38th National Nutrient Databank Conference
Poster Schedule and Abstracts

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ABSTRACTS

Using technology to assess diet as an environmental exposure

Boushey CJ, Delp EJ, Ahmad Z, Roberts SM, Grattan LM.

Abstract
Background: Three Tribal Nations in the Pacific NW comprise the members of the CoASTAL cohort. These populations may be at risk for neurobehavioral impairment, i.e., amnesic shellfish poisoning from shellfish consumption as a result of repeated, low level domoic acid (DA) exposure present in local clams following hazardous algal blooms. Previous work with this cohort confirmed a high proportion of clam consumers, certain beaches may have clams with higher levels of DA, and high consumers of clams tended to have lower memory scores.

Objective: Two goals of the continued monitoring of the CoASTAL cohort include enhancing the assessment of: 1) repeated DA exposure through clam consumption; and 2) functional impact, specifically, short-term memory loss.

Description: Since clams are an episodically consumed food, the dietary record doesn't fully capture dose. Frequency questionnaires can capture long-term dose but not beach location or a relationship with short-term memory loss. To address these shortcomings, we modified the technology assisted dietary assessment (TADA) application to capture only eating occasions with clams. When an image is captured with an iPod running the TADA-domoic application, the user is prompted to identify the beach of origin of the clams from a list of 18 local, well-known beaches. An image initiates a 24-hour and 7-day countdown to complete a modified memory questionnaire administered on the iPod. Since clams are episodically consumed, two daily ecological momentary assessment prompts are randomly sent in the morning and afternoon to remind the participant to take images and monitor engagement. All data are sent via wifi to a central secure server. Cohort members piloted tested the application and responded favorably to using the application. In summary, to address this public health problem, an application running on an iPod to assess exposure to razor clams, identify the source of the razor clams, and assess short-term memory has successfully been implemented for use in the CoASTAL cohort.

Conclusion: The improvements in human exposure assessment coupled with outcome assessment will aid in understanding the functional impact of DA related memory disorders. This technology holds promise for use with other research challenges.

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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.

Developing a Systematic Approach to Estimating Added Sugars: Keeping Pace with a Dynamic Food System

Bricker, Gregory, MS; Kang, Jiyoung, MS RD; Li, Kuo-Ping PhD; Ng, Shu Wen PhD; Carolina Population Center, University of North Carolina

Abstract
Background: There is a growing interest in the role of added sugars in the food supply. Potential adverse health effects have made their use a subject of public health concern; however, it remains difficult to assess their prevalence in the food supply, as added sugar values are not required with nutrition facts panel (NFP) information.

Objective: To develop a systematic, batch-mode approach to estimate the use of added sugars in Consumer Packaged Goods (CPG) at the UPC level.

Description: To estimate the amount of added sugars in CPG, two sources of data are utilized: (1) NFP data with corresponding ingredient lists and; (2) nationally representative purchases of CPG for the years 2005 through 2009. Our team, with expertise in food science, nutrition, and programming, collaborated to clean, organize, and process the data. Ingredients for each product are linked to a matching ingredient nutrient profile from a proprietary commercial ingredient database. Constraints are applied to the ingredients using information gathered from FDA food labeling laws, scientific journals, or knowledge of typical manufacturing practices. Using a mathematical optimization technique (linear programming), we estimate the formulation of each product in order to then estimate added sugar content. For the purpose of this study, added sugars are defined as the extrinsic sugars and syrups added to food and beverages during production. We present results based on applying different linear programming assumptions to test the robustness of our findings.

Conclusion: This systematic batch-mode technique for estimating added sugars in CPG foods and beverages will enhance the capability of food composition databases to continually review and update estimated nutrients for commercial brand name foods.

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Sodium Trends in Selected U.S. Total Diet Study Food Categories and Individual Foods, 1991-2011

Briguglio, Stephanie MPH CPH; Spungen, Judith MS RD; Hoffman-Pennesi, Dana MS; Wirtz, Mark BS; Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration

Abstract

Objective: Identify trends in levels of sodium in selected U.S. FDA Total Diet Study foods sampled and analyzed from 1991 through 2011.

Methods: Trends were identified in Total Diet Study chemical contaminant data from 1991 to 2011, focusing on trends in sodium concentrations in canned soups, breakfast cereals, salad dressings, and specific foods.

Results: Levels of sodium in canned soups, breakfast cereals, and salad dressings as food groups showed varying trends over time. Specific foods such as ramen-style noodles showed gradually increasing sodium content from 1991 through 2009. Beginning in 2009, soups showed a gradual decrease in sodium content, suggesting soup companies may have voluntarily reduced the sodium content in their products in response to the 2008 National Salt Reduction Initiative.

Significance: These findings examine twenty consecutive years of sodium data, showing significant trends in sodium content in selected foods and food groups over time.

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Dietary Coding Methods for Infants in the Infant and Toddler Feeding Practices Study (ITFPS-2)

Brown, Amber, MPH, RD, LD[1]; Douglass, Deirdre, MS, RD[1]; Zimmerman, Thea Palmer MS, RD[1]; Harrison, Gail PhD[2]; Owens, Tameka PhD[3]; and McNutt, Suzanne MS, RD[1]
[1]Westat, [2]UCLA School of Public Health, [3]USDA

Abstract

Background: The ITFPS-2 collects ten 24-hour recalls on infants during their first two years of life using the USDA Automated Multiple Pass Method (AMPM). The diet recalls are coded in SurveyNet using the Food and Nutrient Database for Dietary Studies 5.0 (FNDDS).

Objective: To enhance SurveyNet coding procedures to allow for more complete nutrient analyses of infant dietary intake.

Description: Three procedures were developed to augment the coding of dietary recalls for infants: two estimate unknown amounts of breast milk or formula consumed based on infant age, and one standardizes formula food codes. First, age-based guidelines were established for coding breast milk fed from the breast based on research from the Gerber Feeding Infants and Toddlers Study (FITS) and the Davis Area Research on Lactation in Infant Nutrition and Growth (DARLING) Study. Second, age-based default amounts were created for infant formula and expressed breast milk when the amount the infant has consumed is unknown. Third, 44 infant formulas currently on the market, but not in FNDDS were matched to the nutrient profiles of existing formulas in SurveyNet to allow coders to easily select the correct code for a renamed formula.

Conclusion: Enhanced dietary coding procedures will provide more complete data on infant diets and a more accurate estimate of the nutrient profile of infants who are breastfed exclusively or partially.

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Average Weight of One Cup Raw Kale and Impact on Nutrient Intake

Chenard, Catherine, MS, RD, LD[1]; Smith, Karen L. MS, RD, LD[2]; Nonnie, Patricia [1]; Fadel, Hanan[1]; Zimmerman, Bridget PhD, MS[3]; Wahls, Terry MD, MBA[1,4] — [1]Department of Internal Medicine, University of Iowa Healthcare, University of Iowa, [2]Department of Epidemiology, College of Public Health, University of Iowa, [3]Department of Biostatistics, College of Public Health, University of Iowa, [4]VA Medical Center

Abstract

Background: Kale is a nutrient dense green, leafy vegetable often eaten raw in salads and added to smoothies. Its consumption is typically reported in cups. The weight for one cup raw chopped kale reported by the National Nutrient Database for Standard Reference is 67 grams, among the highest weights for raw green leafy vegetables, and higher than anecdotally observed locally. The Wahls Diet™ recommends consumption of three servings (six cups raw) green leafy vegetables per day, including kale.

Objective: Determine the mean weight of a measured cup of loosely packed 1" pieces of kale and evaluate the impact on nutrient intake for a data set of subjects who are expected to consume three servings green leafy vegetables per day.

Description: Curly and Lacinato kale were purchased from local grocery stores in December 2013. Six individuals weighed and measured one bunch of each type to determine bunch weight, number of stalks per bunch, percent refuse (stem ends, tough stems and tough midrib parts), number of loosely packed cups per bunch, and average cup weight of loosely packed 1 inch pieces. Twenty-four-hour dietary recalls collected with the Minnesota Nutrition Data System for Research will be recalculated using the average weight for one cup kale determined from local samples. Nutrient composition of diets calculated with the differing cup weights will be compared.

Conclusion: Mean (SE) cup weight for curly kale was significantly lighter than Lacinato kale [16.0(1.4) vs 21.3(1.4)g; p<0.0001]. Percent refuse was also lower for curly kale [(28.5(3.5) vs 42.0(3.5)%; p=0.012]. Calculated nutrient composition for one cup curly and Lacinato kale is 24% and 32% of that in the original 67g cup weight, respectively. Impact of the reduced cup weight on the nutrient intake of dietary recalls collected from subjects following the Wahls Diet™ is being assessed.

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Improving the Korean Food Composition Table by Applying Food Sampling Strategies and Food Analysis Network

Cho, Young-Sook PhD; Choi, Youngmin PhD; Kim, Se-Na MS; Kim, Jung-Bong PhD; Park, Hong-Ju PhD, Kim, Haeng-Ran PhD; Functional Food & Nutrition Division, National Academy of Agricultural Science, Rural Development Administration, Korea.

Abstract

Background: The Korean Food Composition Table has been published since 1970 and undated every five years by the Rural Development Administration (RDA). In 2011, the 8th version of the Food Composition Table was released. Due to the increasing demands of nutrient database users and generators, in 2013, RDA started a new research project to improve the data quality and quantity for the 9th version of the Food Composition Table.

Objective: The objective of this study is to introduce our new sampling strategies and food analysis network.

Description: Over 1,000 food items frequently consumed in Korea were selected as key foods using the results of the National Health and Nutrition Examination Survey. About 200 raw materials and processed food items will be collected and analyzed every year. Target nutrients, which were analyzed by corporative labs, were increased from 22 to 43 such as, vitamin B6, vitamin B12, vitamin K, vitamin D, folate, *trans*-fatty acid, etc. Analytical sample handling procedures and data quality evaluation systems were also established in collaboration with nine institutions. Korea food composition data are disseminated via the internet website www.koreanfood.rda.go.kr//fct/Fct_Intro.aspx. For now, this website is available only in Korean but we plan to launch an English website in 2015 for global users.

Conclusion: Our new project could provide sample handling information and analytical protocol information to researches working on similar fields as well as improve the quality and quantity of the Korean nutrient database.

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Comparison of Trienzyme Extraction Time for Determining Food Folates in Vegetables

Choi, Youngmin PhD; Cho, Young-Sook PhD; Kim, Se-Na MS; Kim, Jung-Bong PhD; Park, Hong-Ju PhD; Functional Food & Nutrition Division, National Academy of Agricultural Science, Rural Development Administration, Korea.

Abstract

Objective: Extraction of folates from food relies on enzymatic treatments to liberate the folates from the cellular matrix and deconjugate polyglutamate. The objective of this study was to compare between AOAC Official Method 2004.05 and the shortened digestion condition for the determination of food folates in vegetables.

Materials and Methods: AOAC Official Method 2004.05 digestion (3, 2, and 16 for protease, α-amylase, and conjugase) and shortened digestion procedure (1.5, 1.5 and 3 h for protease, α-amylase, and conjugase) were applied to extract folates from CRM 485(mixed vegetables) and vegetable samples. We determined and compared folate contents in 30 vegetables consumed in Korea by microbiological assay after the two extraction methods.

Results: In CRM 485 (certified value=315±28 μg/100g), the shortened procedure (293.0±2.5 μg/100g) gave slightly higher, although not significantly different, values compared to AOAC Official Method (281.5±10.8 μg/100g). Moreover, in vegetables, the shortened procedure gave statistically similar folate values compare to AOAC Official Method.

Significance: Our finding suggests that the shortened procedure would be applicable to most vegetable matrices, proving significant time saving.

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Adapting Nutrition Facts Panel Information of Foods for Use in the Factory to Fork Crosswalk System

Davis, Jessica MPH RD and Hollingsworth, Bridget, MPH RD; Carolina Population Center, University of North Carolina

Abstract

Background: The University of North Carolina Food Research Program's *factory to fork* monitoring system links time-specific purchase and consumption data to provide current, market representative nutrient information.

Objective: To align nutrient data of foods *as purchased* with foods *as consumed* to create one "per 100g" nutrient profile for similar products.

Description: Data at the Universal Product Code (UPC) level includes product description, attributes, package size, and nutrition facts panel (NFP) information obtained from commercial sources. Unique UPCs were linked to USDA 8-digit codes reported as obtained from stores in WWEIA, NHANES 2007-2008 and "prepared" programmatically to match the form of the USDA code.

UPCs requiring addition of ingredients to the packaged product (e.g., pudding mix requiring milk) received preparation instructions based on manufacturer's directions in the form of grams of added ingredient per gram of packaged product. Added ingredients used nutrition information from the USDA Standard Reference.

UPCs requiring cooking resulting in a change in water content and final weight received a yield factor specific to the food item and cooking method (e.g., cookie dough received yield factor 0.86 because drop cookies lose an average of 14 percent of total weight during baking). Yield factors were based primarily on the USDA's Food Yields:

summarized by different stages of preparation (USDA Agriculture Handbook No. 102, 1975).

UPCs requiring addition of ingredients after cooking (e.g., icing added to cake prepared from mix) were also based on the manufacturer's directions and USDA Standard Reference. The post-cooking ingredients did not receive the yield factor.

Conclusion: Preparation adjustments are important to ensure that products as purchased and as consumed are comparable. This work will reflect packaged goods requiring further preparation and will allow researchers to use food purchase data alongside food consumption data to capture changes in the US food supply.

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Adapting Nutrition Facts Panel Information to Link Beverage Product Data with Consumption Data

Davis, Jessica MPH RD and Hollingsworth, Bridget, MPH RD; Carolina Population Center, University of North Carolina

Abstract
Background: The University of North Carolina Food Research Program (UNCFRP) is creating a system that links time-specific purchase and consumption data to provide current, market representative nutrient information.

Objective: To align nutrient data of beverages *as purchased* with beverages *as consumed* to create one "per 100g" nutrient profile for similar products.

Methods: Information at the Universal Product Code (UPC) level includes product description, attributes, package size, and nutrition information obtained from commercial data sources. Unique UPCs were linked to USDA 8-digit codes reported as obtained from stores in WWEIA, NHANES 2007-2008 and, if needed, were converted to the

same form as the USDA code. UPCs that required addition of water (1mL=1g) received "form factors" to adjust the "per 100g" nutrient values. UPCs that required addition of other ingredients (e.g., milk) received preparation instructions in the form of grams of ingredient per gram of product, using nutrition information from the USDA Standard Reference. UPCs in fluid form received USDA code-specific "density factors" to convert nutrient values from "per 100mL" to "per 100g".

Results: Preliminary results are based on adjustments for beverages in 2007-2008, which included 29,722 UPCs, 133 USDA Codes, and 3 forms: ready to drink, liquid concentrate, or powdered mix. For example, a frozen orange juice concentrate contains 185 calories per 100mL in the unprepared form. When linked to 61210620 ORANGE JUICE, FROZEN (RECONSTITUTED WITH WATER), it receives a form factor of 4 and a density factor of 1.052. The resulting ready-to-drink orange juice contains 44 calories per 100g.

Significance: These adjustments are important to ensure that products as purchased and as consumed are comparable. It will enable the UNCFRP to begin using data on product purchases alongside data on consumption to capture changes in the US food supply and diet from the introduction of new products, reformulations to existing products, and shifts in dietary trends.

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The Importance of Analyzing Industry Fats for Nutrient Database Development

Dougherty, Lauren RD; Wolf, Hilary, RD; Kent, Laura MS, RD -- Department of Nutrition, Harvard School of Public Health

Abstract
Objective: To compare nutrient profiles of oils and shortenings on food labels with fats found in the USDA Nutrient Database.

Background: Every four years Harvard nutrient databases are updated in order to support the development of year specific food frequency questionnaires (FFQS) used in the Nurses' Health Studies, the Health Professional Follow-Up Study, and the Growing Up Today Study. A key component of database maintenance and update is the collection of current nutrient and ingredient information for the food items ("form foods") on the FFQS that are distributed to the cohorts. Data collection includes researching market share information, collecting current label information, and analyzing fatty acids for foods, as wells as fats and oils used as ingredients in our automated recipe program. One of the challenges in developing accurate databases arises from the lack of current and accurate nutrient information for newly developed fats and oils used as ingredients in food products.

Description: A list of ingredient fats was compiled from food labels used to develop food profiles for the 2010/2011 Harvard database. The USDA Nutrient Database (Standard Release 24) was then consulted to determine if the fats listed as label ingredients were maintained in the current USDA database. In addition, samples of fats and oils listed as label ingredients were requested from food manufacturers for onsite fatty acid analysis. Results: Sixteen fats and oils listed as label ingredients were not maintained by USDA, and only five samples were obtained from manufacturers for analysis.

Conclusion: It is difficult to develop and maintain year-specific nutrient databases without the availability of accurate nutrient profiles for label ingredients. More collaboration with industry is needed to accurately represent the nutrient profiles of ingredient fats and oils.

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AMPM Interview Methodology for Infants in the Infant and Toddler Feeding Practices Study (ITFPS-2)

Douglass, Deirdre MS, RD[1]; Brown, Amber, MPH, RD, LD[1]; Zimmerman, Thea Palmer MS, RD[1]; Owens, Tameka PhD[2] and McNutt, Suzanne MS, RD[1]; [1]Westat, [2]USDA,

Abstract:
Background: The Infant and Toddler Feeding Practices Study (ITFPS-2) is assessing the nutritional intake and feeding patterns of more than 4,300 children in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Up to ten 24-hour dietary recalls (24HR) are being collected on each child at specified points in time over their first 2 years of life using the USDA's Automated Multiple Pass Method (AMPM).

Objective: To customize the AMPM and 24HR data collection procedures to capture breastfeeding and formula feeding details that will allow for more specific data analyses. Details include whether breast milk was expressed, frequency of breast and bottle feedings (with formula or breast milk), amount of each bottle feeding, time of each feeding, and classification of eating occasions.

Description: First, the AMPM Main Food List (MFL) was customized by adding the term "expressed" breast milk to distinguish and quantify "expressed" breast milk from breast milk "from the breast". Second, two procedures were implemented to gather detailed information about formula and breastfeeding: 1) the respondent is prompted to report and categorize each eating occasion, including all breastfeeding occasions, even if the infant is exclusively breastfed; and 2) the respondent is asked to report the amount of expressed breast milk or formula consumed per feeding, instead of reporting one amount for the entire day. Westat interviewers previously trained on the AMPM attended a 9-hour training on the modified procedures, and their early interviews were closely monitored to ensure adherence to protocol.

Conclusion: Collecting this level of detail about infant feeding practices will provide a better understanding of patterns of consumption and facilitate more specific data analyses in this population. It may also improve reporting since the respondent is asked to report every feeding event.

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The Dietary Supplement Label Database (DSLD)

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Abstract:
Dietary supplements are significant sources of nutrients and other bioactive substances. About half of the American adult population and about a third of the children consume supplements regularly.

Objective: To develop a public use database containing label information from virtually all dietary supplement products offered for sale in the US, with a Web-based user-friendly interface providing ready access to the data.

Method: An *ad hoc* Federal Working Group provides guidance on the collection, classification, and handling of information from supplement labels.

Results: Launched in June 2013, this searchable database will grow to include most of the more than 55,000 different dietary supplements products available in the US marketplace. DSLD currently contains >25,000 labels, with 1000 labels being entered monthly. DSLD reflects what is printed on product labels and is available through the National Library of Medicine Web portal. The name and form of active and inactive ingredients, amount(s) of active ingredient(s), and information about the manufacturer/distributor of products, label claims, warning statements, and percent of daily value will be captured, along with a photograph of the entire label. Software applications permit simple and enhanced search options. Users will be able to locate specific terms in any dietary supplement label field. DSLD has a user interface designed to help users quickly find and sort information and links to other databases such as MedlinePlus®, PubMed® and NIH fact sheets. DSLD will eventually offer a selection of download *options. Currently there is an option to download single labels to Excel*.

Conclusion: DSLD will serve as a resource for professionals conducting population-based surveys and other epidemiological studies. Research scientists will use the DSLD to determine nutrient intakes from supplements used in populations they study. Product formulations are frequently adjusted, as is information on labels, and DSLD will be updated regularly to incorporate these changes.

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Decrease in the Trans Fatty Acid Content of US Fast Food French Fries 1991-2011

Franz, Mary, MS RD LDN and Sampson, Laura, MS RD LDN – Harvard University, School of Public Health, Department of Nutrition

Abstract
Objective: To demonstrate decreases over time in the analyzed trans fatty acid (TFA) content of commercially prepared fast food French fries.

Methods: Harvard University's School of Public Health Biomarker Lab analyzed fast food French fries in 1991, 2000, 2002, 2007, and 2011. The analyzed French fry samples consisted of 50% McDonalds and 50% Burger King for the analyses conducted in 1991, 2000, and 2002. Market share estimates were used to develop samples for the two later analyses, and consisted of 63% McDonalds, 19% Burger King, & 18% Wendy's fries in 2007 and 48% McDonalds, 27% Burger King, & 25% Wendy's fries in 2011. Information about the types of cooking fats used in the French fry preparation throughout the different time periods was obtained from industry labels and websites. All samples were analyzed using standardized extraction methods, and fatty acid isomers were identified via accepted validation techniques.

Results: The cooking fats used in the French fry preparation consisted of partially hydrogenated soybean oil in 1991, partially hydrogenated and hydrogenated soybean and corn oils in 2000, partially hydrogenated soybean, corn, and canola oils in 2002, partially hydrogenated and non-hydrogenated soybean, canola, and corn oils in 2007, and canola, corn, soybean, cottonseed, palm, and/or hydrogenated soybean oils in 2011. Over time the TFA content of the analyzed French fry samples were as follows:

5.4 g/100 g in 1991, 3.6 g/100 g in 2000, 2.7 g/100 g in 2002, 2.2 g/100 g in 2007, and 0.05 g/100 g in 2011.

Significance: The total TFA content of US fast food French fried potatoes decreased markedly between 1991 and 2011. The decline in the TFA of the analyzed samples was associated with a shift from the use of hydrogenated and partially hydrogenated cooking oils to non-hydrogenated oils.

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Recipe calculation of six Iranian Egg-Based dishes (KuKu)

Ghazizadeh, Mitra MSc., RHN and Behnammoradi, Mahmoud, MSc.

Abstract
Objective: Recipe calculation of six Iranian egg-based dishes (KuKu).

Material and Methods: In this study, the composition of 100 g edible portion of six Iranian egg-based dishes (KuKu) have been calculated, based on the composition of edible part of raw ingredients. Kukus were prepared by mixing vegetables and herbs such as cauliflower, eggplant, green beans, green herbs and leafy vegetables, potatoes, and zucchini with eggs and seasonings. The recipes, especially the proportion of the main ingredients, have been adopted from the Honare Ashpazi cookbook (1). Cooking yield factors (YFs) have been measured by dividing the weight of edible part of cooked food to raw ingredients and have been applied at recipe level. The data for nutrient content of ingredients has been extracted from the online Canadian Nutrient File, USDA nutrient database, and Food Composition Tables for the Near East, FAO (2, 3, 4,). Retention factors (RFs) have been extracted from the USDA Table of Nutrient Retention Factors, which have been applied at ingredient level (5). The whole procedure, including preparation, cooking, calculating YFs and analyzing nutrient contents of each dish, was carried out in duplicate, and results have been reported as mean values.

Results: The Proximate/Energy component of 100 g edible part of dishes is: 45.22-75.61 g moisture, 1.54-2.10 g mineral, 4.84-6.22 g protein, 12.88-37.78 g total fat, 3.83-17.75 g carbohydrate, 1.30-3.82 g dietary fiber, and 148.18-391.54 Kcal energy. The dishes also contain 255.98-436.17 mg sodium, 1.79-3.67 g saturated fat, 0.22-0.81 g trans fat, and 99.64-173.77 mg cholesterol. Cooking yield factors of dishes are between 0.48 and 0.86.

Significance: These findings will be useful for professionals interested in knowing the composition of Iranian meals and also for individuals who are curious about their daily diet.

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Use of diet tracking websites as a resource for hard to find food label information: an example using specialty grocery store items

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Abstract
Background: Many specialty foods cannot be found in research-focused food databases, however brand and store names allows for web searches to find further information on food products that study subjects or the supplier were unable to provide. Popular diet tracking websites contain over 2 million foods, often entered by users, but the reliability of these data to guide dietary data entry decisions are unknown.

Objective: Five popular diet tracking websites were used to compare availability and accuracy of data for food items from a specialty grocery store that are currently unavailable in research-focused food databases.

Description: We compared actual food labels for 87 quick meal food items from a specialty grocery store to the food label information found on five popular diet tracking websites. Number of items found on each site, number of duplicate entries for same product, and discrepancies in serving sizes and calories found on food labels were compared. The percentage of items found on the five diet tracking websites varied from 99%-23%. For those food items with label information listed on the websites, the percentage of inaccurate entries ranged from 6-35%. However, the mean number of entries per food ranged from 1.1-3.2 entries and when alternate entries were included, the percentage of inaccurate entries increased by as much as an additional 23%. Inaccurate entries showed calorie discrepancies ranging from 9 to 400 kcal across the 5 sites.

Conclusion: Currently many grocery store food items are not available in the research-focused food databases. Caution should be used when referencing food label information on popular diet tracking websites for guiding research related data entry decisions. Other considerations include variations in completeness and accuracy of macro and micronutrient information on these websites as well as the inclusion of regulatory checks by the sites.

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Use of Automated Self-Administered 24-hour recalls (ASA-24) and Diet Quality Scores to Characterize Women Who Met or Exceeded Weight Gain Recommendations during Pregnancy

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Abstract
Background: Understanding the dietary patterns of women who exceed the 2009 IOM gestational weight gain (GWG) recommendations is crucial to promote healthier

pregnancies and improve birth outcomes. The ASA-24, a web-based tool to efficiently and inexpensively collect dietary data, was developed by the NCI and has been freely available for use by researchers since 2011. Dietary quality can be assessed with the Healthy Eating Index (HEI)-2010 and the Diet Quality Index-Pregnancy (DQI-P) based on recommendations for the general public and for women during pregnancy, respectively.

Methods: Women in the Pregnancy Exercise & Nutrition Feasibility Study (n=25), a workplace intervention to reduce the risk of developing gestational diabetes, completed ASA-24s during the 1st, 2nd and 3rd trimesters of pregnancy. HEI-2010 and DQI-P scores were calculated using ASA-24 output. GWG was calculated as the difference between the last weight measured before full-term delivery and self-reported pre-pregnancy weight. Women were grouped as meeting or exceeding the GWG recommendations. Differences in mean HEI-2010 and DQI-P scores and individual nutrient intakes at baseline and mean change from baseline to the 2nd and 3rd trimesters were compared between groups using t-tests.

Results: Women who exceeded the 2009 IOM recommendations had higher mean pre-pregnancy weights and GWG than those who met the recommendations ($p < 0.05$). Baseline mean HEI -2010and DQI-P scores were 61% and 67% of total possible points, respectively, and were not significantly different between groups; nor were mean macro- and micro-nutrient intakes. Likewise, there were no significant differences between groups in mean change in dietary quality scores or macro- and micro-nutrient intakes from baseline to the 2nd or 3rd trimesters.

Significance: ASA-24, HEI-2010, and DQI-P can be used to assess diet quality during pregnancy. These results reinforce the need for targeted interventions to improve dietary quality of women during pregnancy regardless of pre-pregnancy weight or GWG.

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French adults report a higher mean fluid intake with a fluid specific 7-day diary then with a 7-day food & fluid diary

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Abstract

Objective: Dietary questionnaires usually only assess the intake of fluids that provide energy but do not necessarily evaluate the total fluid or water intake. The study aim was to compare the fluid intake of 2 adult samples, representative of the French population and recruited in 2 independent cross-sectional surveys.

Methods: In the *Comportement et Consommations Alimentaires en France* (CCAF) 2010 Survey, 1352 French adults (age 18-79y; 42% men) recorded all intakes (food and fluid) with a 7-day food and fluid diary. In the Fluid intake Survey 2012 (FIS), 1534 French adults (age 18-79y; 52% men) recorded their fluid intake with a 7-day fluid specific diary.

Results: The mean fluid intake reported in FIS was significantly higher than the one in CCAF (1501±15ml vs 1277±14ml; p=0.0001). Compared to participants of CCAF, participants of FIS reported a higher intake of water, flavored water and SSB (resp. 552±10ml vs 737±12ml; 2±0 vs 16±2ml; 71±3 vs 106±4; all p<0.0001) and a lower CSB intake (82±6ml vs 64±4; p=0.0052). When comparing the frequency of drinking, more drinking events in total were captured in FIS than in CCAF (6.3 versus 4.7; p< 0.0001). These extra drinking events in FIS occurred during the aperitif (0.4 versus 0.2; p<0.0001) and between meals (2.1 versus 0.3; p<0.0001).

Significance: The hypothesis emerging from these results is that compared to a food diary, a fluid specific diary is more likely to accurately estimate fluid intake. However this hypothesis remains to be tested in a cross-over design. The consequence of this observation is that the adequate intakes for total water, based on national dietary surveys performed with food diaries, are possibly underestimated.

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The Quality and Cost of Diets Reported by Expanded Food and Nutrition Education Program (EFNEP) Participants in the Mountain Region When Entering and Exiting the Program

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Abstract

Objective: EFNEP is USDA's largest nutrition education program for low income people. Evaluations have consistently shown positive results, but the 24-hr recalls of dietary intake have not been widely used. Our objective was to compare the quality and the cost of diets reported by participants when entering the program with those reported when exiting. Because the 2005 Dietary Guidelines were in effect when the curriculum was developed, the Healthy Eating Index (HEI)-2005 was selected as the diet quality indicator.

Methods: Recalls were collected by trained paraprofessionals using a standard format and were coded using the Food and Nutrient Database for Dietary Studies. This study was a secondary analysis of data collected from 3,365 female participants in the eight states of the Mountain region from October 2010 through September 2011. We merged the intake data with the MyPyramid Equivalents Database and the USDA/CNPP Food Prices Database, which contains national average prices of foods reported in the National Health and Nutrition Examination Survey, to calculate mean HEI-2005 scores and mean food cost for entry and exit recalls. Significant differences were determined using the Wilcoxon signed-rank test.

Results: The majority of participants were Hispanic. At entry the mean total HEI-2005 score was 49.1 (out of a possible 100); and at exit, 55.2. Nine of the 12 component scores also improved significantly while Sodium worsened. The mean cost of the diets reported at entry was $4.35; at exit it was 12% higher, $4.76.

Significance: Because of the self-reported data, lack of biomarkers, and no control group, it is difficult to conclude that diet quality improved; however, it is likely that nutrition knowledge improved and led to short-term improvement in diet quality and was accompanied by an increase in food cost. The HEI can be used by to evaluate other nutrition interventions as well.

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Development of a Flavonoid Data Base for a retrospective analysis of the South East Arizona Health Study

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Abstract

Background: Dietary flavonoids from fruits and vegetables have been shown to positively balance cell proliferation and prevent cell carcinogenesis hence playing an important role in cancer prevention. Data show that dietary flavonoids could be considered as a useful cancer preventive approach. This study hopes to show significant preventive effects with high levels of dietary flavonoid intake.

Objectives: First, develop a database of flavonoid values for foods from the *Nutrition* Data System for Research (NDSR) dietary recall data. Further, the aim of this study is to assess total flavonoid intake in individuals with and without cutaneous squamous cell carcinoma. The study will investigate the potential existence of a dose-response for flavonoids in relation to skin cancer risk.

Description: An archived dataset from the Southeast Arizona Health Study 2 (SEAHS 1993-1999) containing 69,232 food lines from 2328 baseline recalls were reduced to average baseline values for 568 patients with complete case-control information. Foods identified from the diet recalls were matched to foods from the USDA Database for the Flavonoid Content of Selected Foods, Release 3, the USDA Database for the Isoflavone Content of Selected Foods, Release 2.0, and the USDA Database for the Proanthocyanidin Content of Selected Foods. Total Flavonoid values were then derived for each food.

Conclusion: Initial results are being examined and significant correlations between high flavonoid intake and presence of cutaneous squamous cell carcinoma is expected.

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Comparison of Selenium Content in Foods from Domestic and International Data Sources

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Abstract

Objective: Compare foods that have been analyzed for selenium across multiple food programs.

Methods: Data sources were identified to compare selenium content in various foods. These included domestic nutrient data sources like U.S. FDA's Total Diet Study and USDA's Standard Reference Database. International nutrient data surveys were also identified from Australia, France, Canada, and other countries. The foods in each selected program were compared across studies for selenium content followed by a focused comparison of foods that are major sources of selenium.

Results: When ranking food lists by selenium content, organ meats (offal) and fish/seafood were always at the top of the list. Outside of these two food groups, there was more variety with different meats, breads, grains, nuts and seeds, and eggs having a wide range of selenium content. There appears to be a difference in selenium content in similar foods between countries, likely due at least in part to known differences in soil selenium content.

Significance: The U.S. Total Diet Study suspended analysis of selenium in 2010. Twenty years of U.S. Total Diet Study selenium data from 1991 – 2010 were used to compare with the other domestic and international data sources. This study provides a unique snapshot of the selenium content of foods in the U.S. diet and how they compare globally.

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Creating nutrient profiles reflecting products purchased in the United States

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Abstract
Background: Currently, there are no existing food composition databases linking time-specific purchase and consumption data to provide updated, market representative nutrient information.

Objective: To link commercial time-specific UPC-level purchase and nutrient data to food codes as they exist in WWEIA, NHANES.

Materials and Methods: Product information data for UPCs, including product description, attributes, package size, nutrient information, sales, and purchase data, is obtained from various commercial sources and connected at the UPC-level. A team of Registered Dietitians reviews the 8-digit food codes reported in WWEIA, NHANES 2007-2008 and delineates groups based on similarities in food description and commercial categorization. We determine the best match between UPCs and 8-digit food codes considering consumer purchasing behavior. Unique UPCs are linked to multiple 8-digit food codes when appropriate, e.g. UPC for generic brand Grapefruit Juice 12oz can is linked to both *61201220 Grapefruit juice, canned, bottled or in a carton* and *61201020 Grapefruit juice, Not Specified as to form.* For an individual 8-digit food code, a nutrient profile is calculated from UPC-linked information, with weighting based on sales within the food code.

Results: To-date, we have completed the UPC to food code links for beverages reported in WWEIA 2007/08. From this work, we used 26,452 unique beverage UPCs and 226 8-digit food codes with food descriptions, to create 46,295 links between UPCs to corresponding food codes. Additionally, we discovered 327 UPCs that were purchased in 2007-2008 but could not be linked with food codes, and represent products like Almond Milk, Rice Milk and Chai Tea Latte Concentrate.

Significance: This system will be a valuable resource for understanding how the US food supply is changing and how those changes may affect diet. The food items and associated nutrient profiles will better reflect the diverse and constantly changing

products available in the US food supply.

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Food intake patterns of self-identified vegetarians among the U.S. population, 2007-2010

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Abstract

Vegetarians' food intake patterns vary in the extent that they exclude animal products, with some eliminating all animal products (meat, poultry, seafood, eggs, and dairy), some consuming dairy products, and some including both eggs and dairy in their diets.

Objective: We examined the differences of consumption of USDA Food Patterns food groups and subgroups, total calorie intake, and the number of food items between self-identified vegetarians and non-vegetarians in the U.S. population.

Materials and Methods: Weighted reliable food consumption data from day 1 of the National Health and Nutrition Examination Survey, 2007-2010 (n=15,453) and the USDA Food Patterns Equivalents Database, 2007-2010 were analyzed in the U.S. population aged 1+ using SAS 9.3.

Results: About 2% (n = 323; 2/3 of whom were females) of the population reported that they were vegetarians. The majority reported consuming some animal products; only 3% did not report any animal products. Compared to non-vegetarians, self-identified vegetarians consumed fewer calories (1862 kcal vs. 2058 kcal), but about the same number of food items (about 16) per day. Vegetarians consumed significantly less meat, poultry, solid fats and added sugars, and more soy, legumes, and whole grains than non-vegetarians. Both groups consumed about the same amounts of eggs, dairy,

seafood, fruits, and vegetables. After energy adjustment, vegetarians consumed significantly more fruits, vegetables, whole grains, and total grains than non-vegetarians per 1000 kcal.

Significance: A large proportion of self-identified vegetarians report consuming some type of animal products, such as meat, poultry and/or seafood. However, the food intake patterns of self-identified vegetarians contain more plant-based foods and whole grains with less solid fats and added sugars. Caution is needed in interpreting the term "vegetarian" from self-reports. Increasing fruit, vegetable, and whole grain consumption remains a targeted message for all populations.

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Sampling and Nutrient Analysis Program of Canada (SNAP-CAN): Vitamin and Mineral Enhanced Water (VW)

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Abstract
Objective: The objective of this study was to use SNAP-CAN methodology to generate VW nutrient profiles for inclusion in the Canadian Nutrient File (CNF).

Methods: Canadian market share data were used to identify the most popular VW products to sample. Samples were collected in 2012 from randomly assigned retail grocery and drug stores in Ontario. Three different lot numbers for each product were sampled and combined into a product composite for nutrient analysis. Nutrients were analysed according to validated and internationally accepted methods by Health Canada's CALA accredited laboratory in Toronto, Ontario. Data were reviewed, compiled and aggregated according to a standardized method. A subsequent comparison of nutrient values reported on product labels to nutrient values determined by our analysis was conducted.

Results: Analytical values for vitamins, minerals, sugars, caffeine, and moisture were generated for 14 national and 10 control brand products, representing 99 percent of the VW market. Product composites were grouped into generic profiles based on common

flavours and caloric content for entry into the CNF. A comparison of nutrient values reported on product labels to analytical data generated from product composites showed that added nutrient content in these fortified beverages can vary greatly from what is reported on the label.

Significance: The nutrient data from this study will support activities within Health Canada, such as the upcoming nutrition surveillance component of the Canadian Community Health Survey, 2015. VW nutrient data will be released into the upcoming publication of the CNF (2015) for general public use. The differences in label versus analytical values noted in this study highlight an important limitation to consider when using label values to populate nutrient databases.

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Dietary patterns of urban African American and White adults examined in the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) Study

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Abstract
Objective: To characterize the dietary patterns of the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study population and to evaluate the micronutrient adequacy of each pattern.

Methods: The (HANDLS) study, a prospective, epidemiological longitudinal study, was designed to examine the influence of aging, race, sex and socioeconomic status on the risk for development of cerebrovascular and cardiovascular disease in African American and White adults. Baseline data collection on this socioeconomically diverse cohort aged 30 to 64 years (n = 3720) began in August 2004 and ended March 2009. During baseline two 24-hr dietary recalls were collected by trained interviewers using the USDA Automated Multiple Pass Method. FASTCLUS, a SAS procedure, was used to

determine the clusters from 26 food groups and Mean Adequacy Ratio (MAR) was used to determine the micronutrient adequacy of each cluster.

Results**:** Ten clusters were identified and were named to reflect the food group which contributed the most energy to the cluster. The clusters were sandwich (44% energy), sweet drink (41% energy), pizza (38% energy), poultry (36% energy), frozen meal (35% energy), dessert (36% energy), alcoholic drink (34% energy), bread (27% energy), starchy vegetables (16%), and pasta/rice dish (16% energy). The MAR, which is based on 15 micronutrients, had scores ranging from 69 for the sweet drink cluster to 82 for the pasta/rice dish cluster. Of all the clusters, the cereal and fruit food groups were the next highest contributors of energy for only individuals consuming the pasta/rice dish cluster.

Significance: The MAR scores of all the clusters suggest inadequacies with respect to micronutrient intakes, especially antioxidant nutrients which may predispose this population to higher risk for developing chronic diseases.

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National Food and Nutrient Laboratory System in Korea

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Abstract
National Nutrient Laboratory System (NLS) is designed to develop robust and nationally representative nutrient content, with the expanding the quantity and quality of food composition data in Korea. NLS, an integrated system for food sampling(frequently consumed foods by the population in Korea using statistically rigorous sampling plans), food preparation and compositing, sample preparation, and analysis of samples by qualified analytical laboratories, quality control for lab, data review, was implemented in 2009 by the Ministry of Food and Drug Safety. Methods for careful handling of food

samples from acquisition to analysis were developed to ensure the integrity of the samples and subsequent generation of accurate nutrient values. To analyze of sample validated and internationally accepted analytical methods were used and quality control was performed using certified reference materials and in-house standards and participating FAPAS program. Analyzed components include energy, carbohydrate components (5 sugars, fiber), protein(17 amino acids), fat(26 fatty acids), 10 minerals, 7 vitamins and cholesterol. NLS has qualified a number of commercial food analysis laboratories and university laboratories for analysis of specific nutrients where specialized expertise is required. Once the analytical results are received by NLS from the labs, they are reviewed by NLS's Quality Control panel and released in annual updates of the Korea National Food Nutrient database Web Site (www.foodnara.go.kr/kisna). We will continue to update Korea's food composition databases to support nutrition-related research in the scientific community in analytical methodology, quality control procedures, statistical sampling, and data quality evaluation with numerous applications in trade, food safety, and research.

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Nutrient intake of older adults with mild cognitive impairment

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Abstract:
Objective: Mild cognitive impairment (MCI) is the stage between expectable age-related memory decline and the development of dementia and Alzheimer's disease (AD). MCI is characterized by mild memory problems that do not interfere with everyday activities but increase risk for further decline and AD. Previous literature suggests dietary patterns, as well as individual nutrients, may be associated with lower risk of cognitive decline and AD. The purpose of this study was to evaluate dietary intake of older adults with MCI compared to those with normal cognitive function for age.

Materials and Methods: Dietary intake data were obtained from two cohorts of generally healthy older adults: one with diagnosed MCI (n=46), and the other with age-related memory decline but not MCI (n=74). Participants recorded 3 consecutive days of dietary

intake, and the Nutrition Data system for Research (NDSR) program was used to calculate average intakes of the following nutrients thought to affect brain health: vitamin E, vitamin C, vitamin B12, folate, niacin, monounsaturated fatty acids, polyunsaturated fatty acids, cholesterol, saturated fatty acids, and fiber. Mean nutrient intakes of the two groups were compared using t-tests.

Results: There was no significant between-group difference in intake of any of the selected nutrients.

Significance: Despite our current knowledge of foods and nutrients thought to benefit brain health, these results suggest that those with MCI consume a diet, with respect to these specific nutrients, similar to their peers who have normal brain function. There may be deficiencies and/or excess consumption in unmeasured nutrients associated with memory status. This presents an opportunity to improve outcomes through better nutrition. Educating patients on diet modifications that may mitigate cognitive decline and forestall development of AD should be a priority of care providers.

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Default portions for use in food intake studies

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Abstract
Objective: Review and update default portion weights for foods and beverages in the USDA Food and Nutrient Database for Dietary Studies (FNDDS).

Methods: FNDDS is a database of foods and beverages, portion weights, and nutrient values used to code and analyze the dietary intakes collected in the national food intake

survey, What We Eat In America (WWEIA), the dietary component of the National Health and Nutrition Examination Survey (NHANES). FNDDS contains default portions, described as "Quantity not specified" (QNS), which are used as estimates of intake amounts when survey respondents are unable to report how much they actually consumed. QNS amounts are used to code approximately 1% of items reported in WWEIA, NHANES (est. 1,500 out of 134,000 items per year). QNS amounts were reviewed for foods and beverages in FNDDS, grouped by similar usage in the American diet using the WWEIA Food Categories. The QNS weight for each food/beverage was compared to the median consumption per occasion by WWEIA Food Category using the 2007-2008 WWEIA, NHANES dietary intake data.

Results: About half of the QNS values were confirmed to match the typical per occasion consumption amount for the category and were left unchanged. Median consumption values for food categories were used to update the other half of QNS weights for FNDDS 7 (for the 2013-2014 survey period).

Significance: Although infrequently used in WWEIA, NHANES, QNS amounts are necessary since respondents are not always able to reports amounts consumed. Review and update of QNS values using an evidence-based approach contributes to the quality of dietary data.

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Development of volume/weight conversion database for foods frequently reported in the Korea National Health and Nutrition Examination Survey

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Abstract

Objective: Volume to weight conversion of food intake is important in processing the results of dietary intake survey using recall methods. This study was performed to develop a volume to weight conversion database for individual foods commonly consumed by Koreans and reported in the nutrition survey of the Korea National Health and Nutrition Examination Survey (KNHANES).

Materials and Methods: A list of foods representing the usual diet of Koreans was derived based on the results of the 2010 KNHANES. Onto this, some fast foods frequently consumed by Korean population were added to develop a volume/weight conversion database. Foods were trimmed, prepared and/or cooked using various method or combination of methods such as peeling, chopping, blanching, etc. And volumes and corresponding weights of different portions were measured using customary volumetric measures such as measuring cups/spoons, graduated cylinders, rulers and digital kitchen scales. For some foods, volume was calculated using their length, width and height. Measurement was repeated 3-4 times for each food-portion.
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Results: We produced volume/weight conversion database for 1,200 food-portion pairs with matching pictures for most of them. This database includes 758 foods encompassing 17 food groups.

Significance: This database will be used in estimating ingredient food weights from food intake reported in volumes in KNHANES and it will enable more reliable estimation of food and nutrient intake of Koreans.

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Comparison of cooking yields and fat and moisture retentions in retail beef cuts

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Abstract

Background: Based upon USDA National Nutrient Database for Standard Reference (SR) data, tables of Cooking Yields and Nutrient Retention Factors for foods are developed, updated, and released by the Nutrient Data Laboratory (NDL).

Objective: To determine the effect of different cooking methods (roasted versus grilled) and cut size (roast versus steak) on cooking yield and percentage of moisture and fat retained after cooking.

Methods and Materials: Roast and steak samples from the chuck, rib, and loin were collected and analyzed as part of a comprehensive Nutrient Data Improvement (NDI) study conducted by the NDL in collaboration with Colorado State University, Texas A&M University, and Texas Tech University with support from National Cattlemen's Beef Association. Up to 72 animals were obtained from six representative US locations using a statistical sampling plan so that samples represented quality grade, yield grade, genetic type, and gender proportions available in retail beef. Roast cuts were roasted to internal temperature of 60°C and steaks were grilled to 70°C internal temperature. Raw and cooked analytical data were processed through Nutrient Data Bank System to obtain values for cooking yield, fat and moisture retention.

Results: Chuck and tenderloin roasts had higher cooking yields (p<0.001) and retained more moisture compared to respective steaks. Rib eye roast had lower cooking yield (76%) and retained less moisture (64%) than rib eye steak with 83% cooking yield and 72% moisture retention (p<0.002). Fat retention in tenderloin steak was higher than in the roast but didn't achieve significance. For each cut, n = 36.

Significance: Cooking yield data including amount of fat and moisture retained after cooking provide researchers, nutritionists, and consumers at retail level with valuable data for selection and cooking of retail cuts. USDA tables of Cooking Yields for Meat and Poultry and for Nutrient Retention Factors are available at http://www.ars.usda.gov/ba/bhnrc/ndl.

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How accurate are the nutrients available on restaurant websites?

Nickle, Melissa, MPH and Pehrsson, Pamela, PhD; USDA-ARS Nutrient Data Laboratory

Abstract

Objective: As part of the Affordable Health Care Act, congress passed a national law requiring restaurants with 20 or more outlets to post calorie information on menus and menu boards allowing consumers to make informed decisions when eating away from home. The objective of this study is to compare analytical nutrient data of popular fast foods to stated nutrient data available on company's websites at the same time.

Methods: USDA's Nutrient Data Laboratory (NDL) conducted a nationwide sampling of 12 popular foods for analysis from top fast food restaurants in 2012 and 2013; nutrient information for the same foods was also collected from the restaurants website. Foods sampled included stuffed crust pizza, breakfast sandwiches, French fries, chicken nuggets, burgers, beef burrito and nachos. Twelve restaurant locations for each of the leading restaurants were statistically identified using a multistage, stratified sampling plan developed for the National Food and Nutrient Analysis Program. Sample units of each food item were prepared for analysis using previously developed NFNAP protocols. Samples and quality control materials were analyzed by USDA-qualified laboratories using AOAC approved methods. Nutrients were compared on 100g basis; serving size information was also evaluated.

Results: Overall, serving sizes and nutrients were similar when comparing analytical samples to company's website. Serving sizes ranged from -19g (cheese nachos) to +31g (nachos supreme). Differences in calories ranged from -2kcal/100g (nachos supreme) to +42kcal/100g (breakfast sandwich), with 66% of samples having ≤5% difference. Sodium had a broader range of -111mg/100g (cheese nachos) to +64mg/100g (chicken sandwich). Total fat was underestimated in 92% of samples (+0.3g/100g to +4.0g/199g), whereas French fries were overestimated (-0.7g/100g). Protein was identical in 25% of the samples and underestimated in the remaining samples (range +0.1g/100g to +2.4g/100g).

Significance: The results of this research will support future public health policies and provide updated information for food composition databases.

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Lipid composition of some commonly consumed traditional Nigerian dishes

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Abstract

Objective: Determination of the traditional dishes consumed in Nigeria for lipid composition is of critical importance for assessing dietary intake because of the significant consumption of them. Lipids in the diet have been associated with the rising prevalence of many chronic diseases. This study aimed at determining the total lipid, free fatty acids, triacylglycerol, and cholesterol contents of twenty standardized commonly consumed Nigerian composite dishes.

Materials and Methods: The composite dishes included a blend of cereals, roots and tubers, legumes, fat and oil and vegetables and were analyzed for total lipid, free fatty acids, triacylglycerol and cholesterol contents spectrophotometrically.

Results: Burabisko (a millet based dish) had the lowest free fatty acid (0.06mg/100g) and cholesterol (1.89mg/100g) contents, yam with eggs (7.11mg/100g) and Miyan Kuka with Semovita (415.90mg/100g) contained the highest amounts of free fatty acid and cholesterol, respectively. Dishes with high triacylglycerol content contained proportionally high free fatty acid content. The total lipid and triacylglycerol content were lowest in Gbegiri with Eko, 26.37mg/100g and 3.11mg/100g, respectively. Stewed beans with fried plantain however had the highest total lipid (864.50mg/100g) content and yam with eggs had the highest triacylglycerol (122.46mg/100g) contents. The moisture content of the dishes ranged between 59.68%- 81.73% in melon seed with vegetable soup and Burabisko, respectively.

Significant: We have provided for the first time the lipid profile of standardized traditional dishes consumed in Nigeria. These dishes contribute a significant proportion of lipids to the diet of Nigerians, which are essential for assessing the nutrient intake of Nigerians.

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Retest decision-making using SAS for analytical laboratory data for vitamins and minerals in adult multivitamin/mineral supplements

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Abstract

Background: The Dietary Supplement Ingredient Database (DSID) provides estimated levels of ingredients in dietary supplement products sold in the US. Results from a study of adult multivitamin/mineral (MVM) products purchased in 2006-07 were released in the 2009 DSID-1 release, and updated in the 2012 DSID-2 release. A follow-up study of adult MVMs is in progress.

Objective: Improve the process of evaluating analytical lab data for retesting and acceptance of final data.

Description: 122 adult MVMs were purchased in multiple lots, and samples from each lot were sent to laboratories for analysis of 21 ingredients. Labs reported the detected amount of an ingredient per gram and these data were compared to labeled levels after adjustments based on tablet weights.

Samples were identified for retesting when the percent difference from label was higher or lower than expected, or variability among lots was high. In addition, blinded duplicate results and results for control materials sent in each batch were used to ascertain whether retesting of a sample was warranted due to bias for ingredients in that batch.

While all results were reviewed manually, an automated process was established to aid in the review. This process, implemented using SAS, evaluated analytical results and suggested potential retests based upon label level comparisons and the range of results from multiple lots. Final decisions for retesting were made after evaluation of quality control data. After considering each ingredient, the range of agreement between the SAS process and the final decision was from 73% to 91%.

Conclusion: Improvements in storing and processing laboratory analytical data have been made to foster a consistent process for reviewing data, and considering additional factors for making retest decisions. With refinement, this process can facilitate evaluating more data, such as more samples in future DSID studies, and comparisons to earlier DSID study results to examine trends in DS content over time.

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Beverage intakes of US adults and their influence on diet quality

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Abstract

Objective: Examine overall beverage choices of US adults and their influence on diet quality.

Methods: Study sample included nationally representative data for adults aged 20 years and older (2789 males, 2973 females) participating in What We Eat in America (WWEIA), NHANES 2009-2010. Beverage intake data were obtained from an in-person 24-recall collected using the interviewer-administered USDA 5-step Automated Multiple-Pass Method. Beverages were categorized into the following groups using the WWEIA Food Categories: 100% juice, alcoholic beverages, coffee and tea, milk (plain and flavored), dairy drinks and substitutes, sweetened beverages, diet beverages, and water.

Results: Water was the most reported beverage on a given day reported by 81% of adults, followed by coffee and tea (67%), and sweetened beverages including soft drinks (45%). Beverage intake contribution to daily energy intake was more than 1 out of every 10 calories. Beverages contributed substantially to daily intakes for several

nutrients including at least 40% of total sugars and vitamin C and at least 25% of vitamin D, riboflavin, calcium, magnesium, and potassium.

Significance: Beverages provide a source of water in the diet but can also contribute a significant amount of calories and nutrients. These data highlight the influence beverage intake has on overall diet quality in US adults.

Funding disclosure: Not applicable

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Iodine in foods: Progress toward a nutrient database

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Abstract
Objective: Determine the iodine content of selected foods.

Methods: The FDA 2008 Total Diet Study provides the iodine content of their market basket of foods. These data guided the selection of food samples from the USDA NFNAP program for subsequent determination of iodine. All samples were assumed to have measurable amounts of iodine. The food samples, along with quality control materials, were sent for analysis to a commercial laboratory.

Results: Analysis of 163 food samples from the NFNAP archives was completed and the data determined to be of high quality. The samples included fish, crustaceans, mollusks, baked goods, dairy products, eggs, and a variety of restaurant foods. Seafood varied widely in iodine concentration, ranging from less than the detection limit (10 mcg/100g) to as much as 300 mcg/100g. The bread samples had low amounts of iodine, possibly due to the change in dough conditioners away from iodates. Milk and milk products such as yogurt and cheese had moderate amounts of iodine. Of the five eggs samples analyzed, two samples known to be from supplemented hens, were about 4-6 times higher in iodine compared to the others, suggesting iodine supplementation of the animal feed. With supplementation

practices in the poultry industry evolving, periodic sampling and analysis of eggs is needed.

Significance: The food consumption patterns in the US population are changing, and the effect on iodine intake should be monitored. Compared with commercially prepared and restaurant foods; salt for home use is more likely to be iodized. Knowledge of the iodine content of foods purchased outside the home along with changes in the iodine content of foods such as bread and eggs is needed to make reliable estimates of the iodine intake of the population.

Funding disclosure: None

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Water from fluids is the main driver of total water intake in healthy French adults

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Abstract
Objective: Various international organizations have set dietary reference values for total water intake (TWI), which include both food moisture and water from fluids (total fluid intake, or TFI). To-date, the relative contributions of various fluid categories and food moisture to TWI are not well-described, though it is assumed that between 70 and 80% of TWI comes from fluids. The objective of this analysis was to determine the relative contribution of TFI and food moisture to TWI.

Methods: 190 healthy French adults (age: 25-40 years; BMI: 18.5-29.5 kg/m^2) completed online food and fluid diaries over three consecutive weekdays. TWI was determined from fluids in 7 categories (plain water, flavored water, milk products, still sweetened beverages, carbonated sweetened beverages, hot drinks, and alcohol), and water from food was determined from a database of food moisture for over 1300 generic foods.

Results: TWI was 2.80 +/- 1.30 L/day, with 1.91 +/- 1.19 L coming from TFI. TFI explained 91% of the variance in TWI (Pearson's R^2 = 0.91; p<0.001), while water from

food was highly variable and only moderately correlated to TWI ($R^2 = 0.18$). On average, 65% +/- 15% of TWI came from fluids. Moreover, linear regression demonstrated that the percentage of TWI obtained from fluids increased as a function of TWI (p<0.001), with the lowest deciles of TWI obtaining a lower percentage of water from fluid than the highest deciles.

Significance: Water from fluids is the main driver of total water intake, with drinking water as the primary contributor to water from fluids. In contrast, water from food moisture is highly variable between individuals and varies as a function of total water intake. Therefore an adequate intake based on TFI, or more specifically on drinking water, may be easier to put into practice.

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What Foods and Beverages Do We Eat in America?

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Abstract
Background: Detailed analysis of food and beverage consumption of the U.S. population is limited, yet critical for developing food guidance programs and dietary surveillance.

Objective: To demonstrate how the What We Eat in America (WWEIA) Food Categories provides an application to analyze foods and beverages as consumed in the American diet.

Description: The WWEIA Food Categories are intended for use with dietary intake data from WWEIA, National Health and Nutrition Examination Survey (NHANES). All codes contained in the Food and Nutrient Database for Dietary Studies (FNDDS) are sorted into 150 mutually exclusive food categories; each category is assigned a 4-digit number and description. The focus of this categorization is on grouping similar foods and beverages together based on usage and nutrient content.   The WWEIA Food Categories contain discrete food items and are not disaggregated; e.g. pizza vs. grain, cheese, tomatoes, etc. Designed to be flexible, the categories can be combined into

smaller or larger food groupings as needed to address specific research questions. A new version of the WWEIA Food Categories is produced for each 2-year release cycle of WWEIA, NHANES and FNDDS.

Conclusion: Potential uses of the WWEIA Food Categories include development of food guidance programs and educational materials, monitoring food and beverage intake and identifying trends.

Funding disclosure: None

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Adapting the Automated Self-administered 24-hour Recall (ASA24) for use in Canada

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Abstract
Background: The ASA24 is a freely available Web-based tool developed by the National Cancer Institute (NCI) enabling automated self-administered 24-hour recalls. Eliminating the need for trained interviewers reduces the cost of collecting dietary intake information in large scale studies.

Objective: The U.S. version of the ASA24 has already been used in Canadian research, but the need for a Canadian version was found necessary in order to improve data quality. Work was undertaken to modify the Food List Terms (FLT), food probes, and nutrient database to improve its application for Canada.

Description: Participants of two Canadian studies using the U.S. version of the ASA24 were asked to evaluate the tool. This evaluation helped identify which foods participants were unable to find. The data collected were used to add to the FLT and to outline which food categories needed to be modified to better reflect the Canadian market. Modifications applied to the Automated Multiple Pass Method (AMPM) tool, which had been used in the Canadian Community Health Survey – Nutrition (2004), were considered when modifying the ASA24. Nielsen marketing data were used to verify

brand name availability and popularity in Canada. Over 450 foods were added and approximately 800 foods were deleted from the FLT, mainly in the burger, margarine, cake, cereal, cookie, cracker, and sandwich categories. Most of these changes reflected differences with fast food restaurants and brand name items. Metric measurements were added for foods and beverages commonly consumed in standard size containers such as water, soda, beer and yoghurt.

Conclusion: ASA24 data are presently coded to U.S. nutrient values. Work is underway to map the data to the Canadian Nutrient File (CNF) and a Canadian recipe database used for surveys. This modified Canadian version will provide a better tool to help monitor the Canadian population for nutrients of interest.

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Prevalence of structure function claims: 2006-2007 Food Label and Package Survey

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Abstract
Objective: The Food and Drug Administration (FDA) studies product labels from the United States (U.S.) food supply through Food Label and Package Survey (FLAPS) to monitor industry response to FDA regulations and policies on foods. FLAPS 2006-2007 captures information on many aspects of the food labels of packaged foods. This FLAPS data were analyzed to obtain prevalence, claim types, and food sources of structure function (SF) claims. The SF claims describe the role of a nutrient or food component intended to maintain the normal structure or function of body (e.g., calcium builds strong bones).

Methods: FDA selected specific foods from the ACNielsen Strategic Planner sales database of the U.S. retail stores using a stratified, two-stage design with selection probabilities proportional to nationally estimated sales dollars. Products were purchased from retail stores across the U.S. and the detailed product label information

was recorded. FDA calculated product sampling weights based on sales data so that FLAPS estimate will be generalizable to the foods sold in all U.S. retail stores.

Results: The FLAPS database contains label information for 1,227 foods in 57 product groups. The weighted prevalence of the FLAPS foods with at least one SF claim was 5.5%, of which 1/3 had two or more SF claims. There were about 30 different types of SF claims and commonly found SF claims include claims about healthy bones and teeth, baby's brain and eye development, healthy weight, immune system, and energy metabolism. The SF claims were found commonly in the following product groups: infant formulas, cheeses, yogurts, cold cereals, refrigerated and shelf stable juices and drinks.

Significance: These results underscore the importance of FDA monitoring activities of manufacture use of SF claims on food labels.

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A network view on metabolic pathway of Kimchi, traditional Korean food, based on literatures

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Abstract
Objective: Analyze the metabolic pathway of Kimchi, Traditional Korean Food using integrated semantic modeling based on literatures.

Methods**:** We extracted several entities such as genes and disease to analyze the network of metabolites related to ingredients of Kimchi by semantic modeling using BioXM. Network-based systems biology tools, including Pathway Studio 9.0 were used to identify critical molecular players, disease network, and underlying biological processes.

Results: We presented the semantic modeling by using the heterogeneous data based on literatures and several public databases with BioXM. We initiated our metabolic pathway analysis of Kimchi with 4351 "seed genes", extracted as Methods. Seed genes were classified under 38 heads by the molecular functions of KEGG pathway, then the classified genes were directly connected to each other by interactions such as regulations, promoter binding and protein modification. The results from Pathway Studio analysis were examined in an attempt to characterize the integrated molecular mechanism involved in lipid metabolism process, neurodegenerative disease and cardiovascular disease among classified functions. With a long-term aim to search for a common molecular mechanism involved in the effect of Kimchi consumption, we renormalized the data for better comparability. Then, the number of specific bio-molecular network were built and analyzed in a variety of ways.

Significance: This network view may provide insights into the metabolic pathway of Kimchi as well as explanations about the effects of Kimchi consumption on human health.

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Nutritive profile of green tea (*Camellia sinesis*) in the USDA Food Composition Database

Somanchi, Meena, PhD and Pehrsson, Pamela, PhD; Nutrient Data Laboratory, ARS, USDA

Abstract:
Objective: Tea is the second most widely consumed beverage in the world. Green tea is made from unfermented leaves and has many health benefits. Scientific studies conducted, suggest that green tea may help treat atherosclerosis, high cholesterol, certain cancers, weight loss and diabetes. Even though the importance of green tea has been recognized by the medical and scientific community, the nutritive profile has not been extensively studied. The nutritive value on the labels of green tea products is limited only to a few nutrients. Therefore, a study was conducted to generate a more comprehensive nutritive profile of green tea, to be released into the USDA National Nutrient Database for Standard Reference (SR).

Methods: Lipton and Salada, the two top sellers of green tea, as well as a store brand were selected from 12 different locations across USA, as per the sampling methods followed by the National Food Nutritive Analysis Program. Proximates and some vitamins and minerals were analyzed at commercial laboratories using approved methods, in the green tea extract brewed in distilled water. Only minerals were subjected to statistical analysis, since the sample sizes for the other nutrients were small. The nutritive value of the three different brands was compared with each other. Kruskal-Wallis non-parametric ANOVA as well as a post-hoc test was conducted using SPSS-18.

Results: All values were expressed as mg/100g of extract ± SEM. Except for calcium, there were no significant differences in the minerals between the three brands (Mg: 0.3 - 0.6; Fe: 0.2-0.3). Post-hoc test revealed that the calcium content was significantly different between Lipton (0.36 ± 0.013) and Salada (0.68 ± 0.10, (p<0.008)).

Significance: The nutritive profile of tea green has not been extensively studied. This study filled the gap by analyzing the values of proximates, certain vitamins and minerals of green tea.

Funding disclosure: Not applicable

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Nationwide variation of sodium levels and portion size of Chinese restaurant menu items

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Abstract
Objective: Sodium levels are typically high in Chinese dishes due to use of ingredients such as soy sauce and monosodium glutamate. Chinese food is popular among many Americans, with the number of Chinese restaurants exceeding the total number of top three major fast food establishments. Since 2008, the Nutrient Data Lab has increased the number of Chinese foods analyzed through its National Food and Nutrient Analysis

Program (NFNAP) to expand their inclusion in the USDA National Nutrient Database for Standard Reference. Variability of sodium in Chinese foods was examined.

Materials and Methods: Twelve popular dishes were selected based on What We Eat in America, NHANES consumption data. Each dish was sampled from independently-owned restaurants in up to 12 nationwide locations using NFNAP's multi-stage, probability-proportional-to-size sampling plan. Sample units were homogenized by menu item and sent with quality control materials to pre-qualified laboratories where sodium was determined using the Inductively Coupled Plasma (ICP) method. Frequency of means, coefficients of variation (CV), and analysis of variance (ANOVA) tests were conducted.

Results: Mean sodium levels ranged from 252 to 553 mg/100 g among the 12 dishes, and differences in variability were indicated by CV's ranging from 13% (general tso's chicken) to 56% (lemon chicken). The weight of 1 order varied among the different restaurants for each dish, creating an even greater impact on the sodium level per order; e.g., an order of beef and vegetables from Oklahoma (average 461 g) had 544 mg sodium compared to 3791 mg in 1 order (average 649 g) from New York. Sodium levels per 100 g were consistent across four U.S. regions, but when based on an order size, significant differences were observed ($p < 0.0001$).

Significance: Researchers and dietitians should consider the high variability of sodium levels in prepared Chinese foods due to its impact on the amount of sodium consumed from these foods.

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An estimation model of the Healthy Eating Index 2010 to measure the dietary quality of grocery purchases

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Abstract:

Background: The Healthy Eating Index 2010 (HEI-2010) developed by the USDA is an ideal metric to assess the dietary quality of household foods. Related work linking point-of-sale grocery items to nutritional content potentially provides a means to monitor dietary quality systematically. However, the calculation of the HEI-2010 currently cannot be applied directly to all items in grocery shopping baskets due to a lack of nutrient and weight information for many purchased foods. To reduce the data's dimensions, we therefore estimate the HEI-2010 by mapping grocery categories to higher-order WWEIA food categories provided by the USDA.

Objective: Develop an estimation model of the HEI-2010 based on the WWEIA food categories to measure the dietary quality of grocery purchases.

Methods: As proof of concept we estimated the HEI-2010 scores for NHANES data (2003–2010). Each component score is calculated from a list of the corresponding nutrient densities of MyPyramid food group intakes, using the MPED. From the reported intakes and food nutrient information in NHANES 2003-2010, we assign numeric scores from the mean nutrient densities of the major MyPyramid food groups to the 150 WWEIA food categories. Each estimated component score of the HEI-2010 is then derived from the ranked sum of the WWEIA food category scores for the relevant MyPyramid food group. Our model of the HEI-2010 component scores was then applied to each NHANES dataset in NHANES 2003-2010.

Results: The standardized Cronbach's alpha coefficient to measure the pairwise correlations between computed and true component scores ranges from 0.65 to 0.95, with strong correlations (>0.75) for such nutritionally significant components as Whole Grains, Greens and Beans, Whole Fruit, and Seafood/Plant Proteins.

Conclusions: Our estimation model of the HEI-2010 shows promise for use with grocery data mapped to the WWEIA food categories, but will require refinement to capture nutrient-based components well.

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Nutrient content of pork sausages with emphasis on sodium and fat

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Abstract

Background: The Institute of Medicine (IOM) 2010 report "Strategies to Reduce Sodium Intake in the United States" concluded that a coordinated approach among government, industry, community groups, and consumers was needed to reduce the sodium content in food. Based on dietary data from NHANES 2007-2008, the CDC reported cured meats including pork sausages contribute 40% of the sodium consumed in the US. Objective: To evaluate nutrient content of raw pork sausage; to determine the effect of cooking on reduced fat and regular pork sausages; to update nutrient composition data for sausages in the USDA National Nutrient Database for Standard Reference (SR).

Methodology: Retail packages of several brands of regular pork sausage, reduced fat pork sausage and fully cooked pork sausage were purchased from 12 retail outlets using a nationwide sampling plan developed for USDA's National Food and Nutrient Analysis Program. Nutrient values for proximates, cholesterol and minerals for both raw and cooked regular (n=15), fully cooked (n=14) and reduced fat (n=4) sausages were determined by commercial laboratories using validated methodology. Quality control was assured through the use of standard reference materials, in-house control materials, and duplicate sampling. Data were analyzed using two-way ANOVA.

Results: The mean sodium value was highest in fully cooked sausage (810mg/100g) when compared to regular (740mg/100g) and reduced fat (580mg/100g). Raw reduced fat sausage compared to raw regular sausage was higher in protein, calcium, iron, and phosphorus ($p<0.001$); and lower in sodium (580 mg/100g) and fat (16g/100g) ($p<0.001$). Both types of sausages had elevated content for all nutrients previously mentioned plus cholesterol ($p<0.001$), after pan-frying.

Significance: Our study concurs with the label value on reduced fat sausage indicating 25% less fat than regular sausage. Lower sodium sausages and other data are available at www.ars.usda.gov/nutrientdata for researchers, health professionals and government agencies involved in the federal sodium reduction initiative.

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Features of the National Cancer Institute (NCI)'s Updated Automated Self-Administered 24-hour Dietary Recall (ASA24-2014) System

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Abstract

Objective: To summarize updates and new features of ASA24-2014 and ASA-Kids-2014.

Description: ASA24, developed by the National Cancer Institute and Westat, is a freely available web-based tool that enables automated self-administered 24-hour recalls. ASA24 consists of a [Respondent Web site,](#) used by respondents to report foods and drinks consumed, and a [Researcher Web site,](#) used by researchers to manage study logistics and obtain data analyses. Since ASA24's initial release in 2009, over 880 researchers have registered to use the tool and over 130,000 recalls have been collected. New versions of the Researcher and Respondent Web sites were released in early 2014 in response to feedback from researchers and based on data from evaluation studies. Goals of the update were to enhance usability and add new features of interest. Updates to the Respondent Web site include an enhanced search function for finding and reporting foods and drinks consumed, improved ease of use of tools for editing reported foods and drinks, and the provision of context-specific help. New Researcher Web site features include the choice of reporting period for recalls within a given study (yesterday from midnight to midnight versus the last 24 hours from the time of login), the option of collecting the source of each food and drink consumed, and an automated wizard to create respondent accounts and schedule recalls. In addition, the food probe database and nutrient analysis module have been updated to consolidate terms used to describe foods and drinks and to correct errors. Finally, new portion images have been added. These changes affect both ASA24-2014 and ASA24-Kids-2014, the latter of which is intended for use with children aged 10 years and older.

Conclusion: The release of the updated ASA24 system is expected to improve usability, enhancing its utility for a variety of research applications.

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The effect of editing open-ended text responses on nutrient and food group estimates from the Automated Self-Administered 24-hour Dietary Recall (ASA24)

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Abstract
Objective: To assess the impact on nutrient and food group estimates of editing recalls collected using the National Cancer Institute's (NCI's) ASA24 system.

Methods: The NCI Food Observing and Reporting Study (FORCS) compares nutrient and food group estimates obtained from ASA24 to standard interviewer-administered recalls among 1054 adults. This analysis involves one aspect of that study: data cleaning for ASA24. Within the ASA24 software, respondents are given two opportunities to enter open-ended text: "other" and "unfound food." "Other" is available as a response to questions about food details, such as brand name or cooking method. The system collects but does not use the text response, instead assigning a default food code. "Unfound food" is a response available if respondents cannot find a food they want to report; the ASA24 system asks a series of general questions to better identify the food, assigning a default food code. "Other" and "Unfound Food" data were reviewed to compare free-text responses to the default, system-assigned food codes to identify and correct mismatches. Nutrient and My Pyramid Equivalent (MPE) values of unedited and edited ASA24 data were compared to determine the effect of editing.

Results: The editing process required over 60 hours of specialized staff time. Edits were made to 268 foods (1.4% of total foods reported), affecting 188 intakes (18.5% of all intakes). The average difference in nutrients and MPE values per intake between the corrected and uncorrected files and the statistical significance will be presented.

Significance: The results of this study will help researchers using ASA24 to weigh the benefits and costs of manually reviewing open-ended text responses.

*At the time the research was conducted, LAC was an employee of Marshfield Clinic

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