



Rethinking “Enough”: From Food Security to Nutrition-Driven Sustainable Food Systems

Moawiya A. Haddad^{1,*} Fajer Alaittan² Ali Qoqazeh^{1,*} Hadeel Alghwairy³

¹ Department of Nutrition and Food Processing, School of Agriculture, Al-Balqa' Applied University, Salt 19117, Jordan

² Department of Nutrition and Integrative Health, Faculty of Allied Medical Sciences, Middle East University, Amman 11831, Jordan

³ KAFA'A Center, Amman 11185, Jordan

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Abstract

For many years, food policy has equated progress against hunger with the number of calories consumed and the availability of staple foods. However, access to sufficient calories does not guarantee that individuals are receiving adequate vitamins and minerals (micronutrients), nor does it ensure healthy diets or protection against diet-related noncommunicable diseases (NCDs). Therefore, this perspective article advocates shifting the focus from the traditional concept of food security to nutrition security, alongside the concept of nutrition-driven, sustainable food systems, in which sufficient nutrition for all is defined as the provision of safe, acceptable, and nutritious food for everyone, while respecting the planet's ecological limits. Furthermore, drawing on synthesized insights from food and nutrition security theory, evidence linking food insecurity to adverse health outcomes, the recognition of hidden hunger, and lessons from governance reforms and policy-driven changes to food environments, it is proposed that three key pivot points be reoriented to guide the implementation of solutions as follows: (1) change the metrics used to define and measure adequate calorie intake to include measures of food quality and micronutrient sufficiency; (2) integrate these short-term safety net programs with longer-term food-based climate-sustaining strategies. (3) strengthen a participatory governance structure where citizens are actively involved in policymaking decisions regarding their food systems.

Keywords:

food and nutrition security; nutrition security; sustainable food systems; hidden hunger; food policy; governance

1. Introduction: When “Full Stomachs” Are Not Enough

For many decades, success against hunger has been measured primarily in terms of tons of grain and calories. While this approach has improved food availability, it has obscured a critical truth: individuals may achieve “food security” in caloric terms yet still suffer from severe malnutrition. The concepts of Food and Nutrition Security (FNS) emerged in response to this challenge, emphasizing that availability, access, utilization, and sustainability must all be addressed simultaneously [1]. Food insecurity is consistently associated with poorer health outcomes and higher health care use [2].

Global data have made evident the limitations of earlier perspectives on malnutrition. Nearly one-third of the

global population has suffered from various types of malnutrition, either resulting from undernutrition or stunting or from overweight and obesity, with micronutrient deficiencies spanning all income levels [3–8]. Nearly two billion people experience chronic deficiencies in essential vitamins and minerals, often without apparent symptoms, a condition referred to as ‘hidden hunger.’ [7,8].

Caloric intake addresses only part of the problem of diet-related diseases, as evidenced by the many individuals whose poor health results from inadequate or unbalanced food consumption [6,9]. The WHO's 2021 report indicates that noncommunicable diseases (NCDs) account for approximately 75% of all global deaths, excluding those attributable to pandemics, and that more than two-thirds of premature deaths related to NCDs

* Corresponding Authors:

Moawiya A. Haddad, Department of Nutrition and Food Processing, School of Agriculture, Al-Balqa' Applied University, Salt 19117, Jordan;
Ali Qoqazeh, Department of Nutrition and Food Processing, School of Agriculture, Al-Balqa' Applied University, Salt 19117, Jordan



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occur in low- and middle-income countries [6,9]. NCDs are closely linked to the global “double burden” of obesity, with more than one billion adults worldwide classified as obese in 2022 [7,10,11].

Food insecurity and micronutrient deficiencies can coexist, particularly in contexts where the local food environment is dominated by inexpensive, energy-dense, ultra-processed products rather than minimally processed foods from diverse sources [8,12]. At present, diet-related non-communicable diseases constitute a substantial proportion of the global burden of disease. According to the WHO, these conditions are responsible for millions of deaths annually; therefore, poor diet quality is not merely a secondary factor but a leading cause of disability and mortality [6,9]. This occurs alongside steadily increasing obesity and overweight rates, particularly in middle-income countries undergoing rapid changes to urban environments [3]. Even where there is a surplus of available food, the proportion of U.S. adults with obesity remains very high, according to CDC reporting, indicating that sufficient calories can coexist with an increased risk of cardiometabolic disease [7–9].

2. From Food Security to Nutrition Security

The U.S. policy discourse has begun to introduce ‘nutrition security’ as a distinct policy objective, defined as the equitable and stable availability of sufficient food and beverages to support good health and prevent disease, rather than focusing solely on the prevention of hunger [5,9].

Implementing this change entails more than simply renaming the goals. It shifts the focus from measuring success solely in terms of calories to evaluating it based on additional factors, including diet quality, adequacy of micronutrient intake, and cardiometabolic risk.

For low- and middle-income countries (LMICs) undergoing rapid nutritional transitions, this dual focus becomes particularly urgent. The phenomenon of hidden hunger, documented in global overviews and within-country analyses, not only coexists with but also increasingly intersects with rising rates of obesity and non-communicable diseases [4,5,7]. Strategies focused on maize yields or on piecemeal commodity distribution to address immediate humanitarian needs may inadvertently reinforce dietary patterns that are high in energy but deficient in essential nutrients [8].

Implications for Program Implementation: While existing programs supporting food security may continue, the approaches for assessing their effectiveness and the modalities of food delivery will require modification.

Social protection strategies can shift from merely tracking calories delivered to evaluating the quality of diets, facilitated by the adoption of healthy procurement standards, conditioning eligibility on the receipt of nutritious food baskets, and/or offering incentives for the consumption of unprocessed foods.

Health systems should now screen for food insecurity and refer households to the appropriate food-based support pathways. For ease of comprehension, **Table 1** provides a more comprehensive list of the types of monitoring and governance channels needed to support this shift across multiple countries, rather than within a single platform. Illustrative platforms include regular sources of continuous surveillance data and national nutrition intake surveys, such as internal measures used by SISVAN [12]. Additionally, integrating community-driven monitoring approaches can further complement these datasets by capturing hyper-local food environment dynamics [13]. These data can be integrated into a National Nutrition Information System focused on population-level monitoring and accountability.

Table 1: Operationalizing nutrition security: indicators, examples, and policy levers.

Domain	What to Monitor/Implement	Why It Matters	Policy Levers/Delivery Platforms
Diet-related burden & “double burden”	Track NCD mortality, premature deaths, and obesity trends alongside undernutrition and micronutrient deficiency [9,10]	Supports the “hidden hunger” argument and shows why calories alone are insufficient [9,10]	Align food policy goals with health outcomes; use nutrition security framing to guide cross-sector coordination [5,9]
Nutrition-sensitive production & sustainability	Diversified production + climate-smart practices aligned with nutrient goals; protect soil/water; reduce post-harvest losses [1,3]	Addresses “how to ensure nutrient-dense production sustainably” while keeping sustainability explicit [3]	Agriculture diversification incentives; loss reduction; nutrition objectives embedded in food system planning [1,3]

Table 1: *Cont.*

Domain	What to Monitor/Implement	Why It Matters	Policy Levers/Delivery Platforms
Food environment governance (country example)	Integrated package: FOP warning labels + marketing restrictions + school environment measures [11]	Concrete example beyond CONSEA showing implementation and measurable shifts [11]	Regulatory package to reshape purchasing and improve food environments [4,11]
Acute malnutrition “nutrition-first” products	Apply quality/specification frameworks for RUTF/RUSF; procurement aligned with standards [14,15]	(RUSF/RUTF) and strengthens practical relevance [14,15]	Standard-based procurement; context-appropriate formulations where feasible [14,15]
Monitoring architecture & accountability	Build/strengthen a National Nutrition Information System (NNIS): combine routine surveillance + surveys + administrative data [14] Pair formal participation mechanisms with	Gives an implementable monitoring model without expanding references excessively	Standardize data flows; link indicators to program redesign and reporting dashboards [14]
Governance & citizen participation	citizen-generated monitoring approaches (“citizen science”) [6,15]	Expands governance examples and operationalizes citizen voice	Community co-design; citizen evidence streams complement regulator/industry data [6,15]

3. Nutrition Security, Sustainability, and “The Triple Imperative”

Sustainable food systems must simultaneously address three critical objectives—ensuring human health, promoting social justice, and safeguarding environmental integrity. As a study shows, “satisfying the growing demand for food products on our planet while not jeopardizing life-support functions on Earth means avoiding transitions to unhealthy and resource- and greenhouse gas-intensive types of food, reducing food waste, and making use of technology to reduce environmental impacts in agricultural production.” Unfortunately, environmental and health achievements are frequently perceived as separate objectives rather than as integrated components of a broader policy framework within food system reform [3].

Indeed, from a nutritional security perspective, it is difficult to maintain this dichotomy. Dietary patterns dominated by refined starches, added sugars, ultra-processed products, and inexpensive fats are unlikely to achieve nutrient adequacy, have been shown to contribute simultaneously to hidden hunger and obesity, and are also associated with substantial environmental impacts. In contrast, minimally processed and biologically diverse plant-based foods, potentially complemented by modest amounts of animal products where feasible, have been shown to provide favorable nutrient adequacy while supporting environmental sustainability and biodiversity outcomes [3,5].

Practical approaches to reconciling nutrient density with sustainability include agricultural diversifica-

tion, particularly emphasizing legumes, fruits, and vegetables; stewardship of soil and water resources; climate-smart agronomic practices aligned with micronutrient objectives, including biofortification or fortification as necessary; reduction of post-harvest losses through improved storage and distribution systems; and recognition that nutrient density can decline throughout the food system, not only at the farm level [1,3]. Furthermore, government mechanisms exist to enhance access to safe storage, affordable pricing, and reliable sources of food through implementable nutrition-sensitive standards in public food procurement and incentive-based policies that promote the purchase of nutrient-dense, minimally processed foods. Regulatory, pricing, and market measures also protect consumers while reducing exposure to food environments dominated by unhealthy products [1,4,8].

4. Governance Lessons: From CONSEA to “Food is Health Policy”

Transforming food systems is not only a technical challenge; it is fundamentally about governance and power. Mozaffarian and colleagues describe how twentieth-century policies aimed at maximizing the inexpensive production of staple foods inadvertently contributed to the current prevalence of ultra-processed, energy-dense diets [4,8].

They advocate for an integrated, evidence-informed policy strategy that extends well beyond education and individual responsibility, employing fiscal measures, regu-

latory tools, labeling, procurement, and urban planning to transform food environments [4,8].

In the United States, the American Heart Association now explicitly frames “nutrition security” as a policy goal, recognizing that social and economic inequities in access to healthy food are the main drivers of cardiometabolic disease [9]. This reframing enables the alignment of agricultural subsidies, food assistance programs, healthcare incentives, and local food policies around diet quality and equity, rather than focusing solely on caloric sufficiency.

A further illustration of the same concept can be found in Brazil, where Castro has recorded the development of a Participatory Food and Nutritional Security System (SISAN), along with the creation of the National Council of Food and Nutrition Security (CONSEA), as an opportunity for civil society and the government to jointly construct policies in three major areas (school feeding, social protection, and dietary practices) [10]. Many observers contend that the disbandment of CONSEA represents a significant setback for rights-based governance in the domain of food and nutrition [10]. There are, however, additional examples beyond CONSEA that demonstrate how the implementation of ‘integration packages,’ which combine front-of-package warning labeling, marketing restrictions, and school environment regulations, can influence the way citizens purchase food. These examples also illustrate how nutrition security can be achieved through effective governance of food environment policies [11]. The two forms of citizen participation, that is, the formal council-based approach and the citizen science approach, enhance credibility and effectiveness by providing additional local evidence concerning the food environment [10,12,13].

5. A Forward Agenda: From Metrics to Action

If we agree that “enough” needs to be redefined to include nutrition and sustainability, what does this imply for practice?

First, metrics must evolve. Household food security scales that consider only quantity, and national indicators that track solely undernourishment, are no longer adequate. Indicators of dietary quality, dietary diversity, micronutrient adequacy, and, where feasible, environmental footprints should be incorporated into routine monitoring systems [1,3,5].

An example of integrated national monitoring approaches includes national monitoring of food consumption and dietary intake, micronutrient intake, and routine dietary surveillance via a National Nutrition Informa-

tion System (NNIS) that integrates routine monitoring of population-level Dietary Quality Indicators (DQI) and Nutritional Adequacy Indicators (NAI). Secondly, explicit integration of short-term safety nets and long-term food-based approaches is needed in policy packages. Evidence on the health consequences of food insecurity [2] and the importance of diverse, minimally processed diets to address hidden hunger [4,5] supports integration of social protection, public procurement (e.g., schools, hospitals), agricultural diversification, fortification where appropriate, and strong regulation of ultra-processed foods [8,9,11]. RUSF and RUTF are two examples of “nutrition-first” products in the context of an acute malnutrition crisis [14,15].

Aligning the specifications of these foods in terms of process, product, and source, as well as their procurement, with sustainable sourcing and locally acceptable formulations wherever feasible, can maximize their outcomes and contribute to the development of more resilient supply chains [8,9]. Furthermore, an emerging opportunity exists to integrate nutrient density and circular economy strategies by valorizing nutrient-rich by-products into safe food ingredients, thereby diversifying sources of protein and micronutrients without necessitating proportional land expansion. Such an opportunity must be managed with careful oversight and due diligence to ensure food safety [3].

Third, where feasible, the “food is medicine” program model should be integrated into social protection and health systems. Shifting from treating diet as a secondary component of lifestyle advice to establishing a health system-directed pathway that supports disease prevention and management directly reinforces the framing of policy and practice discussions on nutrition security and food-based interventions [9,10].

Finally, greater knowledge and evidence on food systems and sustainability should be developed and widely disseminated, and academic journals are well positioned to serve as platforms through which these topics and the related research can be effectively curated and shared—i.e., evaluations of climate-sensitive policy related to nutrition, political economy analysis of food environments, and case studies of rights-based governance innovations, e.g., CONSEA [3,10].

6. Conclusions

The era in which ‘food security’ could be equated solely with calorie availability has ended. In a world characterized by hidden hunger, rising obesity, and accelerating environmental crises, simply producing more food, particularly more of the wrong types, is insufficient to achieve health, equity, or sustainability.

When correctly understood, food and nutrition security (FNS) is a capability that ensures all individuals have the genuine freedom to access, select, and consume diets that support healthy lives today without compromising the nutritional needs of future generations. Achieving this objective requires a shift from calorie-focused metrics and isolated policies toward nutrition-driven, sustainability-aligned food systems grounded in rights-based governance. Below are the policy and program strategies for action:

1. Establish regular measures of dietary quality (dietary diversity and micronutrient adequacy) and report this information on government dashboards.
2. Use public procurement to institutionalize healthy and minimally processed diets in schools and hospitals.
3. Utilize regulatory tools, including labeling, marketing regulations, and fiscal policies, to reduce the availability of ultra-processed foods in food pantries and other food environments.
4. Align agricultural and trade policies and incentives with respect to nutrient density and sustainability, rather than merely the quantity of food produced.
5. Support citizen engagement and participatory governance to maintain accountability and effective oversight of these systems.

In the authors' view, this rethinking of 'enough' is not optional; it represents the minimum ethical standard for food policy in the twenty-first century.

List of Abbreviations

FNS	Food and Nutrition Security
LMICs	Low- and Middle-Income Countries
NCDs	Noncommunicable Diseases
RUSF	Ready-to-Use Supplementary Food
RUTF	Ready-to-Use Therapeutic Food
SISAN	Sistema Nacional de Segurança Alimentar e Nutricional (Brazil)
UPFs	Ultra-Processed Foods

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Conflicts of Interest

The authors declare no conflicts of interest.

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AI Declaration

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