



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

## Guidelines for Market-based Food Environment Assessments

Instruction Manual



**USAID**  
FROM THE AMERICAN PEOPLE

January 2024

## About USAID Advancing Nutrition

U.S. Agency for International Development (USAID) Advancing Nutrition is the Agency's flagship multi-sectoral nutrition project, led by JSI Research & Training Institute, Inc. (JSI), and a diverse group of experienced partners. Launched in September 2018, USAID Advancing Nutrition implements nutrition interventions across sectors and disciplines for USAID and its partners. The project's multi-sectoral approach draws together global nutrition experience to design, implement, and evaluate programs that address the root causes of malnutrition. Committed to using a systems approach, USAID Advancing Nutrition strives to sustain positive outcomes by building local capacity, supporting behavior change, and strengthening the enabling environment to save lives, improve health, build resilience, increase economic productivity, and advance development. This project contributes to the goals of the U.S. Government's Feed the Future initiative by striving to sustainably reduce hunger and improve nutrition and resilience.

## Disclaimer

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## USAID Advancing Nutrition

JSI Research & Training Institute, Inc.  
2733 Crystal Drive  
4<sup>th</sup> Floor  
Arlington, VA 22202

Phone: 703-528-7474

Email: [info@advancingnutrition.org](mailto:info@advancingnutrition.org)

Web: [advancingnutrition.org](http://advancingnutrition.org)

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# Acronyms

CoHD	Cost of a Healthy Diet
EPOCH	Environmental Profile of a Community's Health
DDS	Dietary Diversity Scores
DGA	Dietary Guidelines for Americans
DQQ	Dietary Quality Questionnaire
FGD	Focus Group Discussions
FBDG	Food-based Dietary Guidelines
FVs	Fruits and Vegetables
GPS	Global Positioning System Unit
HDB	Healthy Diet Basket
HEI	Healthy Eating Index
IRB	Institutional Review Board
LMIC	Low- and Middle-Income Country
MFDI	Market Food Diversity Index
MDD-W	Minimum Dietary Diversity for Women
ProDes	Produce Desirability
USAID	U.S. Agency for International Development
ZOI	Zone of Influence

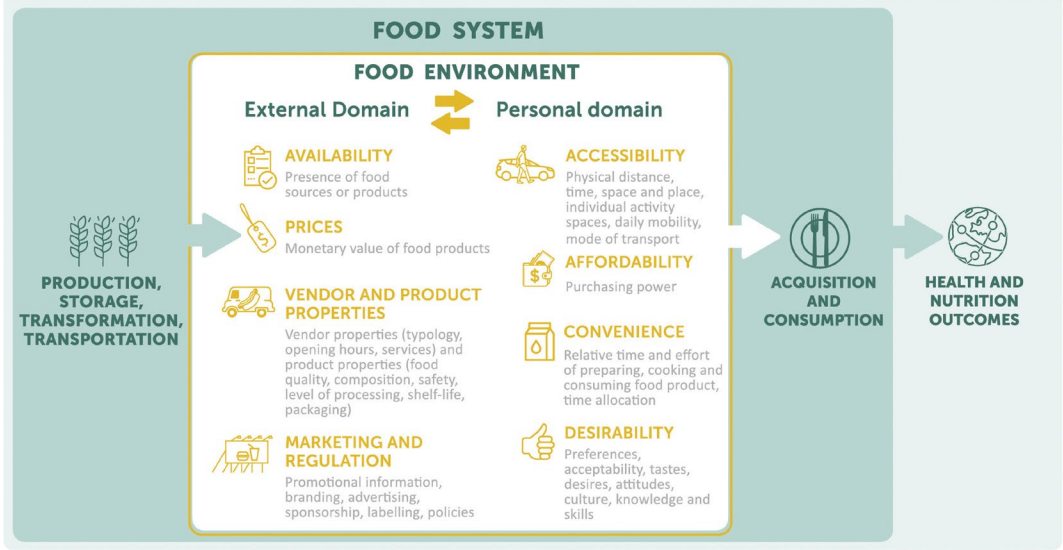


# Preface

Our food system includes all the elements and activities involved in the production, processing, distribution, preparation, consumption and waste of food. The food environment is the space within food systems where consumers directly acquire food. Markets have increasingly become the primary venues where households around the world purchase foods, thus deeply influencing people’s food purchase and consumption behaviors, and in turn their dietary intake and nutritional status. Assessing the dimensions of the market food environment can help us understand how they influence food choices. However, global development partners lack food environment assessments that are designed or adapted for data collection in low- and middle-income country (LMIC) contexts.

To address this gap, U.S. Agency for International Development (USAID) Advancing Nutrition supported the USAID Bureau for Resilience, Environment and Food Security in a multiyear pilot study in four countries to evaluate a package of seven food environment assessments for their feasibility and acceptability. This [assessment package](#), guided by the food environment framework shown below (figure 1), uses seven of the eight food environment dimensions of availability, prices, vendor and product properties, marketing and regulation, accessibility, affordability, and desirability.

Figure F1. The Food Environment Framework



Source: Turner, Christopher, Anju Aggarwal, Helen Walls, Anna Herforth, Adam Drewnowski, Jennifer Coates, Sofia Kalamatianou, and Suneetha Kadiyala. "Concepts and critical perspectives for food environment research: a global framework with implications for action in low- and middle-income countries." *Global food security* 18 (2018): 93-101.

The seven food environment assessments were modified to be more applicable to LMIC settings. Working through an iterative process, USAID Advancing Nutrition documented the experience of conducting the pilot assessments in Liberia, Honduras, Nigeria, and Timor-Leste and noted modifications to improve the assessment package. Specifically, with each pilot, both the instruction manual and the data collection and analysis sheets were updated to increase clarity and streamline the process as much as possible. Findings from the pilot informed the development of a [package of data collection tools](#) intended to be used by practitioners to inform the design and implementation of market-based interventions within food systems to support healthy diets.

Overall, research partners in each pilot country found the package of food environment assessments to be relatively feasible to implement, with minimal modifications needed. Main recommendations included the need to shift toward electronic data collection platforms, the need to extend training and pilot

testing of the tools prior to beginning the data collection process, and the need to make sure that vendor types and sampling approaches were better aligned with local contexts.

This manual incorporates the findings from the pilot and suggests approaches to overcome any implementation challenges identified within them.

## When to Use the Assessment Package

### Activity Design

If an activity intends to include local food markets in strategies to influence food choices to improve diets, the food environment assessment package may be a helpful step to include in the activity design process. The food environment assessment package provides a way to systematically collect reliable data about food environments so that activities are based on context-specific information. Together, the seven assessments serve as a useful component of baseline assessment to characterize the food environment, identify entry points for market food environment interventions, and inform overall program design. Some of the assessments describe physical attributes that are important to understand about the project area, such as infrastructure, the most common modes of transportation, the parameters of outdoor markets, and the presence of alternative market and vendor types. Other assessments provide a better understanding of the availability of various food groups for sale in markets at a given point of time. Combined, the assessments provide a sense of the market food environment where individuals make their food choices.

### Monitoring and Evaluation

The USAID Advancing Nutrition pilots did not explore the functionality of the package in a monitoring and evaluation context. While there is potential for use in routine monitoring purposes, application in this way must be explored further. Many of the assessments can systematically capture information on key attributes of market food environments; therefore, the full assessment package can be conducted as part of periodic assessments to show how food environments change over the course of multiyear activities and as the result of specific interventions. However, some assessments, unless intentionally used to monitor change as a result of a specific intervention, are less likely to demonstrate measurable change on a regular basis than others. Table I provides an overview of how the assessments might be used for program design and monitoring.

**Table F1. An Overview of the Food Environment Assessments and Their Potential Uses for Program Design and Monitoring.**

Assessment	Activity Design	Monitoring
Assessment 1: Market Mapping	Understand market food availability and accessibility to better target programming	Not directly applicable—physical characteristics that influence availability and access (i.e., roads or market infrastructure are unlikely to change year to year).
Assessment 2: Seasonal Food Availability Calendars	Identify opportunities to promote and market nutrient-rich foods available in specific seasons	Examine changes in availability over time from the perspective of vendors, useful for activities designed to increase availability and stability through production or new market linkages
Assessment 3: Market Food Diversity Index	Identify varieties of foods available in markets to increase availability of	Examine variety of food available in activity food environments over time



Assessment	Activity Design	Monitoring
	nutrient-rich foods and/or reduce foods to limit	Examine associations with dietary diversity
Assessment 4: Healthy Eating Index of Food Supply	Identify quantity of foods available in markets Design programs to address shortfalls	Examine changes in availability and variety against Healthy Diet Basket (HDB) or food-based dietary guidelines (FBDGs)
Assessment 5: Cost of a Healthy Diet at Market	Identify the cost of meeting HDB or FBDGs and the relative cost of purchasing different food groups to inform programming aimed at improving the affordability of a healthy diet	Examine cost of a healthy diet over time and in different seasons  Examine cost of different food groups over time  Examine changes in lowest-cost commonly purchased foods (as opposed to absolute least cost) over time; this is useful for activities designed to increase affordability and accessibility of healthy diets
Assessment 6: The Environmental Profile of a Community's Health	Identify how food marketing may be influencing consumer purchases and identify programming opportunities for the promotion of nutritious foods	Examine the number and types of food and beverage promotions over time
Assessment 7: The Produce Desirability Tool for Low- and Middle-Income Countries	Begin to understand which fruits and vegetables are/are not desirable based on sensory attributes defined by the project team. This information could help an activity team focus on specific fruits and vegetables or specific vendor practices	Examine changes in Produce Desirability Tool scores over time

### Using Individual Assessments Versus the Complete Assessment Package

By implementing the complete package of assessments, one can acquire a comprehensive view of the market food environment in any given location, supporting a better-informed design of multifaceted programs that can simultaneously target multiple dimensions of a food environment. However, there may be situations when a project needs to focus on a specific dimension of the food environment (e.g., food availability), in which case, activity teams may decide to select the assessments relevant to availability. While this approach is technically feasible, it may lead to inadvertently missing how other food environment dimensions (e.g., accessibility) influence consumers' decisions to purchase specific foods even if they are available. All of the assessments explained in this manual can be conducted individually using the instructions provided. There are two assessments—Assessments 4 and 5—that are coupled in these instructions, but we have provided guidance for adaptation to enable their use as standalone assessments.

### Where to Use the Food Environment Assessment(s)

The assessment package was designed to be implemented in open-air markets and their surrounding areas, in peri-urban and rural settings. However, the package—either in its entirety or any combination of individual assessments—has the potential for implementation in other settings as well. For instance, the complete package can be applied in urban settings (including informal settlements) by making some

modifications to the market selection and sampling approach. In both urban and rural settings, the community mapping assessment can provide insight into the availability of “healthy” and “unhealthy” food vendors in the areas surrounding schools, whereas the Environmental Profile of a Community’s Health assessment could quantify the food and beverage promotions that students are exposed to in the areas surrounding their schools. Lastly, although the assessments were designed to evaluate open-air markets, most of the assessments could be applied to examine a diverse range of food outlets (e.g., supermarkets and convenience stores).

## Complementary Data Collection

The assessment package was specifically designed to measure market food environments. For this reason, the assessments focus on markets and the built environments that surround them rather than all the food access points from which consumers could acquire food—forage and home production, for example. We recognize that most consumers in LMICs access wild and/or cultivated food environments, and for this reason, we recommend the use of complementary assessments that measure these alternative food access points if understanding all the food environment types that consumers have access to is important for project needs. In addition, the assessment package largely focuses on the external food environment from the perspective of markets and vendors and does not directly explore consumers’ perspectives. Conducting more consumer-focused assessments alongside the package would provide a more comprehensive picture of how consumers interact with their food environments and the factors that drive their decision-making. Although this may not be necessary for all activities, it may be important for some. Additionally, to measure the factors that drive food environment dimensions of availability, accessibility, desirability, etc., it may be necessary to collect complementary data on upstream food system actors and/or sectors. These include data on crop production patterns, productivity, and food safety practices on-farm and post-farm gate, including distribution, handling, and storage.

## Costing

The cost of implementing the assessment package will depend on several factors but is primarily driven by the sampling approach (how large the project area and how exhaustive the list of markets in the area must be) and the expenses associated with labor and travel during data collection. The USAID Advancing Nutrition pilot implemented the full package, costs are likely lower if only specific assessments are used. With the pilot project, the sampling approaches were the same but the cost of implementing the package varied, largely because of differences in expenses, such as fuel for vehicles, enumerator rates, number of people and days needed for data collection, etc. It is therefore not possible to cost an exact amount of implementing the package; however, on average, the teams—which ranged in size from six people to 60—took 30 days to collect the data. Additionally, it took about 3 weeks with teams of four or five people to input and analyze the collected data—and that time does not include the time and technical support that USAID Advancing Nutrition staff members provided.

## Components of This Manual

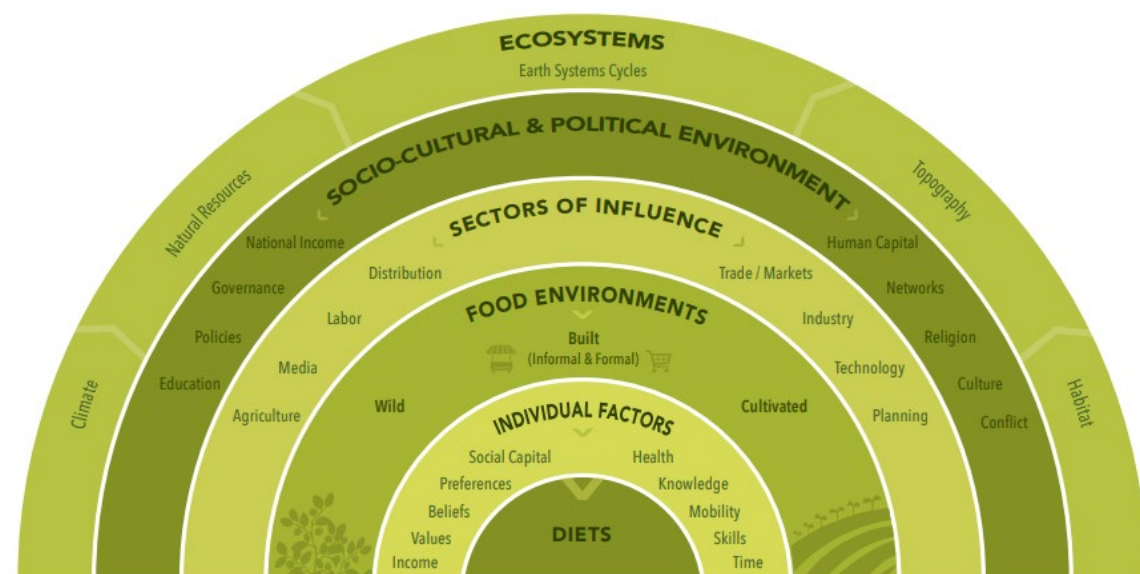
This instruction manual is accompanied by all data collection sheets required to complete the full assessment packages, referenced here as a separate [annex document](#). Additionally, the [data analysis sheets](#) in the form of Excel worksheets and a [data analysis instruction manual](#) are available online. They include detailed instructions on data analysis for each assessment. The Excel sheets are recommended templates for data analysis. Graphs are suggested and are auto-populated if you use the sheets. Activity teams should review the analysis sheets in full and adapt them where needed before using them. In short, with this manual, any interested party will have all the tools needed to conduct the full package of food environment assessments.

# Chapter I. Overview and Background

## Food Systems, Food Environments, and Markets

A food system includes all the elements and activities involved in the production, processing, distribution, preparation, consumption, and waste of food. The food environment refers to the space where consumers acquire food (Herforth and Ahmed 2015; HLPE 2017) (figure 1), which makes it a critical place for programming to improve the availability and utilization of healthy and safe diets (Downs et al. 2020). Within the food environment, markets have increasingly become the primary venues where households around the world purchase foods; thus, they are especially important for programming that aims to improve diets and nutrition. For example, low-income households in East and Southern Africa purchase approximately 48 percent of their food from markets, whereas middle-class households purchase between approximately 60 and 80 percent of their food from markets (Tschirley et al. 2015). Nutritional outcomes in LMICs can be improved by developing a better understanding of how market food environments influence consumers' food access and food choices and whether they promote healthy and safe diets.

Figure I. Place of the Food Environment within the Overall Food System



There are various food environment conceptual frameworks. For this instruction manual, USAID Advancing Nutrition adopted the framework by Turner et al. (2018), where food environment components are conceptually compartmented into external and personal (or internal) domains, each of which consists of four dimensions. The external domain dimensions are availability, price, vendor and product properties, and marketing and regulation, whereas the personal domains are accessibility, affordability, convenience, and desirability.

## Key Terms: Food Environment Dimensions

The external domain comprises four dimensions:

- **Availability:** The presence of a specific food or food groups in a given place.
- **Price:** The monetary value of food products.
- **Vendor and product properties:** Aspects, such as store hours, store type, and other features, that may influence consumer food choices. Also includes cleanliness, signage, and overall reputation. Product characteristics include attributes that consumers value, such as food safety, quality, packaging, and processing (Turner et al. 2018).
- **Marketing and regulation:** The promotion, advertising, branding, and labeling associated with the marketing and sale of food.

The personal domain comprises four dimensions:

- **Accessibility:** The physical and temporal access individuals have to specific foods or food vendors in markets relating to car ownership, presence of public transportation, presence of food retail locations within walking distance, and time needed to access the nearest food retail location (Inglis, Ball, and Crawford 2008).
- **Affordability:** The interaction between prices and individual purchasing power.
- **Convenience:** The time cost of obtaining, preparing, and consuming a specific food item or group of food items (de Menezes et al. 2018) or the proximity of an individual to specific food outlets (e.g., stores, markets, restaurants) (Herforth and Ahmed 2015).
- **Desirability:** The factors that influence an individual's food preferences, such as cultural factors and sensory attributes like visual appeal, aroma, taste, and texture.

Source: (Turner et al. 2018)

## Rationale for Monitoring and Evaluating Market-based Food Environments in LMICs

A consumer's ability to choose a healthy, diverse, and sustainable diet is vital for improving nutrition and health outcomes (HLPE 2017). In both urban and rural contexts, LMIC household diets are increasingly composed of purchased foods. Given that poor diet is a leading contributor to the global burden of disease (GBD 2019), understanding the range of factors that influence food purchase (e.g., access and choice) is critical to supporting improved nutritional outcomes globally. The food environment, where consumers interface with the food system, is a critical place to influence food access and food choices and, ultimately, impact diet quality, food security, and nutrition (Herforth and Ahmed 2015; HLPE 2017; Turner et al. 2018).

Understanding food environments is especially important now as food environments are shifting across the world—with expanded globalization, people are purchasing more food from a variety of outlets, including open-air markets, convenience stores, and grocery stores (Downs et al. 2020). Routine monitoring and evaluation of food environments encourages well-informed, strategic investments in evidence-based policies and programs to support healthy and sustainable diets and address the global burden of diet-related noncommunicable diseases.

Although more than 500 food environment assessments have been developed in the past two decades (Herforth and Ahmed 2015), most have been developed or validated in high-income country contexts, where the food environments differ from those in LMICs (Downs et al. 2020). For example, consumers in high-income countries primarily access market food environments like supermarkets, restaurants, and fast-food chains. They also most often access them by motor vehicles and paved roads. Many households in LMICs procure food from open-air markets, mobile vendors, informal kiosks, and convenience stores in addition to grocery stores and restaurants. This combination of food outlets may subject consumers to limited schedules and highly seasonal diversity of available foods (Downs et al. 2020). In addition, transportation factors, such as poor road conditions and limited use of motorized vehicles, can limit access to market food environments for rural communities in LMICs. It is important to either identify existing assessments that are suitable for assessing food environments in diverse, dynamic contexts within LMICs; modify existing assessments to better fit local contexts; or develop new assessments where gaps exist.

With the support of the USAID, USAID Advancing Nutrition conducted a pilot study to test a set of select food environment assessments that focus on open-air markets to evaluate their utility, feasibility, and effectiveness in characterizing food environments, as well as their potential to inform the development of evidence-based programs and policies. Seven assessments were shortlisted for the pilot study based on a three-step selection process that included a landscape assessment, ranking exercise, and expert survey:

1. Market Mapping
2. Seasonal Food Availability Calendars
3. Market Food Diversity Index
4. Healthy Eating Index of Market Food Supply (adapted version)
5. Cost of a Healthy Diet at Market (adapted version)
6. Environmental Profile of a Community's Health (adapted version)
7. Produce Desirability Tool for Low- to Middle-Income Countries (adapted version)

Four countries—Liberia, Honduras, Nigeria, and Timor-Leste—were identified for the pilot testing based on USAID Mission interest in their Feed the Future initiative portfolios.

This instruction manual provides the steps to conduct the seven assessments that were identified as being suitable for evaluating market food environments in LMICs. A standardized approach with its associated instructions, including data collection sheets and data analysis templates, enables comparison between geographic contexts, such as communities, subnational geographic locations, and countries.

### Key Term: Food Environment

The food environment is defined as the consumer interface with the food system for food acquisition that influences diets, and is influenced by the socio-cultural and political environment and ecosystems within which it is embedded (Downs et al. 2020; Turner et al. 2018; HLPE 2017; Herforth and Ahmed 2015).

Figure 1 depicts where the food environment exists within the broader food system.

# Chapter 2. Objectives of Market-based Food Environment Assessments

Depending on the context, the food environment assessments presented in this instruction manual may be used for the following objectives:

1. Informing program design.
2. Monitoring how food environments are changing over time and/or in response to stressors like food supply disruptions, extreme weather, and pandemics.
3. Evaluating the impact of an intervention, program, or policy on food environments.
4. Researching relationships between food environments and dietary, nutrition, and health outcomes.

Below are the specific objectives of each market-based food environment assessment included in this instruction manual. The market assessments should be carried out in the order presented in this manual.

**Table 1. Objectives of Select Food Environment Assessments**

Food Environment Assessment	Food Environment Dimension	Purpose	Output
1. Market Mapping	<ul style="list-style-type: none"> <li>• Availability</li> <li>• Accessibility</li> <li>• Convenience (physical distance and transportation options)</li> </ul>	<ul style="list-style-type: none"> <li>• Provide overall context of the food environment in an area;</li> <li>• Provide characteristics of the community, including infrastructure;</li> <li>• Document the number and types of market food environments in a given locality, with consideration to distance from specific community features and to the number and types of vendors within selected markets;</li> <li>• Tabulate the market food environment index (adapted from the modified Retail Food Environment Index [mRFEI]) through geocoding, photographs, and a market audit.</li> </ul>	<ul style="list-style-type: none"> <li>• mRFEI</li> </ul>
2. Seasonal Calendars of Availability	<ul style="list-style-type: none"> <li>• Availability</li> </ul>	<ul style="list-style-type: none"> <li>• Capture the availability of fresh local food on the basis of months throughout the year in order to identify patterns in temporal changes in availability through focus groups with market vendors and photography.</li> </ul>	<ul style="list-style-type: none"> <li>• Availability scores</li> </ul>
3. Market Food Diversity Index	<ul style="list-style-type: none"> <li>• Availability</li> </ul>	<ul style="list-style-type: none"> <li>• Determine the availability of foods categorized by food groups of various food group classification systems using a market audit and vendor inventory. The food group classifications to be used include the Diet Quality Questionnaire (DQQ; 29 food groups).</li> </ul>	<ul style="list-style-type: none"> <li>• Availability scores based on the minimum dietary diversity for women and DQQ food groups</li> </ul>



Food Environment Assessment	Food Environment Dimension	Purpose	Output
4. Healthy Eating Index of Food Supply (adapted version)	<ul style="list-style-type: none"> <li>• Availability</li> </ul>	<ul style="list-style-type: none"> <li>• Assess alignment of available foods with quantitative recommendations for Healthy Diet Basket (HDB) or select food-based dietary guidelines (FBDGs) using a food group–based scoring system.</li> </ul>	<ul style="list-style-type: none"> <li>• Availability scores</li> </ul>
5. Cost of a Healthy Diet	<ul style="list-style-type: none"> <li>• Price</li> <li>• Affordability</li> </ul>	<ul style="list-style-type: none"> <li>• Determine the minimum cost of achieving quantitative HDB (or FBDG) recommendations by identifying the cost of a standard portion size of the two cheapest foods per food group (e.g., starchy staples, protein foods, dairy, fruits, vegetables, oils) and then summing the mean cost per food group and comparing this to the average recommended intake in grams from that food group.</li> </ul>	<ul style="list-style-type: none"> <li>• Absolute least-cost diet</li> <li>• Least-cost commonly purchased diet</li> </ul>
6. Environmental Profile of a Community’s Health (adapted version)	<ul style="list-style-type: none"> <li>• Vendor and product characteristics</li> <li>• Marketing and regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Document the presence of food advertisements, media promoting healthy diets, and food labeling with a food environment audit and photographs.</li> </ul>	<ul style="list-style-type: none"> <li>• Advertisement counts</li> </ul>
7. Produce Desirability Tool (adapted version)	<ul style="list-style-type: none"> <li>• Desirability</li> </ul>	<ul style="list-style-type: none"> <li>• Assess sensory desirability of a determined market basket of five fruits and five vegetables based on five sensory parameters (overall desirability, visual appeal, touch and firmness, aroma, and size) using a sensory survey.</li> </ul>	<ul style="list-style-type: none"> <li>• Desirability scores</li> </ul>

## Chapter 3. Planning Phase

This section describes the sampling plan and approach, as well as the required training, equipment and materials, and additional considerations. In the Planning Phase, there needs to be a range of activities to prepare for the assessments themselves which involve direct observations within the sampled markets, market audits, and vendor interviews (including individual vendor interviews and vendor focus group discussions [FGDs]).

### Study Sites and Sampling Plan

The criteria used to select the geographical areas for assessment implementation will depend on the needs of a given activity. It is helpful to identify clear criteria that can inform the selection of primary and secondary administrative units and that align with the activity goals; this will help to ensure that the geographical location selected for the package implementation is appropriate for the needs of the activity. For example, to inform design, subnational administrative units may be identified on the basis of contrasting food security status, geography and demographics, agricultural profiles, and accessibility, as well as study implementation resource limitations.

#### First and Second Subnational Geographic Administrative Unit-Level Selection

The first subnational location selection will occur at the primary subnational geographic administrative unit level. For example, the primary subnational administrative areas in many countries are **states**. From the primary subnational administrative areas, the selection must be narrowed to second subnational administrative units. In Nigeria, for example, the second subnational administrative units are local government areas, whereas in Timor-Leste, these are postos. Many activities may already have these geographic selections defined. If they are not defined, to select study sites at the second subnational administrative unit-level, contextual analysis should be conducted based on existing information, including publicly available research and program reports. Relevant characteristics include:

- Food security, nutrition, and health status
- Prevalent foods produced and consumed
- Existing food environment findings
- Stressors (climate, conflict, condition of infrastructure [roads, electricity, water], etc.)
- Topography and biodiversity
- Population demographics
- Sociolinguistic factors and notable cultural norms (including those in regard to gender interactions)

What constitutes the “**community level**” will vary between countries based on geography and population characteristics. We define the community level as a geographical area with defined boundaries, which sits below the primary subnational administrative unit. In some countries, it may align with the secondary administrative unit level, whereas in others it may not. Examples of communities include neighborhoods, villages, and municipalities. At least one location at the community level needs to be selected within each primary administrative unit, though it may change depending on the context of each country. In short, within each primary subnational administrative area, two community-level areas should be selected.

## Market-level Selection

### Defining Open-Air Markets

The package of assessments was designed to be implemented in open-air markets. Open-air markets include both informal and formal markets and are often referred to as traditional or wet markets. Open-air markets that are open every day (or nearly every day) of the week are considered daily markets, whereas those that are only open one to two times per week are considered weekly markets.

Within each secondary subnational geographic administrative unit, purposive sampling will be systematically conducted to select two contrasting markets. The research team should begin the market selection process by reviewing market and business directories and other publicly available information for each selected community-level location to create a comprehensive list of all open-air markets. Teams should categorize markets as either daily (open every day or most days of the week) or weekly (open once or twice per week)—this is important because some assessment protocols assume the same vendor will be available for an interview two consecutive days.

Following the review of the market and business directories, research teams should conduct key informant interviews in person or via telephone with local officials to validate and, as needed, refine the list of open-air markets (see Annex 2 for tips on conducting interviews and Annex 3a–d for acquiring informed consent for various types of participant). A minimum of one interview will be carried out per secondary subnational administrative unit location. Key informants will include local officials, such as those from the Ministry of Agriculture, who are familiar with open-air markets. The interviewer will introduce themselves, explain the purpose of the study, and seek prior verbal informed consent to record the names of the markets shared by the key informant. If the interviewer finds that the markets listed by the key informant align with those in the public directory review, additional interviews will not be necessary. However, if there are differences between the markets listed by the key informants and those in the public directory review, additional interviews will be carried out until saturation of the informants' responses is reached.

In addition to the key informant interviews, a formative assessment will be completed with local residents who access the food environment in the respective communities. This step is not required but it is recommended and is described in detail in the textbox below this section. The research team is to identify a suitable location for conducting one focus group per community. The interviewer will introduce themselves, explain the purpose of the study, and obtain signed informed consent (Annex 3a), recording the information that the participants share. The Formative Assessment will be used to understand the different types of markets and vendors that the local people purchase food from, help guide market selection, and provide the ground work to help complete Assessment 1.

For each community-level location, one weekly market and one daily market is to be selected using the following criteria, all of equal priority:

1. Size of the market (large open markets should be prioritized)
2. Rural location (more rural locations should be prioritized)
3. Food security status of the geographic area where the market is located (selecting locations with contrasting food security statuses should be prioritized)

The study team should write a description of their purposive sampling process of the open-air food markets.

In some settings, it may be difficult to identify one weekly and one daily market. Given that the way markets operate is shifting in many communities, it is important to be flexible when selecting markets. In some cases, it may make more sense to select two daily markets. While the package of assessments was

designed for one weekly and one daily market, it would only take a few slight adaptations to make the assessments flexibility in regard to market type.

### Considerations for Market Selection

The goal of market selection is to identify market food environments that are relevant to your activity's general plans and aspirations. While there is no standard sampling strategy or protocol for identifying study markets, there are important considerations an activity should reflect on to ensure that the markets selected provide useful information based on the activity's needs.

1. It is important to begin with a sense of how many open-air markets exist within a second subnational administrative unit, including both the formal markets listed in market or business directories and the informal markets that the key informant may mention in their interviews.

#### Illustrative Example

It is not possible to prescribe a number of markets to survey for this step because the number and composition of possible markets will vary depending on location. That said, the desk research and key informant interviews can help inform the decision of how many markets may provide a good representation of the food environments where consumers of interest are likely to shop. For example, for an activity with a zone of influence (ZOI) of 20 counties out of 50 in a country, the activity team may begin the market selection process by researching the average number of markets per county. For illustration purposes, assume an average of 10, meaning 200 possible markets of interest across the ZOI. Through desk research and key informant interviews, the activity team may learn that markets are very similar in terms of size and product content. In this case, if time and resources are available, the team could consider surveying two markets per county (one weekly and one daily) for 40 markets total (10 percent). The team might also consider identifying county groupings that represent economic or geographic clusters and selecting a weekly and a daily market per cluster. In this case, if from the 20 counties the team defined eight clusters, a weekly and a daily market per cluster would result in the team surveying a total of 16 markets.

2. If an activity already has market areas of interest identified, it is important to understand through the key informant interviews and/or the Social Participatory Mapping whether these are primary sources of food for the populations of interest. Some markets function as wholesale retailers that sell large quantities to restaurants or hotels or even to vendors who transport food to smaller markets to sell. Such markets would not be good candidates for the food environment assessments. If the activity is targeting a specific consumer group, take steps to understand where the consumers shop.
3. During key informant interviews, it may be important to ask if potential markets are good representations of markets in the second subnational administrative area. Market food environments may vary significantly because of a number of factors, but investigating this question early can help ensure that the markets selected are representative of the markets available to populations of interest.
4. Each additional market adds personnel time and logistical costs, which should of course be weighed against activity resources and competing agendas.

#### Formative Assessment: Social Participatory Mapping

In addition to the two-stage sampling plan described above, and based on the lessons learned in the pilot study, it is strongly recommended that a social mapping procedure be added to facilitate the

selection of the markets for study. This step involves conducting a FGD with a small number of consumers from each community to gain their insights on the key markets that they access within their food environments. This step proved valuable in understanding how consumers relate to their food environments. It helps to ensure the market sampling is aligned with consumer behaviors. In some cases, the markets that consumers most often access may not be within the boundaries of their community. In these cases, it is important to not let the administrative geographical boundaries lead to the exclusion of markets from the sampling.

## **Background**

Participatory research focuses on a process of sequential reflection and action that is carried out with and by local people rather than on them (Cornwall and Jewkes 1995). In a social mapping exercise, participants create visual maps that highlight the location of specific features of interest, such as markets. Discussions during the creation of the maps often shed light on the social dynamics related to the locations of interest, including transportation options, infrastructure, and, in the case of food markets, topics like food availability, prices, and quality.

## **Objectives**

The objectives of the social participatory mapping procedure are to obtain contextual background information of the local (community-level) food environment through consumer focus groups. This exercise can help team explore the following questions:

1. What and where are the different types of food markets/vendors in a given locality?
2. Why are these markets/vendors accessed by consumers?
3. How often are these markets/vendors accessed?
4. How are these markets/vendors accessed (transportation), and how much time is generally required per trip?

## **Methodology**

Social participatory mapping includes two components: the creation of a map and the discussion in response to questions related to the map and the food markets consumers frequent.

**Sampling Approach:** Purposive selection of 5–10 knowledgeable members of the community where the market assessments will occur. The sampling unit for the focus group is individual consumers that acquire food within their local community. One focus group will be conducted at each secondary subnational geographic units where the selected daily/weekly markets are located.

## **Forms**

1. Annex 4a. Focus group script for Social Participatory Mapping
2. Annex 4b. Data collection sheets for Social Participatory Mapping (Parts 1 and 2)

## **Materials**

1. Colored markers
2. Digital camera
3. Large sheets of paper/flipchart to accommodate focus group
4. Incentives for participants in the focus groups
5. Notebook
6. Waterproof pens/pencils
7. Printed forms
8. Refreshments for the participants in the focus group
9. Audio recorder

## Research Steps

1. Identify markets and recruit participants. List open-air food markets (daily/weekly) based on secondary data and the key informant interviews with stakeholders/market managers. From the list, select a market that is representative of the community. Identify neighborhoods near these markets to recruit participants. A screening checklist (including who within the household typically goes to the market to buy food, how often, gender, age, and who decides what to buy in the household) should be used to recruit participants. A convenience sample of between five and 10 individuals are to be selected from each community.
2. FGDs will be organized at a central location where consumers can easily participate. FGDs will take between 60 and 90 minutes. The FGD includes two components: drawing a map that indicates food markets and guided discussion of the map and market food environment decisions.

## Data collection instructions

1. The focus group will start with the facilitator introducing herself/himself and the research team. The facilitator should remind study participants of the purpose of the interview and share how the information will be used and disseminated, the funder, and the expected outcomes (as described in the Prior Informed Consent Form in Annex 3a).
  - a. Individual-level consent is to be sought from each of the participants before starting data collection as part of the FGD (see Annex 3a for a form that can be adapted).
2. After obtaining consent from each individual, the facilitator will request all participants to introduce themselves.
3. The facilitator will then implement an icebreaker activity for the participants to help them be more comfortable with the activity and create a relaxed environment.
4. The facilitator will ask for a participant volunteer to start drawing a map of the community with input from all participants.
  - a. First, identify main roads and landmarks (black marker).
  - b. Next, identify the places where most of their food is purchased (green marker) and add market/vendor names if available.
  - c. Finally, identify the places where the least amount of their food is purchased (red marker) and add market/vendor names if available.
5. The note-taker is to document the market background, participant information, and results from the free-listing mapping using the data collection sheet (Annex 4b, Part 1).
6. The facilitator will then lead the focus group through a series of follow-up questions to complement the mapping exercise. The note-taker will record participant responses using the data collection sheet (Annex 4b, Part 2).
7. Following the development of the market/vendor food environment, the participants will then be asked to review the data collection sheets for completeness and corrections.
8. Following the mapping activity and group verification of the completeness and accuracy of the data collection sheets, the note-taker is to take **photographs** of the map for record-keeping.
9. To conclude, the facilitator will follow local customs to thank the participants for sharing their time and knowledge and to reiterate how data will be used and how they will be made available. Refreshments will be provided to the participants according to local customs.

## Data Analysis and Presentation of Findings

The Social Participatory Mapping is a recommended step to inform the market selection by helping the research team understand the different types of markets and vendors that the local people



purchase food from. A summary of findings from this formative assessment should be included in the description of the research team’s purposive sampling process of the open-air food markets.

## Vendor Selection

The term “vendor” in this instruction manual is used to refer both to the physical stall in an open-air market where foods are offered as well as to the individuals who are managing/running the stall. While some of the assessments entail conducting a full census of the vendors selling food in a given market, others require the sampling of individual vendors and/or vendor types. Given that the way in which food is sold is different across different contexts, it may be necessary to modify the vendor sampling approach. In one pilot country, the vegetable vendors were often only selling one type of vegetable rather than a variety of vegetables. In these cases, rather than selecting one vegetable vendor to assess the diversity of vegetables sold, it would be important to modify the sampling approach to include additional vegetable vendors.

Making adaptations to the way in which vendors are sampled may also be necessary in markets that have little diversity in terms of vendor type. In some pilot countries, some open-air markets did not sell entire food groups. In such cases, the activity should complement the data collection with tools or strategies to include other food outlets that may exist beyond the parameters of the study markets. The social participatory mapping step can help inform which food outlet types should be sampled in these cases. Box 2 provides a description of how this might be applied in practice. Lastly, if you choose to use individual assessments rather than the package as a whole, you may need to adapt the vendor sampling approach, given that Assessment 1: Market Mapping informs the sampling of vendors for other assessments included in the package.

### Box 2. Sampling Vendors Outside of Open-Air Markets

If a specific food group is not sold in the open-air market (e.g., animal source foods) but is part of the Healthy Diet Basket or country-specific food-based dietary guidelines, you may choose to sample vendors outside of the open-air market in addition to those within the market. For example, you could select a vendor/food outlet (e.g., supermarket or convenience store) outside the open-air market to conduct the vendor inventory (Annex 10) for the Market Food Diversity Index in Assessment 3. The vendors outside the market could be sampled in place of the “vendor that sells meat” and “vendor that sells eggs, cheese, and yogurt” in the market. You could also collect food quantities and prices (Annex 12) to be included in the Healthy Eating Index/Cost of a Healthy Diet (Assessments 4 and 5) calculation from a vendor outside of the market. In this example, the vendor would be used in lieu of the animal source food vendor in the market. In these cases it would be important to clearly outline the sampling approach in any reporting and interpretation of the findings.

## Summary of Sampling Approach for Food Environment Assessments

The majority of the food environment assessments in this instruction manual are conducted at the vendor and market levels using either random or purposive sampling. Several assessments also take place at the community level. For example, Phase 1 of Assessment 1: Market Mapping takes place at the community level. Table 2 specifies the sampling unit, the sample size, and the sampling approach for each assessment.

**Table 2. Sampling Approach by Food Environment Assessment**

Assessment	Sampling Unit	Sampling Approach
Assessment 1: Market Mapping	<ul style="list-style-type: none"> <li>Phase 1: Secondary subnational geographic administrative unit</li> <li>Phase 2: Market level</li> </ul>	<ul style="list-style-type: none"> <li>Phase 1 sampling is at the subnational geographic administrative unit level, where markets per country are located.</li> <li>Phase 2 sampling is at the market level for each of the selected markets per country.</li> </ul>
Assessment 2: Seasonal Food Availability*	<ul style="list-style-type: none"> <li>Individual food vendors (individuals selling food will be invited for focus group interviews; 10 vendors per market)</li> </ul>	<ul style="list-style-type: none"> <li>The sampling unit is individual food vendors who are selling fruits, vegetables, and other fresh foods (minimally processed foods that include minimally processed/raw meat, milk, eggs etc.) at each of the surveyed markets. A total of 5 vendors who are selling fresh fruits and vegetables and 5 vendors who are selling other whole foods are to be randomly selected from each surveyed market based on Assessment 1: Market Mapping (Phase 2).</li> </ul>
Assessment 3: Market Food Diversity Index	<ul style="list-style-type: none"> <li>Phase 1: Vendor level (10 vendors per market)</li> <li>Phase 2: Market level</li> </ul>	<ul style="list-style-type: none"> <li>Phase 1 will occur at the vendor level where 10 vendors will be randomly selected per each of the surveyed markets as identified during Assessment 1: Market Mapping. Phase 2 of Assessment 3: Market Food Diversity Index will occur at the market level where an audit will be carried out to detect the presence of food categories in each of the surveyed markets per country.</li> </ul>
Assessment 4: Healthy Eating Index of Food Supply*,**	<ul style="list-style-type: none"> <li>Phase 1: Market level</li> <li>Phase 2: Vendor level (1 vendor per food group, based on food groups specific to Healthy Diet Basket [HDB] or the selected food-based dietary guideline [FBDG] at each of the daily markets)</li> </ul>	<ul style="list-style-type: none"> <li>Sampling is to occur at the market and vendor level. At the vendor level, 1 vendor is to be selected at each of the selected daily markets per country that sell the specified food groups aligned to HDB (or FBDG) as identified during Assessment 1: Market Mapping (e.g., for HDB: 1 vendor * 6 food groups * 6 daily markets = 36 total vendors per country).</li> </ul>
Assessment 5: Cost of a Healthy Diet*	<ul style="list-style-type: none"> <li>Vendor level (1 vendor per food group at each of the daily markets)</li> </ul>	<ul style="list-style-type: none"> <li>At the vendor level, 1 vendor is to be selected at each of the selected daily markets per country that sell the specified food groups aligned to HDB (or FBDG) as identified during Assessment 1: Market Mapping.</li> </ul>
Assessment 6: Environmental Profile of a Community's Health	<ul style="list-style-type: none"> <li>Phase 1: Distance of 1 km around surveyed market (distance around surveyed markets)</li> <li>Phase 2: 2 vendors per market</li> </ul>	<ul style="list-style-type: none"> <li>Phase 1 will occur at a distance of 1 km around each of the surveyed markets following a predetermined route selected by the research team.</li> <li>Phase 2 will occur at the market level to document the prevalence of advertisements as well as at the vendor level to document food label attributes, where 2 randomly selected vendors that sell the</li> </ul>

Assessment	Sampling Unit	Sampling Approach
		preselected snack food item will be surveyed at each of the selected markets.
Assessment 7: Produce Desirability Tool for Low- and Middle-Income Countries**	<ul style="list-style-type: none"> <li>• Vendor level (2 vendors per market)</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Sampling is at 2 randomly selected vendors per market for each of the selected markets per country.</li> <li>• At each vendor, the researcher will implement the Produce Desirability Tool for 3 replicates of each of the predetermined market basket of 5 fruits and 5 vegetables.</li> </ul>

\* Indicates assessment involving human subject data collection (vendor interviews and focus group interviews).

\*\*Indicates assessment where food(s) must be purchased for analysis.

## Scale-Up

The package of assessments has the potential to scale up at each sampling level (i.e., increasing the number of geographical locations, markets, and vendors sampled) as well as across additional time points, depending on time, resources, and project needs. Perhaps one of the most important opportunities for scaling up sampling would be to include additional vendors for several assessments (Assessments 3, 4, 5, and 7). The appropriate number of vendors will vary depending on the size and composition of the market. An activity team may decide to include additional vendors after conducting Assessment 1: Market Mapping based on the observed number of vendors and vendor types. From this total, a team could agree on an appropriate percentage of vendors to include. To do this, one could simply follow the sampling guidance for vendor type for each of the assessments but increase the number of vendors sampled within each type. The data collection could also be expanded by implementing the package across different seasons. To capture seasonal variation, it may make sense to focus on the collection of specific assessments that would be most influenced by seasonality during the second data collection time point (e.g., Assessments 3, 4, 5, and 7) rather than implementing the package in its entirety.

## Training

Research teams should budget about one week of training on the food environment assessment package and plan sufficient time for field testing. During the pilot studies, a 5-day virtual training was provided, including 1 day of field testing in a nearby open-air market. Given the amount of content that is covered in the training and the importance of field testing the assessments to inform their refinement based on the local context, a full week for training plus additional time for field testing and adaptations is recommended. Training will provide an overview of the entire assessment package and guide research teams through each step of research planning, sampling, materials, data collection, and data analysis for each of the assessments.

As part of the training session, the research team will practice and pre-test the assessments; this practice includes hosting a mock practice session for focus groups and market audits. The pre-test in market settings is a critical step to ensure that interview guidelines are suitable for assessments that require vendor interviews.

### Sample Training Schedule

- 4–5 days for detailed overviews of each assessment, including lecture-style presentations and mock exercises
- 1–2 days field testing assessments in local markets
- 1–2 days making adaptations to assessments and further practice
- 1–2 days conducting a second field test and final debrief

Members of the research team will need to familiarize themselves with all materials and equipment, such as the audio recorder, global positioning system (GPS) unit, and digital camera, before training commences. The research team will be responsible for obtaining training on equipment and materials, if required.

## Study Approvals

The food environment assessments study teams must inform the appropriate authorities about the study; apply for research approvals, including the participation of human subjects in focus groups; receive approval for the study; and making sure the study follows ethical principles and local procedures. See Chapter 6 for details on the required approvals, along with ethics and confidentiality details. Formal research approval should be retrieved at the country level. Research approval should further be sought at the local (subnational) level, which will either be formal or informal in nature. In addition, formal approval for the participation of vendor informants in focus groups must be requested. Informal research approval should be retrieved at market levels by introducing the study before data collection. For vendor data collection, the research team should introduce the study to the vendor during data collection. Chapter 6 provides further guidelines for photographing people in the food environment up close, whereas Annex 3e provides a sample interview and media (photo) release form to obtain signed permission.

## Material and Equipment Checklist

The following materials and equipment are needed for planning, data storage, and data analysis to complete the seven food environment assessments in this instruction manual:

1. Computer with word and spreadsheet processing capability
2. Data storage hard drive
3. Data storage online shared drive, such as Dropbox
4. Online mapping software, such as Google Maps or ArcGIS

The following materials are needed in the field to implement all seven food environment assessments included in this instruction manual:

1. Audio recorder with extra batteries
2. Colored markers
3. Primary and secondary subnational geographic administrative unit maps
4. Digital camera (minimum of 10 MP) with two memory cards (minimum of 1 GB each)
5. GPS unit (can be an application on a smartphone)
6. Refreshments for the focus group participants
7. Large sheets of paper/flipchart
8. Money for purchasing foods
9. Notebooks
10. Portable weighing scale
11. Printed data collection forms
12. Waterproof pens/pencil
13. Clipboard organizer
14. Badges, vests, hats, t-shirts, or other items to visibly identify enumerators (optional)

## Completing the Assessments, Data Collection Sheets, and Data Analysis Templates

The research team should review this instruction manual before implementing the assessments and read through each of the data collection sheets and data analysis templates. It is critical for the field research

to proceed in a systematic manner at each site. All assessments should be pre-tested by the research team and should have backups for materials like spare batteries for the audio recorder.

The research team is to keep track of the research process in a notebook, making note of the overall process, any deviations from the protocols, questions that emerge, and unusual observations.

The various food environment assessments should be conducted when the markets first open in order to best capture the available food supply. For the mapping exercises, observations should take place during daylight working hours. Upon arriving at the field location of interest, the research team should do a casual walkaround as reconnaissance and record preliminary observations in their notebook to help plan data collection.

Each of the seven assessments includes data collection sheets and data analysis templates the research team will use to collect and analyze data in a standardized way. The data collection sheets should be filled out neatly with a waterproof pen or pencil. If it is difficult to maintain neat handwriting in the field, we recommend transcribing the answers to a new data collection sheet after the market visits have been concluded. No questions/fields within the data collection sheet should be left blank; rather, write "N/A" if something is not applicable to indicate that the question was not missed. Upon returning from the markets, the data collection sheets should be scanned and saved with the location, type of assessment, and date. Ideally, data collection sheets should be uploaded at the end of each day after data are reviewed and cleaned. The data analysis templates should be filled out as soon as possible after returning from the field.

### Photographic assessment

Multiple food environment methods and tools in this instruction manual involve photographic assessments. The various data collection instructions associated with each method and tool outline the photographs that are to be taken (specifically in Assessments 1, 2, 6, and 7). It is important that the photographs are taken in a standard manner, with a minimum 10-MP digital camera. Below are considerations to help ensure that photographs are taken in a standard manner:

1. **Lighting:** Photographs should be taken during daylight hours. Avoid using the flash feature outdoors. The flash feature may be required in open-air markets that have shade covers, such as when taking photographs of fruits and vegetables (FV). Try to avoid taking photographs while it is raining. Lighting for photographs is often good after the rain.
2. **Camera Angle and Zoom Feature:** Avoid using the camera's zoom feature. Use the normal or wide angle of the camera. Photograph from a 30- to 40-degree angle.
3. **Photographing Food Environment Features:** Try and stand back to capture the whole scene/feature of interest for the food environment photographic assessment, such as a store front or FV stall. The scene/feature of interest should capture, at minimum, 50 percent of the photograph, though ideally around 75 percent of the photograph. Try to avoid capturing too much of the surroundings so it is clear what feature of the food environment the image focuses on. In certain instances, it may be helpful to use a camera's "stitch assist" feature to stitch together overlapping photographs to depict a whole scene. For example, in order to capture an entire FV display, multiple photographs may need to be stitched together.
4. **Photographing Text:** It is important to ensure photographs of text, such as food advertisements, are kept in focus to ensure the text is readable. If the zoom feature needs to be used, such as for a billboard or poster on a building further away, avoid using the flash.
5. **Saving and Labeling Photographs:** Photographs should be labeled by location, type of feature, type of assessment, and date. It is beneficial to save the photographs immediately so as not to forget the relevant details.

## Storing Data

Each of the data collection sheets and photographs from the field assessments should be scanned, labeled, and saved in a shared data storage folder. For each type of assessment, create subfolders for each primary geographic unit. Within each primary geographic unit folder, create subfolders for each secondary geographic unit. Within each secondary geographic unit, create subfolders for each market. The scanned data collection sheets should be labeled by location, type of assessment, and date. The prior informed consent forms should be stored in a locked drawer or cabinet for access only by the research team and destroyed two years following the study.



# Chapter 4. Data Collection Instructions

## Assessment I: Market Mapping

### Background

Market mapping is used to evaluate the food environment dimensions of food availability, accessibility, and convenience. Specifically, it is used to document commercial and geographic food availability, accessibility, and geographical convenience rather than social, cultural, and economic aspects of the above dimensions. Multiple studies have used market mapping to identify food deserts and food swamps in an effort to modify food environments to support healthy eating and food security for all (Robitaille and Paquette 2020). Market mapping typically involves the use of geographical information systems and field validation to document the number, type, location, density, and proximity of food outlets to reference points, such as a community center or residential areas.

### Objectives

The objective of the market mapping assessment is to provide (1) an overall context of the food environment in a specific area (at the community level) and (2) an overview of the types and quantities of vendors in the selected open-air markets (at the market level). The main output is modified Retail Food Environment Index (mRFEI) values that indicate the number of healthy and less healthy food retailers/market food environments by location. It answers the following questions:

1. What are the different types and quantities of market food environments in each secondary subnational administrative area?
2. What are the different types and quantities of food vendors in each market and what are their working hours (the findings will support the selection of food vendors to include in Assessments 2–7)?
3. How does the presence of market food environments and types of food vendors vary with locality (comparison between markets within the study area, namely, across the 12 markets in the six selected secondary subnational administrative areas) and type of market (between weekly and daily markets)?

### Methodology

This market mapping assessment involves two phases. Phase 1 is at the community level to provide an overview of market food environments and community characteristics, such as infrastructure. Phase 2 is at the market level to characterize the types and quantities of vendors in the selected open-air markets per secondary subnational administrative area. The assessment instructions presented here are adapted from several previous market mapping tools in the literature, including the EPOCH (Chow et al. 2010) and others (Robitaille and Paquette 2020).

**Planning** is to proceed by referring to the map created from the Social Participatory Mapping (Formative Assessment), which identifies the main markets/vendors where focus group participants procure their food. The next step includes gathering maps of the community area by available means (e.g., through an online software program like Google Maps) and identifying the markets' locations and days and hours of operations on the basis of market and business directories. Phase 1 can be completed remotely using secondary data and field validation, whereas Phase 2 is an activity to be completed in the field to collect primary data.

The **sampling unit** for the market mapping assessment is at the community level for Phase 1 and the market level for Phase 2.

**Sampling** is based on the purposive sampling of markets as part of the planning phase. Market mapping for Phase 1 will include the associated communities surrounding the selected study markets, whereas Phase 2 will take place within the selected markets.

## Forms

- Annex 5. Data Collection Sheet for Community-level Mapping to collect data at the community level (Phase 1).
- Data Collection Sheet for Market-level Mapping to collect data at the market level (Phase 2).

**Materials** required for market mapping include:

1. A comprehensive list of open-air markets created during the Purposive Sampling of Markets and carried out during the Planning Phase and Formative Assessment.
2. Secondary subnational administrative area level maps (can be procured from an online software program like Google Maps)
3. Digital camera
4. GPS unit (can be an application on a smartphone)
5. Market and business directories (for identifying locations and operating hours)
6. Notebook
7. Waterproof pens/pencils
8. Printed data collection forms (Annexes 5 and 6)

**Steps** for Market Mapping:

1. **Research Planning:** Use the Social Participatory Map completed in the Formative Assessment and procure maps and existing government/public data documenting the location and operating hours of market food environments.
2. **Community-level Data Collection (Phase 1):** Document community characteristics and types of market food environments within the communities surrounding study markets.
3. **Market-level Data Collection (Phase 2):** Document market characteristics and types of market food vendors/stalls.
4. **Data Analysis:**
  - a. Secondary subnational administrative area level: Tabulate total number of types of market food environments by location. Calculate and graph the mRFEI of the number of healthy and less healthy food retailers/market food environments by location.
  - b. Market level: Tabulate total number of types of market food environments by location (12 markets per country). Calculate and graph the mRFEI of the number of healthy and less healthy food retailers/market food environments by location.

In some contexts, primary data collection may provide more accurate information than relying on secondary data sources like Google Maps and/or key informant interviews. In these cases, the Phase 1 market mapping data collection (Annex 5) can still be used as described in this section; however, the data collection will be conducted in real-time in the community rather than via secondary sources. In these cases, collecting data electronically using tablets may facilitate the data collection process.

## Data collection instructions

1. Make a list of market food environments in the selected secondary subnational administrative areas based on the *Market Food Environment Classification* below.
2. Procure a map of each selected secondary subnational administrative area.

3. In Phase I, complete the secondary subnational administrative area characteristics portion of the data collection sheet (Part 2a and 2b of Annex 5). Community-level mapping of markets data collection sheets collect data regarding community features such as location, post code, availability of transportation (e.g., bus, shared taxi), presence of infrastructure (e.g., paved roads, bus station), distance to community features, and travel time to urban areas.
4. After documenting the community characteristics, document the presence of different types of market food environments within the community using the Market Mapping Checklist (Part 3 in Annex 5, based on the *Market Food Environment Classification* below). Each observed market should be placed in only one category based on its most prominent feature/type of foods available.
5. The Market Mapping Checklist (Part 3 in Annex 5) includes: (a) geocoding to record geographic coordinates from Google Maps in Degrees, Minutes and Seconds format for latitude and longitude (e.g., 6°49'0.01" N -8°46'59.99" W) for all of the different types of market food environments; (b) documenting the days of the week and hours of operation of the market food environments; and (c) taking one photograph (i.e., a screenshot of the storefront if available on Google Maps) of each of the market food environments.
6. Phase 2 takes place at the two selected open-air markets per secondary subnational administrative area and involves inventorying the different types and quantities of vendor stalls (using the data collection instructions and data collection sheet in Annex 6).
7. Complete the background and market characteristics sections (Parts 1 and 2 in Annex 6), which document the type of markets (weekly or daily) and the total number of vendors. The total number of vendors is calculated by walking around the market to count the total number of food stalls, including those selling fruits, vegetables, meat, dairy, seafood, dried foods, herbs/spices, fried foods, processed snacks, etc. Do not count vendors who are not selling food items.
8. Make a tally of the presence of different types of food vendors in the market using the Market Vendor Checklist (Part 3 in Annex 6 based on the *Vendor Food Environment Classification Key*).

From the list of vendors mapped, enumerators will randomly select the number of food vendors to include in Assessments 2–7. This is generally 10 vendors for most assessments per market. The selected food vendors should be selling whole foods (e.g., fruits, vegetables, meat, eggs) and not only prepared food items. Random selection of the vendors involves assigning a number to each vendor selling whole foods and then randomly selecting 10 numbers. Consider including between three and five randomized “backup vendors” in the event a selected vendor cannot be included in the assessment.

### **Market Food Environment Classification (Annex 5 Quantity of Market Food Environments)**

The types of market food environments to be documented in Phase I include various types of markets that can be further classified as healthy or unhealthy, based on the most prevalent types of foods sold and how they contribute to healthy diets (tables 3 and 4). The following types of market food environments will be documented in Phase I of the market mapping assessment using the classifications in the following tables.

**Table 3. Healthy Market Food Environments**

Market Food Environment Type	Definition
Supermarket/large grocery store	A large store that sells a reasonable range of fresh fruits and vegetables, meats, and staples needed to cook meals.
Small grocery	A small store that sells a range of fresh fruits and vegetables, meats, and staples needed to cook meals.
Open-air market	Either a daily or weekly market with a collection of different stalls/vendors selling fresh fruits and vegetables, meat, pulses, staples, and other goods.

Bread shop	A store that primarily sells savory bread products, including flatbreads, whole grain loaves, and baguettes.
Butcher	A store that primarily sells unprocessed and processed meat products, including chicken, pork, and beef.
Herb and spice shop/market	A store/market that primarily sells spices for cooking and/or tea, coffee, and cocoa for making at home.
Healthy street food vendor or cart	Primarily sells fresh or whole foods, or foods prepared from fresh fruits and vegetables, and pulses, such as fruit salads, smoothies, and coconuts.

**Table 4. Unhealthy Market Food Environments**

Market Food Environment Type	Definition
Convenience store	A store that sells a few foods, generally prepackaged convenience foods like ultraprocessed snacks and sweetened beverages, including juice (these goods comprise approximately 60% of food offerings), but not a wide enough selection of foods to make meals. Typically, these stores do not sell fresh fruits, vegetables, or meat.
Bakery for sweets	A store that sells baked sweets, such as biscuits, pastries, cakes, and other baked sweet items (this store may also sell bread).
Processed meat	Primarily sells processed meat products, including sausages, canned meats, bacon, ham, dried meats, smoked meats, and lunch meat (these goods comprise approximately 60% of food offerings).
Unhealthy street food vendor or cart	Primarily sells packaged foods such as ultra-processed snacks or prepared foods that may include meat pie, sausage roll, fried dough, friend banana.

**Vendor Food Environment Classification (Annex 6)**

Types of vendors/stalls to be documented in the markets during Phase 2 of the market mapping can be classified as “healthy” or “unhealthy” based on how their offerings contribute to a healthy diet of the most prevalent types of foods sold (i.e., approximately **60 percent or more**; see table 5). Vendors will be documented based on the classifications in table 5.

**Table 5. Vendor Classification**

Healthy Food Vendor/Stall	Unhealthy Food Vendor/Stall
<ul style="list-style-type: none"> <li>• Fresh fruit AND vegetable</li> <li>• Fresh fruit</li> <li>• Fresh vegetable</li> <li>• Dried whole foods (selling grains, beans, nuts, dried fruits)</li> <li>• Butcher</li> <li>• Bread</li> <li>• Fish and seafood</li> <li>• Dairy and/or egg</li> <li>• Herb and spice</li> <li>• Healthy mixed** food</li> </ul>	<ul style="list-style-type: none"> <li>• Processed meat</li> <li>• Baked sweets</li> <li>• Sweets</li> <li>• Packaged ultraprocessed* salty snacks</li> <li>• Deep-fried food</li> <li>• Sugar-sweetened beverages (soft drinks, sports drinks, juices)</li> <li>• Unhealthy mixed** food</li> </ul>

\*Ultraprocessed foods are industrial formulations that typically comprise five or more ingredients, including sugar, oils, fats, salt, antioxidants, stabilizers, preservatives, and additives not commonly used in culinary preparations.

\*\*Vendors with a mix or variety of foods should be placed in the appropriate category depending on the majority of items sold (i.e., approximately 60% or more) so that a more accurate mRFEI can be calculated. However, in hard-to-classify situations, the Healthy or Unhealthy mixed food category may be used.

## Data Analysis

Data can be analyzed to calculate the Market Food Environment Index at both the community and market levels. These indices are adapted from the mRFEI. The mRFEI measures the number of healthy and unhealthy food retailers within an area as defined by typical food offerings in specific types of retail stores (e.g., fruit and vegetable markets, supermarkets, grocery stores, convenience stores, or fast-food restaurants).

The mRFEI is expressed as the percentage of food retail stores that are classified as healthy out of the total number of food retailers/vendors considered healthy or less healthy in a defined area (community level for Phase 1 of the market mapping assessment and market level for Phase 2 of the market mapping assessment). The mRFEI has been adapted for this analysis to measure the number of healthy and less healthy food market food environments within a secondary subnational administrative area and within a market. Data will then be compared between the different secondary subnational administrative areas and between the types of markets. These data will “summarize” the country they represent.

See the [Data Analysis Instructions](#) document for full instructions and [accompanying data analysis sheet](#).

## Assessment 2: Seasonal Food Availability Calendars

### Background

Seasonal food availability calendars are used to evaluate the food environment dimension of food availability with the understanding that access in the food environment varies throughout the year. Seasonality relates to the availability of perishable foods like fruits and vegetables at different times of the year (Lochetti et al. 2020). Local seasonality of food refers to food that is available (and consumed) within the region of production. Previous research has highlighted the influence of local seasonal availability of food on food and nutrition security (Savy et al. 2006) as well as on dietary quality (Broaddus-Shea et al. 2018; Hirvonen et al. 2016; Stelmach-Mardas et al. 2016).

Understanding seasonal availability of fruits and vegetables and other foods can be used as an entry point for designing programs and activities to support food security, diets, and nutrition to improve year-round access to fresh, healthy, and nutrient-dense foods, namely fruits; vegetables; starchy staples; animal source foods; legumes, nuts, and seeds; and fats and oils. While seasonal food availability calendars can be used to evaluate the wild and cultivated food environments along with built market food environments, this protocol focuses on the availability of fresh foods in market food environments.

### Objectives

The **overall objective** of the seasonal food availability calendars assessment is to visually depict the availability of fresh foods in markets during each month of the year and to identify patterns of changes in availability. This assessment answers the following questions:

1. What are the temporal patterns and fluctuations in food availability in markets?
2. When are fresh foods and nutrient-dense foods most prevalent in markets?
3. When are fresh foods and nutrient-dense foods least prevalent in markets?
4. How does the above vary with locality (comparison between markets in the selected geographic locations and between weekly and daily markets)?

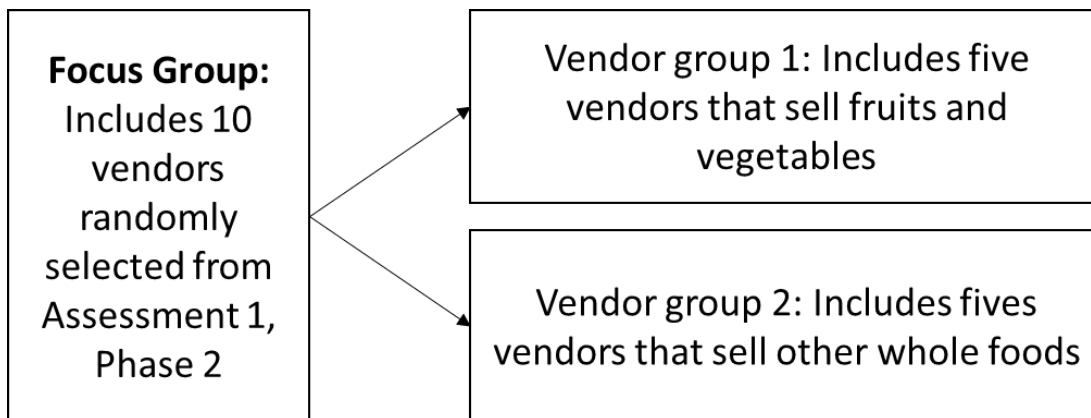
## Methodology

The seasonal food availability calendar assessment aims to evaluate perceived seasonal availability through FGDs with market vendors. The research steps involved include a free listing exercise of foods, verification of food names (local and scientific), and a scoring exercise of seasonal availability. The methodology presented draws from the “Seasonal Food Availability Calendar for Improved Diet Quality and Nutrition: Methodology Guide” (Lochetti et al. 2020) and has been modified for open-air market food environments to evaluate seasonal availability of fresh foods.

**Planning** begins by inviting a total of 10 vendors to participate in one focus group per market. Vendor Group 1 should include five vendors who sell fresh **(1) fruits and (2) vegetables**, and Vendor Group 2 should include five vendors who sell **(3) starchy staples (4) animal source foods (5) legumes, nuts, and seeds, and (6) fats and oils**. These food groups are sourced from **the Healthy Diet Basket**. The research team is to identify a suitable location for the focus groups, preferably in or near the open-air market, and a convenient time for the invited vendors. The vendors should be informed that the focus group will take approximately 2–3 hours. Refreshments should be provided to the participants in a manner that follows local cultural norms. The team is to designate a facilitator and a note-taker. Deviation in the gender composition of the focus group may be necessary to match cultural norms in the region. For example, matching the gender of both the facilitator and focus group vendors will be important when different genders cannot speak freely in a mixed-gender group.

The **sampling unit** is individual vendors, five of whom are selling fruits and/or vegetables and another five who sell other fresh whole foods (starchy staples; animal source foods; legumes, nuts, and seeds; and fats and oils) at each of the surveyed markets. A total of 10 vendors will participate per market.

**Sampling** of the markets includes the open-air markets that were selected during the Planning Phase. The vendors invited to the focus group interview involve a random sampling of vendors of different markets examined on the basis of the following attributes. From each market, one focus group will be conducted with 10 vendors, each of whom sell the fresh foods listed above under “Planning.” This selection process should result in a mix of vendors of different ages, genders, and other sociocultural factors (e.g., years working at the market, knowledge of local food).



If mixing genders in a focus group and/or vendor group does not follow cultural norms, then Vendor Group 1 should include males and Vendor Group 2 should include females (please avoid duplicating food lists; Vendor Group 1 covers fresh fruits and vegetables and Vendor Group 2 covers other foods). All 10 vendors should be present to participate in the focus group. When selecting vendors, confirm there are no scheduling conflicts. Field researchers must obtain informed consent from all participants (see Annex 3c for informed consent forms).

## Provided Forms

- **Annex 3c** is the form to document informed consent of focus group participants
- **Annex 7** provides the script for facilitators to carry out the focus group interviews.
- **Annex 8** provides the data collection sheet for the focus group interviews.

**Materials** required for Assessment 2: Seasonal Calendars of Food Availability include:

1. Colored markers
2. Digital camera
3. Large sheets of paper/flipchart to accommodate breakout session for Vendor Groups 1 and 2
4. Incentives for focus group participants
5. Notebook
6. Waterproof pens/pencils
7. Printed forms (Annexes 3c, 7, 8)
8. Refreshments for the focus group participants

**Steps** for the seasonal food availability calendars assessment include:

1. **Research Planning:** Setting up focus group with market vendors
2. **Implementing Focus Groups:**
  - a. Introduction and Consent: The facilitator will introduce the focus group and elicit consent from each participant.
  - b. Free-listing of foods: The facilitator will ask the participants to name all locally available fresh foods *in the market*. Participants in Vendor Group 1 will be asked to list all the available (1) fresh fruits and (2) vegetables. Vendor Group 2 will be asked to list the other whole foods vendors sell: (3) starchy staples; (4) animal source foods, (5) legumes, nuts, and seeds, and (6) oils and fats.
  - c. Scoring Activity of Seasonal Availability: The facilitator will implement the scoring activity to document the seasonal availability of each species using the 12 months of the Gregorian calendar.
3. **Data Analysis of Scoring Activity Responses:** Creating graphs with calendar months on the x-axis and the average score on the y-axis for each food group by market place, each geographic location, and at the country level.

## Data Collection Instructions

1. Data collection will start by setting up focus groups with the 10 selected vendors per market as described in the planning section above (Vendor Group 1: five vendors who sell (1) fresh fruits and (2) vegetables [FVs], and Vendor Group 2: five vendors who sell other whole foods like (3) starchy staples, (4) animal source foods, (5) legumes, nuts, and seeds, and (6) oils and fats).
2. As part of the focus group interview, each participant must provide consent before data collection begins (see Annex 3c for a form that can be adapted for this purpose).
3. The focus group will start with the facilitator introducing herself/himself and the research team.
4. The facilitator will then remind study participants of the purpose of the interview and share how the information will be used and disseminated, details about the funder, and the expected outcomes (as described in the Prior Informed Consent Form in Annex 3c).
5. The facilitator will request vendors to introduce themselves.
6. The facilitator will then implement an icebreaker activity so that the vendors can become more comfortable with the activity and to create a relaxed environment.
7. Two facilitators then implement the free-listing exercise following the script in Annex 7.



8. The note-taker is to document the market background, vendor information, and results from the free-listing activity using the data collection sheet for the assessment (Annex 8).
9. The free-listing exercise involves participants separating into two groups to name all of the locally available fresh foods:
  - a. Vendor Group 1, which is comprised of participants who sell fruits and vegetables, will be asked to list all of the available fresh fruits and vegetables.
  - b. Vendor Group 2, which includes vendors who sell other whole food, will be asked to list all of the other fresh foods available at the market.
  - c. It is very often helpful to focus on one food group before moving on to the other food groups (e.g., first list all fruits, next list all vegetables, and so forth).
10. A facilitator will join each vendor group and provide a few examples of available fresh fruits and vegetables and other available fresh foods to ensure vendors understand the domains of their respective free-listing exercises.
11. Each facilitator or note-taker will record the participant input from the free-listing exercise on the left side of the large papers/flipchart, with space on the right side corresponding to the 12 months of the Gregorian calendar. It may be helpful for the research team to organize the flip charts prior to the focus group, labeling each chart “Vendor Group 1” or “Vendor Group 2” with an organizational scheme that resembles Table 1 in the instruction manual.
12. The facilitator is to record the local names of the identified foods and prompt the vendors if multiple local names exist for the same foods.
  - a. For foods where plant parts are separately sold for consumption (e.g., fruit and leaves), the different plant parts are to be documented separately.
  - b. The facilitator will further prompt the vendors to identify whether multiple varieties of the fruits and vegetables, and other whole foods identified in their free lists, are available at the market.
13. After the vendors complete their free lists, provide a break. Upon reconvening the entire group of 10 vendors, the facilitator will read the items on the lists out loud. The vendors will then be asked to review the lists for completeness and corrections.
14. At a later time, the research team will be responsible for identifying the scientific names of each food item listed during the free-listing activity of fruits and vegetables. If foods listed are not known/recognizable to the research team, further information should be gathered to identify the species name.
15. The facilitator is to implement the scoring activity to document the seasonal availability of each species based on the 12 months of the Gregorian calendar.
16. The facilitator or note-taker will create a matrix next to the names of the listed species with the 12 Gregorian calendar months (using the example in Annex 8). In addition, the research team should ask the vendors about which seasons correspond to each of the 12 months of the Gregorian calendar as per the interview script (Annex 8) and make note of this in the matrix. In some cases, it may be easier for the vendors to report seasonal availability depending on the season rather than the month; the alignment of months to each season may be shifting more dramatically in some localities because of climate change, which makes the alignment of availability by month difficult.
17. The facilitator is to proceed by naming one item at a time from each list and each month; for each item and month, the vendors are to score the activity as follows:
  - a. No availability: score of 0
  - b. Low availability: score of 1
  - c. Medium availability: score of 2
  - d. High availability: score of 3
18. The vendors will then be requested to share their ratings, which the note-taker will record. The facilitator is to help resolve any discrepancies and document the final score of availability for each

food item. Finally, the facilitator will review the matrix of food names and availability with the vendors for verification of accuracy and completeness.

19. The note-taker is to **take photographs of the final matrix as a record** and save it with the proper naming convention (location, type of assessment, and date).
20. To conclude the focus group, the facilitator will thank the vendors according to local customs for sharing their time and knowledge, as well as to reiterate how the data will be used and how it will be made available. Refreshments will be provided to the vendors according to local customs.
21. The research team will then record the final matrix and attach it to the data collection sheets (i.e., data collection sheets for Parts 1, 2, 3, and 4 should be kept together for credible data entry into the respective market in the data analysis template).
22. Following the focus groups, the research team is to take photographs of each seasonally available item from the free lists, either through the vendors' selections or other means.

## Data Analysis

Data analysis for Seasonal calendars of food availability will begin by inputting the collected data into a spreadsheet. The data will be analyzed to address the research questions with regard to temporal patterns and fluctuations in fresh food availability.

See the [Data Analysis Instructions](#) document for full instructions and accompanying [data analysis sheet](#).

## Assessment 3: Market Food Diversity Index

### Background

The Market Food Diversity Index (MFDI) is used to evaluate the availability dimension of the food environment. MFDI recognizes that, to promote diverse diets, a range of foods must be available in the food environment. Numerous studies provide evidence regarding dietary diversity being an attribute and/or proxy of dietary quality.

The MFDI is benchmarked on the food groups of the Dietary Diversity Score (DDS) and can be adapted for additional food group categorizations, such as those in the Dietary Quality Questionnaire (DQQ). The DQQ is an internationally standardized survey instrument with country-adapted modules that capture the consumption of 29 food groups. The minimum dietary diversity for women (MDD-W), an additional validated indicator of diet quality (FAO and FANTA, 2016), can be derived from the DQQ food groups.

Although the DDS has been extensively used for monitoring and evaluation activities in LMICs, the MFDI has more recently emerged. Several studies have evaluated the link between the MFDI of market food environments and DDS in LMICs (Pingali and Ricketts 2014). The MFDI can provide insight on whether rural market development can, via improved availability, increase consumption of diverse and healthy foods.

### Objectives

The **overall objective** of the MFDI is to determine the availability of all foods, categorized by food groups, through a food environment inventory and audit. The assessment answers the following questions:

- (1) What is the availability of foods categorized on the basis of the food group classifications of MDD-W and DQQ?
- (2) Which food groups are most prevalent and which food groups are least prevalent?
- (3) How do foods and food groups vary by locality (comparison between markets in the selected geographic locations and between weekly and daily markets)?

## Methodology

MFDI as presented here involves data collection on the basis of the 29 food groups of the DQQ or the 10 food groups of the MDD-W. Table 6 shows the food groupings of the DQQ and the MDD-W.

**Table 6. Food Groupings of the DQQ and the MDD-W**

DQQ Food Groups (29 total)	MDD-W Food Groups (10 total)
Foods made from grains	Grains, white roots and tubers, and plantains
Whole grains	
White roots/tubers	
Legumes	Pulses (beans, peas, and lentils)
Dark green leafy vegetables	Dark green leafy vegetables
Other vegetables	Other vegetables
Vitamin A–rich orange vegetables	Other vitamin A–rich fruits and vegetables
Vitamin A–rich fruits	
Citrus	Other fruits
Other fruits	
Eggs	Eggs
Cheese	Milk and milk products
Yogurt	
Fluid milk	
Nuts and seeds	Nuts and seeds
Unprocessed red meat (ruminants)	Meat, poultry and fish
Unprocessed red meat (non-ruminants)	
Poultry	
Fish and seafood	
Processed meats	
Packaged ultraprocessed salty snacks	Not captured
Instant noodles	
Deep-fried foods	
Sugar-sweetened beverages (soft drinks/sports drinks)	
Fruit juice and fruit drinks	
Sweet tea/coffee/cocoa	
Baked sweets	
Other sweets	
Fast food	

**Planning** is to proceed by printing the provided forms for data collection and making arrangements to survey the open-air markets and vendors identified in the Assessment I: Market Mapping.

The **sampling unit** is at the market level for Annex 9 (open-air markets) and vendor level (10 vendors in each market) for Annex 10.

**Sampling** includes the markets selected during the Planning Phase, and the Market Audit step (Annex 9) will comprise all markets selected. The Vendor Inventory (Annex 10) includes a random selection of a total of 10 food vendors per market. From the complete list of vendors identified during the Market Mapping assessment, the research group is to randomly select the following types of vendors to carry out the Vendor Inventory:

1. One vendor that primarily sells fruits
2. One vendor that primarily sells vegetables
3. One vendor that primarily sells whole grains
4. One vendor that primarily sells legumes
5. One vendor that primarily sells sweets (such as baked sweets)
6. One vendor that primarily sells meat
7. One vendor that primarily sells eggs, cheese, and yogurt
8. One vendor that primarily sells nuts and seeds
9. One vendor that primarily sells packaged ultraprocessed salty snacks
10. One vendor that primarily sells deep-fried foods

### Provided Forms

1. Annex 9 provides the data collection sheet to carry out market-level inventories.
2. Annex 10 provides the data collection sheet to carry out vendor-level inventories.

**Materials** required for MFDI include:

3. Notebook
4. Waterproof pens/pencils
5. Printed instructions and data collection sheets (Annexes 9 and 10)

**Steps** for calculating the MFDI include the following:

1. **Planning:** Identify the food vendors and local examples of food in the different food groups.
2. **MDFI Market Audit:** Complete an audit of the entire market, which indicates the presence of each of the food items in the DQQ categories (Annex 9).
3. **MDFI Vendor Inventory:** Complete an inventory of each of the 10 sampled vendor's offerings using the provided data collection sheets (Annex 10).
4. **Data Analysis:** The data will be used to calculate MFDI categorized by food groups of the DQQ and MDD-W as well as to create associated graphs for each market place.

### Data Collection Instructions

1. Before going to the market, print off the data collection forms (one copy for Annex 9 and 10 copies for Annex 10). Enumerators should familiarize themselves with the audit list and collaborate to write down local examples of food items in each category (Part 2 in Annex 9 and Part 3 in Annex 10). This will facilitate the classification of foods during the market audit. Print the "Market Audit Food Groups with Local Food Examples" (Annex 9) and the "Food Group Key with Examples" (Annex 10) to bring during data collection. The local examples will serve as a quick reference.
2. Data collection will start by completing the Market Audit data collection sheet (Annex 9). Complete Part 1 of Annex 9 on background and market information before starting the data collection.
3. For Part 2 of Annex 9, the Market Audit will involve indicating the presence of a food and providing one example of that food (unlike the vendor inventory in Annex 10, where the names of **each** food present in a given category are listed).
  - a. The data collection sheets include classification of foods into 29 DQQ food groups.

- b. Many foods are easily classified into a food group, whereas other foods might present challenges. Enumerators should refer to the printed “Food Group Classification Considerations” guide (see below) if they are having trouble classifying a food. An enumerator continuing to have difficulty choosing a category for a food should choose the most suitable category and place an asterisk next to it. Upon returning from the market, the enumerator should consult with the team.
4. Following the completion of the Market Audit (Annex 9), the enumerator is to complete the Vendor Inventory data collection sheet (Annex 10).
5. Fill in Parts 1 and 2 (Background Information and Market Information, respectively) of Annex 10 before starting the data collection.
6. Make sure you have 10 copies of the data collection sheet (Part 3), one for each of the 10 vendors. Vendor list: (1) fruits, (2) vegetables, (3) whole grains, (4) legumes, (5) sweets (such as baked sweets), (6) meat, (7) eggs, cheese, and yogurt, (8) nuts and seeds, (9) packaged ultraprocessed salty snacks, and (10) deep-fried foods.
7. Enumerators should familiarize themselves with the inventory list in Part 3 of Annex 10 and make sure they have written local examples of food items in each category. This will help classify foods during the vendor inventory.
8. For each of the 10 selected vendors, the enumerator is to list all of the food items for each category. For example, a fruit vendor has a fruit selection that includes orange, cantaloupe, banana, and apple; record “Yes” under the “Present” column in addition to writing out these examples in the “Vendor Offerings” column. In this example, the fruit vendor also has flour and rice, so record “Yes” in addition to listing the foods “flour” and “rice” in the “Foods made from grains” row. In the event one of the 10 vendor types is not available in the market, make sure to mark “No” next to “Present” at the top of the respective data collection sheet, and “NA” across the data collection sheet.
9. Complete an inventory of each vendor’s offerings by writing each item available in the food categories listed. If more than one brand of the same food item exists, only write the item once. However, if more than one type of food item exists with differing attributes (e.g., whole milk and skim milk), write down both food items.
10. As noted above for Annex 9, enumerators should refer to the printed “Food Group Classification Considerations” guide (see below) if they are having trouble classifying a food. When in doubt, choose what you think is the most suitable category and place an asterisk next to it. Upon returning from field work, consult with your team.

## Food Group Classification Considerations

- Classifying food items into categories follows culinary definitions and uses and not botanical (plant) definitions. For example, tomatoes are classified in the “vegetables” category based on their consumption as vegetables in cooking rather than as fruits based on botanical definitions.
- Food items with multiple ingredients often present classification challenges. To avoid inflating diversity scores by placing a single food into multiple categories, classify the item based on its most prevalent ingredient.
- Legumes that are harvested and sold as green (such as green beans) or still in their pod (such as peas) should be classified as “other vegetables” rather than “legumes.”
- While peanuts are technically legumes, they should be classified as nuts based on their culinary use.
- Legume products include items such as soymilk, tofu, tempeh, and other processed legumes.
- The nuts and seeds category includes tree nuts, ground nuts like peanuts, and a range of seeds. The nuts and seeds category also includes “butters” or products that are pounded from nuts and seeds, such as peanut butter and tahini.
- Highly processed “yogurt drinks” with low dairy content and high amounts of sugar are classified with sweet drinks (i.e., sweet coffee/tea/cocoa) if dairy milk is not listed as the first ingredient.
- Fish eggs are classified with seafood.
- Organ meat is classified in the meat category that corresponds to the type of meat.
- Sweetened condensed milk is classified as a sugar-sweetened beverage.
- Plantains are classified as white roots/tubers.

## Data Analysis

Data analysis will begin by inputting the collected data into Assessment 3’s Data Analysis Template and for analysis to address the questions regarding availability of foods, categorized by food groups of the DQQ, with an option to include categorization by the MDD-W. The Market Audit (Annex 9) and Vendor Inventory (Annex 10) data will then be used to create graphs based on the MFDI, with locations on the x-axis and corresponding MFDI on the y-axis for each market place, which includes each geographic location, and type of market (weekly and daily) for all surveyed markets.

## Assessment 4: Healthy Eating Index of Food Supply (Adapted Version)

### Background

The Healthy Eating Index of Food Supply assessment is to be used to measure the food environment dimension of availability. The Healthy Eating Index of Food Supply is adapted from the Healthy Eating Index (HEI) that was originally developed to measure dietary quality on the basis of dietary recalls. Dietary quality is recognized as an important aspect of food security and nutrition and is assessed by adequacy of specific foods, with reduced risk for diet-related diseases. The HEI was developed to be benchmarked to the U.S. Dietary Guidelines for Americans (DGA) and can be adapted to be benchmarked to the HDB or the nationally/regionally appropriate quantitative food-based dietary guidelines (FBDGs) of any country. The HEI, or an adapted version, has been used to evaluate dietary quality in Belgium, Brazil, China, France, Greece, Iran, Italy, Malaysia, Spain, and Sweden. Additionally, the HEI has been adapted in various contexts to evaluate the availability of food supply for supporting dietary quality. For example, the HEI has been adapted for this purpose by retrieving food availability data, as specified by specific food groups and associated quantities, and then evaluating the data based on per capita equivalents.

However, quantitative dietary guidelines are not available in all countries. For Assessment 4, the HEI will be benchmarked to the HDB. The HDB is a global indicator based on average food group proportions and recommendations across national FBDGs and has been recently updated to support transparent, robust, and systematic monitoring of the cost of a healthy diet (CoHD; Herforth et al. 2022). The HDB includes six food groups with quantitative recommendations based on an average dietary energy intake need of 2,330 kcal for one adult per day (Herforth et al. 2022). In the event quantitative FBDGs are available and appropriate for the country or region where the assessment is implemented, the respective food groups and quantitative recommendations may be used in instead of the HDB.

## Objectives

The **overall objective** of the Healthy Eating Index of Food Supply (adapted version) is to evaluate how aligned the food supply in a given locality is with the [HDB](#) in support of diet quality. This assessment answers the following questions:

- (1) Based on the HDB, what food groups are available, and which are lacking in a given food supply?
- (2) How well do available food groups align with quantitative HDB recommendations?
- (3) How do the foods and food groups vary with locality (comparison between markets in the selected geographic locations and between weekly and daily markets)?

## Methodology

In this assessment, the Healthy Eating Index of Food Supply (adapted version) will be evaluated using two approaches—a market audit (Phase 1) and vendor interviews (Phase 2)—to determine available foods. Specifically, the HEI market audit in Phase 1 takes a consumer perspective to assess the possibility to purchase foods in a given market to meet the selected types and quantities (weight) of food groups benchmarked for HDB or FBDG (e.g., the DGA-2015) for a family of five adults for one week. The HEI vendor interview in Phase 2 takes a vendor perspective to evaluate participating vendors' ability to supply different types of each food in the quantity needed, in each food group aligned with the HDB.



## What to Do When a Quantitative FBDG Is Not Available

In the event appropriate FBDGs are available for a respective country, the following example provides the components of the HEI benchmarked to the DGA-2015. The closest quantitative national FBDGs should be used to calculate culturally appropriate dietary intake recommendations (i.e., Indonesia's FBDG for Timor Leste assessment). The DGA-2015 guidelines are based on grouping food items into two groups: (1) those the DGA recommends are either consumed in adequacy (adequacy components) or (2) those the DGA recommends are consumed in moderation (moderation components) (U.S. Department of Health and Human Services and U.S. Department of Agriculture 2015). For this study, the adapted version of the Healthy Eating Index of Food Supply will only evaluate the adequacy components of FBDG and not the moderation components. The HEI benchmarked to the DGA-2015 uses a scoring system to evaluate how availability of specific types, quantities, and amounts of foods meets the food recommendations based on 13 food groups and recommended consumption amounts of the DGA-2015. The HEI scores range from 0 to 100, with 100 being the highest score, indicating that the evaluated foods meets the DGA-2015 recommendations.

The adequacy components of the HEI DGA-2015 comprise nine food groups (of the 13), represent diet components that the DGA encourages, and include (1) total fruit, (2) whole fruits (total fruit excluding juice, such as citrus, melons, and berries plus other intact fruits), (3) total vegetables, (4) greens and beans (e.g., dark green vegetables and legumes, such as beans and peas), (5) whole grains, (6) dairy (milk, yogurt, cheese, and fortified soy beverages in the form of skim milk equivalents), (7) total protein foods (lean fraction only; calculated by summing together all animal and plant proteins, including meat, poultry, fish, eggs, nuts, seeds, soy, and legumes), (8) seafood and plant proteins (e.g., soy products, nuts, and seeds), and (9) fatty acid ratio.

This adapted version of the Healthy Eating Index of Food Supply assessment will only evaluate the adequacy components of the DGA that are food groups rather than nutrient groups (thus the first eight components will be included and the fatty acid ratio will be excluded). Higher scores for the adequacy components of HEI reflect higher intakes that are more desirable. The moderation components of the HEI DGA-2015 represent diet components that the DGA recommends limiting, including refined grains, sodium, saturated fats, and added sugars. This adapted version of the Healthy Eating Index of Food Supply will not evaluate the quantity available of these moderation components.

**Planning** is to proceed by reviewing the HDB that will be used for benchmarking the HEI (modified in the data collection sheets; Annex 11) that includes the following six food groups:

- a. Starchy staples
- b. Vegetables
- c. Fruits
- d. Animal source foods
- e. Legumes, nuts, and seeds
- f. Oils and fats

Calculation of the HEI requires an inventory of quantities of different food groups. The study team will obtain this information through a market audit (Phase 1) and through interviews with select vendors (Phase 2) by asking what food items they offer from the food groups based on the HDB.

The **sampling unit** for Phase 1 of the Healthy Eating Index of Food Supply "HEI Market Audit" is the market level and for Phase 2, "HEI Vendor Interviews" is the vendor level per market.

**Sampling** for Phase 1 includes all daily/weekly markets identified during the Planning Phase and Formative Assessment and Phase 2 includes one vendor (identified during Assessment 1: Market

Mapping: Market-level) per each of the six food groups, at each of the **six daily markets**. The selected vendors should offer a prevalent amount of the food group of interest (60 percent or more) from each of the food groups of the HDB. Only daily markets will be assessed for Phase 2 as the enumerator will want to visit with the vendor prior to the assessment to introduce the study and identify a time for the assessment close to the opening of the market when offerings are abundant.

### Provided Forms

1. Annex 3d is the form used to document vendors' informed consent.
2. Annex 11 provides the data collection sheet used for Phase 1 for the HEI market audit checklist to document the availability of items and recommended quantities based on the HDB for a household of five adults per week.
3. Annex 12 provides the script for Phase 2, the vendor interviews.

**Materials** required for carrying out the Healthy Eating Index of Food Supply assessment include:

1. Notebook/clipboard
2. Waterproof pens/pencils
3. Printed forms (Annexes 3c, 11, and 12)
4. Money to buy food
5. Portable scale

**Steps** of the Healthy Eating Index of Food Supply (adapted version) include:

1. **Planning:** Familiarize yourself with the HDB that will be used for benchmarking the HEI (modified in the data collection sheets in Annexes 11 and 12) to include the food categories and quantities of the HDB, and set up interviews with vendors (Annex 12). Plan for a minimum of 2 days for data collection.
2. **HEI Market Audit (Annex 11):** The enumerator is to take a consumer perspective to evaluate the ability to purchase foods that meet the selected types and quantities (weight) of foods for the HDB for a family of five adults for one week at the market (day one).
3. **HEI Vendor Interviews (Annex 12):** The HEI vendor interview takes a vendor perspective to evaluate participating vendors' ability to supply types of each food, and the respective quantity, in each food group aligned to the HDB. This interview script will collect data for both the adapted versions of the Healthy Eating Index (Assessment 4) as well as the Cost of a Healthy Diet (Assessment 5) (day two).
4. **Data Analysis:** Data will be analyzed to determine availability of food groups and their quantities based on the HDB.

### Data Collection Instructions:

1. The data collection sheet should be filled out neatly. Complete Parts 1 and 2 (Annex 11) with background and market information.
2. For Part 3 (Annex 11, Phase 1) of the HEI market audit, carry out the audit based on the provided checklist from the perspective of a consumer. The enumerator should evaluate if they see foods that meet the selected types and quantities (in weight) as specified in the HDBs to meet the dietary needs of a family of five adults for one week.
  - a. The enumerator may need to purchase any foods where foods must be quantified to complete the checklist. You can use the portable scale to record weight.
3. In the checklist in Part 3 (Annex 11) of the HEI Market Audit, the enumerator is to select:
  - a. "Recommended Quantity Available" if they are able to find enough food in the market in each food category to meet the HDB recommendations listed;
  - b. "Recommended Quantity Not Available" if the foods are available but the amount does not meet the HDB recommendations listed; and
  - c. "Food Not Available" if no food items in that food group are available.

4. **Planning ahead:** Following the HEI Market Audit, the enumerator is to carry out vendor interviews (Annex 12, Phase 2) regarding the types and quantities of foods they have available at a single time point. **These interviews are only to occur at the daily markets and not the weekly markets.**
5. The enumerator will select one vendor per market (as determined by Assessment 1: Market Mapping) for each of the six food groups of the HDB that offer a relatively prevalent amount of that food group.
6. Once the vendors have been selected, the enumerator will introduce the study and determine if the vendor is interested in participating. When introducing the study, the enumerator should emphasize that they recognize it is a market day and they do not want to adversely interfere with the vendor's business. The **interview will be conducted the following day** when the market first opens (Annex 12 for Assessments 4 and 5).

### Data Analysis

Data analysis for the HEI Market Audit and the HEI Vendor Interviews involves scoring the availability of the recommended amounts of food items per food group. For the HEI Market Audit, this means scoring the availability of foods per household of five adults per week. Scores are allocated as indicated below in the instructions (i.e., 0, 2.5, or 5) if a food was selected in the audit checklist.

See the [Data Analysis Instructions](#) document for full instructions and accompanying [data analysis sheet](#).

## Assessment 5: Cost of a Healthy Diet at Market (Adapted Version)

### Background and Objectives

The Cost of a Healthy Diet at Market assessment is used to evaluate the food price and affordability dimensions of the food environment (Herforth et al. 2020). Food price and affordability indices are generally designed to focus on the prices of staple foods, nutrient-dense foods, or other specific food items in a predetermined market basket of goods purchased by consumers (INDDEX Project 2018). However, the selected foods may bear little relation to recommended diets (Herforth et al. 2020). The Cost of a Healthy Diet was established as a food price index to determine the minimum cost of meeting FBDGs. The Cost of a Healthy Diet is benchmarked to dietary recommendations aligned to national FBDGs. For countries without national FBDGs, the HDB or the FBDG of an alternative country can be used. Food price data can be collected from various sources for the FBDG, including from (i) national statistical organizations that track inflation using a Consumer Price Index, (ii) ministries of food/agriculture/trade, and (iii) national household budget surveys. For this study, the Cost of a Healthy Diet has been modified to the market context where food price data will be retrieved at the market level and benchmarked to the HDB.

### Objective

The **overall objective** of the Cost of a Healthy Diet at Market (adapted version) is to determine the minimum cost of meeting HDB. This assessment answers the following questions:

1. What is the minimum cost of meeting HDB and the cost of meeting recommendations for the six specific food groups?
2. Can a nutritious diet aligned to HDB be achieved using locally available foods? If not, what can be modified?
3. What foods and food groups contribute most to the cost of recommended diets?
4. How do results vary with locality (comparison between markets in the selected geographic locations and between weekly and daily markets)?

## Methodology

The Cost of a Healthy Diet at Market (adapted version) requires quantitative dietary benchmarks. For this assessment, the Cost of a Healthy Diet at Market (adapted version) is benchmarked to the HDB. In the event quantitative FBDGs are available for the country of interest, the food groups and quantities from the guidelines may be used instead. Vendor-level food price data will be collected through vendor interviews in selected daily markets. The interview script for Assessment 5: Cost of a Healthy Diet at Market (adapted version) is combined with the interviews for Assessment 4: Healthy Eating Index of Food Supply.

CoHD is calculated by identifying the least cost of two commonly consumed and seasonally available foods in each food category in the HDB, such as starchy staples; vegetables; fruits; animal source foods; legumes, nuts, and seeds; and oils. Note: There will be two price data points of interest: (1) the two **absolute least-cost** items sold and (2) the two **lowest-cost commonly sold** items for each food group. Once prices are obtained, the mean cost is calculated by obtaining the average price/weight of each food group. The textbox below provides guidance for implementing the Cost of a Healthy Diet at Market as a standalone assessment rather than combined with the Healthy Eating Index of Food Supply.

**Sampling** for this study occurs **only at the daily markets** and at the vendor level. The enumerator will want to visit the vendor prior to the assessment (during Assessment 4, Annex 11) to introduce the study and conduct the assessment when the market opens the next day. At each daily market, one vendor for each of the six HDB food groups that offers a prevalent amount of foods from the respective food group will be selected.

**Planning** will proceed by familiarizing oneself with the HDB to be used for the assessments. The research team is to make arrangements for data collection to survey selected vendors in the daily open-air markets identified in the Planning Phase and Formative Assessment.

### Provided Forms

5. **Annex 12** provides the vendor interview script used for the vendor-level inventories.

**Materials** required for carrying out the Cost of a Healthy Diet at Market (adapted version) include:

1. Notebook
2. Waterproof pens/pencils
3. Printed forms (Annexes 3c and 12)
4. Portable scale
5. Money to purchase food items when necessary

**Steps and data collection instructions:** Vendor interviews (Annex 12) will be carried out to elicit information that will inform both Assessment 4: Healthy Eating Index of Food Supply and Assessment 5: Cost of a Healthy Diet:

1. On the interview day, the enumerator is to arrive at the market when it first opens. For each selected vendor, seek prior informed consent using the signed vendor consent form (Annex 3d), and then follow the interview prompts (Annex 12) to document the types of each food and its respective quantity available as well as price in each food group aligned with the HDB. Note that this interview script will collect data for both the Assessment 4: Healthy Eating Index of Food Supply and Assessment 5: Cost of a Healthy Diet (adapted version). For example:
  - a. Most items are sold by weight (grams or kilograms). In these cases, record the total grams/kilograms available. A few items may be sold individually. In these cases, the enumerator should count the total number of items available and record the average weight of the item (based on weighing three randomly selected items).
2. Include the sales unit (e.g., 1 kg of rice) and weight (kg) for each food item.

3. There will be two price data points of interest: (i) the two absolute least-cost items sold and (ii) the two lowest-cost commonly sold items for each food group. During the vendor interview, you will identify and make note of (ii) the **two lowest-cost commonly sold items** for each food group. Upon data entry, (i) the two absolute least cost items will be auto-calculated in the data analysis sheet. A food may have both price data point attributes of interest (i.e., the food is both (i) the absolute least-cost item and (ii) the lowest-cost commonly sold item).
4. If eggs are not sold at the “Animal source food” vendor, please try and find them at the other selected vendors (fruit, vegetable, starchy staples vendor, etc.) and record information for eggs in the respective data collection sheets (i.e., Part a-f)
5. For oils and fats, prioritize the vendor selling more than one variety of oil, if that vendor exists, or make sure to record information on oils if they are offered at any of the other five selected vendors in the respective data collection sheets (i.e., Part a-f).

### Data Analysis

Data will be analyzed to determine the availability (Assessment 4) and minimum cost (Assessment 5) of meeting overall HDB and the six specific food groups. In addition, data will be analyzed for variation with locality between the markets in the six secondary subnational administrative areas.

See the [Data Analysis Instructions](#) document for full instructions and accompanying [data analysis sheet](#).

### Implementing the Cost of a Healthy Diet as a standalone tool

There may be instances in which you want to conduct the Cost of a Healthy Diet assessment as a standalone assessment rather than coupled with the Healthy Eating Index (Assessment 4). In these cases, we recommend the following modifications to the data collection approach to allow for a streamlined data collection. The steps outlined below are only a guide and were not tested as part of the piloting of the package.

#### Step 1. Identify a list of key foods to collect prices on

Given that the identification of food items to collect the food prices for will not be collected through a vendor inventory (as is done with the Healthy Eating Index), we instead recommend starting with a list of key foods for the setting that you are working in. The [DQQ](#) lists sentinel foods for the majority of countries, globally speaking. The DQQ sentinel food list is a good starting point as you derive the list of foods to include in the price data collection. The sentinel foods have already been selected based on what is commonly consumed in the country, and they represent a wide range of food groups. Given that the Cost of a Healthy Diet only includes the food groups that are included in the HDB (or a country’s FBDGs), you would only need to include the sentinel foods for the DQQ groups that are aligned with the HDB/FBDGs. In addition to the DQQ sentinel foods, you should ensure that you include commonly consumed fats and oils in the study setting that you are working in.

After generating an initial list of foods, we recommend working with local partners to refine the list and ensure that it captures the most important foods for the population you are working with. We recommend including a minimum of seven to 10 foods for each food group recommended in the dietary guidelines.

#### Step 2. Determine the sampling approach to select vendors

The sampling approach for collecting price data will differ from the combined Healthy Eating Index/Cost of a Healthy Diet assessments. In the case of a standalone Cost of a Healthy Diet evaluation, we recommend randomly selecting vendors, stratified by vendor type, specialized in selling various types of foods. For example, you would randomly select a fish vendor to collect the prices for fish. If you are unable to find the price for a given food (e.g., specific type of fish), you can simply

replace the food (such as with a different species of fish) and collect the price for that food instead. In these cases, it is important to document the change to the food that the price data are being collected for. It should be clear to enumerators that they can “swap” foods that are unavailable at a given market with similar foods that are available.

### Step 3. Collect food price data

We recommend following the same steps that are described in the Cost of a Healthy Diet data collection instructions to collect the actual food prices. For example, you would still ascertain the price per unit sold and weigh items that are not being sold using standardized weights.

### Step 4. Analyze food price data

There are two options you can use for price data analysis. The first option is to analyze the price data as outlined in the data analysis instructions for Assessment 5. One exception for the data analysis, will be that you will not be able to calculate the Cost of a Healthy Diet for the most commonly purchased foods. However, given that the sentinel foods are based on the commonly consumed foods in a given country, and that the list will be further refined to include key foods based on feedback from local partners, the Cost of a Healthy Diet indicator should closely reflect the cost of a healthy diet that is composed of commonly consumed foods. The second option is to use software tools for calculating the Cost of a Healthy Diet that are accessible through the [Food Prices for Nutrition Platform](#). The software tools are designed to help convert food price data into the Cost of a Healthy Diet using a spreadsheet file macro. Additional information on these methods can be found [here](#).

## Assessment 6: The Environmental Profile of a Community’s Health (Adapted Version)

### Background

An adapted version of the Environmental Profile of a Community’s Health evaluates the dimensions of vendor and product characteristics as well as marketing and regulation of the food environment. The EPOCH instrument was designed to assess the physical environment based on the understanding that multiple aspects of the physical environment influence diet, physical activity, smoking, psychosocial, and other risk factors for obesity, diabetes, and cardiovascular disease (Chow et al. 2010). Additionally, the EPOCH instrument was designed to be suitable in diverse cultural, socioeconomic, and regional (urban and rural) settings across different communities, regions, and countries. The inter-rater reliability of EPOCH was validated in 93 rural and urban communities in five countries (Canada, Colombia, Brazil, China, and India) and demonstrated excellent reliability (Chow et al. 2010).

### Objectives

The **overall objective** of Assessment 6: Environmental Profile of a Community’s Health (adapted version) is to evaluate the food environment for the presence of food advertisements and media promoting healthy diets and food labeling using a food environment audit and photographic assessment. This assessment explores the following questions:

1. What kind of food advertisements and media promote healthy diets within a locality surrounding a market and within a market itself?
2. How does the presence of food advertisements and media vary with locality (comparison between markets in the selected geographic locations and between weekly and daily markets)?

### Methodology

The original EPOCH instrument has two parts: an environmental audit tool to record physical aspects of the environment and an interviewer-administered questionnaire to capture community members’



perceptions (Chow et al. 2010). This guide includes an adapted version of the EPOCH audit tool and does **not** include the interviewer-administered questionnaire. The purpose of excluding the interviewer questionnaire is to focus on objective aspects of the food environment, which is part of the external domain (rather than the subjective personal domain). The adapted version of the EPOCH tool includes a community observation walk to count the different types of advertisements and a market observation walk to assess the presence of advertising in the markets themselves. Both the community and market observation walks include photographic assessments.

**Planning** is to proceed by mapping the route for the community observation walk, starting from sampled markets (i.e., the selected daily and weekly markets) covering a 500-m distance toward a busy central location. Because both sides of the street are to be observed, the total route will be 1 km. In planning the route, the study team is to select the starting point and identify the point at which the team turns around and assesses the other side of the street. The length of the walk between the two points should be measured using software like Google Maps or a GPS unit. The community observation walk may be along one length of a street; alternatively, the walk may involve multiple turns along multiple streets to stay within the busy area of the community. The study team should either drive or walk along the determined path and adjust the path if needed prior to carrying out the observation. The final route is to be printed or drawn and included as part of the data collection (Annex 13). Research planning includes printing the data collection instructions and data collection sheets.

**Sampling** includes two community observation walks per selected geographic location that will include an “inside/outside” walk for each of the open-air markets identified during research planning. For each walk, this will include starting from the selected open-air market (daily/weekly) and covering a 1-km roundtrip distance (outside) and then completing a market observation walk within the selected open-air market (inside).

### Provided Forms

1. Annex 13 provides the data collection sheet used to conduct the community observation walk (“outside” walks for both the daily and weekly markets).
2. Annex 14 provides the data collection sheet used to conduct the market observation walk (“inside” walks for both the daily and weekly markets).

**Materials** required for the Environmental Profile of a Community’s Health (adapted version) assessment include:

1. Notebook
2. Waterproof pens/pencils
3. Digital camera
4. GPS unit
5. Online mapping software, such as Google Maps
6. Printed instructions and data collection sheets (Annexes 13 and 14)

**Steps** for EPOCH include:

1. **Planning:** Plan the route for the community observation walks, starting from the sampled markets and covering a 500-m distance toward a busy central location.
2. **Community Observation Walk:** Document the presence of any type of food advertisements per the Annex 13 data collection sheet.
3. **Market Observation Walk:** Document the presence of any type of food advertisements within a market as well as signage on food menus per the Annex 14 data collection sheet.
4. **Data Analysis:** Data from the community observation and market observation walks will be analyzed to calculate the frequency of types of food advertisements and frequency of the type of advertisement locations.



## Data Collection Instructions

### Community Observation “Outside” Walk

1. The community observation walks should be preplanned and mapped out before starting the assessment, as described in the research planning step. The starting point for the community observation walk is the respective market (daily/weekly).
2. Parts 1–3 of Annex 13 should be completed prior to starting the community observation walk (excluding end point data, which will be completed at the end of the walk). Information for Parts 1–3 of Annex 13 should be obtained from a combination of sources, such as through conversations with knowledgeable individuals working/living in the area, telephone books, Internet resources, and other local resources.
3. Start the community walk by looking in all directions for food-related advertisements, using Annex 13 as a guide. During the walk, count the different types of advertisements and features of the community environment, following the instructions and data collection sheet (Annex 13). The enumerator should slowly walk, and then stop after approximately 10 steps and carefully do another scan all around them. This procedure of walking approximately 10 steps and scanning should be continued along the entire length of the preplanned route on one side of the street. This assessment includes tallying the following types of advertisements observed along the community observation walk:
  - a. Snack foods
  - b. Sugary drinks
  - c. Fruits and vegetables
  - d. Commercial health promotion of foods/diet
  - e. Noncommercial health promotion of foods/diet
4. Document the presence of any type of food advertisement, such as those placed on billboards; posters; signs on shops, walls, bus stop shelters, the pavement; and advertisements on buses/cars, etc. To document advertisements, the enumerator is to look in all directions for advertisements and document the presence of any advertisements, noting where the advertisement is located (e.g., on a bus, on a building) and taking a photograph of each advertisement as described in Annex 13.
  - a. Each time the enumerator sees one of the advertisement types listed in Part 4 of Annex 13, the enumerator is to mark a check in the Tally column to note where the advertisement was found (e.g., on a bus, on a building) and take a photograph. If multiple food types are present in the advertisement, select the most prominent food type OR select one of the “health promotion of foods/diet” options.

#### Notes:

- The walk should be carried out during daylight working hours.
- Distances should be assessed as accurately as possible using a software platform like Google Maps.
- Do not include menu items that are part of an eatery, such as menu items on restaurant windows. However, if the eatery is advertising in a nearby area away from its physical location, these should be included.
- The advertisements may be posted on various surfaces, such as billboards, pasted or painted on walls or the pavement, as well as visible on the sides of buses, on shop windows, and inside shops, easily visible to passersby. Note in Annex 13 where the advertisement was posted. If there are multiple advertisements of the same type stuck one on top of each other or adjacent to each other on a single surface, such as multiple copies of the same poster, count this as one advertisement. However, if the same advertisement is on two nearby surfaces or spread out on the same surface, count as two advertisements.

- Typically, most advertisements are captured during the first half of the walk, and the walk back to the starting point allows the enumerator to see if anything was missed from the other side of the street.
  - Depending on the density of the food advertisements, this community observation walk should take approximately 40 minutes.
5. Photograph advertisements and include the full text of the advertisement (refer to the Photograph Approval and Photographic Assessment sections of this manual).
  6. At the end of the community observation walk, the enumerator is to total the tally columns for each row of advertisement types.

### Market Observation “Inside” Walk

1. Following the community observation walk, the research team is to carry out a market observation walk to count the different types of advertisements and features of the market, following the instructions and data collection sheet (Annex 14) in a similar way to the community observation walk.
2. This research step also includes a tally of the specific types of advertisements along the market observation walk, which are recorded using Annex 14 (data collection sheet for Market Observation Walk). The enumerators will also complete a photographic assessment as described in Annex 14.
3. Start the market walk at the entrance of the market. Look in all directions for food-related advertisements. In Part 3 of Annex 14, document the presence of any type of food advertisements, such as those located on billboards and posters; signs on shops, walls, the pavement, and market stalls (point-of-sale, open display), etc.
4. Every time one of the advertisement types listed below are noted, mark a check in the Tally box in the table included in Part 3 of Annex 14 and take a photograph. If multiple food types are present in the advertisement, select the most prominent food type OR select one of the “health promotion of foods/diet” options.
5. Once you have completed observations at the start point, slowly proceed and stop after approximately 10 steps. Carefully scan all around and again tally the advertisements observed. This procedure of walking approximately 10 steps and scanning should be continued until the entire walkable area of the market has been covered.
6. At the end of the walk, total the tally columns for each type of advertisements row.
7. Lastly, within the market, if there are outdoor food stalls serving meals, the enumerator will document the presence of menus, table information, and wall signs of different food items per Part 4 of Annex 14. The food items with signage that ought to be tallied include the following:
  - a. Fruits and vegetables
  - b. Low-salt foods (*signage specifying low salt*)
  - c. Low-sugar foods and beverages (*signage specifying low sugar/unsweetened*)
  - d. Low-fat foods (*signage specifying low-fat options*)
  - e. Deep-fried foods
  - f. Packaged ultraprocessed salty snacks
  - g. High-sugar foods and beverages

### Data Analysis

Data from the community observation and market observation walks will be analyzed to calculate the frequency of food advertisements and the most common advertisement locations. The frequency of the specified food advertisement attributes, including types, and specific policies and media promoting healthy diets is to be plotted on a graph. Vendor and product characteristics and marketing and regulation will be included in the legend, with the count of advertisements on the x-axis and market location on the y-axis. Though not a part of the data analysis sheets included, analysis of variance can be

conducted to determine how the frequency of food advertisements, policies and media promoting healthy diets, and food labeling varies between selected geographic locations.

See the [Data Analysis Instructions](#) document for full instructions and accompanying [data analysis sheet](#).

## Assessment 7: The Produce Desirability Tool for Low- and Middle-Income Countries (Adapted Version)

### Background

The Produce Desirability (ProDes) Tool measures the sensory desirability of a predetermined market basket of FVs. The ProDes Tool was designed in response to international data showing that diets often do not meet the recommended consumption of FVs, with low FV consumption linked to micronutrient deficiencies and the global burden of disease. Additionally, food desirability is a key attribute that drives consumer food choices, dietary quality, nutrition, and health outcomes. Sensory attributes are important determinants of food choice. Consumers are more likely to choose the FVs that appear more desirable. The original ProDes Tool was developed to assess consumer desirability of a predetermined market basket of five FVs, each based on six sensory parameters (overall desirability, visual appeal, touch and firmness, aroma, size, and taste). The ProDes Tool was then validated for a rural and urban context in the United States based on a market basket of FVs listed in the Nutrition Environment Measurement Survey for Stores (NEMS-S) (Ahmed et al. 2018). Specifically, the FVs listed in the NEMS-S are based on the most-consumed fruits and vegetables in the United States. An version of the ProDes Tool adapted for a LMIC context involves developing a market basket of FVs that are culturally relevant for diets and determining desirability parameters for each selected FV in the market basket.

### Objectives

The **overall objective** of the Produce Desirability Tool for Low- and Middle-Income Countries is to assess consumer desirability of a predetermined market basket of five FVs based on five sensory parameters (overall desirability, visual appeal, touch and firmness, aroma, and size; taste is not included in this adapted version) using a sensory survey. This assessment answers the following questions:

1. What is the desirability of a predetermined market basket of FVs based on sensory parameters?
2. How does the desirability vary with locality (comparison between markets in the selected geographic locations and between weekly and daily markets)?

### Methodology

The ProDes Tool assesses FV desirability in the food environment. The FV items included in the ProDes Tool are based on a predetermined market basket of produce relevant for a local context. The ProDes Tool includes five observational sensory characteristics that were identified to be prevalent and generalizable for FVs, including:

1. Overall desirability
2. Visual appeal
3. Touch and firmness
4. Aroma
5. Size

Taste is not included, as consumers generally do not have the opportunity to taste foods in the food environments prior to purchase. The ProDes Tool is based on a 7-point Likert rating scale, with 0 as the lowest score and 6 as the highest score. Rating is based on rater perception of high-quality produce and not personal preferences.

**Planning** begins by selecting FVs to include in the ProDes Tool market basket (i.e., the five most-commonly consumed fruits and vegetables in the selected geographic location that will be available at

the market when the assessment occurs). FV selection will occur using the free-listing activity completed during the focus groups in Assessment 2. Should an activity opt not to complete Assessment 2, enumerators would identify the top five most commonly consumed fruits and vegetables to include in the Produce Desirability Tool for Low- and Middle-Income Countries assessment. Additionally, the research team is to determine what constitutes high quality for each FV included in the market basket.

**Sampling** entails using the ProDes Tool to evaluate five types of fruits and five types of vegetables at two randomly selected vendors per market for each of the selected markets. At each vendor, the researcher will implement the ProDes Tool for three replicates for each of the predetermined five fruits and five vegetables.

### Provided Forms

1. **Annex 15** provides the ProDes Tool Criteria as agreed upon by the research team.
2. **Annex 16** provides the ProDes Tool instructions and data collection sheet that will be used to carry out the sensory analysis of the predetermined market basket of produce.

**Materials** required for use of the ProDes Tool include:

1. Notebook
2. Waterproof pens/pencils
3. Digital camera
4. Printed instructions and data collection sheets (Annexes 15 and 16)
5. Money to purchase food items
6. Portable scale
7. Small whiteboard and markers (a blank sheet of paper will work as well)

**Research steps** for the Produce Desirability Tool for Low- and Middle-Income Countries assessment include:

1. **Planning:** The research team is to determine the market basket of FVs and complete **Annex 15** of the ProDes Criteria of descriptions of high-quality attributes of the selected market basket of FVs. **Annex 15 is completed once** by the research team and serves as scoring criteria for every implementation of the ProDes Tool (Annex 16).
2. **Procurement of FVs:** The enumerator is to procure three replicates of the five types of fruits and five types of vegetables in the predetermined market basket at two vendors per market that are randomly selected from those that sell FVs. **If a chosen vendor does not have an item available (example: fruit type 1 = apple), then walk the market and complete the assessment at another vendor that has the item.** In addition, the enumerator will record price per unit weight for each type of FV selected.
3. **ProDes Ranking of Sensory Desirability of FVs:** The enumerator is to complete Annex 16 and rank the sensory desirability of each of the FVs in the predetermined market basket using Annex 15. The enumerator is to collect photographic evidence for each fruit and vegetable observed.  
Tip: Using the whiteboard (or blank sheet of paper), create three sections and label them “replicate 1,” “replicate 2,” and “replicate 3.” Place each fruit item replicate on the board in their respective section. Take a photograph of the board.
4. **Data Analysis:** Sensory analysis data will be input to calculate ProDes scores for each of the five sensory attributes as well as total ProDes scores.

### Data collection instructions:

1. The planning for the Produce Desirability Tool for Low- and Middle-Income Countries assessment is to start by determining the fruits and vegetables to include and then to agree upon parameters

- of quality (Annex 15). The fruits and vegetables identified should be the five most commonly consumed fruits and vegetables in the market that are available when the analysis is carried out.
2. Annex 15 is completed once, with feedback from the entire research team. Neatly fill out Annex 15 in pen or pencil (a dark color so it can be easily seen when scanned).
    - a. In Part 1a of Annex 15, write down the names of the five fruits that the research team has decided to include in the market basket for sensory analysis.
    - b. In Part 1b of Annex 15, write down the names of the five vegetables that the research team has decided to include in the market basket for sensory analysis.
    - c. In Part 2 of Annex 15, the research team is to collectively determine, agree upon, and document the characteristics of desirability for high-quality and low-quality fruit and vegetable items for each of the sensory attributes. This standardization of quality parameters for the selected fruits and vegetables will help the enumerators complete the rankings in Annex 16. Specifically, the research team will agree upon criteria for the following desirability attributes for high-quality (most desirable) and low-quality (least desirable) fruit and vegetable items:
      - i. Overall desirability
      - ii. Visual desirability
      - iii. Desirability of touch
      - iv. Desirability of aroma
      - v. Desirability of size
  3. Prior to data collection at markets, complete the data collection sheet (Annex 16, Parts 1 and 2).
  4. The enumerator is to procure the five types of fruits and five types of vegetables in the predetermined market basket at two vendors per market that are randomly selected from those that sell FVs. The selected vendors can be two fruit vendors and two vegetable vendors, or two vendors that sell both fruits and vegetables.
  5. At each vendor, the enumerator will randomly select **three replicates** of the market basket items for the ProDes Tool sensory analysis. For example, if a vendor has 20 apples on a cart, the enumerator should randomly select three apples.
  6. Rank the sensory desirability of each fruit and vegetable in the market basket, using the research team's predetermined Standardized Criteria (Annex 15) of high-quality produce (not personal preferences). Data are recorded in Part 3 of Annex 16 (Part 3a for fruits from vendors 1 and 2, and Part 3b for vegetables from vendors 1 and 2). For each FV, score the item on a scale from 0 (Not Desirable) to 6 (Most Desirable) based on the five observational sensory measures (overall desirability, visual appeal, touch and firmness, aroma, size):
    - a. Overall desirability: Overall, how desirable is this fruit compared to your perception of a high-quality fruit based on the predetermined criteria (Annex 15)?
    - b. Visual desirability: How visually desirable is this fruit compared to your perception of a high-quality fruit based on the predetermined criteria?
    - c. Desirability of touch: How desirable is the touch/firmness of fruit compared to your perception of a high-quality fruit based on the predetermined criteria?
    - d. Desirability of aroma: How desirable is the aroma of this fruit compared to your perception of a high-quality fruit based on the predetermined criteria?
    - e. Desirability of size: How desirable is the size of this fruit compared to your perception of a high-quality fruit based on the predetermined criteria?
  7. For each vendor, rate each sensory attribute one at a time for all food items from that vendor rather than rating each food item for each attribute (example: you are to first rate the *overall desirability* of all five fruit types and the three associated replicates and then move on to *visual desirability* of all five fruit types and the three associated replicates, then move on to *desirability of touch* until you have rated all five attributes).
  8. Make notes on any unusual aspects of quality, such as bruising, rotting items, etc.

## Data Analysis

Sensory analysis data will be input in the data analysis template for Assessment 7: Produce Desirability Tool for Low- and Middle-Income Countries to calculate ProDes scores for the five sensory attributes as well as total ProDes scores. The ProDes scores are to be calculated separately for fruits and for vegetables.

See the [Data Analysis Instructions](#) document for full instructions and accompanying [data analysis sheet](#).

## Data Interpretation and Application

The purpose of each of the assessments is to address specific questions and help identify gaps and opportunities for supporting certain food environment dimensions and thus contribute to healthy diets. For example, if evidence from the Seasonal Food Availability Calendars assessment indicates low availability of fresh foods or food groups during certain months, this information can inform interventions to enhance the availability of these foods at those times and relevant, agriculture-to-nutrition interventions can be designed to promote those foods.

The data collection for each of the assessments explores food environment variation by locality. Variation by locality is intended to provide contrast between the types of market (weekly and daily) as well as between geographic locations, in order to better understand the extent to which the socioecological characteristics of a community influence food access, diets, and nutrition.

Table 7 guides the interpretation of findings that can inform evidence-based activities to improve food security, food access, and nutrition of local communities.

**Table 7. Potential Interpretation of Findings from Food Environment Assessments**

Food Environment Assessment	Resulting Data	Questions to Guide Interpretation and Operationalizing Findings
Market Mapping	Number and types of market food environments; Distance of food environments from community features; Operation times; Number and types of vendors	<ul style="list-style-type: none"><li>• What can be improved in the overall food environment of the surveyed area?</li><li>• What characteristics of the community may impact the food environment/access to the food environment?</li><li>• Would it be beneficial to modify the number and types of market food environments in a given locality?</li><li>• Would it be beneficial to modify transport to the surveyed markets?</li><li>• Would it be beneficial to modify the types of vendors within selected markets?</li></ul>
Seasonal Food Availability Calendar	Food availability matrix by season	<ul style="list-style-type: none"><li>• Are there times of the year when the food supply can be enhanced to support healthy diets?</li></ul>
Market Food Diversity Index	MFDI values	<ul style="list-style-type: none"><li>• How can food supply be modified to enhance dietary diversity?</li><li>• What food groups would be especially beneficial to be introduced into (or removed/decreased from) the food supply?</li></ul>

Food Environment Assessment	Resulting Data	Questions to Guide Interpretation and Operationalizing Findings
Healthy Eating Index of Food Supply (Adapted Version)	HEI scores (total scores and scores by food/nutrient group)	<ul style="list-style-type: none"> <li>• How can food supply be modified to better align with quantitative recommendations of selected FBDGs?</li> </ul>
Cost of a Healthy Diet	CoHD data	<ul style="list-style-type: none"> <li>• How can food supply be modified to better support economic access for meeting HDB or FBDGs? Are there specific low-cost foods that can be introduced?</li> <li>• Are there policies that can help reduce costs of certain foods for supporting HDB or FBDGs? Are there policies that make foods more affordable for households?</li> </ul>
Environmental Profile of a Community's Health (Adapted Version)	Number, types, and descriptions of food advertisements, policies and media promoting healthy diets, and food labels	<ul style="list-style-type: none"> <li>• Can policies that reduce the number of advertisements of unhealthy foods be adopted?</li> <li>• Can policies and/or an intervention be implemented to increase the number of advertisements of healthy foods?</li> <li>• Is there a need to implement policies regarding food labeling?</li> </ul>
Produce Desirability Tool (Adapted Version)	ProDes scores	<ul style="list-style-type: none"> <li>• What fruits and vegetables need support to enhance quality? What might be driving the low quality of select fruits and vegetables and how can this be improved?</li> </ul>



# Chapter 5. Limitations and Risks to Validity

This section describes the limitations and risks to validity of the seven assessments used in this pilot study to evaluate food environment dimensions.

## Assessment 1: Market Mapping

The Market Mapping assessment will be carried out at one point of time and thus does not reflect temporal fluctuations that may occur during the year. Several measures of the Market Mapping that evaluate convenience considers the distance from specific points of reference, which does not precisely represent convenience for every consumer accessing a given market. Several points of reference are thus included in an attempt to achieve a more realistic assessment of convenience. It is also important to note that Market Mapping is used to document commercial and geographic food availability, accessibility, and convenience rather than social, cultural, and economic access. Thus, additional assessments for social, cultural, and economic access can be implemented for a more comprehensive understanding of accessibility.

## Assessment 2: Seasonal Food Availability Calendars

The Seasonal Food Availability Calendars methodology generates data on perceived seasonal availability based on focus groups. Therefore, limitations regarding: (1) accuracy of vendor recall; (2) accuracy regarding botanical identification of crops, and (3) potential bias, exist. Validity is increased by hosting multiple focus groups to cross-check responses. Responses from focus groups can be verified by direct observation using market audits including for verifying botanical (plant) identifications. In order to capture seasonal variation over a year, Seasonal Food Availability Calendar (Assessment 2) will need to be implemented multiple times in a year. For example, in locations with two distinct growing seasons or a wet and a dry season, Seasonal Food Availability Calendar would ideally be implemented twice.

## Assessment 3: Market Food Diversity Index

Although the Market Food Diversity Index has been used to evaluate availability in informal markets in LMICs, it has not been widely used to date, and it is not a formally validated method. However, the Market Food Diversity Index is based on food groups of widely used dietary diversity metrics that are validated.

## Assessment 4: Healthy Eating Index of Food Supply (Adapted Version)

The Healthy Eating Index was developed based on the DGA, which requires adaptation to be culturally relevant for different country contexts. However, quantitative FBDGs are needed for the adaptation. Numerous countries, including those selected for this pilot study, do not have quantitative FBDGs. Thus, quantitative FBDGs from other countries must be applied for the assessment. To address this limitation, the HDB is used as an alternative, as it has been tested for a range of cultural contexts and validated in different countries with distinct dietary patterns (INDDEX Project 2018).

Another limitation of calculating the Healthy Eating Index of Food Supply is the large amount of information required for this indicator. The Healthy Eating Index of Food Supply requires quantifying food supply on a per capita or population basis, which can involve estimations when applied at a market level.

## Assessment 5: Cost of a Healthy Diet at Market (Adapted Version)

In order to contextualize and interpret the Cost of a Healthy Diet at Market assessment, additional information on affordability of a healthy diet, and therefore wage data, is required. The Cost of a

Healthy Diet at Market is conducted at one point in time and thus cannot reflect temporal fluctuations in price volatility that may occur during the year. This is particularly important to understand as high volatility can increase vulnerability to food insecurity.

The data collection for the Cost of a Healthy Diet assessment is linked to the Healthy Eating Index assessment. However, we have provided guidance in the manual to adapt the tool as a standalone assessment for those who wish to use it separate from the Healthy Eating Index.

## **Assessment 7: Produce Desirability Tool for Low- and Middle-Income Countries (Adapted Version)**

The ProDes Tool was validated via statistical methods (standard deviation and internal consistency) with high inter-rater reliability in urban and rural communities in the United States. Validation was based on the most commonly consumed FVs nationally. Although the ProDes Tool has been implemented in a LMIC context, it has not been validated for the specific market baskets that will be used for this pilot study. The ProDes scoring for this pilot study will be conducted at one point in time, thus will not capture temporal variability that occurs based on seasons and time of week. Additionally, the ProDes Tool is completed based on definitions that the enumerators establish, and scores are assigned by enumerators—actual consumer perspectives are not collected via this methodology. There is ongoing piloting of other versions of ProDes, including a version that shifts from the 0–6 scoring to only “low/medium/high” to address the ambiguity and challenges enumerators report using the ProDes Tool.

# Chapter 6. Ethics and Confidentiality

The food environment assessments will proceed by informing the appropriate authorities, applying for approvals appropriate for the participation of human subjects, receiving approval, and following ethical principles that consider local procedures. Approval will be received at country (national), subnational, market, and vendor levels using the protocols put in place by the national ethics committee and following procedures for informed consent (Annex 3a–3e). In addition, formal approval for vendor participation in focus groups will be requested. Prior to market assessments in a given locality, the study team will communicate with managers of the open-air markets and vendors they will survey to inform all parties of the purpose of the study and receive their informed consent to participate.

## Involvement of Human Subjects in Research

Human subjects are any participants involved in data collection during research. In response to abuses against human subjects, the academic and scientific communities have developed formal guidelines to protect human subjects in research. Participation of human subjects in food environment assessments, including the FGDs, should proceed by submitting an application for exempt status to the appropriate Institutional Review Board (IRB) or equivalent.

For these assessments, only individuals who are 18 years of age or older will be invited to participate. Individuals younger than 18 years are considered below the legal age for consent.

All food environment assessments must respect the privacy and psychological well-being of the individuals involved. The research team members must treat all informants and populations fairly and equitably. Implementation of assessments involving human subjects must be conducted in ways that protect informants' identities and well-being. It is critical that participation in the study be voluntary, with informed consent obtained from all informants prior to beginning data collection.

Selection of market personnel and vendors will follow fair subject selection. Market personnel and vendor participation in the focus groups will be voluntary and anonymous. Refreshments will be served following relevant safety protocols during the FGD. Participant responses will not be identified with their identity in any way. The research team should request permission when taking up-close photographs of people in the food environment.

Prospective research participants, such as market vendors invited to participate in focus groups, must be given the information they need to determine whether or not they want to participate in the study. The research team should not place any pressure on the invited individuals to participate and should provide ample time for the participants to decide. Following ethical guidelines, respect for potential participants demands that individuals enter into the research voluntarily and with adequate information. If market personnel and vendors choose to participate in the focus groups, they will be requested to complete a brief consent form regarding their voluntary and anonymous participation, their understanding that the focus groups will be recorded, the usage of the findings for informing the research team about the sample food environments, and the dissemination of findings through reports and publications. Participants will also be made aware that they have the right to withdraw their consent and participation in the study at any point during the research process.

During the FGDs, it is the role of the facilitators to create a respectful and comfortable environment in which vendor informants can share their knowledge, experiences, and perceptions. This involves good listening and communication skills to make sure everyone feels comfortable participating and that one or more people do not dominate the FGD. The facilitator will remain objective without disclosing personal perceptions.

## Photograph Approvals

If photographing people in the food environment up close, research team members must request permission and obtain signed permission (a sample Interview and Media Release Form is provided in Annex 3e). Written informed consent must be translated into the subject's native language with an explanation of intended use (research, use in publications, on websites, etc.). For this activity, up-close photographs of children should be avoided; if there is a need to take a photograph of a child, parental permission and approval form need to be followed.

Public spaces, including markets, are public domain; thus, people included in photographs who are not up close do not need to provide signed permission. However, the research team needs to be respectful, so it is advisable to request to include someone in a photograph in a market if they are watching you collect photos. The following should be considered in order to be respectful when including someone in a photograph:

1. As the photographs taken will be used as data, it is important to avoid “setting up” the scene and to represent the subjects and scene fairly and accurately.
2. Be culturally sensitive and mindful about the culture's norms regarding photography.
3. Be extremely mindful when photographing any situation that is potentially stigmatizing or could endanger the subject. Reflect on the cost/benefits of the photograph to the research and the subject and always prioritize the well-being of the subject.

## Data Storage

All data collected during the assessments, including photographs, should be stored on a backup hard drive as well as a shared online data storage platform. All data collection sheets and photographs should be scanned, labeled, and saved in a shared online data storage platform organized by (1) assessment (one folder for each of the seven assessments), (2) selected geographic location (one folder for each location), and (3) market (one folder for each market). The scanned data collection sheets should be labeled by location, type of assessment, and date. The prior informed consent forms should be stored in a locked drawer or cabinet for access only by the research team and disposed of in accordance with applicable data security protocols.

## Chapter 7. Study Implementation

This section provides information on key implementation considerations when conducting the assessments, including the roles and responsibilities of the different team members.

### Relevant Qualifications/Skills of Study Team

The market assessments include a range of activities that include direct observations within communities, markets, and focus group interviews. Thus, the food environment assessments included in this manual are to be conducted by researchers with experience in community-based research methods that involve human subjects. Within the team there needs to be researchers who are familiar with the geographic areas where the research will be conducted and should be able to speak the main language spoken in that area. A translator will be needed in cases where the researchers do not speak the local language. Prior to carrying out the assessments included in this manual, the study team must review each assessment and associated protocols.

The data collection is to be carried out by a minimum of two field enumerators. The research team should assign one administrator/field supervisor to manage logistics. If feasible, the same enumerators should carry out all assessments for all geographic locations selected for the pilot study. Data quality checks should be put in place prior to data collection and monitored throughout the data collection process. In particular, it is important to ensure data quality checks are conducted in the beginning stages of the data collection when challenges are most likely to arise. Moreover, **if data collection is being conducted using paper-based forms, it is important to conduct regular data entry checks.**

### Timeline

The planning and implementation of the full assessment package can take anywhere from 4 to 6 months, including time for data analysis and reporting. This amount of time can vary, depending on the time necessary to obtain relevant IRB approvals and the size of the geographic area of interest, number of markets, and size of study team.

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# Annexes: Informed Consent and Data Collection Instruments

Informed consent for participants and data collection instruments (Annexes 1–16) for all assessments are found in [the accompanying Annexes document](#).



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Implemented by:  
JSI Research & Training Institute, Inc.  
2733 Crystal Drive  
4<sup>th</sup> Floor  
Arlington, VA 22202

Phone: 703-528-7474  
Email: [info@advancingnutrition.org](mailto:info@advancingnutrition.org)  
Web: [advancingnutrition.org](http://advancingnutrition.org)

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