The 38th National Nutrient Databank Conference (NNDC)
Oral Abstracts

THURSDAY MAY 15, 2014

Keynote Speaker:

- Phyllis Stumbo, University of Iowa - *2014 award recipient of an outstanding lifetime achievement in the area of nutrient databases.*
  Origins and Evolution of the National Nutrient Databank Conference; Chronicling Food Composition Databases from 1976 to 2014

SESSION 1: IMPROVING NUTRIENT DATABASES

- Impact of Nutrient Data Improvements on Analyzing Trends in Dietary Intakes
  Lois Steinfeldt, USDA Food Surveys Research Group
- USDA Food and Nutrient Database for Dietary Studies (FNDDS) 6.0, 2011-2012
  Carrie Martin, USDA Food Surveys Research Group
- Procedure for Adding Natural Language-Based Short Food Descriptions to a Food and Nutrient Database
  Lisa Harnack, University of Minnesota
- Updating and Expanding Nutrient Data Available for Pulse Crops
  David Haytowitz, Nutrient Data Laboratory

SESSION 2: NUTRIENTS OF EMERGING INTEREST

- Development and Application of a Database for Assessing Flavonoid Intakes in the U.S. population
  Rhonda Sebastian, USDA Food Surveys Research Group
- Nutrient Results from a Collaborative Nationwide Beef Study to Update Data in the USDA Database, 2007-2013
  Janet Roseland, USDA Nutrient Data Laboratory
- Do Lower Calorie or Lower Fat Food Products Have More Sodium Than Their Regular Counterparts?
  Joyce Maalouf, Centers for Disease Control and Prevention

SESSION 3: USING LABEL DATA

- Foods and Nutrients Consumed in the US, from Factory to Fork
  Emily Yoon, University of North Carolina
- Populating a Nutrition Database from Nutrition Facts Labels
  Marc Joliat, Info Access Inc.

- qDIET: Toward Calculating HEI Scores From Grocery Store Sales Data
  Valliammai Chidambaram, University of Utah

- Sodium Content of Foods Contributing to Sodium Intake: A Comparison Between Selected Foods from CDC's Packaged Food Database and the USDA National Nutrient Database for Standard Reference
  Joyce Maalouf, Centers for Disease Control and Prevention

FRIDAY MAY 16, 2014

Keynote Speaker:

- Pamela Pehrsson for Joanne Holden, USDA Nutrient Data Laboratory - *2013 award recipient of an outstanding lifetime achievement in the area of nutrient databases*
  Food Composition Data: Keeping Pace with Emerging Trends in Research and Database Applications

SESSION 4: PUBLIC PRIVATE PARTNERSHIP

- USDA Food Composition Databases: Moving into the Future
  Pamela Pehrsson, USDA Nutrient Data Laboratory

- Augmentation of the USDA National Nutrient Database: A Public-Private Partnership on "Branded Food Products Database for Public Health"
  Richard Brenner, ATIP Foundation, Alison Kretser, ILSI North America, John Finley, National Program Staff, ARS-USDA
  **Note: This abstract will also be available as a poster presentation on Friday, May 16th.*

SESSION 5: TOOLS AND METHODOLOGIES

- FAO/INFOODS e-Learning Course on Food Composition Data
  Ruth Charrondiere, FAO
  **Note: Full presentation will be available on the NNDC website*

- Challenges in Estimating Intakes from Non-daily Value Ingredients in Dietary Supplements (DS) Using Label Information: Case Study Energy Products
  Leila Saldanha, NIH

- Foodomics: Just Another Omics or a Useful Tool for Database Research
  James Harnly, USDA

- MenuStat: A Unique Restaurant Nutrition Surveillance Mechanism
  Elizabeth Leonard, New York City Department of Health and Mental Hygiene

SESSION 6: DIETARY ASSESSMENT

- Children's Healthy Living Program for Remote Underserved Minority Populations in the Pacific region: Challenges and Design of Dietary Assessment Methods Among Young Children 2-8 Years Old
  Carol Boushey, University of Hawaii Cancer Center
- The Impact of Conventional Dietary Intakes Data Coding Methods on Foods Typically Consumed by Low-income African American and White Urban Population
  Marie Kuczmarski, University of Delaware
- Estimation of Nutrient Intakes Using Data from the FDA Total Diet Study (TDS): A First Step in Revising the TDS Food List
  Judith Spungen, FDA
- The National Cancer Institute (NCI)'s Web-based Automated Self-administered 24-hour Dietary Recall (ASA24) Performs Similarly to a Traditional Interviewer-administered Automated Multiple Pass Method (AMPM) 24-hour Recall
  Thea Zimmerman, Westat

SESSION 7: INTERNATIONAL DATABASES

- Adaptation and Expansion of the Nigerian food, Recipe and Nutrient Database for Zambia
  Sue Day, University of Texas
- Development of a Nutrient Composition Database for Ghanian Foods
  Seth Armah, Iowa State University
- Food Composition Database for Bangladesh
  Nazma Shaheen, Institute of Nutrition and Food Science, University of Dhaka, Bangladesh
- The Forgotten Science: An Overview of the Influential Developments and Key Players within the Food Composition Program of Australia
  Yasmine Probst, University of Wollongong, Australia

SATURDAY MAY 17, 2014

SESSION 8: USDA UPDATE

- USDA's Key Foods List for NHANES 2009-10 and A General Nutrient Data Laboratory Update
  Pamela Pehrsson and David Haytowitz, Nutrient Data Laboratory
- The Building Blocks for Using What We Eat in America, NHANES Dietary Data
  Alanna Moshfegh, Food Surveys Research Group

Abstracts, Alphabetical Order

Development of a Nutrient Composition Database for Ghanaian foods

Armah, Seth MPhil[1]; Mohammed, Husein MPhil[1,2]; Ghosh, Shibani PhD[3,4]; and Fred Vuvor, Fred MPhil[1]

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2. School of Allied Health Sciences, University of Ghana, Legon
3. Nevin Scrimshaw International Nutrition Foundation, USA
4. Tufts University, Boston, USA

Abstract

Background: A comprehensive nutrient composition database is key in nutritional epidemiology for assessing intakes of nutrients and for informing policies looking at improving nutrition. Unfortunately, the existing Ghanaian food composition tables lack information on some micronutrients, particularly amino acids and some vitamins.
Objective: To develop a nutrient database for analyzing Ghanaian foods for their macro and micronutrient compositions.

Description: As part of a large clinical trial conducted in a peri-urban community in the Greater Accra Region, we developed this new database using field survey data, the USDA nutrient database for standard reference, and the Ghana Food Composition tables. For individual foods, the nutrient compositions were obtained from the USDA nutrient database matching the protein and energy content to foods in the existing Ghana Food composition tables. For composite foods, data were collected on the ingredients used in their preparation and their respective quantities. For each composite food, the nutrient composition of the raw ingredient was obtained from the USDA nutrient database. These nutrients were summed up (based on relative proportions of each component) to determine the total nutrient composition for each composite food. Total nutrient composition obtained for each food was compared to values in the Ghanaian food composition tables to ensure that the two sets of values were reasonably close, particularly for the macronutrients. Additional functions namely dietary diversity score, food variety score, contributions of animal and plant foods to total protein intake, and the contributions of different macronutrients to energy intake were incorporated into the database as measures of diet quality.

Conclusion: A comprehensive nutrient database of Ghanaian foods was developed which is vital tool for nutrition assessment of individuals and populations in Ghana.

Funding disclosure: Ajinomoto Company

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Children's Healthy Living Program for remote underserved minority populations in the Pacific region: challenges and design of dietary assessment methods among young children 2-8 years old

Boushey, Carol PhD, MPH, RD, University of Hawaii Cancer Center; Yonemori, Kim RD, University of Hawaii Cancer Center; Au, Donna MPH, RD, University of Hawaii Cancer Center; Novotny, Rachel PhD, RDN, LD, Human Nutrition, Food and Animal Science Department, University of Hawaii; Fialkowski, Marie PhD, MS, RD, Human Nutrition, Food and Animal Science Department, University of Hawaii; Wilkens, Lynne DrPH, University of Hawaii Cancer Center; Nigg, Claudio PhD, Department of Public Health Sciences; Guerrero, Rachel PhD, MS, RDN, College of Natural & Applied Sciences, University of Guam; Bersamin, Andrea PhD, Center for Alaska Native Health Research, University of Alaska Fairbanks; Niles, Kristine BS, Center for Alaska Native Health Research, University of Alaska Fairbanks; Areta, Aufa'i MA, American Samoa Community College; Kim, Jang PhD, Northern Marianas College; Johnson, Kathleen RD, University of Hawaii

Abstract

Background: Childhood obesity is increasing in all ethnic groups with a greater prevalence in nonwhite populations. The Children's Healthy Living (CHL) Program, a partnership between institutions in Alaska, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and Hawaii, was created to address obesity among children 2-8 years old. One of CHL's objectives is implementation of a community-randomized intervention in five jurisdictions, spanning 6 time zones.

Objective: CHL outcomes related to diet include: increase intakes of fruits, vegetables, and water; and reduce sugar-sweetened beverages. To establish a baseline of these behaviors and assess intervention impact, methods unique to the study and to the diverse populations were developed.

Description: We designed an easy-to-carry booklet, the Food & Activity Log (FAL), to include a dietary record, contextual information (place made, place eaten, other activities), and an activity log. Staff underwent training and standardization for distribution of the FAL and review upon return. Parent/caregivers were instructed to record for two randomly assigned non-consecutive days, provided calibrated utensils, and provided a Ziploc® bag to place food wrappers, labels, and packages (WLP). A novel method of storing the WLP as images was developed. Staff were trained to use the Pacific Tracker3 (PacTrac3) web application for diet, activity, and contextual information data entry. PacTrac3 modifications include saving data from all jurisdictions as a single data file in one secure location,

addition of foods specific to Pacific diets to the food composition table (FCT), capture of contextual information, entry of information exactly as recorded by parents/caregivers, and entry of an “unlisted” food when a ‘match’ in the FCT is not found.

Conclusion: Innovative methods developed for CHL have application to the current nutrition research environment, which increasingly includes diverse populations, multiple languages, distant research sites, and a changing food supply.

Funding disclosure: The support of the Agriculture and Food Research Initiative Grant no 2011-68001-30335 from the USDA National Institute of Food and Agricultural Science Enhancement Coordinated Agricultural Program and the National Cancer Institute P30 CA071789

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Augmentation of the USDA National Nutrient Database: A Public-Private Partnership on Branded Food Products Database for Public Health

Brenner, Richard ATIP Foundation; Kretser, Alison ILSI North America; Finley, John USDA/ARS

Abstract

Assessing the nutritional health of the American people depends on accurate and comprehensive data regarding the nutrient composition of commonly consumed foods. USDA maintains a National Nutrient Database of the composition of such foods, and although the food industry has compositional data for their own products, very little of that data is publicly available through the database. Accordingly, the USDA/ARS, the International Life Sciences Institute (ILSI) North America and the ATIP (Agricultural Technology Innovation Partnership) Foundation have formed a Public-Private Partnership to enhance public health by augmenting the USDA National Nutrient Database with “nutrient composition of branded foods and private label” data provided by the food industry. This partnership will ensure this information will be made available to those who utilize such data including the government, the scientific community, proprietary end users, and the food industry. The Partnership has established expert groups that are determining the specific requirements for execution of the project. Public listening sessions on the extent and scope of the project were convened in Cleveland, Ohio (October 10) and Washington, DC (November 14), the latter co-sponsored by the National Academy of Sciences Government-University-Industry Research Roundtable (GUIRR).

A public-private partnership provides the framework to convene the expertise to compile nutrient data on branded and private label products, secure the private sector engagement in providing this information, as well as the broad-based constituent funding necessary to maximize content and provide timely information for nutrition, agricultural and diet-related health policy on the nutrient composition of the U.S. food supply.

This presentation will include segments from the three Partners in this initiative and information on the Implementation Phase and beta-test.

FAO/INFOODS E-LEARNING COURSE ON FOOD COMPOSITION DATA

Charrondiere UR[1]; Rittenschober D[1]; Nowak V[1;] Nicodemi C[2]; Petracchi C[2];
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Abstract

Background: The knowledge to correctly use and manage food composition data is key to many applications in nutrition and also in agriculture. However, many universities do not include food composition in their curricula and the available post-graduate courses and tools (FAO/INFOODS distance-learning tool *Food Composition Study Guide* or the EuroFIR e-learning) are not sufficient to fill this knowledge gap. Therefore, the FAO developed a new e-learning course on food composition.

Objectives: To increase the knowledge dissemination on food composition (generation, compilation and use) to self-learners and especially to permit universities to incorporate food composition into the curricula of nutritionists, dieticians, food scientists etc.

Description: The e-learning course is based on authorative documents on food composition. It comprises 12 stand-alone, self-paced lessons each lasting approximately between 30 and 45 minutes, to facilitate self-paced learning. The course gives a comprehensive knowledge on essential issues related to food composition (food, components, quality, biodiversity, compilation. It is interactive, includes knowledge assessment tests and exercises. The content was separated into first and second level knowledge where the latter is normally retrieved through pop-up windows. The content was developed by FAO and an instructional designer has adapted the content to design e-learning lessons, also referred to as Reusable Learning Objects. The instructional approach used aims to accomplish learning objectives at the knowledge, comprehension and application level. It is available free-of-charge from the INFOODS website and can be taken as on-line version or a CD-Rom can be ordered. Since its launch in September 2013, more than 350 professionals have subscribed and/or ordered a CD from over 80 countries. The feedback was very positive.

Conclusions: The e-learning course is intended to be highly promoted to universities to allow future generations to have a basic knowledge on food composition which would contribute to improve the appreciation, availability and correct use of food composition data worldwide.

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qDIET: Toward Calculating HEI Scores From Grocery Store Sales Data

Chidambaram, Valliammai MSc[1]; Brewster, Philip PhD[1]; Tran, Le-Thuy PhD[1]; Jordan, Kristine PhD, RD[2]; Hurdle, John MD, PhD[1]. [1]Department of Biomedical Informatics and [2]Division of Nutrition, University of Utah, Salt Lake City, UT

Abstract

Background: Clinicians' counseling practices show patterns of low emphasis on weight control, nutrition, and exercise. There is grounded evidence that clinicians' involvement in obesity-related care has a strong influence on individual health behavior. Even with good counseling, patient compliance varies widely and is difficult to track. If the complexities of household diet quality could be reduced to a simple yet intuitive metric, such as the HEI, we could establish an objective care-counseling model, akin to HgA1C counseling for diabetics, that can be tracked over time to improve nutritional health.

Objective: Establish the viability of matching grocery sales UPCs to the FNDDS as a first step in detecting dietary signals using household grocery data, and validate that UPC-based HEI scores are comparable to HEI scores derived from NHANES data.

Description: Partnering with a national grocery chain, we obtained 12+ months de-identified point-of-sale records for 142,000 households across 4 geographic locations. To minimize the use of proprietary databases *and* to sustain mapping as new foods are added to market, we built an object-oriented framework in Java (qDIET) that crawls the Web using point-of-sale data (UPCs and *abbreviated* item descriptors found on sales receipts) to obtain semantically meaningful *complete* product descriptions. On a preliminary sample of 12,000+ UPCs, we matched sales data to Web data over 70% of the time (much of the missing data were "house-brands"). qDIET's ability to match these complete Web descriptions to FNDDS descriptors or the nearest nutritional "neighbor" completes the crosswalk and shows promising results. We hand-mapped a week's worth of UPCs to FNDDS for 42 households; their calculated HEI distribution compared favorably to NHANES (2007-08).

Conclusion: These results suggest it may be possible to model HEI scores for households longitudinally using grocery data, with the long-term goal of integrating dietary metrics into the electronic health record.

Funding disclosure: Supported by National Library of Medicine Training Grant #T15LM007124, an Innovative Research Grant from the Utah National Children's Study, and a Seed Grant from the VP for Research, University of Utah.

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MenuStat: A Unique Restaurant Nutrition Surveillance Mechanism

Clapp, Jennifer MPA; Leonard, Elizabeth MPH; Curtis, Christine Johnson MBA. All authors are affiliated with the New York City Department of Health and Mental Hygiene

Abstract

Background: Diet-related chronic disease, such as cardiovascular disease and diabetes, are leading causes of morbidity and mortality in the United States. Nearly one-third of calories consumed come from foods eaten away from home. There are many efforts underway to improve the healthfulness of restaurant foods and beverages but until recently, there has been inadequate information to monitor whether the restaurant food environment is changing as a result.

Objective: To present information about MenuStat, a free, online database launched in November, 2013 that allows for analysis of nutrition information across food categories, restaurants, and over time in foods and beverages sold by major, national chain restaurants.

Description: MenuStat includes nutrition information for thousands of foods and beverages from 66 of the top restaurant chains, ranked by United States sales. For example, summary descriptive statistics, including the mean and range sodium and trans fat content in chain restaurant foods, can be calculated by restaurant, food category, and other characteristics such as whether the item appears on a kids' menu. MenuStat will be expanded in 2014 to include nutrition data for three years (2012, 2013, and 2014) and updated annually. Making this type of information publicly available provides an opportunity to improve policy decisions, empower individuals, hold companies accountable, and ideally promote healthier restaurant foods.

Conclusion: MenuStat is a unique surveillance mechanism that can be used to map and

analyze the nutrient profile of restaurant foods and beverages, thereby providing insight into restaurant nutrition trends over time.

Adaptation and expansion of the Nigerian food, recipe and nutrient database for Zambia

Day, R Sue PhD; Douglass, Deirdre MS, RD; Ofodile, Sam BS; Chisenga, Shadrack MS; Maziya-Dixon, Busie PhD.

Abstract:
Background: A food, recipe and nutrient database does not exist for Zambia to enable determination of nutrient intakes of the population. Zambia currently has limited, incomplete nutrient and portion information on raw and singular foods. Previously, we developed a Nigeria food, recipe and nutrient database modeled after the US FNDDS including ingredients, recipes created using the nutrient retention factor methodology, and nutrient values from chemically analyzed portions. Few Zambian foods can be found in the Nigerian database.

Objective: Create a Zambia food, recipe and nutrient database similar to that of Nigeria and use the Food Intake Analysis System (FIAS) to add Zambian foods and recipes. Utilize the newest Zambian population survey to identify commonly consumed foods, preparation methods and portions. Kitchen test recipes and chemically analyze new recipes and foods for nutrients.

Description: 15,000 food records reported in the Zambian survey of mothers and children were reviewed to identify foods not in the current Nigerian database. Mixed dishes not matching existing recipes had new recipes created in FIAS and were kitchen tested for nutrients. Portions for each food were reviewed and necessary conversions completed.

Conclusion: Few ingredients of the Nigerian database could be adapted for use in Zambia. Survey data from Zambia identified commonly consumed foods, and foods not found in the Nigerian database were developed in FIAS using descriptions and nutrient data from chemical analysis. New Zambian foods were incorporated with existing foods to make recipes. The rigorous methodology to create the Nigerian database was replicated using intake data from Zambia. Over time, the Nigerian database will become the Sub-Saharan African Food, Recipe and Nutrient Database (SAFRND) as other African country specific data are added. This database will facilitate policy makers and public health workers to estimate the nutritional status of the respective countries.

Funding disclosure: International Institute of Tropical Agriculture, Ibadan, Nigeria
United States Agency for International Development (USAID), Lusaka, Zambia

Swedish International Development Agency (SIDA), Lusaka, Zambia

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USDA Food Composition Databases: Moving into the Future

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Abstract

Objectives: The Nutrient Databank System (NDBS) maintained by the USDA-ARS Nutrient Data Laboratory (NDL) has for the past decade met most needs for food composition data. However, the system is more than 15 years old, and the food supply, data needs and IT functionality have changed greatly during this period. Enhancement, modification and/or replacement of the present system is needed to enable acceptance of a greater breadth and depth of data reflective of the fluidity of the food supply, capture data from multiple sources and maintain linkages with other sources of nutritional data.

Methods: Automation is needed to reduce labor needs (e.g., data importation, data processing and dissemination); this will allow for improved overall efficiency and user access. Changes in staffing are needed including the need for programmers, data managers and a computational scientist/system analyst to develop and implement long-term enhancements of the system. Enhancements include dissemination of date-stamped portions of the database on a “rolling” or intermittent basis, formulation automation (e.g., OCR, PRS), and interface to format, standardize and import incoming data, data processing bypasses, and data analysis functions.

Results and Significance: It is envisioned that these enhancements will allow better connectivity to related research and data generated by ARS’ Food Composition and Methods Development Laboratory and Food Surveys Research Group (Food and Nutrition Database for Dietary Studies), establishing a network of USDA databases, links, portals and data visualization capability. This online expanded resource is intended to be the authoritative and comprehensive source of food composition data for use by government and non-government researchers, industry and the other end-users. The goals of this effort also allow a larger contribution to the published scientific literature on food composition, and ultimately, an integrated web site where the user has immediate access to all USDA food composition information in one place.

Do lower calorie or lower fat food products have more sodium then their regular counterparts?

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Abstract

Objective: Compare the sodium content of a regular food product and their lower calorie or lower fat counterpart among four food categories.

Materials and Methods: In 2013, among a list of the top 20 food categories contributing most to sodium intake among the U.S. population, we identified four food categories that met the criteria of having regular products with lower calorie or lower fat counterparts. For each category, 2009 Nielsen Scantrak sales data was used to create a list of the ten leading brands. A standard protocol was used to search the manufacturer and other reliable websites to create a list of comparable regular and lower calorie or lower fat products under each brand, referred to as “matches”. Nutrient information comparable to what is found on a nutrition facts label was recorded and analyzed for all matching items.

Results: 278 matches of a regular product and its lower calorie or lower fat versions were identified across the four food categories: savory snacks (n=45), cheese (n=109), salad dressings (n=95) and soups (n=43). Tables are in progress assessing differences overall and those of at least a 25% calorie or fat reduction per 100 grams and per labeled serving.

Significance: Although “low calorie” and “low fat” are regulated terms, many additional descriptors are used to indicate lower fat and lower calorie products. For the purposes of this analysis we used products as marketed on the package to the consumer (such as” low fat”, “slim” and “100 calorie pack”). Results will inform whether reformulation to improve the nutritional profile of a product in one way affects other product attributes (such as lower calories, but higher sodium content).

Funding disclosure: Not applicable

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Procedure for Adding Natural Language-Based Short Food Descriptions to a Food and Nutrient Database

Harnack, Lisa; Setten, Shelly; Pettit, Janet; Nutrition Coordinating Center, University of Minnesota

Abstract

Background: Thousands of nutrition and diet-related applications (apps) are being developed for consumer use. Most need a food and nutrient database that includes food descriptions that are concise and match the way most people describe foods (natural language-based).

Objective: To meet this need we developed and applied a procedure for adding natural language-based short food descriptions to the University of Minnesota Nutrition Coordinating Center (NCC) Food and Nutrient Database, a database with over 18,000 foods including 7,000 brand name products.

Description: A procedures manual was developed that included more than 20 rules/guidelines. Key rules/guidelines included the requirement that each description be unique (no food may have the identical short food description as another). This rule was successfully adhered to. It was specified that food descriptions be no longer than 40 characters in length, although more characters is permitted if required so that food descriptions are unique. Short food descriptions (≤40 characters) were successfully created for most, but not all foods. Some brand name foods and foods with a variety of ingredient options (e.g. 'frosted, jelly filled, with nuts') required more characters. Another key guideline was to use language and word sequences that match the way most people describe food. NCC staff members who conduct 24-hour dietary recalls and code food records were assigned the task of developing short food descriptions due to their familiarity with the way people describe foods.

Conclusion: It is possible to develop unique food descriptions that are natural language-based. However, it may not be possible to make food descriptions for some foods as concise as app developers may prefer. The procedures used for this project may be useful to other database developers aiming to ensure their database is useful for consumer-oriented nutrition and diet-related apps.

Funding disclosure: Supported in part by a cooperative agreement from the National Heart, Lung, and Blood Institute (5U24HL061778)

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Foodomics: Just Another Omics or a Useful Tool for Database Research

Harnly, James PhD, Food Composition and Methods Development Lab; Pehrsson, Pamela PhD, Nutrient Data Lab; Haytowitz, David MS, Nutrient Data Lab; Beltsville Human Nutrition Research Center, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, MD

Abstract

Background: Metabolomics is defined in a very general way as the survey of small molecules in a tissue. When applied to foods, metabolomics is a survey of the nutrients and small molecules that constitute our diet. It is no surprise that there is now an emerging field of "Foodomics." The term is somewhat redundant since any database can be regarded as a repository of foodomics data. However, the term does convey an emerging attitude in the analytical community that an attempt will be made to analyze all the components in a food in a systematic manner, i.e. an attempt will be made to identify and quantify every peak in a chromatogram from a food extract. The concept of foodomics also suggests application to foods of many of the chemometric methods used for metabolomics. Pattern recognition methods are commonly used for data mining of metabolomics data: authenticating botanical materials and identifying adulterants. Such approaches could be easily applied to foods to identify similarities in the composition of different cultivars, changes in processed foods, growing year, or geographic sources of commodities. This can be done on a composition level, using database entries, or on a chemical level, using complex chromatograms or spectra.

Objective**:** Food data for beans, peas, and lentils listed in the USDA Nutrient Database for Standard Reference will be examined using chemometric pattern recognition methods to determine similarities, variability, and systematic changes with respect to cooking.

Description: Approximately 150 entries for raw, canned, cooked (with and without Na) will be analyzed using principal component analysis based on 30 variables (proximate, vitamins, minerals, and fatty acids). Distribution patterns and loadings (dependence on each variable) will be presented.

Conclusion: Data from the USDA database will be used to establish food patterns based on 30 or more food components.

Funding disclosure: Not applicable

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Updating USDA's Key Foods List for NHANES 2009-10

Haytowitz, David

Abstract

Background: The Nutrient Data Lab (NDL) has used the Key Foods approach to select and prioritize foods for nutrient analyses since the mid-1980s. This allows NDL to concentrate analytical resources on those foods that contribute significant amounts of nutrients of public health interest to the diet and is a major aim of the National Food and Nutrient Analysis Program (NFNAP).

Objective: The Key Foods list is updated every two years with each NHANES—What We Eat in America data release, in this case for 2009-10.

Materials and Methods: The Key Foods approach uses food composition data from the USDA National Nutrient Database for Standard Reference (SR24, 2011) for 13 nutrients of public health significance as identified in the 2010 *Dietary Guidelines for Americans*, intake data from NHANES 2009-10, and the *USDA Food and Nutrient Database for Dietary Studies (FNDDS 5.0, 2012)* to connect food composition and consumption data. For each food reported as consumed, the nutrient content was multiplied by the grams consumed, ranked by percent and divided into quartiles.

Results: The current Key Foods list contains 536 food items, comparable to NHANES 2007-08; minor shifts in the number of foods per quartile and the relative ranking of each food occurred. Eight foods fell in the 1st quartile (top contributors), e.g., milks comprised half of the 1st quartile due to vitamin D contribution (~45% of total intake), among other nutrients. There were 36 foods in the 2nd, 93 in the 3rd, and 399 in the 4th quartiles.

Significance: As the SR and the FNDDS are updated, periodic updates of the Key Foods list are essential. Key Foods, along with other information, provides NDL with essential tools to select and prioritize foods and nutrients for analysis and thereby provides current, representative data for researchers, policy makers, the food industry, and consumers.

Funding disclosure: USDA

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Food Composition Workshop: Nutrient Data Laboratory Update

Haytowitz, David and Pehrsson, Pamela USDA-ARS

Abstract
For more than 100 years, USDA has recognized food composition data are fundamental to nutrition research, food policy development, trade, health promotion, food product formulation, and food aid interventions. Today, the Agricultural Research Service, USDA, develops and maintains the National Nutrient Data Bank, a repository of food composition data which provides the foundation for most other US food composition database applications, e.g., What We Eat in America component of NHANES. Data are used by researchers in government, academia, and industry nationally and internationally. USDA's flagship food composition database, the USDA National Nutrient Database for Standard Reference (SR) hosts these data; SR, Release 26 (2014), contains values for about 8500 food items and up to 150 dietary components and is disseminated on the NDL web site: (www.ars.usda.gov/nutrientdata). Recent enhancements to the web-based SR Search program and Special Interest Databases for flavonoids, isoflavones, proanthocyanidins, and choline in foods will be showcased. Through collaboration with NIH, the CDC and FDA, USDA has developed the National Food and Nutrient Analysis Program (NFNAP) to generate nationally-representative, high-quality analytical data for important foods, e.g., approximately 500 foods which are the major contributors of nutrients of public health significance. Foods are purchased from a variety of locations, including retail outlets, fast food restaurants, and points-of-production sites in different geographic areas. Prepared food samples and quality control materials are sent for analysis to pre-qualified commercial labs and cooperators. To complement discussion of these data, a demonstration of existing and emerging databases on dietary supplements (Dietary Supplements Ingredients Database) will be included; this effort is a result of collaboration between USDA and the Office of Dietary Supplements (ODS), NIH. Maintaining comprehensive, current data on the composition of a dynamic food supply is ongoing and requires continuous support for research, data generation, including studies of variability, and data compilation.

Food Composition Data: Keeping Pace with Emerging Trends in Research and Database Applications.

Holden, JM Nutrient Data Laboratory, ARS, USDA (retired)

Abstract
A healthy population is a key resource for any country. To assure the health of a population scientists in government, academia, and industry conduct research to monitor national food (and dietary supplement) consumption patterns and to assess the impact of dietary patterns on health status. Current and accurate composition data for foods and supplements are an essential tool in these areas of nutrition research and food manufacturing.

Over the last 50 years food supplies have become more complex and dynamic, with the increase in multi-ingredient processed products, including restaurant foods, to complement animal and plant–based commodities. Foods have continued to evolve with advances in industrial technology, global ingredient supplies, and immigration.
Scientific interest in dietary components continues to expand. To keep pace with changes in food composition in light of emerging trends in research and consumption database developers must continue to track nutrients and other dietary components in foods and supplements that reflect the changing marketplace. Also, knowledge of food chemistry and production technology is essential to setting priorities for new or updated data entries. Guidelines for calculations must also be reconsidered. Scientists from industry, government, and academia must work together to contribute new composition data for foods and dietary supplements to public databases.

Funding Disclosure: Not applicable

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"**LabelGrabber" - Populating a Nutrition Database from Nutrition Facts Labels**

Joliat, Marc PhD; Joliat, Sharyn MSc, RD, Info Access (1988) Inc.

Abstract
Background**:** Nutrition Facts labels are presented to consumers and researchers as a source of nutritional information. Capturing this information for populating a nutrition database can be a time-consuming and error-prone manual process.

Objective**:** To define and implement a practical approach to capturing images of Canadian bilingual Nutrition Facts labels and unilingual US ones, and to produce nutrient data suitable for loading into a nutrient database, thus providing more robust, faster and less error-prone data preparation.

Description**:** Images of Nutrition Facts labels are captured from Internet web pages or from camera images, and processed by optical character recognition (OCR) from a computer screen image. Pattern matching using “Regular Expressions” (as found in Unix/Linux) is then used to parse nutrient names and values. “Wild Card” characters are employed to handle accented French letters or characters that are often misidentified by OCR (eg: letter “O” rather than the number “0”). All 240+ Canadian bilingual label formats are supported, as well as the differences in US nutrient names. Production results during the investigative phase showed an accuracy of 99.97% in automatically generating nutrient data from 696 labels, and a time of 25 minutes for handling 95 labels and loading the data into our database. The tool has been in production use for more than 18 months and continues to shows the same robust properties.

Conclusion**:** By exploiting currently available technology, we have produced a tool for accurate label data capture and data preparation. The elimination of manual errors and resulting data preparation speedup is significant.

Funding disclosure: Not applicable

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The impact of conventional dietary intakes data coding methods on foods typically consumed by low-income African American and White urban population

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Abstract
Objective: No gold standard exists when coding food intakes yet the method used may impact research findings. With USDA’s Automated Multiple Pass Method, individual foods consumed simultaneously are given a combination code. A review of dietary analysis publications revealed a lack of mention about the use of these codes. This study identified

foods consumed at mealtimes and the most frequently consumed foods by race when combination data were/were not utilized in coding.

Materials and Methods**:** The sample consisted of African American and White adults who participated in the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study and who completed two 24-hour dietary recalls (n=2177) Duplicate analysis methods were performed on separate datasets. The original dataset consisted of all foods where each food item retained its initial code. The revised dataset was derived from the original dataset by first isolating foods coded as individual items from those coded and assigned a combination. Foods assigned a combination code, like pancakes with syrup, were aggregated and associated with a food group, defined by major food component (i.e. pancakes), and then appended to the isolated foods.

Results: Differences existed in lists of foods most frequently consumed by mealtime and by race when comparing results based on original and revised datasets. Sausage/luncheon meat and poultry were only found on the daily list for African Americans, while ready-to-eat cereals and cakes/donuts/pastries only appeared on the list for Whites.

Significance: Use of combination codes provided better representation of how foods are actually consumed by populations. This information is beneficial when creating interventions and exploring diet-health relationships.

Funding disclosure: This work is supported by the Intramural Research Program, National Institute on Aging

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Sodium content of foods contributing to sodium intake: a comparison between selected foods from CDC's Packaged Food Database and the USDA National Nutrient Database for Standard Reference.

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Abstract

Objectives: The validity of sodium data from packaged food databases is unclear. Therefore, we evaluate and compare the sodium content of selected foods contributing to sodium intake as identified in the 2009 CDC's Packaged Food Database (PFD) with the sodium content for these foods identified in the 2013 National Nutrient Database for Standard Reference (SR26).

Methods: We evaluated data on sodium concentration (mg/100g) for 22 of 125 Sentinel Foods (e.g. white bread) in the PFD and compared it with data in SR 26. Sentinel Foods are foods identified by USDA to be monitored as primary indicators to assess the changes in the sodium content of commercially processed foods from stores and restaurants. The foods in this analysis were chosen to represent the top ten food categories contributing most to sodium intake among the U.S. population aged $\geq$ 2 years (e.g., bread and rolls) and among sociodemographic subgroups (e.g. frankfurters and sausages).The PFD is based on nutrient data from labels for food products comprising $\geq$80% of the 2009 sales volume (Nielsen ScanTrak) within each food category. The nutrient content for Sentinel Foods in SR is reviewed annually and based primarily on laboratory analyses of top selling brands. We used T-tests, when possible, to evaluate whether the difference in mean sodium concentrations was statistically significant ($P<0.05$).

Results: 844 products were evaluated in the PFD, between 3 and 126 products were evaluated per selected food. The coefficient of variation (CV) for the sodium content of the selected foods using the PFD ranged between 1.5% for one type (and brand) of ready-to-eat (RTE) cereal (3 products) to 31.2% for ready-to-serve chicken noodle soup (15 products). The mean sodium concentrations of 16 of the 22 (73%) selected foods in the PFD were within 90%-110% of SR26. The sodium concentration in SR26 was >110% of the PFD for ham (114%, P=0.356), and <90% for canned spaghetti with meatballs (84%, P<0.001), unflavored potato and tortilla chips (76%, P=0.204 and <0.001, respectively) and two brands of RTE cereals (65% and 77%, based on manufacturer data in SR26, no P-value).

Conclusions: The PFD foods with statistically significant differences in sodium concentrations <90% of SR could indicate a reduction in the sodium content from 2009 (PFD) to 2013 (SR) or under-reporting of the sodium content listed on nutrition facts labels. The high CV of some of the selected Sentinel Foods in the PFD suggests the potential for sodium reduction due to the variability of sodium concentrations among commercial food products.

Funding disclosure: The study was funded by the Centers for Disease Control and Prevention, Atlanta, Georgia.

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USDA Food and Nutrient Database for Dietary Studies (FNDDS) 6.0, 2011-2012

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Abstract

Background: The Food and Nutrient Database for Dietary Studies (FNDDS) is developed to code dietary intake records and calculate nutrient intakes for each two-year release of What We Eat in America, National Health and Nutrition Examination Survey (WWEIA, NHANES).

Objective: Describe landmark enhancements and updates for FNDDS 6.0.

Description: With every two-year release of FNDDS, the data undergo a process of review and update. Development of FNDDS 6.0 included an expanded three-pronged approach to enhance currency and support food and beverages collected in 2011-2012 WWEIA, NHANES: (1) Increasing foods and beverages in FNDDS is a major priority. Over 1,100 new items were added for FNDDS 6.0, nearly a five-fold increase compared to prior releases. New items reflect increased diversity of the U.S. marketplace. (2) Recipe Protocol Project provides evidence-based development of recipes and corresponding nutrient profiles for multi-ingredient items in FNDDS. Protocols provide a framework for selection of ingredients and amounts for a group of similar items. Approximately 1/3 of FNDDS items were addressed for FNDDS 6.0 and the remaining codes slated for completion by 2016. Documentation of this project will be released with FNDDS. (3) Descriptions and nutrient content have always been provided for each item in FNDDS, however, additional details are useful for research purposes and enhanced transparency of the database. Expanded characterization of foods and beverages were added for FNDDS 6.0 to provide detail about brand names, fortification, and if the item is prepared commercially, at a restaurant/fast food establishment, or at home.

Conclusion: FNDDS 6.0 will be available at http://www.ars.usda.gov/ba/bhnrc/fsrg. The enhanced database allows for new research analyses and provides additional detail on database development and food and beverage content.

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The Building Blocks for Using What We Eat in America, NHANES Dietary Data

Moshfegh, Alanna, Research Leader, Food Surveys Research Group, Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA

Abstract
Dietary intake data and research products from What We Eat in America (WWEIA), NHANES are used in a wide variety of venues to provide policymakers and nutrition researchers with accurate and comprehensive food consumption data on Americans. Since the launch of WWEIA in 2002, more than 100,000 dietary recalls have been collected across the diverse spectrum of the population. This session will focus on the "building blocks" for using WWEIA data. The AMPM, dietary data collection methodology and instrumentation, dietary databases including special purpose databases, data reports including data tables, briefs, and research papers, and recently developed WWEIA Food Categories will be described. In addition to highlighting the key features included in the AMPM and related databases, the specifics of the products and tools available from USDA to augment dietary data analysis will be described.

The forgotten science: An overview of the influential developments and key players within the food composition program of Australia.

Probst, Yasmine PhD, AdvAPD University of Wollongong; Cunningham, Judy PhD, Food Standards Australia New Zealand.

Abstract
Objective: Food composition, the science behind differentiation of the complicated matrix within food and beverages, has slowly gained recognition globally despite early challenges. This review aims to document the development of the food composition program in Australia with particular focus on the enablers and barriers to its progress.

Methods**:** A process of reference harvesting and unstructured telephone interviewing was conducted with experts noted in the identified references. Professional bodies were also consulted about their involvement in the Australian food composition program.
Results: A total of 23 food composition data sets for Australia were reviewed. The Commonwealth Department of Health, NHMRC, ARC, CSIRO and FSANZ were key organizations involved in the Australian food composition program over time alongside academics, nutritionists, dietitians and food chemists who also played pivotal roles in its development, through fluctuating funding levels and varied influence from overseas, particularly the US and UK. The program saw a stagnant period during the last decade of the 20th century following a very strong growth period during the 1970s and 1980s. The move from paper to computerized tables had a significant impact upon the workload and the shift to online databases in 2008 was another significant milestone.
Conclusion: Australia's food composition tables have not developed in isolation but have continued to evolve in line with international developments in nutrition science and with changes in data publication methods. If Australia's tables are to maintain their currency, significant investments in new analytical data are required, and skilled scientists are needed to drive this process.

Funding disclosure: Fellowship from the National Health and Medical Research Council

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Nutrient results from a collaborative nationwide beef study to update data in the USDA database, 2007 to 2013

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Abstract
Background: Through research collaboration, a comprehensive beef research study was designed and conducted between USDA's Nutrient Data Laboratory and meat scientists at

Colorado State University, Texas A&M University, and Texas Tech University, with support from National Cattlemen's Beef Association.

Objective**:** A comprehensive research protocol was developed for updating nutrient and composition data for retail beef cuts in USDA's National Nutrient Database for Standard Reference (SR).

Description: Sample collection and analyses were conducted in three phases: chuck and brisket; rib and plate; loin and round. Using a statistical sampling plan, 72 beef carcasses per phase were obtained with nationally representative quality grade, yield grade, gender and genetic type from six US regions. Retail cuts were fabricated, cooked, and dissected to obtain component weights for separable lean, fat, and waste. Nutrient values were determined by laboratories using validated methodology and quality assurance procedures.

Results: Full nutrient profiles for 42 cuts were released in the SR. Results indicated mean differences in amount of fat within the lean among three raw cuts from loin, chuck, and rib ($p<0.001$). Cooked fat levels differed when comparing grilled to roasted, where fat was lower in roasted than in grilled chuck ($p<0.001$) and loin ($p<0.06$), but fat was lower in grilled than in roasted for rib ($p<0.02$). New data for cooking yields for 45 beef items were derived from these cuts and included in USDA's new table (http://www.ars.usda.gov/nutrientdata). Retailer datasets for 20 cuts were released.

Conclusion: This research demonstrates the value of multifaceted research protocols which provided up-to-date beef data in SR, databases linked to SR, and retail labels. The retailer datasets help vendors meet federal labeling requirements whereas the cooking yield data table is valuable for developing nutrient estimates for foods.

Funding disclosure: Support is from the Beef Checkoff

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Updating and expanding nutrient data available for pulse crops

Rueda, Janice PhD, American Pulse Association; Haytowitz, David MS, USDA-ARS Nutrient Data Laboratory; Pehrsson, Pamela PhD, USDA-ARS Nutrient Data Laboratory

Abstract

Background: Pulse crops, which include dry beans and peas, lentils and chickpeas, are nutrient-dense foods that are unique because they are recognized in both the vegetable and protein categories within the 2010 Dietary Guidelines for Americans. In addition to providing non-animal protein, pulses are excellent sources of fiber and good sources of potassium, both identified by the USDA as “nutrients of concern” among Americans. Pulses are also rich in bioactive compounds that are increasingly being associated with preventative mechanisms of cardiovascular disease, type 2 diabetes and some cancers. While these nutrient dense foods are currently included in the National Nutrient Database for Standard Reference (SR), they were last analyzed over 30 years ago, and no data on cultivar, growing conditions and agricultural practices were obtained at that time.

Objective: The aim of this project is to obtain and provide updated and more detailed information on the nutrient content of pulses and expand the data to include compounds of emerging public health interest.

Description: Initial samples of chickpeas, lentils (red and green) and dry peas (yellow and green) will be collected following the 2014 harvest from the four highest producing states (Idaho, Montana, North Dakota and Washington). The 3-4 top cultivars of each crop type will be selected, and samples will be analyzed using accepted methods (AOAC), in qualified labs and under rigorous quality control procedures. Measurements of proximates, vitamins and minerals will be obtained, as will measurements of individual amino acids, fatty acids and bioactive compounds including flavonols, beta-glucans, lignans and lectins.

Conclusion: These new data will be disseminated in future revisions of the SR as well as newly developed special interest databases. Expanding available data on pulse crops to phytochemical compounds of emerging nutritional interest will serve to facilitate increased research on their role in preventing chronic diseases.

Funding disclosure: TBD

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Challenges in estimating intakes from non-daily value ingredients in dietary supplements (DS) using label information: Case study energy products

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Abstract

Released in 2013, the Dietary Supplement Label Database (DSLD) contains complete label information on DS sold in the US. DSLD currently contains >25,000 labels, with 1000 labels being entered monthly.

Objective: To profile dietary ingredients (DI) with and without Daily Values (DV) in DS sold as energy products.

Methods: The “Quick Search” option in DSLD identified dietary supplements with “energy” in the product name. DI composition as declared within the Supplement Facts panel was compiled from information in DSLD.The LanguaL® Dietary Supplement Thesaurus was used to categorize the DI in these products.

Results: 157 DS in DSLD had "energy" in the product name, (126 in non-liquid (mainly pills) and 31 in liquid [serving size >1 fl oz] form). Of the non-liquid forms, 52 of 126 (41%) declared caffeine on the label and 43 of 52 (83%) provided the amount of caffeine. Of the liquid forms 30 of the 31 (97%) and 9 of the 30 (30%) did so respectively. The % content of DI in energy products surveyed is shown below.

Table: Categories of DI contained in liquid and non-liquid energy DS.

		DSHEA Categories					
		Vitamin	Mineral	Herbal/ botanical	Amino acid/protein	Other DS to supplement the diet	Metabolite, constituent, extract, isolate, or combination
31 Liquid (>1oz)	#	25	12	13	10	3	22
	%	80.6	38.7	41.9	32.3	9.7	71.0
126 Non-Liquid	#	77	51	108	52	20	83
	%	61.6	40.8	86.4	41.6	16	66.4

Conclusions: Manufacturers generally declare the amounts of DI with DV within the Supplement Facts panel. However, the amounts of non-DV dietary ingredients are seldom declared. The non-DV dietary ingredients are often added as components of “proprietary” blends. Thus, estimating exposure to these DI from the label information is not possible.

Specialized databases for non-DV, DI of interest are needed from manufacturers, publications and/or analyzed data.

Funding disclosure: Office of Dietary Supplements, National Institutes of Health

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Development and application of a database for assessing flavonoid Intakes in the U.S. Population

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Abstract

Background: Flavonoids are polyphenolic compounds in plant-based foods that exhibit anti-inflammatory, anti-tumor, and antioxidant activity and could play important roles in preventing chronic diseases. One factor impeding study of flavonoid-health relationships is the need for more comprehensive databases of flavonoid content of foods/beverages. To address this gap, the USDA Food Surveys Research Group created a database that can be used to estimate U.S. flavonoid intakes.

Objective: Describe the development of (a) a database listing the content of the 29 predominant dietary flavonoids per 100 grams for all 7,174 foods/beverages in the Food and Nutrient Database for Dietary Studies (FNDDS) 4.1 used in coding foods/beverages reported in What We Eat in America (WWEIA) 2007-2008 and (b) corresponding files of flavonoid intake data, and report preliminary total flavonoid intake in the U.S.

Description: USDA's Expanded Flavonoid Database for the Assessment of Dietary Intakes was used as the basis for calculating flavonoid values for FNDDS foods. It was necessary to review and, in some cases, modify the specific SR codes used to represent the food or beverage in FNDDS in order to best capture flavonoid content. Decisions regarding these modifications are discussed in documentation to be released with the database. Also developed for days 1 and 2 were data files containing the flavonoid contribution of each food/beverage report and total flavonoid intake for each respondent. For individuals 2+

years, mean total intake of flavonoids studied was 218 mg/day. Tea accounted for 78% of flavonoid intake.

Conclusion: The flavonoid database of FNDDS 4.1 foods and the 2007-2008 flavonoid intake data files will be available at www.ars.usda.gov/ba/bhnrc/fsrg. These new resources will allow researchers to quantify, for the first time, flavonoid intake of the U.S. population and thus open up new possibilities for research on flavonoid-health relationships using WWEIA along with other NHANES health-related data.

Funding disclosure: Supported in part by a cooperative agreement from the Office of Dietary Supplements, NIH.

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Food Composition Database for Bangladesh (FCDB)

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Abstract

Objective: To develop updated and comprehensive FCDB in response to long-term change in food chain including emergence of high-yield variety (HYV) and limitations of current Food Composition Table lacking in reliable and valid compositional data for a considerable number of food items as well as nutritionally significant constituents.

Method: Primary compositional values for twenty key foods (KFs), prioritized on the basis of recent consumption-composition and consumption frequency (HIES, 2010), were generated using AOAC and FAO-recommended procedures. Secondary compositional data were collected from all relevant institutions and possible sources followed by a careful scrutiny for reliability, suitability and adequacy. Finally, all the data generated and collected were compiled using INFOOD compilation tool 1.2.1.

Results: Key foods for Bangladesh were identified and ranked using their composition-consumption frequency. A complete archival databank for foods, containing approximately 2575 entries, was constructed for the first time in Bangladesh. A comprehensive and updated FCDB was developed that provides primary analytical data for 20 prioritized key foods analyzed during last one year of research and secondary data on about 626 foods generated during the last three decades. Nutrients in the main table included proximate, SFA, MUFA, iron, calcium, sodium, potassium, zinc, magnesium, copper, vitamins C, B_1, B_2, B_6, folate, niacin eq., vitamin A, retinol eq., ß-Carotene while other nutrients and bioactive compounds viz. fatty acids, amino acids, antinutrient factors (phytate and oxalate), bioactive compounds (phenol, DPPH), heavy metals, total sugar, free sugar etc in the annexes. FCDB also included information on the inedible portion of numerous indigenous foods thereby increasing its usefulness in evaluating the food consumption of Bangladeshi population.

Significance: FCDB provides detailed information on nutrient composition of local foods and will serve as a basic tool for achieving sustainable nutrition security through supporting the government of Bangladesh in improving food and dietary planning.

Funding disclosure: The technical support from National Food Policy Capacity Strengthening Programme (NFPCSP), Government of Peoples Republic of Bangladesh and Food and Agriculture Organization of the United Nations (FAO);
Funded by EU and USAID

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Estimation of nutrient intakes using data from the FDA Total Diet Study (TDS): a first step in revising the TDS food list

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Abstract
Objective: In the FDA Total Diet Study (TDS), regional and seasonal samples of 285 foods representing the U.S. diet are analyzed to determine concentrations of mineral nutrients and a wide variety of contaminants. Results are mapped to foods reported in National Health and Nutrition Examination Survey (NHANES)/What We Eat In America (WWEIA),

and the mapped data are used to estimate nutrient intakes and contaminant exposures. Our objective was to determine the extent to which TDS-based estimates of nutrient intakes are comparable to estimates generated using the USDA Food and Nutrient Database for Dietary Studies (FNDDS) nutrient database. We have assumed that the extent to which these estimates are comparable can be used as an indication of the accuracy of TDS-based estimates of contaminant exposure.

Methods: We compared TDS results for individual foods with USDA nutrient composition data, and we compared TDS-based and FNDDS-based estimates of nutrient intake.

Results: Data on nutrient content of individual TDS foods generally were in the same ranges as values for similar foods in USDA nutrient composition databases. In addition, TDS-based estimates of magnesium, potassium, and phosphorus intake for the total population were comparable to FNDDS-based estimates of mean intakes of these nutrients. However, TDS-based estimates were lower than FNDDS-based estimates of mean intakes of calcium, iron, sodium, zinc, and copper, and higher than FNDDS mean intake estimates for selenium.

Significance: These results will be considered in revising the TDS food list to better reflect American diets. We are using the results to evaluate the potential benefits of mathematically combining TDS constituent data for ingredients rather than mapping data for TDS-analyzed food mixtures to mixtures not included in TDS.

Funding disclosure: Not applicable

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Impact of nutrient data improvements on analyzing trends in dietary intakes

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Abstract
Background: Knowledge of food and nutrient consumption patterns over time is important to research related to the health and well-being of the population. The USDA Food Surveys Research Group's multi-year Food and Nutrient Database for Dietary Studies (multi-year FNDDS) is designed to track changes in foods and facilitate analysis of intake

trends in the United States. Changes classified as “Data Improvements”, such as updated nutrient values representing improved analytical methods, replace existing values and may be applied retroactively to previous surveys. “Food Change” revisions such as changes in fortification are added to the database while keeping the previous values. Dates accompany each value to indicate the time period for which it is valid.
Objective: Describe the impact of “Data Improvements” accumulated over a 10-year period (2003 – 2012) on the mean intake of nutrients for ages 2 and over for the 2001-2002 What We Eat In America (WWEIA), National Health Nutrition and Examination Survey (NHANES).

Description: The 2001-2002 WWEIA, NHANES dietary intakes were recalculated using the improved nutrient values (“Data Improvements”) from the multi-year FNDDS for energy and the 60 nutrients released for the 2001-2002 survey. The mean nutrient intake amounts with the nutrient data improvements were compared to the mean nutrient intake amounts calculated without the improvements for males and females age 2 and over. Eighteen nutrients had differences ranging from 5% up to 65.1% ($p<.001$). The largest changes were in polyunsaturated fatty acids 18:4, 20:5, 22:5, and 22:6. The differences for fourteen nutrients, including energy, protein, carbohydrate, cholesterol, sodium, potassium, and caffeine were less than 1%.

Conclusion: The multi-year FNDDS is an important tool for analyzing trends in nutrient intake over time. This analysis has shown that some nutrients should be recalculated using the improved nutrient values before comparing across surveys.

Funding disclosure: Not applicable

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Origins and Evolution of the National Nutrient Databank Conference; Chronicling food composition databases from 1976 to 2014

Stumbo, Phyllis PhD, University of Iowa, Iowa City, IA

Abstract
Large projects require team effort to bring science from the laboratory to the consumer. The science of nutrition is an example of a complex environment that requires understanding and cooperation among the many systems that make up the flow of knowledge from laboratory to consumer.

The Nutrient Databank Conference is a prime example of the complexity involved in bringing the right nutrient mix from the farm to the fork (the 2004 conference theme in Iowa) or from the prairie to the plate (the 2010 theme in North Dakota).

The databank conference has played a role in the transfer of knowledge from nutrient data laboratory, national survey activities, regulatory bodies, private enterprise and individual researchers to practicing nutritionists and others for 38 years. How this organization has evolved, and grown, is a fascinating study of organizational function (and occasionally malfunction – or misfortune).

It serves this organization well to review the structure, the forces that alter the operation, how perceptions of the primary goal and activities can further or thwart progress and impact its effectiveness and even survival.

National Cancer Institute (NCI)'s Web-based Automated Self-administered 24-hour Dietary Recall (ASA24) Performs Similarly to a Traditional Interviewer-administered Automated Multiple Pass Method (AMPM) 24-hour Recall

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Abstract

Objective: To evaluate ASA24 in two studies.

Materials and Methods**:** Study 1 assessed data collected using ASA24 compared to AMPM. About 1200 participants were recruited from three integrated health systems using quota sampling. Participants complete two 24HRs, 4-7 weeks apart, and randomized into four study groups: 1) two ASA24s; 2) two AMPMs; 3) ASA24 first and AMPM second; and 4) AMPM first and ASA24 second. Study 2 assessed the validity of ASA24 compared to AMPM in a one-day feeding study. Eighty-one participants consumed three meals from a buffet. All containers were unobtrusively weighed before and after each participant served him/herself; plate waste was also weighed. The next day, participants completed either ASA24 or AMPM.

Results: Study 1: 95% of participants completed at least one recall and 80% completed two; response rates did not differ by recall mode. Estimated intakes of nutrients and food

groups were comparable for ASA24 and AMPM; for example, energy, 2132 vs. 2126 kcal; fat, 84.9 vs. 82.8 g; saturated fatty acids, 27.9 vs. 26.9 g; fiber, 18.4 vs. 18.4 g; and fruits and vegetables, 3.0 vs. 3.1 cup equivalents. Of participants randomized to complete one ASA24 and one AMPM, a greater percentage preferred ASA24. Study 2: Exact or close matches were recalled for 76.9% of items truly consumed among ASA24 respondents compared to 82.5% among AMPM respondents. Far matches were reported for 3.1% of items consumed for ASA24 compared to 0.7% for AMPM. The proportions of items excluded were 20.4% and 16.8% for ASA24 and AMPM, respectively. Median differences between reported and true intakes for energy, nutrient and most food groups were not significantly different between ASA24 and AMPM.

Significance: ASA24 performs well relative to AMPM recalls and is feasible for use in large-scale research. The tool is currently being updated to run on mobile applications.

Funding disclosure: Supported by government contracts

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Foods and nutrients consumed in the US, from Factory to Fork

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Abstract:
Background: Accurate, adequate, and timely food and nutrition information is necessary for planning and evaluating the effects of nutrition programs and policies, predicting future dietary intake trends and understanding the impacts of the changing food environment on health. We focus on the consumer packaged goods (CPG) food and beverage sector as it accounts for over 60% of caloric intake among US children and adolescents and is the most difficult component of the food supply to monitor due to the dynamic nature of product offerings.

Objective: We present results from a system that monitors changes in CPG in the US food supply, and how those translate to the foods and nutrients consumed, and their related health implications.

Description**:** We describe the Factory to Fork system that links barcode level information to FNDDS food codes reported as obtained from stores in WWEIA, the dietary component of NHANES. The system allows us to create a new composite nutrient profile for each FNDDS code weighted by purchase volume of all corresponding barcodes to be applied to US dietary studies to estimate mean intakes of energy, sodium, saturated fat and total sugar. Additionally, we are able to include estimated added sugar content of a subset of CPG products to begin monitoring the added sugar intake in the US.

Conclusion: This Factory to Fork system augments existing national nutrient surveys to provide a comprehensive and representative measurement of the types, amounts, prices, locations and nutrient composition of CPGs consumed in the US. We will know the exact products purchased by various subpopulations and we will use these results to weight the contribution of products to create subpopulation-specific nutrient profiles for application to subpopulation specific dietary intake studies. This system could also improve our understanding of the influence of store-type and chain on dietary intake.

Funding disclosure: Supported by the Robert Wood Johnson Foundation (RWJF) (Grants 67506, 68793, 70017), National Institutes of Health (R01DK098072), and CPC (5 R24 HD050924).

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