Review

Food Composition Data: The Foundation of Dietetic Practice and Research

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ABSTRACT

Food composition databases and dietary assessment systems are important tools for food and nutrition professionals. The availability and accessibility of data have improved over time along with the technology to convert the information into useful formats for planning diets, writing educational materials, counseling patients, and conducting research. Primary sources of food composition data include government, academic, and other institutional databases; the food industry; and scientific literature. Changes in the marketplace affect food availability and composition and affect the accuracy and adequacy of food composition databases. Improvements in both food composition data and in dietary assessment methods have worked synergistically to improve estimates of dietary intake. The development of databases for food frequency assessment systems requires special considerations for data aggregation for each food or food grouping in the questionnaires. Considerations for selecting a dietary assessment system include appropriateness of the data for the intended audience or purpose, efficiency of the search strategy for retrieving data, content and format of summary information, and cost. Needs for food composition data vary depending on dietetic practice area; however, most food and nutrition professionals will benefit from becoming more informed about food composition data, exploring new ways to educate themselves about databases and database systems, and advocating for what is most needed in dietetic practice.

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Food composition databases are used by food and nutrition professionals to assess the dietary status of patients, clients, and consumers and to plan and evaluate the dietary adequacy of meals and diets. Accurate assessment of the intake of nutrients and other food components depends on the accuracy of the databases. The databases are never complete due to the dynamic nature of the food supply; for example, foods are constantly introduced to and removed from the market, and also because of newly recognized food components that are identified as being associated with health and/or disease. The purpose of this review is to provide information and guidance to food and nutrition professionals with respect to primary sources of food composition data and their use, advances in food composition data and databases, the effects of the changing marketplace on data and databases, the synergy between food composition data and dietary assessment, the incorporation of data into dietary assessment systems, and the selection of a dietary assessment system. An overriding theme is meeting food and nutrition professionals' need for food composition data.

PRIMARY SOURCES OF FOOD COMPOSITION DATA

The primary source of food composition data for the United States is the Nutrient Database for Standard Reference (NDSR) (1), which is maintained by the Agricultural Research Service (ARS) of the US Department of Agriculture (USDA) and freely available on the Internet. NDSR, Release 19, contains 7,293 foods and up to 140 nutrients for each food; the data are derived from ARS-contracted food analysis, the food industry, and the scientific literature as well as some values that are estimated or calculated based on recipe ingredients or similar foods. There are missing values in the database because some foods have not been analyzed for all the food components and because some missing values have not been estimated. One feature of the on-line NDSR is the ability to access food lists based on their content of a food component per 100 g or measures provided by ARS.

Another ARS database is the Food and Nutrient Database for Dietary Studies (FNDDS) (2), which is used to assess dietary intakes for the National Health and Nu-

Feature	NDSR (1)	FNDDS (2)
Type of database	Reference database	Survey database
Purpose	National US food composition database; standard for food composition information in the United States	Developed for use with the National Health and Nutrition Examination Survey
Primary uses	Dietetic reference, patient care, student/consumer education; product development by industry; used by some other countries to create national databases	Assessment of food component intakes for US nutrition surveys and studies
No. of foods	7,293	~7,000
No. of food components	140	62
Basis of values	Per 100 g and usually several serving portions	Linked file for serving size portions; ~30,000 serving portions total
Missing values?	Yes	No; values missing from the NDSR for the 62 food components are estimated
Source of data	Laboratory analyses, food companies, literature, estimation	NDSR, estimation
Data provided	Mean/median values, number of data points and standard errors for analytical values; mean/median values for all others	Mean/median values
Special items	Provides documentation about data sources and derivation of non-analytical values	• Includes default food items for use when survey respondents cannot be specific about foods consumed • Contains recipe items calculated from NDSR foods • Has a moisture and fat adjustments file and a nutrient retention file that may be used to calculate the composition of recipe items

Figure 1. Features of the US Department of Agriculture Nutrient Database for Standard Reference (NDSR) and Food and Nutrient Database for Dietary Studies (FNDDS).

trition Examination Survey (NHANES) (3). The FNDDS includes the foods reported as being consumed by NHANES participants and contains 62 food components for approximately 7,000 foods. The data in FNDDS are derived primarily from the NDSR, and all missing values are imputed so that the database is complete for making dietary intake assessments. The FNDDS is also freely available on the Internet. Figure 1 summarizes the features of the NDSR and FNDDS.

A dietary supplement database was developed by the National Center for Health Statistics for use with the NHANES dietary supplement intake data (4,5). The Office of Dietary Supplements at the National Institutes of Health is working on a label-based dietary supplement database and is collaborating with ARS to develop an analysis-based dietary supplement database (6-8). Another government database is that for the Food and Drug Administration's Total Diet Study (9). This database lists about 280 core foods of the US food supply and contains annual analytical data for the levels of dietary minerals, folic acid, heavy metals, radionuclides, pesticide residues, industrial chemicals, and other chemical contaminants (9-11).

Information on the composition of packaged foods is available from the Nutrition Facts and Supplement Facts labels and from food companies, trade associations, and their Web sites. The Nutrition Facts label data have been rounded and adjusted to be in compliance with government regulations and are usually limited to the food components that are required to be on the label. Procedures for attempting to determine the composition of products based on the label data and the ingredient listing are provided by Rand and colleagues (12).

Journal articles are timely sources of data emerging from analytical laboratories and can be accessed through literature searches. One primary source is the *Journal of Food Composition and Analysis* (13). Literature data on the levels of bioactive food components (eg, carotenoids, flavonoids, and polyphenols) and the antioxidant potential of foods are of increasing interest because of their association with health and disease prevention (14,15).

Many food composition databases have been developed in academic, clinical, and private institutions using the primary sources of data mentioned above. Some of these are listed in the *International Nutrient Databank Directory* (16), which is maintained by the National Nutrient Databank Conference. The 2006 edition of this directory lists 33 organizations that provide databases and/or software systems for dietary analysis, recipe calculations and/or other functions. The directory provides detailed information about the number of foods, food components, data sources, software features, availability, and cost of each item.

The *International Food Composition Tables Directory* (17) maintained by the United Nations International Network of Food Data Systems is an extensive archival collection that lists the names of hardcopy and electronic databases from around the world. Food and nutrition professionals may find this directory useful for locating data on ethnic and imported foods that are not present in US databases.

ADVANCES IN FOOD COMPOSITION DATA

Information on nutrient and non-nutrient components of foods has been rapidly expanding. The NDSR database increases in size with each new release, and the FNDDS is routinely updated for consistency with foods reported to be consumed in NHANES. The USDA National Food and Nutrient Analysis Program provides funds to update and expand the NDSR and help assure the quality of analytical data through use of standard reference materials and sound sampling and statistical handling of data (18-20). As information on food components that may be related to health outcomes becomes available in the scientific literature, the data may be incorporated into the NDSR and into academic and other institutional food composition databases. Examples of such components include flavonoids (21), lignans (22), glycemic index (23,24), fluoride (25), tyramine (26), biotin (27), heterocyclic amines (28), and glucosinolates (29).

New forms and units for some food components have been added to the NDSR and other databases that offer data users choices of ways to express the levels of food components. For example, the Institute of Medicine proposed several new ways of expressing nutrient activity for the Dietary Reference Intakes, such as folate as Dietary Folate Equivalents, vitamin A as Retinol Activity Equivalents, and vitamin E as α-tocopherol only (30,31).

The MyPyramid Web site (32) allows for the assessment of dietary intakes based on food groups; that is, the amount of fruits, vegetables, and grain products consumed may be compared to MyPyramid recommendations. This type of food group intake measure may also be incorporated into analyses relating intakes to disease outcomes such as cancer and heart disease. Food composition databases may be used to assign food group servings to each food item, in much the same way that nutrients are assigned to foods; for example, the number of servings of vegetables per 100 g of the food (33). Some food composition databases now have the ability to accumulate such food group intake variables (34).

The increasing availability of data on the composition of dietary supplements is essential for accurate estimates of total food component intakes. The use of dietary supplements is increasingly common in the United States and worldwide, and accurate estimates of total intakes are not possible if supplements are not included. The accuracy and completeness of supplement composition databases have traditionally lagged behind those of food composition databases, but efforts to improve data on the composition of dietary supplements are underway (8).

CONSIDERATIONS FOR USE OF DATA SOURCES

When searching for food composition data, food and nutrition professionals should consider food names and descriptions, data quality, and data variability (35). Accurate food names and descriptors help ensure that the associated data correspond to the food for which information is sought. Sometimes a food name may pertain to more than one type of food (eg, a truffle is a chocolate candy and a mushroom), and food name synonyms (eg, broccoli raab is a synonym for rapini) may make it difficult to find some foods.

The quality of food composition data is usually determined from the sampling design, the number of samples analyzed, the analytical methods used, and the reproducibility of the data. However, because this type of information is usually available only with original data (ie, in scientific papers and reports) and not carried over to compiled databases, the task of ensuring data quality usually falls on the database compiler. The quality of food composition data has been addressed in great detail in Greenfield and Southgate (36).

Food composition variability is a reflection of inherent (eg, genetic), environmental (eg, climate and temperature), processing (eg, cooking and preservation methods), and analytical factors (eg, sampling designs and analytical methods). Some food components are more variable than others because they may be susceptible to loss by heat, light, and processing methods (eg, cereal grain refinement). Food component variability should be considered when making practical use of the data for patients and clients. Food and nutrition professionals should not recommend one food over another as a better or lower source of a food component unless the differences between the foods will be of practical importance for the patient or client.

For national, regional, or local dietary intake surveys in the United States, the FNDDS or similar survey database is appropriate. Survey databases should include foods commonly consumed by the target population and have no missing values. For a reference in the office or classroom, the NDSR or a similar database derived from the NDSR is a good choice and should be used with the understanding that there are missing values for some food components. The NDSR or similar database is also appropriate for patient care such as dietary management for weight loss or disease. For patients who are following therapeutic diets like severe sodium restriction, food and nutrition professionals will need databases with specific brand name information. For research or clinical studies to test the effects of food components on biomarkers, researchers should use either an isolated form of the food component, or, if a food is to be used, it should be purchased in bulk and a representative sample should be analyzed for the food component(s) of concern to the study. Reference and survey databases may not be appropriate for some types of clinical research. The knowledge of food and nutrition professionals can be especially useful in guiding researchers to the most recent food composition data and pointing out the limitations of using reference databases in clinical research protocols.

MAINTAINING DATABASES WITH A CHANGING FOOD SUPPLY

The constant changes in the food marketplace present issues and challenges for those who maintain databases. The process of updating databases requires timely inputs, a detailed understanding of foods in the food supply, and difficult decisions about priorities. One issue facing database developers is globalization of the food supply. Foods may be locally grown, regionally produced, or imported from almost anywhere in the world. Exotic varieties of fruits and vegetables are readily available, and seasonality is no longer a factor in accessibility. Because of this, year-round sampling and analysis may be necessary to accurately reflect the components in some foods as the values may differ significantly due to differences in variety, growing conditions, storage, and transportation. In contrast, specialty vegetables may be grown in only one location and be picked and packaged during one harvest season, thus requiring a local and seasonal sampling protocol. Globalization of the food supply also affects manufactured products. For example, tomato-based soups may be produced all year round, but the source of the tomatoes could be from California, Mexico, or Israel depending on the season.

Databases generally contain composite values for commonly eaten fruits and vegetables that are averaged for seasonal variables and market share of major varieties. When new varieties that differ greatly in nutrient content are developed, new database entries may become necessary. For example, commercially grown heritage potato varieties are purple and yellow. If these differ significantly in carotenoid or flavonoid content from regular potatoes, new database entries will be needed. Ethnic diversity in the population and preferences for ethnic foods require expansion of databases to account for new foods and recipe ingredients. Many foods that may have been thought of as exotic in years past are now part of American cuisine.

The number of manufactured products continues to expand. Yearly output of new products from the top 25 food companies increased by more than 70% since 1999 (37). Since 2004 there have been more than 1,900 new product introductions for just the top 25 food manufacturers. The biggest contributors were Nestlé (Nestlé USA, Glendale, CA), Kraft (Kraft Foods, Inc, Northfield, IL), and Unilever (Unilever PLC, London, UK), with 209, 207, and 190 products, respectively, in 2005. When new foods are introduced into the food supply, those who maintain nutrient databases need to decide if these foods should be added; that is, if they are likely to be short-lived or may have staying power in the marketplace.

Food manufacturers are quick to respond to consumer trends. For example, in response to the popularity of low-carbohydrate diets, which began in 2003 and peaked in 2004, the food industry introduced more than 2,000 low-carbohydrate products by August 2004 (38). Ten percent of the total adult population was on a low-carbohydrate diet that year (39). Popularity of the diets waned, and by 2005 only 2.8% of consumers reported interest in low-carbohydrate dieting. Introductions of new low-carbohydrate products continue to decline, and many products have been removed from the market. Another example of a rapid change in the marketplace is that of whole-grain products in response to the release of the *Dietary Guidelines for Americans 2005* (40), which included a recommendation to consume at least three servings of whole-grain products per day. In anticipation of consumer demand, food companies increased production of whole-grain products, and in the 8 weeks after the release of the *Guidelines*, consumers purchased 12% more whole-grain breads, 19% more whole-grain rice, and 16% more whole-grain ready-to-eat breakfast cereals (41).

Data aggregation is a challenge for database compilers when brands try to distinguish themselves from competitors with different added nutrients and functional ingredients. Database developers need to differentiate among similar products that may have very different nutrient content. For example, the food name "granola bars" fails to capture the hundreds of products on the market designed for athletes, for energy, or for various health issues. If database developers do not distinguish among these products, data users will not be able to accurately estimate nutrient intakes.

SYNERGY BETWEEN FOOD COMPOSITION DATA AND DIETARY ASSESSMENT

Dietary intake information is collected as foods consumed, and increasingly, also as dietary supplements consumed. These food and supplement intake data are then converted to food component intakes using food composition databases (Figure 2). The ultimate goal of dietary assessment is usually to compare reported intakes to intake standards such as the Dietary Reference Intakes (42), or to food guidelines such as MyPyramid (32) (or, frequently, to both).

Improvements in food composition databases complement many ongoing advances in methods for collecting and evaluating dietary intake data. For example, the USDA Automated Multiple-Pass Method appears to capture food intakes from the previous day without the underreporting bias that has been problematic with traditional 24-hour recall methods (43). Another important new method for collecting survey data involves the use of a propensity questionnaire for measuring intakes of infrequently consumed foods (44,45). At the 2006 International Conference on Dietary Assessment Methods, these and numerous other advances in assessment methods were described (46). As computers have become smaller and less expensive and access to the Internet has expanded, dietary assessment has become more available to the public. For example, the USDA MyPyramid Tracker is a user-friendly Internet tool that can be used by consumers to evaluate their food and nutrient intakes (47).

Better estimates of food component intakes are now possible because the accuracy of the dietary assessment methods and the accuracy of food composition databases are improving. The credibility of the final intake evaluation is increased synergistically if both the food composition data and the dietary intake methods are of the highest quality.

INCORPORATION OF DATA INTO DIETARY ASSESSMENT SYSTEMS

Dietary assessment instruments such as 24-hour dietary recalls, food records, and food frequency questionnaires (FFQs) are linked to food composition databases that contain food names and levels of food components. The database associated with each instrument should be accurate, current, and represent foods and components of interest; be specific, precise, and uniform; and have no missing values. Researchers use 24-hour recalls and food records to obtain snapshots of individual diets in cross sectional studies and use FFQs to collect usual diets

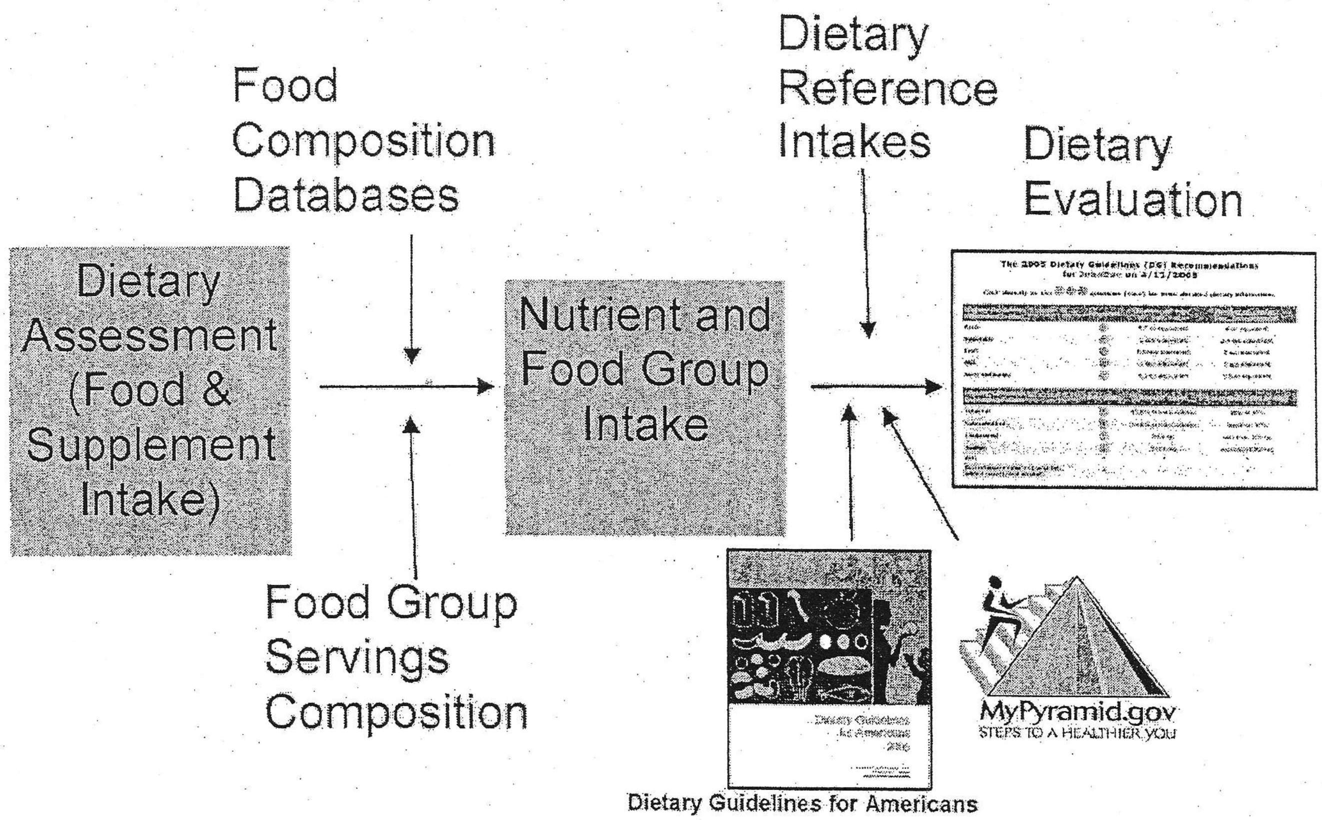

Figure 2. The dietary assessment process, in which food and supplement intake data are converted to food component intakes using food composition databases then compared to intake standards such as the Dietary Reference Intakes (42), or to food guidelines such as the Dietary Guidelines for Americans (40) or MyPyramid (32) (or, frequently, to both), resulting in a dietary evaluation.

generally in retrospective assessments, to evaluate past diets to determine relationships with current health measures.

Researchers use a database such as the FNNDS to code foods reported by participants in 24-hour recalls and food records; however, FFQs, which are the most commonly used instruments in large dietary epidemiology studies, require special considerations for food composition databases. FFQs do not obtain as much detail as 24-hour recalls and food records and, therefore, require the construction of a database of composite food codes with associated food components that represents each food line (48). FFQs consist of a list of foods with very little detail, and each food on the list represents many variations of that food or even a group of related foods. For example, pizza is a typical FFQ line item, and the food components associated with pizza must represent the myriad varieties of pizza that are available. Because the development of a FFQ food composition database is complicated and requires much consideration, existing FFQs (and associated food composition databases) that are used in nutrition epidemiology research could be consulted and considered before attempting to develop a new one.

The first step in the development of a food composition database for an FFQ is to identify the population of interest, foods and food components of interest, and the objective of the data collection (eg, rank individuals or provide intake estimates). The next step is to determine the source of the data used to build the instrument; the data should represent the foods and components commonly consumed in the population of interest.

The food list is constructed by identifying what the target population consumes or by using stepwise multiple regression techniques to identify foods that are the best predictors of dietary factors of interest. In the first approach, frequency data are evaluated to determine which foods are most often consumed by the target population. The multiple regression approach is favored when the goal is to identify foods that are most predictive of certain dietary components, such as fiber intake, percent energy from fat, or vitamin C. A list of foods is compiled from food composition tables or surveys that identify important nutrient sources, pilot tests are conducted to test the predictive value of the foods in the list, and foods with low predictive values are discarded. After multiple iterations of analysis a modest number of foods are identified that are most predictive of the nutrients of interest (49).

With regard to portion sizes for the foods, options for FFQs may be to collect no portion information (simple FFQ), specify a portion size as part of the food line item (semiquantitative FFQ), or include a discrete question for portion (quantitative FFQ). The Block Questionnaire for Kids—Ages 2-7 (50) is an example of the first option. An age-specific portion size is applied to each food line item that represents the average amount consumed by that population based on national survey data. The Harvard Adult Questionnaire (51) is an example of the second option. Two FFQs that use the third option are the Block Adult Questionnaire (52) and the National Cancer Institute Diet History Questionnaire (53).

The last step is to assign the food components of interest to the foods on the list. Options include assigning one food code from a number of available codes in a food composition database or using nationally representative data to derive weighted mean values for a cluster of similar food codes (ie, data-driven). The Harvard Adult Questionnaire uses the first method for assigning food component values to many foods on its FFQ, while the Block Adult Questionnaire and the National Cancer Institute Diet History Questionnaire use the data-driven approach. For example, the values assigned to the line item green beans in the Block FFQ represent more than 30 food codes in the FNDDS, and values applied to fruit drink portion ranges in the National Cancer Institute Diet History Questionnaire represent 58 food codes.

CONSIDERATIONS FOR SELECTING A DIETARY ASSESSMENT SYSTEM

Typical uses for database software are assessing dietary intakes and calculating the composition of menus and recipes. Important considerations for choosing an assessment system are appropriateness of the database for the intended purpose or target audience, efficiency of the search strategy for retrieving data, content and format of summary information, and cost (54-60).

The database developer for a dietary assessment system might begin with the NDSR database and then add or delete foods and/or food components, and then impute missing values. Alternatively, a database developer might use the FNDDS directly. The value added features of the FNDDS are coding aids for database users that help to standardize dietary intake collection methodology. For example, because survey participants, clients, and patients are not always able to provide accurate descriptions of the foods they eat, the FNDDS includes generic foods with the descriptor *not further specified*. Data for *not further specified* foods are based on data for similar or representative foods. Wise users will evaluate the database for availability of foods unique to the population of interest, quality of food descriptions, missing values, and availability of values for nutrients of interest.

The efficiency with which foods and data can be retrieved from a database depends on the software search engine. Search routines vary from a simple keyword that locates a single word at the beginning or elsewhere within the food name and descriptors to two or more words together or separated anywhere within the food name and descriptors. The ability to search for several words helps to narrow a search. For example, *tomato* will locate numerous foods, but *raw tomato* or *cherry tomato* will likely yield only one result.

For many, if not most, dietary assessments, the important result is the sum of food components found in a list of foods, as in the composition of a recipe, a meal, or foods consumed over 1 or more days. For menu development, composition of a 1-day menu may be the key result; for evaluating the intake of an individual, it may be the composition of foods eaten over several days. If printed material is needed for education purposes, the printed output should be simple and concise, with graphs to illustrate nutritional adequacy and the flexibility to display selected food components to highlight those key to the nutrition therapy, such as fat, saturated fat, or key vitamins and minerals. For research applications, data could be exported in a spreadsheet format to facilitate custom summaries and statistical analyses.

Cost drives many purchase decisions. Current listings in the *International Nutrient Databank Directory* (16) vary in cost from <$100 to >$8,000. Systems designed for clinical use are priced under $1,000, and systems with more limited databases and features designed for consumer use are <$100. These systems generally have databases compiled from NDSR data with additional brand name foods and data from food labels or manufacturers. Systems with unique features customized for research purposes are typically more expensive, partly because the programming is more complex, but also because the market for this functionality is limited to relatively few organizations. For example, ProNutra (61) was developed specifically for calculation of defined research diets controlled in many nutrients and including customizable calculation algorithms, with output designed for use in a research setting such as printed production sheets, intake sheets/menus, and electronic spread sheets. The Food Intake and Analysis System (62) is an adaptation of the USDA survey procedure and utilizes files containing recipes used in national surveys and retention values for nutrients that are altered during food preparation, such as increases and decreases in water and fat during cooking as well as loss of vitamins and minerals during preparation. The University of Minnesota Nutrition Coordinating Center Nutrient Data System for Research (63) has extensive, ongoing database development. It contains imputed values for 129 food components for a comprehensive list of generic and branded products and provides annual updates that strive to stay abreast of the US food market.

ARE FOOD AND NUTRITION PROFESSIONALS' NEEDS FOR DATA BEING MET?

Food and nutrition professionals need easy access to food composition data; databases that are continually updated with new foods and new food components important to the health of human beings; simple ways to keep abreast of changes in food composition data; a basic knowledge of how data are generated; and an understanding of uses and limitations of the data in a variety of practice settings. Continuing improvements in computer technology, software applications, Internet access, and wireless technology have improved access to food composition data (64). From the Internet, one can download or search US databases, calculate daily nutrient intakes, obtain label nutrition information for some foods, check the composition of menu items for some chain restaurants, access selected international food composition data, and learn about the featured food components of food commodities (64). A variety of multiuse software applications are available for personal computers (and personal digital assistants) as are programs tailored to the needs of specific practice areas such as school nutrition, clinical research, institutional and restaurant foodservice, food labeling, and education of practitioners (16,64). Novel software applications, including smart cards, personal digital assistants, and artificial intelligence (65-72) are being developed for a variety of practice settings. Despite this potential availability of data and software, not everyone has access to or uses the available technology (73-75). Food and nutrition professionals in all practice settings need easy access to the hardware and software required to use nutrient data, and software applications should perform required calculations such as evaluations based on intake standards at speeds needed for daily practice and with output in formats suitable for the intended audience.

Busy professionals need assistance to keep up with the profusion of new foods, exotic foods, modification of current foods, and new food components. Information can be found on the Internet, colleagues can be queried via practice group listservs, and food composition experts from around the world can be quickly contacted via E-mail. The American Dietetic Association (ADA) also helps practitioners keep current by including food composition information in their Daily News from ADA's Knowledge Center postings (76) and the *Journal* and by evaluating nutrition and health outcomes via the ADA Evidence Analysis Library (77). The National Nutrient Databank Conference is devoted to issues of food composition and fosters communication among database generators and users. The first meeting in 1976 was jointly sponsored by ADA and the Academy of Pediatrics (78), and the 30th National Nutrient Databank Conference in 2006 was a satellite to the ADA Food and Nutrition Conference and Exposition. Food and Nutrition Professionals are encouraged to attend this meeting for yearly updates with regard to advances in food composition and to visit the conference Web site (http://www.nal.usda.gov/fnic/foodcomp/conf/) for information about conference proceedings.

Food and nutrition professionals need a basic understanding of how food composition data are generated, the level of precision needed for the practice area, how to apply data to individuals and groups, and knowledge about important features for associated software. Despite available information about how to select database software, food and nutrition professionals may be uncomfortable making appropriate choices (79). With the increasing variety of available databases and software, food and nutrition professionals must be prepared to reconcile differences between different programs or databases (80,81) and guide clients in selecting and using software (82). Although graduates of dietetics education programs should be able to interpret the composition of foods (83), most college and university dietetics programs include few courses and little training in food composition data. As opportunities appear for food and nutrition professionals to use nutrient data (84-86), it is important that they develop competency in this specialized practice area. Perhaps a new ADA special interest or Dietetic Practice Group or a list of competencies for food and nutrition professionals who specialize in this area is needed.

CONCLUSIONS

Food composition databases are important tools for improving national health (87). Both availability and accessibility of data have improved along with the technology to convert the information into useful formats for planning diets, writing education materials, counseling patients, and conducting research. Despite the availability of current food composition information, data for some food components are still limited. Because new products continually appear in the food supply and scientific interests in new food components emerge through research, gaps will always exist between what databases contain and what food and nutrition professionals need from them. Needs for food composition data vary depending on dietetic practice area; however, most food and nutrition professionals will benefit from becoming more informed about food composition data, exploring new ways to educate themselves about databases and database systems, and advocating for what is most needed in dietetic practice.

Improved features of food composition databases work synergistically with improved dietary assessment software to provide a greatly improved ability to evaluate diets at both the individual and group levels. Food and nutrition professionals can play an important role in ensuring that food composition databases meet the highest standards and that they are used appropriately by consumers who are seeking better nutrition information and by health professionals in their research and practice. Better dietary assessment methods and better food composition data ultimately result in greatly improved estimates of dietary intakes.

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