrition

The most critical impact of food insecurity is malnutrition, which reduces productivity in the labor force due to malnourished adults. Malnutrition in women may lead to an increase in the likelihood of malnourished children being born [7]. Malnutrition affects nearly a third of young children, and a significant portion of pregnant and lactating women across the country. According to [NDHS 2022](https://dhsprogram.com/pubs/pdf/PR142/PR142.pdf), about 31.6% of children under five are stunted, indicating chronic malnutrition, while 11.2% are wasted (have low weight for their height) and 24.3% are underweight [25]. Anemia, a condition primarily linked to iron deficiency, affects 44.6% [29] of children aged 6-59 months, with higher prevalence rates in rural areas than in urban settings. These studies reveal that countless young people aren’t receiving key vitamins and minerals their bodies and minds need to thrive, causing health complications and learning difficulties, which could hold them back in school and later diminish their opportunities to build stable, fulfilling lives.

Pregnant and breastfeeding women are also deeply affected by malnutrition. In Nepal, approximately one in three expectant mothers suffer from anemia [25]. This condition heightens the chances of serious complications, including premature births, underweight newborns, and even life-threatening risks for mothers. Breastfeeding women often lack vital nutrients like iron, iodine, and vitamin A, which are essential for their own health and their babies’ growth [30].

The problem of malnutrition is further exacerbated by geographic and socio-economic inequalities. In Nepal’s Terai region, particularly Madhesh Province and Koshi Province (Fig. 1), child wasting rates are alarmingly high. For instance, nearly 19% of children in Eastern Terai suffer from wasting, the highest rate in the country [31]. This is often linked to inadequate food intake and frequent infections. Similar findings have been presented in other studies conducted in the region [32,33]. Areas with high stunting and wasting rates typically score low on HDI, indicating significant gaps in socio-economic and health progress [34]. Remote districts like Dolpa, Mugu, and Jumla (Fig. 1) face severe shortages due to poor agricultural yields, difficult terrain, and limited access to markets [35]. While malnutrition is more prevalent in rural areas, urban slum populations are also at risk [36]. Cultural practices and taboos complicate the issue, as they often discourage the consumption of nutrient-rich foods, especially animal-based products, worsening the impact of food scarcity in impoverished communities [37].

To combat malnutrition, Nepal has introduced various initiatives. These include providing iron-folic acid and vitamin A supplements, enriching staple foods like salt and wheat flour with the essential nutrients, and initiating community-based programs to promote better feeding practices for mothers and children [38]. Social safety nets, such as cash transfers and food aids, help alleviate food insecurity for vulnerable households. While these efforts have shown promise, challenges persist, particularly in reaching remote areas and addressing cultural barriers to dietary changes [39]. The COVID-19 pandemic further strained these services, highlighting the need for a more holistic approach that integrates health, education, agriculture, and social welfare to sustainability tackle malnutrition in Nepal [40].

5. climate change and natural disasters

Climate change is connected to rise in temperatures, shifts in rainfall patterns, and frequent occurrence, with elevated length, and intensity of extreme weather phenomena, such as floods, droughts, and heatwaves [41]. FAO emphasizes that climate change is a major contributor to the recent rise in global hunger [23], and presents a serious challenge to efforts aimed at tackling it and ensuring food security. It disrupts agricultural productivity, increases food costs, damages the infrastructure that supports food distribution, and increases the risk of waterborne diseases [42,43,44]. Tackling climate change is critical because it affects every aspect of food security, and entire food supply chain. It not only creates new dangers but also intensifies existing weaknesses, reshaping agriculture and food availability at local, national, and international levels [43,44,45,46,47].

In each rainy season, heavy rains, flash floods, and landslides displace large numbers of people, particularly in Terai region and western part of Nepal (Fig. 1). As of September 29, 2024, this year’s continuous and intense rainfall across 44 districts, including that of Kathmandu Valley (Kathmandu, Bhaktapur, and Lalitpur districts (Fig. 1)), led to 192 fatalities, with 30 people missing, and 194 injured. This period marked the most intense rainfall in over 50 years, triggering severe flooding and landslides that disrupted homes, blocked transportation networks, and obstructed relief operations [48]. Agriculture, and particularly rice production, was significantly impacted by both the prolonged drought preceding monsoon, and the delayed arrival of seasonal rains, directly threatening the food security [7].

Kandel et al. [8] found a strong link between drought conditions and food insecurity in households across Mustang, Baglung, and Chitawan districts (Fig. 1). They explained that higher temperatures intensified droughts, leading to crop failures, increased disease outbreaks, and higher irrigation expenses [49]. This pattern revealed that as droughts grew more severe, small-scale farming families became more susceptible to food shortages. These results support earlier studies [49,50,51], which also identified drought as a major climate-related threat to food systems, particularly for smallholder farmers. The study also highlighted a promising connection between adopting climate adaptation strategies and improved food security among smallholder farmers. For instance, small-scale irrigation practices were strongly tied to the Food Consumption Scores (FCS) and the Reduced Cropping Strategies Index (RCSI), two crucial indicators of food security. These findings align with the Intergovernmental Panel on Climate Change (IPCC)’s framework on climate vulnerability, which considers factors like adaptive capacity, exposure, and sensitivity [8,52,53]. The researchers emphasized the role of irrigation in boosting food security and reducing poverty, calling for sustained investment in irrigation systems. They argued that adapting to climate change is crucial for decreasing its harmful impacts and building resilient food systems [54].



**Fig. 1. Political map of Nepal showing 3 topographical regions, 7 provinces, and 77 districts. The highlighted districts represent the study areas of different parameters of food security. (Illustration constructed by authors on QGIS 3.42)**

**6. Demographic facet of food security**

The characteristics of households, such as age, education, and gender play a significant role in determining food security in Nepal [8]. They found that households led by individuals with higher levels of formal education are more likely to achieve food security. Educated household heads are better positioned to make informed choices and investments, leading to increased income and improved access to food. These findings are consistent with the research from Zambia [55] and Ghana [56], which similarly linked education to better food security. Studies in Nigeria [57] and Ethiopia [58] further emphasized that education encourages innovation and access to resources, contributing to greater dietary diversity and food security.

Gender roles within households also significantly impact food security. Households where men dominate meal planning decisions are more likely to experience food insecurity. This is often because women, who are typically more involved in growing food crops and managing meal preparation, tend to prioritize the nutritional needs of the family [56].

**7. emigration**

The migration of people from rural areas, such as Manapang village of Tanahu district (Fig. 1) in Nepal, has brought significant changes to farming methods, increased reliance on store-bought food, and decreased agricultural output, all of which have impacted both food security, and the ability of communities to control their own food systems [59,60].

**7.1. Primary impacts: workforce gaps, feminization of agriculture, and livestock decline**

As many men leave rural Nepal in search of work, farming communities are struggling with a lack of labor, which directly affects agricultural activities. This has led to women increasingly taking over farming responsibilities, a trend often referred to as “feminization of agriculture.” However, cultural norms and practical challenges limit women’s effectiveness in their roles. For instance, societal restrictions prevent women from oxen plowing, forcing them to rely on less efficient tools or expensive hired help. This often results in lower farm output and reduced crop selection. In certain areas, labor shortages have caused up to 30% of farmland to remain unused, or “bajho,” over the last 20 years [59,61].

Emigration has also led to a reduction in livestock, which is crucial for small-scale agriculture. With labor shortages making livestock maintenance challenging, some areas report annual livestock declines of about 1.6% from 1950 to 2000 [59]. The reduction in livestock decreases the availability of organic fertilizers, forcing reliance on costly synthetic alternatives, which also impacts ecological sustainability [60].

**7.2. Secondary impacts: remittances and market dependency**

Remittance contributes to 26.6% of Nepal’s GDP [62]. While remittances provide rural families with additional income, they also shift food practices by making it easier to buy food than grow it. As a result, Nepal, once a net food exporter, has become a net importer, with increased imports from India driven by improved road networks and low-cost food. This dependency on imported foods has led some families to abandon farming, which negatively affects long-term food security and food sovereignty, as it diminishes control over food production [60,63]. Furthermore, some remittance-receiving families convert agricultural land into residential plots, reducing available farmland and intensifying rural-urban migration trend, compounding decline in agricultural production [64].

**8. governance**

Nepal's food insecurity issues are largely rooted in policy gaps, poor infrastructure, and limited government support in agriculture and rural development. Here are some key governmental faults contributing to food insecurity in Nepal:

* Lack of agricultural investment and subsidies: Nepal's government has traditionally allocated limited resources to agriculture despite it being a primary livelihood source for much of the rural population. In 2024, only about 3% of Nepal's budget was dedicated to agriculture, which falls short of meeting farmers' needs for subsidies, seeds, and agricultural inputs [65].
* Ineffective execution and disjointed efforts in policy application: Nepal has introduced various policies to improve food security and boost agricultural growth, but their effectiveness has been hindered by poor execution and disjointed efforts. For instance, the [Agriculture Development Strategy (ADS) 2015-2035 Part 1](https://www.gafspfund.org/sites/default/files/inline-files/6%20and%207a.%20Nepal_%20Ag%20and%20Food%20Security%20Strategy%20and%20Investment%20Plan.pdf), designed to increase productivity and ensure food security, has struggled with delays and a lack of collaboration between national, provincial, and local authorities [66,67]. As a result, resources have been mismanaged, and the policies have not been implemented as effectively as intended.
* Deficient land governance and policy frameworks: Policy designed land reform measures have failed to address the imbalance in land ownership. A significant portion of arable land is concentrated among a small group of affluent individuals, while the majority of farmers are forced to cultivate small or rented plots, severely restricting their ability to increase production [68].
* Excessive dependence on external food supplies: Nepal depends heavily on imported food, particularly essential items like rice, because domestic production falls short of meeting demand. This dependence exposes the country to unpredictability of global price changes, making it harder for poorer families to afford basic food items [69]. Despite this vulnerability, the government has not taken sufficient steps to boost local farming or develop strategies to stabilize trade.
* Inadequate and inefficient infrastructure: Farmers in Nepal face significant challenges due to underdeveloped infrastructure, particularly in rural areas where roads and irrigation systems are lacking. The absence of reliable road networks in hilly and mountainous regions (Fig. 1), along with insufficient irrigation, forces much of the agricultural land to depend on unpredictable rainfall [70]. Additionally, the scarcity of cold storage options results in significant food waste, worsening the issue of food insecurity [71].

Exclusion of marginalized and geographically isolated regions: Marginalized and remote communities, particularly those in mountainous regions (Fig. 1), are frequently overlooked by the government initiatives, leaving them disproportionally affected by food insecurity. For example, during emergencies, the distribution of food aid has often been delayed or failed to reach these isolated areas due to challenges in logistics and transportation [72].

**9. policies, acts and strategic plans to combat issues related to food insecurity in Nepal**

**9.1. Food security**

The [National Nutrition Policy and Strategy (2004)](https://dohs.gov.np/wp-content/uploads/chd/Nutrition/Nutrition_Policy_and_Strategy_2004.pdf) by [MoHP](https://www.opmcm.gov.np/wp-content/uploads/npolicy/Health/Nutrition-Policy-n-strategy.pdf) established a goal to reinforce household food security, ensuring that all individuals have sufficient access to, and availability of, food necessary for maintaining a healthy life [73]. Article 36 of the [Constitution of Nepal](https://lpr.adb.org/sites/default/files/resource/629/nepal-constitution.pdf.pdf) [74] recognizes food as a fundamental right, a commitment further reinforced by [The Right to Food and Food Sovereignty Act, 2075 (2018)](https://faolex.fao.org/docs/pdf/nep186567E.pdf) [75]. This was recently strengthened by the endorsement of [Right to Food and Food Sovereignty Regulations, 2080 (2023)](https://leap.unep.org/en/countries/np/national-legislation/right-food-and-food-sovereignty-regulations-1980-2023), establishing a solid framework for effective implementation [75,76]. The [Fifteenth Plan (2019/20-2023/24)](https://www.npc.gov.np/images/category/15th_plan_English_Version.pdf) highlights the importance of enhancing access to sufficient, affordable, and nutritious food for all, with a special focus on supporting locally produced foods and designing initiatives tailored to assist hard-to-reach and underserved populations [77].

[ADS 2015-2035 Part 1](https://www.gafspfund.org/sites/default/files/inline-files/6%20and%207a.%20Nepal_%20Ag%20and%20Food%20Security%20Strategy%20and%20Investment%20Plan.pdf) proposes targeted measures to raise farm productivity, increase farmers’ earnings, improve market connectivity, reduce post-harvest waste, and strengthen food safety regulations [67]. Alongside this, initiatives like the [National Nutrition Policy and Strategy (2004)](https://dohs.gov.np/wp-content/uploads/chd/Nutrition/Nutrition_Policy_and_Strategy_2004.pdf), [Multi-Sector Nutrition Plan (MSNP)-II (2018-2022)](https://extranet.who.int/ncdccs/Data/NPL_B11_MSNP%20ii.pdf), [MSNP-III (2023-2030)](http://vmis.gov.np/cms/newsEventDetailPage?slug=ResultFrameworkWorkshop%3AFormulationofMSNP-III%282023-2030%2926e161d1-02e3-4bb8-b1e7-378d30269ac5), and [Food and Nutrition Security Plan of Action (FNSP)](https://faolex.fao.org/docs/pdf/nep163184.pdf) aim to strengthen food security by ensuring greater access to and consumption of nutritious foods [73,78,79]. These frameworks collectively offer a holistic strategy to tackle food security issues in Nepal [80,81]. Additionally, the government has introduced measures such as minimum support prices (MSP) and subsidies for transporting essential goods like food and salt. Major programs, including the Prime Minister Agriculture Modernization Project (PMAMP) and the Nepal Livestock Sector Innovation Project (NLSIP), reflect a significant commitment to advancing agricultural growth in the country [12]. Furthermore, several other critical policies and strategic plans currently address food security and the agri-food systems, as outlined below [81].

* [National Seed Policy, 1999](https://ialdorukumeast.p5.gov.np/public/uploads/Pdffile/National_Seed_Policy_1999-42676.pdf)
* [National Agricultural Policy, 2004](https://faolex.fao.org/docs/pdf/nep169556.pdf)
* [Agri Business Promotion Policy, 2006](https://www.fao.org/faolex/results/details/en/c/LEX-FAOC187349/)
* [Agro Biodiversity Policy, 2007](https://leap.unep.org/en/countries/np/national-legislation/agro-biodiversity-policy-2007-first-amendment-2014)
* [National Agroforestry Policy, 2019](https://leap.unep.org/en/countries/np/national-legislation/national-agroforestry-policy-2019)
* Food Safety Policy, 2019
* [Food Systems Transformation Strategic Plan, 2022-2030](https://www.unfoodsystemshub.org/latest-updates/news/detail/transforming-food-systems-in-nepal--a-focus-on-localization/en#:~:text=In%20this%20context%2C%20the%20National,the%20localization%20of%20food%20systems)

**9.2. Food production**

The [National Nutrition Policy and Strategy (2004)](https://dohs.gov.np/wp-content/uploads/chd/Nutrition/Nutrition_Policy_and_Strategy_2004.pdf) and [National Health Policy](https://www.siddhasthalihospital.org/wp-content/uploads/2022/06/National-Health-Policy-2019_DoHS-Annual-Report_Public-Health-Update.pdf) (2019) highlight the importance of increasing the production of nutrient-dense foods [73,82]. These initiatives aim to boost agricultural yields, encourage households to grow crops rich in vitamin A, support the development of kitchen gardens, and promote the consumption of locally available, culturally suitable foods.

The [Food Act, 2023 (1967)](https://faolex.fao.org/docs/pdf/nep22272.pdf) and [The Right to Food and Food Sovereignty Act, 2075 (2018)](https://faolex.fao.org/docs/pdf/nep186567E.pdf), establish legal measures to prohibit the production, sale, and distribution of unsafe or low-quality food, while also focusing on improving farmers’ livelihoods [75,83]. Additionally, the [ADS 2015-2035 Part 1](https://www.gafspfund.org/sites/default/files/inline-files/6%20and%207a.%20Nepal_%20Ag%20and%20Food%20Security%20Strategy%20and%20Investment%20Plan.pdf) and the [FNSP](https://faolex.fao.org/docs/pdf/nep163184.pdf) emphasize sustainable farming practices to enhance food and nutrition security [67,78]. These frameworks aim to optimize the use of natural resources to ensure sustainable food production. Moreover, the [Strategy for Infant and Young Child Feeding: Nepal (2014)](https://www.exemplars.health/-/media/files/egh/resources/stunting/nepal/part-2/strategy-for-infant-and-young-child-feeding-nepal-2014.pdf) and [Nepal Health Sector Strategy Implementation Plan (2016-2021)](https://www.aidsdatahub.org/sites/default/files/resource/nepal-health-sector-strategy-implementation-plan-2016-2021.pdf) promote the cultivation of nutrient-rich, locally available, and culturally appropriate foods to meet the dietary needs of the population [80,84,85].

**9.3. Storage, transportation, marketing, and distribution of food**

The [National Nutrition Policy and Strategy (2004)](https://dohs.gov.np/wp-content/uploads/chd/Nutrition/Nutrition_Policy_and_Strategy_2004.pdf) emphasizes approaches for effective food storage, preservation, and processing skills to minimize nutrient degradation [73]. Furthermore, [The Mother’s Milk Substitutes (Control of Sale and Distribution) Act, 2049 (1992)](https://scalingupnutrition.org/sites/default/files/2021-12/Nepal-Mothers-Milk-Subsitutes-Control-of-Sale-and-Distribution-Act-1992_en.pdf) aims to regulate marketing practices surrounding mother’s milk substitutes, discouraging promotions that might undermine natural feeding practices [86]. [The Right to Food and Food Sovereignty Act, 2075 (2018)](https://faolex.fao.org/docs/pdf/nep186567E.pdf) delineates the distinct responsibilities of central and provincial authorities concerning the procurement, logistics, and equitable distribution of food [75]. This act also mandates coordinated efforts among federal, provincial, and local governments to ensure accessible food distribution via fair-price shops or designated public distribution outlets [80].

**9.4. Consumption**

The Key frameworks such as [National Nutrition Policy and Strategy (2004)](https://dohs.gov.np/wp-content/uploads/chd/Nutrition/Nutrition_Policy_and_Strategy_2004.pdf), [MSNP-II (2018-2022)](https://extranet.who.int/ncdccs/Data/NPL_B11_MSNP%20ii.pdf), [FNSP](https://faolex.fao.org/docs/pdf/nep163184.pdf), [National School Health and Nutrition Strategy, Nepal (2006)](https://healtheducationresources.unesco.org/sites/default/files/resources/national_school_health_nutrition_strategy_nepal.pdf), [Nepal Health Sector Strategy Implementation Plan (2016-2021)](https://www.aidsdatahub.org/sites/default/files/resource/nepal-health-sector-strategy-implementation-plan-2016-2021.pdf), and [Strategy for Infant and Young Child Feeding: Nepal (2014)](https://www.exemplars.health/-/media/files/egh/resources/stunting/nepal/part-2/strategy-for-infant-and-young-child-feeding-nepal-2014.pdf) support the increased intake of locally sourced, diverse, and nutrient-rich balanced foods [78,79,84,85,87]. The [National Nutrition Policy and Strategy (2004)](https://dohs.gov.np/wp-content/uploads/chd/Nutrition/Nutrition_Policy_and_Strategy_2004.pdf) further underscores dietary diversity by establishing food-based dietary recommendations, advocating for locally prepared complementary foods like “Jaulo,” a nutrient-dense rice and lentil soup, and “Sarbottam Pitho,” a flour mix made of 50% cereals and 50% multiple types of lentils to ensure balanced nutrition [73,80].

**9.5. Quality control**

The  [Food Act, 2023 (1967)](https://faolex.fao.org/docs/pdf/nep22272.pdf) authorizes Nepali government to establish specific quality benchmarks for food products, requiring producers, distributors, and processors to obtain appropriate licenses to handle regulated food items [83]. Additionally, [MSNP-II (2018-2022)](https://extranet.who.int/ncdccs/Data/NPL_B11_MSNP%20ii.pdf) and [FNSP](https://faolex.fao.org/docs/pdf/nep163184.pdf) advocate for the adoption of stringent practices such as Good Manufacturing Practices (GMP), Good Hygiene Practices (GHP), and Hazard Analysis and Critical Control Points (HACCP) systems in food processing to enhance safety [78,79]. These documents also underscore the importance of rigorous import-export inspection protocols and certification standards to ensure the trade of safe and high-quality food products. Meanwhile, the [Black-marketing and Some other Social Offenses and Punishment Act (1975)](https://wipolex-res.wipo.int/edocs/lexdocs/laws/en/np/np009en.html) and [Consumer Protection Act (2018)](https://faolex.fao.org/docs/pdf/NEP225788.pdf) include measures to shield consumers from issues related to food quality, quantity, and pricing irregularities, aiming to control excessive pricing practices [88,89]. Further, the [Consumer Protection Act (2018)](https://faolex.fao.org/docs/pdf/NEP225788.pdf) mandates regular government oversight of supply chains, pricing, quality control, labeling, and marketing to secure consumers’ rights to reliable, high-quality goods and services [80,89].

10. conclusion

Food security in Nepal remains a pressing challenge, deeply intertwined with socio-economic, environmental, and governance factors. Despite significant progress in reducing hunger and malnutrition, the country continues to struggle with vulnerabilities exacerbated by climate change, natural disasters, inadequate infrastructure, and socio-economic disparities. The agri-food sector, vital to Nepal’s economy and livelihoods, faces persistent threats from erratic weather patterns, limited access to modern farming resources, and insufficient policy implementation. These challenges disproportionately affect marginalized communities, particularly in remote and rural areas, where food insecurity and malnutrition are most severe.

The interplay of demographic factors, such as gender roles, education levels, and household dynamics, further shapes food security outcomes. Emigration has introduced both opportunities and challenges, with remittances providing financial relief but also contributing to labor shortages and reduced agricultural productivity. Governance gaps, including inadequate investment in agriculture, ineffective policy execution, and a poor infrastructure, hinder efforts to build a resilient and sustainable food systems.

Nevertheless, Nepal has demonstrated a commitment to addressing these issues through various policies, strategies, and legislative measures, aimed at enhancing food production, accessibility, and quality. Initiatives like the Right to Food and Food Sovereignty Act, the Agriculture Development Strategy, and the Multi-Sector Nutrition Plan reflect a holistic approach in tackling food insecurity. However, the effectiveness of these efforts depends on stronger implementation, increased investment, and greater inclusivity, particularly for vulnerable populations.

To achieve lasting food security, Nepal must prioritize climate-resilient agricultural practices, strengthen local food systems, and ensure equitable access to resources and opportunities. Empowering women, improving education, and fostering community-based solutions are essential steps toward building a more food-secure future. Ultimately, addressing food insecurity in Nepal is not just a matter of policy but a moral imperative to safeguard the health, dignity, and well-being of all its people. By fostering collaboration among stakeholders and prioritizing the needs of the most vulnerable, Nepal can move closer to a future where no one is left behind in the pursuit of food security and prosperity.

Ethical approval

Not applicable since the review does not involve direct experimentation, data collection, or interaction with humans or animals.

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