Presentation Objectives

- Brief history of NHANES
- Discuss nutrition status components in NHANES
- Focus on NHANES dietary intake component
- Challenges in deciding what dietary data to collect, how to collect it, and how to analyze and interpret it
NHANES: Objectives

- To provide U.S. population-based estimates
  - Health conditions
  - Awareness, treatment and control of selected diseases
  - Environmental exposures
  - Nutrition status and diet behaviors
- In addition, maintain a national biospecimen program

NHANES: History

<table>
<thead>
<tr>
<th>Survey</th>
<th>Dates</th>
<th>Ages</th>
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<tbody>
<tr>
<td>NHES I</td>
<td>1960-62</td>
<td>18-79 years</td>
</tr>
<tr>
<td>NHES II</td>
<td>1963-65</td>
<td>6-11 years</td>
</tr>
<tr>
<td>NHES III</td>
<td>1966-70</td>
<td>12-17 years</td>
</tr>
<tr>
<td>NHANES I</td>
<td>1971-75</td>
<td>1-74 years</td>
</tr>
<tr>
<td>NHANES II</td>
<td>1976-80</td>
<td>6 mo.-74 years</td>
</tr>
<tr>
<td>HHANES</td>
<td>1982-84</td>
<td>6 mo.-74 years</td>
</tr>
<tr>
<td>NHANES III</td>
<td>1988-94</td>
<td>2 mo. +</td>
</tr>
</tbody>
</table>

Survey Dates Ages

- NHANES becomes continuous from 1999+*

<table>
<thead>
<tr>
<th>Survey</th>
<th>Dates</th>
<th>Ages</th>
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</thead>
<tbody>
<tr>
<td>NHANES</td>
<td>1999-2000</td>
<td>All ages</td>
</tr>
<tr>
<td>NHANES</td>
<td>2001-2002</td>
<td>All ages</td>
</tr>
<tr>
<td>NHANES</td>
<td>2003-2004</td>
<td>All ages</td>
</tr>
<tr>
<td>NHANES</td>
<td>2005-2006</td>
<td>All ages</td>
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<tr>
<td>NHANES</td>
<td>2007-2008</td>
<td>All ages</td>
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<tr>
<td>NHANES</td>
<td>2009-2010</td>
<td>All ages</td>
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<tr>
<td>NHANES</td>
<td>2011-2012</td>
<td>All ages</td>
</tr>
<tr>
<td>NHANES</td>
<td>2013-2014</td>
<td>All ages</td>
</tr>
<tr>
<td>NHANES</td>
<td>2015-2016</td>
<td>All ages</td>
</tr>
<tr>
<td>NHANES</td>
<td>2017-2018</td>
<td>All ages</td>
</tr>
</tbody>
</table>

* 2 year cycles for data collection and release

NHANES: Sample

- Civilian, non-institutionalized household population in the U.S.
- Target: 5,000 individuals examined annually
- Currently oversample:
  - Asian Americans (2011-18)
  - African Americans
  - Hispanics
  - Older persons aged 80+
  - Low income whites

* In the past oversampled other groups including pregnant women and adolescents (1999-06) and Mexican Americans (1988-2006); children (2 mo.-5 y) in NHANES III
A four-stage stratified design to select a nationally representative sample

**Stage 1:** Counties

**Stage 2:** Segments

**Stage 3:** Households

**Stage 4:** Participants

**NHANES: Complex Sample Design**

**Data Collection: Household Contact**

**Screener**

**Home Interview**

Traditional CAPI with portable computer

Information on: health conditions, health care use, prescription meds use, dietary supplements use...

**Mobile Exam Center (MEC) Visit**

**MEC Exam: Standardized Automated Data Collection on Health**

**STAFF (16):**
- Physician
- Dentist
- Medical technologists 3
- Phlebotomist
- Dietary interviewers 2
- Private health interviewers 2
- Health technicians 4
- Manager
- Coordinator
**Post-MEC Exam Assessments**

- Day 2 Dietary Recall
- Food Frequency Questionnaire
- Home Urine Collection
- Physical Activity Monitor

**NHANES Nutrition Component**

**What is Nutrition?**

- Dietary intake?
- Self-reported questionnaire data on nutrition behaviors, physical activity, dietary supplement use, etc?
- Physical measures (body measures, blood and urine tests, etc.)?
- All of the above?

**Comprehensive Data on Nutritional Status**

- Anthropometry and body composition
- Dietary intake and supplement use
- Lab component: Biochemical status

**Questionnaires**

- Knowledge, Attitudes, Practices
  - Diet Behavior
  - Family Consumer Behavior Survey
Nutrition Status Assessment

Dietary Assessment

...and more!

Dietary Assessment (continued)

- Food supply
- Food consumption by individuals
- Food composition, knowledge, attitudes and behavior
- Nutrition and related health measurements

Dietary Assessment

- 24-hour dietary recall
- Food diary (not used in NHANES)
- Food frequency questionnaire
- Knowledge/behavior questions
- Supplements/medications use
- Food security/food programs
CSFII and NHANES dietary component integrated into a single survey - WWEIA

Dietary assessment in NHANES
- USDA’s Automated Multiple Pass Method (AMPM)
- Electronic file transmittal
- Multiple-layer quality control
- USDA’s SurveyNet coding system
- USDA’s Survey Nutrient Database

Dietary assessment in NHANES
- Estimated intakes of food energy and 51 dietary components, including 19 individual fatty acids
- Information on salt used in preparation of foods
- Identification of foods eaten in combination
- Time and name of eating occasion
- Where the food was eaten
- Amount of water consumed

Dietary assessment in NHANES
- 24-hour dietary recall
  - Day 1 MEC interview
  - Day 2 telephone interview
- All ages
- Bilingual dietary interviewers
**Dietary behavior assessment: FFQ**

- Milk consumption over the lifespan
- Alcohol consumption patterns
- Salt use at the table
- Frequency of consumption: 
  - vegetables
  - fish and shellfish
  - skin on chicken and visible fat on meat

**Dietary Behavior Assessment**

- Food assistance
- Food availability
- Food-away-from-home frequency and use of convenience foods
- Knowledge/Attitudes/Perceptions
- Economic variables

**Dietary behavior assessment**

- Elderly food consumption patterns
- Eating out habits
- Breastfeeding and other childhood feeding practices
- Use of dietary supplements/antacids
- Self-reported weight during life span, self-perception of weight, and weight control practices

**Dietary Data: Other Key Points**

- International Conference on Dietary Assessment held every three years since early 1990’s
- NHANES held two workshops in 1980’s and 1990’s to discuss what dietary assessment methods to use
- There are other 24-hour dietary recall data collection systems (e.g. ASA24)
Analytic Considerations

Data Processing and Release
- Quality Control
- Editing/cleanup
- Weighting (complex survey)
- Data preparation
- Documentation
- Confidentiality review

Table A1.1: Vitamin C (mg) Intakes from Food, 2001-2002, Compared to Estimated Average Requirements

<table>
<thead>
<tr>
<th></th>
<th>Males and Females</th>
<th>4 - 8</th>
<th>9 - 11</th>
<th>12 - 13</th>
<th>14 - 15</th>
<th>16 - 17</th>
<th>18+</th>
<th>21-24</th>
<th>25+</th>
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<tbody>
<tr>
<td>Males:</td>
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<td>12 - 13</td>
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Note: EAR for vitamin C for smokers is 35 mg greater than for non-smokers (1). The EAR used is the value in parenthesis for non-smokers.

Change in mean intake 1977-8 to 2001-2 children 6-11 years old, US

<table>
<thead>
<tr>
<th>Food Group</th>
<th>% decrease</th>
<th>% increase</th>
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<tbody>
<tr>
<td>Salted snacks</td>
<td>425%</td>
<td>320%</td>
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<tr>
<td>Candy</td>
<td>18%</td>
<td>144%</td>
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<tr>
<td>Mixed dishes</td>
<td>18%</td>
<td>144%</td>
</tr>
<tr>
<td>Pizza</td>
<td>425%</td>
<td>180%</td>
</tr>
<tr>
<td>Vegetable</td>
<td>-43%</td>
<td>18%</td>
</tr>
<tr>
<td>Fried potato</td>
<td>-43%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Source: Continued USA, USDA 1977-78 and NHANES, NHANES 2001-02, 1 day
Half of Americans sip sugary drinks daily
By Madison Park, CNN
updated 1:47 PM EST, Wed August 31, 2011

(CNN) -- When it was first invented, soda pop was a treat most people had once in a while for special occasions.
Now it's a daily fixture in American life -- in bright containers glowing inside vending machines, chugged from 32-
ounce bucket-like containers at self-service stations and served as the default beverage in fast-food meals.
In today's carbonation nation, half of the U.S. population over age 2 consumes sugary drinks daily, according to a
report released by National Center for Health Statistics.

Assessment of “Total Usual Intake”

- Uses two 24-hour recall estimated intake for nutrients
- Uses intakes estimated from consumption of dietary supplements
- Combines and models the two intakes (which have differences due to data collection methodology)
- Creates estimates of “total usual intake” as compared to “usual intake” from foods alone

Effect of Measurement Error on Distribution Estimation

Dietary Module within the NHANES Web Tutorial

- Creating a special dietary module as part of the NHANES Web Tutorial -- a complete “how to” for any level of user
  of NHANES (and NHANES dietary) data
Nutrition/Dietary Component for Future NHANES

- Continue collection of two recalls on all sample persons
- Continue food propensity questionnaire (FFQ)
- Balance many competing needs --- usual intake, total intake, knowledge and behavior, supplement use, other nutrition and health components

http://www.cdc.gov/nchs/nhanes.htm

Thank you!