Malnutrition: assessment of dietary intakes: focus on dietary diversity

Marie Claude Dop
Nutripass Nutrition research unit,
Institut de Recherche pour le Développement,
Montpellier, France

marieclaude.dop@ird.fr
Why measure dietary intake?

- Food and nutrient intakes are major immediate determinants of nutritional status
- Information on dietary intake is necessary for developing nutrition interventions
- Dietary intakes need to be monitored to assess the impact of interventions or policies
- Monitoring food intake is important for the prevention of food and nutrition crises
Measuring dietary intake is difficult

- Precise methods are intrusive (e.g. weighing) and can disrupt food intake behavior leading to biased results
- Estimation based on common household measures (cups, etc) is imprecise
- Retrospective methods are based on memory which is a source of bias
- Recall can be influenced by social desirability of eating behavior leading to under-reporting of consumption of certain foods (e.g. «fattening foods»)
Proxy methods of estimation of food consumption

• A «proxy» is a simple measure that replaces another measure that is more difficult or more costly to implement

• Proxies commonly used:
  – FAO food balance sheets are an estimation at national level of foods available for consumption by the population
  – Household income and expenditure surveys measure food and nutrients available to households for consumption
  – Dietary diversity is a proxy for food consumption at household and individual level
Advantages & limitations of proxies of food consumption

Advantages:

– Proxies are simpler to measure and to analyze
– Data collection is quicker, requires less skills, is less costly
– Data analysis is easier and quicker, and results are timely

Limitations:

– FAO balance sheets do not represent availability of foods to the individual, do not take into account loss of nutrients due to processing (e.g. cooking), etc
– HIES do not take into account wastage of food in the household, food given to other people or to pets, intra-household allocation of food
– Dietary diversity does not take into account quantities of food eaten
Dietary diversity: definition and main features

- The Dietary diversity indicator was developed because quantitative assessment of dietary intake is difficult, cumbersome and expensive
- It is a qualitative method that reflects quantitative intake

The Dietary Diversity indicator provides a proxy measure of:
- Access to food at the household level
- Micronutrient adequacy of diets at individual level
Household DD as a proxy of access to food

10 Country Study including poor and middle income countries and rural and urban sectors (Hoddinott & Yohannes, 2002):

Dietary diversity is associated with an linear increase in household per capita daily caloric availability

Dietary Diversity is useful for measuring household food security and monitoring impact of interventions on food security
Infant and young child DD as a measure of adequate micronutrient density of complementary food

• Several dietary diversity indicators were tested in relation to mean micronutrient density adequacy (MMDA) of 9 and 10 micronutrients (WHO, 2009)

• Correlations between DD and adequate micronutrient density were positive and significant

• A 7 food group score and a dichotomous indicator of minimum dietary diversity (4 of 7 food groups) were validated

Dietary diversity is a useful indicator of micronutrient adequacy of the diet (complementary foods) of infants and young children in developing countries
Women’s DD as a proxy of micronutrient adequacy of the diet

- WDDP 2005-2010: Using 5 country data sets, several indicators were tested in relation to mean probability of adequacy (MPA) of micronutrient intake (Arimond et al, 2010)

- WDDP 2012-2014: A new validation including 9 data sets was performed

A 10 food group indicator provides the best correlation with adequacy of micronutrient intake

A dichotomous indicator of Minimum Dietary Diversity of 5 food groups was validated (MDD-women) (FAO-FANTA 2015)

http://www.fao.org/3/a-i5486e.pdf
Women’s DD and micronutrient adequacy

Dietary diversity is correlated with probability of adequacy for 11 micronutrients (Arimond et al, 2010)

How is dietary diversity measured and analyzed?
Dietary Diversity Tool

• Open recall of consumption over the previous 24 hours
• Classification of the foods consumed into standardized food groups
• Administered at:
  - Household level (only consumption in the home)
  - Individual level (young child, woman of reproductive age)
• Simple counting of the food groups consumed
  = dietary diversity score
**Dietary Diversity Questionnaire**

**DIETARY DIVERSITY QUESTIONNAIRE**

Please describe the foods (meals and snacks) that you ate yesterday during the day and night, whether at home or outside the home. Start with the first food eaten in the morning.

[Household level: consider foods eaten by any member of the household, and exclude foods purchased and eaten outside of the home]

<table>
<thead>
<tr>
<th>Question number</th>
<th>Food group</th>
<th>Examples</th>
<th>YES=1 NO=0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CEREALS</td>
<td>bread, noodles, biscuits, cookies or other foods made from millet, sorghum, maize, rice, wheat + insert local foods e.g. ugali, nshima, porridge or pastes or other locally available grains</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>VITAMIN A RICH VEGETABLES AND TUBERS</td>
<td>pumpkin, carrots, squash, or sweet potatoes that are orange inside + other locally available vitamin-A rich vegetables(e.g. sweet pepper)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>WHITE TUBERS AND ROOTS</td>
<td>white potatoes, white yams, cassava, or foods made from roots.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DARK GREEN LEAFY VEGETABLES</td>
<td>dark green/leafy vegetables, including wild ones + locally available vitamin-A rich leaves such as cassava leaves etc.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OTHER VEGETABLES</td>
<td>other vegetables (e.g. tomato, onion, eggplant) , including wild vegetables</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>VITAMIN A RICH FRUITS</td>
<td>ripe mangoes, cantaloupe, dried apricots, dried peaches + other locally available vitamin A-rich fruits</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OTHER FRUITS</td>
<td>other fruits, including wild fruits</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ORGAN MEAT (IRON-RICH)</td>
<td>liver, kidney, heart or other organ meats or blood-based foods</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>FLESH MEATS</td>
<td>beef, pork, lamb, goat, rabbit, wild game, chicken, duck, or other birds</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>EGGS</td>
<td>fresh or dried fish or shellfish</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>FISH</td>
<td>beans, peas, lentils, nuts, seeds or foods made from these</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>LEGUMES, NUTS AND SEEDS</td>
<td>milk, cheese, yogurt or other milk products</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>MILK AND MILK PRODUCTS</td>
<td>salt, fats or oil added to food or used for cooking</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>OILS AND FATS</td>
<td>sugar, honey, sweetened soda or sugary foods such as chocolates, sweets or candies</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>SWEETS</td>
<td>spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages OR local examples</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>SPICES, CONDIMENTS, BEVERAGES</td>
<td>Did you eat anything (meal or snack) OUTSIDE of the home yesterday?</td>
<td>YES=1 NO=0</td>
</tr>
</tbody>
</table>

**Note:** Use new questionnaire from MDD-W recent publication (see last slide)

- Food and Nutrition Technical Assistance (FANTA – USAID) tool with 16 standard and universal food groups (2006)

- Adaptation to local food system is needed
Reporting of results

✓ Dietary diversity Score
  ▪ Mean scores and standard deviations
  ▪ Distribution in terciles/quartiles

✓ Percentages
  ▪ % of households/individuals consuming each food group
  ▪ % of households/individuals consuming food groups that are good sources of specific nutrients (eg vit. A or iron rich foods)
  ▪ % of infants and young children or women with minimum dietary diversity

✓ Dichotomous indicator: % of children or women with minimum dietary diversity
# Food groups counted in the infant’s & women’s dietary diversity scores

<table>
<thead>
<tr>
<th>Infant and young children (6 – 23 months)</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All starchy staples</td>
<td>• All starchy staples</td>
</tr>
<tr>
<td>• Legumes and nuts</td>
<td>• Beans and peas</td>
</tr>
<tr>
<td>• All dairy</td>
<td>• Nuts and seeds</td>
</tr>
<tr>
<td>• Flesh foods</td>
<td>• All dairy</td>
</tr>
<tr>
<td>• Eggs</td>
<td>• Flesh foods</td>
</tr>
<tr>
<td>• Vitamin A rich vegetables and fruits</td>
<td>• Eggs</td>
</tr>
<tr>
<td>• Other fruits and vegetables</td>
<td>• Vitamin A-rich dark green leafy vegetables</td>
</tr>
<tr>
<td></td>
<td>• Other vitamin-A rich vegetables and fruits</td>
</tr>
<tr>
<td></td>
<td>• Other vegetables</td>
</tr>
<tr>
<td></td>
<td>• Other fruit</td>
</tr>
</tbody>
</table>
Dietary diversity scores and indicator of minimum dietary diversity (MDD)

- Different scores have been validated for different levels of measurement
- Household level: 12 food group score
- Infant and young children (6 to 23 months): 7 food group score and MDD of 4 food groups
- Women of child bearing age: 10 food group score and MDD-women of 5 food groups

Note: For children and women some of the groups of the questionnaire are aggregated
Dietary diversity indicators are useful in nutrition sensitive programmes that aim to improve the nutritional quality of the diet of the beneficiary population.

- Agriculture, Fishery, Forestry programmes
  - Crop diversification/integration
  - Promotion of indigenous plant and animal foods

- Food security and nutrition programmes
  - Sustainable livelihood support and diversification
  - Programmes in HIV affected areas
  - Food-based nutrition programmes
  - Nutrition education

- Cross-cutting issues
  - Gender
  - HIV/AIDS
  - Right to Food

The cost of adding dietary diversity to an assessment survey is marginal!
For children 6-23 months:
WHO (2010) Indicators for assessing infant and child feeding practices (part II: measurement)
http://www.who.int/nutrition/publications/infantfeeding/9789241599290/en/

NEW FAO-FANTA guidelines for measuring dietary diversity of women (FAO – FANTA, 2016)