Household share of dietary energy from macronutrients

Overview

The household share of dietary energy based on acquisition or consumption from macronutrients is a household-level indicator that quantifies the percentage of caloric intake from the three major macronutrient groups: protein, fat, and carbohydrates. Surveys that collect data on acquisition are a proxy for food consumption, as households may build food stocks or consume food stocks during the reference period, as compared to consumption-based surveys, which collect data on food consumed in a specified recall period (Fiedler et al., 2016 [1]). Both of these types (acquisition and consumption) collect information on food that is purchased, own-produced, or received as a transfer. A third type of Household Consumption and Expenditure Survey [2] (HCES) collects a combination of acquisition and consumption data wherein households report what they acquired through purchases and what they consumed from own-production and transfers (Smith, 2003 [3]). These three macronutrients have distinct and important functions in the body, and all are necessary for proper growth, development, and cognitive and physical functioning. Undernutrition and overweight/obesity due to improper macronutrient intake, and the related health complications, continue to be a major public health concern in the developing world (Muller & Krawinkel, 2005 [4]).

Method of Construction

In order to estimate calories from the three macronutrients, data must be collected from an HCES [2] that includes not just which foods were acquired or consumed, but also amount of food consumed. Then, using food type and the weight/volume consumed, a food composition database is used to estimate the amount of protein, fat, and carbohydrates (distinguishing between fiber and other forms of carbohydrates). The total grams of each nutrient are added together, and the caloric value of each is calculated using the following equation:

\[ \text{Calories (Kcal)} = \left( \text{Protein (g)} \times 4 \right) + \left( \text{Fats (g)} \times 9 \right) + \left( \text{Av. Carbohydrates (g)} \times 4 \right) + \left( \text{Fiber (g)} \times 2 \right) + \left( \text{Alcohol (g)} \times 7 \right) \]

*Note in this equation, Total Carbohydrates = [Available Carbohydrates + Fiber]*

Finally, the proportion of calories from each macronutrient is calculated by dividing the calories from each by the total calories consumed and multiplying by 100 to determine the percentage.

This indicator is one of several indicators included in the ADePT-FSM [5] (Food Security Module) software package, which is a free standalone software developed by the Food and Agriculture Organization (FAO) and the World Bank that allows users to easily derive food security indicators from household survey data. The software download and corresponding documentation can be found on the FAO [5] website.

Please also see the Moltedo et al., 2014 [6] book published by the World Bank, which provides detailed instructions for analyzing food security using household survey data. For more information on calculating this indicator, refer to the "Standardization Procedures" on page 20 in the Moltedo et al., 2014 [6].
Uses

This indicator provides an understanding of the overall balance of the populations’ diet, as consuming disproportionately low or high amounts of energy from a given macronutrient may be a sign of under-consumption (disproportionately high amount of total carbohydrates) or overconsumption (disproportionately high amount of lipids, and sometimes proteins) resulting in an imbalanced diet (Moltedo et al., 2014 [6]). Additionally, this indicator could add richness to the understanding of trends in changing energy consumption, providing information on not just changes in quantity but also changes in dietary balance.

Strengths and Weaknesses

This household-level indicator for population-based measurement reflects an important aspect of dietary quality. An additional strength of this indicator is that it can be constructed from existing HCES [2] data, and is easy to communicate and interpret. However, as a household-level indicator, it does not speak to distribution of macronutrients among members. Another drawback of this indicator is that it does not provide information on the consumption of micronutrients, which are also essential elements of diet quality. If the data come from household surveys, this indicator cannot be used for individual targeting.

Data Source

HCES [2] data can be used to calculate this indicator. The World Bank Microdata Library [7] has the most comprehensive and publicly accessible repository of data. Otherwise, data can be accessed—often for a fee—from the National Statistics Office, though each country has its own policies and procedures. The International Household Survey Network (IHSN [8]) is an informal network to promote data standards and dissemination. National or regional Food Composition Tables should be used to identify the nutrient contents of the foods and can be found at FAO's International Network of Food Data Systems (INFOODS [9]) or the International Life Science Institute’s (ILSI) World Nutrient Databases for Dietary Studies (WNDDS [10]). In addition, Food Balance Sheet [11] (FBS) data could be used to calculate a similar indicator, such as the national average supply of protein [12]. Alternatively, 24-hour Dietary Recall [13] or Weighed Food Records [14] could be used to calculate total individual macronutrient intake [15].

Links to guidelines


Links to illustrative analyses


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Food Security Dimensions

- **Quantity** [20]
- **Quality** [21]

Data Collection Levels

- **Household** [22]

Data Sources and Methods

- **Household Consumption and Expenditure Surveys (HCES)**
- **Food Composition Databases**

Requires Food Composition Database

- **Yes** [23]