

Final Remarks

Dietary assessment methods: where do we go from here?

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The papers presented during the fourth in the series of International Conferences on Dietary Assessment Methods (ICDAM) updated issues on previous themes from the first three ICDAM, and contributed additional information on the need to study overall dietary patterns, the use of biomarkers and the assessment of new food constituents. This conference, IV-ICDAM, emphasised the need to study and develop methods that have a global perspective on nutritional studies, that focus on individuals, single populations and multi-centric studies. Creating data collection and analysis methods for studies that include multiple ethnic and cultural population groups were featured. Research on assessing dietary methods in relation to the metabolic epidemiology of risk was summarised. Knowledge about the variance components of measurement error was extended. Stress was also placed on methods to validate and calibrate dietary methods.

The importance of dietary assessments was a theme that cut across epidemiological studies, clinical evaluations and both process and outcome measures for interventions. Dietary assessments are needed for a variety of purposes including assessment, planning and hypothesis generation. There is a great need to start work now on the implications of globalisation of nutritional assessments on comparisons between and among studies. Also, the differences that occur among populations with regard to collection, analysis and interpretation of dietary data, when a common instrument is used across various populations, must be better understood. Such studies are being done in countries including the USA, Canada, New Zealand, Australia, Switzerland/Germany/Austria, the Nordic countries and other European Union countries. In this regard, research is also needed on validation studies for these merged survey instruments. New studies are also crucial on the interaction between genetics and biomarkers and their implications for validating dietary methods. Improving the analysis of biomarkers of dietary exposure for the study of disease risk also needs attention.

New computer-based technologies (i.e. the Internet) and combinations of qualitative and quantitative methods are now being used for dietary assessment. Combined assessment methods have been especially fruitful for developing assessment methods that tap food security and quality of life. Combined qualitative and quantitative tools are also being used more frequently to better our understanding of the cognitive processes involved with completing dietary assessments.

Dietary assessment methods must reflect new reference standards such as the Dietary Reference Intakes for the USA and Canada. Also, in developing dietary assessment methods, outcome measures need to be comparable across studies and with reference standards. Research on developing reference standards suggests that, at best, ranges of intake and the probability of risk for low and high intakes of nutrients are more realistic measures than single cut-points. Thus, assessment methods need to be developed so that reports can better account for the variability that exists in requirements among individuals. In particular, when an assessment method is used which is acknowledged to yield biases in the reports, adjustment for such biases should be incorporated into the Dietary Reference Intake. Also, more work is needed on methods for special populations such as children, pregnant women, the elderly, ill individuals and ethnic minorities.

Quantitative dietary assessment methods must be expanded so that they can be used to collect intake data on food components of emerging interest. Developers of quantitative methods must keep pace with the rapidly changing composition of foods, including nutrients that are found naturally in food and nutrients added through fortification. The intake of dietary supplements is also increasing rapidly and cannot be neglected in dietary assessment. There are also many emerging food components, including intentional and unintentional additives, that must be included in dietary assessments. The constantly changing composition of foods and the need to keep food databases current must be kept in

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mind. This information will provide valuable input on the metabolic role of nutrients and other food constituents in health.

Dietary assessment is based primarily on a person's ability to report consumption. Dietary recalls, records, duplicate samples and food frequencies remain the dominant methods. For this reason, cognitive studies on what affects dietary reports are expanding and now include both psychological and sociological factors. These studies will lead to modifications of the structure and administration of dietary instruments. Technology is changing how dietary assessment methods are delivered. Computer applications, especially web-based applications, are expanding, as is the number of people who contribute dietary data, making data collection and data management methods more efficient. Although web-based assessments are more accessible and they enable larger nutritional epidemiological studies to be conducted, validation and calibration of these new methods are needed to fully utilise this new frontier in dietary assessment methodology.

Methods that have been developed to measure food security in highly industrialised and developing countries have started to identify similar themes. Measuring food security and the actions caregivers can take to prevent hunger in children remain main components of disaggregating food-secure household from households that have food insecurity and hunger present. Food security measures are good examples of how qualitative and quantitative researches have been combined to develop dietary assessment methods that relate food intake to health and quality-of-life indicators.

The conference featured presentations from less industrialised countries and expanded networking between countries within South American (South–South connections) and between southern and northern countries (South–North connections). In addition to increased collaboration within the Western Hemisphere, there is also a need to extend the linkages world-wide to better develop dietary methods that are used across cultures.

Methods to validate new dietary methods and the errors that occur in the collection of dietary data continue to be integral themes for the ICDAM. At earlier conferences, papers were presented that compared the results between a 'gold standard' method and a new dietary method that was being validated. However, simple correlations and deattenuated correlations to assess instrument reliability are inappropriate. These cannot be the sole approach for validation studies since a gold standard does not exist with dietary methods. We now know that intake measures for two methods are not unbiased. It is already clear from studies using urinary nitrogen as a biomarker for protein intake that two self-report instruments such as a food-frequency questionnaire and a dietary recall are liable to carry person-specific biases that are correlated. When this occurs, the dietary recall, used as a reference instrument to

validate the food-frequency questionnaire, will present too rosy a picture of the performance of the questionnaire. Thus validation studies that use physiological markers, in which the knowledge of the biochemical physiology of the marker is fully elucidated, are needed, and more complex models that account for random and correlated errors will be required for their analysis. It will be important in these analyses to pay attention to different ways of expressing dietary intake, as results for absolute levels of intake may or may not be the same as for energy-adjusted levels.

Further research will be needed to expand the range of biomarkers that can be used reliably in such studies. While relatively good biomarkers for protein and energy intake are available, there is a great need for expansion to markers of other macronutrient intakes such as fats and carbohydrates.

An increased understanding of the components of variance in dietary data has developed over the course of these conferences. Previous conferences clearly described the temporal components of variance (day-to-day, weekly and seasonal effects). The known sources of error have now been elucidated with the relationship between errors. Systematic sources of error include intake-related errors that lead to the flat-slope syndrome reported with regressions between reported intake and true intake. Although person-specific error is often attributed to day-to-day changes in intake as measured in earlier studies, it is now known that other factors may be influencing person-specific error. These include psychological factors of the reporting of intakes and the sociocultural environment from which reports are obtained. For example, in cultures where being overweight is shunned, underreporting often occurs; while in cultures where hunger is present and shame may be associated with low intake, overreporting may occur. In either case, it is now known that these errors may lead to attenuated statistical associations between diet and disease and more complex models are now needed to better estimate diet–disease relationships. A better understanding of measurement errors is needed to understand how error impacts diet–disease relationships.

Understanding the appropriate application of dietary methods was one of the primary focuses of the conference and remained an important area of study. Improved qualitative and quantitative methods are needed to better understand dietary patterns. For international settings, the old paradigms on energy expenditure and energy balance as they apply to dietary methods need to be re-evaluated. They include the effects that physical activity and infection have on evaluating and interpreting dietary assessment. There is also a need for more research on alternative paradigms regarding adequacy and inadequacy for the consumption of nutrients and non-nutrients. A focus is needed on

plant-based diets and the development of analytical methods for studying food patterns, and not exclusively the chemical constituents of diets.

Finally, more researchers from a wider array of countries need to become involved. Participants also need to include more government people who are making decisions on how to monitor the dietary patterns of populations and who provide the vital funds to study diet–disease relationships. Dietary assessments remain

the core method for understanding food security and nutrition–disease interactions. As all aspects of dietary assessment methods become better understood, it may be possible to influence decision-makers more. Thus, our charge for the future is to start research on how to better justify dietary assessments as part of national and international studies on diet and health.

The ICDAM now passes the torch to Mahidol University, where in a few months the next conference will be held.