43rd National Nutrient Databank Conference

Nutrients & Beyond: How the Role of Food Composition Databases are Evolving

Ottawa, Canada
May 21-23, 2024
Program and Abstracts

Message from the NNDC Executive Committee Chair

Welcome to the 43rd National Nutrient Databank Conference. This year's NNDC 2024 theme, Nutrients & Beyond: How the Role of Food Composition Databases is Evolving, highlights the intersection of nutrition, food chemistry, diet, health, and technology as a path forward to caring for a growing, global population. In addition to many exciting oral presentations, we invite you to visit the posters and celebrate a return to in person networking. We are in a beautiful location for sightseeing and revisiting Ottawa, thanks to our gracious Canadian hosts.

It's been 2 years since our last conference, which pivoted into an all-virtual meeting because of Covid, and was chaired deftly by Nancy Emenaker. We learned a lot about resilience and moving forward. This year, we took a gamble on returning to an in-person meeting, embraced by the Program, Communications, and Local Arrangements Committees, as well as the Steering Committee and Executive Committee. This is a tight and very focused community and interactions in person are key to sharing information, new ideas and navigating and planning the future!

As NNDC Chair, of the Executive and Steering Committees, I would like to thank all the energetic and devoted people who made this happen: the Program Committee Lead Thea Bourianne, Local Arrangements Chair Isabelle Massarelli, our gracious host, Communications Chair Dana Hoffman-Pennesi, long-time Treasurer Lisa Harnack, Chair-Elect Lauri Byerley (and Chair of 2026 conference), Past Chair Nancy Emenaker, and Grants Manager Julie Eichenberger, who has worked hard to help support this conference financially. I appreciate the expertise of the Steering Committee, the longtime contributions of Thea Zimmerman and David Haytowitz as Historians and the new energy from Young No, Secretary. We say goodbye to Brian Westrich (Steering Committee) and David Haytowitz (many official positions within NNDC), longtime supporters of food composition database development.

Again, I extend my sincerest appreciation and gratitude to the 2024 Executive Committee, above, retiring members and new, and the Steering Committee for their many contributions to the ongoing success of this important work.

Pamela R. Pehrsson
NNDC Executive Committee Chair 2024

Keynote Speakers Photos and Bio Sketches

Dr. Deirdra Chester

Dr. Deirdra Chester serves as the Director of the Office of the Chief Scientist (OCS). In this role, she leads OCS in delivering science and research that undergirds the policies and practices of USDA and its customers and stakeholders. Additionally, she steers collaboration activities for USDA science programs that support scientific excellence, innovation, and capacity to achieve the Department's mission. Prior to this role, Dr. Chester was with the National Institute of Food and Agriculture (NIFA) where she served as the Division Director for the Division of Nutrition. In this role, she provided leadership and oversight for the Division's research, education, and Extension activities across the nation through competitive grant programs.

Previously, Dr. Chester was the agency Science Advisor for USDA's Animal and Plant Health Inspection Service (APHIS). Before APHIS, she served as the National Program Leader for NIFA's Applied Nutrition Research in the Division of Nutrition. Prior to joining NIFA, Dr. Chester was a scientist at USDA's Agricultural Research Service.

Additionally, Dr. Chester is a Registered Dietitian/Nutritionist. She has spoken both nationally and internationally on nutrition topics and is on the editorial board of the Journal of Obesity and Chronic Disease.

Dr. Chester is an American University Key Executive Leadership program graduate and is SES certified through the USDA Senior Executive Service Candidate Development Program. Dr. Chester holds a Ph.D. in Nutrition from Florida International University, where she was awarded the McKnight Doctoral Fellowship and was in the inaugural class of the Gates Millennial Scholars. She also holds a master's degree in food and nutrition science and a bachelor's degree in nutrition and dietetics from Florida State University.

Dr. Chester is the recipient of numerous honors and awards. The American Public Health Association Food and Nutrition Section awarded her the Mary C. Egan Award and she was recognized by Florida State University's College of Human Science with the Circle of Excellence Alumni Award.

Keynote Speakers Photos and Bio Sketches

Dr. Véronique Provencher

Véronique Provencher (RD, PhD) is a Full Professor at the School of Nutrition at Université Laval and a researcher at the Centre Nutrition, santé et Société (NUTRISS - Leader of Axis 3 – Nutrition et Société) of the Institute of Nutrition and Functional Foods (NAF; Director of Theme 6 – Nutrition et Société).

Dr. Provencher is a registered dietitian and a member of the Ordre des diététistes nutritionnistes du Québec (ODNQ). She earned MSc and PhD degrees at Université Laval before undertaking postdoctoral research in psychology at the University of Toronto. Since the beginning of her career, she has been awarded a number of research grants, published more than a hundred publications in high-impact journals, and is renowned for her work in public health nutrition. She is actively involved in the Food Quality Observatory as the Scientific Director where she studied issues related to the food environment. Her innovative research program focuses on psychological and behavioural factors related to food choices and intake. The main aim of her research is to support the development of new public health practices and policies that promote healthy eating in a sustainable way.

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The National Nutrient Databank Conference is supported by a grant from the USDA

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Westat provides innovative professional services support to clients in addressing challenges to improve outcomes in health, education, social policy, and transportation. Our nutrition work includes development of dietary data collection tools, such as the ASA24, dietary data collection and analysis, database harmonization, and methodology to support numerous federal policy initiatives. We are dedicated to improving lives through research.

43rd National Nutrient Databank Conference Committees

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Marie-France Verreault, Health Canada

Note of Departures & Acknowledgements

Steering Committee departures:

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

Thank you

Gracias

शुक्रिया

Merci

Mahalo

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ありがとう

Grazie

Danke sehr

谢谢

Obrigado

David Haytowitz (Executive Committee member)
USDA-ARS (Retired)

David first attended the National Nutrient Databank Conference in 1978 at the 3rd Conference in Arlington, Virginia, only a few months after joining USDA to work on the revision of Agriculture Handbook No. 8. Since the 13th Conference in 1988 in Framingham, Massachusetts, David has attended every NNDC conference except one. David has given numerous presentations—both oral and poster—in addition to chairing various sessions at the Conferences. Over the years he has served in various leadership roles—Chair 2018-2020; Chair-elect 2016-2018; Past-Chair 2020-2022; Historian 2021-2023; and Steering (1991 – Present) plus a number of committees—Program (1991 – 2002, 2013, 2018); Data Base (1991 – 2001); local arrangements (2004, 2005, 2007, 2011, 2013); and publicity as webmaster (ad hoc 2019 – 2023).

Brian Westrich (Steering Committee member)
McWest Corp.

Dr. Westrich is a long-time participant in the Nutrient Databank Conference, attending his first conference in 1989 and first presenting in 1994. He also served on the Local Arrangements Committee for the conference in 2018. He also attended the conference in Boston in 2013 in the aftermath of the Boston Marathon bombing, which was a stark reminder of the threat civil insecurity can pose to scientific discourse.

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

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

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

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

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

Oral Presentation Schedule

Times are listed in Eastern Daylight Time (GMT-4)

Time	Day 1 - Tuesday, May 21 2024
8:00-9:00 AM	**Registration & Breakfast** **Poster Viewing**
9:00-9:15 AM	**Welcome and Opening Remarks** **Isabelle Massarelli, Local Arrangements Chair** **Pamela Pehrsson, Chair, 43rd NNDC**
9:15-10:15 AM	**Keynote Presentation** Introduction from Pamela Pehrsson **Dr. Deirdra Chester** *Director, Office of the Chief Scientist (OCS/OSEC)* *Research, Education and Economics (REE)* *United States Department of Agriculture*
10:15-10:35 AM	*Break (20 mins)*
10:35-10:40 AM	**Session 1: Database Development and Standardization** Moderator: Lauri Byerley (5 mins)
10:40-11:00 AM	Andrea Lindsey Shaping the Future for Informed Use of Dietary Supplements: An Ingredient Database and Mobile App
11:00-11:20 AM	James Friday The Food Surveys Research Group's Recipe Nutrient Calculation Program Redesign
11:20-11:40 AM	Cho-Il Kim Standardization and Integration of Food and Nutrient Database in Korea
11:40-12:00 PM	Linda Kantor Capturing Data on Foods Purchased and Acquired From Away-From-Home Places in the Second National Household Food Acquisition and Purchase

	Survey Field Test
12:00-1:20	*Lunch (1 hour 20 min)*
1:20-1:25 PM	**Session 2: Government Updates** Moderator: Catherine Champagne (5 mins)
1:25-1:45 PM	Andrea Carlson Statistical Properties of the Purchase-to-Plate Crosswalk: A Comparison of Healthy Eating Index Score
1:45-2:05 PM	Marie-Claude Mallet SNAP-CAN: Sampling and Nutrient Analysis Program for Canada
2:05-2:25 PM	Natalie Partridge Looking to the Future – New Directions for the USDA's Child Nutrition Database
2:25-2:45 PM	Carrie Martin USDA Food Patterns Equivalents Database (FPED), 2021-2023
2:45-3:05 PM	WenYen Juan Development of an Intrinsic, Enrichment, and Fortification Food and Nutrient Database
3:05-3:25 PM	James Harnley Understanding the Data in a Database: a Necessity for Research Integrity
3:25-3:45 PM	*Break (20 mins)*
3:45-3:50 PM	**Session 3: Nutrients and Other Food Components in US National Dietary Surveillance** Moderator: Isabelle Massarelli (5 mins)
3:50-4:05 PM	Alanna Moshfegh Nutrients in National Dietary Surveillance in the United States
4:05-4:20 PM	Kelly Kogan A Review of the Research of What We Eat in America, NHANES' Nutrients and Food Components Reported and Assessed in Research Studies

4:20-4:35 PM	Alexandra Cowan-Pyle Applications of U.S. Federal Micronutrient Data for Dietary Guidance, Surveillance, and Epidemiological Research
4:35-4:50 PM	Diane Mitchell A Review of the Scientific Literature to Characterize Nutrients and Other Food Components Not Reported in the Food and Nutrient Database for Dietary Studies (FNDDS)
4:50-5:20 PM	Session 3 Panel Discussion and Audience Q&A
5:20 PM	**Day 1 Wrap-Up**
	Welcome Reception & Evening Activity Light refreshments served
Time	**Day 2 - Wednesday, May 22 2024**
8:00-9:00 AM	**Registration & Breakfast** **Poster Viewing**
9:00-9:15 AM	**Day 2 Opening Remarks** **Isabelle Massarelli, Local Arrangements Chair**
9:15-10:15 AM	**Keynote Presentation** Introduction from Isabelle Massarelli **Dr. Véronique Provencher** *Professeure titulaire* *Chercheure Centre NUTRISS* *Institut sur la nutrition et les aliments fonctionnels* *FSAA - École de nutrition* *Université Laval*
10:15-10:35	*Break (20 mins)*
10:35-10:40 AM	**Session 4: Dietary Exposure and Contaminant Assessment** Moderator: WenYen Juan (5 mins)
10:40-11:00 AM	Kellie Casavale Expanding Efforts on Nutrient and Contaminant

	Composition of Foods
11:00-11:20 AM	Dana Hoffman-Pennesi U.S. FDA's Total Diet Study: Cadmium, Lead, and Nutrient Element Concentrations in Foods
11:20-11:40 AM	Judi Spungen U.S. FDA's Food Disaggregation Database (FFDD): A New Resource for Dietary Exposure Assessment
11:40-12:00 PM	Pamela Pehrsson New Research in Nitrate and Nitrite Content of Foods, Beverages, and Dietary Supplements
12:00-12:50 PM	*Lunch (50 mins)*
12:50-1:10	**NNDC Recognition Award Honoring Dr. Lisa Harnack** Introduction by Pamela Pehrsson
1:10-1:15 PM	**Session 5: Dietary Intake Assessment and Nutrition Inequalities** Moderator: Diane Mitchell (5 mins)
1:15-1:35 PM	Joy Hutchinson The Process of Scoring Dietary Intake Data Collected with ASA24 Using HEFI-2019
1:35-1:55 PM	Julie Hess Comparing Shelf Stability of Relatively Processed and Relatively Unprocessed Western Diets
1:55-2:15 PM	Stephanie Wilson Mapping Dietary Data to FooDB Reveals Associations between Polyphenol Intake and GI Inflammation
2:15-2:35 PM	Yutong Chen Trends in Health Disparities: Individual-level Dietary Intakes in the United States and China, 1999-2015
2:35-2:55 PM	Tina Irrer Closer to Zero: Incorporating Health Equity into Public Health Activities

2:55-3:15	*Break (20 mins)*
3:15-3:20 PM	**Session 6: Consumer Behavior and Dietary Guidance** Moderator: Thea Bourianne (5 mins)
3:20-3:40 PM	Natalia Rebolledo Changes in the Proportion of Regulated Products and Critical Nutrient Content of Packaged Foods and Beverages After the Implementation of the Final Phase of the Chilean Food Labeling Law
3:40-4:00 PM	Bridget Hollingsworth Nutrients of Concern Decrease Three Years After Chilean Food Labeling & Marketing Law Implemented
4:00-4:20 PM	Deepesh Pandey Nationally Representative Adult and Children's Calcium Dietary Supplements (DS): Nutrient Strength
4:20-4:40 PM	Dylan Bailey Exploring Protein Dietary Guidance Statements: A Consumer-Centric Pilot Study
4:40 PM	**Day 2 Wrap-Up**
	NNDC Steering Committee Meeting
	Evening Activity Dinner in the Italian district
Time	**Day 3 - Thursday, May 23 2024**
8:00-8:30 AM	**Registration & Breakfast** **Poster Viewing**
8:30-8:40 AM	**Day 3 Opening Remarks** **Isabelle Massarelli, Local Arrangements Chair**
8:40-8:45 AM	**Session 7: Nutrient Variability** Moderator: Judi Spugen (5 mins)

8:45-9:05 AM	Lisa Harnack Plant-Based Milk Alternative Products are Highly Heterogeneous in Nutrient Composition
9:05-9:25 AM	Lisa Harnack Snack and Meal Replacement Bars Available in the U.S. Marketplace are Heterogeneous in Macronutrient
9:25-9:45 AM	Xianli Wu Expanded Analytical Data for the USDA/ODS-NIH Database for the Purine Content of Foods
9:45-10:05 AM	Kathryn Hopperton Comparing Values of Human Milk Nutrient Composition for use in Food Composition Databases
10:05-10:20 AM	*Break (20 mins)*
10:20-10:25 AM	**Session 8: Technology and Linkages in Dietary Assessment** Moderator: Julie Eichenberger (5 mins)
10:25-10:45 AM	Bingjie Zhou Advancing Nutrition Data Dashboards: A Standardized Framework for Evaluation and Enhancement
10:45-11:05 AM	Birdem Amoutzopoulos A New Updated Food Grouping System for the UK National Diet and Nutrition Survey
11:05-11:25 AM	Kai Blumberg Development of a Novel Minimum Information Standard for Food Composition Data
11:25-11:45 AM	Kirsten Herrick New Linkages for the NCI's Dietary Assessment Tools: Diet History Questionnaire (DHQ) and Dietary Carbon Footprints and Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24) and Nova
11:45-12:00 PM	**Closing Remarks** Pamela Pehrsson

	Oral Presentation Awards and Poster Awards Lauri Byerley
	Boxed Lunch

Conference Notes

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

Wifi Availability

Wifi is available for conference attendees. Login details will be provided.

Press & Photography/Videography

- **Press:** Media representatives are kindly requested to contact info@nutrientdataconf.org for press inquiries

- **Photography:**
  - We'd love to see photos of your learnings, connections, and conference fun! Post them to social media using the hashtags #NNDC2024 #NNDC #NationalNutrientDatabankConference
  - Please note that any photos or videos taken during the conference cannot be used for commercial purposes without prior written consent from the conference organizers.
  - Speakers, if there are any presentations or sessions with confidential information, please specify so attendees can limit the use of photography.

- **Social Sharing Welcome!** We encourage you to share your conference experience on social media! Please use the official conference hashtags #NNDC2024 #NNDC #NationalNutrientDatabankConference

By sharing photos using our conference hashtag, you grant us permission to use your photos for marketing purposes.

Oral Presentation Abstracts

Session 1. Database Development and Standardization

Shaping the future for informed use of dietary supplements: An ingredient database and mobile app
Andrea T. Lindsey MS1,2; Cindy Crawford BA1,2; Gabrielle Couture MPH1,2; Jacqueline Forster MS1,2; Patricia A. Deuster PhD, MPH1
1. Consortium for Health and Military Performance, Department of Military & Emergency Medicine, F. Edward Hébert School of Medicine, Uniformed Services University, Bethesda, MD 20814, USA;
2. Henry M. Jackson Foundation for the Advancement of Military Medicine, Bethesda, MD 20817, USA

Background: The dietary supplement (DS) market is thriving, in part because consumers often get their information from social media, rather than consulting a healthcare provider or relying upon evidence-based resources. Operation Supplement Safety (OPSS) is the Department of Defense's (DoD) go-to program for DS. OPSS partners with other federal departments, professional and academic institutions to provide the most current, evidence-based information, tools, and resources for education and decision-making. In 2022, DoD Instruction 6130.06, Use of Dietary Supplements in the DoD was issued. It states that OPSS will maintain the official DoD Prohibited Dietary Supplement Ingredients List and provide educational training.

Objective: OPSS is developing a database of information about ingredients found in DS. This database, OPSSID (OPSS Ingredient Database) will support an app under development (OPSSupp), as well as the mandated online DoD Prohibited List. Through collaboration and partnerships, these tools will be useful in diverse settings.

Description: OPSSID will include a variety of functional aspects for stakeholders, including alternative terms for ingredients or terms as presented on a product label, color-coded safety ratings, and warnings for ingredients with known potential side effects.
The app will enable the user to scan a supplement to see if it: 1) contains an ingredient on the Prohibited List or the World Anti-Doping Agency Prohibited List; 2) includes warnings; 3) is considered high-risk; and 4) is third-party certified. The NIH Office of Dietary Supplements Label Database API will be used for product labels, brands, and ingredient information.

Conclusion: OPSSID will be a robust, unique, and comprehensive database of ingredients found in DS and will serve DoD, our federal partners, researchers, clinicians, and the public at large. OPSSupp will allow a user to quickly and easily determine whether ingredients listed in a product might be risky. These resources will help in shaping the future for safe, evidence-informed DS use.

The Food Surveys Research Group's Recipe Nutrient Calculation Program Redesign
James Friday, BS (1); Rebecca Myrowitz, MHS, RDN, LDN, CPH (1); David Pan, BS (2); Aidan Novak, BS (2); Kyle McKillop, MS (1); Alanna Moshfegh MS, RD (1).
(1) U.S. Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Beltsville, MD.
(2) Joint Institute for Food Safety and Applied Nutrition, University of Maryland, College Park, MD.
Background: Food Surveys Research Group's (FSRG) recipe nutrient calculation program generates the nutrient profiles for USDA's Food and Nutrient Database for Dietary Studies (FNDDS), the application database created for converting food and beverages consumed in What We Eat in America (WWEIA), National Health and Examination Survey (NHANES) into gram amounts and determining nutrient values.

Objective: To describe FSRG's recipe nutrient calculation program and planned enhancements.

Description: FNDDS 2019-2020 contains 5,600+ food codes and their detailed descriptions, nutrient values per 100g of edible portion for energy and 64 nutrient/food components, and 20,000+ portion options for those foods. FSRG's recipe nutrient calculation program generates nutrient profiles using two or more ingredients, their amounts, and adjustment factors if appropriate. Ingredient nutrient profiles are primarily from USDA's FoodData Central (FDC). The nutrient profiles for approximately two-thirds of

FNDDS 2019-2020 foods were generated by recipe calculation. The remaining foods were linked directly to a single FDC code and have a single ingredient recipe. The current nutrient recipe calculation program used to generate nutrient profiles was created over two decades ago and has exceeded its expected life span. In collaboration with the Joint Institute for Food Safety and Applied Nutrition, the program has been redesigned using technologies for improved operability. The methodology for recipe calculation is unchanged; however, significant improvements have been made to enhance functionality and ease of use. A longer-term goal for enhancing the recipe nutrient calculation program is to make it accessible to researchers.

Conclusion: A redesigned recipe nutrient calculation program will enhance development of FNDDS food code nutrient profiles. The goal of making it accessible to researchers will further support application of analytical food composition data from FDC.

Standardization and Integration of Food and Nutrient Database in Korea

Sung Ok Kwon, PhD 1, Youngmin Nam, MS 2, Jung Mi Kim, MS 2, Jihyun Yoon, PhD 2,3, Cho-il Kim, PhD 2
1Research Institute of Human Ecology, Seoul National University, Seoul, Korea,
2Department of Food and Nutrition, Seoul National University, Seoul, Korea
3Research Institute for Sustainable Development, Seoul National University, Seoul, Korea

There have been 3 kinds of food & nutrient databases (FNDB) produced/managed by different ministries for years in Korea causing a confusion among innocent users that government launched a collaboration project on 2020 to integrate and standardize them into one universal FNDB. Hence, we gathered all necessary information including metadata of each FNDB and reviewed to derive necessary points for standardization and sustainable maintenance. First, we worked on standardizing food coding, terminology, definition, compilation method, units for nutrient content, etc. To incorporate agricultural product, seafood, and processed food under one coding system, food codes were given in 17 digits at 8 levels instead of 11 or 12 digits in pre-existing FNDBs to embrace unique features of classification used in each case. The universal FNDB has 3 sub-FNDBs, one for commodity type foods, one for processed foods (PF), and one for foods at prepared dish level. Although the number of nutrients included would be expanded later, we designated 24 nutrients to be listed first. Nevertheless, PF FNDB had to start with the mandatory 9 nutrients given in the nutrition information label on the packaging of PF in Korea. Then, standard operating procedures were prepared for collection, compilation, data verification and a sustainable maintenance & update of FNDB at the government level accordingly. Governance of FNDB maintenance including quality control council composed of experts and relevant government officials was proposed also. Final cleaning (ex. removing duplicates) and editing of data in 3 FNDBs were performed to produce an integrated universal FNDB of 66,651 foods. This final FNDB is available to the public through the 'public data portal' (https://www.data.go.kr/index.do) as open API. With a recent amendment on the relevant regulation, reporting nutrition information of PF is required for the food manufacturing report from July 2023 and it will expedite the PF FNDB expansion.

Capturing Data on Foods Purchased and Acquired From Away-From-Home Places in the Second National Household Food Acquisition and Purchase Survey Field Test

Linda Kantor, M.S., Elina Page, PhD, Lauren Miller, M.S., Mark Denbaly, PhD, Alisha Coleman-Jensen, PhD,
U.S. Department of Agriculture, Economic Research Service

Background: The 2022 Second National Household Food Acquisition and Purchase Survey (FoodAPS-2) Field Test evaluated the effectiveness of a native smartphone app to collect data about household food purchases and acquisitions, including food acquired for free and through federal food and nutrition assistance programs, over a 7-day study period. The app linked respondent reports of acquired food items to multiple food and nutrition databases in real time to reduce respondent burden and improve the accuracy of food item descriptions for subsequent nutrition coding. A particular focus of the Field Test was the use of new methods to capture details about individual foods and combination meals acquired at away from home places, like restaurants, fast food locations, and schools, as well as less traditional outlets.

Objective: To evaluate the effectiveness of new databases and reporting methods to improve the accuracy and completeness of food item descriptions and portion size data for food-away-from-home purchases and acquisitions collected in the FoodAPS-2 Field Test.

Description: Field Test respondents used a native smartphone app to report the purchase and acquisition of food-away-from-home items using matches to restaurant-specific menu items and drop-down menus of generic food items in the proprietary Nutritionix database, or text entry. The app included a targeted

reporting format to facilitate reporting of individual components of combination meals, i.e., multiple items purchased or acquired for one price.

Conclusion: The Nutritionix database supplied key serving size and nutrition data on food-away-from-home items that improved the accuracy of the portion size and nutrient information appended to acquired food items. A unique reporting format captured new descriptive details about combination meals that will inform the development of survey instruments for future FoodAPS collections.

Session 2. Government Updates

Statistical Properties of the Purchase-to-Plate Crosswalk: A Comparison of Healthy Eating Index Score
Andrea Carlson, M.S. PhD, USDA- Economic Research Service Christopher Lowe, M.S., USDA-Economic Rese
Key words: household and retail scanner data; Purchase to Plate Crosswalk (PPC); Food and Nutrient Database for Dietary Studies (FNDDS); What We Eat in America (WWEIA); National Health and Nutrition Examination Survey (NHANES); Healthy Eating Index (HEI)

Background: Food scanner data are collected at the store check-out (retail) and by individual households (household) and represent multiple years of weekly (retail) and daily (household) food purchases. To measure adherence to Federal nutrition guidance using scanner data, the USDA-ERS Purchase to Plate Crosswalk (PPC) links these data to the FNDDS. Product weight adjustment factors account for refuse and cooking loss or gain to convert the weight of purchased foods to the edible weight in FNDDS. These links allow estimation of the Healthy Eating Index (HEI) for retail food purchases. There are currently four cycles of the PPC covering the years 2011-2018, and additional cycles are planned.

Objective: Compare HEI scores estimated from household and retail scanner data to the dietary recall survey, WWEIA, a component of NHANES.
Description: We estimate a national average HEI score using food retail scanner data and compare it to the usual intake estimates generated from WWEIA. We also compare the average of household HEI in the household scanner data the average of individuals in WWEIA. Preliminary results show that the scanner data-based HEI scores and the WWEIA HEI scores are similar for the two most recent cycles of the PPC. Analysis of the earlier cycles is still in progress.

Conclusion: By using the PPC researchers can add the healthfulness of food purchases to research addressing policy issues of interest to USDA. In addition, scanner data could complement WWEIA in provide additional nutrition monitoring.

SNAP-CAN: Sampling and Nutrient Analysis Program for Canada
Marie-Claude Mallet, RD, Bureau of Nutritional Sciences Health Products and Food Branch, Health Canada, Ottawa
Marie-France Verreault, RD, Bureau of Nutritional Sciences Health Products and Food Branch, Health Canada, Ottawa
Rita Klutka, RD, Bureau of Nutritional Sciences Health Products and Food Branch, Health Canada, Ottawa

Background: The Canadian Nutrient File (CNF) was established in 1981 and relies on USDA's National Nutrient Database for Standard Reference as its main source of data. SNAP-CAN was initiated in 2008 to increase Canadian content in the CNF in order to answer the growing need from policy-makers and stakeholders to access high-quality analytical unique Canadian data.
Research Objective: To generate nationally representative analytical data for the CNF to support Health Canada's nutrition surveillance, research, policies, standards and regulations.

Methods: Each SNAP-CAN cycle is comprised of four steps. Two to three high priority foods categories are selected after careful considerations of the particularity of the Canadian food supply (i.e. level of fortification, food only sold in Canada, difference in formulation, known nutrient differences, etc.). A sampling plan is then developed for each category. The sampling plan is designed to reflect nutrient

content variability of the food category. Health Canada's laboratories process the samples then analyse for nutrients. Finally, the raw analytical data is aggregated into food composites using a weighted average.

Results: The 2010 CNF publication was the first version that included data from SNAP-CAN with 4 food categories. The 2015 CNF publication included 12 additional food categories. Since 2015, 17 foods categories have been sampled: 10 categories have completed the four-step process (n=362 food composites); 4 categories are in the data aggregation step and 3 are pending nutrient analyses.

Discussion: Data collection for SNAP-CAN will continue to improve data representation of foods consumed by Canadians. Repetition of previously analysed categories will allow the comparison of nutrients over time. The addition of foods representing the Canadian market ensures food policies, standards and regulations are informed using the best available evidence that reflects the Canadian context. While developing representative analytical data is a slow process, SNAP-CAN strengthens the evidence base that Health Canada uses to develop policies, standards and regulations as these data are more specific to the Canadian food supply.

Looking to the Future – New Directions for the USDA's Child Nutrition Database
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Background: The United States Department of Agriculture's (USDA) Child Nutrition Database (CNDB) is a publicly available database required for nutrient analysis software approved by USDA for use in the National School Lunch Program and School Breakfast Program. FNS continues to modernize the CNDB to improve the quality and quantity of data available to school program operators. Objective: To describe the status and future plans of the CNDB modernization, focusing on the data collection process from manufacturers for products sold to school food service, plans to enhance the available data for generic food products, and transfer of the CNDB to FoodData Central (FDC). Description: To continue work on the CNDB with A Partnership for Public Health: The USDA Global Branded Food Products Database (the Partnership), USDA established Interagency Agreements with the USDA Agricultural Research Service (ARS). With the 2023 release, the CNDB fully transitioned to obtaining manufacturers' nutrient and serving data through the Global Branded Food Products Database (Branded Foods) process using GS1 GDSN. As a result, this increased the number of manufacturers represented in the CNDB. The 2024 release focused on continuing to increase the number of manufacturers who publish to CNDB, emphasizing USDA Foods suppliers. FNS worked with ARS to provide added sugars data for selected products obtained from the National Nutrient Database for Standard Reference (SR). Efforts are underway to transition the location of CNDB to FDC which will allow for monthly, rather than annual, data updates. Conclusion: The CNDB, provided to school program operators via USDA-approved nutrient analysis software, is an important and widely used resource. Improving the availability and frequency of the CNDB, updating generic-type food data, and increasing participation by manufacturers is essential, as it plays a critical role in analyzing school meals to ensure they meet the nutrition standards for Child Nutrition Programs.

USDA Food Patterns Equivalents Database (FPED), 2021-2023
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Background: The Food Patterns Equivalents Database (FPED) converts foods and beverages in the Food and Nutrient Database for Dietary Studies (FNDDS) to 37 USDA Food Pattern (FP) components which allows estimation of FP intake and determination of adherence to the Dietary Guidelines for Americans recommendations.

Objective: To describe updates and enhancements for FPED 2021-2023.

Description: The FPED and former MyPyramid Equivalents Database (MPED) have been developed and publicly released to correspond with national dietary survey data from 1994-1996 onward. FPED is an expansion of the FNDDS which provides the survey food codes and associated recipes needed for FP component calculation and assignment. In recent years, extensive review and redevelopment of the FNDDS has streamlined the number of food codes and incorporated generic protocols to standardize recipe representation across similar categories of foods. These efforts were considered in the development of FPED 2021-2023 which utilized the following approach: 1) Systematically review changes implemented in

FNDDS for potential impact and modifications to FPED and the underlying Food Patterns Equivalents Ingredients Database (FPID). For example, food categories including ready-to-eat cereals, baby/toddler items, candy, and yogurt, among others, were extensively modified in recent versions of FNDDS and changes required careful consideration for impact on FPED and FPID development and representation. 2) Develop a framework across similar categories of foods to standardize specific contributions of FP components and ensure they are represented appropriately. For example, the FP contribution of fruit was standardized for similar types of baked goods. 3) Develop documentation for assumptions and standardization methods applied with the intention of enhancing database transparency for all users.

Conclusion: The FPED 2021-2023 will be available at www.ars.usda.gov/nea/bhnrc/fsrg. The updated database and related documentation allow for new research analyses and provide additional details on database development.

Development of an Intrinsic, Enrichment, and Fortification Food and Nutrient Database
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Background: The Food and Drug Administration (FDA) established the enrichment and fortification standards for several food items to maintain a desirable level of nutritional quality in the nation's food supply and to help correct nutrient deficiencies in the population. Inadequate intake of nutrients may have negative health effects. FDA is developing a database of intrinsic, enrichment, and fortification values for nutrients in USDA nutrient databases that can be used to monitor the intake of added nutrients using nationwide dietary intake data.

Objective: Develop an Intrinsic, Enrichment, and Fortification Database that estimates the fractional amounts (intrinsic, enrichment, and fortification) of nutrients for foods and beverages reported consumed in National Health and Nutrition Examination Survey (NHANES) 2013–2018.

Description: The Institute for the Advancement of Food and Nutrition Sciences (IAFNS, formerly the International Life Science Institute) developed a Fortification, Enrichment, and Intrinsic Database that included fractional values for 16 nutrients for the foods and beverages reported in What We Eat In America, NHANES 2009-2010 and 2011-2012. FDA and Westat obtained permission from IAFNS to use the database version 1.0 values to populate the updated database for foods and ingredients that were unchanged across NHANES cycles from 2013-2014 through 2017-2018. For all other foods and ingredients, Westat adapted the methods documented by IAFNS while expanding the number of nutrients included in the database to 34 possible fortified nutrients.

Conclusion: The 2013-2018 Intrinsic, Enrichment, and Fortification Database provides intrinsic, enrichment, fortification, , and total nutrient values for the foods (and their recipe ingredients) reported in three cycles of NHANES dietary intake data. The database allows assessment of the intake of added nutrients in the national dietary intake data for the U.S. population.

Understanding the Data in a Database: a Necessity for Research Integrity
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Too often data are simply accepted as cast in stone with no questioning of the underlying sourcing, analytical methodology, and variability. Budgeting restrictions and convenience frequently dictate that data are acquired electronically rather than analytically, i.e., acquiring the data quickly on the internet or extrapolated from a database rather than paying to have samples from a well-designed study analyzed using validated methods and evaluated with respect to sources of variance. Variance is the key to understanding data. No two samples from the same year, the same field, the same plant, or the same extraction will give the same test value. A law of nature. Results for duplicate samples whose signals lie close to the detection limit are not bad data because they don't agree well. They are obeying the laws of statistics. Validated methods, characterized with respect to precision (detection limits) and applicability (which matrices can be analyzed successfully), are an essential step to understanding the analytical variance. Variance is also introduced through genetics (cultivars), environment (year and location of harvest), management (e.g., conventional vs organic farming), and processing (thousands of ways to prepare commercial foods). Metadata for GxExMxP (described above) are essential for understanding variance and differences in foods and their chemical constituents. Prediction of results requires accurate models which in turn require experimental data. Sophisticated programs can incorporate metadata and

provide accurate predictions. However, without the underlying experimental data, the models will only provide inaccurate results. Thus, databases require analytical data and must not perpetuate electronic data. There is no shortcut to developing a food composition database. If a database is to have integrity, it is necessary to invest in the sampling process, the analytical methodology, and the data processing. Only then can a database have applicability for nutritional and epidemiological studies.

Session 3. Nutrients and Other Food Components in US National Dietary Surveillance

Nutrients in National Dietary Surveillance in the United States

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Background: USDA's Food and Nutrient Database for Dietary Studies (FNDDS) provides 65 nutrient values for food/beverages consumed in What We Eat In America (WWEIA), NHANES, the US Federal source of national dietary surveillance data. It is unclear if all nutrients are needed for nutrition monitoring and research or what other nutrients might be needed. As analytical methods and technologies for measuring nutrients and other components relevant to health continue to advance, evidence-based criteria for inclusion/exclusion of nutrients for national dietary surveillance is needed.

Objective: To introduce USDA's Nutrients in Dietary Surveillance Project and seek input from the NNDC attendees.

Description: USDA has initiated the Nutrients in Dietary Surveillance Project to identify nutrients of significance to public health and agriculture policy leaders and researchers and to develop evidence-based criteria for nutrients and food components (NFC) to be reported in national dietary surveillance. As a first step, USDA in collaboration with Texas A&M-Institute for Advancing Health Through Agriculture, is systematically reviewing the scientific literature from the past decade to assess frequency and use of WWEIA, NHANES NFC. This review will provide important information to launch the Project's next step of determining and applying evidence-based criteria for inclusion/exclusion of nutrients in national surveillance. The criteria will consider factors relevant to critical use of the data including dietary standards and recommendations, federal food regulations and programs, and the availability of timely and comprehensive analytical food composition data. Throughout this process, essential stakeholders will be engaged for input on data needs and guidance.

Conclusion: The Nutrients in Dietary Surveillance Project was launched to establish evidence-based criteria for determining nutrients critical to national dietary surveillance in the US. The NNDC community is an important stakeholder in this Project.

A Review of the Research of What We Eat in America, NHANES' Nutrients and Food Components Reported and Assessed in Research Studies

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Background: The United States' first national food consumption survey, conducted in 1965-1966, reported individual dietary intakes for 10 nutrients. Since then, the U.S. Department of Agriculture's (USDA) continued research in food composition has provided the foundation to support nutrient databases used in national dietary surveillance. Today, USDA's Food and Nutrient Database for Dietary Studies (FNDDS) provides values for 65 nutrients and other food components (NFCs) for all foods/beverages reported in

What We Eat in America, NHANES, the U.S. federal source of national dietary surveillance data. To assess research use of the NFCs in national surveillance, a systematic review was undertaken.

Objective: To describe the extent each of FNDDS' 65 NFCs are reported in the scientific literature.

Description: USDA, in collaboration with Texas A&M Institute for Advancing Health Through Agriculture, is conducting a review of FNDDS' NFCs reported in studies using WWEIA, NHANES data in the peer-reviewed scientific literature between 2013-2023. A series of databases relevant to nutrition and public health have been systematically searched using queries focused on dietary intake of the 65 NFCs. Primary inclusion criteria include the use of WWEIA, NHANES data; using one or more NFCs as independent variables, dependent variables, and/or covariates; and publication since 2013. Preliminary results have yielded approximately 2,000 studies over the 10-year period. Reviewers will extract data from studies meeting the inclusion criteria with the goal of identifying, describing, and quantifying how each of the 65 NFCs have been used.

Conclusion: The identification, description, and quantification of how each of the 65 FNDDS NFCs are being used in research has never been assessed but is an important step to inform priorities in national dietary surveillance and analytical food composition research. Such assessment will ultimately support nutrition policy tailored towards the improvement of the nutritional status of the American public, the ultimate goal of national dietary surveillance.

Applications of U.S. Federal Micronutrient Data for Dietary Guidance, Surveillance, and Epidemiological Research

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Background: The dietary component of the U.S. National Health and Nutrition Examination Survey (NHANES), known as What We Eat in America (WWEIA), serves as the primary nationally representative repository of comprehensive dietary and nutrient intake data for the U.S. population. Texas A&M Institute for Advancing Health Through Agriculture, in partnership with the U.S. Department of Agriculture, systematically reviewed the literature to identify nutrients/food components (NFCs) for national dietary surveillance. As such, identifying and understanding the applications of WWEIA micronutrient data is critical for dietary surveillance and monitoring, as U.S. population subgroups are collectively at risk of inadequate intakes (i.e., % of the population with intakes < Estimated Average Requirement or that do not exceed the Adequate Intake) for nearly 20 micronutrients.

Objective

To identify the applications of WWEIA micronutrient data for dietary surveillance and epidemiological research, as well as the nutrition policy implications of these applications.

Description: A systematic search of four electronic databases (i.e., Medline, Web of Science, EBSCO, Cochrane Central) was conducted in the peer-reviewed literature from 2013-2023 to identify studies analyzing the 65 WWEIA NFCs, with approximately half as micronutrients. Studies were selected for inclusion if they were primary literature published in English and utilized WWEIA, NHANES data to examine intakes and/or dietary quality of at least one of the 65 NFCs. Preliminary findings suggest n=1,835 eligible studies for inclusion. Key applications of WWEIA micronutrient data include examining trends in micronutrient intakes, adherence to Dietary Reference Intakes, correlations with health outcomes, mortality, and nutritional biomarkers, respectively, intake comparisons pre- and post- implementation of Federal nutrition policies and identifying micronutrient disparities among vulnerable population subgroups.

Conclusion: The current applications of WWEIA micronutrient data in epidemiological research offer vital insights for nutrition monitoring, informing dietary guidance, and prioritizing the identification of micronutrients for dietary surveillance and inclusion in national nutrition surveys.

A Review of the Scientific Literature to Characterize Nutrients and Other Food Components Not Reported in the Food and Nutrient Database for Dietary Studies (FNDDS)
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Background: The U.S. Department of Agriculture (USDA) FNDDS is an application database used to convert all food and beverage portions reported in What We Eat in America (WWEIA), the dietary intake portion of the U.S. National Health and Nutrition Examination Survey (NHANES) into gram amounts and to assign their nutrient values. FNDDS contains 65 nutrients and other food components (NFCs) for analysis of WWEIA, which are critical for nutrition monitoring, surveillance, and research. As science evolves around dietary guidance, other food components not included in FNDDS are being calculated and used in conjunction with FNDDS data for the analysis of WWEIA, NHANES.
Objective: To identify and describe the diet and food-related components used in the analysis of WWEIA, NHANES data but are not reported in FNDDS.

Description: As part of a partnership between USDA and the Texas A&M Institute for Advancing Health Through Agriculture, a systematic review of FNDDS NFCs reported in studies using WWEIA dietary data in the peer-reviewed scientific literature between 2013-2023 was conducted. Over 1800 studies met criteria for inclusion. Data extraction included the identification of other dietary and food-related components, food classifications or calculated variables not compiled in FNDDS. These include polyphenols, amino acids, other fatty acids, low-calorie sweeteners, resistant starch, and ultra-processed foods, that are used in the analysis of WWEIA, NHANES. The extent of their use and the research applications of these additional food components will be described.

Conclusion: Further research is needed to determine the accuracy and reliability of food composition data used to estimate intakes of NFC's not reported in FNNDS and whether there is a sufficient scientific need for inclusion in dietary surveillance.

Session 4. Dietary Exposure and Contaminant Assessment

Expanding Efforts on Nutrient and Contaminant Composition of Foods
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Background: Arsenic, lead, cadmium, and mercury are contaminants that occur in the environment naturally and from human activities. When in the air, water, and/or soil where food is grown or raised, they can contribute to the composition of these foods. Many foods that are part of healthy eating patterns and provide key nutrients, including vegetables, fruits, grains, and seafood, can be dietary sources of these contaminants. FDA's initiative, Closer to Zero, aims to decrease exposure from contaminants in foods, particularly those consumed by infants and young children, while ensuring access to affordable nutritious foods.

Objective: To describe initial rationales for expanding work to collect data on the nutrient and contaminant composition of foods in the same samples and to provide these data in publicly available databases for dietary studies.

Description: Agronomic technologies and interventions (e.g., irrigation practices, soil amendments) are studied for lowering levels of contaminants in agricultural production. As one contaminant decreases another can increase and concomitant changes can occur in nutrient composition. Monitoring composition as mitigation efforts are implemented can help identify unintended consequences.

Many nutrients help protect against the harmful health effects of contaminants. Expanding public data on the nutrient and contaminant composition of foods would lead to new population studies on co-exposures through food and on variability in nutrient and contaminant composition.

Conclusions: As efforts by FDA, USDA, and others progresses, it is essential to monitor the changes in contaminant and nutrient composition of foods in the same samples to understand trends in potential health effects in children. These data could inform further study co-exposures of multiple nutrients and contaminants in foods and in dietary patterns on child growth and development and prevention of chronic disease across the life span.

U.S. FDA's Total Diet Study: Cadmium, Lead, and Nutrient Element Concentrations in Foods

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The presence of nutrient elements in foods (e.g. calcium, iron, magnesium, and zinc) may protect against the presence of toxic elements (e.g. cadmium and lead) in the total diet. The U.S. Food and Drug Administration's (FDA) Total Diet Study (TDS) monitors levels of nutrients and contaminants concurrently in 307 foods consumed by the U.S. population with the latest cycle of data being 2018-2020. In that collection, cadmium was consistently detected in 167 of the 307 foods. Foods with the highest lower bound (LB) mean cadmium concentrations included cocoa powder, sunflower seeds, and raw spinach. Lead was consistently detected in 24 foods. Foods with the highest LB mean lead concentrations were baking powder, cocoa powder, and baby food (BF) sweet potatoes. Most concentrations for nutrient elements were above the reporting limit (RL). Calcium and iron were detected in 302 and 276 of the 307 foods, respectively. Foods with the highest LB mean calcium concentrations were American cheese, BF teething biscuits, and baking powder. Foods with the highest LB mean iron concentrations were BF cereals. Magnesium and zinc were detected in 289 and 286 of the foods, respectively. Foods with the highest LB mean magnesium concentrations included cocoa powder, sunflower seeds, and cashews. Foods with the highest LB mean zinc concentrations were oat ring cereal, honey oat ring cereal, and BF teething biscuits. TDS is a source of concurrent data on toxic and nutrient elements which can help inform public health and nutrition programs.

U.S. FDA's Food Disaggregation Database (FFDD): A New Resource for Dietary Exposure Assessment

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Dietary exposure to a food chemical (contaminant, additive, nutrient, or other natural constituent) is a function of the concentration of the chemical in foods and of the quantity of each food consumed. FDA estimates exposures to contaminants using intake data from What We Eat In America (WWEIA), the food consumption survey portion of the National Health and Nutrition Examination Survey (NHANES). To

estimate exposures to contaminants in foods consumed by NHANES/WWEIA respondents, the consumption data must be mapped to contaminant concentration data on the same or similar foods. However, food contaminant data are generally not available on all of the foods and food mixtures that are reported in NHANES/WWEIA. To address this, FDA developed FFDD, a "recipe" database with estimates of ingredient percentages. FFDD allows mapping based on ingredients in NHANES/WWEIA foods rather than on complex foods, resulting in more accurate exposure estimates. Using FFDD, FDA mapped over 11,000 NHANES/WWEIA food codes to FDA Total Diet Study food codes. FFDD will be available as part of an interactive visualization tool that also allows access to the TDS mapping.

New Research in Nitrate and Nitrite Content of Foods, Beverages, and Dietary Supplements
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Background: The nitrate-nitrite (NN) risk-benefit assessment represents a human health conundrum due to (1) increases in nitrate (NO3-) associated with beneficial cardiovascular health outcomes; (2) NO3- intake hypothetically linked to risks of infant methemoglobinemia; and (3) use of nitrite (NO2-) as a processed meat curing agent, associated with formation of carcinogenic n-nitrosamines. NN concentrations vary with agricultural management practices, plant genetics, and environmental conditions. Estimates suggest vegetables contribute 60 – 80% of dietary NO3-, but remaining intakes from water, processed meats, and DS are poorly documented. These limitations present inference barriers to population-level dietary intake exposure research and the development of clear dietary guidance for public health.

Objective: To develop a dynamic dataset representing high NN foods in US foods and DS based on literature values and direct analyses.

Description: As of March 2023, our provisional NN Database compiled from research literature sourced between 1975 – 2019 contains data for over 300 individual foods and beverages comprising a total of 12 categories; DS data will be added pending extensive review. Analyses for at least three food categories and DS, coordinated by USDA and funded by NIH-ODS, were conducted by the University of Oklahoma Health Sciences Center using ozone-chemiluminescence methodology (Keller et al. 2020) and HPLC when appropriate for foods with higher-than-expected NN content. NO3- content in vegetables was highly variable – e.g., raw spinach and beet root ranged between 93 – 371 and 66 – 459 mg/100g of sample, respectively. A round robin pilot study using two experienced laboratories and samples varying in NN content was completed for method validation.

Conclusion: USDA's Nitrate and Nitrite Database Release 1 (2024) will be an important and accessible resource for researchers, clinicians, regulatory bodies, and consumers. We expect the compiled data will assist future efforts on elucidating the current conundrum involving nitrate, nitrite, and human health.

Session 5. Dietary Intake Assessment and Nutrition Inequalities

The Process of Scoring Dietary Intake Data Collected with ASA24 Using HEFI-2019
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Title: The process of scoring dietary intake data collected with the Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA24) using the Healthy Eating Food Index-2019

Background: The Healthy Eating Food Index-2019 (HEFI-2019) allows examination of alignment of intake with the 2019 Canada's Food Guide healthy food choices recommendations. Application of the HEFI-2019 requires comprehensive intake data, such as 24-hour recalls collected using the Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA24-Canada-2018).
Objective: To outline the process for deriving HEFI-2019 total and component scores from data collected using ASA24-Canada-2018.

Description: HEFI-2019 consists of 10 components that are scored and summed to create a total score. Five components are scored using reference amounts, representing amounts of food typically consumed at one time. A Health Canada database specifies reference amounts for food codes used to code intake data collected using ASA24-Canada-2018. Reference amounts can be merged into the ASA24-Canada-2018 data by food code. The amounts reported in ASA24 are divided by reference amounts for each dietary constituent of interest, such as vegetables and fruits, and the resulting quantities are summed to arrive at total reference amounts per constituent per recall. The HEFI-2019 scoring algorithm is then applied to arrive at component scores. The Health Canada database also provides estimated amounts of free sugars by food code, enabling scoring the free sugars component. Information to calculate scores for the remaining four HEFI-2019 components are available from the ASA24-Canada-2018 output. For example, the saturated fat component is the ratio of energy from saturated fat in kilocalories to total energy in kilocalories.

Conclusion: The availability of HEFI-2019 and the capacity to collect 24-hour recalls using systems such as ASA24-Canada-2018 allow for evaluation of diet quality among varied populations in Canada, informing policies and programs to close gaps between intake and guidance. Updates to Health Canada food composition databases will also require revisions to complementary datasets to allow ongoing application of the HEFI-2019.

Comparing Shelf Stability of Relatively Processed and Relatively Unprocessed Western Diets
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Objective: While much research details the potential health impacts associated with consuming "processed foods," factors that impact the choice to purchase processed foods have not been extensively investigated. The objective of this study was to compare the shelf stability of two similar menus containing primarily ultra-processed or unprocessed foods, as defined by Nova.

Materials and Methods: First, less- and more-processed versions of a Western menu (less-processed Western, LPW; more-processed Western MPW) with Healthy Eating Index scores of 44 and 43, respectively, were developed using foods identified as commonly consumed from 2013-2014 National Health and Nutrition Examination Survey (NHANES) data. Processing level was determined by Nova categorizations for each food, which were decided by external graders. Two out of the three graders had to agree on each Nova categorization. Shelf stability of foods and ingredients on both menus was determined with information from food storage guidance manuals including USDA's FoodKeeper. The condition of each food item when purchased (room temperature, frozen, refrigerated) was used to estimate the number of days until expiration.

Results: Relative percentages of shelf-stable, frozen, and refrigerated foods were similar between the two diets (LPW had 41% shelf-stable and 5% frozen foods; MPW had 50% shelf-stable and 7% frozen foods). The LPW included 20% energy (kcal) from Nova Category 4 foods (ultra-processed), while the MPW included 67% energy from ultra-processed foods. Using the Kaplan-Meier survival analysis method, median time to expiration of the LPW menu items was 35 days versus 120 days for the MPW menu items. The Wilcoxon homogeneity testing of survival curves for maximum shelf stability yielded a statistically significant difference ($p = 0.0059$) between the two diets.

Significance: Less-processed menus as determined by Nova can have low diet quality, and less-processed ingredients in this study had a shorter shelf life.

Mapping Dietary Data to FooDB Reveals Associations between Polyphenol Intake and GI Inflammation
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Background: Polyphenols are dietary bioactive compounds, some of which have anti-inflammatory properties. Estimation of dietary polyphenol intake can aid efforts to understand the biological effect of food consumption. FooDB is a comprehensive food composition database but has yet to be used for estimation of polyphenol intake.

Objective: We utilized FooDB to estimate dietary polyphenol intake and examined its relationship with systemic and gastrointestinal inflammation markers in healthy US adults.

Methods: Healthy adults (n = 358) completed the USDA Nutritional Phenotyping Study, an observational, cross-sectional study balanced for age, sex, and body mass index. Dietary intake was assessed through multiple 24-hour recalls. A molecular substructure pattern search identified 3063 polyphenolic compounds within FooDB. Next, we disaggregated dietary intake to the ingredient-level and mapped intake using natural language processing to FooDB to quantify polyphenol content. We analyzed whether dietary polyphenol intake, clustered at various grouping levels (total and polyphenol classes), relates to inflammatory markers.

Results: Mean total polyphenol intake was approximately 914 mg/1000 kcal per day with flavonoids as the greatest class contributor (mean, 495 mg/1000 kcal per day). Tea, coffee, and fruits were among the largest food contributors to total polyphenol intake. Total polyphenol intake negatively associated with the gastrointestinal inflammation marker, fecal calprotectin ($B=-0.004$, $p=0.04$). At the class level, polyphenols categorized as prenol lipids ($B=-0.94$, $p<0.01$) and phenylpropanoic acids ($B=-0.92$, $p<0.01$) negatively associated with lipopolysaccharide-binding protein, representing gastrointestinal permeability. Food sources of these two classes included primarily olive products. No association was found between polyphenol intake and systemic inflammation, measured by C-reactive protein.

Conclusion: This is the first study to leverage the fine-scale composition data of FooDB to quantify dietary polyphenol intake. We found associations of polyphenol intake with gastrointestinal health, but not systemic inflammation, perhaps due to their limited absorption, with a potentially unique role of olive products.

Trends in Health Disparities: Individual-level Dietary Intakes in the United States and China, 1999-2015
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Background: Understanding nutrition needs and inequalities across demographic groups, cultures, and time is invaluable for identifying vulnerable populations and implementing targeted interventions. Thus, we aim to examine trends in nutrition inequalities using two nationally representative dietary databases: the National Health and Nutrition Examination Survey from the United States (1999-2018) and the China Health and Nutrition Survey (1989-2015).

Objective: To compare decadal trends in individual-level dietary intakes captured in publicly available databases, we introduced a methodology for harmonizing data for temporal modeling using mixed effects non-linear regression and machine learning methods. We systematically compared the key characteristics of these two databases in terms of data collection period, survey cycles, demographic information, dietary assessment methods, and dietary factors. We identified the comparable dietary factors by examining the definitions and aligned the databases in terms of intake unit, sex, age, residency, education level, and calendar year. To quantify dietary inequalities, we derived distributions of dietary intakes, supplemented with standard descriptive characteristics, shape parameters (skewness and kurtosis), and statistics of extremes.

Description: We determined that intakes for total energy, carbohydrates, protein, and fat estimates were suitable for trend modeling: these data were obtained from 2-day 24-hour recalls in the United States and 3-day 24-hour recalls and food frequency questionnaires in China between 2000 and 2015. For example, we observed a 26.8-52.2% increase in unadjusted energy intake over the years. In China, energy intake surged from 1912 (±1090) kcal/day to 2425 (±832) kcal/day between 1991 and 2015; in the US, the unadjusted energy was 1304 (±1034) in 2000 and 1985 (±988) kcal/day in 2015. In the presentation, we will delve into assessing adjusted intakes across diverse population groups that bear disproportional inequity burdens.

Conclusion: Our study introduces a comprehensive framework for comparing dietary assessment data across countries and studying the trends with emphasis on inequalities.

Closer to Zero: Incorporating Health Equity into Public Health Activities
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Background: Under FDA's Closer to Zero initiative, the FDA/EPA Advice About Eating Fish provides education to help individuals who might become or are pregnant, breastfeeding individuals, and parents and caregivers of children make informed choices on types of seafood that are nutritious and lower in mercury. The levels of mercury found in seafood and the amounts of different types of seafood consumed, in addition to other factors, are key inputs to provide science-based consumer education to help protect public health.

Objective: To share examples of approaches to expand diversity and inclusion in food composition data and intake analyses related to seafood and public health efforts.

Description: FDA has begun updating our Seafood Monitoring Database that provides mercury data used to develop the FDA/EPA Advice About Eating Fish. In the first study, 600 samples will be collected from three geographic regions and analyzed for total mercury, methylmercury, and per- and polyfluoroalkyl substances (PFAS). To increase the representativeness of seafood samples collected, samples will be acquired from ethnic grocery outlets and low-cost and quick service stores in addition to medium/high volume stores.

A study by the National Academies of Science, Engineering, and Medicine was commissioned to evaluate the science on both nutritional and toxicological aspects of seafood composition on child growth and development– with the findings presented to also elucidate the evidence available on associated inequities and social, economic, health, or environmental disadvantages.

A Health Equity Work Group has been established to identify communities that may have different dietary intake of categories of food or specific foods (e.g., seafood, vegetables, fruits/juices, whole/refined grains), compared to the general population.

Conclusions: Protocols and public health programs can be reviewed to identify new ways to capture additional diversity and better understand unique public health issues in diverse communities in the United States.

Session 6. Consumer Behavior and Dietary Guidance

Changes in the Proportion of Regulated Products and Critical Nutrient Content of Packaged Foods and Beverages After the Implementation of the Final Phase of the Chilean Food Labeling Law
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Background: The Chilean Food Labeling and Advertising law was implemented in three phases and imposed increasingly strict thresholds on products high in calories, sugar, sodium, and saturated fats; "high-in" products were subject to warning labels, marketing bans, and school sales ban.

Objective: To analyze changes in the proportion of high-in products and nutrient composition of the Chilean food supply after implementing each phase of Chile's law.

Methods: This prospective observational study used data on over 2,500 top-selling packaged products collected from supermarkets from 2015 to 2020. We analyzed the changes in the proportion of packaged products exceeding the final cutoffs of the regulation ("high-in" products) and the quartiles of the content of calories, total sugars, sodium, and saturated fats from packaged products. We analyzed the three phases of the regulation using the chi-square test, Cochran-Armitage test for trend, and quantile regression to assess nutrient changes in each studied period.

Results: The proportion of products with any "high in" warning label significantly decreased from 67% before the law to 60%, 52%, and 50% after the first, second, and final phases of the law, respectively ($p<0.001$). When comparing the nutrient content before and after the final phase of the law, there were significant left shifts in the distribution of sugars or sodium content in most sweet and savory food categories. In contrast, left shifts in saturated fats and energy were less frequent.

Significance: The implementation of the three phases of the Chilean law led to significant changes in the proportion of regulated products over time. There were important left shifts in the nutrient composition of packaged foods, particularly for sodium in solid foods and sugars in beverages. Chile was the first country to implement a national warning label policy, and these results are relevant to other countries implementing similar policies worldwide.

Nutrients of Concern Decrease Three Years After Chilean Food Labeling & Marketing Law Implemented

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Objective: This study evaluates changes in calories and regulated nutrients purchased from foods and beverages after Phase 2 implementation of the Chilean Food Labelling and Marketing Law, including policies that mandated warning labels, restricted food marketing to children, and banned school sales of unhealthy foods and beverages.

Materials and Methods: This before- and after- study used longitudinal data on monthly food and beverage purchases from 2,844 Chilean households from July 1, 2013 until June 30, 2019. Nutrition facts panel data from food and beverage packages were linked at the product level and reviewed by nutritionists. Products were considered "high-in" if they contained added sugar, sodium, or saturated fat ingredients, and exceeded the nutrient or calorie thresholds of the final phase (thus would then carry the warning label). Using correlated random-effects models and an interrupted time series design, we estimated changes in the nutrient content of food and beverage purchases associated with Phase 1 and Phase 2, i.e. compared to a counterfactual scenario based on pre-policy trends.

Results: Compared to the counterfactual, we observed significant decreases in purchases of "high-in" foods and beverages during Phase 2, including relative reductions of 36.8% in sugar, 23.0% in energy, 21.9% in sodium, and 15.7% in saturated fat. Decreases were partially offset by increases in non-"high-in" purchases, but the net effect shows a significant decrease in total nutrients of concern purchased during Phase 2. Reductions in sugar and energy were driven by beverage purchases, whereas reductions in sodium and saturated fat were driven by food purchases. The pattern of declines in purchases was similar for households of lower vs. higher socioeconomic status.

Significance: The Chilean policies led to sustained declines in purchases of nutrients of concern, including sugar, sodium, and saturated fat), particularly from foods and drinks over the warning label nutrient or calorie thresholds.

Nationally Representative Adult and Children's Calcium Dietary Supplements (DS): Nutrient Strength
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Nationally representative adult and children's calcium dietary supplements (DS): nutrient strength, health claims and performance quality.

Objective: Calcium ± vitamin D DS are commonly used in the US to improve intakes for these under-consumed nutrients of public health concern. DS efficacy depends not only on the dose but also ingredient release, as measured by disintegration and dissolution tests. The FDA approved an authorized health claim for calcium ± vitamin D and a qualified health claim for magnesium intakes and risk reduction for osteoporosis and high blood pressure in 2008 and 2022, respectively. Our goals were to measure claimed micronutrients and test dosage units for disintegration and dissolution.

Materials and Methods: DS with calcium as the primary ingredient (102 adult, 21 children's) were analyzed for calcium, magnesium, and vitamin D content in qualified laboratories. To pass in vitro tests from the US Pharmacopeial monographs dosage units must release at least 75% of labeled calcium amount within designated times. Analyzed content was compared with labeled amounts and the Dietary Reference Intakes.

Results: For adult DS, overall mean±SD percent differences from labels for calcium, magnesium and vitamin D were 8.05±6.7, 9.25±10.8 and 27.1±26.5; for children's DS, 10.2±12.5, 10.9±8 and 44.2± 96.4, respectively. Amounts at ≥RDAs (UL for supplemental magnesium) were frequently measured among adult DS for calcium (mean %RDA/UL±SD; 111±9.1%, n=31/102), magnesium (156±53.5%, n=28/50) and vitamin D (230±154%; n=50/87). In contrast, most children's DS were below RDAs/UL (calcium, 35.1±17.2%, n=21/21; magnesium, 58.4±12.5%, n=6/7; vitamin D, 39.4±14.8%; n=10/13). However, for adult DS, only 53.2% and 28.3% (13/46) and for child DS, 43.8% (7/16) and 0/3 passed dissolution tests for calcium and magnesium, respectively. Only 15 of 23 tablets (65.2%) bearing the calcium health claim passed dissolution tests.

Significance: Calcium DS may help close calcium, magnesium, and vitamin D intake gaps, but many DS failed dissolution even when they passed disintegration tests. Micronutrients in failed DS may not be available for absorption and utilization.

Exploring Protein Dietary Guidance Statements: A Consumer-Centric Pilot Study
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Background: The Food and Drug Administration's (FDA) Dietary Guidance Statements (DGS) are intended to act as quick signals on the front of packages, or in written, printed or graphic materials that accompany a food, to help consumers better understand how an individual food or food group may contribute to or help maintain a nutritious dietary pattern.

Objective: To understand how exposure to DGS related to animal protein foods impact purchase motivation and claim believability by protein type.

Description: In August 2023, the Consumer & Shopper Insights Innovation Practice of Circana, Inc., tested 6 DGS claims for 5 protein types among 1,002 nationally representative household primary grocery shoppers aged 18-64 years old (494M, 503F, 3NB). Participants were then subjected to a survey that assessed purchase motivation, believability, and willingness to pay more based on DGS claims in their

prediction market. The most motivating and believable message that was consistent across all protein types was the DGS of, "The Dietary Guidelines for Americans recommends eating 5½ ounces of protein food per day as part of a nutritious dietary pattern. [protein type] is a lean meat that provides 3 ounces of protein food per serving. *Based on a 2,000-calorie diet." Over one-third felt this DGS was the most motivating because it was informative, it contained stats/facts, and mentions the Dietary Guidelines for Americans. DGS for pork tenderloin and turkey breast were significantly more believable than plant-based meat ($p<0.10$). Over 50% of participants were willing to pay at least 5% or more across the DGS and protein types.

Conclusion: Across all proteins, being informative was the highest ranked contributing reason that DGS were more believable and motivating. Uniform adoption of DGS across proteins allows for equal representation of how a variety of protein foods can contribute to a nutritious dietary pattern.

Session 7. Nutrient Variability

Plant-Based Milk Alternative Products are Highly Heterogeneous in Nutrient Composition
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Background: The variability of nutrients in plant-based milk alternative (PBMA) products is not well documented, leaving gaps in understanding how to assess nutrient intake from PBMA in nutrition research and surveillance.
Methods: In 2022 University of Minnesota Nutrition Coordinating Center (NCC) database scientists identified leading brands of PBMA products available in the U.S. market. A formulation was created for each product from which composition values for the 175 nutrient, nutrient ratios and other food components were calculated. An internally developed program was used to create the formulations, with product ingredient and nutrition facts panel information key to deriving formulations. We compared nutrient variability within and across plant-base types for calcium, vitamin D, and vitamin A as % Daily Values (%DV) per serving. We limited our analysis to products (total n=196) made with almond (n = 61), cashew (n = 3), coconut (n = 21), hemp (n = 10), oat (n = 51), pea (n = 9), rice (n = 10), or soy (n = 31).

Results: We identified high nutrient variability between and within categories of PBMAs. Nutrient ranges were wide. For calcium, oat milks had the widest range (0 to 45%DV). For vitamin D, soy milks had the widest range (0 to 30%DV). For vitamin A, both almond and soy milks ranged from 0 to 40%DV. Nutrients were not normally distributed within each plant base category, instead bimodal and trimodal distributions were observed.

Significance: The source of nutrient variability between and within PBMA categories may be due to differences in fortification, with distribution modes occurring at common nutrient reporting thresholds (e.g., 10% and 20% DV). For researchers aiming to collect dietary intake information from populations consuming PBMA, this high variability underscores the need to record specific brand and plant-base information.

Snack and Meal Replacement Bars Available in the U.S. Marketplace are Heterogeneous in Macronutrient
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Objective: Evaluate the macronutrient content variability of snack and meal replacement bars for the purpose of determining whether a representative macronutrient profile across this product category may be acceptable in developing food frequency questionnaires (FFQs) and their accompanying food and nutrient databases.

Materials and Methods: The 2022 version of the University of Minnesota Nutrition Coordinating Center Food and Nutrient Database was used to describe the macronutrient content of 588 snack and meal replacement bars sold by 33 leading brands in the U.S. The median, minimum, maximum, and interquartile range (IQR) values per bar were calculated across all products and by product type.

Results: Energy and macronutrient content varied widely across all products. For example, the added sugar content per bar ranged from 0-31 g with a median value of 6 g and IQR of 8 g. Macronutrient content differed between products described as 'protein/meat' or 'meal replacement' in comparison to those described as 'child'/kid' (n=45) or lacking a specific descriptor. For example, the median protein content per bar was 13 g for protein/meat and meal replacement bars versus 2 g and 4 g for child/kid bars and those lacking a specific descriptor. Macronutrient content varied substantially within these product categories as well. For example, protein/meat bars had variable protein (median 13 g; IQR 10 g), saturated fat (median 3 g DV; IQR 3 g) and added sugar (median 4 g; IQR 7) content.

Significance: When developing a FFQ and accompanying food and nutrient database for use with a population where snack or meal replacement bar consumption is common, consideration should be given to asking for the specific brand of snack or meal replacement bar typically eaten. Alternatively, the type of bar (protein, meal replacement, or other type) could be queried with representative nutrient values included in the FFQ database.

Expanded Analytical Data for the USDA/ODS-NIH Database for the Purine Content of Foods

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Background: Purines are essential biomolecules derived from endogenous synthesis and dietary sources (foods and dietary supplements (DS)). A purine-rich diet has been linked to hyperuricemia and gout, a painful arthropathy caused by urate crystal deposition in joint spaces. While multiple foods have been linked with hyperuricemia and gout, dietary recommendations are inconsistent in major part due to the absence of US-based purine compositional data, which challenges population-wide estimates of purine exposure. Therefore, updated purine data relevant to US populations is of paramount importance for patients, clinicians, and public health scientists.

Objective: This update on the "USDA and ODS-NIH Database for the Purine Content of Foods," which was initially launched in February 2023, exhibits expanded, provisional analytical purine data in preparation for a second database release.

Description: USDA-MAFCL is collaborating with academic laboratories to provide quantitative purine data (total purines and individual purine bases) based on a direct assay of US samples. Foods and DS hypothesized to contain significant levels of purines were primarily selected via a) consumption data from the Food and Nutrient Database for Dietary Studies (FNDDS), and b) comprehensive US-based market review using the ODS Dietary Supplement Label Database (DSLD). Food samples were obtained in conjunction with Food Data Central (FDC) and Texas Tech University. Purine analysis was conducted at the University of Florida using HILIC-HRMS/MS, which allowed for elucidation of eleven targeted purine analytes in contrast to traditional analytical methods. Preliminary data was obtained for at least 50 unique foods comprising 8 food groups and 5 DS categories. Additional items of interest will be added in future releases and the second release will be published online this year.

Conclusion: New analytical data expands USDA-MAFCL'S existing purine database with the intent of providing novel purine measurements in food which have potential to impact the health of US populations.

Comparing Values of Human Milk Nutrient Composition for use in Food Composition Databases

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Objective: The profile for human milk nutrient composition jointly used by Canada and the United States [Standard Reference, Legacy (HMsrl)] is largely based on >40-year-old studies and was deemed unsuitable by the U.S. Department of Agriculture in 2018 for estimating nutrient exposures. This work aims to develop an interim human milk nutrient profile (iHMNut) that incorporates more recent data for use while more comprehensive profiles are established.

Methods: U.S. and Canadian data for mature, term human milk were combined from two recent literature reviews (1980-2022) and the Canadian Maternal-Infant Research on Environmental Chemicals Study. Weighted means and standard deviations were calculated. Collection and analytical methods were evaluated against inclusion criteria of a 2020 scanning review from the National Academies of Sciences Engineering and Medicine [NASEM] conducted to inform updates to Dietary Reference Intake values for infants. External validity was assessed by comparison with values from other high- and middle-income countries identified in the NASEM scanning review.

Results: Data that align with the criteria above were identified for macronutrients and many vitamins, minerals, and fatty acids, including components previously assumed to be zero (0) or based on other food types. Concentrations for iHMNut differed by >15% from values in the HMsrl for certain components, including total fat, iron, zinc, and manganese; these values were comparable with data from the NASEM review from other high- and middle-income countries. Eligible data were lacking for niacin, B6, B9, B12, vitamin C, vitamin D, vitamin E, and certain amino acids and available only from single studies with <20 participants for riboflavin, thiamin, and cholesterol.

Conclusions: These findings demonstrate an opportunity for an interim (iHMNut) profile for nutrients in human milk until a more comprehensive set of profiles can be developed. They also highlight important gaps in the literature that must be addressed by future studies.

Session 8. Technology and Linkages in Dietary Assessment

Advancing Nutrition Data Dashboards: A Standardized Framework for Evaluation and Enhancement

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Background: The nutrition and public health domains are witnessing a surge in extensive data accumulation, marking the onset of the big data era. Web-based data dashboards are actively evolving within these domains, claiming to facilitate data sharing, enhance collaboration, and reduce cognitive burdens associated with large nutritional databases. In our prior research, we conducted a systematic review of existing nutrition and health dashboards and developed a comprehensive set of 48 metrics, which was converted into a Likert scale for evaluation by external and internal raters. This evaluation process enabled the ranking of these dashboards. Subsequently, in 2022, we introduced the Global Nutrition and Health Atlas (GNHA) and incorporated lessons learned from the dashboard review for further improvements.

Objective: The nutrition and health dashboard landscape has expanded significantly since our earlier work. We aim to conduct an updated dashboard review and enhance the practicality and standardization of our evaluation metrics.

Description: Notable additions include the Global Food Security Index Dashboard, Global Food and Nutrition Security Dashboard, and Global Diet Quality Dashboard. Additionally, certain dashboards, like the Food System Dashboard, have undergone updates with additional data and visualizations. We refined our criteria to adopt a more quantitative approach to enhance the evaluative process, emphasizing functionality and collaborative capabilities. Furthermore, we integrated analytical functions into the metrics, recognizing that dashboards should not solely share data but also convey the significance of the data, insights derived from it, and its utility for other collaborators. For instance, we are replacing the previously employed subjective Likert scale-based methods with machine learning-based methodology to assess data credibility, completeness, and granularity.
Conclusion
We underscore the growing significance of nutrition data dashboards and advocate the need for a standardized framework for evaluating metrics to assess and enhance the quality, credibility, and functionality of nutrition data dashboards.

A New Updated Food Grouping System for the UK National Diet and Nutrition Survey
Birdem Amoutzopoulos, Angela Mulligan, Gillian Swan, Suzanna Abraham, Anila Farooq, Caireen Roberts, Polly Page

Objective: Using a standardized and relevant food classification system in food consumption surveys is essential for promoting consistency and facilitating meaningful comparisons of dietary data. The objective of this study was to enhance, update and standardize the food grouping system used in the UK National Diet and Nutrition Survey (NDNS), ensuring alignment with the current requirements of government public health priorities and data surveillance. Additionally, it aimed to enable exploration of diverse research questions in relation to food groups, and facilitate cross-country data comparisons.

Materials and Methods: We systematically categorized 3,486 foods, drinks, and supplements into a three-tier food group structure, referencing established systems including FoodEx2, FAO/WHO Gift, FoodEXplorer, and food grouping systems used by FSANZ (www.foodstandards.gov.au/) and NHANES (https://www.cdc.gov/nchs/nhanes/). We maintained consistency in the application of how food group names and structure was applied by aligning them with these systems, and by reviewing products in the food market and food consumption rates among NDNS population. Our approach involved grouping foods according to various criteria, including distinctions such as added sugar, plant-based, meat-based, vegetable-based, wholegrain foods and complex dishes. These groups aim to ensure uniformity in texture, similarity in consumption pattern and classification. We incorporated feedback from various users, including policy researchers to refine the efficiency and usability of these groups.

Results: The new updated NDNS food grouping system comprises 18 main food groups and 141 sub-groups, serving as the foundation for reporting dietary intakes in the NDNS. Furthermore, it incorporates a third-level sub-group (totaling 211) to support in-depth research requirements.
Significance: This new food grouping system enhances the reporting of dietary intakes, offering a more efficient and standardized approach that aligns with current public health priorities in the UK. It also maintains comparability with past survey data, and offers increased granularity for researchers using NDNS data.

Development of a Novel Minimum Information Standard for Food Composition Data
Kai Blumberg, PhD, USDA
Responding to the proliferation of food composition data and ever-increasing calls to make data Findable, Accessible, Interoperable, and Reusable (FAIR), universal standards for organizing food composition data are needed to enable the automated reuse and exchange of data between various stakeholders. Minimum Information Standards (MIS) are sets of guidelines and data reporting formats that are used to standardize scientific data. A number of MIS have been created by consortia of domain and technical experts, which serve the crucial function of standardizing data central to various scientific disciplines such as DNA microarray analysis, plant phenotyping, and genomics. By providing standardized structures for data, MIS facilitate the verification, analysis, and sharing of research data. Although there exist many Food Composition Tables and Databases (FCT/D) globally, a lack of harmonization between existing reporting frameworks hinders data interoperability. In order to fill this gap, the United States Department of Agriculture (USDA)'s, FoodData Central (FDC) team is working to create a novel MIS for the description and annotation of food composition data. FDC intends to implement the novel MIS as an open-source

project involving a global consortium of domain experts. Additionally, the novel MIS will be implemented as a digital schema that can enable data harmonization and validation. In order to bolster the inter-comparability of data, the novel MIS will draw upon existing systems and standards to include various metadata fields detailing critical information about analytical methodology and sample processing. This will include encouraging the use of existing vocabularies and coding standards for the description of foods and components of nutritional interest, as well as building mappings between relevant existing institutional vocabularies and ontologies. Taken together, the use of the novel checklist along with digitally harmonized cross-walks between vocabularies already used for food and component descriptions can enable greater inter-comparability of FCT/Ds globally.

New Linkages for the NCI's Dietary Assessment Tools: Diet History Questionnaire (DHQ) and Dietary Carbon Footprints and Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24) and Nova

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Background: The National Cancer Institute (NCI) has a long history of investment in measurement of usual dietary intake. In 2001, a cognitively developed food frequency questionnaire (FFQ), the Diet History Questionnaire (DHQ) was released. The Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24) was released in 2009. Both tools are freely available, web-based, and enable collection of auto-coded, self-administered FFQs for DHQ, and 24-hour recalls and/or single or multi-day food records for ASA24.

Objectives: To describe two new database linkages: a) DHQ III and the Database of Food Recall Impacts on the Environment for Nutrition and Dietary Studies (DataFRIENDS) and b) ASA24 and the Nova Classification System of Food Processing.

Description: Both DataFRIENDS and Nova are underpinned by a common nutrient database: the Food and Nutrient Database for Dietary Data (FNDDS), like DHQ and ASA24. DataFRIENDS provides an estimate of the carbon footprint of the 8-digit food codes found in FNDDS. We determined the best match between versions of DHQ and DataFRIENDS to minimize missing items and maximize contemporaneous calendar year. The Nova system assigns foods and drinks to one of 4 categories: unprocessed or minimally processed foods, processed culinary ingredients, processed foods, and ultra-processed foods, according to the perceived extent and purpose of the industrial processing and allows calculation of the percent of energy derived from each Nova category, at the food or person level. For ASA24, we applied a previously standardized approach to classify foods and drinks according to Nova to minimize misclassification. By early 2024, these new linkages will be publicly available on the respective websites for DHQ and ASA24.

Conclusion: The linkages are available prospectively for active studies, and retrospectively for previously collected data. These new linkages underscore the NCI's continued commitment to support and enhance innovation in dietary assessment to elucidate associations with human health.

Poster Abstracts

Opportunity for Nutrition Policy Action with Global Nutrition Database for Packaged Foods
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Background: The Global Nutrition Database for Packaged Foods (GND), developed by Resolve to Save Lives, is the first of its kind: a centralized database providing information on the content of key nutrients (sodium, sugar, and saturated fat) for over 25 countries' food supply, by food category.

Objective: The GND provides access to nutrient data, by packaged food category, for countries around the world, along with comparison to World Health Organization Global sodium benchmarks, Pan American Health Organization regional sodium targets, and country-level nutrient targets, serving as a resource for advocacy and nutrition policy development.

Description: The GND contains country-level data from 2015 to 2022, sourced from publicly available records, and data collection methodology descriptions. The database is regularly updated, enabling tracking individual country progress. Currently, sodium data is available for 24 countries, sugar data for 5 countries, and saturated fat data for one country. Limited data availability poses a challenge in WHO Eastern Mediterranean, African, and Southeast-Asian regions.

Results: The GND allows comparison of nutrient content in a specific food category, for example, for the processed cheese category, none of the 5 reporting countries met the WHO benchmark for maximum sodium density, despite significant sodium content variations. In contrast, 2 out of 6 countries met the WHO benchmark for potato chips' maximum sodium density.

Conclusion: National-level packaged food nutrition data informs regional policy development and can aid in tracking global and regional benchmarks. It's a valuable resource for policy advocates and policymakers when setting national nutrient targets, front-of-package label thresholds, and related policies. Enhanced public nutrient data, categorized by food, is needed to better gauge global progress on nutrient targets. Data limitations include disparities in methodology, sample sizes, and data availability.

Evaluating food composition database utilization in low- and middle- income settings: A pilot study using a UK food composition database
Birdem Amoutzopoulos on behalf of NIHR Global Health Research Unit, South Asia Biobank investigators and collaborators

Objective: Selection of a suitable food composition database is crucial for accurate dietary data estimates, especially in low- and middle-income settings, where standardized food composition databases are scarce. We adapted a digital 24hr recall system (https://intake24.org/) for use in the South Asia Biobank; data were collected from ~100,000 individuals (men and women, 18+ years) in Bangladesh, India, Pakistan and Sri Lanka. To facilitate rapid adaptation and given the regional data gaps and funding constraints, foods were pragmatically linked to the UK food composition database (UK NDNS Nutrient Databank). This pilot study evaluates the compatibility of our approach by comparing nutrient values from the UK food composition database with regional data, guiding our future efforts to localize the composition data.
Materials and methods: We identified 15 most commonly consumed foods for each region from the Intake24 dietary data. Regional food composition data was compiled through literature, food composition databases, recipe calculations and consultation with regional experts. Selected nutrients were used for matching. We used R software to calculate the intraclass correlation coefficient (ICC) to assess the agreement between the UK and regional data.

Results: Data were collected for 68 foods. The ICC exceeded 0.75 for energy (n=51), protein (n=68), calcium (n=42) and water (n=42), indicating good agreement between the UK and regional data. Carbohydrates (n=66), fat (n=68) and iron (n=40) had ICC values below 0.75, particularly for mixed dishes. Limitations included regional databases lacking detailed methods information and food composition data for cooked foods.

Significance: Most examined nutrients showed strong agreement between the UK and regional data. When resources are limited, using a comprehensive food composition database could serve as a practical choice for the initial dietary data production. In light of our findings, we will formulate a strategy for adapting the UK food composition database to align with regional data.

Estimating exposure to low- and no-calorie sweeteners among individuals living in Canada using Canada's national food composition database.

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Background: Questions remain about the extent to which consumption of low- and no-calorie sweeteners is an effective approach for reducing added sugars intake. National surveys are an important source for estimation of population-level exposure to low- and no-calorie sweeteners. However, there are currently no comprehensive estimates of the prevalence of low- and no-calorie sweetener consumption among individuals living in Canada.

Objectives: To estimate the proportion of individuals 1 year of age and older living in Canada who consume foods and beverages containing low- and no-calorie sweeteners, as well as tabletop sweeteners, on a given day.

Materials and methods: Data were drawn from the 2015 Canadian Community Health Survey—Nutrition (n=20,483), which included administration of 24-hour dietary recalls coded using the 2015 Nutrition Survey System. Food codes that were likely sources of low- and no-calorie sweeteners were identified using a keyword approach (e.g., low calorie, diet). Using the first recall, survey-weighted proportions of individuals consuming sources of sweeteners were estimated by age, sex, and self-reported diabetes (adults only). The most frequently consumed sources of sweeteners were also identified.
Results: On a given day, 8% of children (1-13 years), 11% of youth (14-18 years) and 20% of adults (19+ years) consumed at least one source of sweeteners. A higher proportion of adults who self-reported diabetes consumed sources of sweeteners (42%) compared to those without diabetes (18%). Among those who consumed foods and beverages sweetened with low- and no-calorie sweeteners, soda was the most frequently consumed source, followed by tabletop sweeteners and yogurt/kefir.
Significance: These estimates of the proportions of individuals in Canada consuming sources of low- and no-calorie sweeteners can inform policies to support healthy eating, including those related to sugars. Enhancements to food composition databases, which contain information primarily for composite foods and beverages, can improve identification of sources of sweeteners.

Image-based dietary assessment tools: comparative analyses among different deep learning algorithms

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Objective: The aim is to develop, train, and validate a deep learning algorithm able to automate food classification from pictures, for the development of an innovative image-based dietary assessment tool with improved dietary record accuracy, and reduced self-report biases.

Materials and Methods: We developed three different models based on Convolutional Neural Networks (CNNs) and trained them on Nutrition5k dataset. We compared their performances of prediction of calories, macronutrients, and dish portion mass with ones from another validated model [1]. We present original comparative results considering the "2D direct prediction model" [1].

Results: The single run model [1] achieves calories prediction with a mean absolute error (MAE) of 26.1%, mass MAE of 18.8%, and macronutrients aggregate MAE of 31.9%. Using the same loss function, our two different 5-run-training models (each one including Resnet34, Resnet50, and Resnet101 CCNs) can predict calories with aggregate MAEs of 34.5% and 34.3%, mass with aggregate MAEs of 29.1% and 27.1%, and

macronutrients with aggregate MAEs of 49.1% and 46.7% respectively. The third model, including Resnet50, Resnet101, and InceptionV3 CNNs, can predict calories, mass, and macronutrients with an aggregate MAE of 30.9%, 23.9%, and 42.9% respectively.

Significance: Our preliminary results align quite closely to the other group [1]. Notably, our algorithm was pretrained only on 1 million images from ImageNet open source database (compared with the JFT-300M dataset). In addition, multiple-training-runs contribute to higher robustness in our results. Future analyses include a model training relying on a comprehensive Italian, rather than US, Food Composition Database, to reduce dietary habits-related biases, and volumes estimation to better explore the impact of a depth model on prediction accuracy, especially for micronutrients.

1Thames et al, Proceedings of the IEEE Computer Society Conference on CVPR, 2021;8899-8907

Utilization of Multiple Food and Nutrient Databases to Code Food Logs in the FoodAPS-2 Field Test
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Background: Under contract with the Economic Research Service (ERS) at the U.S. Department of Agriculture (USDA), Westat executed The Second National Household Food Acquisition and Purchase Survey (FoodAPS) field test in 2022. The study collected seven days of information about household food acquisitions via smartphone app, in contrast to the original survey which was administered on paper in 2012. The data collection and coding phase of the study utilized multiple food and nutrient databases to identify and process the foods and drinks reported by respondents.

Objective: To facilitate efficient coding and nutrient analysis, Westat combined multiple databases to produce a detailed food acquisition study dataset.

Description: Participants used a smartphone app to scan barcodes and enter descriptions and price lookup codes (PLU) codes to report their food acquisitions. Barcode scan data was automatically linked to the Circana IRI database, USDA Databases and Nutritionix to identify foods. The Purchase to Plate Crosswalk (PPC) provided links between the reported UPCs and the 2017-2018 version of the Food and Nutrient Database for Dietary Studies. Reported PLU codes were automatically assigned FNDDS 2017-2018 food codes using a previously establish crosswalk. During data processing, coders reviewed these matches and selected food codes for unmatched items using food codes from USDA's FoodData Central. Following manual review and coding, SAS analysts linked EFPG groups, Nielsen TD Linx store characteristics, NPD ReCount restaurant characteristics, and STARS SNAP store information to the reported foods and beverages.

Conclusion: The FoodAPS2 field test utilized multiple food and nutrient databases to describe food acquisitions. This combination of databases yielded information to identify food and beverage nutrients, food pattern equivalents, ingredients, portion size, package size, PPC form, PPC refuse, label claims, restaurant data, store data, ERS Food Purchase Groups, and brand names.

The Italian Fcdb (Bda): A New Update To Better Assess Nutrient Intake In Plant-Based Diets
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Background. Plant-based diets are growing in popularity worldwide driven by health and environmental concerns. As a result of the increasing demand for animal substitutes, food companies are producing a wide variety of alternatives. To better understand the health implications of these dietary choices, maintaining an up-to-date food composition database for vegetables and plant-based foods is essential in both nutritional research and clinical practice.

Objective. First, to update the Italian Food Composition Database (FCDB) for Epidemiological Studies (www.bda-ieo. BDA) focused on the "Vegetables and plant-based food" food group, both in terms of

nutrient coverage and food list. Secondarily, to assess dietary intake in a sample of patients accessing the European Institute of Oncology (IEO), Milan, Italy, who follow a plant-based diet.

Description. Efforts will be needed to check, update, and complete the composition data of food items already included (144) and to add others by consulting the most recent consumption data and directly verifying the foods available on the Italian market. The compilation process, developed according to international standards (www.eurofir.org), foresees to use of published data. When no data is available, the recipe approach will be used to impute food composition data. Once the database is updated, we will recruit volunteers following a plant-based diet. This study foresees assessing their food intake using a web application, collecting anthropometric measurements and biological samples (blood). We will evaluate the dietary adequacy of plant-based diets compared to Italian DRVs.

Conclusion. The BDA project aims to offer an inclusive FCDB in terms of items and components. This update will provide a good source for composition data of plant-based food for epidemiological studies. The results of the dietary assessment will provide information on nutrient adequacy, facilitating the development of recommendations to prevent nutritional deficiencies in plant-based diets.

Expanding Efforts on Nutrient and Contaminant Composition of Foods
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Background: Arsenic, lead, cadmium, and mercury are contaminants that occur in the environment naturally and from human activities. When in the air, water, and/or soil where food is grown or raised, they can contribute to the composition of these foods. Many foods that are part of healthy eating patterns and provide key nutrients, including vegetables, fruits, grains, and seafood, can be dietary sources of these contaminants. FDA's initiative, Closer to Zero, aims to decrease exposure from contaminants in foods, particularly those consumed by infants and young children, while ensuring access to affordable nutritious foods.

Objective: To describe initial rationales for expanding work to collect data on the nutrient and contaminant composition of foods in the same samples and to provide these data in publicly available databases for dietary studies.

Description: Agronomic technologies and interventions (e.g., irrigation practices, soil amendments) are studied for lowering levels of contaminants in agricultural production. As one contaminant decreases another can increase and concomitant changes can occur in nutrient composition. Monitoring composition as mitigation efforts are implemented can help identify unintended consequences.

Many nutrients help protect against the harmful health effects of contaminants. Expanding public data on the nutrient and contaminant composition of foods would lead to new population studies on co-exposures through food and on variability in nutrient and contaminant composition.

Conclusions: As efforts by FDA, USDA, and others progresses, it is essential to monitor the changes in contaminant and nutrient composition of foods in the same samples to understand trends in potential health effects in children. These data could inform further study co-exposures of multiple nutrients and contaminants in foods and in dietary patterns on child growth and development and prevention of chronic disease across the life span.

Compilation of nutrient composition, standard recipe and portion estimation tables for analysis of 24-hour dietary recalls in Sri Lanka
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Background: To evaluate the impacts of a nutrition-sensitive rural development program on dietary quality and adequacy, a series of dietary assessment surveys were conducted among adults living in program villages and matched control villages in five districts throughout Sri Lanka. Dietary reference data specific to Sri Lankan foodways were needed to estimate food and nutrient intakes from the 24-hour recall dietary data.

Objective: Our objective was to compile reference databases for calculating food group intakes, nutrient intakes, and dietary quality scores from 24-hour dietary recall data collected among adults in rural Sri Lanka.

Description: We compiled four tables of data on Sri Lankan foods: standard recipes, portion conversions, nutrient composition, and food group assignments. The food group table links reported foods to the Global Diet Quality Score, the Dietary Guidelines for Sri Lankans, and the Minimum Dietary Diversity-Women indicator. Our primary sources of recipes, conversion factors, and nutrient composition were tables compiled at the Wayamba University of Sri Lanka through previous diet surveys, laboratory weighing and analyses, local recipe collection, and previously published reference tables. We then added data from new measurements of local foods at Wayamba University; internet searches for Sri Lankan recipes and foods; and published food composition tables from Sri Lanka, India, and the United States.

Conclusion: The Sri Lankan dietary reference tables compiled for this program evaluation incorporate composition, portion size and dietary quality scoring data for over 700 foods. The tables are freely available for download at https://osf.io/j3axd/.

Flavonoid intake is not associated with cognitive function in an at-risk sample of urban adults

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Objective: Explore associations between dietary flavonoid intake and cognitive function among a sample of African American and White adults in Baltimore City, Maryland.

Materials and Methods: Longitudinal data for 1,947 adults, 30-66 years, with complete wave 1 dietary data in the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study were analyzed. Intake data were collected using USDA's Automated Multiple-Pass Method. The Database of Flavonoid Values for USDA Food Codes specified the flavonoid content for all foods and beverages. Mixed-effects linear regression was used to model the natural log Trails Making Test A and B values over waves 1, 3 and 5 (collected between 2004-2020), overall and stratified by race. An unadjusted model including baseline flavonoid values, time, and their interaction was fit for each of the seven flavonoid response variables (total and class-specific), capturing associations with wave 1 cognition and cognition over time. Five adjusted models were also fit, which included demographic, comorbidity, lifestyle, and dietary covariates.

Results: At recruitment, 30% of participants had less than a high school education, 42% lived at <125% of the Federal poverty level, 47% smoked, and 18% used illicit drugs; diet quality was low (mean Healthy Eating Index score = 42.8 of 100 possible points). Unadjusted models exhibited significantly lower log Trails B scores at wave 1 as flavones, flavonols, and anthocyanins increased, but no association with cognitive decline over time. Significant associations for flavones and anthocyanins persisted among White adults. No significant associations were observed after covariate adjustment.

Significance: Beneficial flavonoid-cognition associations previously reported among more advantaged (predominantly White, higher income, and highly educated) groups were not observed in the HANDLS study sample, a group with poor health behaviors. Previously documented lower flavonoid intakes relative to the NHANES sample may have resulted in the inability to detect an association.

Digestible indispensable amino acid scores (DIAAS) in pork products
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Background: The "Digestible Indispensable Amino Acid Score" (DIAAS) method measures protein quality in human foods, with scores > 75 considered "good" and scores ≥ 100 considered "excellent" quality proteins. However, DIAAS values for some pork products are not available.
Objective: Determine standardized ileal digestibility (SID) and DIAAS for nine pork products.

Description: Nine diets contained one pork product (i.e., back ribs, shoulder butt, tenderloin, Coppa ham, prosciutto ham, speck ham, chorizo sausage, Italian sausage, or bratwurst sausage) as the only source of crude protein (CP) and amino acids (AA). Nine growing gilts (50.3 ± 3.8 kg) that had a T-cannula installed in the distal ileum were used in a 9 × 6 Youden square with 9 diets and six 7-day periods. A nitrogen-free diet was also used. The SID and DIAAS of each pork product were calculated. Reference ratios were used for children from 6 months to 3 years old and for individuals older than 3 years. Results indicated that for both age groups, prosciutto ham (DIAAS = 127 and 137) had greater ($P < 0.05$) DIAAS than all other pork products. Back ribs (DIAAS = 106 and 114), shoulder butt ribs (DIAAS = 107 and 115), tenderloin (DIAAS = 115 and 124), and Coppa ham (DIAAS = 115 and 128) had greater ($P < 0.05$) DIAAS than speck ham and all sausages (DIAAS between 66 and 74). Furthermore, for both ages, there was no limiting AA (DIAAS > 100) for back ribs, shoulder butt, tenderloin, Coppa ham, and prosciutto ham, but for speck ham and all sausages, the first limiting AA was leucine.

Conclusion: Data from this study demonstrated that back ribs, shoulder butt, tenderloin, Coppa ham, and prosciutto ham have "excellent" protein quality for individuals older than 6 months, and Italian sausage have "good" protein quality for individuals older than 3 years.

Nutritional and environmental impact of plate waste: data from a study in an Italian hospital canteen
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Objective: The aim of this study is to evaluate plate waste generated by consumers in a hospital canteen in northeastern Italy, defined as the proportion of served edible food that is not eaten.

Materials and Methods: canteen trays of employees at the hospital of Udine (Italy) were photographed before and after meal consumption on 5 working days in August 2022. A modified visual Comstock scale was used to estimate plate waste. Carbon footprint and water footprint of foods were estimated using the SU-EATABLE LIFE database, and energy and nutrient content were estimated using the Italian Food Composition Database for Epidemiological Studies.

Results: 798 meals were analyzed. Half of the participants were women and half were men aged 22 to 66 years (mean: 42). Most trays (66%) did not contain leftovers. Overall, 5.5% of the weight and 6.0% of the energy content of the served food was wasted, with side dishes and salad being the main wasted categories. Looking at waste-containing trays (N=300), leftovers accounted for an average of 126 kcal, 6 g protein, 2 g fiber, 211 g CO_2 eq. and 188 L H_2O per tray. This corresponds to a daily total of approximately 7569 kcal of wasted energy, 380 g of wasted protein, and 116 g of wasted fiber. In addition, plate waste caused a daily production of about 13 kg CO_2 eq. and consumption of 11,293 L H_2O.

Significance: The simultaneous application of a food composition database and a carbon/water footprint database allowed us to determine both the nutritional and the environmental facets of plate waste. Plate waste was limited in the hospital canteen of analysis; however, its impact was not negligible. Sustainability awareness campaigns in worksite canteens should focus on both nutritional and environmental impacts of wasted food.

Update Of The Food Composition Database For Epidemiological Studies In Italy And A New Application

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firstly published in 1998 and designed for nutritional epidemiology. To maintain its scientific relevance, continuous updates are essential, reflecting the dynamic shifts in food supply and food consumption.

Objective. To present the BDA's 2022 update, focused on the "Cereals and cereal products" food group and a web-based application to measure dietary intake.
Description. The BDA is compiled according to international standards (www.eurofir.org) and involves the use of data from pre-existing sources: national and international FCDBs; scientific articles; nutritional labels; analysis of food industries and laboratories. When no data were available, the recipe approach was implemented.

Results. We updated group comprises 3 sub-groups and 24 food categories. It currently includes 272 items, of which 136 were newly added: n=61 (+83,6%) in "Cereals, flours, pasta, bread, crackers, rusks", n=37 (+97,4%) in "Sweets, sugar, jams, ice creams", and n=38 (+95%) in "Brioches, cookies, puddings, cakes" sub-groups. For each food item, data relating to 86 components have been compiled: energy (kcal and kJ), water, 17 macronutrients, 13 minerals, 15 vitamins (9 water-soluble and 6 fat-soluble), 21 fatty acids, 18 amino acids and alcohol. Analysing data sources of macronutrients, we reported a contraction of Italian and foreign sources, while there was a great increase of estimated data from nutritional labels and recipe calculations. This new version of the BDA will be included of an web application to measure dietary intake. This application aims to standardize the process of self-administered dietary reports, and to reduce respondent burden and, possibly, reporting bias.

Conclusion. In nutritional epidemiology, dietary assessment is a key process. High-quality food composition database should be comprehensive and representative, along with methods of real-time recording to help to fully and accurately measure food intake.

Food industry compliance with the use of FOPL after implementation of the final phase Chile's Law

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Title: Food industry compliance with the use of front-of-package warning labels after the implementation of the final phase Chile's Labelling Law

Objective: To investigate the compliance of the food industry with the correct use of the front-of-package warning labels (FOPL) in packaged foods after full implementation of the Chilean mandatory FOPL policy.

Materials and Methods: In 2020, pictures of nutritional information and FOPL were obtained from top-selling packaged products from Chilean supermarkets. General and nutritionally-relevant information from the pictures of these products (N= 3,156) was entered into software developed by our team. Trained dietitians conducted quality checks to ensure data accuracy. Foods and beverages were categorized into 16 mutually exclusive food groups, and we assigned regulation status based on the Chilean government guidelines for FOPL. We contrasted the regulation status of the sample, derived from the nutrient content information, with the presence and/or absence of FOPL on the packages. Statistical analyses were conducted using STATA 16 and R v4.1.3.

Results: Almost 50% of packaged foods and beverages had FOPL on the packages; the most frequent label was high in energy (31%), followed by high levels of regulated nutrients (21% for sugars and sodium, and 20% for saturated fats). There was high compliance with the correct use of the FOPL (94%), and the food groups with lower compliance were ready-to-eat meals, breakfast cereals, and sausages.

Significance: This study adds to previous findings showing that the positive impact of FOPL regulations is in line with high compliance from the food industry. Our results suggest that mandatory, rather than voluntary, policies together with solid implementation and monitoring systems are needed to achieve the full impact of FOPL regulations.
This research should be of relevance not only for Chile but also for many other countries implementing similar food warning labelling policies worldwide.

Investigating the Effect of Seaweed and Seaweed Products on Reproduction in Women of Childbearing Ag
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Background: Maternal nutrition during pregnancy is a major determinant of birth outcomes. Thus, a maternal diet of adequate iodine and iron is important for both mother and baby to thrive. Seaweeds, which are rich sources of iodine and iron, have been staples in Asian cuisine for a long time and are now gaining popularity in Western diets. Despite its numerous benefits, iodine and iron deficiency continue to increase amongst pregnant mothers, their infants, vegans, or women of childbearing age.
Objectives: A systematic literature search was conducted using PubMed, Google Scholar, and Web of Science, databases with the aim of collating evidence to investigate the effect of seaweed on reproduction in women of childbearing age.
Description: One study investigated the association of dietary patterns with Small for Gestational Age (SGA) in pregnant women. Three studies examined the association between seaweed-derived iodine intake and thyroid function during/after pregnancy. One study investigated the effect of seaweed consumption on hemoglobin levels of anemic pregnant women in the first trimester. One study examined the quantity of milk required to meet the iodine recommendations from seaweed-fed dairy jersey cows for pregnant women.

Conclusions: Regular intake of seaweed is associated with a reduced risk of SGA. Consuming seaweed has a significant effect on increasing hemoglobin in anemic pregnant women, and there was no significant increase in subclinical hypothyroidism with seaweed soup consumption after childbirth. Consuming 0.26 cup of milk from seaweed iodine concentration of 765 µg/L provides 21.7% of the RDA of iodine for pregnant women. Overall, consumption of seaweed and seaweed products can contribute to improving the overall birth outcomes for both the baby and the mother.
Keywords: Seaweed, Reproduction, Algae, Women

Animal and Plant Protein Intake of U.S. Adults by Demographic Characteristics, What We Eat in Americ
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Background: Plant protein intake has potential benefits for both health and environmental sustainability. Therefore, dietary recommendations encourage replacing some animal protein in the diet with plant proteins. The relationship between demographic characteristics and source of protein is unknown.

Objective: The objective of this study is to describe protein from plant and animal sources by demographic characteristics.

Description: Proportions of protein intake from total and component animal (dairy, meat, poultry, fish, eggs) and plant (legumes, nuts, soy, fruit vegetables, grains) sources were estimated from the food ingredients in the Food and Nutrient Database for Dietary Studies 2015-2018. The proportions were applied to the dietary intakes to determine the proportion attributable to each source using one day dietary intake data of adults 19+ years (N= 9811) in What We Eat in America, NHANES 2015-2018 by demographic characteristics. Differences were considered significant at $P<0.001$. Overall, the proportion of protein intake from animal and plant sources is 67% and 31%, respectively. Among all demographic groups, about two-thirds of plant protein intake is from grains. The proportion of protein intake from animal sources is higher among males vs females (68% vs 65%), primarily due to a higher proportion from meat (26% vs 20%). The proportion from animal sources is higher among those 19-59 vs 60+ years (68% vs 65%), primarily due to a higher proportion from poultry (18% vs 12%). The percentages from animal sources are lower among non-Hispanic (NH) Asian adults (62%) and higher among Hispanic adults (69%) compared to NH White (67%) and NH Black (67%) adults. There are no differences by income.

Conclusion: There are modest differences in the proportion of total protein from animal and plant foods by demographic characteristics.

Development of ReciCalc, a Nutrient Composition Calculator for Recipes from 24-hour Recall Data

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Background: Twenty four-hour recalls provide comprehensive, quantitative information about individuals' dietary intake; however, the processing of such data can be intensive and time-consuming. Few publicly available tools exist to efficiently estimate nutrient contents of mixed dishes in large 24-hour recall datasets.

Objective: To develop a calculator to estimate the nutrient contents of recipes reported in 24-hour recall surveys.

Description: We developed a Stata code to estimate the nutrient composition of recipes from an input data table containing ingredient-level data for one or more recipes. Each row of the input table corresponds to one ingredient in a recipe and contains the recipe name and unique identifier, ingredient name, ingredient quantity, and codes linking the ingredient to food composition table (FCT) and nutrient retention factor (NRF) data. Ingredient quantity can be expressed as the raw weight per 100 grams of cooked recipe (ingredient fraction), or the user can supply raw ingredient weights along with the final cooked weight of the recipe or an estimated yield factor. For each row of input data, the calculator estimates ingredient-level nutrient contents, accounting for yield and any nutrient losses due to cooking. The values are summed to produce the total nutrient contents per 100 grams of recipe; however, the code can also calculate nutrient contents per 1 gram or total recipe. The code outputs a data table containing the calculated nutrient contents of each recipe in the input table, enabling batch processing of many recipes with a single coding procedure.

Conclusion: The calculator we developed could be utilized in other studies to estimate the nutrient composition of recipes reported in detailed dietary assessments such as 24-hour recalls or food records. The calculator is freely available for download at https://osf.io/j3axd/.

MetaboFood®: A cloud knowledgebase for precision nutrition & health research

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Realizing precision nutrition in health will require characterization of metabolomics features in foods and human biospecimens. The interpretation of these findings in the context of precision health requires the development of knowledgebases containing food-derived microbial and human metabolites, and relevant biochemical and diseases pathways. Unfortunately, highly consumed dietary phytochemicals and their metabolites are poorly represented in existing metabolomics and food composition databases. To address this gap, we have built a cloud knowledgebase named MetaboFood®, which features a database (P-MetDB®) of nutritionally relevant phytochemical metabolites, derived from systematic literature reviews of intervention studies feeding commonly consumed phytochemical-rich foods. Curation of compound synonyms were matched to InChI Key, chemical (mass, formula etc.) and database identifiers (i.e., PubChem, HMDB, PhytoHub, KEGG etc.). Information in P-MetDB® is made Findable, Accessible, Interoperable, Reusable (FAIR), and visually explorable through our MetaboFood® cloud platform, which provides various data visualization dashboards to explore possible associations between food, biochemical and disease pathways. MetaboFood® was built using Flask, a micro web framework written in Python. Data visualization in MetaboFood® is achieved using Self Organizing Maps, Node-link diagram, Sankey diagram and radial dendogram. MetaboFood® allows users to search for nutritionally relevant compounds by synonym, mass, chemical formula, chemical identifiers, or in the future LC-MS/MS spectra. Continued development of MetaboFood includes expansion to other fruits, vegetables, supplements, and processed foods that are most common in the US diet, building data richness and enabling connections between diet and health.

An Interactive Micronutrient Retention Dashboard and Databank: A Pilot Framework for Results Dissemination

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Background: Disseminating results in nutrition research is often complex due to the vast quantity of information available, and the need to communicate them to multiple audiences including researchers, policy makers and consumers. This complexity poses a challenge to the presentation of these data in traditional publication formats.

Objective: To design a relational database framework with dashboard interface to improve the dissemination of results presented in a systematic review and increase the potential impact and uptake of evidence for end-users.

Description: Our systematic review (Huey et al., 2023 in press at Nature Food) on micronutrient retention after processing or cooking biofortified crops contained extensive individual-level data across different combinations of crop type, processing method, micronutrient, and crop varieties from 67 studies. To improve the usability of our findings, we designed an online interactive pilot databank (https://www.cpnh.cornell.edu/mn-retention-db) using Claris FileMaker, a relational database package, to develop the backend database and web interface. Phase one of our design process was to develop the databank interface and structure the extracted data for filtering, searching, and summaries by crop type, processing method, micronutrient, and food product so that retention could be assessed across studies. The next phase will be to solicit feedback from various stakeholders and end users on the pilot databank functionality and interface and improve the framework for application to other studies.

Conclusion: A databank built upon a flexible relational database framework with an interactive user interface can streamline communication of complex study findings for diverse users, creating greater opportunity for impact and ongoing monitoring of related research findings. The structure used provides an adaptable model that can be utilized for future research and systematic reviews containing similarly granular and complex data.

A policy approach to identifying foods and beverages that are ultra processed and HFSS

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Objective: This study outlines a simple approach to support policymakers in the identification of Ultra-processed foods (UPFs) by utilizing criteria for identifying foods high in added saturated fat, sodium, and sugar (HFSS) and the presence of additives in ingredient lists.

Materials and Methods: Four approaches combining elements of NOVA UPF and HFSS definitions were compared attempting to simplify and standardize the identification of less healthy food and beverage products that could be targeted for policy intervention. Nationally representative food purchase data from NielsenIQ linked with nutrition facts panel data were used to examine the proportion of products purchased by US households that would be targeted for policy under each approach. Differences were examined using Student t test; Bonferonni Adjusted P value <.0001 was considered significant.

Results: In 2020, 50% of 33,054,687 products purchased by 59,938 US households were considered NOVA UPFs (65% of foods and 38% of beverages) and 43% HFSS (65% of foods and 26% of beverages). However, there was not 100% agreement between the two definitions. By starting with HFSS criteria and adding elements of the NOVA definition for UPFs (i.e., presence of NNS, colors/flavors and other additives [Anti-foaming agent, Foaming agent, Bulking agent, Gelling agent, Thickener, Carbonating agent, Emulsifier, Emulsifying salt, Flavour enhancer, Glazing agent]), the match rate in the identification of NOVA UPFs compared with HFSS products increased from 84% to 100%. An HFSS approach that included presence of color/flavors and other NOVA additives was found to be the most complete approach for identifying UPFs.

Significance: Results demonstrated how combining HFSS criteria with elements of the NOVA definition of UPFs can help "close the gap" between these two widely used approaches used to identify less healthy

foods and ensure policymakers have both a simple and accurate method to target products for policy intervention.

Food and Nutrient Database for Dietary Studies: Optimizing Analytical Composition Data

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Background: The USDA Food and Nutrient Database for Dietary Studies (FNDDS) converts food and beverages consumed in What We Eat In America (WWEIA), NHANES into gram amounts and determines nutrient values. FNDDS uses codes from Standard Reference (SR) as the primary basis for FNDDS nutrient values; the version used for recent FNDDS cycles was SR Legacy, one of the data types in USDA's FoodData Central (FDC), an integrated data system launched in 2019.

Objective: This research provides an in-depth description of how FNDDS incorporated new analytical data from FDC.

Description: FDC launched a newer data type called Foundation Foods (FF), which contains analytical data on individual samples of commodity or minimally processed foods with extensive underlying metadata. Incorporation of FF as ingredients to build nutrient profiles began with FNDDS 2017-2018 and has expanded with each subsequent survey version. While extensive nutrient profiles were available for SR Legacy codes used in FNDDS, FF contained analytical values for select nutrients, targeting important nutrients based on the food type. Because FNDDS had values for 65 nutrients, missing nutrient values needed to be estimated. In FNDDS 2021-2023, the FF codes used were missing about 60% of the FNDDS nutrients. A set of procedures were developed to determine the best available value for the missing nutrients that included matching to a SR Legacy value for the same food, matching to a FF/SR nutrient value for a similar food, or making calculations/assuming zero.

Conclusion: FNDDS maximized the use of new analytical composition data for the nutrient values in underlying ingredients used to build nutrient profiles. Building a complete nutrient profile for new FF ingredients used in FNDDS required research and expert decision-making.

Analyzing nitrate and nitrite levels in beet-based dietary supplements: a systematic sampling plan to enhance a public database

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Background: Dietary nitrates have shown promising benefits for cardiovascular health and exercise performance, yet a comprehensive analysis of nitrate/nitrite content in dietary supplements (DS) sold in the US market is lacking.

Objective: Our objectives are to compile published nitrate/nitrite data for commonly sold beet DS and analyze a representative sample of these products to generate original experimental data. These compiled and newly analyzed values will be integrated into a special interest nitrate/nitrite USDA database.

Description: We identified two key publications reporting nitrate/nitrite levels in US-sold DS. We focused on beet-based products due to their high nitrate content. We categorized 25 products by dosage form. For the compiled literature data, beet juice shots exhibited the highest mean nitrate content per serving (304.47 mg), followed by beet juice powder (98.59 mg) and beet root powder (88.26 mg). Beet tablets had the lowest mean nitrate content per serving (49.26 mg). As expected, the mean nitrite content was lower than the mean nitrate content for all product types. To expand these compiled data with original analyses, we identified commonly consumed beet DS in the US population through sources including National Health and Examination Survey (NHANES), ClinicalTrials.gov, online markets, and in-store research. A sampling plan was developed encompassing 22 total beet products comprising 3 major categories: 6 general health, 7 cardiovascular, and 9 sports supplements.

Conclusion: This sampling plan will enhance our understanding of nitrate/nitrite intake from DS. The collected analytical data will be integrated into a special interest USDA database, allowing for comprehensive calculations of total nitrate/nitrite intake from both foods and DS.

Development of folate composition database and analysis of folate intake status:

using 7th Korean National Health and Nutrition Examination Survey
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This study aimed to create a folate composition database (folate DB) for evaluating folate intake in the 7th Korea National Health and Nutrition Examination Survey (KNHANES VII). The database included 3,894 food items from KNHANES VII and was compiled using data from various sources including Korean, Japanese, and US food composition tables, along with journal articles. Missing folate values were estimated using similar food items' data. The study involved 15,054 subjects for estimating folate intake and 5,260 for analyzing the relationship between folate intake and serum folate concentration. Among the food items, 2,662 values came from domestic tables, 718 from foreign tables, and 3,495 were extrapolated, with 332 imputed values and 60 calculated values included in the folate DB. The average daily intake of dietary folate equivalent (DFE) was 315.17±2.04 μg DFE/day for men and 320.97±1.96 μg DFE/day for women, with the lowest intake observed in the 19~29 age group. The study concluded that increasing folate intake, especially among women aged 19~29, is necessary, and the newly developed folate DB can help understand the relationship between folate intake and health concerns in the Korean population.

Follow-up of granola bars available in food markets: Results from the Food Quality Observatory
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Objective: The Food Quality Observatory has monitored changes in the nutritional content of granola bars sold in Québec between 2018 and 2023.

Methods: 369 granola bars were collected in 2023 and compared to 310 in 2018. Granola bars were classified based on their content (e.g., nuts, fruits, sweet) and status (i.e., new, identical, modified or removed) compared to 2018. Each granola bar's nutrient content was analyzed according to the Health Canada front-of-pack nutrition symbol, which highlights foods high in sodium, sugar and/or saturated fat.

Results: Granola bars containing sweets were the most prevalent on the market in 2023 (n=126/369), representing 39% of sales. In terms of status, 212 bars were new, 152 were modified, 153 were removed, and 5 remained identical. In 2023, a serving size of 40g contained on average 169 calories (+1.0% vs. 2018), 6.0g fat (-0.2%), 1.9g saturated fat (+2.5%), 12.3g sugars (+6.8%), 2.2g fiber (-3.7%), 2.7g protein (-6.5%), and 103mg sodium (-5.6%). New bars were higher in saturated fat and protein, and lower in sugars, whereas modified bars were higher in sugars, but lower in protein and fiber than other bars. Nearly half of the 2023 granola bars would carry the Health Canada front-of-pack symbol for at least one nutrient. Specifically, 28% of bars would display the symbol for sugars, while 32% would display the symbol for saturated fat.

Significance: The nutritional composition of granola bars sold in Québec has remained rather similar over the last five years. However, sugar and saturated fat content should be reduced in modified and new bars, respectively. Unless changes in nutrient content are made, half of the granola bars would have to carry the front-of-pack symbol indicating high sugar and/or saturated fat content. Efforts must be made to improve the nutritional quality of granola bars offered in Québec.

Leveraging USDA Databases to Assess Ingredient Intakes of the U.S. Population
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Background: Determining basic ingredient intakes from WWEIA, NHANES is important but not straightforward, as many are in foods composed of numerous ingredients. For example, cheese is an energy- and nutrient-dense food with high per capita consumption in the U.S. However, it is often one of many ingredients in foods such as sandwiches, pizza, and macaroni and cheese.

Objective: Provide a case study that describes estimation of basic ingredient intakes in WWEIA, NHANES 2017-2018 using cheese as an example.

Description: Food Data Central (FDC) codes included in the Food and Nutrient Database for Dietary Studies 2017-2018 that are exclusively cheese were identified. These "100% cheese" codes were classified into one of three broad categories: natural cheese, cottage cheese, and processed cheese. Next, FDC codes that contain cheese were ascertained via the cheese variable in the Food Patterns Equivalents Ingredient Database, a supplementary product to the Food Patterns Equivalents Database (FPED). Recipes developed for the 2017-2018 FPED provide the amount and types of cheese for each of these FDC codes. FNDDS food codes containing cheese, i.e., include a 100% cheese or cheese-containing FDC code as part of their recipe, were defined as those with nonzero amounts of the FPED total cheese variable. These FNDDS food codes were deconstructed into (1) the originally identified 100% FDC cheese codes and (2) all other ingredients that do not contain cheese. In this manner, gram amounts and the food and nutrient contributions of each cheese type for every FNDDS code were determined. Applied to the individual food records in 2017-2018 WWEIA, NHANES produces estimates of cheese intake of the U.S. population.

Conclusion: USDA's multiple data resources provide opportunities to address complicated research questions, including those regarding nutritionally relevant foods that are common, ubiquitous ingredients in the food supply.

Total Diet Study-based estimates of children's exposures to lead and cadmium in the U.S.

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Dietary exposures to lead and cadmium for U.S. children 1 – 6 years were estimated using 2018-2020 concentration data from the U.S. FDA's Total Diet Study (TDS) and food intake amounts reported in the 2017-2018 National Health and Nutrition Examination Surveys/What We Eat In America (NHANES/WWEIA). To estimate these exposures, each of the over 7000 foods reported by one or more NHANES/WWEIA respondents was mapped to one or more TDS foods using estimated ingredient percentages in the U.S. FDA's Food Disaggregation Database (FFDD). Exposures were estimated based on lower bound mean concentrations (non-detects set to zero), upper bound mean concentrations (non-detects set to Reporting Limits, or RLs), and hybrid mean concentrations (non-detects set to half the RL for foods with a history of detection). Estimated mean and 90th percentile lead exposures were compared with the FDA Interim Reference Value (IRL) of 2.2 µg/day, and estimated mean and 90th percentile cadmium exposures were compared with the FDA Toxicological Reference Value (TRV) range of 0.21 – 0.36 µg/kg bw/day. Food groups and specific foods with greatest contributions to children's lead and cadmium exposures were identified. In addition, the calcium, iron, magnesium, nickel, zinc, and vitamins C and D contributions from foods contributing to lead and cadmium exposures were characterized. Nutrient contributions from these and other foods consumed may provide some protection against children's lead and cadmium exposures.

Purines in dietary supplements (DS) available in the US market: development of a sampling plan and pilot study

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Background: Purines are chemicals found in the body's cells and in virtually all foods. The purine bases guanine and adenine are the building blocks of DNA and RNA. Purine rich foods include animal meats, fish meats, organ meats and yeast. The end product of purine metabolism is uric acid, which acts as an antioxidant involved in immune support, and for defense against neurological and autoimmune diseases. However, elevated levels of serum urate may lead to the development of hyperuricemia and gout. Consumers with these conditions are instructed to limit their dietary purine intake. There is a lack of published data on purine content for DS sold in the US.

Objective: This study aims to identify what types of DS sold in the U.S. are most likely to contain purines and to determine their analytical content.

Description: After reviewing a paper by Kaneko et al. 2014, which highlights purine-rich DS sold in Japan, our product search strategy focused on five ingredients likely to be highest in purine content: brewer's

yeast, chlorella, royal jelly, RNA/DNA, and spirulina. We searched for DS using the Dietary Supplement Label Database (DSLD), the National Health and Nutrition Examination Survey 2017-2020, and prominent online retailers. This research allowed us to identify key DS, understand the prevalence of potentially purine rich DS on the market, and ensure inclusion of a diverse range of purine-rich DS. Our sampling plan resulted in the identification of 15 DS. Among these, five products will be purchased for a pilot study and analyzed at UF using LC-MS/MS to determine the analytical content of purines.

Conclusion: Based on the results, in-house control materials for QC will be identified from among the pilot products for future DS analyses. Additional DS considered for future testing will include organ meat-based and combination products. The resulting data will be incorporated into a USDA special interest purine database.

Food Patterns Equivalents Database for Use with WWEIA, NHANES 2017- March 2020 Prepandemic
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Background: The National Health and Nutrition Examination Survey (NHANES) program suspended field operations early in March 2020 due to the COVID-19 pandemic, resulting in data that were not nationally representative. Thus, these data were combined with data from the NHANES 2017-2018 cycle to form a nationally representative sample, titled NHANES 2017-March 2020 Prepandemic. In this dataset, respondents and their intake records are not identified by each of these two survey cycles. Because of this, a Food Patterns Equivalents Database (FPED) developed specifically for 2019-2020 data is not feasible to reduce disclosure risk.

Objective: An FPED specifically for use with What We Eat In America (WWEIA), NHANES 2017-March 2020 Prepandemic data was therefore developed to assess dietary intakes based on food pattern equivalents. This approach required linking additional foods from Food and Nutrient Database for Dietary (FNDDS) 2019-2020 to one or more foods in FPED 2017-2018. Thus, all FP data for 2017-March 2020 are based on FPED 2017-2018.

Description: In this presentation, we will discuss the rationale and development methodology, including example crosswalks of linkages between FNDDS food codes. Additionally, we will highlight appropriate use of this unique FPED release for research and analysis purposes in contrast to other FPED releases.

Conclusion: The FPED for Use with WWEIA, NHANES 2017-March 2020 Prepandemic is a unique FPED release designed for the combined WWEIA, NHANES dataset. Users of this FPED data should be informed of its development in contrast to other FPED releases to appropriately use the data for analysis.

Evaluating the impact of post-harvest handling and domestic cooking on phenolic acids in sweet corn
Monica Whent, PhD, RD, USDA Agricultural Research Service; Xianli Wu, PhD, USDA ARS

BACKGROUND: Sweet corn is a frequently consumed vegetable in the US. It contains phenolic acids that are important cell wall structural components and provide potential health benefits.

OBJECTIVE: Determine changes in phenolic acids of sweet corn after post-harvest handling and domestic cooking.

MATERIALS AND METHODS: The bi-color sweet corn ("Baseline") harvested from the field was processed into the samples representing two major retail types (farmers market "MKT" and grocery store "Grocery"). The Grocery sample was cooked by boiling and steaming
("Boil" and "Steam"). Soluble free, soluble conjugated, and insoluble bound phenolic acids in all samples were determined by HPLC.

RESULTS: Benzoic acid (BA), ferulic acid (FA), p-coumaric acid (PCA) and were identified in the sweet corn. Total BA was 199.16 mg/100g dry weight (DW) and decreased by 26.7% in FMT and 30.7% in Grocery samples. BA did not significantly change in the
Boil sample and increased by 5.2% in Steam sample. Total FA in the Baseline sample was 170.32 mg/100g DW and decreased by 41.6% in FMT and 30.7% in Grocery samples. In Boil and Steam samples FA decreased another 35% and 55.1% respectively from the Grocery sample. Total PCA was 5.98 mg/100g DW in the Baseline sample and decreased by 56.9% in FMT and 43% in Grocery samples. PCA also decreased

another 53.7% in Boil and 59% in Steam samples compared to Grocery samples. FA and PCA were present at the highest levels in the insoluble bound forms, while BA was highest in the soluble conjugated form.

SIGNIFICANCE: Postharvest handling and home cooking generally resulted in significant loss of phenolic acids, although there was not a consistent effect. This information helps us better understand the changes of bioactive compounds and interaction between insoluble dietary fiber (mostly cell wall materials) and gut microbiota in sweet corn after food processing.

Influence of blanching, freezing, and canning on minerals in sweet corn
Monica Whent, PhD, RD, USDA Agricultural Research Service; Xianli Wu, PhD, USDA ARS

BACKGROUND: Sweet corn is a widely consumed vegetable in the US. It is a rich source of several essential minerals. The effects of blanching, freezing and canning on minerals in sweet corn are poorly understood.

OBJECTIVE: Determine changes of mineral contents in sweet corn after heat processing and frozen storage.

MATERIALS AND METHODS: The fresh bi-color sweet corn was harvested from the field and was immediately processed into frozen and canned samples. Nine minerals were measured in unprocessed sample ("Baseline") and four samples taken at different processing stages ("Blanch", after blanch; "Can 0", after canning; "Can 1", one month after canning; "FO 1", one month after freezing with kernels off the cob; and "FC 1", one month after freezing with kernels on the cob) by ICP Emission Spectrometry based on AOAC method.

RESULTS: Eight minerals quantified in Baseline sample included K, P, Mg, Zn, Ca, Fe, Mn and Cu. K, P and Mg were major minerals with the concentrations at 259.01, 91.28 and 23.18 mg/100 g fresh weight, and they only decreased in canned samples. Na was below LOD in the Baseline and two frozen samples, but presented in canned corn due to addition of NaCl. Blanched, frozen, and canned samples had increased Ca compared to baseline because of the high water hardness. Zn did not differ between Baseline and Blanch samples, but increased in FO 1 and FC 1 samples and decreased in two canned samples. Fe was only decreased in Can 1 compared to other samples.

SIGNIFICANCE: Food processing including thermal treatment and freezing can alter mineral contents of sweet corn based on the processing methods, processing media and the addition of processing aids/ingredients. The data provided insight on the factors related to mineral contents in sweet corn and can be included in FoodData Central under Experimental Foods.

Evaluating the impact of post-harvest handling, domestic cooking, and industrial processing on carrot
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BACKGROUND: Carotenoids are plant pigments found in many vegetables and offer health benefits in humans, e.g. prevention of macular degeneration. Spinach is a widely consumed vegetable that is rich in carotenoids. Cooking and processing methods are known to affect carotenoid content in vegetables.

OBJECTIVE: To determine the effects of home cooking, post-harvest handling, and processing on the carotenoid content of spinach.

MATERIALS AND METHODS: Auroch F1 flat leafed spinach was collected directly after harvest. There were five different treatments and one Baseline (unprocessed) sample: Grocery, Boiled, Steamed, Blanched, and Frozen. Grocery samples were washed and stored at 4°C for 4 days, then divided to produce Boiled and Steamed samples. Blanched samples were then processed into Frozen samples (stored at -20°C for 30 days). Samples were then lyophilized, saponified, and extracted. Extracts were analyzed for carotenoid composition using HPLC.

RESULTS: The Baseline sample contained 147, 76, 180, 41, and 230 mg/100g (dry wt) of violaxanthin, neoxanthin, lutein, zeaxanthin, and β-carotene respectively. Compared to Baseline, total carotenoids increased 49% after storage for the Grocery sample. They increased another 6.5% and 10% in the Boiled and Steamed samples, respectively. Total carotenoids in the Blanched sample increased 33% compared to Baseline, but then decreased 9.3% in the Frozen sample.

SIGNIFICANCE: This study shows how post-harvest handling, cooking, and processing methods affected the

available carotenoid levels in spinach. It also identifies the levels of individual carotenoids in spinach, which may be used for information in Food Data Central.

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 43rd NNDC oral or poster presentations to the Journal of Food Composition and Analysis (JFCA), for inclusion in a special 43rd 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-forauthors.

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: 43rd NNDC"** when you upload your manuscript.

More information on the submission portal and final timeline will be communicated in the months following the conference.

Oral Presenter Photos and Bio Sketches

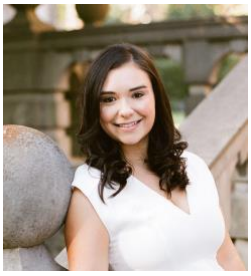
Birdem Amoutzopoulos
Birdem is a nutritionist working as dietary and nutrient data manager in the Nutrition Measurement Platform in University of Cambridge. She takes primary responsibility for managing dietary data and related databases, including supporting the development of innovative approaches for data capture, coding and administration. She is responsible for the management of the UK Nutrient Databank in conjunction with Office for Health Improvement and Disparities for the UK National Diet and Nutrition Survey (NDNS). Her role includes development and management of collection and coding systems. Birdem has supported various dietary assessment and food composition projects. Previously, she worked in EU projects and clinical trials. She has a PhD in Nutrition.

Dylan Bailey
Dylan is a Senior Nutrition Specialist with Ketchum and Fellow of the Academy of Nutrition and Dietetics who works across nutrition, food, beverage, ingredient, agriculture and wellness accounts to ensure accuracy in reporting science and research communications, as well as providing strategic reputation management counsel. He also is a Freelance Writer for outlets including Forbes Health and Healthline Media.
He is a Registered Dietitian and received his Masters from Texas Tech University, where he underwent training in conducting clinical trials. Dylan has presented research at conferences including The Obesity Society's Obesity Week, the American Society for Nutrition's annual nutrition meeting, Experimental Biology, the Association for Healthcare Social Media's annual meeting and the Food and Nutrition Conference and Expo.
Dylan has also published several scientific manuscripts in peer-reviewed journals. His research interests include appetite hormones, obesity, weight bias, feeding behaviors, diversity in the dietetic profession and the impostor phenomenon among nutrition and dietetics professionals.
Dylan served for four years on the Executive Committee of the Cultures of Gender and Age Member Interest Group of the Academy of Nutrition and Dietetics and is also currently the Social Media Chair for the Early Career Nutrition Interest Group of the American Society for Nutrition.

Kai Blumberg
Kai Blumberg is a postdoctoral fellow working for the USDA's Food for the Health of People and Environment (FHPEL) lab. Kai works on various institutional and open-source ontologies and data standards to promote food and life-science data interoperability.

Andrea Carlson
Andrea (Andi) Carlson is an economist in the Food Markets Branch of the Food Economics Division in USDA’s Economic Research Service. She researches gateways and barriers to consumers’ ability to choose and purchase healthy diets, and organic retail markets. She is the project lead for the Purchase to Plate Suite, which allows users to import USDA nutrient and food composition data into retail food 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 in 2009 after 9 years with USDA's Center for Nutrition Policy and Promotion (CNPP), where she was the project leader for the USDA Food Plans and CNPP Food Prices Database. Before joining USDA, she was a CDC Prevention Effectiveness Fellow in the Lead Poisoning Prevention Branch and the Agency for Toxic Substances and Disease Registry. Andi 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 (1992), and B.A. in Physics from St. Olaf College, Northfield, Minnesota (1988).

Kellie Casavale
Kellie Casavale is the Senior Science Advisor for Nutrition in the Office of Analytics and Outreach in CFSAN, FDA. She supports cross-Center and cross-Departmental collaborations, particularly those related to the Dietary Guidelines for Americans (DGAs), Closer to Zero, and maternal and child populations. She has led in the Dietary Guidelines process through roles at USDA/CNPP, HHS/ODPHP, and now FDA for four cycles of the DGAs. She supported the development of the first Dietary Patterns for children under 2 years with 2020 Dietary Guidelines Advisory Committee. Other leadership roles include the U.S. Federal Data Consortium on Pregnancy and

	Birth to 24 Months, the Human Milk Composition Initiative in the U.S. and Canada, and maternal and child health projects in CDC's National Health and Nutrition Examination Surveys (NHANES). She contributes leadership for Closer to Zero and the FDA/EPA Fish Advice, elucidating the ways nutrition can reduce the adverse developmental effects of potential exposures to environmental chemical contaminants from food. Dr. Casavale has a BS in Biology from Lander University, a PhD in Nutrition Science from the University of North Carolina - Greensboro, and is a Registered Dietitian.
	Yutong Chen Yutong Chen is a second-year PhD student at Tufts University Friedman School of Nutrition Science and Policy, concentrating on Nutrition Epidemiology and Data Science. Her research focuses on dietary patterns, inadequate nutrition consumption, and nutrition inequity on a global scale. She graduated from Tufts with a dual master's degree in Nutrition and Public Health. She joined the Global Nutrition and Health Atlas (GNHA) and has worked as a data analyst since the summer of 2021. She has also been dedicated to working on COVID-19 booster-related topics with faculty members in the Tufts Public Health Department.
	**Alexandra Cowan** Alexandra E. Cowan, Ph.D. joined the Institute for Advancing Health Through Agriculture (IHA) at Texas A&M AgriLife Research in June 2022 as a Postdoctoral Research Fellow with a specialization in Precision Nutrition. In her present role, her work focuses on identifying nutrients and food components systematically and scientifically to be reported by national dietary intake assessment, such as What We Eat in America, the dietary component of the National Health and Nutrition Examination Survey, to develop an evidence-based rationale and criteria for inclusion or exclusion. Prior to her role at IHA, Dr. Cowan received her M.S. and her Ph.D. in Nutrition Science from Purdue University and completed an Oak Ridge Institute for Science and Education fellowship at the Centers for Disease Control and Prevention National Center for Health Statistics, in the Division of NHANES. Her research is predominantly focused on assessing micronutrient exposures in relation to human health across the life course, improving quantitative methods of dietary assessment to optimize human health, and dietary supplement research. She is currently a member of the American Society of

	Nutrition and serves as an Editorial Board member of the Journal of the Academy of Nutrition and Dietetics.
	**James Friday** James Friday is a nutritionist with the Food Surveys Research Group of the Beltsville Human Nutrition Research Center, Agricultural Research Service. He is a graduate of the University of Maryland at College Park and began his Federal career with the Human Nutrition Information Service of the United States Department of Agriculture. James has played a critical role in the development of the MyPyramid Equivalents and other specialized databases that allow researchers to assess American diets according to USDA's dietary guidance initiatives. He has also developed many of the methods and protocols used to translate USDA survey foods into ingredients and commodities to create specialized databases such as the Food Commodity Intake Database used by the Environmental Protection Agency to estimate Americans' pesticide exposure through foods, and the Food Intakes Converted to Retail Commodities Database which converts foods into retail-level commodities. James is currently working with other ARS staff on the maintenance and development of foods, recipes, and nutrient components for the Food and Nutrient Database for Dietary Studies (FNDDS) and supporting the What We Eat in America dietary intake data collection.
	**Lisa Harnack** Lisa Harnack is a Professor in the School of Public Health at the University of Minnesota. She conducts research to identify policies and programs that are effective in supporting good nutrition and health for all. She also directs the University of Minnesota Nutrition Coordinating Center (NCC). This Center developed, maintains, and supports two widely used dietary assessment tools- Nutrition Data System for Research (NDSR) and the NCC Food and Nutrient Database.

James Harnly

James Harnly, PhD, is an analytical chemist with more than 40 years of experience in industry and government. He serves as the Research Leader for the newly organized Methods and Applications Food Composition Lab, which is responsible for analytical and food nutrition research and FoodData Central, the new USDA food composition database system. Dr. Harnly has authored more than 170 peer-reviewed papers, technical reports, and book chapters, and holds two patents. He served as the US editor of the Journal of Analytical Atomic Spectrometry and as Editor-in-Chief of the Journal of Food composition and Analysis. He is a member of the Society for Applied Spectroscopy, American Society for Nutrition, American Society for Mass Spectrometry, and AOAC International. He served on the Board of Directors and as President of the Board for AOAC International and is on the Advisory Board for the American Botanical Council. He received his Bachelor of Arts from the University of Colorado and his Ph.D. in Analytical Chemistry from the University of Maryland.

Kirsten Herrick

Kirsten A. 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 which enables collection of auto-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. She also serves as the Project Scientist for the NIH Common Fund's Nutrition for Precision Health, powered by the All of Us Research Program. Her scientific interests include nutrient intakes and food consumption patterns among infants birth to 24 months, breastfeeding disparities, iodine nutrition, and ultra-processed food identification and consumption.

Dr. Herrick received her B.S. in biochemistry and psychology from The University of Tennessee, Knoxville, her M.Sc. degree in maternal and child nutrition from The London School of Hygiene and Tropical Medicine at The University College

	London in the UK, and her Ph.D. in nutrition health sciences from Emory University.
	**Julie Hess** Dr. Hess is a Research Nutritionist at the Grand Forks Human Nutrition Research Center in Grand Forks, North Dakota. Dr. Hess's research is centered on identifying and evaluating strategies to help Americans meet recommendations from the Dietary Guidelines for Americans. Her work involves investigating how American diets currently align with dietary guidance and recognizing and addressing barriers to following recommendations, including dietary restrictions and dietary and cultural preferences. Before joining the GFHNRC, Dr. Hess served as Vice President of Scientific Affairs for the National Dairy Council in Chicago, IL. She is an active member and volunteer with several nutrition and scientific organizations, including the Institute of Food Technologists (IFT), the National Nutrient Databank Conference, and the American Society for Nutrition (ASN), and currently serves as Chair of the Nutrition Translation Research Interest Section with ASN, a member of ASN's Publications Committee, and a member of the Annual Meeting Scientific Program Advisory Panel for IFT. She is also an adjunct assistant professor at the University of North Dakota. Dr. Hess received Bachelor of Arts degrees in French and English from the University of Texas at Austin and earned a doctoral degree in Human Nutrition from the University of Minnesota.
	**Dana Hoffman-Pennesi** Dana Hoffman-Pennesi received her BS in Chemistry and MS in Food Science from the University of Delaware. She has been with the U.S. FDA for more than ten years. She began her career working on FDA's sodium reduction initiatives. Currently, she is a data analyst for FDA's Total Diet Study and other FDA data sources, an exposure assessor, and a project manager for various workgroups.
	**Bridget Hollingsworth** Bridget Hollingsworth is a Registered Dietitian with a Master of Public Health Nutrition from the University of North Carolina at Chapel Hill; she is currently a Research Project Manager for the Global Food Research Program (GFRP). In this role, she provides project management, planning, and problem-solving

	support for faculty, staff, students, and collaborators as the GFRP team works alongside diverse partners around the world to carefully evaluate emerging unique policy interventions aimed at improving the food environment and reducing non-communicable diseases on a population level. For more information, please visit globalfoodresearchprogram.org.
	The Human Milk Composition Initiative (HMCI) is a joint effort between multiple federal agencies within the United States and Canada to coordinate the development of human milk composition data for use by federal policy, programs, and other stakeholders. Dr. Kathryn Hopperton will be representing the HMCI in presenting the abstract. Dr. Hopperton is a Senior Laboratory Biologist in the Nutrition Research Division at Health Canada. She has a Master's and PhD in Nutritional Sciences from the University of Toronto, and completed post-doctoral work at the Hospital for Sick Children in Toronto, where her research focused on nutrition for very low-birthweight infants, including determinants of human milk fatty acid composition.
	**Joy Hutchinson** Joy Hutchinson is a PhD Candidate at the University of Waterloo in the School of Public Health Sciences. Her research is focused on diet assessment methods and nutrition inequities. She participated in the development of the Canadian Food Intake Screener, a brief screener assessing alignment of adults' dietary intake with the 2019 Canada's Food Guide, including leading the evaluation of the screener's construct validity.
	**Tina Irrer** Tina Irrer is a Nutrition Fellow contracted by the Office of Analytics and Outreach in the Center for Food Safety and Applied Nutrition at FDA. She supports Center and cross-Departmental projects related to maternal and child health, including support for the U.S. Federal Data Consortium on Pregnancy and Birth to 24 Months, the Human Milk Composition Initiative in the U.S. and Canada, and maternal and child health projects in the National Health and Nutrition Examination Surveys (NHANES). She supports FDA's Closer to Zero initiative and the FDA/EPA joint Advice About Eating Fish to decreases exposures to heavy metals through foods commonly consumed by children while supporting a nutritionally adequate dietary patterns. Since coming to FDA,

	Dr. Irrer has supported the expansion of health equity principles in food and nutrition data infrastructure to support advancements in research and policy. She has a BS in Applied Nutrition from North Carolina State University, a PhD in Nutrition Science from the University of North Carolina - Greensboro, and is a Registered Dietitian.
	**WenYen Juan** Dr. WenYen Juan is an Interdisciplinary Nutritionist with the Nutrition Assessment and Evaluation Branch, Division of Nutrition Programs in the Office of Nutrition and Food Labeling at Center for Food Safety and Applied Nutrition (CFSAN), U.S. Food and Drug Administration (FDA). Her projects involve nutrition assessment, modeling exposure assessment on regulatory impact, estimating the prevalence of nutrient adequacy for the revision of Daily Values and modernization of the Reference Amounts Customarily Consumed (RACC) or Serving Size on the updated Nutrient Facts label. Her research concentrates in the areas of the nutrition assessment and evaluation, food intake patterns and diet quality, and psychosocial factors related to dietary behaviors. Dr. Juan holds a Ph.D. in Nutrition and Public Health/Statistics from Oregon State University, an M.S. degree in Clinical Nutrition from the University of Alabama at Birmingham, and a B.S. in Nutrition and Food Science from Fu-Jen University, Taipei, Taiwan.
	**Linda Kantor** Linda Kantor is an agricultural economist in the Diet, Safety, and Health Economics Branch, Food Economics Division at USDA's Economic Research Service (ERS). 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. Her research interests include food availability and food loss and the role of food away from home in diet quality. As a member of the survey development team for the Second National Household Food Purchase and Acquisition Survey (FoodAPS-2) she is the team lead for food item identification and nutrient analysis of acquired food items. Kantor joined ERS in 1991 after receiving her M.S. in Agricultural and Applied Economics from the University of Minnesota.
	Cho-il Kim Cho-il Kim is a visiting professor in the Department of Food &

	Nutrition at Seoul National University. She received her undergraduate degree and MS from Seoul National University in Food & Nutrition and, PhD in Nutritional Sciences from Cornell University. After working at the Mount Sinai School of Medicine for postdoctoral research and as a research assistant professor for 6 years, she returned to Korea and joined a government-affiliated research institute, KHIDI, to support government in developing food and nutrition policies and programs. With more than 100 research projects conducted at KHIDI during 26 years of service, she developed methodology and tools for national nutrition survey, which is a part of the ongoing 'KNHANES', and a special supplemental nutrition program for vulnerable population, 'NutriPlus'. She also has set up the 'Korean Total Diet Study' to ensure a safer & healthier diet, developed the food-based dietary guidelines for Koreans in 2010's and participated in developing sodium intake reduction strategies and drafts for nutrition related Acts including 'Special Act on Safety Management of Children's Dietary Lifestyle' and 'National Nutrition Management Act'. Currently, she is serving as a member of the NUGAG Subgroup on Policy Actions for WHO and ISAB for Saudi Arabia.
	**Kelly Kogan** Kelly Kogan is postdoctoral research fellow with the U.S. Department of Agriculture's Food Surveys Research Group in Beltsville, Maryland. Her work involves identifying and evaluating nutrients and food components of significance to public health and agriculture policy and developing evidence-based criteria for nutrients and food components to be reported in national dietary surveillance. She holds a PhD in Health Services Research with a focus on federal nutrition policy and a Master of Science in Nutrition and Food Studies, both from George Mason University in Fairfax, Virginia. Dr. Kogan previously worked as a lawyer in Washington, D.C., having earned a J.D. from Columbia Law School in New York City and a B.A. in International Affairs from Transylvania University in Lexington, Kentucky. In 2014 she left the field of law to begin a new career in nutrition and public health, a task made easier by the transferability of many of the skills she developed as a lawyer, including in-depth research skills, the ability to organize and analyze large volumes of information, effective time management, and attention to detail.

Andrea Lindsey

Andrea Lindsey, MS, serves as Director of Operation Supplement Safety (OPSS) and Senior Nutrition Scientist with the Consortium for Health and Military Performance (CHAMP), Uniformed Services University. She received her Master of Science degree in Nutrition from University of Maryland, College Park. Andrea is a nutrition information specialist with extensive experience in the field of dietary supplements, and she has considerable knowledge and understanding regarding the content, safety, labeling, and marketing of these products. At CHAMP, most of her work encompasses the topic of dietary supplements and their ingredients, which involves reviewing, evaluating, and interpreting the scientific literature; writing; and directing the program. Ms. Lindsey also regularly educates Service Members, healthcare providers, military family members, and leaders about dietary supplements. She also manages a team of nutritionists for CHAMP, overseeing all of the nutrition content. She works closely with Federal partners and other health professionals in and outside the military to exchange relevant and pertinent information about nutrition and dietary supplements.

Ms. Lindsey currently maintains membership in the American Public Health Association, American Society for Nutrition, and the Collegiate & Professional Sports Dietitians Association.

Marie-Claude Mallet

Marie-Claude Mallet is a registered dietitian and a nutrition research analyst at Health Canada. Marie-Claude has extensive experience in food composition and nutrition promotion having participated in the last release of Canada's Food Guide. Prior to joining the Federal Government she was the Health Check program Nutrition Manager at the Heart and Stroke Foundation of Canada.

Carrie Martin

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 and a member of the Academy of Nutrition and Dietetics. In her current position, she works on the maintenance and development of the Food Patterns Equivalents Database (FPED)

	and the Food and Nutrient Database for Dietary Studies (FNDDS). Both databases are used to analyze foods reported in the 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 USDA Food Surveys Research Group website.
	**Diane Mitchell** Diane C. Mitchell, M.S., R.D., received her graduate degree in nutrition from the Pennsylvania State University and is a Registered Dietitian with membership in the Academy for Nutrition and Dietetics and the American Society for Nutrition. She served as an Associate Research Professor and the Director of the Diet Assessment Center in the Department of Nutritional Sciences at The Pennsylvania State University where she had been for over 30 years. In 2022, she took on a new position as Program Director for the Individualized Dietary Exposure Assessment (IDEA) Center at the Institute for Advancing Health Through Agriculture at Texas A&M. The IDEA Center integrates diet assessment, biomarkers, and data science to study how diet differentially affects individuals and population subgroups to reduce risk of chronic disease and promote health equity. Her research interests include developing, validating and improving various diet assessment methodologies, nutrient and food database development, dietary patterns, diet quality and population-based dietary exposure research. She has been actively involved in NNDC for well over 20 years and has been a member of the NNDC Steering Committee since 2008. She has served on several NNDC committees, as Program Chair, Program Co-chair and as Chair of the NNDC Executive Committee.
	**Alanna Moshfegh** Alanna Moshfegh, M.S., R.D., is Research Leader, Food Surveys Research Group at the Beltsville Human Nutrition Research Center for the United States Department of Agriculture. In her current position, Ms. Moshfegh is responsible for directing What We Eat in America, the dietary interview component of the National Health and Nutrition Examination Survey. 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. She directed development and validation of USDA's Automated Multiple-Pass Method, a 5-step 24-hour

	dietary recall system used in What We Eat in America and in research studies in the U.S. and internationally. Her research interests focus on food consumption and nutritional adequacy, dietary assessment, food and nutrition policy, and dietary guidelines. Ms. Moshfegh is a member and Fellow of the American Society for Nutrition and a member of the Academy of Nutrition and Dietetics. She 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.
	**Deepesh Pandey** Dr. Deepesh Pandey, a scientist whose journey has spanned from the intricacies of vascular biology to the real-world impact of public health. Dr. Pandey's research has shed light on cardiovascular disease, and his passion for science extends beyond the lab. Currently, Dr. Pandey is leading projects at the USDA to ensure the quality and composition of dietary supplements. His expertise is instrumental in developing resources that empower consumers and contribute to the development of high-quality supplements, ultimately benefiting public health. Dr. Pandey is also dedicated to mentoring the next generation of scientists, fostering a love for discovery and its real-world applications.
	**Natalie Partridge** 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.
	**Pamela Pehrsson** Pamela Pehrsson, PhD, is a research nutritionist with 40 years of experience at the USDA. She received her PhD and MS in Nutrition from University of Maryland and BS from Virginia Tech in Nutrition/Animal Science and is Lead Scientist for the Food and Nutrition Research group, Methods and Application of Food Composition Laboratory (MAFCL), Acting Research Leader of MAFCL, BHNRC, ARS, USDA and prior, Research Leader of the Nutrient Data Laboratory. Research includes data

	development for foods; NIH-USDA Dietary Supplement Ingredient Database; Human Milk Composition Initiative; carbohydrates in foods/impact of processing and cooking; Special Interest Databases e.g., iodine, nitrates/nitrites, purines, and glucosinolates. She has presented nationally and internationally and taught courses on development of food composition databases and national food sampling, and coordinated study of indigenous foods of American Indians/Alaska Natives. She has authored 150+ papers and food composition databases and presented on food sampling plans, analyses, databases, and research, collaborating with colleagues nationally and internationally. She has supported vitamin D research to support the DRIs. She is a member of the CODEX Committee on Nutrition and Foods for Special Dietary Uses Delegation, an American Society of Nutrition (ASN) Fellow, and was USDA Co-Executive Secretary on the 2005 Dietary Guidelines for Americans.
	**Natalia Rebolledo** Dr. Rebolledo is a Dietitian with a Master's in Pediatric Clinical Nutrition from INTA of the University of Chile and Ph.D. in Nutrition with a minor in Epidemiology at the University of North Carolina at Chapel Hill. She is currently a postdoctoral researcher at the Center for Research in Food Environments and Prevention of Nutrition-Related Chronic Diseases (CIAPEC) from the Institute of Nutrition and Food Technology (INTA) of the University of Chile. Her research interest is related to dietary intake at the population level and its association with chronic non-communicable diseases, with a special focus on sweeteners. She is also the principal investigator in a Fondecyt Grant titled: "Association between sucralose intake and metabolic outcomes in Chilean infants, preschoolers, and adolescents".

Judi Spungen

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 and Program Committees and served 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.

Stephanie Wilson

Dr. Stephanie M.G. Wilson is a postdoctoral research fellow at the USDA ARS Western Human Nutrition Research Center in Davis, California. Her work is a part of a research initiative between USDA-ARS scientists and the Texas A&M Institute for Advancing Health Through Agriculture. Her research utilizes natural language processing and machine learning to delve into how intake of dietary polyphenols relates to human health outcomes, exploring the role of gut microbiome as a key facilitator. Dr. Wilson has a PhD and MS from Montana State University and a BS from Indiana University.

Xianli Wu

Dr. Xianli Wu is currently a chemist at USDA-ARS Beltsville Human Nutrition Research Center. His current research focuses on the analysis of nutrients and dietary bioactive compounds, the factors the influence their compositions in foods, and their impact on human health. Dr. Wu obtained his doctoral degree majoring in Natural Medicinal Chemistry from China Pharmaceutical University in 2000. He started his career as a postdoctoral fellow and then principal investigator and analytical core director at USDA-ARS Arkansas Children's Nutrition Center (ACNC). His research at ACNC focused primarily on the analysis of dietary bioactive compounds, and

	the disease preventive effects of certain dietary factors. From 2012-2015, Dr. Wu worked at the Hershey Company as a staff scientist, where he led research projects in 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 over 100 peer-reviewed papers and 11 book chapters, and has also 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).
	**Bingjie Zhou** Bingjie Zhou is a second-year Ph.D. student at the Friedman School of Nutrition Science and Policy at Tufts University in the Nutrition Epidemiology and Data Science division. She has expertise in collecting, cleaning, and analyzing publicly available nutrition and health data and creating interactive visuals using various software like R, SAS, and Tableau. She has been involved in several data-intensive projects and used visual analytic tools to detect individual weight trajectory patterns and better communicate with flu and foodborne diseases. Her current research primarily focuses on creating a visual analytic framework for investigating time-series nutrition outcomes at the individual, national, and global levels.

Poster Presenter Photos and Bio Sketches

Birdem Amoutzopoulos
Birdem Amoutzopoulos is a nutritionist working as dietary and nutrient data manager in the Nutrition Measurement Platform in University of Cambridge. She takes primary responsibility for managing dietary data and related databases, including supporting the development of innovative approaches for data capture, coding and administration. She is responsible for the management of the Nutrient Databank in conjunction with Office for Health Improvement and Disparities for the UK National Diet and Nutrition Survey (NDNS). Her role includes development and management of collection and coding systems. Birdem has supported various dietary assessment and food composition projects. Previously, she worked in EU projects and clinical trials. She has a PhD in Nutrition.

Lesley Andrade
Lesley Andrade is a PhD Candidate in the School of Public Health Sciences 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- and no-calorie sweeteners and applying an innovative method to estimating usual intake in Canada and abroad.

Rachele Bianco
Rachele Bianco, Dietitian, MSc, PhD student in Biomedical Sciences and Biotechnology at the University of Udine. Involved in several research projects focused on nutritional epidemiology (e.g., reproducibility of a posteriori dietary patterns in Italy), and collaborating with Artificial Intelligence Laboratory of Udine (AILAB Udine) to development of machine learning algorithms with the aim to elaborate innovative dietary assessment tools. Co-author of a scientific publication investigating the role of pizza consumption in rheumatoid arthritis disease activity (ORCID 0009-0001-4268-8654).

Amber Brown McFadden
Amber Brown McFadden is a Registered Dietitian Nutritionist with 15 years of experience in nutrition research. Her expertise supports development of data collection software, such as the FoodLogger mobile app and NCI's Automated Self-Administered 24-Hour Recall (ASA24). She monitors the quality of food and nutrition data and develops, adapts, and links dietary databases for nutrient research and mixed-mode data collection. For the FoodAPS-2 Field Test she led software development, receipt and nutrient coding, and data processing for food logs. Additionally, she supervises dietary coders and conducts quality control reviews of dietary intakes and school menus.

Giulia Carioni
Giulia Carioni, Dietitian, MSc, PhD student in Clinical and translational medical sciences at the University of Udine. Member of the Technical Scientific Association of Food, Nutrition and Dietetics (ASAND) and the Italian Society of Human Nutrition (SINU). Collaborating with the Division of Epidemiology and Biostatistics, European Institute of Oncology (Italy, Milan), I'm Involved in numerous research projects focused on studying the relationship between diet and cancer and promoting a healthy lifestyle. Currently working on updating the Food Composition Database for Epidemiological Studies in Italy (BDA). Co-author of scientific publications.

Kellie Casavale
Kellie Casavale is the Senior Science Advisor for Nutrition in the Office of Analytics and Outreach in CFSAN, FDA. She supports cross-Center and cross-Departmental collaborations, particularly those related to the Dietary Guidelines for Americans (DGAs), Closer to Zero, and maternal and child populations. She has led in the Dietary Guidelines process through roles at USDA/CNPP, HHS/ODPHP, and now FDA for four cycles of the DGAs. She supported the development of the first Dietary Patterns for children under 2 years with 2020 Dietary Guidelines Advisory Committee. Other leadership roles include the U.S. Federal Data Consortium on Pregnancy and Birth to 24 Months, the Human Milk Composition Initiative in the U.S. and Canada, and maternal and child health projects in CDC's National Health and Nutrition Examination Surveys (NHANES). She contributes leadership for Closer to Zero and the FDA/EPA Fish Advice, elucidating the ways nutrition can reduce the adverse developmental effects of potential

	exposures to environmental chemical contaminants from food. Dr. Casavale has a BS in Biology from Lander University, a PhD in Nutrition Science from the University of North Carolina - Greensboro and is a Registered Dietitian.
	**Bess Caswell** Bess Caswell is a Research Nutritionist with the US Department of Agriculture, Agricultural Research Service. Her research interests include dietary assessment methodology, public health nutrition, food- and agriculture-based nutrition interventions, and diet as an exposure in gut and immune health outcomes.
	**Sara Crawford** Sara Crawford is a mathematical statistician with the Food Surveys Research Group within the Agricultural Research Service at the USDA. She has a bachelor's degree in mathematics and economics from Kenyon College and a doctorate in biostatistics from Emory University. She has previously worked as a statistician with the federal government and as a statistical educator at the college level.
	**Natalia Fanelli** Natalia S. Fanelli is a master's student at University of Illinois at Urbana-Champaign, USA. She earned her bachelor's degree in Brazil at Sao Paulo State University in 2018 and started working at the Monogastric Nutrition Laboratory at the U of I. After 3 years of experience, she decided to pursue her master's degree. Her dissertation examines the additivity of protein quality in combined meals and the evaluation of protein quality in human foods using pig as a model.
	Federica Fiori Federica Fiori, MSc in Human Nutrition, PhD in Biomedical Sciences and Biotechnology. Member with secretarial duties of a regional section of the Italian Society of Human Nutrition (SINU). Currently working as a postdoctoral research fellow at the University of Udine on different topics, including: diet sustainability, plant-based meat analogues, food supplement consumption among amateur athletes, gluten free food products and celiac disease. Collaborating to the update of the Italian Food Composition Database for Epidemiological Studies in Italy (www.bda-ieo.it). First author of 4 scientific publications and co-author of 16 (Scopus Author ID:

	57216921208).
	**Patrizia Gnagnarella** Patrizia Gnagnarella (RD, PhD). I'm a research dietitian of the Division of Epidemiology and Biostatistics at the European Institute of Oncology (IEO), with over 20 years of experience in methodological aspects of nutritional epidemiology and in developing tools for the determination of nutritional habits, to study the influence of diet on cancer risk, cancer prevention or prognosis. She published more than 50 papers in peer-reviewed journals, in close collaboration with different divisions and units at the IEO. I'm also the project manager of the Italian food composition database for use in epidemiological studies which has become a major instrument for the conduction of nutritional studies in Italy. This collaborative project led to the publication of the book "The Food Composition Database for Epidemiological Studies in Italy" (Salvini, 1998), the creation of a dedicated website (www.ieo.it/bda) and more recently of a new publication "Food Composition Database for Epidemiological Studies in Italy. Compact edition" (Gnagnarella ISBN 9788833595382; 2022).
	**Cindy Granados Evans** Cindy Granados Evans is a Registered Dietitian originally from Bogotá, Colombia. She obtained her first undergraduate degree in Human Nutrition and Dietetics at the National University of Colombia. After moving to United States in 2012, she decided to pursue further studies by obtaining a bachelor's degree in Human Environmental Sciences at the University of Alabama, and a master's degree in Family and Consumer Sciences at the North Carolina Central University. Cindy has worked as a research specialist with the Global Food Research Program UNC-Chapel Hill since 2018. Her role has focused in project and data management of Latin American country projects, particularly Chile and Colombia. After five years of experience in public health research, and having the opportunity to immerse herself in the fascinating world of the dietetics and nutrition in two different countries, Cindy has reaffirmed her passion for her career and the interests of supporting public and nutrition health interventions, that promote healthy food environments, and seek to improve the quality of life of all populations, especially ethnic groups prompted to be affected by health disparities.

	**Katherine Hoy** M. Katherine Hoy is a Nutritionist with the Food Surveys Research Group. Using What We Eat in America, NHANES data, she analyzes and reports on dietary intake of the population, including nutrient intake, food patterns and diet quality.
	Caroline Joyce Caroline Joyce is a PhD candidate at the University of California Davis. Her research interests include dietary assessment, global nutrition, food- and agriculture-based nutrition interventions, and maternal and child health.
	**Colin Kay** Dr. Kay is a professor of translational nutrition in the department of pediatrics at the University of Arkansas for Medical Sciences, Director of Precision Health Research, Arkansas Children's Research Institute (ACRI), and Director of the Metabolomics and Analytical Chemistry Research Core, Arkansas Children's Nutrition Center (ACNC). Dr. Kays research is centered on analytical and nutritional biochemistry with focus on phytochemical intake, their microbial metabolites and biological activities. He has developed and validated methods for the recovery and quantification of dietary phytochemical metabolites from animal and human clinical samples over the past 20 years, and has identified many previously unreported metabolites, many of which possess cardiometabolic activities. To date these methods have been applied to studies investigating the impact of diet, obesity, exercise and exercise recovery. Since 2016 he has been developing a dietary phytochemical metabolome database (P-MetDB) and quantitative metabolomics workflow to support precision nutrition and health research initiatives. The database was extended to a cloud knowledge database (MetaboFood.org) with an interactive data visualization interface, comprising diet/food composition, pathway, disease, and mass spectrometry data. Presently he in a Co-I in two National precision health initiatives, NIEHS HHEAR (1U2CES03085) and NIH NPH (1U24CA268153-01), which have a focus on diet, health, and bioinformatics driven data integration.

Donna Miles
Donna Miles earned a PhD from the Institute for Behavioral Genetics, University of Colorado Boulder and is currently the Research Programming Director for the Carolina Population Center at the University of North Carolina at Chapel Hill. As programming manager for the Global Food Research Program (GFRP), she provides data management and programming support for faculty and students. The GFRP team collaborates with diverse partners around the world to carefully evaluate emerging unique, local and national-level policy interventions aimed at improving the food environment and reducing non-communicable diseases on a population level. For more information, please visit globalfoodresearchprogram.org.

Suzanne Morton
Suzanne Morton is a Nutrition Research Scientist with the American Society for Nutrition and works as a full-time contractor in the Food Surveys Research Group in the Beltsville Human Nutrition Research Center, USDA Agricultural Research Service. She conducts research and updates ingredients, food codes, and nutrient profiles of food and beverages in the USDA Food and Nutrient Database for Dietary Studies (FNDDS) used in What We Eat in America (WWEIA), NHANES, and develops FNDDS files for public release. She also conducts research using the WWEIA data on topics such as added sugars intake, snacking patterns and sources of food and beverages in the U.S. Prior to joining ASN/USDA, Ms. Morton conducted research and analysis of health care services at the National Committee for Quality Assurance. She received her Master of Public Health in Epidemiology from George Washington University, her Master of Business Administration from Northwestern University, and her Bachelor of Science in Commerce from the University of Virginia.

Deepesh Pandey
Dr. Deepesh Pandey, a scientist whose journey has spanned from the intricacies of vascular biology to the real-world impact of public health. Dr. Pandey's research has shed light on cardiovascular disease, and his passion for science extends beyond the lab.
Currently, Dr. Pandey is leading projects at the USDA to ensure the quality and composition of dietary supplements. His expertise is instrumental in developing resources that empower consumers and contribute to the development of high-quality supplements, ultimately benefiting public health. Dr. Pandey is

	also dedicated to mentoring the next generation of scientists, fostering a love for discovery and its real-world applications.
	**Eunji Park** My name is Eunji Park, and I work as a researcher at the National Institute of Agricultural Sciences. My major is Food Nutrition, and I have obtained a Master's degree. My responsibilities include building The Korean Food Composition Table. My team selected over 1,000 food items commonly consumed in Korea based on the results of the Korean National Health and Nutrition Examination Survey. Approximately 150 raw materials and processed food items are collected and analyzed annually. The target nutrients analyzed by collaborative labs, such as sugars, selenium, iodine, and biotin, have been increased to 130.
	**Sonia Pomerleau** A 2000 graduate of Université Laval, Sonia Pomerleau is a dietician and member of the Ordre des diététistes nutritionnistes du Québec (ODNQ). She undertook graduate studies and completed her Master's degree in nutrition in 2002, focusing on various components of citrus fruits and their impact on lipoproteins. Sonia then worked for 6 years in Dr. Charles Couillard's team at INAF, where she focused on the effects of antioxidant consumption on plasma lipid concentrations, lipoprotein oxidation and inflammatory processes. Since 2009, she has been working in Dr Véronique Provencher's team, where she coordinates and directs studies focusing on dietary behaviours. At the same time, Sonia is part of the Innovation Support Service, providing agrifood industries with customized services to support their projects aiming at improving nutritionnal quality of their food products. Finally, Sonia participated in the development and implementation of the Food Quality Observatory. She is currently in charge of sectorial studies to characterize and monitor the nutritional quality of the food supply.

Rhonda Sebastian
Rhonda Sebastian is a nutritionist in the Food Surveys Research Group, Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA. In this capacity, she analyzes, interprets, and disseminates results from What We Eat in America (WWEIA), the dietary intake component of the National Health and Nutrition Examination Survey (NHANES). She has published numerous journal articles, online dietary data briefs, abstracts, and reports describing findings concerning American diets using the WWEIA, NHANES data.

Judi Spungen
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 and Program Committees and served 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.

Suma Vavilala
Suma Vavilala graduated from University of Maryland Baltimore County (UMBC) with a PhD in analytical chemistry in 2010. She has over twelve years of industry experience as an analytical chemist. She worked as a Research and Development chemist at Pharmaceutics international Inc (PII) for eight years. At PII her focus of the work was to develop and validate assay and impurity methods for drug substances, drug products, and Active Pharmaceutical Ingredients (API). She worked as Scientist II at Becton Dickinson Advanced Bioprocessing (BDAB) for three years. As a scientist II at BDAB her focus was to develop HPLC-UV, HPLC-FLD, HPLC-ECD for small molecules in peptone, chemically defined (CD) cell

	culture media and CD supplements and raw materials. She worked as Research scientist at Next Breath, an Aptar company for half a year. At Next Breath, she worked with complex instrumentation such as Next Generation Impactor (NGI), Mighty Runt Nasal Spray Actuation Station and Auto Actuation of Nasal Spray and Metered Dose Inhaler using Proveris Actuators. She joined Dietary Supplement Ingredient Database (DSID) group at USDA October 2022 as a senior research manager, since then she has been involved in development of dietary supplement databases for Cranberry, and Methylfolate. Also, involved in development of Purine special interest database.
	**Anna Waller** Dr. Anna Waller is a Nutritionist with the U.S. Department of Agriculture's Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group in Beltsville, Maryland. In this role, she works on USDA databases supporting U.S. national dietary surveillance in the What We Eat in America, National Health and Nutrition Examination Survey. Prior to this role, she was a Presidential Management Fellow at the USDA-Agricultural Marketing Service where she worked on food labelling policies such as the National Bioengineered Food Disclosure Standard and the National Organic Program standards. She received her Ph.D. in Food Science and Human Nutrition from the University of Illinois at Urbana-Champaign in 2020 and her B.S. in Chemistry, Spanish, and Latin American Studies from the University of Wisconsin-Eau Claire in 2016.
	Monica Whent Monica Whent is a Nutritionist at USDA ARS Beltsville Human Nutrition Research Center, MD. Monica Whent has a PhD in Food Science focusing on food chemistry and functional foods. She has studied the effects of agriculture and processing methods on bioactives in foods. She previously worked at the University of Maryland.

Thank you all for being part of this year's NNDC. We hope to see you again in 2026 at our 44th National Nutrient Databank Conference in Washington D.C., USA!