

Task Force 2: Energy, Climate and Sustainable Development



Food Systems and Food Security: Connecting the Dots for Achieving Sufficiency of Healthy and Sustainable Foods

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Abstract

The policy brief tackles the formidable challenge of global food and nutrition security, exacerbated by a surging global population, climate change, and geopolitical unrest, highlighting the urgent need for sustainable solutions as the world edges closer to a population of 10 billion. With over 258 million people across 58 countries facing acute food insecurity, a significant increase from 193 million in 2021 (FSIN and Global Network Against Food Crises 2023: 17), and a double burden of malnutrition affecting over 200 million children under five with undernutrition and over 137 million school-age children with overweight and obesity (UNICEF et al. 2023), the brief proposes the 'Smart Food' concept as a viable pathway. This approach harmonizes nutritional needs, environmental stewardship, and economic feasibility to forge resilient, sustainable food systems capable of supporting the burgeoning global populace.

Central to the brief is a multi-dimensional analysis spanning economic, social, and environmental aspects of food security, enriched by global case studies. These include Australia's carbon farming, Bangladesh's climate-smart agriculture, Brazil's sustainable livestock practices, and urban agriculture in the US, showcasing the practical application and success of Smart Food initiatives across diverse contexts.

Schools also represent an exceptionally cost-effective platform through which to deliver high impact programmes to reduce food insecurity and malnutrition, while at the same time contributing to food systems transformation and sustainable development. School food and nutrition programmes can build bridges with local, sustainable, diversified food production, bringing together communities and transforming food, education, and social protection systems. The recommendations underscore the critical role of the G7 in leading this transformation, advocating for investments in climate-resilient agriculture and innovative food production technologies. The brief envisions a G7-led international collaborative effort to transition towards sustainable and efficient food systems that not only meet the nutritional needs of the global population but also address the challenges posed by climate change.

The recommendations also include increased, smarter investment in school food and nutrition policies and programmes. By taking a holistic approach to school food and nutrition programs, especially school meal programmes, strong linkages can be created between procuring food from sustainable agriculture and farming, food and nutrition education, the school food environment and the policy and legislation spheres.

Set against the backdrop of a world grappling with climate change, malnutrition, and the need for a substantial increase in food production, the G7's commitment, evidenced by over 14 billion US dollars allocated to combat global food insecurity, positions these nations as pivotal players in the global effort. The adoption of Smart Food systems offers a promising avenue towards reimagining global food security, leveraging the G7's economic, technological, and diplomatic resources to spearhead a coordinated response to these pressing challenges.

1. Challenges

1.1 The need for feeding the future: Navigating the nexus of climate, growth, and innovation for global food security

The challenge of global food security is increasingly pressing as approximately 30 per cent of the global population, out of 8 billion, faces food insecurity. This comes despite a 56 per cent increase in agricultural production from 2000 to 2021, with growth projected to slow down to an anticipated 1.1 per cent annually over the next decade. This slowdown is attributed to various factors, including climate change and geopolitical conflicts, with an estimated need for a 50 per cent increase in food supply by 2050 to meet demand. The existing food system's focus on expanding agricultural economies has led to a mismatch with nutritional needs and natural resource management, contributing to diet-related illnesses and a significant portion of global greenhouse gas emissions.

Climate change is a major driver of food insecurity, impacting agricultural production through shifting climate patterns and extreme weather events, which resulted in a 5 per cent loss of global production in 2023 alone (FAO 2023b). The adaptation strategies include developing climate-smart technologies and changing farming practices (Lobell and Asseng 2017), but challenges remain due to the carbon-rich atmosphere reducing the nutrient content of foods (Beach et al. 2019) and vulnerabilities in the global food system leading to significant food waste and loss.

Population growth, particularly in the least developed countries, along with urbanization, is set to exacerbate the divide in access to healthy diets. Urban expansion consumes agricultural land, reducing productivity and contributing to climate change, yet it also pushes for greater efficiency and innovation in food systems. Agricultural trade, accounting for 23 per cent of global production in 2023 (Statista 2024), plays a crucial role in balancing supply and demand but is highly susceptible to shocks such as the Covid-19 pandemic and conflicts like the war in Ukraine (Pasic 2021), leading to increased food prices and encouraging diversification and self-sufficiency initiatives (Caldara and Iacoviello 2024).

Access to resources for agricultural development, especially in low- and middle-income countries, is limited with a vast gap between the required investment for adapting to climate change, estimated by the UN at 387 billion US dollars annually, and the actual funds available, which stood at 21 billion in 2021. Innovative financing mechanisms like carbon finance and private sector investments in smart food technologies offer some pathways forward, though these are primarily focused on developed countries.

In summary, achieving global food security amidst climate change, population growth, and geopolitical challenges requires a multifaceted approach that includes significant innovation, sustainable resource management, and considerable investment in agricultural development,

particularly in developing regions. The interplay between these factors underscores the complexity of ensuring a stable and nutritious food supply for the growing global population.

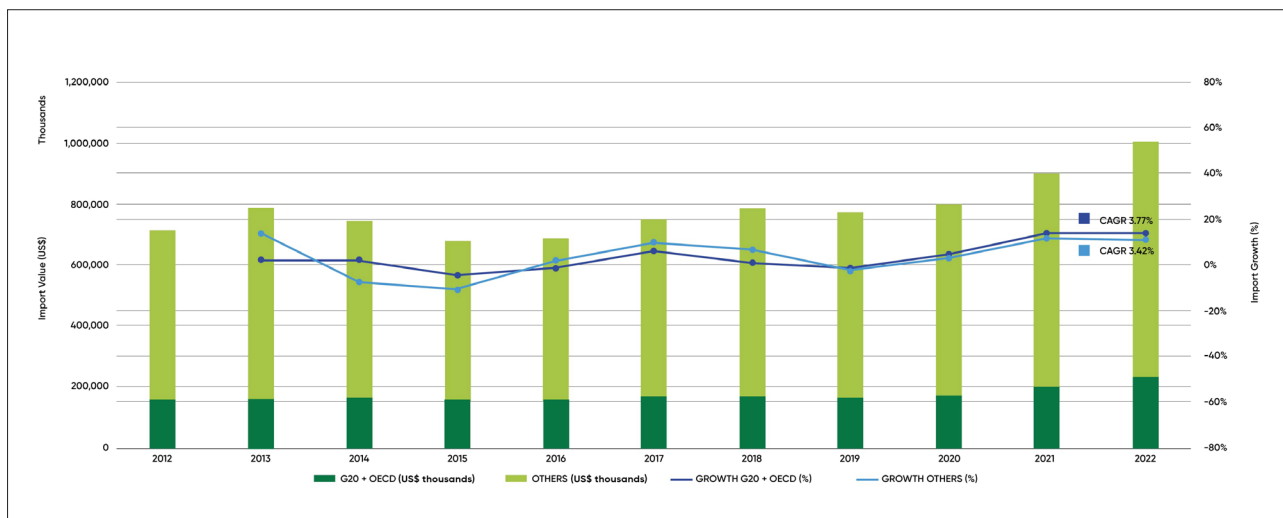
1.2 The interplay of agri-food trade, climate disruptions, and digital solutions in the contemporary world

In the present global uncertainty, where the challenges of food security intertwine with the intricate dynamics of the world economy, the pivotal role of international agri-food trade emerges as a beacon, offering a critical perspective on the interconnectedness of these pressing issues. The geopolitical turmoil in the Black Sea and the Red Sea has disrupted the stability of the agri-food value chain. It threatens the transportation of food to various global destinations and jeopardises the distribution of essential fertilisers and their raw materials crucial for enhancing crop productivity. There is a delay of 15 to 20 days due to the need for deep-sea transportation to circumnavigate Africa (Acharya and Kumar 2024). Fertilisers, in fact, contribute to more than 50 per cent of the world's food production (Erisman et al. 2008).

Moreover, agro-climate conditions define crop performance. Climate change has disturbed agriculture with the uncertainty of the planting season and the explosion of pest and disease attacks. The far-reaching impacts of the El Niño phenomenon have reverberated across numerous developing nations, leading to a stark reality where 258 million people are currently grappling with acute hunger since its last cycle in 2022 (FAO 2023a). Paradoxically, agriculture has emerged as a substantial contributor to greenhouse gas emissions (GHGs), namely nitrous oxide and methane. The pervasive challenge stems from inadequate adoption of sustainable agricultural practices and limited access to technology and market resources. Given agriculture's inherent global interconnectivity, the consequential carbon footprint associated with agri-food trade is notably high. FAO estimated that the carbon emissions from food transport were 555,783 kt CO₂eq in 2021 (FAOSTAT 2023b).

The G7 countries retained a commanding presence in the 2022 global agri-food trade, contributing 60.28 per cent of the total export values – an increase of 2,48 billion US dollars from the 2012 figures. Concurrently, developing nations have assumed a more significant role as G7's trade partners, experiencing a commendable annual growth rate of 3.42 per cent in agri-food import values over the ten years from 2012 to 2022 (Figure 1). Non-G20 and OECD countries comprised 77 per cent of the import values of G7 countries. Therefore, the G7 leadership in transforming agri-food systems will significantly shape the future of agriculture.

Figure 1 | The agri-food imports of G7 countries



Source: FAOSTAT 2023a.

Figure 2 | Digital technologies in the agri-food value chain



The advancement of information technology and digitalisation has opened a new realm of agriculture practices. These sophisticated technologies can tackle the challenges multiple actors face along the agri-food value chain (Figure 2). Several studies have investigated the future scenario of harnessing digital technology into agri-food policies (Lajoie-O'Malley et al. 2020). Formally, the European Parliament has conducted a foresight study on this issue and argued that implementing such technologies can support sustainable farming practices and contribute to food security and safety (Schrijver 2016). Despite its potential, G7 should help to amplify its utilisation in partner countries, ensuring a lower carbon footprint along the agri-food value chain.

1.3 Global malnutrition crisis: Challenges, impacts on children, and the crucial role of school food and nutrition programmes

In recent years, natural events related to climate change, and the conflicts and wars in many parts of the world have put additional constraints on the availability and sustainability of the global food supply that was already struggling to produce enough nutritious foods for all. Food prices – especially for healthy food items – have increased significantly, contributing to increased levels of food and nutrition insecurity, and poverty. In such crisis situations, governments tend to focus on using their fiscal resources to ensure the availability of staple foods, disregarding the nutritional quality of foods, which contributes to further perpetrating malnutrition.

Children, because of their increased nutrient needs, have become at higher risk of falling into malnutrition in such situations. Today, a growing number of children around the world are suffering from one or more forms of malnutrition (undernutrition, micronutrient deficiencies, overweight and obesity): the 2023 Joint Malnutrition Estimates show over 148 million children under 5 (22.3 per cent) suffer from chronic undernutrition globally, while over 135 million children aged 5 to 19 live with overweight (20.4 per cent) (UNICEF et al. 2023). Malnutrition negatively affects the human and economic capitals of individuals and nations and perpetuates cycles of intergenerational poverty, food insecurity and ill-health.

One of the immediate causes of malnutrition and a major contributor to the global burden of disease is unhealthy diets: today, 1 in 3 children live in severe food poverty, consuming less than 2 of the recommended 8 food groups every day (UNICEF 2022). Today, the global food system is failing to provide children with sufficient, affordable, culturally appropriate, safe, and nutritious foods, while simultaneously inundating food environments with unsustainably produced foods and beverages (UNICEF 2023). On the other hand, the diets that people eat can increase or alleviate the pressure and impact on the environment, affecting factors such as carbon and water footprints, land resources, biodiversity, organic waste).

Schools are an exceptionally cost-effective platform through which to deliver high impact food and nutrition programmes and reach vulnerable children, while at the same time contributing to food systems transformation and sustainable development. School food and nutrition programmes can build bridges with local, sustainable, diversified food production, bringing together communities and transforming food, education, and social protection systems (UNICEF 2020).

2. The role of G7

The G7 nations hold a pivotal role in enhancing global food security and nutrition, particularly in the context of stabilizing the global food supply chain and ensuring the availability of nutritious foods essential for the growth of children. By fostering cooperation with non-traditional trade partners and leveraging innovations such as artificial intelligence and blockchain technology, the G7 can effectively link smallholder farmers to school meal programmes, ensuring the provision of sustainably sourced nutritious foods.

Collaboration among G7 countries to share best practices, research findings, and policy approaches related to school food and nutrition is vital. Such cooperation can lead to the identification and implementation of effective strategies globally, enhancing school environments through initiatives that may include funding for research, pilot programmes, infrastructure development, and capacity building.

Moreover, the G7 can use its collective influence to advocate for improved school food and nutrition policies at the international level, prioritizing the well-being and nutrition of children and adolescents. This advocacy is crucial for placing school food and nutrition policies at the forefront of the international agenda, demonstrating leadership in addressing global food security challenges.

Financial commitments by G7 countries, such as the US's pledge of nearly 8 billion US dollars to combat global food insecurity and the collective response of an additional 4.5 billion, totaling over 14 billion US dollars, highlight the substantial resources allocated towards mitigating hunger and malnutrition. The Hiroshima Action Statement further emphasizes the G7's commitment to promoting open and fair trade in agricultural products, enhancing market transparency, and strengthening food system resilience.

National policies by G7 nations, including the US's efforts to address food insecurity exacerbated by global challenges like the Ukraine conflict and the Covid-19 pandemic, showcase the importance of emergency food assistance and investment in food system strengthening.

Research and development (R&D) spearheaded by G7 countries in sustainable agricultural practices and technologies are essential for building resilient food systems capable of withstanding environmental and climatic pressures. These R&D efforts encompass climate-smart agriculture, innovative crop varieties, and sustainable farming techniques.

Global partnerships and knowledge-sharing initiatives, such as the Global Alliance for Food Security (GAFS) and the Global Network Against Food Crises (GNAFC), enable G7 countries to collaborate with international partners, sharing insights, data, and best practices to address immediate needs and prepare for future food security challenges.

Funding strategies employed by G7 countries support food security and sustainable agriculture worldwide, including direct assistance to vulnerable regions and backing for multilateral initiatives aimed at boosting agricultural productivity and resilience.

Regulatory frameworks established by G7 nations are critical for promoting sustainable agricultural practices, ensuring fair trade in agricultural products, and supporting the development of resilient food systems, thereby contributing significantly to the global effort to ensure food security and nutrition.

3. Recommendations

1) *Smart Food: A holistic strategy for nutritional richness, environmental sustainability, and economic viability.* Smart Food, as defined in the Global Report on Food Crises 2023, represents a comprehensive approach to addressing food insecurity by being good for the consumer, the planet, and the farmer. This concept prioritizes nutritionally rich crops, sustainable agricultural practices, and economic viability to ensure long-term resilience in global food systems.

At its core, Smart Food focuses on enhancing nutrition through the promotion of diverse, nutrient-rich crops like legumes, fruits, vegetables, and nuts, aiming to combat malnutrition and prevent chronic diseases. This shift is not merely about addressing immediate dietary needs but also about fostering community health resilience.

Environmental sustainability is another critical aspect of Smart Food, involving the adoption of farming practices that conserve water, improve soil health, and reduce chemical use. Techniques such as crop rotation, organic farming, and agroforestry are integral to this approach, contributing to biodiversity and lowering agriculture's carbon footprint, thereby combating climate change.

The strategy also encompasses climate-smart agriculture, introducing technologies and methods that increase productivity sustainably, enhance farmers' resilience to climate variability, and reduce greenhouse gas emissions where possible. Innovations like drought-resistant crops and precision farming are essential for food security amid changing weather patterns.

The relevance of Smart Food is underscored by the growing global population, projected to reach nearly 10 billion by 2050, and the increasing demand for food. Approximately 9.9 per cent of the global population was undernourished in 2020, highlighting the importance of nutrient-rich crops. By advocating for a diet that is diverse and nutritionally adequate, Smart Food addresses both malnutrition and environmental degradation, paving the way for a sustainable future.

Implementing a Smart Food strategy involves government policies and investments to accelerate research and development, improve infrastructure, and increase the availability of sustainable foods. This includes exploring alternative proteins and integrating livestock into regenerative farming to reduce methane emissions from livestock and enhance soil health and biodiversity. Such practices not only contribute to environmental sustainability but also offer financial benefits and risk diversification for farmers.

Furthermore, integrating gender inclusivity into the Smart Food strategy amplifies its impact by acknowledging the crucial role of women in agriculture. Women represent 43 per cent of the agricultural labour force in developing countries. Given that women make up a significant portion of the agricultural labour force in developing countries, ensuring they have equal access to resources and decision-making can greatly enhance agricultural outputs and sustainability. Women's involvement in food systems, from production to household nutrition, is vital for improving dietary diversity and health outcomes, making gender-inclusive policies an essential component of the Smart Food approach.

2) Establish an accessible digital platform dedicated to promoting sustainable agri-food trades. The market serves as an effective medium for fostering the adoption of sustainability values in agri-food systems transformation. Certification is a prerequisite to make that market approach doable. Certification is a correct mechanism for valuing more sustainable products. However, there are numerous certification standards present in the market with different requirements, methods of calculation, and different treatments on countries' borders. This complexity is further intensified by the financial burden of certification, disproportionately affecting farmers, particularly those in developing countries (Elverdin et al. 2022).

In the certification context, finding an accessible platform for smallholder farmers and harmonised regulation are critical. The platform should facilitate access to services, markets and assets. Simultaneously, regulations concerning sustainable products should be well-defined and simplified to encourage partner countries to participate in a sustainable market mechanism. Eliminating the need for multiple certification standards in global trades is vital for smallholder farmers, mitigating complexity and enhancing efficiency.

Blockchain technology stands as a promising solution for delivering sustainable agri-food values to farmers, markets, and consumers. This transparent digital ledger stores the information along the value chain and is synchronised by multiple actors in the system. Consumers can verify information about sustainable technology or practices during crop production, post-harvest manufacturing, and logistics.

The technology has the potential to bolster consumer trust and catalyse the supply and demand for sustainable products. Indeed, such an approach would alleviate the burden on farmers and developing countries, enabling them to meet market standards without the necessity of

cumbersome sustainable certifications. Notably, the FAO, UNDP, and Germany have initiated pilot programmes to integrate this technology into climate action in agriculture (FAO 2021). The G7, of which Germany is a member, should expand and support these efforts.

In fact, adopting smart-climate agriculture and technology heavily depends on the capacity of farmers. A global survey showed that financial exclusion, knowledge gap and poor access to the market are hindrances to the adoption of digitalisation (GSMA 2020). Thus, to implement this policy recommendation, G7 should:

- Provide communication and assistantship for important trade partners in establishing the platform.
- Developed suitable and harmonised market policies for sustainable products, encompassing initiatives like the carbon label and border taxation policies.
- Encourage market actors to adopt and promote sustainable agri-food products through incentives, such as lower tax rates or creating carbon-credit-like mechanisms. This could involve fostering agreements between farmers and food manufacturers, incentivizing the incorporation of low-carbon agri-food into their production processes.

3) Transforming school food systems: Addressing malnutrition and environmental sustainability through holistic approaches and high-impact interventions. Schools present golden platforms for addressing the dual objective of reducing malnutrition and improving environmental sustainability to contribute to a more sustainable food system that delivers food security and nutrition for all.

School food and nutrition programmes shall focus on building the competencies, skills and motivations of children and adolescents to be able to make the healthy food choices in healthy school food environments for better nutritional and environmental outcomes. By taking a holistic approach to school food and nutrition programmes, especially school meal programmes, strong linkages can be created between procuring food from sustainable agriculture and farming, food and nutrition education, the school food environment and the policy and legislation spheres (FAO 2019).

To address all forms of malnutrition among school-age children and contribute to food systems transformation, governments should implement a package of cost-effective high impact interventions (UNICEF 2021; WHO 2021), including:

1. Improving access to nutritious and sustainably sourced school meals and safe drinking water: School meal programmes present a good opportunity to link smallholder and family farmers to guaranteed markets for the supply of culturally-relevant nutritious foods that comply with nutrition standards. Local farmers should be supported (through subsidies and technical support) to increase their production of diversified nutritious foods that contribute to a healthy diet (vegetables, fruits, pulses, grains, etc.), applying more sustainable production practices. Water infrastructures especially for drinking water shall be improved.

2. Restricting marketing and sale of foods and beverages injurious to health: Possibly linking with other policies such as food labelling and food marketing restrictions, national regulations shall be enforced to protect school from the distribution, sale and marketing of highly processed foods and beverages that are high in saturated fats, sugars, salt and other harmful ingredients.
3. Integrating skills-based food and nutrition education and physical activity in the curriculum: This will contribute to develop core skills and motivations among children and adolescents (with support from teachers and families) to eat healthily and live physically active lives.
4. Implementing supplementation and deworming programmes to prevent micronutrient deficiencies: In specific countries with high rates of micronutrient deficient anemia and helminth infections, weekly supplementation of iron and folic acid, and annual deworming programmes are recommended to reduce micronutrient deficiencies and contribute to improving school performance.

The implementation of this package of food and nutrition interventions will contribute to eliminating malnutrition in children and adolescents, while also facilitating the transformation of food systems.

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