

DIETARY ASSESSMENT

Why measure dietary intake in research?

To assess:

1. Dietary intake (both quantity and quality) of individuals or specific populations
2. Whether dietary intake changes in response to an intervention
3. Dietary adherence to a diet intervention
4. Background habitual diet when implementing a food/supplement or non-diet intervention (i.e. confirming it does not change)

Diet composition vs diet quality.

Diet composition: This refers to measurement of energy and nutrients (e.g. macronutrients, such as protein, or micronutrients, such as iron) and/or foods (e.g. tomatoes) and/or food groups (e.g. vegetables) within an individual's diet over a period of time. This is usually then averaged to a 'per day' value. Most nutrition research involves measurement of one or more of these aspects of diet.

Diet quality: This refers to measurement of the healthiness of the dietary pattern or how well it adheres to a specific diet (e.g. Mediterranean diet). This usually requires measurement of diet composition for calculation of a diet quality index. Measures of individual dietary components known to be important for health are aggregated together for a final diet quality score. The diet quality method helps to overcome the reductionist approach of just measuring individual dietary components. Dietary pattern analysis is an approach to measuring diet quality that is statistically derived 'a posteriori'.

Why is dietary intake difficult to measure?

The doubly-labeled water technique is the gold standard for measuring energy intake. Measuring dietary biomarkers (i.e. in blood or other biological samples) can be used to accurately measure intake of specific nutrients. However, both of these types of methods are expensive. Therefore, dietary assessment usually relies on self-report of dietary intake, which comes with challenges, explained below:

Complex: People consume a variety of foods in a variety of combinations. Nutrition comes from foods, supplements, snacks and fluids.

Adaptive: Dietary intake changes day-to-day, on weekdays vs weekends, work vs. rest hours. Diet also changes when we are observed by others (even if the observation is not diet-related). People place different values on food and dietary intake and many have specific food beliefs.

System: Many parts make up the whole of diet. These include nutrients, food components, foods, food groups and dietary patterns.

For all of these reasons, we rarely report what we eat correctly (and often not deliberately). The most frequently used methods of measuring dietary intake rely on self-report. Capturing the full depth and breadth of complex dietary information is very challenging even using the most comprehensive measurement tools.

Who should measure diet?

For research requiring assessment of diet or any outcomes, which could be directly related to diet, we strongly encourage collaboration with an Accredited Practising Dietitian or Accredited Nutritionist. Ideally, they should be involved at each stage of the research process:

- Conception
- Choice of measurement tool
- Data coding
- Data verification and cleaning (see below)
- Data analysis
- Interpretation, dissemination and translation of findings

Is dietary data verification necessary?

Diet reporting is inherently inaccurate. This is because as humans we make mistakes. For example, we might overreport intake of 'desirable' foods (e.g. overreporting 'healthy' foods and underreport on 'undesirable' foods). These types of error differ depending on the target population (e.g. overreporting might occur in parents of children or by people with restrictive eating patterns and underreporting might occur in people who are overweight). Data verification at the participant level helps to reduce error and at the group level identifies implausible reporting and identifies outliers. Measurement error & bias also occurs if the assessment is not checked by an appropriately trained and qualified person.



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Examples of dietary assessment tools

The methods for collecting dietary information dietary assessment include:

- Food frequency questionnaires
- 24-hour recalls
- Unweighed food records
- Weighed food records

Food frequency questionnaires: These are used to assess long term diet. There are many validated tools available (e.g. DQES, AES).

24-hour recalls: This method usually involves a trained dietitian/nutritionist capturing all of the previous day's dietary intake from the participant via interview. Web or mobile-based methods are also available (e.g. ASA24-Australia).

Food records: These methods are considered the most accurate measure of recent dietary intake. This can involve weighing food or taking photos.

Diet quality: To assess diet quality or diet patterns, raw dietary data using one of the above methods is usually required.

See here for examples of different assessment tools, the type of data derived from each method, and advantages and disadvantages of each.

Choosing the dietary assessment tool

There are a variety of issues to consider:

- Why are you assessing diet?
- What do you want to measure? (e.g. nutrients, food components, foods, food groups, diet quality; intake at one timepoint or change over time?)
- What is the size of your sample, age of your sample, participant literacy level and other trial commitments? (consider participant burden)
- What resources do you have available (e.g. cost, personnel, equipment)?
- Has the tool been validated in a representative population?
- Is the tool of choice sensitive enough to measure what you would like to measure at each time point?

Useful websites

<https://www.nutritools.org/>

<https://www.anzoz.com/food-nutrition>

<https://www.dapa-toolkit.mrc.ac.uk/diet/diet-splash>

<https://dietassessmentprimer.cancer.gov/>

Useful publications

Bingham et al. Comparison of dietary assessment methods in nutritional epidemiology: weighed records v. 24h recalls, food frequency questionnaires and estimated-diet records. *Brit J Nutr* 1994;72:619-643.

Burggraf et al Review of a priori dietary quality indices in relation to their construction criteria *Nutr Rev* 2018;76(10):747-764.

Cade et al. DIET@NET: Best practice guidelines for dietary assessment in health research *BMC Med* 2017;15:202

Collins et al Reproducibility and comparative validity of a food frequency questionnaire for Australian adults. *Clin Nutr* 2014;33(5):906-14.

Ireland P et al. Development of the Melbourne FFQ: a food frequency questionnaire for use in an Australian prospective study involving an ethnically diverse cohort. *Asia Pac J Clin Nutr* 1994;3,19-31.

Subar A. et al. The automated self-administered 24-hour dietary recall (ASA24): A resource for researchers, clinicians, and educators from the National Cancer Institute. *J. Acad. Nutr. Diet.* 2012, 112, 1134-1137. (need Australian ref if there is one)

Waijers et al A critical review of predefined diet quality scores *Brit J Nutr* 2007;97:219-231

