Penn Medicine

ITMAT
Institute for Translational Medicine and Therapeutics

Institute for Translational Medicine and Therapeutics

Racially and Economically Disparate Common Diseases in 2020 – A BRFSS Analysis

Ashley Duchi
Mentor: Blanca Himes, PhD

August 17th, 2022

Background: Racial and Income Disparities

- 13.8% of African Americans, 10% of Hispanics, 17.4% of American Indians and Alaska Natives reported having **fair or poor health** compared with 8.3% of non-Hispanic Whites as of 2020
- Since 2001, **life expectancy** increased by 2.5 years for top 5% of the income distribution, but no gains for bottom 5%

Health Disparities by Race and Ethnicity CAP (2020)

Khullar, Chokshi Health Affairs (2018)

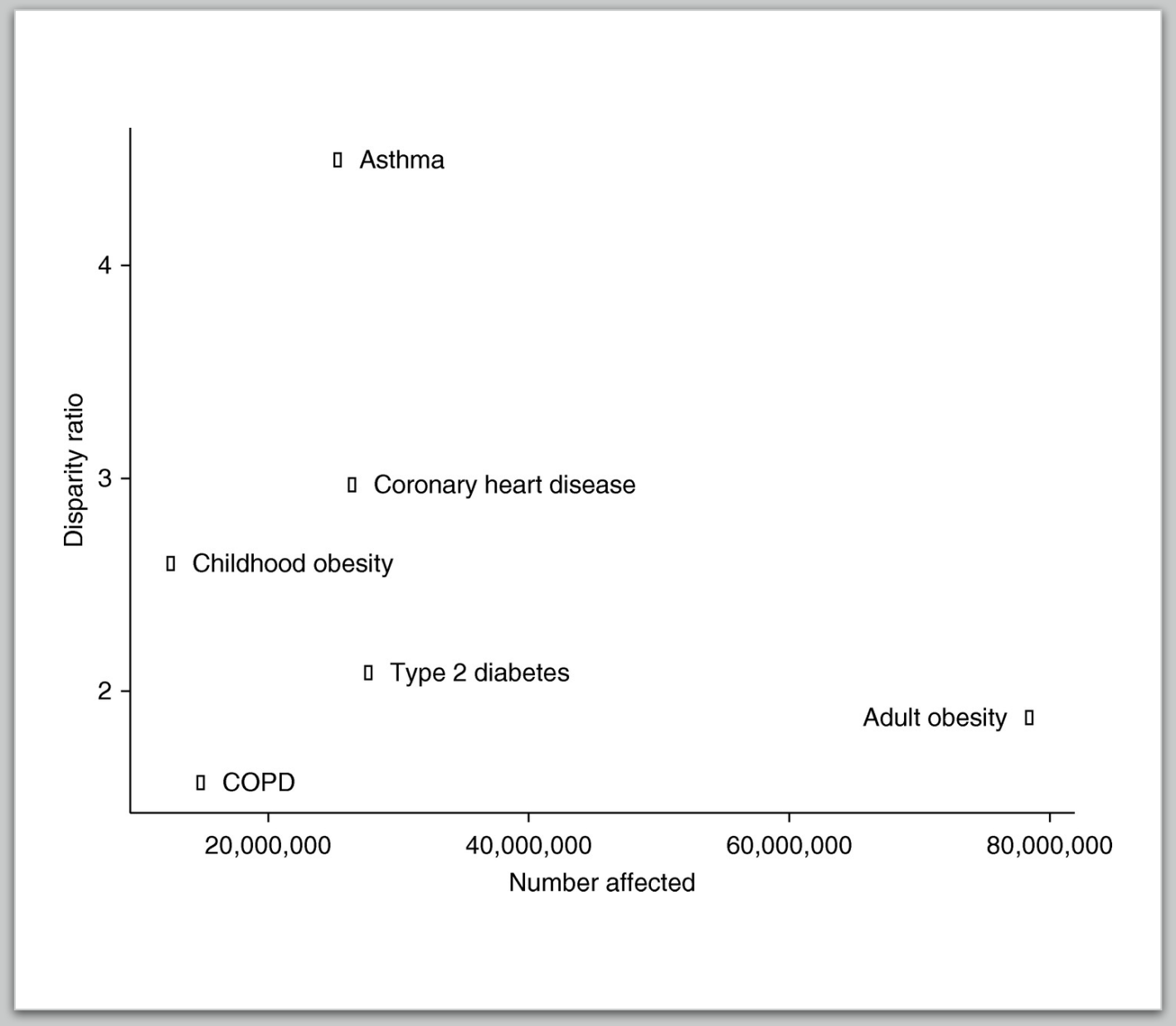
Goal

- Identify the existence and extent of disparities in the prevalence of common diseases by race/ethnicity and income level in 2020

Purpose

- Provide an understanding of the latest available evidence of health disparities
- Help target actions (programs, policies, research) on key common diseases

Most disparate health condition among common diseases in the United States



Oh, et al AJRCCM (2016)

Methods

Data Source - BRFSS

- Behavioral Risk Factor Surveillance System (BRFSS)
- Health-related telephone surveys that collect state data about U.S. residents ages 18 or older (health-related risk behaviors, chronic health conditions, use of preventive services)
- Conducted in all 50 states and U.S. territories

Main Measure – Disparity Ratio

- Disparity ratio = RateA / RateB
  - RateA: prevalence rate for selected population (RateA) for selected health indicator
  - RateB: “best prevalence rate” for selected health indicator
  - Determines how much more likely a particular event is to occur in a population compared to another population
- **Best rate is the lowest prevalence rate among each race/ethnicity and income level group for each indicator**

Secondary Measure – Prevalence Ratio

- Prevalence ratio = RateA / RateB
  - RateA: prevalence rate for a non-White population (RateA) for selected health indicator
  - RateB: prevalence rate for White population for selected health indicator

Independent Variable – Race/Ethnicity

"What is your race/ethnicity: "

- White, NH
- Black, NH
- American Indian/Alaskan native, NH
- Asian, NH
- Native Hawaiian/other Pacific Islander, NH
- Other race, NH
- Multiracial, NH
- Hispanic

- White, NH
- Black, NH
- Native, NH
- Asian/PI, NH
- Hispanic

Independent Variable – Income Level

"Is your annual household income from all sources:"

- <10K
- <15K
- <25k
- <30k
- <35k
- <50k
- <75K
- ≥75k

- <75k
- ≥75K

Dependent Variables - Prevalence

Original selected disease	BRFSS Variable
Asthma	Asthma
COPD	COPD, emphysema, chronic bronchitis
Adult obesity	Adult obesity
Coronary heart disease	Coronary heart disease or angina
Childhood obesity	N/A
Type 2 diabetes	N/A
N/A	Kidney disease

Calculations

- Prevalence estimates for each disease by race/ethnicity or income
  - respondents in a population with disease at time of survey / total number of respondents in that population
  - Ex: number of Hispanics with asthma / total number of Hispanics who answered that question
- Prevalence ratio between non-White and White populations
  - prevalence rate of disease in non-White population / prevalence rate of disease in White population
- Disparity ratio
  - Highest prevalence rate of disease / lowest prevalence rate of disease

Results

Demographics

	Number of Respondents
Sex at Birth	
Male	46,371
Female	54,541
Race/ethnicity	
White	295,900
Asian/PI	12,147
Black	30,130
Hispanic	36,322
Native	6,813
Income	
<75K	203,122
≥75K	118,779

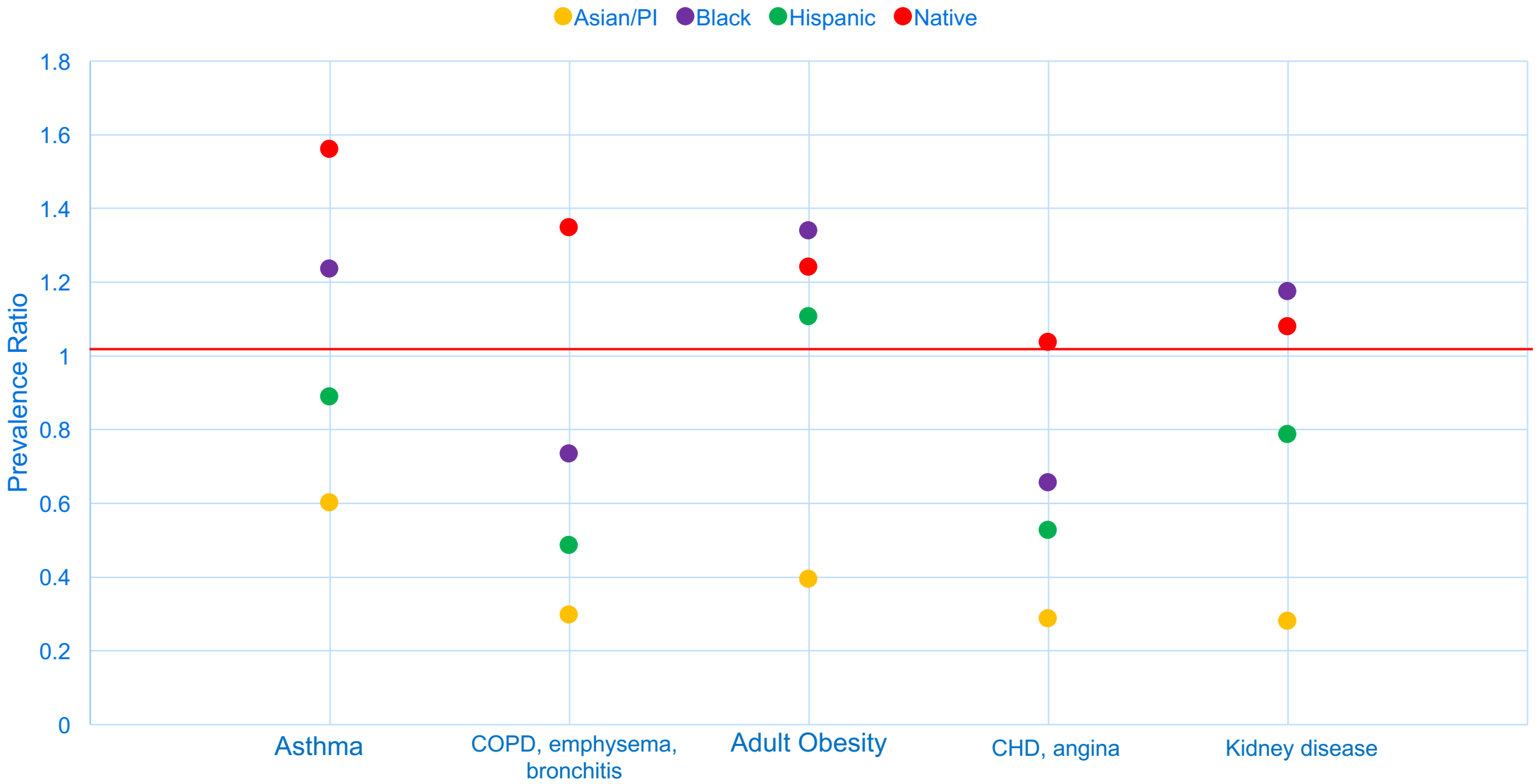
Disease	Number of Respondents
Asthma	54,141
COPD, emphysema, bronchitis	401,953
Adult obesity	360,601
CHD, angina	401,955
Kidney disease	401,952

Results: Race/Ethnicity

Summary: Prevalence Ratio Between Non-White and White Participants

Disease	Race/Ethnicity			
	Asian/PI	Black	Hispanic	Native
Asthma	0.601	1.234★	0.888	1.560★
COPD, emphysema, bronchitis	0.296	0.734	0.485	1.348★
Adult obesity	0.394	1.339★	1.106★	1.241★
CHD, angina	0.286	0.656	0.525	1.037★
Kidney disease	0.280	1.173★	0.786	1.079★

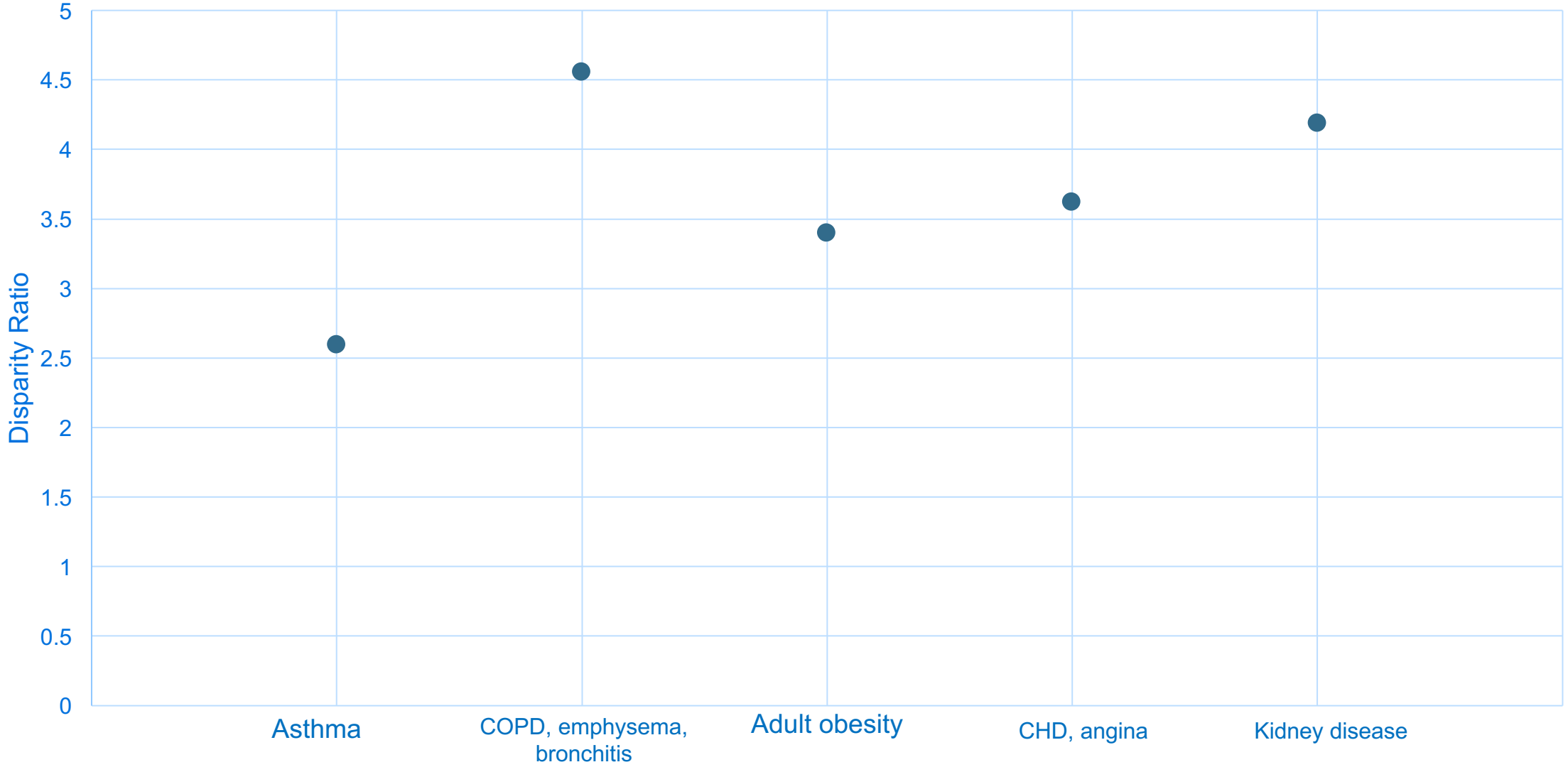
Prevalence Ratio Between Non-White and White Participants

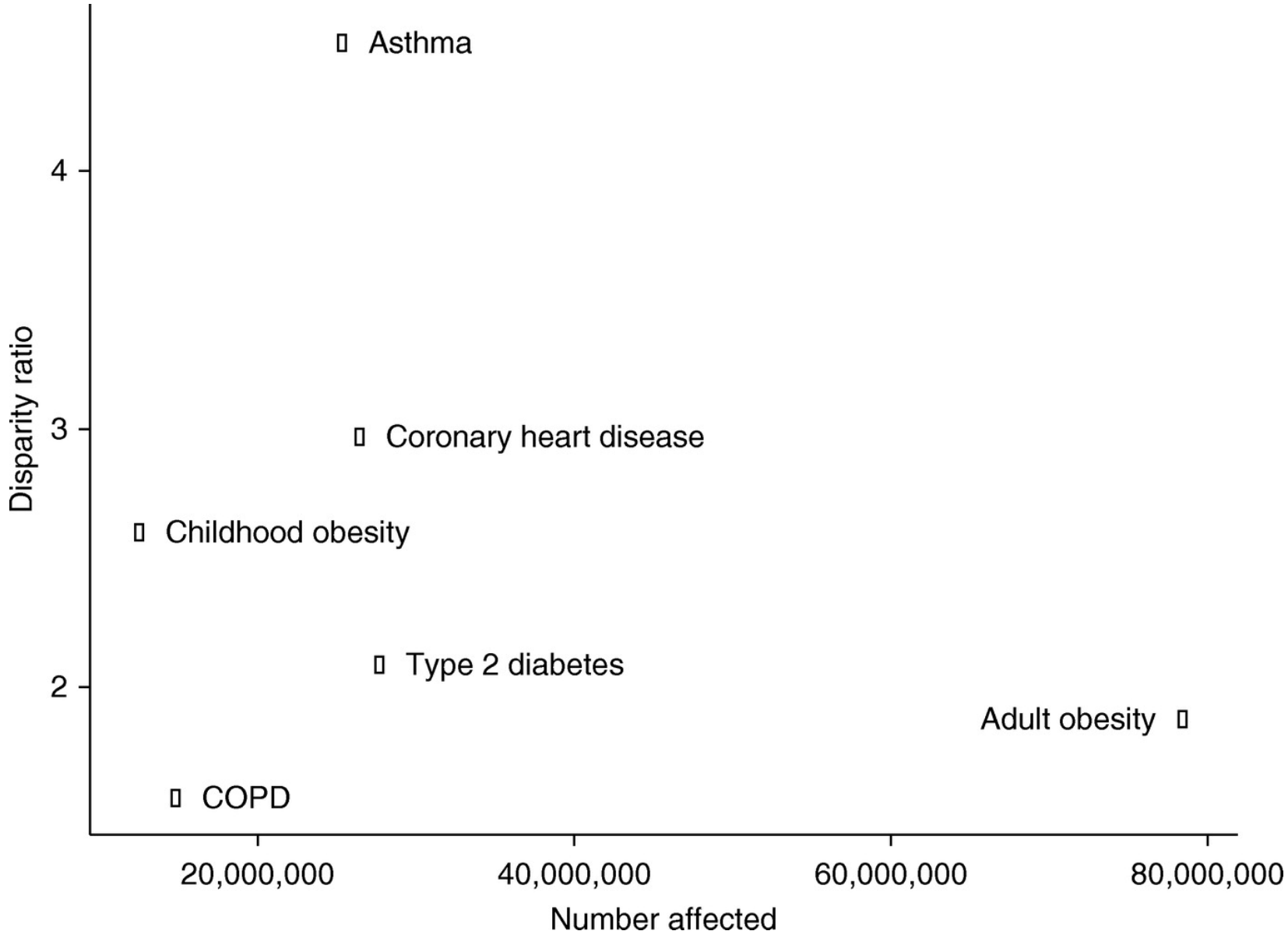


Summary: Disparity Ratio

Disease	Calculation	Disparity Ratio
Asthma	Native / Asian/PI	2.560
COPD, emphysema, bronchitis	Native / Asian/PI	4.559
Adult obesity	Black / White	3.399
CHD, angina	Native / Asian/PI	3.621
Kidney disease	Black / Asian/PI	4.192

Most Racially Disparate Common Diseases



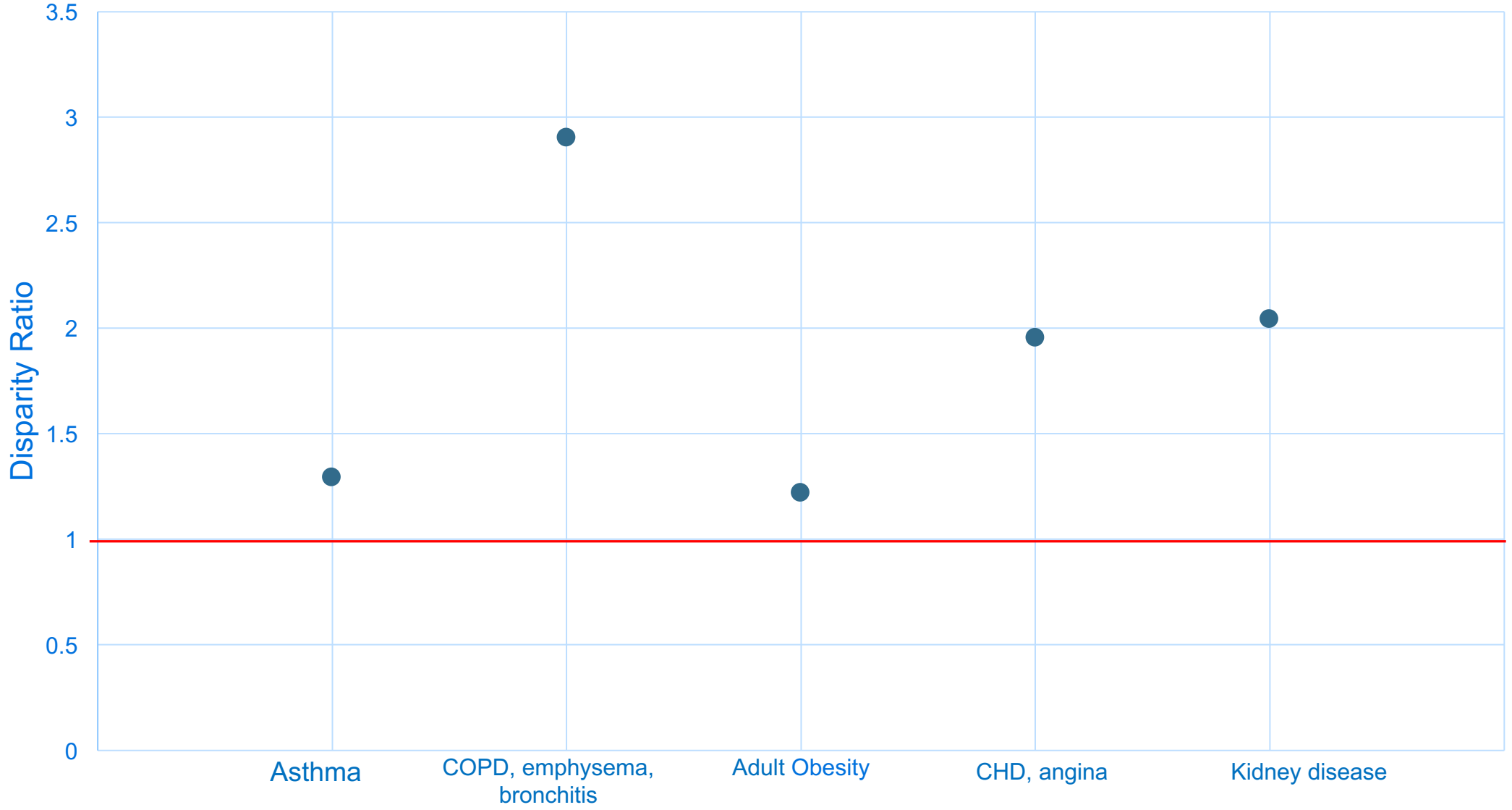

Asthma
Coronary heart disease
Childhood obesity
Type 2 diabetes
Adult obesity
COPD
Disparity ratio
4
3
2
20,000,000
40,000,000
60,000,000
80,000,000
Number affected

Results: Income

Summary: Disparity Ratio

Disease	Disparity Ratio
Asthma	1.292
COPD, emphysema, bronchitis	2.901
Adult obesity	1.219
CHD, angina	1.953
Kidney disease	2.043

Most Economically Disparate Common Diseases



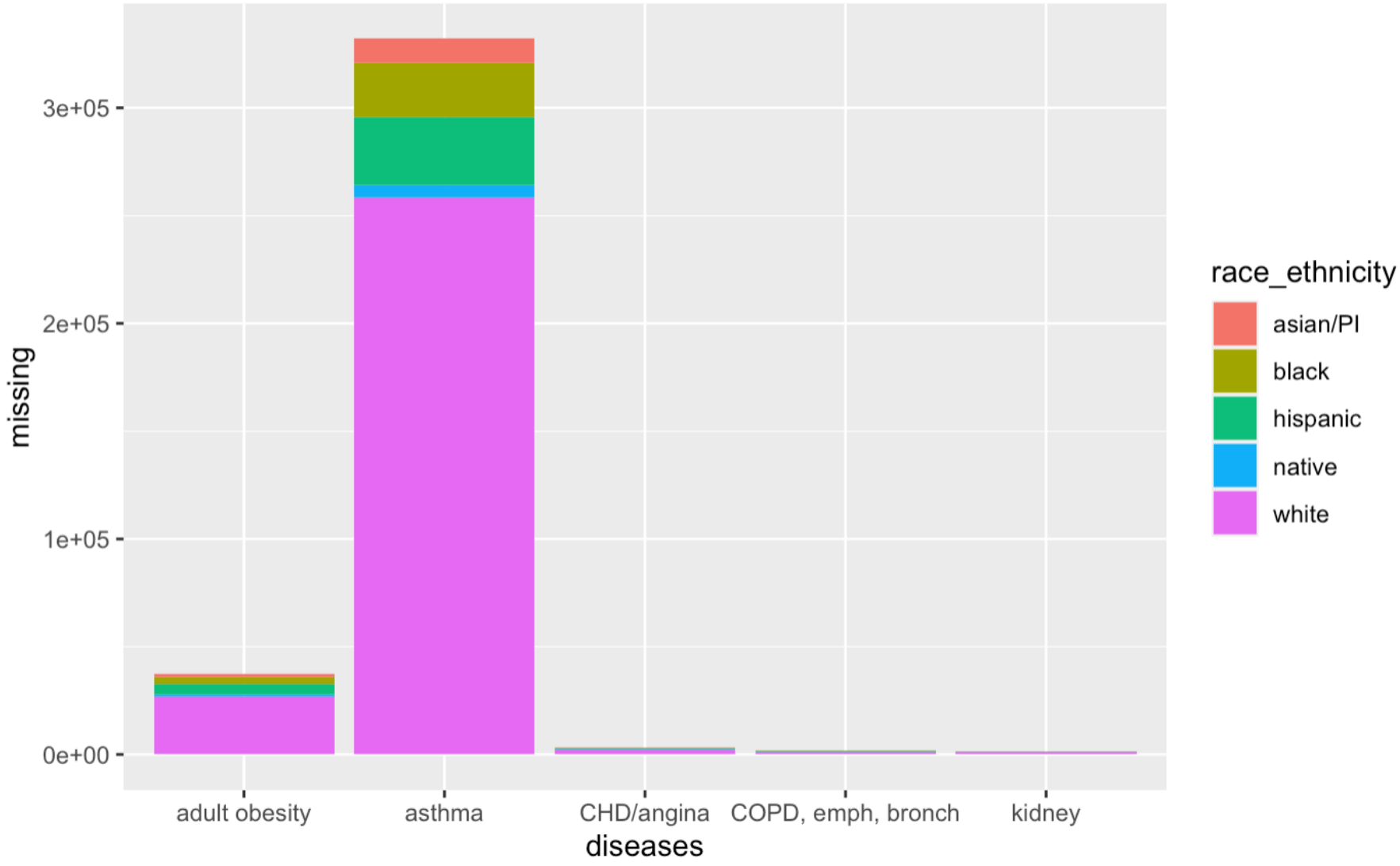
Conclusions

- Race/ethnicity
  - Prevalence ratio
    - Asthma most severe disparity for native population
  - Disparity ratio
    - Most racially disparate condition: COPD, emphysema, bronchitis
- Income level
  - Disparity exists for every chosen common disease
  - Most economically disparate condition: COPD, emphysema, bronchitis
- Implication
  - Focus research, interventions on COPD, emphysema, bronchitis

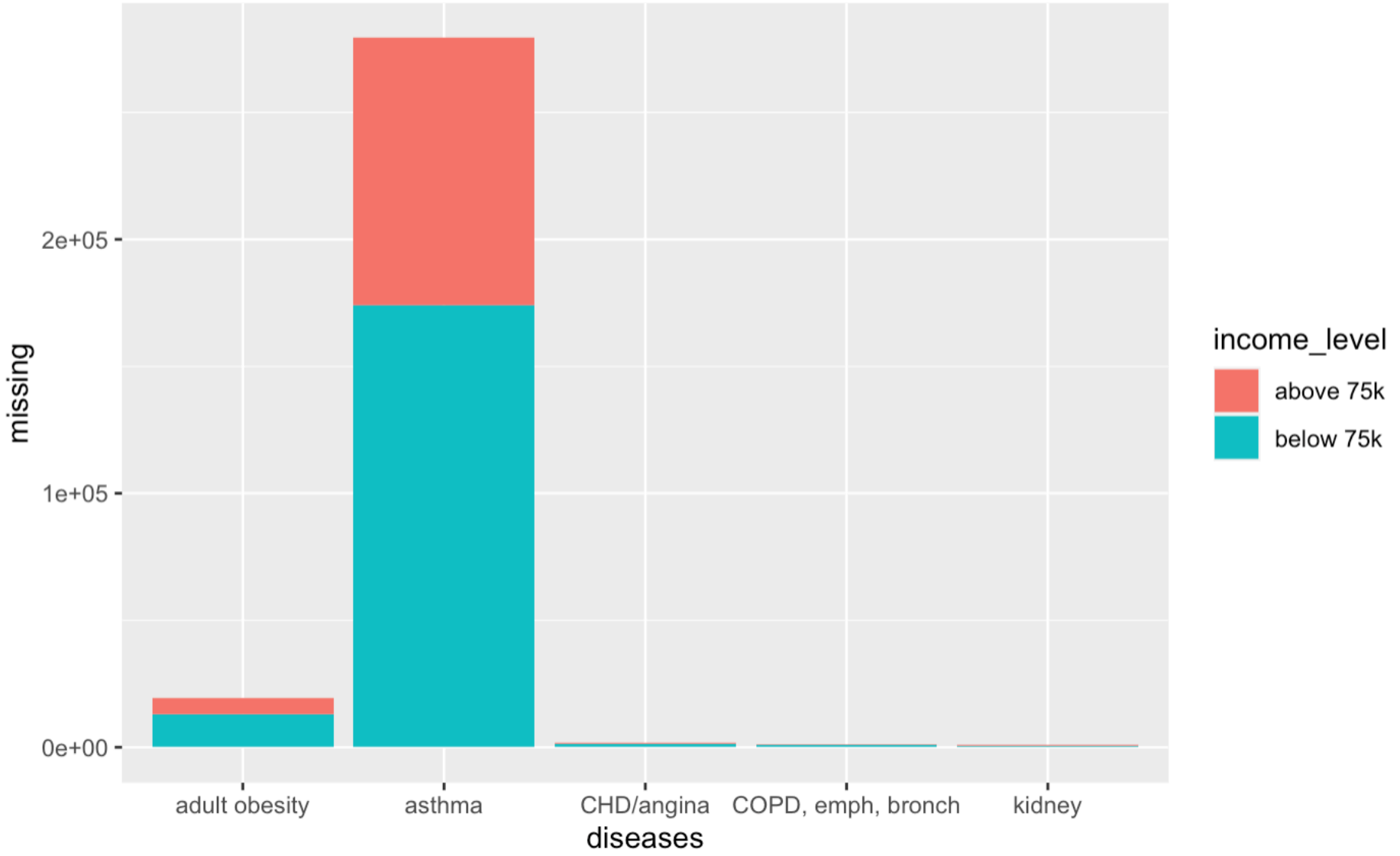
Limitations

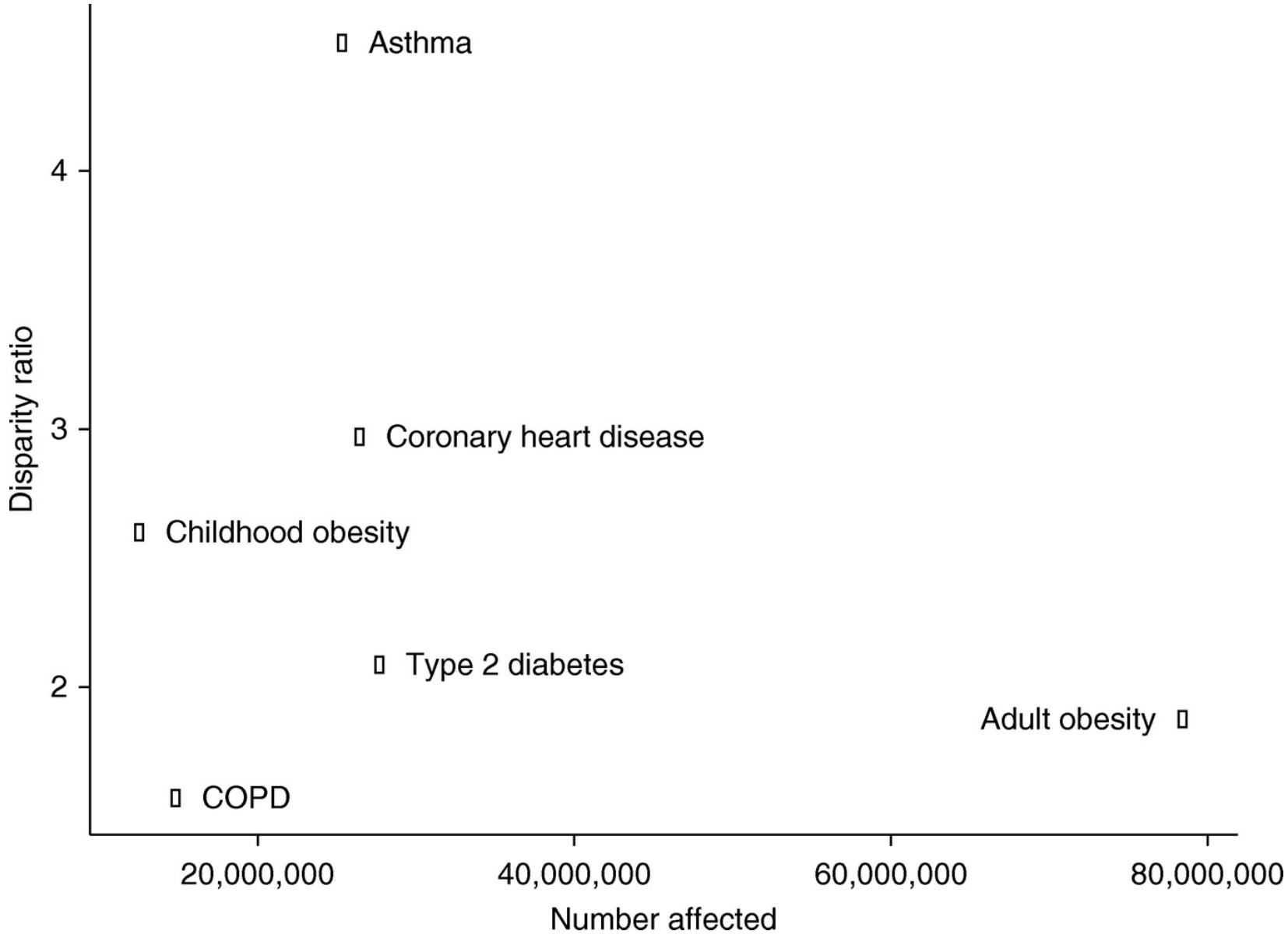
- 1 year of phone survey data
- Income doesn't adjust for cost of living
- Variables aren't precise
  - COPD, emphysema, bronchitis
  - CHD, angina
- Missing data varies by:
  - Disease
  - Race/ethnicity or income level

Limitations – Missing Responses by Race/Ethnicity



Limitations – Missing Responses by Income




Asthma
Coronary heart disease
Childhood obesity
Type 2 diabetes
Adult obesity
COPD
Disparity ratio
4
3
2
20,000,000
40,000,000
60,000,000
80,000,000
Number affected

My Role and Lessons Learned

- R
  - Extracted data, cleaned data
  - Computed calculations
  - Experience graphing
- Reproducing findings is difficult
  - Choosing the right data is key
    - BUT complete databases are hard to find
- Self-guided learning

Acknowledgements

- Dr. Himes
- Joanne Levy
- SUMR Cohort

Thank you! Any questions?

Penn Medicine