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Sustainable Healthy Diets in Cambodia: Evidence for Transforming Food Systems

Executive Summary

Background

Food systems should be at the heart of Cambodia's development, positively influencing health, economic growth, and climate resilience while creating food security. Yet current diets—dominated by large amounts of rice and excessive ultra-processed foods and sugar—are driving a triple burden of malnutrition: undernutrition, micronutrient deficiencies, and overweight and obesity. To support a shift toward healthier, more sustainable diets, a new analysis led by the World Food Programme (WFP) and the World Bank uses innovative optimization to derive diet baskets that are healthy, that is, that are nutritious and diverse.

Sustainable Healthy Diets in Cambodia: Evidence for Transforming Food Systems analyses what healthy, affordable, and low environmental impact diets could look like in Cambodia and what policy and investment changes might be needed to make such a shift possible. The findings offer timely guidance as Cambodia revises its Food Systems Roadmap, sets the new Nationally

Determined Contribution (NDC) 3.0 and develops sectoral and cross-sectoral investment strategies.

The analysis also examines how food production systems can contribute to healthier diets and climate goals. It reviews climate-smart production practices (such as improved yields, reduced post-harvest losses, laser land levelling practice, and sustainable rice platform practices) currently implemented through four projects in rice and livestock supported by the Global Agriculture Food Security Program (GAFSP),¹ showing their potential to reduce greenhouse gas (GHG) emissions while improving productivity and resilience. These practices provide practical, scalable models for transitioning away from high-emission, input-intensive farming. Fortified rice is highlighted as a particularly cost-effective solution to address micronutrient deficiencies, especially for low-income households that are unable to afford sufficiently diverse diets. **Sustainable Healthy Diets in Cambodia** explores sufficiently diverse, and hence nutritious diets, including alternative protein sources, such as legumes,

¹ [Global Agriculture and Food Security Program](#).

eggs, and insects, which offer a lower environmental impact and nutrient-rich options to reduce reliance on environmentally intensive animal source foods. Complementing these production solutions, the analysis highlights the role of social and behaviour change (SBC) strategies in shifting demand toward healthier diets. Drawing on a GAFSP-supported model, it illustrates how a targeted approach to behaviour change, coupled with community engagement, can be designed to complement nutrition behaviour change initiatives in the health sector in order to increase demand for healthier, more sustainable diets.

Main Messages

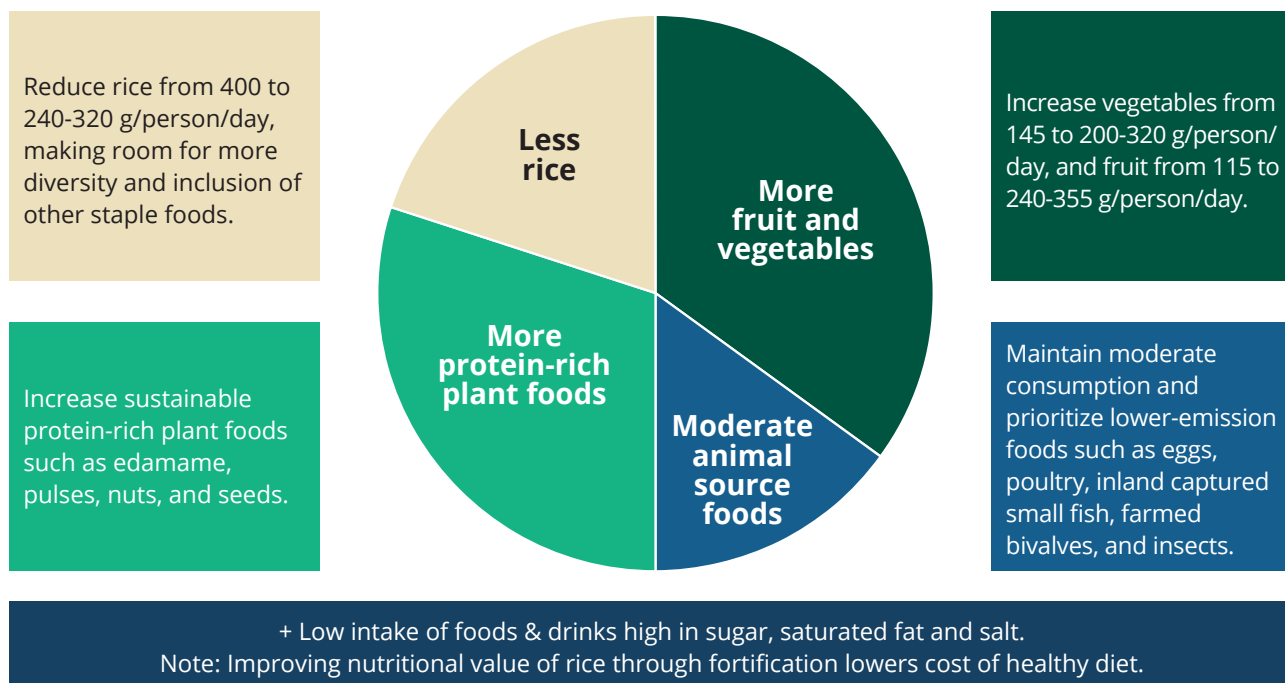
Healthy diets: human health and environmental sustainability in one solution

Promoting healthier diets is a strategic policy instrument for mitigating food system-related environmental impacts, offering mitigation potential comparable to climate-smart production practices, while also supporting public health.

Current diets are dominated by rice, ultra-processed

foods, and sugar, which provide roughly 80 percent of daily energy intake, thus limiting the space available for consumption of more nutritious, micronutrient-rich foods. A shift toward healthy diets (assessed against current average consumption) requires: a) increased consumption of plant-based foods, particularly vegetables, fruit, and legumes, while reducing consumption of rice by 20–40 percent (from 400 to 240–320g/person/day)²; b) replacing high GHG-emitting animal source foods (red meat, farmed fish, and sea-captured fish) with lower GHG-emitting animal source foods (eggs, chicken, small fish captured inland, and insects); and c) prioritizing animal source foods for groups with higher nutritional needs (young children, adolescent girls, and women during pregnancy and breastfeeding). This shift to a healthy dietary pattern can lower GHG emissions by up to 31 percent, from 4.9 kg CO₂ eq. to 3.4 kg CO₂ eq./person/day, while achieving substantial nutritional improvements. Shifts toward a healthy diet can also reduce the water footprint by up to 32 percent. GHG emissions and the water footprint can be further reduced when consumption shifts beyond bounds of current dietary patterns (that is, reduced consumption of rice to below 240g/person/day and increase in fruit, vegetable, eggs, and other foods to quantities higher than currently consumed).

Figure 1: Summary of shifts from current dietary patterns to healthy diets



The authors' analysis of the 2021 Cambodia Socioeconomic Survey revealed that fish consumption in Cambodia is about 103g/person/day. Fish is a good source of protein and other nutrients. The average retail price of fish tends to be higher per unit of protein than that of eggs and poultry, and

the environmental impact depends on production practices (marine capture, inland capture or aquaculture). More granular environmental impact data by species and practices are required to identify recommended levels of production and consumption for species preferred for healthy diets.

² The reference individual for all analyses was an adult, non-pregnant, and non-breastfeeding woman with an energy intake of 2,330 kcal/day. All results expressed as 'per person' are for this reference individual. Numbers expressed as 'per capita' are for the population average of Cambodia. The national level emission and the supply/consumption gap is scaled to the national level based on Cambodia's demographics (by gender and different age group) and their energy intake.

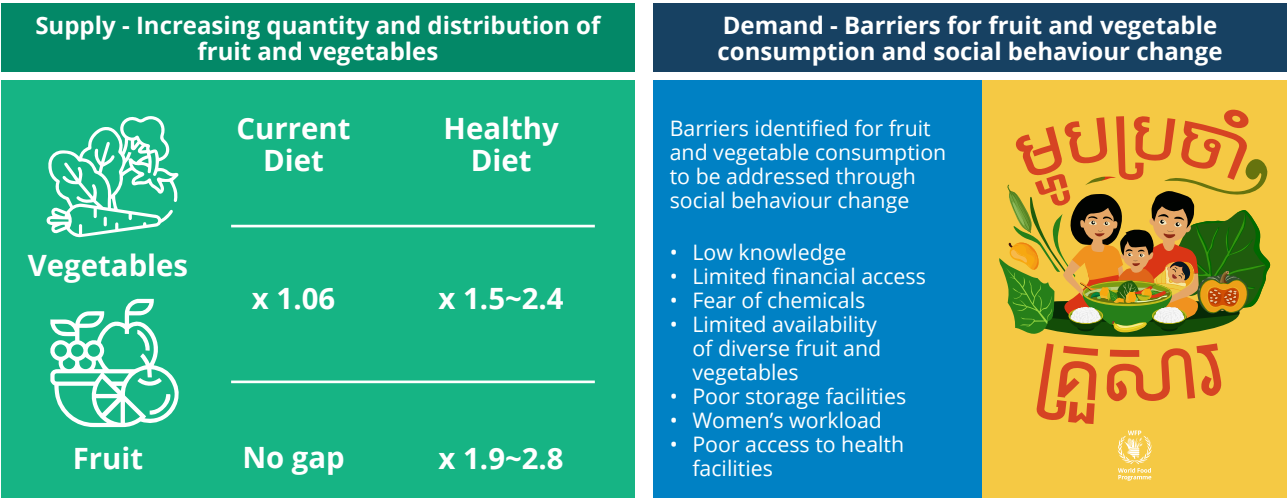
How to achieve healthy diets — focus on fruit and vegetables

The necessary increase in fruit and vegetable consumption requires targeted investment across the value chain to improve supply, as well as coordinated, large-scale behaviour change efforts to shift demand.

Current intake levels of fruit and vegetables fall far below the requirements of a healthy diet: vegetable consumption needs to rise from 145g to 200–320g/person/day and fruit from 116g to 240–355g/person/day to meet the minimum recommended by the World Health Organization of 400g/capita/day and contribute required levels of nutrients to the diet (which was one of the healthy diet requirements for this analysis - meet nutrient and diversity needs). However, supply (which includes domestic production and imports) falls significantly short

of these needs. Current fruit and vegetable production targets are set by the Ministry of Agriculture, Forestry and Fisheries at 78kg/capita/year (214g/capita/day). Meeting healthy diet needs for the population would require an increase of supply by approximately 1.5 to 2.4 times for vegetables and 1.9 to 2.8 times for fruit. This increase has to overcome supply barriers such as climate risks, post-harvest losses, and inefficiencies in food value chains specific to these perishable foods. On the demand side, consumption is held back by concerns about chemical contamination, limited knowledge, women's time and workload, and some cultural norms. Shifting consumer behaviour is critical and requires clearer communication around dietary guidelines, scaled-up and tried-and-tested SBC strategies using trusted channels, and efforts to remove structural barriers to healthy eating, such as affordability and time constraints.

Figure 2: Required increase of fruit and vegetable supply to enable consumption at population level as required for the healthy diet, and barriers to increased consumption that should be addressed by social and behaviour change strategies focused on healthy eating



Mitigating the environmental impact of diets requires better production of widely consumed foods, shifting to healthy diets and choosing lower-cost nutrient-dense options

Combining existing climate-smart production practices with dietary shifts enhances the mitigation potential. Existing climate-smart production practices in rice and livestock help to reduce Cambodia's GHG emissions relating to food consumption; these practices can reduce emissions by an even greater extent when combined with a shift toward healthy diets. Climate-smart production practices in the rice and livestock sectors, which are already being implemented in Cambodia with GAFSP support, can reduce emissions of the current diet by up to 22 percent, from 4.9kg CO₂ eq. to 3.8kg CO₂ eq. emissions/person/day. Achieving these reductions would require supporting more widespread adoption of these practices.

Lower-cost nutrient-dense foods can have additional benefits, particularly for the poorest. Fortified rice³ and lower-emission protein sources like eggs, chicken, and legumes offer promising sustainable and affordable solutions, and protect access to adequate nutrition for the poorest. The reduction in emissions associated with a shift to healthy diets could be boosted to 43 percent if people consumed fortified rice (which reduces the need for nutrient-dense but high-cost animal source foods in the diet). Staple food fortification is particularly important for the bottom quintile of households that cannot afford a healthy diet, the cost of which is, in part, driven by animal source foods.

Combining climate-smart agriculture interventions with a shift to healthy diets that include fortified rice could cut emissions by 55 percent, down to 2.2kg CO₂ eq. emissions/person/day.

³ Fortified rice is ordinary rice that has been enriched with essential vitamins and minerals—such as iron, zinc, vitamin B₁₂, and folic acid— after production to improve its nutritional value and help address micronutrient deficiencies.

Healthy dietary shifts combined with climate-smart production of food and rice fortification could deliver up to 27 percent of Cambodia's current 2030 emissions target. Cambodia's NDC 2.0 aims to reduce emissions from 155 Mt CO₂ eq. (in a business-as-usual scenario) to 90.5 Mt CO₂ eq. by 2030—a reduction of 64.5 Mt CO₂ eq.—with the agriculture sector expected to deliver 23 percent of this total reduction. Healthy diet transitions alone can reduce food consumption emissions by 31 percent,

contributing 15 percent of the total NDC reduction goal of 64.5 Mt CO₂ eq. Taken together, climate-smart production, healthy diets, and fortified rice could cut food consumption emissions by 55 percent, from 31.5 Mt CO₂ eq. to 14.1 Mt CO₂ eq., thus contributing 27 percent of the total NDC reduction goal. This highlights the need to integrate a diet-focused strategy into NDC planning, aligning nutrition with climate and food system policies through cross-sectoral strategies.

Table 1: Summary of findings on GHG emissions mitigation potential (CO₂ eq./person/day) in the food system, from climate-smart production of rice and livestock and consumption of healthy diets, including fortified rice⁴

	Scenario	GHGe (CO ₂ eq./person/day)	% reduction of GHGe compared to current production & consumption	Intervention entry point
Rice sector interventions	Current diet	4.9	-	Food production practice interventions
	Removal of crop residues	4.8	3%	
	Sustainable Rice Platform	4.4	11%	
	Alternate wet and drying	4.4	10%	
	Post-harvest loss reduction (10%)	4.6	7%	
	Biochar	4.2	15%	
	Yield improvement*	4.2	16%	
	Laser land levelling + yield improvement + post-harvest loss	3.8	22%	
Live-stock sector	Productivity improvement + High quality feed and fodder**	4.9	2%	Demand side interventions
Dietary shifts	Healthy diet (dietary shift)	3.4	31%	
	Healthy diet + fortified rice	2.8	43%	Multisectoral approach
Combined interventions	Healthy diet shift +Rice climate smart intervention (highest impact***) +Productivity improvement and, high quality feed and fodder in livestock sector +Fortified rice	2.2	55%	

* Yield improvement result from Climate Resilience Rice Commercialization Sector Development Program, supported by the Asian Development Bank

** Projected result from Cambodia Inclusive Livestock Value Chains Project, supported by the World Bank

*** Highest impact intervention is Land laser leveling + yield improvement + post-harvest loss reduction

⁴ The four GAFSP-supported projects are: the Climate Resilience Rice Commercialization Sector Development Program (CRRCDSP), supported by the Asian Development Bank; Organic Agriculture for Smallholder Farmers in Northern Cambodia (OASF), led by WFP-Producer organization; MARS-Sustainable Rice Platform: Strengthening Farmer Resilience in Cambodia's Rice Paddies (MARS-SRP), led by the International Finance Corporation; and the Cambodia Inclusive Livestock Value Chains Project (CILVCP), supported by the World Bank. All four projects include investments to improve reduction of post-harvest loss and yield. The CRRCDSP includes biochar application, laser land levelling, and alternate wet and drying. The OASF includes biochar application, removal of crop residues, and alternate wet and drying. MARS-SRP includes the removal of crop residues, alternate wet and drying, and biochar application. The CILVCP includes better quality feed and fodder and manure management.



Policy implications

For a healthy population and planet, climate and nutrition objectives and associated sectoral actions must be aligned

The findings of the **Sustainable Healthy Diets in Cambodia: Evidence for Transforming Food Systems** report underscore the need for strengthened, coordinated, multisectoral action across both demand and supply levers. Taking a diet perspective highlights the intersection of agriculture, health, and nutrition outcomes, reinforcing the need for public policies and investments in the agrifood system. These large changes are essential to ensure that the challenge of the triple burden of malnutrition and the increase in non-communicable diseases is addressed, and that foods required for better diets can be provided and dietary changes sustained by current and future generations. These elements are essential to ensure that Cambodia's economic growth can be sustained.

Relevant government stakeholders and respective roles:

- The Council for Agriculture and Rural Development and the Ministry of Health to set the vision for change.

- Ministry of Health on setting food-based dietary guidelines, promoting optimal nutrition practices, and preventing non-communicable diseases.
- Ministry of Agriculture, Forestry and Fisheries on aligning production targets, promoting diversification and supporting the adoption of climate-smart production practices in rice and livestock.
- Ministry of Environment on recognizing the magnitude of impact of dietary shifts for the environment and championing this contribution through the NDCs.
- Ministry of Industry, Science, Technology & Innovation and Ministry of Commerce on strengthening the regulatory environment and enforcing food standards.

Recommended priority actions to align agriculture, climate, and diet goals in Cambodia

To support Cambodia's Sustainable Development Goals (SDG) (particularly SDG 2), NDC targets, and Nutrition for Growth (N4G) commitments, the **Sustainable Healthy Diets in Cambodia: Evidence for Transformative Food System Investments**

recommends the following priority actions:

- **Promote healthier diets**, characterized by substantially reduced consumption of rice, sugary drinks, and ultra-processed foods rich in sugar, salt and saturated fat, and increased consumption of nutrient-dense foods with a lower environmental impact, including fruit, vegetables and eggs.

- **Develop food-based dietary guidelines for the general population** to prevent all forms of malnutrition and **scale evidence-based SBC campaigns** to help stimulate dietary changes through various channels, including through health services, agriculture services, commune platforms, and schools.

Relevant government stakeholders:

- Ministry of Health
- Ministry of Agriculture, Forestry and Fisheries
- National Committee for Sub-National Democratic Development
- Ministry of Education, Youth and Sport.

- **Invest in more diverse and lower-emission food production**, including climate-smart production of rice and livestock as demonstrated by GAFSP-supported intervention models, and also aligned with the recommendation from The World Bank supported Public Expenditure Review 2019,⁵ diversifying investments in agrifood production beyond rice to better adapt to climate change and meet shifting demand for healthy diet. In terms of fruit and vegetables, there needs to be a strong focus on increasing production and improving value chains by fostering public-private partnerships and building on existing models (such as the AIMS and ASPIRE-AT projects supervised by the International Fund for Agricultural Development) of integrated support for smallholder farmers that can enhance productivity, reduce environmental impact, and promote inclusive, climate-smart agriculture.

Relevant government stakeholders:

- Ministry of Agriculture, Forestry and Fisheries
- Ministry of Water Resources and Meteorology.

- **Reshape food environments**, including in and around schools, to nudge shifts toward healthier diets through stronger regulation, enforcement, and awareness-raising efforts to limit ultra-processed foods and promote safe, nutritious, convenient, and affordable options.

Relevant government stakeholders:

- Ministry of Commerce
- Ministry of Industry, Science, Technology & Innovation

- Ministry of Education, Youth and Sport
- Ministry of Health.

- **Integrate fortified rice into national social protection programmes**, including school feeding, to improve micronutrient intake among vulnerable populations unable to afford healthy diets that meet their nutrient needs.

Relevant government stakeholders:

- Ministry of Economy and Finance
- National Social Protection Council
- Ministry of Education, Youth and Sport.

- **Leverage shifts towards healthier diets as a climate mitigation strategy** by reducing food systems emissions and introducing a 'diet' or broader 'food systems' indicator in NDC updates (starting with NDC 3.0).

Relevant government stakeholders:

- Ministry of Environment
- Council for Agriculture and Rural Development.

- **Mainstream nutrition into agricultural and climate resilience policy** by ensuring that existing and upcoming projects focused on productivity, climate resilience, and market development effectively contribute to national nutrition goals.

Relevant government stakeholders:

- Ministry of Agriculture, Forestry and Fisheries
- Council for Agriculture and Rural Development
- Ministry of Environment.

- **Strengthen institutional capacity, public financing, and coordination in the agriculture and water sectors** to lay the foundation necessary for implementing broader food systems reforms. This includes implementing high-impact climate-resilient infrastructure reforms like modernizing irrigation systems and promoting water-efficient technologies for diversified crops and increased rice productivity, improving programme-based budgeting and performance monitoring, addressing underinvestment in core technical and regulatory functions such as plant and animal health and agricultural research, and improving interministerial coordination.

Relevant government stakeholders:

- Ministry of Water Resources and Meteorology
- Ministry of Rural Development
- Ministry of Agriculture, Forestry and Fisheries.

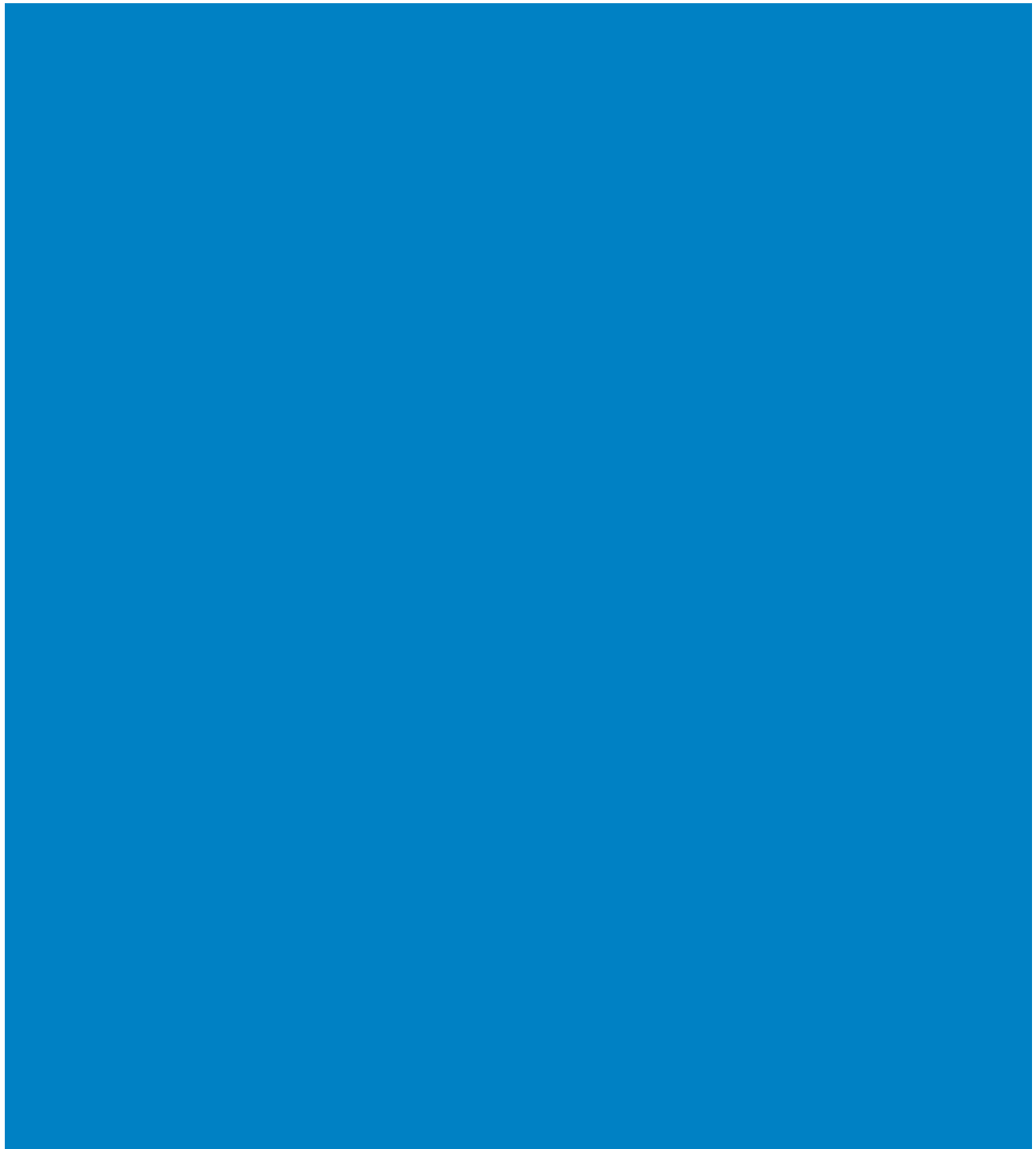
These actions directly support Cambodia's N4G commitments, particularly those focused on school meals, food fortification, climate-resilient agriculture, and implementation of the national Food Systems Roadmap.

⁵ World Bank Group. 2019. [Improving the Effectiveness of Public Finance: Cambodia Public Expenditure Review](#)

WFP Enhance platform and model

The analysis for this report was conducted using the WFP Enhance platform, which applies multi-objective linear optimization to model healthy diets that meet energy and nutrient needs and diversity recommendations, minimize costs, reduce environmental impact (GHG emissions, water withdrawals, and land use), and remain close to current consumption levels. The platform was developed by the WFP in collaboration with Capgemini Netherlands, the Zero Hunger Lab of Tilburg University, and Johns Hopkins University. The WFP Enhance platform will be made open-access at the end of 2025 ([Enhance | WFP Innovation](#)).



**Nutrition and Food Quality Service**

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