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Fill the Nutrient Gap Cambodia

Report

unicef

October 2023

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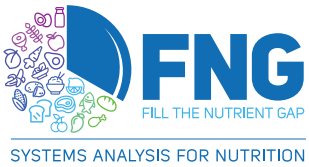

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Foreword

The Royal Government of Cambodia (RGC) has prioritized nutrition and food systems transformation as important opportunities to support continuing social and economic development for the nation and well-being of the Cambodian people, as well as to achieve the 2030 Sustainable Development Goals.

This prioritization is evidenced by the priorities outlined in the Seventh Legislature of the RGC's Pentagonal Strategy-Phase 1 for Growth, Employment, Equity, Efficiency, and Sustainability. Notably, this Strategy emphasizes human capital development as the first pentagon and includes priorities around promoting a healthy diet for all and strengthening food systems so that they are robust, smart, resilient, and inclusive.

Cambodia has further demonstrated commitment to food systems transformation through leadership in the National Food Systems Dialogues in 2021, the development of Cambodia's Roadmap for Food Systems for Sustainable Development 2030, and active participation in the UN Food Systems Summit +2 Stocktaking Moment in Rome in 2023.

Cambodia looks forward with high ambition and a solid record of achievements to progressing to upper-middle-income status by 2030 and to reaching higher income status by 2050. The transformation of our food systems to adapt to the uncertainties of climate change and deliver good nutrition outcomes, is a necessary and valuable component of the country's economic and social development and the momentum for these changes can only be sustained through strong leadership and effective partnerships.

The Fill the Nutrient Gap (FNG) analysis was conducted in Cambodia in 2022-2023 by WFP and UNICEF in collaboration with the Council for Agricultural and Rural Development (CARD) and line ministries, UN Agencies, development partners, NGOs, and private sector actors. The purpose of the analysis was to identify the cost and affordability of a nutritious diet in Cambodia, understand the main barriers to nutritious diets in Cambodia, and to model the contributions that health, food, agriculture, education, and social protection systems can make to address these constraints and fill identified nutrient gaps. Ultimately, this analysis highlighted that current diets are not delivering good nutritional outcomes, and that actions are needed across sectors to transform food systems and improve the nutrition situation in the country.

This analysis is an update of the original 2017 Fill the Nutrient Gap Analysis, the findings from which have been widely used, including as a key input to inform the design of the 2nd National Strategy for Food Security and Nutrition 2019-2023. Since the last FNG was carried out, Cambodia has been affected by a series of external shocks including the COVID-19 pandemic, increased food and fuel prices, and a series of seasonal climate shocks.

The updated analysis was undertaken to take stock of the current situation and reflect the new circumstances throughout the country; to serve as a key input in the design of the forthcoming 3rd National Strategy for Food Security and Nutrition 2024-2028; and to help operationalize Cambodia's Roadmap for Sustainable Food Systems 2030.

On behalf of the CARD, I would like to extend my sincere appreciation to relevant ministries, UN agencies, development partners, NGOs, private sector actors, and other relevant stakeholders for contributing to this exercise. I would particularly like to thank WFP for facilitating and supporting this important exercise together with UNICEF and the national Scaling Up Nutrition (SUN) movement networks.

Phnom Penh, Date 25 October 2023

Dr. Ouk Rabun
Senior Minister and Chairman of CARD

Executive Summary

Context

Nutrition is a crucial pillar for the development of a healthy, productive nation. While impressive economic gains have been made, Cambodia's vision to become an upper-middle income nation by 2030 and achieve high-income status by 2050 relies on fully developing human capital potential. Current malnutrition rates (stunting, wasting, overweight and obesity) undermine productivity and strain health systems. Poor nutrition impairs people's ability to engage actively as productive members of the workforce and results in significant healthcare costs. Ending all forms of malnutrition is critical for Cambodia to harness this development potential. Coordinated action, leadership and strengthened partnerships can change trajectories for good.

New evidence from the Fill the Nutrient Gap analysis offers timely guidance and a narrative for change. The Fill the Nutrient Gap (FNG) analysis was conducted in Cambodia in 2022-2023 by WFP and UNICEF in collaboration with the Council for Agricultural and Rural Development (CARD), and line ministries, UN agencies, development partners, NGOs, and private sector actors. Insights showcase persisting gaps and identify barriers from economic vulnerabilities to food systems challenges including supply-side issues, poor food environments, and inadequate consumption and suboptimal infant feeding practices. Climate change risks placing healthy diets out of reach of the most vulnerable and heightens stresses on supply and access to healthy diets.

This new analysis equips decision-makers with integrated solutions across food, health, and social protection systems attuned to realities of Cambodia's rapid development transition. The analysis serves as a key input in the design of forthcoming Third National Strategy for Food Security and Nutrition, 2024-2028 and other national strategies and to operationalize Cambodia's Roadmap for Food Systems for Sustainable Development 2030 with the aim to nourish Cambodia's shared potential, as per the new Pentagonal Strategy.

Methodology

FNG is a multisectoral stakeholder engagement and analytical process which seeks to identify the obstacles that households face in accessing and consuming a nutritious diet, and prioritize actions to overcome them. It consists of two main components: a country-specific review of secondary literature to characterize the food system and nutrition situation, and linear programming using the ENHANCE platform to estimate the cost of meeting nutrient needs across the life cycle as well as the environmental impact of diets.

Based on these cost results and household expenditure data from the Cambodia Socio-Economic Survey (CSES), the portion of the population that cannot afford to meet nutrient needs was estimated. This was followed by the modelling of stakeholder identified interventions across multiple sectors to assess their contribution to reducing non-affordability. The implications of the findings were discussed with stakeholders working across multiple systems including food, health, social protection and environment, to reach a shared understanding of the main barriers. Using this information, stakeholders prioritized interventions for improving access to nutritious foods.

Main findings

1. **Progress has been made, but current diets are still inadequate and contribute to all forms of malnutrition and increase the risk of non-communicable diseases.**
   - 1.1 The nature of malnutrition and quality of diets is changing.
   - 1.2 Diets need to improve to build human capital and achieve economic growth.
   - 1.3 All sectors have a critical role to play.

2. **Although many could afford nutritious diets, some households are still being left behind or are at risk of falling behind.**
   - 2.1 On average, 16 percent of households cannot afford a nutritious diet without loans.
   - 2.2 Social assistance is critical for vulnerable households to afford a nutritious diet.
   - 2.3 Shock responsive social protection could prevent more households from falling behind.

3. **The supply of nutritious foods is inadequate to meet all nutrient needs.**
   - 3.1 The supply of food is sufficient to cover dietary energy and protein needs, but many micronutrient needs are not being met.
   - 3.2 Nutrient-adequate diets will result in higher greenhouse gas emissions and water use.
   - 3.3 Mitigation measures could deliver win-wins for climate and nutrition.

4. **The current food environment is not nurturing healthy diets.**
   - 4.1 Ultra-processed foods and snacks high in salt, fat and sugar are available, affordable and consumed.
   - 4.2 Regulation and compliance gaps support the unhealthy food environment.
   - 4.3 The school food environment could provide an opportunity to build lifelong healthier food habits.

5. **Consumer preferences and behaviour do not result in consumption of healthy diets.**
   - 5.1 Consumer preferences and habits are barriers to ensuring healthy nutritious diets.
   - 5.2 Nutrition knowledge is not the main driver of dietary behaviours, but some knowledge gaps remain.

6. **Climate change is putting healthy diets at risk.**
   - 6.1 Changes in climate will lead to reduced nutrient content, diversity and availability of foods.
   - 6.2 Climate change will increase food prices, reduce incomes and further compromise access to healthy diets.
   - 6.3 Preparedness for climate shocks needs to be strengthened to build resilience.

Stakeholder recommendations

Food, health and social protection systems must work together to secure positive nutrition outcomes in Cambodia and achieve Cambodia's economic, human capital development, and climate ambitions. In the context of climate change, particular attention will be required to ensure these ambitions do not slip. The following recommendations are divided into five sections: food system, social protection system, health system, climate change and governance.

1. Food systems

Agricultural and food production

- Diversify domestic food production to increase availability and local consumption of fruit, vegetables, pulses, eggs, and other nutrient-dense foods while ensuring sustainable and environmentally friendly practices.
- Scale up climate-smart production practices, and promote the use of solutions such as net houses, greenhouses, cover crops, water management practices and technologies, use of compost as fertilizer, short crop cycle varieties, and other good agricultural practices and technologies to adapt to climate change and prevent environmental degradation.

Post-harvest handling and processing

- Invest in infrastructure to reduce post-harvest losses of perishable nutritious foods, including cold storage and warehouses.
- Strengthen the capacities of millers to locally blend rice with fortified rice kernels.
- De-risk private sector investments to improve safety, handling, and value addition of domestic agricultural products.
- Strengthen public-private producer partnerships to respond to demand for healthy nutritious foods and improve supply chains for these.
- Improve food handling practices across the food chain including at market and vendor level to reduce risk of biological contamination and food-borne illnesses, preventing uptake of nutrients.

Regulatory system and consumer protection

- Develop standards and regulate the marketing and sale of unhealthy and ultra-processed foods and beverages (e.g. tax on sugar-sweetened beverages and ultra-processed foods, front of pack labelling, advertisement restrictions, etc.).
- Strengthen enforcement of legislation related to the marketing and sale of breast-milk substitutes (i.e. SD 133) and develop and enforce standards for commercially produced complementary foods.
- Strengthen enforcement of regulations (Directive 18) around school food environments, particularly of food stalls, to reduce the sale of unhealthy and unsafe foods.
- Strengthen control mechanism to enhance compliance with food fortification standards.
- Explore mechanisms such as results-based financing to strengthen enforcement of regulations and increase necessary budget allocations accordingly.

Demand generation

- Use social behaviour change (SBC) approaches to stimulate demand for vegetables, fruits, pulses, eggs and calcium-rich foods as well as fortified foods, and reduce demand for unhealthy foods, to encourage supply-side changes.
- Strengthen coordination and dialogue platforms between government, civil society and consumer organizations to uphold safeguards.

2. Social protection system

Cash-based social assistance

- Incorporate explicit nutrition objectives, metrics and indicators on diets into existing and any new social assistance schemes to monitor the impact on dietary outcomes and health seeking behaviour.
- Tailor transfer values to close the affordability gap based on emerging evidence including the Minimum Expenditure Basket (MEB) and FNG analysis.
- Expand social assistance schemes to cover the 'near poor'.
- Implement SBC strategy to complement cash transfers encouraging optimal use of the cash for nutrition benefits for women and children.

Shock responsive social protection

- Make social assistance shock responsive and anticipatory to disburse cash to households to protect livelihoods and assets and access to healthy nutritious diets before, during and after a disaster.
- Strengthen data systems and vulnerability analysis to inform targeting of interventions to the most at risk.

- Develop nutrition guidelines and standards for food assistance during emergencies, including modalities to secure access to fresh nutrient-dense produce.

Home-grown school feeding

- Revise nutrition standards for school meals to increase the nutrient content of rations and enhance ability to meet children's nutrient needs. Consider the integration of fortified rice into the ration as a cost-efficient solution to provide essential micronutrients.
- Adjust the allowance per meal for home-grown school feeding to enhance the ability to prepare meals that meet nutrition and food safety standards.
- Explore geographical and beneficiary target group expansion of the National Home-Grown School Feeding Programme to groups most at risk of not affording a nutritious diet, in addition to expansion to secondary facilities.

3. Health system

- Develop sustainable food-based dietary guidelines (FBDGs) for the general population, followed by FBDGs for specific population groups.
- Update national food fortification strategy and guidelines.
- Develop cohesive SBC package (following FBDGs, MIYCN SBCC Strategy and national nurturing care parenting package) to stimulate demand for more healthy foods, reduce consumption of ultra-processed unhealthy foods, and encourage improved hygiene and sanitation practices across all population groups.
- Tailor SBC package, including content and approaches, for specific population groups and integrate into interventions led by other sectors including cash transfers, education, WASH, extension services, media channels and more.
- Improve SBC approaches to address evidence-informed barriers to sustained behaviour change going beyond communication and awareness raising only.
- Update national guidelines to accommodate transition from iron folic acid supplementation to multiple micronutrient supplementation and expand the target to include all adolescent girls.
- Ensure quality, equitable access of services that prevent and treat child wasting, growth monitoring promotion, infant and young child feeding and micronutrient deficiencies as part of primary health care.
- Remove barriers to optimal breastfeeding practice by increasing maternity leave provisions, increasing skilled breastfeeding support at the community and health centre level, improving the quality of newborn care, and promoting workplace breastfeeding facilities.

4. Climate change

Agriculture, rural development, environment

- Reforest and reduce deforestation for agriculture land use.
- Improve efficiency of existing agricultural land use to improve productivity, reduce water footprint, and reduce deforestation.
- Invest in climate-proofed infrastructure including irrigation, roads, electricity system, storage facilities and markets.
- Invest in climate-smart agricultural technologies and practices, including use of raised beds, greenhouses, net houses.
- Diversify agriculture production to nutrient rich and low environmental impact foods.
- Invest in food fortification as a mechanism to reduce emissions/footprint and simultaneously meet nutrient needs.
- Integrate early warning system and market/price information into application that farmers and extension workers currently use.
- Address increasing food safety risks emerging from rising temperatures and cold chain disruptions in food storage, handling and preparation.

Disaster risk management

- Improve early warning systems to reach the last mile.
- Expand the food reserve system and make it more nutrition-sensitive by fortifying grain reserves.
- Promote access to finance and weather-based insurance for farmers to protect livelihoods and access to healthy diets before, during and after a disaster.
- Support studies, data systems, surveillance mechanisms to better analyse vulnerability and risk, such as the Children's Climate Risk Index for Cambodia

Health

- Develop FBDGs that incorporate environmental and sustainability considerations.
- Integrate promotion of less environmentally impactful foods in SBC for healthy diets.
- Support climate-resilient WASH services and waste management in facilities and communities to prevent contamination and enable optimal hygiene and sanitation conditions that impact nutrition.

Research on the nexus of climate change, nutrition and food systems

- Model impacts of climate change on diets and nutrition using a range of climate change scenarios.
- Build business cases to invest in food systems to deliver co-benefits for climate and nutrition.
- Identify vulnerabilities to climate change in Cambodia's food systems and understand potential role of domestic, regional and international trade to increase resilience.
- Invest in research related to alternative environmentally sustainable protein sources, including aquaculture.
- Support research to better understand water, soil and food pollution and ways to mitigate and prevent risk.

5. Governance

In order to reach Cambodia's ambitions to achieve upper-middle income country status by 2030 and upper income status by 2050, the Royal Government of Cambodia has committed to strengthening human capital development, food systems and resilience to climate change as outlined in the new Pentagonal Strategy. As the Royal Government of Cambodia develops its Third National Strategy for Food Security and Nutrition, under the leadership of the Council for Agricultural and Rural Development, the FNG analysis offers findings to prioritize actions. Furthermore, the Ministry of Planning plays a critical role in coordinating actors and setting standards for food fortification.

- Continue to coordinate and develop a common narrative around barriers to access healthy nutritious diets in Cambodia and identify roles and responsibilities for each sector to address these barriers.
- Use the FNG recommendations to inform the Third NSFSN and ensure that it is backed by financing, adequate budget allocations with a robust monitoring and evaluation framework to measure impact and results on nutrition across key sectors and systems.
- Coordinate fortification efforts including setting standards, strengthening capacities of private sector, and stimulating demand.
- Facilitate capacity strengthening on nutrition, food systems, and climate change across sectors and at subnational level.
- Promote and facilitate public-private partnerships and strengthen the SUN Business Network.
- Use SBC approaches to transform food systems from farm to fork, encouraging behaviour change of producers, value chain actors and consumers.
- Invest in data collection, monitoring and evaluation around nutrition, including consumption data, to track progress for evidence-based decision making.
- Improve disaggregated data, evidence generation to identify, target and reach most vulnerable to malnutrition with multisector interventions.
- Address evidence gaps on climate-nutrition impact pathways and biological and chemical food safety risks across the value chain.

Introduction to Fill the Nutrient Gap (FNG)

Building consensus for improved nutrition

Nutrition is a crucial pillar in the development of a healthy, productive nation. While Cambodia has achieved impressive economic growth and poverty reduction in recent decades, human capital development, access to healthy diets and ending malnutrition are unfinished national agendas. Notably, current levels of malnutrition have a significant cost to the economy and society as poor nutrition impairs people's ability to engage actively as productive members of the workforce and results in significant healthcare costs. Improving diets, especially for women and children, has the potential to bring about immediate and long-term health, education, and economic benefits.

Nutrition must be a priority for Cambodia to achieve its ambitious goal of reaching upper-middle income status by 2030 and high income status by 2050. Transforming food systems to adapt to the uncertainties of climate change and deliver good nutrition outcomes is a necessary and valuable component of the country's economic and social development, and the momentum for these changes can only be sustained through strong leadership and effective partnerships.

The Fill the Nutrient Gap (FNG) analysis was conducted in Cambodia in 2022-2023 by WFP and UNICEF in collaboration with the Council for Agricultural and Rural Development (CARD) and line ministries, UN agencies, development partners, NGOs, and private sector actors. The analysis aims to build a deeper understanding of the barriers that households face in accessing nutrient-adequate diets and to generate evidence on the contributions that health, food, and social protection systems can make to address barriers and fill identified nutrient gaps in the context of climate change.

This analysis is an update of the original 2017 Fill the Nutrient Gap Analysis, the findings from which have been widely used to inform programmes and policies in Cambodia. However, since the last FNG was carried out, Cambodia has been affected by a series of external shocks including the COVID-19 pandemic, increased food and fuel prices, and a series of seasonal climate shocks. The updated analysis was undertaken to take stock of the current situation and reflect the new circumstances across the country; serve as a key input in the design of forthcoming national strategies; and help operationalize Cambodia's Roadmap for Food Systems for Sustainable Development 2030.

FILL THE NUTRIENT GAP: SITUATION ASSESSMENT FOR MULTISECTORAL DECISION MAKING ON THE PREVENTION OF MALNUTRITION

Malnutrition has two direct causes: inadequate dietary intake and disease. The FNG assessment focuses on gaps in dietary intake to inform national policies and actions that can be taken across food, social protection, and health systems to improve nutrition, with a focus on the most vulnerable populations. The FNG considers whether nutritious foods are available, accessible, and affordable in a specific context, and identifies the barriers that lead to gaps in nutrient intake. The analysis focuses on the extent to which vulnerable people have choices in the foods they consume and how those choices are made. The FNG process identifies and models the impacts of context-appropriate interventions to improve diets and nutrient intake across food, health, and social protection systems. The results are used to identify entry points across systems, to refine programmes, and to make recommendations to policymakers.

The assessment comprises two components:

1. A country-specific review of secondary data and information on factors that reflect or affect dietary intake. This includes malnutrition trends over time, characteristics of the food system and food environment, and how these are affected by climate change, and population behaviour related to food and feeding.
2. An assessment of the extent to which economic barriers prevent adequate nutrient intake. This uses the ENHANCE linear programming platform developed by the World Food Programme with support from Capgemini Netherlands, Johns Hopkins University, and the Zero Hunger Lab at Tilburg University. The assessment includes modelling of the economic impact of possible interventions to increase nutrient intake and fill nutrient gaps. The environmental impact (greenhouse gas emissions and water footprint) of the food baskets is estimated to generate the evidence necessary to inform decisions related to sustainable and equitable food systems transformation.

Preventing malnutrition, including through improved access to nutritious foods, cannot be achieved by one sector alone. The FNG is designed to inform multisectoral decision making and therefore engages stakeholders from all sectors including food, health, agriculture, and social protection.

It is the stakeholders who define the scope and focus of the assessment. They contribute data and sources of information for identification of context-specific barriers and entry points and together with the analytical team develop a shared understanding of the issues and possible solutions. They then identify appropriate nutrition-specific and nutrition-sensitive interventions that can be implemented by different sectors using their existing delivery platforms. These could be social safety nets, food processing and markets, antenatal care, school feeding programmes, etc.

Between 2016 and early 2023, FNG analyses were completed in 40 countries and, at the time of writing in September 2023, were ongoing in 8 countries with more in the pipeline.

The FNG methodology has been developed by WFP with technical support from partners including the University of California Davis, the International Food Policy Research Institute (IFPRI, Washington DC), Epicentre (Paris), Harvard University (Boston), Mahidol University (Bangkok), Save the Children (UK), and UNICEF.

For more information on the concept and the method of the analysis, see Bose I, Baldi G, Kiess L, de Pee S, The 'Fill the Nutrient Gap' Analysis: An approach to strengthen nutrition situation analysis and decision-making toward multisectoral policies and systems change. Maternal and Child Nutrition 2019: DOI: 10.1111/mcn.12793

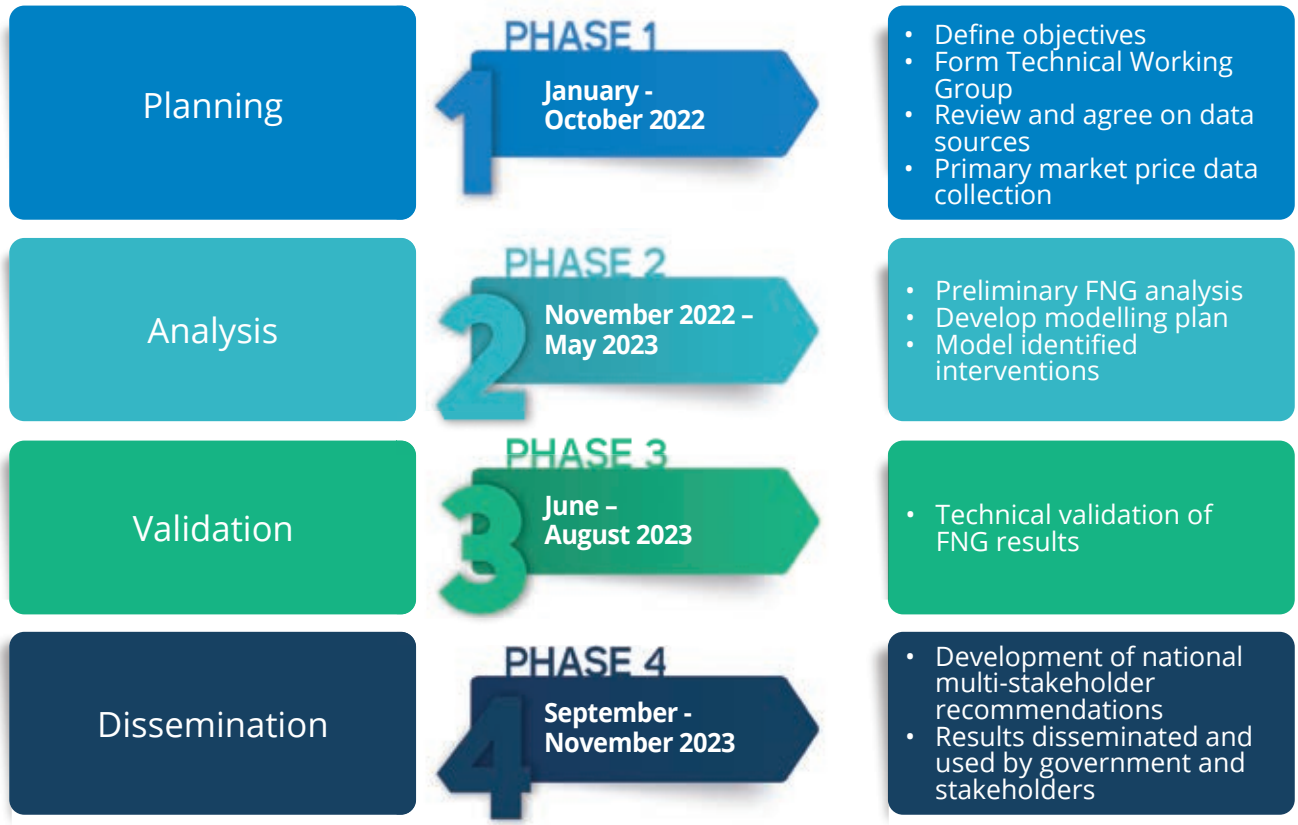
Process and Scope of the Analysis

Process of the FNG Analysis in Cambodia

The FNG analysis was conducted in Cambodia between January 2022 and September 2023.

Under the coordination and collaboration of CARD, the Agricultural Marketing Office of the Department of Planning and Statistics (AMO-DPS) of the Ministry of Agriculture Forestry and Fisheries and WFP Cambodia Country Office collected primary market price data in 2022.

Figure 1 : The Fill the Nutrient Gap (FNG) process followed in Cambodia

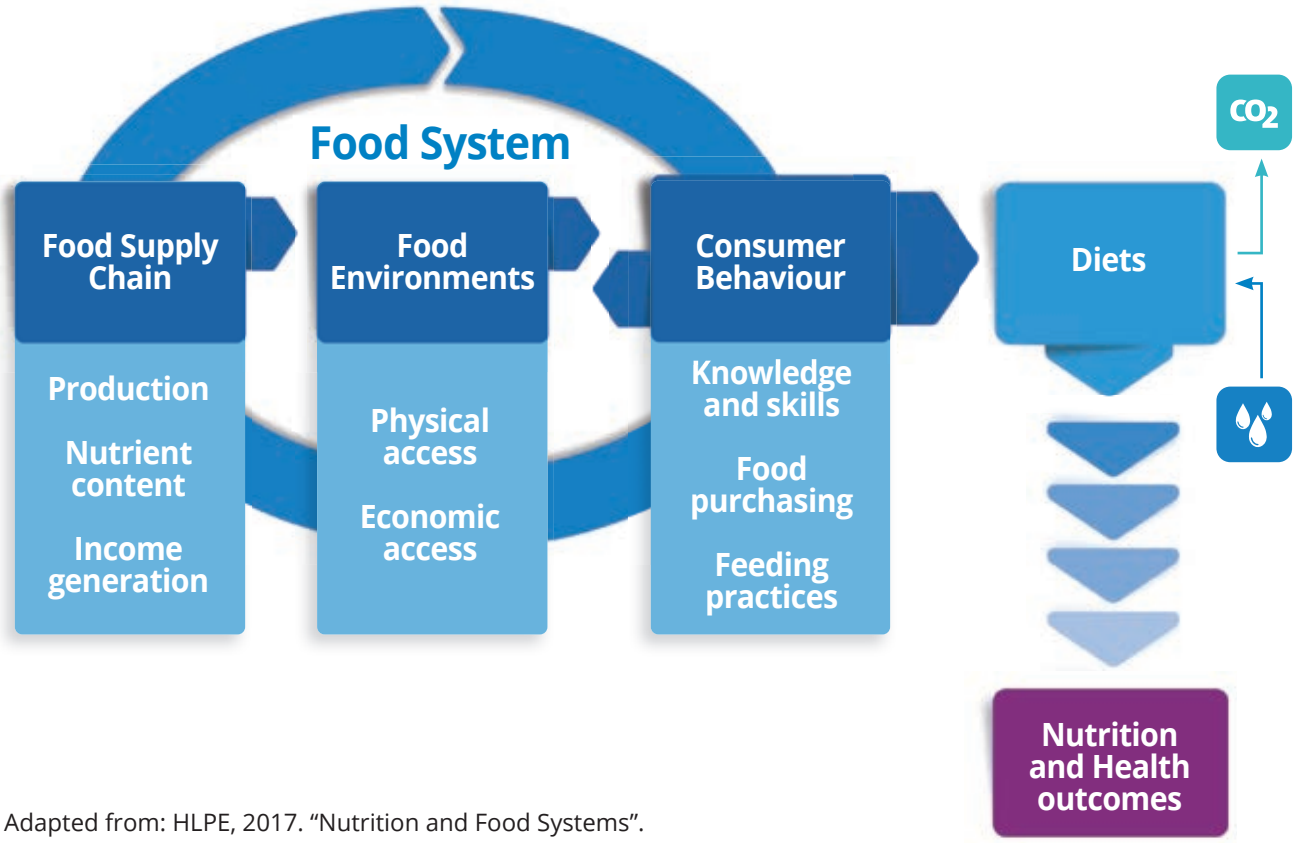


Scope and focus of the FNG Analysis

Long-term solutions to malnutrition require transformation of the food system along food supply chains, food environments and consumer behaviour (Figure 2). The FNG analysis provides a framework for strengthened situation analysis and multisectoral decision making that identifies context specific barriers to adequate nutrient intake among specific target groups. The analysis identifies nutrient gaps and barriers to adequate nutrient intake for different target groups across the life cycle.

The overall objectives of the FNG are to contribute to the implementation of the Royal Government of Cambodia's new Pentagonal Strategy Phase 1, informing the design of the hird National Strategy for Food Security and Nutrition (NSFSN, 2024-2028), implementing the National Roadmap for Food Systems for Sustainable Development 2030, and informing cross-sectoral initiatives to accelerate progress toward enhancing human capital development and transition to a middle income economy by 2030.

Figure 2 : Food systems for diets and nutrition and health outcomes framework.

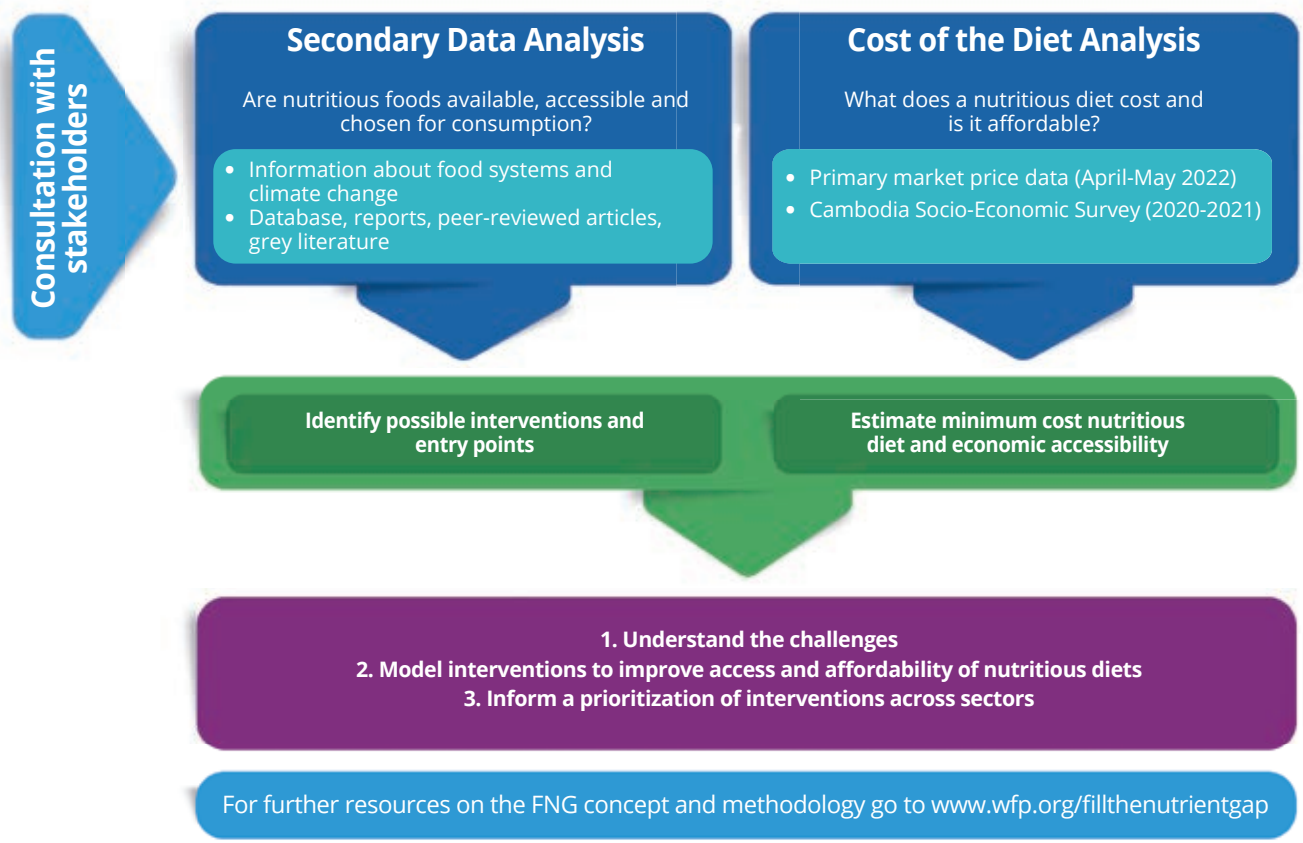


Adapted from: HLPE, 2017. "Nutrition and Food Systems".

Methodology

The FNG analysis is composed of a secondary literature analysis and a quantitative cost of the diet and affordability assessment (Figure 3). The secondary analysis identifies barriers to accessing nutrient-adequate and healthy diets, platforms for reaching nutritionally vulnerable groups in the population, and opportunities for policy and programme interventions to improve access to nutritious foods through multiple sectors, including agriculture, social protection and health. The secondary literature review also identifies evidence on the impact of climate change on access to adequate diets, attempting to characterise the pathways of the impact of climate change on Cambodia's food systems. Linear programming embedded in the ENHANCE tool is used to provide a detailed look at availability, cost and affordability of nutritious diets (Figure 3).

Figure 3 : FNG analytical framework



COST AND AFFORDABILITY OF DIETS ANALYSIS

ENHANCE, an open-access online analytical platform that uses multi-objective programming to identify combinations of foods that optimise meeting nutrition, cost and environmental objectives. It allows for analysis of the interplay of cost, affordability, nutritional value, diversity and environmental impact of dietary scenarios. This supports analysis of the impact of shocks and climate change and how interventions across multiple sectors, including social protection and food value chains, can help mitigate their impact.

ENHANCE enables the understanding of the extent to which poverty, food availability and food prices may affect the ability of people to meet their nutrient needs. Using price data collected from markets or from secondary sources, the platform calculates the amount, combination, and lowest possible cost of local foods that are required to provide individuals or households with their average needs for energy, and their recommended intake of protein, fat and micronutrients[1]. These diets are calculated within defined constraints to prevent the inclusion of unrealistic types or amounts of food and the provision of excessive amounts of nutrients.

The FNG approach used national consumption data based on the Cambodia Socio-Economic Survey 2020-2021 to derive average dietary patterns. These were used to apply grams-based minimum bounds at food group level to calculate the lowest cost nutritious diet that reflects average dietary preferences, including staple consumption[2]. This diet is referred to as the nutrient-adequate basket or 'nutritious diet' throughout this summary. It meets requirements for nutrients, including protein, nine vitamins and four minerals, and does not exceed the energy average requirement (EAR) (+/- 2.5 percent) and fat recommended intake.

Population expenditure data is compared to the cost of the nutritious diet and is used to estimate the proportion of the population that would not be able to afford it. This non-affordability can be estimated and compared across different regions, seasons or countries. The estimate of non-affordability is a conservative estimate of the share of households unable to afford the lowest cost nutritious diet, assuming optimized selection of nutritious foods. The real cost and non-affordability of a nutritious diet is likely to be higher, as reflected by a healthy diet, which includes foods from several food groups and has greater diversity within food groups.

1 As defined by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO).

2 This diet is not intended to reflect what individuals or households are currently eating nor should it be used to develop food-based recommendations or dietary guidelines. Foods that are prohibited could be for customary or public health reasons, e.g., raw meat during pregnancy in some parts of the world.

Data sources for the cost and non-affordability analysis

Data on food prices were collected from 22 April to 5 May 2022 across 64 (36 rural and 28 urban) markets in 23 provinces. The list of 89 commodities included 3 grains and grain-based products, 5 roots and tubers, 6 legumes and nuts, 12 meat and offal, 13 fish, seafood and amphibians, 2 eggs, 27 vegetables and leafy green vegetables, 11 fruits, three dairy products, 3 condiments and 3 sugars.

The Cambodia Socio-Economic Survey (CSES) of 2020-2021 was used to inform the non-affordability analysis by deriving information on total food expenditure for all regions. The CSES data were also used to derive insights on current consumption practices.

Modelled household & main target groups for the analysis

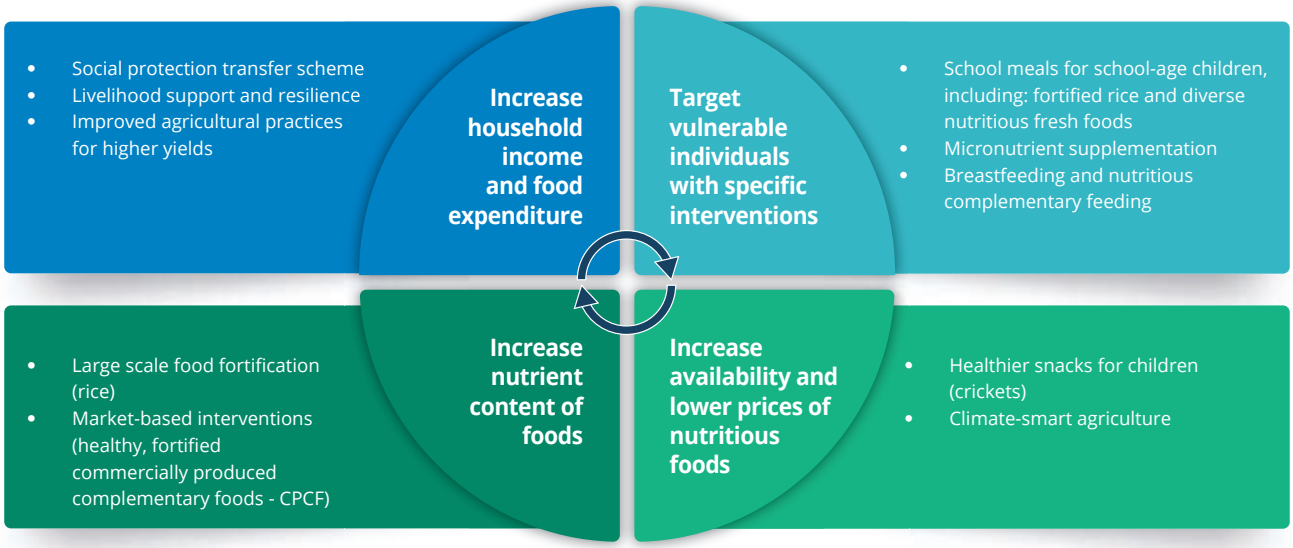
The FNG estimated a nutritious diet for a model household of five members, including:

- a breastfed child (12–23 months);
- a school-age child (6–7 years);
- an adolescent girl (14–15 years);
- a breastfeeding woman; and
- an adult man.

Intervention modelling

The selection of potential interventions for modelling was informed by secondary data review and stakeholder consultations. At the stakeholder workshop held in March 2023, attendees participated in an exercise to identify and rank interventions to be modelled, which are shown in Figure 4.

Figure 4 : Entry points and interventions modelled to estimate reduction in cost of a nutritious diet



Considerations for interpretation and data gaps

The FNG estimates the cost and affordability of a diet that meets energy and nutrient needs across the life cycle. These estimates are economic indicators and they should not be interpreted as reflecting a recommended diet, nor do they fully reflect actual consumption patterns.

There are also limitations in the data that may influence the estimates. As described, the food price data was collected at one point in time, and the food list does not include all foods available at local markets or consumed by households (e.g., wild and gathered foods are not included). Price data were collected in several main markets at the regional level, therefore the food list may not reflect food availability in remote areas and results cannot be disaggregated by urban or rural context. As the food list used for the ENHANCE cost of the diet analysis is aggregated at the regional level, it does not reflect potential variations in availability and price. Importantly, the household expenditure data used for the affordability estimates are from the CSES 2020-2021 and were updated with inflation to correspond to the food price data collected in March 2022. Finally, while the models consider the market cost of a nutritious diet for households, the FNG does not calculate programme implementation costs or cost benefit ratios.

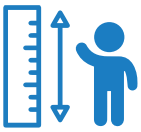
The environmental impact (greenhouse gas emissions and water footprint) was estimated on the basis of environmental factors compiled by researchers at Johns Hopkins University (Kim et al. 2020). These factors are reflective of environmental impacts at either country level, regional level, or global level, depending on the data available. Due to the limited availability of country specific data (derived from life cycle assessments or similar), estimated environmental impacts may not be reflective of current production practices. Trade patterns are considered in the estimated environmental impact and were last updated in 2022.

Findings

Cambodia in the midst of a nutrition, food systems & climate transition

Cambodia's impressive economic growth between 2009 and 2019 led to reductions in poverty, food insecurity and hunger (1,2). This growth has been accompanied by rapid urbanization, lifestyle changes, modernizing of food systems and dramatic shifts in the country's nutrition profile. Socioeconomic development and increasing household wealth have contributed to an impressive reduction in stunting among children under 5 – from 50 percent in 2000 to 22 percent in 2021 (3,4), though continued efforts will be required to ensure Cambodia remains on track to reach its SDG target of 15 percent stunting prevalence by 2030 (5). However, economic growth has not had the same impact on child wasting, which has been stagnant at around 10 percent for over a decade, with limited difference in prevalence by household wealth quintile (12 percent among the poorest compared to 8 percent for the most wealthy (4). It is estimated that more than 80 percent of adult women and children under 5 are deficient in at least one critical micronutrient (iron, vitamin A, zinc, folate, vitamin B_{12}, vitamin D, and iodine) (6).

Figure 5 : Summary of national statistics on nutrition indicators (Cambodia Demographic Health Survey 2021-22)



22% of children under five are stunted

10% of children under five are wasted

33% of women 20-49 years are overweight or obese

>80% of women and children are deficient in at least one critical micronutrient

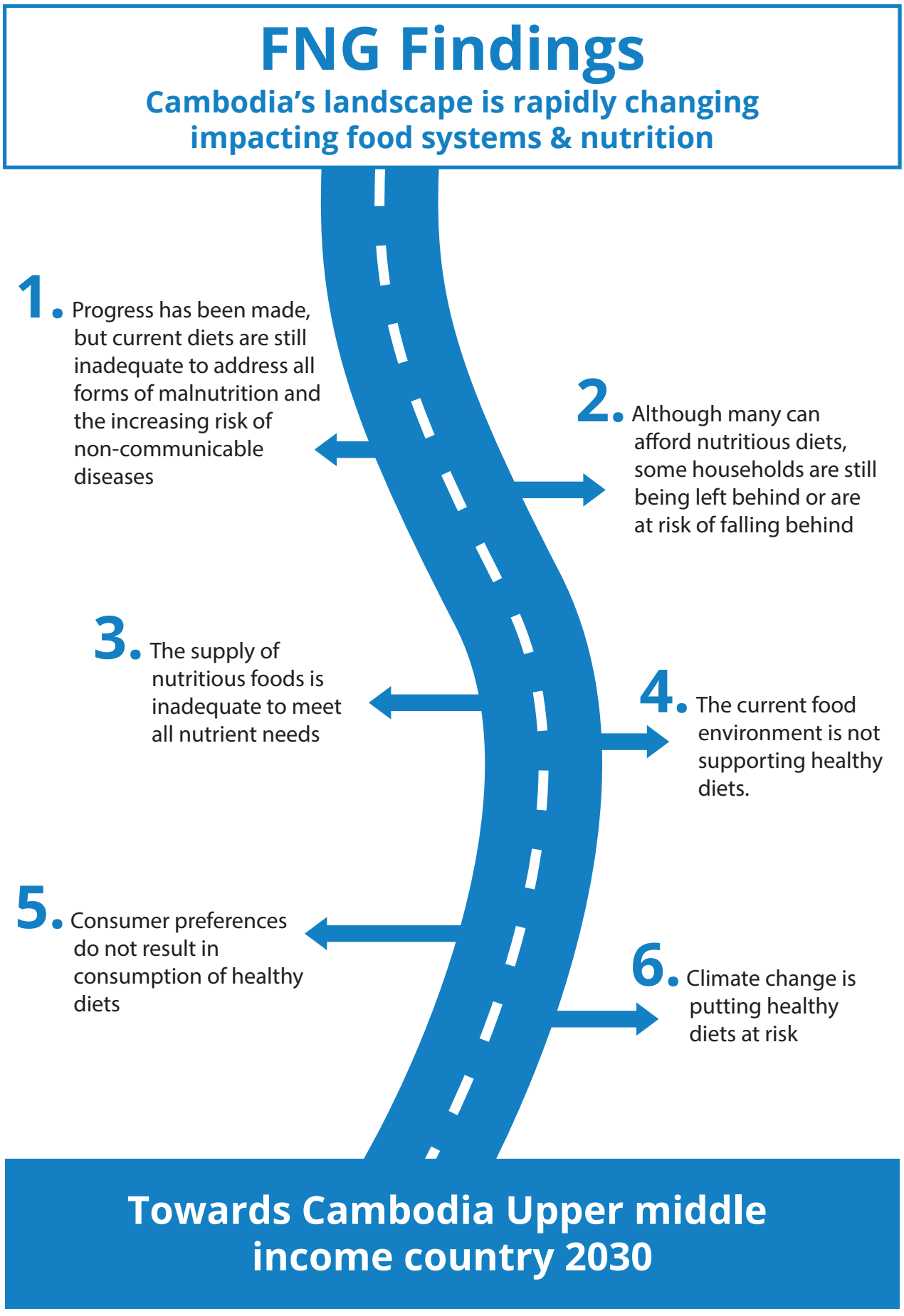
>64% of deaths in Cambodia are due to non-communicable diseases costing 6.6% GDP

While Cambodia continues to grapple with issues of child undernutrition and micronutrient deficiency, the nutrition landscape is becoming more complex as overweight and obesity become of increasing concern. In 2021, 33 percent of women aged 20-49 years were overweight or obese, an almost five-fold increase since 2000 (4). This complex 'triple-burden' of malnutrition – undernutrition and micronutrient deficiency coexisting with rising overweight/obesity – is changing the nature of Cambodia's nutrition landscape and putting the population at increased risk of non-communicable diseases (NCDs). NCDs are currently estimated to account for 64 percent of deaths in Cambodia (7) with the annual economic burden to the country estimated at USD 1.5 billion per year, equivalent to 6.6 percent of Gross Domestic Product (GDP) (8).

Cambodia's food system is also undergoing substantial changes. While the agricultural system remains dominated by rice, in recent years there has been substantial diversification into primarily export-oriented cash crops such as maize, cassava, rubber, mango and cashew (9). Traditional capture fisheries, an important source of livelihoods and nutrition for rural households, are under threat from climate change, illegal fishing, and hydropower dam construction (10,11). Production and availability of unhealthy ultra-processed foods high in fat, salt and sugar is on the rise and per capita caloric availability of sugar and other sweeteners increased by a substantial 61 percent between 2010 and 2020 (12). Cambodia is also experiencing changes in its weather patterns. Average annual temperatures have been increasing since the 1960s, and there are now up to 46 more 'hot days' (>35°C) per year compared to a century ago. During the twentieth century, rainfall variability linked to the El Niño phenomenon also contributed to the occurrence of drought throughout the country (13).

Having recognised the rapid transition occurring in Cambodia's nutrition profile, food system and economic landscape, the FNG identified six main findings and barriers that may hinder Cambodia's progress and ambition to transition to a middle income country by 2030. These findings are summarised in Figure 6 and are discussed in the sections below.

Figure 6 : Infographic summary of the FNG findings in Cambodia.



1.

Progress has been made, but current diets are still inadequate and contribute to all forms of malnutrition and increase the risk of non-communicable diseases.

- The nature of malnutrition and quality of diets is changing.
- Diets need to improve to build human capital and achieve economic growth.
- All sectors have a critical role to play.

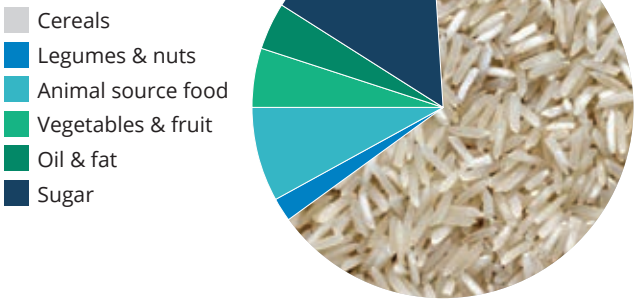
For people across Cambodia, demand for, and consumption of, healthy and nutritious diets remains suboptimal at all stages of the life course, contributing to the burden of malnutrition in all its forms and increasing the risk of NCDs.

At the population level, nearly 80 percent of calories consumed come from rice and sugar, with insufficient consumption of nutrient-dense foods (14). Consumption of food groups that protect against NCDs (fruits, vegetables, legumes, nuts, and wholegrains) is lower than the minimum recommended intake, while consumption of foods that can have detrimental impacts on health or the environment (red meat, fish, and ultra-processed foods and beverages) exceed maximum recommendations (15). Approximately one third of women in Cambodia are not currently meeting the minimum standards for dietary diversity, increasing their risk of inadequate micronutrient intake. Conversely, consumption of unhealthy foods and beverages high in salt, fat and sugar – which increase risk of overweight/obesity and NCDs – is common among all population groups. One third of adult women consume unhealthy foods and nearly two thirds consume sweetened beverages (4).

Infant and young child feeding practices during the first two years of life, a period when good nutrition is critical to physical and cognitive development, are suboptimal. Only 50 percent of children under 6 months are exclusively breastfed and 42 percent of 6- to 23-month-old children receive a minimally acceptable diet (that meets recommendations for dietary diversity, meal frequency and milk feeding frequency for non-breastfed children), putting them at risk of undernutrition and micronutrient deficiency. Children as young as 6-11 months consume sweetened beverages and unhealthy foods daily, and consumption of these products increases with age (4).

Healthy diets are a prerequisite to optimal nutrition and health, and are critical for growth, cognitive development and wellbeing of individuals, enabling people to fulfil their human capital potential and become productive members of society. However, in addition to consumption of nutritious diets, access to improved water, sanitation and hygiene (WASH) infrastructure (including in schools and health facilities) and use of good WASH practices are critical to achieving nutritional outcomes. Actions across the food system must be complemented with multisectoral interventions in the health and social protection systems in order to improve nutrition and diets.

Figure 7: National average consumption of calories based on the Cambodia Socio-Economic Survey 2020-2021 compared with nutrition indicators in the Cambodia Demographic and Health Survey 2022



Nearly 80% of Cambodian diets are comprised of rice and sugar, with insufficient consumption of diverse, nutrient-dense foods.

50% of children <6 months are exclusively breastfed

42% of children 6-23 months consume a minimally acceptable diet

57% of women 15-49 years consume a diet with minimum diversity

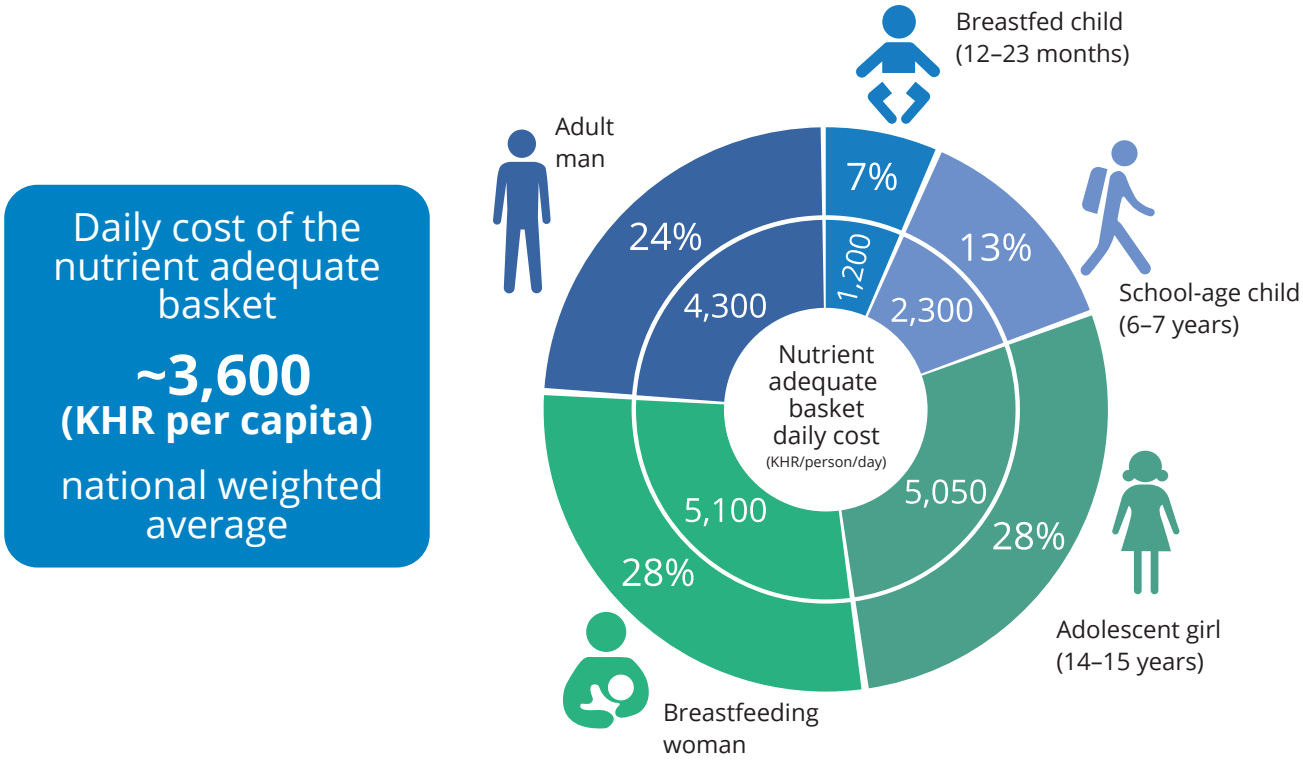
All population groups frequently consume unhealthy snacks & beverages

2.
Although many could afford nutritious diets, some households are still being left behind or are at risk of falling behind.

- On average 16 percent of household cannot afford a nutritious diet without loans.
- Social assistance is critical for vulnerable households to afford a nutritious diet.
- Shock responsive social protection could prevent more households from falling behind.

The average cost of a nutrient-adequate basket is approximately 3,600 Cambodian riel (KHR) per person per day, or about KHR 18,000 for a family of five (based on March 2022 prices). Importantly, over half of the total cost of that modeled household's diet is required to meet the nutritional needs of the breastfeeding woman and adolescent girl, given the substantially higher nutrient needs during these stages of the life course.

Figure 8 : Average per person and individual daily cost of the nutrient-adequate basket (in KHR and percentage)



The cost of the modelled diet was compared to the distribution of household food expenditure to estimate the proportion of households that cannot afford a nutritious diet. At the national level, an estimated eight percent of households are unable to afford the least cost nutritious diet, with subnational variation between 1 and 18 percent. This relatively low level of unaffordability speaks to Cambodia's impressive economic growth (16). However, many households' current food expenditure is only sufficient to cover the cost of a nutrient-adequate basket because they rely on loans for daily consumption. Cambodia faces significant challenges due to its high level of microfinance debt, with debt from microfinance institutions reaching USD 4,213 per capita in 2021, considerably higher than Cambodia's GDP per capita (17). In 2021, 20 percent of household debt was used for daily consumption, including food (14,18). When household expenditure is adjusted for debt used for food consumption, the percentage of households unable to afford a nutritious diet doubles to 16 percent (with subnational variation of 5 to 36 percent). The debt adjustment led to a steep increase in cost (over 10 percent) in the regions of Koh Kong and Preah Sihanouk, Kampong Speu, Prey Veng and Oddar Meanchey, and as high as 21 percent increase in Mondulkiri and Rattanakiri, highlighting particular dependency on loans to access food in these regions. For the 16 percent of households unable to afford a lowest cost nutritious diet, the average difference in current food expenditure and cost of a nutritious diet (or depth of unaffordability) is KHR 950 per person per day (with subnational variation of KHR 640 to KHR 1,100) (14).

Figure 9 : Unaffordability is relatively low which speaks to impressive progress in Cambodia's economic growth

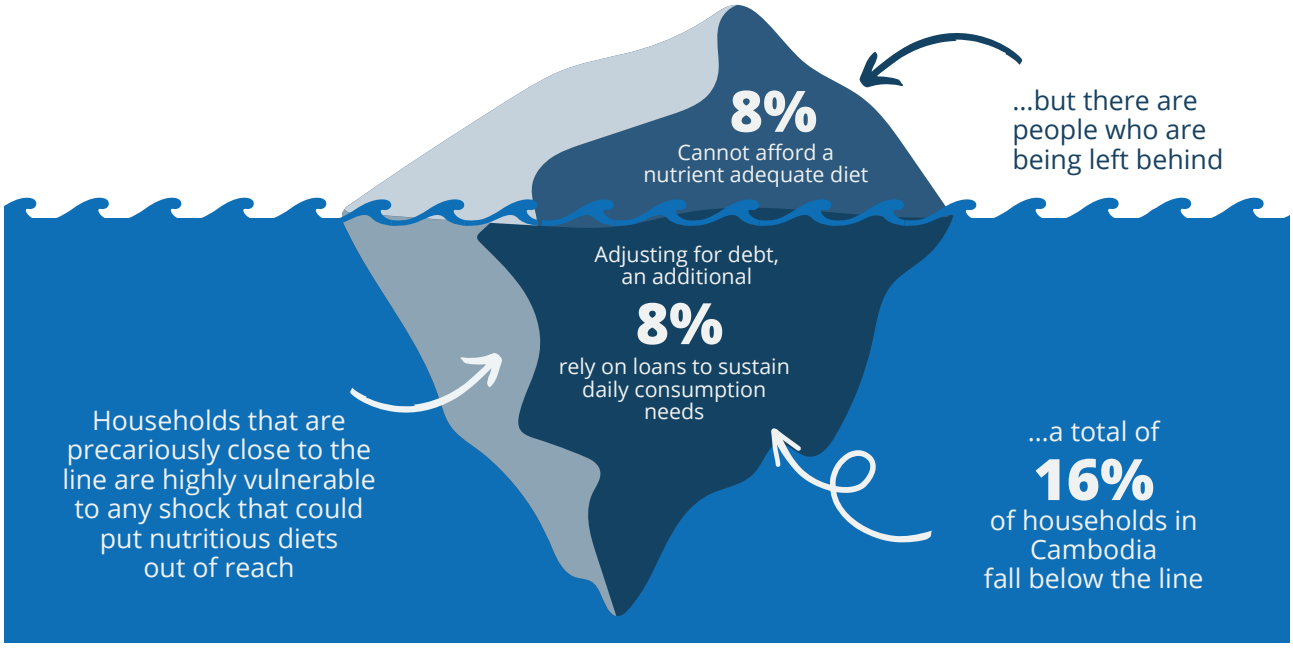
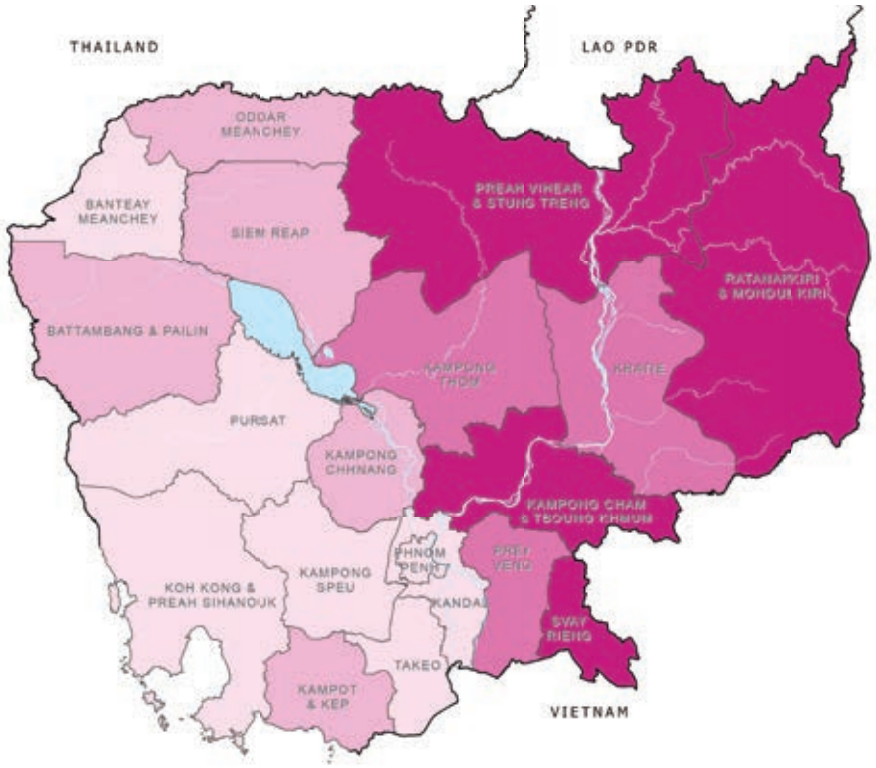


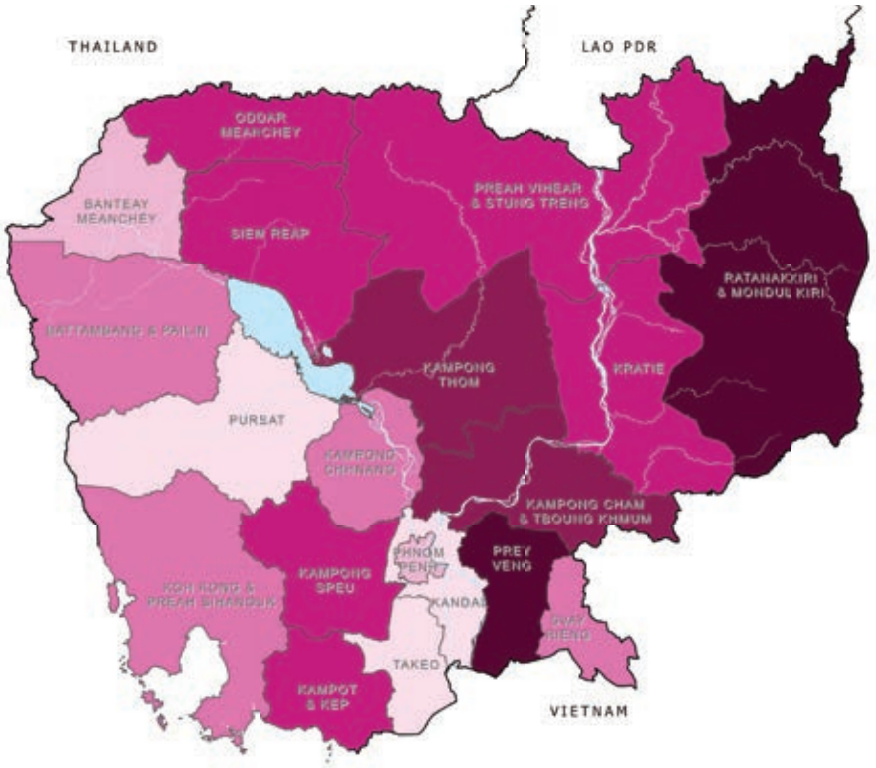
Figure 10 : Percentage of households who cannot afford the nutrient-adequate basket at regional level before (map 1) and after (map 2) accounting for current loans (CSES 2020-2021)



Map 1

Non-affordability of the nutrient adequate basket (% households)

- <5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- 20% - 25%
- >25%



Map 2

Non-affordability of the nutrient adequate basket (% households)

- <5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- 20% - 25%
- >25%

Social assistance has a vital role to play in ensuring that this 16 percent of households can access nutritious diets. Cambodia's cash transfer programme for pregnant women and young children (CT-PWYC) is one such mechanism that has potential to improve dietary affordability for households. At the time of modelling, the total maximum transfer value (KHR 760,000) would reduce the cost of a nutritious diet for a breastfeeding woman by 22 percent or for the whole household by 6 percent. Since modelling was undertaken, the CT-PWYC transfer value has been doubled, so the programme is likely to better support women and children in meeting their nutrient needs. School feeding programmes that provide children with diverse, nutritious food at school similarly have potential to reduce the cost of the diet. The impact of the current National Home-Grown School Feeding Programme was modelled, and results show a potential reduction of the cost of a nutrient-adequate diet for school-age children by 20 percent, thus reducing the household cost. Adjusting the meal composition could further reduce the cost to households and including fortified rice would lower the cost by an additional 5 percent.

Health interventions can also play a critical role in reducing the cost of a nutritious food basket. Given women's high nutrient needs, particularly during adolescence, pregnancy and breastfeeding, and the high cost of meeting needs through food alone, supplements can play an important role. Supplementation with iron and folic acid tablets could reduce the cost of the nutrient-adequate basket for breastfeeding women and adolescent girls by 11 percent and 17 percent respectively. Supplementation with multiple micronutrient tablets could reduce the cost even more, by 20 percent and 25 percent respectively.

Climate and economic shocks are likely to lead to an increase in these non-affordability estimates, as 15 percent of households are already precariously close to the poverty line. Evidence from 2020 suggests that the economy contracted by 3 percent due to COVID-19 and the poverty rate rose for the first time in decades by an estimated 2.8 percent (16). Sustained and repeated climate stresses, unpredictable weather events and other shocks could exacerbate this figure.

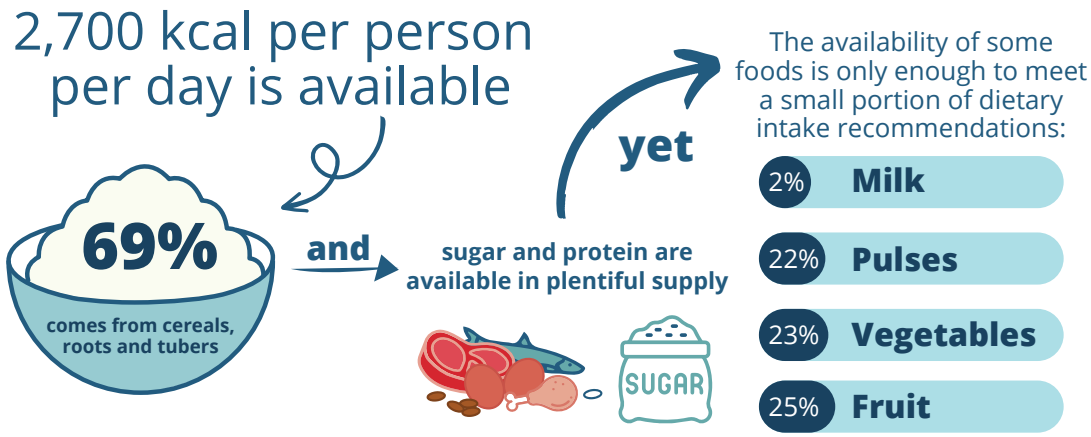
Recognizing the role that social protection can play in supporting shock responses, the government has developed a shock responsive social protection framework and rolled out schemes such as a large-scale COVID-19 cash transfer programme, a flood-affected household scheme, and inflation scheme. The framework offers an important avenue through which the government can reduce the loss of livelihoods and assets, and ensure that vulnerable and at-risk households are able to continue meeting their nutrient needs during and after shocks and crises (16). The FNG analysis shows that the COVID-19, Flood-Affected Households and Inflation Schemes could cover about 19 percent, 11 percent, and 10 percent respectively of the cost of a nutrient-adequate basket for the household. While the shock responsive schemes cover the greatest proportion of the households' costs, they are also short term (usually only several months in duration) and would need to be complemented by longer term social assistance packages to impact nutrition outcomes in the short and long run.

3.
The supply of nutritious foods is inadequate to meet all nutrient needs.

- The supply of food is sufficient to cover dietary energy and protein needs, but many micronutrient needs are not being met.
- Nutrient-adequate diets will result in higher greenhouse gas emissions and water use.
- Mitigation measures could deliver win-wins to climate and nutrition.

Current food supply in Cambodia is largely reflective of consumption practices; supply exceeds energy and protein requirements but falls short of meeting micronutrient needs. In accounting for domestic production plus imports minus exports, nearly 70 percent of energy supply comes from staples (mostly rice) (19). Protein supply is approximately 64.3 grams/person/day, which is more than enough to cover the recommended protein intake for healthy adults (50-60 grams/person/day).

Figure 11 : Dietary energy is highly available but there are insufficient quantities of most nutrient-dense foods



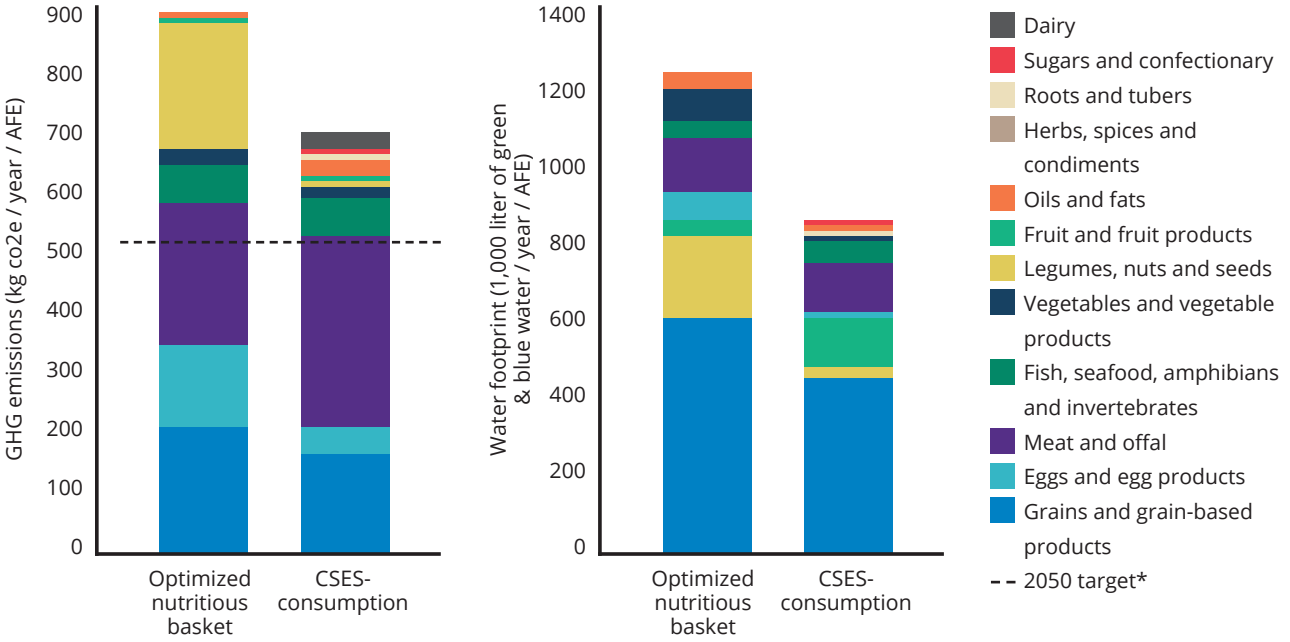
In contrast, food groups missing in diets – fruits, vegetables, legumes, dairy, eggs, and fats and oils – are available in insufficient quantities to meet recommended consumption levels. Data indicates that Cambodia's fruit, vegetable, pulse, and milk supply only meet 25 percent, 23 percent, 22 percent, and 2 percent respectively of daily recommended intake (19). Cambodia's current fruit and vegetable supply is of particular concern (140 grams/person/day), as it is three times lower than the regional average for supply, and considerably lower than the 400 grams/person/day recommended by WHO (20).

Low agricultural productivity and inefficient supply chains are some of the limiting factors contributing to inadequate supply of nutritious foods. The Cambodian agricultural sector is dominated by smallholder farmers and has relatively low productivity (11). Supply chains are short and fragmented, and post-harvest handling practices are poor (19), leading to high post-harvest loss. For example, vegetable products have an estimated damage rate of 25-40 percent due to poor handling practices alone (21) (for comparison, 10 percent damage is considered acceptable in high income countries). A substantial amount of produce is also lost between production and consumption due to poor road networks, inappropriate storage facilities, and lack of cold chains. Increasing temperatures, humidity, and climate shocks are likely to result in higher food losses and food safety risks across value chains, particularly of perishable items like meat, eggs, fish, vegetables and fruits (22).

Contamination of food across the supply chain is also of concern in Cambodia, with recent outbreaks of foodborne illnesses linked to both microbial and chemical contamination (23). While some data highlight the concern of heavy toxic metals and pesticides in fish, vegetables, rice etc. (24), as well as microbial contamination – and poor handling practices – of vegetables and animal source foods in markets (23,25), more research is needed on food safety in Cambodia.

Given that current diets are not adequate to nourish Cambodia's population, greenhouse gas (GHG) emissions and agricultural water use may have to further increase to ensure that the population's nutrition needs are met. Despite Cambodia being a very low contributor to global GHG emissions (26), food systems are – directly or indirectly – the largest driver of domestic emissions. Agriculture is estimated to be directly responsible for 28 percent of Cambodian GHG emissions, and likely also linked to the country's greatest contributor, land use change and forestry (27). The agriculture sector also accounts for 56 percent of all water usage in Cambodia (28). Food waste also contributes to GHG emissions; methane emissions from landfill sites in four major cities have been estimated to be as high as 360,000 tons of carbon dioxide equivalent (CO_2e) per year, making landfills one of the largest contributors to overall emissions in Cambodia (29).

Figure 12 : Environmental impact (greenhouse gas emissions and water footprint) of optimized versus current diets (ENHANCE (2023); CSES (2021))



* EAT-Lancet target, 519 kg carbon dioxide equivalents/capita/year (de Pee et al 2021. Balancing a sustained pursuit of nutrition, health, affordability and climate goals: exploring the case of Indonesia. American Journal of Clinical Nutrition)

The FNG analysis estimated that current diets emit just under 700 kg CO_2e/person/year, whereas the optimized nutrient-adequate basket is expected to emit just under 900 kg CO_2e/person/year (Figure 12). Both exceed the EAT-Lancet commission target for 2050 of 519 kg CO_2e/person/year, a global reference planetary health diet to promote better health within planetary boundaries, including reducing GHG emissions (30). At the same time as increased emissions, the optimized diet would require a 44 percent increase in agricultural water use, from 800 m_3/person/year to 1,200 m_3/person/year. The largest GHG contributors to current diets (CSES-consumption) are meat (46 percent), particularly beef, and rice (24 percent). Though the optimized basket increases overall GHG emissions, meat related emissions reduce by 20 percent; the overall increase is driven by a sharp increase in plant-based foods, specifically legumes which are a more cost-effective contributor to meeting nutrient needs, increasing the emission by 24 percent. In terms of water use, rice contributes to approximately half of the total footprint of the basket; the higher water footprint of the cost-optimized basket is also driven by the great quantities of legumes and vegetables selected.

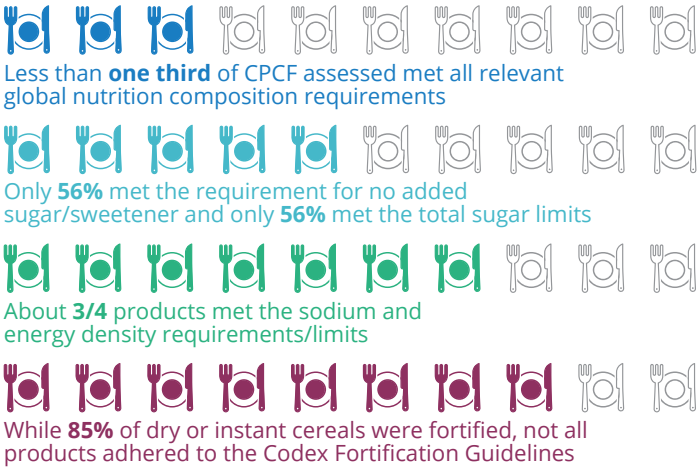
Nutrition goals may therefore be at odds with Cambodia's ambition of net zero emissions by 2050 and will require policy coherence to recognize trade-offs and identify potential solutions with co-benefits (or 'win-wins') that can help mitigate and adapt to climate change. Ultimately, significant food system diversification and adoption of climate-smart varieties and production practices, coupled with adequate national regulatory frameworks and behaviour change interventions to stimulate demand for healthier, nutritious food are needed. Without demand, supply cannot be sustained or stimulated and vice versa.

4.
The current food environment is not nurturing healthy diets.

- Ultra-processed foods and snacks high in salt, fat and sugar are widely available, affordable and consumed.
- Regulation and compliance gaps support the unhealthy food environment.
- The school food environment could provide an opportunity to build lifelong healthier food habits.

In addition to gaps in the food system's supply of nutrient-dense healthy foods such as fruit and vegetables, unhealthy and ultra-processed foods, snacks and drinks are becoming increasingly available and consumed by all population groups. Demand for commercially produced baby foods, snacks and beverages has risen rapidly in Cambodia, and gaps in the regulatory framework for food marketing (including related to enforcement) mean that consumers are frequently exposed to advertising for unhealthy products. At the same time, the absence of national nutrition standards for commercially produced complementary foods means these products often exceed global recommendations for salt, sugar and fat content (31). These products – along with frequently consumed ultra-processed snacks and drinks – provide little nutrition with many 'empty calories', displace important nutrient-dense foods from the diets of young children during their critical early years, and drive up the cost of the children's diet for households.

Figure 13 : Commercially produced complementary foods (CPCF) are increasingly available in Cambodia, however, they often do not adhere to global nutrition standards (UNICEF 2023 COMMIT Cambodia Synthesis Report)

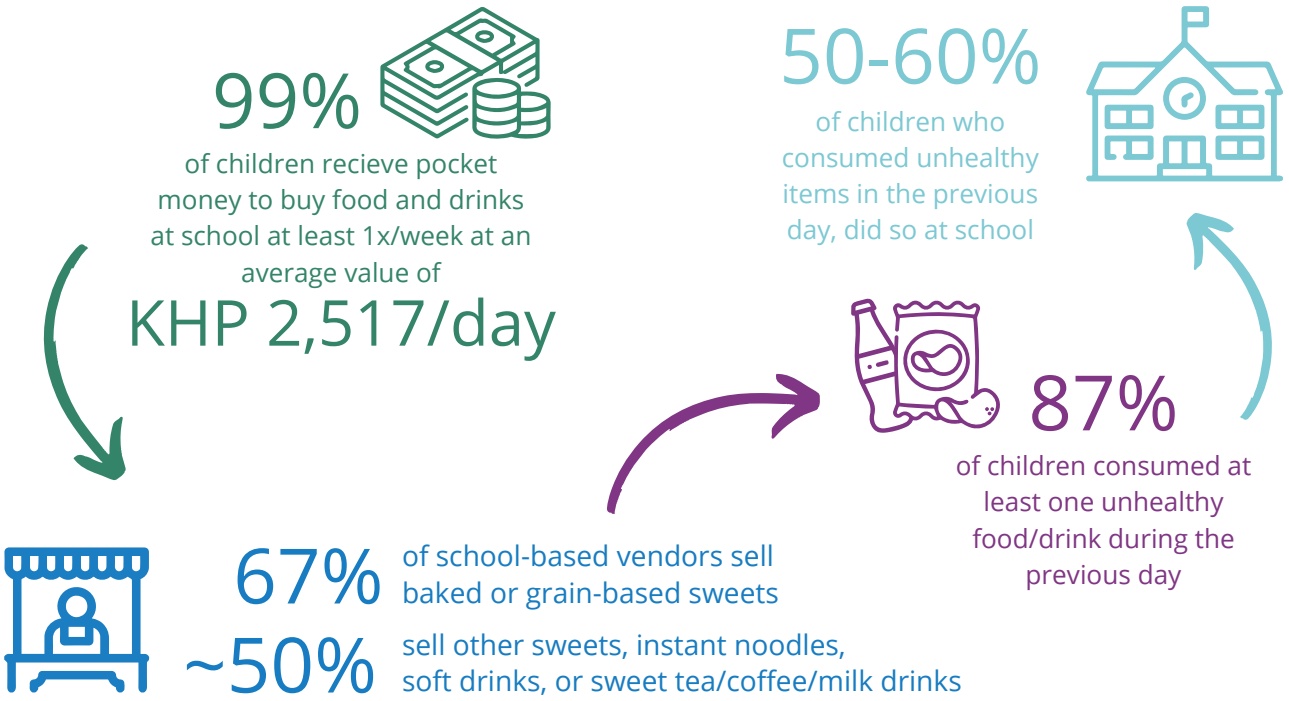


As children become older and enter school, many are exposed to a wide range of high fat, salt and sugary foods within the school environment. Preliminary findings from a recent study suggest that around two thirds of school-based vendors sell baked or grain-based sweets, and approximately half sell other unhealthy items such as sweets, instant noodles, soft drinks or sweetened milk drinks. A very strong social norm of providing pocket money to children to purchase snacks and drinks exists in Cambodia: 99 percent of Cambodian primary schoolchildren receive pocket money to purchase food/drinks at least once a week, with an average value of KHR 2,486 /child/day (32).

Children's consumption of foods that increase risk of NCDs (33) increases as they receive larger amounts of pocket money, with no accompanying increase in consumption of healthy food items, suggesting that children primarily choose to purchase unhealthy products with their pocket money. Critically, the average amount of pocket money provided to children exceeds the cost of the nutrient-adequate diet for primary school children (KHR 2,315 /child/day) (32).

While some regulations that aim to reduce consumption of unhealthy foods exist (for example, the Sub-Decree 133 on Marketing of Products for Infant and Young Child Feeding and Ministry of Education, Youth and Sport Directive No.18 on Strengthening the Implementation Rules for Promoting Food Safety and Wellbeing at Public and Private General Education Facilities), additional efforts are needed to achieve full compliance. The majority (86 percent) of mothers have observed (banned) commercial advertising for breastmilk substitutes (34), and preliminary results from a recent study found that very few school-based vendors are fully compliant with Directive 18 restrictions on sales of products with high fat/salt/sugar content (32). Thus, stronger implementation of existing policies and regulations is needed, concurrently with additional measures that could help reduce consumption of unhealthy foods across the wider population, for example, fiscal policies such as taxes on sugar-sweetened beverages, and setting standards and regulations about online and offline marketing of unhealthy foods and breastmilk substitutes, particularly in settings around schools and/or health facilities.

Figure 14 : In Cambodia there is easy access to ultra-processed foods at schools (Ministry of Education, Youth and Sport, Helen Keller International (HKI), WFP, FAO & UNICEF (2023): Eating Practices and Consumption Patterns of Primary School Students in Cambodia)



5.
Consumer preferences and behaviour do not result in consumption of healthy diets.

- Consumer preferences and habits are barriers to ensuring healthy nutritious diets.
- Nutrition knowledge is not the main driver of dietary behaviours, but some knowledge gaps remain.

While economic barriers may prevent the poorest and most vulnerable from accessing nutritious diets, for the remaining households who can afford a nutritious diet, challenges across the food system, as well as consumer behaviour and preferences, also influence dietary choices and contribute to consumption of suboptimal diets. For example, rates of exclusive and continued breastfeeding are lowest among the wealthiest households (4). Emerging evidence suggests that breastfeeding is increasingly viewed as something that is done by the poor, with those who can afford to do so switching to infant formula. Women's engagement in the workforce and need to contribute to household income is also a barrier to optimal breastfeeding, with many women unable to continue breastfeeding for longer than three months when they return to work (35). Similarly, many caregivers face time constraints in preparing nutritious meals for infants and young children; when combined with the belief that plain rice porridge is nutritious enough to promote growth and avoid sickness (36), the result is continued sub-optimal complementary feeding practices.

The belief that rice alone provides sufficient nutrients is likely tied to the cultural importance of rice in Cambodia. Rice is intrinsically linked to definitions of identity, particularly in rural areas. In the Khmer language 'to eat' means 'to eat rice' (37), and having 'enough' rice so all family members can eat until they are full is highly valued (38). Rice-based meals are perceived to be healthy (32), irrespective of other ingredients included, relative portion sizes, and the high average quantity of processed white rice consumed daily in Cambodia (over 300 g/capita/day). The large quantities of rice consumed by Cambodians contribute to caloric adequacy but are likely to displace more micronutrient-dense foods in the diet or lead to excessive consumption of dietary energy. In addition to the centrality of rice in Cambodian diets, other socio-cultural beliefs, such as perceptions that price directly correlates with a foods' nutritional value, and the social status associated with more expensive food choices, limit consumption of nutritious foods such as eggs (35). Pulses and legumes, which tend to be relatively low-cost sources of dietary protein and micronutrients, are rarely consumed as part of traditional Cambodian diets (14). These factors – particularly perceptions that improving dietary diversity requires consumption of expensive foods – may contribute to a sense of powerlessness to improve dietary quality, particularly among those in rural areas (35).

Consumption of ultra-processed unhealthy snacks and drinks is also driven largely by habits, preferences and convenience, rather than wealth or knowledge. For example, while consumption of unhealthy foods and sweetened beverages is highest amongst the wealthy and in urban areas, 30-40 percent of women in the lowest wealth quintile consume these products daily (4). Packaged snacks and drinks are often fed to young children as they are accessible, affordable, convenient, and enable caregivers to placate crying children when they demand these items (39). While ultra-processed snacks and drinks are widely viewed as 'unhealthy', gaps in knowledge remain about sugar/fat/salt content of foods, and the long term health risks of consuming these items. Traditional local snacks and desserts – many of which are high in fat, salt and sugar – are often perceived to be healthy, as are many sugar-sweetened beverages such as fruit drinks (35). Emerging evidence also suggests that dietary quality is generally perceived to be related to consumption of healthy foods only, with consumption of unhealthy products – such as ultra-processed foods/beverages – not taken into account. A recent study from Mondulkiri found that individuals who perceive the quality of their diet to be higher consume more diverse, nutrient-dense food groups. However, these individuals also consume significantly more foods that increase risk of NCDs (33,40), suggesting a need to broaden understanding of the term 'healthy diets' to encompass both healthy and unhealthy dietary components.

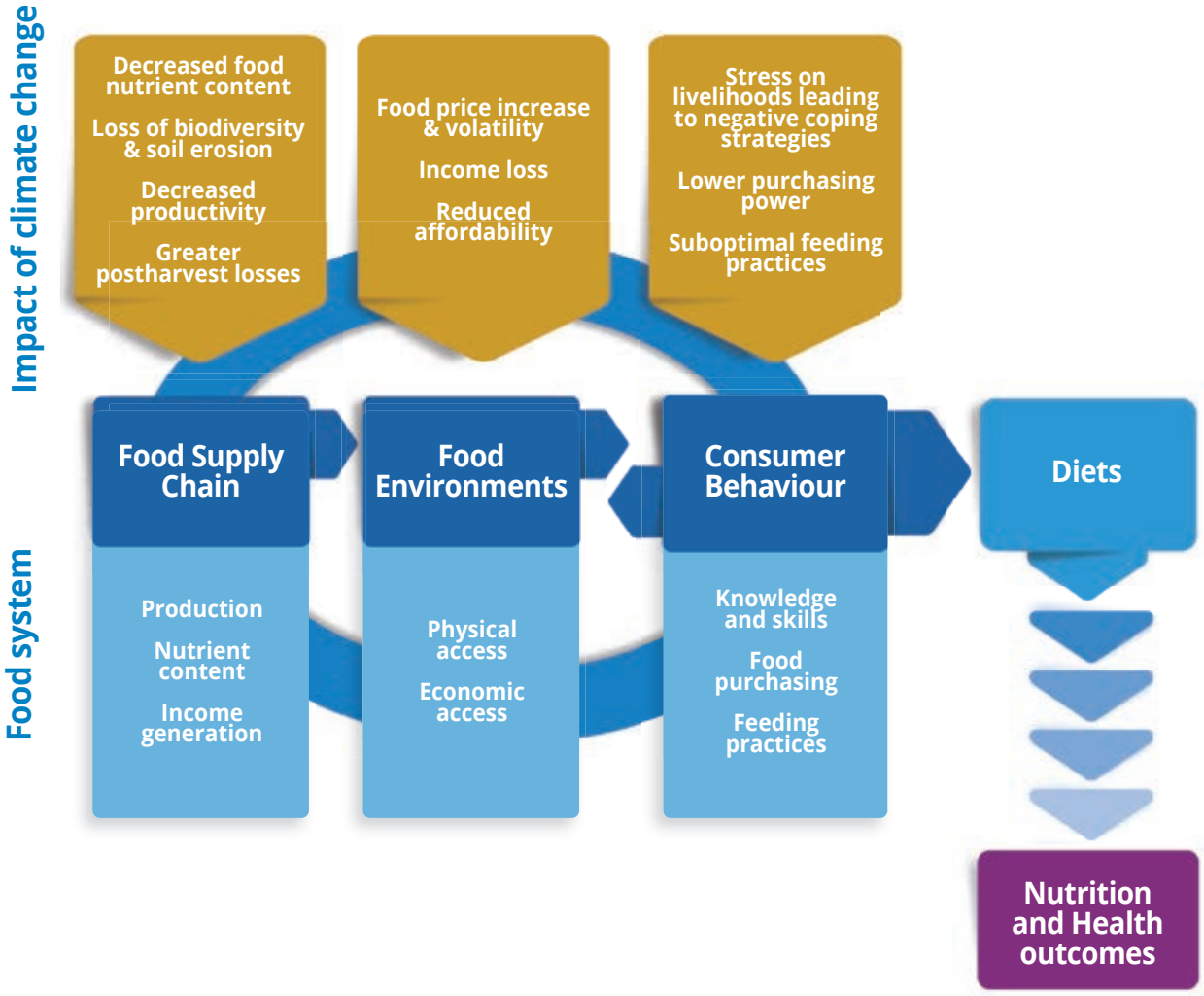
Thus, these food preferences and norms, which are further influenced by aggressive marketing by the food industry, play a critical role in shaping households' and individuals' food choices (41). Food-based dietary guidelines could be used to establish a basis for public food and nutrition policies as well as guiding consumers and fostering healthy eating habits. These could not only provide advice on foods, food groups and dietary patterns, but they could also serve as a basis to guide the design of a social and behaviour change strategy to influence Cambodians' preferences and nudge them towards improved dietary practices.

6.
Climate change is putting healthy diets at risk.

- Changes in climate will lead to reduced nutrient content, diversity and availability of foods.
- Climate change will increase food prices, reduce incomes and further compromise access to healthy diets.
- Preparedness for climate shocks needs to be strengthened to build resilience.

Cambodia is highly vulnerable to climate change, with expected increases in severity of floods, prolonged droughts, windstorms, more frequent heat waves, and temperature rises (42). Over a period of forty years, Cambodians have been mostly affected by floods, followed by droughts and other extreme events (such as storms) (43). By 2050, most of Cambodia's agricultural areas will be exposed to higher drought risk, and more severe floods and droughts alone are expected to reduce Cambodia's GDP by almost 10 percent (44).

Figure 15 : Impact pathway of climate change on food systems and nutrition (Adapted from: HLPE, 2017. "Nutrition and Food Systems"; Owino et al 2022; Bush et al 2022)



These changes in weather patterns will put healthy diets at risk. Nutritious diets will likely be compromised due to projected production losses of up to 14 percent in rice alone (45), post-harvest losses due to heat and humidity, reduced biodiversity, and decreased nutrient content of some foods (46). Accounting for the effect of climate change alone, the cost of a nutritious food basket is likely to increase by 10 percent by 2030 and 20 percent by 2050 to KHR 4,309 per capita per day (47), placing diets further out of reach for those who are already vulnerable.

Based on Cambodia Agriculture survey data from 2020, it was estimated that farmers experience revenue losses of 17 percent and 12 percent respectively when affected by droughts and floods. Rice farmers experienced even greater revenue losses of between 19 percent (drought) and 13 percent (flood). These results shed light on the vulnerability of farmers, which may further increase during years of El Niño-Southern Oscillation[1]. Droughts have also caused significant drops in aquaculture production and income. Longer dry seasons caused reductions in freshwater levels and

[1] The El Niño-Southern Oscillation (ENSO) is a recurring climate pattern involving changes in the temperature of waters in the central and eastern tropical Pacific Ocean.

between 2019 and 2020 this led to a loss of aquaculture revenue of 60 percent (48). There has been significant reduction in fishing around the Tonle Sap Lake area, where paddy production has surpassed fishing as the major livelihood (49). Hydropower dam construction in Lower Mekong River Basin is also a major contributor to this shift in land use and continued development of dams could exacerbate the climate-related impact, particularly in the dry season (50).

Given the prominence of rice in Cambodian diets, the analysis identified a number of win-win solutions for climate change mitigation (by reducing GHG emissions) and adaptation (to counter productivity losses):

- **Introducing short-duration rice varieties:** can reduce methane emissions from rice production by up to 30 percent (51) and reduce risk of climate-related shocks (such as providing protection from late-season drought) and allowing early planting of second season crop and;
- **Improving rice irrigation practices:** (such as alternate wetting and drying) can reduce water use of rice production by 20-30 percent and greenhouse gas emissions by 10-20 percent, and increase economic returns by 10-30 percent (51).

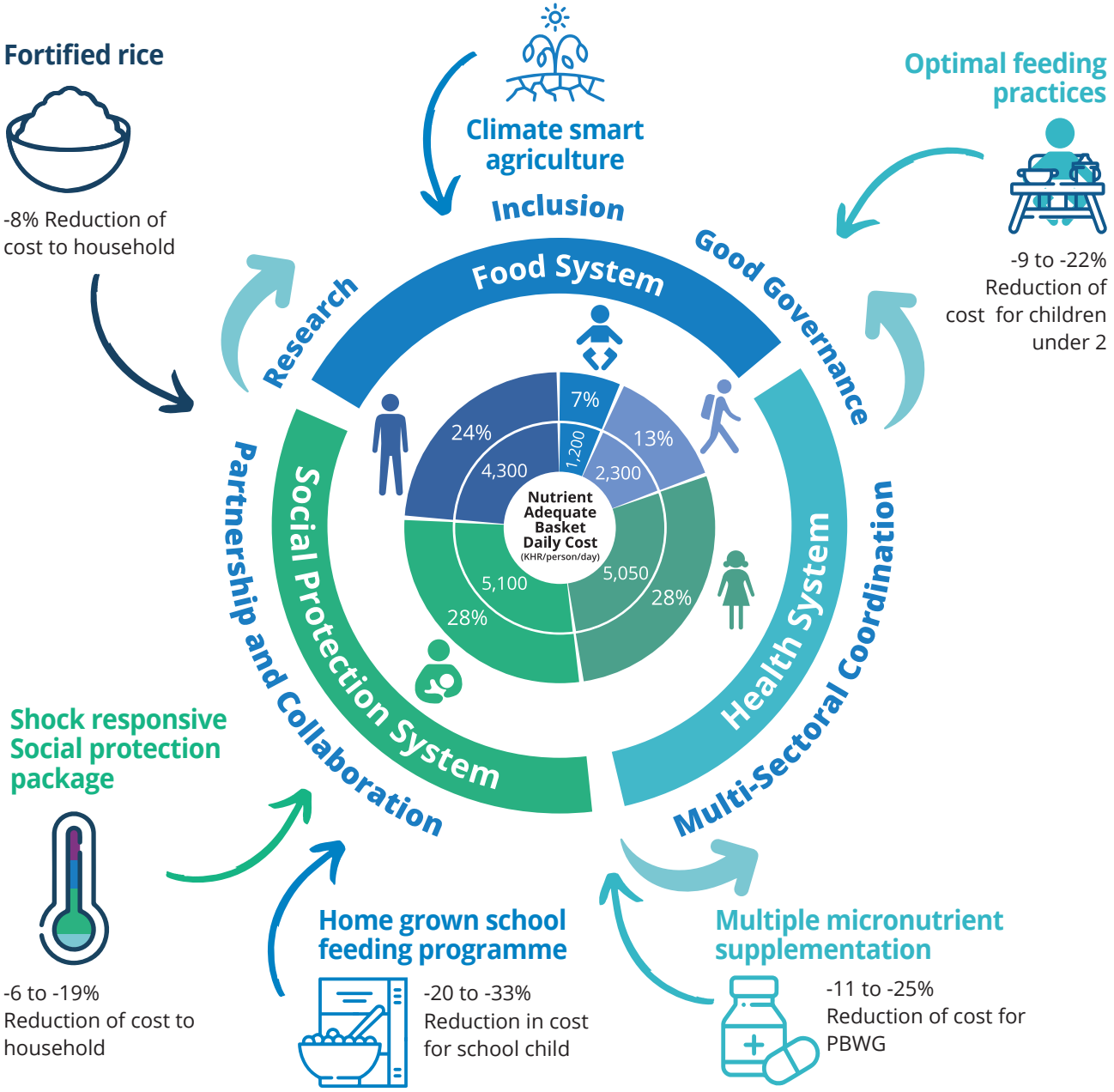
However, in the longer term diversification of production and consumption beyond rice is necessary. Diversification to plant-based foods and alternative protein sources can offer win-wins for climate change mitigation and nutrition with fortification modeled as a potential win-win intervention:

- **Introducing fortified rice:** GHG emissions decrease by 13 percent and water use decreases by 7 percent (primarily driven by lower quantities of animal source foods required to meet micronutrient requirements). The model also showed that inclusion of fortified rice in the diet could reduce the household cost of nutrient-adequate diets by 8 percent due to a reduction in the amount of animal-source food required. Fortification of rice could also mitigate nutrient losses due to rising CO_2 levels (52).

Climate change will ultimately lead to decreased production, reduced income for farming households, increases in food prices, reduced diversity of food items in the local market, decreased nutrient content in foods, and increasing rural-to-urban migration. Adaptation and mitigation strategies could provide win-win solutions for resilience building against climate change whilst reducing environmental impacts, and ensure nutritious food is available and accessible for Cambodians. Adapting to climate change and increasing the capacity of farmers and systems to bounce back after a climate shock (like flood, drought, and/or storm) will require changes in agriculture production practices, improvements in production efficiency, better post-harvest management, and shock responsive social protection including early warning systems and anticipatory actions to protect livelihoods and assets.

Conclusion

Figure 16 : Actions are needed across sectors to improve access to healthy diets for all. The FNG analysis unpacks three systems and relevant actions under each to address barriers to healthy diets



Stakeholder recommendations

Food, health and social protection systems must work together to secure positive nutrition outcomes in Cambodia and achieve Cambodia's economic, human capital development, and climate ambitions. In the context of climate change, particular attention will be required to ensure these ambitions do not slip. The following recommendations are divided into five sections: food system, social protection system, health system, climate change and governance.

1. Food Systems

Cambodia stood out at the Food Systems Summit for its domestic and international engagement in food systems and for its comprehensive Roadmap for Food Systems for Sustainable Development 2030. Cambodia has also made Nutrition for Growth (N4G) commitments and is currently drafting its third NSFSN. Food systems bring together many different sectors,

from agriculture production to consumption, and are increasingly affected by climate change. To nudge changes in the food system, supply of food will need to diversify, the regulatory environment will need to be strengthened, and demand will need to be stimulated for healthy food and discouraged for unhealthy food.

Agricultural and food production

- Diversify domestic food production to increase availability and local consumption of fruit, vegetables, pulses, eggs, and other nutrient-dense foods while ensuring sustainable and environmentally friendly practices.
- Scale up climate-smart production practices, and promote the use of solutions such as net houses, greenhouses, cover crops, water management practices and technologies, use of compost as fertilizer, short crop cycle varieties, and other good agricultural practices and technologies to adapt to climate change and prevent environmental degradation.

Post-harvest handling and processing

- Invest in infrastructure to reduce post-harvest losses of perishable nutritious foods, including cold storage and warehouses.
- Strengthen the capacities of millers to locally blend rice with fortified rice kernels.
- De-risk private sector investments to improve safety, handling, and value addition of domestic agricultural products.
- Strengthen public-private producer partnerships to respond to demand for healthy nutritious foods and improve supply chains for these.
- Improve food handling practices across the food chain including at market and vendor level to reduce risk of biological contamination and food-borne illnesses, preventing uptake of nutrients.

Regulatory system and consumer protection

- Develop standards and regulate the marketing and sale of unhealthy and ultra-processed foods and beverages (e.g. tax on sugar-sweetened beverages and ultra-processed foods, front of pack labelling, advertisement restrictions, etc.).
- Strengthen enforcement of legislation related to the marketing and sale of breast-milk substitutes (i.e SD 133) and develop and enforce standards for commercially produced complementary foods.
- Strengthen enforcement of regulations (Directive 18) around school food environments, particularly of food stalls, to reduce the sale of unhealthy and unsafe foods.
- Strengthen control mechanism to enhance compliance with food fortification standards.
- Explore mechanisms such as results-based financing to strengthen enforcement of regulations and increase necessary budget allocations accordingly.

Demand generation

- Use social behaviour change (SBC) approaches to stimulate demand for vegetables, fruits, pulses, eggs and calcium-rich foods as well as fortified foods, and reduce demand for unhealthy foods, to encourage supply-side changes.
- Strengthen coordination and dialogue platforms between government, civil society and consumer organizations to uphold safeguards.

2. Social protection system

Cambodia exemplified exceptional leadership during the COVID-19 pandemic by rapidly expanding social protection schemes. As Cambodia transitions to an integrated 'Family Package', there are opportunities to explore an improved package and enhanced operating modalities for nutrition and to make the package more shock responsive. Lastly, in light of the National Home-Grown School Feeding Programme transition to full government ownership by 2028, the next years offer a critical window to pilot models, guidelines and standards for nutrition, and complementary interventions.

Cash-based social assistance

- Incorporate explicit nutrition objectives, metrics and indicators on diets into existing and any new social assistance schemes to monitor the impact on dietary outcomes and health seeking behaviour.
- Tailor transfer values to close the affordability gap based on emerging evidence including the Minimum Expenditure Basket and FNG analysis.
- Expand social assistance schemes to cover the 'near poor'.
- Implement SBC strategy to complement cash transfers encouraging optimal use of the cash for nutrition benefits for women and children.

Shock responsive social protection

- Make social assistance shock responsive and anticipatory to disburse cash to households to protect livelihoods and assets and access to healthy nutritious diets before, during and after a disaster.
- Strengthen data systems and vulnerability analysis to inform targeting of interventions to the most at risk.
- Develop nutrition guidelines and standards for food assistance during emergencies, including modalities to secure access to fresh nutrient-dense produce.

Home-grown school feeding

- Revise nutrition standards for school meals to increase the nutrient content of rations and enhance ability to meet children's nutrient needs. Consider the integration of fortified rice into the ration as a cost-efficient solution to provide essential micronutrients.
- Adjust the allowance per meal for home-grown school feeding to enhance the ability to prepare meals that meet nutrition and food safety standards.

- Explore geographical and beneficiary target group expansion of the National Home Grown School Feeding Programme to groups most at risk of not affording a nutritious diet, in addition to expansion to secondary facilities.

3. Health system

The Ministry of Health Fast Track Road Map for Improving Nutrition 2021-2030, National Strategic Plan for the Prevention and Control of Noncommunicable Diseases 2022-2030, Global Action Plan national roadmap to prevent and treat Wasting, and Maternal Infant and Young Child Feeding Social Behaviour Change Communication Strategy 2020-2025 (MIYCN SBCC Strategy) provide a robust foundation for the following recommendations. While the health sector will take the technical lead, many other sectors will need to engage to roll out these strategies.

- Develop sustainable food-based dietary guidelines (FBDGs) for the general population, followed by FBDGs for specific population groups.
- Update national food fortification strategy and guidelines.
- Develop cohesive SBC package (following FBDGs, MIYCN SBCC Strategy and national nurturing care parenting package) to stimulate demand for more healthy foods, reduce consumption of ultra-processed unhealthy foods, and encourage improved hygiene and sanitation practices across all population groups.
- Tailor SBC package, including content and approaches, for specific population groups and integrate into interventions led by other sectors including cash transfers, education, WASH, extension services, media channels and more.
- Improve SBC approaches to address evidence-informed barriers to sustained behaviour change going beyond communication and awareness raising only.
- Update national guidelines to accommodate transition from iron folic acid supplementation to multiple micronutrient supplementation and expand the target to include all adolescent girls.
- Ensure quality, equitable access of services that prevent and treat child wasting, growth monitoring promotion, infant and young child feeding and micronutrient deficiencies as part of primary health care.
- Remove barriers to optimal breastfeeding practice by increasing maternity leave provisions, increasing skilled breastfeeding support at the community and health centre level, improving the quality of newborn care, and promoting workplace breastfeeding facilities.

4. Climate change

Cambodia's ambitious goal of reaching net zero emissions by 2050 and improving its adaptive capacity to climate change, as evidenced by its revised nationally determined contributions, provide a rigorous framework for mitigation and adaption measures to be scaled up across sectors including environment, agriculture, rural development, and consumption. At the same time, Cambodia is highly vulnerable to climate change. In line with the recent launch of the UN Secretary General's flagship project Early Warning for All (EW4All), for which Cambodia is a priority country, there are opportunities to adapt the disaster management system to protect healthy diets before, during and after a disaster strikes.

Agriculture, rural development, environment

- Reforest and reduce deforestation for agriculture land use.
- Improve efficiency of existing agricultural land use to improve productivity, reduce water footprint, and reduce deforestation.
- Invest in climate-proofed infrastructure including irrigation, roads, electricity system, storage facilities and markets.
- Invest in climate-smart agricultural technologies and practices, including use of raised beds, greenhouses, net houses.
- Diversify agriculture production to nutrient rich and low environmentally impact foods.
- Invest in food fortification as a mechanism to reduce emissions/footprint and simultaneously meet nutrient needs.
- Integrate early warning system and market/price information into application that farmers and extension workers currently use.
- Address increasing food safety risks emerging from rising temperatures and cold chain disruptions in food storage, handling and preparation.

Disaster risk management

- Improve early warning systems to reach the last mile.
- Expand the food reserve system and make it more nutrition-sensitive by fortifying grain reserves.
- Promote access to finance and weather-based insurance for farmers to protect livelihoods and access to healthy diets before, during and after a disaster.
- Support studies, data systems, surveillance mechanisms to better analyse vulnerability and risk, such as the Children's Climate Risk Index for Cambodia.

Health

- Develop FBDGs that incorporate environmental and sustainability considerations.
- Integrate promotion of less environmentally impactful foods in SBC for healthy diets.
- Support climate-resilient WASH services, eco friendly health care waste management in health facilities and the community to prevent contamination and enable optimal hygiene and sanitation conditions that impact nutrition.

Research on the nexus of climate change, nutrition and food systems

- Model impacts of climate change on diets and nutrition using a range of climate change scenarios.
- Build business cases to invest in food systems to deliver co-benefits for climate and nutrition.
- Identify vulnerabilities to climate change in Cambodia's food systems and understand potential role of domestic, regional and international trade to increase resilience.
- Invest in research related to alternative environmentally sustainable protein sources, including aquaculture.
- Support research to better understand water, soil and food pollution and ways to mitigate and prevent risk.

5. Governance

In order to reach Cambodia's ambitions to achieve upper-middle income country status by 2030- and upper-income status by 2050, the Royal Government of Cambodia has committed to strengthening human capital development, food systems and resilience to climate change as outlined in the new Pentagonal Strategy. As the Royal Government of Cambodia develops its Third National Strategy for Food Security and Nutrition, under the leadership of the Council for Agricultural and Rural Development, the FNG analysis offers findings to prioritize actions. Furthermore, the Ministry of Planning plays a critical role in coordinating actors and setting standards for food fortification.

- Continue to coordinate and develop a common narrative around barriers to access healthy nutritious diets in Cambodia and identify roles and responsibilities for each sector to address these barriers.
- Ensure the Third SFSN includes many of the FNG recommendations, that it is backed by financing, adequate budget allocations with a robust monitoring and evaluation (M&E) framework to measure impact and results on nutrition across key sectors and systems.
- Coordinate fortification efforts including setting standards, strengthening capacities of private sector, and stimulating demand.
- Facilitate capacity strengthening on nutrition, food systems, and climate change across sectors and at subnational level.
- Promote and facilitate public-private partnerships and strengthen the SUN Business Network.
- Use SBC approaches to transform food systems from farm to fork, encouraging behaviour change of producers, value chain actors and consumers.
- Invest in data collection, monitoring and evaluation around nutrition, including consumption data, to track progress for evidence-based decision making.
- Improve disaggregated data, evidence generation to identify, target and reach most vulnerable to malnutrition with multisector interventions.
- Address evidence gaps on climate-nutrition impact pathways and biological and chemical food safety risks across the value chain.


Lovely Siwon

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Acronyms

AMO-DPS	Agricultural Marketing Office of the Department of Planning and Statistics
CARD	Council for Agricultural and Rural Development
CO_2e	Carbon dioxide equivalent
CPCF	Commercially produced complementary foods
CSES	Cambodia Socio-Economic Survey
CT-PWYC	Cash transfer programme for pregnant women and young children
EAR	Energy average requirement
FAO	Food and Agriculture Organization
FBDGs	Food-based dietary guidelines
FNG	Fill the Nutrient Gap
GDP	Gross domestic product
GHG	Greenhouse gas
KHR	Cambodian riel
HKI	Helen Keller International
MIYCN	Maternal, infant and young child nutrition
NCD	Non-communicable disease
NGO	Non-government organization
NSFSN	National Strategy for Food Security and Nutrition
SBC	Social and behaviour change
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
WFP	World Food Programme
WHO	World Health Organization

Contributors

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