Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Target 2.1: 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

Indicator 2.1.2: Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

Institutional information

Organization(s):

Food and Agriculture Organisation of the United Nations (FAO)

Concepts and definitions

Definition:

The indicator measures the percentage of individuals in the population who have experienced food insecurity at moderate or severe levels during the reference period. The severity of food insecurity, defined as a latent trait, is measured on the Food Insecurity Experience Scale global reference scale, a measurement standard established by FAO through the application of the Food Insecurity Experience Scale in more than 140 countries worldwide, starting in 2014.

Rationale:

Food insecurity at moderate levels of severity is typically associated with the inability to regularly eat healthy, balanced diets. As such, high prevalence of food insecurity at moderate levels can be considered a predictor of various forms of diet-related health conditions in the population, associated with micronutrient deficiency and unbalanced diets. Severe levels of food insecurity, on the other hand, imply a high probability of reduced food intake and therefore can lead to more severe forms of undernutrition, including hunger.

Short questionnaires like the FIES are very easy to administer at limited cost, which is one of the main advantages of their use. The ability to precisely determine the food insecurity status of specific individuals or households, however, is limited by the small number of questions, a reason why assignment of individual respondents to food insecurity classes is best done in probability terms, thus ensuring that estimates of prevalence rates in a population are sufficiently reliable even when based on relatively small sample sizes.

As with any statistical assessment, reliability and precision crucially depend on the quality of the survey design and implementation. One major advantage of the analytic treatment of the data through the Rasch model based methods is that it permits testing the quality of the data collected and evaluating the likely margin of uncertainty around estimated prevalence rates, which should always be reported.

Comments and limitations:

An average of less than three minutes of survey time is estimated to collect FIES data in a well-conducted face-to-face survey, which should make it possible to include the FIES-SM in a nationally representative survey in every country in the world, at a very reasonable cost. FAO provides versions of the FIES-SM adapted and translated in each of the more than 200 languages and dialects used in the Gallup World Poll.

When used in the Gallup World Poll, with sample sizes of only about 1000 individuals, the width of confidence intervals rarely exceeds 20% of the measured prevalence (that is, prevalence rates of around 50% are estimated with margins of errors of plus or minus 5%). Obviously, confidence intervals are likely to be much smaller when national prevalence rates are estimated using larger samples.

Compared to other proposed non-official indicators of household food insecurity, the FIES based approach has the advantage that food insecurity prevalence rates are directly comparable across population groups and countries. Even if they use similar labels (such as “mild”, “moderate” and “severe” food insecurity) other approaches have yet to demonstrate the formal comparability of the thresholds used for classification, due to lack of the definition of a proper statistical model that links the values of the “indexes” or “scores” used for classification, to the severity of food insecurity. For this reason, care should be taken when comparing the results obtained with the FIES with those obtained with these other indicators, even if, unfortunately, similar labels are used to describe them.

Methodology

Computation method:

Data at the individual or household level is collected by applying an experience-based food security scale questionnaire within a survey. The food security survey module collects answers to questions asking respondents to report the occurrence of several typical experiences and conditions associated with food insecurity. The data is analysed using the Rasch model (also known as one-parameter logistic model, 1-PL), which postulates that the probability of observing an affirmative answer by respondent i to question j, is a logistic function of the distance, on an underlying scale of severity, between the position of the respondent, a_i and that of the item, b_j.

$$\text{Prob}\{X_{i,j} = \text{Yes}\} = \frac{\exp(a_i - b_j)}{1 + \exp(a_j - b_j)}$$

Parameters a_i and b_j can be estimated using maximum likelihood procedures. Parameters a_i, in particular, are interpreted as a measure of the severity of the food security condition for each respondent and are used to classify them into classes of food insecurity.

The FIES considers the three classes of (a) food security or mild food insecurity; b) moderate or severe food insecurity, and (c) severe food insecurity, and estimates the probability of being moderately or severely food insecure ($p_{mod+sev}$) and the probability of being severely food insecure (p_{sev}) for each respondent, with $0 < P_{sev} < P_{mod+sev} < 1$. The probability of being food secure or mildly food insecure can be obtained as $P_{fs} = 1\text{-}p_{mod+sev}$.

Given a representative sample, the prevalence of food insecurity at moderate or severe levels ($FI_{mod+sev}$), and at severe levels (FI_{sev}) in the population are computed as the weighted sum of the probability of belonging to the moderate or severe food insecurity class, and to the severe food insecurity class, respectively, of all individual or household respondents in a sample:

$$(1) \quad \text{FI}_{\text{mod+sev}} = \sum_i p_{i\,\text{mod+sev}} \times w_i$$

and

$$(2) \quad \text{FI}_{\text{sev}} = \sum_i p_{i\,\text{sev}} \times w_i$$

where w_i are post-stratification weights that indicate the proportion of individual or households in the national population represented by each element in the sample.

It is important to note that if w_i are individual sampling weights, then the prevalence of food insecurity refers to the total population of individuals, while if they are household weights, the prevalence refers to the population of households. For the calculation of the indicator 2.1.2, objective is to produce a prevalence of individuals. This implies that: if a survey is at household level, and provides household sampling weights, they should be transformed to individual sampling weights by multiplying the weights by the household size. This individual weighting system can then be used to calculate the individual prevalence rates in formulas (1) and (2)

If the survey includes only adults, then the adult weights applied to the probabilities in formulas (1) and (2) provide the adult prevalence rates (FI^{Adults}). In this case, to calculate the prevalence in the total population, then the proportion of children who live in households where at least one adult is food insecure must also be calculated. This can be done by dividing the adult weights by the number of adults in the household and multiplying those approximate household weights by the number of children in the household. Once the approximate child weights are obtained, the prevalence of food insecurity of children who live in households where at least one adult is food insecure ($FI^{Children}$) can be calculated by applying these weights to the probabilities of food insecurity in formulas (1) and (2). The prevalence of food insecurity in the total population is finally calculated as:

$$FI_{mod+sev} = \frac{FI_{mod+sev}^{Adults} * N^{Adults} + FI_{mod+sev}^{Children} * N^{Children}}{N^{Adults} + N^{Children}}$$

and

$$FI_{sev} = \frac{FI_{sev}^{Adults} * N^{Adults} + FI_{sev}^{Children} * N^{Children}}{N^{Adults} + N^{Children}}$$

Where N^{Adults} and $N^{Children}$ are the adult and children populations in the country.

When applied to the country total population, the prevalence of food insecurity in the total population provides the number of individuals who live in food insecure households (or in households where at least one adult is food insecure) in a country, at different levels of severity ($N_{mod+sev}$ and N_{sev}).

In the database, the number of food insecure people are expressed in thousands.

Treatment of missing values:

- ***At country level:***

The indicator is not computed if no country data are available.

- ***At regional and global levels:***

Missing values for individual countries are implicitly imputed to be equal to the population weighted average of the estimated values of the countries present in the same region.

Regional aggregates:

Regional and global aggregates of $FI_{mod+sev}$ and FI_{sev} are computed as:

$$FI_a = \frac{\sum_c FI_{a,c} \times N_c}{\sum_c N_c}$$

Where a = {mod+sev, sev} and $FI_{a,c}$ is the values of FI_a estimated for country c in the region and N_c is the corresponding population size.

Sources of discrepancies:

In the few cases where indicators of food insecurity based on experience-based food security scales have been reported by countries (U.S., Canada, Mexico, Guatemala and Brazil), these have been based on nationally set thresholds that do not correspond to the international thresholds proposed by the FIES. See Annex I and Table A3 in http://www.fao.org/3/i4830e.pdf for a description of the differences. In the future, it is desirable that country would start reporting prevalence estimates using also the internationally set thresholds for moderate or severe and severe levels, in addition to those based on national thresholds.

FAO is ready to provide assistance on the analytic methods needed to estimate prevalence based on the FIES global reference thresholds.

Methods and guidance available to countries for the compilation of the data at the national level:

Experience-based food security scales data are collected through population surveys (either household or individual surveys) using questionnaires/modules that are adapted to the country language and condition.

Examples are provided below:

U.S.A.: Household Food Security Survey Module (https://www.ers.usda.gov/media/8271/hh2012.pdf)

Brazil: Escala Brasileira de Insegurança Alimentar (http://biblioteca.ibge.gov.br/visualizacao/livros/liv91984.pdf , Quadro 5, page 30)

Mexico: Escala Mexicana de Seguridad Alimentaria (http://www.beta.inegi.org.mx/contenidos/proyectos/enchogares/regulares/enigh/tradicional/2012/doc/c_tra_enigh12_hogares.pdf, pages 13-14)

Guatemala: Escala Latino Americana y Caribena de Seguridad Alimentaria (http://www.ine.gob.gt/sistema/uploads/2015/12/11/DDrIEuLOPuEcXTcLXab1yOkiOV2HQreq.pdf , pagina 3)

FAO – Food Insecurity Experience Scale (http://www.fao.org/3/a-bl404e.pdf)

Inclusion of the FIES survey module in a questionnaire is a simple matter of adapting the questions to the local language by following guidelines provided in the following documents.

http://www.fao.org/3/a-be898e.pdf

http://www.fao.org/3/a-be898f.pdf

http://www.fao.org/3/a-be898s.pdf

http://www.fao.org/3/a-be898r.pdf

http://www.fao.org/3/a-be898a.pdf

http://www.fao.org/3/a-be898c.pdf

Quality assurance:

FIES data are validated through testing of adherence to the Rasch model assumption of equal discrimination of the items and absence of residual correlation and measurement of Rasch reliability indexes. Such test would reveal whether the data is of sufficient quality to produce reliable estimates of the prevalence of food insecurity according to the FIES standard.

Then, item severity parameters are compared with the FIES global reference standard to verify the possibility of calibrating the measures against such standard and thus produce estimates of the prevalence of food insecurity that can be considered comparable across countries.

Relevant material is available here http://www.fao.org/3/a-i4830e.pdf, http://www.fao.org/3/b-i4830s.pdf, http://www.fao.org/3/c-i4830f.pdf and here http://www.fao.org/3/a-i3946e.pdf.

National data used to compile the indicator is obtained directly from the microdata dissemination websites of countries, when available (e.g. USA, Mexico), or by direct request to the national statistical offices responsible for data collection (e.g. Brazil, Canada, Guatemala).

For data collected by FAO through the Gallup World Poll, the results of the analysis of the 2014, 2015 and 2016 round of data collection have been shared with all national statistical offices in the world in May 2017 through an email communication sent by the FAO Chief Statistician, requesting feedback. By October 2017, positive feedback was received by 57 countries.

Data sources

Description of sources and collection process:

Data can be collected using the Food Insecurity Experience Scale survey module (FIES-SM) developed by FAO, or any other experience-based food security scale questionnaires, including:

- the Household Food Security Survey Module (HFSSM) developed by the Economic Research Service of the US Department of Agriculture, and used in the US and Canada,
- the Latin American and Caribbean Food Security Scale (or Escala Latinoamericana y Caribeña de Seguridad Alimentaria – ELCSA), used in Guatemala and tested in several other Spanish speaking countries in Latin America,
- the Mexican Food Security Scale (or Escala Mexicana de Seguridad Alimentaria, - EMSA), an adaptation of the ELCSA used in Mexico,
- the Brazilian Food Insecurity Scale (Escala Brasileira de medida de la Insegurança Alimentar – EBIA) used in Brazil, or
- the Household Food Insecurity Access Scale (HFIAS),
- or any adaptation of the above that can be calibrated against the global FIES.

Two versions of the FIES-SM are available for use in surveys of individuals or households respectively, and the difference stands in whether respondents are asked to report only on their individual experiences, or also on that of other member of the household.

The current FIES-SM module include eight questions as in the table below.

GLOBAL FOOD INSECURITY EXPERIENCE SCALE	
Now I would like to ask you some questions about food.	
Q1. During the last 12 MONTHS, was there a time when you (or any other adult in the household) were worried you would not have enough food to eat because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q2. Still thinking about the last 12 MONTHS, was there a time when you (or any other adult in the household) were unable to eat healthy and nutritious food because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q3. And was there a time when you (or any other adult in the household) ate only a few kinds of foods because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q4. Was there a time when you (or any other adult in the household) had to skip a meal because there was not enough money or other resources to get food?	0 No 1 Yes 98 Don't Know 99 Refused
Q5. Still thinking about the last 12 MONTHS, was there a time when you (or any other adult in the household) ate less than you thought you should because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused

Q6. And was there a time when your household ran out of food because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q7. Was there a time when you (or any other adult in the household) were hungry but did not eat because there was not enough money or other resources for food?	0 No 1 Yes 98 Don't Know 99 Refused
Q8. Finally, was there a time when you (or any other adult in the household) went without eating for a whole day because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused

The questions should be adapted and administered in the respondents' preferred language and enumerators instructed to make sure that respondents recognize the reference period and the qualifier according to which experiences should be reported only when due to "lack of money or other resources" and not, for example, for reasons related to health or other cultural habits (such as fasting for religious credos).

The FIES-SM can be included in virtually any telephone-based or personal interview based survey of the population, though face to face interview is preferred.

Since 2014, the individual referenced FIES-SM is applied to nationally representative samples of the population aged 15 or more in all countries covered by the Gallup World Poll (more than 140 countries every year, 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).

Other national surveys exist that already collect FIES compatible data.

In Burkina Faso, the FIES was included in the 2014 round of ENQUETE MULTISECTORIELLE CONTINUE (EMC-BF).

In Cabo Verde, the FIES was included in the 2018 round of INQUÉRITO NACIONAL DE VULNERABILIDADE ALIMENTAR E NUTRICIONAL DAS FAMÍLIAS.

In Canada, Canadian Health Food Security Scale was included by Statistics Canada in the 2015 round of Canadian Community Health Survey (CCHS).

In Chile, FIES was included in the 2017 round of Encuesta de Caracterización Socioeconómica Nacional (Casen).

In Ecuador, FIES was included in the 2016 round of the GESTIÓN DE ESTADÍSTICAS PERMANENTES A HOGARES (GEPH-ENEMDU).

In Ghana, the FIES was included in the 2016-17 round of Living Standards Survey.

In Indonesia, FIES is regularly collected every year since 2017 through National Socio-Economic Survey (SUSENAS).

In Israel, HFSSM was collected in the 2016 round of the Food Security Survey.

In Kenya, the FIES was included in the 2015-16 round of Integrated Household Budget.

In Malawi, the FIES was included in the 2016-17 round of FOURTH INTEGRATED HOUSEHOLD SURVEY.

In Nigeria, the FIES was included in the 2015 round of GENERAL HOUSEHOLD SURVEY-PANEL.

In Palestine, FIES was included in the 2018 round of the Socio-economic Monitoring of the Palestinian Households' Survey.

In the Republic of Korea, the Korean translation of the HFSSM was included in the 2014 and 2015 rounds of the Korea National Health and Nutrition Examination Survey (KNHANES).

In the Russian Federation, FIES was collected in the 2018 round of Nutrition sample survey.

In Saint Lucia, FIES data were collected in the Survey of Living Conditions and Household Budgets 2016.

In Seychelles, FIES data were collected in the Quarterly Labour Force Survey.

In the United States, the HFSSM is included every year in the Current Population Survey Food Security Supplement (CPS-FSS) by the US Bureau of Census since 1995. (The CPS-FSS reached about 83,000 individuals aged 15 or more in about 42,000 households in 2014.)

Obtaining internationally comparable data for global monitoring:

To ensure comparability of the FImod+sev and FIsev indicators computed for different populations, universal thresholds are defined on the FIES global reference scale and converted into corresponding values on the "local" scales obtained as a result of application of the Rasch model on any specific population, through a process of "equating".

Equating is a form of standardization of the metric based on identification of the subset of items that can be considered common to the global FIES and the specific scale used for measurement in each context. The severity levels associated with the common items are used as anchoring points to adjust the global FIES thresholds to the local scales. The standardization process ensures that the mean and standard deviation of the set of common items is the same when measured on the global FIES or on the national scale. Compatibility with the global FIES and the possibility to compile this indicator requires that at least four of the eight FIES items are identified as common.

The Statistics Division at FAO has developed the RM.weights package under R, which provides routines for estimating the parameters of the Rasch model using conditional maximum likelihood, with the possibility to allow for the complex survey design.

Data availability

Description:

Data for 2014, 2015,2016, 2017 and 2018 are available from FAO for 137 countries, areas and territories included in the Gallup World Poll. Regional and sub regional aggregates are computed for all regions, with the exceptions of the Caribbean and the Oceania regions (as most small island states in the Caribbean and in the South Pacific are not covered by the GWP) and Middle Africa (as less than 50% of the regional population was covered). Data have been subject to a country consultation process and only results validated by national statistical offices are published at country level.

FIES compatible data from official national surveys are already available from theBurkina Faso, Cabo Verde, Canada, Chile, Ecuador, Ghana, Indonesia, Israel, Kenya, Malawi, Nigeria, Palestine, Republic of Korea (2014 and 2015), Russian Federation (2016-18), Saint Lucia, Seychelles, United States of America.

Breakdown of the number of countries covered by region is as follows:

World	137
Africa	39
Northern Africa	5
Sub-Saharan Africa	34

Eastern Africa	11
Middle Africa	4
Southern Africa	5
Western Africa	14
Americas	22
Latin America and the Caribbean	20
Caribbean	3
Latin America	17
Northern America	2
Asia	36
Central Asia	4
Eastern Asia	4
Southern Asia	8
South-Eastern Asia	7
Western Asia	13
Europe	39
Eastern Europe	10
Northern Europe	10

Southern Europe	12
Western Europe	7
Oceania	2
Australia and New Zealand	2
Melanesia	0
Micronesia	0
Polynesia	0

Time series:

Only the 3-year average (2014-2016, 2015-17 and 2016-18) is provided.

Disaggregation:

As the FIES or any other compatible experience-based food security questionnaire is applied through surveys, the prevalence of food insecurity can be measured in any population group for which the survey used to collect data is representative.

If applied at household level, disaggregation is thus possible based on household characteristics such as location, household income, composition (including for example presence and number of small children, members with disabilities, elderly members, etc.), sex, age and education of the household head, etc. If applied at the individual level, proper disaggregation of the prevalence of food insecurity by sex is possible as the prevalence of food insecurity among male and among female members of the same population group can be measured independently.

When producing disaggregated statistics, attention must be devoted to verifying the validity of the application by estimating the Rasch model with the data from each specific subpopulation group and, if necessary, perform the appropriate equating of the measure before comparing results.

It is good practice to associate a measure of variability (margins of error or upper and lower bound) when disaggregated data are produced.

Calendar

Data collection:

Continuing

Data release:

March 2020

Data providers

National data providers will be the National Statistical Authorities that are responsible for the survey in which the FIES or similar scale is included. FAO will provide data for countries where the FIES or compatible module is not included in any national survey.

Data compilers

Organization(s) responsible for compilation and reporting on this indicator at the global level: Food and Agriculture Organization of the United Nations, Statistics Division, Food Security and Nutrition Statistics Team.

References

URL:

http://www.fao.org/in-action/Voices-of-the-Hungry/

http://www.fao.org/3/i4830e.pdf

Related indicators as of February 2020

NA