International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Food Security in India: A Comprehensive Examination of Progress, Challenges, and Pathways to Sustainable Development

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Abstract:

Food Security refers to the state in which every individual, without exception, possesses both the physical and economic means to obtain an adequate amount of nutritious food that caters to their dietary requirements, enabling them to lead active and healthy lives. India has been ranked 105th out of 124 countries in the Global Hunger Index 2024. Despite remarkable progress in food production and the transition from being a food importer in the 1960s to becoming a major food exporter now, India has been placed under the "serious" category in terms of hunger. Securing food security in India is a formidable challenge, considering the vast population and prevalent issues of poverty and malnutrition.

This paper draws upon a range of secondary sources, including the National Family Health Survey (NFHS-5) and other government reports, in conjunction with existing literature, to provide a comprehensive overview of the nutritional landscape in India. The research methodology involved an extensive review of existing literature related to food security in India, Sustainable Development Goal 2, and related topics. This foundational understanding was complemented by an examination of statistical data about food production, distribution, and nutrition indicators, with a special emphasis on temporal trends. Additionally, an in-depth analysis of government policies, reports, and documents related to food security and nutrition programs was conducted to assess their impact and effectiveness.

This descriptive paper discusses the multifaceted aspects of food security in India, encompassing availability, accessibility, utilization, and stability. The results highlight that despite a manifold increase in food production in the last five decades, the net per capita food availability has remained stagnant. According to the latest NFHS-5 (2019-21) report, there have been notable improvements in nutrition indicators for children under 5 years when compared to NFHS-4 (2015-16). Stunting and wasting have reduced from 38.4% and 21.0% to 35.5% and 19.3% respectively, and underweight prevalence dropped from 35.8% to 32.1%. However, it is important to note that the absolute number of malnourished children remains significant. Out of the 22 states and Union Territories (having available data), 18 exhibit either stagnancy or a deterioration in levels of stunting (height-for-age) among children under the age of five. Persistent challenges, including food distribution inefficiencies, price fluctuations, and regional disparities, continue to impede India's full realization of food security. Factors such as the COVID-19 pandemic and the Ukraine-Russia war have further complicated these challenges.

The paper also explores the potential strategies for India to further enhance its food security initiatives, focusing on sustainable agriculture, technology integration, and policy reforms. It underscores the significance of India's continued commitment to addressing food security to ensure its population's healthy and prosperous future.

Keywords: Food Security NFHS-5 Sustainable Development Goal 2 Sustainable Agriculture

Introduction:

Ensuring food and nutrition security is vital for societal well-being, a key focus in national and global development goals. Nutrition is the fuel for our bodies, impacting not only individuals but also macro-level outcomes. Intergenerational malnutrition begins early, from undernourished mothers to low birth-weight babies, perpetuating through inadequate feeding, limited healthcare access, and early pregnancies. Malnutrition hinders cognitive and physical development, resulting in poor education and economic attainment, sustaining poverty. This forms a destructive cycle unless timely intervention occurs. A higher proportion of undernourished workforce increases morbidity, mortality, and adversely affects a country's overall income. Economic costs of malnutrition, estimated at 2 to 3 percent of GDP and up to 16 percent in severely affected nations, underscore the urgency for intervention. (Akseer et al., 2022)

Despite India's strides in food grain self-sufficiency, achieving food security for a substantial population remains a challenge. The Global Hunger Index 2024 ranks India 105 out of 127 nations, categorizing it as 'serious' alongside Bangladesh, Myanmar, and Pakistan. The State of Food Security and Nutrition in the World 2023 (SOFI) report revealed that during 2018-2020, moderate to severe food insecurity in India witnessed a significant increase of approximately 6.8 percentage points. Since the onset of the Covid pandemic, the number of individuals grappling with moderate to severe food insecurity surged by 9.7 crores. Despite boasting the world's largest grain stockpile at 120 million tonnes as of July 2021, India shoulders a substantial burden, accounting for a quarter of the global population grappling with food insecurity. (SOFI Report, 2023). This underscores the complex challenge of ensuring food access and nutrition security in a nation with abundant grain reserves but persistently high levels of food insecurity. In light of this pressing issue, this paper sets out to accomplish the following objectives: [1] Investigate the concept of food security, exploring its dimensions and significance within the Indian context. [2] Evaluate the extent to which India has made progress in achieving food security and its alignment with Sustainable Development Goal 2. [3] Identify the persistent challenges that hinder food security in India. [4] Delve into the prospects and strategies that could enhance India's efforts in ensuring food security for all.

1. Concept of Food Security:

Food Security is a multifaceted and dynamic concept. The concept was developed in the mid 1970s during the period of global food crisis (1972-1974). The first conference on Food Security was held in Rome in 1974. The Office of the High Commissioner for Human Rights (OHCHR) in 1974 proclaimed that “every man, woman and child have the inalienable right to be free from hunger and malnutrition to develop their physical and mental faculties”. As per the latest definition given by FAO in 2001, “Food Security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”.

2. Dimensions of Food Security:

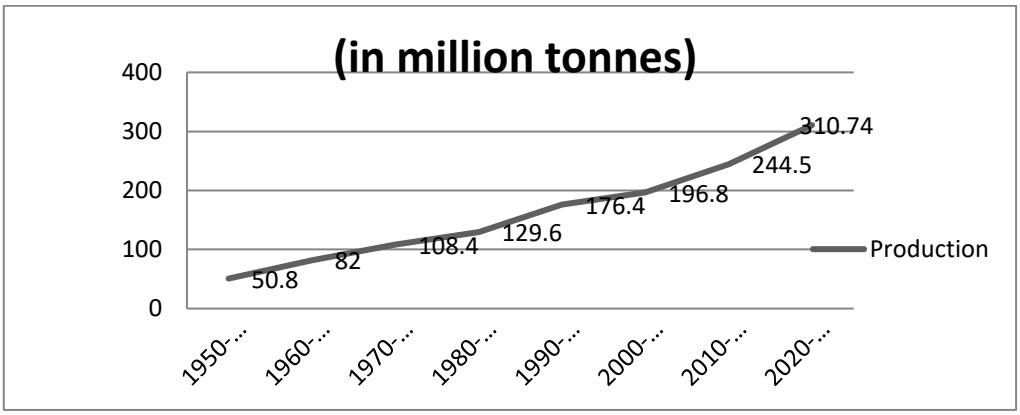
The concept of Food Security as evolved over time ‘from freedom of hunger’ in the early 1970s into a broad concept encompassing four dimensions viz. availability, accessibility, utilization, and stability.

Availability is a physical factor, ensured when sufficient food is accessible to people. **Accessibility** is achieved if a household has enough means to obtain an appropriate diet. **Utilization** depends upon the biological and social environment and proper health care. **Stability** implies that people should not risk losing access to food because of sudden shocks (e.g., an economic or climatic crisis) or cyclical events (e.g., seasonal food insecurity).

2.1 Availability

Food security relies on a robust foundation of food production, serving as a pivotal factor in ensuring sufficient food availability. From 1950-51 to 2020-21, the country witnessed a consistent growth in the production of food grains, encompassing rice, wheat, coarse cereals, and pulses. This growth occurred at an average annual rate of 2.5%. India's horticulture production is has increased to 351.92 million tonnes in 2022-23 crop year (July-June) from 347.18 million tonnes in 2021-22, recording a growth of 1.4 % attributing to higher productivity.(Press Information Bureau, 2022).

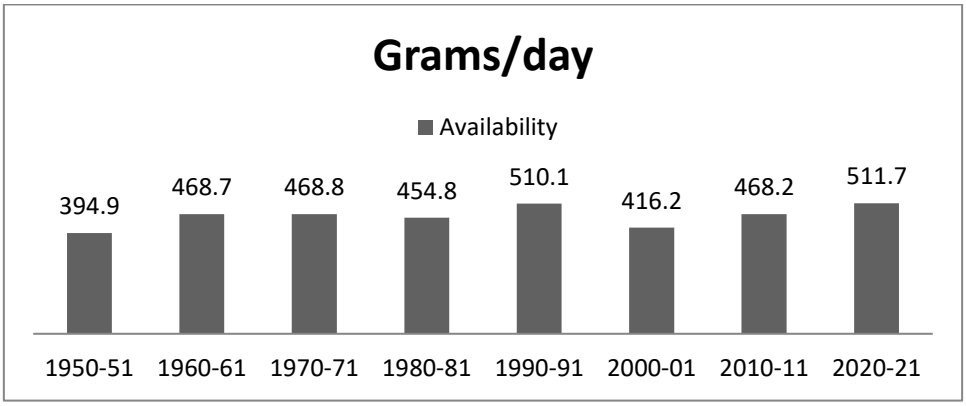
Figure 2: Production of Food grains in India from 1950-51 to 2020-21



Source: Directorate of Economics and Statistics, Ministry of Agriculture, 2022

Despite considerable increase in the overall food grain production since 1950s, India still falls under the serious category of hunger and ranks 105th out of 124 countries in the Global Hunger Index 2024. One possible reason could be the fact that the per capita net availability of food grains has remained stagnant. Net availability of food grains= Gross Production (-) seed, feed & wastage, (-) exports (+) imports, (+/-) change in stocks

Figure 3: Per Capita Net Availability of Food grains (grams/day)



Source: Agricultural Statistics at a Glance 2021

In 1961, the per capita availability stood at 468.7 grams, a marginal increase to 468.8 grams in 1971, followed by a dip to 454.8 grams in 1981. Subsequently, there was a notable over 12% rise, reaching 510 grams per person per day in 1991. However, this increase was short-lived, as it reverted to 468 grams in 2011. In 2021, the per capita net availability of food grains stood at an all time high at 511.7 grams.

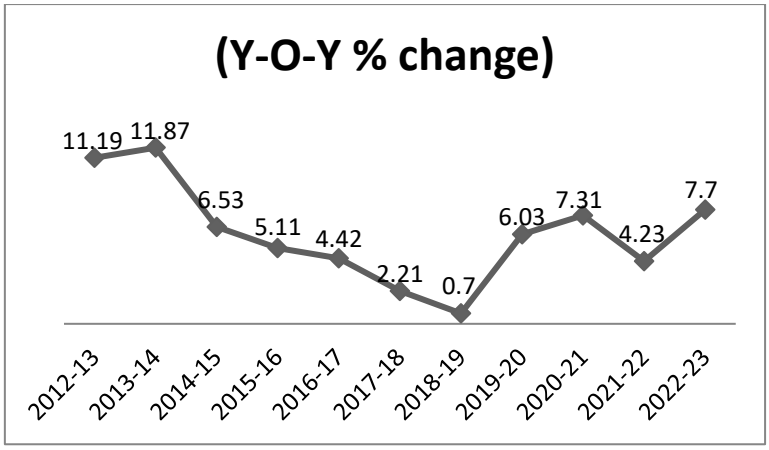
2.2 Accessibility of Food

Accessibility of food can be gauged in terms of purchasing power, government initiatives aimed at food distribution and food waste.

Food Inflation and Purchasing Power

Mere availability of food is not enough to ensure food security. A household's ability to afford sufficient food hinges on its purchasing power. Food inflation serves as a crucial metric reflecting economic access to food. Particularly impacting low-income earners, who allocate a significant portion of their income to food, rising prices make sustenance unattainable, intensifying the struggle and propelling more individuals into poverty. According to a recent report by Asian Development Bank, one per cent increase in food inflation leads to an increase of 0.3 per cent in both infant and child mortalities, and 0.5 per cent in undernourishment.

Figure 4: Food Inflation in India over the Years (Y-o-Y % Change)



Source: Ministry of Statistics and Program Implementation, 2022

In September 2022, the cost of food in India surged by 8.6% compared to the previous year, marking the highest rate since November 2020. Notably, vegetables (18.05%), spices (16.88%), and cereals (11.53%) experienced the most significant increases in nine years.

Role of Government in Ensuring Food Security

The Government of India actively prioritizes citizens' food access through substantial initiatives, notably the Public Distribution System (PDS). Allocating 5.2% of the 2022-23 budget to food subsidies, the PDS safeguards consumers and supports farmers against market fluctuations. The National Food Security Act, 2013 (NFSA) follows a rights-based approach, covering 75% of the rural and 50% of the urban population. The Antyodaya Anna Yojana caters to the poorest who receive 35 kg of foodgrains per household per month. The NFSA empowers women as heads of households and ensures free nutritious meals for children. Further, schemes like PMGKAY and PM POSHAN enhance food accessibility for vulnerable populations, emphasizing education and eradicating malnutrition.

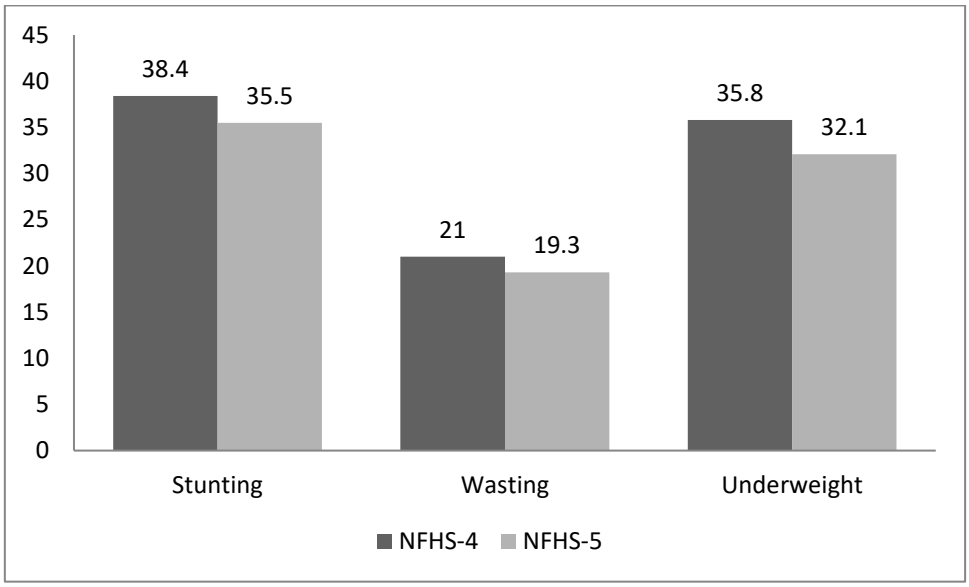
Minimising Food Wastage to ensure food for all

Approximately 40% of India's annual food production goes to waste, as indicated by the Food and Agricultural Organisation (FAO). This wastage is a result of fragmented food systems and inefficient supply chains, occurring prior to the food reaching the end consumer. As per the Ministry of Consumer Affairs, Food, and Public Distribution, from 2017 to 2020, approximately 11,520 tonnes of food grains stored in government warehouses decayed. According to the UNEP's (United Nations Environment Programme) food wastage index report 2023, 68.7 million tonnes of food is wasted annually in Indian homes, in simple words it is about 50 kgs per person. It ranks second globally in household food wastage, surpassed only by China. Addressing food waste aligns with Sustainable Development Goal 12, specifically Target 12.3, aiming to cut food waste and minimize losses throughout supply chains by 2030, as an integral aspect of ensuring sustainable consumption and production patterns.

3. Utilization

Food utilization refers to the proper biological use of food, requiring a diet that provides sufficient energy and essential nutrients, as well as access to clean water and adequate sanitation. Utilization of food can be gauged by nutrition indicators such as stunting, wasting, prevalence of underweight and anaemia.

Figure 5: Comparison of key nutrition indicators for NFHS-4 (2015-16) AND NFHS-5 (2020-21)



Source: National Family Health Survey 5 (2019-20)

3.1 Stunting, Wasting and prevalence of Underweight

According to NFHS-5 (2019-20), India has witnessed a notable reduction in child stunting, declining from 38.4% in 2016 to 35.5% in 2019, marking a relative 20% decrease. Despite this progress, India still contributes nearly one-third of the global burden of childhood stunting, with discernible disparities between and within states.

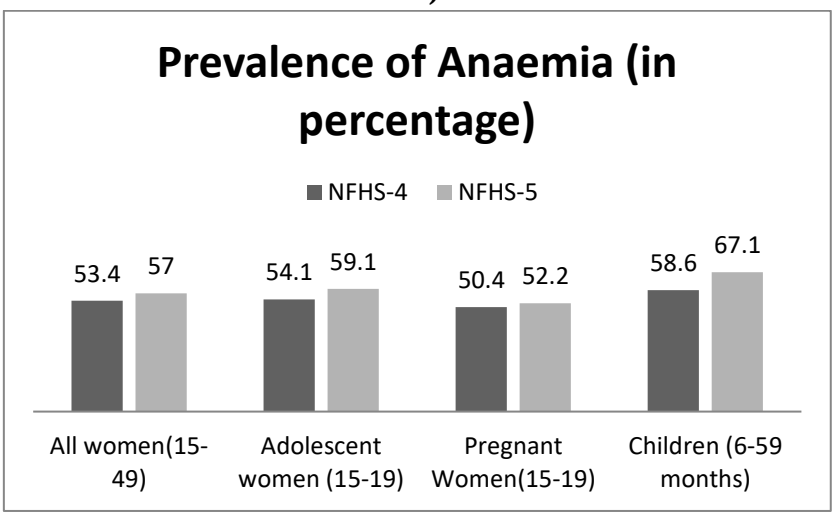
Wasting in India has reduced from 21.0% in 2015-16 to 19.3% in 2019-20 as per NFHS-5. During the period from 2015-16 to 2019-20, the proportion of wasted children has increased in a total of 9 states and Union Territories. Nationally, there has been an improvement, with the prevalence of underweight

children decreasing from 35.8% to 32.1%.

3.2 Anaemia

In India, the most prevalent causes of anaemia are iron and vitamin B-12 deficiencies, with a more pronounced impact in rural areas compared to urban regions. Anaemia is more prevalent in women due to factors like menstrual iron losses and the heightened iron demands during pregnancies. In 2019-20, nine states, including West Bengal, Tripura, Odisha, Jharkhand, Gujarat, Haryana, Chhattisgarh, Bihar, and Assam, recorded over 60% anaemic women.

Figure 6: Prevalence of Anaemia among women and children NFHS-4 (2015-16) vs NFHS-5 (2020-21)



Source: National Family Health Survey 5 (2019-20)

As per the NFHS-5 survey, prevalence of anaemia has worsened for women and children from 2015-16.

4. Stability

Stability in food security ensures a consistent household food supply year-round and long-term, by minimizing risks like natural disasters, price volatility, and conflicts. Recently, COVID-19 and the Russia-Ukraine War have disrupted this stability, highlighting the need for effective interventions and resilience strategies.

Impact of COVID-19 on Supply Chain Disruptions

The COVID-19 pandemic severely impacted health, economic, and food sectors, hitting the poorest communities hardest. Lockdown measures disrupted food supply chains, affecting availability, pricing, and quality (Barrett, 2020). Restaurant closures decreased demand for perishable foods like dairy, potatoes, fresh fruits, and specialty items (Lewis, 2020; Terazono & Munshi, 2020). Media reported food waste due to collapsed demand and market access issues (Yaffe-Bellany & Corkery, 2020). Farmers without storage faced significant losses, and international food trade was heavily disrupted.

Worsening of Nutritional Status

In India, undernutrition indicators worsened across most states between 2015 and 2019. COVID-19 likely exacerbated nutritional insecurities, particularly for vulnerable populations, highlighting the need for accessible, affordable nutritious food. The pandemic disrupted key government nutrition programs,

including Anganwadi services, nutrition rehabilitation centers, and village health initiatives. School closures hindered the distribution of iron and folic acid tablets and suspended nutrition awareness campaigns, worsening anemia rates. Health workers were diverted to COVID-19 response efforts, delaying nutritional programs. Community-based interventions, like counseling and training for pregnant and lactating women, were also disrupted.

Coping Mechanisms

A recent study indicates that poor households are likely to reduce spending on fresh fruits and vegetables, opting for less nutritious staple foods due to the pandemic (Laborde, Martin & Vos, 2020). Other research found a shift towards more processed foods. In North America, community-supported agriculture (CSA) subscriptions saw a resurgence as people sought safer, direct access to fresh produce, meat, and fish though CSA farms couldn't meet all the demand. Interest in home and community gardening also grew as people aimed to secure their own food supply (Lal, 2020). These shifts affected food diversity and nutrition variably.

Wars are inherently violent and destructive, but the devastation of resources often causes more catastrophic harm than the violence itself. Conflicts can cause severe food shortages and disrupt economic activities, threatening entire populations' survival. Displacement is a common consequence, severing people's access to food and livelihoods, leading to acute food insecurity and increased disease. Those who remain in conflict zones can be besieged, cut off from essential supplies until they surrender. Humanitarian aid is desperately needed in these areas, but increasingly, warring parties block relief operations or attack humanitarian organizations.

Wars

While armed conflicts create dangerous conditions of food insecurity, the reverse can also be true: food insecurity can precipitate political conflict. A sudden change in food availability or prices can trigger social unrest. Historical examples include the French Revolution, fueled by poor grain harvests and economic pressures, and the Arab Spring, which coincided with historically high food prices in North Africa and the Middle East. The Russia-Ukraine war has intensified global food security issues. Together, Russia and Ukraine account for nearly 30% of the world's traded wheat and 12% of its total calorie supply. The conflict has disrupted the export of wheat, corn, and barley from these countries and has entangled a significant portion of the world’s fertilizer supply, primarily from Russia and Belarus. As a result, food and fertilizer prices have surged. The FAO predicts global food and feed prices could increase by 8-22% if the conflict continues.

Countries like Eritrea, which rely entirely on imports from Russia and Ukraine for their wheat supply (53% from Russia and 47% from Ukraine), face severe threats to food security. If Ukraine cannot export wheat due to the conflict, other countries must fill the gap, complicating the situation as global food prices rise drastically. The war also impacts international food aid. The World Food Programme, which purchases 50% of its grain from Ukraine, has had to reduce rations due to rising costs, risking the exclusion of millions from food aid programs. This highlights the far-reaching consequences of the conflict on global food security and the critical need for resolution.

Millets for Nutrition and Climate Action

Hidden hunger, or micronutrient deficiency, is a major obstacle to achieving SDG2, which aims to end hunger and malnutrition by 2030. This issue is particularly significant in India, where excessive reliance on fine cereals like rice and wheat, and a lack of dietary diversity, exacerbate the problem. To address this, a shift towards sustainable and diverse food production is crucial for ensuring both food and

nutritional security. Millets, now known as Nutri-cereals, offer superior nutrition compared to fine cereals and are also climate-resilient, making them a key part of the solution.

Three-fold Benefits of Nutri-Cereals

Millets provide three significant benefits for farmers, consumers, and the planet:

For Farmers – Risk Mitigation against Droughts

Despite the full utilization of irrigation potential, approximately half of India's net sown area will remain rain-fed. This necessitates a shift to low water-intensive crops like millets, which thrive on shallow, low-fertility soils with pH levels ranging from 4.5 to 8.0. Millets are drought-resistant and can be used for food, fodder, and fuel, making them an excellent risk mitigation strategy. However, the area under millet cultivation in India has steadily declined from 45.95 million hectares in 1970-71 to 23.83 million hectares in 2020-21, while the area under wheat cultivation has increased from 18.24 million hectares to 31.61 million hectares over the same period.

For Consumers – The Nutrition Angle

Millets are rich in nutrients, consisting of 7-10% protein, 2-4% fat, 60-70% carbohydrates, and 15-17% dietary fiber. They are rich in essential nutrients like iron, zinc, and calcium, making them effective in combating malnutrition and anemia in India. Additionally, millets can aid in managing lifestyle diseases such as obesity, diabetes, cardiovascular diseases, and cancer due to their slow digestible starch (SDS), which prolongs carbohydrate digestion and absorption. Despite these benefits, per capita millet consumption in India has drastically declined from 32.9 kg in 1962 to 4.2 kg in 2010.

For the Planet – Combating Climate Change

Millets offer significant environmental benefits, particularly in combating climate change. With a low overall water requirement and a short growing period of 60 to 90 days, millets like pearl millet and proso millet require much less rainfall compared to rice, which needs 120-140 cm. As C4 crops, millets efficiently absorb carbon dioxide from the atmosphere and convert it to oxygen. They exhibit high water and input use efficiency, making them environmentally friendly. By reducing climatic uncertainties and decreasing atmospheric carbon dioxide levels, millets play a crucial role in mitigating climate change.

Promoting Consumption

To promote millet consumption, awareness campaigns with celebrities should be launched, similar to the successful "Sunday ho ya Monday, roz khao ande" egg campaign of the 1980s. Introducing millet-based food and snacks on flights and premium trains can help familiarize consumers with their taste and benefits. Additionally, incorporating millets into flagship government schemes like the Mid-Day Meal Programme and Integrated Child Development Services (ICDS) can enhance their reach and impact. Including millets in the Public Distribution System (PDS), as per Government of India guidelines and the example set by states like Karnataka, will further support this initiative. Improving value chains and providing processing facilities will ensure the availability of tasty and affordable millet-based foods. Scaling up technologies developed by institutions like the Indian Institute of Millets Research and supporting entrepreneurs in producing ready-to-eat and ready-to-cook millet products will also increase their acceptability, particularly among bachelors and youngsters.

Improving Production and Promoting Value Chains

To enhance millet production and promote value chains, it is essential to adopt improved cultivation practices and develop higher-yielding millet varieties to boost productivity and profitability for farmers. Incentivizing millet growers through cash compensation and other measures will encourage more farmers to cultivate millets. Organizing small millet producers into Farmer Producer Organizations

(FPOs) and connecting them with schemes like the National Rural Livelihood Mission (NRLM) and Self-Help Groups (SHGs) can streamline efforts and resources. Scaling up successful models, such as the Ramanar millets-based FPO in Tamil Nadu and the Arogya Millets Producer Company Limited in Andhra Pradesh, will further strengthen the millet economy. Promoting millets in watershed and Wadi projects of NABARD with an emphasis on value chain integration will enhance their reach and impact. Providing special incentives for entrepreneurs and FPOs to purchase processing machinery, along with recommending fiscal incentives such as tax concessions along the millet value chains, will ensure sustainable growth and profitability in the millet sector.

Conclusion

The health of agri-food systems is fundamental to the well-being of a nation, yet India's systems face challenges of sustainability, nutrition, and technology adoption. While policies like the Minimum Support Price (MSP) and Public Distribution System (PDS) have reduced hunger, they have perpetuated reliance on staple crops like rice and wheat, limiting diversification into nutrient-rich foods such as fruits, vegetables, pulses, and millets. This imbalance has contributed to malnutrition, including both micronutrient deficiencies and rising obesity. A transition to more diverse production systems, supported by financial incentives, value-chain development, and consumer education, is crucial. Strengthening research in climate-resilient agriculture and technologies like digital tools and big data analytics can also drive sustainable growth.

To address malnutrition and ensure food security, India must embrace a multi-pronged approach that includes improving dietary diversity, reducing food waste, empowering women, and investing in nutrition-sensitive agriculture. Promoting local food systems and supporting smallholder farmers through livestock, aquaculture, and backyard poultry can enhance livelihoods and resilience. With strategic action and investments, India can realign its agri-food systems to address climate change, improve nutrition, and support the UN Sustainable Development Goals, offering hope for healthier and more sustainable futures by 2030.

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