

Consumption of Empty-calorie Snack Foods Raises Cost of Nutritious Diet

Results from Fill the Nutrient Gap analysis in Cambodia, Lao PDR, Tajikistan and Ecuador

Indira Bose

Cambodia Country Office, World Food Programme, Phnom Penh, Cambodia

Amy Deptford, Giulia Baldi, Frances Knight, Pierre Momcilovic, Neil Mirochnick, Natalie West
Nutrition Division, World Food Programme, Rome, Italy

Lina Badawy

Regional Bureau Cairo, World Food Programme, Egypt

Saskia de Pee

Nutrition Division, World Food Programme, Rome, Italy; Friedman School of Nutrition Science and Policy, Tufts University, Boston, MA, USA; Human Nutrition, Wageningen University, the Netherlands

Key messages

- > Meeting nutrient needs is essential for good health throughout the life cycle, but nutritious diets are often not affordable in low-resource settings.
- > Over the last three decades, there has been a significant increase in the access to, and consumption of, unhealthy snack foods in low- and middle-income countries. Fill the Nutrient Gap analyses in Asia and Latin America demonstrate that such high-energy, low-nutrient-density foods contribute to overnutrition by exceeding energy requirements and increase the likelihood of micronutrient deficiencies by making it

more expensive to meet nutrient needs using diets based on local foods.

- > Fill the Nutrient Gap analysis can act as a powerful advocacy tool to demonstrate the economic and health implications of unhealthy snack food consumption. It can also inform discussions regarding the regulation of the composition and marketing of processed snack foods with low nutrient density and high sugar and/or fat content.
- > Processed foods vary in form and nutrient content, so they can have positive and negative implications on diets. Unhealthy processed foods, including snack foods, contribute to the increasing prevalence and severity of overweight/obesity and NCDs, often in populations where micronutrient deficiencies and related health consequences continue to exist. Fortified processed foods can potentially make nutritious diets more affordable and convenient for people who may otherwise find it challenging to meet nutrient needs.

Introduction

The past three decades have witnessed a global shift in dietary patterns and a rapid change in food environments, driven by factors such as urbanization and economic and industrial development. This shift has led to a rising demand for, and increased availability of, unhealthy processed convenience foods, in addition to an increasing tendency towards more sedentary lifestyles. Consequently, many countries, including low- and middle-income countries, are experiencing a nutrition transition, with a concerning increase in the prevalence of overweight and obesity and noncommunicable diseases (NCDs). In many of



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Snack foods on display in a local shop in Guatemala.

these low- and middle-income countries, however, the prevalence of undernutrition remains high. The problem is therefore twofold, and these countries are challenged by the double burden of malnutrition.^{1,2}

For good health and nutritional status, it is essential to meet nutrient intake requirements. These requirements vary according to an individual's size, age, sex and biological status.^{3,4} Nutritional needs are particularly high during periods of rapid growth such as during the complementary feeding stage (6–23 months of age) and during adolescence.⁵ To meet these needs, diverse diets that contain nutrient-dense foods are required, such as specific fresh foods and fortified foods. In low-income settings, for many people, diets that would meet their nutrient needs are not affordable, as nutrient-dense foods are too expensive or may not be widely available.^{6,7} Meeting nutrient needs becomes even more of a challenge in areas where the shift in dietary patterns has occurred; the opportunity cost of preparing nutritious, diverse meals is considered, given the high workloads and other time demands on caregivers, particularly in low-resource settings. In such settings, limited access to cold storage also adds an additional time burden, as more frequent trips to the market are required to purchase fresh foods. Unhealthy processed foods that are high in sugar or fat can have much lower opportunity costs, as they are often much cheaper than nutrient-dense foods⁸ and do not require the same level of

preparation or storage. These foods are also often highly desirable due to taste preferences and attractive packaging, and in some communities these foods are considered to be representative of higher status.

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“Processing can offer the opportunity to fortify commonly consumed foods to increase their nutritional value”

Processed foods come in many different forms and nutrient contents, so not all necessarily have negative consequences for health and nutrition. In fact, processing can offer the opportunity to fortify commonly consumed foods to increase their nutritional value and provide a more convenient and affordable option for people to obtain diets that meet their nutrient needs.⁹ Processing foods can also help to improve shelf life and control for food safety issues. Companies may, however, also use a ‘fortified’ branding claim to make unhealthy foods seem healthier. In many countries, the regulation around processed and snack foods is fairly weak. This enables the marketing of unhealthy snack foods to be deliberately misleading or confusing, and allows these foods to be more easily available and affordable than nutritious alternatives. A situation analysis is required in these instances to increase

awareness among different stakeholders, inform decision-making for regulators and guide actions by public- and private-sector actors involved along the value chain. Strengthened situation analysis enables them to better assess the availability and composition of unhealthy snack foods and the possible impact of these on health and nutrition, and to make decisions to improve the situation accordingly. The Fill the Nutrient Gap (FNG) analyses^{10,11} (see **Box 1** for a brief explanation of the methodology of the FNG) in several countries have included a review on snack food consumption and how it impacts the cost of nutritious diets

BOX 1: Fill the Nutrient Gap

The FNG analysis is used to identify which nutrition-specific and nutrition-sensitive interventions are most appropriate for a given context to improve nutrient intake – inadequate nutrient intake being one of the two direct causes of malnutrition (the other being disease). Any intervention should ultimately result in an improvement in nutrient intake.

The analysis has been developed by the WFP with technical support from the following research institutes: the University of California, Davis; the International Food Policy Research Institute (IFPRI) (Washington, DC); Epicentre (Paris); Harvard University (Cambridge, MA); Mahidol University (Bangkok); and the United Nations Children's Fund (UNICEF).

FNG provides a framework for strengthened situation analysis and multisectoral decision-making that identifies context-specific barriers to adequate nutrient intake among specific target groups. It engages different sectors to propose cost-effective strategies to overcome barriers. FNG has been used in more than 13 countries to date, across Asia, Latin America and sub-Saharan Africa. FNG combines review of secondary data and information with linear programming analysis using the Cost of the Diet (CotD) software developed by Save the Children UK.¹⁶ The FNG analysis considers a range of factors that reflect or affect dietary intake, including local malnutrition characteristics; the enabling policy environment; the type and availability of nutritious foods in local markets; the affordability of nutritious foods; nutrient intake; local practices; and cost optimization.

The consolidated information is analyzed and the findings are reviewed by a multisectoral group of stakeholders, at relevant levels, to come to a shared understanding of the

issues, context and solutions. Through this consultation process, context-specific optimal policy and program actions, including possible entry points for interventions, are jointly identified for different sectors, for example, health, social protection and across the food system, and stakeholders from the public and private sectors.

for key vulnerable target groups, especially children under two years, primary school-aged children and adolescents. This article reports the findings of this analysis in Cambodia,¹² Lao PDR,¹³ Tajikistan,¹⁴ and Ecuador.¹⁵

Methods

In order to assess the impact that snack food consumption has on the cost of obtaining a nutritious diet, three types of diets were modeled using the CotD software:

- 1) The cheapest possible diet that only meets energy needs (EO);
- 2) The cheapest possible diet that meets all nutrient needs,³² includes minimum consumption of local staples, and excludes taboo foods (SNUT); and
- 3) A staple-adjusted nutritious (SNUT) diet that includes the observed average consumption of commonly consumed snack foods.

The consumption of more nutrient-dense snack foods was modeled in some countries.

In each country, diets for households with five or more people, based on the average household size of that country, were mod-



A local vendor's stall in Cambodia.

FIGURE 1: The comparative daily cost in Lao kip (LAK) of an energy-only diet and a staple-adjusted nutritious diet for an average-size household in five provinces³⁴ in Lao PDR

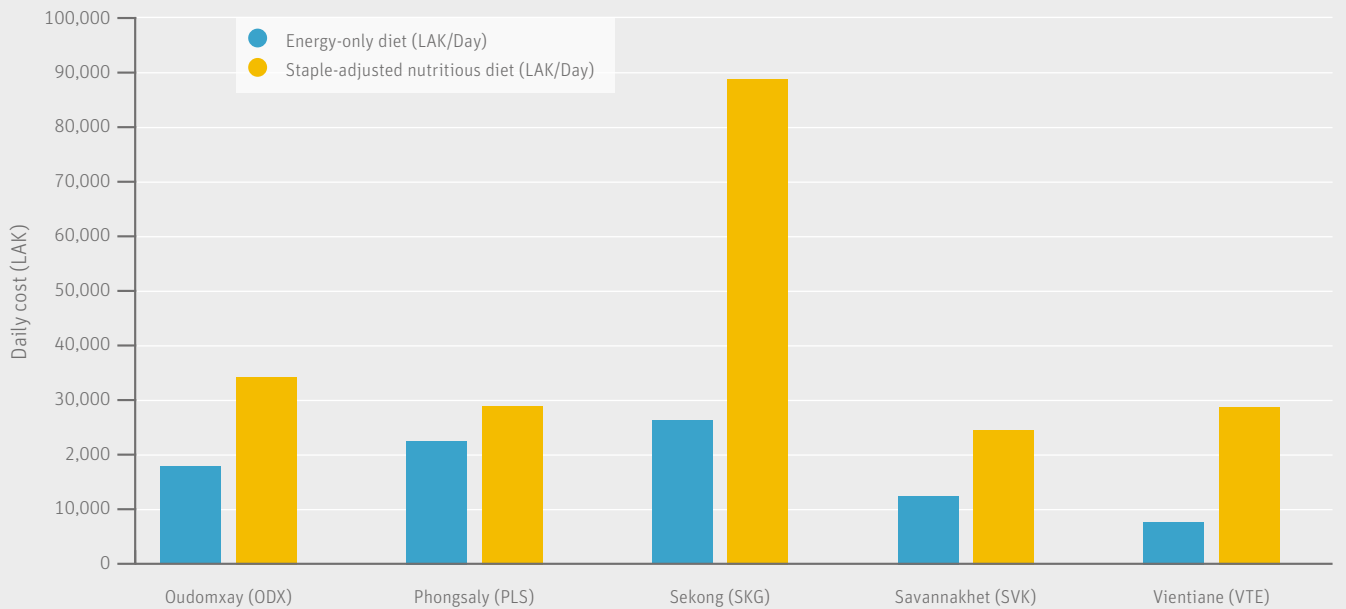
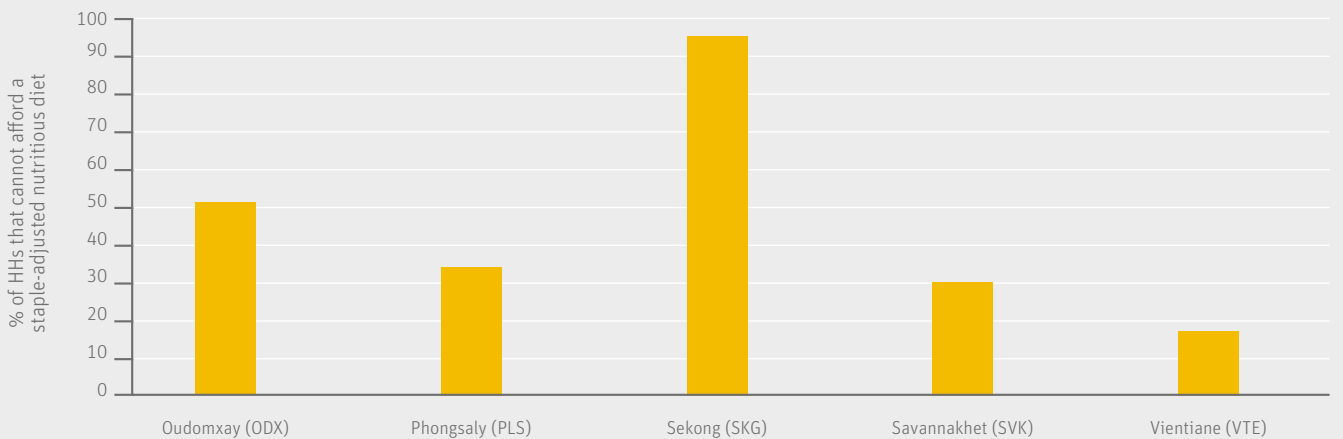


FIGURE 2: Proportion of households (HH) that cannot afford a staple-adjusted nutritious diet in five provinces in Lao PDR³⁵



eled. These model households all included a lactating adult woman, an adult man, a breastfeeding child aged 6–23 months, a primary-school-aged child (6–7 years) and an adolescent girl (14–15 years). In Lao PDR, five-person households were modeled in all zones except for Oudomxay and Sekong, where the average household sizes were larger (six and seven people, respectively). In these areas, an elderly woman (over 60 years old) was included in the model household in both provinces, and in Sekong a child aged 10–11 years was also included. In Tajikistan, where average household size was six people, an elderly man (over 60 years old) was included in the household. In Ecuador, a child aged

3–5 years replaced the 6–7-year-old child in order to align with national programs. Household expenditure data from nationally representative Household Consumption and Expenditure Surveys (HCES) were used to compare to this cost of diet and assess the proportion of households that could not afford a nutritious diet.

Findings

The findings of the Fill the Nutrient Gap analyses demonstrate the high cost of diets that would be able to meet nutrient needs by comparing them to diets that would meet energy needs only. **Figure 1** displays the minimum cost of a nutritious diet (SNUT)

TABLE 1: Information reviewed to conduct the snack food analysis in each country

Country	Type of information available on snack food consumption	Sources	Target group	Foods included in the model
Lao PDR	Multiple studies demonstrating high snack food consumption; supported by stakeholder consultation	Ministry of Agriculture and Forestry 2013; ¹⁹ Bouapao et al. 2016 ²⁰	Children 6–23 months (modeled for a child 12–23 months)	1 portion/week of biscuit/cracker, cake, candy, potato crisps and fruit juice (based on quantitative consumption data on children under 2 from the Cambodia study)
Cambodia	Multiple studies demonstrating high snack food consumption; quantitative data on type of snacks and frequency of consumption by children under 2; supported by stakeholder consultation	Pries et al. 2016; ²¹ HKI 2011; ²² Plan International 2016; ²³ SCI 2016; ²⁴ Skau et al. 2014 ²⁵	Children 6–23 months (modeled for a child 12–23 months)	1 portion/week of biscuit/cracker, cake, candy, potato crisps and fruit juice (based on quantitative data from the ARCH study)
Tajikistan	Detailed report on food environment; supported by stakeholder consultation; price of snack foods sampled in shops in respective regions	WHO & ISPUP 2017 ²⁶	Children 6–23 months (modeled for a child 12–23 months)	1 portion/week of sweet biscuits, savory biscuits, chips (two varieties), chocolate, sunflower seeds, cake
Ecuador	Multiple studies demonstrating high snack food consumption; quantitative data on type of snacks and frequency of consumption by adolescents; supported by stakeholder consultation	Ochoa-Avilés et al. 2014; ²⁷ ENSANUT 2012; ²⁸ Verstraeten et al. 2016 ²⁹	Adolescents (modeled for an adolescent girl 14–15 yrs)	2 models were run: 1) sugary drink (with sugar), 1 portion/week; 2) cookie, 1 portion/week & sugary drink (with sugar), 1 portion/week

in Lao PDR compared to a diet that would meet energy needs only (EO). On average, a diet that met nutrient needs would cost nearly 2.5 times the amount of a diet that only met energy needs. An even more dramatic difference was seen in the other countries: in Ecuador, a nutritious diet was over three times more expensive than the EO diet; in Cambodia, it was 3.3 times more; and in Tajikistan, it was three times more expensive.

These cost differences are indicative of how difficult it is for households to obtain nutritionally adequate diets, especially when considering that these are predominately low-resource settings.³³ The FNG non-affordability analysis further revealed that for a high proportion of the households in each of the study countries, a nutritious diet would not be affordable. **Figure 2** displays the proportion of households that would not be able to afford a nutritious diet in Lao PDR, which ranged from 17% to 95% of households. On the national level, 21% of households in Cambodia would be unable to afford a nutritious diet, 51% in Ecuador (national average) and 29% to 56% in the four regions that were analyzed in Tajikistan.³⁴

In each of these countries, the secondary data and discussions with key stakeholders highlighted that the prevalence of

unhealthy snack food consumption is high. **Table 1** summarizes the available information on snack food consumption in each country. To assess the impact that regular snack food consumption has on the diet of a child under two years of age, this information was modeled³⁵ using the CotD software (see **Table 1** for foods modeled). In some countries, such as Cambodia, consumption data on snack foods was available for children aged 6–23 months, so these specific amounts could be modeled. In other countries, precise consumption data was not available, but from secondary data and key informant information, it was possible to extrapolate a model to demonstrate the potential impact snack food consumption could have on a specific age group.

Figures 3–5 demonstrate the increase in costs to obtain a nutritious diet for a child aged 12–23 months in Lao PDR, Cambodia and Tajikistan. As displayed, regular snack food consumption resulted in diets being 1.4 times more expensive in Lao PDR and 1.7 times more expensive in Cambodia and Tajikistan. This increase in dietary costs is due to the low nutrient content of these foods, which made it more difficult for the software to meet the nutrient needs of the child.

FIGURE 3: Comparative daily cost in Lao kip (LAK) of a staple-adjusted nutritious diet and the cost of this diet with snack food consumption included for a child aged 12–23 months in five provinces in Lao PDR

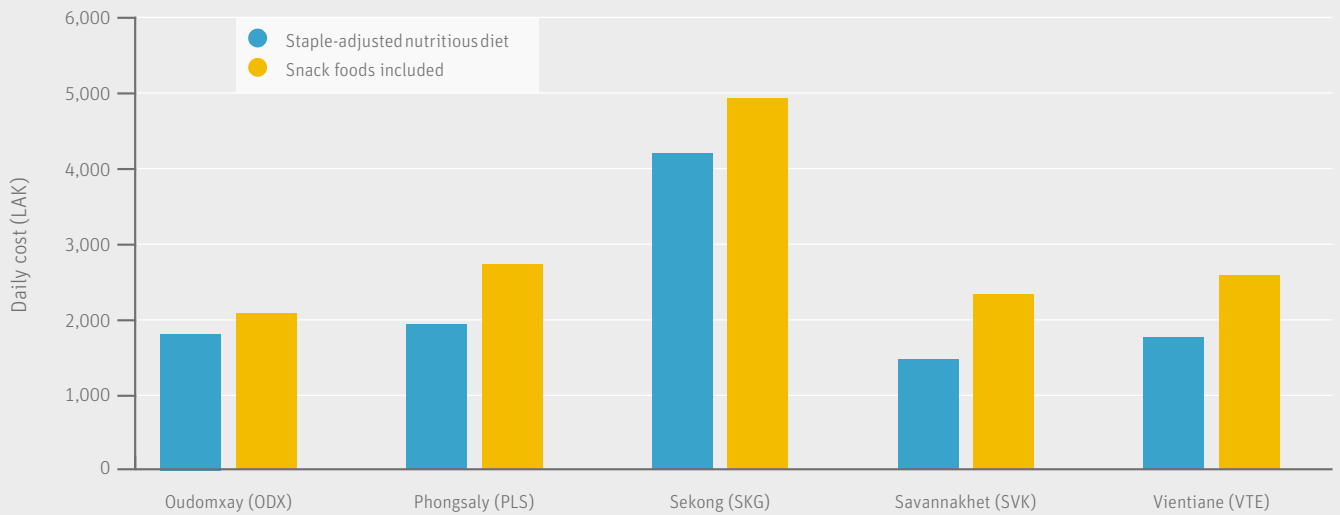
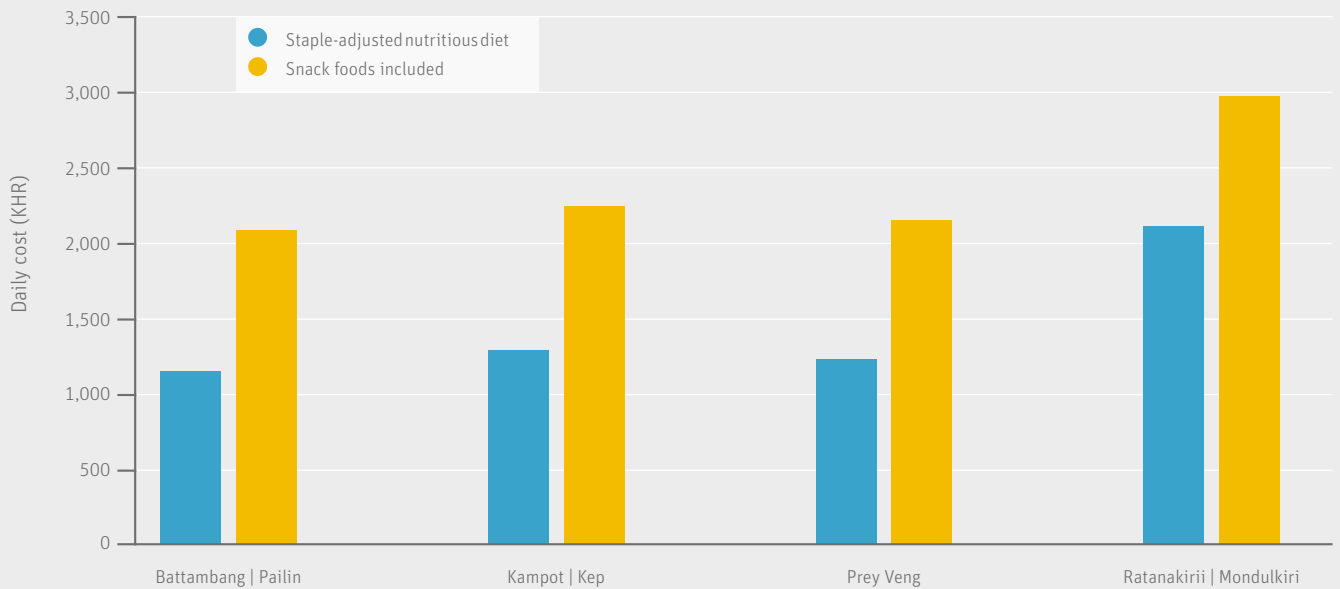


FIGURE 4: Comparative daily cost in Cambodian riel (KHR) of a staple-adjusted nutritious diet and the cost of this diet with snack food consumption included for a child aged 12–23 months in four regions of Cambodia³⁸



Little data was available on the snack food consumption patterns of preschool and school-age children and adolescents for most FNG countries; however, qualitative information indicates consumption is high, if not higher, among these age groups than children under two.^{17,18} In Ecuador, snack food consumption data was available for adolescents, and **Figure 6** displays the increase in the cost of a nutritious diet of an adolescent girl (14–15 years) if sugary drinks and a combination of cookies and

sugary drinks were consumed on a regular basis. The results show that for an adolescent girl, regular snack consumption could increase the cost of a nutritious diet by 33% on average (sugary drink consumption alone by 7%). The results demonstrate that, as in the case of a child aged 6–23 months, unhealthy snack food consumption can make meeting nutrient needs more expensive, as the low nutrient content of high-energy foods requires the software to pick more nutrient-dense (and usually

more expensive) foods to fulfill nutrient requirements without exceeding energy requirements.

In Cambodia, a locally produced fortified food³⁹ intended as a healthier alternative to currently consumed snacks, is currently under development. **Figure 7** displays the cost of a nutritious diet for a child aged 12–23 months if the locally produced fortified food were consumed three times a day, compared to a diet that includes unhealthy snack foods and a minimum cost nutritious diet (SNUT). As shown in the graph, while in some regions a nutritious diet that included the local fortified food would be slightly costlier than a minimum-cost nutritious diet, it would still be much cheaper than a diet that included regular unhealthy snack food consumption. In some regions (Prey Veng and Ratanakiri/Mondulakiri), the inclusion

of the local fortified food reduced the cost of a nutritious diet, as this food is highly nutrient-dense. This demonstrates the potential of a ‘healthier’ snack food in making nutritious diets more affordable and convenient.

“The consumption of unhealthy snack foods can further increase diet costs and make it more difficult to meet nutrient needs”

FIGURE 5: Comparative daily cost in Tajik somoni (TJS) of a staple-adjusted nutritious diet and the cost of this diet with snack food consumption included, for a child aged 12–23 months in four regions of Tajikistan

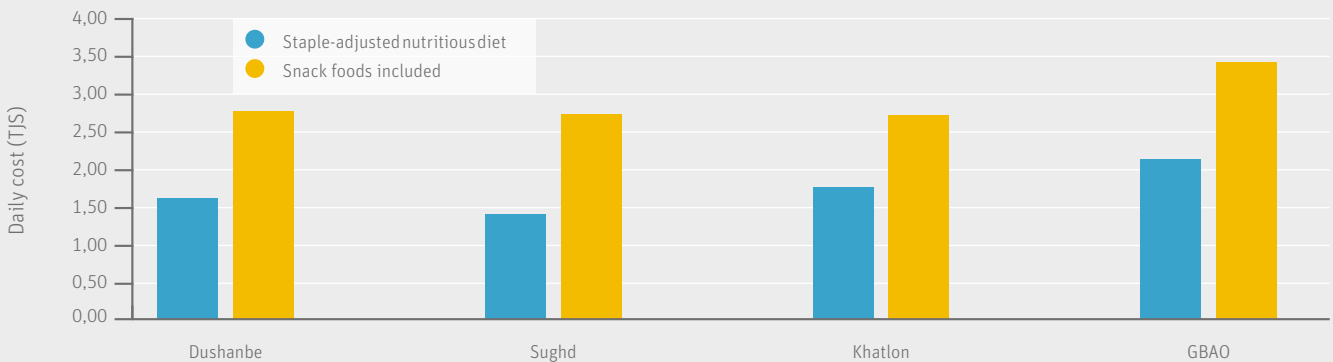
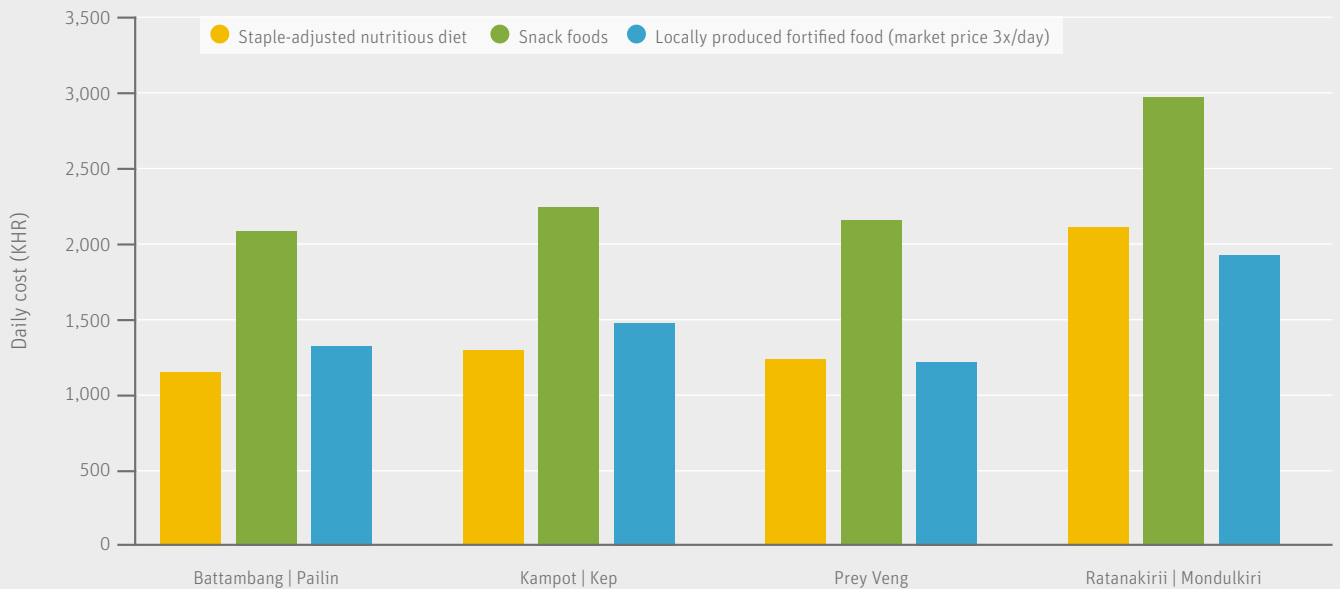


FIGURE 6: Comparative daily cost in US dollars (USD) of a staple-adjusted nutritious diet, the cost of this diet with the consumption of sugary drinks included, and this diet with cookies and sugary drinks included for an adolescent girl in 15 provinces in Ecuador



FIGURE 7: Comparative daily cost in Cambodian riel (KHR) of a staple-adjusted nutritious diet, the cost of this diet with snack food consumption included, and this diet with a locally produced fortified food consumed at market price three times per week for a child under 2 years in four regions of Cambodia



Discussion

These findings demonstrate that in low-resource settings, where it is a challenge for households to access and afford nutritious diets, the consumption of unhealthy snack foods can further increase diet costs and make it more difficult to meet nutrient needs. This further intensifies the need to regulate the marketing and sales of unhealthy snack foods and to encourage caregivers to feed children healthy foods, including snack foods that are nutrient-dense. High consumption of unhealthy snack foods and

sugary drinks may prevent children from meeting nutrient needs and contribute to an increase in childhood overweight/obesity and the risk of NCDs. High snack food consumption, including consumption of sugar-sweetened beverages, is a risk for anyone in the population, not only young children, displacing micronutrient-rich foods and contributing to excess energy intake⁴¹ and other related health issues. Little data were found on the quantities of these foods that are being consumed by older age groups, but judging from their presence in small shops and local markets, it can be assumed that they are being purchased in great quantities, which would increase the likelihood that diets are lacking in essential (micro)nutrients yet contain too much energy. This is supported by the findings from Ecuador that display the higher cost of nutritious diets for adolescents consuming unhealthy snack foods. These unhealthy dietary patterns contribute to the emergence of populations that are overnourished in terms of energy and simultaneously suffer from micro-nutrient deficiencies.

Although regulation of the marketing and sales of unhealthy snack foods might help reduce their consumption, food choices are governed by factors other than cost alone, such as time, convenience, taste preferences, and aspiration.^{30,31} It may not be feasible to influence habits to favor the selection of optimal diets, but as shown by the Cambodia modeling of a fortified snack food alternative, it might be possible to introduce healthier alternatives that are affordable and convenient (in terms of accessibility and shorter preparation times). If such options can be



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A volunteer with UNICEF (left) conducts data collection for a field study on the acceptability of the flavor and packaging of Num Trey (a fish snack) in Ratanakiri Province, north-east Cambodia, in May 2016 by interviewing children and parents.

desirable to target populations and offered at an affordable price point, there is potential to improve access to nutritious diets. Strategies coupled with context-specific social and behavioral change communication (SBCC) interventions to increase consumer awareness of what does and does not constitute a healthy diet and the importance of adequate nutritional status could improve nutrient intake.

The FNG analyses were presented during multisectorial stakeholder meetings in each of the countries mentioned, attended by actors from government, development partners, civil society, the private sector and academia. These presentations led to discussions on how to tackle the issue of high unhealthy snack food consumption and the formulation of country-specific recommendations.

In Lao PDR, the presentation of the FNG findings encouraged the government in their social behavior change communication strategy to incorporate an element that encourages caregivers to feed children healthy foods as opposed to unhealthy processed snacks, and also to raise awareness of the negative health implications of consumption of these foods by young children.

In Cambodia, the FNG analysis strengthened the existing dialogue around the role of snacks and processed food in the rise of the double burden and NCDs in the country. The need to engage more closely with the private sector to produce healthy, viable alternatives was strongly recognized during the FNG dissemination meetings. Development partners in Cambodia have since prioritized efforts to better understand consumption patterns of these foods among older children and adolescents, as well as the food environment, to provide further evidence to guide regulation and policy-making.

In Ghana, the Affordable Nutritious Foods for Women (AN-F4W) partnership, now known as OBAASIMA, developed a range of Ghana-specific fortified foods for women using a quality seal. These products were then modeled as a further FNG analysis, following the original FNG analysis (disseminated in April 2016), to demonstrate the potential impact these foods could have on improving access to nutritious diets for women.

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“The Fill the Nutrient Gap analysis of snack food consumption demonstrates the impact of high consumption of unhealthy snack foods”

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The Fill the Nutrient Gap analysis of snack food consumption can serve as a powerful advocacy tool to demonstrate the impact of high consumption of unhealthy snack foods on the

ability to achieve optimal nutritional status. The FNG dissemination meetings are attended by stakeholders from different sectors (including actors from the public and the private sector) who would not regularly receive this type of information, and this provides them with the opportunity to engage in the dialogue and identify how their sector can contribute to resolving this issue. FNG findings can be used as a basis to advocate for stronger regulation on unhealthy snack foods, highlight the need to provide viable healthy alternatives, and ensure that consumers have access to accurate information to support their choices. The findings can also be used to stimulate public- and private-sector partnerships and coordination mechanisms such as the SUN Business Network to provide a good platform to help foster this dialogue and identify potential areas for collaboration.

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Correspondence: Indira Bose,

World Food Programme Cambodia, House 108, Street 63, Sangkat Boeung Raing, Khan Daun Penh, Phnom Penh, Cambodia
Email: indira.bose@wfp.org

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- Notes on text**
32. A diet that meets the recommended intakes of energy, protein, fat, and 13 micronutrients (vitamin A, C, B₁, B₂, niacin, vitamin B₆, folic acid, vitamin B₁₂, calcium, iron, zinc, pantothenic acid, and magnesium).
 33. Tajikistan is classified as low-income; Cambodia and Lao PDR as low middle-income; and Ecuador as upper middle-income.
 34. In Cambodia and Ecuador the national figure was calculated by weighing the non-affordability figures for each province by their population size.

35. The diet required to meet the nutrient needs of a child aged 12–23 months was modeled using the Cost of the Diet software.
36. The selection of provinces was based on their differing rates of stunting and their differing livelihoods, in order to develop an understanding of the diversity of the national situation in respect to access to, and availability of, nutritious foods.
37. Affordability was estimated by assessing the cost against 65% of total expenditure (a proxy estimate of the amount of expenditure spent on food for less well-off households based on national data collected in Lao PDR).
38. The selection of these regions was based on stakeholder consultation and with a view to displaying a range of areas with differing stunting rates and differing factors influencing access to, and availability of, nutritious foods.
39. UNICEF, in collaboration with the Cambodian Department of Fisheries Post-harvest Technologies, the Quality Control (DFPTQ) of the Fisheries Administration, Institut de Recherche pour le Développement (IRD) and Vissot Co. Ltd, aims to make a locally produced fortified food for young children available on the market. This food contains vitamin A, vitamin C, folate, calcium, iron, zinc, vitamin B₁, vitamin B₂, niacin, vitamin B₆, vitamin B₁₂ and magnesium.
40. And other nutrients such as essential fats, amino acids and fiber, phytonutrients.