Indicator 2.1.1

Contents

Indicator Name, Target and Goal

Indicator 2.1.1: Prevalence of undernourishment

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

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

Definition and Rationale

Definition:

The prevalence of undernourishment (PoU) is the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life. It is expressed as a percentage.

Concepts:

Undernourishment is defined as chronic hunger, a condition where a person has inadequate access to food amounts necessary to provide the energy required for conducting a normal, health and active life, given their idividual dietary energy requirements over a period of at least one year. The concept encompasses three aspects: availability of food, inequality in access to that food, and minimum dietary energy requirements compatible with long term good health.

The food available for human consumption is the sum of domestically produced and imported food products, minus food exports, foodwithdrawn from stocks for purposes other than human consumption (feed, seed, inducatiral use) and food losses. This is then converted into dietary energy terms expressed in kilo-calories and divided by the total population and the number of days in the year to come up with the average daily per capita dietary energy available for human consumption. This dietary energy value is used as a proxy for the habitual dietary energy consumption per capita per day. To smooth annual fluctuations, a three-year average is calculated.

The level of inequality in access to food is measured by two coefficients : (1) the variation of dietary energy consumption due to income differences derived from food consumption and income data collected in household surveys; (2) the variation of dietary energy consumption due to biological factors determining individuals' dietary energy requirements (this coefficient is derived from anthropometric survey data on attained height by sex and age, standards on energy requirements and data on the country sex-age population structure). Inequality in access to food due to differences in socio-economic characteristics may be caused by changes in economic, socio-political and environmental factors such as physical availability of food and prices. Inequality in access to food due to factors determining individuals' dietary energy requirements reflects differences in sex, age, physiological status, body weight and physical activity level.

Within a probability distribution of habitual dietary energy consumption, the minimum level of dietary energy requirements, or cut-off point, is derived using energy standards established by the Food and Agriculture Organization of the United Nations, the World Health Organization and the United Nations University (FAO/WHO/UNU) for different sex and age groups. The minimum level of requirements correspondons to sedentary physical activity and minimum acceptable body-weight for attained heights. Since adults'energy needs almost double the energy needed by a three-year old child, the estimation of the minimum energy requirement per capita in a country must take into account the sex-age structure of the population. Therefore, the daily per capita energy requirements used as cut-off point, for estimating undernourishment in a given year, is calculated at national level, based on dietary energy needs of different age and sex groups, and the proportion of the population represented by each sex-age group.

Rationale and Interpretation:

This indicator measures the level of dietary energy inadequacy, an important aspect of food insecurity in a population and the capacity to sustain development which demands efforts to reduce poverty, including finding solutions to hunger and malnutrition. Alleviating hunger is a prerequisite for sustainable poverty reduction since undernourishment seriously affects, among other things, labour productivity, health and learning capacity and hence earning propensity. Within a country, this indicator allows monitoring trends in the extent of dietary energy inadequacy in a population, generated as a result of the combination of changes in the overall availability of food, in households' ability to access it, and in socio-economic, geographic location and demographic characteristics of the population. It also allows the analysis of differences across countries and global regions in any given moment in time.

The indicator ranges from 0 per cent (no undernourished population) to 100 per cent (the entire population is undernourished). Within a given country, a higher value of this indicator, means that more people suffer from undernourishment (food deprivation). Among countries, a higher value does not necessarily mean a higher number of people undernourished because it depends on the size of the total population. The following undernourishment categories are the most commonly used:

- <5% Very low
- 5% - >14.9% Moderately low
- 15% - >24.9% Moderately high
- 25% - >34.9% High
- 35% and over Very high

Changes in the indicator guide governments and international organizations in formulating policies and implementing actions towards: improving food availability and access by the population, decreasing the negative impact of a rise in income inequalities and coping with trends in food needs.

Data Sources and Collection Method

The three main sources of data at the national level, that are used for monitorig of the PoU at national level, are:

(1)   Official reports on the production, trade and utilization of major food crops and livestock;

(2)   Household survey data on food consumption; and

(3)   Demographic characteristics of the national population.

Data sources for agricultural production are usually national surveys that are conducted by the Ministry of Agricultural/Livestock or the National Statistical Office. The surveys are usually annual, and in the absence of direct measurements, use information on areas/animal numbers and crop yields/carcass weights to calculate crop or livestock product quantities. Agricultural censuses may complement these surveys by providing more updated data on crops and livestock, and thus enable more precise projections/revisions. For production of processed crops the sources are agriculture holdings and/or food and agriculture enterprises. For trade, all crops and livestock products registered by the custom office in the country are taken into consideration. In case of non custom trade data, the observation unit is the trade operator.

The ideal source of data to estimate the inequality in access to food would be a carefully designed and skilfully conducted individual dietary intake survey, in which actual daily food consumption, together with heights and weights for each surveyed individual, are repeatedly measured on a sample that is representative of the target population. However, a well-designed household survey that collects information on food consumption and/or acquisition might be sufficient to inform a reliable estimate for inequality in access to food. Such surveys are generally conducted by the national statistical office of countries. Some examples are Household Income and Expenditure Survey (HIES), Household Budget Surveys (HBS) and Living Standard Measurement Surveys (LSMS).

The data on demographic characteristics such as: (1) population size by sex and age, (2) median height by sex and age, and (3) distribution of physical activity levels, is derived from nationally representative Demographic and Health Surveys (DHS) and Time-Use Surveys. They are also conducted by the national statistical offices.

Method of Computation and Other Methodological Considerations

Computation Method:

The estimates of the prevalence of undernourishment are essentially a measure of food deprivation based on the calculation of four key parameters for each country: the average amount of habitual daily per capita food consumption (the food available for human consumption is used as a proxy), the level of inequality in access to food, the asymmetry in the distribution of habitual per capita consumption and the minimum dietary energy requirements of the population under analysis.

This indicator has been defined within a probability distribution framework as follows:

$$P(U) = P(x < MDER) = \int_{x < MDER} f(x \mid DEC, CV, Skew)dx$$

where,

- P(U) is the proportion of undernourished in total population;

- *DEC* is the average of the distribution of habitual daily per capita dietary energy consumption in the population;
- *CV* is the coefficient of variation of the distribution of habitual daily per capita dietary energy consumption in the population;
- *Skewness* is the skewnes that characterise the asymetry of the distribution of habitual daily per capita dietary energy consumption in the population; and
- MDER is the minimum dietary energy requirements of the population.

For computational methodologies of DEC, CV, MDER and Skewness using household survey data, see: http://www.fao.org/3/a-i4046e.pdf and https://openknowledge.worldbank.org/handle/10986/18091

Comments and limitations:

Assessing undernourishment by comparing individual dietary energy consumption (collected through individual dietary intake surveys) with sex-age groups' energy requirements is not cost effective, or practical; therefore, just few countries conduct such type of surveys at national level.

The model-based approach developed by FAO offers the best alternative approach to provide with a consistent and reliable measure of the PoU to be used for global monitoring of hunger given the information available.

In the absence of nationally representative individual dietary intake surveys, particularly in low and middle-income countries, food consumption data collected in Household Consumption and Expenditures Surveys (HCES) represent a valid and affordable second source of food. However, a most of individual or household surveys are subject to measurement errors: random and systematic errors. If these later are not accounted for can they affect the estimates of the population' parameters. For instance, dietary energy consumption estimates could be underestimated due to underreporting of consumption by survey respondents. Respondents also sometimes fail to account for food consumed outside of the household.

In context of the global monitoring, providing an estimate for all countries would require access to national survey data on food intake or consumption for all countries. As such information is not available, a proxy value for habitual dietary energy consumption is calculated using information on food available for human consumption in a country obtained from Food Balance Sheets (FBS). FBS are compiled, by FAO, every year for 184 countries. However, these data are also not free from errors, there are estimated or imputed data points especially on the stock levels and FAO concepts may not fit with national concepts. To limit the effect of such errors, the PoU estimates reported for global monitoring refers to a 3-year average.

Survey data are the only source to estimate the CV and Skewness and the data need to be treated to reduce the upward bias in the estimates that is induced by the spurious variability from measurement errors before estimating the CV and the Skewness.

If the same method of computation is used throughout, the comparability across time is relatively high. The only potential cause of heterogeneity is the different quality of background data used for calculating the four parameters.

Proxy, alternative and additional indicators: N/A

Data Disaggregation

Due to reliance on national Food Balance Sheets data to estimate mean caloric consumption levels anualy for 184 countries, the global monitoring of MDG Target 1C and of the WFS target were based on estimates of the PoU at national level only. For the same reason, the FAO global monitoring of the SDG indicator 2.1.1 is also being based on Food Balance Sheets.

In principle, the SDG indicator 2.1.1 can be computed for any specific population group, provided sufficient accurate information exists to characterize the model's parameters (i.e. average habitual dietary energy consumption, the level of inadequacy in access to food and the minimum dietary energy requirement) for that specific group.

The scope for disaggregation thus crucially depends on the availability of surveys designed to be representative at the level of sub national population groups. Given prevailing practice in the design of national household surveys, sufficient reliable information is seldom available for disaggregation beyond the level of macro area of residence (urban-rural) and of the main Provinces/Divisions in a country. To the extent that most of the used surveys are designed to accurately capture the distribution of income, inference can be drawn on the PoU in different income classes of the population. Gender disaggregation is limited by the possibility to identify and group households by gender-related information (such as sex of the head of the household, or male/female ratio).

References

Official SDG Metadata URL
https://unstats.un.org/sdgs/metadata/files/Metadata-02-01-01.pdf

Internationally agreed methodology and guideline URL
http://www.fao.org/3/a-i4046e.pdf

Other references

FAO SDG Portal and E-Learning:
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Moltedo, A., Troubat, N., Lokshin, M. & Sajaia, Z. 2014. Analyzing Food Security Using Household Survey Data: Streamlined Analysis with ADePT Software. Washington (DC): World Bank. URL: https://openknowledge.worldbank.org/handle/10986/18091

Country examples:
Some countries have published estimates of the prevalence of undernourishment at national and subnational levels in food insecurity assessment reports.
URL: http://www.fao.org/economic/ess/ess-fs/fscapdev/essfscd/en/

International Organization(s) for Global Monitoring

This document was prepared based on inputs from Food and Agricultural Organization(FAO).

For focal point information for this indicator, please visit https://unstats.un.org/sdgs/dataContacts/