



Food and Agriculture Organization
of the United Nations

The Food Insecurity Experience Scale:

Measuring food insecurity through people's experiences

In September 2015, **the 193 Member States of the United Nations adopted** the 2030 Agenda for Sustainable Development to succeed the Millennium Development Goals. The UN Statistical Commission (UNSC) agreed in March 2016 on a global indicator framework comprising 230 indicators to monitor targets and measure progress towards achievement of the 17 new Sustainable Development Goals (SDGs).

The UNSC created the Inter Agency and Expert Group on SDG indicators (IAEG-SDG), **whose members are the chief statisticians (or their delegates) of 28 countries**, elected on a rotating basis and representing all UN regions. The group includes regional and **international agencies as observers** with no deliberating power but who play an important advisory role.

IAEG-SDG has **appointed FAO to serve as custodian of 21 indicators**. FAO's responsibilities include maintaining the methodology needed to properly compile these indicators, providing technical support to countries, receiving data/indicators from countries to maintain a global database, and producing regional and global aggregates to report to the UN Department of Economic and Social Affairs (UNDESA).

What is the FIES and what is its role in the SDG process?

With SDG 2, countries commit to *“End hunger, achieve food security and improved nutrition and promote sustainable agriculture”* by 2030. The first of eight targets set to mark progress towards this goal, Target 2.1 focuses on ensuring access to food for all: *“By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.”* All countries commit to the same standard: eradicate hunger and ensure food security for all people, leaving no one behind. Information on the demographic characteristics and geographic location of food insecure sub-populations is essential to the achievement of this goal.

A tool with the potential to provide this level of information by **asking people directly about their experience of food insecurity** has already been in use by several countries for national monitoring purposes – some for more than a decade. Building on these efforts, as well as on a regional initiative in Latin America and the Caribbean, a global version of the tool has been developed and validated for international use: the Food Insecurity Experience Scale (FIES).

After several years of methodological development and three years of data collection in over 140 countries, this new metric of food insecurity is a **reliable and valuable contribution to global food security monitoring**. The FIES is an important complement to the long-established indicator of hunger, the Prevalence of Undernourishment (SDG indicator 2.1.1), and other related food insecurity measures, with unique potential for guiding actions aimed at achieving food security targets outlined in the 2030 Sustainable Development Agenda. The FIES is well-aligned with SDG Target 2.1 because it produces indicators that are measures of people's **access to food**. After broad consultation, the UN Statistical Commission, mandated by the UN General Assembly to select the indicators to monitor the 2030 Agenda, elected the "Prevalence of moderate or severe food insecurity in the population, based on the FIES" to be SDG indicator 2.1.2.

How does the FIES work?

The FIES is a metric of **severity of food insecurity** at the household or individual level that relies on people's direct yes/no responses to eight brief questions regarding their access to adequate food. It is a **statistical measurement scale** similar to other widely-accepted statistical scales designed to measure unobservable traits such as aptitude/intelligence, personality, and a broad range of social, psychological and health-related conditions.

A common misconception is that the FIES is a "subjective" measure. However, the eight questions, when analyzed together, form a **quantitative tool** to measure the prevalence of food insecurity (at moderate and severe levels) in a given population, using statistical methods that enable estimation of error (confidence intervals around the measures produced).

The concepts underlying experience-based food security measurement have a long history grounded in ethnographic studies to understand the experience of hunger. Research in the USA revealed that the experience of food insecurity is characterized by **uncertainty and anxiety** regarding food access and changes in the **quality** of the diet, such as a less balanced, more monotonous diet. With increasing severity, the **quantity** of food consumed decreases as portion sizes are reduced, meals are skipped and at its most severe, people are forced to go without eating. Years after the original research was published, a review of more than twenty studies in countries around the world concluded that these dimensions of the experience of food insecurity appear to be **common across cultures**.

	Standard label	Question wording
1	WORRIED	During the last 12 MONTHS, was there a time when You were worried you would not have enough food to eat because of a lack of money or other resources?
2	HEALTHY	Still thinking about the last 12 MONTHS, was there a time when you were unable to eat healthy and nutritious food because of a lack of money or other resources?
3	FEWFOODS	Was there a time when you ate only a few kinds of foods because of a lack of money or other resources?
4	SKIPPED	Was there a time when you had to skip a meal because there was not enough money or other resources to get food?
5	ATELESS	Still thinking about the last 12 MONTHS, was there a time when you ate less than you thought you should because of a lack of money or other resources?
6	RANOUT	Was there a time when your household ran out of food because of a lack of money or other resources?
7	HUNGRY	Was there a time when you were hungry but did not eat because there was not enough money or other resources for food?
8	WHOLEDAY	During the last 12 MONTHS, was there a time when you went without eating for a whole day because of a lack of money or other resources?

Table 1. English version of the Food Insecurity Experience Scale Survey Module.

Each FIES question refers to a different experience and is associated with a different level of severity of food insecurity. One of the unique contributions of the FIES and similar experienced-based food insecurity measures is that, in addition to considering compromised diet quality and reduced food quantity, they also capture **psychosocial elements** associated with anxiety or uncertainty regarding the ability to procure enough food, a facet that other measures do not.

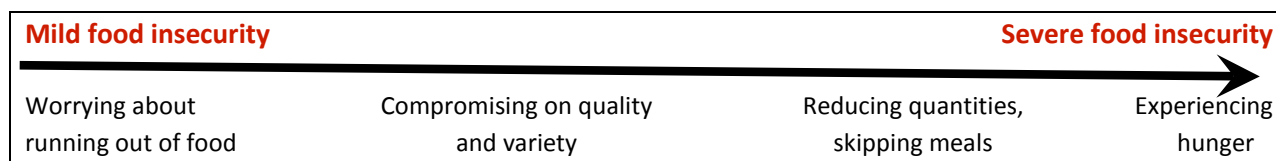


Figure 1: Food insecurity severity along a continuous scale of severity

Since 2014, the 8-item FIES survey module has been applied in nationally representative samples of the adult population (defined as aged 15 or older) in over 140 countries included in the Gallup World Poll[®] (GWP), an annual survey covering 90% of the world population. In most countries, samples include about 1000 individuals, with larger samples of 3000 individuals in India and 5000 in mainland China.

For the United States, Canada, Brazil, Ecuador, Mexico, Guatemala and The Seychelles, national government survey data were used to estimate the prevalence of food insecurity in a way that makes them fully comparable with the ones obtained for the other countries using GWP data. This is possible with statistical methods developed by FAO that adjust national results to a global reference standard.

Kenya, Indonesia, The Seychelles, Marshal Islands, Kiribati, Swaziland, Dominican Republic, St. Lucia, Jordan and North Sudan all fielded the FIES in 2017.

What is the innovation of the FIES methodology?

The key innovation of the FIES methodology is that it produces food insecurity prevalence estimates

- whose **validity and reliability can be formally assessed**
- and **that can be compared across countries**

The strength and rigor of the analytic approach, coupled with the long-tested robustness of the specific questions of the FIES, make it capable of producing reliable food insecurity prevalence estimates, **even in countries with very low or very high rates of food insecurity.**

How do countries analyze FIES data?

Item Response Theory and the Rasch model

The approach used to analyze FIES data comes from **Item Response Theory (IRT)**, a branch of statistics that permits the measurement of **unobservable traits** through analysis of responses to surveys and tests. As food security itself is an inherently unobservable characteristic, such as attitude or intelligence, it can be measured only by examining its observable manifestations. The specific IRT model applied to FIES data is the **Rasch model**, which is widely used in health, education and psychology.¹

The Rasch model provides a theoretical base and a set of statistical tools to 1) assess the suitability of a set of survey questions (“items”) for constructing a measurement scale and to 2) compare a scale’s performance across different populations and survey contexts.

The analysis of FIES data involves the following steps:

- **Parameter estimation:** calculation of the severity of food insecurity associated with each survey item and each respondent.
- **Statistical validation:** The assessment of whether, depending on the *quality of the data collected*, the measure is valid, i.e. is reliable enough for the intended policy and research uses.
- **Calculation of measures of food insecurity:**
 - **Individual probabilities:** For each sampled individual or household (each case in the data), the *probability* of the individual/household experiencing food insecurity above a given level of severity is calculated, based on their responses to the FIES items.
 - **Population prevalence estimates:** The probabilities are used to estimate the *prevalence of food insecurity* at moderate and severe levels in the population.

Statistical validation assesses the quality of the FIES data collected by testing their consistency with the assumptions of the Rasch model. This analysis involves the interpretation of several statistics that reveal 1) items that do not perform well in a given context, 2) cases with highly erratic response patterns, 3) pairs of items that may be redundant, and 4) the proportion of total variance in the population that is accounted for by the measurement model.

¹ For more detail, consult: Nord, M. 2014. Introduction to Item Response Theory applied to Food Security Measurement: Basic Concepts, Parameters, and Statistics. Technical Paper, FAO, Rome. (available at <http://www.fao.org/economic/ess/ess-fs/voices/en>)

Characteristics of the scale and parameter estimation

A concept essential to experience-based food insecurity scales is that the **items** and the **respondents** (individuals or households) are positioned on the **same underlying scale** of severity of food insecurity.

The probability of a respondent answering “yes” to an FIES item depends on the **distance along the scale between the severity of the respondent and the severity of the item**. The more severe a respondent’s food insecurity is, relative to that of the item, the higher the probability they will respond affirmatively.

The relative position of items and respondents on the scale of severity is expressed by their respective **parameters**. Both **item and respondent parameters** are estimated based on patterns of responses given to the eight FIES questions.

A respondent’s **raw score** (an integer number with a value between zero and eight) is the *sum of affirmative responses given to the eight FIES questions*. For data that pass the validation tests, the raw score in itself is already an *ordinal measure* of severity, with lower raw scores corresponding to less severe food insecurity. The raw score is the basis for estimating the respondent parameter, which provides an *interval measure* of the severity of food insecurity and makes it possible to produce measures of food insecurity that are comparable across countries and contexts.

The order of the FIES items in terms of the severity they reflect is not constant, but is instead revealed through an analysis **of the specific data collected**. The relative severity of a given experience of food insecurity depends on the frequency with which people respond affirmatively to that item, with more severe experiences being reported less often. This is akin to a relatively difficult test question eliciting a smaller proportion of correct answers than easier ones do.

Across different countries and subpopulations, the same item may be associated with a different level of severity due to nuances in translation or to actual differences in the way that food insecurity is experienced and managed in diverse cultures and livelihood systems. The implication of the specificity of the scale is that parameters **cannot automatically be compared across applications of the FIES**. However, this does not prohibit them from being formally compared.

Comparability can be achieved by **calibrating the scales on a common metric**, in a process called **equating**. This is done by adjusting all measures obtained at the country level to the **global standard**, which is a *set of item parameter values* based on results from over 140 countries covered by the Gallup World Poll in 2014, 2015, and 2016.

How are food insecurity prevalence rates calculated and reported?

To calculate **internationally comparable estimates of the prevalence of food insecurity**, respondents must first be assigned to **classes** of food (in)security defined by **standard thresholds** set along the scale of severity. Two global standard thresholds are set at the severity of two specific FIES items: ATELESS and WHLDAY, defining the **moderate and severe food insecurity classes**, respectively.

The equating procedure ensures that these thresholds are mapped to the national scales, and respondents are then assigned **probabilistically** to common food insecurity classes, given their raw scores. The prevalence of food insecurity in the population is then given by **the weighted sum of the raw score-specific probabilities**. The weighted proportions of cases with each raw score in the population are used as weights.

FIES-based indicators

Two FIES-based indicators can be used for **national and global monitoring** purposes. Note that the first indicator is an estimate of the *sum* of the moderately food insecure and the severely food insecure segments of the population.

- **FI_{mod+sev}** The proportion of the population experiencing **moderate or severe food insecurity** (SDG indicator 2.1.2)
- **FI_{sev}** The proportion of the population experiencing **severe food insecurity**

People experiencing moderate levels of food insecurity will typically eat low quality diets and might have been forced, at times during the year, to also reduce the quantity of food they would normally eat, while those experiencing severe levels would have gone for entire days without eating, due to lack of money or other resources to obtain food. We expect the prevalence of severe food insecurity to be highly correlated, across countries, with the Prevalence of Undernourishment.