DIETARY ASSESSMENT
what are we really eating?

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With new reports being released seemingly every day on foods that may improve or worsen our health outcomes, data on the relationship between diet and disease carry huge weight. Dr Amy R Beaudreault comments on how data on food intake must become more accurate to draw valid conclusions, particularly in light of ageing populations.

Do you keep track of how much you eat on a daily basis? How do you measure your food intake when you sit down for a family dinner? Does the season affect your diet?

On an individual level it is incredibly difficult to accurately measure food intake, even with close attention. When you expand the scope to far larger populations, imagine the complexities involved with ensuring rigorous data collection.

For researchers who have attempted to collect and analyse dietary data, frustration with the various sources of bias and variance is a familiar feeling. Collecting precise dietary intake data is an issue the scientific community continues to struggle with, but happily an area in which consensus exists: improvement of current methods is critical for nutrition science to move forward.

With 3 billion affected worldwide by malnutrition – which includes under-nutrition, over-nutrition and micronutrient deficiencies – the stakes have never been higher for those wanting to strengthen the evidence for improving health through diet.

However, if scientists and policy makers are going to enhance the nutritional status of the global population, all stakeholders involved in public health must have an inventory of reliable tools that assess what people are eating, the nutrient content of foods in various cultures and the nutritional gaps. Today, despite the many assessment tools available and research dating back to the 1930s, the need for improvement continues.
Hunting and gathering nutritional data

Food consumption data are a necessary part of any dietary or nutritional assessment for researchers to evaluate how diet affects health, and when gaps or deficiencies in someone's usual dietary intake may exist. Currently, four dietary assessment methods are commonly used in the field: food frequency questionnaires (FFQs), 24-hour dietrecalls (24H), nutrient biomarkers and food records.

1 FFQs are used to measure normal food intake over a period of time. This assessment has low financial and respondent burden, but it makes assumptions about portion size and food preparation methods based on the population being studied. Because of these assumptions, an FFQ may miss major dietary contributors if all factors are not properly considered during the study design. Furthermore, studies in which biomarkers are used to assess the intake of specific nutrients, such as protein, report measurement errors with FFQs, indicating that these questionnaires are unsuitable for quantitative analysis.

2 In contrast to FFQs, the 24H method is more expensive, often needing trained personnel to administer the assessment while also putting greater responsibility and time commitment on the respondent. This method requires an interviewer to ask the respondent questions on all foods and amounts consumed during a predetermined 24-hour period. Although 24Hs allow for collection of detailed information on all variables from an individual – making them applicable for diverse populations – underestimation of intake often occurs. If the study population is large, this method can also become extremely costly.

3 Nutrient biomarker assessments analyse an individual's exposure to nutrients using blood, urine or tissue samples. This analysis can be used with other dietary assessment methods, such as FFQs, to validate intake. Nutrient biomarker measurements have their own complexities as they require 24-hour urinary collection, fasting and blood samples. In addition, analysis can be expensive and not all nutrients have identifiable biomarkers.

4 Food records require respondents to record all foods consumed – including amounts, cooking techniques and meal frequency – through the course of three to seven days, with representation of both week and weekend days. The quality of these data may vary considerably depending on how well respondents are trained in record completion and how detailed and timely record reviews take place with respondents, if needed. Data obtained may be rich with information, but the process of recording food intake itself influences diet and thus introduces bias. Who honestly reports how many cookies he or she had after dinner last night? Reporting bias can reflect what survey researchers call social desirability – questions are answered based on social acceptability rather than accuracy. Moreover, like the 24H method, keeping food records is a burden to respondents and can become expensive if needed for a large sample over many days.

ASSESSING AN AGING PLANET

Many of the dietary assessment methods that we have to hand at present have huge pitfalls. Recently, studies have begun to employ electronic methods of obtaining food records that make use of mobile, web, camera and sensor technologies in order to remove issues with cost and time. However, many of these innovations still rely on self-reporting and may not be accessible or usable by diverse populations, especially ageing populations.

The ageing population is one that has inherent complications with dietary assessment methods that rely on self-reporting. Bias can come from many variables; however, one variable where we need more research is the impact of cognitive function on dietary assessments. Impaired cognitive function can hinder question comprehension, information retrieval and abstract reasoning, and so methods that use diet recall will have significantly reduced accuracy.

A recent study funded by the US Department of Health and Human Services’ National Institute on Aging and the Center for Nutrition, Learning, and Memory at the University of Illinois at Urbana-Champaign looked at how cognitive function may bias dietary assessment methods. The study identified research gaps and provided recommendations for enhancing dietary assessment of groups with impaired cognitive function. In particular, it highlighted that having a tool that relies less on self-reporting would increase the validity and reliability of dietary assessment methodology, which would in turn lead to better nutrition intake data.

IMPROVING THE DIETITIANS’ TOOLBOX

Concerns with the reliability of dietary assessment of the elderly are especially important considering the fact that every four seconds, someone is diagnosed with dementia. In fact, approximately 44 million people worldwide live with the disorder, and by 2050 it is estimated that numbers will reach 135 million. Diet is inextricably linked with health, and better understanding of the two factors in the elderly population could help us reduce and or manage the effects of dementia.

Studies on vitamin B12, vitamin D, omega-3 fatty acids and phytoneutrients – such as those found in cocoa, berries and nuts – support suggestions that such nutrients have positive effects for dementia patients. Researchers also have identified certain dietary patterns, such as the Mediterranean diet, which may help prevent cognitive decline and dementia. Although the possibility that cognitive decline could be improved with nutritional interventions exists, findings have not proved consistent. Additional rigorous dietary assessments that remove biases due to impaired cognitive function could improve the outcome of such nutritional studies.

Learning what people of all ages eat, throughout the world and over time, is an imperative for identifying gaps in intake, finding associations between diet and disease, and determining interactions between diet and genes within diverse populations. A new validated and customisable research tool to assess normal individual dietary intake – which uses the advantages of all current methods, can be adapted to any community and relies less on self-reporting – is sorely needed to advance the fields of nutrition and epidemiology, and overall improve public health.

Until nutrition has validated and reliable data on food consumption for diverse populations, debate will continue on research outcomes.