PROJECT REPORT:
NUTRITION TRANSITION AND FOOD ENVIRONMENTS IN CAMBODIA




Angkor Research and Consulting LTD.
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ANGKOR RESEARCH

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DEUTSCHE ZUSAMMENARBEIT

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Acronyms and abbreviations

ARC: Angkor Research and Consulting Ltd.
BMZ: German Federal Ministry for Economic Cooperation and Development
CAPI: Computer-Assisted Personal Interviews
CARD: Council for Agricultural and Rural Development
CGM: Care Group Member
CGL: Care group leader
FGD: Focus Group Discussion
GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit
IDI: In-Depth Interview
KAP: Knowledge, Attitude, Practice
MUSEFO: Multi-Sectoral Food and Nutrition Security Cambodia
NGO: Nongovernmental Organization
VHSG: Village Health Support Group
WRA: Women of Reproductive Age

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Mr. Ian Ramage oversaw the survey project. Ms. Saing Ratanaksophea led the data collection and supervised the quality control processes. Ms. Rin Sinan oversaw the quality of the collected data. Mr. Michael Renfrew reviewed and adapted the survey instruments, conducted data analysis and wrote the report. Thank you to Dr. Sanne Singh for her recommendations and contributions to the report also.

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A. Project Background

Program Overview

The Project "Multi-Sectoral Food and Nutrition Security Cambodia" (MUSEFO) is part of the Global Programme "Food and Nutrition Security, Enhanced Resilience" under the "One World – No Hunger" Special Initiative of the German Federal Ministry for Economic Cooperation and Development (BMZ). This project aims to improve the food and nutrition situation of vulnerable populations, especially women of reproductive age (WRA) and children under two years of age. A core activity is nutrition and basic hygiene education and counselling delivered through Care Groups at community level. The project is currently implemented in the provinces of Kampot and Kampong Thom between 03/2015 and 03/2026 in close cooperation with the project's political partner, the Council for Agricultural and Rural Development (CARD).

Cambodia is currently experiencing a nutrition transition, which is generally marked by a shift from a diet rich in starch and fibre-based foods to one dominated by the consumption of fatty, animal-source foods, refined carbohydrates, and processed foods[1]. With the nutrition transition, there is an increasing emergence of overweight, obesity and non-communicable diseases such as diabetes and cardiovascular diseases, which is often linked to high consumption of junk food[2], and unsuitable snacks[3] and drinks[4]. Along with the nutrition transition, food environments have changed with development over time, too. The food environment is "the consumer interface with the food systems that encompass the availability, affordability, convenience, promotion and quality, and sustainability of foods and beverages in the wild, cultivated, and built spaces that are influenced by the socio-cultural and political environment and ecosystems within which they are embedded" (Downs et al. 2020:5)[5].

Signs of nutrition transition are already observed in Cambodia both among children and WRA. A considerable proportion of children aged 6-23 months are being fed infant formula, and powdered milk (29.3%) and drinks containing high amounts of sugar such as soft drinks, fruit drinks, and malt-based drinks were consumed by up to 19.5% of the 6-23-month-old children.[6] Commercially produced snack foods were found to be the third most consumed food group being consumed and being consumed by a higher proportion of the young children than vitamin A-rich fruits or vegetables and other vegetables or fruits, indicating more children eat industrial snack food than vegetables and fruits. The study indicates that consumption of commercial produced snacks is very common among children under the age of 2 years, and the primary reason for feeding industrial snacks among mothers

[1] Nutrition Transition in the South-East Asian Region. Literature Review on the State of Knowledge. Vanessa Rosin for MUSEFO Project/GIZ, Nov 2018.
[2] Junk food refers to foods high in sugar and/or fat, and/or processed.
[3] Snack with/without chemicals, conservative, and/or with high amounts of added sugar and/or salt with are unsuitable for infants and young children.
[4] Drinks with a high amount of chemicals, and/or with sugar.
[5] Downs et al. Food environment Typology: Advancing an expanded definition, framework, and methodological approach for the improved characterization of Wild, Cultivated, and Built Food Environments towards Sustainable Diets. Foods 2020, 9, 532.
[6] Pries et al. Consumption of commercially produced snack foods and sugar-sweetened beverages during complementary feeding period I four African and Asian urban contexts. Maternal & Child Nutrition, 2017. DOI: 10.1111/mcn.12412.

were the children liked the snacks, children demanded/cried to get it, and ~22% of the mothers believed the snacks were healthy for their child.[7] According to the last Cambodian Demographic health survey (2015), 14% of WRAs were underweight (body mass index <18.5) and 17% were overweight or obese, which has increased steadily over the last decade.[8] Paternal food habits and feeding strategies are the most dominant determinants of the child's eating behaviour and food choices.

The data on dietary choices and snack consumption among children and mothers are limited in Cambodia, however, with the trends of snack consumption observed among young children and weight status of the mother, it urges for further investigation of dietary choices and eating patterns including junk food and unsuitable snack and drink consumption among mothers and their children.[9]

Research Aims and Objective

The overall objective of the GIZ Nutrition Transition and Food Environments in Cambodia project is to understand the current food environments, as well as the knowledge, attitudes, and practices of mothers/primary caregivers and their children (6 – 59 months) in the MUSEFO project, (and non-participating mothers) in Kampong Thom and Kampot provinces.

To facilitate a comprehensive approach to understanding the nutrition transition taking place in Cambodia, this study employs four (4) components: focus group discussions and in-depth interviews; household surveys, food environment assessments, and desk review/expert interviews.

To provide meaningful insight to the project, the following questions will be explored:

1. How do caregivers perceive their food environments?
2. How are decision-making and responsibilities related to food and nutrition negotiated within families?
3. What knowledge, attitudes, and practices do caregivers hold regarding personal nutrition and the nutrition of their children?
4. How are the immediate built food environments of mothers/caregivers shaped in terms of availability/diversity, affordability, convenience, promotion and quality, and sustainability properties?
5. What recommendations can be made to MUSEFO for further project activities?

[7] Ibid & Nutrition Transition in the South-East Asian Region. Literature Review on the State of Knowledge. Vanessa Rosin for MUSEFO Project/GIZ, Nov 2018

[8] National Institute of statistics, Directorate General for Health. Cambodia Demographic and Health Survey 2014. The DHS program, 2015.

[9] Scaglioni et al. Factors Influencing Children's Eating Behaviours. Nutrients, 2018. doi: 10.1111/j.1748-720X.2007.00111.x.

B. Methodology

Overview

This project has utilised a mixed method approach to data collection, incorporating:

1. Quantitative questionnaires to learn about the knowledge, attitudes, and practices (KAP) of caregivers.
2. Observational assessment of food environment combined with a structured questionnaire and.
3. Qualitative focus group discussions (FGD) with mothers/caregivers and grandparents discussing their perceptions of their food environments and household dynamics around nutrition.
4. In-depth interviews (IDI) with shopkeepers along with photographs of best-selling snacks.

Activities were structured to capture KAP, perceptions of food environment, household dynamics contributing to nutrition choices, and in-person assessment of food environment of respondents.

The findings of the questionnaire were used to inform the development of the FGDs and IDIs. To personally evaluate food environments, ARC conducted observational assessments of the food environments of respondents to understand how food environments affect or contribute to their currently held knowledge, attitudes, and practices.

Study Design

To facilitate a comprehensive approach to understanding the nutrition transition taking place in Cambodia, this study is comprised of four (4) components: focus group discussions and in-depth interviews; household surveys; food environment assessments; and expert interviews. This section provides details of each component's methodology and sampling for the study.

Component 1: Focus Group Discussions & In-Depth Interviews

Component 1 includes two qualitative components: focus group discussions and in-depth interviews.

Focus Group Discussions: The FGD provides foundational knowledge for the study and builds upon the data collected from the household survey. Participants were selected using purposive sampling of mothers/caregivers and grandparents in target provinces. To explore potential differences in food environment perceptions between people living in rural and urban settings, 1 urban FGD was added per province with another FGD conducted in Phnom Penh. Fifteen FGDs with 8-10 participants have been conducted, covering either (a) perceptions of food environments or (b) household dynamics related to nutrition.

> ***Perceptions of Food Environments***: Focus group discussions on the topic of "perceptions of food environments" enquired about participants' accessibility to food (i.e., affordability and availability), how convenience impacts their perceptions of their food environment, and promotion quality of natural/created food environments.

Household Nutrition Dynamics: Focus group discussions for the second topic, "household nutrition dynamics", explored the process of how nutritional choices are made in the homes. Specifically, participants were asked about how mothers and caregivers select roles, make decisions, and go about acquiring, procuring, and preparing food for their households.

In-Depth Interviews: In addition to FGDs, 6 in-depth interviews (IDI) were conducted with shopkeepers in FGD provinces (Kampong Thom, Kampot, and Phnom Penh). In-depth interviews focused on the types, range, price, popularity, and supply chain of snacks purchased for or by young children. To supplement this qualitative inquiry, photographs of the most purchased snacks in the interviewee's shop were taken.

Component 2: Household Survey

The purpose of the household survey is to evaluate the KAP of mothers and caregivers on nutrition. The knowledge of mothers and caregivers on nutrition involves the depth of their knowledge, as well as where they receive(d) their information from (e.g., social media, friends/family, doctors, etc.). For attitudes, the household survey enquires about the beliefs of mothers and caregivers based on the perceptions of food environments established in component 1; for behaviour, consumption patterns, food procurement, and the factors influencing nutrition practice. The household survey also addresses identified factors beyond knowledge and attitude that affect dietary choices (e.g., media consumption, education level, sources of nutrition information, age, gender, income, 24/commune, etc). Respondents for the household survey will be selected from a sampling of Care Group beneficiaries and mothers/caregivers of children between 6-59 months old, as well as non-Care Group beneficiaries.

Surveys have been conducted in the target provinces: Kampot, Phnom Penh, and Kampong Thom. Sampling from Kampot and Kampong Thom provinces was from 22 villages per province for a total of 44 villages; the Phnom Penh sample was randomly select from 24 villages (10 respondents per village) for a total of 240 respondents. Care Group beneficiaries have been selected using systematic random sampling, whereas non-Care Group beneficiaries have also been selected using systematic random sampling.

Component 3: Food Environment Assessment

Food environment assessment data focused on evaluating the built food environment (i.e., the informal market environment, including wet markets, street vendors, small shops, and mobile food vendors). The assessment is observational and documents the availability of food, diversity of choice, food price, food placement and display, and how sellers promote brands. In addition to the observations, structured interviews with vendors (food sellers and mobile sellers) were conducted to gain insight into their perception of consumer requests and expectations, what promotions they engage with, and opportunities and challenges to selling healthy products.

Component 4: Expert Interviews

Expert interviews were undertaken with experienced project staff, as well as government and nongovernmental organization (NGO) experts.

C. Nutrition Transition and Food Environments

MUSEFO Background

Beginning in 2015, the Multisectoral Food and Nutrition Security – Cambodia (MUSEFO-Cambodia) country project has been implemented in Kampot and Kampong Thom provinces, within 180 target villages, across 8 selected districts. The target group is Women of Reproductive Age (WRA) and young children (under 24 months). In total there are 15,000 women of reproductive age and 3,000 children under 24 months of age in the target group.

The project was designed to address the issues of food insecurity and malnutrition that were a persistent feature of the target communities. The baseline assessment identified that 83% of families experienced some form of food insecurity and only 47% of children under 24 months of age achieved the minimum dietary diversity[10]. The factors responsible for these outcomes are numerous and cross-sectoral. They incorporate low levels of nutrition knowledge at the community level (both household and health centre), exacerbated by limited financial capacity and a lack of crop diversification in agricultural production.

To address these issued, the initial conception of MUSEFO-Cambodia comprised of three main components that recognised the need for a multisectoral approach:

1. **Nutrition-Sensitive Diversification of Food Production** (home gardening) using the farmer-to-farmer approach by providing capacity development on Multi-Purpose Farm to key farmers. Trained key farmers were then asked to provide cascading awareness-raising activities to cooperating farmers, and others, while also applying the concept of the Minimum Farm Package .
2. **Integrating and Improving the Quality of Nutritional Services in the Health Sector** by providing capacity development measurements for the health centre staff so that they can effectively deliver nutrition counselling services related to the basic understanding of a healthy diet for women and children under 2 years old to the clients using the services at the health centre.
3. **Care Group Approach** designed to integrate nutritional knowledge with basic hygiene topics and are conducted at the community level by volunteer groups. Care Group Leaders (CGLs), and Village Health Support Groups (VHSGs), with support from the project team ensuring the women receive support and understanding on the aforementioned topics.

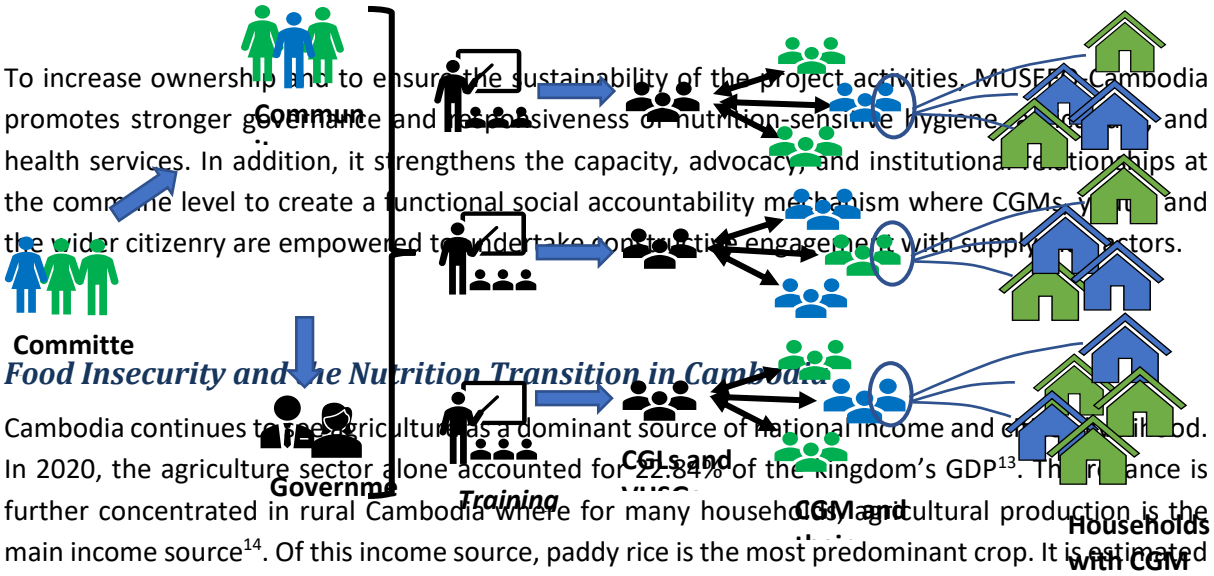
As of mid-2020, MUSEFO-Cambodia has been reshaping its strategy by focusing on a more robust Care Group Approach as the core component of the project interventions. The new Care Group Approach is designed to focus on four intervention groups: (1) Pregnant women and WRA with children under 24 months of age; (2) WRA with children between 24 and 60 months of age; (3) non-WRA (particularly grandmothers) as primary caregivers of children under 24 months of age; and (4) husbands/male household members. Regarding (4), under the reformed approach, husbands/male household

[10] Amry O, Weingaertner L. Nutrition baseline survey Cambodia: for the global programme food and nutrition security, enhanced resilience July 2016. GIZ: 2016.

members are encouraged to participate in home visits and care group sessions with their partners/female care group members. The interventions to be targeted in these groups will focus on cooking and hygiene practices and dietary food consumption, with a particular emphasis on social behaviour change. In addition, activities will also include: nutrition-sensitive business training to Care Group Members (CGM); diversification strategies for garden and small animal farming; local food vendor healthy food promotion; and, nutrition curriculums and school gardens.

As can be seen from figure 1 below, the MUSEFO Care Group structure is a community-driven behaviour model that combines cascaded, repeated messaging with comprehensive coverage to elicit behaviour change specific to maternal and child health and nutritional well-being[11]. Each Care Group has a CGL and VHSG volunteers who are trained by the implementing partner's facilitators to learn relevant topics on nutrition and health and discuss barriers/solutions to behaviour change. Each CGL is then responsible, with support from the VHSG, for meeting with their Care Groups to share knowledge that can thereafter be passed on to non-Care Group members.

Figure 1. MUSEFO Care Group Structure[12]



To increase ownership and to ensure the sustainability of the project activities, MUSEFO Cambodia promotes stronger governance and responsiveness of nutrition-sensitive hygiene, [illegible] and health services. In addition, it strengthens the capacity, advocacy, and institutional relationships at the commune level to create a functional social accountability mechanism where CGMs, [illegible] and the wider citizenry are empowered to undertake constructive engagement with supply [illegible] actors.

Food Insecurity and the Nutrition Transition in Cambodia

Cambodia continues to see agriculture as a dominant source of national income and employment. In 2020, the agriculture sector alone accounted for 22.84% of the Kingdom's GDP[13]. This reliance is further concentrated in rural Cambodia where for many households agricultural production is the main income source[14]. Of this income source, paddy rice is the most predominant crop. It is estimated to contribute around 50% of agricultural GDP and uses 3.3 million hectares of land[15]. The consequence of this focus on rice is an unbalanced diet among the rural population. In the face of high demographic pressure (high population growth rates particularly in urban areas), farmers need to lift production output beyond the current levels. This is important to meet the rising food demand, to assure national food and nutrition security, and to decrease the reliance on food imports.

As an outcome of an overreliance on a small number of crops 32% of children under 60 months of age in Cambodia show signs of chronic malnutrition[16]. Many factors influence the growth and

[11] Brief on MUSEFO, 2018-2020, GIZ:2020
[12] Source: Sona Sharma, Care Groups on Facebook Ensuring engagement during the COVID-19 pandemic.
[13] Data from World Bank (2021)
[14] The Future of Multi-Purpose Farms in Cambodia. GIZ (2021)
[15] Cambodia Economic Update May 2019. World Bank (2019)
[16] Training for Nurses and Midwives in Nutrition Counselling, MUSEFO Cambodia, Kampot and Kampong Thom 2016-2017. GIZ (2021)

development of a child, with child feeding practices one of the most important elements. Proper initiation of feeding solid and semi-solid foods from the age of 6 months, increasing the variety and frequency of meals the child gets, while at the same time maintaining frequent breastfeeding, are key. Concomitantly, however, Cambodia has been delivering an average economic growth rate of 6.1% over the past decade[17]. This transition to lower-middle income has brought about changes in the built food environments and ushered in a nutrition transition.

The issues at hand resulting from food insecurity and economic growth are not simple to tackle. As outlined in the works of Downs et al.[18] "nourishing a growing population in ways that supports human and planetary health is one of the greatest challenges of the Anthropocene". Malnutrition in all its forms, including overweight, obesity, undernutrition, and their coexistence, is the leading cause of death globally and affects every country.

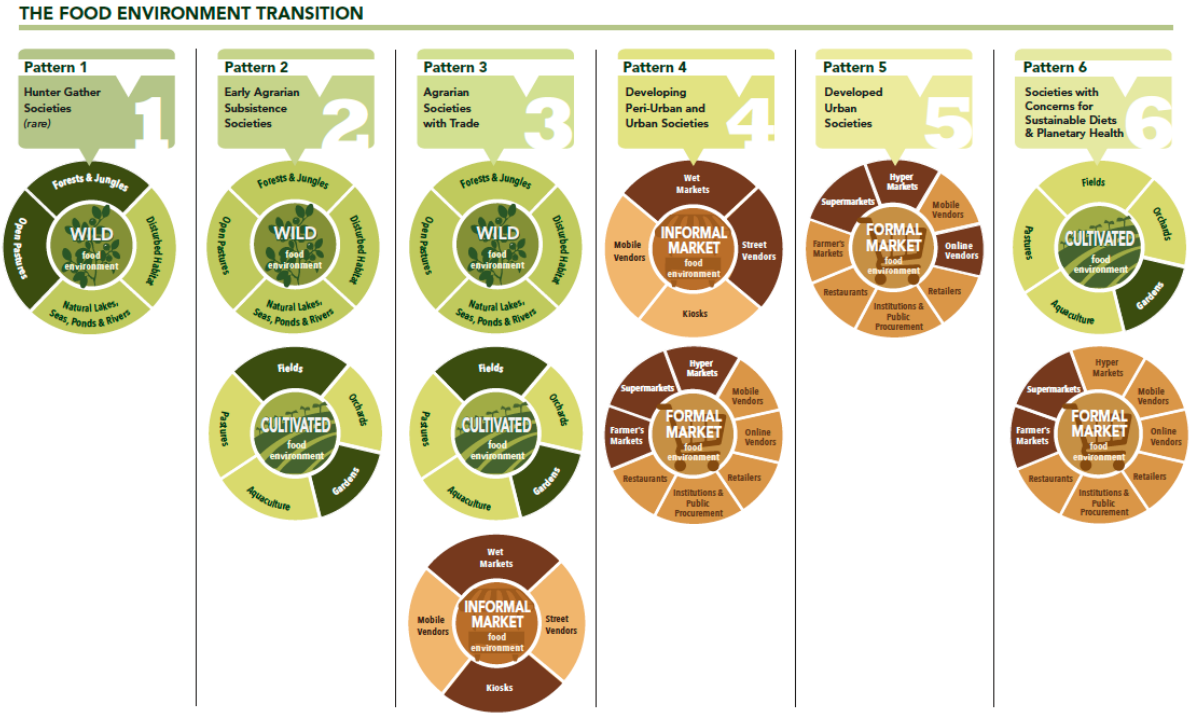
The figure below provides an overview of food environment transitions in the context of development that is useful to conceptualising Cambodia's status. Given the multisectoral approach and long-term thinking built into MUSEFO-Cambodia, it is useful to identify future stages of the food environment and food system that may be built into the planning stages.

As can be seen in figure 2, the types of food environments that communities and countries have access to may shift over time with development. This figure depicts how the food environment types change aligned to Popkin's nutrition transition. A sixth pattern of food environment types was added by Downs et al. to indicate a transition to societies with concerns for sustainable diets and planetary health. As of 2021, Cambodia is at pattern 4, a developing peri-urban and urban society, comprising of informal and formal markets.

Figure 2. Nutrition Transition with Development Stages (Downs et al., 2020)

[17] Data from World Bank (2021)

[18] Food Environment Typology: Advancing an Expanded Definition, Framework, and Methodological Approach for Improved Characterization of Wild, Cultivated, and Built Food Environments toward Sustainable Diets. Downs et al. (2020)



A crucial issue with respect to nutrition and health outcomes during this stage is the dramatically increased availability and consumption of commercially produced foods and beverages such as packaged snacks and fizzy drinks. As of 2017, a study conducted by Pries et al. identified that in Phnom Penh, children of mothers in the lowest wealth tercile were 1.5 times more likely to consume commercial snack food products, compared to wealthier mothers. This result is compounded by the insight that 80.6% of mother's sampled noted that their child (between 6 and 23 months of age) had consumed a commercially produced snack food in the previous week, whilst 29.8% had consumed a commercially produced sugar-sweetened beverage. Such snack and drink consumption patterns during the critical complementary feeding period require further attention as such products are often high in added sugars and salt, making them inappropriate for infants and young children.

D. Fieldwork Results and Analysis

Component 1: Focus Group Discussions and In-Depth Interview

Table 1. Focus Group Discussions

No	Province	District	Commune	Village Name	Type of Group
1	Kampot	Chhuk	Chhuk	Trapeang Chrey	Parents
2	Kampot	Chhuk	Boeng Nimol	Prech	Parents
3	Kampot	Toek Chhou	Kandaol	Meanrith	Parents
4	Kampot	Chhuk	Duon Yay	Preykhmom	Parents
5	Kampot	Toek Chhou	Trapeang Pring	Bos Trabaek	Grandparents
6	Kampot	Toek Chhou	Koun Satv	Kampong Tnaot	Grandparents
7	Kampot	Chhuk	Satv Pong	Chrey	Grandparents
1	Kampong Thom	Stoung	Samprouch	Slak Kranch	Grand Parents
2	Kampong Thom	Santuk	Tang Krasang	Sangkom Thmei	Grand Parents
3	Kampong Thom	Stoung	Chamna Kraom	Chi ab	Grand Parents
4	Kampong Thom	Baray	Chaeung Daeung	Ponnoreay	Parents
5	Kampong Thom	Kampong Svay	San kor	Krasaing Kha	Parents
6	Kampong Thom	Kampong Svay	San kor	Sangkr Kha	Parents
7	Kampong Thom	Baray	Ballangk	Doung	Parents
1	Phnom Penh	Chbar Ampov	Preak Aeng	Toul Tachan	Grand Parents

Table 2. In-Depth Interviews

No	Province	District	Commune	Village Name	Type of Vendor	How long has the business been open?
1	Kampot	Chhuk	Chhuk	Trapeang Chrey	Shophouse Vendor	60 months
2	Kampot	Toek Chhou	Koun Satv	Kampong Tnaot	Small Store Vendor	5 months
1	Kampong Thom	Kampong Svay	San kor	Krasaing Kha	Small Store Vendor	120 months
2	Kampong Thom	Stoung	Chamna Kraom	Chi ab	Small Store Vendor	120 months
1	Phnom Penh	Chbar Ampov	Preak Aeng	Toul Tachan	Small Store Vendor	27 months
2	Phnom Penh	Chbar Ampov	Preak Aeng	Toul Tachan	Shophouse Vendor	27 months

1.1.1. Focus Group Discussion

The FGD was developed to explore two topics that are interdependent in the discussion of family nutrition:

(1) Perceptions of Food Environments. Covering the *where* of food environments with respect to participants. It focuses on food availability, affordability, convenience, promotion, and quality of natural and built food environments as perceived by mothers or caretakers.

(2) Household dynamics related to nutrition. The FGD has sections exploring the *who*, the *what*, and the *how* of household nutrition dynamics. It focuses on mothers and caretakers'

situation regarding the roles, decision-making, and responsibilities for acquiring, procuring, and preparing food for the family.

In addition, section 5 of the FGD explores the effects of Covid-19 on nutrition habits. In this section, FGD participants have reported that during Covid-19 there was much less opportunity to go to the market due to restrictions, hereby decreasing the accessibility of food from available market sources and potentially limiting dietary diversity. This was compounded by the fear that if there were many people at the market then they might get sick from Covid-19 as a result. In addition to worries around health, participants noted an increase in the prices of everyday items. As a result, many people brought less and sourced more from their own land where they could. Under such circumstance it can be expected that dietary diversity is negatively affected due to reduced access to food sources and types.

1.1.2. Perceptions of Food Environments

This section examines the perceptions of food environments with respect to where food is purchased, why it is purchased from there, and whether the interviewees have a sense of healthy foods versus unhealthy foods. Using the mapping criteria displayed in figure 3, FGD participants were asked to discuss the food sources they utilise, and the foods that they get from these sources.

Figure 3. Food Source Mapping Exercise

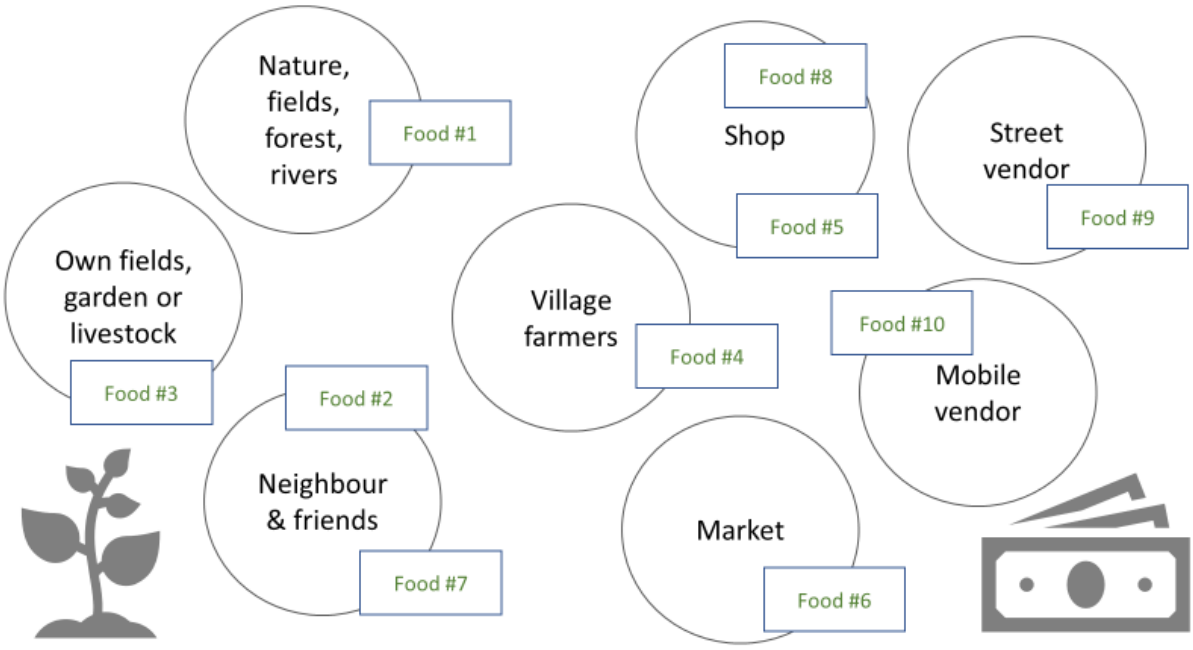


Table 3 below contains the typical food categories identified in relation to the source that they are procured from. The variety of options is important as it allows households to balance a requirement for dietary variety against an often-limited financial capacity and distance to alternatives. In particular, neighbourhood relations facilitate a food-type arrangement for trade and sharing. For example, having breakfast with your neighbour. As can be seen, nutritious foods are generally sourced from the first four source categories. By comparison, snacks, processed foods, and desserts are from the last three (although nutritious options are also found here as well.

Table 3. Food Source and Type

Food Source	Food Type Sourced
Nature, fields, forests, river	Fish, crab, snail, and vegetables.
Own fields, garden, or livestock	Chicken, vegetables, rice, and fish.
Neighbour and friends	Vegetables, and cooked meals.
Village farmer	Fish, crab, and snail.
Shop	Vegetables, fruit, meat (notably only a category in Phnom Penh)
Mobile vendor	Fried meatballs, sweet sticky rice wrap in banana leaves, sesame hollow donut, sish, sork, vegetables, and snacks.
Street vendor	Lemonade tea, butterfly tea, package snacks, cooked pork rice, pork, nutritious porridge, vegetables, and fish.
Market	Food, vegetables, fish, meat, snacks, dessert, chicken, fish, vegetables, and rice.

Street food and mobile vendors are found to be used up to three times a week to purchase finished or cooked meals, whilst the purchase of snacks from such vendors is often a daily occurrence. Practically, street and mobile vendors provide customers a variety of products they do not have at home, as well as addressing issues of distance by being available at your door. In addition, such vendors can specialise in offerings and sell them at a reasonable price to customers with limited time to prepare snacks.[19]

As well as discussing the food environment, participants were asked to note whether or not they felt a given food group was healthy or unhealthy. Table 4 below contains the results. 14. Cheese and 15. Yoghurt stand out as food groups where health designation is most uncertain, so too 24. Fried foods.

Table 4. Food Group Health Classification.

Food Group	Designation
01-Basic food made from whole grains: rice, crispy rice pancake, glass noodles, breads, Khmer noodles or porridge.	Healthy
02-Pure cereals: corns, brown rice.	Healthy
03-Roots/white tubers: potatoes, cassava, sweet potato, potato noodles, taro, lesser yam, green cavendish banana	Healthy
04-Beans: soybeans, peanuts, red beans or green beans	Healthy
05-Yellow/Orange vegetable rich of vitamin A: carrot, pumpkin, sweet potato	Healthy
06,1-Dark green leave vegetables: ivy gourd leaves, moringa leaves, green edible amaranth, morning glory, dwarf pak choi, pickled mustard green	Healthy
06,2-Dark green leave vegetables: Pumpkin leaves, sweet leaf bush, choy sum, mustard green, collard green or broccoli	Healthy
07,1-Other vegetables: eggplant, cauliflower, yardlong bean, cabbage, mung bean sprout, tomato or lady fingers	Healthy

[19] Snacks are considered to include fresh and prepared fruits and vegetables, waffles, Khmer cake or dessert, and homemade ice cream and chips.

07,2-Other vegetables: winter melon, sponge gourd, bitter melon, ridge gourd, bottle gourd, ivy gourd fruit, cucumber	Healthy
07,3-Other vegetables: Local lettuce, banana flower, mushroom, bamboo shoot, Chinese radish, green mango, green papaya	Healthy
08-Fruits rich of vitamin A: ripe mango, ripe papaya or passion fruit	Healthy
09-Fruits have many sections: oranges, tangerines, pomelo, fragrant pomelo	Healthy
10,1-Other fruits: banana, watermelon, sweetsop, pineapple, jackfruit, star fruit	Healthy
10,2-Other fruits: mangosteen, durian, rambutan, longan fruits, guava, dragon fruits or apples	Healthy
11-Grain sweet: cake, donut, biscuit in tin box, sticky rice dessert, egg custard, durian custard, steamed layer rice cake, or coconut palm sugar sticky rice balls (plai-ai)	Kampot and Kampong Thom: Healthy Phnom Penh: Unhealthy
12-Other sweet/dessert: candies, chocolate, ice cream, tapioca shredded dessert (lot-swit), Khmer mung bean dessert, coconut jelly	
13-Eggs: chicken egg or duck egg also	Healthy
14-Cheese: cheese (soft, hard or food has cheese odour/coated with cheese)	Not Sure
15-Yogurt:	Not Sure
16-Processed meat: sausages or ham	Unhealthy
17-Unprocessed red meat (ruminant animals): beef, buffalo meat, lamb, goat	Healthy
18-Unprocessed red meat (non ruminant animals): pork, frog, turtle, mice, binturong, rat or wild animal meat	Healthy
19-Chicken, duck or goose	Healthy
20-Fish and seafood: fish, seafood, eel, shrimp, canned tuna, fermented fish	Healthy
21-Fruit seeds and cereals: peanuts, sunflower seeds, pumpkin seeds, watermelon seeds	Healthy
22-Extra processed food, salty packaging: French fries or prawn cracker snack	Healthy
23-For quick boil: Instant noodles	Unhealthy
24-Deep fried: chicken fried, banana fried, sweet potato fried or French fried	Healthy
25-Liquid milk: fresh milk, UHT milk or powdered milk	Healthy
26-Milk drinks/coffee/tea which sweet: lemon tea, condense milk coffee, ice coffee, ice chocolate, ice green tea	Unhealthy
27-Fruit juice: juice, juice beverages, cane juice or fruit smoothies	Healthy
28-Sweet beverages (sweet soda): sweet drink like: Coca-Cola, Fanta, Sprite, energy drinks	Unhealthy
29-Fast food: burger king, KFC, Pizza Company, Five Star, Lucky Burger or other places that sell burgers, chicken fried or pizza	Unhealthy

In general, healthy foods are considered easy to procure as they are plentiful, and it is feasible to grow them yourself. However, FGD respondents referred to the difficulty in preparing healthy food for their families. This is considered an outcome to the perception that healthy food requires creativeness in its preparation and execution. Adding on to this, is the idea that it is a timelier process and mothers have little support in the household for food preparation or looking after the children. From these

insights one might propose that mothers and caregivers would benefit from support in developing healthy eating practices and knowledge that remove the concerns of time constraints and creativity.

1.1.3. Household Dynamics Related to Nutrition

In addition to the food environment, it is important to understand the household dynamics at play when it comes to nutrition and childcare. Mother and grandmother are the adults most responsible for both arenas. Mothers as the primary caregiver, and grandma when mum is unavailable due to working commitments. In addition, support may be on hand from father, aunty, uncle, grandpa, or siblings.

With specific relation to childcare, the primary caregivers' (mother and grandmother) roles involve feeding, bedtime routines, bathing, dressing, and playtime. The latter of these is also often cited as a role for father and older siblings. Aunts and uncles can provide an alternative location for the children to be cared for. Male roles are described as similar but occurring if female household members are busy and on an infrequent basis.

Intergenerationally, childcare nutrition is identified as having changed with respect to a greater availability of food and drinks options. Households no longer need to grow quite so much of the required produce as the availability is plentiful and the cost is cheaper.

As regards food, mother and grandmother make the decisions on food in the household. Other family members may have a say on occasion with respect to food preference, particularly the father. Mum and grandmother have the responsibility to determine where food is sourced. The same dynamic is true when it comes to how much money is spent, what type of food is purchased, and who cooks the food. The father may take more involvement when instructed to purchase, grow, or harvest food. Table 5 details commonly consumed food by meal category.

Table 5. Common Foods by Meal Category

Meal Category	Foods Consumed
Breakfast	Khmer Noodle Rice (fish, duck egg, pork) Fried rice Porridge (pork, fish, duck egg)
Lunch	Rice (fish) Fried Rice Soup (sour, vegetable, Pror-heu, lemongrass) Stir-fried vegetables Porridge (pork, fish, duck egg)
Dinner	Rice (fish, duck egg, pork, stir fried vegetables) Fried egg Soup (sour, vegetable, Pror-heu, lemongrass, Kor-ko) Fish caramel Porridge and duck egg
Snacks	Cake

	Lemon tea Fruits Sugar cane juice Packaged snacks Fried banana Bread Meatballs Boiled sweet potato Sticky rice wraps in banana leave cake

FGD participants were also asked to identify adult only and child only foods. The latter focused on porridge, boiled sweet potato, corn, milk, jelly, cake snacks, and ice cream. With the exception of the latter two, these foods were cited as supporting bone development, supporting health, and supporting brain development. For cake and ice cream caregiver noted that they made children happy. Additionally, these foods are chosen as they are easy to find, minimise stomach pain, and are favoured by children. By comparison, adult foods were noodles, papaya salad, energy drinks, meatballs, sour fruits, soups, and fried food.

When asked what foods pregnant and breastfeeding women and young children should not eat, respondents noted that for pregnant women they should not eat spicy, fermented, or sour food, nor drink alcohol and smoke because it can affect the foetus. Whilst children should not eat packaged snacks because it can affect physical development, and cause diarrhoea and tooth cavities.

Considering Cambodia's changing socio-economic landscape, it is of interest to consider what constitutes a traditional diet versus a modern one. Traditional Cambodian diets are considered to items that have been passed down between generations, embrace vegetables and rice, and are cheap. Examples include, soups, fermented fish, pig's leg caramel, meatballs, and rice dishes. In comparison, a modern diet is one that is more expensive and is newly popular such as roast beef or chicken, seafood barbecue, smoothies, prawns, papaya salad, and spicy noodles. The majority of those involved in the FGDs identified that their household's diet was more traditional as it was made in the way that was passed down and is cheap to make.

1.1.4. In-Depth Interview

Six IDIs with where conducted with local vendors - four small store vendors and two shophouse vendors – to provide insight into the demand and supply of food and drink items in the local community. In particular, the IDIs provided an opportunity to gauge the snack purchasing habits of Cambodian children and the health perceptions of local vendors as to their stocked items and produce. Two IDIs were conducted in each of the three provinces of interest: Kampong Thom, Kampot, and Phnom.

On average, vendors interviewed has been operating their business for an average of 60 months. Each vendor identified the importance of being at their home as a primary reason for the location of their operation. It allows them the ability to balance other commitments with respect to raising children, preparing meals for the family, and taking care of the household. In addition, vendors noted that their location was determined by the fact that the land was owned by the vendor and rent was therefore

not required. Vendors were asked to provide their top five selling snacks alongside details on cost, popularity, and purchaser. The products and their selling price are detailed below.

Table 6. IDI Kampong Thom 01

				
Sakura	Soft Cake	Red Milk	Tenta	Oni Cake
Biscuits	Cake	Condensed milk	Flavoured chips	Processed salty snack
500r/pack	500r/pack	1000r/carton	500r/pack	500r/pack
Vendor perspective on why these items are popular: The cake has soft texture. Unsure for other items but knows that children like them all.				

Table 7. IDI Kampong Thom 02[20]

				
Lactosoy	Khun Milk	Angkor Milk	Red Milk	AD Milk
Milk	Milk	Milk	Condensed milk	Fruit flavoured milk drinks
800r/carton	1000r/carton	1000r/carton	1000r/carton	1000r/carton
Vendor perspective on why these items are popular: Children like them. Healthy for child development. Tasty. Grandma likes the children to have them.				

Table 8. IDI Kampot 01

				
Juice	Package Snack	FA Jelly	Orange Juice	Candy
Sugar cane juice	Processed Salty Snack	Jelly	Orange Juice	Small sucking candies

[20] Kampong Thom Vendor 2 stands out from the IDI pack due to the concentration of milk products that sell within their top five. The vendor noted that she had heard from mothers and caregivers in the community that these milk drinks are very good for child health and growth. Whilst she sells other types of snacks, she puts extra effort into promoting milk products.

1000r/bottle	500r/pack	500r/pack	500r/bottle	100-500r/pack
Vendor perspective on why these items are popular: Good price for sale.				

Table 9. IDI Kampot 02

				
Juice	Pumpkin Snack	Milk Cake	Chocolate Cake	Peanut Cake
Sugar cane juice	Flavoured chips	Cake	Cake	Cake
1000r/bottle	500r/pack	500r/pack	500r/pack	500r/pack
Vendor perspective on why these items are popular: No harm to children's health. Children like to eat them. Good quality snacks at reasonable price.				

Table 10. IDI Phnom Penh 01

				
Angkor Milk	Candy	Sakura	Hanami	Oreo
Milk	Small sucking candies	Biscuits	Processed salty snack	Biscuit
1000r/carton	500r/pack	500r/pack	1000r/pack	2000r/pack
Vendor perspective on why these items are popular: Children like them due to the sweet taste.				

Table 11. IDI Phnom Penh 02

				
Red Milk	Yoghurt Milk	Copp Snack	Hanami	Oreo
Condensed Milk	Fruit flavoured milk drinks	Cereal	Processed salty snack	Biscuit

1000r/carton	1000r/carton	35000r/bag	1000r/pack	500r/pack
Vendor perspective on why these items are popular: Snack is tasty. Milk helps to support bone development in children.				

With respect to the food and drink that they sell, vendors stated that popularity amongst customers, perceived quality of product by the vendor, and availability at wholesale were the primary reasons for stock selection. In addition, every interviewee noted that there was a demand for healthy foods; with Vendor IDIK01 stating that if the market had healthy snacks for children, then she would purchase them for sale. This suggests that there is low supply of healthy snack alternatives.

In terms of children, vendors noted that snacks were purchased a minimum of one time per day when alone or with siblings, and a further one time with parents. Each of these visits had the same average spend of 500 riel to 1,000 riel reported by vendors in Kampot and Kampong Thom. For Phnom Penh the minimum spend starts at 1,000 riel and can be as high as 3,000 riel.

All vendors have identified the use of a wholesale market in the purchase of their goods. In addition, vendors utilise passing seller carts, local markets, and delivery services (in Phnom Penh).

Component 2: Household Survey

The purpose of the household survey is to evaluate the KAP of mothers and caregivers on nutrition. The knowledge of mothers and caregivers on nutrition involves the depth of their knowledge, as well as where they receive(d) their information from (e.g., social media, friends/family, doctors, etc.). For attitudes, the household survey enquires about the beliefs of mothers and caregivers based on the perceptions of food environments; for behavior, consumption patterns, food procurement, and the factors influencing nutrition practice. The household survey also addresses identified factors beyond knowledge and attitude that affect dietary choices (e.g., media consumption, education level, sources of nutrition information, age, gender, income, village/commune, etc.). Respondents for the household survey have been selected from a sampling of Care Group beneficiaries and mothers/caregivers of children between 6-59 months old, as well as non-Care Group beneficiaries. The household survey instrument can be found in Appendix (1).

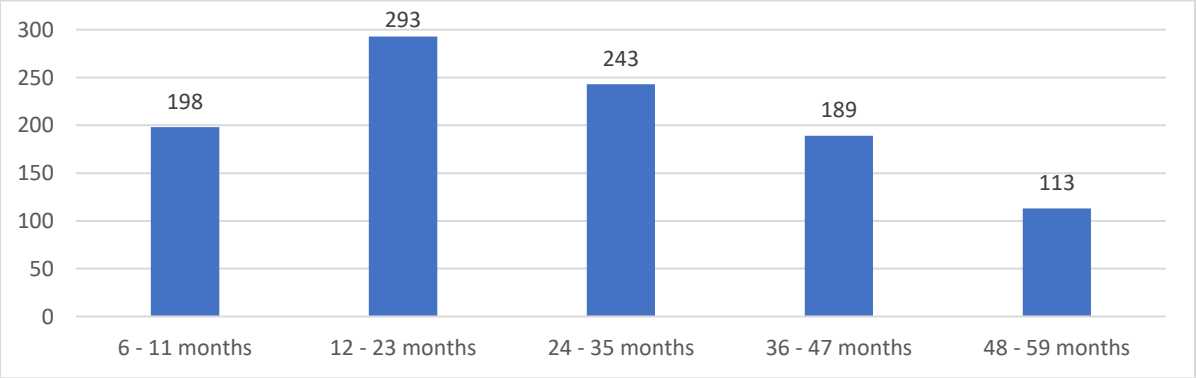
1.1.5. Module 1. Background Information

Module 1 enquired about household features relating to occupation, background, and relationship to the MUSEFO project. In total, 1,036 households were surveyed across the three provinces:

- ***Kampot***. 397 households, of which 199 (50.1 percent) are MUSEFO beneficiaries;
- ***Kampong Thom***. 397 households of which 194 (48.9percent) are MUSEFO beneficiaries; and,
- ***Phnom Penh***. 242 households.

All households had at least one child between 6 and 59 months, of which 183 households had more than one. For these households, the information provided was about the youngest child within the age bracket.[21] For those with more than one child in the household 168 households had two, 13 households had three, and 2 households had four. The gender breakdown of children is 517 females and 519 males. Figure 4 captures the age range in months of the only, or youngest, children in the sample.

Figure 4. Age of Child

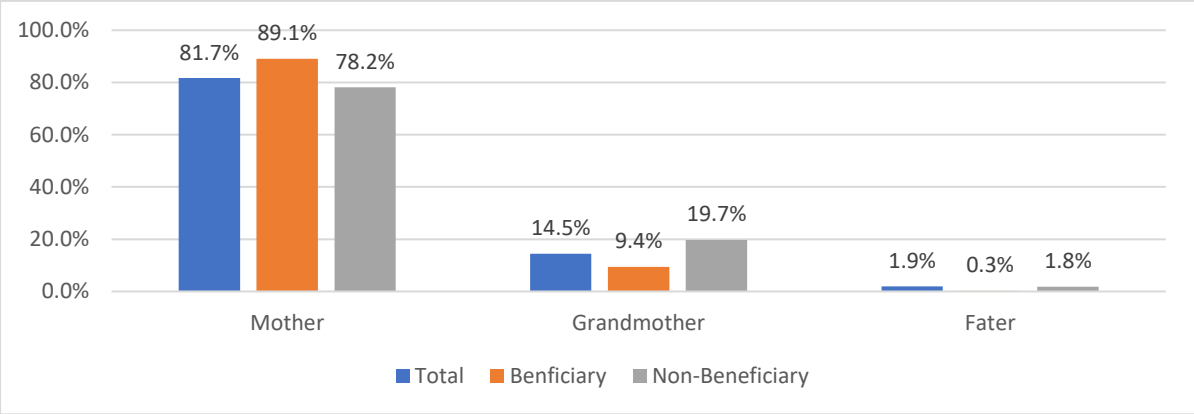


Noting the age breakdown, 61 percent of children are reported to be no longer receiving infant formula or being breastfed. Of the 404 households still nursing their child, 280 are breastfeeding, 114 are using infant formula, and 10 are using both methods.

[21]Households with more than one child between 6 and 59 months: Kampot (74 households), Kampong Thom (54 households). And Phnom Penh (55 households).

With respect to the primary caregiver, 1,031 of the respondents are between 15 and 49 years old, and 97 percent are female. Figure 5 highlights that the mother is typically the primary individual responsible. Grandmother is next, followed by father. For beneficiary households, mothers are identified as the primary caregivers above the total sample average. The same is true for the prevalence of grandmothers in the non-beneficiary sample. In terms of household respondent education level, 935 respondents (90 percent) have attended school, where grad 6 is the average highest school year completed.

Figure 5. Primary Caregiver

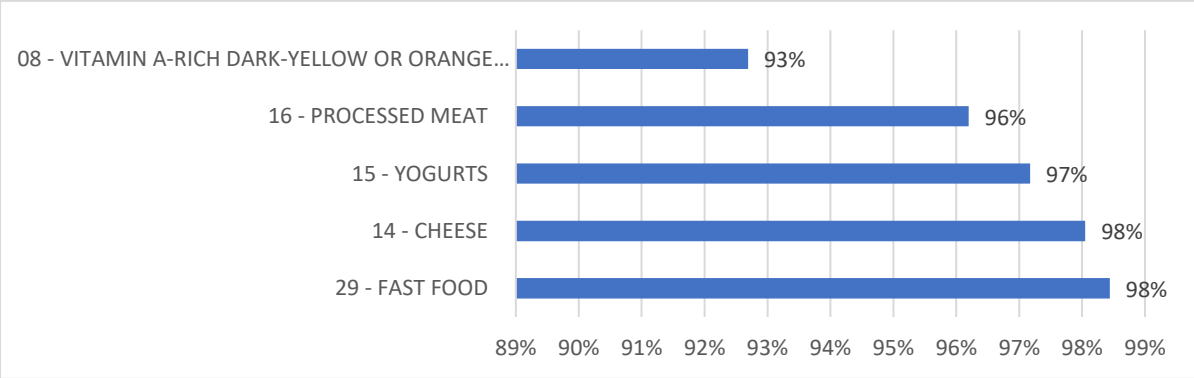


1.1.6. Module 2. Food Consumption and Food Acquisition

Module 2 introduced the respondents to thirty-three food group classifications and asked them to note whether they, or their child, had eaten anything from each category the day before and, if so, to note what sources they came from. Figure 1.3 to 1.6 capture the most common food groups between the four categorizations: (1) not consumed, (2) consumed by caregiver, (3) consumed by child, and (4) consumed by both. In every food group mentioned, the primary source of the food was noted to be "purchased from neighbors, vendors, market".

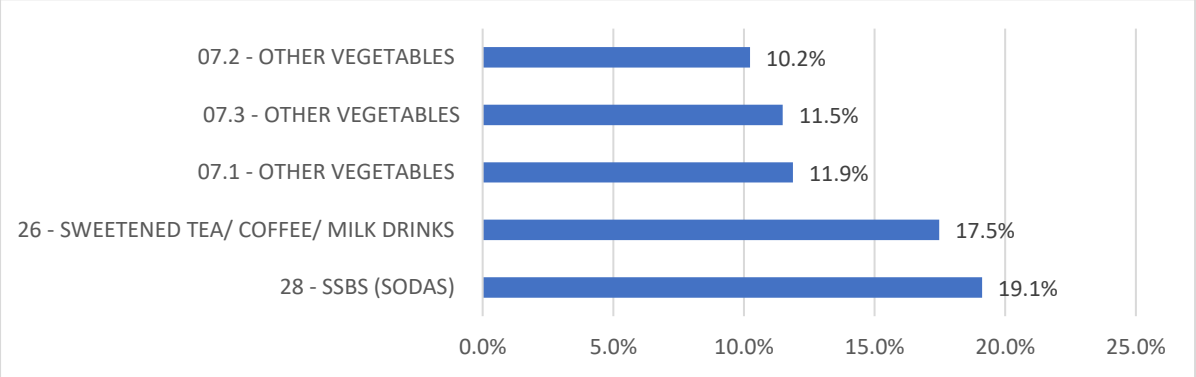
Beginning with the foods identified as (1) not consumed by caregiver or child, the top five food categories are the same for beneficiary, non-beneficiary, and full sample classifications. They are fast food, cheese, yogurt, processed meat, and vitamin A-rich dark-yellow or orange fruits. Figure 6 contains the top-five food groups for the total sample by percentage.

Figure 6. Top Five Food Groups Not Consumed by Either Caregiver or Child (% of total sample)



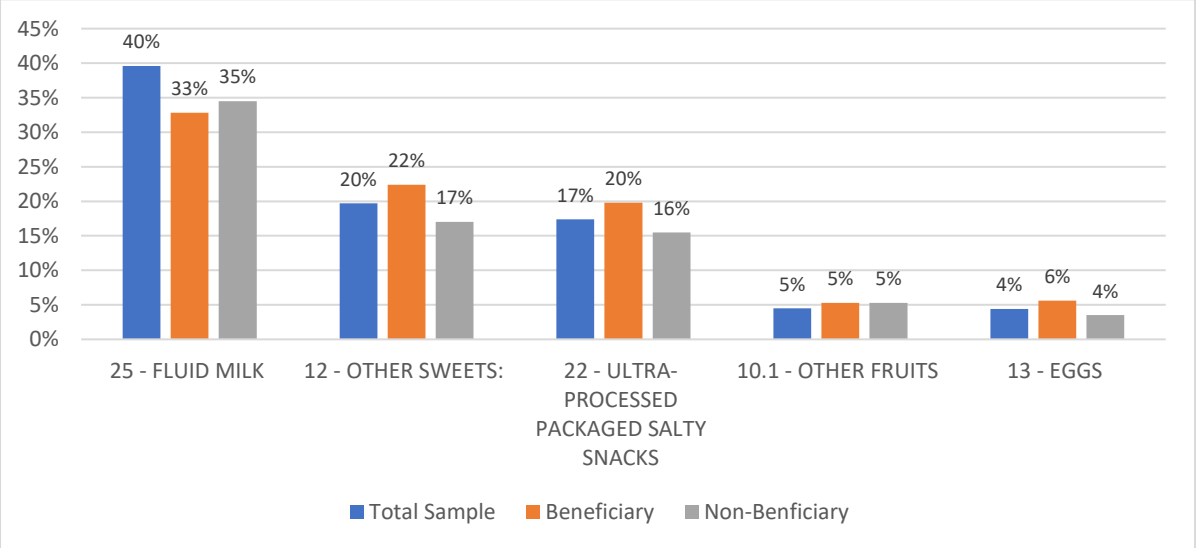
For food groups consumed by caregivers only, the top five is the same across all three classifications (beneficiary, non-beneficiary, and full sample): SSBS (soda), sweetened tea/coffee/milk drinks, other vegetables (including eggplant, cauliflower, cabbage), other vegetables (including lettuce, mushroom, and bamboo shoot), and other vegetables (including winter melon, gourd, and cucumber). The only exception here is that non-beneficiary households report unprocessed red meat as their fifth most consumed food group for caregivers only.

Figure 7. Top Five Food Groups Consumed by Caregiver (% of total sample)



As can be seen in Figure 8, there are two food groups of concern with respect to child nutrition. Other Sweet/Dessert (including candies, chocolate, ice cream, and tapioca shredded dessert) and Ultra-processed packaged salty snacks are consumed at a high frequency across all categories. Curiously, this rate is higher for program beneficiary households.

Figure 8. Top Five Food Groups Consumed by Child



With respect to foods consumed by both caregivers and children, the five food categories are the same: staple foods made from grains, fish and seafood, unprocessed red meat, eggs, and other fruits (including banana, watermelon, sweetsop, pineapple, jackfruit, and star fruit).

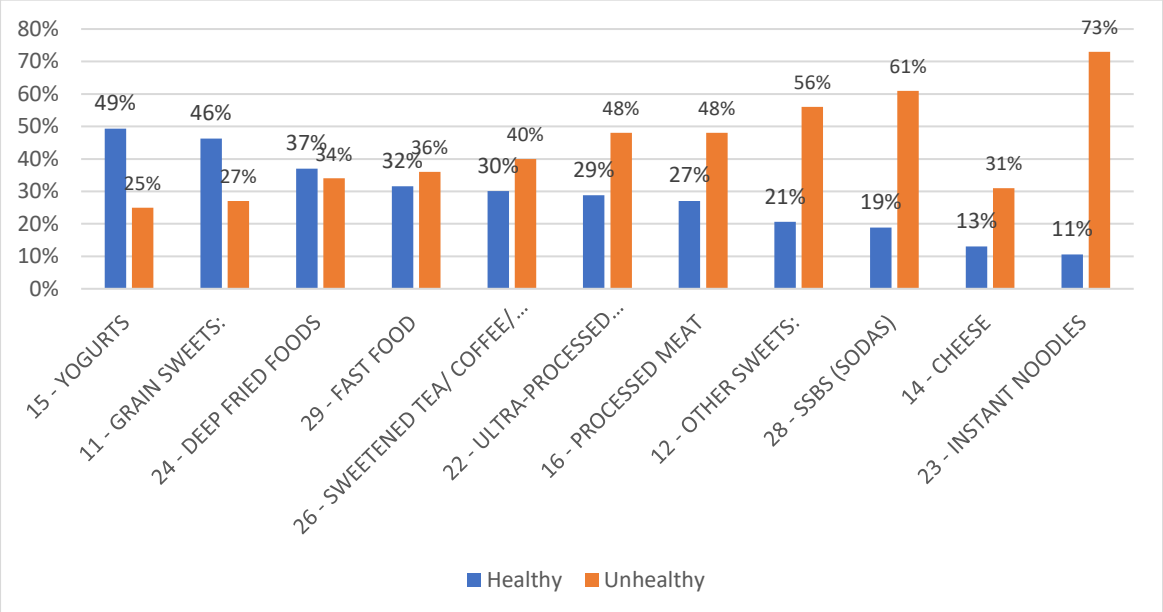
1.1.7. Module 3. Perceptions of Healthiness of Different Foods and Drinks

Module 3 asked respondents to rate their perception of the thirty-three food group classifications on a scale of 1 (unhealthy) to 5 (healthy). Table 12 contains the responses capturing foods that are considered unhealthy or moderately unhealthy by more than a combined 25% of those interviewed in the sample (or in the beneficiary or non-beneficiary groups). As can be seen, the most commonly food that was considered unhealthy is instant noodles, followed by soda and sweets. Ten of the eleven food groups can reasonably be considered as unhealthy; however, sweetened yogurt stands as an interesting outlier. Beneficiary respondents had a greater awareness of the unhealthy classifications of soda, sweets, salty snacks, and sweetened tea/coffee/milk drinks, set against non-beneficiary respondents. However, the opposite was true for instant noodles and deep-fried foods.

Table 12. Food Group Perception Responses. Classified Unhealthy Food Groups (% of response)

Food Group	Full Sample	Beneficiary	Non-Beneficiary
23 - INSTANT NOODLES	73%	66%	71%
28 - SSBS (SODAS)	61%	61%	55%
12 - OTHER SWEETS:	56%	52%	49%
22 - ULTRA-PROCESSED PACKAGED SALTY SNACKS	48%	46%	43%
16 - PROCESSED MEAT	48%	43%	44%
26 - SWEETENED TEA/ COFFEE/ MILK DRINKS	40%	38%	35%
29 - FAST FOOD	36%	33%	34%
24 - DEEP FRIED FOODS	34%	23%	29%
14 - CHEESE	31%	26%	25%
11 - GRAIN SWEETS:	27%	21%	20%
15 - sweetened YOGURTS	25%	25%	26%

Figure 9 contains the comparison table for healthy versus unhealthy perspectives on the food groups contained in table 12.



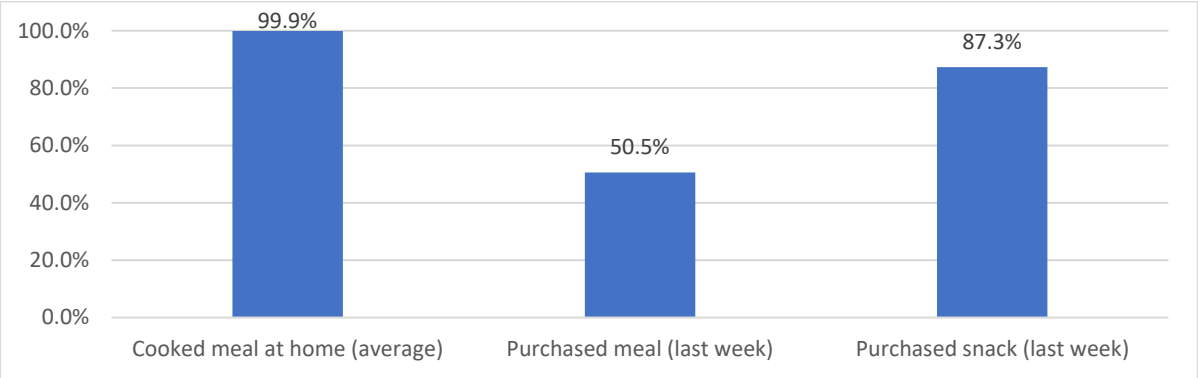
When compared to the results for the those who have a perception of these foods as healthy, there is a worrying 29% of the sample who consider ultra-processed salty snacks to be somewhat healthy or healthy; this grows to 30% for beneficiary households and 32% for non-beneficiary households. A similar concern is identified for fast food. Perhaps most curious is the consideration around deep-fried foods, where there is a higher percentage of respondents who think that they are healthy than those who think they are unhealthy. This is also the case for grain sweets.

1.1.8. Module 4. Food Practices and Access to Nutrition Information

With respect to food practices and access to nutritional information, respondents noted that they themselves where primarily responsible for cooking and procuring food in the households at 99% and 98% of respondents respectively. This level is the same across beneficiary and non-beneficiary groups.

In both cases the respondent's mother and husband are frequently listed as supporting figures in these roles. For beneficiary groups the rate of a husband's involvement (22.9%) is higher than husbands in non-beneficiary household (19.8%), whilst grandmothers' involvement is slightly lower. Figure 9 highlights the almost total reporting of home cooked meals featuring as part of a households every day eating habits. It can also be seen that purchasing snacks and meals is a regular feature of respondent's diets. For beneficiary households, 50% stated that they had purchased a meal in the last week versus 47% of non-beneficiary households. For snack consumption the rate is 89% to 87% respectively. These results also align with the FGD insights around regular daily snack consumption from a mobile or street vendor in most case, whilst finished meal purchases where still frequent but less of an everyday occurrence.

Figure 9. Percentage of Population's Eating Procurement Habits

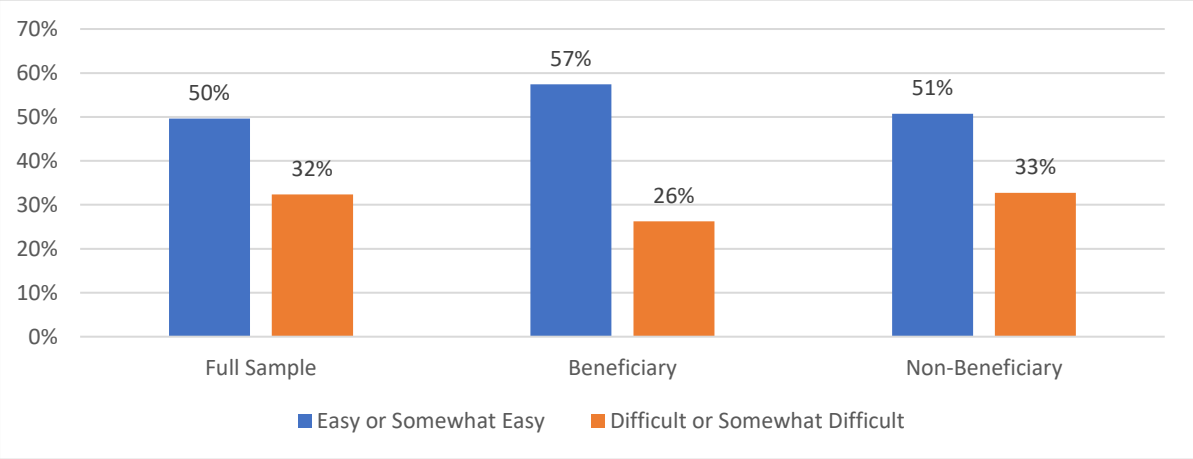


When it comes to looking at the nutritional information on packaged foods, drinks, and snacks, 47% of respondents confirmed that they look at such labels; of which 84.7% do so to check for the expiration date. The number of people looking at labels is greater in beneficiary households, but the reasons for looking at them are consistent across all groups.

As can be seen in figure 10, 50% of respondents found the preparation of healthy meals easy or somewhat easy. This increases to 57% for beneficiary households. For those who noted that this was the case, they noted predominantly that this was the case because healthy food was easy to find and that children liked to eat it. For the 32% who found it difficult or somewhat difficult to prepare healthy food, respondents noted that the opposite was true. In addition, and in consideration of the FGD

discussion on this topic, there is also a sense that healthy cooking requires creativity that there is either no time or finance to achieve. Encouragingly, beneficiary households reported that it was difficult or somewhat difficult at a lower rate.

Figure 10. Is it easy or difficult for you to prepare healthy meals for you and your child?



In considering different food environments, table 13 contains the categorization of food source by primary justification for use. The most visited source is village shopping venues, followed by mobile vendors, and home, forests, or jungles. Food quality and safety is the most common justification for utilizing a given source.

Table 13. Food Sources and Reasoning for Use

Food Source	% of Sample Using Source	Most Common Frequency of Use	Main Reason for Use
141. Home, forests, or jungles	70.4%	2-4 time/week (49%)	Food Quality and Safety
153. Own home garden	65.3%	2-4 time/week (45%)	
150. Own fields or orchards	52.8%	Only during season (82%)	
144. Open fields or roadsides	26.7%	2-4 time/week (33%)	
174. Mini marts or supermarkets	10.7%	Seldom (<1 time/mo) (49%)	
180. Cafe/restaurants or coffee shops	7.6%	Seldom (<1 time/mo) (63%)	
177. Formal farmers markets	2.9%	Seldom (<1 time/mo) (27%)	
168. Village shops	84.0%	2-4 time/week (37%)	Convenience
162. Mobile vendors	81.7%	2-4 time/week (32%)	
165. Street food vendors	30.1%	1-3 times/mo (27%)	
183. Online	4.2%		
156. Raised animals	66.8%	1-3 times/mo (29%)	Availability (Free)
147. Lakes, rice fields, or rivers	36.7%	Seldom (<1 time/mo) (25%)	
159. Own Pond or fish farm	12.5%	1-3 times/mo (25%)	
171. Wet markets	66.9%	Seldom (<1 time/mo) (21%) 2-4 time/week (20%)	Diversity of Selection

The final module of section four provides insights as to respondent's access to nutrition information. From those interviewed, 21% reported having heard information about nutrition in the past month, of which eating vegetables was the most common message (89% reported receiving information on this front). For beneficiary households the rate is considerably higher at 31%, whilst only 11% of non-beneficiary households only reported seeing nutrition information. As for source, 33% received their information from Facebook, 22% from TV, and 7% from health providers. Other cited sources include GIZ (for beneficiary members), neighbors and the village chief. A similar proportion of respondents (26%) noted having actively looked for information about nutrition; typically, from social media, female peers, or health providers.

Table 14 contains the top three products that respondents reported seeing in the previous week, categorized under the media from which they were presented. All four forms of media count energy drinks and soft drinks amongst the highest reported. Of the media, social media has the highest reported rate of use at 64% of the sample, whilst TV adverts are the most seen of the traditional commercial advertisement forms (20 percent of respondents noted seeing a TV advert; versus 5% for village posters and 1% for radio).

Table 14. Top Three products advertised in the Past Week by Source (% of respondents)

Rank	TV Commercials	Radio Commercials	Village Advertisements	Social Media Advertisements
[1]	Energy Drink (71%)	Soft Drink (33%)	Beer (56%)	Energy Drink (28%)
[2]	Soft drink (49%)	Energy Drink (20%)	Soft Drink (36%)	Prepared Khmer Dishes (21%)
[3]	Cake/Candies/Biscuits (11%)	Khmer Desert (13%)	Energy Drink (35%)	Soft Drink (19%)

1.1.9. Module 5. Health Perception

Module 5 asked respondents questions pertaining to their health status, and chronic illnesses.

Figure 11 summarizes the incidence of these conditions reported by respondents. High cholesterol was the most reported condition at 10.7% for the full sample, whilst cancer was the lowest reported. There is a higher reported incidence of diabetes and hypertension/high blood pressure in the beneficiary group, whilst heart disease and diabetes are more common in the non-beneficiary group.

With respect to drinking and smoking behaviors, only 1% of the sample identified as a smoker, whilst 32% acknowledged that they drank alcohol. Of the latter, 61% alcohol drinking respondents reported zero consumption in the previous week.

Figure 11. Incidence of Health Diagnosis (% of sample)

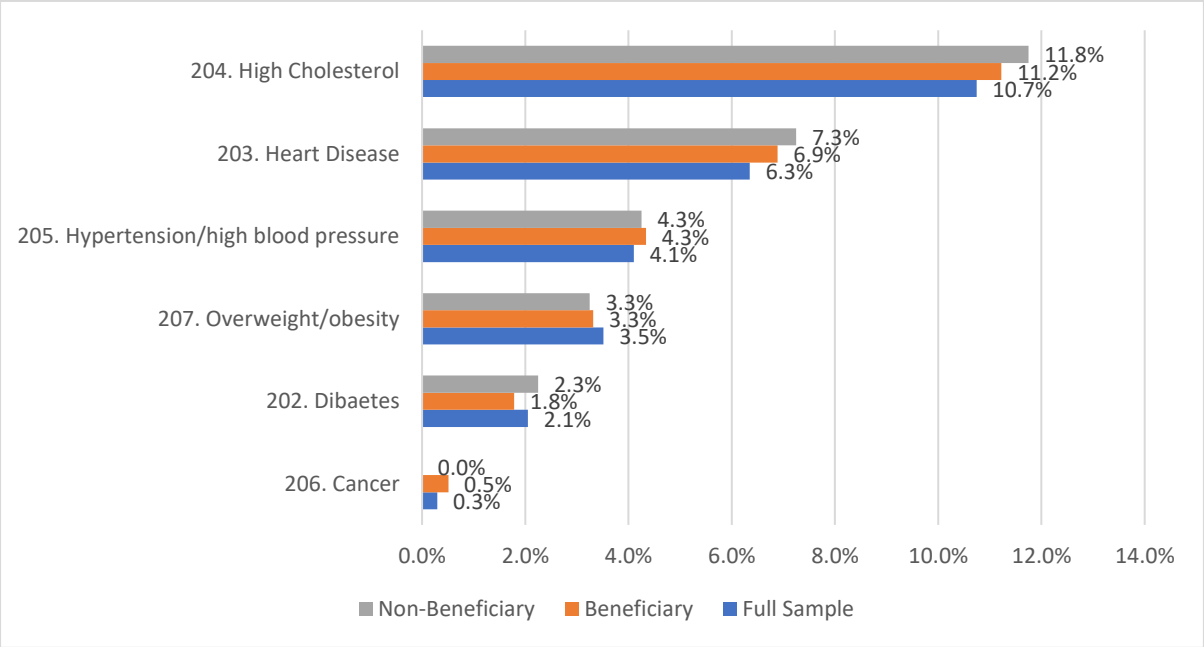
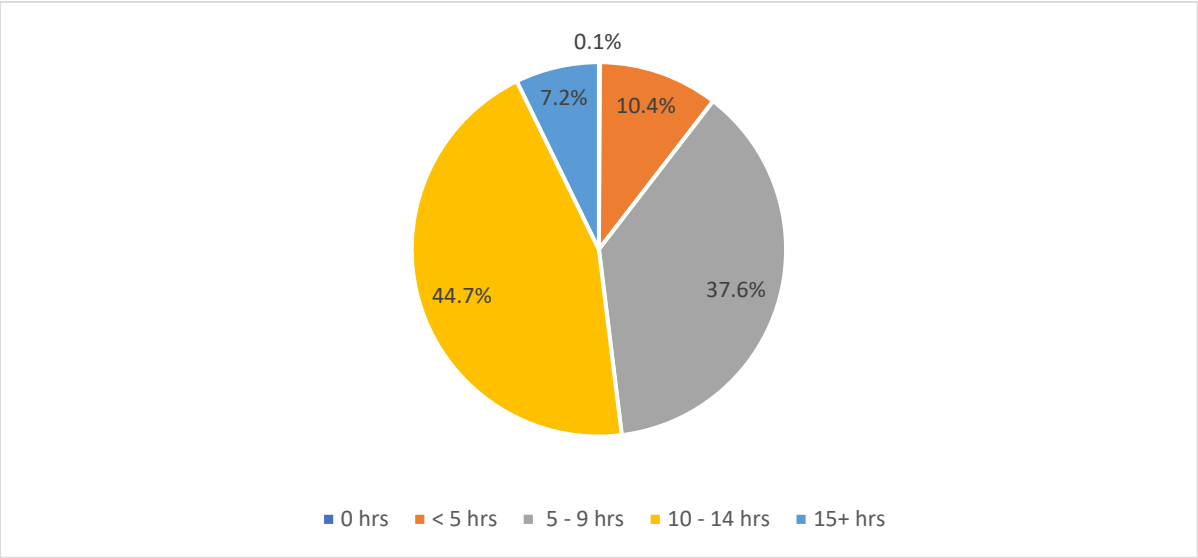


Figure 12 highlights the number of hours that respondents reported keeping active during the previous day. The most cited sources of exercise were having a physical job (1,020 respondents) and riding a bike (1,019 respondents). Purposeful activity for the purpose of exercise was cited by only 5% of the sample. Interestingly, walking each day was reported by the beneficiary group at 38% versus 28% for non-beneficiary respondents.

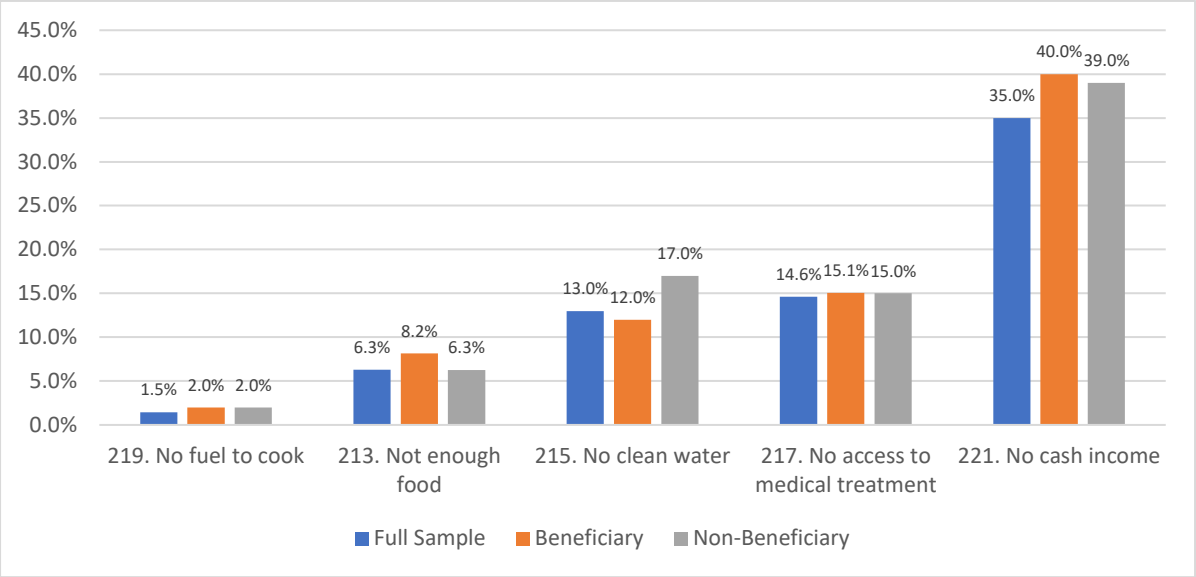
Figure 12. How many hours spent moving or working with your body



1.1.10. Module 6. Socio-economic Information

Figure 13 contains the results for questions pertaining to hunger, clean water, medical treatment, fuel, and income.

Figure 13. Households Reporting Lack of Given Resource in the Previous Year (%)



These questions asked respondents to self-report incidents in the previous year where the household had insufficient access to the named resource. The percentage total represents the number of households who reported that they experienced a shortage in the category on at least one occasion. An absence of cash income was the most reported concern. Of the 366 household who reported an absence of cash income, 104 reported that this only occurred on one occasion. However, 78 noted that this happened more than 5 times.

The sample identified that 194 households (19% of the sample) held an ID Poor card, of which 69 are classified ID Poor 1, and 125 are classified ID Poor 2. There is a slightly higher that of ID Poor designations in the beneficiary group (19%) versus the non-beneficiary group (17%).

Component 3: Food Environment Assessment

1.1.11. Food Environment Assessment

The food environment assessment data focuses on evaluating the built food environment (i.e., the informal market environment, including wet markets, street vendors, small shops, and mobile food vendors). The assessment is observational and documents the availability of food, diversity of choice, food price, food placement and display, and how sellers promote brands. In addition to the observations, structured interviews with vendors (food sellers and mobile sellers) have been conducted to gain insight into their perception of consumer requests and expectations, what promotions they engage with, and opportunities and challenges to selling healthy products.

Section 1 of the food environment assessment sees the interviewer enquire about the availability of 26 varieties of food, and anything else they might have in stock. Table 15 contains the percentage of vendors who stock each of the food categories. Citrus was the only category not carried by anyone. Of the vendors surveyed in this report, 40% are mobile, 36% are on private property, and 12% operate from the road reserve.

Table 15. Food Categories Stocked by Percentage of Vendors

Food Category	Percentage	Most Common Form
1. Staple foods made from grains	37.8%	Cooked
25. Fruit juice and sugar sweetened beverages	30.8%	-
23. Instant noodles	26.6%	Dried or Canned
13. Eggs	23.8%	Raw/Fresh
20. Fish and seafood	23.1%	Dried or Canned
15. Dairy, highly processed	22.4%	Dried or Canned
12. Commercially processed and packaged sweet snacks and candy	21.0%	-
14. Dairy	21.0%	Dried or Canned
24. Sweetened tea/coffee/milk drinks	20.3%	-
22. Ultra-processed packaged salty snacks	19.6%	-
6. Dark-green leafy vegetables	13.3%	Raw/Fresh
7. Other vegetables	12.6%	Raw/Fresh
18. Unprocessed red meat from non-ruminants	11.2%	Raw/Fresh
19. Poultry	9.1%	Raw/Fresh
11. Homemade or traditional Khmer sweets	8.4%	Cooked
5. Orange-yellow fleshed vegetables	7.0%	Raw/Fresh
16. Processed meats	7.0%	Cooked
17. Unprocessed red meat from ruminants	7.0%	Raw/Fresh
4. Legumes	6.3%	Raw/Fresh
21. Nuts & seeds	6.3%	Cooked
10. Other fruits	5.6%	Raw/Fresh
3. Root vegetables	4.2%	Raw/Fresh
2. Whole grains	3.5%	Cooked

26. Fast Food	2.8%	-
8. Orange-dark yellow fruits	0.7%	Raw/Fresh

Figure 14 provides an overview of the food procurement environment. It contains the assessment insights regarding three key features: price, damage, and display. As can be seen, where it concerns price, most surveyed vendors fail to make their prices clear. Similarly, 64% of vendors have visibly damaged produce. In contrast, 80% of their products are clearly displayed. However, interestingly, when the concept of brand promotion is considered, 83% of sellers have zero promotion.

Section 2 saw vendors asked about their assets. Figure 15 contains the data on vendor asset ownership.

Figure 14 Vendor Produce Insights

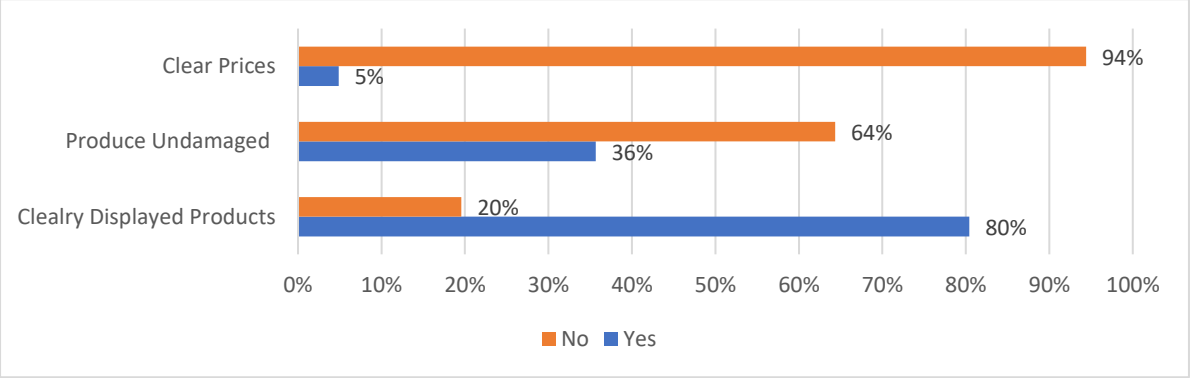
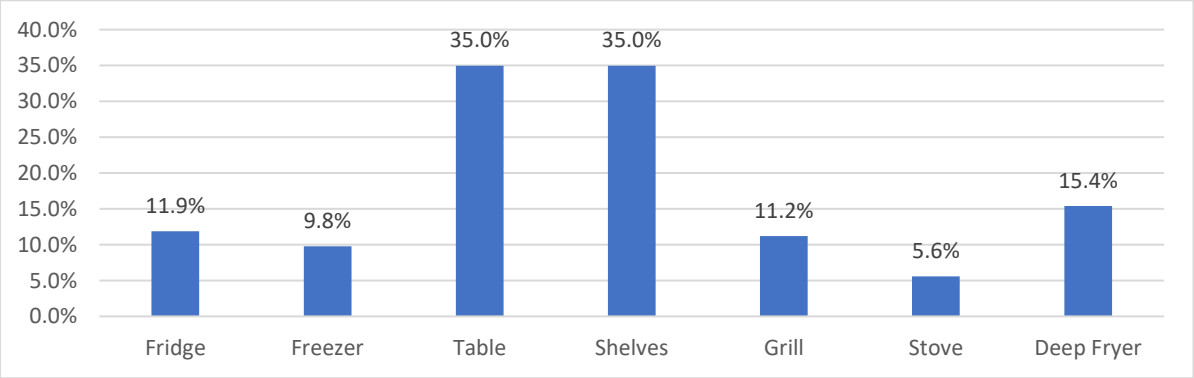
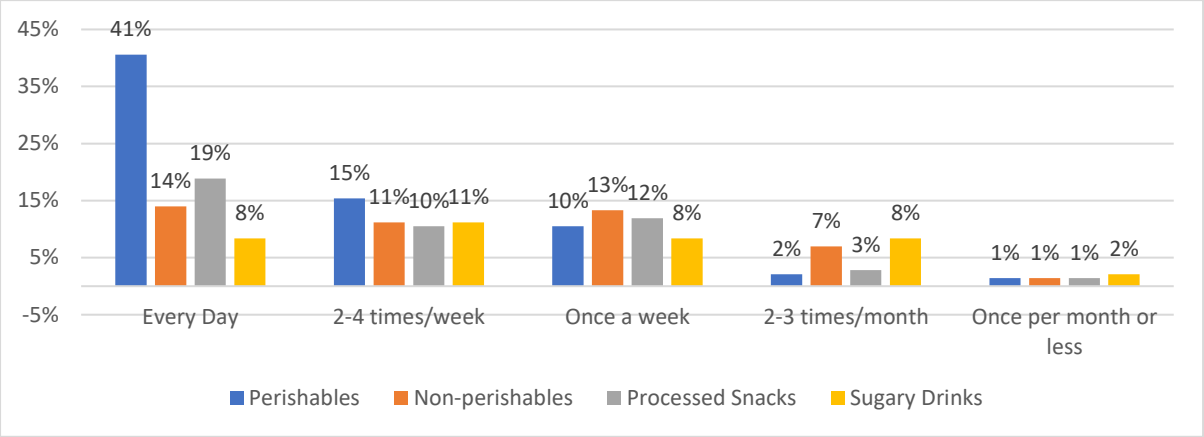


Figure 15. Vendor Asset Ownership



Section three invited vendors to discuss how they procure new supplies. Figure 16 contains the results and highlights a consistency across supply procurement across each of the four categories. An obvious exception is in the daily requirement to renew perishables, and the ability to stock and hold sugary drinks for a longer period with less frequency. In total, only 3% of vendors belong to a buying association, with the majority procuring and transporting their goods on a personal vehicle or moto (83%).

Figure 16. Supply Procurement Frequency



1.1.12. Vendor Mapping and Structured Interview

The vendor mapping process provides an overview of the types and locations of vendors operating within the community. It is used alongside the structured interview to gain further insight as to the motivations, objectives, and practices of vendors in the community, with a view to understand their role in the nutrition transition. The vendor mapping provides an overview of the breakdown of food vendor type (figure 17), location, (figure 18), and type of food sold (table 16).

Figure 17. Type of Food Vendor

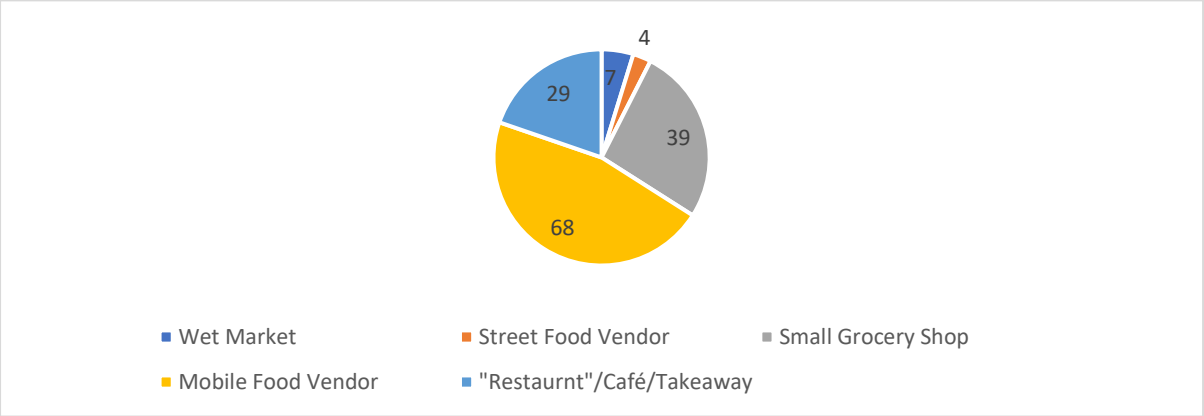


Figure 18. Location in the Village

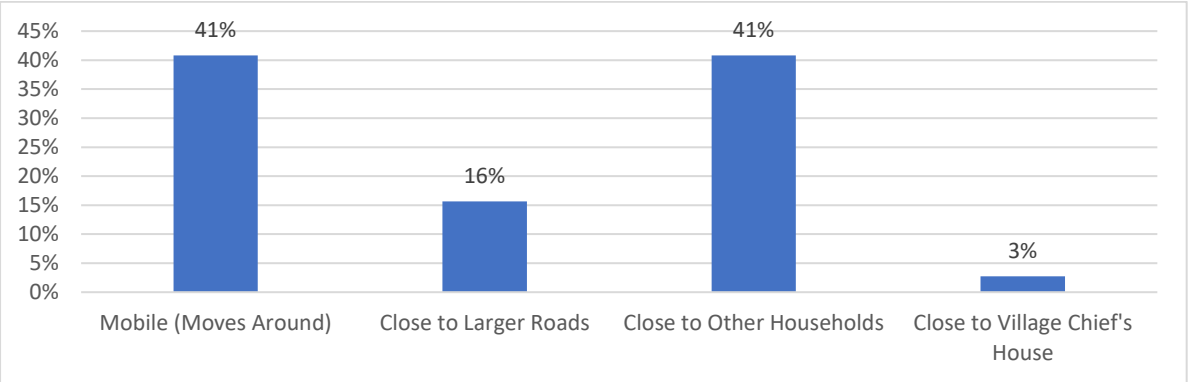
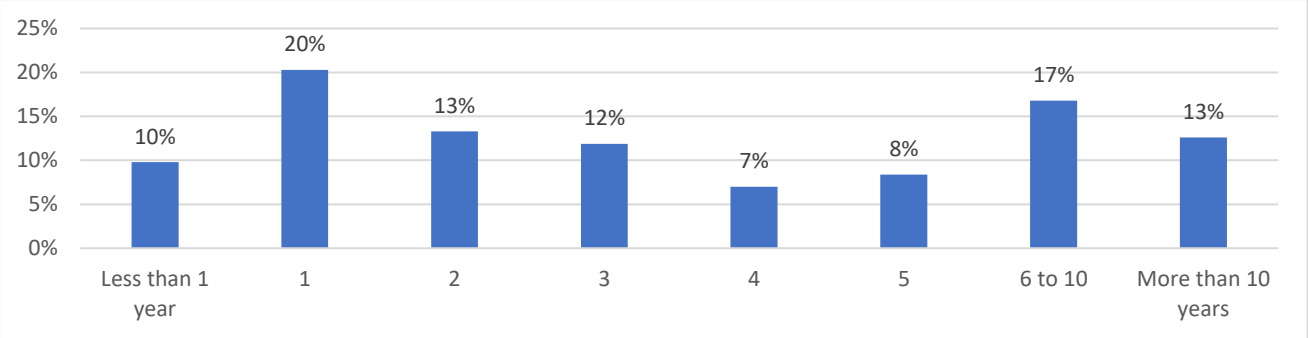


Table 16. Types of Food Sold

Food Sold	Freq.	Percent
Beverage only (coffee, tea, soda, packed milk)	55	37%
Fresh products (fruits, vegetables, meat, fish, eggs)	47	32%
Packaged processed commercial foods and snacks (chips, biscuits, sweetened yogurt)	40	27%
Self-prepared/home-prepared traditional snacks (Khmer cake, dried fruit, seeds, nuts, boiled potato, boiled egg)	32	22%
Prepared meals self- made/home-made (breakfast, dinner, lunch)	30	20%

Figure 19. Vendor Years in Location



Of the vendor sample, 64% of those interviewed were female, whilst over 50% of them had 2 or more workers. In terms of establishment, 10 percent of vendors had operated for less than one year, whilst 13% where in operation for over ten years. The mean number of years in operation was 6.2. Figure 19 contains the breakdown by years in location.

The final feature of the combined instrument was to identify trader perceptions around consumer interaction, brand promotions, and the opportunities and challenges of selling healthy foods. Table 17. contains some preliminary insights to questions and answers in this section.

Table 17. Vendor Perceptions

Question	Insight from Answers
Q12 - Why did you choose this location to sell foods?	Access to road, access to people, cheap rent, mobile ability to allow for easy travel.
Q13 - Why do you chose to sell the food and drinks that you have in your shop?	Popular, easy to sell, daily sales, low purchase cost.
Q14 - Who are your typical customers?	Everyone - or combinations of everyone.
Q15 - Which foods are the most popular foods and beverages being bought by women and children?	Candy, bread, drinks, corn, pickles, fruit.
Q16 - Why do you think these foods and beverages are popular?	Cheap, tasty, healthy, known, trusted.
Q17 - What companies/brand do you work closely with?	Nearly all respondents said “no one”. Therefore, Q18 and Q19 are unable to yield too much insight.

Q19 - How do you need to promote the brands' products?	A mixture of answers capturing general sales tactics around shouting, playing music, and travelling to areas where there is demand.
Q20 - Do you experience any challenges with selling fresh produce, for example, fruit, vegetables?	Challenges selling fresh produce? Freq. Percent No 120 84% Yes 23 16% Total 143 100%
Q21 - Why do you think it is difficult to sell these?	Answers focus on the impact of weather: either there being too much rain or too much heat. The question is considered literally as to why healthy food has been an issue to sell on a given day. Covid-19 is listed twice as a reason, whilst one respondent notes the ability for customers to grow their own produce.
Q22 - How do you think these difficulties could be overcome?	Have less to sell so less goes off, wear a raincoat, sell at a cheaper price
Q23 - Do you experience any challenges with selling self-prepared snack foods or meals?	Challenges selling fresh produce? Freq. Percent No 101 71% Yes 42 29% Total 143 100%
Q24 - Why do you think it is difficult to sell these?	Covid, food going off quickly, seasonal rain patterns.
Q25 - How do you think these difficulties could be overcome?	Reduce the quantity made, more open market after Covid - start a ratings system.
Q26 - What opportunities do you see to sell more healthy foods?	Many vendors had no thoughts about it but those that did speak of hygiene and cleanliness of the produce.

Component 4. Expert Interviews

Expert interviews were designed to capture the experienced insights of experienced project staff, as well as government and nongovernmental organization (NGO) experts. A total of nine experts were sent the expert interviews: Camilla Pedersen (WFP), HOU Kroeun (HKI) and Dr. Chhoun Wathana (UNIICEF), Dr. Prim Loan, Dr. Chan Sophal, Dr. Cheng, H.E. Mak Soeun, and H.E. Say Ung.

The questionnaire contained 7 questions exploring the state of Cambodian nutrition. Each question is detailed below with key insights from our expert interviews.

Table 18: Expert interview Insights

Question	Expert Insights
Question 1: How would you describe the Nutrition Transition in Cambodia?	- Cambodia still has both under-nutrition and over-nutrition among children under five and WRA. - Dietary diversity for women in reproductive age remains low. - More fat and carbohydrate foods are being eaten which indicate increasing prevalence of over-weight and obesity - Increased exercise amongst urban residents. - The growth of unhealthy snack food and soda drinks (especially for young children and youth) in both urban and rural areas - The growth of fast foods in Phnom Penh and other urban areas. Many people are time and economically limited, making fast food a viable option to busy people, rather than cooking at home - With the increased wealth, the population's economic access is rising and with that, calory intake has increased. From 2000 to 2014, the number of overweight and obese women of reproductive age tripled - There are big different in changes in nutrition between unreached villages and the city or downtowns. We need to prioritize these unreached villages, help to solve infrastructure problems, help them access with our health services to solve the malnutrition problem. It still remains those unreached villages until today.
Question 2: What do you think are the drivers of the Nutrition Transition in Cambodia?	- Limited food accessibility and availability to meet dietary diversity due to production, processing, price, market, and accessibility. Poor people and those living in the remote and rural areas are exposed to these problems. - Alcohol promotion and affordable accessibility which increase alcohol consumption. - The ease, convenience, accessibility and affordability of snack foods and fast foods. - Increased economic and physical access to cheap, unhealthy foods. Especially amongst children and in school environments, where dietary habits are formed. - Knowledge and economic factors. An increase in income and more availability of lots of types of food and drink. This can lead to knowledge gaps and purchasing power towards less nutritious foods. - Increased availability of food and a great number of options.

	- The knowledge and understanding of the people. For example, in learning we see literacy increasing, they received a school education from elementary school to high school to college, which was included in health education. - Increased use of social media driving health messaging in contrast to traditional distribution formats.
Question 3: What do you think Cambodia is doing to respond to the Nutrition Transition?	- The national strategy for food security and nutrition is continued to develop to reduce stunting and over-weight. - Global Action Plan-Country Roadmap to reduce children wasting is developed. It aims to improve child health and nutrition, food production, WASH, social protection, and treatment of severe wasting. - There is school feeding program supported by development partner with government contribution. - The ministry of health developed the National Multisectoral Action Plan for the Prevention and Control of Noncommunicable Diseases 2018-2027 to address issues around overweight and diabetes. - The Council for Agricultural and Rural Development recently designated reducing overweight/obesity as a primary target in their National Strategy for Food Security and Nutrition 2019-2023. - The Ministry of Education, Youth and Sport has developed policies (Directive 18) restricting some categories of foods and drinks within school settings. - There is an increased focus on engagement of the private sector across several central policies. While largely focusing on malnutrition in general, these could easily be leveraged to ensure healthier eating habits all-around. - The Ministry of Health has been working on issues related to nutrition for a long time. - Available from the Ministry of Health, nutritious, staff, Maternal and Child Health Centre. Outreach and provide services to sub-national, provincial, district, health centre operations. They will support training to the lower levels. - The Ministry of Health is preparing a strategy with other ministries, such as Ministry of Industry deals with cutting down on salty and sweet foods.
Question 4: How do you think the Developing Partners are responding to the Nutrition Transition in Cambodia?	- Supporting government in term of financial and technical support to implement the strategy, to enhance nutrition sensitive and specific interventions, to strengthen law enforcement on BMS code and local and imported Breast Milk Substitutes, and Commercially Available Complementary Foods. - The Cambodian NCD Alliance, comprising UN, NGOs and some donors, launched a few years back for the efforts to tackle the rising burden of NCDs. They also developed a 3-year Strategic Plan 2020-2023. - An increased focus on healthy diets overall (linking back to the issue of malnutrition as a whole, rather than undernutrition alone). Previous focus on food systems through the dialogues for the food system summit made this especially visible.

	- The Ministry of Health develops strategies and implements interventions towards rehabilitation and treatment, prevention of both problems of overweight and underweight. - Partner organizations, both UNICEF and the World Health Organization, support these nutrition programs also. - Development partners are developing materials that can be integrated into national development plans.
Question 5: What do you think needs to be improved to adequately address the Nutrition Transition in Cambodia?	- Law on BMS code should be reviewed and amended to improve protection of breastfeeding and complementary feeding for children age from 0-36M - Social protection should be more cover for treatment of acute malnutrition children and continue fully support for first 1000 day maternal and child health nutrition - More domestic budget should be allocated to support nutrition interventions such as supplies and program implementation - Awareness raising among the public on the issue is currently limited. This needs to be active, using social media and IT technology as platform. - There are no standards, regulations and laws on nutrient and compositions of specific snack foods for both adults and children. This needs to be addressed. - Increased understanding of nutrition at all levels and across multiple stakeholders (incl. Govt., PS, population). - Increased engagement of private sector. - Increased focus on where the mandate for FSN lies and how to improve the coordination, upscaling of the mandate related to this (influence / advocacy position with other line-ministries), and support to budget-allocation / tracking for nutrition. - Increased access to and analysis of nutrition sensitive data (also related to data sharing across line-ministries). - Increased focus on gender-inequalities and dynamics and how this influences nutrition. - Education is key. There needs to be minimum school year requirements to ensure that all citizens complete high school. - Public cooperation between research, institution, and ministry. - Improved data collection and sharing at the rural level. - Utilization of the Pagoda infrastructure in Cambodia to spread messages about nutrition within the community.
Question 6: Where and what opportunities do you see for Cambodia to respond to the Nutrition Transition?	- Domestic fiscal space could be advocated to increase national budget support for nutrition program interventions. - Fast Track Roadmap to reduce wasting and improve nutrition for women and children can have more supported from both government and development partners. - Youth and women empowerment should be the opportunity to support referring to food system. - Youth is very powerful agents for changes. 65% of Cambodian pupation are young people. Currently, there has been initiative to engage youth throughout the country to support food security and nutrition. Youth are

	already touched to education on healthy diets. This is an opportunity to use them for agents of changes for this subject. - The FSS roadmap to sustainable food systems 2030 reflects well on the many entry points for nutrition and the operationalization and funding of this will be important for the level of overweight in the coming years. - The ongoing operationalization of the PWG-FSN is also a key opportunity to create meaningful coordination structures at the decentralized level to better utilize existing funding for nutrition outcomes. - Women Empowerment. - Longitudinal network of the authorities and partners. - Economic factors related to the wealth of the people, where people with money can buy nutritious food.
Question 7: Where and what challenges do you see for Cambodia to respond to the Nutrition Transition?	- National budget allocation to support nutrition program is limited. - Limited capacity of programs to improve working on public finance referring to program review, strategic plan review, budget formulation, and execution. - Data management system still be limited and need to strengthen. - Human resource development to deliver service is needed. - There is a need to increase public awareness building on the issue through a national, and innovative, campaign. - The lack of awareness amongst the population may create issues. Uncoordinated responses from a high number of partners may mean that efforts to improve this is in vain. Lack of incentive for private sector may also create issues in terms of investment for innovative solutions being developed and marketed. - Behavioural change takes time. - Influence of advertising and the import of products is also a challenge.

E. Conclusions and Recommendations

The Nutrition Transition and Food Environments in Cambodia project has provided a necessary window into the progress of the MUSEFO-Cambodia program, as well as the current status of the nutrition transition in Cambodia. Particularly, primary caregivers' knowledge, attitudes, and practices have been captured to provide useful insights into the requirements for future interventions.

In considering the perception of food markets, caregivers utilise a wide variety of food sources to procure their food and drink. If we consider Figure 2 and the nutrition transition with development stages, this is in line with the theory. As Cambodia is completing transition from an agrarian society with trade to a developing peri-urban and urban society, one can expect households to make use of formal and informal markets whilst also dipping into wild and cultivated sources. For the latter two source, they are still often cited as areas to access vegetables, fish, crab, and snail. When we look at the household survey response to most used food source, we can see that this intersection of growth is perfectly balanced with the use of market shop infrastructure located within the sphere of the wet market. As for mobile and street vendors, these are seen primarily as sources for a variety of snacks and drinks, with occasional weekly use for finished meals.

In 2021 it is still the case that food and nutrition related responsibilities are handled by the mother in the household. Where the mother is working or requires support the grandmother will also be a key decision maker with respect to type of food purchased, money spent, and meals made. Male responsibility is still predominantly reserved to the household economic needs. Fathers, grandfathers, and uncles may support in some aspects of farming or food purchase, but this is usually at the discretion of the mother.

An intergenerational change that was cited throughout the FGDs was the fact that this generation has greater access to a wider variety of foods and healthcare support. There is a greater understanding about the health of children with respect to growth and development. Several items are considered to be avoidance necessary for children and pregnant women including alcohol, cigarettes, or spicy or fermented foods. It is also noted that children should not eat packaged snacks due to concerns around physical development, illness, and tooth cavities. However, when this translates to practice, results from the household survey highlight how a high proportion of children are reported as regularly receiving ultra-processed packaged salty snacks and sweets. The justification provided by caregivers and vendors alike is that they are children's favourite and they may cry or misbehave if they cannot have them. They are also priced at affordable levels between 500 riel and 1,000 riel in most instances. For adults, the worrying perspective is that deep fried foods are considered healthy by more people than consider them unhealthy. This may be to do with the perception that chicken and other meats traditional to frying are healthy when prepared by other means.

Both the KAP of caregivers, and the diversity of food sources in the natural and built environments, are at an intersection where health and nutrition outcomes could be improved or drastically reduced. Modern foods are considered those foods that are newly popular and expensive set against their traditional Khmer counterparts (those that have been passed down, are cheap, and make use of lots of vegetables). The built food environment in terms of small stores, mini-markets, and mobile vendors,

are increasingly utilised by individuals with greater spending power to purchase a variety of less nutritious products: including processed package snacks, energy drinks, sugary coffees and teas, and fried foods. The aspiration of income growth in a developing economy could result in an increased uptake of less nutritious diets as the Khmer alternatives are seen as old and for those with less income, and can often be more time consuming. By comparison, the current food environment infrastructure is well suited to deliver healthy alternatives through village and community group networks. Some vendors noted that they would purchase healthy snacks if they knew what they were and where to find them.

For future MUSEFO projects there are several potential avenues to consider:

- Providing an information campaign and community care group training with a focus on sugary drinks and salty packaged snacks for children. In particular, healthy alternatives and practices that can keep children healthy and happy.

- For adults, there could be an information campaign focused on the negative health effects of consuming too much fried food.

- An information campaign to draw on the idea that traditional Cambodian meals are already healthy. This could support an attitude shift in people no longer being concerned when they hear the word “healthy” and have to think about meals to make. On this point, it appears to be the case that reducing the intake of snack and fried foods would have a greater effect on the baseline health than the introduction of new meals and practices (given that Cambodian traditional food as identified is more nutritious by design).

- In specific relation to income aspiration nutrition outcomes, one could design newly branded healthy meals that make the most of Cambodia’s abundant vegetables and fruit and have them recognised as tasty alternatives to less healthy alternatives.

- Developing community support mechanisms to provide young mothers and caregivers with access to nutritious food alternatives.

- Utilizing existing community infrastructure to spread nutrition and health messages. As noted during the expert interviews, the Pagoda network has been previously, and successfully, utilised to disseminate critical public information around health.