Dietary Data: What To Know and How to Use It

- Dietary Data Collection and Products
  Alanna Moshfegh

- Data Preparation Steps for Dietary Analysis
  Randy LaComb

- Dietary Data Analysis Using SAS
  Joe Goldman
Dietary Data Collection and Products

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Food Surveys Research Group
Beltsville Human Nutrition Research Center
Agricultural Research Service
US Department of Agriculture
National dietary data collection . . .

Partnership between USDA and DHHS

What We Eat in America

NHANES
National Health and Nutrition Examination Survey

- **Objective:** Assess health and nutritional status of children and adults in the U.S.

- **Annual national sample 5,000 persons**

- **Data released publicly in 2-year cycles**
Dietary Interview Component of NHANES

**Partnership:** Department of Health & Human Services
US Department of Agriculture

**National Survey:** What We Eat in America, NHANES

**Method:** USDA’s Automated Multiple Pass Method used since 2002

**Dietary Collection:** 2 days of dietary intake data

**Sample:** 5,000 individuals each year
Dietary Component

- USDA Automated Multiple Pass Method—24-hour dietary recall instrument

- Interview administration
  - Day 1: in-person
  - Day 2: telephone
  - Bilingual dietary interviewers

- Sample: all ages
  - Day 1: 100% sample
  - Day 2: 100% sample
Dietary Interview Features

In-Person Interview—Day 1

- interview at MEC on exam day
- 2D and 3D food models
- appointment set for telephone interview
- food measurement aids provided for use during telephone interview
NHANES Mobile Exam Center
Dietary Interview Features

Telephone Interview—Day 2

- interview 3-10 days post-exam
- 2D and limited 3D food models
  - USDA Food Model Booklet
  - measuring cups and spoons
  - ruler
  - two household spoons
USDA Automated Multiple-Pass Method

Step 1
Quick List
... listing of all foods and beverages

Step 2
Forgotten Foods
... Probes for forgotten food items

Step 3
Time & Occasion
... Ask for each food

Step 4
Detail Cycle
... Standardized probes and questions for each food

Step 5
Final Probe
... A final probe for anything else
Step 1: Quick List

First, we'll make a list of the foods you ate and drank yesterday, Tuesday. It may help you remember what you ate by thinking about where you were, who you were with, or what you were doing, like eating out, or watching television.

Please tell me everything you had to eat and drink all day yesterday, Tuesday, from midnight to midnight. Include everything you had at home and away, even snacks and drinks... I'll ask you for specific details and amounts of the foods in a few minutes. **At this time, just tell me what you had.**
Step 2: Forgotten Foods List

Other categories include:

- Alcoholic beverages
- Sweets
- Savory snacks
- Fruits and vegetables and cheese
- Breads and rolls
- Anything else
 Forgotten Foods

Quick List

50% remembered foods

<table>
<thead>
<tr>
<th>Type of foods</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>beverages</td>
<td>40</td>
</tr>
<tr>
<td>sweets</td>
<td>20</td>
</tr>
<tr>
<td>fruits, vegetables, cheese</td>
<td>15</td>
</tr>
<tr>
<td>savory snacks</td>
<td>13</td>
</tr>
<tr>
<td>breads and rolls</td>
<td>9</td>
</tr>
<tr>
<td>anything else</td>
<td>2</td>
</tr>
</tbody>
</table>

Importance of “Forgotten Foods”

- 50% remembered foods

Quick List

Time & Occasion

Detail Cycle

Final Probe
Step 3: **Time and Occasion**

**Blaise Data Entry - S:\AMPM2.1\Testing\Instruments\Intake**

<table>
<thead>
<tr>
<th>Intake</th>
<th>Sorted_RFL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassandra (10, F)</td>
<td>N1.001.IN.01.001</td>
</tr>
</tbody>
</table>

**About what time did you **begin** to eat/drink the Coke?**

<table>
<thead>
<tr>
<th>Food Name</th>
<th>Comment</th>
<th>Time</th>
<th>Occasion</th>
<th>Occasion, OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food[1]</td>
<td>Pancakes</td>
<td>8:00AM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Food[2]</td>
<td>Milk</td>
<td>8:00AM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Food[3]</td>
<td>Pizza</td>
<td>12:00PM</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Food[4]</td>
<td>Coke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food[5]</td>
<td>Apple</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food[6]</td>
<td>XXX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food[7]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Time entered here*
Step 3: **Time and Occasion**

What would you call this eating occasion?

- 1. Breakfast
- 2. Lunch
- 3. Dinner
- 4. Supper
- 5. Brunch
- 6. Snack
- 7. Drink
- 8. Feeding-infant only
- 9. Extended consumption
- 10. Desayuno
- 11. Almuerzo
- 12. Comida
- 13. Merienda
- 14. Cena
- 15. Entre comidas
- 16. Botana
- 17. Bocadillo
- 18. Tentempié
- 20. Other, Specify
### Step 3: Time and Occasion

**About what time did you begin to eat/drink the Coke?**

<table>
<thead>
<tr>
<th>Food Name</th>
<th>Comment</th>
<th>Time</th>
<th>Occasion</th>
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</thead>
<tbody>
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<td>Pancakes</td>
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<td>8:00AM</td>
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<td></td>
<td>12:00PM</td>
<td>2</td>
</tr>
<tr>
<td>Coke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

---

The occasion entered here.
Step 4: **Detail Cycle**

Four Tasks to be completed:

- collect **description** of each food
- **amount** consumed
- **addition(s)** for each food
- **review** 24-hr day
Percent of Foods Reported by Probes

Foods reported/year = ~125,000
Average number of probes/food = 6
Maximum number of probes = 59

Source: What We Eat in America, NHANES 2005-2006, all individuals, 2 days
Step 5: Final Probe

Do you remember anything else you ate or drank yesterday - even small amounts, anything you ate in the car, at meetings, or while shopping, cooking or cleaning up?
Objective

- Validate AMPM comparing energy intake with total energy expenditure measured by the doubly-labeled water technique

Study Design

- 524 adults from Washington DC - Baltimore area
- 5 cohorts, July 2002 – September 2003
- 14-day study period for each subject
- 3 24-hr recalls - - first in person, others by telephone
- Numerous other health and physical activity measures
Results of AMPM Validation Study

Energy intake was under-reported by:
- 11% overall
- <3% for normal weight
- 16% for over weight

Source: Moshfegh et al, AJCN 2008:88:324-32
How do we interview children?

- < 6 years -- proxy respondent
- 6 - 8 years -- proxy respondent and child
- 9 - 11 years -- child and proxy-assisted
- 12 and over -- child
Data Retrieval

- children <12 years
- eating occasion reported … but
  - with no foods
  or
  - with some foods
Food and Nutrient Database for Dietary Studies (FNDDS)

- Used to code foods and amounts to determine nutrient content of foods
- Food descriptions, mainly generic
  ~ 7,000 food codes
- Food portions and weights
  30,000+ portions in grams
- Food energy & 64 nutrients based on USDA National Nutrient Database for Standard Reference, 24
Food and Nutrient Database for Dietary Studies

- Updated for each 2-year WWEIA data release

<table>
<thead>
<tr>
<th>FNDDS version</th>
<th>WWEIA cycle</th>
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</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2001-2002</td>
</tr>
<tr>
<td>2.0</td>
<td>2003-2004</td>
</tr>
<tr>
<td>3.0</td>
<td>2005-2006</td>
</tr>
<tr>
<td>4.1</td>
<td>2007-2008</td>
</tr>
<tr>
<td><strong>5.0</strong></td>
<td><strong>2009-2010</strong></td>
</tr>
</tbody>
</table>

- [www.ars.usda.gov/ba/bhnrc/fsrg](http://www.ars.usda.gov/ba/bhnrc/fsrg)
- On CD in packet
Main Food Descriptions

- **Food Code:** 56205430 (8 digits)
- **Complete description:** (200 Characters)
  Rice, white, cooked, instant, fat added in cooking
- **Food Code:** 58421080
  Sopa de tortilla, Mexican style tortilla soup
8 digit code number is in each food record.

Description is not in food record.

Can link to food descriptions in two ways:

- FNDDS
- Food Code Description File
  - DRXFCD_F
Modification Codes

- Recipe and nutrients adjusted to represent food eaten
- Often reflect type of fat used in cooking
- 2.5% of foods reported
- 6 digit code, variable DR1MC, DR2MC
- Modification Code Description File
  DRXMCD_F in IFF
Combinations are used for...

Two or more foods eaten as a unit

- Items added to main food, eaten together

- Components / ingredients of foods --

  home-prepared & non-fast food sandwiches and salads

- Unusual mixtures not in FNDDS
Welcome to the FOOD SURVEYS RESEARCH GROUP!

Our mission is to monitor and assess food consumption and related behavior of the U.S. population by conducting surveys and providing the resulting information for food and nutrition-related programs and public policy decisions.

WHAT WE EAT IN AMERICA
... source of data on food and nutrient intakes of Americans

<table>
<thead>
<tr>
<th>Data Tables</th>
<th>Usual Intakes DRI's</th>
<th>Data Briefs</th>
<th>Research Articles</th>
<th>Overview FAQs</th>
<th>Documentation Data Sets</th>
<th>Links</th>
</tr>
</thead>
</table>

DIETARY METHODS RESEARCH
... topics in collection of dietary recalls

Salt
Adjustment

Water
Intake

Research
Articles

WHAT'S IN THE FOODS YOU EAT SEARCH TOOL
... search nutrient content of 13,000 commonly eaten foods

FOOD AND NUTRIENT DATABASE FOR DIETARY STUDIES
... foods, portions/weights, nutrients for analyzing dietary data

AUTOMATED MULTIPLE-PASS METHOD
... computerized method to collect 24-hour dietary recalls

Overview

Validation

Study

Research

Articles

MYPYRAMID EQUIVALENTS DATABASE
... MyPyramid equivalents data for analyzing dietary intakes

FOOD INTAKES CONVERTED TO RETAIL COMMODITIES
... convert foods consumed in national dietary surveys to retail-level commodities

<table>
<thead>
<tr>
<th>Data Tables</th>
<th>Overview</th>
<th>Methodology &amp; User Guide</th>
<th>Databases</th>
</tr>
</thead>
</table>

FSRG LISTSERV
... receive announcements about FSRG releases

USDA FOOD SURVEYS, 1935 - 1998
... documentation, questionnaires, reports, data sets
## Dietary Data for Download

### Documentation and Data Sets

<table>
<thead>
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<tr>
<td>Documents (Source: NHANES website)</td>
<td>Day 1 and Day 2</td>
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<td>Demographic</td>
</tr>
<tr>
<td>Codebook, and Frequencies (Source: NHANES website)</td>
<td>Day 1</td>
<td>Day 1</td>
<td></td>
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<tr>
<td>What's New</td>
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<td>Day 2</td>
<td></td>
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<td>Intake Days</td>
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<td>VIEW</td>
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<tr>
<td>Data File Descriptions</td>
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<td></td>
<td>VIEW</td>
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<tr>
<td>Sample Weights</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>VIEW</td>
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<tr>
<td>Variables</td>
<td>VIEW</td>
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<td></td>
<td></td>
<td>Demographic</td>
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<tr>
<td>Nutrients/Food Components</td>
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<td>FNDDS - Version 5</td>
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<td>VIEW</td>
</tr>
<tr>
<td>Download Data (help) (Source: NHANES website, SAS format)</td>
<td>Day 1</td>
<td>Day 2</td>
<td>Day 1</td>
<td></td>
<td>Demographic</td>
</tr>
<tr>
<td>Suggested Citation/Key Words</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>VIEW</td>
</tr>
</tbody>
</table>
What are combination foods?
Combination: number & type

All line items in a combination have the same values for 2 variables:

- **Combination food number** - DR1CCMNM:
  links a group of foods eaten together as a unit

- **Combination food type** - DR1CCMTZ:
  identifies the general type of combination

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bagel</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Cream Cheese</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Coffee</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sugar</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
## Combination Food Types by Percent use

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: Not in combination food</td>
<td>56%</td>
</tr>
<tr>
<td>1: Beverage w/ additions</td>
<td>8</td>
</tr>
<tr>
<td>2: Cereal w/ additions</td>
<td>5</td>
</tr>
<tr>
<td>3: Bread/baked prod w/ adds</td>
<td>4</td>
</tr>
<tr>
<td>4: Salad</td>
<td>4</td>
</tr>
<tr>
<td>5: Sandwiches</td>
<td>11</td>
</tr>
<tr>
<td>6: Soup</td>
<td>&lt;1</td>
</tr>
<tr>
<td>7: Frozen meals</td>
<td>&lt;1</td>
</tr>
<tr>
<td>8: Ice crm/frz yogurt w/ adds</td>
<td>&lt;1</td>
</tr>
<tr>
<td>9: Dried beans/veg w/ adds</td>
<td>3</td>
</tr>
<tr>
<td>10: Fruit w/ additions</td>
<td>&lt;1</td>
</tr>
<tr>
<td>11: Tortilla products</td>
<td>3</td>
</tr>
<tr>
<td>12: Meat, poultry, fish</td>
<td>2</td>
</tr>
<tr>
<td>13: Lunchables</td>
<td>&lt;1</td>
</tr>
<tr>
<td>14: Chips w/ additions</td>
<td>&lt;1</td>
</tr>
<tr>
<td>90: Other mixtures</td>
<td>3</td>
</tr>
</tbody>
</table>

Table in “Key Points” handout and Survey Documentation
Information Collected

- Detailed description and amount of each food and beverage including water consumed during previous 24-hour period
- Additions to the food
- What foods were eaten in combination
- Time each food consumed and name of eating occasion
- Was food eaten at home?
- Source of tap water
- Day of the week
- Daily intake usual, more than or less than usual
- Frequency of fish & shellfish consumption for 1 yr of age and older
- Use and type of salt at table and in preparation
- Intakes of energy and 64 nutrients – vitamin D added in 2007-2008
WHAT WE EAT IN AMERICA
... source of data on food and nutrient intakes of Americans

Data Tables
Usual Intakes
DRI's
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Links
<table>
<thead>
<tr>
<th>Table Title</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary Data Tables</td>
<td>Nutrient Intakes from Food by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Percent of Energy from Protein, Carbohydrate, Fat and Alcohol</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Away from Home: Percent of Nutrients</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Breakfast: Percent of Nutrients</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Lunch: Percent of Nutrients</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Dinner: Percent of Nutrients</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Snacks: Percent of Nutrients</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Snacks: Distribution of Snack Occasions</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
<tr>
<td>Meals and Snacks: Distribution of Meal Patterns and Snack Occasions</td>
<td>by Gender and Age, Race/Ethnicity, Income (In Dollars), Income (as % of Federal Poverty Threshold)</td>
</tr>
</tbody>
</table>
Reports on Usual Intakes Compared to Dietary Reference Intakes

5 Usual Nutrient Intakes from Food 2005-2006 Compared to 1997 Dietary Reference Intakes for Vitamin D, Calcium, Phosphorus, and Magnesium (24-page report)

4 Cholesterol: Usual Intakes from Food and Water, 2003-2006, Compared to the Recommendation of Below 300 mg

3 Dietary Fiber: Usual Intakes from Food and Water, 2003-2006, Compared to Adequate Intakes

2 Sodium: Usual Intakes from Food and Water, 2003-2006, Compared to Adequate Intakes and Tolerable Upper Intake Levels

WHAT WE EAT IN AMERICA
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Data Tables  Usual Intakes  DRI's  Data Briefs  Research Articles  Overview FAQs  Documentation Data Sets  Links
Thank you

To keep informed about dietary data products, join the FSRG listserv at . . .

www.ars.usda.gov/ba/bhnrc/fsrg