

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

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Agricultural  
Research  
Service

## 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<sup>1</sup>
  - 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

<sup>1</sup>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

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

Urbanicity (county)  
within gCMSA

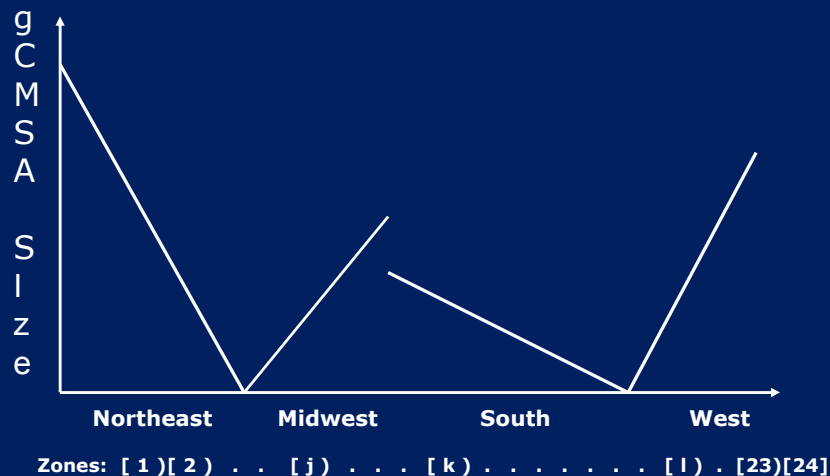
## U.S. CENSUS REGIONS AND DIVISIONS



## 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



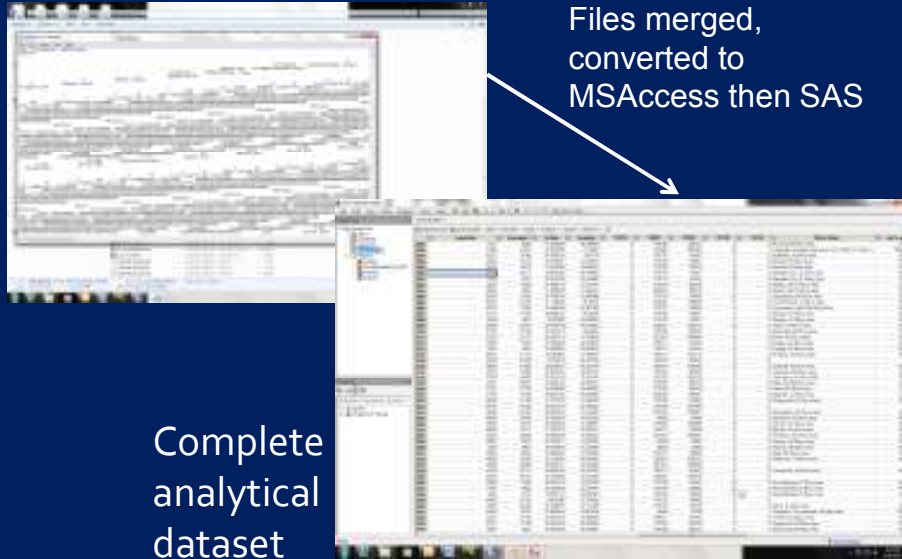
## Revised NFNAP County Sample



## Current Sampling Locations (12)

State	County	City	Store
AL	Jefferson	Bessemer	Wal Mart Supercenter
CA1	Butte	Paradise	Safeway
CA2	Alameda	Pleasanton	Albertsons
CO1	Denver	Denver	Safeway
CT	New Haven	Waterbury	Price Chopper Supermarket
FL	Palm Beach	Lake Worth	Publix Super Market
IN	Madison	Anderson	Pay Less Super Market
MI	St Clair	Port Huron	Kroger
MO	Cass	Belton	Hy Vee
NY	Queens	College Point	Waldbaum
NC	Orange	Hillsborough	Lowes Food store
OK	Creek & Tulsa	Sapulpa	Wal Mart Supercenter

## 2010 Census ASCII Data (linked/unlinked files)



Files merged,  
converted to  
MSAccess then SAS

Complete  
analytical  
dataset

The image shows a workflow for data processing. On the left, a window displays a large volume of raw ASCII data. An arrow points from this window to a larger window on the right, which shows a structured, multi-column dataset. The text 'Files merged, converted to MSAccess then SAS' is positioned above the arrow, and 'Complete analytical dataset' is written below the structured data window.

## US Minority Populations<sup>1</sup>

- 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

<sup>1</sup> U.S. Census Bureau, 2010 census

## Diabetes in US Subpopulations

- Worldwide<sup>1</sup> ~ 350m people (~5%)
- US<sup>2</sup> 26 million people (8.3%)
- Minority populations<sup>2</sup> (% 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%)

<sup>1</sup>Lancet, June 2011.

<sup>2</sup>NIDDK, NIH, USDHHS, 2011.

[http://diabetes.niddk.nih.gov/dm/pubs/statistics/DM\\_Statistics.pdf](http://diabetes.niddk.nih.gov/dm/pubs/statistics/DM_Statistics.pdf).

## 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)

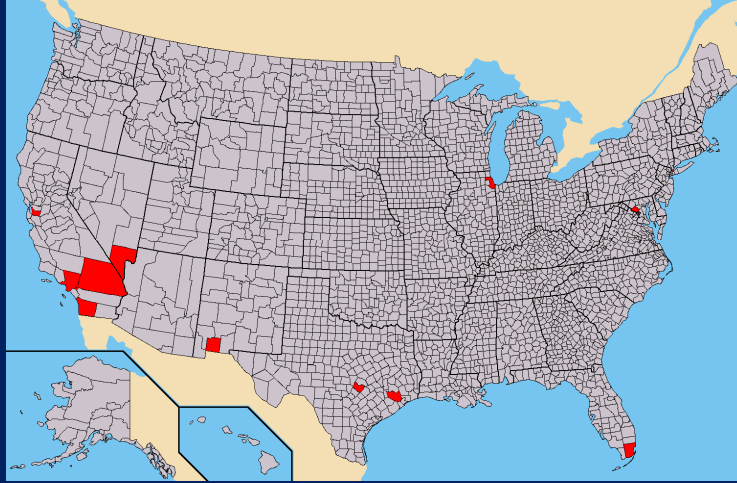
STRATUM	TRIBE NAME	ENROLLMENT
1	Cherokee Nation	200628
2	Caddo Tribe (OK)	3307
3	San Carlos Apache Tribe	10834
4	Western Navajo	40921
5	Fort Defiance Navajo	15326
6	Eastern Navajo	44435
7	Muskogee (Creek) Nation	44775
8	Sault Ste. Marie Tribe of Chippewa	27855
9	Standing Rock Sioux Tribe	12723
10	Cheyenne River Sioux Tribe	12703
11	Karuk Tribe (CA)	3835
12	Cherokee Nation	Second Sampling

## Latino Foods: Sampling

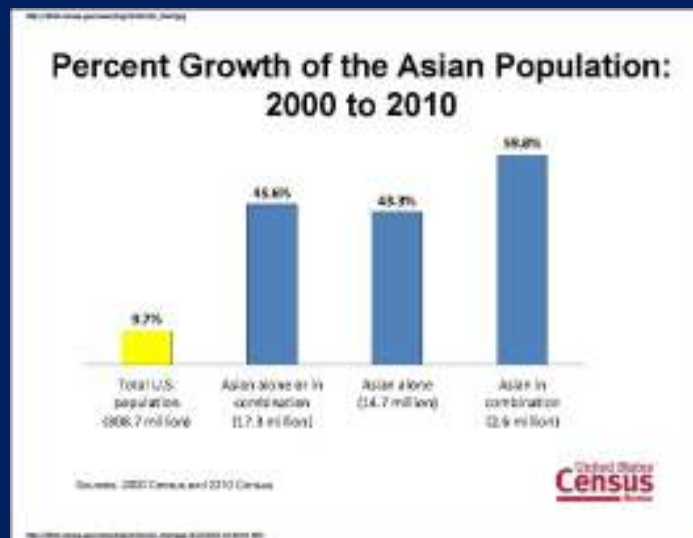


- 21-food Pilot with Hispanic Community Health Study (NIH)
  - Bronx-NY (Puerto Rican; Dominican)
  - Miami (Cuban; Ce/So American)
  - San Diego (Mexican)
  - Chicago (Mexican; Puerto Rican; Ce/So American)
- Stage 2:
  - State level Hispanic data (US Census 2000-7)
    - <http://www.census.gov/popest/counties/asrh/CC-EST2006-Race6.html>
  - 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](http://www.ars.usda.gov/nutrientdata)

