



**Learning Session #6**  
**Urban vs. Rural Cardiovascular Health Outcomes**

**September 24, 2025**  
**1pm – 2pm**

# Call Agenda

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- Welcome

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- Housekeeping

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- Presentation

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- Close-Out & Next Steps

# Housekeeping



This meeting  
is being  
**recorded**  
and  
**transcribed.**

By staying in the  
meeting, you  
automatically  
consent to be  
recorded.



Slides and  
recording will  
be posted on  
a public  
MDHHS -  
MICH  
Learning  
Collaborative  
webpage.



All  
attendee  
video and  
audio  
functions  
have been  
disabled by  
the host.



We  
encourage  
you to  
submit  
questions  
and  
comments  
at any time  
via Teams  
chat.

# Disclaimer

- Funding for this Learning Session was made possible (in part) by the Centers for Disease Control and Prevention.
- The views expressed in materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services, nor does the mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.



# Webpage "Sneak Peek"



Health & Human Services

Assistance  
Programs

Adult & Children's  
Services

## Michigan Cardiovas Learning



> Keeping Michigan Healthy > Chro

**The Michigan Improving Car**  
from public health, healthcare  
of ideas around successful ap  
efforts on the implementior

A primary focus of the MICH L  
necessary for helping commu  
those at highest risk of CVD fo

► Interested in becor  
Collaborative mailing list

### MICH Learning Sessions

The MICH Learning Collaborative hosts qu  
health equity and outcomes, with a partici

At every session, attendees from across cli  
improvements related to hypertension bu  
cardiovascular health equity throughout M

► Want to join us for a Learning !

#### Upcoming MICH Learning Sessi

#### Past MICH Learning Sessions

### MICH ❤️ - Beat Newsletter

The MICH ❤️ - Beat Newsletter, published  
Collaborative's MICH Learning Sessions an  
other resources of interest.

#### Newsletters

► [Click here to join our mailing lis](#)



#### Upcoming MICH Learning Sessions - Dates and Registration Links



#### Past MICH Learning Sessions



#### Learning Session #1: Data-Driven Strategies for Reducing Hypertension Burden (June 6, 2024)

- [Meeting Presentation](#)
- [Learning Session Recording](#)

#### Objectives:

- Discuss how and what population-level data sources are used to determine hypertension burden.
- Explore how clinical and community-level data informs population-level data.
- Provide examples for how clinics and community-based organizations can use population-level data to inform their treatment practices and programming.

#### Presenters:

- **Phillip Levy, MD, MPH, FACEP, FAHA, FACC**, Professor of Emergency Medicine and Associate Vice President for Translational Science, Wayne State University, and Director, Wayne Mobile Health Unit Program
- **H.C. Michelle Byrd, PhD, MPH**, Cardiovascular Health Epidemiologist, Michigan Department of Health and Human Services (MDHHS)

#### Resources:

- [The PHOENIX Project](#) (Wayne State University)
- [Michigan Behavioral Risk Factor Surveillance System, Tables by Race/Ethnicity](#) (Michigan Department of Health and Human Services)
- [CDC/ATSDR Social Vulnerability Index](#) (CDC/Agency for Toxic Substances and Disease Registry)
- [PLACES: Local Data for Better Health](#) (CDC, the Robert Wood Johnson Foundation, and the CDC Foundation)
- [Missouri Map Room](#) (University of Missouri)



- Dr. Phillip Levy, MD, MPH, FACEP, FAHA, FACC
  - Professor of Emergency Medicine and Associate Vice President for Translational Science - Wayne State University
  - Director, Wayne Mobile Health Unit Program

# Urban vs. Rural Cardiovascular Health Outcomes

Phillip D. Levy, MD MPH, FACEP, FAHA, FACC

Professor of Emergency Medicine and Associate Vice President for Population Health Translational Science

Director, Mobile Health Unit Program

Wayne State University

# Relevant Disclosures

- NIH/NHLBI: R01 HL153607; R01 HL163377; R01 HL146059; R01 HL127215; T32 HL120822
- NIH/NIMHD: P50 MD017351 (ACHIEVE GREATER)
- AHA: RESTORE Health Equity Research Network (LEAP HTN); Collaboration for Equitable Health
- MDHHS: Mobile Health Unit Pilot; Michigan Mobile Health Collaboration; Promotion of Health Equity; CDC 1815, 1816, 1817, 2304, and 2305 programs
- Philanthropy: Bank of America; Ford Philanthropy; WK Kellogg Foundation; Cielo Fund; Michigan Health Endowment Fund; Delta Dental; Centene Charitable Foundation
- Consulting: Moderna; Beckman Coulter; Pathfast; Siemens; Roche; Ortho Quidel; Tosoh Bioscience; UltraSight Medical; People.Health; AstraZeneca

## Newsroom

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Press Releases

Sep 15, 2025

# CMS Launches Landmark \$50 Billion Rural Health Transformation Program

[Rural health](#)

Share

*New Federal Program Aims to Transform Rural Health Care Nationwide*

Today, the Centers for Medicare & Medicaid Services (CMS) unveiled details on how states can apply to receive funding from the \$50 billion Rural Health Transformation Program created under the [Working Families Tax Cuts Act](#) to strengthen health care across rural America. This unprecedented investment is designed to empower states to transform the existing rural health care infrastructure and build sustainable health care systems that expand access, enhance quality of care, and improve outcomes for patients.

“Rural communities are the bedrock of America. They have waited too long for Washington to act. Now, at last, we are acting with the largest investment ever made to improve health care for rural Americans,” **said U.S. Health and Human Services Secretary Robert F. Kennedy, Jr.** “This \$50 billion program is about delivering dignity and dependable care to rural communities, making sure every American has access to affordable, high-quality treatment.”

“This program is a historic investment that will catalyze needed change in rural health systems and improve lives for generations to come,” **said CMS Administrator Dr. Mehmet Oz.** “For too long, when it comes to health care access and infrastructure, we’ve left behind the backbone of America. That stops now with this program that will spark real change for rural health care.”

## Related Releases

Press Releases

Jun 08, 2023

[CMS Announces Multi-State Initiative to Strengthen Primary Care](#)

Press Releases

Nov 01, 2022

[HHS Continues Biden-Harris Administration Progress in Promoting Health Equity in Rural Care Access Through Outpatient Hospital and Surgical Center Payment System Final Rule](#)

Press Releases

Jun 30, 2022

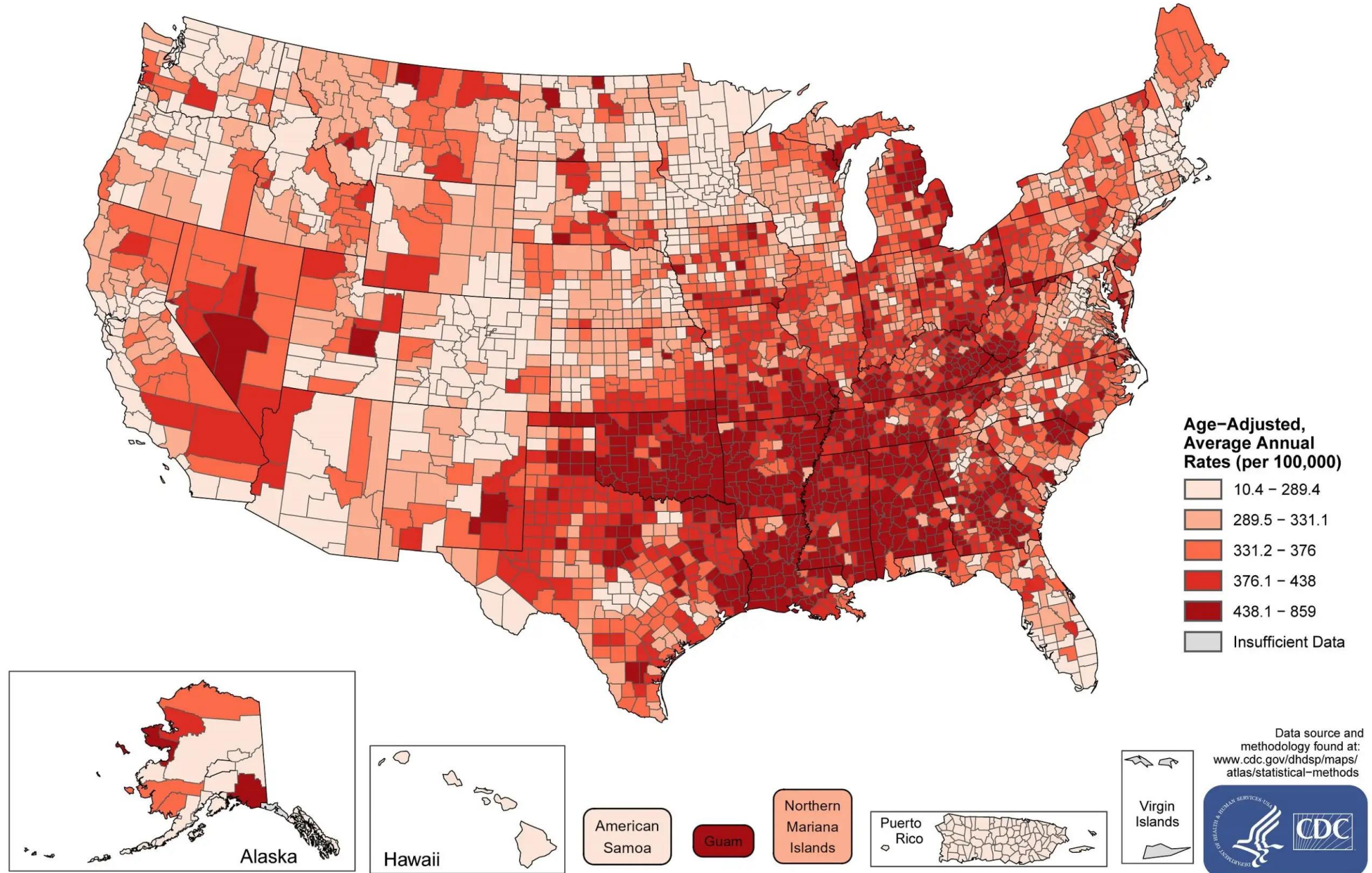
[Biden-Harris Administration Takes Action to Expand Access to Emergency Care Services in Rural Communities](#)

The Program has five strategic goals, grounded in the statutorily approved uses of funds:

- **Make rural America healthy again:** Support rural health innovations and new access points to promote preventative health and address root causes of diseases.
- **Sustainable access:** Help rural providers become long-term access points for care by improving efficiency and sustainability.
- **Workforce development:** Attract and retain a highly skilled health care workforce by strengthening recruitment and retention of health care providers in rural communities.
- **Innovative care:** Spark the growth of innovative care models to improve health outcomes, coordinate care, and promote flexible care arrangements.
- **Tech innovation:** Foster use of innovative technologies that promote efficient care delivery, data security, and access to digital health tools by rural facilities, providers, and patients.

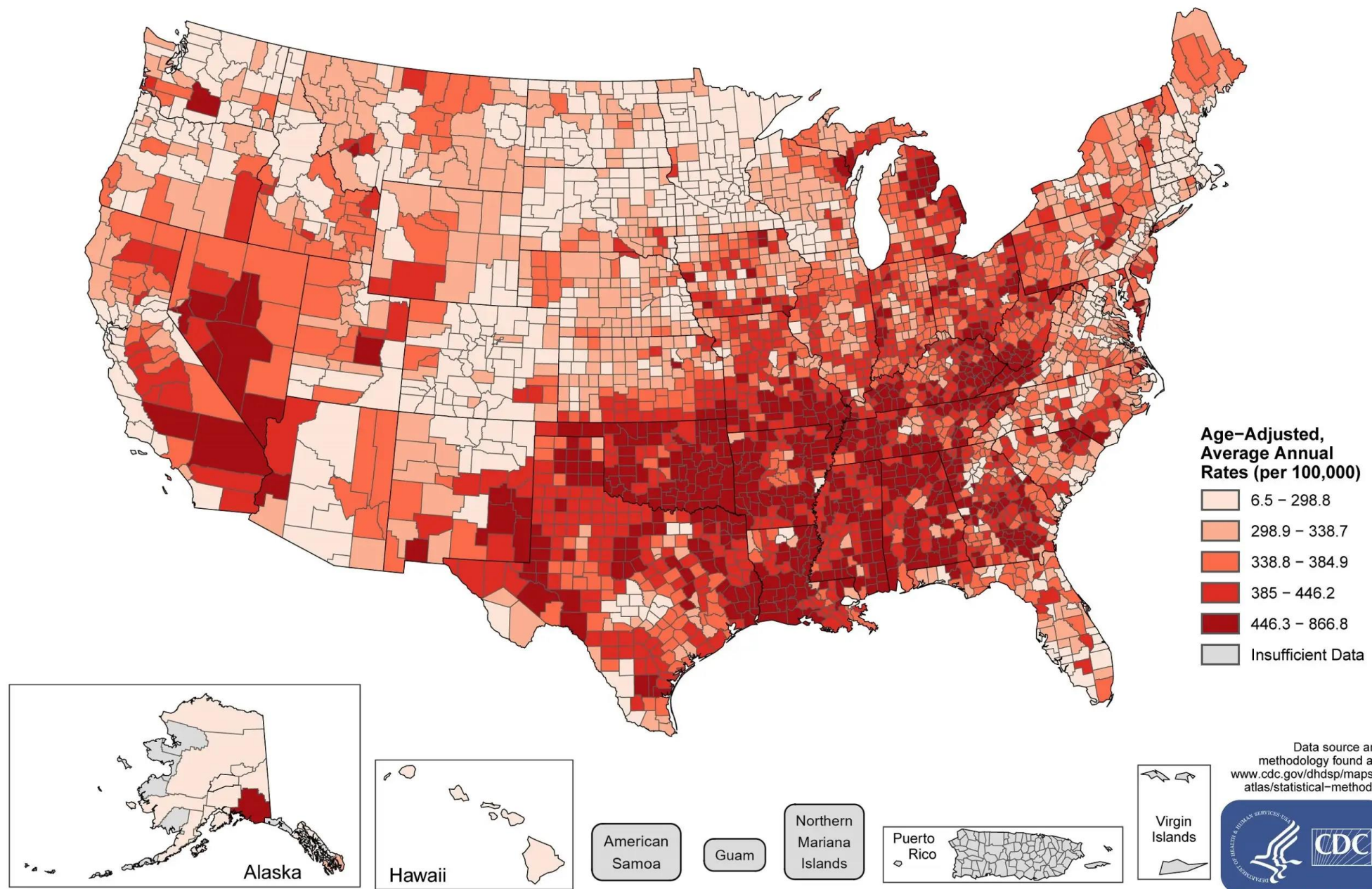


# Heart Disease Death Rates, 2019–2021, All Race, Ages 35+, by County



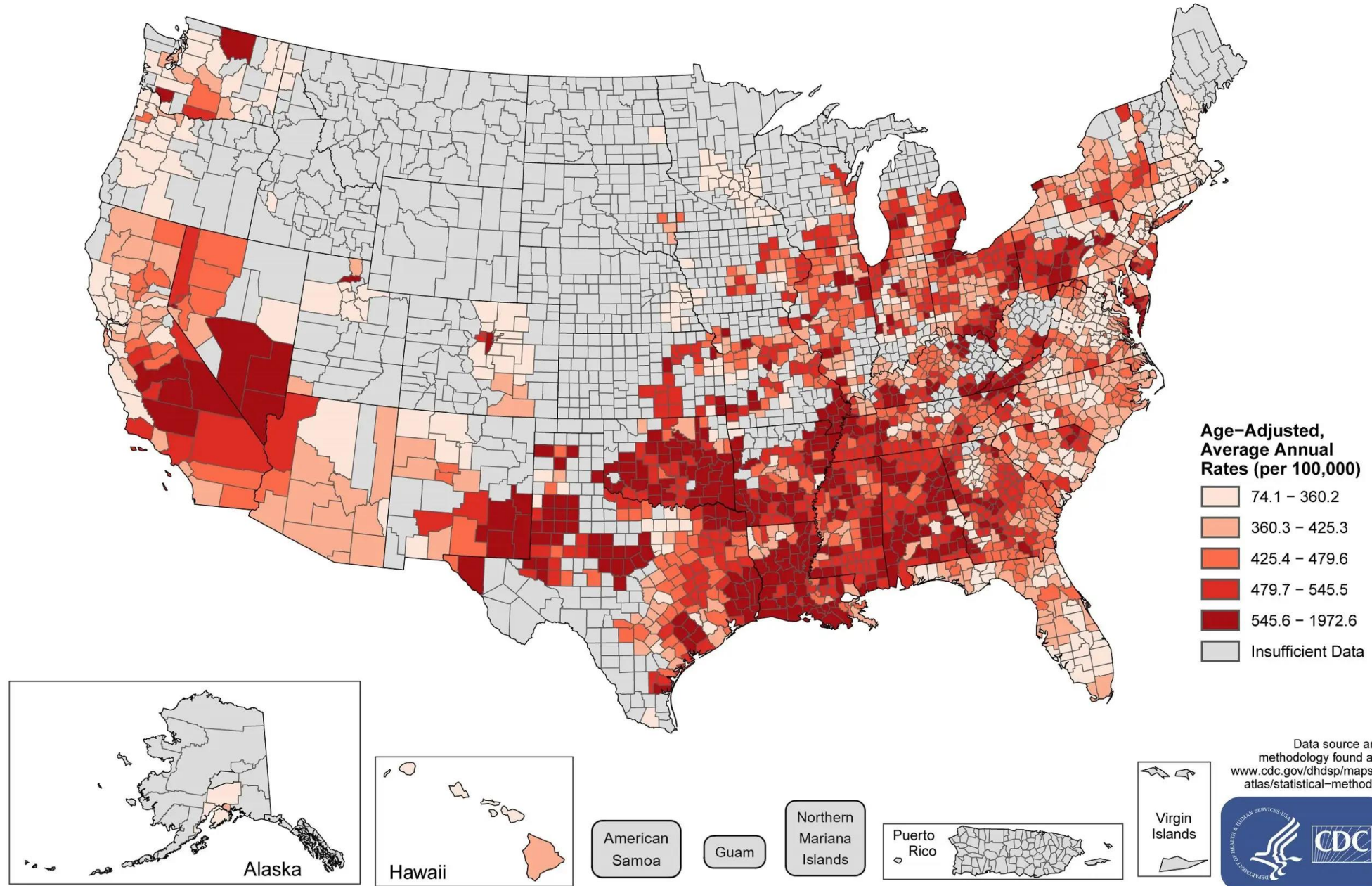


# Heart Disease Death Rates, 2019–2021, White (Non-Hispanic), Ages 35+, by County





# Heart Disease Death Rates, 2019–2021, Black (Non-Hispanic), Ages 35+, by County



# National Map of Trends in Death Rates

Year Trend

2010 - 2019



Outcome

All heart disease



Age Group

Ages 65 years and older



Race

All Races/Ethnicities



Sex

Both Sexes



Total Percent Change(%)

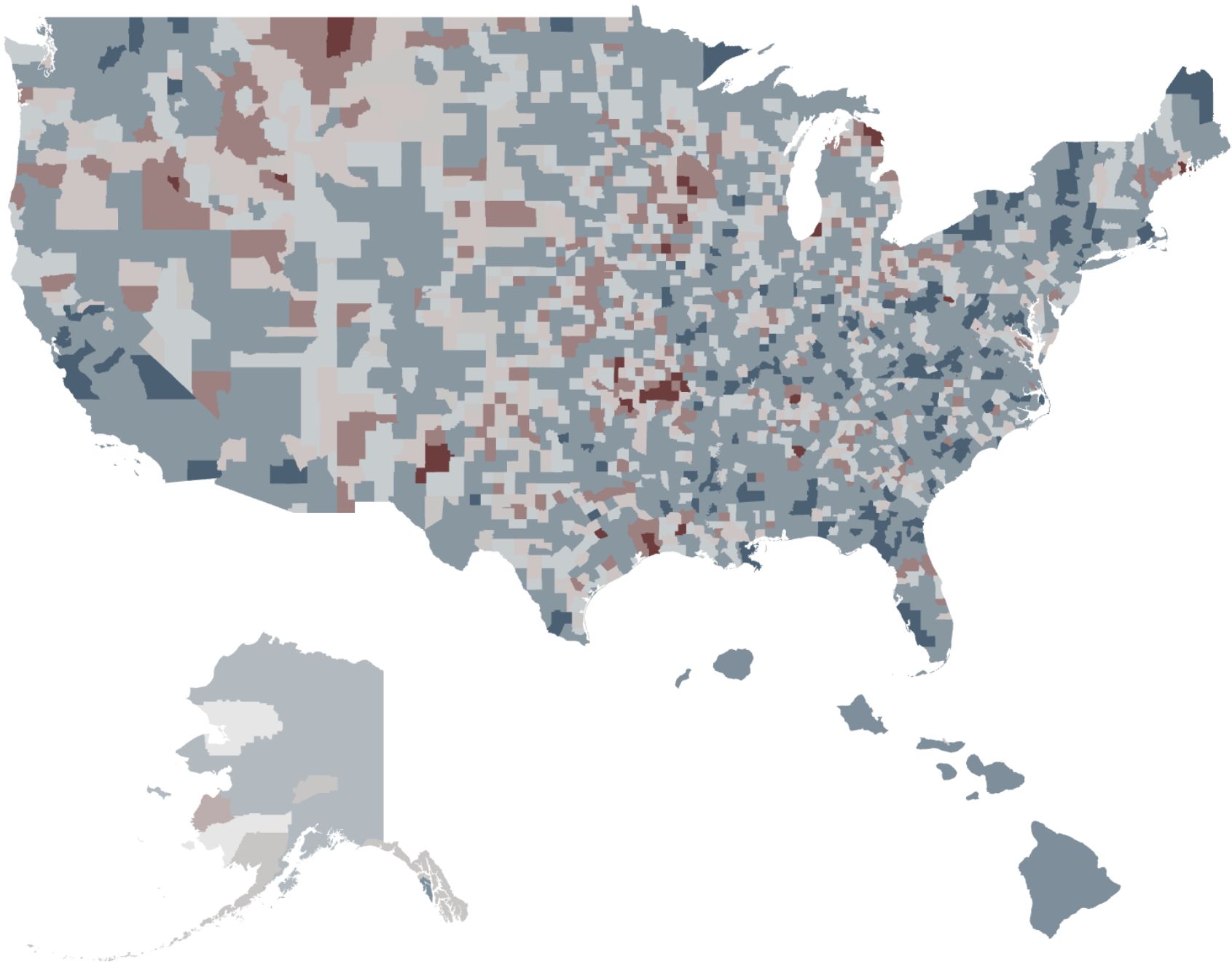


Suppressed

-20 -5 0 +5 +20

Largest declines

Largest increases



# National Map of Trends in Death Rates

Year Trend

2010 - 2019

Outcome

All heart disease

Age Group

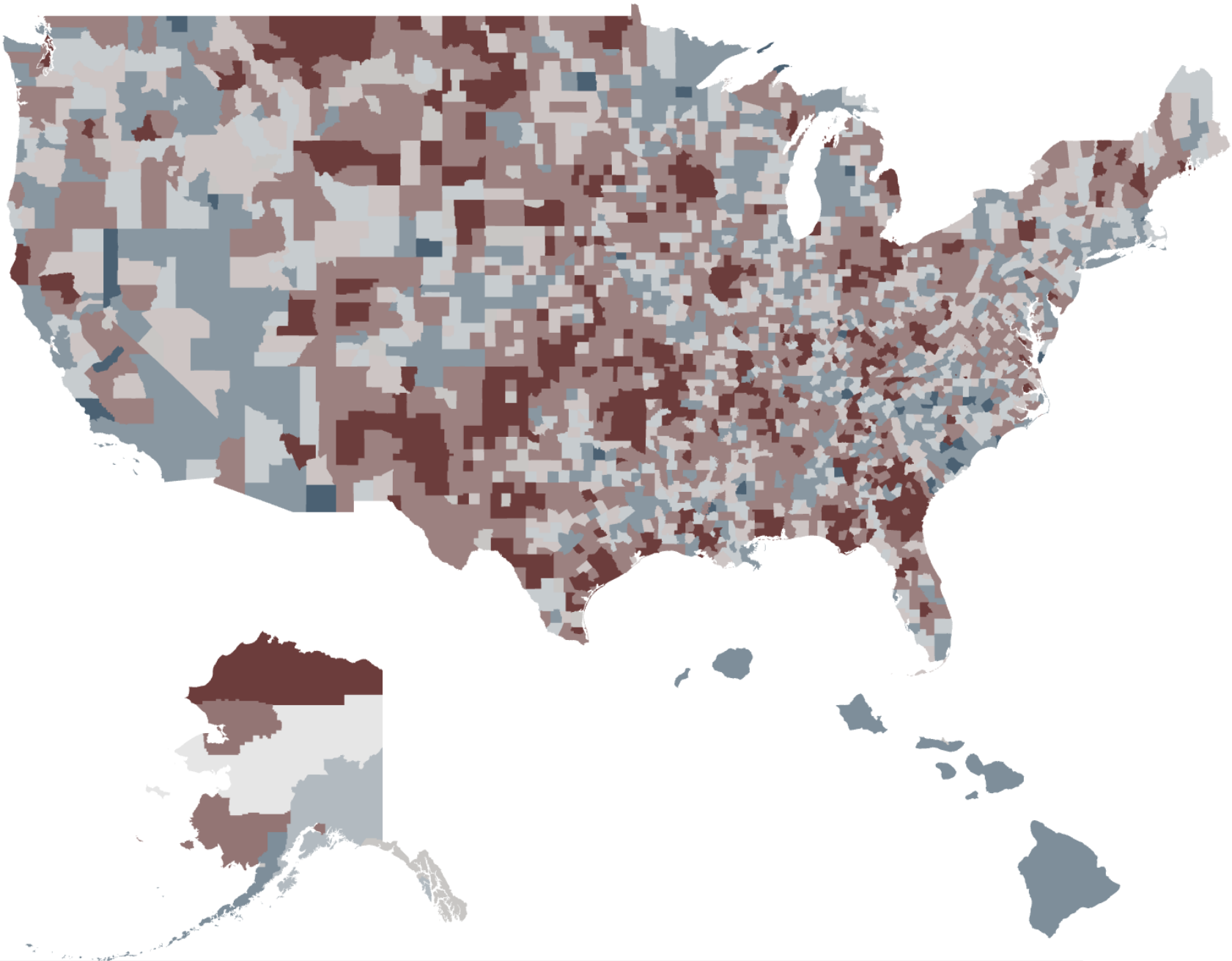
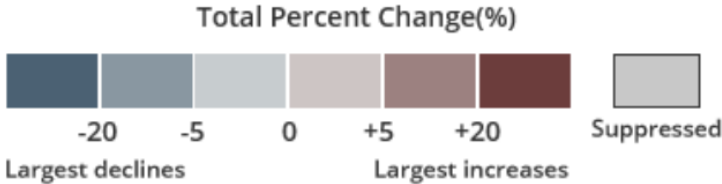
Ages 35-64 years

Race

All Races/Ethnicities

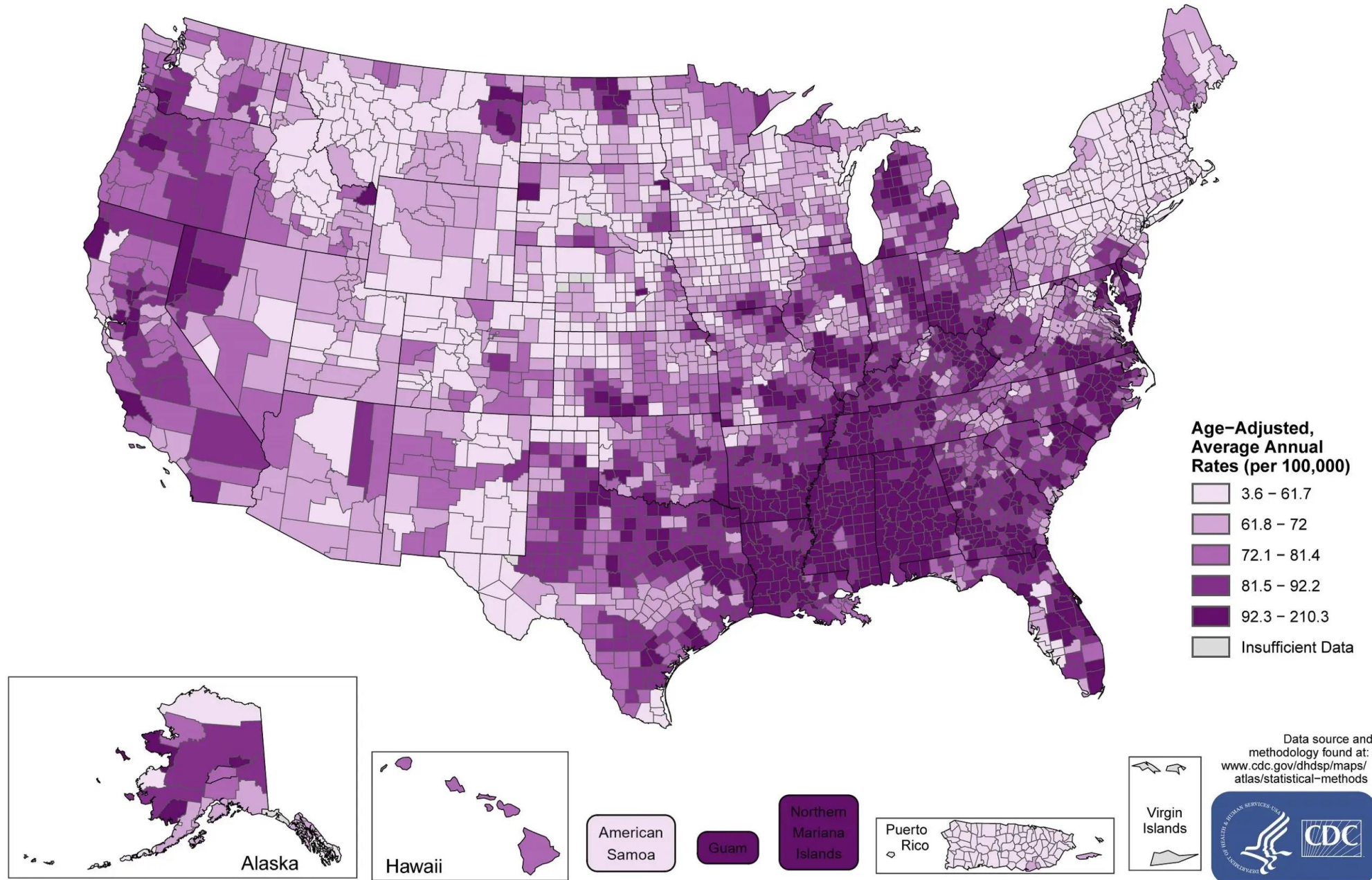
Sex

Both Sexes



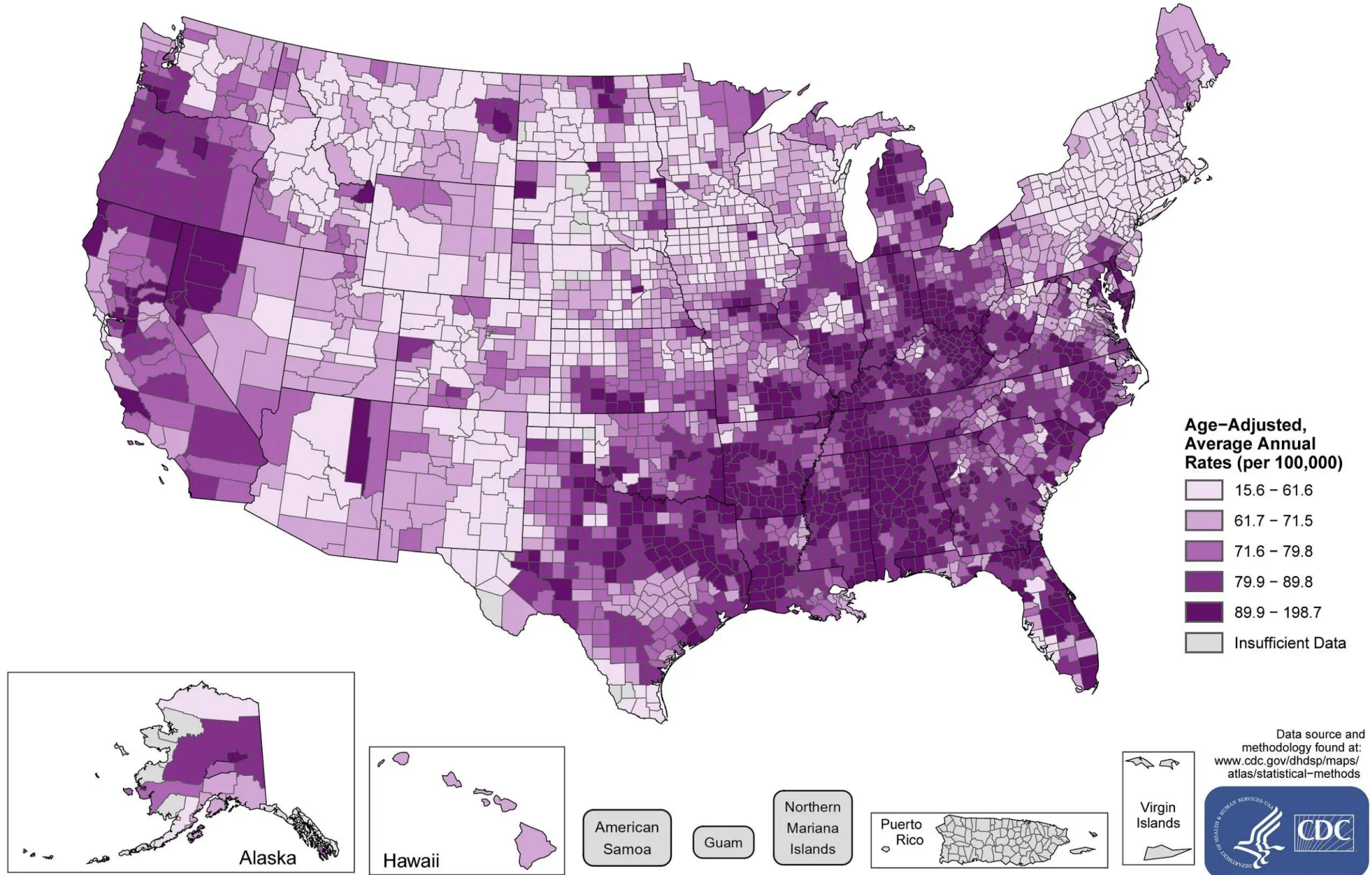


# Stroke Death Rates, 2019–2021, All Race, Ages 35+, by County

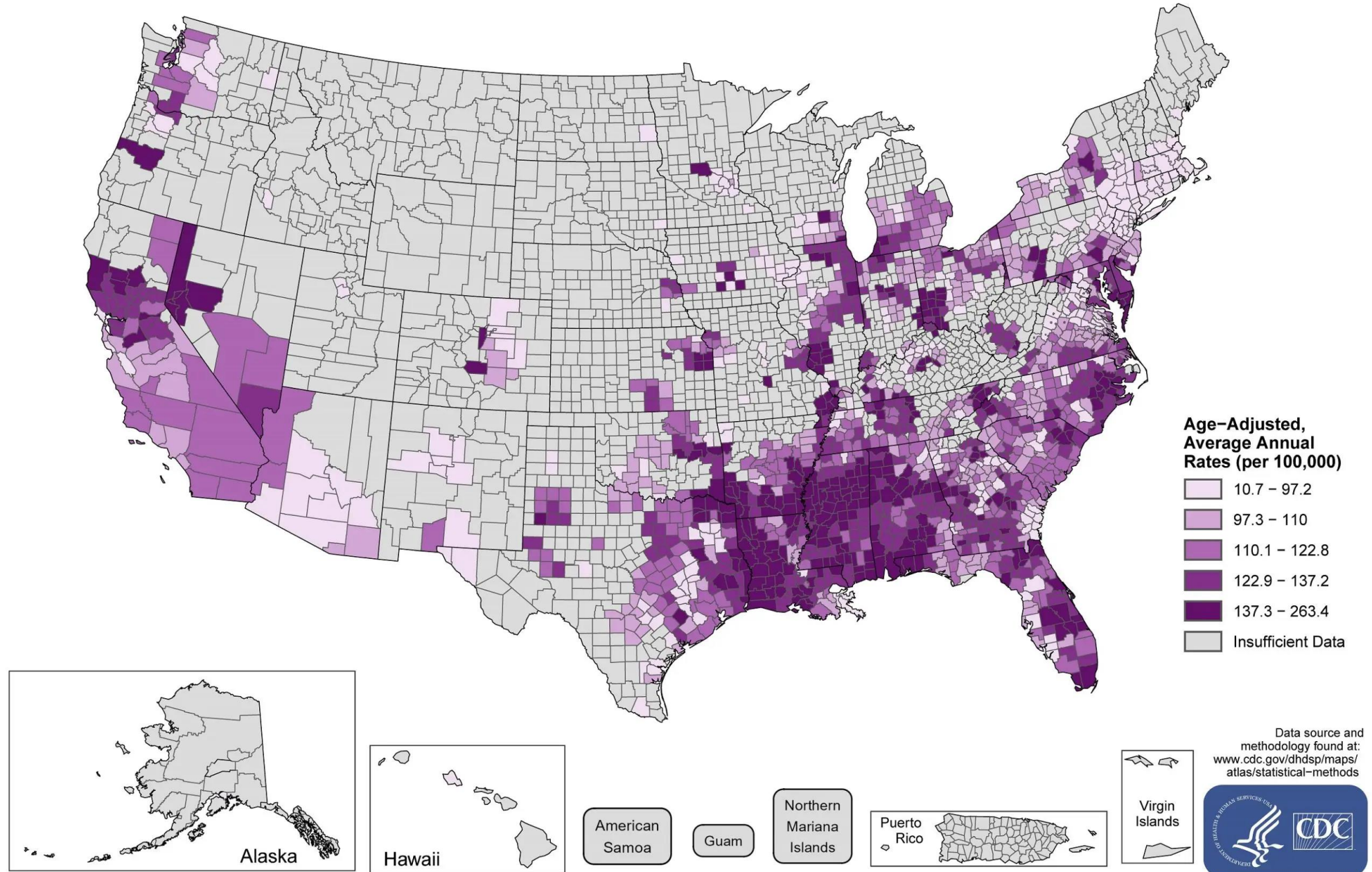




# Stroke Death Rates, 2019–2021, White (Non-Hispanic), Ages 35+, by County



# Stroke Death Rates, 2019–2021, Black (Non-Hispanic), Ages 35+, by County





# National Map of Trends in Death Rates

Year Trend

2010 - 2019

Outcome

All stroke

Age Group

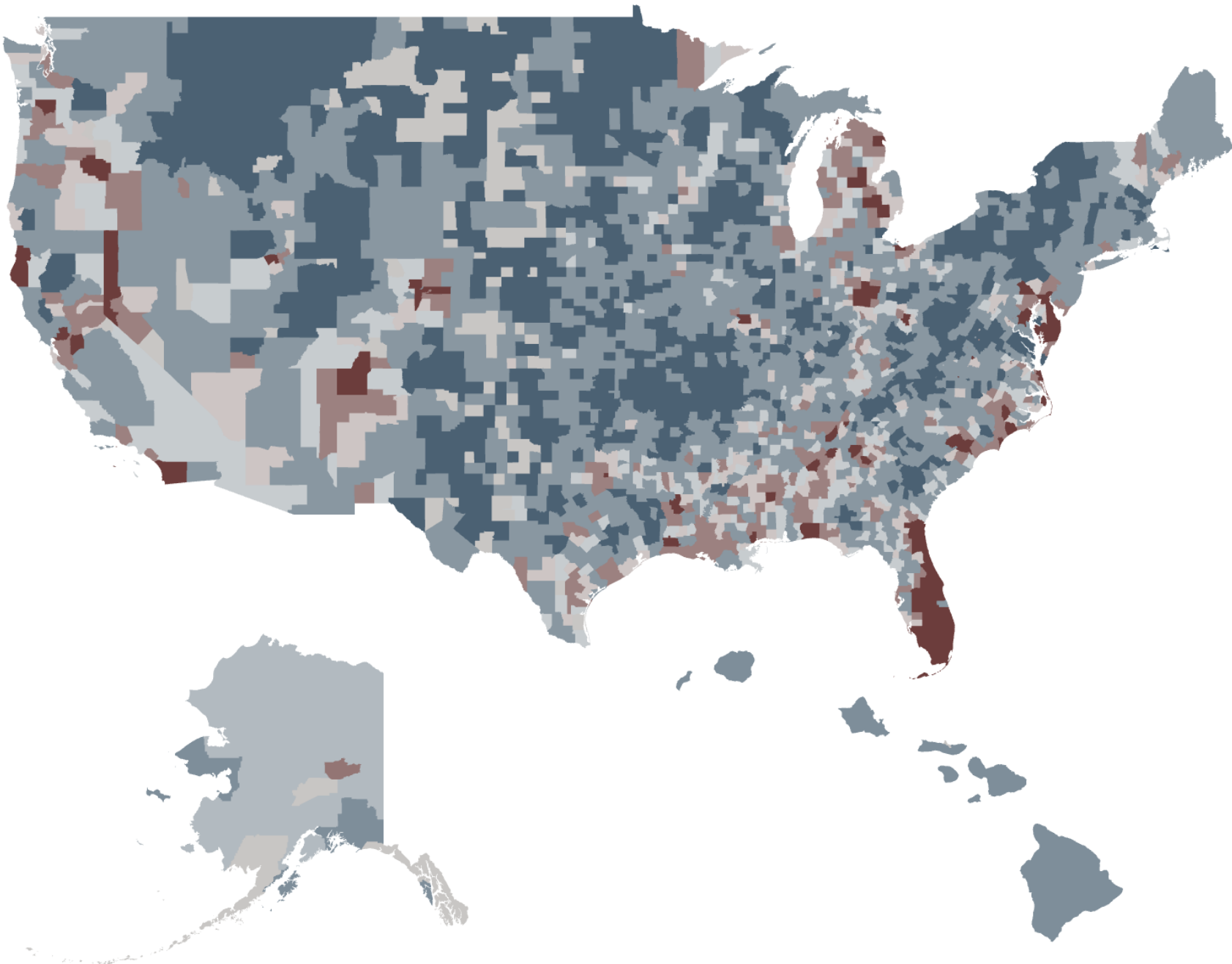
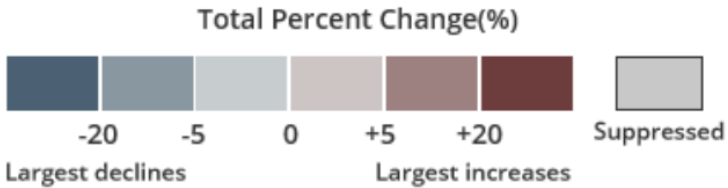
Ages 65 years and older

Race

All Races/Ethnicities

Sex

Both Sexes



# National Map of Trends in Death Rates

## Year Trend

2010 - 2019

## Outcome

All stroke

## Age Group

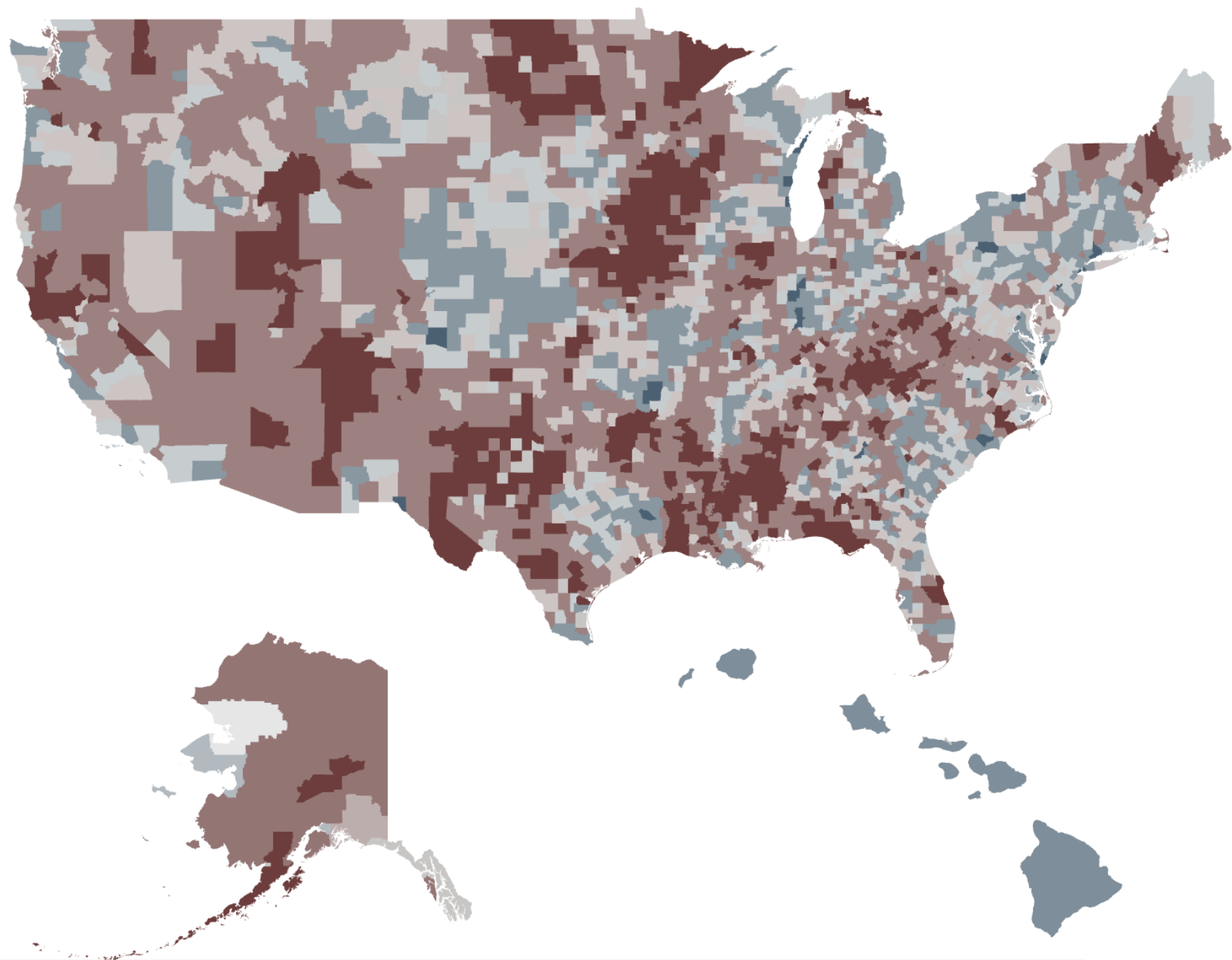
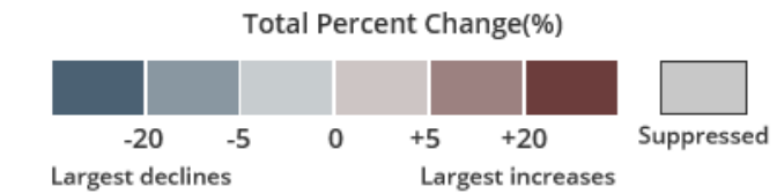
Ages 35-64 years

## Race

All Races/Ethnicities

## Sex

Both Sexes





# State Maps of Death Rates & Trends

Outcome

Cardiovascular disease (CVD) ▾

Age Group

Ages 35-64 years

State

Michigan ▾

Year

2019 ▾

Race

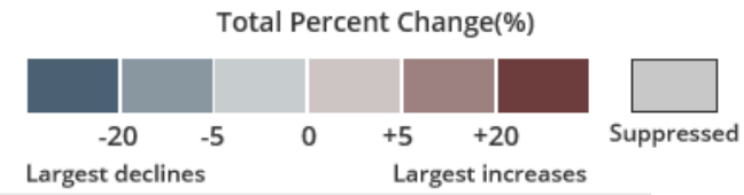
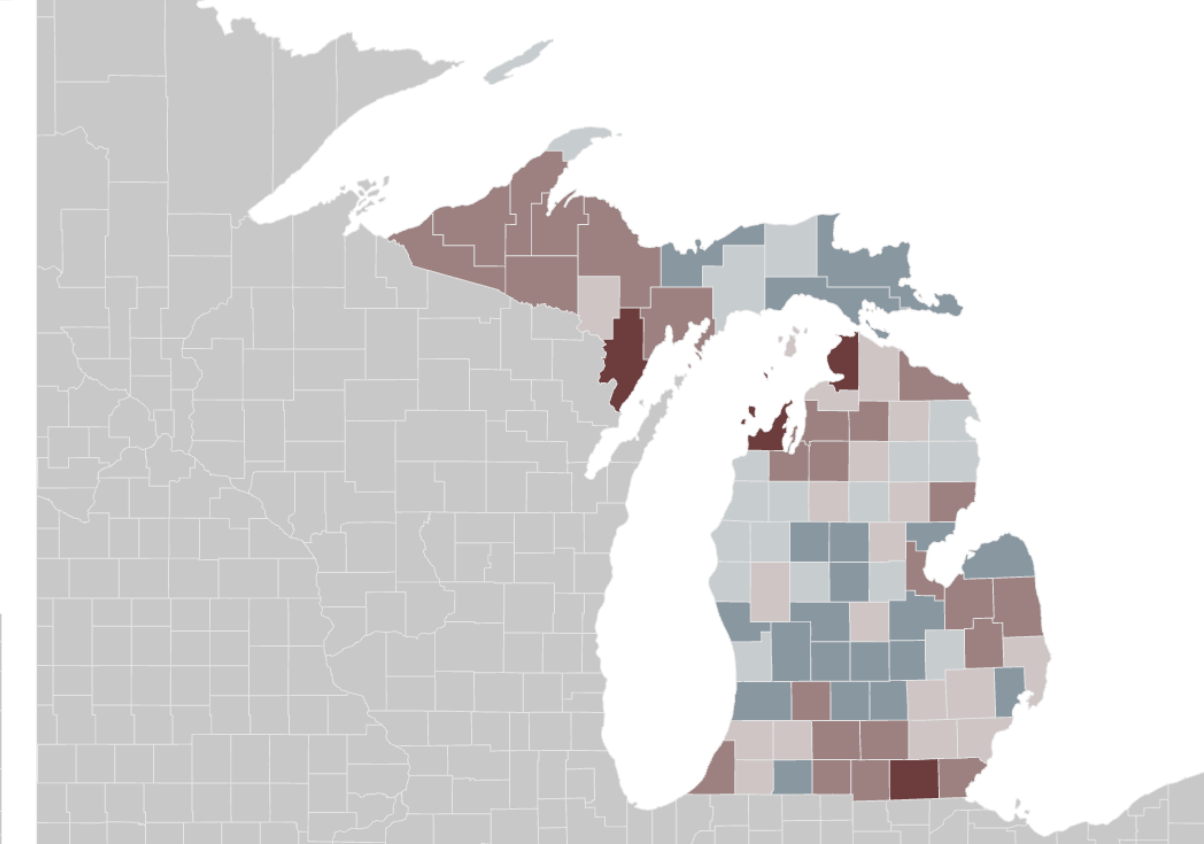
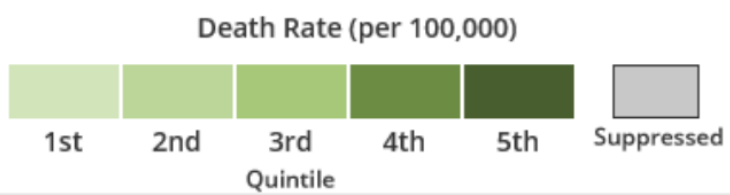
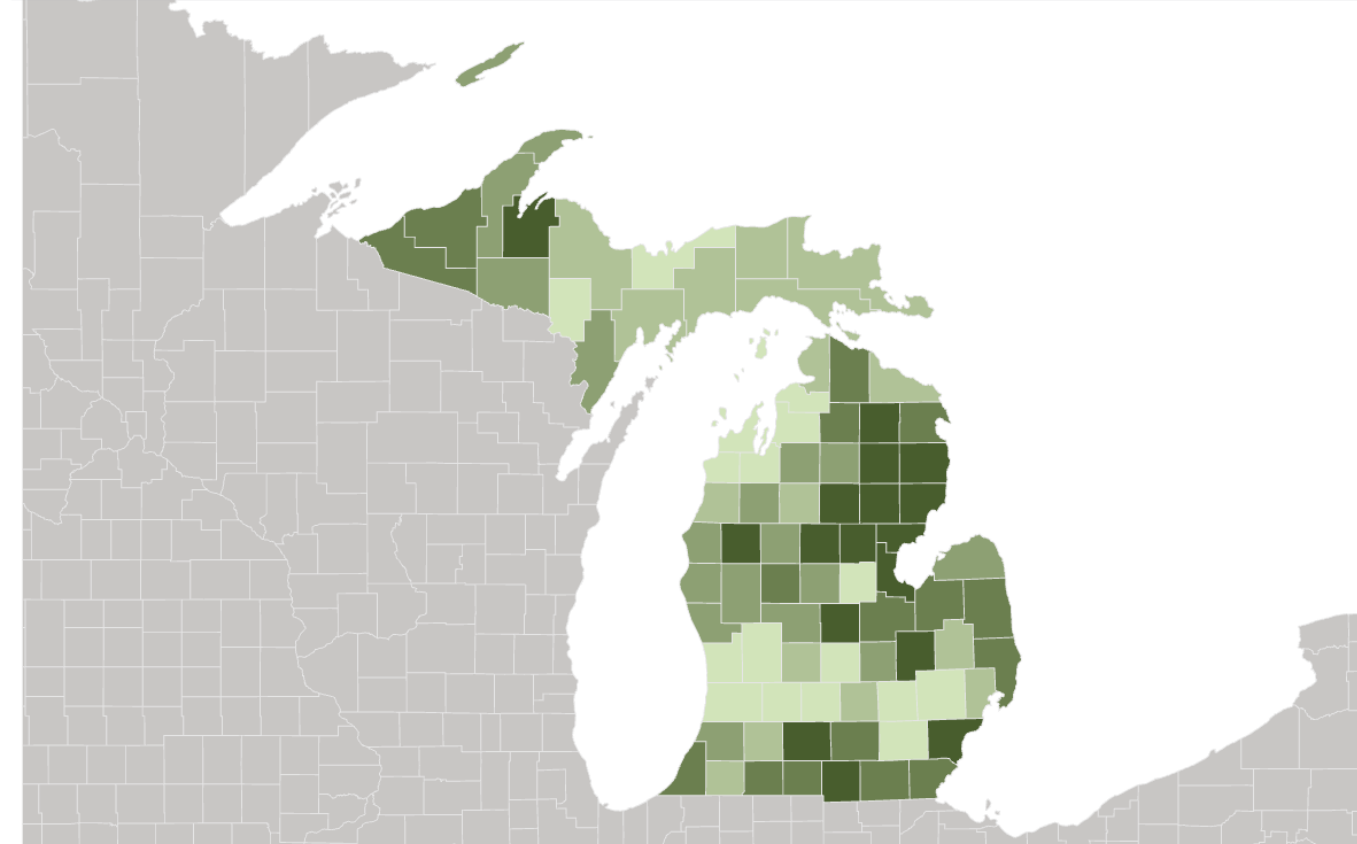
All Races/Ethnicities ▾

Sex

Both Sexes

State Map of Death Rates (2019)

State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

Cardiovascular disease (CVD) ▾

Age Group

Ages 35-64 years

State

Michigan ▾

Year

2019 ▾

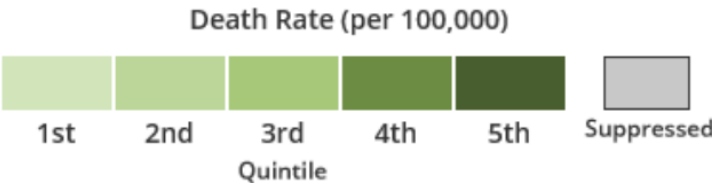
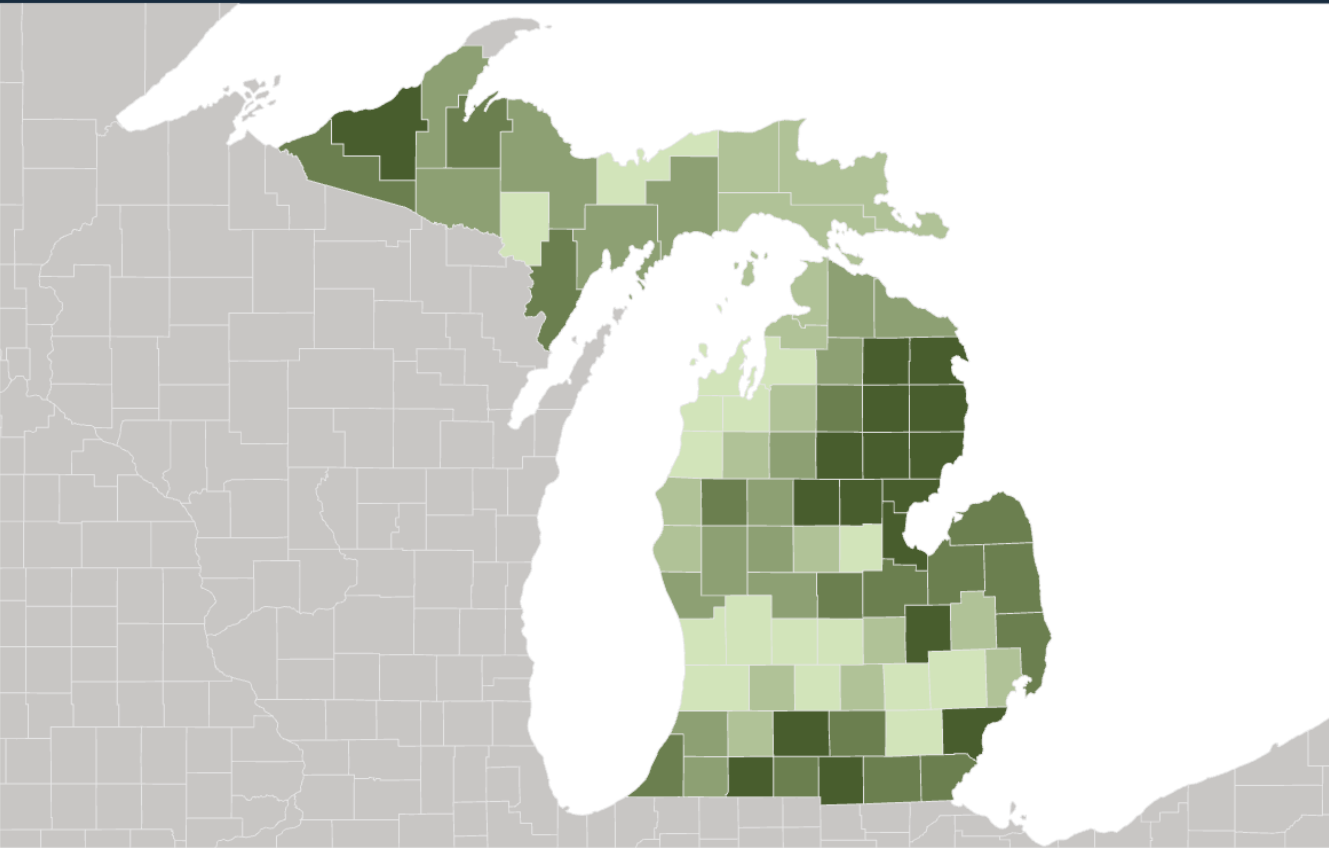
Race

All Races/Ethnicities ▾

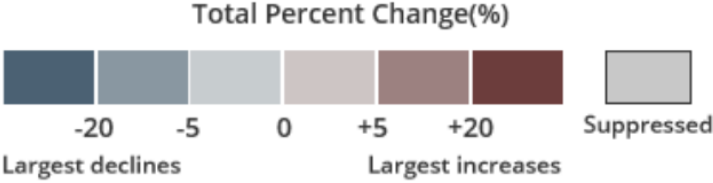
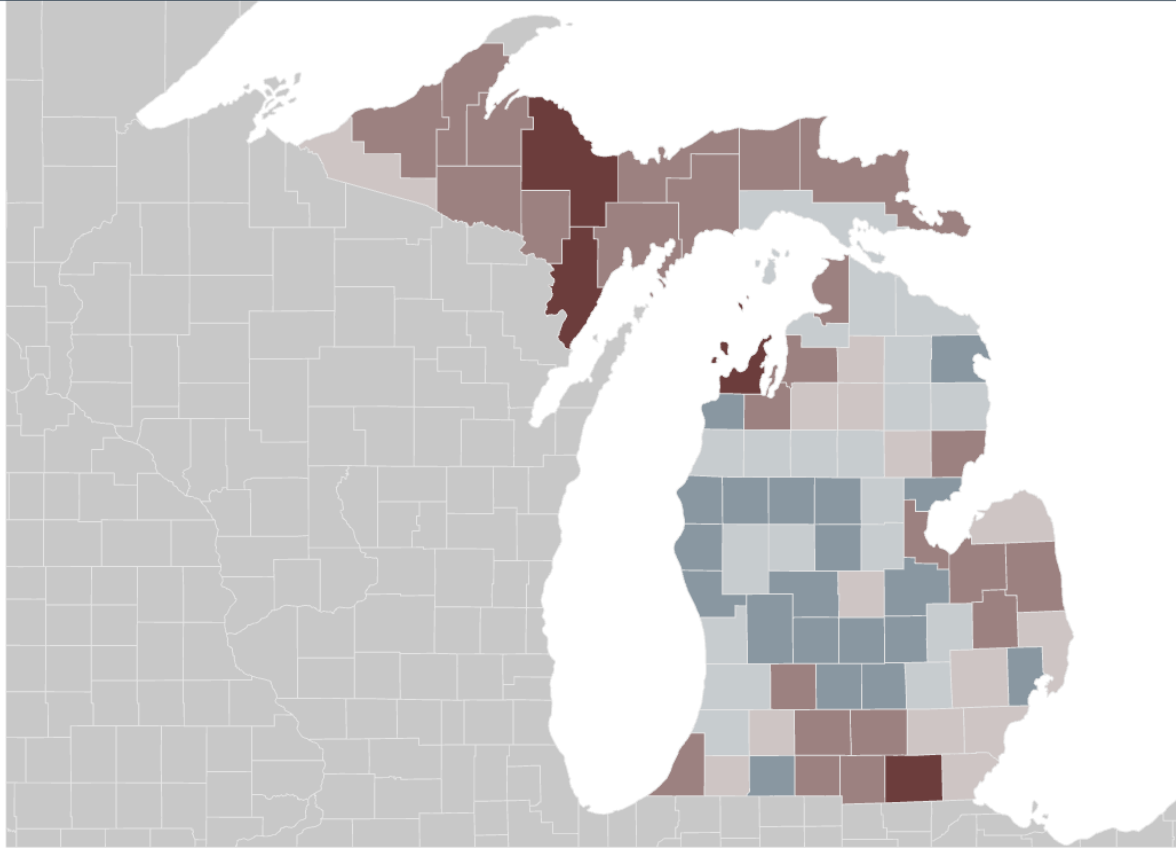
Sex

Men

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

Cardiovascular disease (CVD) ▾

Age Group

Ages 35-64 years

State

Michigan ▾

Year

2019 ▾

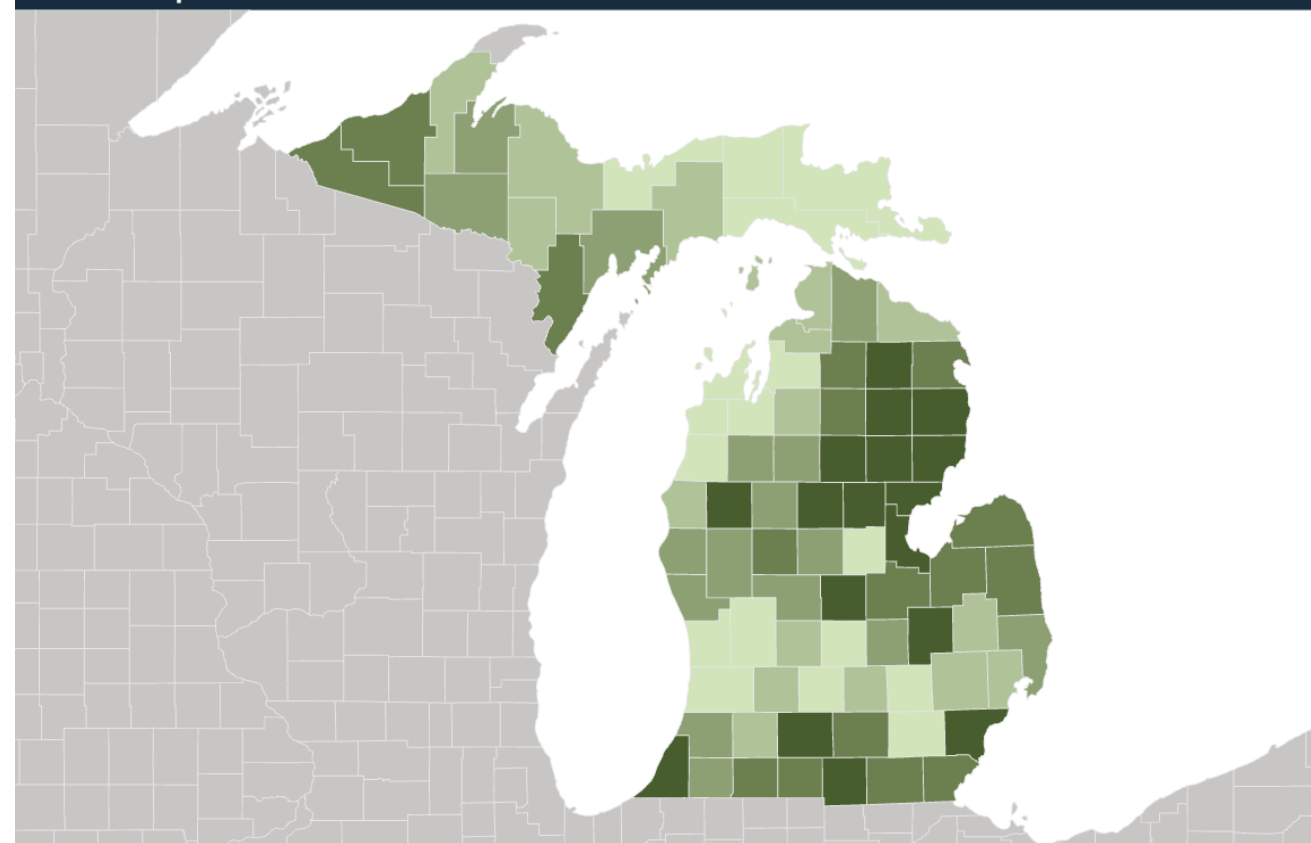
Race

All Races/Ethnicities ▾

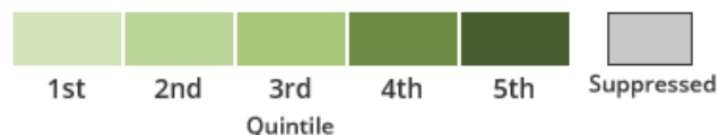
Sex

Women

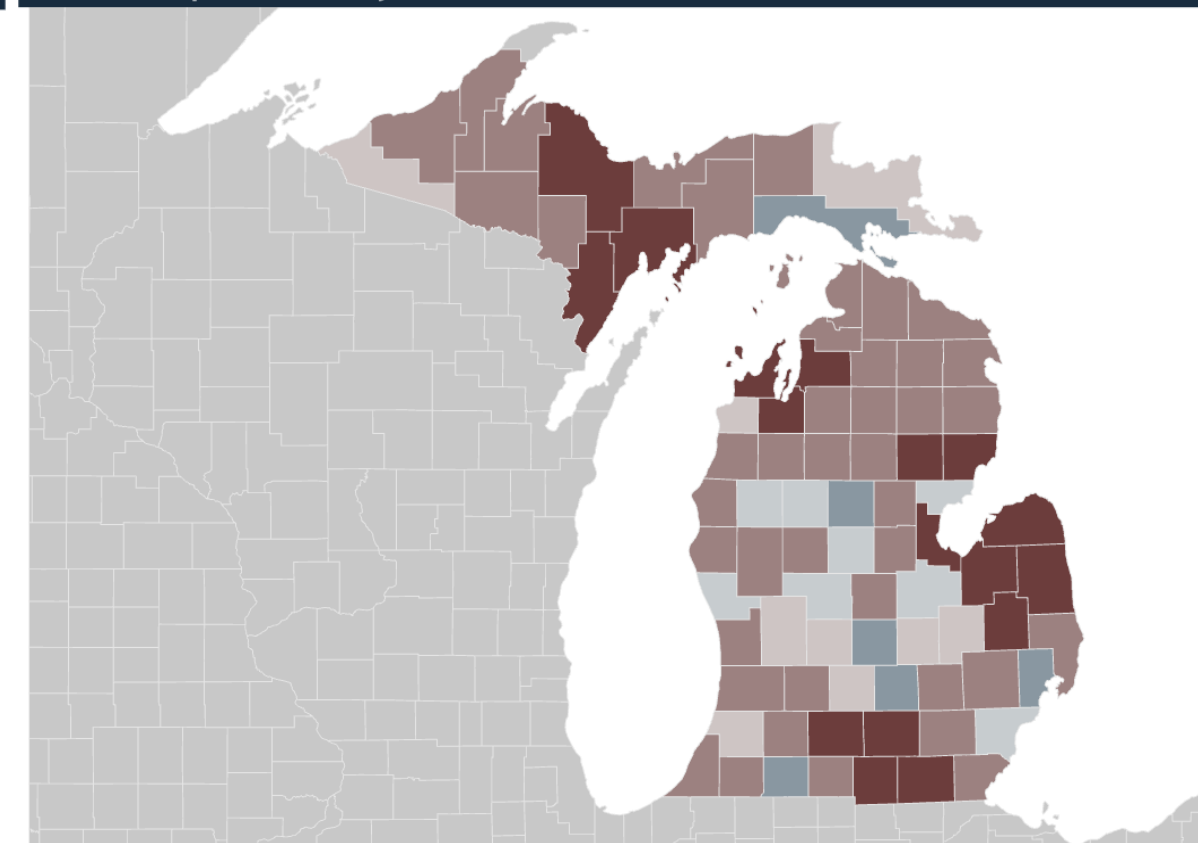
State Map of Death Rates (2019)



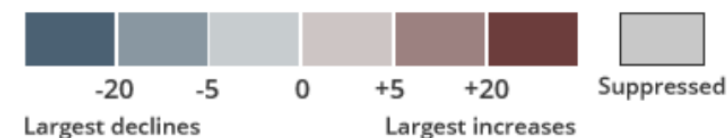
Death Rate (per 100,000)



State Map of County Trends in Death Rates (2010 - 2019)



Total Percent Change(%)



# State Maps of Death Rates & Trends

Outcome

All heart disease

Age Group

Ages 35-64 years

State

Michigan

Year

2019

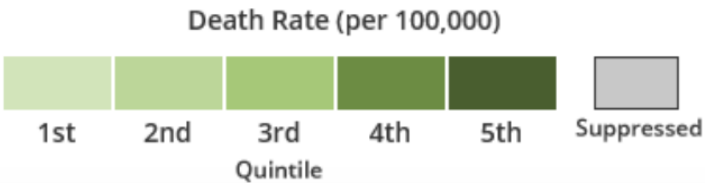
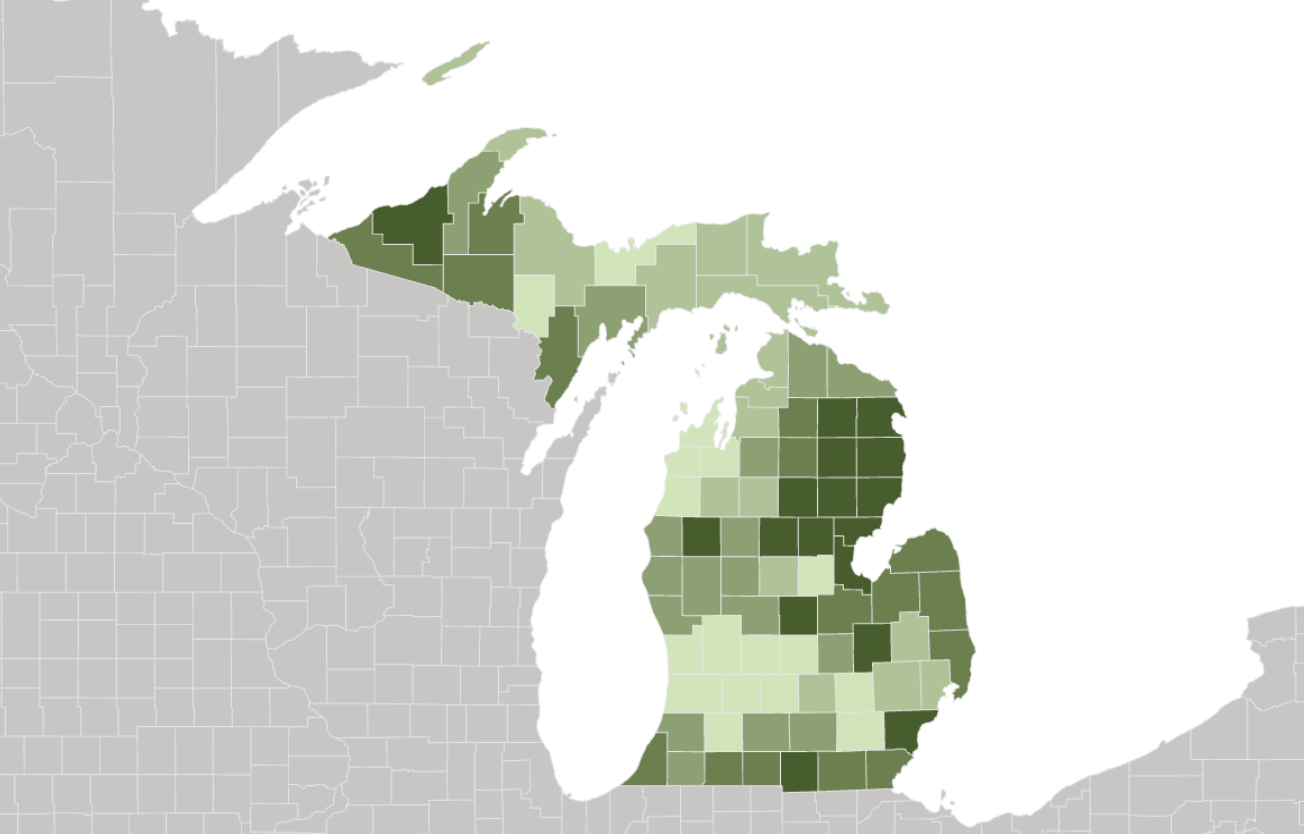
Race

All Races/Ethnicities

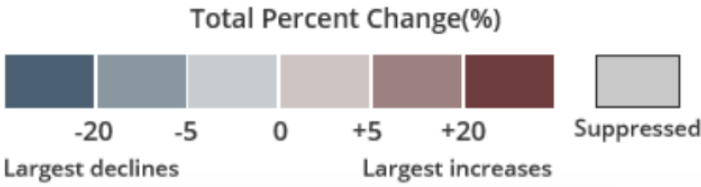
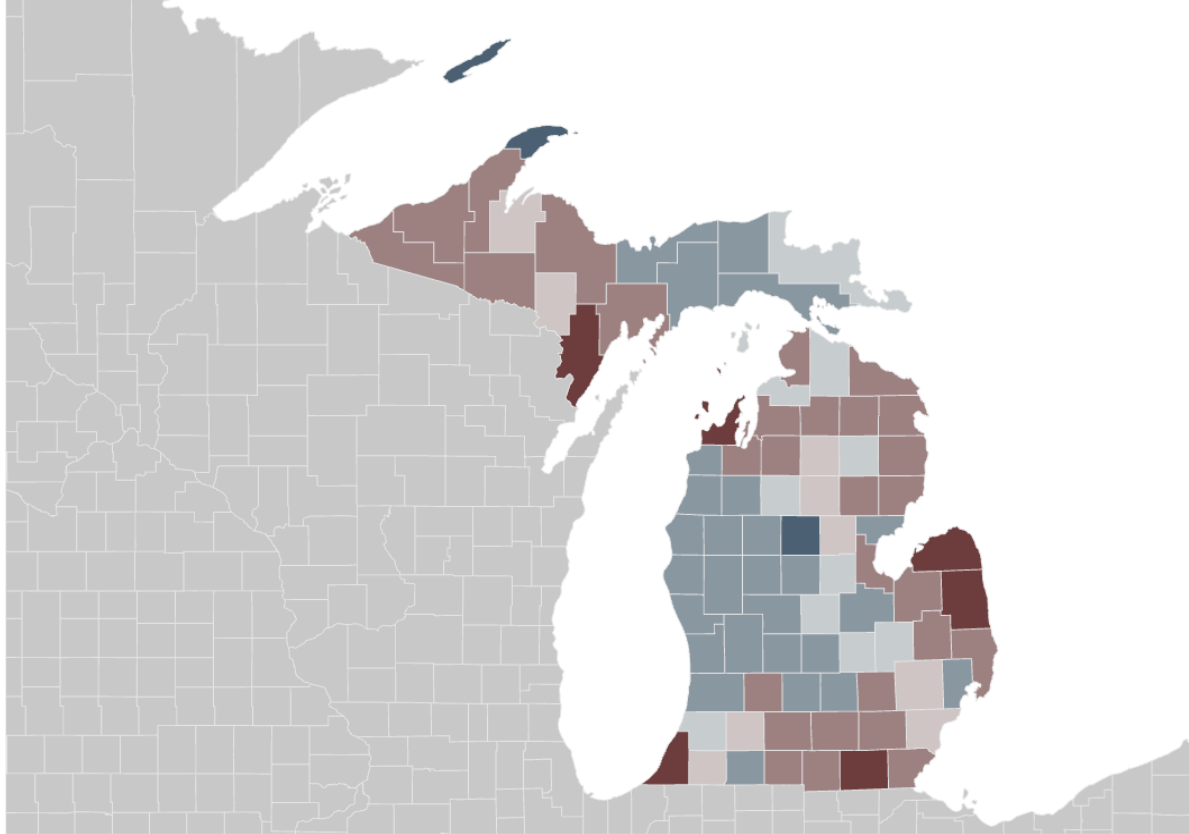
Sex

Both Sexes

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

All heart disease

Age Group

Ages 35-64 years

State

Michigan

Year

2019

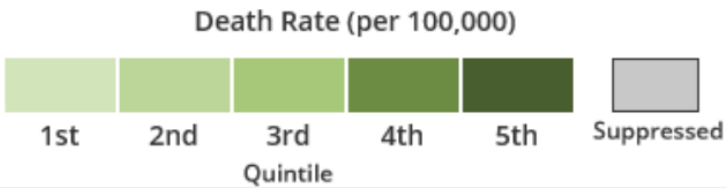
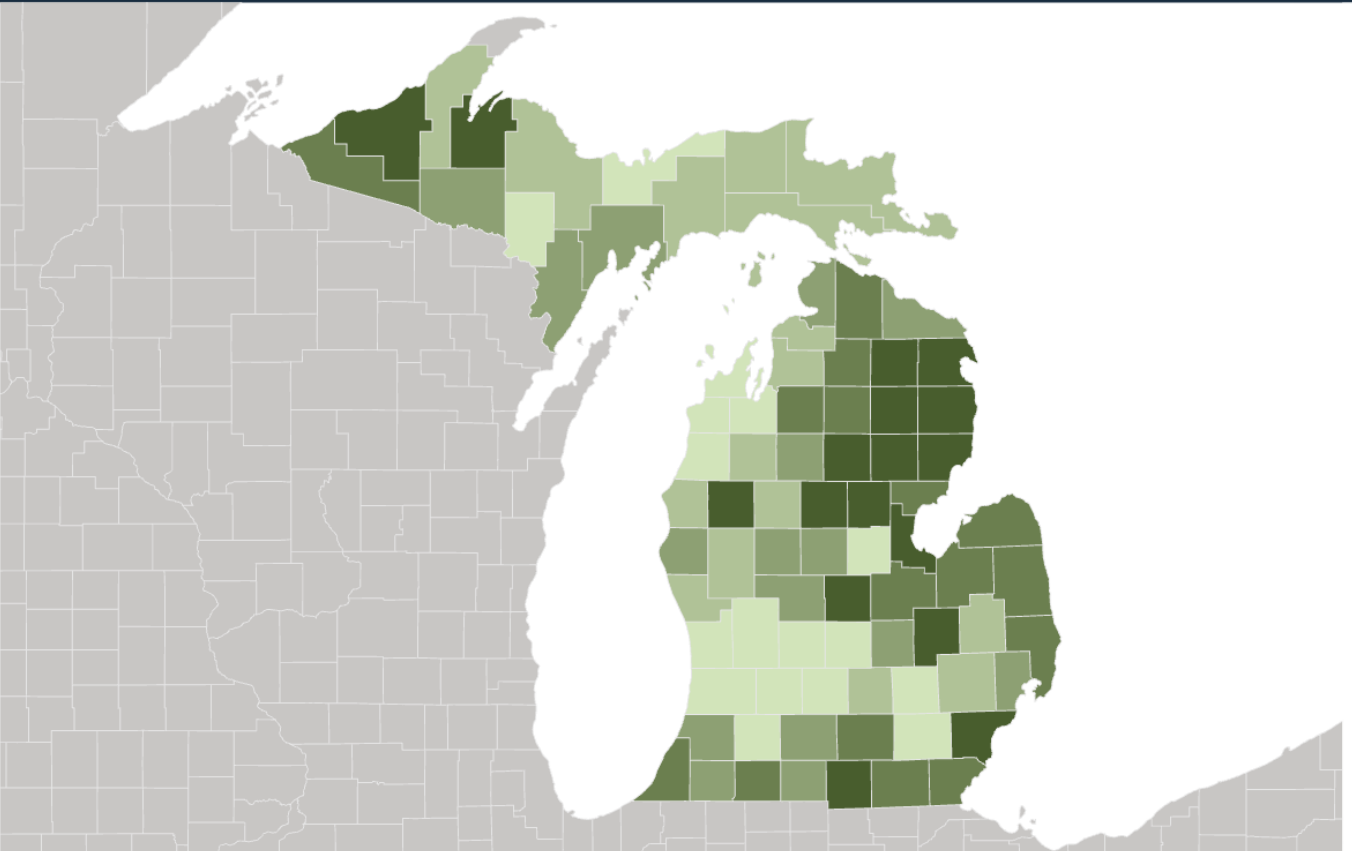
Race

All Races/Ethnicities

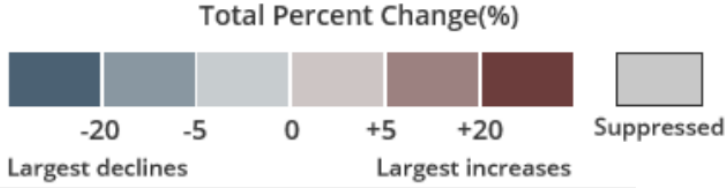
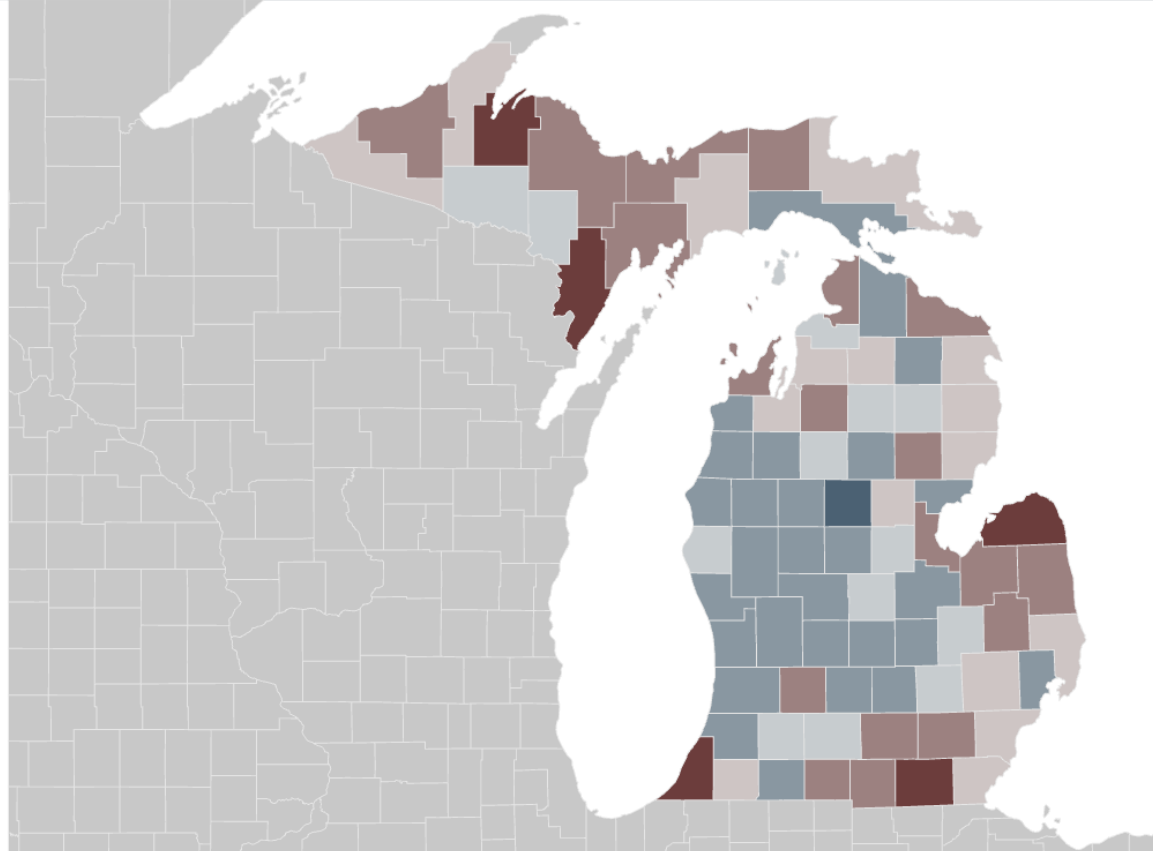
Sex

Men

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

All heart disease

Age Group

Ages 35-64 years

State

Michigan

Year

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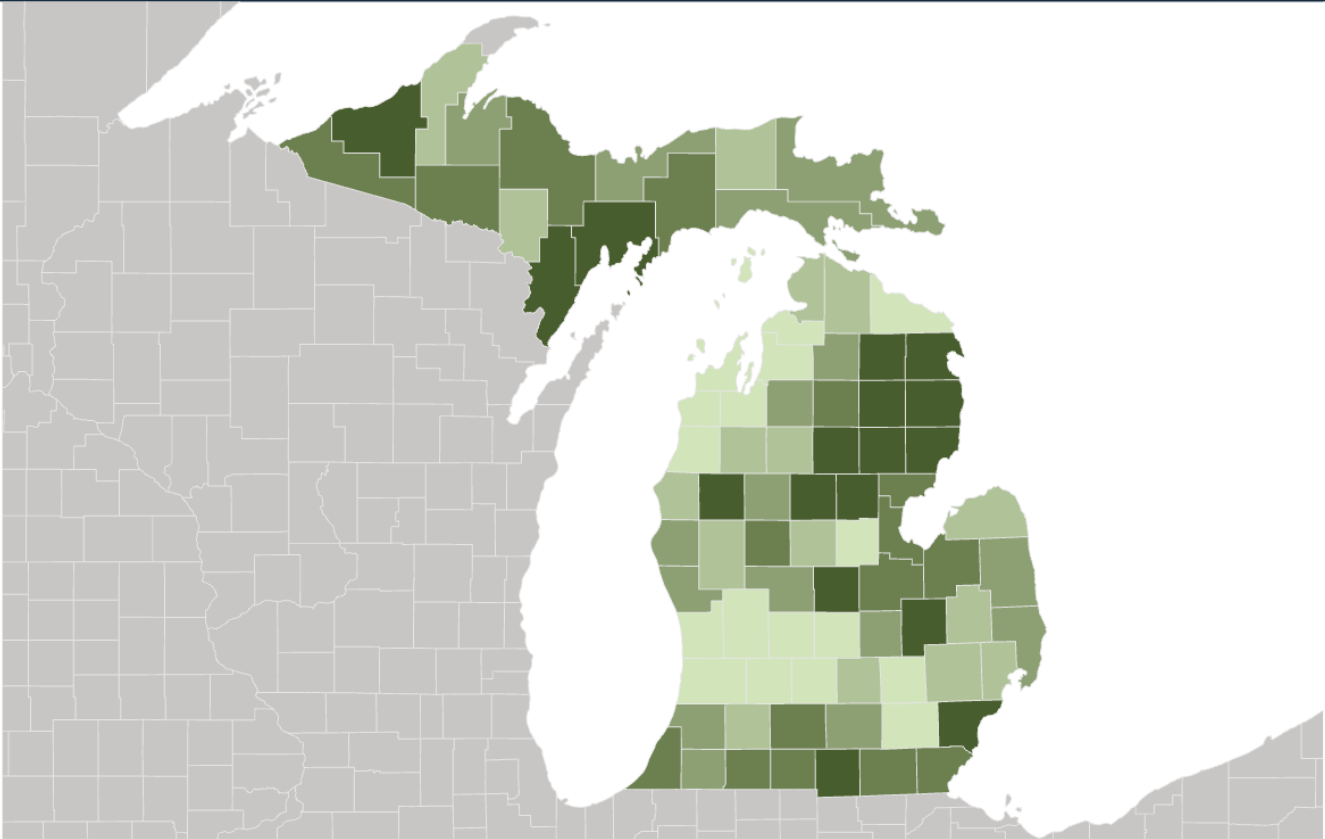
Race

All Races/Ethnicities

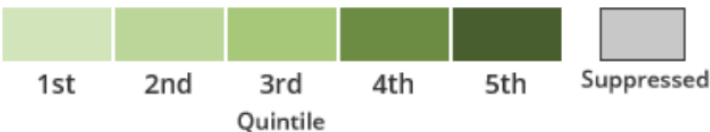
Sex

Women

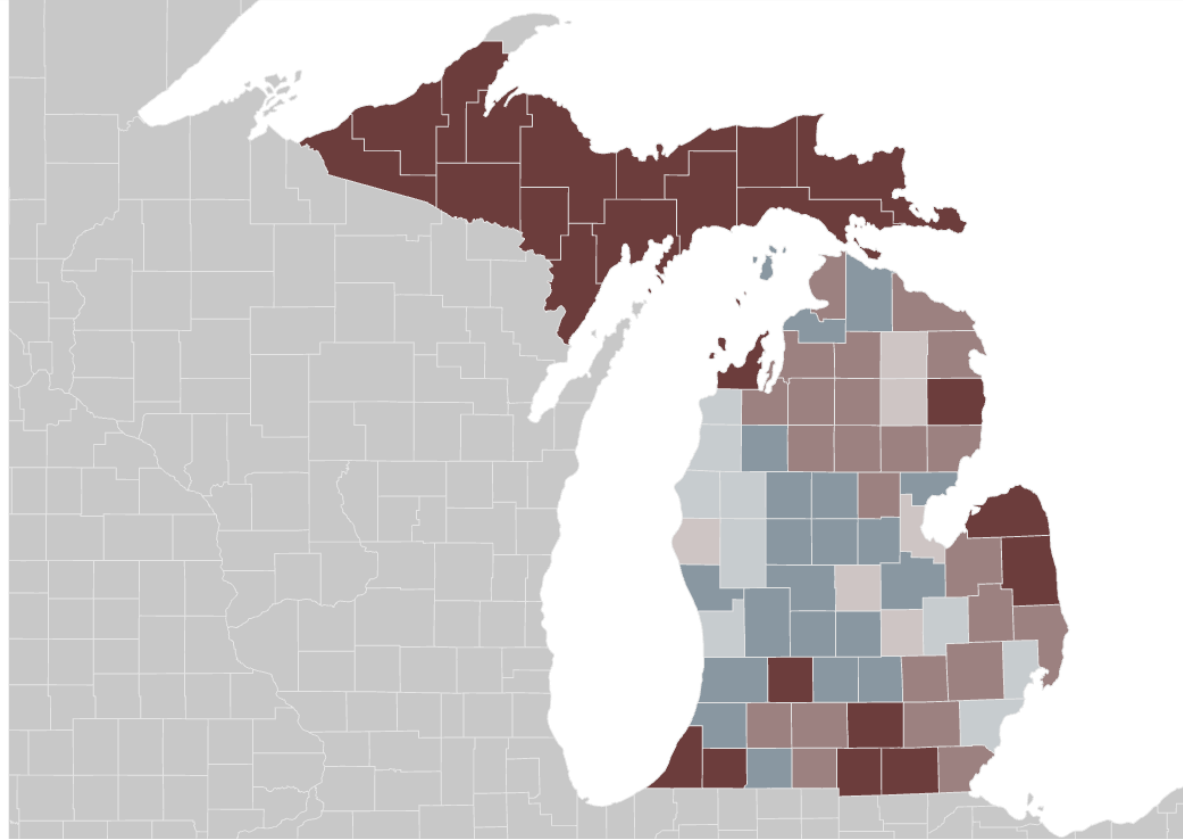
State Map of Death Rates (2019)



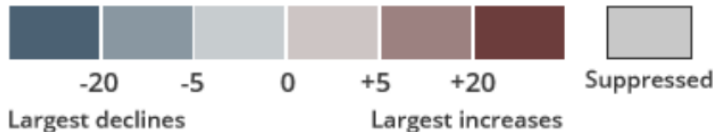
Death Rate (per 100,000)



State Map of County Trends in Death Rates (2010 - 2019)



Total Percent Change(%)



# State Maps of Death Rates & Trends

Outcome

All stroke

Age Group

Ages 35-64 years

State

Michigan

Year

2019

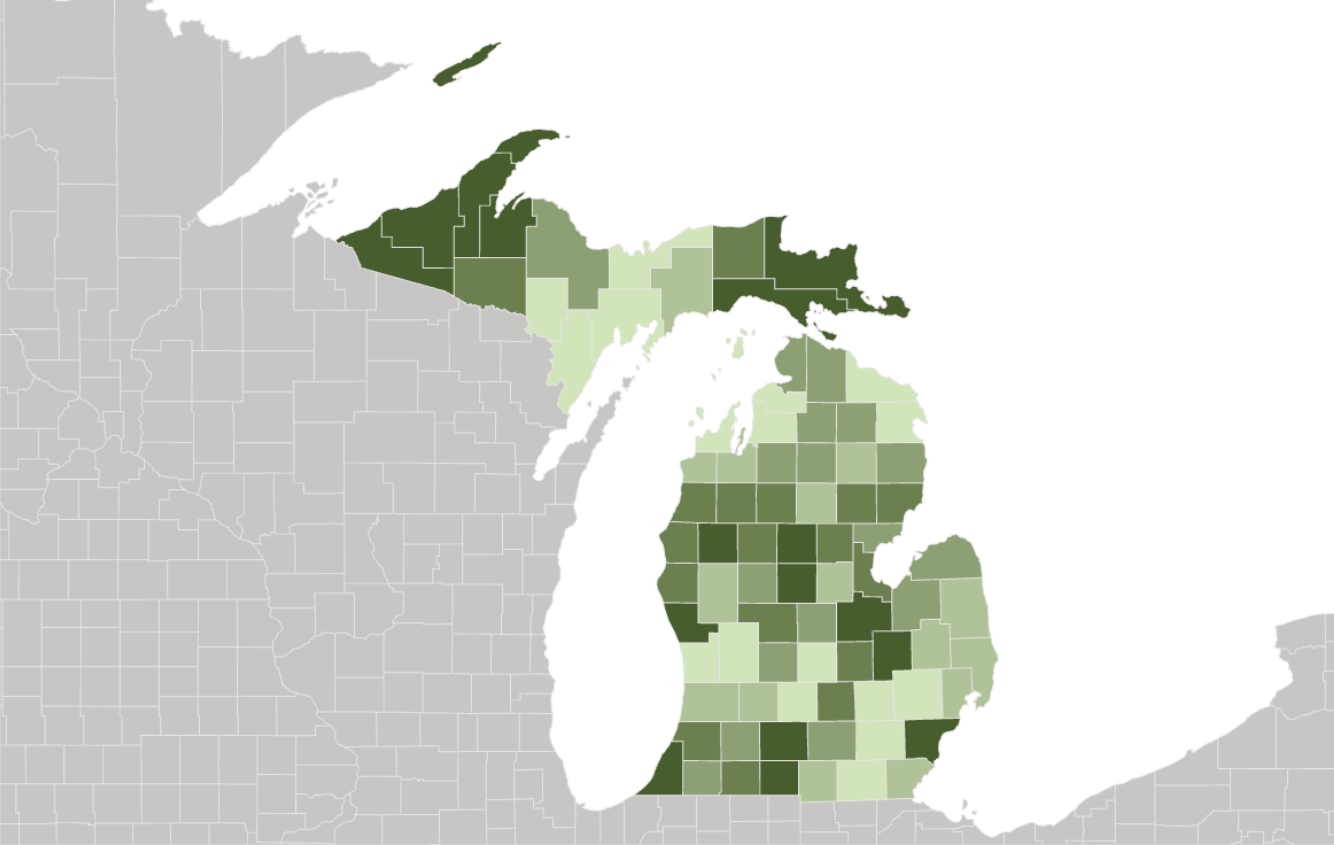
Race

All Races/Ethnicities

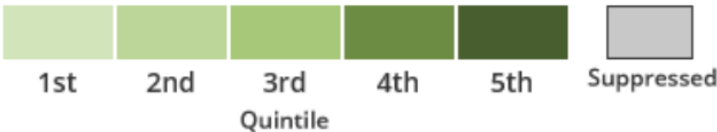
Sex

Both Sexes

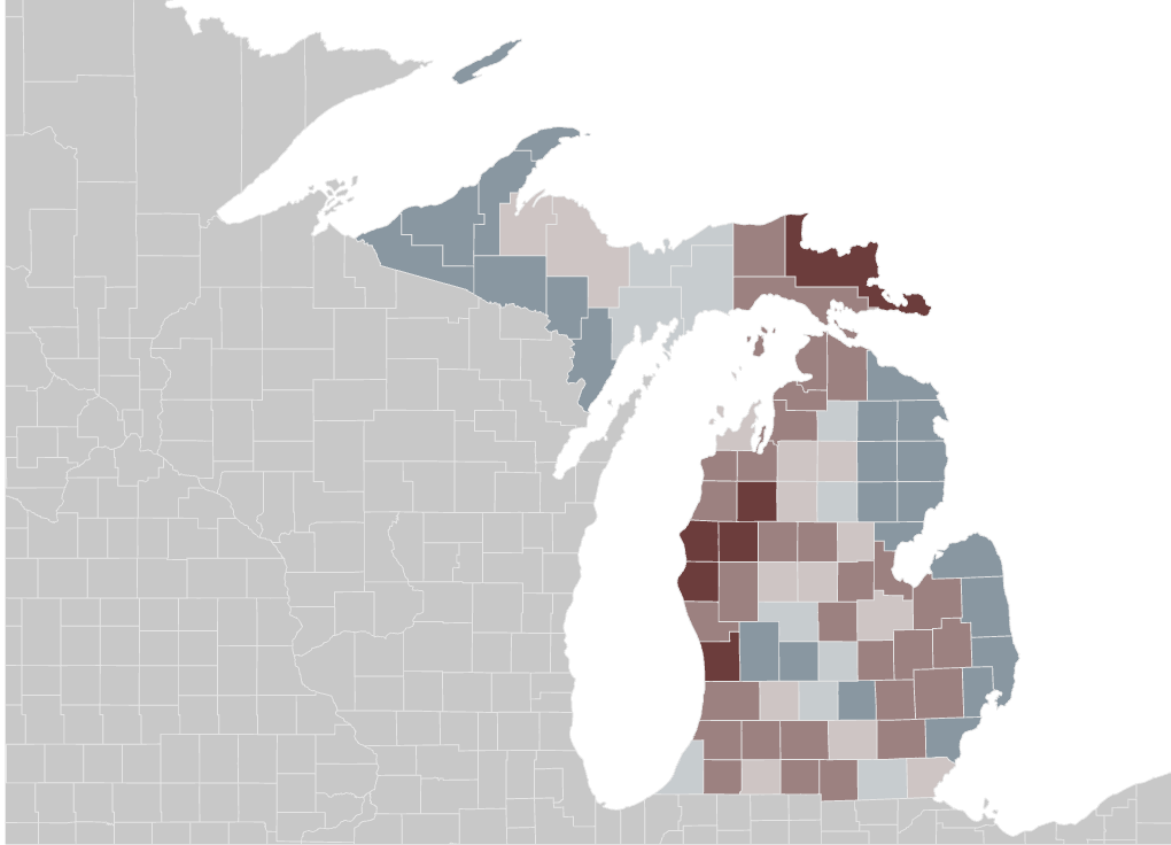
State Map of Death Rates (2019)



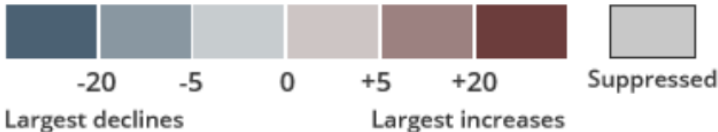
Death Rate (per 100,000)



State Map of County Trends in Death Rates (2010 - 2019)



Total Percent Change(%)



# State Maps of Death Rates & Trends

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All stroke

Age Group

Ages 35-64 years

State

Michigan

Year

2019

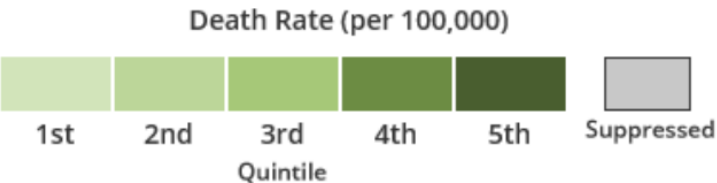
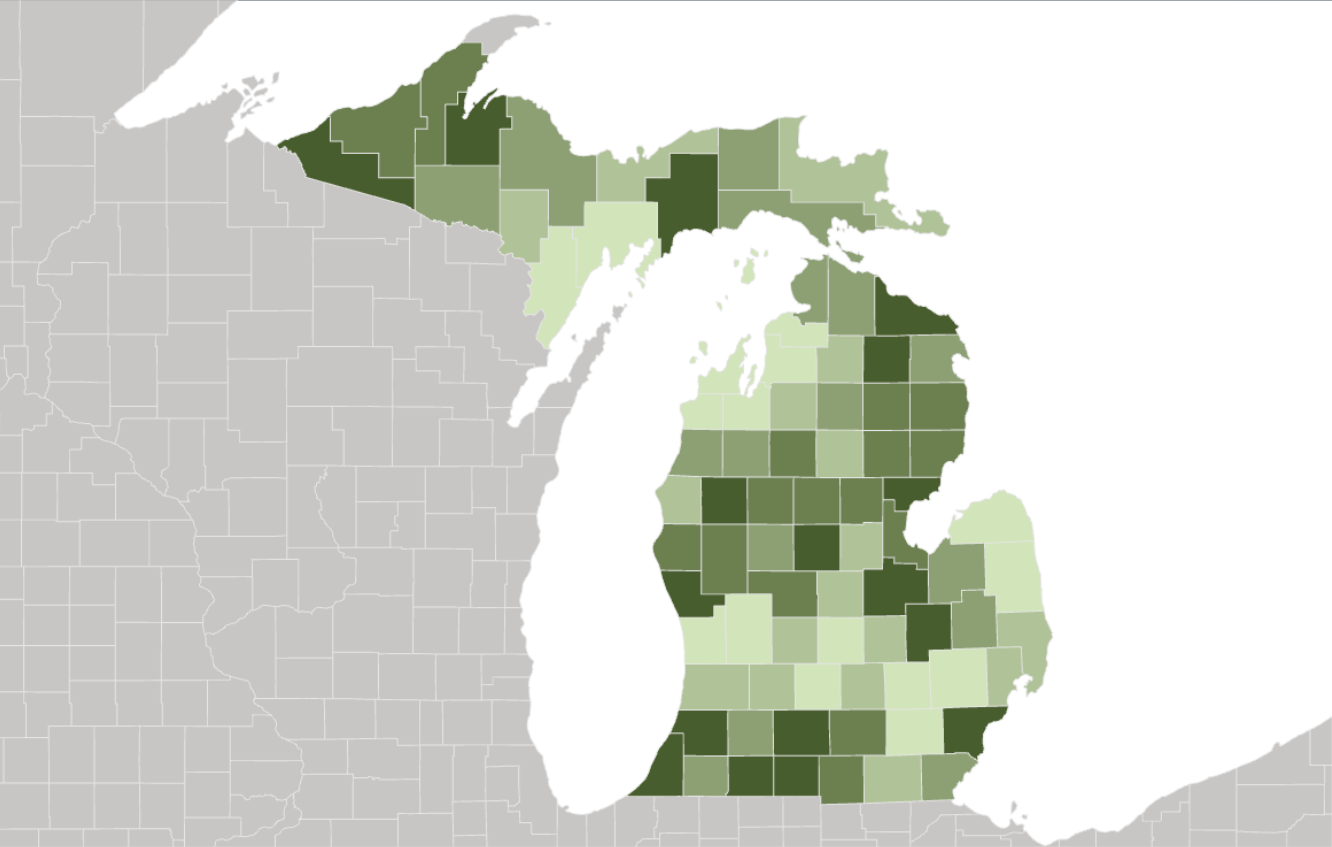
Race

All Races/Ethnicities

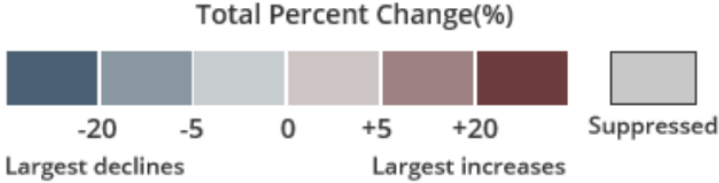
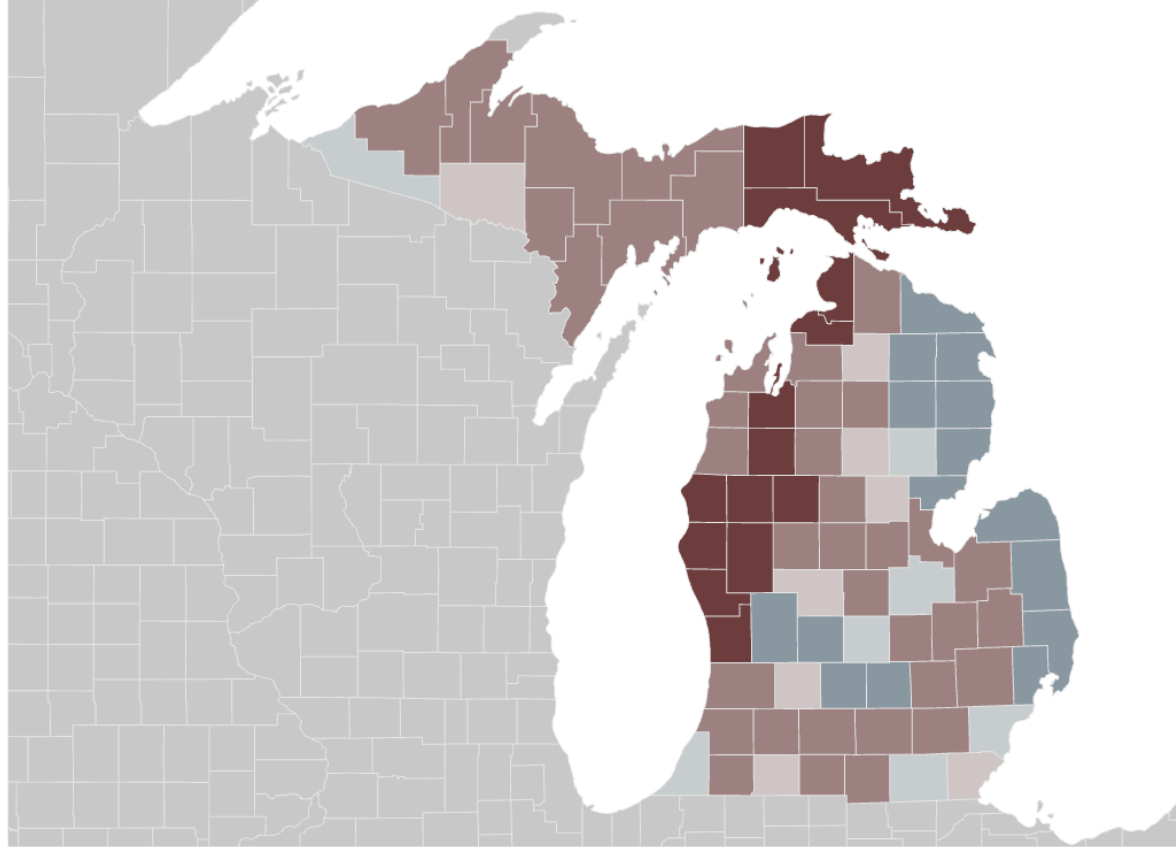
Sex

Men

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)





# State Maps of Death Rates & Trends

Outcome

All stroke

Age Group

Ages 35-64 years

State

Michigan

Year

2019

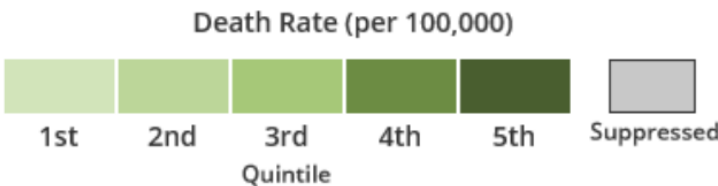
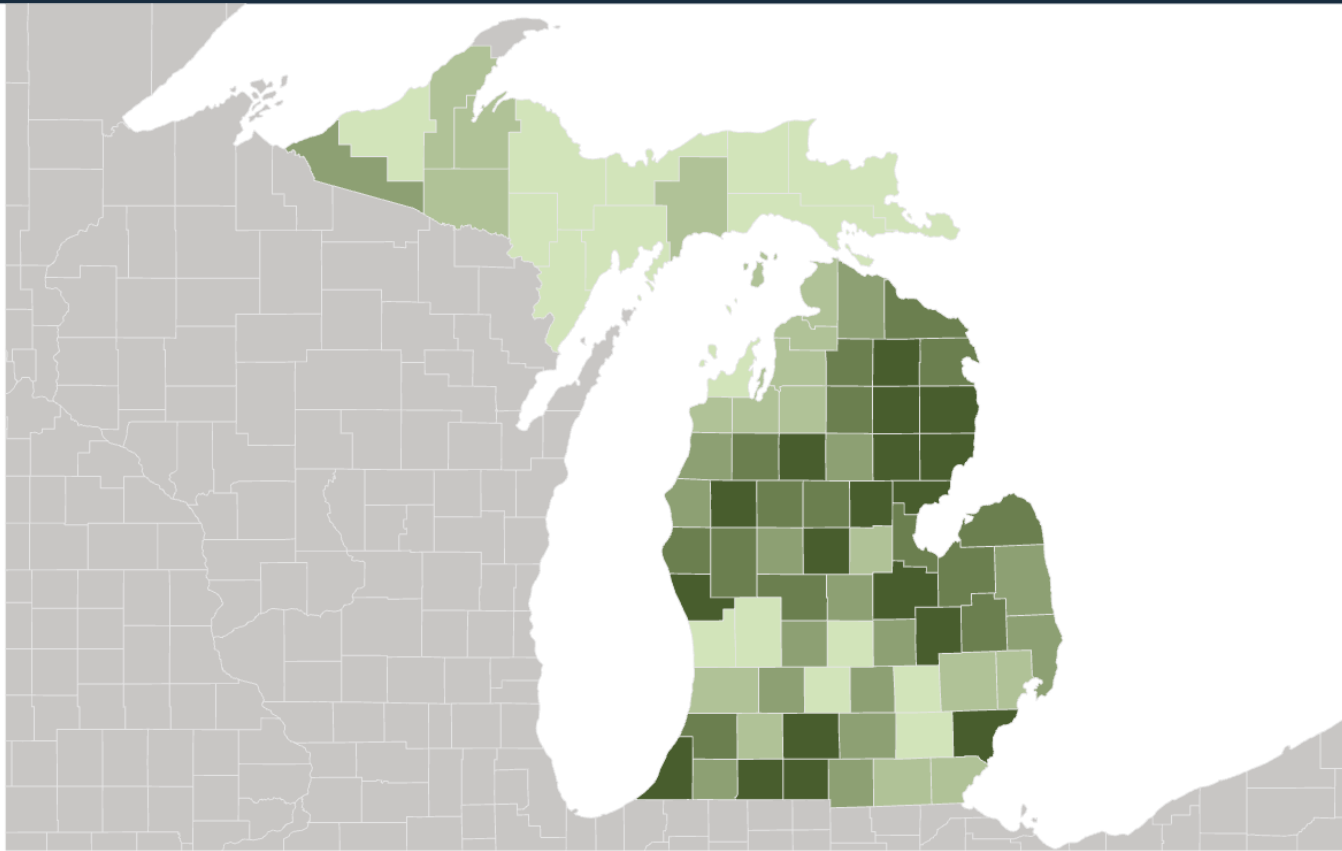
Race

All Races/Ethnicities

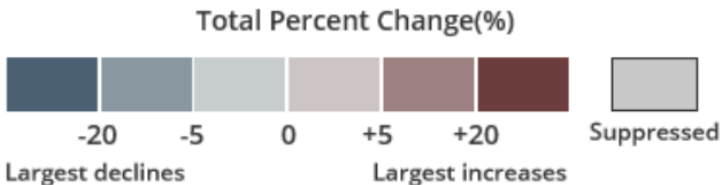
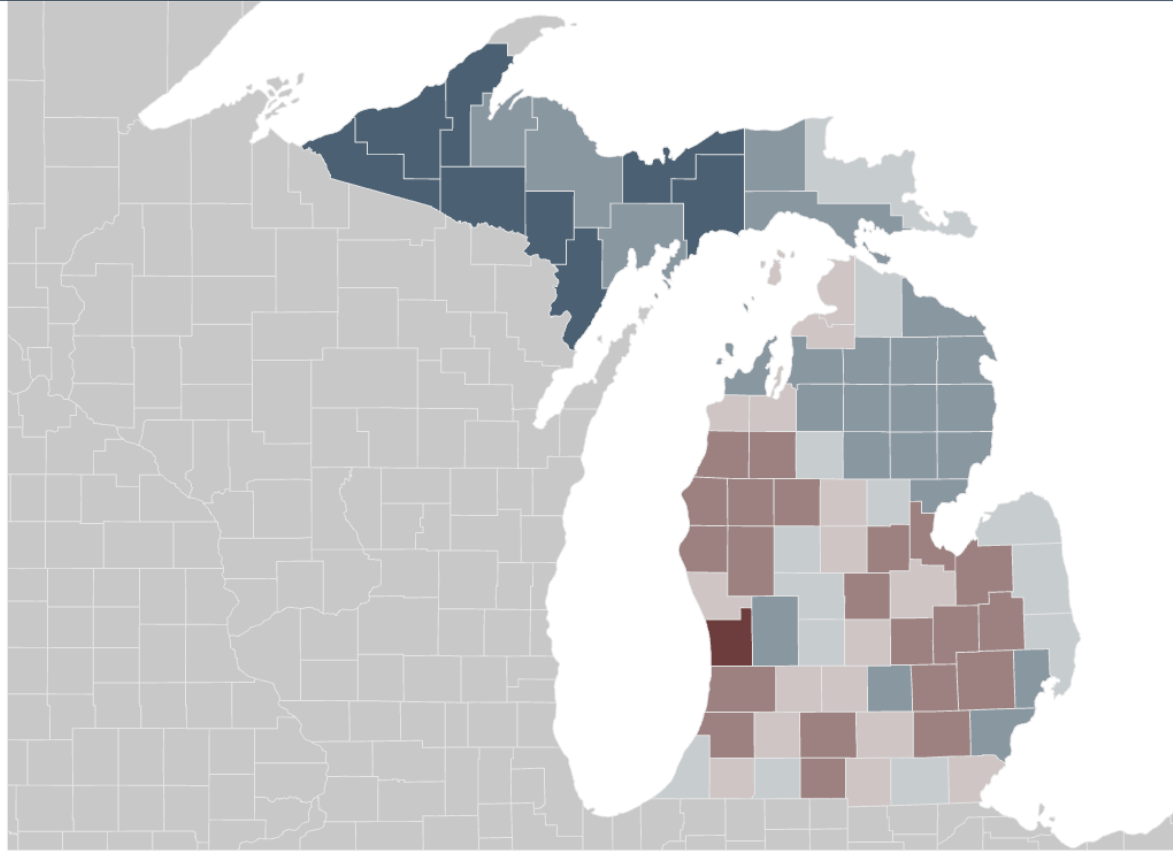
Sex

Women

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

Coronary heart disease (CHD) ▾

Age Group

Ages 35-64 years

State

Michigan ▾

Year

2019 ▾

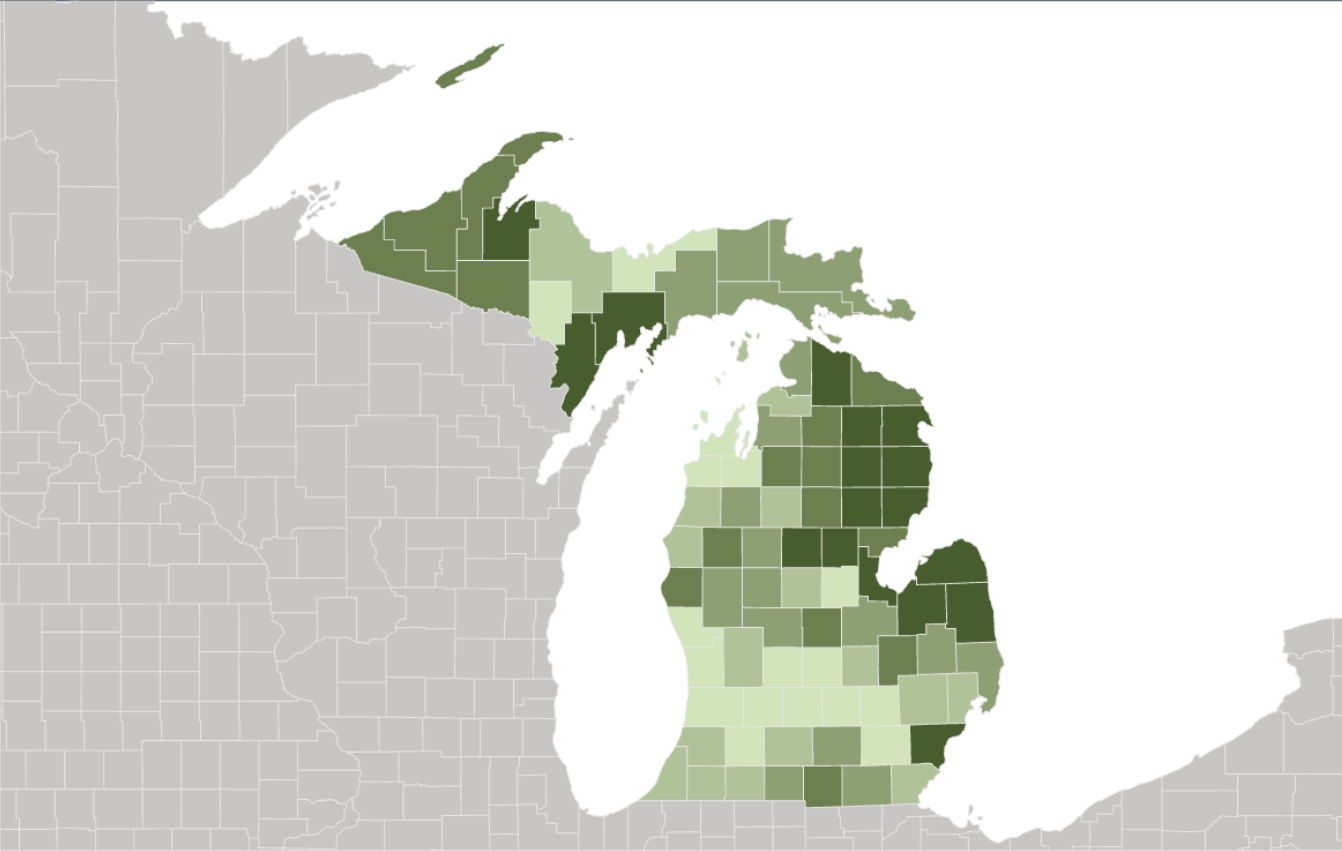
Race

All Races/Ethnicities ▾

Sex

Both Sexes

State Map of Death Rates (2019)

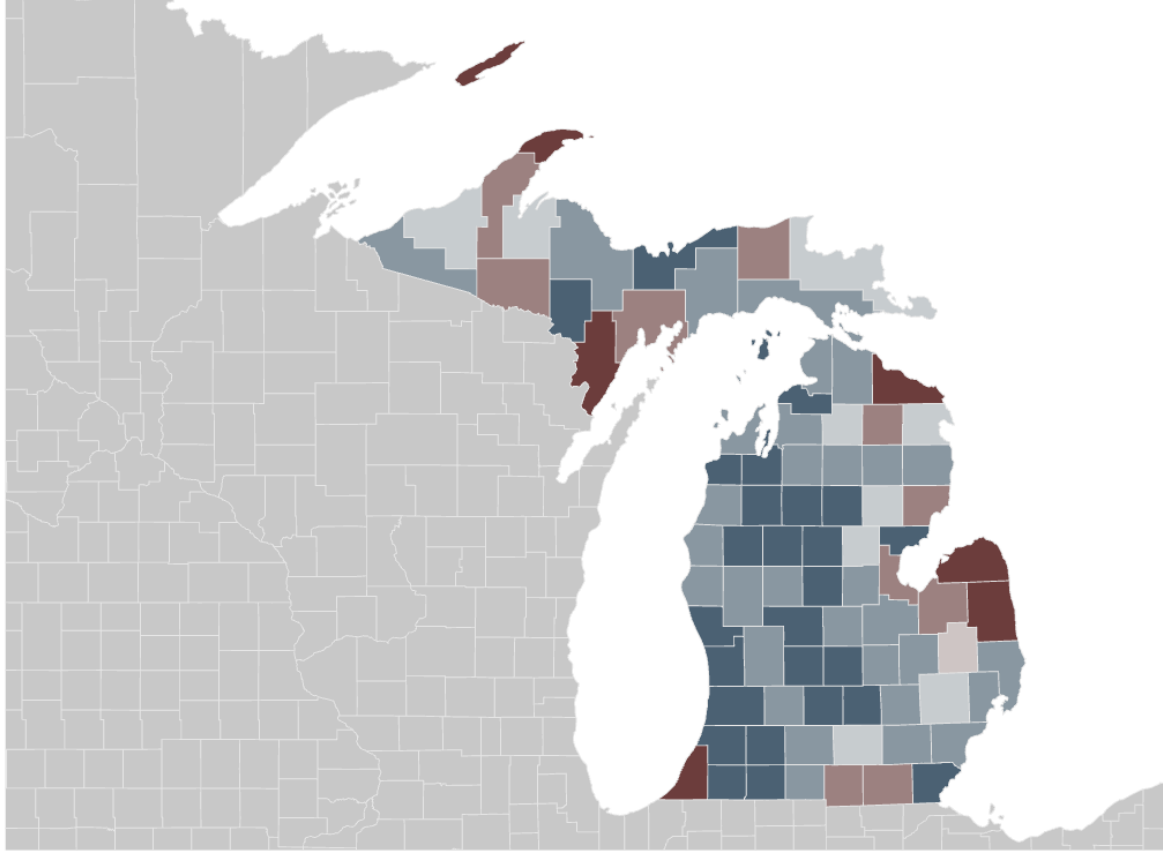


Death Rate (per 100,000)

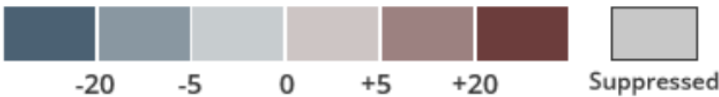


Quintile

State Map of County Trends in Death Rates (2010 - 2019)

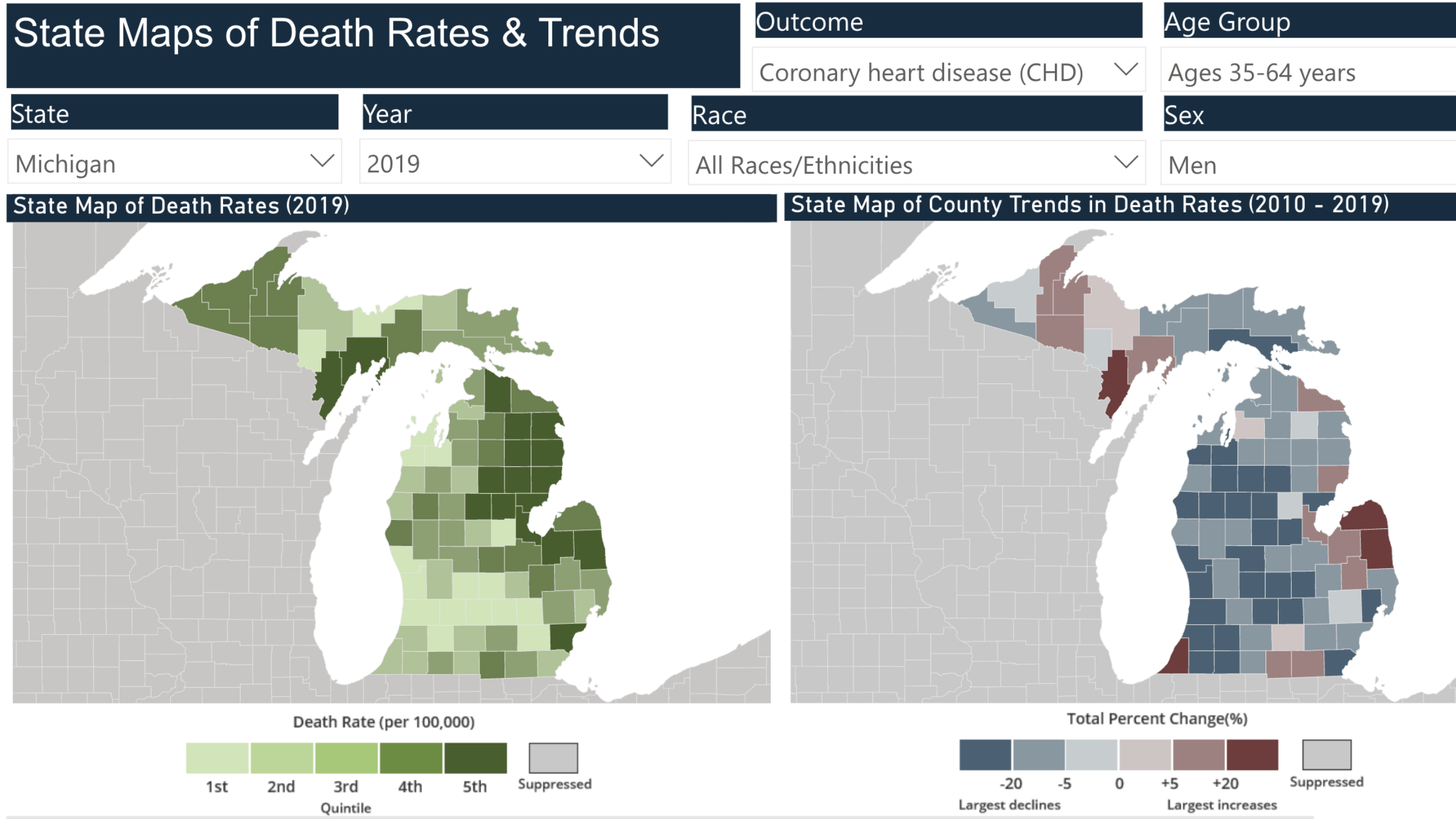


Total Percent Change(%)



Largest declines

Largest increases



# State Maps of Death Rates & Trends

Outcome

Coronary heart disease (CHD) ▾

Age Group

Ages 35-64 years

State

Michigan ▾

Year

2019 ▾

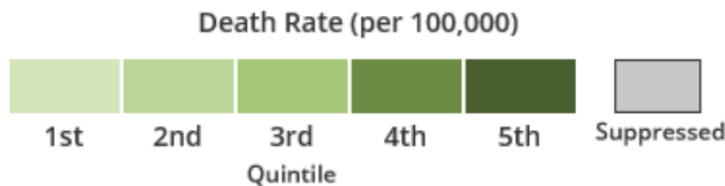
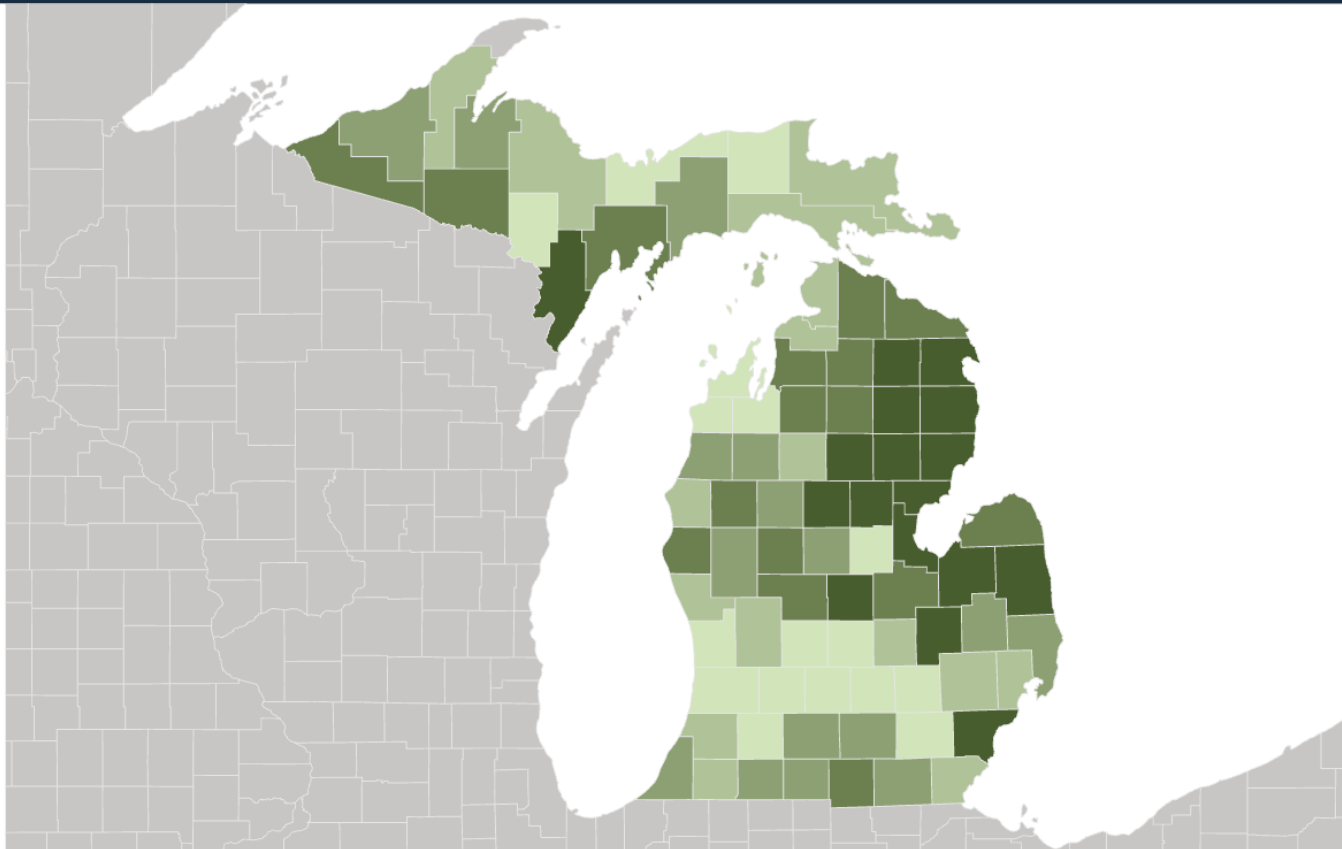
Race

All Races/Ethnicities ▾

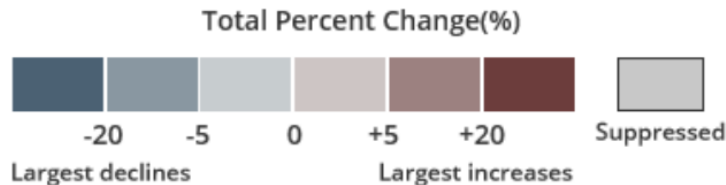
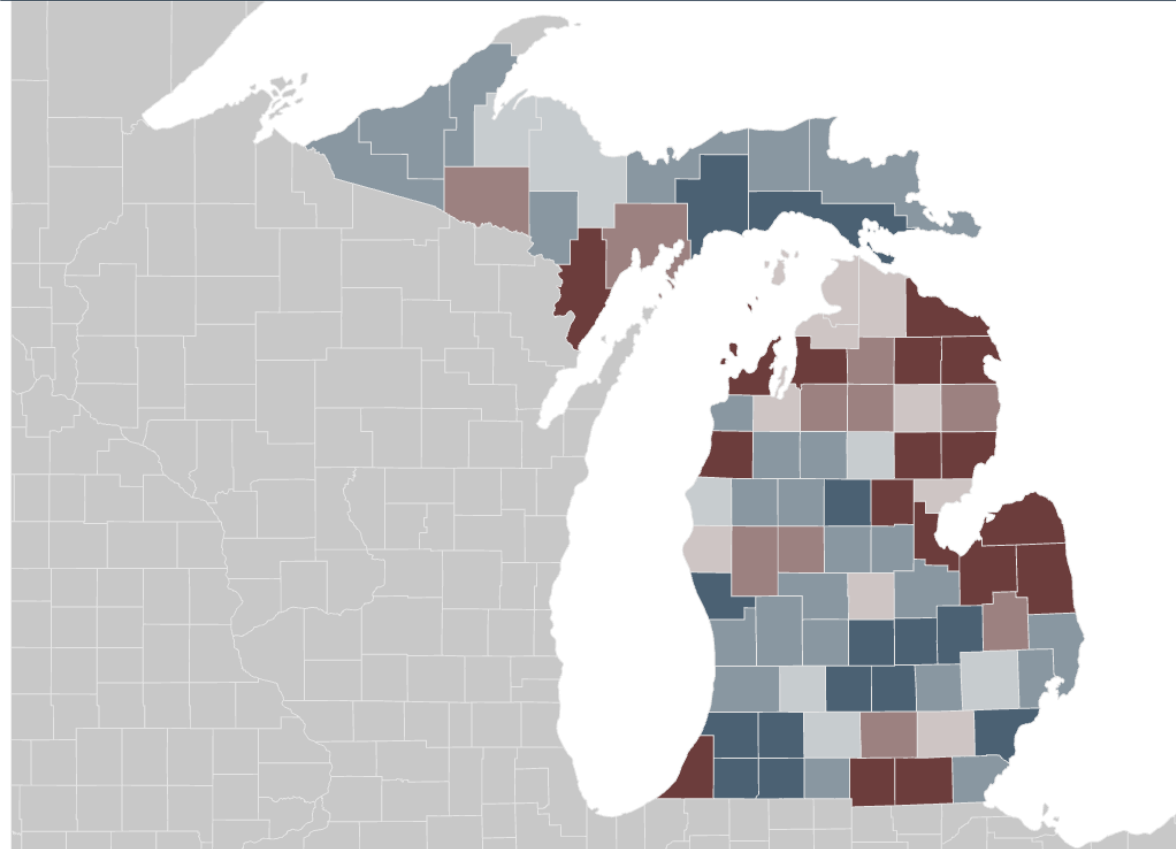
Sex

Women

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

State

Michigan

Year

2019

Race

All Races/Ethnicities

Sex

Both Sexes

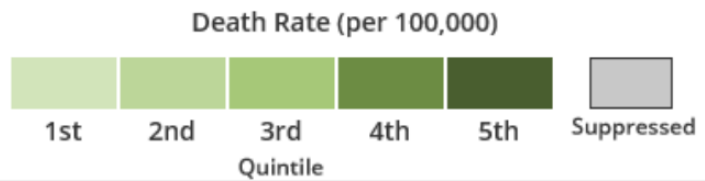
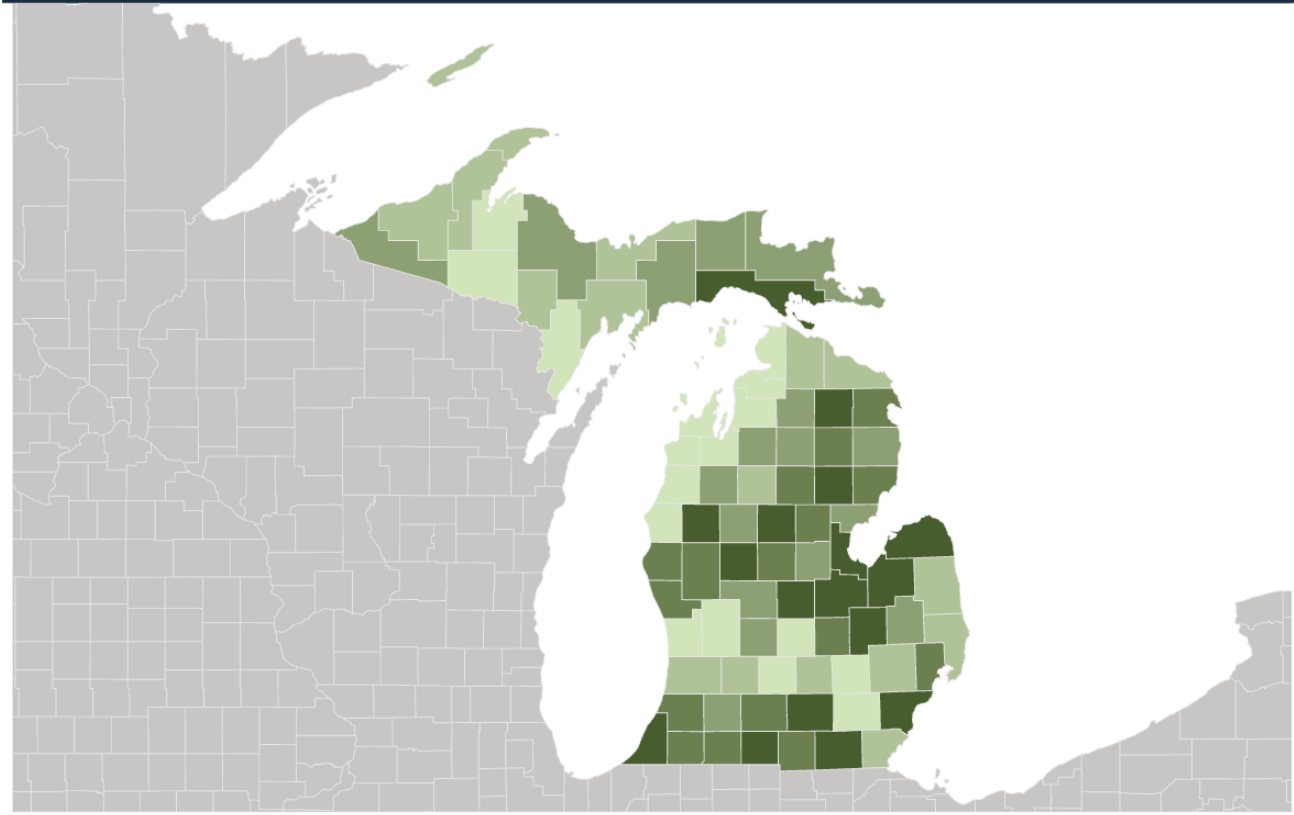
Outcome

Heart failure

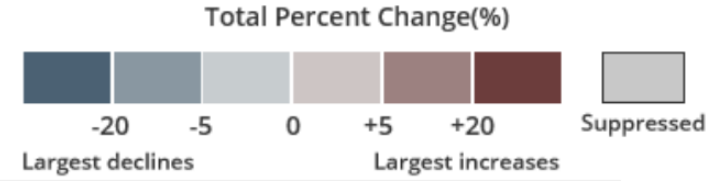
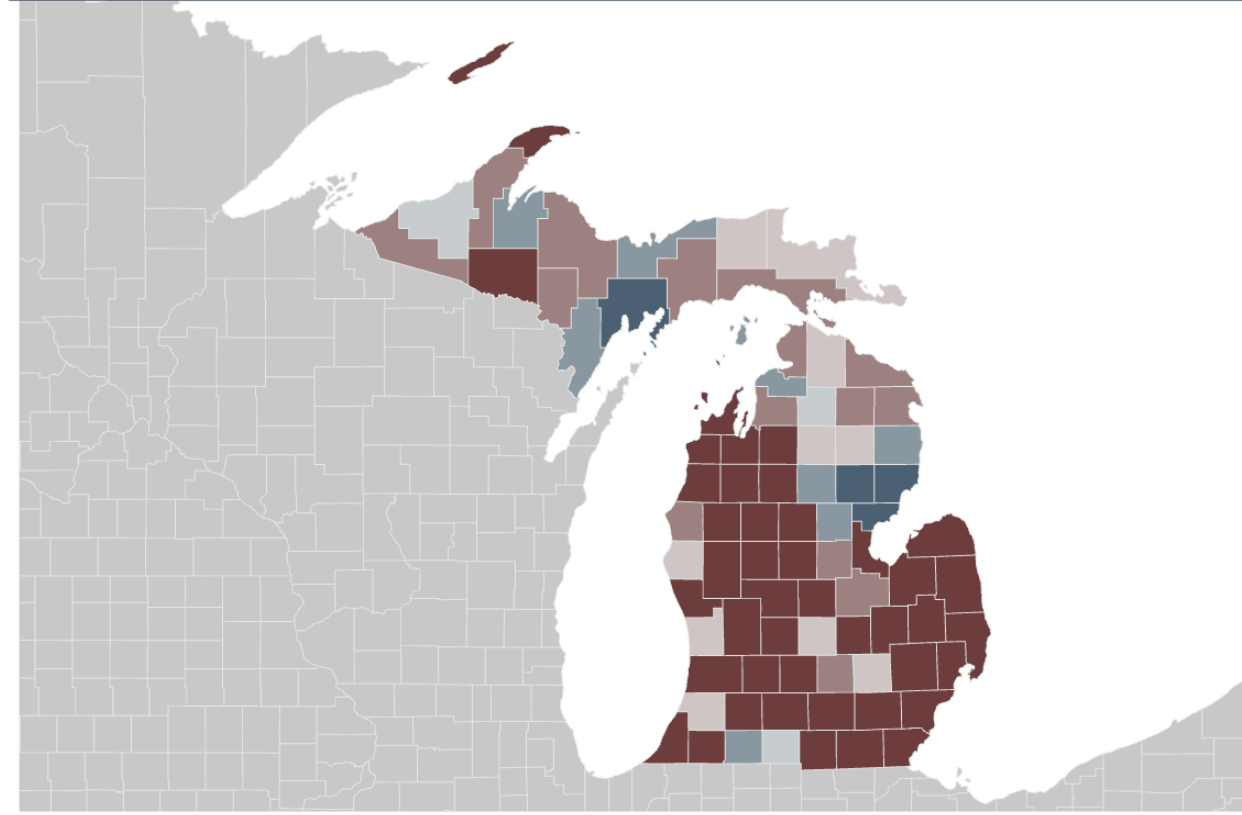
Age Group

Ages 35-64 years

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

Heart failure

Age Group

Ages 35-64 years

State

Michigan

Year

2019

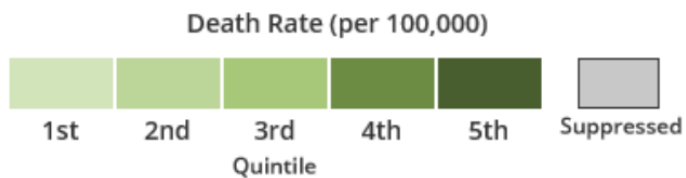
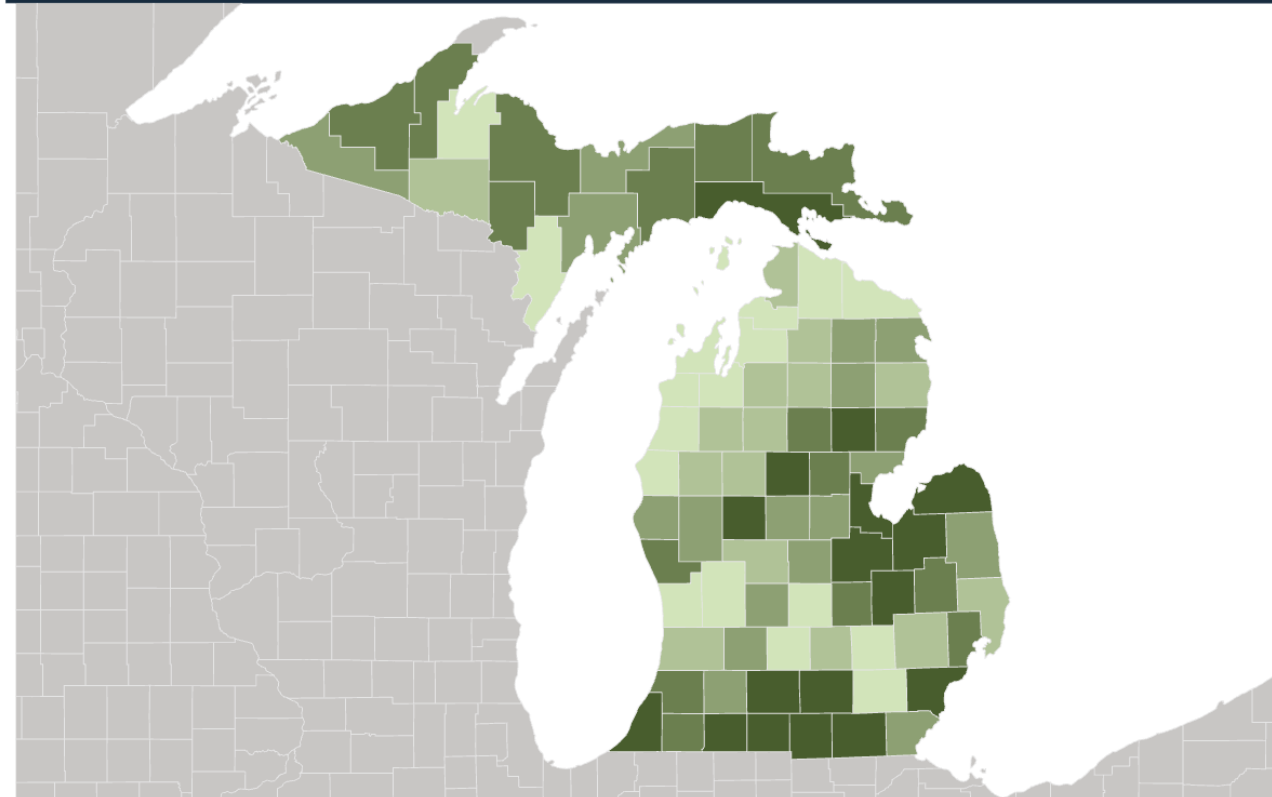
Race

All Races/Ethnicities

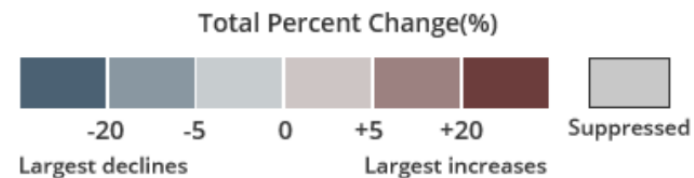
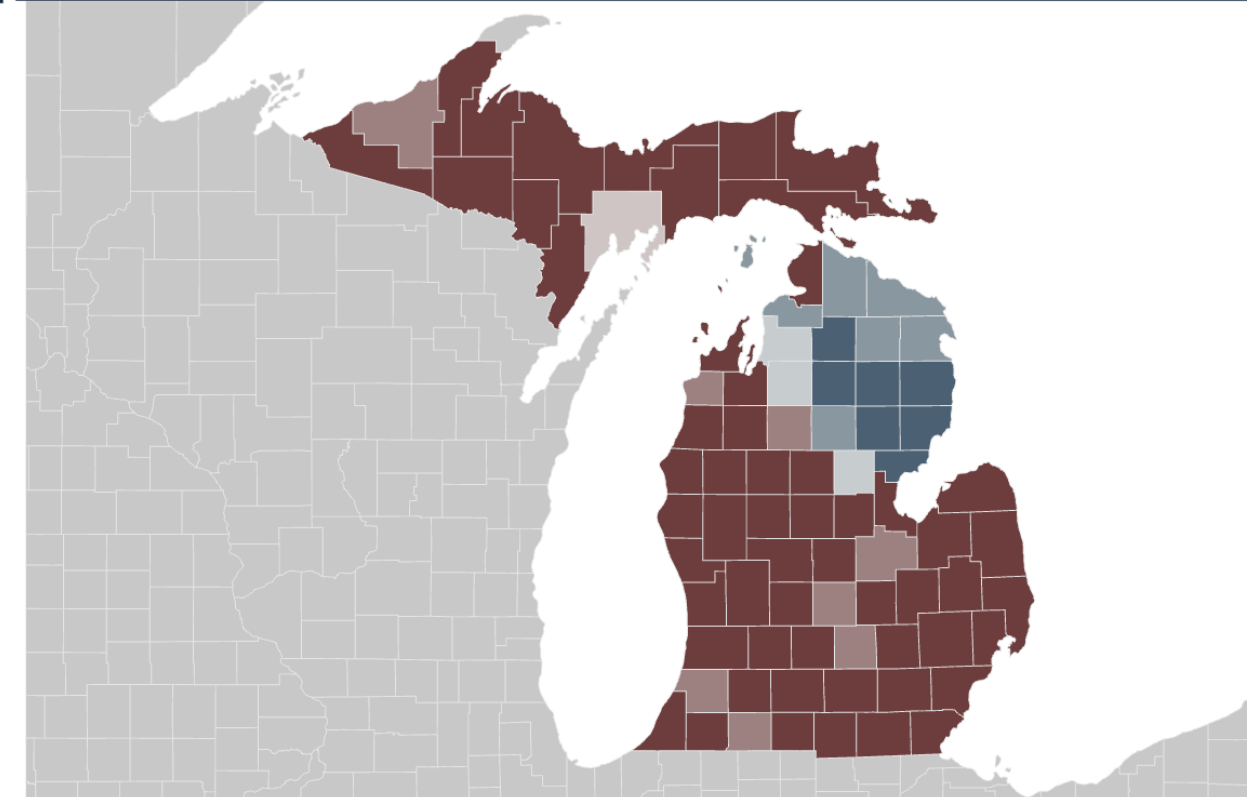
Sex

Men

State Map of Death Rates (2019)



State Map of County Trends in Death Rates (2010 - 2019)



# State Maps of Death Rates & Trends

Outcome

Heart failure

Age Group

Ages 35-64 years

State

Michigan

Year

2019

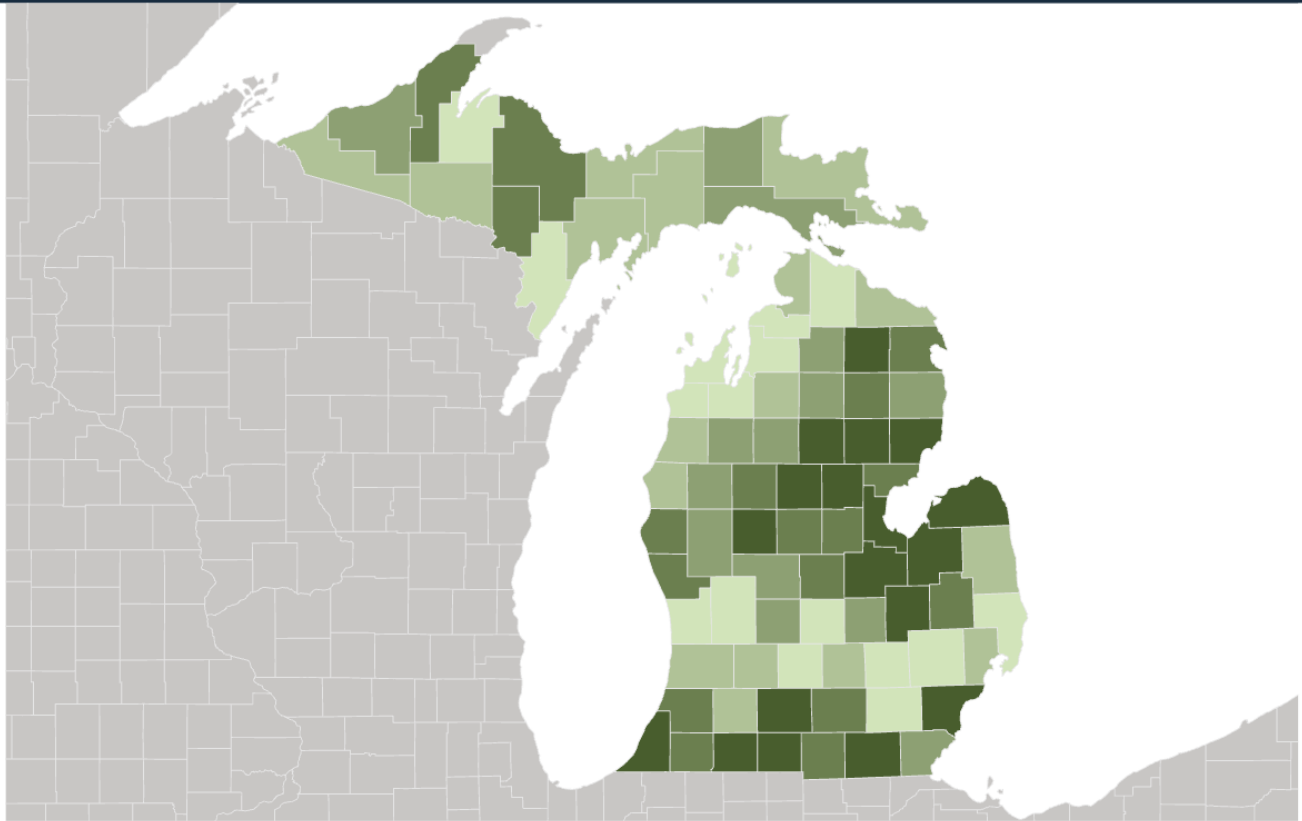
Race

All Races/Ethnicities

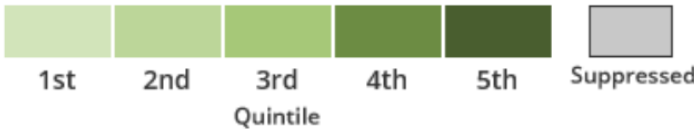
Sex

Women

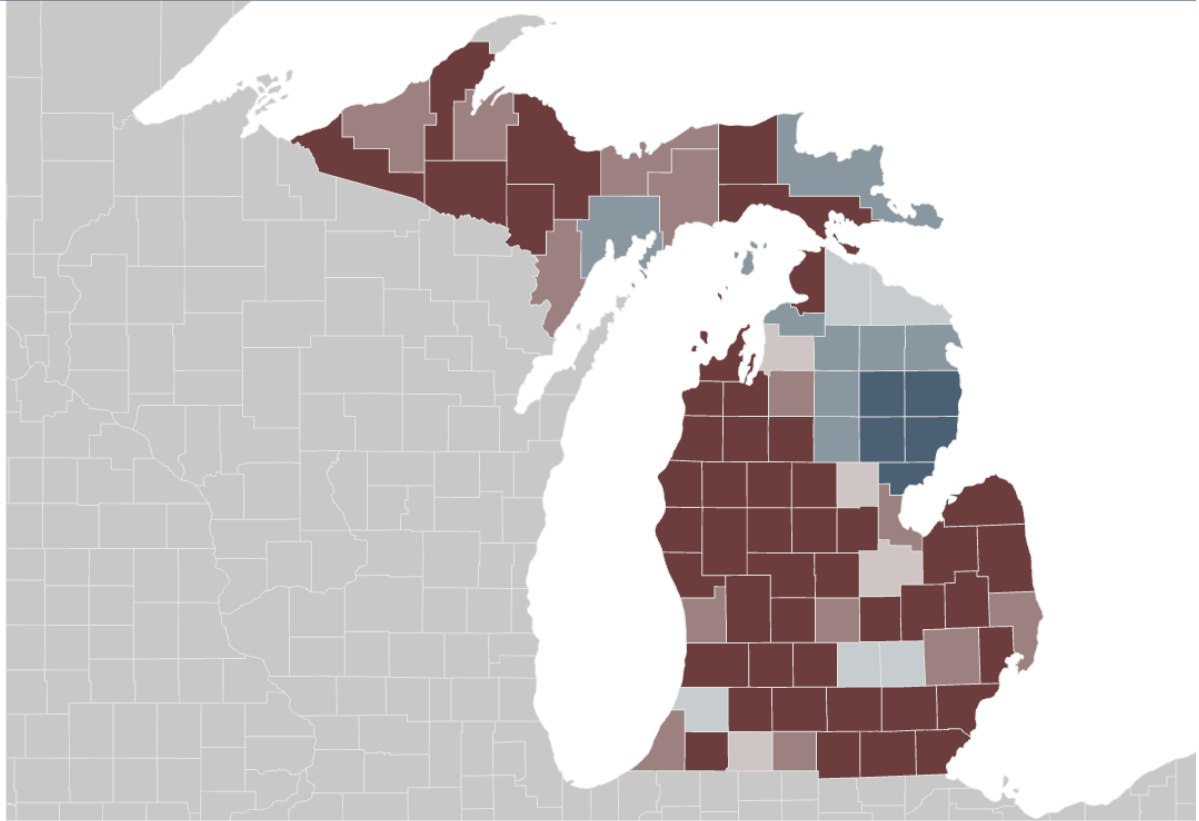
State Map of Death Rates (2019)



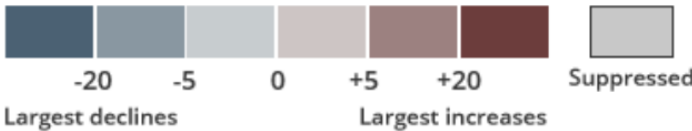
Death Rate (per 100,000)



State Map of County Trends in Death Rates (2010 - 2019)



Total Percent Change(%)





# Tracking US Health Care Spending by Health Condition and County

Joseph L. Dieleman, PhD; Meera Beauchamp, BS; Sawyer W. Crosby, BA; Drew DeJarnatt, MS; Emily K. Johnson, MSc; Haley Lescinsky, MPH; Theresa McHugh, PhD; Ian Pollock, MLS; Maitreyi Sahu, MPH; Vivianne Swart, MPH; Kayla V. Taylor, MPH; Azalea Thomson, MPH; Golsum Tsakalos, MS; Maxwell Weil, MS; Lauren B. Wilner, MPH; Anthony L. Bui, MD, MPH; Herbert C. Duber, MD, MPH; Annie Haakenstad, ScD, MA; Bulat Idrisov, MD, MSc; Ali Mokdad, PhD; Mohsen Naghavi, MD, MPH, PhD; Gregory Roth, MD, MPH; John W. Scott, MD, MPH; Tara Templin, PhD, MS; Christopher J. L. Murray, DPhil, MD

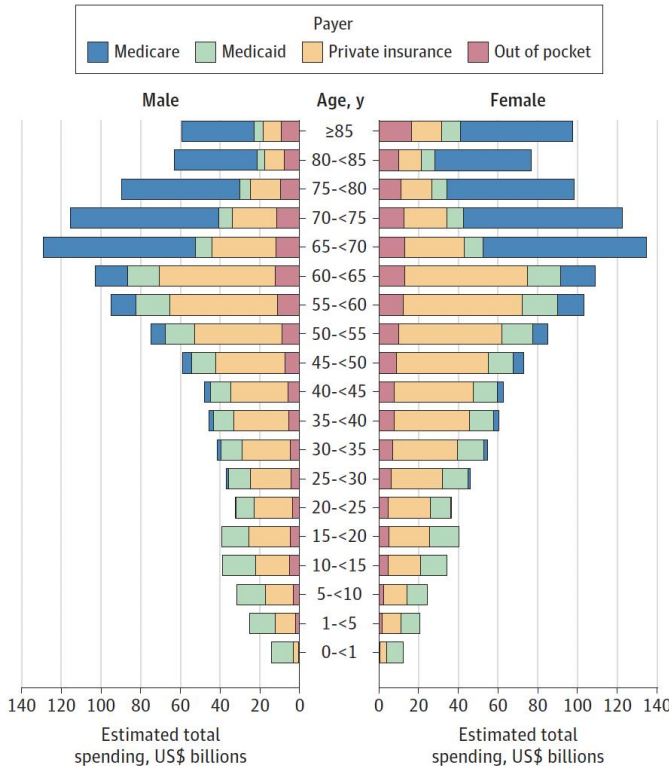
## Key Points

**Question** Which health conditions, types of care, and counties are associated with the highest levels of spending?

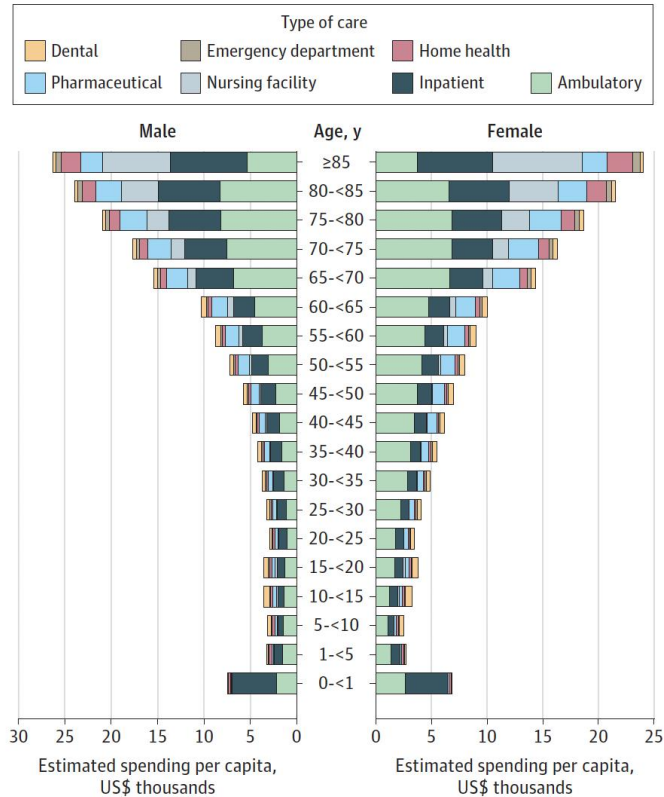
**Findings** This observational study showed considerable variation in spending across health conditions, types of care, age groups, payers, and counties—with spending being greatest for type 2 diabetes. Across counties, there was more variation in utilization rates rather than price and intensity of care.

**Meaning** Further investigation into unexplained variation in spending, focusing on the health conditions with the most spending, could help inform health care policies aimed at lowering costs and improving access to care.

A Estimated spending by age, sex, and payer



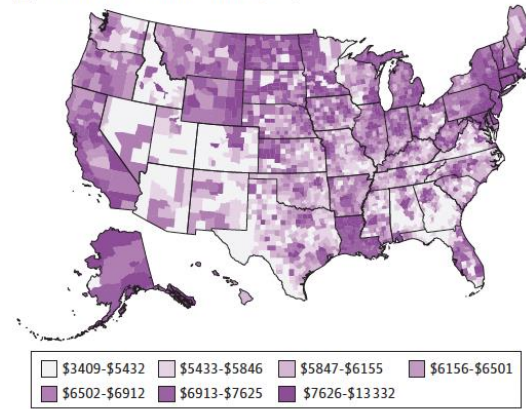
B Estimated spending per capita by age, sex, and type of care



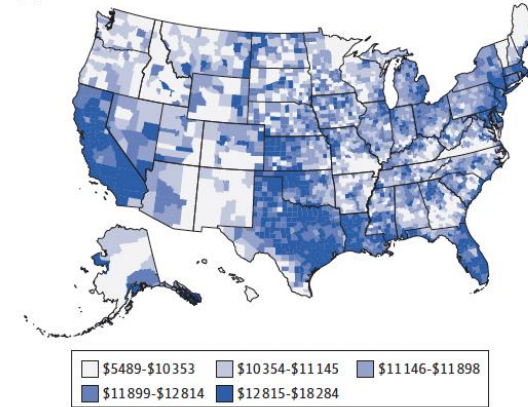
A, Study captured \$2.4 trillion in spending in 2019, measured in 2019 US dollars. Medicare is inclusive of Medicare Advantage. B, National average spending per capita in 2019 was \$7374, measured in 2019 dollars.



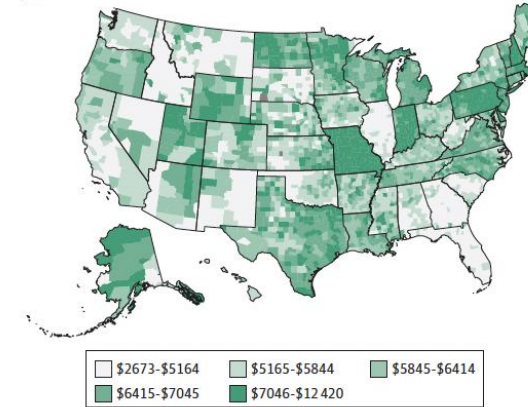
**A** Spending per capita by US county (2019)



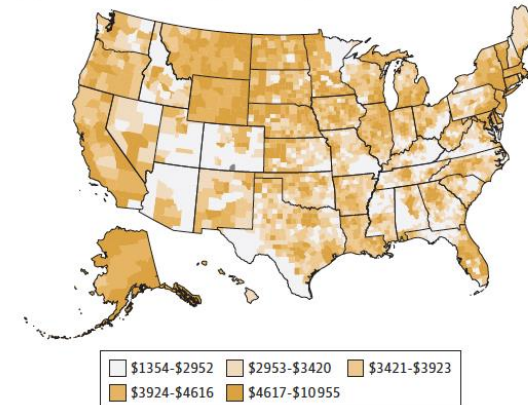
**B** Medicare spending per beneficiary



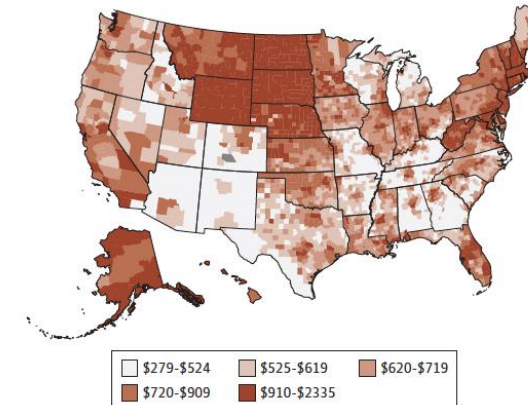
**C** Medicaid spending per beneficiary



**D** Private insurance spending per beneficiary



**E** Out-of-pocket spending per capita



# Cardiovascular Health Among Rural and Urban US Adults—Healthcare, Lifestyle, and Social Factors

Michael Liu, MPhil; Lucas X. Marinacci, MD; Karen E. Joynt Maddox, MD, MPH; Rishi K. Wadhera, MD, MPP, MPhil

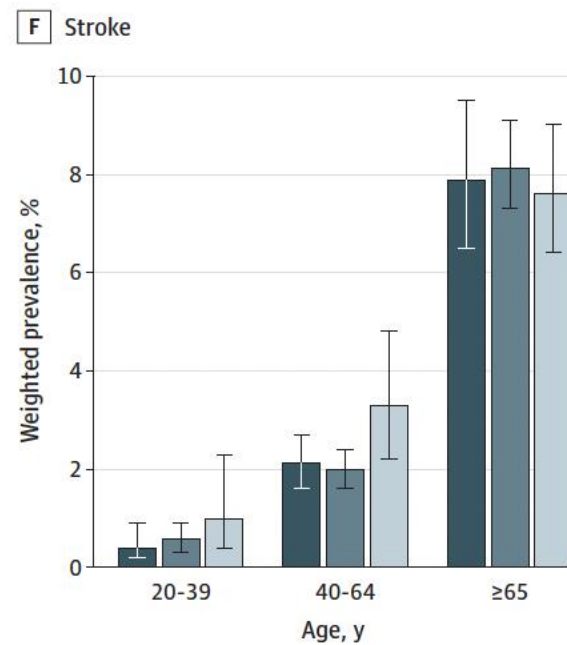
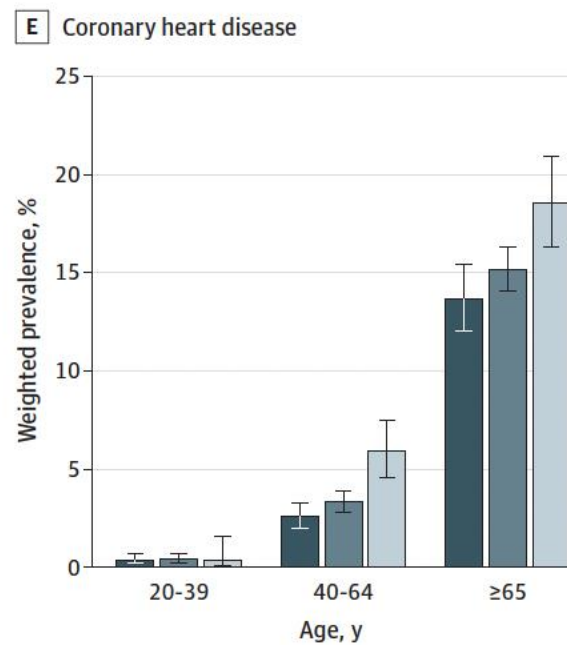
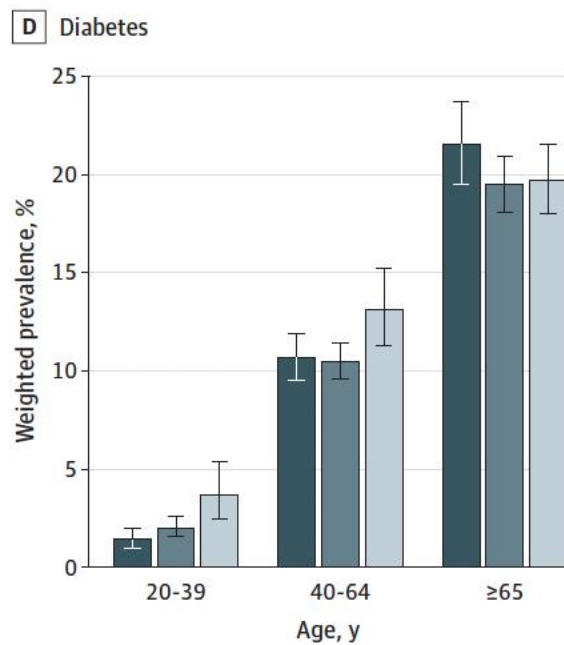
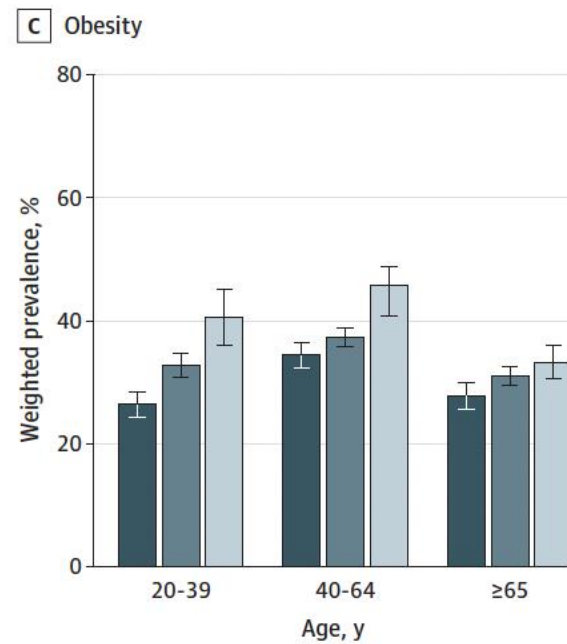
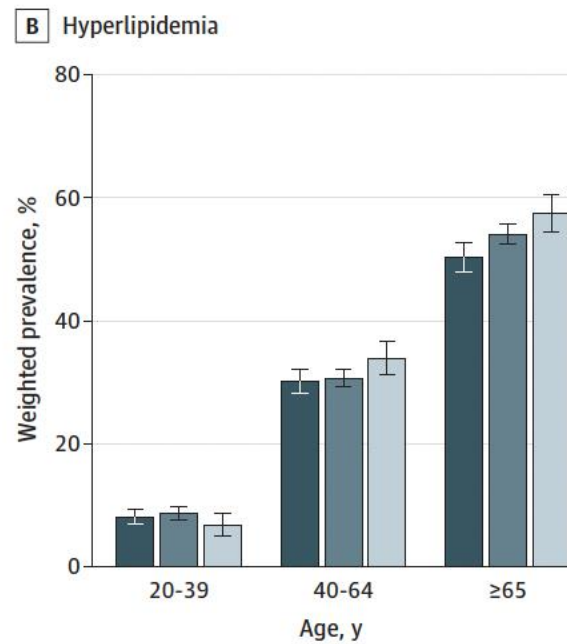
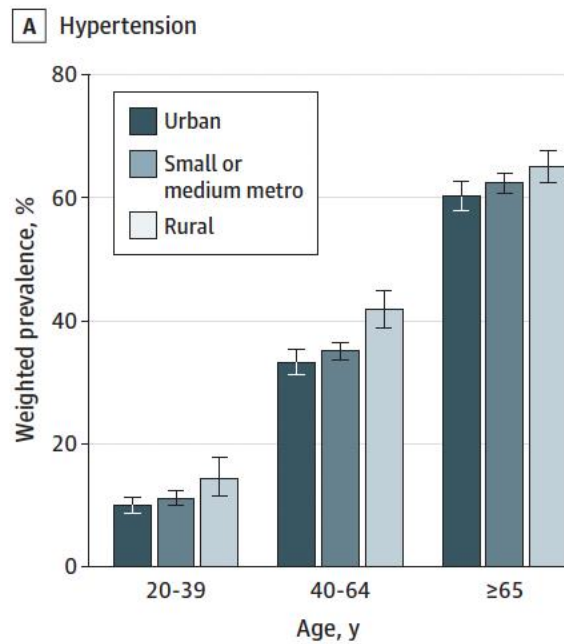
## Key Points

**Question** How does the burden of cardiometabolic risk factors and cardiovascular diseases differ between rural and urban areas of the US, and do health care access, lifestyle factors, and social risk factors contribute to any rural-urban differences in cardiovascular health?

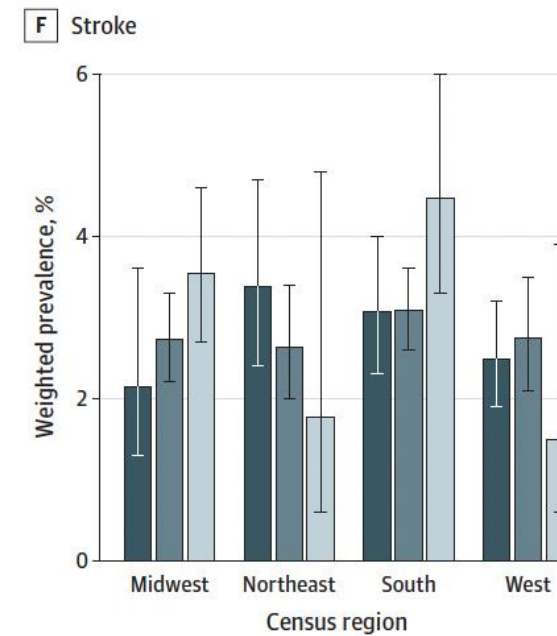
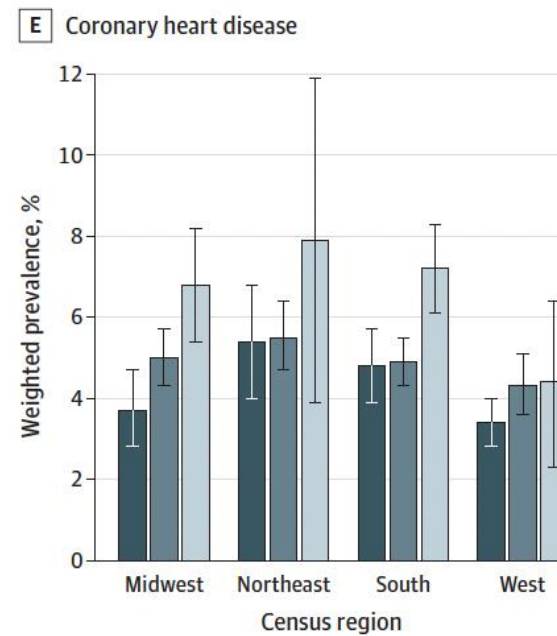
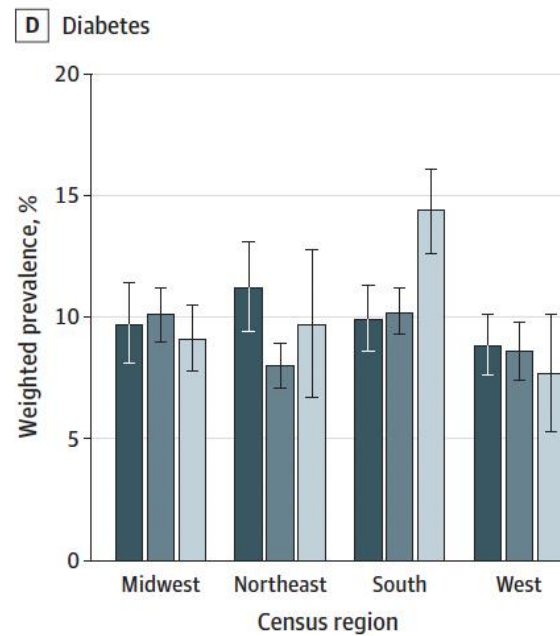
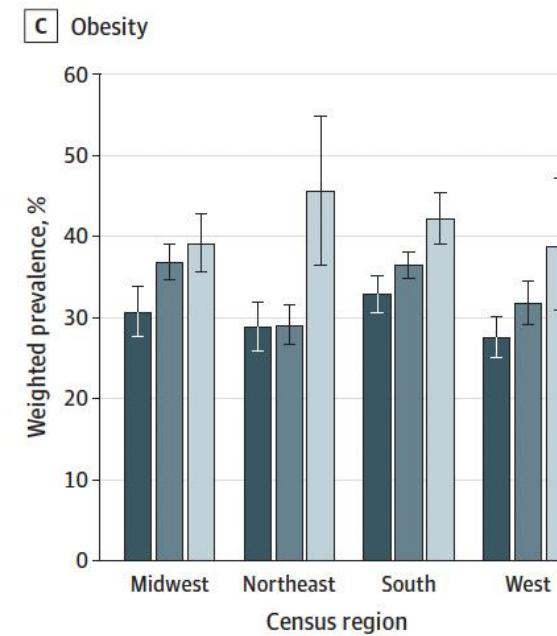
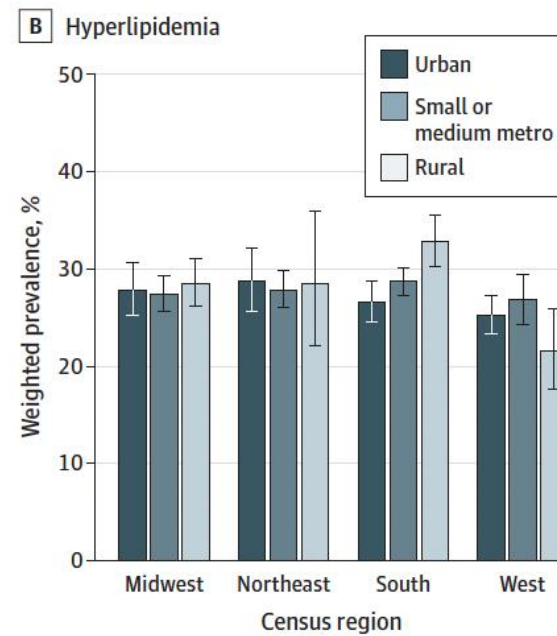
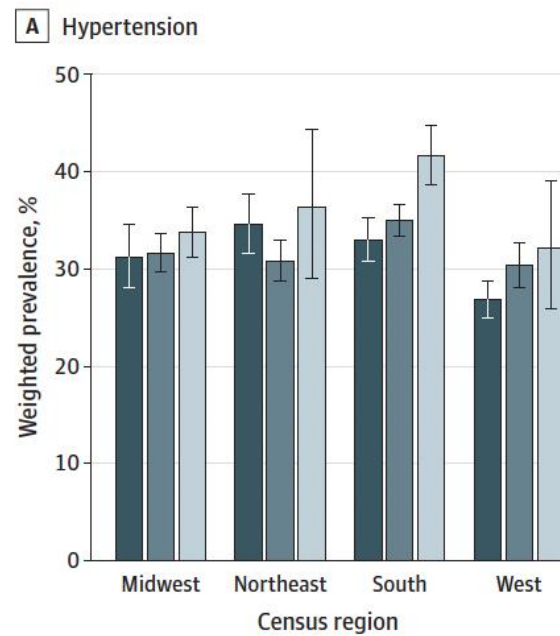
**Findings** In this national cross-sectional study of US adults, age-standardized rates of hypertension, hyperlipidemia, obesity, diabetes, and coronary heart disease were significantly higher in rural vs urban areas. Many rural-urban disparities in cardiovascular health were largest among young adults (aged 20-39 years) and almost entirely explained by social risk factors.

**Meaning** Efforts to improve socioeconomic conditions across the rural US may be important to close the rural-urban gap in cardiovascular health.

Characteristic	No. (weighted %)		
	Urban (n = 8175) <sup>a</sup>	Small or medium metro (n = 14 741) <sup>b</sup>	Rural (n = 4256) <sup>c</sup>
Demographic			
Age group, y			
20-39	2757 (39.4)	3842 (34.0)	931 (29.5)
40-64	3236 (40.9)	5922 (42.2)	1713 (43.8)
≥65	2182 (19.6)	4977 (23.8)	1612 (26.7)
Sex <sup>d</sup>			
Female	4399 (50.8)	8148 (52.1)	2270 (49.8)
Male	3775 (49.2)	6591 (47.8)	1986 (50.2)
Race or ethnicity <sup>e</sup>			
Asian	888 (10.1)	700 (5.0)	45 (1.3)
Black	1248 (15.7)	1455 (10.6)	329 (7.5)
Hispanic	1820 (26.0)	1784 (14.6)	208 (6.1)
White	4042 (46.0)	10 472 (67.2)	3515 (80.6)
Other <sup>f</sup>	177 (2.2)	330 (2.5)	159 (4.6)
Health care access			
Uninsured	699 (11.5)	977 (8.8)	361 (10.3)
No usual source of care <sup>g</sup>	1040 (14.6)	1473 (11.9)	351 (9.1)
No health care visit in past year	1356 (18.7)	2015 (15.9)	556 (15.7)
Lifestyle factors			
Current smoking	692 (8.5)	1698 (11.8)	747 (18.1)
Insufficient physical activity <sup>h</sup>	3940 (51.3)	7588 (52.8)	2524 (59.4)
Social risk factors			
Poverty			
<200% FPL	2178 (28.0)	3645 (24.5)	1604 (36.2)
Education level			
<High school	739 (11.5)	1057 (9.0)	485 (13.0)
High school graduate	1625 (22.6)	3660 (26.7)	1508 (36.1)
Some college	2015 (26.2)	4247 (30.2)	1319 (32.5)
College graduate	3733 (39.7)	5717 (34.1)	930 (18.4)
Food security			
Food insecure <sup>i</sup>	603 (8.0)	1002 (7.0)	359 (8.8)
Home ownership			
Own home	4403 (59.6)	10 160 (73.4)	3079 (76.4)



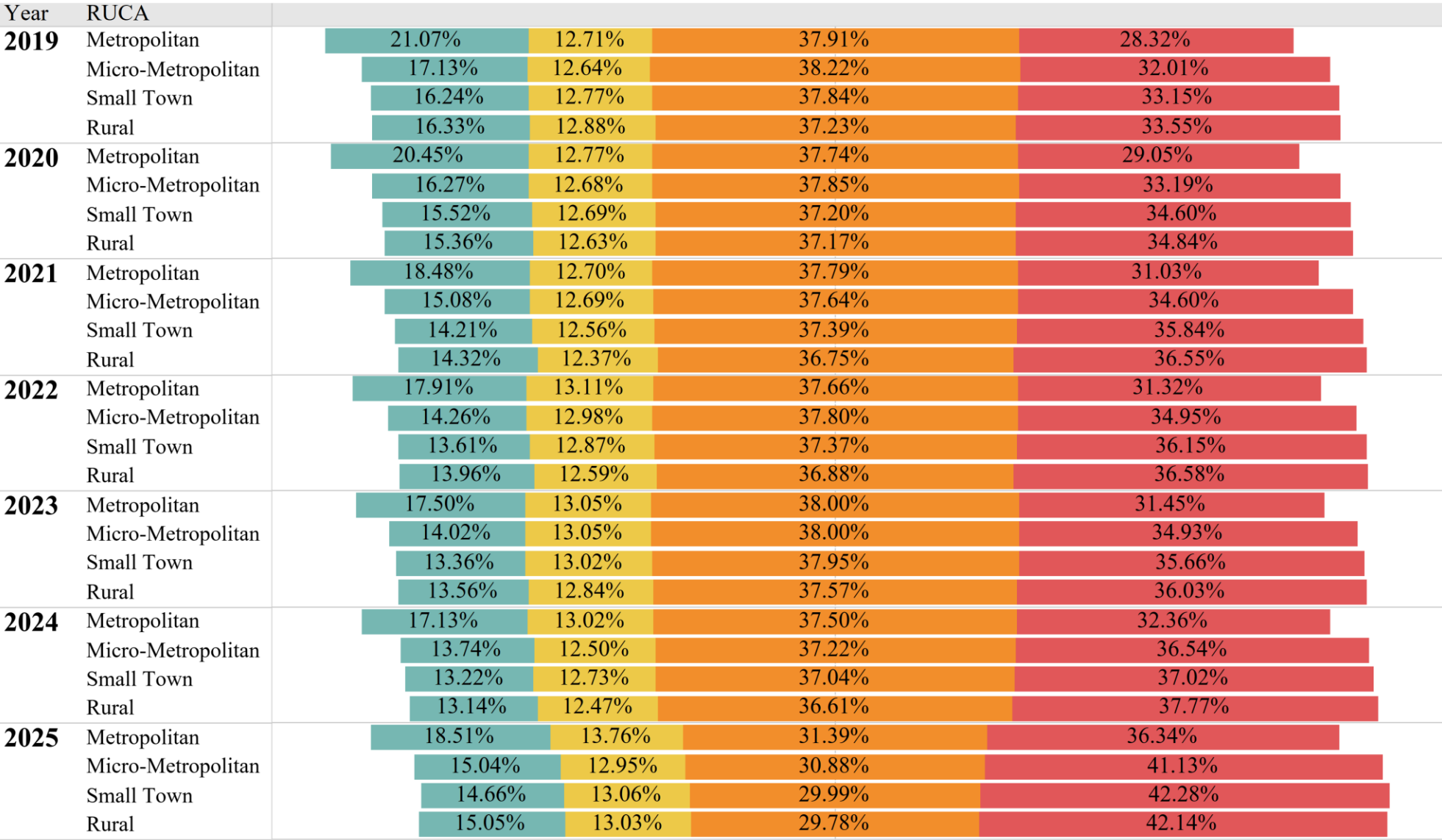




Outcome	Age-standardized prevalence (95% CI), % <sup>a</sup>	Rate ratio (95% CI)	Adjusted rate ratio (95% CI)			
			Demographic <sup>b</sup>	Access <sup>c</sup>	Lifestyle <sup>d</sup>	Social risk <sup>e</sup>
Hypertension						
Rural	37.1 (35.3-38.9)	1.20 (1.13-1.27)	1.16 (1.09-1.23)	1.17 (1.09-1.24)	1.11 (1.04-1.18)	0.99 (0.93-1.06)
Small or medium metro	32.6 (31.7-33.5)	1.05 (1.01-1.10)	1.03 (0.99-1.08)	1.03 (0.98-1.08)	1.02 (0.97-1.07)	0.98 (0.94-1.03)
Urban	30.9 (29.8-32.0)	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]
Hyperlipidemia						
Rural	29.3 (27.7-31.0)	1.10 (1.03-1.18)	1.03 (0.96-1.11)	1.04 (0.97-1.12)	0.99 (0.92-1.07)	0.93 (0.86-1.00)
Small or medium metro	27.9 (27.1-28.8)	1.05 (1.00-1.10)	1.01 (0.96-1.06)	1.00 (0.95-1.05)	0.99 (0.93-1.04)	0.96 (0.91-1.02)
Urban	26.7 (25.6-27.8)	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]
Obesity						
Rural	41.1 (38.7-43.4)	1.37 (1.27-1.47)	1.40 (1.30-1.50)	1.39 (1.30-1.50)	1.37 (1.27-1.47)	1.29 (1.20-1.39)
Small or medium metro	34.2 (33.2-35.3)	1.14 (1.08-1.20)	1.16 (1.10-1.22)	1.15 (1.09-1.21)	1.15 (1.09-1.22)	1.13 (1.07-1.19)
Urban	30.0 (28.7-31.3)	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]
Diabetes						
Rural	11.2 (10.2-12.2)	1.15 (1.02-1.29)	1.27 (1.13-1.42)	1.29 (1.15-1.45)	1.21 (1.07-1.36)	1.02 (0.90-1.15)
Small or medium metro	9.4 (8.9-10.0)	0.97 (0.88-1.06)	1.03 (0.94-1.12)	1.01 (0.92-1.11)	1.00 (0.91-1.09)	0.96 (0.87-1.06)
Urban	9.8 (9.1-10.5)	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]
Coronary heart disease						
Rural	6.7 (6.0-7.6)	1.58 (1.35-1.85)	1.38 (1.18-1.61)	1.41 (1.20-1.66)	1.29 (1.10-1.53)	1.08 (0.91-1.29)
Small or medium metro	4.9 (4.6-5.3)	1.15 (1.01-1.31)	1.07 (0.94-1.22)	1.06 (0.93-1.21)	1.05 (0.92-1.20)	1.02 (0.89-1.17)
Urban	4.3 (3.8-4.7)	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]
Stroke						
Rural	3.4 (2.8-4.2)	1.23 (0.96-1.58)	1.15 (0.90-1.49)	1.17 (0.90-1.51)	1.03 (0.79-1.34)	0.86 (0.65-1.13)
Small or medium metro	2.9 (2.6-3.2)	1.03 (0.85-1.24)	0.99 (0.82-1.19)	0.98 (0.81-1.18)	0.96 (0.79-1.16)	0.95 (0.77-1.16)
Urban	2.8 (2.4-3.2)	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]	1 [Ref]

Distribution of Red Cross Blood Donors Aged 40- Between Years 2019-2025

Across American Heart Association's Hypertension Stages



HTN Stages (AHA Classification)

Normal (SBP<120 & DBP<80)

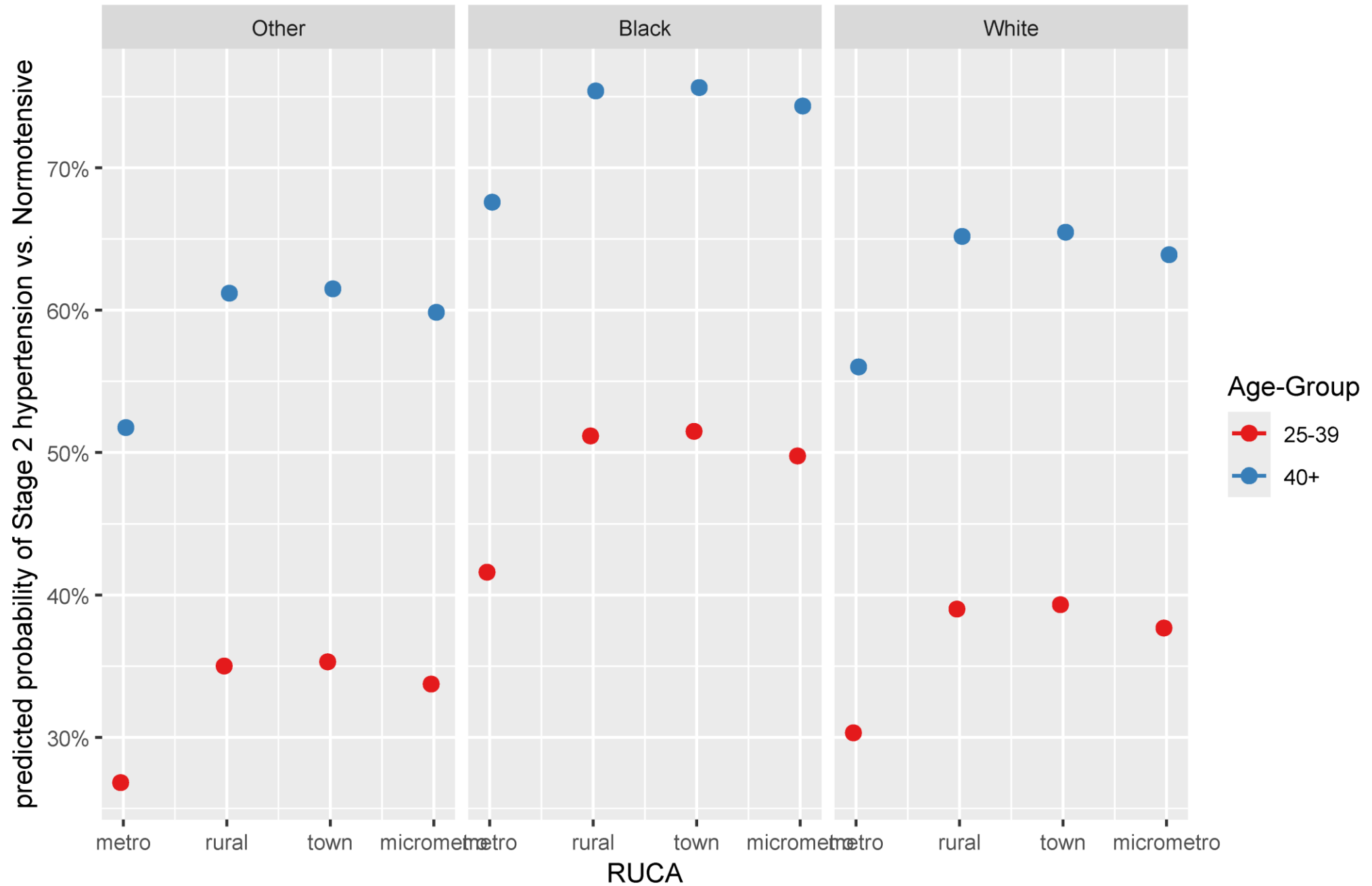
Elevated (129≥SBP≥120 & DBP<80)

Stage 1 (139≥SBP≥130 or 89≥DBP≥80)

Stage 2 (SBP≥140 or DBP≥90)












Predicted probabilities of stage 2 hypertension by RUCA, age-group and race



## ORIGINAL RESEARCH

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# Social Determinants of Cardiovascular Health: A Longitudinal Analysis of Cardiovascular Disease Mortality in US Counties From 2009 to 2018

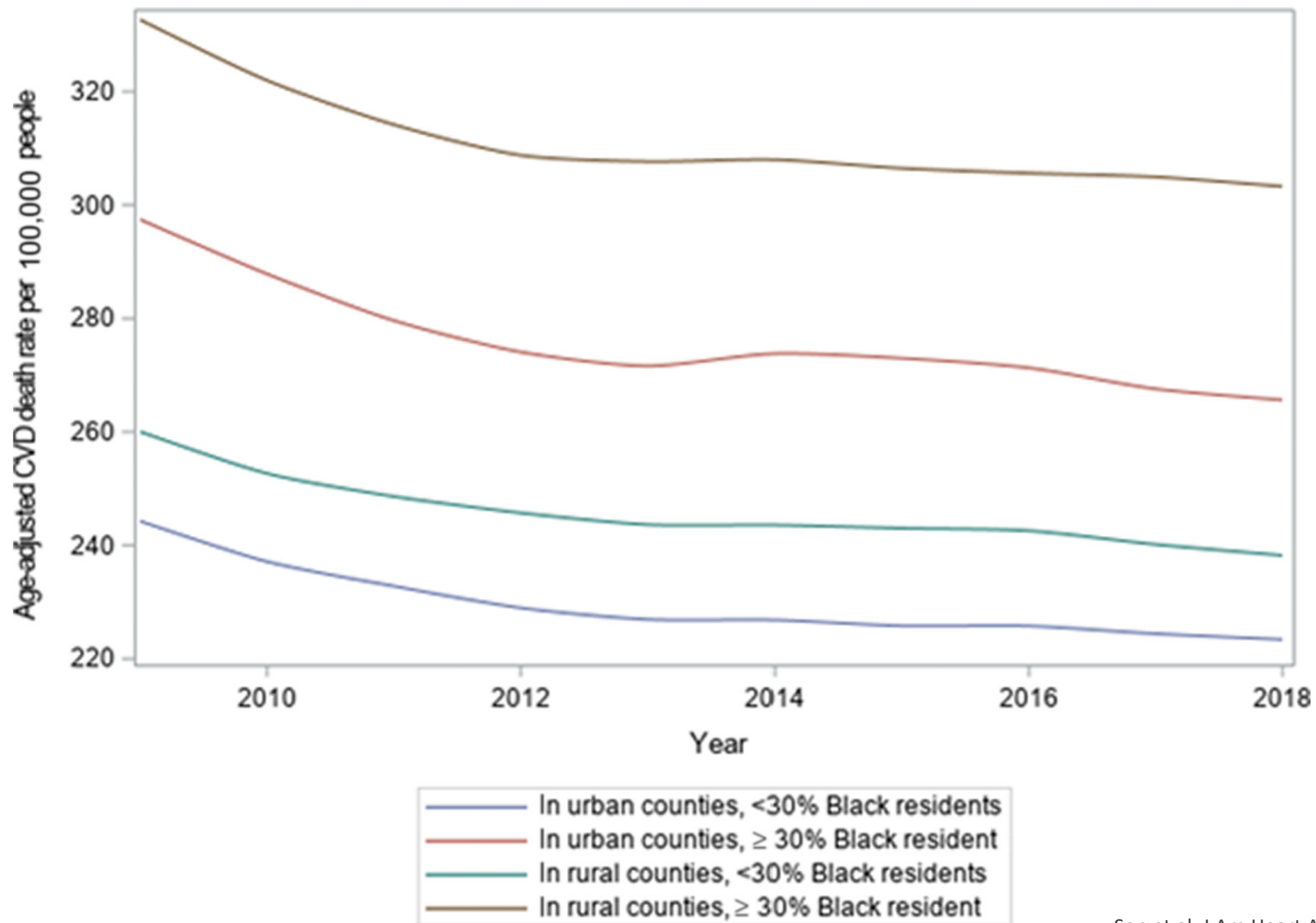
Heejung Son , MS; Donglan Zhang , PhD; Ye Shen, PhD; Anna Jaysing, MS; Jielu Zhang , MS; Zhuo Chen , PhD; Lan Mu , PhD; Junxiu Liu , PhD; Janani Rajbhandari-Thapa , PhD; Yan Li , PhD; José A. Pagán , PhD

**BACKGROUND:** Disparities in cardiovascular disease (CVD) outcomes persist across the United States. Social determinants of health play an important role in driving these disparities. The current study aims to identify the most important social determinants associated with CVD mortality over time in US counties.


**METHODS AND RESULTS:** The authors used the Agency for Healthcare Research and Quality's database on social determinants of health and linked it with CVD mortality data at the county level from 2009 to 2018. The age-standardized CVD mortality rate was measured as the number of deaths per 100 000 people. Penalized generalized estimating equations were used to select social determinants associated with county-level CVD mortality. The analytic sample included 3142 counties. The penalized generalized estimating equation identified 17 key social determinants of health including rural–urban status, county's racial composition, income, food, and housing status. Over the 10-year period, CVD mortality declined at an annual rate of 1.08 (95% CI, 0.74–1.42) deaths per 100 000 people. Rural counties and counties with a higher percentage of Black residents had a consistently higher CVD mortality rate than urban counties and counties with a lower percentage of Black residents. The rural–urban CVD mortality gap did not change significantly over the past decade, whereas the association between the percentage of Black residents and CVD mortality showed a significant diminishing trend over time.

**CONCLUSIONS:** County-level CVD mortality declined from 2009 through 2018. However, rural counties and counties with a higher percentage of Black residents continued to experience higher CVD mortality. Median income, food, and housing status consistently predicted higher CVD mortality.

## CVD mortality in rural-urban counties <30% and ≥30% Black residents



Parameters	Estimate, $\beta$ (95% CI)	<i>P</i> value
Intercept	242.54 (214.96–270.11)	<0.0001 <sup>‡</sup>
Year	–1.08 (–1.42 to –0.74)	<0.0001 <sup>‡</sup>
Urban	Reference	
Rural	4.26 (0–8.51)	0.0498*
Median household income, in \$1000 US, inflation-adjusted	–0.64 (–0.78 to –0.49)	<0.0001 <sup>‡</sup>
Black race, %	1.11 (0.81–1.41)	<0.0001 <sup>‡</sup>
Hispanic ethnicity, %	–0.01 (–0.18 to 0.17)	0.925
White race, %	–0.19(–0.45 to 0.06)	0.1384
Unmarried partner households, received food stamps/SNAP, %	–0.28 (–0.38 to –0.18)	<0.0001 <sup>‡</sup>
Households, received food stamps/SNAP, %	0.51 (0.17–0.86)	0.0032 <sup>†</sup>
Foreign-born, %	–1.19 (–1.55 to –0.82)	<0.0001 <sup>‡</sup>
Only high school diploma, aged $\geq 25$ y, %	1.43 (1.21–1.65)	<0.0001 <sup>‡</sup>
Housing units: mobile homes, %	0.83 (0.59–1.08)	<0.0001 <sup>‡</sup>
Housing units: vacant, %	–0.70 (–0.90 to –0.51)	<0.0001 <sup>‡</sup>
Single-parent families with children, %	–0.01 (–0.14 to 0.12)	0.8826
Renter-occupied housing units with children, %	0.18 (0.06–0.30)	0.0039 <sup>†</sup>
People living with diagnosed HIV, per 1000 people	0.88 (0.45–1.25)	<0.0001 <sup>‡</sup>
Public transportation, at least 60-min commute time, aged $\geq 16$ y, %	–0.01 (–0.03 to 0.01)	0.4685
Medicare, the derived field, which is the ratio of enrollees over Medicare-eligible, %	–0.18 (–0.26 to –0.10)	<0.0001 <sup>‡</sup>

PHOENIX

Time period:

All data

Last 12 months

Tract 000200, Gladwin County MI

very low  
≤ 6.5%

median  
37.0%

very high  
≥ 62.6%

49.2%

View trends and determinants summary

Advanced display:

Metric by Metric Comparison

Metric by Metric Comparison

High Cholesterol

Survey estimated

Click an axis to change plot

High Cholesterol (%)

median 37.0

45.5 very high

11.6 very low

11.8 very low

58.2 very high

Hypertension (%)

45.9%

Tract 000200

Gladwin County, MI

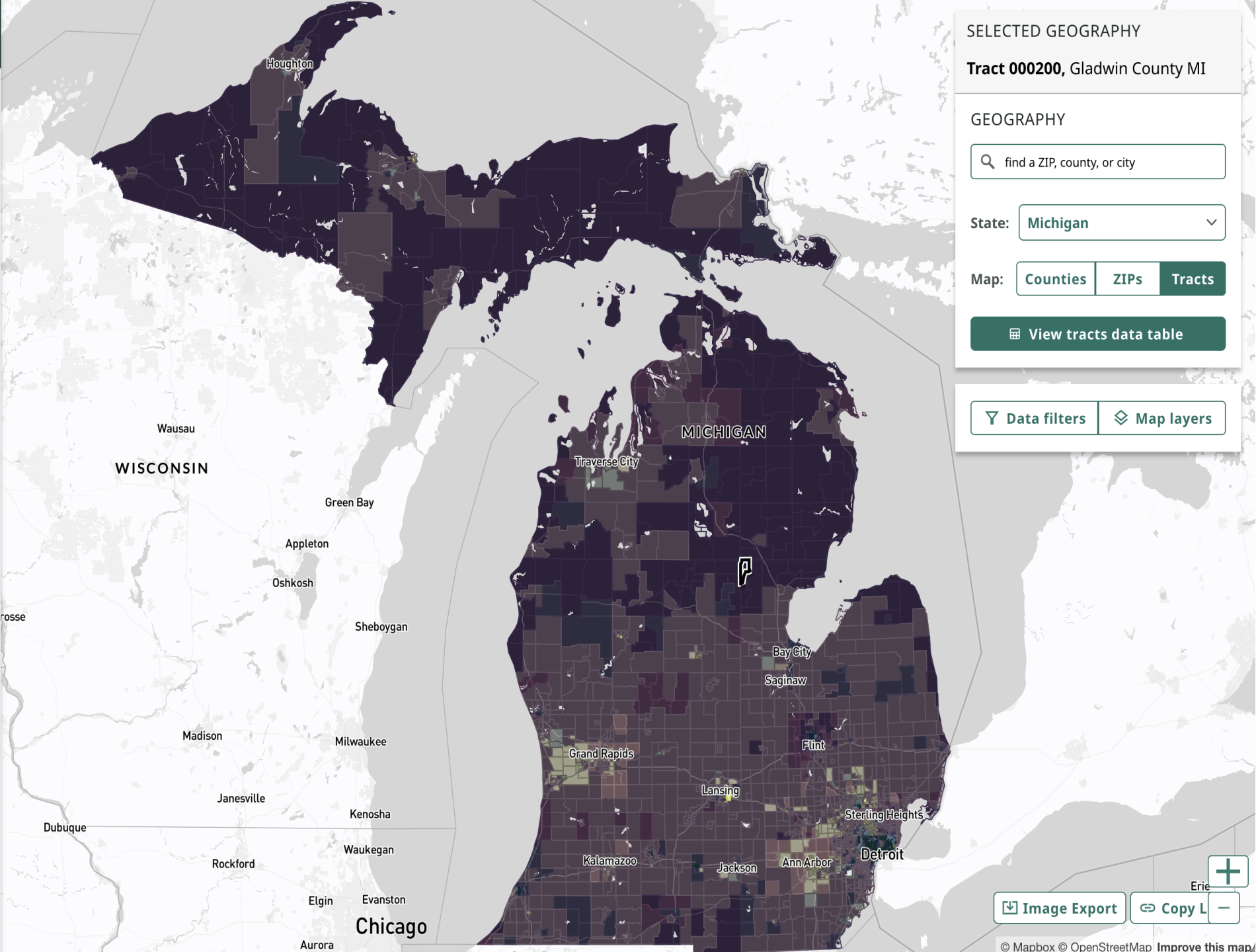
Jan 2021 - Dec 2022

49.2% Hypertension

45.9% High Cholesterol

Swap axis metrics


View other related metrics



SELECTED GEOGRAPHY


Tract 000200, Gladwin County MI


GEOGRAPHY


 find a ZIP, county, or city


State: Michigan


Map: Counties ZIPs **Tracts**


 View tracts data table

 Data filters

 Map layers

 Image Export

 Copy Link



© Mapbox © OpenStreetMap Improve this map



**Tract 002200, Berrien County MI**

 find a ZIP, county, or city

State: Michigan

Map: **Counties** ZIPs **Tracts**

 [View tracts data table](#)

### ▼ Data filters

Map layers

 Image Export

Copy L -

© Mapbox © OpenStreetMap Improve this map

Time period:

## All data

Last 12 months

**Tract 002200, Berrien County MI**

51.0%

very low

median

very high

 $\leq 6.5\%$ 

37.0%

 $\geq 62.6\%$ [View trends and determinants summary >>](#)

Advanced display: **Metric by Metric Comparison**

## METRIC BY METRIC COMPARISON

### Lack of Health Insurance

Survey estimated

?

19.0%

 $\leq 2.4\%$ 

≥ 33.9%

Click an axis to change plotted metric.

Lack of Health Insurance (%) ⓘ

median

29.9 g/L

very high

Tract 002200

Berrien County, MI  
Jan 2021 - Dec 2022

**51.0% Hypertension**

19.0% Lack of Health Insurance

2.8 ery

very

> very low


very high

Hypertension (%) ?

## Swap axis metrics

[View other related metrics >>](#)



PHOENIX

Time period:

All data

Last 12 months

Tract 961200, Lake County MI

very low  
≤ 6.5%

median  
37.0%

very high  
≥ 62.6%

48.5%

View trends and determinants summary

Advanced display:

Metric by Metric Comparison

METRIC BY METRIC COMPARISON

Coronary Heart Disease

Survey estimated

≤ 0.6%

13.9%

Click an axis to change plot

Coronary Heart Disease (%)

median 37.0

very low 1.0

very high 13.9

Hypertension (%)

median 7.4

very low 11.8

very high 58.2

Tract 961200

Lake County, MI

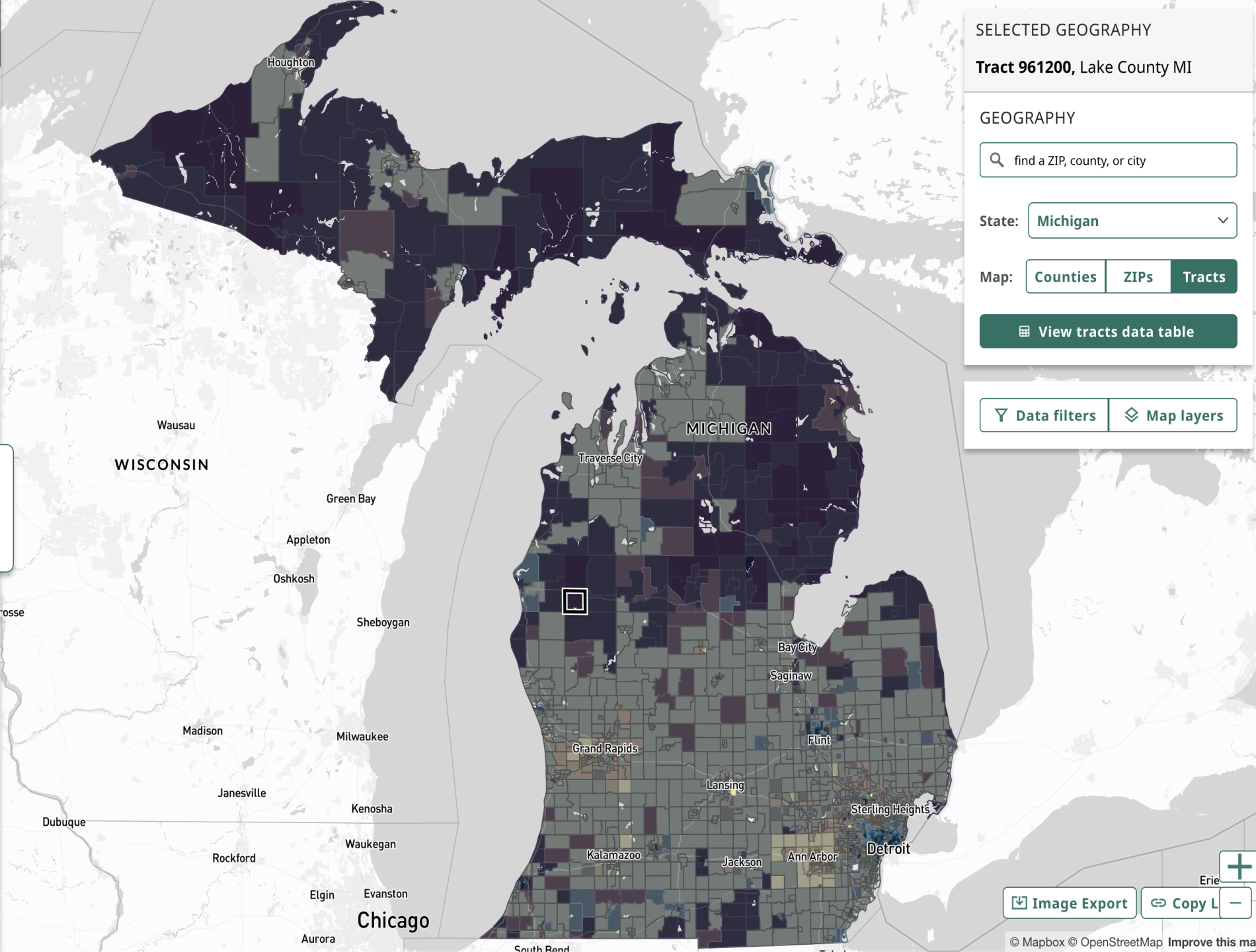
Jan 2021 - Dec 2022

48.5% Hypertension

13.9% Coronary Heart Disease

Swap axis metrics

View other related metrics



SELECTED GEOGRAPHY

Tract 961200, Lake County MI

GEOGRAPHY

find a ZIP, county, or city

State: Michigan

Map: Counties ZIPs Tracts

View tracts data table

Data filters

Map layers



A photograph of a modern building at night. The building features a large glass facade that is illuminated from within, reflecting the city lights. A prominent section of the building is clad in horizontal wooden slats, which are also lit from within, creating a warm glow. The building is situated in an urban environment, with other buildings visible in the background. The sky is dark blue with some clouds. The overall scene is a nighttime architectural shot.

[plevy@med.wayne.edu](mailto:plevy@med.wayne.edu)

# Questions & Discussion

# Close-Out & Next Steps

- Next Learning Session – Session #7:
  - Wednesday, January 14th, 2026, 1-2 pm
  - The registration link is already available on the MICH Learning Collaborative Webpage
    - Under "Upcoming Learning Sessions"
  - Still confirming topic and presenters



For additional questions about MICH Learning Sessions, contact:

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