

## Voices

## Inclusive diets within planetary boundaries

Our food production system is unsustainable and threatening planetary boundaries. Yet, a quarter of the global population still lacks access to safe and nutritious food, while suboptimal diets account for 11 million adult deaths per year. This Voices asks: what critical barriers must be overcome to enable sustainable, healthy, accessible, and equitable diets for all?



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### Gender is a hidden driver of inequality in diets

Inequality in diets is deeply associated with the structural problems of gender at all levels including global food systems, household resource allocation, food policies, and research priorities. For example, global food production and processing depend heavily on women's "cheap" labor characterized by low wage and precarious form of employment. Ironically, these women workers cannot afford healthy and sustainable diets for themselves. At the household level, women do not necessarily have decision-making power and the economic resources to invest in healthy diets for their children. This is also closely associated with the structural inequality persisting in their societies. Furthermore, in food policies and governance, gender is often addressed by merely inviting more women into the existing unequal food system rather than substantively introducing structural change. Gender is also sidelined in mainstream research on food systems and diets that focus more on how, rather than for whom, food was produced and distributed.

To address these underlying structural issues, I suggest three actions: (1) embracing pluralistic knowledge production in our understandings of food systems and diets by inviting other disciplines such as feminist approaches in political sciences, anthropology, and cultural studies; (2) analyzing policy-making processes to understand how and why the agenda on gender is marginalized and depoliticized; and (3) involving more women and early-career scientists from the Global South in food system research to incorporate their perspectives in food system theories, concepts, and practices. These are the first step to moving beyond providing technological solutions toward facilitating structural transformation in food systems and food system research.

### Neglected and underutilized crops for inclusive diets

While the existing food system has improved food security, [this was achieved in an unsustainable way](#) and has led to issues of obesity, environmental degradation, and exacerbated social inequalities, while hunger persists among many communities. Also, the focus on providing sufficient food calories over improved nutritional quality has left millions in Africa still lacking access to healthy diets. Many are calling for a transformation of Africa's food system, which is currently centered around a few major staple crops, by expanding the role of neglected and underutilized crop species (NUSs)—also known as orphan crops that were historically used by Indigenous communities. Successful production and consumption of NUSs [could improve food systems' resilience to climate shocks and transform diets to be healthier, more equitable, and inclusive](#). For example, several NUS crops (e.g., bambara groundnut, cowpeas, amaranth, millets, wild mustard) are nutrient-dense and could be a sensible addition to the current average African diet, which typically lacks micronutrients. Furthermore, there will be environmental co-benefits, as [NUSs typically can adapt to marginal environments: they require less landscape modification, are more tolerant to stresses \(e.g., drought, heat, salinity\), and need fewer external inputs \(e.g., fertilizer, water, pesticides\)](#). Hence, diversifying the food system by incentivizing NUS production and consumption can be pivotal in adequately addressing food insecurity, micronutrient deficiencies, vulnerability to climate change, and environmental degradation. To gain momentum, policy changes are needed to acknowledge NUS's critical value and



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potential for food system transformations; support and fund research, development, and innovation; and develop inclusive value chains.



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### Targeting economics to shape better food choices

Today's diet results from access to healthy, nutritious foods but also non-nutritious foods (e.g., soft drinks, sweets, energy-dense snacks like chips). Currently, however, economics that drive access to nutritious foods vary considerably from non-nutritious foods. First, just looking at the affordability of these two different types of food, you find that non-nutritious are generally **half the cost** of healthy foods worldwide except in Africa. Although affordability is a key factor for food choice, it alone doesn't drive habitual consumptions. Generally, unhealthy energy-dense foods are always available because they are shelf-stable, convenient, and packaged at scale. There are also very low time-use requirements to consume unhealthy foods compared to healthy foods, which often require time for preparation, cooking, and cleaning. Furthermore, if you look at marketing expenditure for unhealthy foods, for example, in 2017, the US spent **\$11 billion** on beverages alone. Another study in the UK shows that spending on unhealthy foods is **about 30 times** as much as government spending on promoting healthy foods. And evidence shows that **the marketing of unhealthy foods is also targeted toward young minorities and children from low-income families**. Often, unhealthy foods are not replacing meals; rather they are supplemental excess calories. So, when we think about nutrition inequities leading to various health disparities, we must consider economic factors and measures that drive access to *healthy and unhealthy foods in tandem*. Policies that take a bundled view of targeting the economics of unhealthy and healthy foods are more likely to enable sustainable, healthy, accessible, and equitable diets for all.



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### Reforming blue food production for healthy global diets

Blue foods—fish, crustaceans, and molluscs—are rich sources of protein and micronutrients that **contribute to healthy diets around the world**. Many blue foods are produced using marine ecosystems, either directly by fisheries that catch wild animals and plants (wild fisheries), or indirectly, using wild catches as feed for farmed fish and invertebrates (aquaculture). Though marine ecosystems are **producing more food than ever**, global hunger is increasing, suggesting blue foods are failing to meet dietary needs of vulnerable populations.

In wild fisheries, rebuilding of overexploited stocks is essential for sustainable food production. However, governments may prioritize economically valuable stocks (e.g., tuna) over more nutritious species (e.g., sardinella), while foreign fishing and global seafood trade **favor the already nutrient-secure nations**. Hence, catches that directly contribute to local food systems should be protected, for example, by **managing coral reef fisheries according to local needs and Indigenous norms**.

Some types of aquaculture also use marine ecosystems to produce blue food, using catch of small “forage” fish to feed species such as salmon and carp. However, aquaculture growth will soon exceed forage fish catch limits, and there is growing concern that aquafeeds will also divert nutritious fish away from vulnerable populations. **Upcycling of food system by-products** and use of non-marine feeds can help aquaculture to expand while minimizing ecological and social impacts.

For both wild fisheries and aquaculture, reforming production to protect marine ecosystems and prioritize local nutrient supply, especially in vulnerable communities, can enhance blue food contributions to healthy, sustainable diets around the world.

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### The limited potential of inclusive business

Private agriculture business is increasingly recognized as a leading agent in the pursuit of providing sustainable and healthy diets to all. Businesses are accordingly expected to become more inclusive. This has spawned “inclusive business models,” which are assumed to improve livelihoods of farmers, especially those at the base of the economic pyramid, by integrating them into companies’ value chain as suppliers, distributors, retailers, or customers for mutual benefits such as higher income and increased productivity.

However, there are few indications that such benefits will indeed translate into improved food and nutrition security for all, e.g., [empirical studies](#) show that the effects of such business can vary across diverse groups in the community. Moreover, company-catalyzed development trajectories, e.g., via more market-oriented production, can lead to changes in local food production and consumption, although the long-term effects of these changes remains unclear. There are also [studies](#) that show how interventions aimed at improving local food security, e.g., by helping farmers achieve higher incomes through producing high-economic-value crops, can nevertheless cause water scarcity or pressure on the soil. Other studies show that the introduction of export crops for better economic profits may risk a replacement of local food crops and, consequently a decrease in diversity of food crops at the local markets. These examples indicate that “inclusive business models” may only be a partial answer in realizing sustainable and healthy diets for all, if contextual factors are not scrutinized when designing and implementing the models.

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### The elephant in the room

Sustainable food systems are key to inclusive and healthy diets. In the final chapter of their 2023 [book](#), Joachim van Braun and the co-chairs of the [UNFSS Scientific Group](#) reflect on what is needed to achieve sustainable food systems: “*Science, research, and innovation are essential for accelerating the transformation to healthier, more sustainable, (...) food systems.*” In essence, science and research, together with innovation, are portrayed as the “solutions” that should help us solve the current food system crisis. What these authors forgot to mention, however, is that science, research, and innovation are also what made our food systems what they are now: a mixture of unsustainable forms of production, distribution, and consumption. In this debate, the elephant in the room is the role that some actors have played in influencing and driving research and innovation toward our current unsustainable—yet very profitable—food systems. Did you know that between 2013 and 2015, food corporations in the US spent [>\\$192 million](#) to stall various legislations aiming at improving consumer access to food content information; or that the combined spending of all agribusiness lobbying in Washington exceeds the lobbying expenditure of the entire US defense industry? The influence of food transnational corporations in sectors such as seeds, agrochemical, ultra-processed foods, and distribution has never been as big as it is now. Yet, the terms “corporations,” “lobbying,” or “political economy” were never mentioned (not even once!) in van Braun et al.’s final chapter. Until this elephant in the room is recognized and tackled head-on, it will be difficult to engage in any of the transformational changes that our food system [is desperately needing to achieve sustainability](#).

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### Transforming food systems to work for the rural poor

Food is indispensable for our lives, but food systems are currently unable to deliver desirable outcomes for the climate, nutrition, and social welfare due to the many negative externalities they generate. Of particular concern are the rural poor, most of whom are engaged in agricultural production; they contribute **31% of the global total food calories from cultivating merely 11% of world's farmland**, often in small-scale farms from which it is difficult to make a living for the entire family. Small-scale farmers are among the most vulnerable to perturbations in the food systems. For many of them, the cost of a healthy diet is **largely unaffordable**. Moreover, while it is estimated that small-scale farmers contribute just **5% of greenhouse gas emissions**, they also suffer the most from the impacts of climate change through lowered productivity and crop failure, reduced incomes, degraded farmland, and insufficient climate adaptation capacity. They also often lack security of land tenure and don't have access to markets, financing, or other productive resources. Thus, moving to more inclusive and resilient food systems requires radical changes. It's essential to diversify production to improve not only adaptation to climate change and crop resilience but also nutrition. It's also vital to use nature and knowledge-based systems with advanced information and technology to support sustainable production that harmonizes various objectives across domains, e.g., strengthening training and investments in the mid-stream (e.g., processing, packaging, distribution, etc.) to support local economies and ensure that local laborers are trained with additional skills and resources beyond farming to accommodate the potential surplus labor.



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### From bug bites to bite-sized

Alternative protein sources, particularly edible insects, have the potential to address critical issues such as food insecurity, malnutrition, and environmental degradation. However, several barriers prevent the widespread adoption of this solution mainly in low- and middle-income countries (LMICs). For example, insects have high moisture content and are prone to spoilage, making it essential to maintain appropriate temperature and humidity levels during storage and transport. They are often consumed in processed forms, such as powders, which require specialized packaging to ensure stability and prevent contamination. However, the **lack of infrastructure** to enable expected production, processing, and distribution of insect-based foods presents a huge barrier to the development of insect manufacturing. Besides, there is low awareness and social acceptance of insects as food, compounded by misconceptions about their taste, nutritional value, and safety. Consumers may be hesitant to try new and unfamiliar foods, especially if there is little information available about their processing methods. Moreover, the high cost of production limits the sector's scalability. For instance, the cost of producing cricket protein powder in Thailand was found to be approximately US \$11.44/kg, whereas the cost of chicken protein was merely about US \$2.15/kg.

Governments in LMICs can play a great role in this industry's growth by creating incentives and providing support for small- and medium-sized enterprises. Formal markets dealing with insect-based products could be established while tapping the potential of gastronomic tourism. Furthermore, building capacity in research and development for innovation and technological advancement is urgently needed to foster sustainable growth of the sector.





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### Harnessing aquatic food systems for equitable diets

The biodiversity and climate crises, wealth inequalities, and unstable world economic situations underscore the need to ensure sustainable and equitable food systems. **Blue foods** from aquatic environments, marine or freshwater, are essential to such food systems, yet can be extremely diverse—e.g., **they can differ in species (caught or farmed), nutrition levels, scale of production and processing, supply chains, environmental impacts, and roles in livelihoods.**

Recognizing the critical role aquatic foods have in meeting sustainability, health, and inclusive diets requires a deep understanding of these diversities, along with the **underlying challenges**: e.g., the interplay between environmental conditions and social structures can **exacerbate inequities in aquatic food systems** across socio-economic and geographic contexts. A purposeful transition to more inclusive systems must understand the actors, institutions, and practices that are key to food accessibility across various scales. Actions such as improving the transparency of supply chains to trace environmental impacts and human rights abuses are necessary. Addressing teleconnections, where distal consumer preferences and market dynamics can threaten or improve aquatic food systems, is key. At a smaller scale, **enhancing the role of small-scale actors** is important to support their viability in the face of dysfunctional institutions, inequitable access to resources and opportunities, and environmental change. Incentivizing feedback across scales that can serve to redefine visions of sustainable and equitable aquatic food systems is also critical.

We still have opportunities to embrace the diversity of aquatic food systems, harnessing their capacity to address nutritional, environmental, and socio-cultural challenges.



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### Making collective actions and innovative interventions

Good nutrition is important for all. However, there exist barriers that prevent consumers from sustainably eating healthy diets and achieving optimal nutrition. These include lack of access to nutritious and healthy foods, inadequate nutrition knowledge, perception that nutritious foods are too expensive, lack of food-preparation skills, and difficulties in adjusting eating habits to favor healthy eating. Overcoming these barriers is a collective responsibility that requires effective implementation of innovative nutrition interventions. Approaches such as **nutrition social behavior change communication** can be used to change individual, communal, and social behaviors that **encourage shift of food consumption** from poor-quality diets to sustainable, healthy ones. Through **community-based participatory interventions** (e.g., nutrition education, community dialogues, participatory cooking classes, home-based counseling), people can be educated about importance of healthy eating and appropriate food choices and be provided with skills on how to prepare healthy meals. Sustainability can be increased by strengthening the capacity of community resource persons (community nutritionists/health volunteers, agriculture extension workers) to promote behavior change. It is also necessary to apply a gender and equity lens to ensure that interventions reach individuals with increased nutrient needs. Governments can also help to make it easier for everyone to access healthy, safe, and affordable diets by ensuring food is produced sustainably. They should regulate access to calorie-dense and nutrient-poor foods in retail outlets, closely monitor government policies that directly target improving diet quality, and increase and sustain funding on food, nutrition, health, and policy implementation.



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### Nutrition-sensitive agriculture and food systems

Approximately 670 million people are predicted to remain undernourished by 2030, making up 8% of the global population. [This percentage is equivalent to the figure in 2015](#), at the inception of the 2030 Agenda. As the UN anchor agency for [advancing equitable livelihoods and value distribution](#), the International Fund for Agricultural Development (IFAD) specializes in targeting these poor and nutritionally vulnerable households in rural areas via investments in nutrition-sensitive agriculture guided by the [Nutrition Action Plan \(2019–2025\)](#) to navigate sustainable development of agriculture and food systems centered on providing nutritionally rich foods and diversified diets.

IFAD's primary objective is to ensure that people of all ages have access to **acceptable, diverse, nutritious, and safe foods** that are adequate to meet their dietary needs. Currently, IFAD has 106 nutrition-sensitive ongoing projects, and more than two-thirds of them focus on African countries: 34 implemented in east and southern Africa, 29 in west and central Africa and 8 in north Africa.

To achieve better nutritional [outcomes](#) of these projects, it is essential to transform all stages of the food chain and food systems by taking a holistic approach, to address the root causes of malnutrition and ensure that people have access to diverse nutritious and safe foods throughout the food system. It is also crucial to address the social and cultural norms that impede the overcoming of malnutrition issues. Collaborative actions are urgently needed to promote the use of neglected and underutilized species, ancestral seeds, and Indigenous peoples' knowledge to lead the transition toward nutrition-sensitive agriculture and food systems for inclusive, sustainable, and healthy diets in rural communities.



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### Inclusively engaged with all stakeholders

Hunger, food insecurity, and malnutrition are increasing. Almost [40% of the global population](#) cannot afford a healthy diet. Reshaped food systems are required to realize sustainable, equitable access to safe and healthy diets.

Food and nutrition security policies provide a framework to guide this reshaping. However, implementation thereof is challenged by a need to be *more* inclusive, coherent, and coordinated, responsive to learnings, locally owned, better mediated, and critically reflexive about people and planet tradeoffs. On-going engagement with a diversity of stakeholders is fundamental to support such policy implementation. [Multi-stakeholder platforms \(MSPs\)](#) are a viable approach because these can enhance connections between local, city, national, and regional governments as well as between formal and informal sectors, research, and wider civil society stakeholders. Well-designed and skillfully practiced MSPs facilitate equitable, legitimate engagement, especially with vulnerable populations whose voices are often unheard, e.g., small farmers and informal food market vendors, women, Indigenous peoples, and urban residents living in poverty. [MSPs also offer a space where stakeholders can benefit from learning by doing](#). Examples include exploring ways to bridge different food systems and types of nutrition knowledge; cut across food system silos from agriculture, health, economic development, to the environmental; manage a range of well-organized stakeholders (e.g., commercial farmers) and less-organized stakeholders (e.g., women street vendors); coping with perceived risk of engaging those who are often excluded from decision-making; and to effectively and efficiently operationalize a shared agenda from convening to translating stakeholder-wide contributions into action.

### DECLARATION OF INTERESTS

A.T.-J. is an employee of the Global Alliance for Improved Nutrition (GAIN). A.T.-J. represents GAIN at the UNFSS Coalition on Sustainable and Inclusive Urban Food Systems that comprises 26 organizations including UN bodies and city networks; as well as the Food Forward Consortium comprising EAT, CARE, WWF, Club of Rome, ICCCAD, and Good Finance. A.T.-J. provides non-financial rewards re: lectures and supervision to students at Leiden University and ETH Zurich University; and is associated with the *Frontiers* journal.