41st National Nutrient Databank Conference

20-20 Vision for Food Composition Data:
Promoting Public Health Worldwide

Virtual Meeting
November 16-18, 2020
Program and Abstracts

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Note of Departures & Acknowledgements

Steering Committee departures:

- **Dr. Bernadette Marriott** (Steering Committee member). Dr. Marriott has volunteered her time to play various roles in past Conferences. She was member of the Program Committee in 2017 and Nomination Committee in 2018. Since the planning of the 41NNDC, she was an active member of the Steering Committee. We wish to thank her for all her contributions over the years.
- **Patricia Zecca** (NNDC Communications co-chair until November 2019). Trish volunteered her time as a co-chair of the Publicity Committee for the 40NNDC. She worked with then-co-chair Winnie Cheung and web designer, Stephen G. Hull, on the modernization of the web since the end of the 40NNDC until November 2019.

Publicity Committee acknowledgments:

- **Stephen G. Hull** (long time NNDC web designer until end of 2019)– Steve was instrumental in creating the first web presence for the NNDC. He has also provided support on all web-related work to promote Conferences of the NNDC, archived materials shared in past Conferences and supported the development and maintenance of the INDD.
- **Trevor Newman** (web designer)– Trevor is an independent web designer who has helped modernize the web presence for the NNDC and created the new website: www.nutrientdataconf.org. He also advised on web related activities and supported the first virtual Conference of the NNDC.

Thank you

Gracias

Merci

Mahalo

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Grazie

Danke sehr

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41st National Nutrient Databank Conference Sponsors

This work is supported by the National Institute of Food and Agriculture (NIFA) [grant no. 2019-67017-29256/project accession no. 1018656] from the USDA National Institute of Food and Agriculture.

Donations from: Natalie Partridge and Debra Sullivan

In Memoriam

Phyllis Stumbo (1934-2017)
University of Iowa

Marilyn Buzzard (1934-2015)
Nutrition Coordinating Center at the University of Minnesota
and Virginia Commonwealth University

Joanne Holden (1946-2014)
Research Leader, USDA Nutrient Data Lab

Frank Hepburn (1922-2003)
Leader, USDA Nutrient Data Research Group

Margaret Carrington Moore (1896-1995)
Louisiana State University Health Sciences Center, New Orleans, LA

Ruth Matthews (1927-2000)
Chief, USDA Nutrient Data Research Branch

Robert Rizek (1931-1997)
Director of Consumer and Food Economics
Research Division, USDA

The National Nutrient Databank Conference remembers and recognizes the contributions of the following volunteers, all of whom gave generously of their time, talents, and energy to the conference.

Message from the NNDC Executive Committee Chair

Welcome to the 41st National Nutrient Databank Conference and our first virtual conference. Our theme "20-20 Vision for Food Composition Data: Promoting Public Health Worldwide" was chosen over a year ago. We always knew public health is important. However, we never imagined how important it would become, but in a way we never thought possible.

A year ago, our Program Committee, led by Judi Spungen, had sent out the call for abstracts. The committee then reviewed and evaluated the abstracts creating an exciting program. The Local Arrangements Committee, led by Dana Hoffman-Pennesi, was hard at work, coordinating with the hotel in College Park, Maryland to choose meals and finalize other arrangements. I even took a vacation to Patagonia in January—the last time I was able to travel. Then in February, the coronavirus struck and everything closed down in March. People were told by their employers that only essential travel would be permitted, and as hard as it is to believe, the NNDC was not considered essential, and we were forced to cancel the in-person conference. We decided a virtual conference was the way to proceed and at first, we thought we could keep our April conference dates. However, it soon became clear that there was not enough time to pull everything together, so that led to the decision to postpone the conference until the fall, and here we are.

Thanks to a grant from USDA-NIFA, we were able to switch to a virtual conference at no charge to our attendees. The participation far exceeded our expectations with over 500 people registering so far. Thanks to our Program Committee, we have an exciting program with almost all of the presentations and posters we would have had for the in-person conference. Without a location, we lost the opportunity to have a number of engaging social events. However, Lisa Harnack stepped up to design and hosted a virtual Trivia Night, where participants will get an opportunity to test their knowledge of the conference and food composition and have some fun.

Since our last meeting, we overhauled our web site thanks to the efforts of our Communications Committee, chaired by Winnie Cheung, along with our new contract Web Developer, Trevor Newman. I hope you have all taken a look at our website: www.nutrientdataconf.org.

Finally, I acknowledge the dedication of my fellow Executive Committee members: Nancy Emenaker, our incoming chair; Thea Zimmerman our past-chair, who has been an invaluable source of information on past decisions and activities and will be taking over as the NNDC Historian, filling a vacancy that occurred due to Phyllis Stumbo's untimely passing; Julie Eichenberger-Gilmore, who handled our application for the USDA-NIFA grant which we received and is helping fund this Conference; and our Treasurer, Lisa Harnack. I also want to thank the Steering Committee for all their efforts on behalf of the Conference.

While we will all miss the networking opportunities that are a hallmark of our Conference, we have an exciting virtual conference event that we know you will enjoy and expand your knowledge of food composition. We are a volunteer-run organization and we welcome your participation. Email us exec@nutrientdataconf.org and become part of the NNDC.

David B. Haytowitz

NNDC Executive Committee Chair (2020)

Oral Presentation Schedule

Time	*Monday, November 16*	
8:45 AM	Welcome and Introductory Remarks • David Haytowitz, Chair • Judi Spungen, Program Chair	
9:00 AM	Keynote Presentation (Moderator: Judi Spungen)	Susan Mayne, Director, FDA Center for Food Safety and Applied Nutrition: ***COVID-19, Food and Nutrition: Update from FDA's Center for Food Safety and Applied Nutrition*** Q&A
10:00 AM	Break	
10:15 AM	Session 1: U.S. Government Updates (Moderator: Nancy Emenaker)	Kyle McKillop, USDA Agricultural Research Service: ***USDA FoodData Central (FDC): Version 2 and beyond*** Alanna Moshfegh, USDA Agricultural Research Service: ***Fast Track Your Understanding of the New Food and Nutrient Database for Dietary Studies 2017-2018*** 10 minute break Kirsten Herrick, NIH National Cancer Institute: ***Recent Enhancements to the Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24)*** Natalie Partridge, USDA Food and Nutrition Service: ***New Directions for the USDA's Child Nutrition Database*** Lauren O'Connor, NIH National Cancer Institute: ***Creating Total Red Meat and Total Poultry Intake Variables Based on the Food Patterns Equivalents Database using NHANES data*** Q&A
11:55 AM	Lunch	
12:30 PM	Session 2: Linking Datasets to Improve Food Composition Estimates, part 1 (Moderator: Janet Roseland)	Pamela Pehrsson, USDA Agricultural Research Service: ***Iodine in Foods and Dietary Supplements: A Collaborative Tool by NIH, FDA and USDA*** Judith Spungen, FDA Center for Food Safety and Applied Nutrition: **New System for Mapping FDA Total Diet Study Constituent Data to National Health and Nutrition Examination Survey (NHANES)/What We Eat In America (WWEIA) Food Consumption Data** Q&A
1:15 PM	10 minute break	
1:25 PM	Session 3: Linking Data to Extend Nutrient Analysis of Food Purchase Data	Linda Kantor, USDA Economic Research Service: ***Improving nutrient data for food items reported in the USDA National Household Food Acquisition and Purchase Survey (FoodAPS)***

Time	Monday, November 16	
	(Moderator: Debra Sullivan)	Andrea Carlson, USDA Economic Research Service: ***Linking USDA Nutrient Composition to Scanner Data, and Estimating Prices for Foods in the National Health and Nutrition Examination Survey/ What We Eat in America: The Purchase to Plate Crosswalk and Food Price Tool*** Alison Kretser, ILSI North America: ***Update on the "A Partnership for Public Health: USDA Global Branded Food Products Database"*** Q&A
2:25 PM	Lisa Jahns, National Institute of Food and Agriculture (NIFA) (Introduction by Debra Sullivan)	

Time	Tuesday, November 17	
8:45 AM	Information on 42nd NNDC : Isabelle Massarelli Information on Trivia Night: Lisa Harnack Other announcements: Judi Spungen	
9:00 AM	Keynote Presentation (Moderator: Pamela Pehrsson)	Johanna Dwyer, Senior Nutrition Scientist, NIH Office of Dietary Supplements: ***How Important are Dietary Supplements?*** Q&A
10:00 AM	Break	
10:15 AM	Session 4: Federal Resources for Dietary Supplement Databases (Moderators: Pamela Pehrsson and Johanna Dwyer)	Leila Saldanha, NIH Office of Dietary Supplements: ***Label Information: Dietary Supplement Label Database (DSLD)*** Karen Andrews, USDA Agricultural Research Service: ***Improve Nutrient Intakes from Dietary Supplements with Predicted Analytical Content: Dietary Supplement Ingredient Database (DSID)*** 10 minute break Karen Regan, NIH Office of Dietary Supplements: ***Who is Researching Supplements?: Computer Access to Research on Dietary Supplements (CARDS) Database*** Patricia Deuster, Uniformed Services University: ***Finding Prohibited and Risky Dietary Supplement Ingredients: Operation Supplement Safety*** Q&A
11:40 AM	NNDC Recognition Awards: Brief Comments from Catherine Champagne (2018) and David Haytowitz (2020) (Introduction: Nancy Emenaker)	
11:55 AM	Lunch	
12:30 PM	Session 5: Linking Datasets to Improve Food Composition Estimates,	Elizabeth Chin, USDA Agricultural Research Service: ***Nutrient Estimation from 24-hour Food Recalls using Machine Learning and Database Mapping: a Case Study with Lactose***

Time	*Tuesday, November 17*	
	part 2 (Moderator: Janet Roseland)	Lesley Andrade, University of Waterloo (Canada): ***Linking Food and Nutrient Databases across Countries to Enable Comparative Analyses***
		Q&A
1:15 PM		10 minute break
1:25 PM	Session 6: Food Composition Data for Global Public Health (Moderator: Winnie Cheung)	Mary L'Abbe, University of Toronto: ***Examining Food Industry Progress in Reducing the Sodium Content of Canadian Packaged Foods***
		Kristy Soraya Coelho, University of São Paulo, Brazil: ***Design of a decision support system for planning patient´s personalized menus***
		Sarah Wafa, Tufts University: ***INDDEX24: A New Global Dietary Assessment Platform to Scale Up the Availability, Access, and Use of Global Dietary Data***
		Q&A
7:00 PM	Trivia Night!	

Time	**Wednesday, November 18**	
8:45 AM	Poster awards: Nancy Emenaker Other announcements: Judi Spungen	
9:00 AM	Keynote Presentation (Moderator: David Haytowitz)	Ruth Charrondière, Nutrition Officer, Food and Agriculture Organization of the UN: ***International Perspective on Harmonizing Food Composition Databases – Challenges and Successes***
		Q&A
10:00 AM	Break	
10:15 AM	Session 7: The Human Milk Composition Initiative in the United States and Canada: Efforts to Improve Data to Support Public Health (Moderator: Judi Spungen)	Pamela Pehrsson, USDA Agricultural Research Service, and Winnie Cheung, Health Canada: ***Human Milk Composition Initiative in the US and Canada: The Beginning of a Journey to Improve Infant, Child, and Maternal Health***
		Jaspreet Ahuja, USDA Agricultural Research Service: ***Human Milk Composition and Related Data for National Nutrition Monitoring and Related Research***
		10 minute break
		Ying Li, USDA Agricultural Research Service: ***Human Milk Composition Initiative: Potential Measures for Human Milk Composition Database/s***
		Winnie Cheung, Health Canada: ***The Synergy of Human Milk Composition Data and Related Metadata to Help Address Issues of Public Health Concern***
		Kellie O. Casavale, FDA Center for Food Safety and Applied Nutrition: ***Human Milk Composition and Associated Data: Relevance to Federal Policies, Programs, and Regulations in the United States and Canada***

Time	Wednesday, November 18	
		Q&A
11:55 AM	Lunch	
12:30 PM	Session 8: Use of Product Label Data to Promote Public Health (Moderator: Alison Kretser)	Thea Bourianne, Label Insight: ***How US Grocery Stores are Differentiating their Mission of Health & Wellness by Leveraging Product Label Data***
		Lisa Harnack, University of Minnesota Nutrition Coordinating Center: ***Nonnutritive Sweeteners in Brand Name Food Products in the U.S. Marketplace***
		Q&A
1:15 PM	10 minute break	
1:25 PM	Session 9: Focus on Food Constituents (Moderator: David Haytowitz)	James Harnly, USDA Agricultural Research Service: ***Pulling Information out of Raw Food Data***
		Mamatha Singh, University of Wollongong (Australia): ***Developing an Anthocyanin Food Composition Database for Australian food supply***
		10 minute break
		Bhaskarani Jasthi, University of Minnesota Nutrition Coordinating Center: ***Distribution of Lignans in Different Food Categories***
		Doreen Larvie, University of North Carolina - Greensboro: ***Estimating Phytate Intake from the US Diet using NHANES data***
		Q&A
2:50 PM	Oral presentation awards and wrap-up (David Haytowitz)	

CPE credits – An individual's responsibility

For dietetic professionals who wish to receive Continuing Professional Education (CPE) credits for attending the activities that correspond to the performance indicators noted in your Learning Plan within your professional portfolio (e.g. attending virtual conferences), please note it is the individual's responsibility to submit the required information.

The NNDC will not provide certificates of attendance for this purpose. For more information, please visit the following link from the Commission on Dietetic Registration: **https://www.cdrnet.org/pdp-guide-featuring-essential-practice-competencies**

41st National Nutrient Databank Conference Oral Presentation Abstracts

Session 1. U.S. Government Updates

1. **USDA FOODDATA CENTRAL (FDC): VERSION 2 AND BEYOND.** Pamela Pehrsson[1], James Harnly[1], Naomi Fukagawa[1], Alanna Moshfegh[1], John Finley[2] and Kyle McKillop; [1] USDA ARS Beltsville Human Nutrition Research Center, Beltsville, MD 20705, USA. [2]USDA ARS Office of National Programs, Beltsville, MD 20705, USA.

   Objective: A dynamic US food supply and need for assessment of diet on health demands transparent, easily accessible information on foods and food components and related data on production and variability for researchers, health and nutrition policy makers and professionals, and food manufacturers.
   Materials and Methods: USDA's FoodData Central (FDC) is an integrated system with five unique types of data: 1) Foundation Foods - nutrient values and extensive underlying metadata on commercially available foods which are highly consumed either as a whole food or food ingredient e.g., number of samples, sampling location, harvest dates, analytical approaches, and related agricultural information; 2) SR Legacy (2018), the final release of Standard Reference (SR); 3) The Food and Nutrient Database for Dietary Studies (FNDDS) - nutrient values for foods and beverages reported in What We Eat in America, National Health and Nutrition Examination Survey (NHANES); 4) the USDA Global Branded Food Products Database, industry-provided label data for over 260,000 foods from a public-private partnership (USDA, ILSI International, JIFSAN-UMD, GS1, Label Insight); and 5) Experimental Foods that will include information from multiple sources about foods produced under experimental conditions but not commercially available. With Version 2, released 2019, new Foundation Foods have been added (shell eggs (whole, whites, yolks), oils (extra virgin olive oil, canola, corn and soybean), and select restaurant food components (American cheese, bacon, ham, ketchup) as well as many new Branded Foods. Moving forward, agricultural data allow users to investigate many factors, including geography and agricultural practices that affect the nutritional profiles of foods and dietary intake estimates. New data, foods and sample information are continuously added and provide research insights on attributes that influence variability of classic nutrients and emerging bioactive compounds of public health importance.
   Significance: Researchers, health professionals and consumers can access and download the data they need with transparency.

2. **FAST TRACK YOUR UNDERSTANDING OF THE NEW FOOD AND NUTRIENT DATABASE FOR DIETARY STUDIES 2017-2018**. Alanna Moshfegh[1], MS, RD; Donna Rhodes[1], MS, RD; Suzanne Morton[2], MPH, MBA; [1]U.S. Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group; [2]American Society for Nutrition.

   Background: The USDA Food and Nutrient Database for Dietary Studies (FNDDS) converts foods and beverages consumed in What We Eat In America (WWEIA), National Health and Nutrition Examination Survey into gram amounts and determines nutrient values. It is developed for each two-year release of WWEIA, NHANES.
   Objective: The objective of this presentation is to describe enhancements and updates for FNDDS 2017-2018.
   Description: The FNDDS 2017-2018 contains 7,083 food/beverage codes and 32,614 portion weights. Every FNDDS code contains a complete nutrient data set for 65 nutrients. The source for most nutrient

values is the new USDA FoodData Central integrated data system launched in 2019; however, some nutrient values were adjusted for inclusion in FNDDS. To enhance the transparency of the database, the source of every individual nutrient value is provided as well as derivation code and year of modification or sample acquisition. Specific categories of foods/beverages were updated to yield standardization of codes, descriptions, weights, and nutrient profiles. For quick viewing select variables are provided – At A Glance – as five Excel files. For enhanced searching, files include the WWEIA Food Category code and description.
Conclusion: The complete FNDDS 2017-2018 is available at www.ars.usda.gov/nea/bhnrc/fsrg in Access and SAS. The enhanced database allows for new research analyses and provides additional detail on database development and nutrient profiles for foods and beverages.

3. **RECENT ENHANCEMENTS TO THE AUTOMATED SELF-ADMINISTERED 24-HOUR DIETARY ASSESSMENT TOOL (ASA24).** Kirsten A. Herrick[1], PhD, MSc*; Jennifer L. Lerman[1], MPH, RD; Beth Mittl[2], BA, Amy Miller[2], MPH; Edwina Wambogo[1], PhD, RD; Thea P Zimmerman[2], MS, RD, Deirdre Douglass[2], MS, RD; Christie Kaefer[1], MA, RD, Sharon I Kirkpatrick[3], PhD, RD, Nancy Potischman, PhD[1], Lauren E. O'Connor[1], PhD, MPH, Amy F. Subar[1], PhD, MPH, RD; [1]National Cancer Institute, [2]Westat, [3]University of Waterloo.

Background: The National Cancer Institute (NCI) introduced the Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24) in 2009. The ASA24 is a freely available, web-based tool that enables collection of multiple, automatically coded, self-administered 24-hour recalls and/or single or multi-day food records. The U.S. version is available in English, Spanish, and Polish, and country-specific versions are available for Canada (English and French) and Australia (English). Based on researcher feedback and user testing, NCI continually enhances ASA24 to increase functionality.
Objectives: To describe 1) updated features for respondents, including the ingredient database, recipe function, updated food code and nutrient values, and updated Respondent Nutrition Report (RNR), and 2) enhancements for researchers, including real-time analytic capability, redesign of the researcher site, and migration to a cloud platform.
Results: A recipe module based on the U.S. Department of Agriculture's SuperTracker ingredient database was integrated to allow respondents to create and reuse their own recipes. ASA24-2020 will include updated food lists, nutrients, food groups, and supplements based on FNDDS 2015-2016. NCI user tested a redesigned RNR to ensure that updates were well understood by respondents. In 2020, researchers will be able to provide the redesigned RNR to respondents. Further, researcher access to output data files was improved with real-time analysis, allowing immediate download of nutrient and food group intakes. In the near future, this enhancement will be integrated within a redesigned researcher website to facilitate improved study setup and respondent monitoring. To support growing usage of ASA24, migration to a cloud platform will occur in early 2020.
Conclusion: Since its release, ASA24 has been used to collect over 500,000 days of dietary intake, with over 100+ studies registering per month in 2019. NCI and other NIH institutes are continually enhancing ASA24 to maintain relevance and usability to support the collection of high-quality dietary intake data.

4. **NEW DIRECTIONS FOR THE USDA'S CHILD NUTRITION DATABASE.** Natalie Partridge, MS, RD; Bethany Showell; and Anne Garceau, MS, RDN; Nutrition, Education, Training and Technical Assistance Division, USDA-Food and Nutrition Service (FNS).

Background: The USDA's Child Nutrition Database (CNDB) is a publicly available database, with over 11,000 foods, that is designed for use with nutrient analysis software approved by USDA for use in Child Nutrition Programs.
Objective: To describe the current structure and function of the CNDB and the new and innovative methods for updating the CNDB for the future.
Description: The CNDB is comprised of several different sources of data, including the USDA National Nutrient Database for Standard Reference (SR), food manufacturers' data, nutrient profiles for USDA Standardized Recipes, and data for USDA Foods (formerly known as Commodity Foods). To ensure data quality, reliability, and cohesion a quality control process is conducted. Software developers are required to incorporate the most recent version of the CNDB into their approved nutrient analysis software. The next CNDB (Release 23), scheduled for release in 2020, will be the last version made available using our current technologies and provided as a Microsoft Access file, as this program will no longer be supported. Therefore, FNS is embarking upon key research required to modernize and streamline the collection, compilation, and dissemination of data used in the CNDB using new nutrient databases and software management systems available on the market. Participants attending this session will receive information on the new methodologies planned for the CNDB.
Conclusion: The CNDB, provided to school program operators via USDA-approved nutrient analysis software, is an important and widely used resource. Modernizing related methodology is essential, as it plays a critical role in analyzing school meals to ensure they meet the nutrient requirements of Child Nutrition Programs.

5. **CREATING TOTAL RED MEAT AND TOTAL POULTRY INTAKE VARIABLES BASED ON THE FOOD PATTERNS EQUIVALENTS DATABASE USING NHANES DATA.** Lauren E. O'Connor, PhD, MPH*; Edwina A. Wambogo, PhD, MS, MPH, RD, LDN.; Kirsten A. Herrick, PhD, MSc; Jill Reedy, PhD, MPH, RD**.** Risk Factor Assessment Branch, Epidemiology and Genomics Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, National Institutes of Health, United States of America.

Student and New Investigator Presentation Award Competition Entry

Objective: The Food Pattern Equivalents Database (FPED) of NHANES includes variables for ounce equivalents of Meat (i.e. non-cured red meat), Poultry (i.e. non-cured poultry) and Cured Meat (i.e. cured red meat and poultry). Our objective was to create new FPED-aligned variables for Total Red Meat (cured and non-cured) and Total Poultry (cured and non-cured).
Materials and methods: We merged 2007-08 through 2015-16 NHANES, What We Eat in America (WWEIA), and FPED cycles by the 8-digit food codes and disaggregated Cured Meat into Cured Red Meat or Cured Poultry. Two independent researchers manually coded the dataset to consensus. The final manual code was compared to a SAS program that we developed. The SAS program disaggregated Cured Meat into either Cured Red Meat or Cured Poultry based on WWEIA categories and text mined the additional food code descriptions and ingredients provided by the Food and Nutrient Database for Dietary Studies. Cured Meat was evenly split into Cured Red Meat and Cured Poultry if text such as 'meat and poultry' was specified. Cured Red Meat was defaulted if the text was not further specified. We combined Cured Red Meat with Meat and Cured Poultry with Poultry to establish Total Red Meat and Total Poultry, respectively.
Results: Of the 775 food codes with Cured Meat, 646 were identified as cured red meat, 41 were identified as cured poultry, and 88 were identified as a combination of both cured red meat and cured poultry. Concordance correlations between the manual code and the SAS program were >0.99.
Significance: This SAS program can reasonably classify the Cured Meat FPED into Cured Red Meat and Cured Poultry. Cured Red Meat and Cured Poultry can be combined with current Meat and Poultry

FPED variables, respectively, to allow researchers to estimate Total Red Meat and Total Poultry intakes using NHANES.

Session 2. Linking Datasets to Improve Food Composition Estimates, Part 1

1. **IODINE IN FOODS AND DIETARY SUPPLEMENTS: A COLLABORATIVE TOOL BY NIH, FDA AND USDA.** **Pehrsson P[1], Spungen JH[2], Ershow A[3], Gahche J[3], Patterson K[4]**; [1]USDA-ARS, Methods and Applications of Food Composition Laboratory; [2]FDA Center for Food Safety and Applied Nutrition; [3]NIH Office of Dietary Supplements; [4]USDA-ARS, retired.

   Background: Data on the iodine content of foods and dietary supplements are needed to develop general population intake estimates and identify major contributors to intake; some data are available through the U.S. Food and Drug Administration (FDA) Total Diet Study (TDS) and the USDA food composition databases (FoodData Central). Seafood, dairy products, eggs, baked products, salt, water, select commercial foods and dietary supplements were assayed for iodine content using inductively coupled plasma mass spectrometry with rigorous quality control measures and SRMs.
   Objective: Describe collaborative efforts to develop iodine composition data for use in estimating dietary iodine intakes.
   Description: The data (FDA TDS and USDA) were released as a Special Interest Database and are being mapped to foods reported consumed in the 2014 U.S. National Health and Nutrition Examination Survey (NHANES) and subsequent releases. NHANES foods which cannot be mapped directly to items in the Special Interest Database will be mapped using FDA's ingredient-based mapping system. The FDA mapping system was developed by disaggregating NHANES/WWEIA codes into ingredient percentages using data on ingredient amounts and moisture loss/gain from the Food and Nutrient Database for Dietary Studies (FNDDS) Ingredient File. Additional recipes were created to allow mapping of selected NHANES foods that did not have FNDDS ingredient breakdowns. Iodine data for dietary supplements will be drawn from the ODS-USDA Dietary Supplement Ingredient Database and the ODS Dietary Supplement Label Database.
   Conclusion: This information is a critical tool with updated U.S. iodine intake estimates in the U.S. and allows the development of dietary guidance, especially for those at risk for deficiency (i.e., women of reproductive age and young children).

2. **NEW SYSTEM FOR MAPPING FDA TOTAL DIET STUDY CONSTITUENT DATA TO NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES)/WHAT WE EAT IN AMERICA (WWEIA) FOOD CONSUMPTION DATA.** Judith Spungen, MS RD; U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition, Office of Analytics and Outreach.

   Background: FDA's Total Diet Study (TDS), initiated in 1961, continuously monitors concentrations of mineral nutrients and contaminants in about 265 foods, based on regular sampling and analysis of these foods in various locations in the U.S. FDA uses TDS concentration data to provide perspective for safety assessments, to inform risk assessments, to identify potential safety concerns, and to estimate dietary nutrient intakes and contaminant exposures. To estimate nutrient intakes and contaminant exposures, TDS data are first mapped to NHANES/WWEIA food codes. Constituent concentration values for each TDS index food are assumed to apply to all NHANES/WWEIA foods to which the TDS food is mapped. However, the ingredients in some NHANES/WWEIA food mixtures are quite different from the ingredients in the TDS food to which it is mapped. As part of an overall multi-year TDS

modernization program, FDA has developed an innovative ingredient-based system for mapping TDS data to NHANES/WWEIA food codes.
Objective: Describe FDA efforts to develop a new ingredient-based system for mapping TDS data to NHANES/WWEIA food codes.
Description: FDA disaggregated NHANES/WWEIA codes into ingredient percentages using data on ingredient amounts and moisture loss/gain from the Food and Nutrient Database for Dietary Studies (FNDDS) Ingredient file data. Additional recipes were created for selected NHANES/WWEIA codes that did not have ingredient information in FNDDS. TDS data for food ingredients were then mapped to NHANES/WWEIA ingredients where possible.
Conclusion: Use of the new ingredient-based system for mapping TDS data to NHANES/WWEIA food codes will improve the accuracy of estimates of nutrient intake and contaminant exposures.

Session 3. Linking Data to Extend Nutrient Analysis of Food Purchase Data

1. **IMPROVING NUTRIENT DATA FOR FOOD ITEMS REPORTED IN THE USDA NATIONAL HOUSEHOLD FOOD ACQUISITION AND PURCHASE SURVEY (FOODAPS).** Linda S. Kantor, M.S.; Elina T. Page. Ph.D., USDA Economic Research Service.

   U.S. households obtain food from a variety of sources, including retail food stores, restaurants, schools, and work places. Some of these acquisitions—such as meals at family gatherings and employer-provided meals and snacks—are free to the household and are therefore not captured in expenditure surveys. USDA's National Household Food Acquisition and Purchase Survey (FoodAPS) captured information about food obtained from all sources—both paid and free—from a nationally representative sample of about 4,800 households during 2012-2013.

   Surveyed households reported all foods purchased or acquired for free over a seven-day period using a combination of handheld barcode scanners (with scanned codes linked to the proprietary IRI supermarket scanner database), paper log books, phone calls, and saved receipts. Respondents reported over 55,000 unique food at home items (e.g. from grocery stores) and over 22,000 food away from home items (e.g. restaurants, schools, friend's homes). Nutrient data, including micro and macro nutrient content and Food Pattern Equivalents (FPEs), were appended to each reported item to assess diet quality using the 2010 Healthy Eating Index and compare differences across demographic and socioeconomic groups.

   However, the greater-than-expected number of unique items, the variation in how the items were reported, and the level of detail included meant that a substantial set of foods, particularly foods acquired away from home, lacked the detailed ingredient and weight information necessary to calculate the HEI. As a result, many items required post-collection product identification and matching to USDA nutrient databases. This presentation will provide an overview of the processes used to assign macro- and micronutrients and FPEs to FoodAPS items and describes a food grouping system developed by ERS. A look ahead to new food item identification methods and third-party databases under consideration for use in FoodAPS-2 also will be briefly discussed.

2. **LINKING USDA NUTRIENT COMPOSITION TO SCANNER DATA, AND ESTIMATING PRICES FOR FOODS IN THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY/ WHAT WE EAT IN AMERICA: THE PURCHASE TO PLATE CROSSWALK AND FOOD PRICE TOOL.** Andrea Carlson, M.S., PhD, USDA-Economic Research Service (ERS); Elina Page, M.S., PhD, USDA-Economic Research Service (ERS); Kevin Kuczynski, MS, RD, USDA – FNS-CNPP; TusaRebecca Pannucci, PhD, MPH, RD, USDA – FNS-CNPP;

Kristin Koegel, MBA, RD, USDA – FNS-CNPP; Thea Palmer Zimmerman, MS, RD, Westat; Carina E. Tornow, MA Westat; Sigurd Hermansen, MA, Westat.

Objective: Import data from USDA's FNDDS and FPED databases into scanner data and estimate prices for foods reported consumed by NHANES/WWEIA participants. Scanner data contain detailed product and purchase information, but the nutrition data are not sufficient to measure how well Americans follow dietary advice or what may motivate them to do so. On the other hand, WWEIA/NHANES provides extensive nutrition and health information and the Flexible Consumer Behavior Survey (FCBS) collects information on NHANES participants' knowledge, attitudes, and beliefs regarding nutrition and food choices, but NHANES does not include individual food prices.
Methods: We use probabilistic and semantic matches to merge the scanner data with the USDA Food and Nutrient Database for Dietary Studies (FNDDS) to create the Purchase to Plate Crosswalk (PPC), allowing scanner data users to import USDA nutrient and food group quantity data into the IRI scanner data. Using the PPC and recipes from the FNDDS we create the Purchase to Plate Price Tool (PPPT) to estimates prices for foods Americans report eating in the dietary intake study WWEIA/NHANES.
Results: The PPC covers about 95 percent of the sales in both the retail and household scanner data that USDA purchases. The PPPT calculates a price for about 97 percent of the food mentions in WWEIA. Users can use the PPC to estimate Healthy Eating Index scores using scanner data. The PPPT allows users to estimate national average prices, or use a subset of scanner data to estimate prices by different store types or geographic region.
Significance: The PPC and PPPT fill a gap in our ability to understand America's food purchase decisions, and support federal food programs and regulations such as estimation of the Thrifty Food Plan, and monitoring the healthfulness of retail food purchases.

3. **UPDATE ON THE "A PARTNERSHIP FOR PUBLIC HEALTH: USDA GLOBAL BRANDED FOOD PRODUCTS DATABASE.** Alison Kretser, Pamela Starke-Reed, Angela Fernandez, Marshall Keener, Kyle McKillop, David Yunkong Pan, Thea Bourianne, Harris Diamond, Scott Brown, Travis Sterling. Funding: *The USDA Branded Food Products Database is maintained and funded by USDA ARS*.

Background: In 2013, several organizations—including the U.S. Department of Agriculture, Agricultural Research Service (USDA-ARS), the International Life Sciences Institute North America (ILSI North America), GS1 US®, 1WorldSync, Label Insight, and the University of Maryland—formed a collaborative public-private partnership to deliver "A Partnership for Public Health: USDA Branded Food Products Database," with the goal of strengthening public health and the open sharing of food composition data. The USDA Global Branded Food Products Database enhances the existing USDA FoodData Central, which serves as a main source of food composition data for governments, the public health research community, and the food and beverage industry. It also provides public access to nutrient composition and ingredient information on branded foods and store-brand data provided voluntarily by the industry.
Objective: The presentation will provide an update on the USDA Global Branded Food Products Database and its integration within FoodData Central.
Description: This public-private partnership was critical in bringing together the public and private sectors to realize a solution that could not be achieved by a single organization. Today, government agencies around the world are looking at their transparency efforts, and there is complementary engagement across multiple fronts. Endorsed by the United Nations and the Food and Agriculture Organization (FAO), the USDA Global Branded Food Products Database is currently expanding beyond foods consumed in the U.S. It has been extended to support USDA FNS K-12 National School Lunch Program. The Partnership is in the exploratory phase with USDA ERS to determine how the Database can help support their research programs.

Conclusions: Unprecedented coverage: Over 260,000 food and beverage products; accounts for 85% sales coverage; 238 food categories; national and regional brands. Unprecedented access: #1 highest API traffic on data.gov; over 9 million page views to date; 1 million governments, business, and consumer users.

Session 4. Federal Resources for Dietary Supplement Databases

1. **LABEL INFORMATION: DIETARY SUPPLEMENT LABEL DATABASE (DSLD).** Leila Saldanha, PhD, RD; Richard Bailen, MBA, MHA; Johanna Dwyer, DSc, RD. Office of Dietary Supplements, National Institutes of Health (NIH)

   Background: The DSLD (https://dsld.nlm.nih.gov/dsld/), NIH's online database, provides information extracted from > 100,000 labels of dietary supplement products sold in the US.
   Objective: To demonstrate new features in the modernized version of the DSLD resource**.**
   Description: The current version of the DSLD is a legacy Java Server Pages application that stores information in a relational database (MySQL). The modernized version, to be deployed in 2020, will feature a JavaScript based front-end application that will utilize the United States Web Design System (USWDS) and data retrieval functionality based on an Application Programming Interface (API). A developer API will be available via the database website for third-party developers to use in their application or app development. The backend datastore will be a NoSQL database (MongoDB). The redesigned website will yield near instantaneous label retrieval, more attractive layout of information and search features, and the ability to view data in pictorial formats resulting in a much-improved user experience. Other improvements include complete review and update of the project website static text, improvements to the database storage of product labels as verbatim representations of the original labels and their corresponding label images, and strategies to secure product labels to make sure the DSLD is representative of products sold in the US. The 2020 technological update will help ensure the DSLD is following modern best practices for application development and is as representative of dietary supplement product labels as is currently, technically feasible.
   Conclusion: The modernization of the DSLD ensures that this NIH resource has a dedicated API for website developers and data scientists, and improved performance for users, including data visualizations as charts. The DSLD is updated frequently to reflect the products sold in the rapidly evolving US dietary supplement market to serve as a resource for developers, researchers, health care providers, and consumers.

2. **IMPROVE NUTRIENT INTAKES FROM DIETARY SUPPLEMENTS WITH PREDICTED ANALYTICAL CONTENT: DIETARY SUPPLEMENT INGREDIENT DATABASE (DSID).** Karen W. Andrews, BS, Methods and Application of Food Composition Laboratory, Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA

   Background: Many dietary supplement ingredients are added at higher than declared label amounts, but the overages are not standardized among manufacturers. As a result, researchers may underestimate nutrient intakes from some categories of DS, if only label information is used.
   Objective: Describe the nationally representative studies for the Dietary Supplement Ingredient Database (DSID), the online calculators of analytically verified supplement content estimates, and how these data can be applied in nutrition research.

Description: The DSID provides statistical tools developed using the results of chemical analysis to convert label claims into analytically predicted ingredient amounts. These adjustments to labels are linked to DS products reported in National Health and Nutrition Examination Survey (NHANES). When DSID label adjustments are applied to adult MVMs reported in the 2009-2014 NHANES, 75-100% of adult MVMs are predicted to have an analytical content >20% of the label claim for chromium, folic acid, iodine, selenium, and vitamins B-12 and D. Most vitamins and minerals in MVMs are predicted to have analytical content above label claim. In contrast, DSID label adjustments are minor for fish and plant oil DSs with claims for content for one or more of the three major omega-3 fatty acids (EPA, DHA and ALA). Predicted analytical contents are close to or slightly below label claims. DSID studies of prescription prenatal MVM and calcium and vitamin D DSs are underway. Smaller studies of green tea, turmeric and cranberry DSs are evaluating patterns in the analytical content of botanicals, including dried leaves, roots or fruits, their concentrated extracts, and combination products. **Conclusion:** We estimate that the majority of MVM DSs reported in NHANES have significant overages for several ingredients. It is important to account for non-labeled additional nutrient exposure from DSs to better evaluate nutritional status in the United States.

3. **WHO IS RESEARCHING SUPPLEMENTS? COMPUTER ACCESS TO RESEARCH ON DIETARY SUPPLEMENTS (CARDS) DATABASE.** Karen S. Regan, MS, RD, Office of Dietary Supplements, National Institutes of Health (NIH).

Background: It is often difficult to locate information about active research on dietary supplement ingredients. The Computer Access to Research on Dietary Supplements (CARDS) database can be used to identify federally funded dietary supplement-related research.
Objective: To describe the data, search features, and the search results visualization tool available in CARDS.
Description: The CARDS database can be searched by ingredient (calcium), biological effect or outcome (osteoporosis), study type (animal, human or clinical) or by investigator to find federally funded research pertaining to dietary supplements. A search of CARDS can be used to gather information for a variety of purposes. For example, to determine which Institutes at the NIH fund research on herbal supplement ingredients, or if the Federal government is currently supporting research on a dietary supplement ingredient such as folic acid, or even to identify research funding gaps. The NIH records in CARDS are a subset of the records available in the NIH RePORTER. Future plans include capturing non-NIH federally funded dietary supplement-related projects from Federal RePORTER. Each record imported into CARDS is reviewed and coded by the specific dietary supplement(s) or ingredient(s) being studied, the health outcome(s) and the research methodology(ies) being used. Data and reporting/visualization features in CARDS will be highlighted.
Conclusion: NNDB attendees will gain a better understanding of federal resources available to identify federally funded dietary supplement-related research.

4. **FINDING PROHIBITED AND RISKY DIETARY SUPPLEMENT INGREDIENTS: OPERATION SUPPLEMENT SAFETY.** Andrea T. Lindsey, MS[1,2], Cindy Crawford, BA[1,2], Patricia A. Deuster, Ph.D[1]. [1]Consortium for Health and Military Performance, Department of Military & Emergency Medicine, F. Edward Hébert School of Medicine, Uniformed Services University; [2]Henry M. Jackson Foundation for the Advancement of Military Medicine.

Background: Warfighters are among the heaviest users of dietary supplements, and the military has a vested interest in keeping them healthy and warning them about potentially risky products. Brain

health products have quickly emerged in the dietary supplement marketplace as cognitive health has become an important health issue. From promises of improved memory and focus to those of enhanced cognitive performance and energy, these products are widely available in stores on bases and through the Internet.
Objective: A scoping review was conducted to identify dietary supplement products marketed for brain health and cognitive performance in otherwise healthy adults. These products were submitted for analysis to determine if they contained ingredients that were unlisted on the product label.
Description: We identified 72 frequently included ingredients across 650 unique products. We then chose 12 specific products for third party analysis. They were formulated as combinations of vitamins, minerals, amino acids, and herbal ingredients and included 70% of the 72 identified ingredients. Eight (67%) of the 12 products had at least one ingredient listed on the Supplement Facts label that was not detected through the analysis. Ten (83%) of 12 products were found to have compounds not reported on the Supplement Facts panel and 10 (83%) of 12 products should be considered adulterated and misbranded. These results raise serious concerns about brain health products.
Conclusion: Advertisements and product claims may be deceiving and could put Warfighters at risk. Operation Supplement Safety (OPSS) provides evidence-based information, by conducting analyses such as this, and offers educational tools that can be used as a trusted source to help Warfighters make informed decisions about safe supplements.

Session 5. Linking Datasets to Improve Food Composition Estimates, Part 2

1. **NUTRIENT ESTIMATION FROM 24-HOUR FOOD RECALLS USING MACHINE LEARNING AND DATABASE MAPPING: A CASE STUDY WITH LACTOSE.** Elizabeth Chin[1,2], Gabriel Simmons[3], Yasmine Y. Bouzid[1,4], Annie Kan[1,4], Dustin J. Burnett[1,4], Ilias Tagkopoulos[2,5], Danielle G. Lemay[1,2,4]. [1] USDA ARS Western Human Nutrition Research Center, Davis, CA; [2] Genome Center, University of California Davis, Davis, CA; [3] Department of Mechanical Engineering, University of California Davis, Davis, CA; [4] Department of Nutrition, University of California Davis, Davis, CA; [5] Department of Computer Science, University of California Davis, Davis, CA.

   Student and New Investigator Presentation Award Competition Entry

   Objective: Apply computational methods to obtain values for nutrients exclusive to the Nutrition Coordinating Center (NCC) Food and Nutrient Database for foods output by the Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA24) system. NCC has more nutrients than the ASA24 output, but manual lookup of ASA24 foods into NDSR is time consuming and currently the only method to acquire these values.
   Methods: Using lactose as an example, we evaluated machine learning and database matching methods to estimate this NCC-exclusive nutrient from ASA24 reports. A dataset of ASA24-reported foods was manually looked up into NDSR to obtain lactose estimates and split into training (n= 378) and test (n = 189) datasets. Nine machine learning models were developed to predict lactose from the 62 nutrients common between ASA24 and the NCC database. Database matching algorithms were developed to match NCC foods to an ASA24 food using only the 62 overlapping nutrients ("nutrient-only") or the nutrient and food descriptions ("nutrient+text"). The nutrient inputs of the matching algorithms were also weighted by the coefficients from the best machine learning models ("ML-weighted"). For both methods, the lactose predictions were compared to the manual curation.
   Results: *Machine Learning:* The gradient-boosted tree model performed the best on the independent test data ($R^2 = 0.33$). *Database matching:* Unweighted nutrient-only database matching correlated

better than ML-weighted matching. Nutrient+text matching yielded the best lactose estimates (R^2=0.76), a vast improvement over the status quo of no estimate.
Significance: Obtaining values for NCC-exclusive nutrients would greatly expand the research potential of ASA24 data. These results suggest that computational methods can be used to estimate an NCC-exclusive nutrient for foods reported in the ASA24, significantly reducing the time and human expertise that is currently required.

2. **LINKING FOOD AND NUTRIENT DATABASES ACROSS COUNTRIES TO ENABLE COMPARATIVE ANALYSES.** Lesley Andrade, Isabelle Rondeau, Miriam Price, Kirsten Lee, Amanda Raffoul, Qihuang Zhang, Allison C. Sylvetsky, Sharon I. Kirkpatrick. *This work was partially funded by a Canadian Institutes of Health Research grant (383447).*

****Student and New Investigator Presentation Award Competition Entry***

Background: Surveillance of population-level dietary patterns is critical to inform policies to support healthy eating. Comparative studies that leverage policy contrasts between contexts can lend particularly valuable insights, with linked food and nutrient databases uniquely enabling such studies.
Objectives: To describe the process of matching food codes used in Canadian and US surveillance and potential applications of the linked databases.
Description: Matching of codes within the United States Food and Nutrient Database for Dietary Surveys (FNDDS) and the Canadian Nutrition Surveillance System (NSS) was initially pursued to support the development of a Canadian adaptation of the Automated Self-Administered 24-hour Dietary Assessment Tool. Subsequently, all food codes within FNDDS and NSS were matched based on the food and beverage names and descriptions, enabling several lines of inquiry using dietary data collected in each country. For instance, the linkage facilitates between-country comparisons of usual intake and sources of nutrients and food groups, with standardized estimation of food group intakes based on the United States Food Patterns Equivalents Database. Further, recent applications of FNDDS, such as identification of food codes reflecting foods and beverages containing low-calorie sweeteners, can be applied to data coded using NSS, enabling examination of Canadians' exposure to low-calorie sweeteners for the first time, as well as between-country comparisons of the prevalence of low-calorie sweetener consumption. Future enhancements will seek to extend the linkage to additional countries to allow broader policy-relevant analyses of dietary intake data.
Conclusion: Applying country-specific food and nutrient databases to dietary intake data is critical for accounting for unique aspects of the food supply, such as fortification. Linking such databases across countries can subsequently enable novel analyses to inform approaches to improve eating patterns.

Session 6. Food Composition Data for Global Public Health

1. EXAMINING FOOD INDUSTRY PROGRESS IN REDUCING THE SODIUM CONTENT OF CANADIAN PACKAGED FOODS. Mary L'Abbe, Anthea Christoforou, Jodi Bernstein, Joanne Arcand. University of Toronto. *Funding: Canadian Institutes of Health Research*

BACKGROUND: Canadians consume excessive amounts of sodium, the majority of which comes from packaged, processed foods. In 2012, Health Canada published voluntary targets for reducing sodium in processed food by the end of 2016. The aim of this study was to evaluate the food industry's progress

towards meeting these targets using multiple cycles of the University of Toronto's branded Food Label Information Program (FLIP) database.
MATERIALS AND METHODS: The analysis drew on foods from the 2013 (n=9,199) and 2017 (n=10,578) cycles of FLIP. Sodium content was obtained from products' Nutrition Facts table. The proportion of products meeting the 2016 targets was calculated. Differences in mean sodium content (mg/100g) overall and by food category were estimated using t-tests. Analyses were also conducted to compare the nearly 40% (n= 4,260) of products that were consistent between cycles. These products where identified using UPCs and confirmed by product descriptors (e.g. brand and product name).
RESULTS: Overall there was no significant difference in the sodium content of packaged foods from 2013 to 2017. At the food category level meat products, breakfast cereals, nut butters and vegetables had a significant mean decrease in sodium and mixed dishes and snacks had a significant increase. The proportion of foods meeting the 2016 sodium targets increased slightly from 33.6% in 2013 to 37.3% in 2017. Of the identical product from 2013 to 2017 that reduced sodium content (n=1515), only 17% of these were reformulated to meet targets.
SIGNIFICANCE: Minimal efforts to reduce sodium over the last four years and the high proportion of products not meeting sodium targets calls into question the effectiveness of voluntary programs to reduce dietary sodium in the Canadian food supply. Ongoing monitoring is critical to tracking industry progress and to develop robust regulations to provide consumers with lower sodium products.

2. **DESIGN OF A DECISION SUPPORT SYSTEM FOR PLANNING PATIENT´S PERSONALIZED MENUS.** Kristy Soraya Coelho, PhD[1]; Eliana Bistriche Giuntini, PhD[1]; Osmar Betazzi Dordal, PhD [4]; Eduardo Purgatto, PhD[1]; Bernadette Dora Gombossy de Melo Franco, PhD[1]; João da Silva Dias, PhD[3]; Franco Maria Lajolo, PhD[1,2]; Elizabete Wenzel de Menezes, PhD[1,2.]. [1]FoRC/CEPID/FAPESP and Department of Food and Experimental Nutrition, FCF/USP, São Paulo, Brazil; [2]Coordinator of BRASILFOODS; [3]Federal University of Parana, Department of Electrical Engineering. [4]OBTZ-Tech. *Funding: FoRC/CEPID/FAPESP (Processes 2013/07914-8; 2017/21193-2; 2019/01766-3)*

Student and New Investigator Presentation Award Competition Entry

Objective: Computational tools integrated with food composition tables have been used to assist the nutritionist's decision making in their professional practice. The aim of this work was to design a computational tool using the Nutrient Intake Assessment database of the Brazilian Food Composition Table (TBCA DB-NIE) to generate personalized menus, considering the food preferences and nutrient requirements of the patient. The TBCA DB-NIE presents mainly analytical data of food consumed in Brazil.
Materials and Methods: The steps for the development of this work included: (i) differentiation among the available computational tools; (ii) characterization of the nutrition care process; (iii) definition of the protocol of clinical care for the nutrition consultation; (iv) TBCA DB-NIE data adaptation for use by the computational tool; (v) definition of food preferences; (vi) implementation of the computational tool; (vii) evaluation of the results generated by the computational tool. The computational tool developed, called Nutri – Intelligent Solutions in Nutrition, a web application, characterized as Expert System (ES), used the Finite State Machine (FSM) technique to represent the nutritionist's expertise in the elaboration of menu.
Results: The 105 daily menus (7 menus for 15 fictitious cases – for healthy, physically active or inactive adults of both genders) were evaluated to be suitable for the nutritional recommendations and preferences proposed, for selecting foods/dishes of the different groups (according to the meal), and for considering sensorial characteristics, showing 89.7% agreement for the evaluated items.

Significance: Thus, the proposed tool will contribute to: (i) optimization of clinical care by helping nutritionists to reduce the calculations performed, and by providing more consultation time for patient care; (ii) decision support, since menus are more likely to be suitable for nutritional recommendations; (iii) fidelity to the dietary prescription, since the menus will be elaborated based on the patient's choices/preferences.

3. **INDDEX24: A NEW GLOBAL DIETARY ASSESSMENT PLATFORM TO SCALE UP THE AVAILABILITY, ACCESS, AND USE OF GLOBAL DIETARY DATA.** Brooke Colaiezzi MS, Sarah Wafa MPH RD, Winnie Bell MS MPH PhD (candidate), Jerome Some PhD, Cathleen Prata MPH, Hallie Perlick MPH (candidate), Beatrice Rogers PhD, Jennifer Coates PhD.

   BACKGROUND: Individual-level quantitative dietary data are often viewed as prohibitively expensive and time-consuming to generate. As a result, nutrition policymakers and program officers in low-resource settings often resort to use of food balance sheet and household data to address policy relevant questions that would be better informed by individual-level quantitative dietary data. INDDEX24 is a dietary assessment platform designed to reduce the time and cost associated with generating dietary data, particularly among users in low and middle-income countries (LMICs).
   OBJECTIVE: To introduce the INDDEX24 platform and its development process.
   DESCRIPTION: INDDEX24 is comprised of a mobile application (app) for dietary data collection that is linked to a web app for managing and sharing dietary data inputs (i.e. food composition data, recipes, food descriptors, and portion conversions). To inform development of the platform, experts with dietary assessment experience in LMICs were consulted and a structured literature review of existing dietary assessment platforms was performed. An initial version of INDDEX24 was developed and tested through feasibility studies in Vietnam and Burkina Faso and webinars with potential users of the platform. Additional development rounds implemented feedback from these studies. The platform's relative validity, time, and cost were then evaluated in Vietnam and Burkina Faso. The extensive consultative process and evidence driven design has produced a high-quality platform that balances flexibility of adaptation to a range of contexts with quality control and standardization. INDDEX24 allows users to search for and customize dietary data inputs to their research context, translate questionnaire text, add survey modules, conduct real time monitoring of data collection efforts, and match items reported during the survey to food composition data. A phased rollout of the platform began in the fall of 2019.
   CONCLUSION: INDDEX24 is an innovative contribution to global dietary assessment research infrastructure.

Session 7. The Human Milk Composition Initiative in the United States and Canada: Efforts to Improve Data to Support Public Health

Coordinating Co-Authors (in alpha order):
Jaspreet Ahuja, MS[1]; Kellie O. Casavale, PhD, RD[2]; Subhadeep Chakrabarti, PhD[3];
Winnie Cheung, MSc, RD[3]; Patricia D'Onghia, MPH, RD[4]; Deborah Hayward, BSc, PGDip[3]; Richard Olson, MD, MPH[5]; Pamela Pehrsson, PhD[1]; Ashley Vargas, PhD, MPH, RDN, FAND[6]; Marie-France Verreault, RD[3]. [1] Methods and Application of Food Composition Laboratory, Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA; [2]Office of Nutrition and Food Labeling, Center for Food Safety and Applied Nutrition, Food and Drug Administration, HHS; [3]Bureau of Nutritional Sciences, Food Directorate, Health Canada; [4]Office of Nutrition Policy and Promotion, Health Canada; [5]Office of Disease Prevention and Health Promotion, Office

of the Assistant Secretary for Health, HHS; [6]Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, HHS

Session Description:
National nutrition monitoring by the federal governments in the United States and Canada is an essential surveillance effort to address the health of our respective populations. Accurate estimates of nutrient exposures require up-to-date food composition and dietary intake data, yet clear understanding of exposures through human milk (HM) remain out of reach due to lack of representative data on its composition and intake volume. This session will describe activities of federal agencies in these countries to collaborative through the Human Milk Composition Initiative (HMCI). The session will describe the evolution of HMCI and the aims of a series of peer-reviewed manuscripts to articulate the types of HM composition data and associated metadata that could be collected, the public health relevance of these data to the US and Canadian populations, and potential uses of these data to support federal processes addressing public health.

1. **HUMAN MILK COMPOSITION INITIATIVE IN THE US AND CANADA: THE BEGINNING OF A JOURNEY TO IMPROVE INFANT, CHILD, AND MATERNAL HEALTH.** HMCI co-authors listed above. Presenters: Pamela Pehrsson and Winnie Cheung.

   Background: Human milk (HM) is a complex biological fluid important in infant nutrition. Currently, neither the United States nor Canada collect HM samples in national population health surveys. Also, data on HM are scarce and outdated in the national food composition databases in both countries. The Human Milk Composition Initiative (HMCI) is a joint United States-Canada federal undertaking to articulate how data related to human milk composition (HMC) is relevant to our respective federal programs, policies, and regulations that positively impact public health.
   Objectives: To describe the evolution of HMCI and the aims of a series of peer-reviewed manuscripts including: 1) types of HMC data and associated metadata to collect; 2) public health relevance of these data to the US and Canadian populations; and 3) potential uses of these data to support federal processes addressing public health.
   Description: HMCI is taking a novel approach to create an exploratory communication platform whereby diverse disciplines related to HMC research in the US and Canada can synchronize to better understand the relationship between human milk and health. Contributions to the manuscript series include over 50 federal subject matter experts from numerous departments and agencies in the US and Canada. Collection and quality analysis of HM using a sampling plan and harmonized analytical methods for HMC would provide improved understanding of its composition. HMCI expands beyond nutrition to include environmental, immunological, and other biological factors important to support the healthy development of infants/children and related outcomes to maternal and population health.
   Conclusion: Successful outcomes of this long-term collaboration would be to support future robust and scientifically valid data on and related to human milk that could inform federal policies, programs, and regulations regarding infant, child, maternal, and population health in both countries.

2. **HUMAN MILK COMPOSITION AND RELATED DATA FOR NATIONAL NUTRITION MONITORING AND RELATED RESEARCH.** HMCI co-authors listed above, with Ying Li, PhD[1]. Presenter: Jaspreet Ahuja.

   Background: National nutrition monitoring by the federal governments in the United States and Canada is an essential surveillance effort to address the health of their respective populations. Accurate estimates of nutrient exposures require up-to-date food composition and dietary intake data, yet clear understanding of exposures through human milk (HM) remain out of reach due to lack of

representative data on its composition and intake volume. Federal agencies in these countries have begun collaborative efforts to establish an initiative on human milk composition.
Objective: To develop a framework for collection of data on human milk composition and related metadata for national monitoring and related research.
Description: HM contains thousands of components including macro- and micro-nutrients, bioactives, environmental chemicals, microbes and its composition is influenced by many maternal and environmental factors. Several hundreds of potential measures in over 40 categories including macronutrients such as proteins, carbohydrates, lipids; micronutrients such as minerals and vitamins; bioactives such as carotenoids and polyphenols; environmental chemicals such as contaminants and drugs/pharmaceuticals, and microbiota were elucidated. The characteristics of the mother, child, environment, and other factors, including sample handling, storage, and analytical methods that can potentially impact variability in HM composition and volume were expounded. Furthermore, a vision for a publicly available Human Milk Composition Data Repository (HMCD-R), a central platform for researchers and public health officials for compiling, evaluating, comparing, tracking, and sharing human milk composition data was articulated. Information from HMCD-R could potentially be used to determine measures of central tendency and variability for composition and volume for population sub-groups for national nutrition monitoring.
Conclusion: HM composition and related metadata could facilitate understanding of the complexity and variability of HM composition, provide crucial data for assessment of infant and maternal nutritional needs, and inform public health policies, food and nutrition programs, and clinical practice guidelines.

3. **HUMAN MILK COMPOSITION INITIATIVE: POTENTIAL MEASURES FOR HUMAN MILK COMPOSITION DATABASE/S.** HMCI co-authors listed above, with Ying Li, PhD[1]. Presenter: Ying Li.

Background: Nationally representative human milk composition (HMC) data are important for filling crucial gaps in scientific knowledge to support various nutrition and related health programs, policies, and regulations across the federal governments in the United States (US) and Canada as well as in the nongovernment sector. However, publicly available HMC data are outdated, and the limited scope of human milk (HM) research led to the lack of robust estimates of HMC and volume consumed by infants and young children.
Objective: To identify potential HM components and related measures for future prioritization by the HMC research communities relevant to the US and Canadian populations.
Description: Four sources were used to identify potential measures of HM: 1) US Department of Agriculture (USDA) databases: National Nutrient Database for Standard Reference and Special Interest Databases on Flavonoids; 2) Food and Agriculture Organization of the United Nation's International Network of Food Data Systems (INFOODS); 3) outcomes from the 2017 National Institute of Health Workshop on HMC; and 4) targeted PubMed literature search. The PubMed search led to 2840 paper titles and upon further screening, approximately 600 papers were identified for consideration. Subject matter experts from US federal agencies and Health Canada provided insights on the structure and scope of the resulting list consisting of several hundreds of potential measures in over 40 categories providing structural information (e.g., proteins, lipids, and carbohydrates) and other categories (e.g., environmental chemicals, cells, microbes, etc.).
Conclusion/Significance: Identification of HM categories and potential measures highlight the traditional and on-going research interest in HMC and the breakthroughs in the understanding the vast number of components in HM brought by innovative technology. Importantly, they provide fundamental information for prioritization of HM measures based on the potential public health

impact, which could guide the process of acquiring nationally representative HMC and related metadata.

4. **HMCI: THE SYNERGY OF HUMAN MILK COMPOSITION DATA AND RELATED METADATA TO HELP ADDRESS ISSUES OF PUBLIC HEALTH CONCERN.** HMCI co-authors listed above**.** Presenter: Winnie Cheung.

   Background: The Human Milk Composition Initiative (HMCI) has identified the types of data on human milk composition (HMC) and related metadata which could help address public health issues in the United States and Canada.
   Objectives: To describe examples of public health concerns and interests related to HMC from the perspectives of a diverse group of federal subject matter experts as part of the HMCI.
   Description: A variety of factors affect the composition and quantity of milk a mother produces and what is consumed by the infant/child. Understanding the maternal factors affecting HMC and the potential health outcomes for infants/children consuming human milk could help address public health concerns. These factors include the mothers' direct exposures (e.g., dietary and supplement intake, environmental chemicals, medications, smoking), biological considerations (e.g., health conditions, genetics), and infant feeding decisions/behaviors due to societal/behavioral influences (e.g., financial and direct-service resources, social and familial support, employment status and policies, stress). Moreover, behavioral factors can affect HMC including how the milk was expressed, stored, prepared, and fed to the infant/child. Other areas of public health interest include the relationship of these factors to the nutrition status, incidence of acute and chronic illness, and healthy growth and development of infants/children and, for mothers, the relationship between lactation and maternal health. Lastly, there is interest in better understanding the role of early child feeding exposures on trajectories for dietary patterns and nutrition-related chronic disease across the lifespan in the general population.
   Conclusion: There is potential to address an array of major public health issues in the United States and Canada through understanding the impact of a multitude of factors associated with HMC and volume and subsequent health outcomes for infants/children, mothers, and the general populations in the United States and Canada.

5. **HUMAN MILK COMPOSITION AND ASSOCIATED DATA: RELEVANCE TO FEDERAL POLICIES, PROGRAMS, AND REGULATIONS IN THE UNITED STATES AND CANADA.** HMCI co-authors: listed above. Presenter: Kellie O. Casavale.

   Background: Knowledge gained through human milk composition (HMC) and related metadata has applications to inform scientific foundations of federal policies, programs, and regulations aimed at protecting and/or improving infant and maternal health as well as those to promote the health of the general population in the United States and Canada.
   Objective: The Human Milk Composition Initiative (HMCI) describes how different combinations of human milk data (composition, volume, and relevant metadata) could foster knowledge on the relationship between HMC and health. The resulting evidence could inform established federal processes, thus advancing the scientific foundations supporting them.
   Description: While federal policies and programs in the United States and Canada differ, this initiative addresses common foundational elements. This includes the Dietary Reference Intakes, dietary guidance, and breastfeeding promotion as well as infant and maternal health promotion. Such health programs include those of the US Military Health System and the Canada Prenatal Nutrition Program.

New knowledge could inform various regulations, standards, and guidance for food and supplement manufacturers including those on nutrient fortification, infant formula for term infants and human milk fortifiers for preterm infants, and labeling of related products. New knowledge could also inform federal programs involved in developing clinical guidelines and those that directly reach vulnerable populations with education and resources like the US Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) as well as public health materials produced by the Public Health Agency of Canada and Health Canada.
Conclusion: The opportunities to positively impact public health through a coordinated approach to collecting data on and related to HMC has applications across a vast number of federal initiatives in the United States and Canada. HMCI has provided a collaboration platform for federal perspectives to be communicated with the aim of fostering concerted and informed efforts.

Session 8. Use of Product Label Data to Promote Public Health

1. **HOW US GROCERY STORES ARE DIFFERENTIATING THEIR MISSION OF HEALTH & WELLNESS BY LEVERAGING PRODUCT LABEL DATA.** Thea Bourianne, MBA, RD, LDN; Dagan Xavier. Label Insight.
Funding: Label Insight is paid by retail customers purchasing nutrition and packaged goods data for the purpose of powering programs featured in this abstract. The funders had no role in this abstract design, data collection and analysis, decision to submit, or preparation of the abstract.

   Background: Today's consumers demand greater transparency into the products they purchase for themselves and their families. Consumers are increasingly looking to the retailer as a wellness educator and are leveraging additional digital channels to discover a wider range of products that suit their various health and wellness requirements. Consequently, access to extensive product data and attributes that are flexible enough to adapt to these consumer demands is necessary.
   Objective: Label Insight's patent protected analysis of derived food composition data, enables several retailers such as Target and Raley's to cater to their consumers demand for greater transparency, by highlighting better-for-you products at shelf-edge and online according to their custom position on health and wellness.
   Description: The Label Insight database includes over 80% of the top-selling food and beverage CPG products in the US, including private label products. By utilizing capabilities to query products based on levels of nutrients utilizing the on-package nutrition facts label (NFL), we support the development of health and wellness programs for grocery retailers, large and small, across the US. These retailers have differentiated definitions for various terms, such as "Nutritious" or "Nutrient Dense" which include various nutrition minimum and maximum levels to make the healthier choice, the easier choice for their shoppers.
   Conclusion: In an era of digital information and digital shopping, retailers are differentiating through nutrition-driven insights to help their shoppers make better choices of the foods they purchase.

2. **NONNUTRITIVE SWEETENERS IN BRAND NAME FOOD PRODUCTS IN THE U.S. MARKETPLACE.** Lisa Harnack, DrPH RD; Janet Pettit; Bhaskarani Jasthi, PhD RD; Kristine Schmitz; Jennifer Stevenson; Kerrin Brejle, MPH RD. Nutrition Coordinating Center, University of Minnesota

   Objective: Describe the extent to which various types of nonnutritive sweeteners (NNS) are included in leading brand name food products in the U.S. marketplace.

Methods: The number and percent of brand name food products in the 2019 version of the University of Minnesota Nutrition Coordinating Center (NCC) Food and Nutrient Database that contain acesulfame potassium (Ace K), aspartame, saccharin, sucralose, or a combination of these sweeteners were calculated.
Results: Of the 9,078 brand name food products in the NCC Database, 451 (5%) contain one or more of the NNS examined in this study. The most commonly included nonnutritive sweeteners are Ace K (253 products), sucralose (254 products), and aspartame (186 products). A small number of foods contain saccharin (19 products). More than half (56%) of the products that contain a NNS include more than one type of sweetener. The most common combinations are Ace K and sucralose (121 products) and Ace K and aspartame (114 products). NNS are in foods in a variety of product categories including the soft drink, fruit drink, nutritional drink, energy drink, frozen yogurt, ice cream, yogurt, sports/nutrition bar, and candy categories. Products containing a NNS generally have a food name that indicates the product may contain a NNS (e.g. words such as 'sugar free', 'reduced sugar', 'low calorie', 'low carb', 'light', or 'diet' in the product name). However, in some cases the product name has no such descriptor.
Significance: Researchers studying the health effects of NNS need to be aware that a variety of food products contain these sweeteners and it is common for more than one type of NNS to be included in products. The distribution of NNS in the marketplace also has implications for nutrient database developers aiming to include NNS values for foods in their databases.

Session 9. Focus on Food Constituents

1. **PULLING INFORMATION OUT OF RAW FOOD DATA**. James Harnly[1], Matthew Picklo[2], and Kenneth Kalcheur[3]. [1]Methods and Applications Food Composition Lab, Beltsville Human Nutrition Research Center, USDA, Beltsville, MD; [2]Dietary Prevention of Obesity-related Disease Research, Grand Forks, Human Nutrition Research Center, Grand Forks, USDA, ND; [3]Dairy Forage Research Unit, U. S. Dairy Forage Research Center, USDA, Madison, WI.

   Detecting patterns in complex animal and human feeding studies can be difficult due to the many factors (independent variables) associated with the experiment and the many dependent variables associated with the analytical measurements. The analysis of variance must be multi-factorial to consider all the experimental factors and multivariate to incorporate all the analytical variables. Hence factorial-multivariate analysis of variance (F-mANOVA) is required. For example, an experiment to determine the impact of forage on milk fatty acids consisted of 76 cows, fed 3 forages, with 2 days of milk samples per forage, and 77 fatty acids analyzed per milk sample. In addition, the cows were divided into 2 groups and the milk samples were collected on 6 different days. The resulting data matrix consisted of 456 sample x 77 fatty acid measurements. F-mANOVA allowed the variance associated with each variable to be systematically removed. Over 70% pf the variance of the data set arose from the biological variation between cows. After removal of the cow variance, it was possible to determine that forage had a significant impact on the milk fatty acid profiles. Specific changes in the fatty acids were then determined for each forage. F-mANOVA is an essential tool for analysis of these complex data sets.

2. **DEVELOPING AN ANTHOCYANIN FOOD COMPOSITION DATABASE FOR AUSTRALIAN FOOD SUPPLY.** Mamatha Chandra Singh, PhD candidate; Celine Kelso, PhD; William E Price, PhD; Yasmine Probst, PhD.

University of Wollongong, Wollongong, Australia. *Funding: Supported by SMAH research grant, University of Wollongong, Wollongong, Australia.*

Student and New Investigator Presentation Award Competition Entry

Objective: To quantify anthocyanins by three different analytical methods and develop a food composition data for the Australian food supply, thus contributing towards a food composition database (FCD) for the Southern Hemisphere**.**
Methods: We sampled fresh fruits and vegetables (n=20) from three different locations (Illawarra, Sydney, Southern Highlands) of NSW Australia, fruit and vegetable peel (n=9) and frozen fruits (n=4) (Illawarra region only) for quantifying anthocyanins. They were extracted by optimized solvent composition (Methanol: Water 80:20 (v/v) adjusted to pH 3.0) and extraction methods. A standard AOAC (Association of Official Analytical Chemists) total pH differential method for anthocyanins was validated between laboratories (NSW and QLD) to judge the quality, reliability, and consistency of the analytical results. Data analysis following three different methods were reported. Anthocyanins were also quantified by a liquid chromatography-mass spectrometry method using photodiode array and mass spectrometer detection methods.
Results: Australian anthocyanin food composition data were developed for 24 foods by extracting in optimized extraction solvent by ultra-sonication and analyzing by the total pH differential method. Despite advanced and approved analytical methods, decision making in reporting analytical data for FCD is challenging. Food composition data is affected by various factors such as the stability of the analyte, selection of the analytical standards, heterogeneity of samples, extraction methods, food sampling location and procedures, the part of the fruit/vegetable analyzed, analytical method and reporting analytical conclusions.
Significance: Analysed anthocyanin content for foods in this study will help assess diet quality for food-based dietary guidelines. However, drawbacks in analyzing anthocyanins by the advanced analytical method are due to the lack of anthocyanin reference standards and it is also challenging to identify the type of anthocyanin present in foods. Further, to build a robust database by the total pH differential method, should pay close attention to the reporting method.

3. **DISTRIBUTION OF LIGNANS IN DIFFERENT FOOD CATEGORIES**. Bhaskarani Jasthi, PhD RD; Janet Pettit, and Lisa Harnack, DrPH RD. Nutrition Coordinating Center, Epidemiology & Community Health, University of Minnesota. *Funding: NIH through a subcontract with Harvard University (R01HL035464-27)*

Objective: The objective is to describe the distribution of lignans in foods in different food categories across the food supply. Lignans are a class of phenolic compounds being studied for potential human health benefits with respect to cardiovascular diseases, hypertension, diabetes, metabolic syndrome, obesity, and cancer.
Materials and Methods: In 2019, lignan values (total lignans and four sub-types) were assigned to all foods in the University of Minnesota Nutrition Coordinating Center (NCC) Food and Nutrient Database (0% missing). To describe the distribution of lignans in the over 18,000 foods in the NCC Database the mean, minimum and maximum amounts of lignans in foods in various food categories were determined.
Results: Most foods in the NCC Database (85.5%) contain lignans and all of the food categories in the Database include foods that contain lignans. Lignan values range widely within most categories, and those with the highest mean content of lignans include grains (275 mcg/serving; range 0-67,059 mcg/serving); fats, oils and nuts (mean 173 mcg/serving; range 0-106,123 mcg/serving); and

commercial entrees (mean 95 mcg/serving; range 0-6,545 mcg/serving). The high variability within categories appears to be attributable to the following seeds that are high in lignans and used as ingredients in a variety of commercial food products: flaxseed (106,123 mcg/serving), chia seeds (9,325 mcg/serving), psyllium seeds (8,619 mcg/serving), and sesame seeds (2,879 mcg/serving). Food products that contain these seeds tend to be notably higher in lignans than products that do not. For example, 26% of baby foods in the fruits and fruit products category contain more than 100 mcg of lignans per 100g due to the presence of chia seeds in these products.
Significance: Lignans are found in foods in all food categories, with content varying widely within the categories. Studies aiming to quantify intake of lignans may need to rely on dietary assessment methods that capture a high level of food detail, such as a brand of ready-to-eat cereal.

4. **ESTIMATING PHYTATE INTAKE FROM THE US DIET USING NHANES DATA.** Doreen Yvonne Larvie; Seth Mensah Armah, PhD. University of North Carolina at Greensboro.

Student and New Investigator Presentation Award Competition Entry

Objective: To demonstrate a method for estimating phytate intake from the National Health and Nutrition Examination Survey (NHANES) data.
Methods: Phytate intake was estimated using published data on the phytate content of food groups together with the Food Patterns Equivalents Database (FPED) data for NHANES 2009/2010 and 2013/2014 survey cycles. The published phytate data includes phytate content in mg/100 g for dark green vegetables, starchy roots and vegetables, nuts and seeds, whole grains and refined grains. The FPED file contained data on the number of food pattern (FP) equivalents of the different food groups consumed by each individual on day one of the NHANES survey. Phytate values were assigned to food groups taking into account the amount in grams that makes up one FP equivalent. The daily phytate intake for each individual was estimated as the sum of phytate intake from the different food groups. To assess reproducibility, we compared mean intake values after adjusting for changes in phytate-rich food consumption using fiber intake since the two nutrients share similar food sources. The means and medians were adjusted for the complex NHANES survey design.
Results: Mean ± SEM and median (25^{th}, 75^{th} percentile) phytate intakes for 2009/2010 were 738± 10 and 588 (377, 925) mg. The corresponding values for 2013/2014 were 784 ±16 and 615 (373, 965) mg. Mean phytate intakes expressed as mg phytate/g fiber were 48.6 ± 0.6 for 2009/2010 and 50.5 ± 0.6 for 2013/2014, while the respective medians were 43.8 (31.8, 59.3) vs 44.7 (32.6, 61.5).
Significance: Although emerging studies show anti-neoplastic and anti-inflammatory properties of phytate, epidemiological studies are lacking due to lack of phytate intake data. Our proposed method will be useful in studying the relationship between phytate intake and health outcomes.

41st National Nutrient Databank Conference Poster Presentation Abstracts

A. Dietary Supplements

1. **AUTOMATING RETEST DECISIONS FOR ANALYTICAL INGREDIENT LEVEL DATA OF ADULT CALCIUM DIETARY SUPPLEMENTS TO IMPROVE DECISION-MAKING EFFICIENCY.** Ronelle Bautista, BS[1]; Karen Andrews, BS[1]; Phuong-Tan Tey, MS[1]; Pavel Gusev, PhD[1]; Sushma Savarala, PhD[1]; Laura Oh, BS[1]; Ashley Batugo, BS[1]; Rahul Bahadur, MS[1]; Pamela Pehrsson, PhD[1]; Johanna T. Dwyer, DSc[2]; Leila G. Saldanha, PhD[2]; Rebecca B. Costello, PhD[2]. [1]Methods and Applications of Food Composition Laboratory, ARS, USDA; [2]Office of Dietary Supplements, NIH.

Background: The Dietary Supplement Ingredient Database (DSID) provides analytically derived estimates for the ingredient content in commonly reported dietary supplements (DS). In 2019, adult calcium DS were analyzed for their ingredient content. The accuracy and precision of results were monitored by sending quality control (QC) materials (in-house and standard reference materials (SRMs)) in each batch. Retests were identified to confirm laboratory results or replace laboratory errors.
Objective: To improve efficiency and consistency in retest decision-making while evaluating analytical data and decreasing turnaround time.
Description: Samples of 105 calcium DS with two to three lots were analyzed for calcium, vitamin D, and other minerals. Initial laboratory data was received in ingredient amount per gram, which was compared to the label amount per gram calculated from the labeled level and dosage unit weight. Results were manually reviewed for retesting, with decisions based on a product ingredient's relative standard deviation (RSD), the United States Pharmacopeia (USP) acceptance criteria, and the QC results for the batch. Using similar requirements, a SAS program was written to automate the retest decision-making for each ingredient. For results outside the RSD limit, the sample furthest from the product mean was flagged as a retest. Batches with laboratory bias were identified by determining outliers in the QC results; samples tested in the compromised batches were flagged as subjects for retesting. The automated program identified 28% (calcium) and 38% (vitamin D) of results for retest, whereas 20% and 19% were decided by manual evaluation, respectively. The two processes agreed for 83% and 77% of decisions.
Conclusion: Although not intended to replace manual assessment, the SAS program can be a useful screening tool in determining laboratory data that needs additional review. We will continue to modify the program's parameters so it can aid in decision-making for future studies.

2. **NUTRITIONAL TRENDS: WHAT DIETARY SUPPLEMENTS ARE CANCER PATIENTS USING?** Nancy J. Emenaker[1], Barbara C. Sorkin[2], and Luz M. Rodriguez[3]. [1]NSRG, NCI, NIH, Bethesda, MD, [2]ODS, NIH, OD, Bethesda, MD, and [3]GOCRG, NCI, NIH, Bethesda, MD.

Background: In 2018, U.S. DS sales were estimated at $46 billion. Between 20-90% of cancer patients report self-selecting dietary supplements (DS) in the hope of enhancing therapeutic efficacy, improving health, and reducing adverse treatment side effects. Current nutritional trends seen in cancer patient survivors include special diets and single nutrient dietary supplements. Leveraging National Cancer Institute Physicians Data Query (NCI PDQ) and NIH Dietary Supplement Label Database (DSLD), we investigated commercially available DS use trends by U.S. cancer patients.

Objective: To describe how oncology practitioners, researchers and patient survivors can use NCI PDQ health professional resources and NIH DSLD to assess potentially health-critical information about commercially available DS.
Description: NCI PDQ is a comprehensive cancer information resource targeting oncology clinicians and their patients. DSLD contains labels of >90,000 DS currently or previously on the U.S. market, providing free access to dietary supplement label data in a web-based user interface.
Methods: Using NCI PDQ-identified nutritional trends, we queried DSLD (Version 7.0.7) for all on market DS containing the search terms "Vitamin C", "probiotic", "melatonin", and "glutamine" as specific ingredient name on the Supplement Facts Panel. Labeled contents of these DS are described.
Results: "Vitamin C" was most common of the trending DS, appearing in 12,822 products. Over 8,900 DS contained > 100% (60 mg/d) U.S. DV of vitamin C for healthy adults, including 1,372 products > 1,000% DV (600mg) and 118 products containing megadose (> 2g/d) levels of this nutrient. Comparatively fewer "probiotic-" (1,416), "melatonin-" (679), and "glutamine-" (2,257) containing DS were found. DVs are not established for all of these trending DS.
Conclusion: DSLD may provide relevant information to oncology practitioners and others on commercially available formulations of DS trending in use by cancer patients.

3. **INGREDIENT CONTENT IN A MAJORITY OF MULTIVITAMIN/MINERAL SUPPLEMENTS REPORTED IN NHANES COULD BE CORRECTED BY ANALYTICALLY BASED ESTIMATES.** Pavel A Gusev[1], PhD, Karen W Andrews[1], BS, Malikah McNeal, MS, PhuongTan Tey[1], MS, Sushma Savarala[1], PhD, Laura Oh[1], BS, Renata Atkinson[1], BS, Pamela R Pehrsson[1], PhD, Johanna T Dwyer[2], PhD, Leila G Saldanha[2], PhD, Rebeca B Costello[2], PhD, Larry W Douglass[3], PhD. [1]USDA-ARS, BHNRC, Methods and Application of Food Composition Laboratory, Beltsville, MD; [2]NIH-ODS, Bethesda, MD; [3]Consulting Statistician, Longmont, CO

Background: Epidemiologic studies considering only the dietary supplement labels for ingredient content can provide misleading information on nutrient intakes because many ingredients in multivitamin/minerals (MVMs) are added at higher than declared labels amounts. The Dietary Supplement Ingredient Database (DSID) website provides 5 online interactive calculators to convert labeled amounts into analytically predicted ingredient amounts (for adult, children's ages 1 to 4 and older than 4 years, and non-prescription prenatal MVMs.
Objective: The DSID estimates are linked to MVMs reported in National Health and Nutrition Examination Surveys (NHANES). Our goal was to investigate how many, and to what extent, the DSs in the NHANES database are impacted by the DSID analytically predicted label corrections.
Materials and Methods: Multiple lots of 64-124 nationally representative DSs were purchased and analyzed by qualified laboratories for the content of 22 vitamins and minerals. With the use of regression analyses, we established relationships between the labeled nutrient amounts and percentage differences from labels. These were incorporated into the DSID calculators. For MVMs in NHANES, predicted percentage differences from labels were assigned.
Results: Analytical overages >20% of labeled levels are predicted for several nutrients in 50–99% of the reported MVMs: for iodine and selenium in adult MVMs, for iodine and vitamins D and E in children's MVMs, and for iodine, chromium, and potassium in nonprescription prenatal MVMs. Predicted overages of 10–20% for calcium can be applied to most MVMs and overages >10% for folic acid in the vast majority of adult and children's MVMs.
Significance: Nonlabeled additional nutrient exposure from MVMs should be taken into account to better evaluate nutritional status in the United States. MVMs may have significant ingredient overages including overages for such underconsumed nutrients as calcium and vitamin D.

4. **APPLY NATURAL LANGUAGE PROCESSING (NLP) TO UNCOVER MISSING INFORMATION IN DIETARY SUPPLEMENT LABELS.** Yue Long, Abt Associates Inc.

Objective: Missing data is a common issue in most research communities. In research on dietary supplements, studies have attempted to evaluate the recommended daily intake of multivitamin and minerals (MVMs) listed on dietary supplement labels with FDA's published daily values (DVs) and upper limits (ULs). To do that, we need information on both the amount of nutrient per serving and the recommended servings per day. However, when some information is missing, we can use techniques from data science to impute the missing data from other available information. This case study demonstrates how we can apply these techniques to retrieve data on recommended servings per day for the 90k+ dietary supplement labels in the NIH's Dietary Supplement Label Database (DSLD) database.
Methods: First we identified a small pool of products from the DSLD and collected the missing data for these products by manually reviewing product labels. We then applied standardized text processing to label statements, combined with other information such as target group and serving size to form the training dataset. After training models on this dataset, we evaluated them and compared their performance to choose the best one to impute for the entire database (90k+ labels). This information is then used to compute the recommended daily intake of MVMs to compare with the DVs and ULs.
Results: Our evaluation results showed that gradient boosting has the best performance with a testing mean squared error (MSE) of 0.03. We applied gradient boosting to predict for the entire database and used this result to calculate the daily intake of MVMs for these products.
Significance: This case study explored tools from data science that can be used in current research on dietary supplements. Specifically, it introduced ways to impute missing values from text data, which is useful not only for dietary supplement research, but for other areas of nutrient research, as well.

5. **NATIONAL SAMPLING PLAN OF ADULT CALCIUM AND VITAMIN D DIETARY SUPPLEMENTS (DS) FOR THE DIETARY SUPPLEMENT INGREDIENT DATABASE (DSID).** Laura Oh[1], Karen W Andrews[1], Pavel A Gusev[1], Sushma Savarala[1], Phuongtan Tey[1], Ronelle Bautista[1], Rahul Bahadur[1], Denise Trainer[1], Pamela R Pehrsson[1], Johanna T Dwyer[2], Leila G Saldanha[2], Rebecca B Costello[2], Adam J Kuszak[2]. [1]Methods and Application of Food Composition Laboratory (MAFCL), USDA, Beltsville, MD; [2]Office of Dietary Supplements, NIH, Bethesda, MD

Objective: For the DSID, a study of adult calcium DS will provide national estimates for calcium, vitamin D, and other minerals, based on chemical analysis. For the sampling plan we first identified and then purchased nationally representative products.
Materials & Methods: Retailer data from SPINS, a data technology company, and reported products from National Health and Examination Surveys (NHANES) were combined to identify DS in NH (natural health) and MM (mass market) channels. Products chosen had calcium as the predominant ingredient (>80 mg) and contained less than three vitamins. Products were sampled randomly with the probability of being sampled proportional to market share. The initial plan was to purchase products representing 76.9% of the market share in MM (n=49) and 53.9% in NH (n=28).
We also created an in-house sampling plan to purchase 20 direct channel products (multi-level marketing, Internet, practitioner brands). Products from NHANES, Dietary Supplement Label Database, and the 2017 Nutrition Business Journal (NBJ) report were ranked based on the number of websites selling the product.
Results: MM and NH products were procured in six demographically representative counties across the nation. Sample requirements included a minimum of 240 pills and minimum expiration date of June

2020 to ensure enough product and time to complete chemical analysis. An earlier expiration exemption was made for gummy DS as shoppers had difficulty with initial requirements. Direct DS were purchased by MAFCL. In total, we obtained 105 DS (47 MM, 38 NH, and 20 direct) representing 72.4% of the market in MM and 65.1% in NH.
Significance: The 2017 NBJ report states that calcium supplements are the most prevalent mineral-containing DS, with a 40.3% market share. Through nationally representative sampling and subsequent chemical analysis, the DSID aims to provide analytically derived calcium and vitamin D nutrient intake estimates for improved population assessments of total nutrient intake.

6. **DOES THE USE OF DEFAULT VALUES FOR VITAMIN AND MINERAL SUPPLEMENTS YIELD THE SAME OUTPUTS AT THE NATIONAL POPULATION LEVEL COMPARED TO EXACT NUTRIENT PROFILES?** Isabelle Rondeau, RD; Nadine Kebbe, MPH RD; Rong Huang; Isabelle Massarelli, RD. Bureau of Food Surveillance and Science Integration, Food Directorate, Health Canada.

   Objective: The 2015 Canadian Community Health Survey (CCHS) - Nutrition showed that 45.6% of Canadians aged one year and older reported using at least one nutritional supplement. The Licensed Natural Health Products Database (LNHPD) was used to code reported vitamin and mineral supplements which required extensive manual intervention and verification. The objective of this study is to compare intakes from these supplements at the national population level when using default values instead of exact nutrient profiles from Natural Product Numbers (NPN).
   Materials and Methods: The study was conducted using 1-day data intake from the 2015 CCHS-Nutrition for females aged 31 to 70 years. All reported supplements were matched to generic supplement categories based on the Diet History Questionnaire III (DHQ). New categories were created when supplements did not fit within the existing classification. The nutrient profile for each DHQ category was reviewed and adapted to better match data reported in 2015 CCHS-Nutrition. The CCHS-Nutrition vitamin and mineral data was analysed using the default nutrient values and compared to original values.
   Results: Preliminary results were obtained for the most consumed supplement types among females aged 31 to 70 years (Vitamin D, Vitamin C, Iron, Vitamin B12 and Calcium with Vitamin D), excluding multivitamins. The distributions of nutrient intakes were not significantly different between the two methodologies for all analysed supplements.
   Significance: These preliminary findings suggest that using default values instead of collecting NPN's provide accurate results for single-nutrient supplements. Next is to analyze the remaining supplement categories, including multi-nutrient supplements. If these results are conclusive, the same process will be applied to the whole survey population to evaluate the reliability of the methodology to calculate intakes of a nationally representative population.

7. **USERS AND USE OF THE DIETARY SUPPLEMENT LABEL DATABASE (DSLD) DETERMINED FROM PUBLISHED PAPERS.** Leila Saldanha, PhD, RD; Richard Bailen, MBA, MHA; Johanna Dwyer, DSc, RD. Office of Dietary Supplements, National Institutes of Health

   The DSLD (https://dsld.nlm.nih.gov/dsld/) catalogs virtually all information printed on dietary supplement labels. There are ~100,000 label entries currently in the database.
   Objective: To determine from published papers who is using the DSLD and how is it being used to guide the database's future directions.
   Methods: Publications citing the DSLD were identified in Google Scholar using the search term "Dietary Supplement Label Database". As of September 2019, the search yielded 233 citations (some duplicate

entries), of which 117 were publications in peer-reviewed and technical journals; published abstracts were excluded. For this analysis only publications (n=82) where the first authors were individuals who were not members of the DSLD Federal working group are reported.
Results: Of these 82 publications, 23% were by non-US based authors. 55% were by authors from schools (or institutions) of informatics, medicine, pharmacy or toxicology and 13% from schools of nutrition or public health; other was 33%. Although a primary intent of the DSLD was as a tool for estimating nutrient intakes, none (0%) used it for this purpose. The primary use (48%) was in toxicology or chemistry research to identify products that contained a specific ingredient of interest. In 9% of the papers it was used as a research tool, e.g., to determine the labeled amount of iodine in prenatal supplements or vitamins in children's supplements, or for data informatics; to create standardized terminology of DS product names to aid in product retrieval. In 44% of the papers the DSLD was cited as a resource for information on dietary supplement products.
Significance: Although over 50% of adults in the US take vitamin supplements, this analysis shows that currently unlike food composition databases, the primary use of the DSLD is for informatics, toxicology and chemistry purposes and not for estimating the contribution to nutrient intakes from dietary supplements.

8. **ANALYTICAL ESTIMATES OF CURCUMINOID CONTENT IN TURMERIC DIETARY SUPPLEMENTS FOR THE DIETARY SUPPLEMENT INGREDIENT DATABASE (DSID).** PhuongTan Tey[1], MS, Karen W Andrews[1], BS, Pavel A Gusev[1], PhD, Sushma Savarala[1], PhD, Laura Oh[1], BS, Ronelle A Bautista[1], BS, Renata Atkinson[1], BS, Rahul J Bahadur[1], MS, Pamela R Pehrsson[1], PhD, Johanna T Dwyer[2], PhD, Adam J Kuszak[2], PhD, Leila G Saldanha[2], PhD, Rebecca B Costello[2], PhD. [1]Methods and Application of Food Composition Laboratory, USDA, Beltsville, MD; [2]Office of Dietary Supplements, NIH, Bethesda, MD.

Objective: A DSID Botanical Initiative was launched to evaluate levels of constituents in botanical dietary supplements (DS). Turmeric is a common spice used in food and taken as a DS for potential health effects, such as anti-inflammation and anti-tumor activity. The goal of the study is to evaluate the curcuminoid content in DS containing turmeric material (*Curcuma longa* root powder and/or extract).
Materials & Methods: Turmeric DS (n=54 x 2 lots) were analyzed for curcumin, demethoxycurcumin, bisdemethoxycurcumin and piperine, a constituent of black pepper extract, added to improve bioavailability. Certified reference materials, sample duplicates and in-house controls were sent to ensure the quality of the laboratory results. Total curcuminoid (sum of three measured curcuminoids) and piperine contents were compared to the label claim amounts, if available.
Results: Label amounts for turmeric material ranged from 50 – 1300 mg/serving (most common: 500 mg). Forty-two products (78%) had labeled amounts for total curcuminoids. Fifteen products (36%) had only a minimum claim ("standardized to at least" an amount, or more than one turmeric sources with a claim for only one) and differences from label ranged from -34.4 to 73.1% (mean = 11.4%). Twenty-seven products (64%) with an exact amount claim, had differences from label ranging from -9.3 to 25% (mean = 7.3%). Twelve products had piperine claims (1.9 – 14 mg/serving) and differences from label ranged from -3.4 to 24%.
Significance: FDA requires the weight of turmeric material on labels, but not the concentration of individual constituents. Most turmeric DS in this study had voluntary information about curcuminoid content, but only a minimum level was provided for one third of the products. While preliminary results indicated that the mean total curcuminoid content in products with a minimum claim was more variable compared to exact label claims, the mean percentage differences were similar in both labeling types.

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B. Food Composition Data Analysis and Compilation

1. CONCENTRATIONS OF PHYTOCHELATINS, PLANT-DERIVED METAL-BINDING COMPOUNDS, IN COMMONLY CONSUMED FRUITS AND VEGETABLES. Kristine K. Dennis[1], MPH; Ken H. Liu[2]; Young-Mi Go[2], PhD; Dean P. Jones[2], PhD; [1]Emory University, Nutrition and Health Sciences Program, Laney Graduate School; [2]Emory University, Division of Pulmonary, Allergy and Critical Care Medicine.
Funding: NIH F31 ES030980; NIH U2C ES030163; NIH T32 DK007734

Student Poster Award Competition Entry

Objective: Determine the concentrations of phytochelatin2-glycine (PyC_2-Gly), a metal-binding compound produced by plants, in three groups of commonly consumed plant foods.
Materials and Methods: Four food types were selected for three food groups (leafy greens, root vegetables, fruits) based on the most commonly consumed foods for each group in the United States. Ten food items for each food type were purchased from local grocery stores, resulting in 120 analyzed foods (food groups, n=3; food types per group, n=4; individual foods per type, n=10). Food samples were analyzed with liquid chromatography-mass spectrometry for PyC_2-Gly, one of the most common phytochelatin types, following extraction by grinding with mortar and pestle and sonication in a 2:1 acetonitrile to water solution. Authentic standards allowed PyC_2-Gly quantification and comparison via one-way ANOVA within and across groups.
Results: PyC_2-Gly content was highly varied both within and across food groups. Across food groups, fruits had the highest PyC_2-Gly content followed by root vegetables and leafy greens (mean±SEM, µg/g fresh weight; fruits, 2.63±0.35>root vegetables, 2.55±0.51>leafy greens, 1.24±0.18). Across all twelve food types, the highest PyC_2-Gly levels were in carrots, oranges, apples, and onions (mean±SEM, µg/g fresh weight; carrots, 6.35±1.35; oranges, 5.09±0.57; apples, 3.23±0.63; onion, 2.53±0.30). Within each food group, food types were significantly different (one-way ANOVA, $p<0.05$) and there was high variability in concentrations depending on food type with 5-fold, 10-fold, and almost 30-fold differences within leafy greens, fruits, and root vegetables, respectively.
Significance: Phytochelatins may impact bioavailability of nutritional and toxic metals due to their metal-binding characteristics. PyC_2-Gly was found in all analyzed foods but concentrations varied widely across food types. As these compounds may protect from toxic metal absorption, our research provides a foundation for understanding the concentrations of phytochelatins in commonly consumed foods and demonstrates that dietary phytochelatin exposure depends on the specific foods consumed.

2. EXPERIENCE IN THE COMPILATION OF FOOD COMPOSITION DATA TO STRENGTHEN THE COSTA RICA VALORNUT SOFTWARE DATABASE. Cindy Hidalgo Víquez[1], Licda., Anne Chinnock McNeil[1], PhD., Carolina Cortés Herrera, MSc., Johanna Cedeño Izaguirre[1], student. [1]Nutrition School, Universidad de Costa Rica; [2]Food Technology School, Universidad de Costa Rica.

Objective: Strengthen the food composition database (FCDB) of ValorNut software by compiling data generated by chemical analysis at the National Center for Food Science and Technology (CITA) of the University of Costa Rica (UCR).
Methods: A review of the CITA database of chemical analyzes conducted between 2014 and 2018 was carried out. The first part consisted of a revision of the FCDB to select the data belonging to research projects carried out at the center, excluding analytical data generated by the sale of services. Foods

were identified from which the current FCDB of the software did not have information or had lost data. The database was reviewed considering the following criteria: 1. The analytical data would have been generated by analytical methods recommended by INFOODS according to the matrix, 2. The analytical data were complete, 3. The food sampling corresponded to what was established by INFOODS. Data that did not meet one or more of the criteria were excluded. Consent was requested from researchers who had generated the data that met the criteria and included data from those who agreed to transfer them to be included in the ValorNut FCDB.
Results: The analytical database contained data on traditional foods from CR and the Central American region of which there was no or little information in the FCDB of ValorNut.
Conclusions: The linking of food composition data generating entities with those who compile data and manage FCDB is essential to strengthening information systems in individual countries. Although INFOODS promotes that each country generates its data, this is expensive and requires the contribution of various institutions. A detailed analysis of the information is required when it is intended to compile analytical data that was not generated specifically for an FCDB.

3. **ANALYSIS OF METHODOLOGICAL COMPONENTS AND HUMAN AND TECHNOLOGICAL RESOURCES AVAILABLE IN COSTA RICA TO GENERATE FOOD COMPOSITION DATA.** Cindy Hidalgo Víquez[1], Licda., Anne Chinnock McNeil[1], PhD., Carolina Cortés Herrera, MSc., Jessica Campos Morales, BA., Mariel Molina Castro, BA. [1]Nutrition School, Universidad de Costa Rica; [2]Food Technology School, Universidad de Costa Rica.

   Objective: Analyze the methodological components and available resources for generation of food composition data (FCD) in Costa Rica (CR).
   Methods: The laboratories that perform food composition analysis in CR were visited in order to characterize them and evaluate which complied with the standards established by international authorities for the generation of FCD. Finally, the applicability of the technical criteria determined by the international authorities for food and nutrient analysis was evaluated with experts in CR. **Results:** We found that several entities have the capacity of both in infrastructure and human resources to generate FCD, however their work is disjointed, they have a very limited budget and there is no national FCD system. One of the limitations that we identified is that public laboratories don´t offer analysis of water-soluble vitamins, which limits obtaining complete data on food samples. In CR the FCD are generated under the methodological guidelines of INFOODS, making it necessary to adapt these guidelines to the local context. Also, there is no consensus in CR regarding which foods and nutrients should be included in the food composition databases (FCDB). The School of Nutrition of the University of CR developed a software called ValorNut which calculates the nutritional value of food. The software's database was compiled from the USDA's database and the mandatory fortification values in CR were included, but there is a need to improve it with the generation of our own data in the country for some specific foods. ValorNut represents an opportunity as a starting point for an integrated FCD system at the national level.
   Conclusions: Work must be done to adapt the international FCD management methodologies within the context of CR, promote alliances between entities that have the capacity to produce data and work towards achieving an integrated FCD system in the country.

4. **DESTRUCTION OF NUTRIENT CONTENTS UPON COOKING OF BEEF VARIETY MEATS.** Nguyen, Quynhanh; Roseland, Janet; Bahadur, Rahul. USDA-ARS, Methods and Application of Food Composition Laboratory.

Objective: Compare current analytical nutrient values and variability before and after cooking for three beef varieties.
Method: Retail-ready samples of beef tongue, heart, and tripe were collected from three major U.S. processing facilities in Texas, Nebraska, and Kansas in order to obtain national representation of these items. Samples were cooked according to established protocols.
Results: Raw and cooked samples were prepared and assayed for proximate nutrients, minerals, and cholesterol (n=3/variety meat item) at CSU and approved commercial laboratories. Analytical values for all nutrients for each variety type were modeled using a linear mixed model with heterogeneous variances Pairwise comparisons between cooked and raw values, using dry weights, were done using t-tests and adjusted for multiple comparisons using Tukey HSD. Results showed that for heart, tongue, and tripe, there were significant decreases after cooking in mineral concentrations ($p<0.05$) including phosphorus, potassium, sodium, and copper. Protein increased significantly from raw to cooked in tripe and tongue ($p<0.05$). Ash decreased from raw to cooked for heart, tongue, and tripe ($p<0.05$).
Significance: Reporting data for these variety meats will benefit meat scientists, exporters, dietitians, and consumers by showing the impact of cooking on the nutrient content and variability of these foods. These data can facilitate usage of these economical nutrient-dense foods for health, and can enable better estimates of nutrient intake.

5. **EVALUATION AND IMPLEMENTATION OF MODEL FOR FREE AND ADDED SUGAR.** Anders Poulsen, Tue Christensen and Anja Pia Biltoft-Jensen. National Food Institute, Technical University of Denmark

Objective: Evaluate a model for prediction free and added sugar in foods [1].
Method: The Danish food database contains 1740 food items of which 64% have data for added sugar. Existing data was compared to the prediction of added sugar derived by the model.
Result: 75% of predictions were identical to existing data. 70% of these were Zero-values and 95% of predictions were within 5g/100g of added sugar. For the remaining 5% the existing data was estimated to be less reliable than the model prediction. The model was implemented in the Danish Food Database (https://frida.fooddata.dk/) with minor modifications. These related to classification of mainly processed meat and wine where we did not want lactose from whey and fruit sugar from grapes to count as added sugars. Free and added sugar as well as the model classification step were recorded for all foods in the database.
Significance: Danes generally ingest more sugar than recommended by national guidelines. This has contributed to the rise in cardiovascular and metabolic diseases. Publishing reliable data on added sugar in foods aids scientists, authorities, the food industry and citizens with the aim of reducing sugar intake.
[1] J. Wanselius, C. Axelsson, L.Moraeus, C. Berg, I. Mattisson,and C.Larsson: Nutrients 2019 Jun 14;11(6). pii: E1342

6. **IODINE AND VITAMIN D CONTENT AND VARIABILITY IN U.S. SHELL EGGS AND PROCESSED EGGS.** Janet M. Roseland, MS, RD; Rahul Bahadur, MS; Pamela R. Pehrsson, PhD. USDA-ARS, Methods and Application of Food Composition Laboratory

Objective: To measure differences among analytical nutrient values and variability for iodine and vitamin D in shell eggs and processed eggs, due to public health concerns regarding iodine and vitamin D intake.
Methods: The Methods and Application of Food Composition Laboratory conducted a nationwide study of shell eggs, obtaining representative sample units from 24 U.S. retail locations in 2019,

according to USDA's statistical sampling plans previously published. Frozen liquid whole eggs were obtained in 2018 from six major producers (up to 3 lots per producer; n=14). Virginia Tech collaborators prepared sample units using established protocols. Samples were sent to approved laboratories for iodine and vitamin D analysis using validated methods. To monitor accuracy and precision, standard reference materials and matrix-specific control materials were analyzed. Nutrient means were computed with linear models using appropriate data transforms wherever necessary. Values were compared using t-tests.
Results: Based on these analyses, vitamin D_3 concentration (mean±SE; mcg/100 g) for shell eggs (1.9±0.32) and 25-hydroxyvitamin D_3 levels (0.6±0.04) were not significantly different (p=0.3) than respective values in USDA's retail sampling conducted in 2010. Vitamin D_3 and 25(OH)D_3 content of shell eggs did not differ significantly (p>0.8) from processed liquid whole eggs. Iodine concentration (mean±SE; mcg/100 g) was 49.2±4.3, which was not significantly different (p=0.06) than processed liquid whole eggs. Updated nutrient data including metadata for individual samples were incorporated into FoodData Central (FDC), USDA's database (https://fdc.nal.usda.gov/).
Significance: Eggs are an important dietary source of iodine and vitamin D. Agreement of vitamin D data over time, and between shell vs. frozen liquid types, suggests consistency of content in eggs. Comparison of iodine data suggests consistency between shell and frozen liquid eggs. These data contribute valuable information for estimating U.S. iodine and vitamin D intakes.

7. **INFLUENTIAL FACTORS OF AGRICULTURAL PRACTICE AND COOKING ON THE NUTRIENT COMPOSITION OF YELLOW SWEET CORN: A PILOT STUDY.** Xianli Wu[1], PhD, Katherine Philips[2], PhD; James Harnly[1], PhD; Pamela R. Pehrsson[1], PhD. [1]Methods and Applications of Food Composition Laboratory, USDA ARS Beltsville Human Nutrition Research Center, Beltsville, MD 20705, USA. [2] Biochemistry Department, Virginia Tech, Blacksburg, VA 24061, USA.

Objective: Sweet corn is one of the most consumed vegetables in the US. Yellow sweet corn is high in carbohydrates and contains a fair amount of several shortfall vitamins and minerals, which could be affected by the factors related to agricultural practice and cooking/processing. This pilot study was designed to gain preliminary understanding on the key influential factors of the nutrient composition of yellow sweet corn.
Materials and Methods: Yellow sweet corn samples were picked at different locations and harvest days from a local farm in Maryland. Half of one freshly picked corn sample was steamed. Additional yellow sweet corn samples were purchased at grocery stores in Maryland and Virginia for comparative purpose. All samples were properly prepared, and were then analyzed by commercial laboratories using validated methodology with quality assurance procedures for vitamins, carotenoids, minerals, dietary fiber, starch and free sugars.
Results: Different locations within the same farm did not appear to influence all nutrients in yellow sweet corns. Harvest day altered the profiles of free sugars and starch. Corn samples from Virginia contained no maltose and much higher carotenoids comparing to those purchased in Maryland. Steaming was found to increase sucrose, while decrease all other free sugars as well as the total sugars. In addition, steaming resulted in the increases of total fiber, insoluble fiber and high molecular weight dietary fiber.
Significance: Carbohydrates are mostly likely affected by growing condition, harvest day and cooking. Minerals and B vitamins are largely unaffected by growing conditions and harvest days. Growing regions could significantly alter the carotenoids. This pilot study will guide future sampling plan and study design.

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C. Food/Nutrient Intake Assessment Methodology

1. **VALIDATION OF SEMI-QUANTITATIVE FOOD FREQUENCY QUESTIONNAIRE (FFQ) FOR ADULTS IN NIGERIA.** Galya Bigman[1], Sally N. Adebamowo[2], Olubanke Ipadeola[3], Gbemisola Jenfa[3], Temilola Yusuf[3], Adeola Ogundeji[3], Tobiloba Oyediran[3], Oshevire Susan[3], Adeola Akintola[3], Olusegun Adeyemo[3], Clement Adebamowo.[1,2,3] [1] Institute of Human Virology, University of Maryland School of Medicine, Baltimore; [2] Department of Epidemiology and Public Health; and Marlene and Stewart Greenbaum. Comprehensive Cancer Center, University of Maryland School of Medicine, Baltimore; [3] Center for Bioethics and Research, Ibadan, Nigeria

Objective: To validate a semi-quantitative Food Frequency Questionnaire (FFQ) for measurement of dietary intakes in Nigerian adults.
Materials and Methods: The Nigerian FFQ comprised 225 food items that includes common Nigerian foods based on previous studies. Because of lack of consistent portion sizes in Nigeria, we also created a Food Picture Book (FPB) to be used alongside the FFQ. We enrolled 220 participants, older than 18 years, resident in Ibadan, Nigeria, who do not plan to move during the 2 years of the study. Participants are being administered one FFQ and two 24 hours dietary recalls (24HrDR) (one on the same day as the FFQ and a second one, a week later) during the two main seasons of the year - dry and rainy - in Nigeria because this affects availability and cost of specific food items. The data are doubly entered into a Redcap database. In this analysis, we compare the intakes of foods reported by the FFQ with the two 24HrDR recalls
Results: Overall 210 participants completed the first round of one FFQ and two 24HrDR. Some 46% were males and their mean(SD) age was 45.3(13.6) years, ranging from 19 to 83 years. The FFQ reported higher mean(SD) daily total rice intake of 2.07(1.79) portions compared to 1.55(1.1) from the average of two 24HrDR. The Spearman rank correlation coefficient was 0.38 (95% CI: 0.25-0.5).
Significance: The Nigerian semi-quantitative FFQ incorporating a FPB showed good correlation with 24HrDR with results similar to studies from other parts of the world. Given its comprehensiveness, our FFQ can be used to investigate the role of diet on health outcomes in adult Nigerians. Future research will establish the validity of FFQ for other foods and nutrients.

2. **DEVELOPMENT OF A SPECIAL PURPOSE NUTRIENT AND FOOD PATTERNS EQUIVALENTS DATABASE FOR SELECTED BRANDED FOODS IN THE NATIONAL HOUSEHOLD FOOD ACQUISITION AND PURCHASE SURVEY-1.** Shanthy Bowman, PhD[1]; Miyuki Shimizu, MS, RD[2]; Natalia Schroeder, PhD, RD[2]; Devendra Paudel, MS[2]; Anastasiya Yakovlev BS[2]; Suruchi Mishra, PhD[3]; John Clemens, MS[1]; Alanna Moshfegh, MS, RD[1]. [1] Food Surveys Research Group, Agricultural Research Service, USDA, Beltsville, MD; [2]University of Maryland, College Park, MD; [3]National Center for Health Statistics, CDC, Hyattsville, MD.

Objective: To develop energy and nutrient profiles and Food Patterns Equivalents (FPEs) needed to compute the Healthy Eating Index (HEI) for about 3600 branded foods in the National Household Food Acquisition and Purchase Survey (FoodAPS-1) conducted by the USDA Economic Research Service.
Methods: The branded foods included frozen meals; bread, cookie, cakes, brownie and muffin mixes; snack bars; hamburger helpers; salad kits with dressing; beverages; dry soup mixes; and cheeses. The ingredient list, nutrient contents per serving, nutrient content claims, health claims, and structure function claims were obtained from the respective food labels. In addition, Information Resources Incorporated (IRI) scanner data were used to obtain claims on sodium, fat, whole grains, gluten, and allergens. The amount of each ingredient present per 100 grams of each of the 3600 foods was

estimated using food label information and IRI data. Energy and HEI nutrients for the ingredients in the amounts present were computed next, by linking the ingredients to the appropriate Standard Reference 28 or the Food and Nutrient Database for Dietary Studies 2013-2014 food. The FPEs in the ingredients were computed using the Food Patterns Equivalents Database 2013-2014, and the computed energy, nutrients, and FPEs were totaled for each food.
Results: The final database contained energy, 6 HEI nutrients, and 37 FPEs for each of the 3600 branded foods in FoodAPS-1.
Significance: The research showed that energy, nutrients and FPEs can be developed successfully for complex, processed foods purchased by U.S. households and can be used to assess the dietary status of Americans, at the household level. The Economic Research Service will use this database in the future FoodAPS-2 collections.

3. **STRATEGIES FOR CODING CHILD NUTRITION MENUS WITH THE FOOD AND NUTRIENT DATABASE FOR DIETARY STUDIES (FNDDS).** Amber Brown, MPH, RD, Westat; Deirdre Douglass, MS, RD, Westat; and Thea Palmer Zimmerman, MS, RD, Westat. *Funding: The USDA Food and Nutrition Service is conducting this study through a contract with Westat (Contract number AG-3198-B-16-0002).*

Background: Although the USDA's Food and Nutrient Database for Dietary Studies (FNDDS) includes many food codes labeled as "school foods", school menus include many more products developed for child nutrition (CN) programs. These foods may be whole grain-rich, low sodium or low fat versions of common foods that FNDDS does not include. Additionally, there is interest in identifying foods supplied by the USDA Foods program (i.e., commodity foods). Research studies on menus and food items offered in CN programs require development of foodcodes that reflect these characteristics.
Objective: To code and analyze menus, production records, and recipes from CN programs and distinguish foods uniquely available to CN programs, such as USDA Foods and whole grain-rich products, from foods in the general food environment.
Description: Using USDA's SurveyNet food coding software, Westat dietitians developed a menu coding approach focused on building a study database to characterize CN menu data. We prioritized the use of 73 FNNDS food codes described as school food when coding menu items, as these recipes closely align to foods in CN programs. We created recipes to match whole grain (146) or whole grain-rich (200) products to code menu items reported with these labels. We developed 162 modified recipes using USDA Foods to track the use of these items in production records or menus. We modified recipes for items reported as reduced sodium (48) or reduced fat (23).
Conclusion: With this approach, we created a menu database to better match the nutrient values, food pattern equivalents, and food groups of menus served in child nutrition programs.

4. **DEVELOPMENT OF A SCREENING TOOL FOR MAGNESIUM DEFICIENCY.** Emily Young Campbell*[1], Andrea Rosanoff, PhD[2], Rebecca Costello, PhD[2], Bernadette P. Marriott[1], PhD. Medical University of South Carolina[1]; Center for Magnesium Education & Research[2]

**** Student Poster Award Competition Entry***

Objective: Validation of a screening tool for magnesium (Mg) deficiency.
Methods: Using REDCap software, we built an evidence-based, computerized, self-scoring instrument called MagQuest designed to estimate 30-day dietary intake and capture medical conditions associated with Mg deficiency. The 37-item instrument consists of an abbreviated 30-day Food Frequency Questionnaire (FFQ) based on the National Cancer Institute's Diet History Questionnaire (DHQ-II).

Twenty-three volunteers participated in an initial validation study to compare Mg intake estimated by MagQuest with the NCI DHQ-II, with participants randomized and instructed to take either the DHQ-II or MagQuest first. DHQ-II nutrient analysis was obtained using DietCalc version 1.5 and MagQuest's Mg intake estimate is based on Mg values retrieved from the USDA Standard Reference Database. All values assigned to Mg supplements were subtracted from dietary intake estimates before Pearson's correlation coefficients were calculated.
Results: Mg intake values estimated by MagQuest and the DHQ-II were positively correlated (Pearson's $r = 0.617$, $p < 0.01$), indicating good correlation. Further examination of survey responses revealed a discrepancy between Mg intake estimated for consumption of greens and nuts. After adjusting for these differences, Pearson's correlation coefficient rose to $r = 0.766$ ($p < 0.01$).
Significance: The 2015 Dietary Guidelines Advisory Committee found Mg to be under-consumed relative to the Estimated Average Requirement. Despite this, Mg intake tends to be under-emphasized in clinical settings and it is rarely included on Nutrition Facts labels. Initial investigations indicate that MagQuest may accurately estimate dietary Mg intake. A larger-scale validation study is planned to further investigate MagQuest's ability to estimate dietary Mg intake.

5. **DIGITAL FOOD SURVEY PROTOTYPE - EANSE FORMS**. **THE NEW DIETARY DATABASE OUTPUT FEATURE.** Adriane dos Santos da Silva, MSc student; Fábio Ramos da Silva, MSc student; Débora Martins dos Santos PhD; Flávia dos Santos Barbosa Brito, PhD. Nutrition Institute, Rio de Janeiro State University.

Student Poster Award Competition Entry

Objective: To present the automatic output feature of the *Eanse Forms* food database management system.
Methods: Eanse Forms is a computer-based food database management system developed in a query language similar to structured SQL beta. For the Front End, the table's data entry forms were created in a friendly interface using Microsoft Access version 2010. The data import and query structure used Visual Basic version 7.1 for formatting and Microsoft Excel version 2010 for reporting**.**
Results: The pre-tests results indicated excellent performance in the food data list organization, quantification, and nutritional assessment, which was based on the Brazilian food composition table. Through this interface, it was possible to optimize access to dietary data from the 24-hour recall, as well as other nutritional information of the studied group, prototype's propose. The system also organized the complementary data, which includes health and socioeconomic information.
Significance: The *Eanse Forms* prototype has produced an automatic data generation interface for food consumption information. *Eanse Forms* food data management system improved food data quality through the management of dietary data for nutritional and dietary assessment proposals of community action older adult participants. Its design allowed automated and integrated food data capture, decode, and generation as part of a community action that produces health research-based health promotion activities. The use of *Eanse Forms* allowed the production of more accurate, cheaper, and faster dietary data. Operational capabilities, such as predefined report management, still need to be improved, and this challenge leads the team to new and more exciting proposals to accrued dietary data, essential information for the community action program participants.

6. **CREATION OF AN INGREDIENT DATABASE FOR NCI'S AUTOMATED SELF-ADMINISTERED 24-HOUR DIETARY ASSESSMENT TOOL (ASA24) RECIPE FEATURE.** Deirdre Douglass, MS, RD, Westat; Thea Zimmerman, MS, RD, Westat; Viji Narayana, Westat; Beth Mittl, Westat; Amy Miller, Westat; Amy

Subar, Ph.D, RD, NCI; Kirsten Herrick, Ph.D, NCI. *Funding: ASA24-2018 was funded by the National Cancer Institute, contract # HHSN261201200008C.*

Background: Dietary recalls and records are used to collect information on foods and beverages consumed and on habits and trends. Although food and nutrient databases offer a variety of foods, having the additional ability to create unique recipes can allow for more specificity of foods and beverages recorded.
Objective: To create an ingredient database and add a recipe feature to NCI's Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24).
Description: NCI obtained permission to use USDA's SuperTracker ingredient database as a basis for ASA24 ingredient data. Westat updated foodcodes to include only those in USDA's Food and Nutrient Database for Dietary Studies (FNDDS) 2013-2014 and National Nutrient Database for Standard Reference 28. We ensured that ASA24 included all appropriate forms of ingredients, such as raw, cooked, chopped, and sliced. We used yield data from FNDDS or Agriculture Handbook 102, USDA's cooking yield database, to adjust weights and nutrients from the raw to the cooked ingredient to allow respondents to report the amount of a raw ingredient in a recipe that they consumed in cooked form. Additionally, given that respondents are likely to report salt added as an ingredient in recipes, we removed salt in FNDDS cooked foods by adjusting the sodium value in the nutrient profile of ingredients to avoid artificially high levels of sodium. The recipe feature allows the respondent to name the recipe, assemble ingredients, specify the recipe yield in servings, and enter the number of servings consumed into the record or recall. The newly created recipe is available to the respondent for other meals within the intake day and for subsequent intake days. **Conclusion:** ASA24-2018, released in November 2018, includes a new recipe feature with over 2000 ingredients available to respondents. The ASA24 recipe feature provides an avenue for respondents to provide more discrete details about foods consumed.

7. **POSTER WITHDRAWN**

8. **RECENT APPLICATIONS OF THE USDA FOOD AND NUTRIENT DATABASE FOR DIETARY STUDIES IN FEDERAL PROGRAM EVALUATION.** Courtney Paolicelli, DrPH, RDN; Alice Ann Gola, PhD; Danielle Berman, PhD; Kelley Scanlon, PhD, RD. USDA Food and Nutrition Service.

Background: USDA Food and Nutrition Service (FNS) administers 15 Federal nutrition assistance programs, including the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), National School Lunch Program (NSLP), and Child and Adult Care Food Program (CACFP). Thorough and timely evaluation of these programs is critical to understanding how they impact children's diets, as adequate nutrient intake during childhood is essential for optimal growth and development.
Objective: This poster describes how FNS applies the USDA Food and Nutrient Database for Dietary Studies (FNDDS) when assessing the impacts of WIC, NSLP, and CACFP.
Description: Since 2013, FNS has conducted three national studies that evaluate the diets of children participating in WIC, NSLP, and CACFP. Two studies, the WIC Infant and Toddler Feeding Practices Study-2 and the School Nutrition and Meal Cost Study-I, used the Automated Multiple Pass Method and FNDDS to assess intakes of children participating in WIC and NSLP, respectively. A third study, the Study on Nutrition and Activity in Child Care Settings used a Child Food Diary to record everything the child consumed and FNDDS to assess their dietary intake. All studies measured energy, macro- and

micronutrient intakes, and quantified participants' diet quality using a Health Eating Index score. To incorporate accurate data on foods specifically formulated for school meals, the nutrient and ingredient information of 250 of the most commonly offered products in school meals was used to generate the nutrient and USDA Food Pattern food group profiles in FNDDS.
Conclusion: As the food supply and foods offered through FNS programs continue to change, so do the intakes of those who participate in the Federal nutrition assistance programs. In order to accurately assess the impacts of these programs on participants' intakes, it is critical for nutrient databases, including FNDDS, to reflect the food supply and foods available through FNS programs.

9. **METHODOLOGY FOR ESTIMATING PRICES FOR FOODS AND THEIR INGREDIENTS IN THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY/ WHAT WE EAT IN AMERICA.** Thea Palmer Zimmerman, MS, RD, Westat; Carina E. Tornow, MA Westat; Sigurd Hermansen, MA, Westat; Kevin Kuczynski, MS, RD, USDA – FNS-CNPP; TusaRebecca Pannucci, PhD, MPH, RD, USDA – FNS-CNPP; Kristin Koegel, MBA, RD, USDA – FNS-CNPP; Elina Page, M.S., PhD, USDA-Economic Research Service (ERS); Andrea Carlson, M.S., PhD, USDA-Economic Research Service (ERS). *Funding: The USDA Economic Research Service is conducting this study through a contract with Westat (Contract number 1232SB18F0322)*

Background: The nutrition research community has long been interested in linking food purchases with reported food consumption data. A main question of interest what does it cost to eat a healthy diet The previously developed Purchase to Plate Crosswalk (PPC) provided a link between retail UPCs and food codes in the USDA Food and Nutrient Database for Dietary Studies (FNDDS), which allows researchers to calculate the nutritional content of purchases. The more recent Purchase to Plate Price Tool (PPPT) estimates retail prices for the foods Americans report eating in NHANES/WWEIA at the recipe level. However, to link costs to consumption, researchers are interested in the underlying ingredients that comprise the food recipes in NHANES/WWEIA and finding a methodology that estimates the quantity of each ingredient to purchase. The challenge is that many ingredients are available in multiple forms, e.g., raw carrots, sold with or without refuse, versus canned carrots. Estimations based on retail data need to provide the amount to purchase of all forms and the corresponding cost.
Objective: To estimate the purchase quantity and purchase price of ingredients for recipes reported in the National Health and Nutrition Examination Survey/ What We Eat in America (NHANES/WWEIA).
Description: Using the FNDDS recipes, retail sales data, and the PPC, we developed the Ingredient Purchase to Plate Price Tool (IPPPT). The tool determines for each recipe the purchase forms, quantity, and cost of each underlying ingredient.
Conclusion: The ingredient price tool (IPPPT) expands upon the PPPT by estimating costs and purchasable quantities of all ingredients for approximately 97 percent of recipes reported in NHANES/WWEIA. Instead of providing the overall cost of the recipe, it provides an estimate at the ingredient level. The resulting quantity, form, and price data may be used by researchers to develop market baskets or for policy initiatives.

D. Food/Nutrient Intake Assessment Results

1. MEETING THE DIETARY GUIDELINES SATURATED FATS RECOMMENDATION IS ASSOCIATED WITH HIGHER INTAKES OF FRUIT, SEAFOOD, AND POULTRY AND LOWER INTAKES OF ENERGY, DAIRY, AND EGGS, IN U.S. ADULTS. Shanthy Bowman, PhD[1]; James Friday, BS[1]; Randy LaComb, MS[1]; Devendra

Paudel MS[2]. [1] Food Surveys Research Group, Agricultural Research Service, USDA, Beltsville, MD; [2]University of Maryland, College Park, MD

Objective: To estimate and compare energy, saturated fats, and selected Food Patterns food group intakes of adults who met the Dietary Guidelines for Americans 2015-2020 (DGA) saturated fats recommendation and the adults who did not meet the recommendation. **Methods:** Adults 20+ years with complete dietary intake on day 1 of What We Eat in America NHANES, 2015-2016 were included in the study (N=5017). They were divided into two groups: (1) adults who met the DGA saturated fats recommendation; and (2) adults who did not meet the recommendation. Food Patterns Equivalents (FPE) Database was used for FPE estimations. Mean intakes of energy, saturated fats and selected FPEs of the two groups were estimated and compared using linear contrasts; and a p-value less than 0.01 was considered as significantly different.
Results: Thirty-seven percent of the adults in the study met the DGA recommendation by limiting their saturated fats intake to less than 10 percent of the day's total energy. The adults who met the DGA recommendation had significantly lower intakes of energy (1961±34 vs, 2189±26 calories) and saturated fats (17±0.4 vs. 34±0.5 grams) than the adults who did not meet the recommendation. They had significantly higher intakes of fruit (1.2±0.06 vs. 0.80±0.04 cup equivalents), seafood (0.8±0.10 vs. 0.5±0.08 ounce equivalents), and poultry (2.0±0.12 vs. 1.4±0.09 ounce equivalents). However, they had significantly lower intakes of eggs (0.4±0.02 vs. 0.7±0.03 ounce equivalents) and dairy foods such as fluid milk (0.5±0.04 vs. 0.7±0.03 cup equivalents) and cheese (0.3±0.02 vs. 1.0±0.03 cup equivalents).
Significance: The findings showed that the adults who met the DGA recommendation ate more seafood and poultry, the protein foods that are lower in saturated fats compared with meat. Dairy foods are sources of saturated fats. By choosing low-fat or nonfat dairy options adults could increase their dairy intakes without compromising their saturated fats intakes.

2. **ASSOCIATIONS BETWEEN MEETING RECOMMENDATIONS FOR FISH INTAKE AND DIET AND CHRONIC DISEASE INDICATORS IN U.S. ADULTS**. **Hannah Church-Lee, BS, ACSM – CPT; Francine Overcash, PhD, Marla Reicks, PhD, RDN.** University of Minnesota - Twin Cities.

Student Poster Award Competition Entry

Objective: To examine associations between meeting U.S. Dietary Guidelines recommendations for fish intake, dietary intake and indicators of chronic disease in U.S. adults.
Methods: Data from the National Health and Nutrition Examination Survey (NHANES 2013-2016) were used to examine associations between meeting fish consumption recommendations (8 oz equivalents seafood/week) and diet and indicators of chronic disease among 7554 adults (20-65 years) using regression models (SAS Survey procedures) adjusted for covariates with appropriate cluster, strata and weight statements. Fish consumption was based on frequency data from the first day NHANES total nutrient intake files.
Results: A low percentage of adults met fish consumption recommendations (n = 1062, 14%). The number meeting and not meeting recommendations did not differ by age, sex, race, education, income or marital status. The most common species of finfish consumed were tuna and salmon. The most common species of shellfish consumed were shrimp, crabs and clams. Individuals meeting recommendations for fish intake had greater intakes of energy, protein, fiber, polyunsaturated fatty acids, cholesterol, alcohol, whole grains, and some vitamins and minerals compared to those not meeting recommendations. LDL cholesterol was higher and age of onset for heart attack and stroke were later for individuals meeting dietary recommendations compared to those not meeting

recommendations. Other indicators of chronic disease, such as diabetes and hypertension were not associated with meeting fish intake recommendations.
Significance: Findings indicate that meeting fish intake recommendations was not consistently associated with positive dietary outcomes and lower chronic disease risk compared to those not meeting fish intake recommendations.

3. **ENERGY AND NUTRIENT INTAKE OF AMERICANS MEETING DAIRY FOOD RECOMMENDATIONS OF THE 2015-2020 DIETARY GUIDELINES FOR AMERICANS.** Julie M. Hess, PhD, National Dairy Council; Christopher J. Cifelli, PhD, National Dairy Council; Victor L. Fulgoni, III, PhD, Nutrition Impact, LLC.
Funding: The study and writing of this manuscript were supported by National Dairy Council. JMH and CJC are employees of National Dairy Council, Rosemont, Illinois, USA. VLF as Senior Vice President of Nutrition Impact, LLC performs consulting and database analyses for various food and beverage companies and related entities.

Objective: Most Americans do not meet dairy food recommendations from the 2015 Dietary Guidelines for Americans (DGA) and therefore may underconsume nutrients like calcium, vitamin D, and potassium. This study assesses the energy and nutrient intake of Americans who meet dairy food recommendations from the 2015 DGA Healthy U.S.-Style and Healthy Vegetarian Eating Patterns (i.e. 3 servings for those 9 years and older, 2½ servings for those 4-8 years, 2 servings for those 2-3 years).
Materials and Methods: This analysis used dietary recall data from day 1 of the National Health and Nutrition Examination Survey conducted in 2013-2014 and 2015-2016 (n = 5670 children 2–18 years and 10,112 adults 19+ years) to identify subpopulations meeting dairy recommendations. Usual intakes (using the National Cancer Institute method) and percent population below Estimated Average Requirement (EAR) or above Adequate Intakes (AI) were calculated and compared.
Results: Approximately 25.7% of children and 11.6% of adults consumed at least the recommended number of dairy servings. Children and adults who met or exceeded dairy serving recommendations (Above RS) consumed more energy but had lower body mass indices (BMI) or BMI z-scores than those who did not meet recommendations (Below RS). Most children and adults Above RS consumed above the EAR for calcium, magnesium, phosphorus, riboflavin, vitamin A, vitamin B12, and zinc. Americans Above RS were also more likely to meet the AI for potassium and choline but also to exceed recommendations for sodium, added sugars, and saturated fat. Nearly 60% of Americans 2 years and older Below RS consumed amounts of calcium and magnesium below the EAR, and only about 20%of Americans Below RS consumed above the AI for potassium.
Significance: It can be difficult to meet nutrient needs without consuming recommended amounts of dairy foods but intake of nutrients to limits must be considered.

4. **ASSOCIATIONS BETWEEN ACCULTURATION AND DIET, PHYSICAL ACTIVITY AND INDICATORS OF CHRONIC DISEASE AMONG U.S. ASIAN ADULTS.** Yue Jiang, BS, Francine Overcash, PhD, Marla Reicks, PhD, RDN. University of Minnesota, Department of Food Science and Nutrition.

Student Poster Award Competition Entry

Objective: Examine associations between acculturation and diet, physical activity, and indicators of chronic disease among U.S. Asian adults.
Materials and Methods: Asian adults participating in the 2011-2016 National Health and Nutrition Examination Survey (n = 1818, 20-65 years) were divided into more (n = 708) and less acculturated (n = 1110) groups based on an acculturation scale (country of birth, length of U.S. residence, language

spoken at home). Asian adults included those having origins in any of the original people of the Far East, Southeast Asia, or the Indian subcontinent. Food group and nutrient consumption, physical activity, and indicators of chronic disease were compared by acculturation level using regression models adjusted for covariates with appropriate cluster, strata and weight statements.
Results: Most participants (86%) were born outside of the U.S. About half (47%) reported speaking only a non-English language at home. Fewer less acculturated participants (38%) reported an annual income < $75,000 than more acculturated participants (56%). Adjusted analyses showed that the more acculturated participants had lower intakes of dietary fiber, folate, total fat and grains, and greater dairy and cured meat intakes than less acculturated participants. Intake of total vegetables and refined grains were not significantly lower for more vs. less acculturated participants (p = 0.057 and 0.067, respectively). Body mass index, but not waist circumference, was higher for more compared to less acculturated participants. The more acculturated participants reported spending more time on vigorous recreational activity in a typical day than the less acculturated participants. No associations were observed between acculturation score and indicators of diabetes, hypertension, or hyperlipidemia.
Significance: Findings can be used by public health professionals to implement nutrition education and physical activity programs tailored to U.S. Asian adults to improve diet and physical activity and prevent obesity.

5. **COMPARISON OF SKIN CAROTENOID CONTENT AND DIETARY CAROTENOID INTAKE.** Jessica Keller, MS, RD, Matthew Taylor, PhD, RD; Kendra Spaeth, MS, RD; Juleah Littrell, MS, RD; Jeffrey Burns, MD, MS; Debra K. Sullivan; PhD, RD, Department of Dietetics and Nutrition; University of Kansas Medical Center. *Funding: NIH R01AG060157-01*

Objective: Skin Carotenoid Content (SCC) is a validated biomarker of fruit and vegetable intake. The objective of this study is to compare SCC to self-reported dietary carotenoid intake and to combined dietary and supplement intake.
Methods: This is a cross-sectional study using baseline data from an ongoing study (Nutrition Interventions for Cognitive Enhancement). Participants are cognitively normal adults (≥65 years, MMSE score > 25). SCC was determined non-invasively by Resonance Raman spectroscopy (VEGGIE METER®; Longevity Link Corporation). Three measurements were taken on the fingertip and averaged. Dietary intake was obtained by 3-day diet records. A dietitian reviewed the diet records and entered the records into the Nutrition Data System for Research (version 2019). Residual QQ plot visualization was used for model diagnostics. Data were heterogenous and normal and indicated one extreme outlier that was dropped from our analysis. Simple linear regression was used to assess relationships between self-reported carotenoid intake and SCC measurement.
Results: The mean SCC was 281 ± 72.2. Correlations for self-reported individual carotenoid intake and SCC scores were beta-carotene (r2=0.15, b=0.40, p=0.003), alpha-carotene (r2=0.11, b=0.33, p=0.01), beta-cryptoxanthin (r2=0, b=0.004, p=0.97), lutein + zeaxanthin (r2=0.18, b=0.42, p=0.002), and lycopene (r2=0.04, b=0.19, p=017). Correlations for self-reported combined dietary and dietary supplement carotenoid intake and SCC scores were beta-carotene (r2=0.16, b=0.40, p=0.003), alpha carotene (r2=0.11, b=0.33, p=0.01), beta-cryptoxanthin (r2=0, b=0.004, p=0.97), lutein + zeaxanthin (r2=0.07, b=0.27, p=0.05), lycopene (r2=0.03, b=0.18, p=0.18).
Significance: Dietary intake of lutein + zeaxanthin, beta-carotene, and alpha-carotene were significantly correlated with increased SCC measures. When dietary supplement data were included, the relationship between lutein + zeaxanthin intake and SCC scores decreased. The SCC measure is an indicator of dietary lutein + zeaxanthin, beta-carotene, and alpha-carotene intake when compared to dietary assessment using a validated nutrition database.

6. **USUAL INTAKE OF FOOD PATTERN COMPONENTS BY U.S. CHILDREN: WHAT WE EAT IN AMERICA, NHANES 2013-2016.** Carrie Martin, MS RD; Lois Steinfeldt, MPH; Joseph Goldman, MA; Alanna Moshfegh, MS, RD; U.S. Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group, Beltsville, MD

Objective: To estimate the usual, or long-term, adherence to recommendations in the Dietary Guidelines for Americans (DGA), 2015-2020 by U.S. children.
Methods: The analysis used dietary intake data from What We Eat in America, NHANES, 2013-2016. The sample included 723 and 1,685 children age 2-3 yr and 4-8 yr, respectively, excluding breastfed children. The Food Patterns Equivalents Database (FPED) and the Food and Nutrient Database for Dietary Studies (FNDDS) 2013-2014 and 2015-2016 were used to determine the consumption of Food Pattern components, saturated fat, and sodium. Usual intake estimates representative of the U.S. population were produced using the National Cancer Institute method and compared to the DGA energy-specific recommendations based on age, sex, and assuming the lowest physical activity level.
Results: Children age 2-3 yr had significantly ($p < 0.001$) higher percentages meeting the DGA recommended intake than 4-8 yr for fruits (62% vs 36%), vegetables (11% vs 5%), dairy (55% vs 28%) and protein foods (68% vs 42%). For components to limit, children age 2-3 yr had significantly ($p < 0.001$) higher percentages meeting the DGA recommendation for added sugar <10% of total energy (50% vs 20%) and sodium less than the upper limit (20% vs 10%).
Significance: Overall, children age 2-3 yr had higher percentages meeting the DGA recommended intakes than 4-8 yr. The analysis provides an example of using a usual-intake approach with the FPED and FNDDS to study adherence to the DGA.

7. **APPLICATION OF THE FLAVONOID DATABASE FOR USDA SURVEY FOODS AND BEVERAGES 2007-2010 TO ASSESS INTAKE DIFFERENCES BETWEEN THE HEALTHY AGING IN NEIGHBORHOODS OF DIVERSITY ACROSS THE LIFE SPAN (HANDLS) STUDY AND WHAT WE EAT IN AMERICA (WWEIA), NHANES.** Rhonda S. Sebastian, MA[1]; Marie Fanelli Kuczmarski, PhD, RD[2]; Joseph D. Goldman, MA[1]; Theophile Murayi, PhD[1]; Lois C. Steinfeldt, MPH[1]; Alanna J. Moshfegh, MS, RD[1]; Alan B. Zonderman, PhD[3]; Michelle K. Evans, MD[3]. [1]Food Surveys Research Group, Beltsville Human Nutrition Research Center, ARS, USDA; [2]Department of Behavioral Health and Nutrition, University of Delaware; [3]Laboratory of Epidemiology and Population Sciences, National Institute on Aging, National Institute of Health.
Funding: This work is supported by the Intramural Research Program, National Institute on Aging, National Institutes of Health, project number Z01-AG000513, and the Agricultural Research Service, USDA.

Objective: Compare flavonoid intake estimates in the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study to nationally representative estimates from What We Eat in America (WWEIA), NHANES. This study sought to describe differences by sex, income, and age between the two surveys.
Materials and Methods: The HANDLS study is a fixed cohort of adults 30-64 years of age (at baseline) residing in Baltimore City. The design is a four-way factorial cross of race (African American or white), household poverty status (HPS), age, and sex. 3,418 individuals completed at least one dietary recall. All individuals from WWEIA, NHANES 2007–2010 who were in the same age range, non-Hispanic white or non-Hispanic black, and had a household income ≤$75,000 per year comprised the comparison group (n = 2,598). Flavonoid intakes from both surveys were estimated using the Flavonoid Database for USDA Survey Foods and Beverages 2007-2010. Flavonoid intake distributions were transformed to

achieve normality prior to parametric testing. Adjusted flavonoid intakes were calculated by sex, HPS (< 125%, >125% of the 2004 HHS poverty guidelines), and age group (30-49, 50-64 years). Sample designs were accounted for in all analyses and sample weights were applied.
Results: Though total flavonoid intake did not differ, intake of multiple flavonoid classes were lower in HANDLS relative to WWEIA, NHANES. Intake of anthocyanidins was lower in HANDLS for all subpopulations analyzed. For males, intake of flavones and flavonols were lower in HANDLS irrespective of HPS and age and intake of flavan-3-ols were lower except among the older age group.
Significance: Study findings suggest that lower flavonoid intake, particularly among males, could place low-income populations represented by HANDLS at elevated risk for diet-related disease. Any surveys that use USDA's food coding system can utilize the Flavonoid Database for comparisons of flavonoid intakes.

8. **COMPARING TWO DAYS OF DIETARY INTAKE IN WWEIA, NHANES 2013-2016.** Lois Steinfeldt, MPH; Alanna Moshfegh, MS, RD; John Clemens, MS. U.S. Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group, Beltsville, MD

   Objective: The objective of this research is to compare the day 1 and day 2 dietary intakes of adults in What We Eat in America (WWEIA), NHANES 2013-2016.
   Materials and Methods: Dietary recalls of males (n=2,599) and females (2,624) 20+ years who had both a day 1 and day 2 recall and reported their intake as usual on both days in WWEIA, NHANES 2013-2016 were examined. The day 1 recall was conducted in-person in the NHANES Mobile Exam Center and day 2 was collected by telephone 3 to 10 days later. USDA's Automated Multiple-Pass Method was used by trained interviewers to collect each recall. Two-day dietary weights for adjusted for the proportion of weekend (Friday through Sunday) and weekday (Monday through Thursday) combinations of Day 1 and Day 2 recalls.
   Results: Mean (±SE) energy intake for males was 2,425 ±26 kcal for day 1 and 2,334 ±32 kcal for day 2 (p=.004). For females, 1,832 ±18 kcal and 1,775 ±26 kcal were reported for day 1 and 2, respectively (p=.020). There were no significant differences between energy intake on day 1 and day 2 within males and females by ten year age groups. Comparing 20 year age groups for males and females by race/ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic Asian, and Hispanic) and income (< 131%, 131-350%, and > 350% of poverty level) also showed no significant differences in energy intake between day 1 and day 2.
   Significance: Mean energy intake of adults was not statistically different between the two days of recall by sex, age, race/ethnicity or income. Overall, the difference in energy intake was less than 4% for both males and females.

9. **TEMPORAL PATTERNS OF EATING BY MODE OF DATA COLLECTION FROM THE BASELINE DIETARY INTAKES OF PARTICIPANTS IN THE HEALTHY DIET AND LIFESTYLE STUDY.** Kim M Yonemori, RDN, University of Hawai'i Cancer Center; Siobhan Meehan, Dublin Institute of Technology; Loic Le Marchand, MD, PhD, University of Hawai'i Cancer Center, Edward J Delp, PhD, Purdue University, Fengqing M Zhu, PhD, Purdue University, Deborah Kerr, PhD, APD, Curtin University; Carol J Boushey, PhD, MPH, RDN, University of Hawai'i Cancer Center.

   Objective: Scientific interest in temporal patterns associated with eating has grown in recent years. Presently, there are no specific recommendations regarding timing or frequency of eating. The Healthy Diet and Lifestyle Study (HDLS) pilot used the mobile food record (mFR) to collect dietary information. However, traditional paper-based dietary records (DR) were used by enrollees not owning a device

capable of capturing images of eating occasions. Thus, this analysis examined the differences in data associated with time of eating among participants using the mFR and those using a DR.
Methods: Dietary intakes of adults (35-55 y) of East Asian ancestry were collected prior to the start of the intervention using the mFR over 4 days. If no device was available, a DR was used. Trained staff entered data from the mFR and DR into a dietary data entry program.
Results: Among the 60 participants enrolled at baseline, 5 participants completed a paper-based DR. Among those completing the DR, the majority of the times were recorded as an hour or half hour, e.g., 1:00 or 1:30. The majority, 55% of entries, recorded food intake as the top of the hour, .00; and 27% at the half-hour. The distribution of eating times was fairly redundant. However, among those for whom timing was captured automatically using the mFR app, only 8% of the eating occasions were recorded as occurring at any quarter hour. The distribution of eating occasions among those using images was asymmetrical supporting the concept of eating occasions having a broader range of times than reflected in the commonly used practice of rounding times. **Significance:** Previous studies using self-reported methods of gathering time of eating may be biased which may lead to erroneous conclusions with regard to best practice for timing of eating. These results require further affirmation from additional studies.

10. **ASSOCIATION BETWEEN BREAKFAST CONSUMPTION AND DIETARY INTAKE IN THE US, NHANES 2015-2016**. Yong Zhu[1], PhD; Vipra Vanage[2], MS; Neha Jain[2], MS; Norton Holschuh[2], BS; Jessica Smith[1], PhD. [1]Bell Institute of Health and Nutrition, General Mills, Inc.; [2]Global Knowledge Solutions, General Mills, Inc. *Funding: Supported by Bell Institute of Health and Nutrition, General Mills, Inc.*

Objective: Breakfast is an important meal for the day. The current study was conducted to compare dietary intake and diet quality between breakfast consumers and breakfast skippers in US children and adults.
Methods: National Health and Nutrition Examination Survey 2015-2016 day-1 dietary data were used to classify participants by breakfast consumption status. Daily nutrient intake between breakfast consumers and skippers were compared by multiple linear regression, adjusting for demographic characteristics and energy intake. Percent below Estimated Average Requirements (EAR) for nutrients were estimated. Diet quality was assessed by Health Eating Index 2015 (HEI-2015). Data for children (aged 2-17 years, N=2645) and adults (aged 18 years or older, N=5163) were analyzed separately.
Results: 83% of children and 80% of adults were breakfast consumers. Compared to breakfast skippers, children who consumed breakfast had significantly higher daily intake of total energy (35%); they had higher intake of whole grains (90%), vitamin D (78%), vitamin A (50%), vitamin B12 (49%), riboflavin (37%), folate (37%), iron (36%), vitamin B6 (30%), calcium (28%), vitamin C (26%), thiamin (25%), zinc (22%), magnesium (14%), dietary fiber (12%), potassium (11%), niacin (11%), total sugar (5%) and carbohydrate (3%); they had lower intake of added sugar (-11%) with no difference in saturated fat or sodium intake. Results were similar for adults except intake of total sugar, niacin, and vitamin B12 was not different by breakfast status and breakfast consumers had higher intake of protein (8%). For both children and adults, breakfast consumers were less likely to have intake of nutrients below EAR and they had higher HEI-2015 total score and sub-scores for total fruits, whole fruits, whole grains, dairy, seafood and plant proteins, and added sugar, than breakfast skippers.
Significance: The results showed that breakfast consumption was associated with better dietary intake and diet quality in US children and adults.

11. **ASSOCIATION BETWEEN READY-TO-EAT CEREAL CONSUMPTION AND DIETARY INTAKE AMONG CHILDREN PARTICIPATING IN THE SPECIAL SUPPLEMENTAL NUTRITION PROGRAM FOR WOMEN, INFANTS AND CHILDREN.** Yong Zhu[1], PhD; Neha Jain[2], MS; Vipra Vanage[2], MS; Norton Holschuh[2], BS; Jessica Smith[1], PhD. [1]Bell Institute of Health and Nutrition, General Mills, Inc. [2]Global Knowledge Solutions, General Mills, Inc. *Funding: Supported by Bell Institute of Health and Nutrition, General Mills, Inc.*

Objective: Ready-to-eat (RTE) cereal that meets specific nutrition requirements are eligible foods in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC program). However, little is known about consumption of RTE cereal and its association with dietary intake in children enrolled in the WIC program. The study was conducted to compare dietary intake by RTE cereal consumption status in this population.
Methods: Children aged 6 months to 5 years from National Health and Nutrition Examination Surveys 2011-2014 who reported receiving WIC benefits at the time of data collection were included in the study (N=877); they were classified as RTE cereal eaters or non-eaters according to their day-1 dietary recall. Data from Food Patterns Equivalents Database 2011-2014 were used to assess food group intake. Daily dietary intake between RTE cereal eaters and non-eaters were compared by multiple linear regression analysis, adjusting for demographic characteristics and energy intake. Diet quality was assessed using the Health Eating Index 2010 (HEI-2010).
Results: Among children in the WIC program, 40% were RTE cereal eaters. Compared to non-eaters, RTE cereal eaters had significantly higher intake of total energy (12%), carbohydrate (4%), dietary fiber (16%), iron (20%), zinc (27%), thiamin (19%), riboflavin (17%), niacin (19%), vitamin B6 (36%), folate (80%), vitamin B12 (45%), whole grains (48%), and dairy (19%). RTE cereal eaters also had significantly lower intake of total fat (-7%), although their intake of saturated fat, added sugar, and sodium did not differ from that in non-eaters. RTE cereal eaters also had higher sub-scores of HEI-2010 on whole grains, dairy, and sodium, than non-eaters; but there was no significant difference in HEI-2010 total score.

12. **EXAMINING RACIAL/ETHNIC DISPARITIES IN DIETARY INTAKE OF U.S. CHILDREN PARTICIPATING IN WIC USING NHANES DATA.** Meghan C. Zimmer, Cristina Barroso, DrPH. University of Tennessee.

Student Poster Award Competition Entry

Objective: To explore the relationship between WIC participation status and dietary intake by race/ethnicity.
Materials and Methods: This cross-sectional study was conducted using data from children aged 2-4 years who were income eligible for the WIC program and included in the 2011-2014 National Health and Nutrition Examination Survey (NHANES). Multivariable linear regression was used to evaluate the relationship between mean dietary intake and WIC participation status, stratified by race/ethnicity. In addition, the percentage that food subgroups (e.g. dark green vegetables) contribute to total intake within a food group (e.g. total vegetables) was calculated, and multivariable linear regression with domain analysis was used to explore racial/ethnic differences, compared to a reference group of Non-Hispanic White. Both linear regression models were adjusted for age, sex, household income, household size, and total energy intake. Statistical significance was determined at $p<0.05$. All data were analyzed using SAS 9.4 survey procedures.
Results: Mean dietary intake of WIC participants exceeded nonparticipant counterparts. Both Non-Hispanic Black and Hispanic WIC participants had greater intake of whole grains (p=0.036 N-H Black, p=0.002 Hispanic) compared to their nonparticipant counterparts. WIC participants also consumed

more fruits and vegetables than nonparticipants, including total vegetables (p= 0.031 N-H Black), total fruit (p=0.005 Hispanic), and red and orange vegetables (p=0.045 N-H White). The proportions that food subgroups contributed to total food group intake varied by race/ethnicity. Total protein intake of Hispanic WIC children was comprised of a lower percentage of meat (p=0.039) and higher percentage of eggs (p<0.001), nuts and seeds (p=0.024), and legumes (p=0.007) compared to Non-Hispanic White WIC children. Additionally, total vegetable intake of Hispanic WIC children was comprised of a greater percentage of legumes (p=0.014) and other vegetables (p=0.015), compared to Non-Hispanic White WIC children.
Significance: Findings can inform culturally-tailored nutrition interventions and future WIC food package revisions.

E. Foodservice and food label applications and research

1. **IT'S EXPIRED? THROW IT OUT! PERCEPTIONS OF DATE LABELS AMONG YOUNG ADULTS.** Priscilla L. Connors Ph.D., Department of Hospitality & Tourism Management, University of North Texas; William C. Schuelke M.S. Division of International Affairs, University of North Texas. *Funding: University of North Texas Office of Research and Innovation Small Grant Award.*

   Background: USDA recommends "BEST if used by" as an understandable date label indicating quality not safety. Preliminary research suggests that consumers 18-34 years old discarded food based on dates assumed to indicate product safety not quality.
   Objective: (1) What intent do young adults attach to date (expiration) labels on milk containers and (2) Is date labeling on local milk containers consistent with recommendations?
   Description: A script invited college students to take a written survey as they entered a dining hall (New York) or library (Texas) and passed a display table. A question, "Do you drink milk?" screened for familiarity with milk containers. Participants wrote answers to open-ended questions about label location, appearance, and purpose. A thematic analysis with pre-figured categories complimented interpretive reading of question response sets by two researchers. Data was systematically coded until themes emerged. Debriefings included debating emergent understanding, negative instances, and compatibility with pre-figured categories.
   Results: Confidence in judging milk drinkability without a date label was lacking among 93 respondents (18-25 years old). Typical sentiments were "I rely on labels," and "the only way I can tell if it's safe." Label purpose was to communicate "when it spoils," "freshness," or "time not to drink." Whether a container had been opened or not the majority answered "No!" to the question of drinking from one with a past date label. In terms of quality and safety there was confusion about the purpose of date labels with most students viewing it as a warning that helped them avoid getting sick. Design suggestions centered on noticeability: "bigger letters," "not on the back," and "bold color." Local grocery store observations found variability in label phrase and location both within and among brands.
   Conclusion: Young adult education on the purpose of date labels is needed coupled with label consistency within the packaged food industry.

2. **ADAPTATIONS OF NUTRIENT DATABASE FOR GOVERNMENT REGULATIONS IMPACTING THE FOODSERVICE INDUSTRY**. Claire Peacock, Laurel Whisker, MPH, Rocky Craig. MenuTrinfo, LLC.

Background: MenuTrinfo, LLC was founded in response to the opportunities created by the Affordable Care Act, section 2205.
Objective: To show how the USDA Nutrient Database for Standard Reference has been adapted and expanded upon to produce consumer-oriented deliverables.
Description: To meet the growing needs of the foodservice industry following passage of federal menu labeling regulations, MenuTrinfo utilizes raw nutrition data from the USDA to create applicable reports. Applications include basic nutrition reports in both rounded and un-rounded forms, allergen charts for the top 8 allergens, reverse ingredient look-up, lifestyle diet analyses, recipe chain tracking and calculator integration. The USDA database has been extended to account for foodservice-specific ingredients, and a trained Culinary Nutritionist staff takes complex recipes and breaks them down into analyzable data. A combination of manual and personal analysis tools and automation assists have been built into the programming to eliminate repeating actions and improve the efficiency and accuracy of each review. Future programming will allow for quantifying added sugar values, identifying allergens beyond the top 8, and further improving our reports to meet the demands of our clients and their customers.
Conclusion: Integrating the USDA Nutrient Database with advanced software programming has allowed MenuTrinfo to take foodservice recipes and transform them into consumable information for both restaurants and their guests.

3. **ACCELERATING R&D IN CPG VIA NUTRIENT, INGREDIENT AND MARKETING CLAIM COMPARISON.** Tim Younger, MS, RD; Dagan Xavier. Label Insight. *Funding: Label Insight is paid by brands purchasing nutrition and packaged goods data for internal research purposes featured in this abstract. The funders had no role in this abstract design, data collection and analysis, decision to submit, or preparation of the abstract.*

Background: As brands develop new consumer packaged goods (CPG), there is an increased need to quickly understand the applicable claims that a product can make. As trends emerge and regulations evolve, brands are triggered to update their packaging, which can be a time and resource intensive exercise to assess how to best market a product. Brands are looking to gain quick and accurate insights into how their product portfolios meet these trends, and cater their product to transparency hungry consumers. When paired with sales data, brands have an extensive set of regulatory compliant decision-making criteria.
Objective: To share learnings that Label Insight has experienced from working with leading brands to provide data-driven insights. Assessing food composition data gives valuable insight into marketing opportunities for brands to capitalize on. It can be difficult to decide how to best market a product, but utilizing food composition data in a comparison to on-package marketing claim data around these trends can accelerate this process. This presentation will explore how brands are utilizing this approach for research and development (R&D).
Description: The Label Insight database includes over 80% of the top-selling food and beverage CPG products in the US. Brands gain the ability to quickly and effectively query how their product portfolio aligns with current trends and associated regulations. When this nutrient data is compared to explicitly stated marketing information on the package, brands gain a deeper understanding of how they are keeping up with trends and whether this is being reflected on packaging for the best go to market strategy.
Conclusion: Discovering trends is a top priority for brands, but it can be very difficult to understand which products in their portfolios have nutrient profiles that align with these trends. A comparison of marketing claims and nutrient data can allow brands to gain these insights quickly and effectively.

Submission of Manuscripts for a Special Issue of the Journal of Food Composition and Analysis

NNDC encourages all presenters to submit manuscripts based on their 41st NNDC oral or poster presentations to the *Journal of Food Composition and Analysis (JFCA)*, for inclusion in a special 41st NNDC online issue.

About the journal from the publisher: The *Journal of Food Composition and Analysis* publishes manuscripts on the chemical composition of human foods, analytical methods, food composition data and studies on the statistics, use and distribution of such data. More details are available on their website: https://www.journals.elsevier.com/journal-of-food-composition-and-analysis

Important guidelines for submission to all interested authors:

Please format your manuscript based on the specifications listed in the *Guide for Authors*: https://www.elsevier.com/journals/journal-of-food-composition-and-analysis/0889-1575/guide-for-authors.

Manuscripts should be submitted via the following website: https://www.evise.com/profile/api/navigate/JFCA.

Please make sure that you select the NNDC special issue (VSI: 41st NNDC) when you upload your manuscript.

The submission portal will be open for six months (until May 18, 2021).

For more information, please contact our Program Chair via email program@nutrientdataconf.org.

41st National Nutrient Databank Conference Presenter Photos and Bio sketches

Ahuja, Jaspreet US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory jaspreet.ahuja@ars.usda.gov 	Jaspreet Kaur Ahuja received her MS degree in Clinical Nutrition from University of Maryland, and in Dietetics and Institutional Administration from University of New Delhi. She has over 25 years of experience in food composition research and public health programs related to surveillance, national nutrition monitoring and exposure assessment. Jaspreet is currently working on developing a dataset of ingredients used in high sales commercially packaged foods. She has co-led several inter-agency collaborative projects, such as the 'Monitoring sodium and selected nutrients in the U.S. food supply (USDA-CDC)' and the 'Human Milk Composition Initiative (Joint US/Canada project)'. Jaspreet was the co-lead for the update of the USDA National Nutrient Database for Standard Reference and the Food and Nutrient Database for Dietary Studies, USDA food and nutrient databases that provide the infrastructure for food and nutrition research, policy and practice. She has over 100 publications in major food and nutrition journals. Jaspreet was responsible for expanding the nutrient database used for national nutrition monitoring in the U.S. from 30 to 65 nutrients. She was the first scientist to report national intake estimates for 29 of these additional nutrients in peer-reviewed publications – vitamin D, choline, alpha-tocopherol, caffeine, theobromine, 19 individual fatty acids, and 5 individual carotenoids.
Andrade, Lesley University of Waterloo 200 University Ave. West, Waterloo, Ontario, Canada landrade@uwaterloo.ca 	Lesley Andrade is a PhD Candidate in the School of Public Health and Health Systems at the University of Waterloo, Canada. Her research interests include healthy weights promotion, disordered eating and obesity prevention, dietary assessment methods and public health nutrition policy. Lesley is a Registered Dietitian with over 10 years of public health nutrition experience. Her doctoral research is examining the consumption of low-calorie sweeteners and applying an innovative method to estimating usual intake in Canada and abroad.
Andrews, Karen US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory karen.andrews@usda.gov 	Karen W. Andrews manages the Dietary Supplement Ingredient Database (DSID) research program at the MAFCL. She worked as an analytical chemist for Texaco, Inc. and W.R. Grace & Co and the Food Composition Laboratory, USDA before joining MAFCL. In 2003, she initiated the research program for the DSID (https://dsid.od.nih.gov), an analytically validated database of dietary supplement ingredient information. Version 4 of the DSID was released in 2017 with national estimates of ingredient content for multivitamin and omega-3 fatty acid dietary supplements. Karen received her B.S. in Chemistry from Penn State and is an author or co-author of over 20 peer reviewed articles. She is a member of the American Chemical Society, the American Society for Nutrition and AOAC, Intl., where she was formerly a member of the Task Force on Dietary Supplements. Karen and her team won a USDA Excellence in Technology Transfer Award for the first release of the DSID.

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Barroso, Christina **University of Tennessee,** Department of Public Health cbarroso@utk.edu 	Cristina S. Barroso, DrPH, is a health disparities researcher who partners with community organizations, local and regional health departments, and policymakers to provide a more equitable physical and social environment so that all populations can achieve high health status to enable them to thrive in their communities. She is particularly interested in topics concerning childhood obesity, healthy eating, active living, and body image.
Bautista, Ronelle US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory ronelle.bautista@usda.gov 	Ronelle Bautista joined the Dietary Supplement Ingredient Database (DSID) research program at the Methods and Application of Food Composition Laboratory (MAFCL) as a research assistant in 2018. Prior to joining the team, she received her B.S. in Bioengineering from the University of Maryland. Currently, she is a student in Georgia Tech's Online Master of Science in Analytics program.
Bigman, Galya bigman.galya@gmail.com 	Galya Bigman is a Nutritional Epidemiologist with research interests in global nutrition, aging, and maternal and child health.

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Bourianne, Thea Label Insight tbourianne@labelinsight.com 	Thea Bourianne, MBA, RD, LDN is a licensed and registered dietitian based in Chicago. Specializing in nutrition, US and international food regulation, and food composition makes her uniquely positioned to work strategically with global CPG and retail clients to build data-driven, customer-centric solutions. In her current role at Label Insight, a SaaS company that provides insights on food label data, Bourianne supports retailers, CPG brands, US government, technology companies, researchers, and other entities by crafting and applying high order attribution to products in-store and online. Bourianne is passionate about safe, transparent, sustainable, wholesome products and strides for best-in-class customer experiences to make the healthy choice the easy choice. Prior to working at Label Insight, Bourianne's previous positions have included product development, commercialization, fresh and frozen food manufacturing, and regulatory affairs with companies and clients such as Taco Bell Corp., Wilton Brands, Starbucks, Ahold, Walgreens and 7-Eleven, among others.
Bowman, Shanthy shanthy.bowman@usda.gov US Department of Agriculture, Beltsville Human Nutrition Research Center, Food Surveys Research Group 	I hold a bachelor's degree in physics and chemistry, master's in food technology, and a doctoral degree in foods science. I have been with the U.S. Department of Agriculture (USDA) for the past 30 years. I have expertise in conducting research using national dietary survey data and creating large food and food commodity databases for the WWEIA, NHANES foods. I simplified and streamlined the development of Food Patterns Equivalents Databases (FPED) for the WWEIA, NHANES foods and their unique ingredients (FPID), thereby enabling the timely release of these data. I developed Food Intakes Converted to Retail Commodities Databases for WWEIA, NHANES 2003-2008 foods, for USDA Economic Research Service (ERS). My current projects include the following: (1) Identification of dietary patterns associated with healthy eating, using the NHANES data. (2) Development of FPED 2017-2018 for the NHANES 2017-2018 foods. (3) the development of FPED and nutrient profiles for about 20,000 unique foods in the ERS's National Household Food Acquisition and Purchase Survey-1 that did not have a direct match to any of the WWEIA foods or their ingredients. I served as one of the two USDA co-executives secretaries to the Dietary Guidelines Advisory Committees 2000, 2010, and 2015.
Brown McFadden, Amber Westat AmberBrown@westat.com 	Amber Brown McFadden is a Registered Dietitian with 15 years of experience in nutritional and clinical research. She is a supervisor on Westat's Dietary Assessment Team (DAT), which develops and maintains dietary assessment instruments such as NCI's Automated Self-Administered 24-Hour Recall (ASA24); develops, adapts, and links dietary databases for specialized nutrient research and mixed-mode data collection such as Economic Research Service's Linkages; and codes, cleans, and monitors dietary data. Ms. Brown McFadden conducts quality control reviews of 24-hour dietary recall interviews, develops coding procedures, and supports dietary database updates. Additionally, she supervises dietary coding for the Food and Nutrition Service's Infant and Toddler Feeding Practices Study and Summer Food Service Program Study. She has also developed materials to teach respondents how to use data collection tools for the ERS's National Food Study Pilot and contributed to new database research for this study. She also serves on the Westat wellness workgroup and is a member of the Academy of Nutrition and Dietetics.

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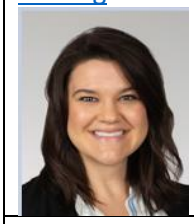
Campbell, Emily Young Dartmouth University Emily.Y.Campbell@hitchcock.org 	Emily Young Campbell, MD is an Internal Medicine resident at Dartmouth. She is considering a career as a hospitalist and has an interest in studying the connection between nutrition and chronic disease as well as nutrition interventions and patient outcomes.
Carlson, Andrea USDA-Economic Research Service Andrea.carlson@usda.gov 	Andrea (Andi) Carlson, an economist in the Food Markets Branch of the Food Economics Division in USDA's Economic Research Service, researches food prices, with an emphasis on their impact on healthy diets and organic food purchases. She is the project lead for the Linkages project which allows users to import nutrient and food composition data into USDA's purchased scanner data and estimate individual food prices for dietary intake data. Her research interests include the affordability of healthy diets, tracking consumption over time, and examining organic food purchases and price premiums. Carlson joined ERS after 9 years with USDA's Center for Nutrition Policy and Promotion (CNPP) where she was the project leader for the USDA Food Plans, CNPP Food Prices Database, and a major contributor to the Cost of Raising a Child. Andi received the Secretary's Award for developing and implementing USDA's Food Patterns as found on MyPlate.gov. She received her Ph.D. in Agricultural and Applied Economics from the University of Minnesota (1999), M.S. in International Development and Appropriate Technology from the University of Pennsylvania (2002), and B.A. in Physics from St. Olaf College, Northfield, MN (1988).
Casavale, Kellie O. US Food and Drug Administration, Center for Food Safety and Applied Nutrition kellie.oconnell@fda.hhs.gov 	Kellie O. Casavale is a Senior Nutrition Advisor in the Office of Nutrition and Food Labeling within the Center for Food Safety and Applied Nutrition (CFSAN), FDA. Among her roles is co-leadership of the Federal Data Consortium on Pregnancy and Birth to 24 Months (P/B24), a forum of over two dozen federal agencies for sharing information and finding solutions to resolve crucial needs for data on P/B24 populations to inform public health initiatives. She leads collaborative projects related to the Consortium, including the Human Milk Composition Initiative and special projects within NHANES. Prior to coming to FDA, she served in leadership roles for both USDA and HHS as a policy writer for the 2010 and 2015-2020 *Dietary Guidelines for Americans*. Currently, she serves as an FDA liaison to the Departments to support the process to develop the *2020-2025 Dietary Guidelines* and supported the work of the 2020 Dietary Guidelines Advisory Committee. Dr. Casavale completed her Doctorate in Nutritional Sciences at the University of North Carolina at Greensboro, Bachelors in Biology at Lander University, and is a Registered Dietitian.

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Champagne, Catherine Pennington Biomedical Research Center 	Catherine M. Champagne, PhD, RDN, LDN, FADA, FAND, FTOS, FAHA is Professor/Chief, Nutritional Epidemiology/Dietary Assessment and Nutrition Counseling, Pennington Biomedical Research Center, Baton Rouge, LA. She is a native of Louisiana and received her MS and PhD degrees from Mississippi State University in Nutrition with a minor in Food Science. She is a long-standing member of the Academy of Nutrition and Dietetics (including the following Dietetic Practice Groups: Weight Management; Sports, Cardiovascular, and Wellness; Research; and School Nutrition Services), the American Diabetes Association, American Society of Nutrition, The Obesity Society, American Heart Association, American Diabetes Association and the National Nutrient Databank Conference. Dr. Champagne is a Fellow of the Academy of Nutrition and Dietetics, The Obesity Society, and the American Heart Association. She is involved in studies which include dietary counseling and/or dietary intake assessment. Her interests are women and children's health, child nutrition, diet for weight loss and chronic disease, Mediterranean diet approaches, physical activity promotion, nutritional assessment of diverse populations, cancer prevention/treatment and functional foods. One of her significant achievements was the final design of the DASH and DASH-Sodium diets. She has been involved in several NIH-funded trials: The Diabetes Prevention Program, the Look AHEAD Trial for Diabetes Management, PREMIER, Weight Loss Maintenance, POUNDS LOST, and others. In addition, she currently receives funding for research efforts with the Department of Defense and the Louisiana Department of Education, Nutrition Support. She is also coordinator of the Women's Nutrition Research Program at Pennington, a research, education, and outreach program specifically targeted to women.
Charrondière, Ruth Food and Agriculture Organization of the United Nations (FAO) Ruth.Charrondiere@fao.org 	Dr. U. Ruth Charrondière holds a Master of Nutrition (Christian Albrechts University, Kiel, Germany), a Diploma in Applied Medical Statistics with a specialization in Epidemiology (University V, Paris, France) and a PhD in Nutrition (University of Vienna, Austria). She has worked on food composition, biodiversity, dietary assessment, breastfeeding, sustainable diets and exposure assessment. She has worked with WHO, UNICEF and since 2002 with FAO and is since 2011 the coordinator of INFOODS (International Network of Food Data Systems). She has contributed to capacity and standard development in food composition and Total Diet Studies through teaching in many international courses, the development of the FAO/INFOODS e-Learning Course on Food Composition Data and the Compilation Tool, and many guidelines. She is also active in policy and international fora to advocate for nutrition and agriculture linkages through the implementation of nutrition-sensitive agriculture and by including local foods and biodiversity in nutrition interventions, policy, and programming, which can only be achieved if adequate nutrient composition data are available. She has published over 200 scientific articles, book chapters, technical and policy-guidance documents, and databases/tables/tools. In 2015, Ruth received the Nevin Scrimshaw Award, the highest possible award in the area in food composition.

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Cheung, Winnie Bureau of Nutritional Sciences, Food Directorate, Health Canada Winnie.cheung@canada.ca 	Winnie Cheung is a scientific evaluator at Health Canada's Bureau of Nutritional Sciences within the Food Directorate. She is a Registered Dietitian who obtained her Masters of Science degree in Nutrition from McGill University in Montréal, Canada where she also paddled at dragon boat races. She has experience in national food and nutrition surveillance, food and nutrient research, Codex and project coordination. She helped maintain the *Canadian Nutrient File*, a standard reference food composition database reporting foods commonly consumed in Canada. This database has various uses including research, risk assessments, setting of policies, standards and regulations, education and general consumer information. She is one of the Canadian coordinators of the joint US-Canada Human Milk Composition Initiative.
Chin, Elizabeth US Department of Agriculture, Agricultural Research Service, Western Human Nutrition Research Center elizabeth.chin@usda.gov 	Dr. Elizabeth Chin is a Computational Biologist postdoctoral researcher with the USDA Agricultural Research Service in Dr. Danielle Lemay's lab. In her current position, Dr. Chin uses machine learning to better understand how diet influences health. Specifically, she is identifying dietary, physiological, and anthropometric predictors of bone health in healthy adults. She has also helped to develop innovative computational methods to expand nutrient estimation from 24-hour dietary recalls. For her future work, she is interested in using artificial intelligence techniques for image recognition to develop image-based diet collection methods for researchers. More information about her research experience and publications can be found at https://ebeth-chin.github.io/.
Church-Lee, Hannah University of Minnesota – Twin Cities, Department of Food Science and Nutrition churc200@umn.edu 	Hannah Church-Lee, MS, RDN, received a Bachelor of Arts in Exercise Science in 2016 from Concordia University – St. Paul, a Bachelor of Science in Nutrition in 2018 and a Master of Science in Nutrition Science in 2020 from the University of Minnesota. She also completed the University of Minnesota Dietetic Internship program and the Registered Dietitian Examination in 2020. Her MS research project examined associations between fish consumption, overall dietary intake, and health outcomes. Mrs. Church-Lee is currently working as an enteral nutrition specialist, for Morrison Healthcare, and is responsible for processing, preparing, distributing, and mixing formulary products for adult and pediatric patients at a prominent hospital in southeastern Minnesota.

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Coelho, Kristy Soraya FoRC/CEPID/FAPESP and Department of Food and Experimental Nutrition, FCF/USP, São Paulo, Brazil kristycoelho@usp.br 	Kristy Soraya Coelho is a Nutritionist and a Specialist in Clinical Nutrition. She has a Master's in Health Technology (Pontifical Catholic University of Paraná, Brasil) and a PhD in Applied Human Nutrition (University of São Paulo, Brasil). She currently holds a Postdoc position in the Department of Food and Experimental Nutrition, Faculty of Pharmaceutical Sciences (University of São Paulo, Brasil) and works as a Researcher at the Food Research Center (FoRC/CEPID/FAPESP). She has worked as a personal dietitian and personal chef (home care) and has years of experience in Human Nutrition, Dietetic Technique, Food Technology, Hospital Gastronomy, Health Technology and computing, Data compilation and Recipe calculation. She has technically contributed to the analysis of food consumption in the 2017-2018 Household Budget Survey (POF/IBGE, 2020) and taken part in the Regional Technical Committee of LATINFOODS Users (2018-2021). She is currently working on the Brazilian Food Composition Table (updating and management) and its applications, such as the development of computational tools.
Connors, Priscilla University of North Texas Priscilla.Connors@unt.edu 	Priscilla Connors, PhD, RDN, is an Associate Professor at the University of North Texas. Priscilla Connors does collaborative research in food choice and waste behaviors and adapts emerging knowledge into her nutrition classes. An early adapter of online education she has presented on the scholarship of online teaching and learning at Society for Nutrition Education and Behavior Conferences, National Nutrient Databank Conferences, and Blackboard World where she was an invited speaker. Currently she is collaborating with Stanford History Education Group in a News Literacy Project that trains her nutrition students in fact checking online information sources. Dr. Connors is a Registered Dietitian Nutritionist and earned her PhD in Nutrition at Texas Woman's University. The U.S. Department of Agriculture and National Dairy Council have funded her research. She recently finished a study about food expiration labels that highlighted consumer misunderstanding of these labels and the waste of safe, nourishing foods. In an ongoing investigation of campus food insecurity, she has co-presented webinars on food affordability for Menus of Change University Research Collaborative and National Association of College Auxiliary Services. Dr. Connors has authored/co-authored articles published in Nutrients, Journal of Nutrition Education and Behavior, and Psychological Science. She is in the final stages of an open access nutrition e-text that will be available on UNT Open Texts.

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Dennis, Kristine Emory University, Nutrition and Health Sciences Program kristine.kay.dennis@emory.edu 	Kristine Dennis is a PhD candidate in the Nutrition and Health Sciences Program at Emory University. Her current research applies molecular and population approaches to better understand how complex dietary exposures may lead to long-term impacts on health. In her dissertation research, she is applying a range of techniques and approaches to understand human exposure to dietary phytochelatins, a class of metal-binding plant compounds, and how these plant compounds may prevent toxic metal absorption.
Deuster, Patricia Uniformed Services University of the Health Sciences (USU), Department of Military and Emergency Medicine patricia.deuster@usuhs.edu 	Patricia A. Deuster, PhD, MPH, is a Professor in the Department of Military and Emergency Medicine at the Uniformed Services University of the Health Sciences (USU) in Bethesda, Maryland and Executive Director for the Consortium for Health and Military Performance (CHAMP), the Defense Center of Excellence for Human Performance Optimization. She obtained an AB in Mathematics and Computer Science and MA in Education and Physical Education from the College of William and Mary, a PhD in Nutritional Sciences and Physiology from the University of Maryland, and a MPH with an emphasis in public health and epidemiology from USU. Dr. Deuster chairs the Department of Defense (DoD) Dietary Supplement Subcommittee, is a member of the DoD Food and Nutrition Subcommittee, serves on the DoD Human Performance Optimization Committee, the VA/DoD Health Executive Committee Women's Health Work Group, the DoD Nutrition Committee, and the DoD Population Health Working Group. She also oversees the DoD Operational Supplement Safety (OPSS) program. She is a Fellow of the American College of Sports Medicine, a Certified Nutrition Specialist, and has over 250 peer-reviewed papers and numerous book chapters and books relating to human performance with a focus on health, nutrition, dietary supplements, and total force fitness. She has conducted research in the area of sports and warrior nutrition and performance for over 35 years. Visit the CHAMP Human Performance Resource Center (hprc-online.org) and Operation Supplement Safety (OPSS.org) websites. Dr. Deuster is a member of the Order of Military Medical Merit and received the Special Operations Medical Researcher Award from the Special Operations Medical Association in 2014.

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Dos Santos de Silva, Adriane State University of Rio de Janeiro, Brazil ane.adriane@hotmail.com 	Nutritionist Graduated in Nutrition from the University of Grande Rio (Unigranrio-2010). Post-graduated in Nutritional Therapy from the State University of Rio de Janeiro (UERJ-2012). Master student of the Postgraduate Program in Food, Nutrition and Health at the State University of Rio de Janeiro (UERJ) with research focus: Food and Nutrition in Public Health. My research object aims to study the development of digital dietary tools to assess food consumption in the context of nutritional epidemiology. He has an Executive MBA in Health from Getúlio Vargas Foundation (FGV) concluded in 2014. Specialist in Nutritional Therapy from BRASPEN (2017). Coordinator of the Nutrition Service at Adventist Silvestre hospital since 2013. She worked as a service provider in the ambulatory and Home Care, with elderly patients, of the Integrated Prevention Unit (IPU) of the Silvestre Saúde agreement (2016-2018). Invited teacher by the Adventist College of Bahia (FADBA) to act as a teacher in the Graduate Program Health of the Elderly: Multidisciplinary Care – managing the curricular component: Food and Nutrition for the Elderly (2015-2019).
Douglass, Dierdre Westat DeirdreDouglass@westat.com 	Deirdre Douglass, MS, RD is a research nutritionist with more than 30 years of experience in nutrition research and nutrient databases. She is a senior nutritionist and supervisor on Westat's Dietary Assessment Team (DAT), which develops and maintains databases for dietary assessment instruments such as NCI's Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA24); develops, adapts, and links dietary databases for specialized nutrient research and mixed-mode data collection; coordinates telephone and field dietary data collection using USDA's Automated Multiple Pass Method and the ASA24; and codes, cleans, and monitors dietary data quality. In work at the Michael and Susan Dell Center for the Advancement of Healthy Living, University of Texas Health Science Center at Houston, she coordinated the design, development, and testing of nutrient analysis software, including the Food Intake Analysis System, the Recipe Analysis Program, Survey Net, and ANSURS. She provided technical expertise for a variety of dietary research studies, such as the Continuing Survey of Food Intakes by Individuals, the Australia National Nutrition Survey, and the Nigerian Food Consumption and Nutrition Survey.

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Dwyer, Johanna Tufts University's Medical Center and School of Medicine; Freidman School of Nutrition Science and Policy; US National Institutes of Health, Office of Dietary Supplements 	Dr. Johanna Dwyer is Professor in Tufts University's Medical Center and School of Medicine, adjunct Professor at the Freidman School of Nutrition Science and Policy, and a Senior Nutrition Scientist at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts in the nutritional epidemiology group. She is on the clinical staff of Tufts Medical Center at the Frances Stern Nutrition Center in Boston. In Washington, she serves as Senior Nutrition Scientist (contractor), Office of Dietary Supplements (ODS), NIH—where she is responsible for developing databases for dietary supplements. She also collaborates in analyses of national survey data from national surveys that involve dietary supplements and on developing screening measures for dietary supplement use, frailty, and undernutrition in surveys of older Americans, as well as on studies of bioactives, especially the flavonoids and their possible roles in chronic disease. She is author of over 500 research and review articles in scientific journals, editor of two books and of Nutrition Today. She is a member of the National Academy of Medicine and served on its Council, the Food and Nutrition Board, and the Report Review committee for many years. She is a past president of both the American Society of Nutrition (formerly the American Institute of Nutrition) and the Society for Nutrition Education. She was a Robert Wood Johnson Health Policy Fellow on Capitol Hill in the offices of Barbara Mikulski (D, MD) and Richard Lugar (R, IND). She served on the year 2000 Dietary Guidelines Advisory Committee. In 2014 she was awarded the Trailblazer Award of the Institute of Food Technologists and the Academy of Nutrition and Dietetics and in 2018 the Healthy Lion Award at Pennsylvania State University.
Emenaker, Nancy US National Institutes of Health, National Cancer Institute emenaken@mail.nih.gov 	Nancy J Emenaker, PhD, MEd, RDN, LD, FAND, is a National Cancer Institute (NCI) Program Director in the Nutritional Science Research Group, Division of Cancer Prevention. She has overseen a basic and clinical research portfolio in nutrition and cancer prevention since joining NCI in 2006. Dr. Emenaker is a member of the American Society for Nutrition (ASN), Academy of Nutrition and Dietetics (AND) and several Academy Dietetics Practice Groups (DPG). She is currently AND Research DPG Chair-Elect and Chair-Elect of the International Nutrient Database Executive Committee. Dr. Emenaker serves on the Introduction to Cancer Research Careers Program Selection Committee and is a program mentor. Prior to joining NCI, her scientific and clinical experiences included: NIH Center for Scientific Review, Endocrinology, Metabolism, Nutrition and Reproductive Sciences and Oncology Integrated Review Groups, 2004-2006; Department of Defense's Congressional Directed Medical Research Program (CDMRP) for the Prostate and Breast Cancer Research Programs, 2004; and Life Sciences Research Office, 2002-2003. Dr. Emenaker was Associate Research Scientist at Columbia University College of Physicians & Surgeons, Department of Physiology & Cellular Biophysics, 1998-2002. In that role, she maintained an independent biomedical research program, mentored undergraduates and medical students while earning full memberships in Gastrointestinal Malignancies, Carcinogenesis, and Prevention & Control Programs at the Columbia University Herbert Irving Comprehensive Cancer Center. Dr. Emenaker was one of six founding members ASN Diet & Cancer Research Interest Group and held multiple leadership roles in professional organizations including: ASN Diet & Cancer RIS Chair, 2000-2001, and on its Steering Committee until 2004; an author and co-editor of the first NCI Nutrition in Cancer Care PDQ (professional and patient versions); Academy's Oncology Nutrition DPG Chair, 2002-2003, and Research DPG

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*Bio of **Nancy Emenaker** cont'd.*	Chair, 2013-2014; Academy's Scientific Advisory Board, Food & Nutrition Conference & Expo Committee for Professional Development, Oversight Group for the Dietetics Based Practice Research Network (DPBRN), and Council on Research. In 2017, she was awarded Fellow of the Academy of Nutrition and Dietetics. She earned a Masters in Nutrition Education and Bachelor of Science in Dietetics from the University of Cincinnati before earning a doctorate (Ph.D.) in Human Nutrition at The Ohio State University. She completed rigorous Postdoctoral and Fellowship training in at Yale University School of Medicine, Department of Surgery, in New Haven, Connecticut where her research included dietary modification of invasive and metastatic human colorectal cancers and wound healing. While at Yale, Dr. Emenaker promoted women in the sciences and medicine, a passion she still pursues today. Her research interests include: molecular biology, nutrition, pathology, and genetics.
Gusev, Pavel US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory pavel.gusev@usda.gov 	As a Senior Research Program Manager for DSID I develop research and sampling plans for DSID studies on analytical content and performance quality of dietary supplement dosage forms (disintegration and dissolution). I received PhD degree in neuroscience at MV Lomonosov Moscow State University in Russian Federation. Before to join USDA as a contractor, I worked at MV Lomonosov Moscow State University, Russia; Max-Planck Institute of Psychiatry Munich, Germany; National Institutes of Health, Blanchette Rockefeller Neurosciences Institute and Uniformed Services University of Health Sciences in the USA. I studied mechanisms of learning and long-term memory applying a wide spectrum of methods: animal behavior, *in vivo* and *in vitro* electrophysiology, large-scale mapping of immediate – early gene expression, immunohistochemistry and varied microscopy. The most recent project in neuroscience focused on calcium waves and F-actin growth underlying dendritic spines plasticity following laser-induced neurotransmitter uncaging.
Harnack, Lisa University of Minnesota, Nutrition Coordinating Center harna001@umn.edu 	Lisa Harnack is a Professor in the Division of Epidemiology and Community Health at the University of Minnesota and Director of the Nutrition Coordinating Center. As Director she has led efforts to make improvements to Nutrition Data System for Research (NDSR), a widely used dietary analysis program. She also oversees the maintenance and expansion of foods and nutrients in the NCC Food and Nutrient Database.

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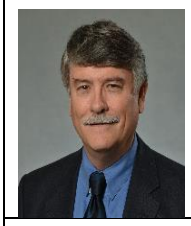
Harnly, James US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory james.harnly@usda.gov 	Dr. Harnly serves as the Research Leader for Methods and Applications Food Composition Laboratory (MAFCL), part of the Beltsville Human Nutrition Research Center of USDA. His lab develops analytical methods for nutrients and bioactive compounds in foods, dietary supplements, and botanical materials. His personal research interest is the development of chemometric methods for authentication of botanical materials. Dr. Harnly received his BA from the University of Colorado and his PhD from the University of Maryland. He has served on Boards for AOAC International, US Pharmacopeia, and the American Botanical Council. He has served as US editor for the Journal of Atomic Spectrometry (Royal Society of Chemistry), as Editor-in-Chief for the Journal of Food Composition and Analysis, and on the Editorial Board for the Journal of AOAC International.
Haytowitz, David Retired, US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory exec@nutrientdataconf.org 	David Haytowitz retired on February 1, 2019 after 41 years of federal service with USDA. He served as a nutritionist with USDA's Nutrient Data Laboratory and joined USDA in 1977 after receiving his B.Sc. in Food Science from the University of Massachusetts. He later received a M.Sc. in Food Science from the University of Maryland His entire career at USDA has been with the Nutrient Data Laboratory through several reorganizations. Mr. Haytowitz is an internationally recognized expert on food composition. He has worked on several iterations of USDA's Nutrient Databank System and most recently on the development of FoodData Central. He has coordinated the National Food and Nutrient Analysis Program, the dissemination of USDA's Food Composition Data and compiling representative nutrient values for vegetables, legumes, spices and herbs, and nuts and seeds. He also worked on developing Special Interest Databases on bioactive compounds. In 2011 he spent two months at the Food and Agriculture Organization of the United Nations Headquarters as an expert consultant. He has authored or co-authored over nearly 150 scientific articles and over 160 scientific presentations. Mr. Haytowitz has been recognized as being a highly cited researcher for 2014-2016. Mr. Haytowitz also serves as the coordinator of the North American (NORAMFOODS) regional data center for INFOODS and is chair of the National Nutrient Databank Conference.
Herrick, Kirsten US National Institutes of Health, National Cancer Institute kirsten.herrick@nih.gov 	Dr. Kirsten Herrick is a Program Director with the Risk Factor Assessment Branch (RFAB) of the Epidemiology and Genomics Research Program (EGRP) in NCI's Division of Cancer Control and Population Sciences (DCCPS). Her focus is on developing, designing, and conducting nutrition research related to dietary methods, dietary instruments, measurement error, dietary surveillance, and nutritional epidemiology. Dr. Herrick oversees the web-based Automated, Self-Administered 24-Hour Dietary Assessment Tool (ASA24), a freely available web-based tool that enables multiple, automatically coded, self-administered 24-hour recalls and/or single or multi-day food records. Dr. Herrick also oversees the Diet History Questionnaire, NCI's publicly available food frequency questionnaire. Dr. Herrick's scientific interests include nutrient intakes and food consumption patterns among infants from birth to 24 months, breastfeeding disparities in the U.S. population, and iodine nutrition.

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Hess, Julie National Dairy Council julie.hess@dairy.org 	Julie Hess, Ph.D., currently serves as Director of Scientific Affairs at National Dairy Council. In this role, she is responsible for translating and communicating important research for the academic community, health professionals, and the public. Julie holds a doctoral degree in Nutrition from the University of Minnesota as well as Bachelor of Arts degrees in French and English from the University of Texas at Austin. She is an active member and volunteer with several nutrition and scientific organizations, including the American Society for Nutrition (ASN) and the Institute of Food Technologists (IFT).
Hidalgo Viquez, Cindy University of Costa Rica, School of Nutrition cindy.hidalgoviquez@ucr.ac.cr 	Master Candidate in Food Science, Bachelor of Human Nutrition, University of Costa Rica. Professor and Researcher at the School of Nutrition of the University of Costa Rica. Researcher in projects related to food composition in Costa Rica Member of the management team of the ValorNut nutritional value calculation software Vice-president of COSTA RICA FOODS from LATINFOODS Linkedin: https://www.linkedin.com/in/cindy-hidalgo-v%C3%ADquez-07564a3b/
Jasthi, Bhaskarani University of Minnesota jast0014@umn.edu 	Bhas Jasthi is a Food and Nutrient Database Scientist at NCC University of Minnesota. Bhas has been with NCC since 2007. She is received her Ph.D. in Food Science and Nutrition from Banaras Hindu University, India. Bhas is primarily responsible for adding and updating nutrient values in the NCC Food and Nutrient Database. The nutrients Bhas has added to the database over the years include vitamins D2 and D3, conjugated linoleic acid, gluten, and lignans, to name a few.
Jiang, Yue University of Minnesota-Twin Cities 	Yue Jiang, MS, RDN, received a Bachelor of Science degree in Nutrition in 2018, and a Master of Science degree in Nutrition Science in 2020 from the University of Minnesota, Department of Food Science and Nutrition. She also completed the University of Minnesota Dietetic Internship program and the Registered Dietitian Examination in 2020. Her MS research project examined associations between acculturation among U.S. Asian adults and diet and health indicators. Ms. Jiang is currently a nutrition counselor in Mutual Up, an international education platform, responsible for publishing nutrition education blogs in social media, presenting nutrition classes, and conducting nutrition counseling sessions.

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Kantor, Linda US Department of Agriculture, Economic Research Service Linda.kantor@usda.gov 	Linda Kantor is an agricultural economist in the Diet, Safety, and Health Economics Branch of the Food Economics Division at USDA's Economic Research Service. Linda is the research lead for the ERS Food Availability Data Series, which annually reports the amount of food available for human consumption in the United States and the Loss-Adjusted Food Availability Data Series, which adjusts the food supply data for spoilage and other losses, and is one of two Federal government sources of food loss in the United States. Her research interests include tracking changes in the healthfulness of the food supply over time, food loss measurement, and as a member of the ERS *National Household Food Acquisition and Purchase Survey* (FoodAPS) team, identifying data needs for food item identification in FoodAPS-2. Linda joined ERS in 1991 after receiving her M.S. in Agricultural and Applied Economics from the University of Minnesota.
Keller, Jessica University of Kansas Medical Center kkali17@kumc.edu 	Jessica Keller is a Registered Dietitian, PhD student, and research associate at the University of Kansas Medical Center. Jessica received her BS in Psychology from the University of Kansas (2008), BS in Human Nutrition from Metropolitan State University of Denver (2016), and Master's in Dietetics and Nutrition from the University of Kansas Medical Center (2017). Jessica's Master's thesis work investigated pre-surgical nutrition quality and immune system dysregulation in the perioperative window of radical cystectomy in bladder cancer patients. Her current work focuses on nutrition interventions for the prevention and treatment of Alzheimer's Disease and other dementias.
Kretser, Alison ILSI North America akretser@ilsi.org 	Alison Kretser, MS, RDN, is Senior Science Advisor for ILSI North America where she recently retired from her full-time position as the Deputy Executive Director of ILSI North America. She currently serves as the Project Director for the Public-Private Partnership on the USDA Global Branded Food Products Database. ILSI North America is one of six partners that make up the Partnership. She has over 35 years of experience working in the field of nutrition and food safety. ILSI North America is a non-profit scientific organization that advances food safety and nutrition science for the benefit of public health. Ms. Kretser received a Bachelor of Science degree from the University of Delaware and a Master of Science degree in nutrition from Syracuse University.

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L'Abbe, Mary University of Toronto, Faculty of Medicine, Department of Nutritional Sciences mary.labbe@utoronto.ca 	Dr. L'Abbé is a Professor and former Chair, Department of Nutritional Sciences, Faculty of Medicine, University of Toronto, where she leads a research group on Food and Nutrition Policy for Population Health. She is an expert in public health nutrition, nutrition policy, and food and nutrition regulations and in 2018 was named to the Order of Canada. Her research examines the nutritional quality of the Canadian food supply, nutrient profiling methods, dietary intake patterns, and consumer research on food choices related to obesity and chronic disease. Professor L'Abbé is a member of several WHO committees, chairs the PAHO Technical Advisory Group on Sodium and was a member of the US National Academies Panel on Global Harmonization of DRIs. She is the Director of the WHO Collaborating Centre on Nutrition Policy for NCD Prevention and one of the founding members of *INFORMAS* (International Network for Food and Obesity/Non-communicable Diseases Research, Monitoring and Action Support).
Larvie, Doreen University of North Carolina, Greensboro dylarvie@uncg.edu 	Doreen Larvie is a second year PhD Nutrition student at the University of North Carolina, Greensboro (UNCG). She completed her BSc in Dietetics at the University of Ghana and her MS in Human Nutrition at UNC Greensboro. She is a UNCG Excellence Fellow and Minerva Scholar at UNCG. Her research is focused on the relationships among dietary components, micronutrient status and inflammation in at-risk populations out of which she is the first author on the paper *"Relationship between Selenium and Hematological parameters in Young Adults with Normal Weight or Overweight/Obesity*". As part of her research, Doreen also worked with the National Health and Nutrition Examination Survey (NHANES) data to investigate the association between phytate intake and cognition in older adults in the US which birthed the work she will be presenting on titled "*Estimating phytate intake from the US diet using NHANES data*".
Li, Ying US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory; University of Maryland College Park ying.li2@ars.usda.gov 	Ying Li is a Principal Faculty Specialist at the Method and Application of Food Composition laboratory in the US Department of Agriculture and Department of Nutrition and Food Science at the University of Maryland College Park. She holds a doctoral degree in Food Science. Since 2017, she has performed literature review on human milk compositions, and developed/managed the dataset of potential measures in human milk. Her expertise includes food chemistry and developing and managing food composition databases for public health and national nutrition monitoring purposes. She has over 30 publications/presentations in major food and nutrition journals and conferences.

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Long, Yue Abt Associates Inc. Katie_long@abtassoc.com 	Yue Long is a senior programmer analyst at Abt Associates Inc. who has extensive experience in applying data science algorithms to public health projects and helping federal clients with data visualizations. She has worked with various clients including the NIH, CMS and CDC. Prior to joining Abt, Long worked as a research assistant at Columbia University helping with data analysis on topics related to public health issues faced by the minority populations. Long received her M.A. from Columbia University, and her B.A. in mathematics from Kenyon College.
Martin, Carrie US Department of Agriculture, Beltsville Human Nutrition Research Center, Food Surveys Research Group carrie.martin@usda.gov 	Carrie Martin, M.S, R.D., has been a Nutritionist at the USDA Beltsville Human Nutrition Research Center, Beltsville, MD since 2007. Prior to joining USDA, she was a Research Dietitian at the University of Hawaii, Cancer Research Center from 2001-2007. Carrie received her Masters of Science in Nutrition and Bachelors of Science in Dietetics from the University of Hawaii in Honolulu, Hawaii. She is also a Registered Dietitian. In her current position, she works on the maintenance and development of foods, recipes, and nutrient components for the Food and Nutrient Database for Dietary Studies (FNDDS). The FNDDS is used to analyze foods reported in What We Eat In America, (WWEIA) National Health and Nutrition Examination Survey. She also conducts research using WWEIA data for development of data briefs released on the FSRG website. Carrie has authored or co-authored journal articles, data briefs, and database releases on the USDA Food Surveys Research Group website and presented her research at AND's FNCE, ASN's Nutrition, the National Nutrient Databank Conference, and other local and national meetings.
Massarelli, Isabelle Food Surveillance Integration Division of the Food Directorate, Health Canada isabelle.massarelli@canada.ca 	Isabelle Massarelli is the Chief of the Food Surveillance Integration Division of the Food Directorate, Health Canada. She is a registered dietitian and an employee of Health Canada for the past 25 years. She has extensive experience in food and nutrition consumption surveys, having been involved in the Provincial Nutrition Surveys, the Canadian Community Health Surveys with a focus on Nutrition in both 2004 and 2015 and the Canadian Health Measure Surveys. Her team manages a food and recipe database used in surveillance activities, collaborates in the adaptation of dietary collection tools for use in Canada, including the Automated Multiple-Pass Method (AMPM) , the ASA24 a self-automated 24-hour recall tool, and the Diet History Questionnaire (DHQ).

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Mayne, Susan US Food and Drug Administration, Center for Food Safety and Applied Nutrition 	Susan T. Mayne, Ph.D., is the Director of the Center for Food Safety and Applied Nutrition (CFSAN) at the U.S. Food and Drug Administration (FDA). In this position, Dr. Mayne leads the Center's development and implementation of programs and policies related to the composition, quality, safety, and labeling of foods, food and color additives, and cosmetics. CFSAN also oversees diet and health initiatives, which include fostering the development of healthier foods and ensuring that consumers have access to accurate and useful information to make healthy food choices. The FDA foods program is responsible for approximately 80% of the U.S. food supply, which includes approximately $400 billion in domestic food and $50 billion in imported food. The Center is comprised of 1000 staff with a budget of over $300 million. An internationally recognized public health leader and scientist, Dr. Mayne received a B.A. in chemistry from the University of Colorado. She earned a Ph.D. in nutritional sciences, with minors in biochemistry and toxicology, from Cornell University. She came to the FDA from Yale University, where she was the C.-E.A. Winslow Professor of Epidemiology and the Associate Director of the Yale Comprehensive Cancer Center.
McKillop, Kyle US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory 	Kyle McKillop is the lead on USDA's FoodData Central, an integrated data system that provides expanded nutrient profile data and links to related agricultural and experimental research. He has a Bachelor's in Computer Science and a Master's in Information Management with a specialty in Technology Development and Deployment. He previously worked for the University of Maryland's Joint Institute for Food Safety and Applied Nutrition where he worked on developing food database systems, including modernizing USDA's food composition database. In January of this year, Kyle joined the USDA's Beltsville Human Nutrition Research Center to lead FoodData Central's data collection efforts and manage future application developments.
Moshfegh, Alanna US Department of Agriculture, Beltsville Human Nutrition Research Center, Food Surveys Research Group alanna.moshfegh@usda.gov 	Alanna Moshfegh is Research Leader, Food Surveys Research Group at the Beltsville Human Nutrition Research Center for the United States Department of Agriculture, a position she has held since 1994. She leads a staff of nutritionists, food technologists, and statisticians in planning and directing a national program of research in monitoring food consumption behavior and assessing nutritional adequacy of American diets. Ms. Moshfegh is responsible for directing *What We Eat in America*, the dietary interview component of the U.S. Federal government's primary health survey—the National Health and Nutrition Examination Survey. In that capacity, she oversees data preparation for public release data files, statistical reports and research papers; initiates enhancements to national dietary data collection methodology; and develops nutrient databases of foods commonly consumed. For this program, she directed the development and validation of USDA's Automated Multiple-Pass Method (AMPM), a 5-step 24-hour dietary recall system that is used in *What We Eat in America* and in research studies in the United States and internationally. She has established and participated in collaborations with more than 30 studies, research organizations, and foreign governments using the AMPM and other programs and databases for dietary data collection.

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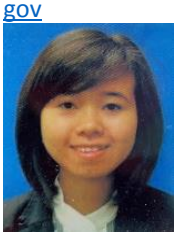
Bio of **Moshfegh, Alanna** – cont'd	Ms. Moshfegh received her M.S. in nutrition and food service management from the University of Nebraska and her B.S. in nutrition and dietetics from North Dakota State University. She is a member of the Academy of Nutrition and Dietetics and is a Registered Dietitian. In addition to membership, she is a Fellow of the American Society for Nutrition. Her research interests and responsibilities focus on food consumption behavior and nutritional adequacy of Americans, dietary assessment, food and nutrition policy, and dietary guidelines. Ms. Moshfegh has published and presented extensively on nutrition monitoring, food consumption, and dietary status of Americans. Prior to her current position, Ms. Moshfegh served in numerous positions in USDA including Assistant to the Administrator in the Human Nutrition Information Service and nutritionist in the Food and Nutrition Service.
Nguyen, Quynhanh US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory quynhanh.nguyen@ars.usda.gov 	Quynhanh V Nguyen is a Food and Nutrition Research Specialist at the USDA Methods and Application of Food Composition Laboratory (*formerly Nutrient Data Laboratory*). She joined USDA in 2013. She earned a BS in Biochemistry and an MS in Cybersecurity Technology at the University of Maryland.
O'Connor, Lauren US National Institutes of Health, National Cancer Institute lauren.oconnor@nih.gov 	Dr. Lauren O'Connor is a Cancer Prevention Fellow with the Risk Factor Assessment Branch at the National Cancer Institute. She is a nutrition scientist with a research focus on how red meat, processed foods, and food patterns influence cardiovascular disease, diabetes, and cancer risk in U.S. populations. She has several years of experience designing and conducting clinical feeding studies, systematic reviews, and meta-analyses and has more recent training in epidemiology, nutrition surveillance, and metabolomics. Her breadth of training and research allows her to leverage strengths of multiple study designs and methodologies to identify sources of scientific uncertainty to better understand complexities in nutrition research.

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Oh, Laura US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory Laura.Oh@usda.gov 	Laura Oh is a research assistant for the Dietary Supplement Ingredient Database (DSID) research program at Methods and Application of Food Composition Laboratory (MAFCL). She worked as an undergraduate intern on the DSID project before joining full-time after graduation. Laura received her B.S. in General Biology from the University of Maryland College Park in 2016.
Paolicelli, Courtney US Department of Agriculture, Food and Nutrition Service Courtney.Paolicelli2@usda.gov 	Dr. Courtney Paolicelli is a Lead Analyst and team lead for WIC Evaluation Research at the U.S. Department of Agriculture (USDA) Food and Nutrition Service (FNS). In this role, she oversees a multi-million-dollar research portfolio of projects examining the impacts and operations of the Special Supplemental Nutrition Program for Women, Infants and Children. Dr. Paolicelli is Registered Dietitian Nutritionist by training, and began her career as a dietitian for the WIC Program in San Diego, CA. She also worked in a variety of other public health and clinical settings before beginning her tenure with FNS in 2014. She received her Doctorate of Public Health from the University of Texas-Health Science Center in 2012, and her Master of Public Health in Nutrition from UNC-Chapel Hill in 2004. In addition to her role at USDA, Dr. Paolicelli is a commissioned Officer in the U.S. Army Reserve and serves on faculty at the U.S. Military-Baylor University Graduate Program in Nutrition. She resides in the DC-metro area with her husband, LtCol Mark Paolicelli, US Marine Corps, and their daughter, Molly.
Partridge, Natalie US Department of Agriculture, Food and Nutrition Service natalie.partridge@usda.gov 	Natalie has worked for the Child Nutrition Programs in the Nutrition and Technical Assistance Branch since 2015. Her primary tasks include coordination of the Child Nutrition Database and the USDA-software evaluation and approval projects. Prior to working at USDA, Natalie worked for many years at USDA's Food and Nutrition Information Center at the National Agricultural Library in Beltsville, MD. She has a BS in Applied Nutrition and a MS in Nutrition from The Pennsylvania State University.

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Peacock, Claire MenuTrinfo claire@menutrinfo.com 	Claire Peacock joined the MenuTrinfo team in 2012 as a recent Biomedical Sciences graduate from Colorado State University. She has spent the last eight years working with the foodservice industry to meet and exceed labeling regulations and provide food that is safe for consumers with special dietary needs. She specializes in nutrient analysis, menu labeling and food allergy identification.
Pehrsson, Pamela US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory pamela.pehrsson@usda.gov 	Pamela Ruth Pehrsson is an expert in the field of nutrition and food chemistry. She has a PhD and MS in Nutrition (University of Maryland) and has worked with US Department of Agriculture (USDA) for 35 years, conducting food composition and nutrition research and database development. Pamela served until recently as Research Leader of the Nutrient Data Laboratory, Beltsville Human Nutrition Research Center (BHNRC), ARS-USDA and now serves as Lead Scientist for the newly formed Food and Nutrition Research, Methods and Application of Food Composition Lab, BHNRC, ARS-USDA. Her current projects include: planning and implementing research data for USDA's FoodData Central (FDC) – the authoritative food composition database system in the US – and related nutrition research; development of iodine data in foods and dietary supplements and estimates of US intake; the NIH-USDA Dietary Supplement Database and related research; the Human Milk Composition Initiative; research on carbohydrates in foods and impact of processing and cooking; and indigenous foods in the diets of American Indians/Alaska Natives. She has authored over 100 papers and presented on food sampling plans and analysis, USDA food composition databases, and research on the above topics, collaborating with colleagues nationally and internationally. She is a member of the CODEX Committee on Nutrition and Foods for Special Dietary Uses Delegation, NORAMFOODS – INFOODS, and ASN, among other organizations. She also served as Co-Executive Secretary on the 2005 *Dietary Guidelines for Americans* and served on data analysis teams in subsequent guideline initiatives and has taught courses on development of food composition databases.
Poulsen, Anders National Food Institute, Technical University of Denmark andpo@food.dtu.dk 	Anders is the compiler of the Danish Food Composition Database. Anders has 20 years industrial and academic experience working with chemoinformatics, analytical chemistry and ADME/Tox.

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Regan, Karen US National Institutes of Health, Office of Dietary Supplements Karen.regan@nih.gov 	Karen S. Regan, M.S., R.D. joined the NIH Division of Nutrition Research Coordination, currently the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Office of Nutrition Research, in a position jointly funded with the Office of Dietary Supplements (ODS) in September 2002. Her responsibilities include the coordination of the Computer Access to Research on Dietary Supplements (CARDS) database for ODS. Before joining NIH, Ms. Regan worked at the USDA National Agricultural Library's Food and Nutrition Information Center managing the Healthy School Meals Resource System database and acting as a Nutrition Information Specialist. She has a master's degree in nutrition from the University of Maryland, and she is a registered dietitian.
Rondeau, Isabelle **Food Surveillance Integration Division** **Food Directorate, Health Canada** isabelle.rondeau@canada.ca 	Isabelle Rondeau, a registered dietitian, is a Senior Scientific project coordinator at Health Canada where she manages the food and recipe database used in surveillance activities. Isabelle has extensive experience in food and nutrition consumption surveys, having been involved in the Canadian Community Health Surveys - Nutrition in both 2004 and 2015 and the Canadian Health Measure Surveys. She has also collaborated in the adaptation of dietary collection tools for use in Canada, including the Automated Multiple-Pass Method (AMPM), the ASA24 a self-automated 24-hour recall tool, and the Diet History Questionnaire (DHQ).
Roseland, Janet US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory janet.roseland@usda.gov 	Janet M. Roseland, MS, RDN, is a Senior Nutritionist and lead scientist managing MAFCL's efforts to plan, conduct, and report research on animal-based food products in collaboration with other scientists in universities, government, and industry. Most recently, processed egg products, retail milk, and shell eggs have been examined through Roseland's efforts. Roseland has authored papers on vitamin D and iodine in foods, as well as nutritional content and cooking yields for various cuts of meat and poultry, providing applicability to human nutrition. She and her team have released nutrient and food composition data obtained from research to FoodData Central, the USDA food composition database. She has co-authored over 26 peer-reviewed manuscripts, 12 peer-reviewed data reports, 36 peer-reviewed poster presentations, and has delivered over 12 oral research presentations at national scientific conferences since 2005. Prior to this position, Roseland was the project coordinator for MAFCL's Dietary Supplement Ingredient Database from 2005 to 2012. Before joining USDA, she held faculty and management positions at North Dakota State University, Kansas State University, and U.S. Foods. Ms. Roseland earned an M.S. in institutional management at Kansas State University and a B.S. in dietetics from Purdue University. She has the distinction of being inducted into Purdue University's Nutrition Science Hall of Fame.

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Saldanha, Leila US National Institutes of Health, Office of Dietary Supplements saldanhl@mail.nih.gov 	Leila Saldanha, PhD, RD, FAND, currently serves as a part-time Scientific Consultant at the Office of Dietary Supplements at the National Institutes of Health (ODS). At ODS, she provides scientific expertise and support with the development of the Dietary Supplements Label Database (DSLD) and the Dietary Supplement Ingredient Database (DSID). The DSLD is a public use database that captures label-derived information from dietary supplement products offered for sale in the U.S. Currently, she is actively involved in the modernization of the DSLD. Previously, Leila coordinated the modification of the LanguaL thesaurus to comply with U.S. dietary supplement labeling regulations for describing products in the DSLD. She coordinated the Bioactive Food Components ad hoc Federal working group that undertook defining bioactive components and exploring approaches to evaluating their significance in health promotion and disease prevention. She also played a lead role in the formation and implementation of the Dietary Supplements Analytical Methods and Reference Materials Program, and coordinating publication of the *Annual Bibliographies of Significant Advances in Dietary Supplement Research*. Before providing consulting services to ODS, Leila was Vice President, Nutritional Sciences for the Consumer Healthcare Products Association, a trade organization representing manufacturers and distributors of non-prescription medicines and dietary supplement products. She has held several progressively responsible senior managerial roles during her 10 plus years at the Kellogg Company, including Director Nutrition and Scientific Affairs for the AsiaPacific region based in Sydney, Australia. She is a Fellow of the Academy of Nutrition and Dietetics (AND) and an active professional member of AND, and the American Society for Nutrition. Dr. Saldanha has authored and co-authored several publications. She received her MS and PhD degrees from Kansas State University, and undergraduate training in Bombay, now Mumbai, India.
Sebastian, Rhonda US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group. Rhonda.Sebastian@usda.gov 	Rhonda Sebastian is a Nutritionist with the Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA. Sebastian analyses data collected in What We Eat in America, the dietary intake component of the National Health and Nutrition Examination Survey (NHANES), with the aims of assessing the dietary and nutritional adequacy of the U.S. population and at-risk subgroups and identifying associations between food intakes, diet-related behaviors, and markers of health. In her current position as a member of the team responsible for conduct of the dietary collection in NHANES, she has firsthand knowledge of the strengths and limitations of these data. Accordingly, another important aspect of her work is to capitalize on this expertise to highlight unique features of the NHANES dietary data, address methodological issues germane to its correct analysis and interpretation, and expand its application through development of value-added resources, including the Flavonoid Values for USDA Survey Foods and Beverages 2007-2010 database. She received a bachelor's degree in Dietetics and a master of arts in Measurement, Statistics, and Evaluation from the University of Maryland, College Park.

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Singh, Mamatha Chandra University of Wollongong, Australia mcs931@uowmail.edu.au 	Mamatha Chandra Singh is a Ph.D. candidate at the University of Wollongong and is a recipient of IPTA and UPA scholarships from the faculty of the School of Medicine. She has completed a Bachelor's and a master's in food science and nutrition and a recipient of the Manjula Suma award at the University of Mysore and perform research in Food and Nutrition. Her research expertise and publications are associated with nutrition science, food chemistry, food product development, and method development. She is currently working on anthocyanins (purple color) and her thesis title is "Developing a food composition database for anthocyanins in the Australian food supply"
Spungen, Judith US Food and Drug Administration, Center for Food Safety and Applied Nutrition Judith.Spungen@fda.hhs.gov 	Judi Spungen, a Nutritionist with FDA's Center for Food Safety and Applied Nutrition (CFSAN), works to estimate dietary exposure to contaminants in foods. Judi also serves as an expert in dietary exposure assessment for the Joint FAO/World Health Organization Expert Committee on Food Additives (JECFA). From 2015-2018, Judi chaired the US Interagency Risk Assessment Consortium's Dietary Exposure Assessment Working Group in an interagency effort to describe federal dietary exposure assessment methods and available resources. Judi is a member of the National Nutrient Databank Conference (NNDC) Steering Committee and is serving as Program Chair for the 41st NNDC. Prior to joining FDA, Judi had positions with USDA and with several consulting firms, including TAS, Environ and Exponent. She has a BS with high honors in foods and nutrition from Drexel University, an MS in nutritional sciences from the University of Maryland, a Certificate in Risk Policy and Analysis from the Johns Hopkins Bloomberg School of Public Health, and is a Registered Dietitian.
Steinfeldt, Lois US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group lois.steinfeldt@usda.gov 	Lois Steinfeldt, MPH, is a nutritionist with the Food Surveys Research Group, Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA. Prior to joining USDA in 1998, she was a Faculty Associate at The University of Texas School Public Health and an independent consultant in nutrition and health management information systems in Houston, TX. Ms. Steinfeldt has an M.P.H. from the University of Texas, Houston, Texas and a B.S. in Biology from Rensselaer Polytechnic Institute, Troy, New York. She has designed and managed Survey Net, Post Interview Processing System, Recipe Processing System, and FSRG Processor software used in processing dietary intake data for the CSFII and WWEIA, NHANES national food consumption surveys. She has over 30 years of experience managing and analyzing nutrition and health related data

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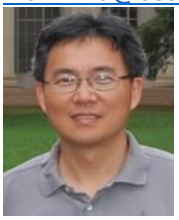
Tey, Phuongtan US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory phuongtan.dang@usda.gov 	Phuongtan Tey is a data analyst for the Dietary Supplement Ingredient Database (DSID) research program at the Methods and Application of Food Composition Laboratory, USDA. In this role, she designs procedures for data collection and maintains the research databases for dietary supplement analytical studies. She also develops programs to perform quantitative analysis of large data sets to answer research questions. She received a B.S. in biology from the University of Maryland, College Park and a M.S. in biotechnology from University of Maryland, University College.
Wafa, Sarah Tufts University Sarah.Wafa@tufts.edu 	Sarah Wafa is a Researcher on the International Dietary Data Expansion (INDDEX) Project at the Friedman School of Nutrition Science and Policy, Tufts University (Boston, US). Her work focuses on the development of tools for the collection, processing, and analysis of individual dietary assessment data as well as supporting users in the use of these tools. Prior to working with the INDDEX project, Sarah worked on various programs in clinical nutrition, epidemiology and nutrition research at the McGill University Health Centre. She has experience in international health and nutrition programming with the WHO and ACF. Sarah earned her MPH from Queen's University and is a registered dietitian in Canada (Quebec).
Wu, Xianli US Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Methods and Application of Food Composition Laboratory Xianli.wu@usda.gov 	Dr. Xianli Wu is a chemist at USDA-ARS Beltsville Human Nutrition Research Center. He is currently working on the research related to influential factors of nutrient composition and their impact on human health. Dr. Wu obtained his doctoral degree majoring in Medicinal Chemistry from China Pharmaceutical University. He started as a postdoctoral researcher and then group leader at USDA ARS Arkansans Children's Nutrition Center (ACNC). His research at ACNC focused primarily on the analysis of dietary bioactive compounds, their bioavailability and bioactivity, and the disease preventive effects certain dietary factors. Dr. Wu worked at the Hershey Company from 2012-2015 as a staff scientist, where he led research projects for developing new food ingredients/food products. He was also engaged in the research on the health & wellness of cocoa and cocoa bioactive components. Dr. Wu has authored and co-authored 86 peer-reviewed papers and 10 book chapters, and he also has presented his research findings at many professional conferences. He was listed as one of the world's most cited scientists in Agricultural Sciences by Thomson Reuters (*World's Most Influential Scientific Minds 2014, 2015*).

41st National Nutrient Databank Conference Presenter Photos and Bio sketches	
Yonemori, Kim University of Hawai'i Cancer Center kmurakam@cc.hawaii.edu 	Kim Yonemori, RDN is a research dietitian supervisor at the University of Hawaii Cancer Center in Honolulu, Hawaii.
Younger, Tim Label Insight tyounger@labelinsight.com 	Tim is a Registered Dietitian who holds a Master's degree from St. Louis University where he specialized in Medical Nutrition Therapy, while working with multiple hospitals, health clinics, and public health organizations in the St. Louis area. For the past 4 years, he has focused on enhancing Label Insight's data taxonomies to fuel robust product attribution and insights with a team of dietitians and CPG experts. As the Data Transformation Manager, he works closely with retailers and brands throughout the industry to help solve their unique health and wellness initiatives.
Zhu, Yong General Mills, Bell Institute of Health and Nutrition yong.zhu@genmills.com 	Dr. Zhu is a senior nutrition scientist from the Bell Institute of Health and Nutrition at General Mills. In his current role, he leads nutrition research projects with a focus on food clinical trials and nutritional epidemiological studies. Dr. Zhu received his doctoral degree in Nutritional Sciences from Iowa State University and completed a postdoctoral training in Epidemiology at the University of Iowa.
Zimmer, Meghan US National Institutes of Health, National Cancer Institute meg.zimmer@nih.gov 	Meghan Zimmer, MPH is a Cancer Research Training Award (CRTA) Fellow at the National Cancer Institute in the Risk Factor Assessment Branch. She is interested in associations between maternal and child nutrition and chronic disease prevention. Her research has evaluated dietary intake as well as retail and clinic operations in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

41st National Nutrient Databank Conference Presenter Photos and Bio sketches	
Zimmerman, Thea Palmer Westat theazimmerman@westat.com 	Thea Zimmerman is a research nutritionist and Westat Senior Study Director with more than 20 years of experience in dietary assessment, with a focus on food and nutrient databases. She directs Westat's Dietary Assessment Team (DAT) of research nutritionists. This team develops and maintains the question and nutrient database for dietary assessment instruments such as NCI's Automated Self-Administered 24-Hour Recall (ASA24); develops, adapts, and links dietary databases for specialized nutrient research and mixed-mode data collection; coordinates telephone and field dietary data collection using USDA's Automated Multiple Pass Method (AMPM) and the ASA24; and codes, cleans, and monitors the quality of dietary data. Ms. Zimmerman has served as project director and task lead for dozens of nutrition and dietary studies for USDA's Food and Nutrition Service (FNS) and Economic Research Service (ERS), NCI, and EPA. As project director and senior nutritionist for the ERS Database Linkages task order, she is responsible for linking U.S. retail food purchase data with USDA nutrient databases; she worked with programmers to develop methods for automating linkage, oversaw development of synonyms to align terms in the retail data with those in the USDA databases, and created factors that convert the weight of purchased foods to edible food portions in order to calculate the cost of foods reported in the National Health and Nutrition Examination Survey. In addition, Ms. Zimmerman established standardized dietary data collection, coding, and quality control procedures for collecting and coding more than 21,000 intakes for the FNS Infant and Toddler Feeding Practices Study (ITFPS-II) and the Healthy Incentives Pilot Evaluation. She also developed a database of nutrient values to calculate the nutrients and food group equivalents that USDA foods provide to nutrition assistance programs. To support development of the ASA24, she directed linkage of more than 10 million food question pathways to food codes in the Food and Nutrient Database for Dietary Studies. Throughout her career, Ms. Zimmerman has written or contributed to numerous technical publications, conference presentations, and published articles.

Thank you all for being part of this virtual event.
We hope to see you again in 2022 at our 42nd National Nutrient Databank Conference.