

Databases for Characterizing Foods in the “As Eaten” Form

Elizabeth Condon, M.S., R.D.

36th National Nutrient Databank Conference
March 27, 2012

MATHEMATICA
Policy Research

Key Issues

- **Most databases designed for assessing dietary intake**
 - Foods as eaten
- **Characterize diets relative to dietary recommendations**
 - Nutrients
 - Guidance-based food groups
- **Increasing interest in food offerings and acquisitions**
- **Challenges in using databases for purposes other than assessing individual-level intake**

Databases for Foods As Eaten

- **USDA National Nutrient Database for Standard Reference (SR)**
- **USDA Food and Nutrient Database for Dietary Studies (FNDDS)**
- **MyPyramid Equivalents Database (MPED)**
(soon to be *Food Patterns Equivalents Database* [FPED])
- **NCC Food and Nutrient Database**
(Nutrition Data System for Research [NDSR])

NCC = Nutrition Coordinating Center, University of Minnesota.

3

MATHEMATICA
Policy Research

Overview of SR

- **Intended use**
 - Primary source of nutrient data in United States
 - Foundation for most other nutrient databases
- **Features**
 - More than 7,900 foods
 - 146 nutrients and food components
 - Includes foods in raw and prepared forms
(as purchased and as eaten forms)
 - Includes ingredients that make up food mixtures
 - Updated annually
 - Available at no cost

4

MATHEMATICA
Policy Research

Overview of FNDDS

- **Intended use**
 - Processing dietary recalls collected for WWEIA, NHANES
 - Dietary intake data for other studies
- **Features**
 - Includes more than 7,000 foods
 - Includes mixtures, ethnic foods, and brand-name items
 - 65 nutrients and food components
 - Nutrient values based on SR
 - Links to SR at food or ingredient level
 - Version 5.0 just released (used for WWEIA 2009–2010)
 - Updated every 2 years
 - Available at no cost

WWEIA = What We Eat in America; NHANES = National Health and Nutrition Examination Survey.

5

MATHEMATICA
Policy Research

Overview of Equivalents Database (MPED)

- **Intended use**
 - WWEIA, NHANES
 - Translates foods into guidance-based food groups
- **Features**
 - Provides equivalent amounts for 32 MyPyramid groups and subgroups
 - Disaggregates foods into ingredients
 - Includes foods in FNDDS
 - Links directly to FNDDS, but not to SR
 - Current version (2.0) for WWEIA 2003–2004
 - Available at no cost



6

MATHEMATICA
Policy Research

MPED Groups and Subgroups

<p style="text-align: center;">Fruit Group <i>cup equivalents</i></p> <hr/> <p>Total fruits Citrus fruits, melons, berries Other fruits</p>	<p style="text-align: center;">Milk Group <i>cup equivalents</i></p> <hr/> <p>Total milk Milk Yogurt Cheese</p>	<p style="text-align: center;">Meat and Beans Group <i>ounce equivalents</i></p> <hr/> <p>Meat, poultry and fish 6 subgroups Eggs Cooked dry beans and peas Soybean products Nuts and seeds</p>
<p style="text-align: center;">Vegetable Group <i>cup equivalents</i></p> <hr/> <p>Total vegetables Dark-green vegetables Orange vegetables White potatoes Other starchy vegetables Tomatoes Other vegetables</p>	<p style="text-align: center;">Grain Group <i>ounce equivalents</i></p> <hr/> <p>Total grain Whole grain Non-whole grain</p>	<p style="text-align: center;">“Extras”</p> <hr/> <p>Solid fats (<i>grams</i>) Added sugars (<i>tsp</i>) Alcoholic beverages (<i>drinks</i>)</p>
	<p style="text-align: center;">Oils <i>grams</i></p> <hr/> <p>Discretionary oil</p>	

7

MATHEMATICA
Policy Research

Linking USDA Databases

FNDDS
Peanut butter and jelly sandwich
(42302010)

→

MPED
Peanut butter and jelly sandwich
(42302010)

↓

FNDDS recipe:
Peanut butter and jelly sandwich

	Ingredient	Code
1	Bread, white, commercially prep	18069
2	Peanut butter, smooth style, with salt	16098
3	Jellies	19300

→ → →

SR

8

MATHEMATICA
Policy Research

Overview of NCC Food and Nutrient Database (NDSR)

- **Uses**
 - Dietary recalls, menus, food records
- **Features**
 - Includes more than 18,000 foods and 7,000 brand-name items
 - 162 nutrients and dietary components
 - Food group serving count system (different from MPED)
 - Ability to add missing foods
 - Updated annually
 - Fee-based

NCC = Nutrition Coordinating Center; NDSR = Nutrition Data System for Research.

9

MATHEMATICA
Policy Research

Using As Eaten Databases for Food Offerings or Acquisitions

10

MATHEMATICA
Policy Research

Food Offerings or Acquisitions

- Restaurants and fast-food outlets
- Grocery stores and markets
- Worksites and cafeterias
- Schools and day care settings
- Food banks and pantries
- Nutrition assistance programs
 - School lunch and breakfast menus
 - SNAP food purchases
 - WIC food packages
 - Congregate and home-delivered meals (older adults)

SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

11

MATHEMATICA
Policy Research

Database Challenges and Limitations

- Foods differ in nutrient and ingredient content
- Foods modified in FNDDS
- Foods reported in the as purchased form (raw, dry, or unprepared foods)

12

MATHEMATICA
Policy Research

Foods Differ in Nutrients and Ingredients

- Restaurant foods
- Commercially prepared school foods



- Lower in calories, fat, saturated fat
- Contains whole grain ingredients

(per 100 g)	The MAX® Whole Grain Pepperoni Pizza	FNDDS Pizza with meat
Calories	204 kcal	302 kcal
Total Fat	7.6 g	14.0 g
Saturated Fat	2.6 g	5.2 g
Dietary Fiber	3.0 g	1.6 g
Ingredients:	<ul style="list-style-type: none"> • Whole grain wheat flour • Reduced fat pepperoni 	<ul style="list-style-type: none"> • Wheat flour, white • Pepperoni • Sausage • Ground beef (75% lean)

- Potential solution: Impute nutrient and food group data using known nutrient and ingredient information
 - ARS, Food Surveys Research Group; and NCC

13

MATHEMATICA
Policy Research

Foods Modified in FNDDS

- MPED food group data
 - Includes modified recipes only from WWEIA 2001–2004
 - Food group data not available for other modified recipes

FNDDS
Peanut butter and jelly sandwich
W/ WHOLE WHEAT BREAD



MPED
Peanut butter and jelly sandwich
(42302010)

- Potential solution: Use ingredient-level recipe
 - Link each ingredient (if possible) to MPED and re-calculate food groups

14

MATHEMATICA
Policy Research

Foods in the As Purchased Form

- **Foods reported in dry, raw, or unprepared form**
 - Individual or household food purchases
 - Foods acquired by schools
- **Source of nutrient and food group data**
 - Nutrient data in SR; no food group data in MPED
 - FNDDS/MPED = foods in as eaten form
- **Potential solution: Transform foods to as eaten form**
 - Use nutrient/food group data from FNDDS/MPED
 - Apply yield factors to adjust weight of food

Foods
as purchased



Foods
as eaten

15

MATHEMATICA
Policy Research

Yield Factors

- **Adjustments needed to account for:**
 - Refuse (inedible parts of food)
 - Losses or gains in cooking or preparation
- **No comprehensive, linkable database with yield factors**
 - SR
 - FNDDS
 - USDA Agricultural Handbook 102 (from 1975)
 - USDA Food Buying Guide for Child Nutrition
- **Can't apply yield factors to all foods**
 - Foods with ingredients added during preparation (for example, brownie mix or salad dressing mix)

16

MATHEMATICA
Policy Research

Future Data Needs

- Comprehensive data source with yield factors

Foods
as purchased



Foods
as eaten

- Guidance-based food group data for ingredients
 - Foods as purchased (raw or dry ingredients)
 - Modified recipes
- Expanded nutrient and food group data for restaurant foods and school foods