

# **A Study on the Sample Representativeness of the Wisconsin ADRC Clinical Core Participants versus the Wisconsin State Population**

Yue Ma, PhD

Wisconsin Alzheimer's Disease Research Center  
University of Wisconsin-Madison

2022 Fall ADC Meeting  
Data Core Pre-Meeting Analytics Workshop  
Chicago, IL October 19, 2022



# Comparison of Center Participants with State Population

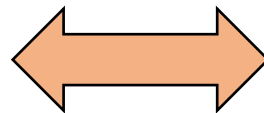
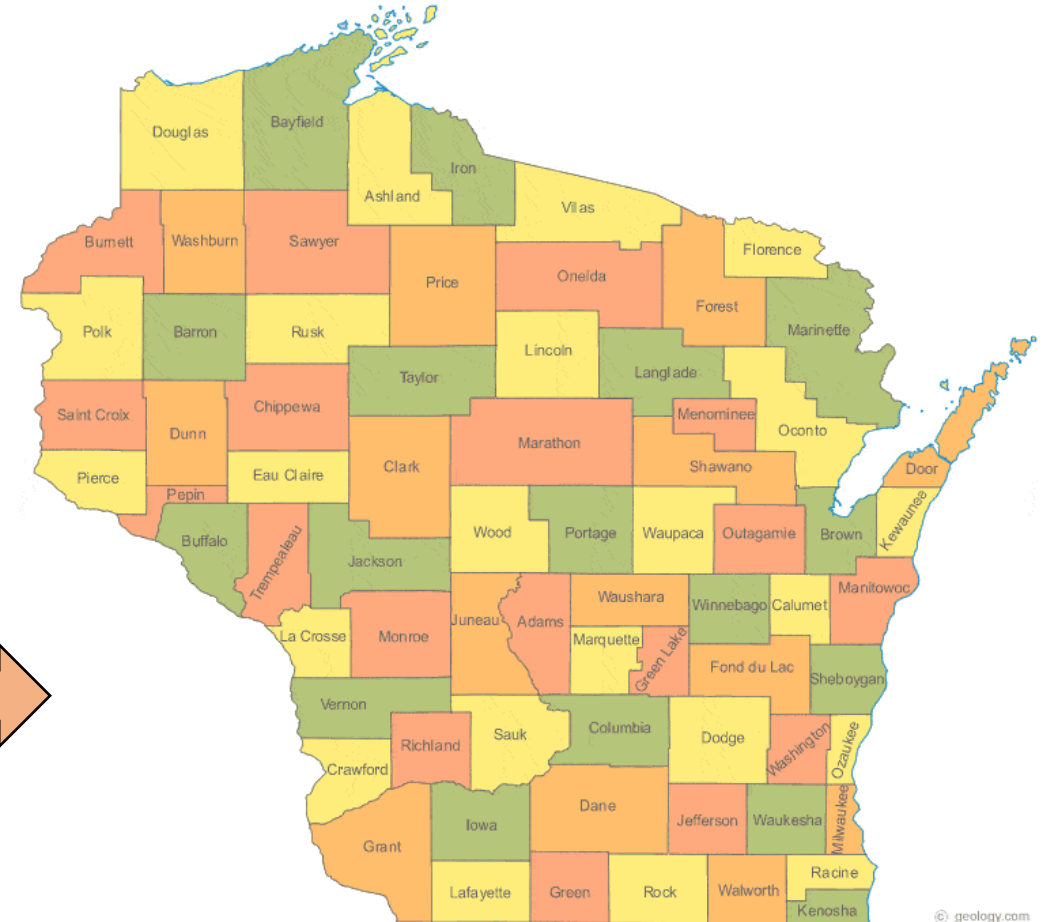
- Demographics
- Vascular risk factors



**ALZHEIMER'S DISEASE RESEARCH CENTER**



Source: <https://www.adrc.wisc.edu/open-studies>



Source: <https://geology.com/state-map/wisconsin.shtml>



# Wisconsin ADRC Clinical Core Participants



## ALZHEIMER'S DISEASE RESEARCH CENTER

- Active participants as of November 30, 2021
- Total:  $n = 678$ 
  - (Younger) 45-64 years:  $n = 296$
  - (Older) 65 years & older:  $n = 382$
- Age and vascular risk factors: most recent visit data



# Wisconsin State Population - Age, Sex, Race, Ethnicity



## Wisconsin Interactive Statistics on Health (WISH) Query Population Module

<https://www.dhs.wisconsin.gov/wish/population/form.htm>

- Presents population counts and estimates for Wisconsin
- Data are statewide, by region, and by county



# Wisconsin State Population - Education



Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

## Behavioral Risk Factor Surveillance System

[https://www.cdc.gov/brfss/data\\_tools.htm](https://www.cdc.gov/brfss/data_tools.htm)

- Telephone surveys about US residents on health-related risk behaviors, chronic health conditions, and use of preventive services
- Collect data in all 50 states, District of Columbia, and three U.S. territories

Behavioral Risk Factor Surveillance System



Behavioral Risk Factor Surveillance System

## Prevalence Data & Data Analysis Tools



Find city and county data collected through the Selected Metropolitan/Micropolitan Area Risk Trends (SMART) project, the Web Enabled Analysis Tool (WEAT), interactive maps, and other resources provided through BRFSS.

### Prevalence and Trends Data

Using the Prevalence and Trends Data Tools, users may produce charts for individual states or the nation by health topic. Users may select specific years or request multiple year data. The Prevalence and Trend Data Tools will produce line graphs for multiple years and bar charts for single years for each selected indicator.

### Web Enabled Analysis Tool (WEAT)

The Web Enabled Analysis Tool (WEAT) permits users to create custom crosstabulation tables for health indicators within selected states. Up to two control variables may be included to create crosstab tables within each category of control variables. WEAT also may be used to create logistic equations using BRFSS data. Users are prompted to make selections of year, state and variables to be included in the analyses.

### MMWR Surveillance by Year

Each year the BRFSS publishes prevalence estimates in the Morbidity and Mortality Weekly Report (MMWR) for multiple indicators by state and some sub-state areas. The prevalence estimates are presented in comparison tables for each geographic area included in SMART BRFSS as well as for each state individually.

### SMART: City and County Data

Selected Metropolitan/Micropolitan Area Risk Trends (SMART) is an ongoing project that uses BRFSS data to produce some local area estimates. Counties and Metropolitan/Micropolitan Areas (MMSAs) were selected for SMART if there were 500 or more respondents BRFSS combined landline and cell phone data for any year.

### Chronic Disease Indicators (CDI)

The Chronic Disease Indicators Tool allows users to select two or more geographic areas such as states, Metropolitan/Micropolitan Areas (MMSAs), or regions within states. The tool then creates a table illustrating differences on user selected health indicators by geographic area. Chronic conditions and health risk behaviors may be selected for inclusion in customized tables.

### Worker Health Charts

Use BRFSS industry and occupation data to create charts on chronic conditions, health behaviors, health status, healthcare issues, and musculoskeletal health.



# Wisconsin State Population – Rural / Urban



Online  
Library ▾

Topics &  
States ▾

Rural Data  
Visualizations ▾

<https://www.ruralhealthinfo.org/visualizations>

- Provides many data visualization tools including interactive charts, graphs, and maps on a variety of topics related to rural health status, health care, and disparities.



# Wisconsin State Population – Vascular Risk Factors



## Survey of the Health of Wisconsin (SHOW)

Improving Health in Wisconsin through Research, Community Engagement, and Education

<https://show.wisc.edu/>

- Household-based examination health surveys on representative samples of Wisconsin residents
- Topics include health conditions, health-related behaviors, health care, social and socioeconomic determinants
- Four waves since 2008 with 6,000+ participants
- Self-reported data, objective measures, biological samples



# Statistical Testing Methods

## Continuous variables

- One-sample z-test (the population variance is known)

## Binary variables

- Exact binomial test

## Categorical variables with >2 categories

- Exact multinomial test with the Monte Carlo approach

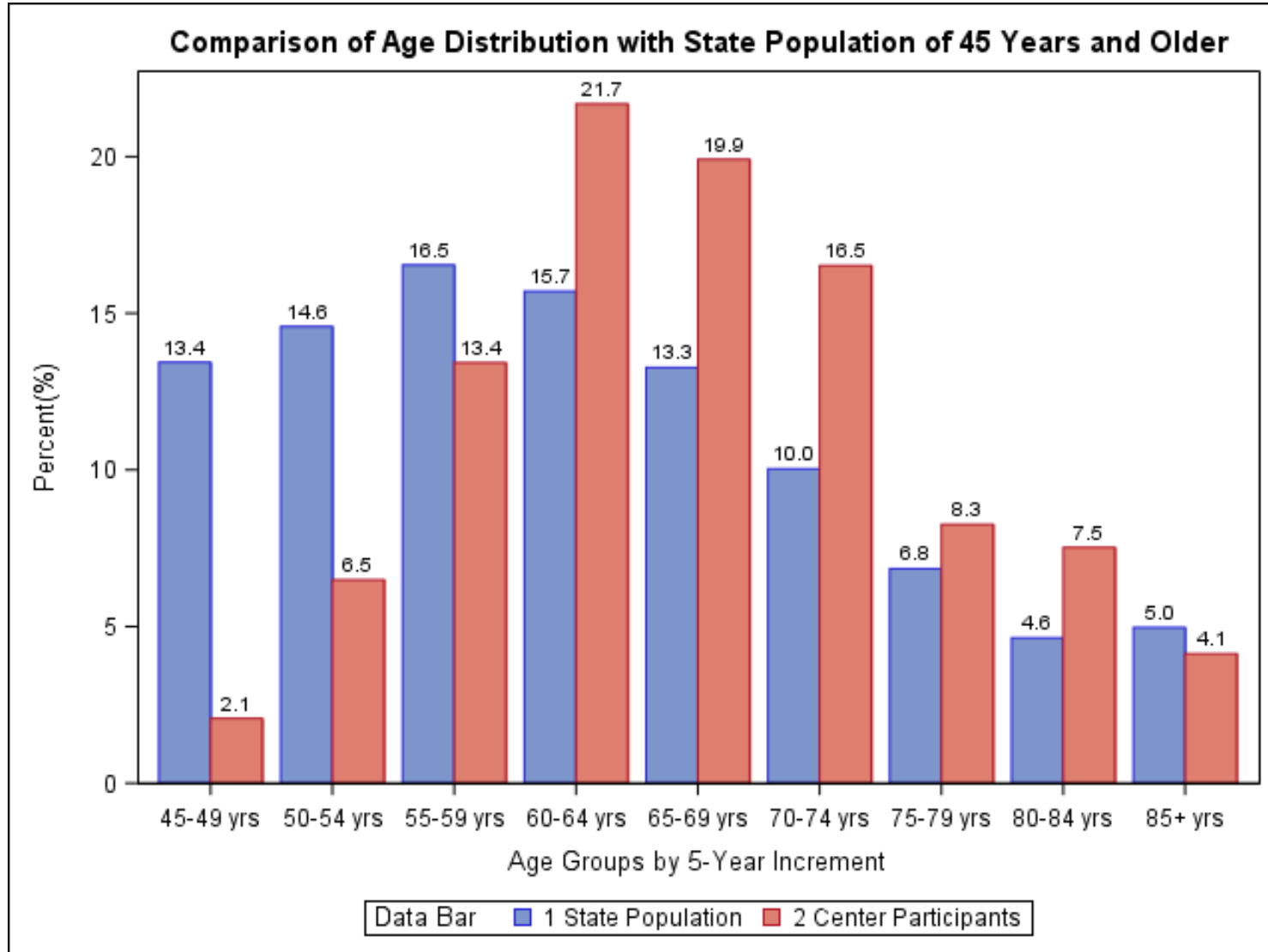
## Correction for multiple testing

- Benjamini-Hochberg false discovery rate (FDR) correction method





# Results – Demographics



Center participants:

Range 45-99 years

*Mean (SD) = 67.3 (9.6)*



# Results – Demographics

Metrics	Younger Age Group (45 - 64 Years)		Older Age Group (65 Years and Older)	
	State Population	Center Participants	State Population	Center Participants
<b>Women, % *</b>	50.3%	66.6%	54.2%	61.0%
<b>Underrepresented groups (URG), % *</b>	10.7%	25.3%	5.7%	24.4%
<b>Race, % *</b>				
<b>White</b>	91.4%	77.7%	94.9%	77.7%
<b>Black</b>	5.3%	17.6%	3.2%	16.5%
<b>American Indian</b>	1.1%	4.1%	0.7%	5.8%
<b>Asian</b>	2.1%	0.7%	1.2%	0.0%
<b>Hispanic, %</b>	4.7%	3.0%	1.9%	0.8%

\* Significant for both age groups



# Results – Demographics

Metrics	Younger Age Group (45 - 64 Years)		Older Age Group (65 Years and Older)	
	State Population	Center Participants	State Population	Center Participants
<b>Education, % *</b>				
Did not graduate high school	7.5%	0.7%	9.3%	0.8%
High school graduate	30.0%	7.4%	36.0%	9.2%
Attended college	33.2%	22.0%	32.7%	21.5%
<b>College graduate</b>	29.3%	69.9%	21.9%	68.6%
<b>Rural, % *</b>	27.6%	18.9%	31.4%	17.5%

\* Significant for both age groups



# Results – Vascular Risk Factors

Metrics	Younger Age Group (45 - 64 Years)		Older Age Group (65 Years and Older)	
	State Population	Center Participants	State Population	Center Participants
<b>Hypertension, % *</b>	41.1%	32.4%	67.0%	46.5%
<b>Diabetes, % +</b>	13.7%	13.2%	21.0%	14.7%
<b>Systolic blood pressure (mm Hg), Mean(SD) *</b>	127.3 (16.6)	122.1 (16.3)	136.1 (18.5)	126.8 (17.0)
<b>BMI (kg/m<sup>2</sup>), Mean(SD) *</b>	30.6 (7.3)	29.2 (7.0)	29.8 (6.0)	28.3 (5.6)
<b>Total Cholesterol (mg/dL), Mean(SD) +</b>	200.2 (40.5)	202.3 (41.4)	187.1 (42.4)	191.8 (40.1)

\* Significant for both age groups, + significant for older age group only



# Conclusions

**Compared to the Wisconsin state population 45 years and older, our center participants**

- Older
- More women
- Greater percentages of Black and American Indians
- Better educated
- Less living in rural areas
- Better vascular risk profiles



# Conclusions

## **Not designed to be representative of state population**

- Not suitable for epidemiology studies

## **Oversampling underrepresented minorities**

- Statistical power
- Precision in effect size estimates

## **Target recruiting more people who are less educated or live in rural areas**

- Allow research findings to be generalizable to these subpopulations
- Support better policy making to meet their needs



# Acknowledgement

## Collaborators (in alphabetical order of last name)

- Sanjay Asthana, MD
- Barbara B. Bendlin, PhD
- Andrew Bersch, MS
- Hanna M. Blazel, MS
- Cynthia M. Carlsson, MD, MS
- Richard J. Chappell, PhD
- Nathaniel Chin, MD
- Carey E. Gleason, PhD
- Sterling C. Johnson, PhD
- Tamara LeCaire, PhD
- Maria Mora Pinzon, PhD
- Ryan Powell, PhD
- Leah Reuter, BS
- Alice Spalitta, BS
- Michelle L. Wahoske, MS

**ADRC investigators and staff**

**ADRC research participants**

*Thank you!*

