



## HOW TO ENSURE NUTRITION FOR EVERYONE UNDER CLIMATE CHANGE AND VARIABILITY

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The intersection of climate change, food security, and nutrition is critical given that the growing adverse impacts of climate change threaten food security and nutrition outcomes, especially for the most vulnerable in the global South. Climate is a potential driver of nutritional status, but dietary choices can affect both nutrition and climate. A better understanding of the pathways linking climate change and nutrition is key to developing effective interventions to ensure that the world's population has access to sufficient, safe and nutritious food. Undernutrition can be exacerbated by the effects of climate change at all stages of the food value chain. In addition, disease is affected by climate and can, in turn, increase the demand for nutrients, while reducing nutrient absorption.

By some projections (IFPRI 2017), medium-to-high levels of climate change are expected to result in an additional 4.8 million undernourished children by 2050, half of whom will reside in Africa south of the Sahara. The emphasis on linkages between climate change and malnutrition is supported by a plethora of evidence of the adverse effects of malnutrition on productivity and health at different scales—be they individual, household, national, or global (Victora et al. 2008).

Nutrition is determined by diet, and diets are also a driving factor of greenhouse gas emissions. In addition to its direct and indirect impacts on health, climate change influences nutritional status through the enabling food,

work, social, health, and living environments, possibly disrupting health and biological status leading to disease, diminished productivity, and mortality. In a vicious cycle, communities and countries without adequate means of mitigation and adaptation are forced to make short-term decisions on food consumption; livelihoods; land, water and energy use; and transportation that might impair effective climate mitigation and potentially worsen planetary health. This policy note summarizes research presented in an International Food Policy Research Institute discussion paper (Fanzo et al. 2017b) that utilizes a food systems approach to analyze the multifaceted interrelationships among climate change, food, and nutrition along the entire food value chain.

### A Food-Systems Approach to Analyzing Linkages Between Climate Change and Nutrition

The food system encompasses all steps, from food production to food consumption (Figure 1). Each step in the value chain has the potential to affect nutrition and can be “nutrition-sensitized” to increase people's consumption of nutritious food (Fanzo et al. 2017a). Climate change can have positive and negative impacts at each step along the value chain. Appropriate interventions are needed to ensure that nutrition is maximized at each step in the chain (Fanzo et al. 2017b).

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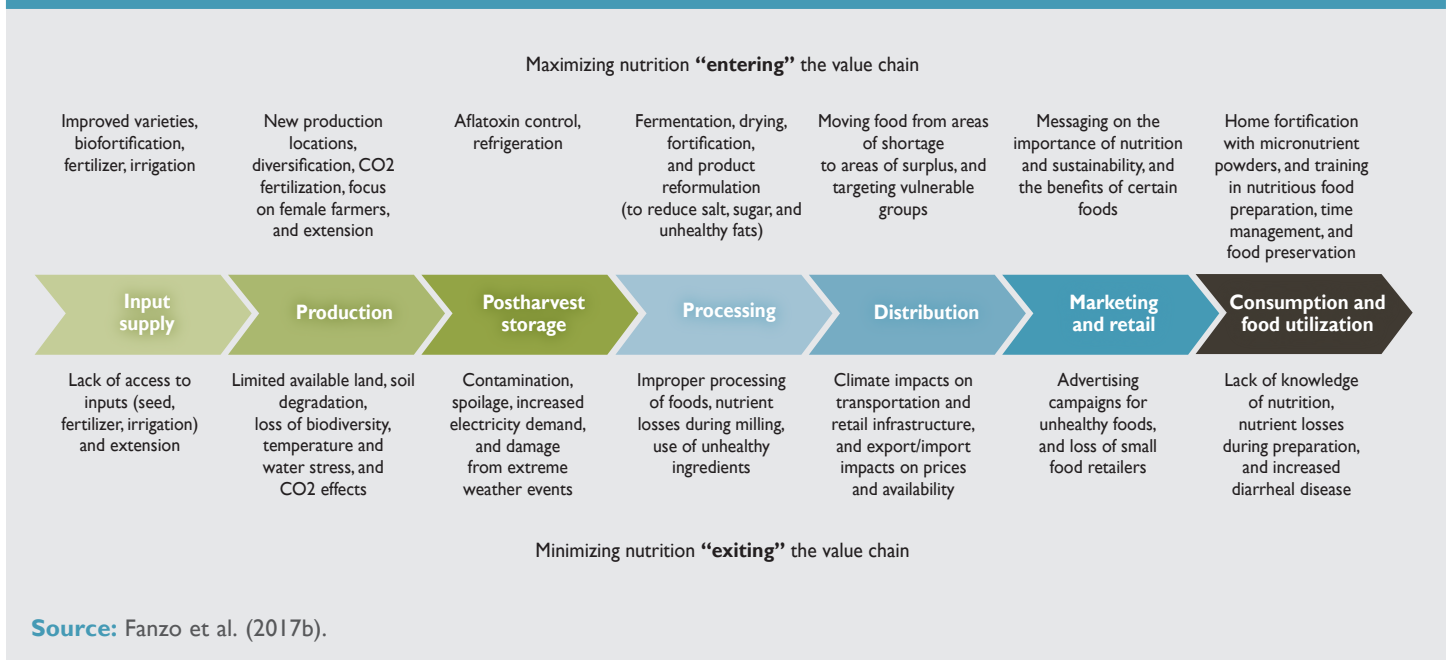
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**FIGURE I. Entry and exit points for increasing net nutrition along the food value chain under climate change**



Interventions along the food value chain to reduce nutrition risks under climate change can be categorized into seven areas of focus, as described below.

- 1. Input supply in the food value chain.** Crop and livestock diversity, soil quality, and water access increase crop production and nutrition; crop and livestock diversity also have the potential to increase dietary diversity.
- 2. Agricultural production.** Mitigation and adaptation strategies are needed to offset the adverse impacts of climate change on food production and to reduce global warming. Mixed crop and livestock systems can improve the nutritional quality of food and minimize the impacts of livestock on climate. Services and financing, such as risk-management tools, income diversification, insurance, and improved rural access to credit, can also reduce nutrition risks under climate change.
- 3. Food storage and processing.** Practices that reduce climate-related food safety concerns, such as aflatoxins, while also preserving the nutritional value of foods and minimizing, where possible, the need for fossil fuel-intensive cold storage, are crucial. These strategies can also support reducing food waste.
- 4. Distribution, marketing, and retail.** Climate change is expected to reduce market access for smallholder farmers, thus adversely affecting nutrition outcomes. Climate-proofed infrastructure and transportation can reduce these adverse impacts, protect nutritional value, and reduce food waste by improving connections between farmers and consumers and increasing retailers' access to cold storage. Public health campaigns around the world can promote an understanding of the need to incorporate sustainability into dietary guidelines.
- 5. Food consumption and utilization.** Climate-smart interventions include social protection services to protect the most vulnerable from long-term stresses and short-term shocks that threaten food security, judicious consumption of animal-source foods, and energy-efficient methods of food preparation.
- 6. Addressing the multiple dimensions of undernutrition.** Increasing the number of healthcare facilities and staff can improve access to healthcare for vulnerable populations, especially the rural poor. Access to fortified and animal-source foods can improve nutrition for vulnerable populations.

TABLE I. Recommendations for action

| Theme  | Action  |
|--|---|
| 1. Food value-chain inputs                                     | <ul style="list-style-type: none"> <li>• Increase access to seed varieties and livestock breeds that are diverse and resilient to variable weather conditions (heat and drought), pests, and diseases</li> <li>• Use agricultural extension programs to improve access to information and training about these varieties and breeds</li> <li>• Improve soil quality through the use of cover crops, crop rotation, balanced use of fertilizers, and manure</li> <li>• Increase irrigation systems to protect crops and livestock from loss due to changes in seasonal precipitation and extreme weather events</li> </ul> |
| 2. Food production   | <ul style="list-style-type: none"> <li>• Invest in and provide education on integrated land-use policies and mixed crop and livestock systems</li> <li>• Expand access to services and financing to support farmers, including farmer risk-management tools, insurance, and loans</li> </ul>  |
| 3. Postharvest storage and processing                          | <ul style="list-style-type: none"> <li>• Improve infrastructure, especially in rural areas, including roads, warehouses, and processing plants</li> <li>• Provide training on safe storage and processing techniques, such as drying</li> </ul>   |
| 4. Distribution, marketing, and retail                         | <ul style="list-style-type: none"> <li>• Improve retailer access to water, electricity, and cold storage</li> <li>• Create networks of food producers to increase market access and help limit food waste</li> <li>• Improve transportation infrastructure in areas where the effects of climate change will limit people's ability to access markets</li> </ul>  |
| 5. Food consumption and utilization                            | <ul style="list-style-type: none"> <li>• Expand access to social protection services, including unconditional cash transfers and supplementary food allowances</li> <li>• Increase consumption of animal-source foods in low- and middle-income countries, while educating the public about the health risks associated with overconsumption of these foods</li> <li>• Improve access to safe and energy-efficient cookstoves</li> </ul>  |
| 6. Undernutrition  | <ul style="list-style-type: none"> <li>• Increase access to healthcare for vulnerable populations, especially the rural poor, by increasing healthcare facilities and staff</li> <li>• Provide access to animal-source and fortified foods for nutritionally vulnerable populations</li> </ul>  |
| 7. Early warning systems                                       | <ul style="list-style-type: none"> <li>• Improve early warning systems and increase farmers' access to them</li> <li>• Provide training to producers on how to protect crops, store food, and otherwise prepare for extreme weather events</li> </ul>   |
| 8. Evidence for and inclusion of nutrition in climate research | <ul style="list-style-type: none"> <li>• Conduct research, and collect and analyze data on how climate change affects the food system and how to maximize nutrition amid these effects</li> </ul>   |

Source: Fanzo et al. 2017b.

**7. Early warning systems.** Early warning systems are needed so that farmers can produce sufficient food, and traders can adequately store food in the face of extreme weather events.

## Recommendations

The food system is highly sensitive to climate, being both a “victim” and an “instigator” of the effects of climate variability and change. Climate-smart agriculture is one approach that has shown promise in addressing these challenges, but more evidence and action are needed to link climate-smart agricultural approaches to diets and nutrition—particularly for women and children, who suffer the highest burdens from poor nutrition. Agriculture needs not only to be more climate-smart, but also to be more nutrition-smart.

To ensure that nutrition is maximized—and especially that it does not deteriorate due to climate change—19 points of action are recommended, focusing on 5 steps along the nutrition value chain and 3 additional target areas (Table 1). Actions would mainly be undertaken by governments and nongovernmental organizations, as well as the private sector, but they target the urban and rural poor in low- and middle-income countries because those groups will be the most directly affected by climate change and the least able to respond on their own. These

suggestions also take into account—and promote—the important role women play in climate change mitigation and adaptation. Finally, it is also essential to recognize the tradeoffs inherent in these strategies and to implement them in ways that first evaluate the unique needs and priorities of each situation.

## References

- IFPRI (International Food Policy Research Institute). 2017. *2017 Global Food Policy Report*. Washington, DC.
- Victora, C., L. Adair, C. Fall, P. Hallal, R. Martorell, L. Richter, and H. Sachdev. 2008. “Maternal and Child Under-nutrition: Consequences for Adult Health and Human Capital.” *Lancet* 371 (9609): 340–357.
- Fanzo, J., S. Downs, Q. Marshall, S. de Pee, and M. Bloem. 2017a. “Value Chain Focus on Food and Nutrition Security.” In *Nutrition and Health in a Developing World*, edited by S. de Pee, D. Taren, and M. Bloem. New York: Springer International Publishing.
- Fanzo, J., R. McLaren, C. Davis, and J. Choufani. 2017b. *Climate Change and Variability. What are the Risks for Nutrition, Diets, and Food Systems?* IFPRI Discussion Paper 1645. Accessed May 2017. <http://www.ifpri.org/publication/climate-change-and-variability-what-are-risks-nutrition-diets-and-food-systems>.

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