

FACT

The Woman with  
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FORTIFICATION  
ASSESSMENT  
COVERAGE  
TOOLKIT  
MANUAL

2019





# FACT

## FORTIFICATION ASSESSMENT COVERAGE TOOLKIT (FACT) MANUAL

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# About

The *FACT Manual* provides standardized methods for the collection, analysis, and synthesis of **data on quality, coverage, and consumption of fortified foods** across countries while allowing for adaptations to meet specific country needs and contexts. Specifically, it provides step by step guidance on how to decide, design, and conduct a FACT survey. The manual is accompanied by **practical tools and templates** that are available to download at [www.gainhealth.org](http://www.gainhealth.org).

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# Foreword

Dear Reader,

Sustainable Development Goal 2 calls for ending all forms of malnutrition by 2030. One of the most hidden parts of this ambitious agenda is addressing deficiencies in essential vitamins and minerals, which have devastating consequences in terms of lost lives and human potential. A robust and growing body of evidence shows that well designed and implemented large-scale food fortification programs can indeed make a major contribution towards our collective goal of eliminating micronutrient deficiencies.

However, as the saying goes, “*If you don’t measure it, you can’t improve it*”—and there is perhaps no better illustration of this statement than tracking the effective coverage of large-scale food fortification.

Effective coverage of large-scale food fortification is only achieved when people consume enough fortified food to reduce a nutrient inadequacy. One might think that once a food is fortified in a given country that its entire population is automatically protected. Unfortunately, this is far from the case.

Three key gaps exist between fortifying a food and achieving effective fortification coverage. First, a fortified food will not necessarily reach all population groups. This is because some people purchase their foods in areas where the industrialized milling of grain, refining of edible oil, or processing of salt is not possible. Second, the food may not be fortified sufficiently because of faulty processing, lack of adequate quality control systems, or degradation of micronutrients due to environmental factors or poor quality of the food into which the premix is added. And third, even if properly fortified, some people may not be able to consume enough of the food to eliminate a micronutrient inadequacy and its associated deficiency due to poverty or consumption patterns.

To date, the Fortification Assessment Coverage Toolkit (FACT) surveys and tools have quantified the magnitude and distribution of these gaps in over a dozen countries, effectively mapping the fortification landscape of hundreds of millions of people. FACT surveys have allowed leaders in government, business, non-governmental organizations, and development partners to understand which people remain the least well served by this important intervention.

Ultimately, the FACT surveys reveal a vast unfinished fortification agenda: this highly cost-effective intervention needs to be scaled up significantly. It is a classic, no regrets intervention and provides a sound platform for the food system transformations needed to make all nutritious foods more available, affordable, and desirable.

We are proud that the Bill & Melinda Gates Foundation, the Global Alliance for Improved Nutrition, and our partners have combined efforts to produce a toolkit that is so rigorous, illuminating, and useful for guiding action. Put into practice and used to inform decision-making, we believe it has the potential to be transformative. We encourage you to read the *FACT Manual*, map food fortification in your own geography, improve the tools where they need improving, and—most importantly—act on the results. More effective food fortification programs will support the ultimate goals of our organizations and the many partners we work with to save lives, prevent human suffering, and enable human potential to be fulfilled.

Sincerely,

*Chris Elias, President, Global Development Division, Bill & Melinda Gates Foundation*

*Lawrence Haddad, Executive Director, Global Alliance for Improved Nutrition*

# Acknowledgments

The Fortification Assessment Coverage Toolkit (FACT) was originally designed in 2013 to respond to the need identified by the Global Alliance for Improved Nutrition (GAIN) and its donors for additional information on the coverage and consumption of fortified foods in countries where GAIN had implemented and/or provided funding for fortification programs. We sincerely thank the many individuals and organizations that supported the design, development, and implementation of this toolkit over the past years.

We give special acknowledgement to Grant J. Aaron (formerly GAIN) and Mark Myatt (Brixton Health) for their invaluable contribution to the initial development, design, testing, and naming of the original conceptualization of the FACT method.

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# Abbreviations

<b>CAPI</b>	computer-assisted personal interviewing
<b>CV</b>	coefficient of variance
<b>DEFF</b>	design effect
<b>DHS</b>	Demographic and Health Survey
<b>EAR</b>	estimated average requirement
<b>FACT</b>	Fortification Assessment Coverage Toolkit
<b>GAIN</b>	Global Alliance for Improved Nutrition
<b>ICC</b>	intraclass correlation coefficient
<b>MPI</b>	Multidimensional Poverty Index
<b>MU</b>	measurement uncertainty
<b>MUAC</b>	mid-upper arm circumference
<b>OPM</b>	Oxford Policy Management
<b>PPS</b>	probability proportional to size
<b>RDA</b>	recommended dietary allowance
<b>RNI</b>	recommended nutrient intake



# Glossary

**Availability** refers to the amount of food that is present in a country or area through all forms of domestic production, importation, and other supplies.

**Brand** refers to a unique product with the same characteristics and expected quality that can be differentiated from others by a combination of its name, product type, producer, and production site provided on the packaging.

**Consumption** refers to the amount of food that is eaten among the targeted population.

**Coverage** refers to the proportion of those in need of a program or intervention, or for whom the program or intervention is designed, who actually receive it (e.g., proportion of households within a specified geography that consume a fortified food vehicle).

**Essential micronutrient** refers to any micronutrient that is required for proper growth and development and the maintenance of healthy life and that must be obtained from the diet because the body cannot produce it in sufficient amounts.

**Evaluation** refers to the assessment of the outcomes and impact of a program on the targeted population.

**Food vehicle** refers to a food that is selected for addition of a nutrient or nutrients during its normal processing (i.e., it “delivers” nutrients); it is usually a staple food or condiment that is universally or widely consumed.

**Fortifiable food vehicle** refers to a food vehicle in which the raw materials are processed by industry (and therefore amenable to fortification).

**Fortification** is the practice of intentionally increasing the content of a micronutrient (i.e., a vitamin or mineral, including trace elements) in a food to improve the nutritional quality of the food supply and provide a public health benefit without any adverse effects.

**Fortification quality** refers to the extent to which fortifiable food vehicles or brands contain an added micronutrient.

**Fortified food vehicle** refers to a food vehicle that has been confirmed by laboratory analyses to contain an added micronutrient.

**Micronutrient contribution** refers to the percentage of daily nutrient requirements met from consumption of a fortified food vehicle among the targeted population.

**Monitoring** refers to the routine collection of information on program implementation activities that is used to assess progress, identify problems, and take corrective actions to ensure the program objectives are achieved.

**Nutrient requirement** refers to the amount of nutrient intake needed to sustain a defined level of nourishment in an individual for a specific measure of nutritional adequacy.

**Population-based food fortification** refers to the addition of micronutrients to foods commonly consumed by the general public, such as staple food vehicles and/or condiments.

**Targeted food fortification** refers to the fortification of specific foods intended for population subgroups with unique nutrient requirements, such as complementary foods for infants and young children.



# 1 Overview

## 1.1 Introduction

### What is food fortification?

Food fortification is the practice of intentionally increasing the content of an essential micronutrient—i.e., a vitamin or mineral (including trace elements) needed for growth, development, and the maintenance of healthy life—in a food to improve the nutritional quality of the food supply and increase the micronutrient intakes of the general population or a target group (Allen et al., 2006). There are different types of fortification that vary based on the point at which nutrients are added to the foods. Large-scale (also known as industrial or mass) fortification adds nutrients to food vehicles at the point of food processing. While home fortification has been used to denote the addition of a micronutrient supplement in the form of powders to foods at homes. However, in the latter case the vehicle of the micronutrients is the supplement, which is consumed with foods.

Population-based fortification strategies are designed to shift averages and distributions of nutrient intakes by the general population toward those considered adequate. As such, food vehicles that are regularly and frequently consumed by large segments of the population (i.e., staple foods and/or condiments) are selected. These types of programs can be mandatory, where producers are required by law to add specific amounts of one or more nutrients to certain foods in accordance with national standards, or voluntary, where producers may choose to add nutrients by their own accord. Targeted fortification strategies are designed to reach a particular population group through the selection of specific foods and products and fortifying them at levels needed to fill dietary gaps of vulnerable population segments (e.g., complementary foods for infants and young children, foods designed for pregnant and/or lactating women, or emergency rations).

### How can food fortification programs be effectively designed and implemented?

Although conceptually simple, several conditions must be in place for food fortification programs to be impactful (Neufeld et al., 2017). Briefly:

1. the food vehicle selected must be appropriate—i.e., regularly and frequently consumed in a form that is fortifiable;
2. the program must be designed based on the magnitude and distribution of inadequate nutrient intake and deficiency and consumption of the fortifiable food in the population;
3. there must be effective quality control and monitoring systems in place to ensure the availability of high-quality fortified food in the market; and
4. the assumptions related to consumption patterns of the fortifiable food must be reviewed periodically to ensure the program design remains appropriate.

The fulfillment of these conditions should translate into coverage and consumption of high-quality fortified foods among a high proportion of the population.

Nonetheless, gaps in fortification program design and implementation often occur (Timotijevic et al., 2013), and in many countries information on program performance is limited (Development Initiatives, 2018). Many fortification programs have not been subject to coverage assessments owing in part to a lack of fit-for-purpose tools to generate standardized data on coverage and consumption of high-quality fortified foods at the population level.

### What tools and methods exist to inform fortification program design and assess program performance?

Some tools and methods exist to inform fortification program design and help monitor performance, but they offer limited guidance on assessing coverage and consumption. For population-based fortification

programs, the Fortification Rapid Assessment Tool (FRAT) was developed to provide guidance on the selection of suitable food vehicles and determination of fortification contents during the design phase of a fortification program using a modified 24-hour recall and food frequency questionnaire (Micronutrient Initiative, 2003). FRAT has been used to design fortification programs in multiple African countries (Hess et al., 2013); however, its scope is limited to use during the design phase of a fortification program and does not cover performance assessment of on-going programs though it has been adapted in one country to assess program coverage in one country (Engle-Stone et al., 2015). Manuals have been developed for monitoring industry compliance with fortification standards and legislation for salt, oil, and wheat flour during program implementation (ECSA-HC Secretariat, 2007; Food Fortification Initiative et al., 2018; IC-CIDD, 2012). However, the scope is limited to assessing fortification quality at industry and retail levels and does not include guidance on assessing coverage and consumption. Finally, the Fortification Monitoring and Surveillance (FORTIMAS) tool was developed to assess population-level impact of flour fortification programs by tracking indicators of micronutrient status (e.g., prevalence of neural tube defects) collected from program-monitoring and surveillance systems over time at sentinel sites (Smarter Futures, 2014). FORTIMAS recommends the assessment of program coverage indicators as part of the program-monitoring plan and provides some guidance on collection of flour samples from schoolchildren in sentinel sites, but it gives limited information on assessing consumption.

## 1.2 The Fortification Assessment Coverage Toolkit (FACT)

### What is the FACT method, and why was it developed?

Today, mandatory fortification programs are implemented in more than 100 countries for salt, 86 countries for at least one type of cereal flour, more than 26 countries for edible oil, and 8 countries for sugar. (Global Fortification Data Exchange, 2019). However, there are limited data available on the household coverage and consumption of target foods for fortification in most countries (Neufeld et al., 2017). Additionally, a number of programs were designed in the absence of recent data on dietary patterns and deficiency and, as a result, selected foods and set fortification standards with limited potential for impact in the population (Neufeld et al., 2017).

Since its founding in 2002, the Global Alliance for Improved Nutrition (GAIN) has supported a large portfolio of population-based and targeted fortification programs (GAIN, 2016). Motivated by the desire to produce information about the coverage and consumption of fortified foods that would enable the assessment of this portfolio, GAIN developed a Fortification Assessment Coverage Toolkit (FACT) for carrying out coverage assessments in both population-based (i.e., staple foods and/or condiments) and targeted (e.g., infant and young child) fortification programs (Friesen et al., 2017). FACT filled gaps in the availability of standardized and program-oriented tools for fortification stakeholders and provided information necessary for decision making and improvement related to program performance.

The FACT method concentrates on three main areas: (1) assessing the availability and fortification quality of fortified foods at the market and/or household level; (2) assessing coverage, consumption, and micronutrient contribution of fortified food vehicles (e.g., staple foods and/or condiments in population-based programs or fortified foods targeted to specific population subgroups); and (3) assessing equity in coverage, consumption, and micronutrient contribution by identifying vulnerable population subgroups using measures of vulnerability that are often associated with poor micronutrient intakes (e.g., rural residence, poverty, low women's dietary diversity, poor infant and young child feeding practices, and household food insecurity).

In July 2013, a pilot survey was conducted as part of a coverage assessment of a targeted fortification program for infants and young children in three districts in Ghana (Aaron et al., 2016). The initial FACT method was then finalized in September 2013 following a three-day technical consultation with relevant stakeholders. FACT surveys were subsequently rolled out between 2013 and 2017 in numerous countries to assess both population-based and targeted fortification programs. Results were disseminated through reports and stakeholder workshops in each country, peer-reviewed publications, and presentations at international meetings. Further refinement of the FACT method continued during this time to ensure it was fit-for-purpose, maintained high rigor and low cost, and was rapid to implement, analyze, and report.

The final method and indicators provided in this *FACT Manual* have been extensively tested, used, referenced, and/or advocated by sector experts and academics.

### Where have FACT surveys been conducted to date?

Between 2013 and 2017, 18 FACT household assessments were conducted in 16 countries and 7 FACT market assessments were conducted in 6 countries (3 of which were combined with a household assessment) to assess large-scale fortification programs. Additionally, 11 FACT household assessments were conducted in 5 countries to assess targeted fortification programs (i.e., complementary foods and micronutrient

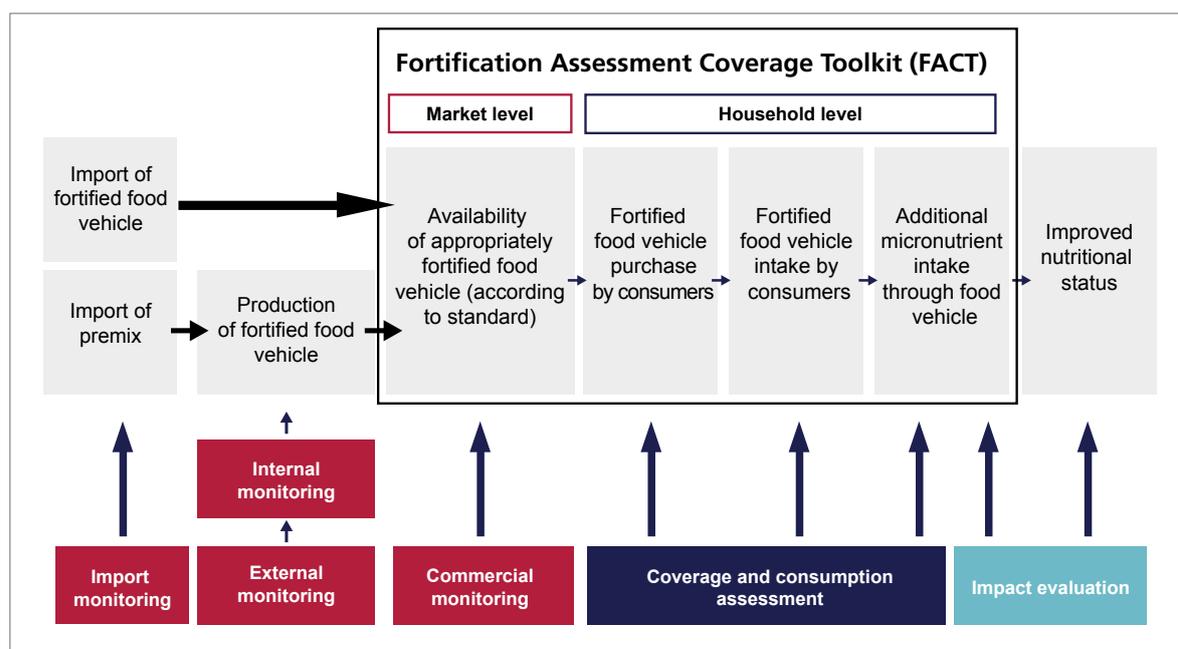
supplements in the form of micronutrient powders as part of interventions for infants and young children). Technical reports, peer-reviewed publications, and public datasets for completed surveys are available on the GAIN website ([www.gainhealth.org](http://www.gainhealth.org)).

## What are the components and objectives of a FACT survey?

The components and objectives of a FACT survey are purposely defined to generate indicators that are aligned with the impact pathway for fortification programs. Figure 1 presents a general impact pathway for a population-based fortification program (e.g., large-scale fortification of staple foods and/or condiments). The grey boxes along the top describe the specific conditions that must be in place for the program to be impactful while the colored boxes below describe where information for each condition is generated. To realize the intended impacts on nutritional status, a fortification program must ensure that appropriately fortified foods are available and that consumers demand them. These goals should be achieved through the importation and production pathways. Only once program performance and coverage reach acceptable levels should the impact on biological or functional outcomes related to nutritional status be assessed.

A FACT survey contributes to assessing progress along the impact pathway by generating key indicators at market and household levels (see black box in Figure 1). Depending on the program objectives and other preexisting available data, a FACT survey can be implemented as an independent market assessment, an independent household assessment, or a combined market and household assessment. Alternatively, FACT modules can be added to other surveys or ongoing surveillance systems that are being conducted in the same population groups of interest.

**Figure 1:** Key indicators along the impact pathway for population-based fortification programs



The objectives of each FACT survey component are as follows:

### 1. Market assessment:

- Assess **availability** of brands of each food vehicle.
- Assess the **fortification quality** of food vehicles by brand compared to fortification standards.

### 2. Household assessment:

- Assess the **coverage** of food vehicles, fortifiable food vehicles (i.e., industrially processed foods), and fortified food vehicles among households.
- Estimate the **consumption** of fortifiable food vehicles among target populations (e.g., women of reproductive age and children 6-23 or 6-59 months of age).

- c. Estimate the **micronutrient contribution** of fortified food vehicles to the intake of select nutrients in the diets of target populations (e.g., women of reproductive age and children 6-23 or 6-59 months of age).
- d. Assess **equity** in coverage, consumption, and micronutrient contribution by identifying **vulnerable population subgroups** using risk factors that are often associated with poor micronutrient intakes (e.g., rural residence, poverty, women of reproductive age not meeting minimum dietary diversity, poor infant and young child feeding practices, and household food insecurity) and disaggregate the coverage, consumption, and micronutrient contribution results by them to determine whether there are any subgroups that may not be reached by the program.
- e. Assess **awareness** of food fortification among households.
- f. Identify **potential new food vehicles** for fortification based on their coverage and consumption patterns (optional).

When assessing targeted fortification programs (e.g., fortified foods designed for a specific population subgroup, such as infants and young children), the coverage and consumption objectives need to be adapted and the assessment of fortification quality should be developed on a fit-for-purpose basis depending on the procurement and distribution systems. The methods and indicators provided in this FACT Manual focus on assessing population-based fortification programs. The methods for assessing targeted fortification programs (i.e., complementary foods and micronutrient supplements in the form of micronutrient powders) are available from GAIN upon request.

### What are the key indicators assessed by a FACT survey?

Various indicators at market, household, and individual levels are assessed in a FACT survey. Table 1 lists the key FACT indicators for both the market and household assessment components of a FACT survey designed to assess a population-based fortification program.

**Table 1: FACT survey key indicators**

Key indicator	Survey component	Description
<b>Availability of brands of food vehicles in the market</b>		
Total number of brands of a food vehicle that are available	Market assessment	These indicators are determined by registering all the available brands in purposively selected marketplaces and retail outlets.
Proportion of brands of a food vehicle that are locally produced (or other characteristic of interest/relevance)		
<b>Fortification quality of brands of a food vehicle available in the market</b>		
Nutrient content of a food vehicle brand	Market assessment	These indicators are determined using information from the laboratory analyses of food samples collected for each brand from the market for food vehicles of interest.  Where supplementary data on food vehicle volume supply in a country are available from other sources, the last four indicators may be additionally estimated as a proportion of food vehicle volume.
Proportion of food vehicle brands that are fortified (to any extent)		
Proportion of food vehicle brands that are fortified below minimum standard		
Proportion of food vehicle brands that are fortified according to standard		
Proportion of food vehicle brands that are fortified above standard range (if applicable)		
<b>Coverage of food vehicles among households</b>		
Proportion of households that consume a food vehicle	Household assessment	These indicators are used to assess coverage of food vehicles that are included in the national fortification program. The second indicator can also be constructed to assess the coverage of potential food vehicles that are being considered for inclusion in the program.
Proportion of households that consume a fortifiable food vehicle	Household assessment	
Proportion of households that consume a fortified food vehicle	Household, and, in some cases, market assessment	The third indicator is constructed based on results of laboratory analyses of food samples that may be collected from households as part of the household assessment or from purposively selected market hubs as part of the market assessment (an option only if this component is included in the survey). If food sample came from a market assessment, fortification quality results are linked to the household using the reported food vehicle type, producer, and brand name.
<b>Consumption of fortifiable food vehicles among target population groups</b>		
Amount of fortifiable food consumed daily among target population groups (e.g., children 6–59 months of age or women of reproductive age [15–49 years])	Household assessment	This indicator is used to estimate the amount consumed of fortifiable food vehicles that are included in the national fortification program as well as of potential fortifiable food vehicles that are being considered for inclusion in the program.
<b>Micronutrient contribution of fortified food vehicles to the intake of select nutrients in the diet among target population groups</b>		
Actual percentage of daily nutrient requirements met from consumption of a fortified food vehicle among target population groups	Household and, in some cases, market assessment	These indicators are used to estimate the contribution of fortified food vehicles included in the national fortification program to nutrient requirements.
Modeled percentage of daily nutrient requirements met from consumption of a fortified food vehicle among the target population groups		They are constructed by combining consumption data from the household assessment with fortification quality data. The first indicator—the actual percentage—uses fortification quality data from the laboratory analyses of food samples collected as part of either the household or market assessment. The second indicator—the modeled percentage—uses the target fortification content as outlined in the national fortification standards.  Where available, these indicators should be complemented by additional data on nutrient intakes from all dietary sources (e.g., from full dietary intake assessments) to estimate the total intake of micronutrients from all dietary sources, in addition to fortified foods, to determine the extent to which the nutrient gap in the diet is or could be filled through fortified foods.

In addition to the key indicators listed in Table 1, other indicators of risk are constructed to enable the assessment of equity of coverage, consumption, and micronutrient contribution across diverse population subgroups. The risk indicators are selected on the basis that they are associated with poor micronutrient intakes and highlight vulnerable population subgroups. The standard risk indicators used in FACT surveys conducted to date are

- households living in rural areas;
- households at risk of acute poverty;
- households with low socioeconomic status;
- households at risk of food insecurity;
- households with women of reproductive age not meeting minimum dietary diversity; and
- households with poor infant and young child feeding practices.



**The document “FACT Indicator Definitions and Measurement Guidelines” provides a detailed list of all FACT standard indicators with the research questions and objectives they contribute to answering, their definitions, and how they are constructed.**

### How can results from a FACT survey be used?

FACT surveys provide meaningful information for decision making related to fortification program improvement. Specifically, the results document successes and identify potential barriers based on evidence of program performance, potential for impact, and equity:

- Performance
  - o The proportion of food vehicle brands that are fortified according to standard can be used to identify bottlenecks related to production of fortified foods and help prioritize inspections and follow-up action by regulatory authorities and industry.
  - o The coverage of fortified foods can be used to understand the proportion of households that are reached by the program.
  - o The consumption of fortifiable foods among target populations can be used to estimate the added micronutrient contribution coming from intake of fortified foods when combined with results on fortification quality.
- Potential for impact
  - o The coverage of fortifiable foods can be used to indicate the potential proportion of households that could be reached by the program if all the fortifiable foods were fortified.
  - o The consumption of fortifiable foods among target populations can be used to estimate the potential added micronutrient contribution coming from intake of fortified foods at various fortification contents.
- Equity
  - o The risk factors by which vulnerable population subgroups are identified can be used to disaggregate the coverage, consumption, and micronutrient contribution results to determine whether there are any groups that may not be reached by the program.

Additionally, the results can be used for decision making related to program design, such as

- Food vehicle selection
  - o Coverage and consumption of fortifiable foods can be used to identify potential new food vehicles for fortification based on those that are used by a high proportion of households and in sufficient amounts by target populations.

## When should a FACT survey be conducted?

In the context of a new large-scale food fortification program, a FACT survey may be conducted during the design phase of the program to identify potential food vehicles for fortification and estimate coverage and consumption patterns of fortifiable food vehicles among the target populations.

In the context of an ongoing fortification program, a FACT survey may be conducted during the implementation or evaluation phase of a program, but the latter should happen only when the program has sufficient evidence to show that the previous activities and outputs in the impact pathway have been achieved. For example, for a large-scale food fortification program, a survey should not be undertaken until evidence confirms that the fortified food vehicle is being imported and/or produced in the country (Figure 1).

## How should one decide whether a FACT survey should be conducted?

The decision to conduct a FACT survey, and subsequently which components (i.e., market and/or household) are conducted, should be made based on two key considerations: the research questions and the presence of existing data.

First, it is critical to establish whether there is alignment between the research objectives and the FACT survey objectives (described above). If there is, the next step is to consult with all relevant stakeholders to collect background information on the fortification program as well as any existing relevant data (e.g., from program-monitoring activities, research and evaluation activities, and other related research). Additionally, it is important to consult with other organizations and partners to find out whether there are any upcoming surveys or surveillance systems in the country with overlapping objectives or target populations that may present opportunities for collaboration.

The following examples illustrate different scenarios and subsequent decisions related to whether or not to conduct a FACT survey:

- If there are existing data available to answer the research questions, then a new survey is not needed; secondary analyses should be done using the existing data.
- If there are existing data available to answer some but not all of the research questions, then a new survey may be needed but only to fill the relevant gaps:
  - For example, if recent, high-quality monitoring data are available that provide information on the availability and fortification quality of fortified foods at market level, but no information on coverage and consumption at household level, then the FACT household assessment could be implemented without the market assessment component and linked to the existing monitoring data where needed for certain indicators.
  - Alternatively, if information is available on coverage and consumption at household level, but no recent information on the availability and fortification quality of foods, then the FACT market assessment component could be implemented without the household assessment component.
- If no existing data are available to answer the research questions, then both the household and market assessment components of a FACT survey may be needed.
- If there is an upcoming national survey or ongoing surveillance system in the country in the same target populations, then the relevant FACT modules could potentially be added to it rather than implemented as a separate survey.

## What areas of work are ongoing?

Currently, the application of FACT indicators and modules as part of recurring national surveys and ongoing surveillance systems is being tested to more comprehensively generate and track population-level coverage and consumption indicators over time. FACT modules that assess coverage and consumption of biofortified foods are also being developed and tested by building on the established FACT methods. Additionally, simplified dietary assessment methods aimed at better estimating adequate intakes or “effective coverage” are being tested. Such information, which is required to estimate the dietary gap in micronutrient intake that we aim to address with fortification, is critical to effectively design programs and interpret the nutrient contribution from fortified foods and assess the extent to which it meets or exceeds requirements in on-going programs.

## 1.3 Guide to using this manual

### Who is this manual intended for?

This *FACT Manual* is intended to be used by fortification program stakeholders, including government agencies, national and international organizations, universities, and individuals, who are responsible for the planning, design, implementation, analysis, reporting, and/or dissemination of surveys that aim to assess the coverage and consumption of fortified foods as part of a fortification program or national surveillance system.

### Why was this manual developed, and what does it contain?

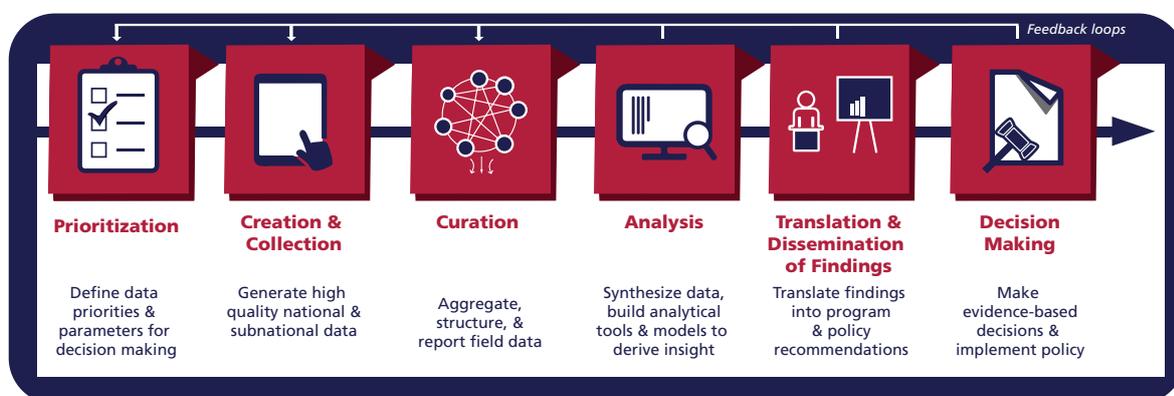
In the context of food fortification programs, data on quality, coverage, and consumption are required to design, assess, and enhance implementation and to estimate and measure impact. The main objective of this *FACT Manual* is to provide standardized methods for the collection, analysis, and synthesis of data on quality, coverage, and consumption of fortified foods across countries while allowing for adaptations to meet specific country needs and contexts. Specifically, it provides guidance on how to undertake all the steps of a FACT survey from prioritization through dissemination and is accompanied by the following practical tools and templates. All tools and templates are available for download on the GAIN website ([www.gainhealth.org](http://www.gainhealth.org)).

1. FACT Research Protocol Template
2. FACT Indicator Definitions and Measurement Guidelines
3. FACT Market Assessment Forms Template
4. FACT Fieldwork Manual for the Market Assessment Template
5. FACT Household Questionnaire Template
6. FACT Household Questionnaire Customization Guidelines
7. FACT Fieldwork Manual for the Household Assessment Template
8. FACT Tabulation Plan Template
9. FACT Indicator Stocklist Template
10. FACT Technical Report Template

### How should one use this manual?

The need for a “nutrition data revolution” that encompasses the entire data value chain from priority setting to creation, collection, analysis, translation, dissemination, and decision making was highlighted in the *2017 Global Nutrition Report* (Development Initiatives, 2017). In line with this holistic approach to generating and using data, the *FACT Manual* was structured to provide detailed guidance at each link in the nutrition data value chain (Figure 2).

**Figure 2: Nutrition data value chain**



Throughout the *FACT Manual*, the following icons are used to direct the user to other resources:



**References to accompanying tools and templates**



**Resources for further reading**



**Tips for users**

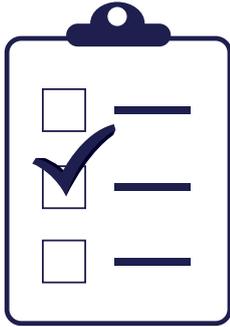
### Users should expect to

- learn about the background, components, and objectives of a FACT survey designed to assess population-based fortification programs;
- access standardized tools and templates that enable the user to carry out a FACT survey that generates data that can be compared across countries;
- obtain guidance on how to design a FACT survey, including how to adapt the standardized tools and templates to meet the users' survey objectives and country context; and
- obtain guidance on how to analyze, report, and disseminate data from a FACT survey with the aim of maximizing its use for decision making.

### Users should not expect to

- learn the basics of implementing a survey (it is assumed that the user has experience and knowledge of survey design and implementation as well as data management and statistical analysis); or
- access a "ready-to-roll-out" tool (all tools and templates provided must be adapted to the country context).

# 2 Prioritization



This chapter provides an overview on how and why to identify and engage stakeholders and jointly set priorities in the context of a FACT survey.

## 2.1 Identifying and engaging stakeholders

### Why is involvement of stakeholders in a survey essential?

Stakeholder engagement is an important component of a FACT survey, from prioritization through translation and dissemination of survey findings, to ensure that results are used for decision making. A stakeholder engagement strategy acts as a conduit between the survey team and the survey’s stakeholders to keep them involved and informed, with the ultimate aim of stimulating use of the survey findings for program improvement.

### How should the right stakeholders be identified?

A mapping exercise should be used to identify all individuals and organizations with an interest in the results of the FACT survey. Once a comprehensive list of stakeholders has been produced, they can be categorized according to various criteria, such as their role, relative importance, and influence in the fortification program and/or the facilitation of the survey implementation. Table 2 provides a list of the typical fortification stakeholders and their roles in the program. In the context of a national food fortification program, there may already be an existing National Fortification Alliance that contains a large majority of the typical stakeholders.

**Table 2:** FACT survey stakeholder mapping

Typical stakeholders	Role in program
Fortification program managers	Conduct day-to-day implementation and monitoring of the program’s progress
Program/technical support agencies	Provide support on design, implementation, and evaluation to program managers and other stakeholders
Policymakers, including government ministries (e.g., Ministry of Industry, Trade, and Health)	Make decisions related to the development and enforcement of fortification legislation and standards
Regulatory and food control authorities	Conduct inspections at import, production, and retail levels and enforce compliance with standards and legislation
Food producers	Produce fortified food in accordance with standards and legislation
Donor agencies	Provide funds to support activities related to fortification program design, implementation, and evaluation
Research community	Develop and/or test new methods and metrics related to various elements of program design, implementation, evaluation, food formulation, etc.

## How can stakeholders be engaged?

A stakeholder engagement strategy that sets out the process, frequency, and timelines for engaging with the identified stakeholders is pivotal to ensuring that the data generated by a FACT survey are country owned, meet the needs of the stakeholders, and are ultimately used for decision making related to program improvement. The strategy should be developed early on in the survey and tailored for each stage of the data value chain (Figure 2).

**Prioritization:** Obtaining input and agreement from all stakeholders on the survey objectives, indicators, approach, and timeline at the start of the survey activities is a crucial element of the engagement strategy. The scope of the survey—including the components (i.e., market and/or household assessment) to be implemented, the food vehicles and fortificants to be assessed, the target population, the geographic scope, and the key indicators—must be defined. Additionally, the level of involvement required of different stakeholder groups should be discussed. This can be done through a planning workshop with all stakeholders and/or through individual meetings with different groups.

**Creation and collection:** It is essential to engage stakeholders during the aspects of survey creation (i.e., design) and data collection in greatest alignment with their interests, roles, loci of control, and influence. For example, government officials, such as ministries of health, are often gatekeepers to certain communities and districts, whereas others, such as regulatory agencies, may provide knowledgeable staff who could participate directly in data collection at market levels.

**Curation and analysis:** Stakeholder input is important for interpretation during the data analysis. For example, technical support agencies and the research community can provide support to the actual data analysis as well as to the interpretation of the data. Additionally, other stakeholders such as program managers may be able to provide further insights into the findings relative to their programs.

**Translation and dissemination of findings:** It is essential that the survey results are translated into relevant program and policy recommendations that are then shared with and agreed upon by all stakeholders before dissemination. Additionally, it is necessary to engage with all stakeholders about their preferences for dissemination activities to ensure that the materials produced and the channels used to communicate the final results and recommendations are accessible, engaging, and effective.

**Decision making:** Various stakeholders, including program managers, program/technical support agencies, donor agencies, and the research community, play a critical role at the decision-making stage. They can help ensure that the information generated from a FACT survey meets the data needs of different decision makers and is presented in such a way that it is actionable—by either triggering an immediate decision to be made or signaling further investigation into additional data sources to ultimately lead to program improvement.

## 2.2 Defining priorities and standard indicators

### How to define priorities and standard indicators?

The initial step following the decision to conduct a FACT survey (refer to section 1.2 for details on how this should be done in consultation with stakeholders) is for the survey team and key stakeholders to define the priorities and scope of the survey. The scope of the survey will depend on which survey components are being implemented (i.e., market and/or household assessment), the specific research questions that need to be answered, and the time and budget available.

Once the scope of the survey is defined, each survey objective and research question must be matched to the standard FACT indicator(s) that will be used to answer it. This matching is necessary to determine what data need to be collected in the survey and to understand how they will be used. This task should be done early in the prioritization stage because it forms the starting point for developing the research protocol and data collection tools in the creation stage.

The list of selected indicators should be recorded in the form of an indicator stocklist that will be further developed and used to construct the indicators during the data analysis phase (refer to section 5.2 for further information on data analysis).

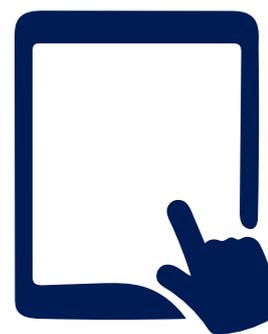


The document “FACT Indicators Definitions and Measurement Guidelines” provides FACT survey objectives and research questions and matches them to the indicators to be measured and analyses to be conducted.



A sample indicator stocklist can be found in the “FACT Indicator Stocklist Template.”

# 3 Creation and collection



This chapter provides guidance on the process of designing and implementing a FACT survey, including planning human, financial, and time resources, designing and pre-testing data collection methods and tools, recruiting and training data collectors, and collecting high-quality data.

## 3.1 Survey planning

### 3.1.1 Survey team

#### What staff are needed to implement a FACT survey?

Staff composition ultimately depends on the scope of the survey, which survey components are being implemented (i.e., market and/or household assessment), the available financial and time resources, and the institutional setup of the organization running the survey. In any case, the survey team requires a minimum set of skills to implement a FACT survey.

The survey team needed to implement a typical FACT survey is as follows:

- **Core survey technical and management team:** This is the team responsible for the ultimate delivery of survey outputs. It generally includes a project director, a survey manager, fieldwork managers, statisticians, questionnaire design staff, programmers, data managers, data analysts, report production staff, and administrative and financial staff.
- **Data collection team:** This team is responsible for data collection and includes fieldwork coordinators, team supervisors, interviewers, quality assurance monitoring staff, data entry supervisors, and data entry clerks.
- **Accredited laboratory technicians:** This group conducts the laboratory analyses needed to assess the micronutrient content of the collected food samples. Section 5.1.1 provides advice on how to choose an appropriate laboratory.
- **Technical advisory group:** This group of experts provides technical assistance to the core survey technical and management team where needed. This work includes advising on the survey planning, sampling design, questionnaire design, training, data collection, data processing, data analysis, report writing, dissemination, and archiving, while ensuring that FACT survey protocols and recommendations are followed. This group is different from the technical steering committee described below as it does not represent the stakeholders. Additionally, this group may not always be relevant, such as in cases where the core survey technical and management team already includes individuals who have the required specialized knowledge in food fortification and survey design.
- **Technical steering committee:** This group of individuals and organizations represents the interests of stakeholders and acts in an advisory capacity to the core survey technical and management team.



For a description of the responsibilities of the key survey staff, refer to Chapter 2 of the International Household Survey Network Survey Quality Assessment Framework (Reading, UK: University of Reading, Statistical Services Centre, 2009), available at [www.ihsn.org/projects/survey-quality-assessment-framework-SQAF](http://www.ihsn.org/projects/survey-quality-assessment-framework-SQAF).

### 3.1.2 Budget

#### How should the budget for a FACT survey be determined?

The costs of a FACT survey will vary considerably from one context to another because they will depend on many factors. The major cost drivers include the following:

- the survey components being implemented (i.e., market and/or household assessment);
- sampling areas (e.g., national versus subnational, urban versus rural)
- sample size;
- fieldwork and labor costs; and
- laboratory costs, which depend on the number and type of food vehicles and nutrients analyzed.

Table 3 provides a budget template with a detailed list of budget items that should be considered when estimating the costs of a FACT survey. Note that the list is a guideline and is not guaranteed to be exhaustive. The budget template groups costs by six major survey tasks: personnel costs, planning and design, pre-testing, training, data collection, data analysis, and dissemination. When developing the budget, it is important to be as detailed and transparent as possible to ensure that no survey activities are overlooked.

### 3.1.3 Work plan

#### Why should one prepare a detailed work plan?

Scheduling is an essential planning step in which the survey manager predicts the overall project duration and lays out when activities and events are planned to happen. The work plan for the survey should therefore outline the main activities of the assignment, their content and duration, phasing and interrelations, milestones, and delivery dates of project deliverables. A reduced form of the survey timetable (with the main survey activities, milestones, and deliverables) is often included as part of the research protocol and shared with stakeholders to establish clear timelines of planned activities and consequently manage expectations around when results will be available.

#### What are the key considerations to note when developing a FACT survey work plan?

Table 4 provides a work plan template with a detailed list of activities to include in a FACT survey. The activities and their timeframe will vary depending on the context. Note that the activities are not necessarily listed in the order they should be executed because there will certainly be overlap between them. For instance, obtaining ethics clearance often takes several months and often overlaps with other design activities (such as procuring the sampling frame) and preparation activities (such as contracting the laboratory and procuring field supplies). The sequencing of activities depends on how long each activity is expected to take in the country of study and the timeframe for the entire survey.

The following are some FACT-specific work plan considerations:

- Data collection for the household assessment should be avoided during periods when food consumption is exceptionally high or low among the target populations in the country of study (for example, harvesting season or periods of fasting or food abstinence for religious reasons).
- If both market and household assessments are being implemented, they can run in parallel or be sequenced, depending on the number of data collectors and the time available for the survey (refer to section 3.8.2 for further discussion of the advantages and disadvantages of the different sequencing models).
- Brands from some food producers may not be supplied throughout the year. To find the widest possible variety of brands, avoid periods when producers halt their supply when determining the timing for the market assessment if possible.
- An informed decision needs to be made on the number of nutrients to test in each food vehicle assessed because this number will have implications for the time and budget needed to analyze the food samples (refer to section 5.1 for further discussion of this issue).

**Table 3: FACT survey budget template**

Budget item	Unit	Number of items	Number of units	Cost per unit in local currency	Total cost in local currency
<b>Personnel costs (salaries plus indirect costs)</b>					
Project director					
Survey manager					
Survey consultants (including statisticians, questionnaire design, and analysis teams)					
Fieldwork managers					
Data managers					
CAPI/data entry software programmers (if applicable)					
Financial and administrative staff					
Technical advisory group members					
<b>Planning and design phase costs</b>					
Stakeholder workshops (venue hire, lunch and refreshments, per diems, accommodation, transport costs, etc.)					
Sampling frame					
License for CAPI software and/or data entry software and/or data analysis software (if applicable)					
Ethical approval application and other permit costs					
Cost of computer units (for data entry if administering survey on paper or for data collection if using CAPI)					
Translation of questionnaires, manuals, etc.					
Printing costs and stationary supplies					
<b>Pre-test costs</b>					
Trainers – per diems (and salary if not already included in personnel costs)					
Data collectors – salary, per diems, insurance					
Venue hire (including refreshments)					
Vehicle hire (including drivers’ salaries and fuel)					
Other transport (air tickets with visa costs, taxi hire, public transport trips, etc.)					
Incentives for households (if appropriate; for example, small bag of salt or sugar)					
<b>Training costs</b>					
Recruitment of data collection staff (including supervisors, mappers, listers, interviewers, logistics officers, quality assurance officers, and regional coordinators)					
Trainers – per diems (and salary if not already included in personnel costs)					
Data collection staff – salary (repeat for listing, household, and market personnel if they are different people)					
Data collection staff – per diems (including accommodation, meals, refreshments, and transportation cost to join training) (repeat for listing, household, and market personnel if they are different people)					
Data entry staff – salary (if administering survey on paper)					
Data entry staff – per diems (including accommodation, meals, refreshments, and transportation cost to join training) (if administering survey on paper)					

Stakeholder participants – per diems					
Venue hire including refreshments (for listing, household, market, and data entry training; the latter if survey is being administered on paper)					
Vehicle hire (including drivers’ salaries and fuel)					
Other transport (air tickets with visas and terminal costs, taxi hire, public transport trips, etc.)					
Incentives for households (if appropriate; for example, small bag of salt or sugar)					
<b>Data collection costs</b>					
Data collection staff – salary (repeat for listing, household, and market interviewers and supervisors and for the regional field coordinators and quality assurance monitoring staff for all three components)					
Data collection staff – per diems (repeat for listing, household, and market interviewers and supervisors and for the regional field coordinators and quality assurance monitoring staff for all three components)					
Data collection staff insurance					
Data collection supplies for interviewers (backpacks, rain coats/umbrellas, folders, batteries, etc.)					
Market assessment supplies for collection and storage of food samples (plus costs for shipment and customs clearance if importing from out of country)					
Communications allowance for data collection staff					
Compensation for local guides (if appropriate)					
Incentives for households (if appropriate; for example, small bag of salt or sugar)					
Printing maps, listings, manuals, permission letters, etc. and questionnaires (latter if administering survey on paper)					
Postage of blank questionnaires to the field and filled-in questionnaires to headquarters (if administering survey on paper)					
Vehicle hire (including drivers’ salaries and fuel) for listing, household, and market assessment teams and for quality assurance monitoring visits					
Other transport (air tickets with visas and terminal costs, taxi hire, public transport trips, etc.)					
Packaging and shipping of food samples to the laboratory (plus costs for shipment and customs clearance if exporting out of country)					
<b>Data analysis and dissemination costs</b>					
Data entry supervisors – salary (if administering survey on paper)					
Data entry clerks – salary (if administering survey on paper)					
Laboratory analysis of food samples					
Report copy-editing and printing					
Dissemination workshops (venue hire, lunch and refreshments, per diems, accommodation, transport costs, etc.)					
<b>Other costs</b>					
Security costs					
Other costs as required					
Overhead costs (ongoing business expenses that are not related to direct labor, direct materials, and direct expenses)					
<b>TOTAL COSTS</b>					

Note: CAPI = computer-assisted personal interviewing.

**Table 4: FACT survey work plan (Gantt chart) template**

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Prioritization</b>												
Identify stakeholders and conduct planning workshops												
Define survey priorities and standard indicators												
<b>Creation and collection</b>												
Develop research protocol												
Design sampling strategy												
Procure sampling frame												
Draft data analysis plan												
Adapt data collection tools and survey manuals												
Translate data collection tools												
Obtain ethical approvals and authorizations												
Program data collection tools into CAPI and desk-test (if using CAPI)												
Pre-test data collection tools and protocols												
Revise data collection tools, protocols, and survey manuals												
Contract laboratory for food sample analysis												
Procure field supplies												
Recruit field teams												
Design data quality assurance system and training plan												
Conduct training and pilot												
Collect data												
Monitor data collection and conduct quality assurance												
Sort and ship food samples to the laboratory												
<b>Curation</b>												
Design data entry software (if administering survey on paper)												
Enter data (if administering survey on paper)												
Clean and process final data												
Prepare data validation report and data dictionary												
<b>Analysis</b>												
Analyze food samples at laboratory												
Analyze data												
Document and archive data												
<b>Translation and dissemination of findings</b>												
Draft preliminary report, including translation of findings into policy recommendations												
Have stakeholders review preliminary report												
Finalize report												
Prepare dissemination materials												
Conduct dissemination events with stakeholders												

Note: CAPI = computer-assisted personal interviewing.

### 3.1.4 Equipment and supplies

#### What equipment and supplies are needed to implement a FACT survey?

Ordering of equipment and supplies needs to be done well ahead of data collection, particularly if the supplies are being ordered from abroad, to avoid unnecessary delays in starting data collection.

A sample list of the equipment and supplies that are needed for a standard FACT survey, as well as guidance on how to calculate the minimum amount to be procured for each item, is provided in the Annex. After calculating the minimum amount needed for each item, it is essential to add extra for contingency purposes. All equipment should be routinely tested to ensure everything is in good working condition.

## 3.2 Research protocol

#### Why should one develop a research protocol for a FACT survey?

During the design phase of any survey, a research protocol must be developed that describes the objectives, methods (sampling design and data collection tools), key indicators, dissemination plans, budget, and work plan. The protocol is submitted to an ethics review committee or institutional review board to obtain approval to conduct the survey (see section 3.6 for further information on approvals) and may also be shared with stakeholders.



A research protocol template can be found in the document “FACT Research Protocol Template.”

#### How should the sampling methodology and data collection tools for a FACT survey be designed?

The sampling design and data collection tools for the survey components being implemented are critical parts of the research protocol that require careful consideration during the design phase to ensure they are fit for purpose. The following sections (3.3 and 3.4) describe the analytical requirements of a standard FACT market and household assessment, respectively. They are intended as a guide and may be adjusted where needed to suit (1) the specific objectives and requirements of the analysis and (2) the context in which the assessment is being implemented.

## 3.3 Market assessment design

### 3.3.1 Sampling design

#### At what level and among which populations are the key indicators estimated?

The main objective of a FACT market assessment is to estimate two key indicators:

- availability of food vehicles at the level of the brand; and
- fortification quality of food vehicles compared to fortification standards at the level of the brand.

These key indicators are reported among the total available brands identified in the market assessment and may be further disaggregated among other characteristics such as

- origin (locally produced, imported);
- food vehicle type (e.g., palm oil, sunflower oil);
- supplier type (producer, import/exporter, distributor, packer/repacker);
- retail outlet type (e.g., retail shop, supermarket, wholesaler/distributor); and
- market hub/geographic administrative area.

Where supplementary data on food vehicle volume supply in a country are available from other sources, these key indicators may be additionally reported as a proportion of food vehicle volume.

## What kind of sampling approach is recommended?

A FACT market assessment sampling methodology employs a purposive multi-stage approach where different levels of markets and ultimately retail outlets are sampled sequentially. Purposive sampling yields a non-probability (non-random) sample that is selected based on characteristics of a population and the objective of the study.

**The first stage of sampling is the selection of market hubs:** Market hubs are agglomerations (places of higher population density such as cities, towns, and villages) where large volumes of food products are sold or pass through and are dispatched to other places. Market hubs are located on the nodes of the main supply routes for different food vehicles; one can expect to find a wider variety of products in these hubs than in the places they supply. Places supplied by these hubs are expected to have available some or all of the brands that are available in the market hub from which they source products.

In the first stage of sampling, market hubs are purposively selected based on the following criteria: population size and density, geography, volume of trade, supply channels, and road networks. Market hubs located in areas of high population density and at the intersection of roads used to dispatch the food vehicles of interest from production or import sites toward populated areas are generally prioritized. As such, they represent the largest concentration of retail outlets at all levels and therefore the best proxy for the national level of availability and variety of the food vehicle brands of interest in a given country.

**The second stage of sampling is the selection of marketplaces within the sampled market hubs:** Marketplaces are large concentrations of all types of retail outlets in a relatively large contiguous, geographic area within a market hub where buyers and sellers of the food vehicles interact. Composition, size, clientele, and geography of marketplaces can differ.

In the second stage of sampling, marketplaces where at least one of the food vehicles of interest is being sold within each sampled market hub are purposively selected based on achieving diversity in terms of geographical dispersion, retail outlet types present, and the population groups served.

**The third stage of sampling is the selection of retail outlets within the sampled marketplaces:** Retail outlet is a general term used here to refer to a vendor or business that sells food vehicles within marketplaces. The following list presents the most common retail outlet types found in different countries:

- **Retail shop:** A small-scale shop offering a variety of goods to a local community, such as a convenience store. Stores can be either located in a street or concentrated in a marketplace. Shops can be simple stalls or selling points situated within a building of some kind.
- **Supermarket:** A large store that sells a wide variety of goods placed in specific departments.
- **Wholesaler/distributor:** A wholesaler is an intermediary entity in the distribution channel that buys goods in bulk and sells to resellers rather than to consumers. In its simplest form, a distributor performs a similar role but often provides more complex services. Distributors can be owned by the mother company of the products they sell. Distributors and wholesalers often work together as channel partners. They are often located in marketplaces.

Retail outlets can also be situated outside of organized marketplaces and placed along streets. These types of retail outlets are difficult to find, and the resources required to consider these retail outlets when designing a sampling approach may be prohibitive. As such, the current FACT market assessment methodology does not include these retail outlets in its scope.

In the third stage of sampling, retail outlets are purposively selected based on the size and diversity of the marketplace, with the aim of maximizing the type and number of retail outlets surveyed. In smaller marketplaces all retail outlets may be visited, whereas in larger marketplaces some selection of retail outlets needs to take place. In the latter case, it is important to structure the initial selection of retail outlets in such a way that the information obtained from them can assist in the selection of subsequent retail outlets. We therefore recommend first surveying wholesalers/distributors, because they are likely to stock a large variety of different food vehicle brands and be able to provide information on the other retail outlets selling the food vehicles of interest in the marketplace, which will help with the selection of other retail outlets. Then the selection of retail outlets should continue with retail shops followed by supermarkets. One branch of each supermarket chain present in the market hub should be surveyed. Choose the largest one, where the variety of available food vehicle brands is likely to be the largest. Smaller independent supermarkets are sampled similarly to other retail outlets.

It is important to note that this methodology may not suffice to discover every single brand that is available across the country for a given food vehicle. It is not a census of all producers and importers. Rather, the aim is to maximize the number of food vehicle brands that can be found in markets at the time of the survey and that represent the majority of the available brands on the market.

## What is the sampling frame for each stage of sampling?

**In the first stage of sampling,** the sampling frame for the selection of market hubs is generated by collecting data related to the key criteria used for selection—i.e., population size and density, geography, volume of trade, supply channels, and road networks. Existing geographic information system databases on national and subnational boundaries and road networks and world population density databases, such as Worldpop ([www.worldpop.org.uk](http://www.worldpop.org.uk)), are useful sources of information. Based on a qualitative assessment of the existing data and discussion with relevant in-country stakeholders, the sample of market hubs is chosen at the discretion of the survey designers. Even though the selection is discretionary, it is important to fully document all the decisions and supporting rationales.

**In the second stage of sampling,** the sampling frame is a list of all marketplaces within each selected market hub. Most commonly, no prior lists of marketplaces exist in a country, and thus the sampling frame needs to be compiled through primary data collection. In most cases compiling this frame will involve interviews with key informants at the level of market hubs or, in the case of large hubs, at the level of communities upon arrival in the market hub during data collection.

**In the third stage of sampling,** an ideal sampling frame would be a list of all retail outlets within the selected marketplaces, but it is unlikely that a country will possess such a list. A partial list of some types of retail outlets may exist, but even that would be difficult to obtain for research purposes. Therefore for a FACT market assessment, it is assumed that no prior list exists.

Owing to the structure (or lack thereof) of the marketplace, it may not be possible to fully enumerate all retail outlets in each marketplace to generate a sampling frame. Therefore we instead recommend mapping the position and type of retail outlets in a selected marketplace. The mapping is constructed through a combination of key informant interviews and confirmation observations upon arrival in the market hub during data collection. Retail outlets from all three different retail outlet types (i.e., retail shop, supermarket, and wholesaler/distributor) should be included. The number of retail outlets visited is then recorded for each type.

## How should the needed sample size be determined?

The number of selected market hubs, marketplaces, and retail outlets will differ by country and context because the selection is done using purposive sampling based on specific criteria.

The number of selected market hubs depends on the number of areas where large volumes of food products are sold that meet the criteria for selection described in the previous section.

The number of selected marketplaces per market hub depends on the size and diversity of the market hub and the time and resources (human and financial) available to conduct the survey. The survey designers may choose to set a maximum number of marketplaces for selection at the onset. For example, a selection of up to five marketplaces per market hub is a recommended benchmark because it is generally deemed a sound balance between diversity and cost. In market hubs where the number of marketplaces is below the benchmark value of five, it is recommended that all marketplaces be surveyed.

The number of retail outlets to survey also depends on the number and diversity of retail outlets in the selected marketplaces. Because the aim of the market assessment is to identify all the available brands in each marketplace without full knowledge of the total universe of all possible brands, it is not possible to recommend the total number of retail outlets that needs to be selected in each marketplace. Therefore the recommended approach is to continue selecting retail outlets with a different range of products until a point is reached where additional retail outlet visits do not result in new brands' being added to the list of all registered brands in the marketplace. That said, selection should not be stopped immediately after selecting one retail outlet that does not add diversity to the list of recorded brands. Owing to the purposive selection approach, this may occur just by chance. Rather, the criterion for concluding the selection of retail outlets should be based on a specified minimum number of consecutively selected retail outlets that do not add to the diversity of brands. We thus recommend that when at least three consecutive retail outlets do not add to the diversity of the registered brands, the selection of retail outlets should be stopped and the survey of the marketplace concluded.

### 3.3.2 Data collection tools

A FACT market assessment collects information at the level of the brand using three forms. The main information collected by each form is summarized in Table 5. All forms must be adapted to the survey context and translated into the appropriate language(s) before use.

**Table 5: FACT market assessment forms**

Form	Description
Marketplace and retail outlet registration	List of all marketplaces and retail outlets visited within a market hub
Brand registration	List of all food vehicle brands that are found in the visited retail outlets and other information on the package (e.g., producer name and location of production site)
Sample registration	List of all samples collected for each food vehicle brand including the sample identification information (i.e., the information that links the registered sample in the form to the collected sample that will be sent to the laboratory) and information on the package from which the sample was taken (i.e., type, brand name, and producer name and location)

As brands are identified in the selected retail outlets through data collection, food samples are simultaneously collected from the selected retail outlets until the required number for each brand are obtained. The selection of the samples for a given brand is predominantly purposive and based on convenience. It does not require stratification by retail outlet type or geography. The main criterion that it must satisfy is the need to disperse the selection of the samples across different batches of production to check consistency of fortification by the producer. It may be possible to meet this criterion by collecting multiple samples of one brand from one retail outlet, or the samples may need to be sourced from multiple retail outlets. For each registered food brand, collect 10 samples (if 10 are not available, a minimum of at least 5 should be collected) and pool them together for laboratory analysis to determine the average micronutrient content of each food vehicle brand (see section 5.1 for further information on laboratory analysis of foods).

Additionally, a fieldwork manual for data collectors must be developed. The manual should contain descriptions of the survey and its objectives, instructions on how to collect data and fill in the forms, a description of the sampling protocols, a description of the food collection and storage protocol, and a description of the data management procedures.



**The standard market assessment forms, with instructions on how to adapt them to the survey context, can be found in the “FACT Market Assessment Forms Template.”**



**A fieldwork manual template for the data collectors of the market assessment can be found in the “FACT Fieldwork Manual for the Market Assessment Template.”**

## 3.4 Household assessment design

### 3.4.1. Sampling design

#### At what level and among which populations are the key indicators estimated?

The main objective of a FACT household assessment is to estimate key indicators of fortifiable and fortified food coverage, consumption, and micronutrient contribution that are reported at the following levels:

- coverage of fortifiable and fortified foods at the level of the household;
- consumption of fortifiable foods at the level of the individual; and
- micronutrient contribution from fortified foods at the level of the individual.

Target individuals are most often children (6–59 months) and women of reproductive age (15–49 years) because they are among those at greatest risk of inadequate micronutrient intake in the household.

The key indicators are reported among the total survey population and among vulnerable population subgroups that may be at risk of inadequate micronutrient intakes. The standard risk indicators used to assess vulnerable population subgroups are as follows:

- households living in rural areas;
- households at risk of acute poverty;
- households with low socioeconomic status;
- households at risk of food insecurity;
- households with women of reproductive age not meeting minimum dietary diversity; and
- households with poor infant and child feeding practices.

The sampling strategy must be designed in a way that makes it possible to distinguish between the different levels of analysis for each key indicator and the different population groups for whom each indicator is estimated.

#### What kind of sampling approach is recommended?

A FACT household assessment sampling approach typically employs a multi-stage design whereby different types of sampling units are selected at different stages of the process. Single stage samples result in the best geographical spread and thus geographical representativity of the sample; however, such samples tend to be geographically spread out and as a result are often prohibitively expensive. Multi-stage designs are therefore recommended because they limit the geographical spread by first selecting a relatively small geographical cluster at the first stage and second selecting secondary units (most often households) from within these clusters at the second stage. Such a design lowers the cost of data collection but also reduces the statistical power of the survey due to clustering effects. (Other designs may be employed depending on survey objectives and the sampled population under study, in which case the methodology would be tailored to purpose. We present this approach as the most widely used for a cross-sectional coverage survey.)

**The first stage of sampling is the selection of clusters:** Clusters, which are commonly low-level administrative units such as villages or communities, are selected using systematic random sampling with probability proportional to size (PPS) and stratification (if applicable) or simple random sampling. The specific sampling method chosen at this stage may vary because it depends on the resources available to carry out the survey and the quality of the sampling frame.

- Systematic random sampling uses an ordered list wherein the units are selected based on a random start and a designated selection step  $k$ —i.e., each  $k$ th unit from the list is selected.
- With PPS sampling, the selection probability is proportional to the size of the sampling unit, meaning that larger clusters (i.e., those with a greater number of households) have higher probabilities of being selected than smaller ones.
- With stratification, the population is classified into sub-populations (i.e., strata) and sampling units are sampled from each stratum independently. Stratification serves two purposes: (1) to increase the precision of the estimates at the level of the total population of interest (e.g., national estimates), and (2) to ensure proper representation of important sub-population groups (e.g., households living in a specific region, including rurality).

- Simple random sampling is the simplest form of sampling design whereby a simple random draw is made from a pool of eligible sampling units.

The process for determining the most appropriate sampling design is a balance between keeping costs low and achieving the desired statistical precision and representativity of the sample. On the one hand, estimates derived from simple random samples have the best possible statistical properties, but they do not necessarily ensure the representativeness of the sample. To maintain the proportional representativity of the sample, the first stage sampling units are often selected with PPS, whereby larger clusters are selected with higher probability.

**The second stage of sampling is the selection of households within the sampled clusters:** Households are selected within the sampled clusters using systematic random sampling or simple random sampling with equal probability of selection. The recommended number of households to select within a cluster is up to 15. This number presents a good balance between statistical precision and the resources required for the data collection. Larger samples of households per cluster tend to slightly reduce the cost of data collection by selecting fewer clusters in the first stage but increase the clustering effects and thus have a diminishing effect on statistical precision.

**The third stage of sampling is the selection of the target individuals (e.g., a child (6–59 months) and a woman of reproductive age) within the sampled households:** In a standard FACT household assessment there are two target population groups (i.e., children (6–59 months) and women of reproductive age). First, the child is selected within the sampled household as follows: if there is only one eligible child 6–59 months of age within the sampled household, then he or she is selected automatically; if there are multiple eligible children 6–59 months of age, one child is selected using simple random sampling. Then, the primary caregiver of the selected child is selected to respond to the questionnaire on behalf of the household, herself, and the child.

The sample of caregivers is used as a proxy for the sample of women of reproductive age. In the data analysis phase, selected caregivers who are not women of reproductive age are excluded. Interviewing the caregiver of the selected child, as opposed to additionally randomly sampling one eligible woman of reproductive age, is done for practical reasons. First, the respondent is asked about foods recently eaten by the child; therefore, it is critical that the person who feeds the child on most days (i.e., the caregiver) answers the questions. Second, selecting the caregiver of the child avoids the need for interviewing both the caregiver and the sampled woman of reproductive age, thereby reducing time, costs, and complexity of data collection. The trade-off however is that the sample of caregivers is not representative of all women of reproductive age. Alternative sampling strategies may be considered to ensure representativeness of both target populations, if necessary.

If the household assessment has only one target population group (e.g., women of reproductive age), then only selection of the woman is required, and the woman is selected as follows: if there is only one eligible woman of reproductive age within the sampled household, she is selected automatically; if there are multiple eligible women of reproductive age, one woman is selected using simple random sampling.

### What is the sampling frame for each stage of sampling?

**In the first stage of sampling,** the sampling frame is a list of all clusters in the country and their population size. In low- and middle-income countries, full lists of all eligible clusters often exist that can be used for research purposes. Most commonly these are frames of geographical units, such as a list of regions, districts within regions, and villages within districts. These kinds of geographical area-based sampling frames can be as detailed as the level of a village or a ward. The most complete geographical sampling frames are lists of census enumeration areas.

These types of sampling frames can most commonly be found within major government agencies. The best source for sampling frames is the country’s national statistical office. When approaching government agencies for sampling frames, it may be necessary to present the research protocol and/or ethics approvals to conduct the survey. Furthermore, sufficient time should be planned to procure the sampling frame.

**In the second stage of sampling,** the sampling frame is a list of all eligible households (e.g., households that contain a child 6–59 months of age) in the sampled cluster. No such list of households exists in most cases; therefore, household lists must often be built through a household listing survey before data collection.

**In the third stage of sampling,** a sampling frame consists of all eligible individual (e.g., children 6–59 months of age) in the sampled household. This listing is obtained on the day of data collection by using a roster of household members.

## How to determine the sample size needed?

The main criteria for determining the required sample size for a FACT household assessment are analytical focus and statistical precision.

The analytical focus defines the level at which the sample size will be estimated. If the analytical focus is on the full scope of the survey population, then the sample size is determined on the full sample. However, if the analytical focus is on particular subgroups of the total population, such as regions, provinces/states, or explicit strata, then the sample size is determined at that level. For example, if the target population is all children 6–59 months of age and the requirement is to report the estimates at both provincial and national levels, then the sample size must be determined at the provincial level and all provinces will be summed to form the total national sample size for the particular country.

The statistical precision required for the analysis is the main factor in determining sample size requirements. Sample size has no relation to the actual size of the population. Keeping all other factors equal, the required sample size for a country with 2 million inhabitants is the same as for a country with 50 million inhabitants. For a FACT household assessment, statistical precision should be defined as the margin of error. Margin of error is a simple statistical concept and is defined as half of the width of the confidence interval.

Another important factor to consider is the balance between statistical precision and the optimization of data collection costs. Keeping all other factors equal, a larger sample size will lead to better survey precision. However, the larger the sample size, the higher the cost of implementing the survey. As a result, there will always be a trade-off between these two considerations.

Calculate the sample size using the following formula:

For example, a FACT household assessment assumes two explicit strata (urban and rural) below the national level in a given country. A two-stage sampling is assumed where the clusters are selected within each stratum as the first sampling stage and 15 households are then sampled in each cluster in the second sampling stage. Based on the possible historic value of the intraclass correlation coefficient (ICC) at 15%, the DEFF is thus assumed to be 3.1. It is assumed that the survey will estimate proportions of 50% and a

$$n = \frac{z^2 \times p(1 - p)}{\alpha^2} \times DEFF$$

where:

$n$  = net sample size

$z$  = z-score

$p$  = proportion of target population with a given trait

$\alpha$  = margin of error

$DEFF$  = design effect

margin of error of seven percentage points at the 95% confidence interval. The calculation thus yields a recommended sample of 615 households and 41 clusters in each stratum. The total size of the sample countrywide would be 1,230 households sampled from 82 clusters.

## What sampling weights need to be considered?

Two main types of weights should be considered in the context of a FACT household assessment: sampling weights and sample adjustment weights.

- **Sampling weights** are adjustments needed when sampled units have been selected with unequal probabilities. They are defined as the inverses of the probability of the selection of each selected unit. Whenever a complex sampling method (i.e. anything other SRS) is used, sampling weights are required. Sampling weights can be presented as either population weights (that sum up to the total population size) or analytical weights (that sum up to the total sample size).
- **Sample adjustment weights** adjust the distribution of the sample to the known benchmark, such as a population census. With a good-quality sampling frame and the use of stratification in the sampling method, sample adjustment weights are not needed. Furthermore, because reliable benchmark distributions are not widely available in developing countries, sample adjustment weights cannot be reliably estimated.

### How should one decide where to collect food samples?

Depending on the survey design, a household assessment may be conducted alone or combined with a market assessment. If only a household assessment is being implemented, food samples should be collected from households as part of that assessment. If both household and market assessments are being implemented, the survey designers will need to decide where to collect food samples to fulfill the household assessment objectives that require fortification quality data—either from households as part of the household assessment or from markets in purposively selected market hubs as part of the market assessment (with fortification quality results linked to the household by reported brand name). Each option has pros and cons, and the decision should be made based on the primary survey objectives and the budget available for laboratory analyses. In any case, it should be noted that the nutrient content in fortified food samples collected from households may be lower than those from markets as it may degrade overtime or due to inappropriate storage conditions.

Collecting food samples from households and analyzing them quantitatively as individual samples allows for the most accurate assessment of coverage of fortified foods at the household level. However, single-sample point estimates should not be applied as fortification contents when estimating micronutrient contribution indicators because of their high variability. Instead the single sample results must be averaged together by cluster or brand, and that value must be assigned to the household. Given the high cost of conducting individual analyses on a large number of food samples, FACT surveys do not often recommend this option.

Collecting food samples from households and analyzing them quantitatively as composite samples by cluster is a more cost-effective option because it significantly reduces the number and cost of analyses required (i.e., one sample analyzed per food vehicle per brand or cluster). This option allows for the most accurate assessment of micronutrient contribution indicators but is limited in that it cannot accurately assess coverage of fortified foods at the household level. In this case, assessing household coverage of fortified foods involves using alternative methods, including linking the fortification content of the reported brand from the analysis of samples collected from markets and analyzed as composite samples, conducting additional qualitative spot tests on individual household samples to determine dichotomously whether added nutrients are present (if analytical methods exist for the nutrient of interest), or assigning the average fortification content of the composite sample from the cluster to all households in the cluster.



The Department of Economic and Social Affairs of the United Nations Secretariat's **Designing Household Survey Samples: Practical Guidelines** provides detailed guidance on how to design household survey samples; available at [http://unstats.un.org/unsd/demographic/sources/surveys/Series\\_F98en.pdf](http://unstats.un.org/unsd/demographic/sources/surveys/Series_F98en.pdf)

### 3.4.2 Data collection tools

#### What data collections tools are used in a FACT household assessment, and how are they developed?

A FACT household assessment collects information at the level of the household and individual using one household questionnaire. The main components of the questionnaire are summarized in Table 6. All questionnaire modules are taken or adapted from validated instruments where available and must be

adapted to the survey context and translated into the appropriate language(s) before use. The questionnaire is accompanied by a photo catalogue used to administer the individual food vehicle consumption module.

**Table 6: FACT household questionnaire modules**

Module <sup>a</sup>	Description
Household roster	Questions on the composition of the household and the gender, age, and education of all household members
Household characteristics and assets	Questions on features of the household dwelling and ownership of assets
Water, sanitation, and hygiene	Questions on access to drinking water and toilet facilities
Short birth history	Questions on live births and deaths of children in the past 5 years
Household hunger scale	Questions on household hunger in the last 30 days
Child feeding practices	Questions on breastfeeding and feeding frequency of the child
Dietary diversity	Questions on food items consumed in the previous day by caregiver and child
Fortification coverage of food vehicles	Questions on the household coverage and consumption of food vehicles that are included in the national fortification program as well as of potential fortifiable food vehicles and, in some cases, collection of food samples from households (dependent on survey design <sup>b</sup> )
Individual food vehicle consumption (accompanied by a photo catalogue)	Questions on the individual consumption of specific food vehicles that are included in the national fortification program and are typically consumed in prepared forms made outside the household
Fortification knowledge	Questions on the awareness and knowledge of fortification generally or of the fortification logo used in the program
Health and nutrition	Questions on the pregnancy and lactation status of the caregiver and measurement of the mid-upper arm circumference (MUAC) of both caregiver and child

<sup>a</sup> Modules are adapted from the following sources:

- Household roster and household characteristics and assets: ICF International (2011); Alkire and Santos (2013)
- Water, sanitation, and hygiene: WHO and UNICEF (2006); Hernandez and Tobias (2010); Billig et al. (1999)
- Short birth history: David et al. (1990); Myatt et al. (2002)
- Household hunger score: Deitchler et al. (2010); Ballard et al. (2011); Deitchler et al. (2011)
- Child feeding practices: WHO et al. (2008); WHO et al. (2010)
- Dietary diversity: FAO and FHI 360 (2016)

<sup>b</sup> As described in section 3.4.1, the decision about where to collect food samples will depend on the overall survey design (i.e., household assessment alone or combined household and market assessments) and objectives as well as on the budget available for laboratory analyses.

Additionally, a fieldwork manual for data collectors and supervisors must be developed. The data collectors' manual should contain a description of the survey and its objectives, guidelines on general behavior and attitude when in the field, instructions on how to collect data and fill in the questionnaire, a description of each module and question in the questionnaire, a description of the sampling and replacement protocols, and a description of the data management procedures. The supervisors' manual should provide additional information on the supervisor's specific roles and responsibilities, including preparing for fieldwork, community engagement and mobilization, supervising and monitoring the performance of interviewers, and reviewing and validating questionnaires.



**A standard household questionnaire template can be found in the document “FACT Household Questionnaire Template.” Guidelines on how to adapt the questionnaire to the survey context can be found in the document “FACT Household Questionnaire Customization Guidelines.”**



**A fieldwork manual template for the data collectors of the household assessment can be found in the document “FACT Fieldwork Manual for the Household Assessment Template.”**



The Supervisor's Manual of the Malaria Indicator Survey provides a template for a fieldwork manual for supervisors of household survey data collection teams; available at <http://malariasurveys.org/toolkit.cfm>.

### 3.5 Pre-testing data collection tools

**Why should data collection tools in a FACT survey be pre-tested, and what does it involve?**

The pre-test is a critical component of the survey design phase. All data collection protocols and questionnaires must be pre-tested. A pre-test is not the same as a pilot. A pre-test is carried out by a small team of experts after the initial questionnaires and data collection protocols have been designed to produce an initial assessment of how they work and allow for any necessary adaptations to the local context. The findings of the pre-test are then used to inform the finalization of the data collection tools and protocols. A pilot, on the other hand, is carried out by all selected data collectors at the end of the training and is essentially a full-team dress rehearsal of all questionnaires and data collection protocols before the rollout of data collection.

For a FACT survey, the objectives of the pre-test differ depending on which components are being implemented.

1. For the **market assessment**, the objectives of the pre-test are to
  - a. understand the structure and size of the market hubs and what retail outlets commonly operate in them by visiting some of the market hubs and interviewing key informants who can provide information on how the markets operate;
  - b. test the protocol for selection of the marketplaces and retail outlets and make introductions at the retail outlets;
  - c. test the protocol for registration of brands and collection of food samples (i.e., selection of the food sample, labeling, storage, and transport methods); and
  - d. test the functionality of the computer-assisted personal interviewing (CAPI) questionnaires if CAPI is being used to collect data.

If feasible, visit several different market hubs during the pre-test. Market hubs can be very different from one another, and the sampling protocol needs to take that reality into consideration.

2. For the **household assessment**, the objectives of the pre-test are to
  - a. identify questions, concepts, or terms that are not clear to the respondents or not appropriate given the cultural and contextual elements, and find potential solutions to making them clearer and/or more suitable;
  - b. test for acceptable levels of response variation, inadequate response categories, ease of conveying meaning, translation errors, difficulty of administering the questions, respondent interest, flow of individual questions and modules, skip patterns, and overall timing per module and per full questionnaire; and
  - c. test the functionality of the CAPI questionnaires if CAPI is being used.



**In the household questionnaire, pay particular attention to certain modules and questions that are difficult to administer and may need further adaptation to the local context during the pre-test. These specific details are highlighted in the document “FACT Household Questionnaire Customization Guidelines.”**



### **Pre-test organization and design tips:**

- The pre-test for a standard FACT survey typically takes about one week for each component (market and household assessment), with the first few days dedicated to training the interviewers.
- The pre-test for the household component must be carried out in communities that are not among those that are sampled for the survey. In contrast, the pre-test for the market component must be carried out in market hubs that are selected for the assessment because it is necessary to understand how those market hubs are structured.
- The pre-test interviews should not be confined to the questions in the questionnaire and should have certain qualitative elements to them. For instance, if a certain question is not working properly, the interviewer should engage with the respondent and ask questions beyond the questionnaire to understand why the question or response options are not working and to identify a better-functioning question or response option.

- During the pre-test, collect materials that could be used for training purposes later on, such as a list of food vehicle brands, photographs of markets and food packages, or actual food packages.



The MICS6 Pre-test Report Template and CAPI test checklist (5 May 2017) is a useful template on how to document the pre-test plan, findings, and results; available at <http://mics.unicef.org/tools?round=mics5#survey-design>.

## 3.6 Ethical considerations and authorizations

### What ethical standards must a FACT survey adhere to?

Like any primary data collection involving human subjects, a FACT survey must be carried out in accordance with the principles of ethical research and must obtain all necessary ethical approvals before data collection begins.

Any primary data collection involving human subjects must follow the principles of voluntary participation, confidentiality, do no harm, and respect. More specifically, these principles include the following:

- Always seek informed consent from all survey participants before the start of an interview (written or verbal, depending on what is approved by the ethics review committee). The interviewer must carefully and honestly explain the nature of the study to the respondents, describe its expected risks and benefits, and inform them that their participation is fully voluntary and can be withdrawn at any time, even after the interview has started. In certain countries, when interviewing caregivers under the age of 18, informed assent must be sought from the minor caregivers and additionally consent to interview the caregivers must be sought from another household member who is 18 years of age or older.
- All personal information collected must be kept completely confidential and not shared with anyone beyond the survey team. The survey data must be anonymized before being shared with a third party. Data should be analyzed, published, and stored in a way that does not allow any data to be traced back to a respondent.
- Utmost care must be taken to ensure that the research does not involve any situation that might result in physical or emotional harm to the participants.
- Individuals who are found to be severely malnourished during the interview (e.g., based on the results of anthropometric measurements) must be referred to nearby health facilities.



The International Ethical Guidelines for Health-related Research Involving Humans by the Council for International Organizations of Medical Sciences (CIOMS) 2016, provides further information on principles of ethical research; available at <https://cioms.ch/wp-content/uploads/2017/01/WEB-CIOMS-EthicalGuidelines.pdf>.

### What authorizations are needed to conduct a FACT survey?

The following approvals must be obtained before any primary data collection:

- **Ethical approval:** Ethical approval must be sought from a research ethics committee or institutional review board in the country where the research is taking place. The application process depends on the requirements of the committee or board in the country of study, but it typically involves submission of an application form, research protocol, data collection tools, and consent forms.
- **Written permits from relevant government authorities:** Government permits may be necessary to smooth survey implementation by facilitating access to communities, households, and markets; increasing cooperation with data collectors; and guarding against any unexpected interventions and interruptions by the government during data collection. Depending on the country of study and the geographic scope of the survey, permissions for data collection may need to be sought from government authorities at national and/or subnational levels.
- **Community-level support:** For the household assessment, once the data collection teams are in a community, the first thing they should do is meet with local community leaders to inform them of

the survey and explain its purpose and nature, to facilitate cooperation and as a basic matter of courtesy. For the market assessment, it is important to understand the different levels of authority in the market and to identify the key stakeholders. Advance advocacy with key gatekeepers is essential; without their approval, the data collection teams may not be able to conduct the survey in the market. Furthermore, the teams need to be conscious of sentiment toward them in the market; retailers may distrust them and think they are making inspections on behalf of the government. Where it is not clear from which market authority the teams should be seeking approval, it may be useful to identify a key gatekeeper who can serve as a guide to help smooth implementation of the market assessment.

The length of time required to obtain these authorizations is specific to the country of study and can vary from one to three months. Survey managers should start thinking about this process early in the planning and design phases, consult with key stakeholders to get a sense of how long it will take, and plan submissions accordingly.

### 3.7 Recruitment and training

#### What are the key considerations when recruiting data collection staff?

The procedures for recruiting data collection staff will depend on the survey context and the practices of the organization implementing the survey. Typically, candidates are evaluated on their education, experience in collecting survey data, interpersonal skills, fluency in local languages, and computer literacy when using CAPI or other electronic data collection and entry platforms. Gender representation may need to be considered in certain countries depending on the local context and cultural norms.

When recruiting staff, it is helpful to

- keep the total number of interviewers limited to the minimum needed to deliver the project within the agreed timeframe to maximize data quality; and
- recruit and train at least 15% more data collectors than needed for the survey to allow for the selection of the best-suited candidates at the end of the training and to provide a pool of additional trained staff in case of data collector attrition during data collection.

#### How should the training of data collectors be planned and executed?

The quality of the collected data is dependent on the quality of the training of data collectors. Separate training sessions are required for each survey component being implemented as the data collection tools and protocols differ and may be implemented by different teams. The main objective of the training is to ensure that data collectors master the data collection tools and understand and correctly implement the data collection protocols. Supervisors should be further trained on their additional responsibilities related to organization, logistical planning, and data management.



#### Tips for successful training:

- Sufficient time for training is vital to successful data collection. Training should last at least one week for each survey component.
- The training should be delivered and closely monitored by a team of survey experts as well as those who have been involved in the questionnaire design.
- A detailed training agenda listing what the teams will be doing at all times throughout the day should be developed. The agenda should be shared with the stakeholders, and if appropriate, some of them should be invited to attend the training.
- The training should include the following components:
  - introduction to the survey and the survey team;
  - briefing on the training agenda and logistical arrangements;
  - introduction to general interviewing principles and techniques;

- detailed training on the questionnaires (each module, question, and response option) and their protocols; and
- the use of computers/tablets (if applicable).
- The training should have a classroom-based component and a field-based component. Role playing and extensive practical exercises in the field should be employed throughout the duration of the training.
- Throughout the training, trainees should be evaluated on an ongoing basis through written assessments and observations during role playing in the training, group work, or field practice.
- Before the rollout of data collection, it is essential to conduct a full pilot by all the data collection teams. The data collectors should implement all tools and protocols in such a way that the pilot day simulates a real day in data collection as closely as possible.



The **Guidelines for Interviewer Training of the Malaria Indicator Survey** is a good resource on how to organize and implement training and includes general tips and guidelines that are useful for any survey beyond malaria indicator surveys; available at <http://malariasurveys.org/toolkit.cfm>.

## 3.8 Data collection

### 3.8.1 Computer-assisted personal interviewing (CAPI)

#### Why should a FACT survey use CAPI to collect data?

It is strongly recommended that FACT survey data be collected using CAPI because of its many advantages over traditional paper-based data collection:

- It increases potential for quality supervision during data collection and reduces potential for cheating by data collectors. The immediate availability of data allows better organization and closer monitoring of data collection, enabling data managers to provide timely feedback to the data collection teams and preventing future errors.
- It improves the quality of data collected by providing consistent data linkage, automated routing/skips, and consistency checks that can provide instant feedback to interviewers.
- It dramatically reduces the time lag between data collection and data analysis.
- It reduces data entry errors.
- It allows for greater speed and fluency of interviews, which increases the efficiency of data collection.

There are a number of considerations when using CAPI:

- Several types of CAPI software are available; some are open source, and others require a license. The choice of software ultimately depends on the expertise available within the survey team.
- Computer tablets of solid build that can withstand the wear and tear of fieldwork in extreme settings should be used for the survey. The computer units should also have long battery life, and data collectors should be equipped with spare batteries to ensure that battery life does not limit fieldwork.
- During the development of the CAPI instruments, each individual module as well as the entire CAPI questionnaire should undergo repeated desk and field testing to ensure they are fully operational, error free, and ready to use before the start of data collector training.
- One of the biggest advantages of CAPI is that it makes the data available daily to the survey and data management team, who can monitor the data and provide timely feedback to interviewers. As a result, CAPI should be strongly integrated into the data management system so that data are sent from the data collection teams to the data management team at the end of each day.

- With CAPI, automated skips and routing and consistency checks can be built directly into the survey questionnaires to provide instant feedback to interviewers, allowing them to address inconsistencies as they arise during interviews.
- If CAPI is used, the work plan and budget should reflect this fact. Sufficient time should be allowed to program and test each questionnaire in CAPI as well as train the interviewers on how to use it. Furthermore, the budget must include the salary of the CAPI programmers and the costs of the license, computer tablets, tablet accessories, and spare batteries.

### 3.8.2 Data collection model

#### What is involved in setting up a data collection model for a FACT survey?

Once the survey design is finalized, it is necessary to set up a data collection model for each survey component being implemented (i.e., market and/or household assessment). A data collection model provides a detailed plan for how, when, and by whom all aspects of the data collection activities will occur.

Setting up a data collection model involves two steps:

##### 1. Defining the data collection team structure (i.e., the size and number of teams needed):

- For the **market assessment**, the team structure will depend on the sampling design (i.e., the number, location, and size of selected market hubs) and the overall time available for data collection. One or two teams could move sequentially from one market hub to the next, or multiple teams could work in parallel in different market hubs.
- For the **household assessment**, the team structure will depend on the sampling design (i.e., number and size of clusters), the expected length of interview per household (which determines how many interviews each data collector can complete per day), the seating capacity of the vehicles that will be used, and the overall time available for data collection.

If both market and household components are being implemented in the survey, different teams should be used for each component unless the survey timeline allows for the two assessments to be done sequentially with time in between for the data collectors to have a few days of rest before the training for the second assessment begins.

##### 2. Developing a survey implementation work plan

The survey implementation work plan relates specifically to the data collection and is different from the work plan discussed in section 3.1.3, which plans the entire survey from planning to data archiving. The survey implementation work plan essentially states which market hubs/clusters each team will be responsible for completing on each day during the data collection period. This plan will factor in the available timeline for data collection, the number of teams, the number of days per week data collectors work, and the travel time needed between market hubs/clusters.

If both market and household assessments are being implemented in the survey, the survey manager needs to decide how to sequence them. They can run in parallel or sequentially. Key factors to consider include the overall time available for data collection and the number of available data collectors, fieldwork managers, and data managers:

- If they run sequentially, the fieldwork managers and data managers can devote their full attention to each assessment on its own time, but the overall data collection period is prolonged. In this case, a decision needs to be made about which assessment to start first. In most cases, it may be advantageous to start with the market assessment so that laboratory analyses of the food samples can be done while the household assessment is being conducted.
- If they run in parallel, the overall data collection period is shorter, but there is a greater burden on the fieldwork and data managers to monitor progress and quality assurance of the two sources of data being collected simultaneously. In this case, it is ideal to have at least a one-week lag between the start of fieldwork for the first assessment and the start of training for the second assessment,

as the first week of data collection is always the most intensive week for the fieldwork and data managers as they monitor teams in the field.

### 3.8.3 Quality assurance

#### What specific quality assurance considerations are needed in a FACT survey?

It is important to establish a comprehensive data quality assurance system that cuts across the entire survey process to provide accurate, reliable, and valid results. This section discusses quality assurance before data collection occurs and during the survey design, preparation, and training phases. Quality assurance after data collection occurs, during data entry, cleaning, and analysis, is discussed in Chapters 4 and 5.

Quality control during data collection is necessary at different levels, some of which are exercised by individuals in the field and others by the survey management team.

#### Level 1: Quality assurance by CAPI built-in routing and validations

As discussed in section 3.8.1, if possible, it is strongly recommended to use CAPI for collecting data. Besides providing real-time updates on progress and data quality (discussed further in Level 4 below), CAPI allows for the use of automatic routing and checking rules that are built into the CAPI questionnaires and that flag simple errors during the interview, allowing them to be corrected in real time during the interview.

In addition to having automatic skip patterns built into the design to eliminate errors resulting from wrong skips, the CAPI validations can also check for missing fields, out-of-range values, potential outliers, and inconsistencies within instruments. The latter checks whether any related information collected in different questions of the instrument is consistent. A warning or error message is given if an entry is out of range, inconsistent, or left empty.

Examples of checks and questionnaire design features that can be embedded into a FACT CAPI questionnaire include:

- automating the recording of date and time of interview;
- automating the capturing of the GPS coordinates.
- checking that only one household member has been selected to be the head of the household;
- checking for the eligibility of households (e.g., checking whether there are children 6–59 months of age listed in the household roster);
- automating the process of selecting respondents for the household questionnaire;
- checking whether children who are reported to be exclusively breastfed in the child feeding practices module are reported to have consumed any food in the dietary diversity or individual food consumption modules; and
- checking for out-of-range values in all questions with numeric responses.

#### Level 2: Quality assurance in the field by supervisors

Each data collection team must include one supervisor. The supervisor's role is to support and supervise data collectors in delivering high-quality completed questionnaires. Specifically, supervisors are responsible for

- observing interviewers to ensure all protocols are followed correctly;
- tracking the number of completed interviews and clusters;
- collecting, reviewing, and validating all completed questionnaires from their team;
- holding daily debriefs with their team to discuss outputs and experiences from the day and to retrain on any questions if needed;
- submitting all completed questionnaires and other tracking forms to data management for archiving and further data-processing activities (if CAPI is used, data should be sent to the data management team daily, or as frequently as network coverage allows); and

- communicating any substantial problems that are identified to the survey management team, who in turn will communicate these to all data collection teams to improve understanding.

### **Level 3: Quality assurance in the field by survey management team and independent quality assurance monitors**

The survey management team should quality assure the data collection operations by regularly visiting and observing teams during data collection. During the first week of data collection, all the teams should be accompanied and supervised by a member of the survey management who will observe the team in the field, check all questionnaires daily, and give feedback to the interviewers. On-the-spot retraining should be provided as necessary.

Quality assurance monitors may also be used to provide independent third-party monitoring in the field throughout the duration of data collection. Specifically, quality assurance monitors are responsible for

- spot checking: visiting a random sample of households to re-administer randomly selected questions to allow for consistency checks;
- observing interviews: observing all teams in a number of clusters (particularly during the first stages of data collection); and
- visiting or calling some of the households that refused to participate in the survey (as reported by the team) to confirm the authenticity of the reports.

### **Level 4: Quality assurance overall by the survey management team**

The survey management team is responsible for checking the overall quality of data collected and monitoring the progress of data collection and the performance of teams.

Checking the quality of the data should be done daily if the survey is being administered using CAPI. If the survey is being administered on paper, then the frequency of data checking by the survey management team will depend on how often the completed questionnaires are sent to the data entry team.

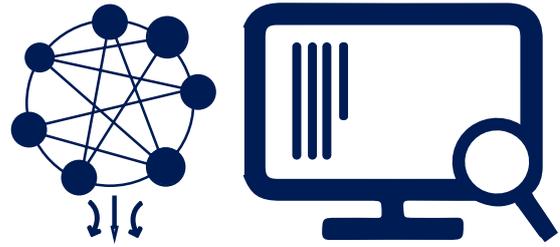
Checking the data involves running a set of completeness and consistency checks after interviewing. These steps include checking that all questionnaires are completed, all identification numbers match the sampling frame with no duplicated identification numbers, replacement protocols are being followed, and there are no out-of-range values, potential outliers, or inconsistencies.

Any problems identified by the central survey team must be fed back to the teams to ensure that the same mistakes are not made in future. Substantial mistakes should result in a revisit or call back to the households. Under this system, errors will quickly fall to low levels.

In addition to checking the data, the survey management team must monitor the progress of data collection. This task involves checking how many interviews are completed daily and whether the teams are on track to complete data collection within the agreed timeline. Daily monitoring will allow for early detection of warning signs and preparation in case more resources must be allocated to finish data collection in a timely manner. The number of interviews completed per cluster should also be checked, and any cases of refusal or non-response should be constantly monitored.

If CAPI is being used, it should be used to monitor the performance of interviewers. If weaknesses are identified in their performance, survey managers can take corrective action (for example, retraining, pairing weak interviewers with strong interviewers, or closer scrutiny) in a timely fashion.

# 4 Curation and analysis



This chapter provides guidance on the data-entry and data-cleaning processes needed before data analysis, the processes for food and data analyses required to construct FACT indicators and good practices for data archiving.

## 4.1 Data entry

### How should data be entered?

It is strongly advised that CAPI be used to administer a FACT survey. If CAPI is used, then data entry is done automatically by the interviewers during the interview.

In cases where the survey is administered on paper, data entry should be done in a centralized location by data entry staff to control for the quality of the entered data. In such cases, a data entry system needs to be developed. The system should be designed in a way that captures errors while data are being recorded. Rules must be programmed into the data entry system that check skip patterns (i.e., do not allow the data entry clerk to enter a response when there should not be one), check completeness of a questionnaire, allow only acceptable codes to be entered (for categorically distinct variables), and flag out-of-range values or potential outliers. This system will facilitate the work of the data entry staff and ensure that all possible errors are detected.

Additionally, double entry is strongly recommended: the same data are entered twice by two different individuals, and the two files are then compared and any identified discrepancies are checked against the paper questionnaires.

## 4.2 Data cleaning

### What does data cleaning involve?

All data need to be checked for completeness and errors, and the frequency depends on how data are entered:

- If entry is done by data collectors using CAPI, then checking should be performed daily.
- If it is done by data entry staff in a centralized location, then it should be done at the end of data collection or as frequently as batches of completed questionnaires are sent to the data entry office.

Based on the outputs from the checks, data cleaning will need to be done to produce a “clean” dataset. The outputs from the checks must be critically assessed to classify each case as either impossible (i.e., definitely an error) or improbable (i.e., not likely to be true).

- For impossible cases, such as identification numbers that are duplicated or outside of the sampling frame or values that have been flagged as out of range or logically impossible, they must be corrected. Responses can be corrected either by revisiting or calling back respondents to correct the flagged errors or by making assumptions about how to clean certain variables. If it is not possible to make assumptions about the variables or correct them through revisits, then they should be assigned special codes in the data to flag that these are impossible cases. The data analysts can decide whether to treat them as missing or impute their values, for example.
- For improbable cases, such as values that appear unrealistic, the first step is to try to revisit or call back respondents to confirm the answers and make corrections as needed, if possible. If that approach is not possible (for instance, if the teams have already left the cluster), then it is advisable not to

correct them but to flag them for the data analysis team so that they are aware of the issues and can decide how to deal with them when constructing the indicators.

It is crucial to document all cleaning activities and preserve a copy of the raw datasets so that the process is transparent and the data analysts understand what cleaning steps have taken place in the event they need to reverse a cleaning step during analysis. All cleaning should be written in a syntax file that is performed on the raw data from the field and produces a new set of clean data (in addition to the original raw datasets). Data managers and assistants should not correct a value without first preserving its original value.



**ISTAT, CBS, and SFSO's Recommended Practices for Editing and Imputation in Cross-Sectional Business Surveys provides a good resource on editing and imputation of business survey data that also applies to household survey data; available at <http://ec.europa.eu/eurostat/documents/64157/4374310/30-Recommended+Practices-for-editing-and-imputation-in-cross-sectional-business-surveys-2008.pdf>.**

### How can data be transformed into a format that is ready for analysis?

Once data cleaning is complete, additional data-processing activities are performed to transform the data into a format that is ready for analysis. The aim of these activities is to produce a reliable, consistent, and fully documented dataset that can be analyzed and archived in a way that allows for future use by other data users.

Data-processing activities normally involve the following:

- reshaping and integrating datasets to produce data files for each level of analysis;
- merging in sampling weights (if applicable);
- creating unique identifiers for each unit of observation and each dataset that can be matched to other units in other datasets;
- anonymizing data by removing all variables that identify respondents, such as names, addresses, and GPS coordinates;
- reviewing "Other (specify)" responses and recoding them into the existing category or, if warranted, creating a new response category (a decision to be made by the data analysts);
- naming and labeling the variables in each dataset; and
- classifying non-responses and coding them using a pre-determined classification scheme (dependent on the analysis software used) to ensure they are treated as missing rather than as non-missing numeric values that may unintentionally be included in calculations.

### What documentation on data cleaning processing should be produced?

It is essential that the data management team clearly document their work, particularly for the benefit of the data analysts, who may not have been involved in the data-cleaning stage. This documentation includes

- preparing a data dictionary that defines each variable in all the datasets, including the codes used for categorical variables;
- preparing a data validation report that describes
  - the setup of the data management system, including a description of the data management team;
  - how the sampling was done for each survey component (if done centrally by the data management team);
  - what checks were performed on the data, including those embedded into the CAPI program if using CAPI; and
  - how the data were cleaned; and
- sharing the final cleaned datasets as well as all data checking, cleaning, and processing syntax.

## 4.3 Laboratory analysis of foods

Food samples collected as part of the market and/or household assessment are analyzed for micronutrient content to provide the information needed to construct several key indicators such as fortification quality, household coverage, and micronutrient contribution of fortified foods.

### 4.3.1 Laboratory selection

#### How should a laboratory be selected?

When selecting a laboratory to conduct the food sample analyses, it is critical to ensure that the laboratory is accredited for the specific analyses needed and can provide certificates of accreditation for all methods used.

To avoid lengthy storage and shipping times to laboratories and possible degradation of the nutrient of interest in the samples, a capable laboratory in the country where the survey is being implemented would be the ideal choice. If there are no capable laboratories in the country, it will be necessary to ship the samples abroad to a laboratory that has the required capacities and accreditations.

In any case, to reduce the risk of nutrient degradation, food samples should be shipped to the laboratory for analysis as quickly as possible upon completion of the survey. When shipping food samples collected as part of a research study, due diligence before data collection is critical to assess the requirements for transportation and/or export. Regulations vary by country, and there may be restrictions on the type of transport allowed (i.e., ground or air) for certain types of foods in some countries.

#### What information should one ask the laboratory to provide?

It is critical to ensure that the laboratory provides the following information, which is needed when analyzing the data and reporting the results of the survey:

- accreditation certificates for each method of nutrient analysis conducted;
- description of methods used for each type of nutrient analysis;
- estimates of nutrient content for each individual or composite sample analyzed (typically in the form of a spreadsheet);
- description and results of the quality control procedures performed by the lab, including the coefficient of variance (CV), bias, and measurement uncertainty (MU):
  - general good practice includes analyzing in duplicate every n sample (usually 10) to determine the precision through the CV and regularly conducting a reference test against a sample with known nutrient levels to ensure that all devices are calibrated and used appropriately to confirm the trueness by establishing the bias (or systematic error);
  - the MU gives information about the accuracy of a lab method result and is calculated as follows:  $MU = \text{bias} + CV * \text{confidence}$  (confidence = 1.96 for 95% confidence).

### 4.3.2 Nutrient analysis

#### How should one decide which nutrients to analyze?

At a minimum, one nutrient should be analyzed in each food vehicle. If multiple nutrients are added to one food vehicle, the nutrient(s) analyzed should be selected based on highest priority in the food fortification program. This information can be determined by consulting with key program stakeholders and by noting the nutrients' sensitivity to degradation (i.e., the first to degrade has the highest priority). If only one nutrient is analyzed, the content of that nutrient can be used as a proxy for other nutrients that are confirmed to be in the premix added during the fortification process. If the budget permits, multiple nutrients can be analyzed in subsamples of the same food vehicle to confirm the presence and amount of the other nutrients in the food vehicle. To save resources, the analysis of the second nutrient should be conducted only in those samples that have already tested positive for the first tested nutrient. How should one decide which nutrient analysis methods to use?

#### How should one decide which nutrient analysis methods to use?

Accredited methods must be used to analyze the nutrient content in food vehicles. For some nutrients, multiple methods of assessing nutrient content are acceptable. For example, total iodine in salt can be assessed using titration or any iodine-determining apparatus available on the market (e.g., iCheck (Germany),

iReader (Thailand), and WYD (China)). The choice of method used should be based on the capacity of the laboratory (i.e., which method they are certified to conduct) and the validity of the method for the specific nutrient being measured.

Quantitative analyses—i.e., those that measure the specific amount of nutrient (added or total) in a food vehicle—should be conducted on composite samples. This approach allows for a more accurate estimate of the average nutrient content of the food samples collected and reduces the cost because significantly fewer analyses are needed. If food samples are collected as part of a market assessment, individual samples of each food vehicle brand are pooled together into one composite sample and then analyzed quantitatively to determine the average nutrient content by brand. This is how food control procedures in food industries are usually done: they take samples from the line of production at determined periods of time along the production of each batch, and then they confirm compliance of technical specifications in a composite sample prepared by mixing the single samples of the batch. If food samples are collected from households as part of a household assessment, individual samples of each food vehicle from the same community are pooled together into one composite sample and then analyzed quantitatively to determine the average nutrient content by community. The process of preparing composite samples at the household level is also important for having sufficient amounts of the fortifiable food, which is required for reducing the intrinsic variation of the nutrient content in single samples as well as ensuring that the appropriate amount of the fortified food is used in the laboratory analyses. For example, for testing iodine in salt, solutions should be made with 50 grams of salt. Large errors in the determination of the nutrient content in foods are attributable to the use of small quantities of the fortified foods in the analytical assays rather than to the accuracy or precision of the methods.

Additionally, if qualitative tests—i.e., those that measure the presence of the added nutrient compound but not the amount—for the nutrient of interest exist, individual food samples collected from households may be analyzed using them to determine dichotomously if the food vehicle used in that specific household is fortified or not. However, it is important to note that even though qualitative tests often only require small quantities of the fortifiable foods, care should always be taken to ensure that the samples used come from a well-mixed amount of those foods.

When assessing nutrients in food vehicles that already contain intrinsic levels of the nutrient of interest, such as iron in wheat flour, methods that specifically measure the added nutrient compound should be selected if available. For example, if the form of iron added to wheat flour is NaFeEDTA, some methods can measure the amount of NaFeEDTA separately from the amount of intrinsic iron present in the wheat flour.

If added nutrients cannot be measured directly, then total nutrient content in the food vehicle must be assessed. For example, if assessing iron in wheat flour from samples collected from markets, the analyses are done at the level of the brand. First it is necessary to conduct a qualitative test on each individual sample from a particular brand to confirm the presence of added iron (i.e., the iron spot test). If at least one of the individual food samples tests positive for added iron, then all samples from that brand should be pooled into one composite sample, which is then analyzed quantitatively to measure total iron. If all the individual samples test negative for added iron, then the brand is considered to be non-fortified. Samples that test negative can be additionally pooled into one composite sample and analyzed for total iron content, which can be interpreted as the intrinsic iron content of the non-fortified wheat flour. This value can be used to determine the added iron content of the positive samples by subtracting the total iron content estimated in the non-fortified samples by the total iron content estimated in the fortified samples. If assessing iron in wheat flour from samples collected from households, the procedures described above are followed, but the analyses are done at the level of the cluster rather than the brand. If desired and feasible, qualitative tests can be applied to household samples of fortified foods. However, in cases where the fortified foods appear as prepared products made from the fortified food vehicle (e.g. bread or tortillas) the qualitative test may not be applicable. In this case, composite samples of the prepared products made from the fortified food may be tested quantitatively for the nutrient of interest and the added nutrient contents estimated by subtracting the total nutrient content determined in equivalent products made with non-fortified foods.

### How should one interpret the results and compare against the fortification standard?

A fortification standard generally stipulates the required nutrient content (added or total) in a food vehicle expressed as a target value with an acceptable range of variation (minimum value and, in some cases, maximum value) defined for different levels of the supply chain (e.g., production site, import site, or retail). This is the range with which the results of the quantitative analyses for each composite sample are compared. If different ranges are defined for different supply chain levels, then the result is compared with the one that matches where the food samples were collected (e.g., retail level for foods collected from markets) (Food Fortification Initiative et al., 2018). Here is important to note that the standard is generally applicable to the “best before” date of the product and, if this information exists, it may be collected and used to interpret the results.

At household level, comparison of the nutrient content in fortified food samples to standards is not required. At households, the objective is to determine the additional average content of micronutrients in the fortified foods, regardless of the specifications in the standards. Nevertheless, the theoretical average micronutrient contents mentioned as the target values in the standards may be used to estimate the potential micronutrient contribution if the target in the standards is met.



**For more information on validated methods for nutrient analysis refer to the following: across foods and condiments generally, AOAC, available at [www.aoac.org](http://www.aoac.org); for cereals, AACC, available at [www.aaccnet.org](http://www.aaccnet.org); and for oils and fats, AOCS, available at [www.aocs.org](http://www.aocs.org).**

## 4.4 Data analysis

### How should one prepare for data analysis?

Each organization or individual has their own methods and preferences on how to set up the data analysis process. In any case, it is good practice to develop common standards for the data analysis team on how to conduct the analyses as well as basic rules—e.g., on how to name and code variables—to ensure consistency in the work across all data analysts.

An indicator stocklist—i.e., a repository of all indicators to be built during the analysis—is a recommended tool for facilitating analysis. It specifies not only the final indicators that will be reported in the tables but also the intermediate indicators that need to be constructed to get to the final indicators. For each indicator, the stocklist should include its name, base population, level of analysis, instructions to construct it, the syntax file where it is constructed, and any notes that are helpful in constructing it.

The development of the indicator stocklist should be started during the design phase as indicators are selected to answer each of the survey objectives and research questions (as described in section 2.2 on defining priorities and indicators). The data analysis team should then finalize it before data analysis begins.

A tabulation plan should also be produced prior to data analysis that specifies the indicators, disaggregations, and statistics that must be produced by the data analysts to answer each survey objective.



**The document “FACT Indicator Stocklist Template” provides an example of an indicator stocklist for a FACT survey that could be adapted by users.**



**The “FACT Tabulation Plan” provides a series of dummy tables based on the list of objectives and indicators of a standard FACT survey.**

### How should FACT indicators be constructed?

All of the information needed to construct the indicators for both the market and household component of a FACT survey appears in the document “FACT Indicators Definitions and Measurement Guidelines.” Specifically, it includes

- a list of all the FACT standard indicators with the research questions and objectives they contribute to answering, their definitions, and the base population in relation to which they are defined;
- a description of how these indicators are measured, including intermediary steps and any resources needed to build them; and
- notes on how these indicators should be disaggregated.

Be sure to report indicators according to the specifications in the “FACT Tabulation Plan.” All estimates produced should be weighted by the sampling weights.

For easy reference, a list of key FACT indicators is also presented in Table 1, section 1.2, of this manual.



**The document “FACT Indicator Definitions and Measurement Guidelines” provides a detailed list of all FACT standard indicators with the research questions and objectives they contribute to answering, their definitions, and how they are constructed.**



### Tips for dealing with outliers:

An *outlier* is an observation point that lies at an abnormal distance from other observations for a variable. If outliers are not dealt with properly, then the data will be skewed by extremities. Outliers should be investigated carefully as they might be linked to the quality of the data.

Begin by identifying and defining outliers, as follows:

- Plot the distribution of the variable where outliers might be an issue. A simple scatterplot, a histogram, or a boxplot can be used.
- Define what an outlier is. Data analysts might want to experiment with different definitions of outliers to see how sensitive outliers are to those definitions. The following are some potential definitions:
  - Any value below  $Q1 - (3 \times \text{interquartile range})$  or above  $Q3 + (3 \times \text{interquartile range})$ . This identifies “extreme” outliers and is the most recommended method.<sup>1</sup>
  - Any value that is 2 or 3 standard deviations away from the mean.

There are several ways of handling outliers:

- If there are any extreme outliers, the data analysts might want to consider recoding them as “missing.” In that case, the outliers must be assigned a special code (e.g., “.y”) to easily distinguish them from other types of missing values.
- The data analysts might choose to perform an imputation on the outliers if they represent a non-negligible proportion of the base population.
- If the outliers are excluded from the analysis or imputed, the data analysts should report and justify their approach in the survey report.
- If the outliers are not excluded or replaced, the median should be presented rather than the mean as the median is not sensitive to outliers.



### Tips for dealing with missing data:

Missing data from key variables may bias the point estimates and reduce the accuracy of the estimate by reducing the effective sample size on which the estimate is based. To decide how to deal with missing data, it is important to first understand the nature of the missing data—are they missing at random, missing completely at random, or not missing at random?

There are several options for dealing with missing data:

- Analysts could leave the data as missing but create special codes showing why they are missing (e.g., “Don’t know,” “Refused,” or “Missing”).
- Analysts could make an informed assumption about the missing data and replace the missing values. This is recommended if the share of missing data is small, if an informed assumption about replacing the data can be made, and if the variable is necessary to build a key indicator.
- An imputation could be performed on the missing data. This is recommended if a simple assumption about replacing the missing data cannot be made and a more complex model is required instead, if the variable is essential to the analysis, and if there is enough information in the dataset to perform an imputation. Note that imputations are complex and in some cases can be more detrimental to the results than acknowledging the level of missing data.

Note also that missing data usually says something about the data and/or survey and can represent interesting findings on their own. For example, if many households do not know the brand of a certain food vehicle that they purchased and hence the brand variable suffers from high rates of missing data, this is an interesting finding that should be reported and could give information on how foods are sold and purchased in certain contexts.

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<sup>1</sup> Q1 is the first quartile, which is the value in the data set that holds 25% of the values below it. Q3 is the third quartile, which is the value in the data set that holds 25% of the values above it. The interquartile range is the difference between the first and third quartiles.

## 4.5 Data archiving

After data analysis is completed, a FACT survey should be documented and archived to encourage research uptake by facilitating access to the data, maximizing its future use, and allowing for replication of the data analyses.

It is critical to comply with the requirements of the entities that own the data, whether donors or government stakeholders. Their consent to publish the data and associated documentation must be sought first.

Documentation should be an ongoing process from the start of the survey to ensure quality, completeness, prevention of information loss, and reduced costs. The documentation should include anonymized public-use datasets, questionnaires, sampling documents, and other key documents, from survey design through data analysis and publication of results. It is important to include sufficient documentation along with the datasets to enable other users of the data to fully understand the study.

Paramount to documenting the data is ensuring the confidentiality of survey respondents in accordance with the ethics standards that the survey should adhere to and any specific requirements of the authorizations received, as specified in section 3.6. All identifying information must be deleted from the datasets before they are published or shared with third parties.

It is recommended that the Data Documentation Initiative standard—an international standard on microdata documentation—be used when preparing survey documentation. Recommended archiving software is Nesstar Publisher, the archiving software recommended by the International Household Survey Network. It is free, user-friendly, and compliant with the Data Documentation Initiative standard. It consists of data and metadata conversion and editing tools, enabling the user to prepare these materials for publication to a Nesstar Server. However, it can also be used as a stand-alone tool for the preparation of data and metadata.



To learn more about the international standard for describing data produced by surveys, visit the Data Documentation Initiative webpage: [www.ddialliance.org](http://www.ddialliance.org).

For detailed guidance on data archiving, including on documentation, anonymization, cataloging, and dissemination activities, visit the webpage of the International Household Survey Network: [www.ihsn.org/archiving](http://www.ihsn.org/archiving).

Nesstar Publisher can be downloaded for free from the following link: [www.ihsn.org/software/ddi-metadata-editor](http://www.ihsn.org/software/ddi-metadata-editor).



# 5 Translation and dissemination of findings



This chapter provides guidance on translating FACT survey findings into program and policy recommendations and disseminating results, including examples of data visualization.

## 5.1 Translation of findings

### How should analytical findings be translated into program and policy recommendations?

Once the FACT indicators are constructed, the results must be interpreted and translated into relevant program and policy recommendations. This is an essential step in the data value chain and requires input and agreement from stakeholders. The recommendations from the survey are intended to feed back to specific areas in the impact pathway that, according to the survey results, require improvement or adjustment.

Generally, the survey team, based on its knowledge of the program and understanding of the indicators, prepares an initial draft of the program and policy recommendations. The draft should then be reviewed by key stakeholders and revised accordingly before dissemination to ensure that the recommendations are appropriately aligned with the results and program objectives, are feasible, and provide clear, relevant guidance on next steps for program improvement.

## 5.2 Dissemination of findings

### How can survey results be effectively communicated to stakeholders?

Disseminating knowledge and experience gained through a FACT survey is a critical stage of the data value chain. An active dissemination and research uptake strategy is necessary to foster a culture of data use and sharing and to ensure the findings reach the relevant stakeholders and contribute to evidence-based decision making. The strategy should clearly outline the survey stakeholders, preferred communication channels to reach them, and dissemination material specifications that will facilitate uptake of the findings. By engaging with the stakeholders throughout the duration of the survey, it will be possible to understand their needs and how they want to use the survey results.

There is an increasing demand from stakeholders for short, accessible, and engaging materials that facilitate understanding and uptake of results from complex research activities. Producing accessible and effective dissemination materials from a FACT survey requires tailoring language, content, and communication channels to the needs and preferences of different stakeholders. The dissemination materials must then be shared widely among the full range of stakeholders through diverse communication channels, such as digital, print, face-to-face, and national and/or state-level events. What type of dissemination materials should be produced for a FACT survey?

The format in which the results and recommendations of a FACT survey are reported will depend largely on the target audience. In most cases, several types of materials will be developed to suit the diverse needs of the stakeholders involved and will be disseminated through multiple communication channels. The most common dissemination materials include

- a technical report;
- peer-reviewed journal articles;
- policy or advocacy briefs;

- press releases;
- slide presentations;
- appearances in traditional media (e.g., radio, television, newspaper); and
- social media content (e.g., infographics, short videos).

Technical reports and peer-reviewed journal articles are important materials among stakeholders such as fortification program managers, program/technical support agencies, technical staff in government agencies, donor agencies, and the research community who are interested in understanding the detailed methodology and assumptions of the survey, as well as the nuances of the results. For others, such as senior policymakers and donor agencies, a concise policy brief or press release that highlights the key recommendations is often a more effective means of communication.

Additionally, certain components of the survey results may be more interesting to specific audiences. For example, in a combined market and household assessment survey, stakeholders such as regulatory and food control authorities and food producers may be interested only in the market assessment results; therefore, specific materials focusing only on that component may need to be produced.

Other materials, such as slide presentations, are useful for providing a summary of the technical report and are commonly used in workshops where the results are presented to groups of stakeholders. Social media content, such as infographics and short videos, are widely accessible materials that facilitate understanding of key messages in a short but engaging way to a diverse range of audiences.

### How should one write a technical report for a FACT survey?

A technical report that provides a detailed account of the survey rationale, methods, findings, and recommendations is always required for a FACT survey as it forms the basis for all other subsequent dissemination materials that are developed.

A FACT survey technical report should include the following sections:

- summary (brief two- to three-page summary of the full report);
- introduction (overview of the nutrition situation, fortification program, and survey rationale);
- objectives (general survey objective and detailed specific objectives);
- methodology (from study design and sampling through to data collection and analysis);
- results; and
- key findings and recommendations (summary and interpretation of results, conclusions, and recommendations).



#### Tips on report writing:

- It is important to be transparent and include in the report any assumptions made during the analysis and the limitations of the survey design or administration.
- Not all results included in the tabulation plan need to be presented in the report (e.g., intermediary indicators or certain indicators disaggregated by risk factor that show no significant differences between groups). If some indicators are not presented in the main text of the report but are still relevant and of interest to certain audiences, they could be provided in annexes or supplementary tables. As a first step, all tables in the tabulation plan should be produced, and then the individuals writing the report can decide which results to include in the report and annexes.
- Consider showing only a subset of the full range of statistics for each indicator in the main text of the report. Additional statistics that may be useful for further understanding of the results could be provided in an annex or in supplementary tables. For example, the estimate and confidence interval for a given indicator could be presented in the main text of the report, while the standard error and percentiles could be presented in the annex or supplementary tables, or vice versa.
- Converting survey results into figures is highly encouraged for certain indicators (e.g., coverage indicators), as they can improve the readability of the report and facilitate greater understanding.
- The report should be peer reviewed and copy edited before dissemination.

 The “FACT Technical Report Template” provides a detailed outline of a technical report and tips for writing some of the sections and presenting the results.

 The “FACT Tabulation Plan” provides a series of dummy tables based on the list of objectives and indicators of a standard FACT survey that can be included in the technical report.

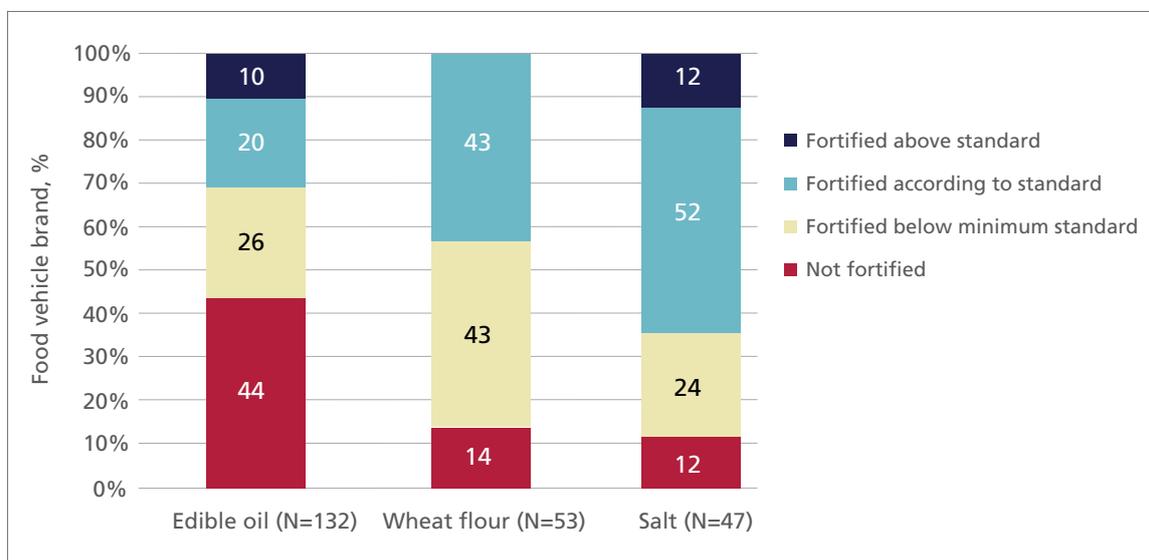
### How can data visualization be used to facilitate understanding of results?

Data visualization is incredibly useful for summarizing data, making it compelling, and highlighting gaps. Moreover, it has been found effective at facilitating users’ understanding and their retention of information. Consequently, figures, infographics, and other creative visualizations of FACT survey data are encouraged as much as possible in all dissemination materials produced.

The following examples demonstrate how key FACT indicators on fortification quality, household coverage, and micronutrient contribution of fortified foods can be presented visually. Use these examples as templates, and/or come up with new and innovative ways to visually present the FACT indicators.

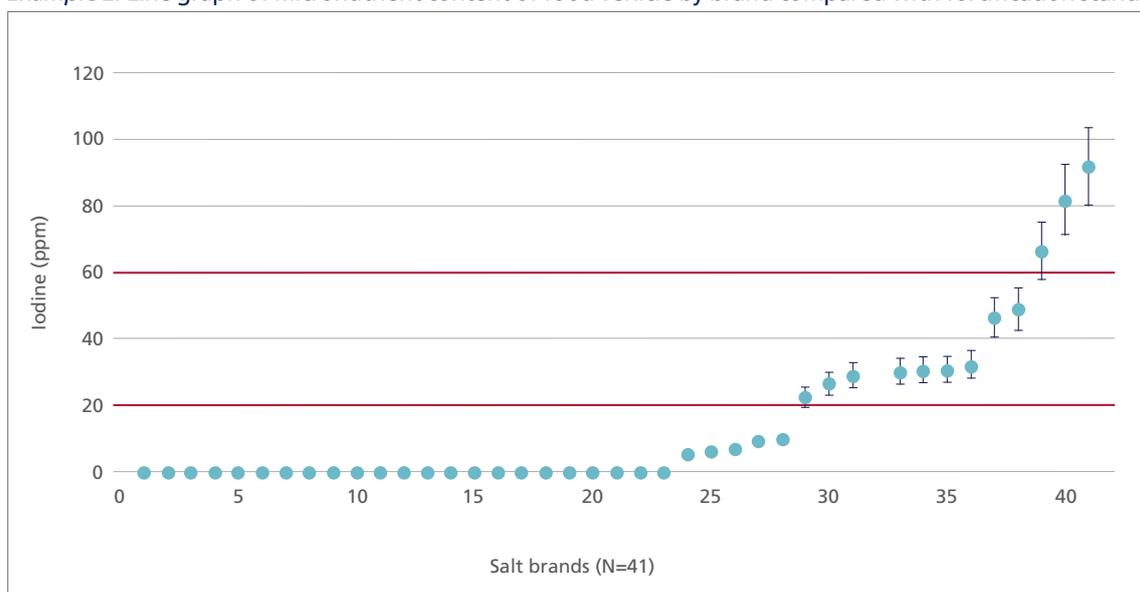
**Figure 3: Fortification quality of food vehicle brands**

*Example 1: Bar chart summarizing brands by food vehicle classified according to the fortification standards*



Include in a footnote the fortification ranges for each category and other relevant information as needed.

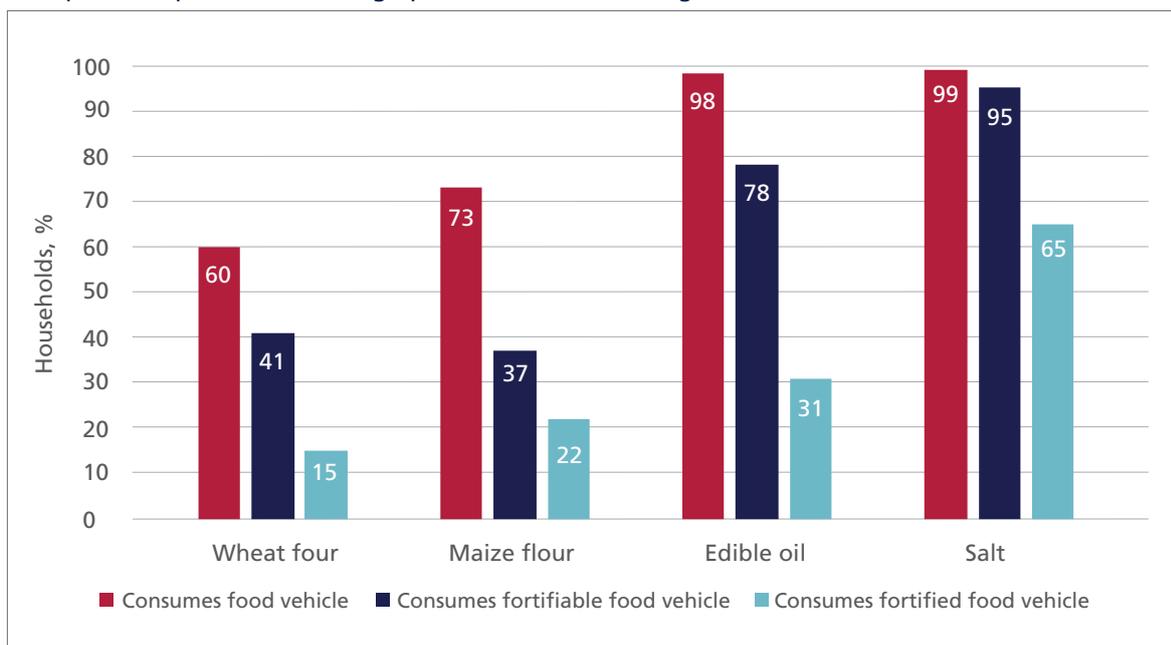
*Example 2: Line graph of micronutrient content of food vehicle by brand compared with fortification standards*



Solid lines show the mandatory fortification range (include specific range). Error bars show laboratory measurement uncertainty (include specific values).

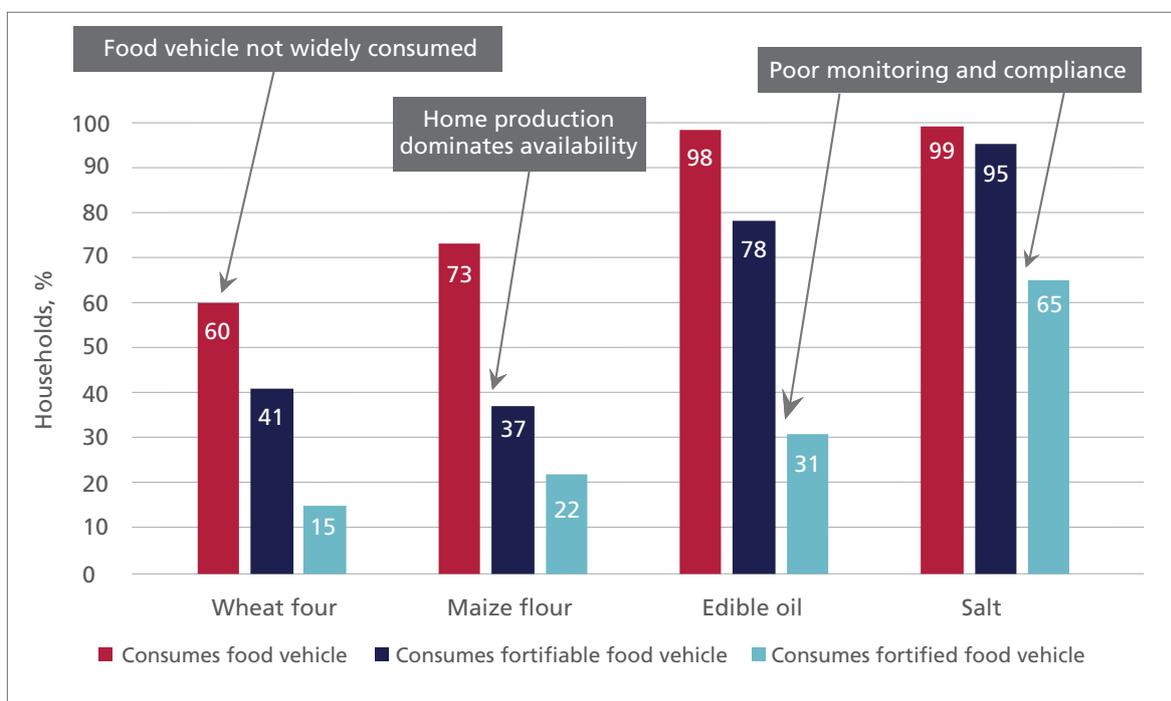
**Figure 4: Coverage of foods among households**

*Example 1: Simple clustered bar graph of household coverage of foods*



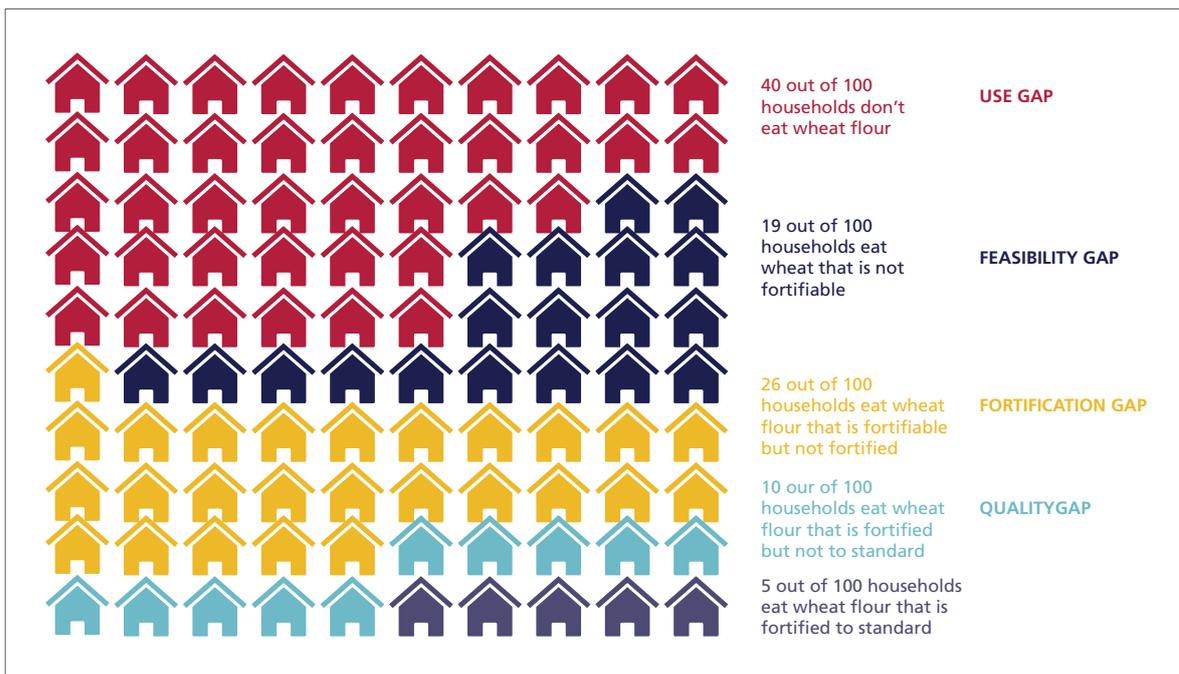
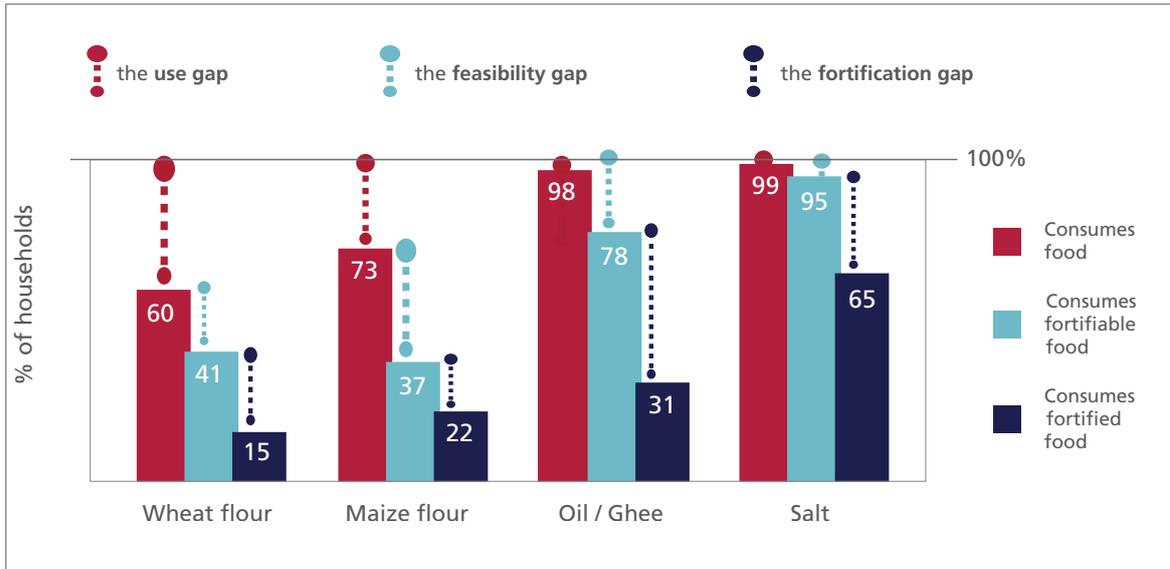
Include in footnote the definitions for each category (e.g., definition of fortifiable, minimum micronutrient content to be considered fortified) and any other relevant information as needed.

*Example 2: Simple clustered bar graph of household coverage of foods highlighting causes of program gaps*



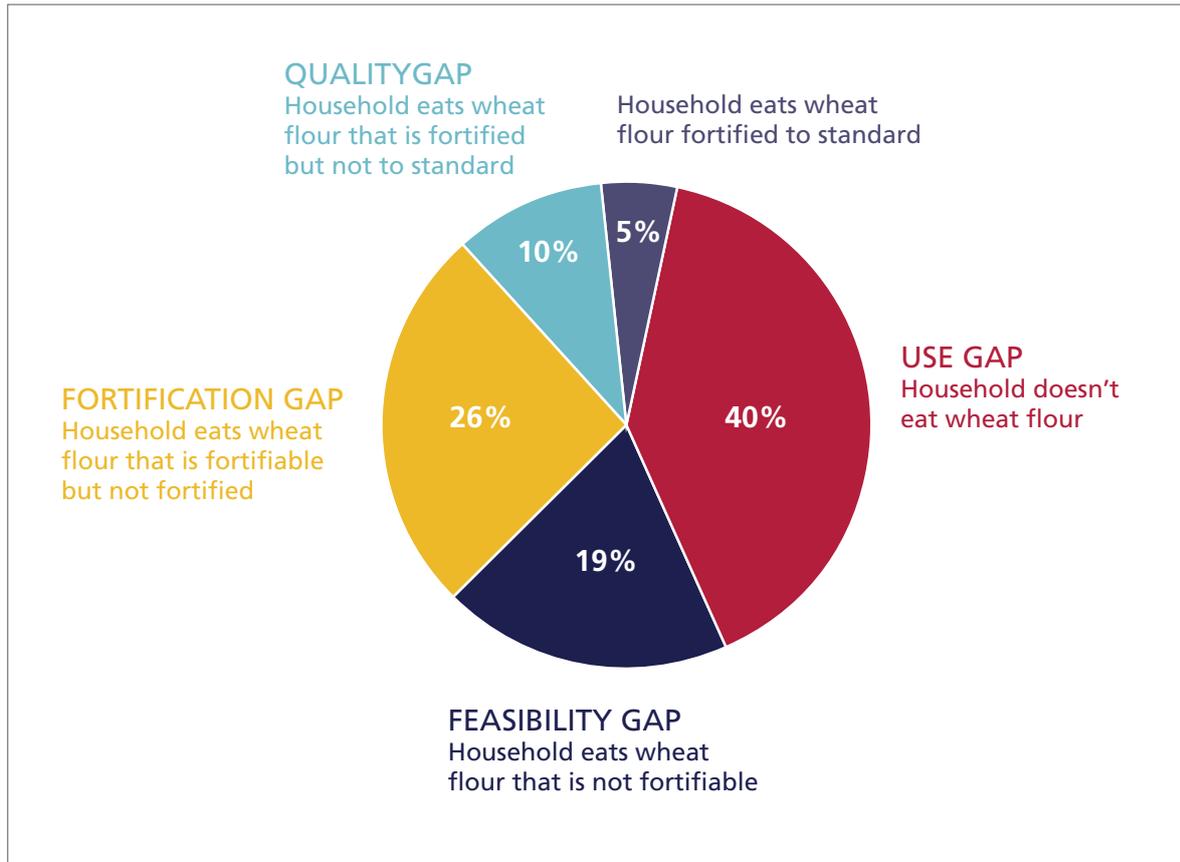
Include in footnote the definitions for each category (e.g., definition of fortifiable, minimum micronutrient content to be considered fortified) and any other relevant information as needed.

Example 3: Simple clustered bar graph of household coverage of foods highlighting size of program gaps



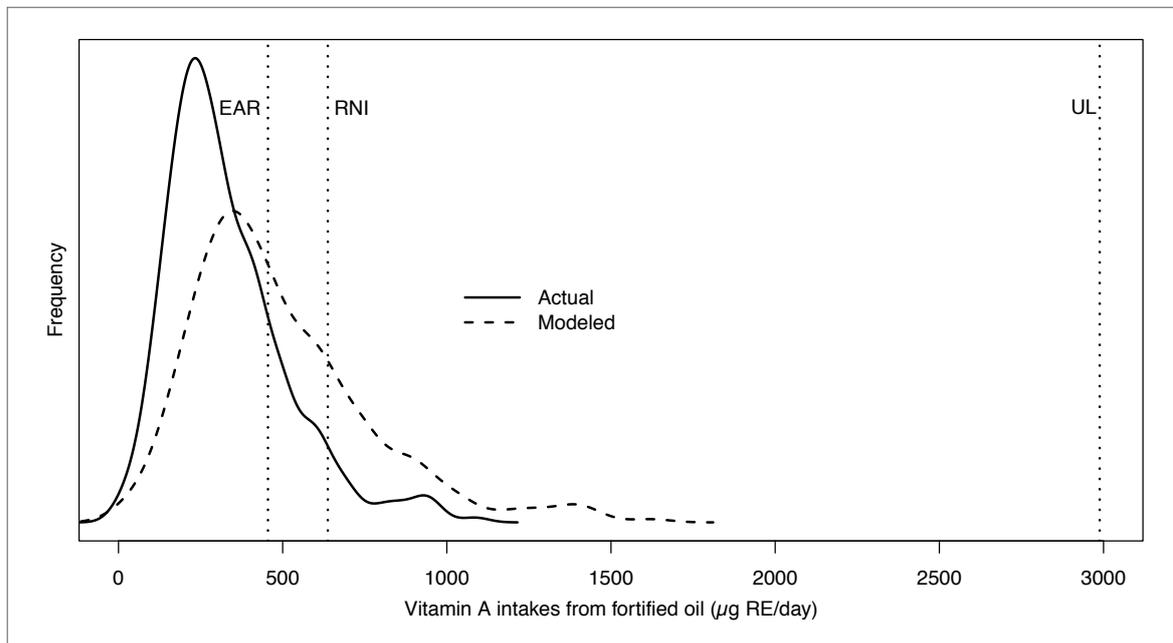
Example 4: Household infographic highlighting gaps in household coverage of wheat flour

Example 5: Pie chart infographic highlighting gaps in household coverage of wheat flour



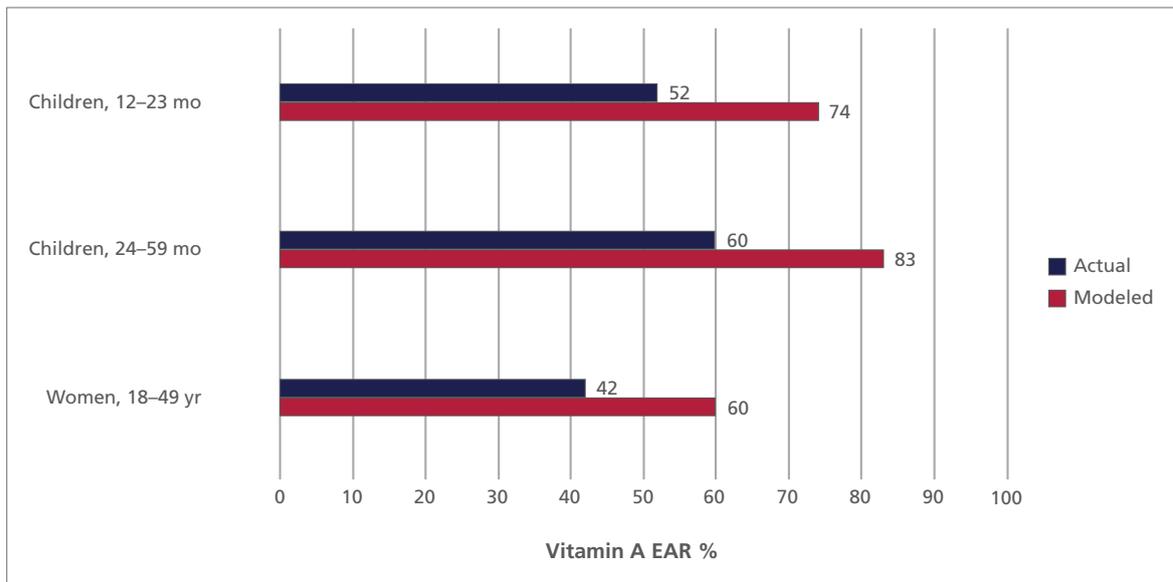
**Figure 5: Micronutrient contribution from fortified foods among target populations**

*Example 1: Curves presenting actual and modeled vitamin A intakes from consumption of fortified edible oil among women of reproductive age (distribution of amount of nutrient consumed)*



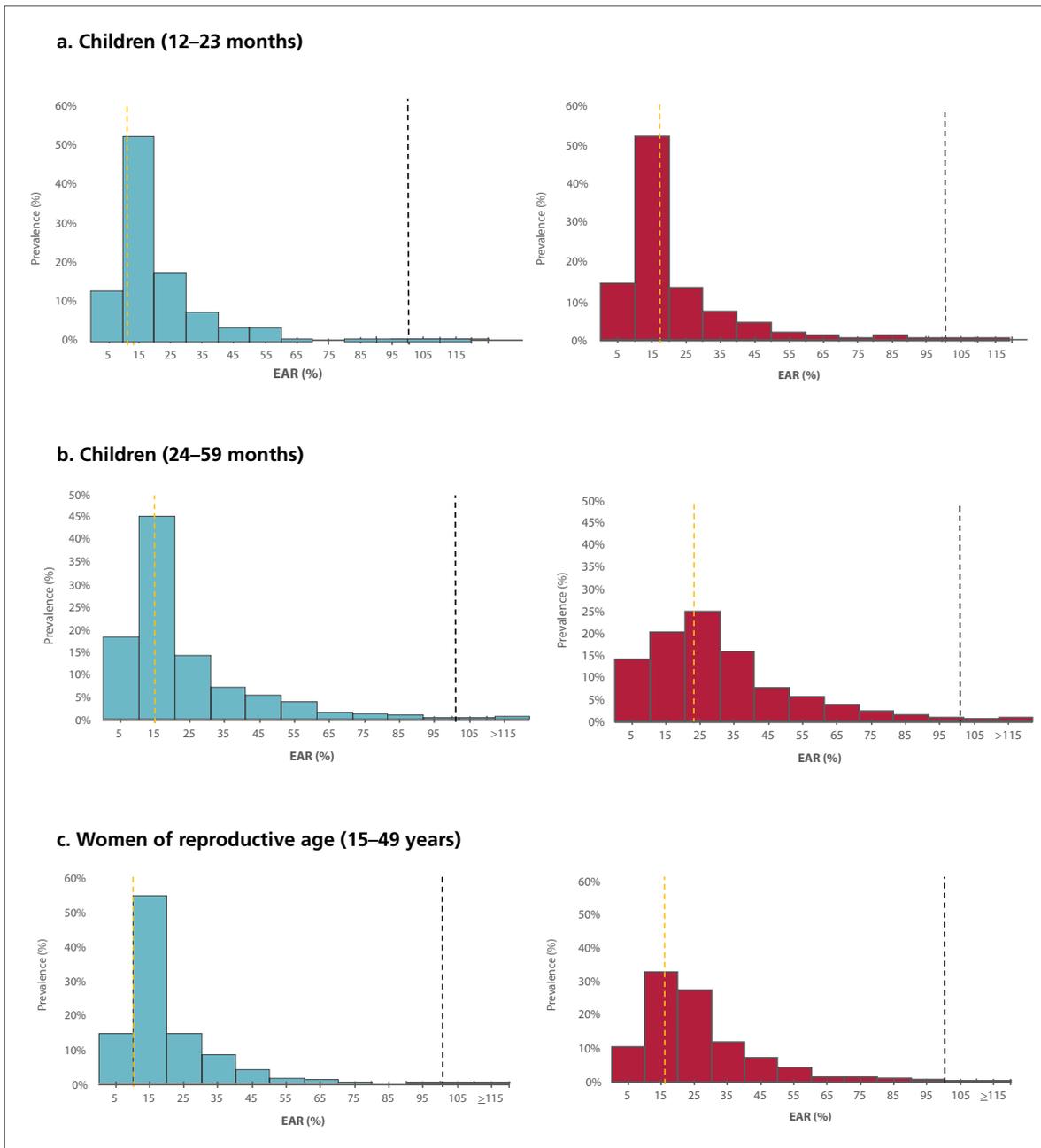
Include in footnote any relevant information as needed (e.g. EAR, estimated average requirement; RE, retinol equivalents; RNI, recommended nutrient intake; UL, upper limit).

*Example 2: Bar chart presenting actual and modeled vitamin A contribution from consumption of fortified edible oil as a percentage of estimated average requirements (EARs) (median percentages of EAR)*



Include in footnote any relevant information as needed.

**Example 3:** Bar chart presenting actual and modeled vitamin A contribution from consumption of fortified edible oil as a percentage of EAR (distribution of percentages of EAR)



Teal and red bars indicate actual and modeled estimates, respectively. Dotted black line is at 100%; dotted yellow line is at the median %.



# 6 Decision making



This chapter provides guidance on how FACT survey findings can be used in evidence-based decision making related to program improvement.

## 6.1 Using data for decision making

### Who are the decision makers along the fortification impact pathway, and what information do they need?

At the start of a FACT survey, it is necessary to develop a comprehensive list of all stakeholders involved in the fortification program, including their specific roles, relative importance, and influence in the program (as described in section 2.1). This critical tool will be used throughout the survey but is especially important during the decision-making stage as it helps to clarify who the decision makers are at different points along the fortification impact pathway (section 1.2, Figure 1), what decisions they need to make, and what information they need to make those decisions.

Policymakers, including government ministries, are generally the most important decision makers in a fortification program, particularly in the context of a mandatory program. During the design of a fortification program, they are responsible for making decisions related to the passing of fortification legislation and standards. Information on coverage and consumption patterns of potential food vehicles for fortification (as well as demonstrated need for the program) is critical at this stage to inform the selection of appropriate vehicles and fortification levels. During program implementation, policymakers are responsible for making decisions related to the enforcement of the fortification legislation and standards, which is generally mandated to regulatory and food control authorities in the country. Information on the availability, quality, and compliance of fortified foods at import, production, and retail levels is critical at this stage to understand program performance and track progress against its objectives. As the program progresses, information on coverage and consumption patterns of fortified foods is additionally required to understand the potential for impact and equity among targeted population groups.

### How do FACT survey findings provide information needed for decision making?

FACT surveys provide meaningful information for decision making related to program improvement by documenting successes and identifying potential program gaps and barriers based on evidence of program performance, potential for impact, and equity.

Results on fortification quality from a market assessment provide information on the proportion of food vehicle brands that are fortified according to standard. If quality is poor, these results in and of themselves do not provide enough information to trigger an immediate decision. Rather, they highlight a series of possible constraints to quality that require further investigation to determine the main drivers of the problem. For example, is industry not complying with fortification legislation and standards, and, if not, why not? Are the monitoring and enforcement mechanisms in place being implemented appropriately, or are additional actions required by regulatory authorities? From this information, a series of follow-up actions can be recommended.

Results on coverage of foods highlight where specific gaps in the program are, which in turn trigger a series of decisions depending on the type of gap and the population subgroups affected. For example, gaps in use and feasibility would trigger decisions about the appropriateness of fortification for a particular food vehicle. If the use gap is large, meaning only a small proportion of the population uses the food vehicle in general, then fortification of that food vehicle is not likely to be an effective intervention in that group. Similarly, if use of the vehicle is high but the feasibility gap is large, meaning a significant proportion of the population use the food vehicle but in a form that is not fortifiable, then fortification of that food vehicle is not likely to be an effective intervention in that group. Additionally, equity of coverage plays an important role in the decision making concerning appropriateness of food vehicles for fortification. If the

people in the population with the greatest potential to benefit do not consume the food in a fortifiable form, then fortification will not reach them. This information triggers the need for a different approach, such as a complementary intervention to fill the use and/or feasibility gaps.

Alternatively, the fortification and quality gaps will trigger very different responses related to the performance of the program for a particular food vehicle. If the fortification gap is large, meaning a significant proportion of the population uses the vehicle in a fortifiable form but it is not fortified, or the quality gap is large, meaning a significant proportion of the population consumes a food vehicle that is fortified but not to standard, then this information would trigger further investigation into the main drivers of the problem related to the fortification quality results, as described above.

Finally, micronutrient contribution results provide information on the additional micronutrient intake coming from intake of fortified foods. High quality and coverage of fortified foods as well as consumption of fortified foods in meaningful amounts are prerequisites for this indicator, as shown in the impact pathway for fortification. If results of those indicators are poor, the micronutrient contribution will similarly be poor, and what subsequent decisions are required will need to be determined by investigating the drivers of poor quality and coverage, as described above, and by better understanding consumption patterns.

### **How to facilitate the uptake of FACT survey data for decision making?**

Depending on the nature of the data generated by a FACT survey, the results may provide evidence-based recommendations that either trigger the immediate making of decisions or signal the presence of a gap for which investigation into additional data sources is required, as described in the examples above. Various stakeholders, including program managers, program/technical support agencies, donor agencies, and the research community, play a critical role in facilitating the uptake of data generated from a FACT survey by ensuring that the data meet the needs of different decision makers and are presented in such a way that they are actionable. The stakeholder mapping and dissemination and research uptake strategy previously discussed (in sections 2.1 and 5.2, respectively) are essential tools for ensuring success at this stage in the data value chain.

# Annex: FACT survey equipment and supplies list

Survey component	Equipment/supplies	Basis to determine amount required
General supplies	Tablets (if using CAPI)	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator and data manager
	Tablet chargers (if using CAPI)	Per tablet
	Backpacks	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Office supplies: notebooks, pens, clipboards, calculator	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Raincoat/umbrellas	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Power banks	Per data collection team and for each quality assurance officer and fieldwork coordinator
	Internet dongles	Per data collection team and for each quality assurance officer and fieldwork coordinator
	First aid boxes	Per data collection team and for each quality assurance officer and fieldwork coordinator
	Identification cards	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Copy of permission letters	Per data collection team and for each quality assurance officer and fieldwork coordinator
Household listing	Phone lists of team members and authorities for all surveys	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Chalks or markers for marking houses	A number of chalks/markers per cluster being listed
	Sketch map	Per cluster being listed
	Listing questionnaire (if administering survey on paper)	Per cluster
	Listing manual	Per listing data collection staff member
	List of clusters with information on reaching them, e.g., maps provided by the Statistics Department	Per cluster

<b>Household assessment</b>	Map of the clusters; name and contact number of influential person collected during listing; document with information on how to reach cluster	Per cluster
	Copy of team work plan	Per team supervisor
	Assignment sheets (including list of sampled households per cluster if sampling done by central data management unit)	Per team supervisor
	Household selection form if listing is done on paper and the household selection is performed in the field	Per team supervisor
	Copy of household questionnaire (if administering survey on paper)	Per household being interviewed
	Written consent forms (if required)	Two forms per household being interviewed (one for the completion of the roster and a second for interviewing the caregiver or another respondent)
	Photograph grid (for the individual consumption module)	Per data collector including supervisors and quality assurance officers
	Data collection manual	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Mid-upper-arm circumference measurement tapes	A number of tapes per data collector including supervisors and quality assurance officers
	Forms for referral of severely malnourished cases to nearby health facilities	A form per respondent being measured
	Back-check questionnaire, interviewer observation checklist (if administering quality assurance surveys on paper)	Per household that will be revisited by the quality assurance officers and per interviewer that will be observed by the quality assurance officers
<b>Market assessment</b>	Copy of market data collection forms (if administering survey on paper)	Each form differs depending on the number of food vehicles being assessed and the number of different types of retail outlets (the FACT Market Assessment Forms template indicates how to calculate how many forms will be needed)
	Data collection manual	Per data collector including supervisors and quality assurance officers and for each fieldwork coordinator
	Document with information on how to reach market hub and any other useful information such as possible people and authorities to contact	Per market hub
	Copy of team work plan	Per team supervisor
	Assignment sheets	Per team supervisor
	Weighing scales	Per team
	Plastic tubes	One per sample of liquid food vehicle (e.g., oil)
	Plastic resealable bags	One per sample of a liquid food vehicle and two per sample of a solid food vehicle (e.g., salt)
	Black plastic bags	Per sample collected for all food vehicles
	Twist ties	Per sample collected for all food vehicles
	Cardboard boxes	This will depend on the total number of samples expected and the size of the boxes (i.e., how many samples fit in a box)
	Adhesive labels	Two per sample collected for all food vehicles
	Sterile utensils	Per sample collected for all food vehicles
	Masking tape	A number of tapes per team
Waterproof markers	A number of markers per team	

- If food samples are collected as part of the household assessment, estimate to collect one of each food vehicle assessed in the survey per household surveyed.
- If food samples are collected as part of the market assessment, estimate 10 samples of each food vehicle brand. To estimate the expected number of brands for each food vehicle, check with business authorities in the country for a list of local and imported registered brands for each food vehicle, and add about 20% to account for brands that may not be registered. Then multiply that number by 10 as the protocol calls for collecting 10 samples per brand.

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