POLICY BRIEF

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Game-changing actions in the food system for achieving both climate change and nutrition outcomes

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Introduction

Climate change negatively impacts nutrition in many ways, and inversely, what we eat and how it is produced drives climate change. Climate change influences diets, health, social protection, and water/sanitation systems (I-CAN, 2023). Thus, ending hunger and all forms of malnutrition depends not only on food systems but also on health, social protection, and WASH systems (I-CAN, 2023). In the food system, climate change is impacting the amount of food produced, the type of food produced and is shifting the nutritional composition of some food types.

The food on our table is also one of the biggest drivers of climate change (European Commission, 2023). Shifting diets—especially in the Global North–is regarded as one of the keys to reducing climate change (Steiner et al., 2020). How we produce, store, purchase and use food is also important, as large volumes of food are lost in post-production or early in the supply chain (especially in the Global South) or wasted later in the supply chain and in our homes (especially in the Global North). Loss and waste are impacting both greenhouse gas emissions and nutrition (GloPan, 2018), and reducing loss and waste is another key to reducing climate change.

Efforts to tackle all forms of malnutrition and climate change—both adaptation and mitigation—should be aligned and mutually reinforcing to make sure that actions address both sides of the same coin. This policy brief does not cover the many well-researched interactions of climate change and nutrition, but instead focusses on the possible game-changing actions to drive climate change adaptation and mitigation and improved nutrition synergistically, with a focus largely on the Global South.

Eight game-changing actions—prominent ways forward to improve climate and nutrition outcomes in an aligned manner—are gathered under four headlines:

- Incorporating nutrition into climate policies and vice versa
- Enhancing public-private cooperation and accountability
- Diversifying agricultural output and production and reducing food loss and waste in food systems
- Building climate and nutrition resilience for vulnerable groups.

1. Incorporating nutrition into climate policies and vice versa

Lack of coordination amongst public sectors and fragmented policies and programmes is a key barrier to joined-up actions for climate change and nutrition (FAO, 2021; I-CAN, 2023). Sixty per cent of Nationally Determined Contributions (NDCs) were found to have no intentional linkage between climate and nutrition (I-CAN, 2023).

While National Adaptation Plans (NAPs) and National Nutrition Plans (NNPs) scored higher in incorporating climate and nutrition considerations, the policies haven't led to joint action (I-CAN, 2023). This diminishes the public sector's capacity to carry out intentional and aligned activities that could mitigate and adapt to climate change, as well as address hunger and malnutrition. The more nutrition is considered in climate policies and vice versa, the more national efforts are directed into activities that work together for both climate and nutrition (European Commission, 2023; I-CAN, 2023; GloPan, 2015). Moreover, integrated climate and nutrition policies can inform the work of other related areas of government, further improving the alignment of policy outcomes (FAO, 2021).

Food security has made its way high up the climate agenda, but alone, it is not enough to tackle all forms of malnutrition; instead, we might put too much emphasis on calorie sufficiency (GIZ, 2024; I-CAN, 2023). Food system approaches have also been touted, but this is often in a very generic fashion; instead, we need concrete ways of linking climate change and nutrition policy grounded in the principles of inclusiveness in order to reach the most vulnerable.

Two recommended game-changing actions are:

1.1 Incorporate nutrition into NDCs and NAPs.

Link NDCs and NAPs to nutrition, especially under the targets of relevant sectors, and improve the level of political commitment with concrete action. Where high-level consideration of food security or food systems is included, ground this through including nutrition targets and indicators in climate action commitments.

Not all countries have submitted NAPs, and NAP implementation is slow. NDCs need to be updated by 2025, while one of the outcomes of the Global Stocktake was to urge countries to develop NAPs by the end of 2025 and to make progress in implementing them by 2030. These represent good opportunities to join up climate and nutrition actions. There are a number of tools that can be used to support NAP and NDC updates—and the tools themselves can also be updated to include more nutrition outcomes.

The lack of comprehensive and cross-linked data connecting both climate and nutrition is a barrier to speed of progress and joint action (I-CAN, 2023). Having nutrition-focussed targets and indicators (Box 2) in NAPs and NDCs will incentivise attention to the climate and nutrition linkages and help address the barrier. There are a number of initiatives in the nutrition community focussing on strengthening national nutrition information systems. Similarly, there are efforts in the climate change community to define climate-related indicators, especially concerning adaptation. Bringing these two different communities together to define indicators at the nexus of climate and nutrition will be important. In terms of concrete climate-nutrition actions that can be included in NDCs and NAPs, many of the game-changing actions proposed in this policy brief offer examples.

BOX 1: What is nutrition?

Nutrition is the process of consuming, absorbing, and using nutrients needed by the body for growth and development (Bhupathiraju & Hu, 2023). Nutrition is intricately linked to diets—the patterns of food consumption that contribute to health outcomes. To receive adequate, appropriate nutrition, people need to consume a healthy and diverse diet. A healthy diet enables people to maintain a desirable body weight and composition, to do their daily physical and mental activities, and to minimise the risk of disease and disability. The terms nutrition and diet are often used interchangeably—given the focus here is on food systems, we give more attention to the food aspect of the nutrition concept.

Some examples exist where nutrition considerations have been included in climate policies. For example, the NDC of Zambia has incorporated nutrition under the climate change adaptation section, ensuring that assessments and recommendations are provided to the sector and that progress is tracked (Republic of Zambia, 2022). It will be important to gather lessons learnt as to how some countries have been successful in incorporating nutrition into their NDCs, and to understand the barriers to do so faced by other countries.

1.2 Incorporate climate adaptation and mitigation into food-based dietary guidelines (FBDGs).

Update FBDGs to promote diets that are nutritious, aligned with planetary boundaries, and promote climate change adaptation.

FBDGs that promote diversified diets can also incentivise diversified production systems, which are important for climate change adaptation. In Malawi, the link between diversified production and better outcomes for soil health (and climate adaptation and biodiversity), as well as for nutrition, is recognised and is being considered in the reform of fertiliser input subsidy schemes (Campbell et al., 2023). In the Southeast Asia region, the Senior Officials Meeting for the ASEAN Ministers on Agriculture and Forestry (SOM-AMAF) recommended that the Member States consider the FBDGs and food consumption patterns to develop a nutrition-sensitive indicator for the national and sub-national policies on crop diversification (ASEAN, 2019).

On the mitigation side, the number of countries reportedly including environmental sustainability in their official dietary guidelines had grown from 4 countries in 2016 to 37 in 2020 (Aguirre-Sanchez, 2023). Reducing or limiting red meat consumption is now recommended in 39 countries, and 28 recommend reducing or limiting meat in general. While this is particularly relevant for the Global North, where over-consumption of animal-based products is a particular problem for health and climate change, some countries in the Global South have also designed FBDGs to ensure healthy diets while minimizing negative impacts on the environment, e.g. Ghana (Ministry of Food and Agriculture, 2023). With a rising urban middle class in the Global South, issues of over-consumption will become increasingly important. At the same time, recent reviews showed that half of the world's population is at risk of inadequate intakes of micronutrients, and animal-sourced foods are important for essential micronutrients, so a nuanced perspective on the consumption of animal-sourced foods is needed (FAO, 2023b; Passarelli et al., 2024).

There are arguments to shift from FBDGs to food systems-based dietary guidelines (FSBDGs). A recent publication on FSBDGs, a methodology developed by FAO (2024), incorporates adaptation and mitigation cosiderations.

While dietary guidelines are a starting point, these need to go hand in hand with other measures to help facilitate behavioural change. This includes improved transparency for consumers about the climate impacts of different foods (such as through food labelling), to market-based interventions such as food carbon taxes.

Vegetable seller in Central Hong Kong Market. ©2016 David Guyler / Flickr.

BOX 2: Examples of nutrition-focussed indicators*

- Stunting (children under 5)
- Wasting (children under 5)
- Anaemia levels in women
- Non-staple foods availability
- Fruits and vegetables availability
- Minimum diet diversity
- Social protection programme coverage
- Access to a basic drinking water service
- Population consumption of fortified food

* *From the Cambodian country dashboard for Scaling UP Nutrition*

Market in Nicaragua. ©2023 CIAT/Elizabeth Ramirez Perez.

2. Enhancing public-private cooperation and accountability

The public sector can have a major influence on accelerating the work on nutrition and climate. However, it cannot reform the system without working together with the private sector. Without public-private cooperation, there is a risk that commercial actors' interests do not align with those of the public sector (GloPan, 2021). Multi-stakeholder dialogues open avenues for identifying win-win situations as well as potential risks and trade-offs, support the resolution of conflicts of interest and create trust between the actors (GIZ, 2024; FAO 2021; GloPan, 2021). Furthermore, public-private collaboration can help create strategies that support consumers to make nutritious and climate-friendly dietary choices (European Commission, 2023).

In addition to influencing consumer choices, the private sector plays a key role in driving innovation and holds the potential to make healthy diets affordable and accessible (GloPan, 2021). However, the private sector also engages in aggressive marketing of ultra-processed, fast, and animal-sourced foods, which undermines efforts to promote healthy diets and protect the environment (Moodie et al., 2021; Clapp & Scrinis, 2017). The public sector can guide and support the development of the private sector by, for example, establishing partnerships, markets and incentives (e.g. food labelling requirements, taxation levels, import regulations, school feeding programs, stimulating local markets, driving food fortification).

Market disruptions and price volatility are partly caused by climate change. Increasing demand from a growing and wealthier population is also likely to drive price and market volatility (GloPan, 2021). This poses risks to the accessibility and affordability of healthy diets, especially for the most vulnerable people, lowering their resilience in the face of climate change (FAO, 2023a). Cross-sectoral measures can create a more stable supply and demand for nutritious and sustainable foods, improving the nutritional status of people and balancing the markets in the face of disruptions.

Finance is a key barrier to joined-up climate change and nutrition action. I-CAN (2023) notes that the number of nutrition-related projects receiving monetary support from global financing institutions has been much smaller than that of climate change and that sufficient financing of projects linking both climate change and nutrition is crucial. Getting private sector investment aligned with climate and nutrition goals is extremely important for increasing finance. This can be seen in Africa, where climate finance is extremely limited (less than 10 billion USD per annum), whereas the food economy is projected to grow to one trillion USD by 2030.

Two recommended game-changing actions are:

2.1 Develop a framework and mechanisms for food industry engagement to align public-private interests for climate and nutrition.

Develop a comprehensive framework to convene and engage the key food industry and public players around climate-nutrition linkages. Promote the alignment of interests between the public and commercial actors by identifying the win-wins, resolving conflicts of interest, and creating incentives and supporting mechanisms.

Denmark has a long history of interaction between the public and private sectors in food system activities. More recently, in 2020, the Danish government set out a framework for a green transition, including four missions, one of which focussed on the food system. As part of this, AgriFoodTure was established—a mission-based partnership that aims to accelerate the green transition of the Danish agri-food system and position Denmark as the leader in innovative, green solutions. This partnership brings together diverse stakeholders and includes policy-related activities as well as concrete projects with significant funding for possible breakthrough innovations. While the partnership is largely focussed on ambitious targets for greenhouse gas emission reductions, it includes reference to dietary shifts, consumer behaviour and human nutrition. In addition, two of its five tracks have significant implications for dietary shifts: (i) plant-based food production; and (ii) biotechnology-based food production and alternative protein sources.

Public-private partnerships in nutrition and agriculture are challenging because of a deep level of distrust on both ends. Organisations such as the Access to Nutrition Foundation (ATNF) and the World Benchmarking Alliance will be key partners to ensure accountability and engage in seeking out responsible food industry partners, as they rank food industry players based on product portfolios, ethical conducts, actions to promote healthy diets, gender considerations, and climate actions. Gathering lessons learned on sensitivities and pitfalls of public-private partnerships will be important.

2.2 Develop nutrition-sensitive and climate-resilient markets and products.

Support the development of markets and products that improve the affordability and availability of food for healthy diets, promote low-emissions foods and help climate adaptation efforts through, for example, joint R&D, blended financing, public procurement criteria, and marketing efforts.

Africa Improved Foods (AIF), a Rwandan social enterprise, is a prime example of improving nutritional status and the resilience of local food systems by harnessing public-private partnerships. The enterprise produces fortified foods for humanitarian relief programs (such as through the World Food Program (WFP)) and commercial sales. It sources its inputs from empowered smallholder farmers whose resilience is built in the process.

Women farmers in Western Uganda with a variety of seeds. ©2016 CIAT / Georgina Smith.

AIF's products were specifically developed for the nutritional needs of pregnant and lactating women and small children. The public-private cooperation has ensured investments and aligned interests in product development, sharing of operational expertise, as well as accessibility and availability of products through institutional distribution. The AIF partnerships include that with the Rwandan Ministry of Health on nutrition in the 'First 1000 Days". The Ministry initiative focusses on improved advice to mothers, breastfeeding, and immunization and includes attention to fortified blended foods (such as those provided by AIF).

It is not only the large enterprises that should be targeted but also the micro, small and medium enterprises which dominate the food value chains in the Global South. The success of such enterprises is hindered by several challenges, including a lack of finance and technical capacity to improve businesses. Female-led enterprises face additional challenges, as there is a large gender gap in access to finance and technical know-how. The Nutritious Foods Financing Facility (N3F) provides targeted financial support and technical assistance to small and medium enterprises, enabling investments that improve the availability of nutritious foods with decreased food losses.

3. Diversifying agricultural production and output, and reducing loss and waste in food systems

Climate change is likely to increase supply-side shocks in food systems, and market disruptions and price volatility represent a major challenge (GloPan, 2015). Relying on a narrow range of agricultural outputs makes the food system more vulnerable to threats such as droughts, floods, poor rainy seasons and crop and livestock diseases, risking both calorie and nutrient sufficiency in diets. Having a larger variety of agricultural outputs generally also improves the diversity of diets (GloPan, 2015) while also contributing to biodiversity goals. The diversification of outputs can include producing a variety of crops, livestock and fish species, as well as selecting varieties with higher resilience to local conditions and/or biofortified crops (GIZ, 2024; European Commission, 2023).

Farm transitions to increase the diversity of production could be assisted by creating a conducive policy

environment, which incentivizes farmer innovation and private investment in nutrition-sensitive farming (FAO, 2021; GloPan, 2015). While the focus here is on diversification, there are, of course, measures for sustainable food production beyond diversifying, such as those related to conservation agriculture, improved soil management and biofortification, which often have implications for plant nutrient content (Galani et ail, 2022; Mhlanga et al., 2021).

Food losses are considerable in the Global South, in the post-harvest period and during storage and transport. Nutrient-dense outputs are particularly prone to losses (fruits, vegetables, animal products). It is a systemic inefficiency where part of the emitting agricultural inputs and activities never 'bears fruit' but ends up lost—thus, reducing food loss contributes to climate change mitigation while increasing the availability of nutritious foods. While we recognize the importance of food waste, which is particularly a problem at sales outlets and in households in the Global North (Chen et al., 2020), the game-changing action 3.2 focuses on food loss for its significance to nutritional security.

Two recommended game-changing actions are:

3.1 Support efforts to diversify agricultural production and output.

Promote and invest in the diversification of agricultural production. This could include creating a conducive policy environment to drive farmer innovation and private investment in nutrition-sensitive, diversified farming.

Ducks walking on a rice field in Indonesia.

The rice-fish-duck system in China provides an example of diversified agricultural practices and outputs. Cultivating rice, farming fish, and raising ducks in the same paddies is are the products of traditional knowledge, but also include new innovations, such as specific rice varieties. This integrated production system includes crop rotations, the application of organic fertilizers, and mechanical pathogen preventive measures. It also provides rice and animal protein without the use of pesticides or herbicides and helps diversify incomes for farmers (Zhang et al., 2023; GIAHS, 2011).

Another example of such mixed rice-fish systems comes from Cambodia, where support has been gained through recognition of the important outcomes such systems bring to climate change adaptation, nutritional security, increased biodiversity and livelihood benefits. Cambodia's rice field ecosystems that maintain diverse habitats, biodiversity, and food provisioning stand in contrast to rice monocultures, where farmers may experience ecosystem service loss and financial vulnerability (Freed et al., 2020). In Cambodia, rice-fishery benefits are recognised in policies on fisheries, agriculture, and food and nutrition security but could be extended to water management and irrigation policies for further alignment. Women provide essential but often overlooked contributions to small-scale fisheries, which tend to be dominated by men. Strategies to enhance women's contributions include training women for leadership roles in management committees (Shieh et al., 2021).

Diversification should also embrace alternative sources of food. One example is microalgae, which can enhance food production while reducing the impact on climate through carbon sequestration and limited need for more land (Ahmad & Ashraf, 2023).

3.2 Support initiatives to reduce food loss.

Post-harvest storage mechanisms and food preservation measures are critical to reduce food loss and waste. Having tighter connections between producers and consumers, thus matching demand and supply better, will also help reduce food losses.

The rice value chain offers some examples of what can be promoted. Some common interventions targeting the reduction in rice harvest losses include improving infrastructure, introducing advanced machinery and equipment, timely harvesting, providing specific extension messages to farmers, and enhancing pest and disease management (Qu et al., 2021). For livestock products and fruits and vegetables, improving infrastructure such as cold-storage facilities and refrigerated transport is a key to reducing losses. There is much hope in and many pilot developments, involving solar as the source of energy for cold storage-another strong nutrition-climate connection.

4. Building climate and nutrition resilience for vulnerable groups

Climate change can decrease the supply of nutritious food through lower yields and nutrient density in produce and decrease the demand by diminishing the purchasing power of the most vulnerable when food prices are high (GloPan, 2015).

During times of price volatility and economic shocks, consumers tend to decrease their purchase and consumption of nutrient-rich foods and increase their consumption of more affordable, calorie-intensive foods (GloPan, 2015). Climate change also hits the more vulnerable small-scale food producers who operate under structural constraints such as limited access to resources, technology, and markets. They face significant challenges related to hunger and malnutrition. The Covid-19 pandemic also demonstrated that major economic shocks disproportionately affect and amplify the existing nutritional challenges of the most vulnerable—women of reproductive age, young children, adolescents and the elderly (Carducci et al., 2021).

To improve community resilience in the face of climate change, social protection schemes should be introduced and targeted to secure the nutritional intake of the most vulnerable groups (FAO, 2023a). Social protection schemes can include a variety of modalities, such as mechanisms to protect the livelihoods of formal and informal workers, accessible rural credit, conditional cash transfers, savings groups, as well as public procurement of and vouchers for nutrient-rich foods (GIZ, 2024; FAO, 2023a; Carducci et al., 2021: GloPan, 2015). Given the linkages between health and nutrition, as well as between water/sanitation and nutrition, enhanced health services and water and sanitation developments for the most vulnerable are crucial.

BOX 3: Winners and losers in reducing post-harvest losses

As with all game-changers, there can be winners and losers and unintended consequences. With respect to reducing food loss, women play a major role in post-harvest processing, so the promotion of new technologies to reduce losses may impact their livelihoods negatively (Nordhagen, 2021). For instance, the promotion of machinery may reduce the need for manual work and increase unemployment. There are many gender dimensions to post-harvest loss. Women often experience higher post-harvest losses than men due to a lack of access to information and financial/operational support and may be less able to adopt solutions. These dynamics are highly context-specific but need to be considered when promoting solutions to post-harvest losses. The reduction in farmgate prices as a result of reduced food losses and increased food supply may also harm farm livelihoods.

Farmers harvesting okra in the village of Loulouni in Mali. ©2012 CCAFS

The climate and nutrition resilience of communities can also be increased through the provision and dissemination of relevant information and services. Early warning systems should be improved to detect climate and biological hazards, with the incorporation of appropriate food safety and nutrition indicators (European Commission, 2023; FAO, 2023a). Accessible services should be offered, including timely and accurate climate and nutrition-related data, climate risk management strategies, and disaster insurance (European Commission, 2023).

Two recommended game-changing actions are:

4.1 Strengthen social protection schemes, by making them more gender-responsive.

Strengthen the design and modalities of social protection schemes by sheltering livelihoods and peoples' access to food for healthy diets, increasing access to credit, savings and insurance schemes, scaling up climate risk management strategies and by making social protection much more gender-responsive.

Public procurement for institutions can offer an impactful route to social protection. For example, the school feeding programme in Bolivia, supported by the country's Law on School Feeding, enhances the consumption of healthy diets for children and adolescents, both of which are nutritionally vulnerable groups. The public procurement of school food also creates nutritional security and enhances climate change adaptation in food production since it contributes to the stability of markets by creating a continuous demand for locally produced, pesticide-free food (FAO, 2021). It also holds the potential to promote agro-biodiversity.

There tends to be a disconnect between rhetoric and response when it comes to the gender equality of social protection strategies (Cookson et al., 2024). In the study of 52 national social protection strategies from primarily low- and middle-income countries, the majority recognise gender inequalities and acknowledge the role of social protection in achieving gender equality, but far fewer respond through the proposal of programmes, policies and actions. Less than half stated gender equality or the realisation of women's rights as a goal of social protection. Only a third of the strategies cited national, sex-disaggregated data, and usually, the data describes only one type of risk: vulnerability of inequality. Making social protection more gender-responsive is crucial.

4.2 Develop early warning systems and include nutrition-related indicators.

Develop early warning systems to provide timely and accurate data on natural hazards and include appropriate indicators for nutrition. Such systems should include advisories that focus on practical actions that vulnerable groups can implement and they need to be gender-responsive.

A good example of nutrition being integrated into early warning systems comes from Guatemala (SUN, 2020). The first systems emerged around 2010 as a result of extreme climatic events. The systems represent a partnership amongst the Ministry of Health, Ministry of Agriculture, Livestock and Food and the Department of Food Security and Nutrition, as well as with international partners. Factors that have contributed to the program's success include improved coordination among institutions, appropriate incentives for technical committees, and relevant institutions to collaborate in the process. These kinds of efforts invariably involve national information systems. Thus, they also help to address the barrier of limited cross-linked data on climate and nutrition, and the lack of evidence on best practices for policy-making decisions.

The co-operation between the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the Senegalese National Meteorological Agency (ANACIM) offers an example of how climate information services can be developed with the consideration of target group needs and key stakeholder capacity building. Women and men farmers, the main users of the services, were involved throughout the development process to ensure relevant service design and build trust. The capacity of both farmers and radio broadcasters was enhanced to understand the jargon of their information source, enhancing their ability to interpret and spread the information further. Climate information is now regarded as the primary agricultural input among Senegalese farmers, increasing the local food system resilience and, consequently, the provision of (nutritious) food (CGIAR, 2015).

Early warning systems often lack gender inclusivity, even though men and women process, interpret, and respond to signals differently (Upadhyay & Bastola, 2024). Women are poorly represented in planning processes, budget formulation and program design, leading to action plans that do not ensure inclusive outcomes.

Conclusions

The need to tackle climate change and nutrition challenges in a linked-up, mutually reinforcing manner is receiving more attention, but there is much room for stepped-up action. We have presented eight game-changing actions, under four headlines:

1. Incorporating nutrition into climate policies and vice versa

1.1. Incorporate nutrition into NDCs and NAPs.

1.2. Incorporate climate into food-based dietary guidelines (FBDGs).

2. Enhancing public-private cooperation and accountability

2.1. Develop a framework and mechanisms for food industry engagement to align public-private interests.

2.2. Develop nutrition-sensitive and climate-resilient markets and products.

3. Diversifying agricultural production and output, including reducing food loss and waste in food systems

3.1. Support efforts to diversify agricultural production and output.

3.2. Support initiatives to reduce food loss.

4. Building climate and nutrition resilience for vulnerable groups

4.1. Strengthen social protection schemes, including through making them more gender-responsive.

4.2. Develop early warning systems and include nutrition-related indicators.

A key starting point is the national nutrition and climate policies (1.1 & 1.2) which can be improved through linked climate and nutrition targets and indicators, and can bring in concrete game-changing actions. Enhancing the monitoring of nutrition and climate indicators and analysis of related targets will go a long way towards mitigating two of the key barriers to progress: the lack of linked-up policies as well as the lack of data and evidence on best practices. Considerable attention should be on actions that incentivise private sector engagement (2.1 & 2.2), partially to address the financial gaps that are unlikely to be filled by public resources. Given the climate shocks being experienced, another key focus area is related to diversified production models (3.1) and the reduction of post-harvest losses (3.2). Climate change will impact the most vulnerable to a greater extent, thus the need for stepped-up efforts on early warning systems and social protection schemes (4.1 & 4.2).

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