Data4Diets: Building Blocks for Diet-related Food Security Analysis

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Diet Quality Index - International (DQI-I)

Overview

Diet quality is an important measure in understanding food security because of the synergistic nature of micro- and macronutrients (Gerber, 2001 [1]) and the association of healthy diet patterns with reduced risk for diet-related disease and illness (Kant, 1996 [2]). The Diet Quality Index – International (DQI-I) is illustrative of a class of diet quality indices, which include other indicators such as the Healthy Eating Index [3] (HEI). We have chosen to highlight the DQI-I here because it is one of the few indicators that has been tested for a range of cultural contexts and validated for use in a range of countries with different dietary patterns.

The DQI-I is a composite, individual-level diet quality indicator. It was created in 2003 to enable cross-cultural diet quality comparisons, something that had previously not been done using diet quality composite indicators (Kim et al., 2003 [4]). The DQI-I is built off existing indicators, such as the HEI and the Diet Quality Index (DQI), but was formulated to incorporate the many aspects of a diet which contribute to quality, including diversity, adequacy, moderation, and balance.

Method of Construction

This indicator is created using scores from four components of diet quality, each calculated separately. The table below outlines basic information on how the components are defined, and the criteria for scoring each.

<table>
<thead>
<tr>
<th>Diet quality component</th>
<th>Grouping of diet quality component</th>
<th>Scoring criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety - food groups</td>
<td>5 food groups: meat/poultry/fish/egg, dairy/beans, grains, fruits, and vegetables</td>
<td>Each food group awarded 0 or 3 pts. 3 points awarded if at least 1 item from that group was consumed</td>
<td>0-15</td>
</tr>
<tr>
<td>Variety - protein sources</td>
<td>6 sources: meat, poultry, fish, dairy, beans, eggs</td>
<td>3 or more sources consumed: 5 pts 2 sources consumed: 3 pts 1 source consumed: 1 pts 0 sources consumed: 0 pts</td>
<td>0-5</td>
</tr>
<tr>
<td>Component</td>
<td>Groups/Parameters</td>
<td>Score Range</td>
<td>Details</td>
</tr>
<tr>
<td>-----------</td>
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<tr>
<td>Adequacy</td>
<td>8 groups: vegetables, fruit, grain, fiber, protein, iron, calcium, vitamin C</td>
<td>Between 0 and 5 points awarded for each of the 8 adequacy groups, depending on percentage of or Recommended Daily Allowances (RDA) met</td>
<td>0-40</td>
</tr>
<tr>
<td>Moderation</td>
<td>6 groups: total fat, saturated fat, cholesterol, sodium, empty calorie foods</td>
<td>Between 0 and 6 points awarded for each of the 5 moderation groups, depending on percentage of RDA met</td>
<td>0-30</td>
</tr>
<tr>
<td>Balance</td>
<td>2 groups: macronutrient ratio, fatty acid ratio</td>
<td>Between 0 and 6 points awarded, depending on ratio of macronutrients and between 0 and 4 points awarded depending on ratio of fatty acids</td>
<td>0-10</td>
</tr>
</tbody>
</table>

Once a score has been calculated for each of the components, the DQI-I is calculated by summing each of the four scores together, producing a number between 0 and 100. For a more detailed explanation on the process and the specific scoring criteria, please refer to the “Construction of the DQI-I” section of the paper published in *The Journal of Nutrition* (Kim et al., 2003 [5]).

## Uses

DQI-I is used to assess the diet quality of individuals, and can be used in a variety of cross-cultural settings, making it useful in comparing diets across regions (Kim et al., 2003 [4]). Additionally, this indicator includes specific nutrients associated with chronic, diet-related illnesses and includes particular food groupings, such as empty calorie foods, that make it an especially useful tool in assessing changing diet quality associated with the nutrition transition (Kim et al., 2003 [4]). As an individual-level indicator, it can be paired with individual health outcomes or demographic information, such as religion, age, sex, education, or any other characteristics of interest (Yun et al., 2009 [6]).

## Strengths and Weaknesses

The main strength of the DQI-I is that it offers greater richness in its definition and evaluation of diet quality than other composite diet quality indices. For example, the HEI is based solely on food group consumption (USDA, 2006 [7]), and the DQI, the indicator on which the DQI-I is based, touches upon the same four diet quality components, but it employs fewer measures and quantifies fewer micronutrients (Newby et al., 2003 [8]).
However, both a strength and a weakness, the DQI-I uses weights to proportionally score food based on its assumed nutritional importance and researchers have found that standardized weights may not be applicable in all scenarios (Tur et al., 2005 [9]). Additionally, because of the large amount of information required to calculate this indicator, it is necessary to have multiple days of diet recall information from each respondent, which is not always feasible given resource constraints.

**Data Source**

Individual-level dietary data can be obtained from a Food Frequency Questionnaire [10] (FFQ), 24-hour Dietary Recall [11], or Weighed Food Records [12]. National or regional Food Composition Tables should be used to identify the nutrient contents of the foods and can be found at Food and Agriculture’s (FAO) International Network of Food Data Systems (INFOODS [13]) or the International Life Science Institute’s (ILSI) World Nutrient Databases for Dietary Studies (WDDS [14]).

Finally, to calculate the adequacy, moderation, and balance scores, Recommended Dietary Allowance (RDAs) or Reference Nutrient Intake (RNIs), can be obtained from the Institute of Medicine for the United States (IOM, 2006 [15]), from the British Nutrition Foundation for the United Kingdom (British Nutrition Foundation, 2016 [16]), or the European Food Safety Authority of the European Union (EFSA, 2017 [17]). As an alternative to country specific RDAs/RNIs, the FAO/WHO RNIs can be used (FAO/WHO, 2001 [18]).

**Links to guidelines**


**Links to validation studies**


**Links to illustrative analyses**


**Food Security Dimensions**

- Quality [23]
Data Collection Levels

- Individual [24]

Data Sources and Methods

- 24-Hour Dietary Recall (24HR)
- Food Frequency Questionnaire (FFQ)
- Food Composition Databases

Requires Food Composition Database

- Yes [25]