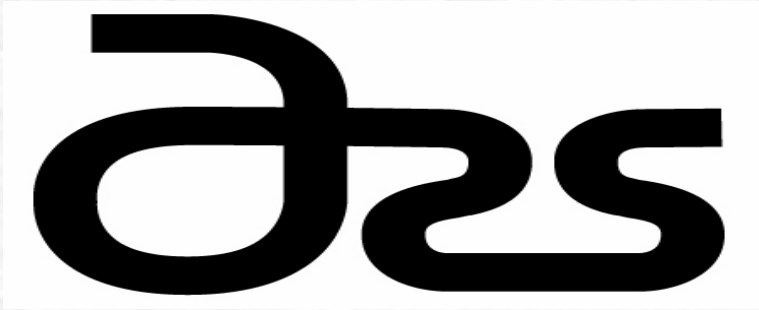
The Dietary Supplement Ingredient Database: Results of USDA Pilot Studies

Presented by Joanne M. Holden, USDA, Agricultural Research Service, Nutrient Data Laboratory



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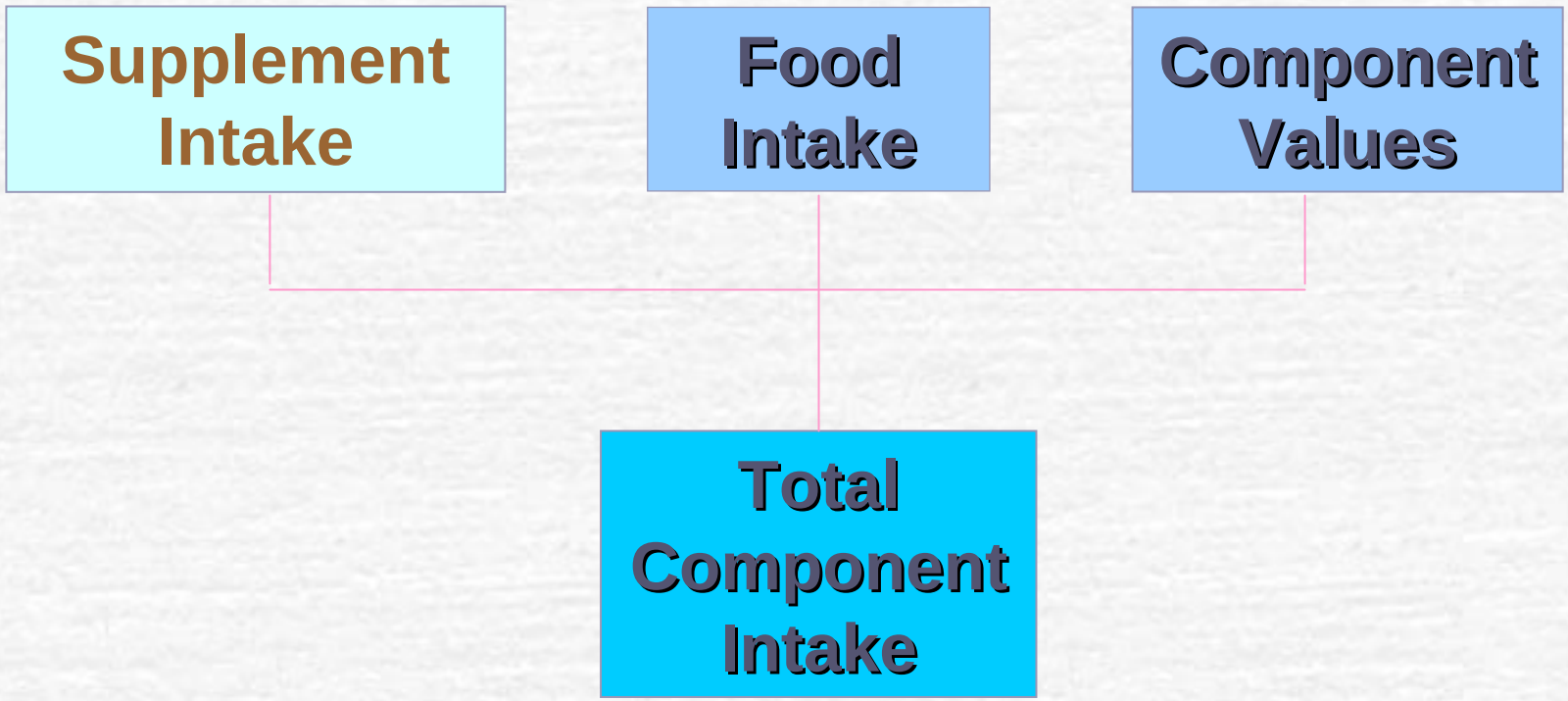
Assessment of Intake



USDA Database Products

- USDA National Nutrient Database for Standard Reference
- Database for national food and nutrition surveys
- Database for bioactive components
- Factors, guidelines, and protocols

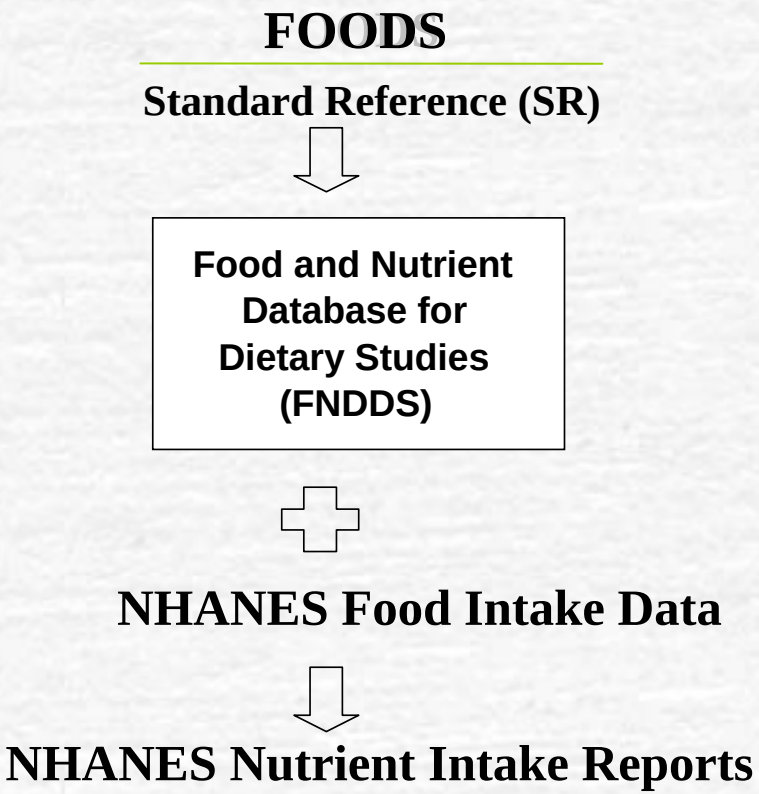
NDL's Foodcomp Web site

- www.nal.usda.gov/fnic/foodcomp

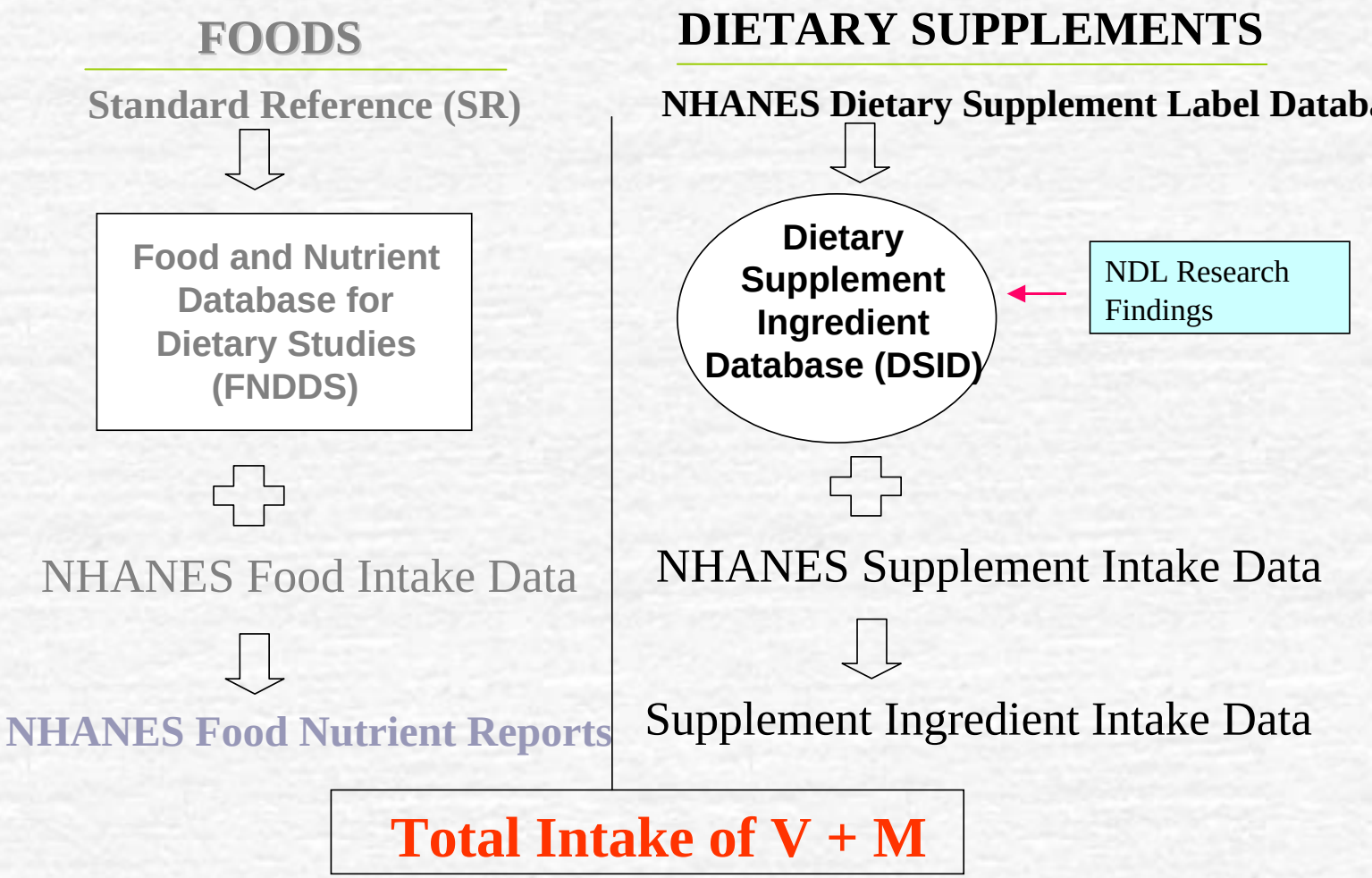
NHANES: What We Eat in America

- National Health and Nutrition Examination Survey of nearly 5,000 individuals annually
- Food intake assessed with two 24-hour dietary recalls
- Supplement intake assessed over past month
- DS nutrient values obtained from labels

Assessment of Vitamin - Mineral Intake for Foods



Assessment of Vitamin -Mineral Intake for Foods and Dietary Supplements



NHANES
Dietary Supplement Database

- Database contains 6000+ products reported by respondents
- Products include multivitamins, single vitamins/minerals, botanicals, amino acids
- Nutrition information in database is based on label values
- Partnership with NCHS

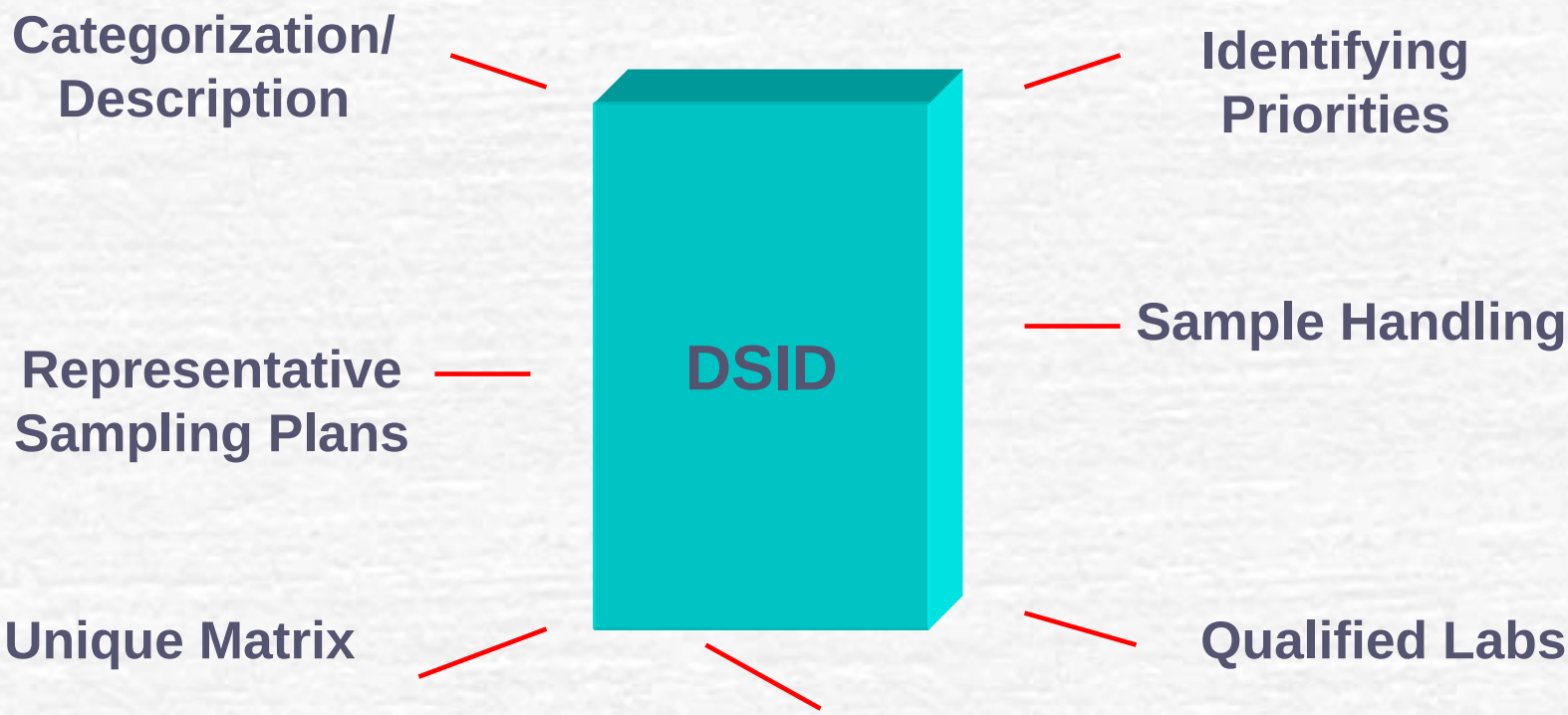
Today's Objectives

- Goals for a DSID
- Key Challenges
- Pilot Study Questions
- Pilot Study Accomplishments
- Future Plans

Goals for Dietary Supplement Ingredient Database

- To develop reliable estimates of nutrients and other bioactive components in Dietary Supplements
- To release and maintain on-line DS database
- To assess variability and/or possible bias in nutrient levels for DS

Key Challenges



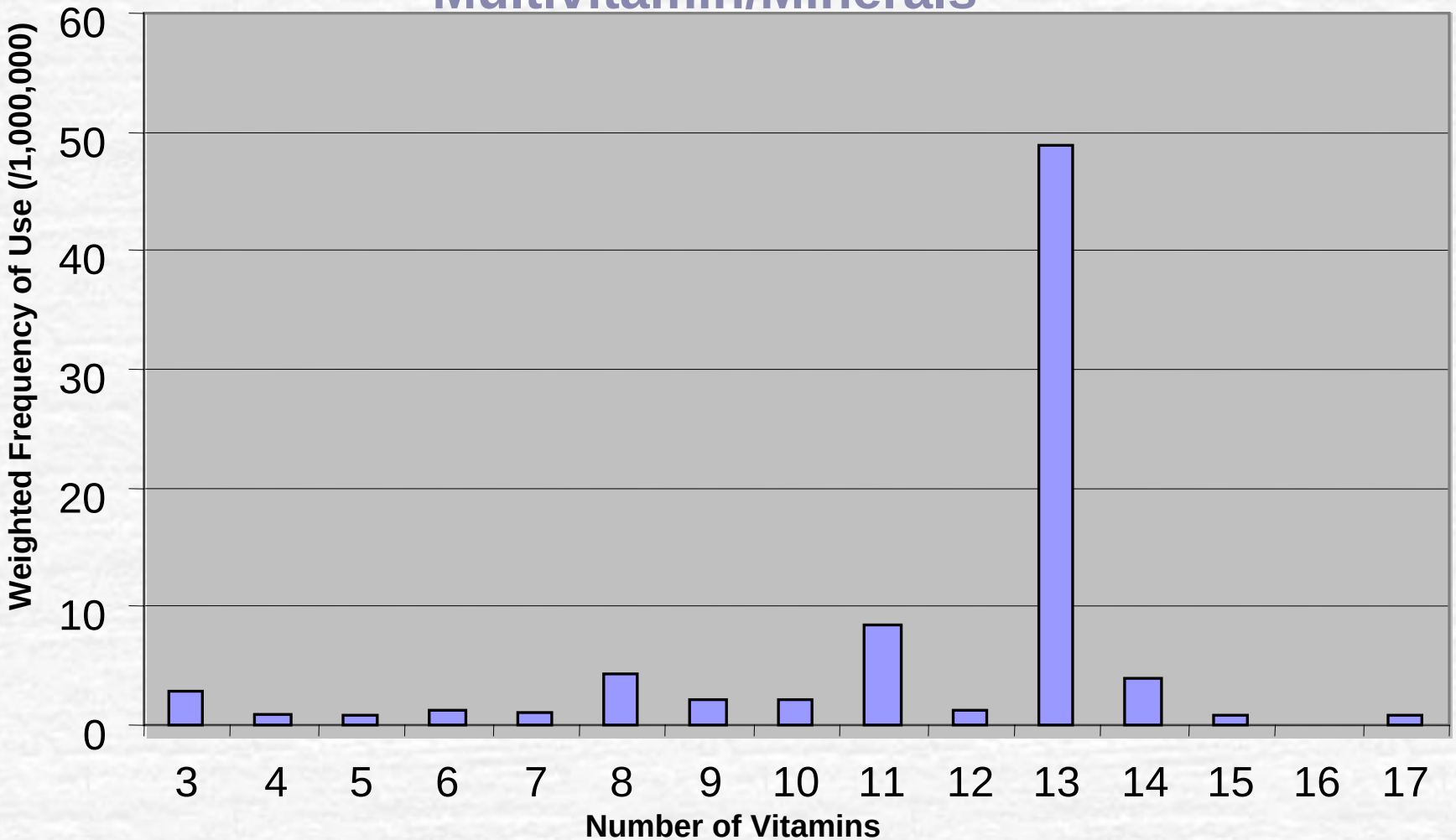
Categorizing Product Types

- Defining a dietary supplement
- Classifying various dietary supplements available
- Defining a multivitamin/multimineral (MVM)
- Partners with NCHS

Diverse Product Types

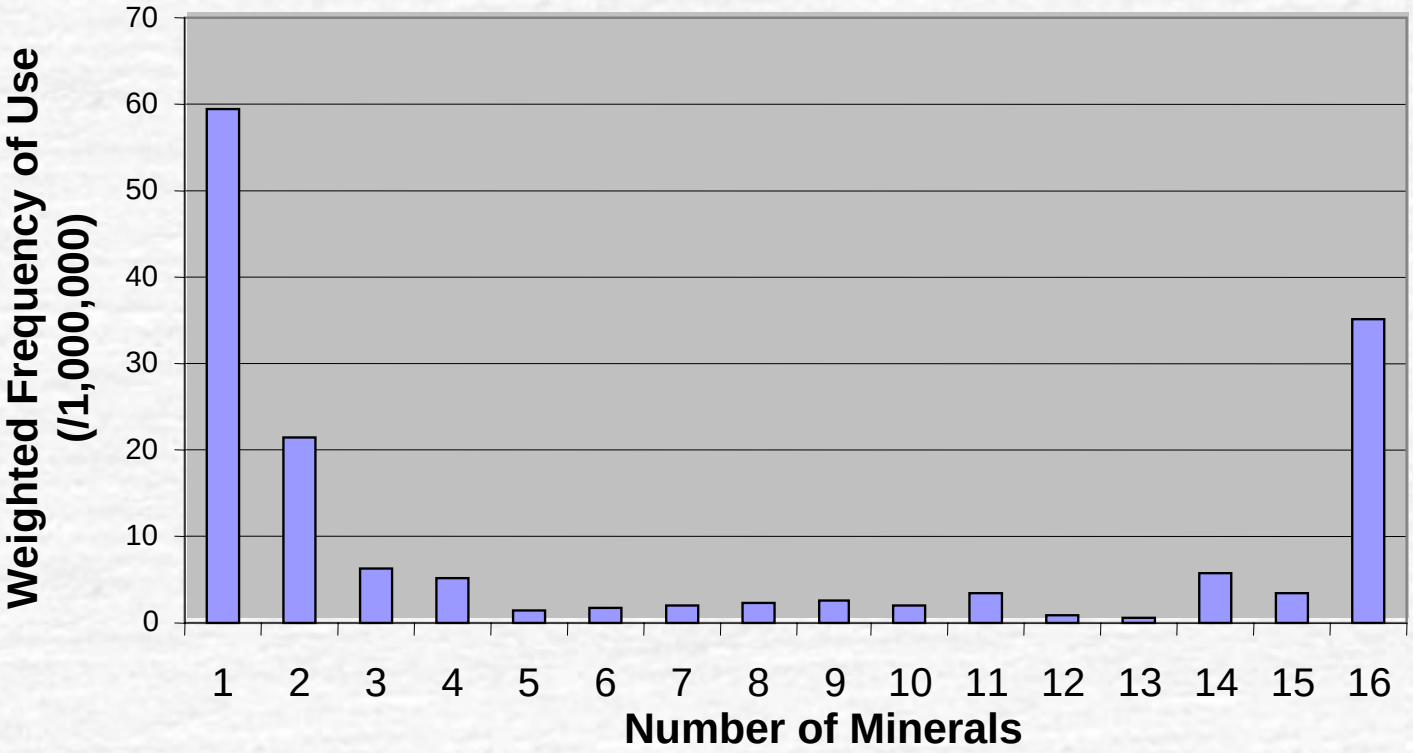
- Multivitamins
- Condition-specific products: joint health, bone health, memory
- Botanicals
- Weight-loss products
- Sport performance products
- Specialty products: amino acids, enzymes, melatonin, plant oils, glucosamine, probiotics

Distribution of Vitamin Count in Adult Multivitamin/Minerals*



***Distribution of vitamins (>2) indicates that the most commonly reported adult multivitamins (NHANES 1999-2000) contain 13 vitamins.**

Distribution of Mineral Count in Adult Multivitamin/Minerals*



***Distribution indicates that most products reported (NHANES 1999-2000) are either single or double mineral products or are multivitamin/mineral products with 16 minerals.**

Identifying priority components

Criteria considered:

- **Frequency of consumption: NHANES**
- **Public health significance**
- **Status of methods and reference materials**
- **Federal agency interest**

Highest Priority Categories

Multivitamins/minerals(MVMs)
Antacids
Calcium Supplements
Vitamin E
Vitamin C
B Vitamin products
Caffeine-containing products

Highest Priority “Tier 1” Ingredients

Folic Acid/folate
Calcium
Vitamin E
Vitamin A (Retinol)
Vitamin C
Iron
Beta Carotene

“Tier 2” Ingredients

Riboflavin	Potassium
Thiamin	Copper
Niacin	Selenium
Vitamin B6	Chromium
Vitamin B12	Manganese
Vitamin D	Magnesium
Vitamin K	Zinc
Phosphorus	Iodine

Representative Sampling Plans

Identify products: NHANES

Select across distribution channels

- **Mass market retail**
- **Natural food and health stores**
- **Multi-level marketing**
- **Direct sales**

Specific Methodology Issues for MVMs

- Unique matrix effects of capsules, pills, and gel caps
- Sample handling of MVMs for accuracy and precision
- Selection of valid methods
- Development of reference material
- Qualifying labs

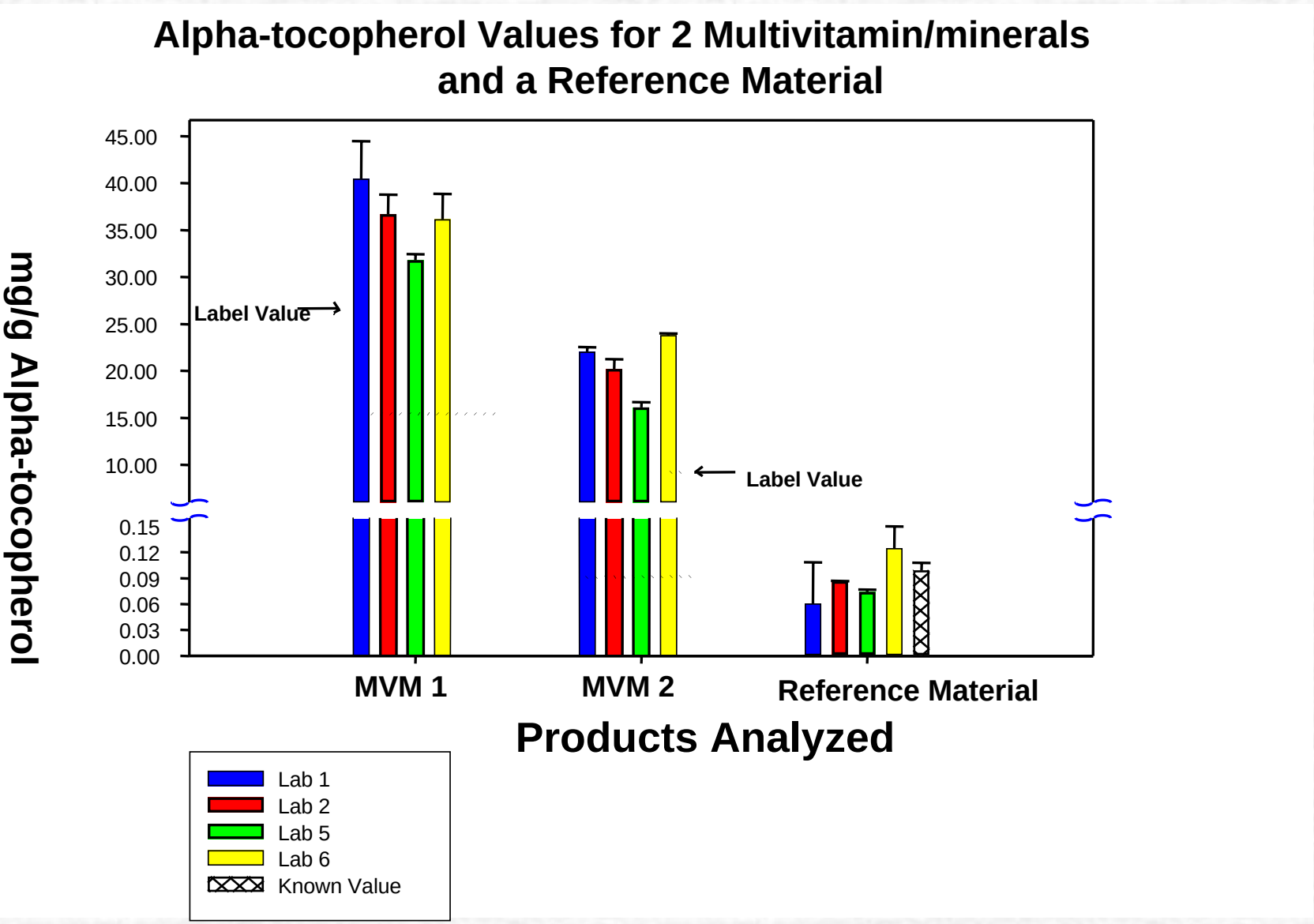
Development of Reference Materials (RMs)

- RM (known value) is measured along with sample MVM (unknown value)
- NIST is developing an RM for DS
- ODS, NIST, and FCL are partnering with NDL to:
  - Characterize SRMs
  - Review analytical methods
  - Qualify labs

Pilot Study Goals

Pilot Study 1: Survey laboratories for standard analytical methods. Identify sample handling protocols for MVMs to insure complete recovery.

Pilot Study 2: Assess capabilities of qualified labs to determine nutrient values of MVMs.

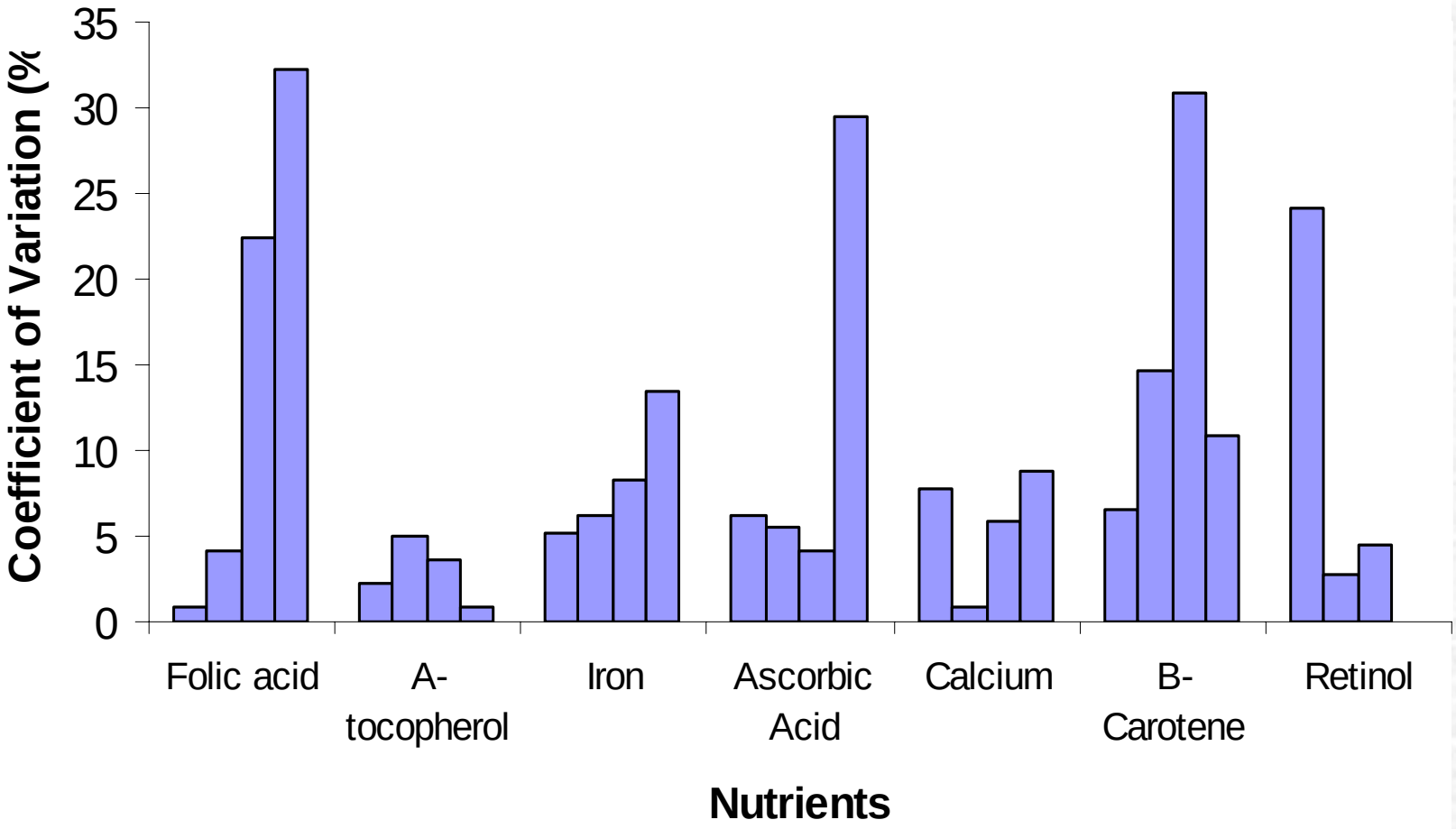

Alpha-tocopherol Values for 2 Multivitamin/minerals and a Reference Material
mg/g Alpha-tocopherol
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
0.15
0.12
0.09
0.06
0.03
0.00
Label Value
Label Value
MVM 1
MVM 2
Reference Material
Products Analyzed
Lab 1
Lab 2
Lab 5
Lab 6
Known Value

Levels of Alpha Tocopherol in Food and Supplements

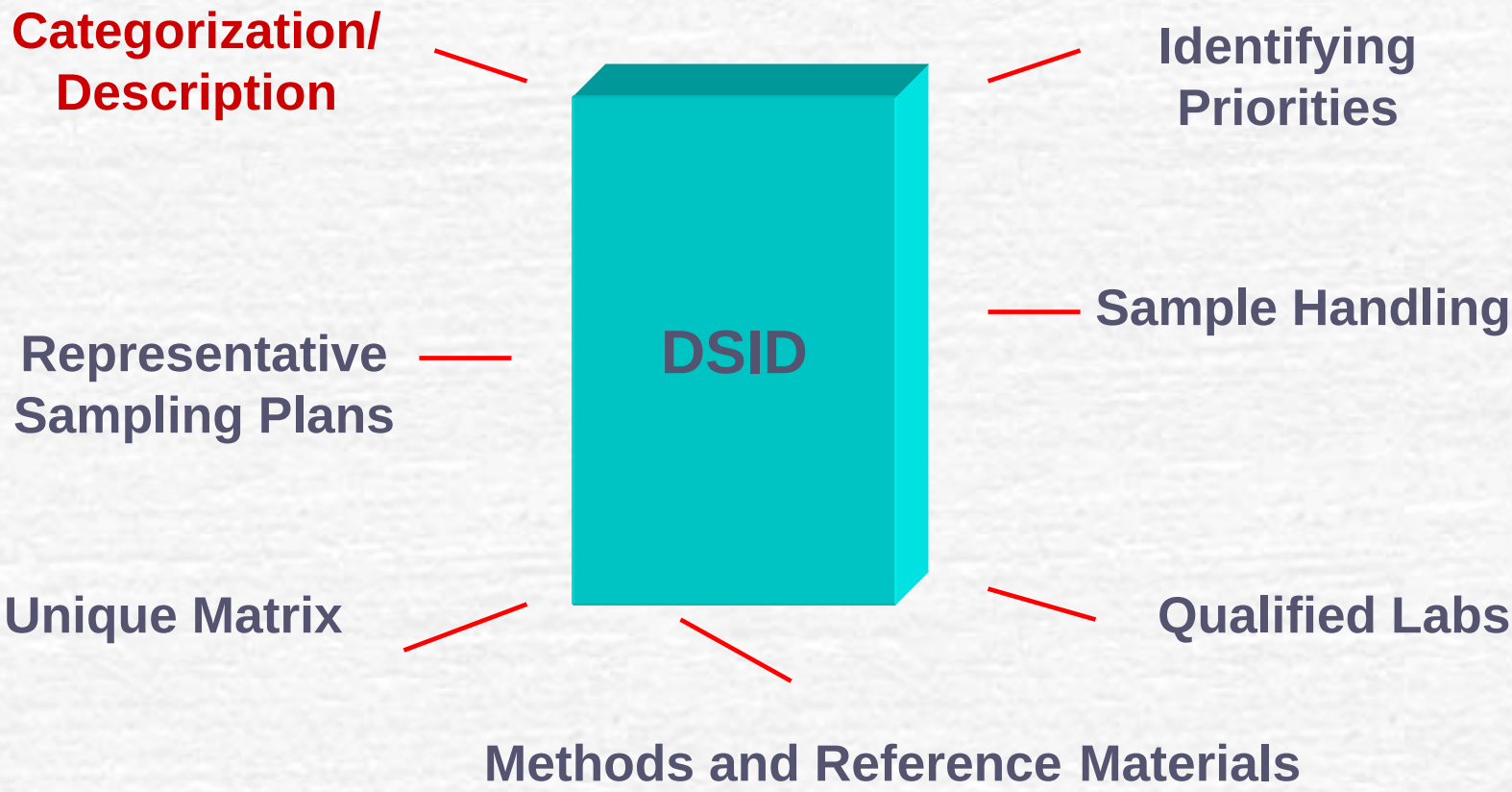
- 1 Tbsp safflower oil = 5 mg alpha tocopherol* in natural form = 37% DV
- 1 oz dry roasted almonds = 7 mg alpha tocopherol* in natural form = 52% DV
- Common MVM = 30 IU (13.5 mg) synthetic alpha tocopherol = 100% DV

*U.S. Department of Agriculture, Agricultural Research Service. 2005. USDA National Nutrient Database for Standard Reference, Release 18. Nutrient Data Laboratory Home Page, http://www.nal.usda.gov/fnic/foodcomp, Accessed October 19, 2005

Coefficient of Variation (%) for Laboratories Analyzing Tier 1 Nutrients in a Multivitamin/mineral Product



Key Accomplishments



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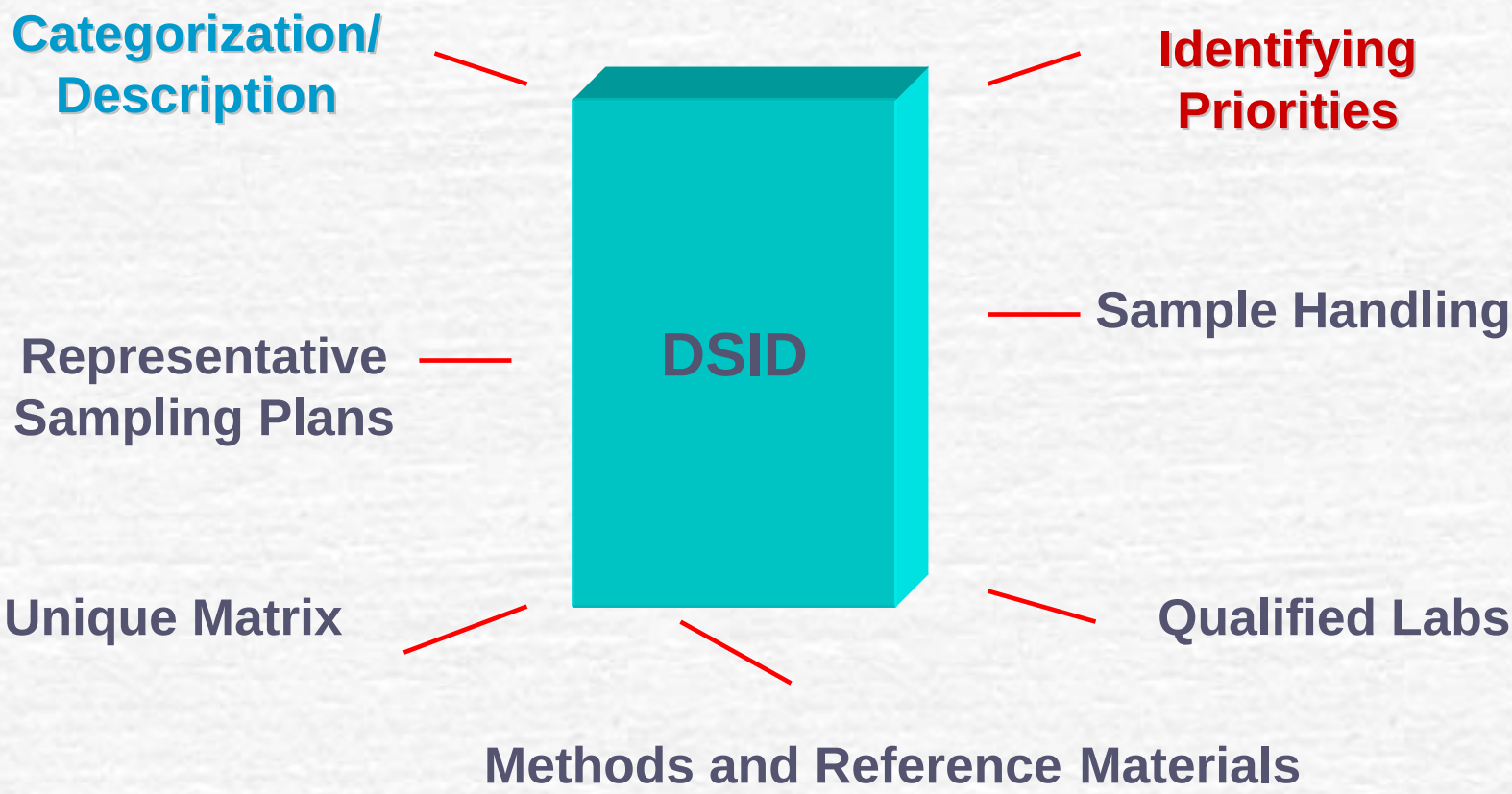

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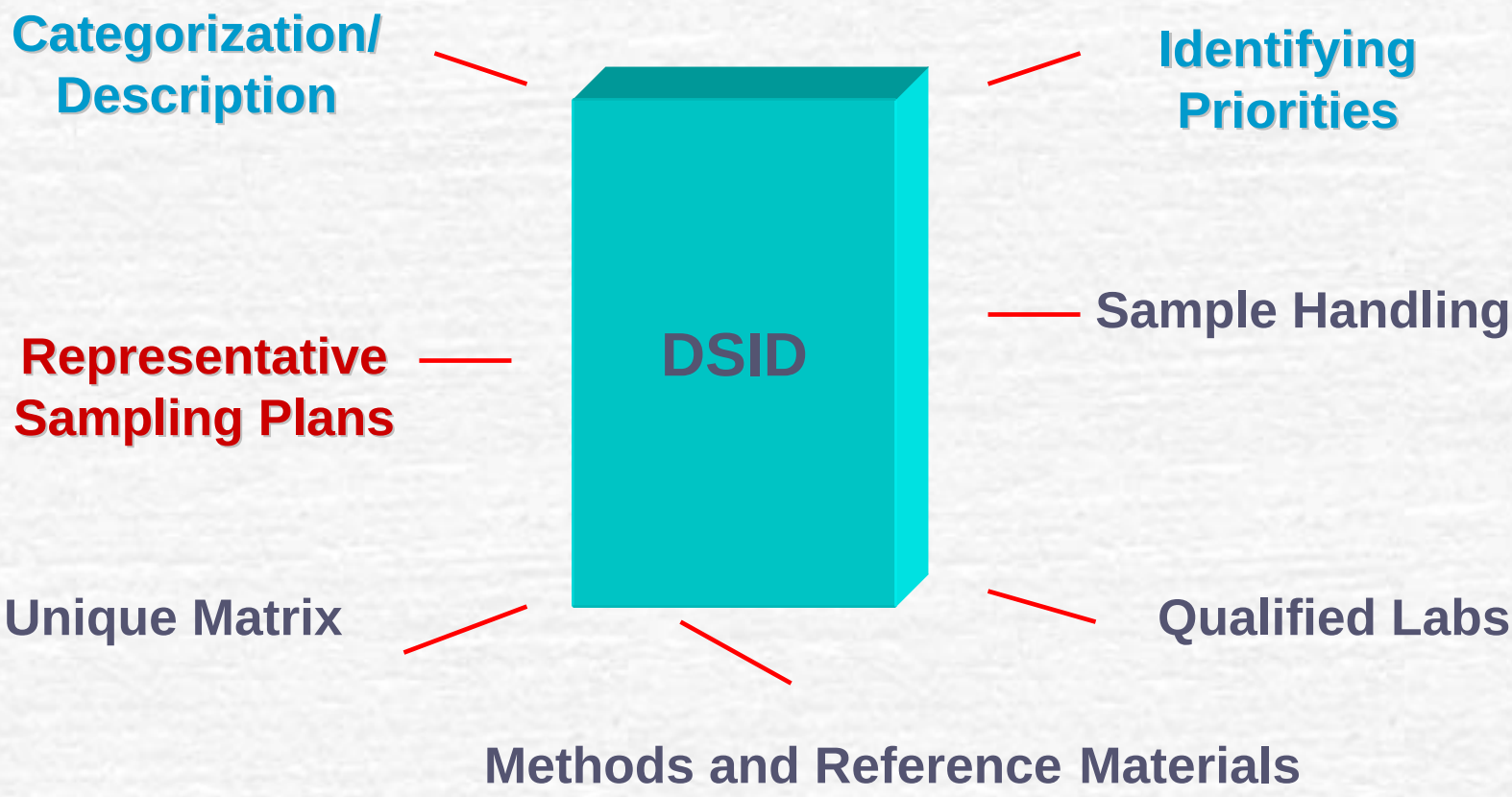

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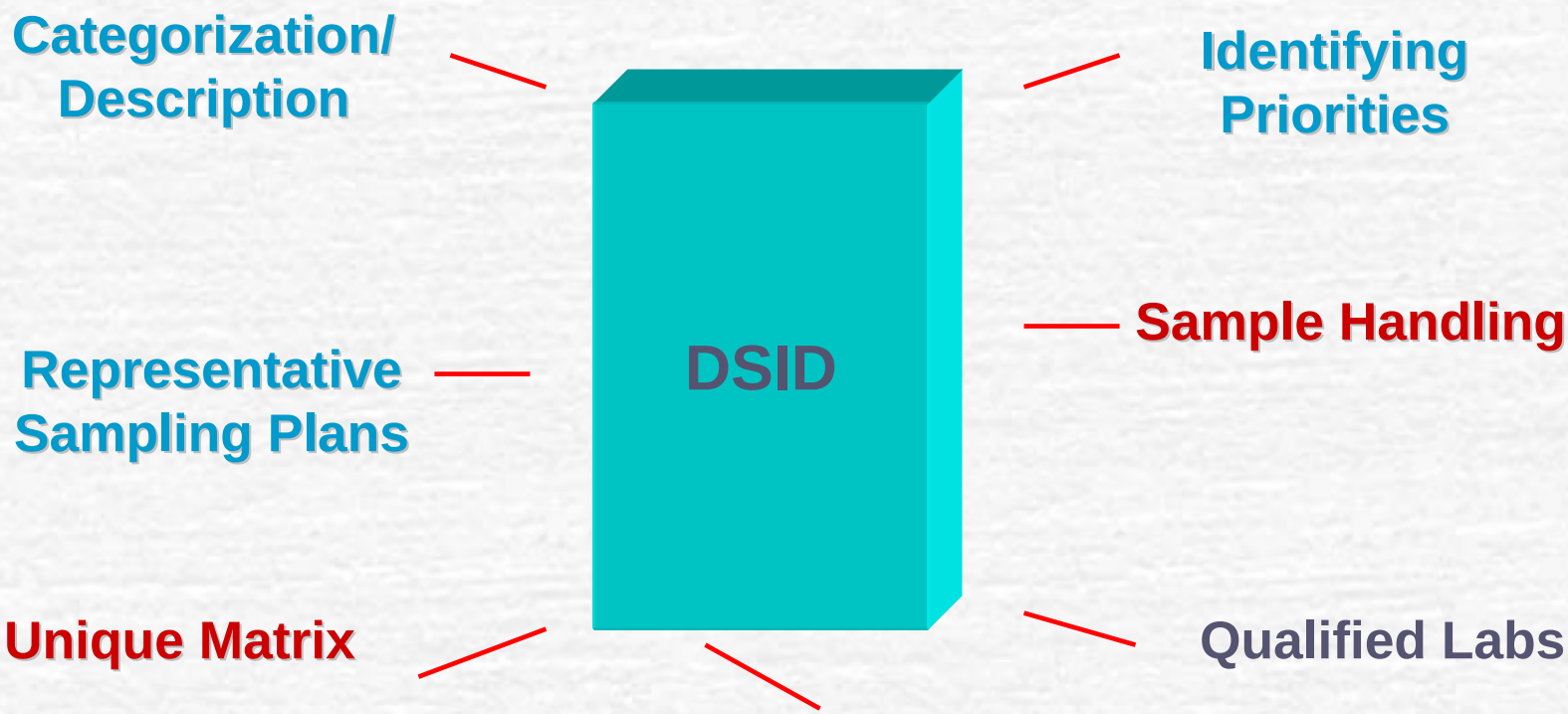

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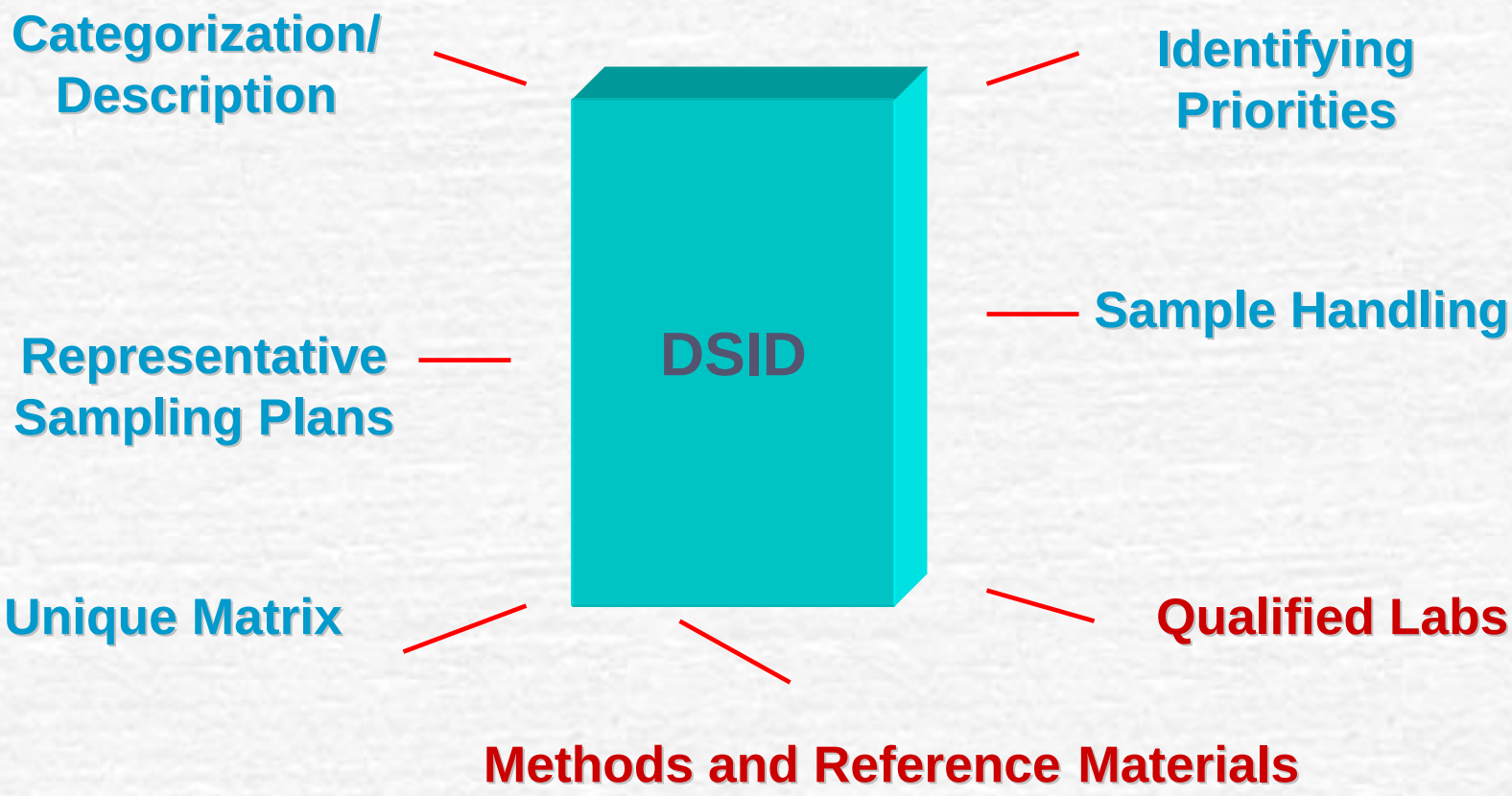
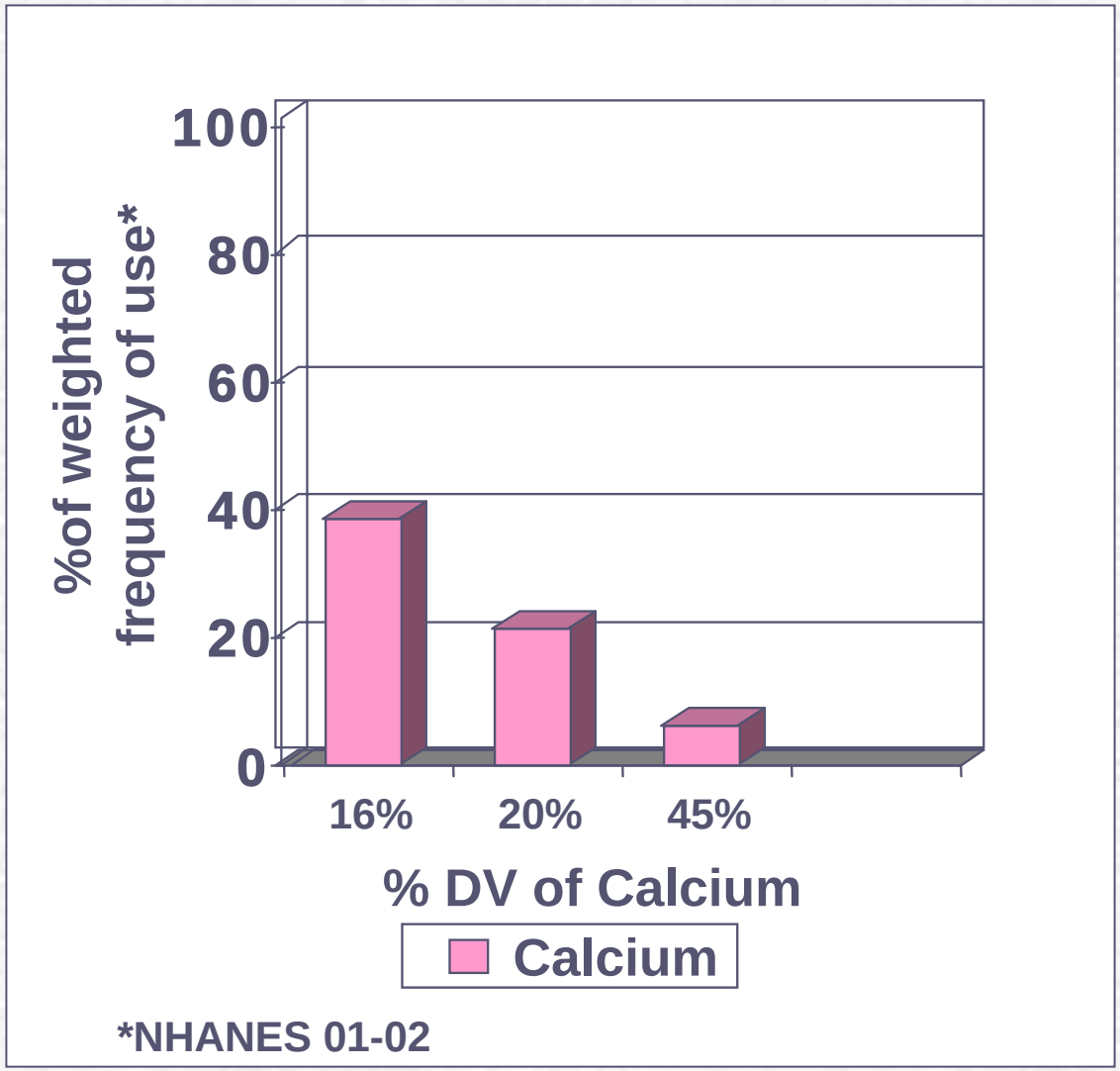


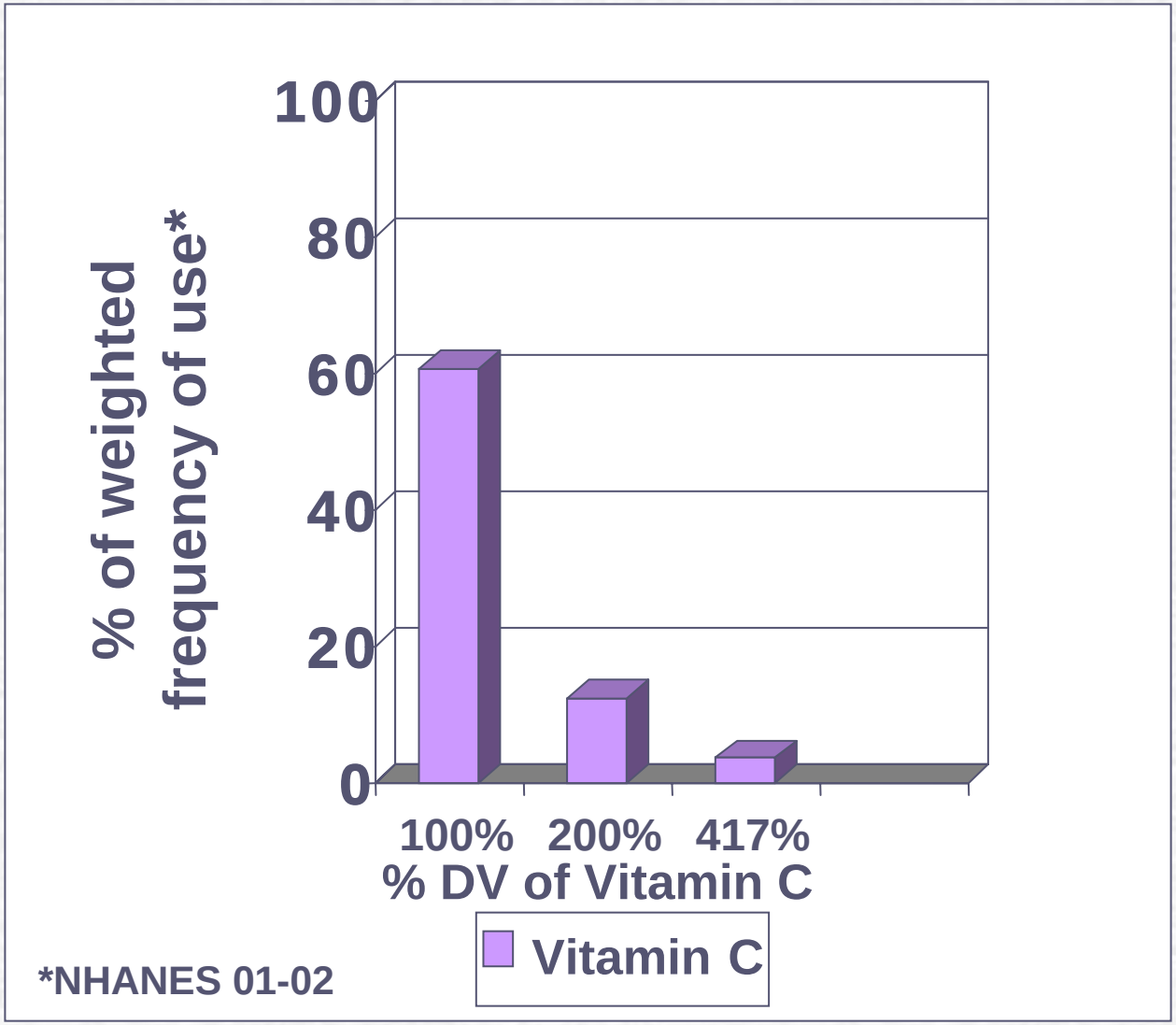
Next Steps: The “% DV” study

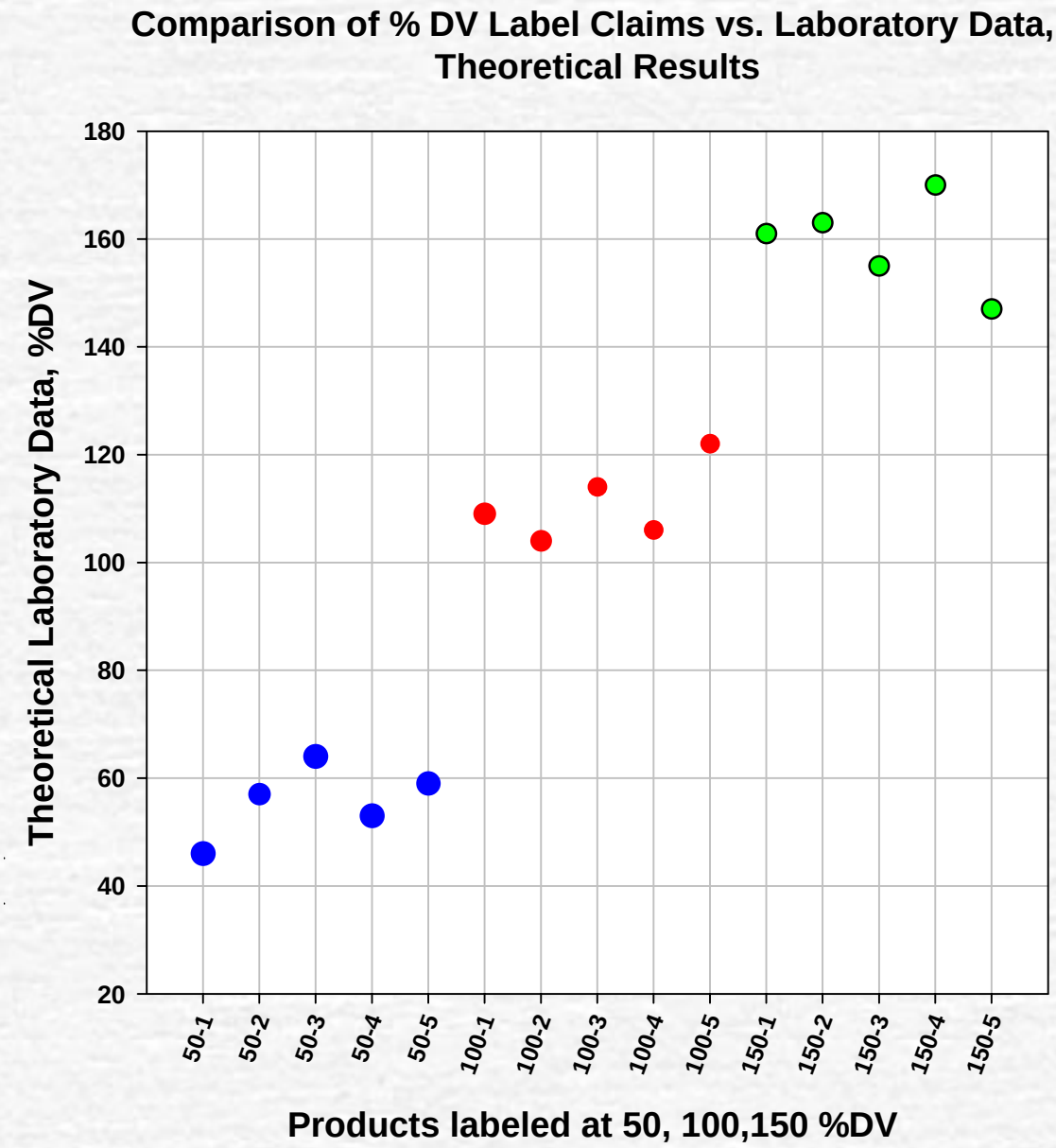
- Compare label and actual values of MVMs.
- Choose products at 3 or 4 DV levels.
- Analyze 5 products from each DV level.
- Measure 2 lots per product.

Example: Most Common % DV Levels for Calcium in Adult Multivitamins



Example: Most Common % DV Levels for Vitamin C in Adult Multivitamins




Comparison of % DV Label Claims vs. Laboratory Data, Theoretical Results
Theoretical Laboratory Data, %DV
180
160
140
120
100
80
60
40
20
50-1
50-2
50-3
50-4
50-5
100-1
100-2
100-3
100-4
100-5
150-1
150-2
150-3
150-4
150-5
Products labeled at 50, 100,150 %DV

Application of Pilot Study Results

- Plans to analyze representative MVMs to support estimates for MVMs reported in NHANES.
- Validate composition data for generic classes of dietary supplements.

USDA Database Products

- USDA National Nutrient Database for Standard Reference
- Database for national food and nutrition surveys
- Database for bioactive components
- Factors, guidelines, and protocols
- **Dietary Supplement Ingredients Database**

Summary

Pilot studies can refine questions and focus research for the development of a dietary supplement ingredient database.

Acknowledgements

- Funded by Office of Dietary Supplements, National Institutes of Health
  - http://Nutrition.gov
  - http://ods.od.nih.gov
- DSID group

Questions?