ARS, USDA Updates Food Sampling Strategies to Keep Pace with Demographic Shifts

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Outline

- Overview
- Updated national sampling plan
- Specialized sampling plans
- Future
National Food and Nutrient Analysis Program (NFnAP)

- Prioritize foods for analysis for population of interest using Key Foods and other information
- Evaluate existing data from USDA-sponsored contracts, published literature, government documents, food industry
- Develop a representative sampling approach for the population of interest (specific or national)
- Use approved analytical methods
- Develop rigorous quality control (QC) program
- Review data – QC panel
- Dissemination of data

NFnAP Sampling Goals

- Obtain representative probability based sample of selected foods and beverages consumed by the US population for nutrient analysis

- In order to obtain reliable estimates with known variability for the nutrient content of the food and beverages consumed by the US population
Food Sampling under NFNAP

- Stratified, probability-proportional-to-size (PPS)
  - 2010 US Census population density data
  - Urban and rural areas
- Three-stage PPS design
  - Location - counties, locality (population density)
  - Site - retail outlets, mills, event (sales, volume)
  - Food - brands (market share data, WWEIA)
- Customize PPS sampling plans for:
  - Subgroups e.g., Latinos, American Indians/AK Natives
  - Specific nutrients e.g., fluoride in residential water supplies
  - Commercial ingredients e.g., flours from mills

\(^{1}\)update in progress

Process for Location Selection

- Draw sample of counties using Chromy’s method for state criterion
- Compute goodness of fit statistics versus ideal sample with good dispersion across US
- Combine goodness of fit by min of max of individual goodness of fit test
- Used R\(^2\) and Kolmogorov D statistics then checked mean of sample vs mean of ideal
- Choose “best” sample using D statistics
Sampling Approach for Criteria

Census Regions (4)

Census Divisions sorted within region

States sorted within division

Generalized CMSA serpentine ordering within state

Urbanicity (county) within gCMSA

Population density ordering:
First – highest to lowest
Second – lowest to highest
Etc.

U.S. CENSUS REGIONS AND DIVISIONS
Criteria for NFNAP Sampling Plans

- States containing sample counties (SC):
  - geographically dispersed over 48 states
  - Selected proportional to the states popn, using current US Census popn estimates
- gCMSAs selected proportional to the gCMSA’s population, overall and in regions
- Counties selected proportional to the counties’ population, overall and in regions

Serpentine Ordering of gCMSAs

**Current Sampling Locations (12)**

<table>
<thead>
<tr>
<th>State</th>
<th>County</th>
<th>City</th>
<th>Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>Jefferson</td>
<td>Bessemer</td>
<td>WalMart Supercenter</td>
</tr>
<tr>
<td>CA1</td>
<td>Butte</td>
<td>Paradise</td>
<td>Safeway</td>
</tr>
<tr>
<td>CA2</td>
<td>Alameda</td>
<td>Pleasanton</td>
<td>Albertsons</td>
</tr>
<tr>
<td>CO1</td>
<td>Denver</td>
<td>Denver</td>
<td>Safeway</td>
</tr>
<tr>
<td>CT</td>
<td>New Haven</td>
<td>Waterbury</td>
<td>Price Chopper Supermarket</td>
</tr>
<tr>
<td>FL</td>
<td>Palm Beach</td>
<td>Lake Worth</td>
<td>Publix Super Market</td>
</tr>
<tr>
<td>IN</td>
<td>Madison</td>
<td>Anderson</td>
<td>Pay Less Super Market</td>
</tr>
<tr>
<td>MI</td>
<td>St Clair</td>
<td>Port Huron</td>
<td>Kroger</td>
</tr>
<tr>
<td>MO</td>
<td>Cass</td>
<td>Belton</td>
<td>Hy Vee</td>
</tr>
<tr>
<td>NY</td>
<td>Queens</td>
<td>College Point</td>
<td>Waldbaum</td>
</tr>
<tr>
<td>NC</td>
<td>Orange</td>
<td>Hillsborough</td>
<td>Lowes Food store</td>
</tr>
<tr>
<td>OK</td>
<td>Creek &amp; Tulsa</td>
<td>Sapulpa</td>
<td>WalMart Supercenter</td>
</tr>
</tbody>
</table>
US Minority Populations

- Racial/ethnic minorities
  - 35% of the US popn
  - 92% of popn growth over past decade
  - Many cities are “majority” minority
- Includes (% of US popn):
  - 16.3, Latinos
  - 12.2, African Americans
  - 4.8, Asian/Asian Indian Americans
  - 1.9, American Indians/Alaska Natives, others

1 U.S. Census Bureau, 2010 census
Diabetes in US Subpopulations

- Worldwide\(^1\) ~ 350m people (~5%)
- US\(^2\) 26 million people (8.3%)
- Minority populations\(^2\) (% diagnosed):
  - 7.1, non-Hispanic whites
  - 8.4, Asian Americans
  - 11.8, Hispanics/Latinos
  - 12.6, non-Hispanic blacks
  - 16.1, American Indians/Alaska Natives (5–34%)

\(^1\)Lancet, June 2011.
\(^2\)NIIDDK, NIH, USDHHS, 2011.

American Indian/Alaska Native (AIAN) Sampling Plan

- Stages – 48 conterminous states:
  - Based on tribal enrollment data (BIA)
  - Frame options = 6, 12, 24, 35, or 48 strata
  - Strata by region or tribe
  - Hunted, fished and foraged foods, traditional recipes and ceremonial dishes
  - ~ 200 foods, to date
AIAN Foods

Table 1. Sample of Tribes by Stratum (12 Strata)

<table>
<thead>
<tr>
<th>STRATUM</th>
<th>TRIBE NAME</th>
<th>ENROLLMENT</th>
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<tbody>
<tr>
<td>1</td>
<td>Cherokee Nation</td>
<td>200628</td>
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<tr>
<td>2</td>
<td>Caddo Tribe (OK)</td>
<td>3307</td>
</tr>
<tr>
<td>3</td>
<td>San Carlos Apache Tribe</td>
<td>10834</td>
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<tr>
<td>4</td>
<td>Western Navajo</td>
<td>40921</td>
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<tr>
<td>5</td>
<td>Fort Defiance Navajo</td>
<td>15326</td>
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<tr>
<td>6</td>
<td>Eastern Navajo</td>
<td>44435</td>
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<tr>
<td>7</td>
<td>Muskogee (Creek) Nation</td>
<td>44775</td>
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<tr>
<td>8</td>
<td>Sault Ste. Marie Tribe of Chippewa</td>
<td>27855</td>
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<tr>
<td>9</td>
<td>Standing Rock Sioux Tribe</td>
<td>12723</td>
</tr>
<tr>
<td>10</td>
<td>Cheyenne River Sioux Tribe</td>
<td>12703</td>
</tr>
<tr>
<td>11</td>
<td>Karuk Tribe (CA)</td>
<td>3846</td>
</tr>
<tr>
<td>12</td>
<td>Cherokee Nation</td>
<td>Second Sampling</td>
</tr>
</tbody>
</table>

Latino Foods: Sampling

- 21-food Pilot with Hispanic Community Health Study (NIH)
  - Bronx-NY (Puerto Rican; Dominican)
  - Miami (Cuban; Ce/So American)
  - San Diego (Mexican)
  - Chicago (Mexican; Puerto Rican; Ce/So American)

- Stage 2:
  - State level Hispanic data (US Census 2000-7)
  - Dataset of 345 counties (90% of US Hispanics) → PPS sample 24 counties (12-county subset)
  - Includes 4 pilot locations
Latino Sampling Plan

Asians/Asian Indians

Fastest growing (43% increase) minority in past 10 years
Asian/Asian Indian Foods: Sampling

- NHANES 2011-12 oversampling of
  - Chinese
  - Japanese
  - Vietnamese
  - Filipino
  - Korean
  - Asian Indian
- NDL researching existing published data for foods, ingredients and recipes
- Using WWEIA 2007-8 to identify foods for analysis (2009-10 and 2011-12 when available)

International Work

- >400 scientists from >50 countries trained by NDL in principles of sampling
- NDL has worked with Argentina, Chile and Paraguay to develop sampling plans for FAO
- NDL has provided guidance to Korea in development of sampling plans and databases
Summary and Future

- Complete new national plan
- Monitor Key Foods
- Sampling of ethnic/national origins foods
  - Asian foods for WWEIA 2011-12
  - Continue AIAN and Latino foods
- High sodium contributors
- Foods containing bioactive components
- International sampling efforts
- www.ars.usda.gov/nutrientdata