The Burden of Cardiovascular Disease in North Carolina

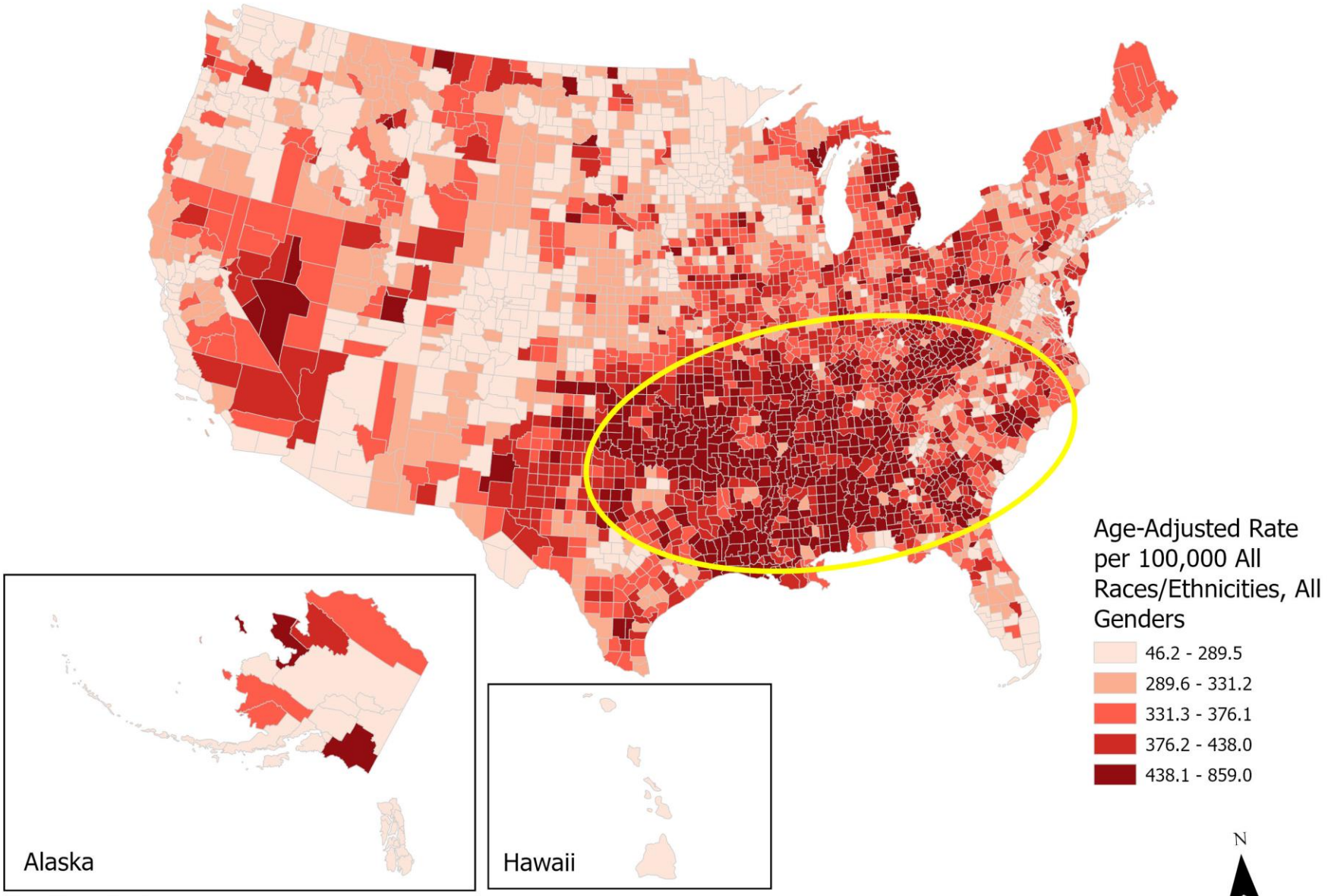
Start With Your Heart®
Justus-Warren Heart Disease & Stroke Prevention Task Force

Justus-Warren Heart Disease and Stroke Prevention Task Force
2024

Purpose

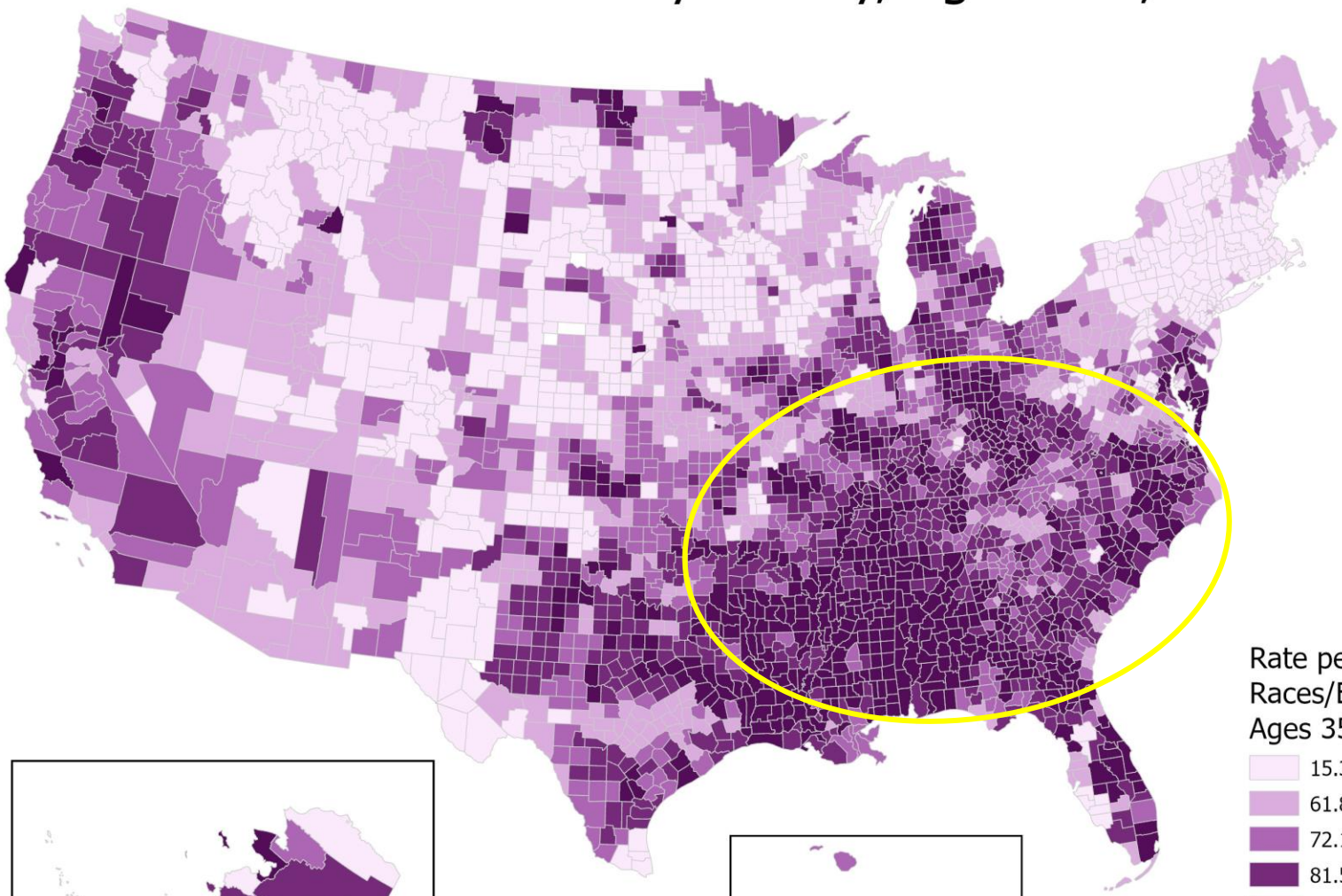
1. To detail the burden of heart disease and stroke in North Carolina
2. To examine the risk factors for heart disease and stroke including identification of subpopulations at highest risk
3. To publicize the profile of the heart disease and stroke burden and its preventability
4. To identify priority strategies which are effective in preventing and controlling risks for heart disease and stroke
5. To recommend to the Governor and General Assembly funding and strategies needed to modify or enact laws to enhance heart disease and stroke prevention

US Heart Disease Death Rates by County, Ages 35+, 2019-2021



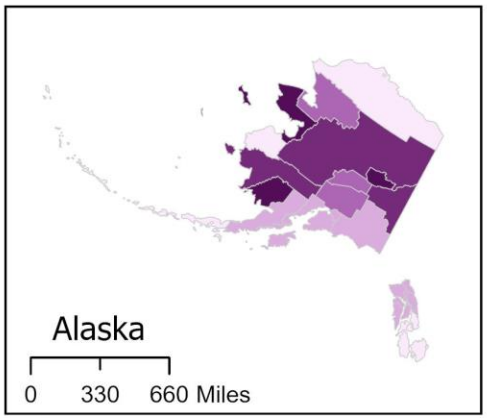
Author: Stacey Burgin
Source: Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, 2019-2021 county-level U.S. heart disease death rates.
Date: November 18, 2024

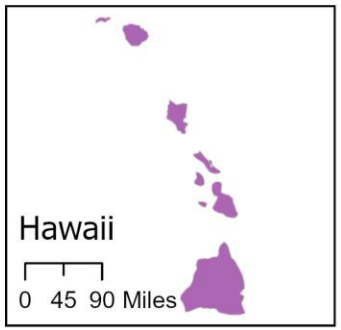
US Stroke Death Rates by County, Ages 35+, 2019-2021



Rate per 100,000 All Races/Ethnicities, All, Ages 35 and Up

- 15.3 - 61.7
- 61.8 - 72.0
- 72.1 - 81.4
- 81.5 - 92.1
- 92.2 - 210.3





N

0 75 150 300 Miles

Author: Stacey Burgin
Source: Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, 2019-2021 county-level U.S. stroke death rates.
Date: November 18, 2024

US Heart Disease Death Rates and Ranking by State, 2017-2021

State	2017		2018		2019		2020		2021	
	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank
Delaware	158.4	27	159.1	27	154.3	21	159.6	23	162.7	22
Maryland	164.5	31	161.9	28	159.3	28	168.3	30	165.2	23
Idaho	162.4	29	157.9	24	150.7	19	151.9	17	166.4	24
Virginia	154.5	21	147.9	16	149.1	17	152	18	167.2	25
Maine	143.5	12	147.0	15	142.4	11	146.2	13	169.8	26
Illinois	163.3	30	163.9	31	162.0	30	171.4	32	169.8	27
North Carolina	156.5	24	155.5	21	154.7	22	156.5	22	170.9	28
Wisconsin	157.6	25	157.8	23	158.8	27	162.2	25	171.7	29
Montana	155.0	22	163.2	30	157.1	23	162.7	26	175.2	30
Vermont	152.5	20	150.5	18	151.6	20	167.1	29	175.7	31
Kansas	157.9	26	158.9	25	166.0	33	167.0	28	176.1	32
Pennsylvania	176.0	37	176.1	37	172.9	37	175.7	35	180.6	33
Texas	169.2	33	170.0	34	163.4	31	173.9	34	180.7	34

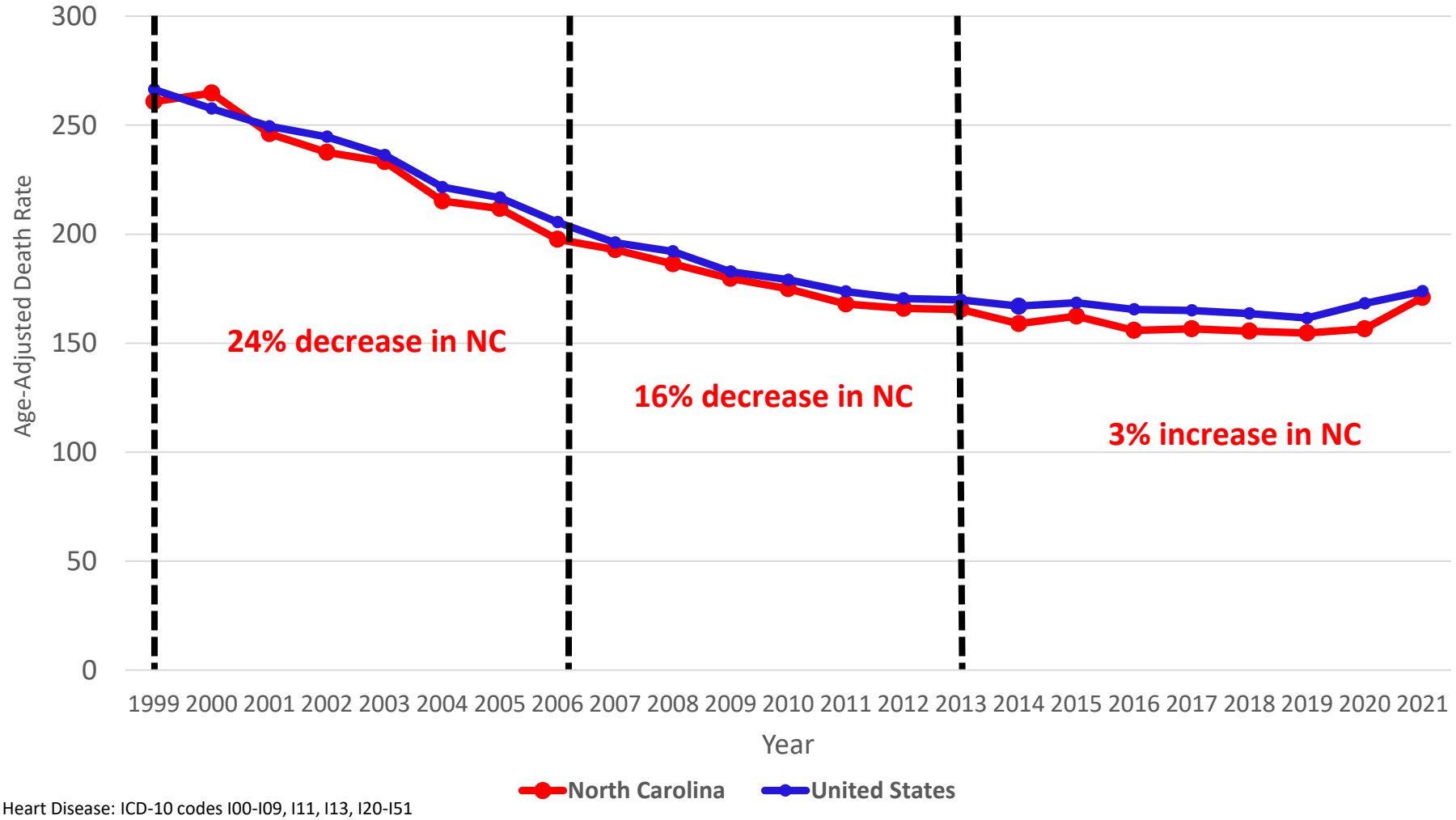
Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Heart Disease Mortality by State. Accessed at https://www.cdc.gov/nchs/pressroom/sosmap/heart_disease_mortality/heart_disease.htm on December 4, 2023.

US Stroke Death Rates and Ranking by State, 2017 - 2021

State	2017		2018		2019		2020		2021	
	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank	Age Adjusted Death Rate	US Rank
Illinois	38.9	31	37.3	27	38.8	32	42.3	36	44.1	35
Oregon	39.9	34	38.0	29	39.5	35	40.5	33	45.1	36
Kentucky	39.4	33	41.5	42	42.5	46	42.4	37	45.8	37
Michigan	39.3	32	40.0	36	39.3	34	44.5	45	46.2	38
Tennessee	45.0	46	43.6	45	41.8	42	43.6	43	46.2	39
Florida	38.9	30	39.6	34	40.4	37	43.5	41	46.5	40
North Carolina	43.0	41	41.3	40	41.5	40	44.4	44	46.5	41
Maryland	40.2	36	40.3	38	41.8	41	42.5	38	47.3	42
Georgia	43.5	43	43.4	44	41.9	43	43.0	39	47.9	43
South Carolina	44.9	45	45.5	46	42.2	45	43.5	42	48.3	44
Ohio	42.8	40	42.6	43	42.2	44	45.3	46	49.0	45
Arkansas	43.8	44	41.5	41	40.7	38	43.5	40	49.9	46
Louisiana	47.4	48	46.7	48	44.1	47	46.6	47	52	47

Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Stroke Mortality by State. Accessed at https://www.cdc.gov/nchs/pressroom/sosmap/stroke_mortality/stroke.htm on December 4, 2023.

Heart Disease Death Rates, NC vs. US, 1999 - 2021



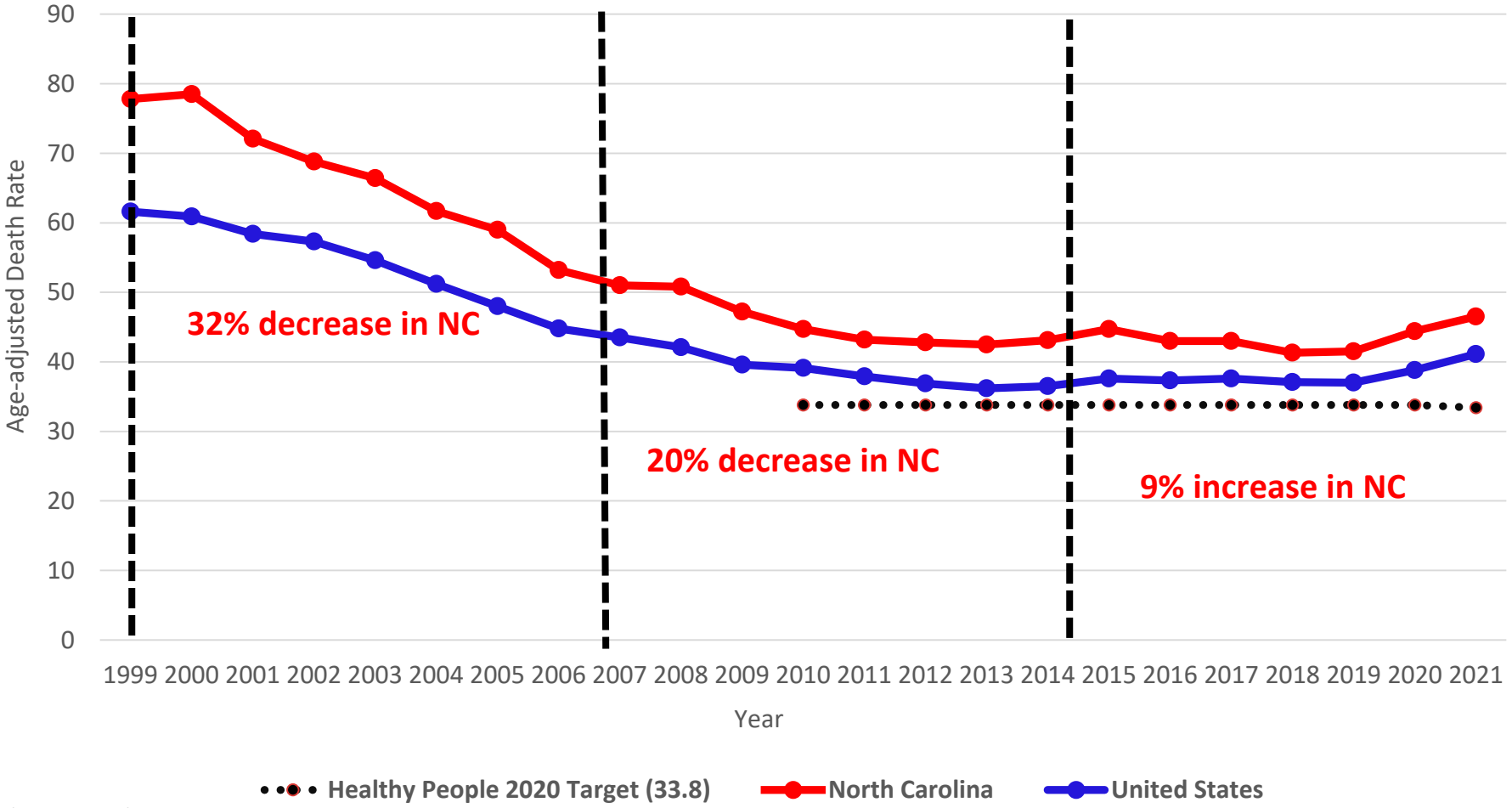
Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51

Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Data Sources: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2019 on CDC WONDER Online Database, released in 2020. Accessed at https://wonder.cdc.gov/ucd-icd10.html on January 4, 2021.

Centers for Disease Control and Prevention, National Center for Health Statistics. Heart Disease Mortality by State. Accessed at https://www.cdc.gov/nchs/pressroom/sosmap/heart_disease_mortality/heart_disease.htm on December 4, 2023.

Stroke Death Rates NC vs. US, 1999 – 2021



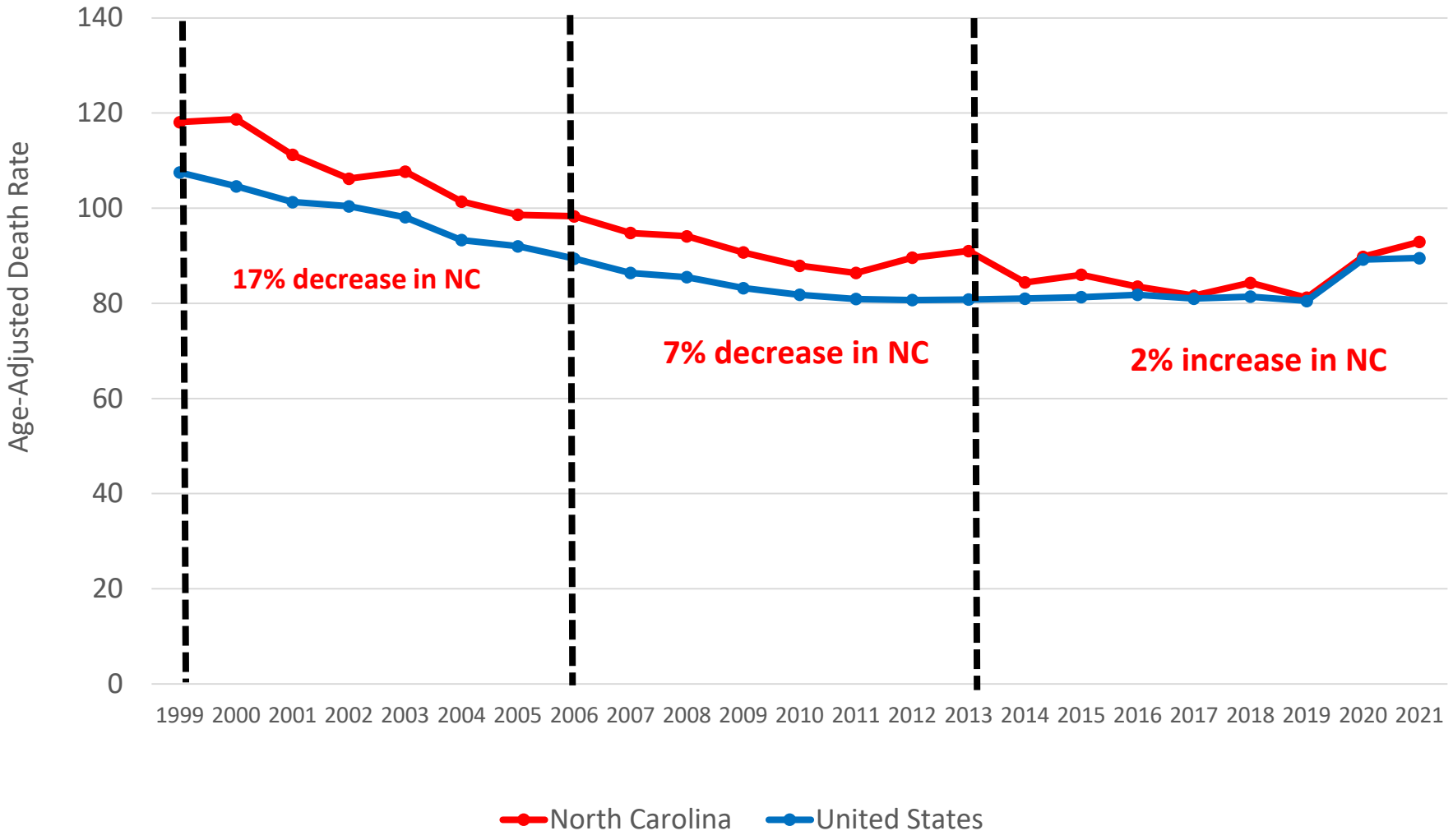
Stroke: ICD-10 codes I60-I69

Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2019 on CDC WONDER Online Database, released in 2020. Accessed at https://wonder.cdc.gov/ucd-icd10.html on January 4, 2021.

Centers for Disease Control and Prevention, National Center for Health Statistics. Stroke Mortality by State. Accessed at https://www.cdc.gov/nchs/pressroom/sosmap/stroke_mortality/stroke.htm on December 4, 2023.

Heart Disease Death Rates, Ages 35-64 Years, NC vs. US, 1999 - 2021



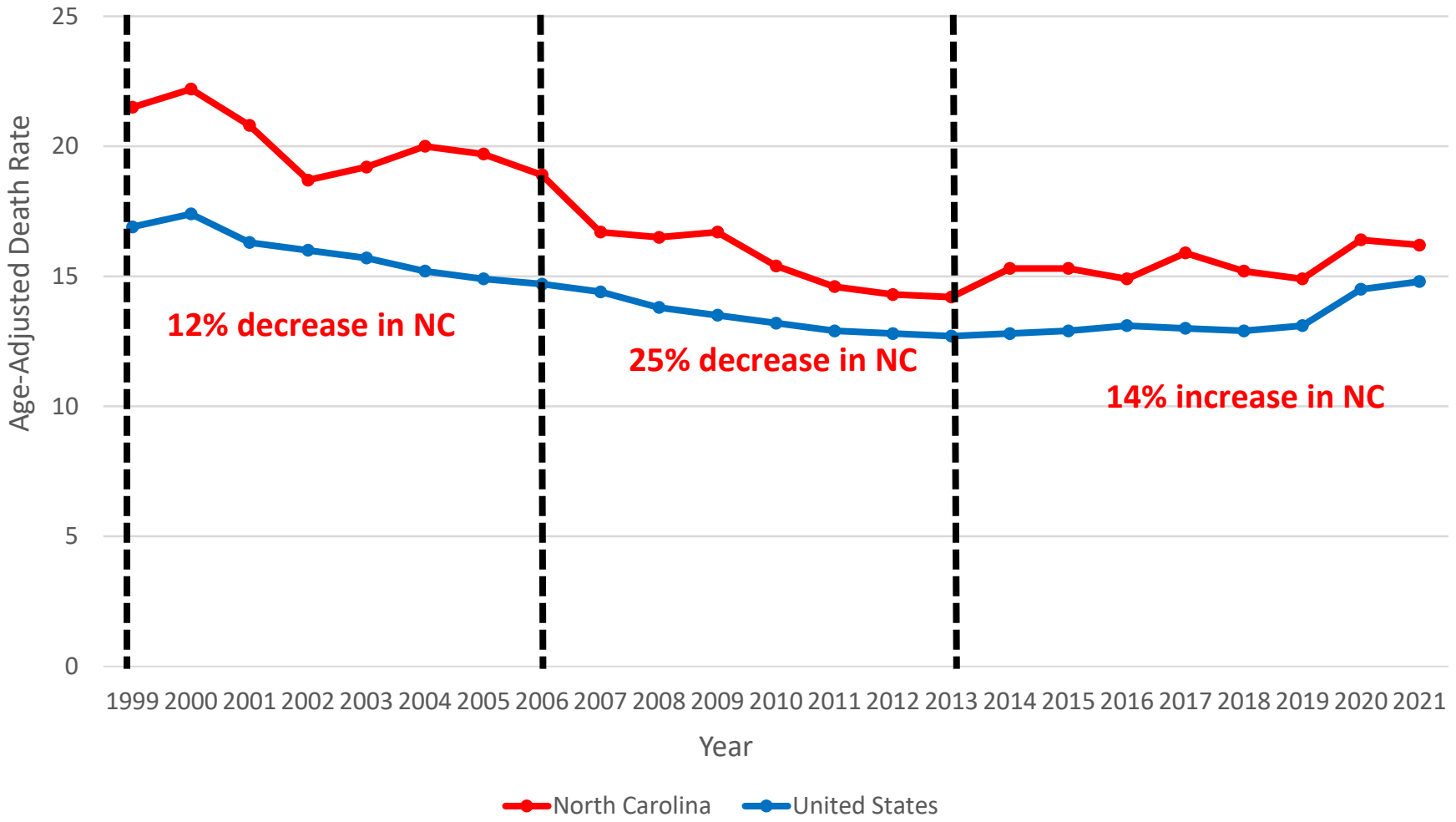
Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51'

Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2019 on CDC WONDER Online Database, released in 2020. Accessed at https://wonder.cdc.gov/ucd-icd10.html on January 4, 2021.

Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Heart Disease Mortality by State. Accessed at https://www.cdc.gov/nchs/pressroom/sosmap/heart_disease_mortality/heart_disease.htm on December 5, 2023.

Stroke Death Rates, Ages 35-64 Years, NC vs. US, 1999 - 2021



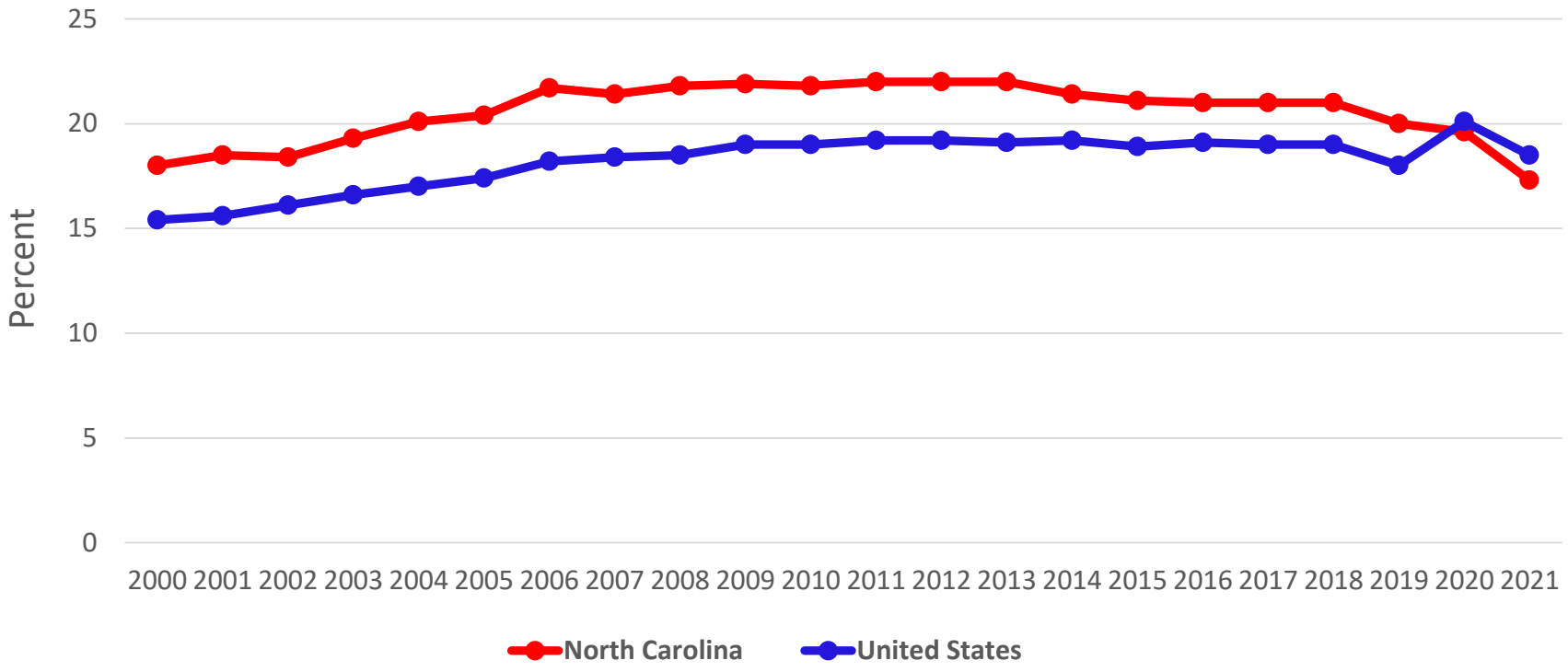
Stroke: ICD-10 codes I60-I69

Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2019 on CDC WONDER Online Database, released in 2020. Accessed at https://wonder.cdc.gov/ucd-icd10.html on January 4, 2021.

Centers for Disease Control and Prevention, National Center for Health Statistics. National Vital Statistics System, Mortality 2018-2021 on CDC WONDER Online Database, released in 2021. Data are from the Multiple Cause of Death Files, 2018-2021, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10-expanded.html on Dec 5, 2023

Cardiovascular Disease Deaths Under 65 Years, NC vs. US, 2000 – 2021



Cardiovascular Disease: ICD-10 codes I00-I78

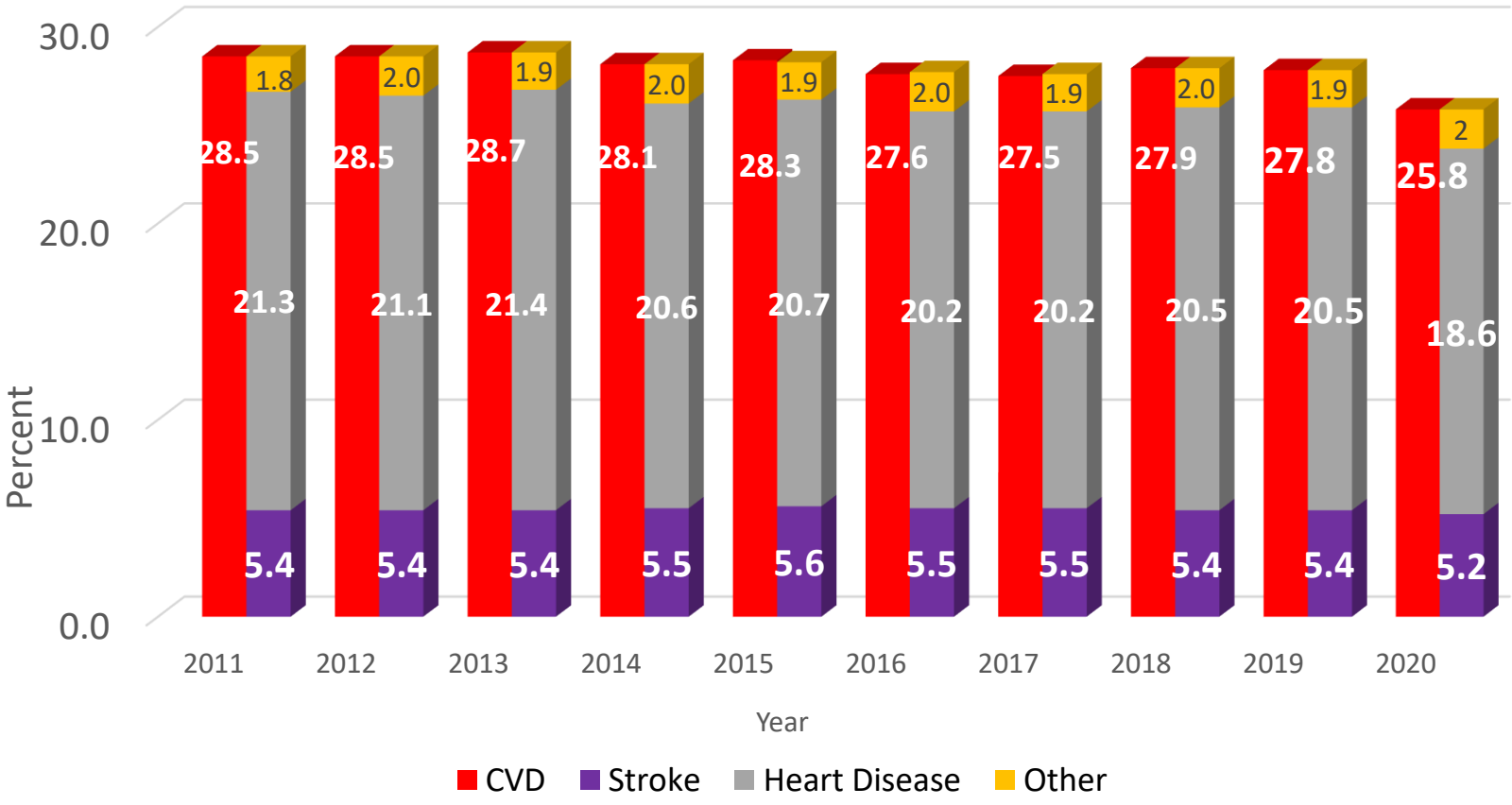
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File, 1999-2019. CDC WONDER Online Database. Accessed at https://wonder.cdc.gov/ucd-icd10.html on January 31, 2024.

Leading Causes of Death, NC, 2021

Rank	Cause	Number	%
1	Diseases of the heart	21,299	18.0
2	Cancer	20,225	17.1
3	COVID-19	13,594	11.5
4	Cerebrovascular Disease	5,670	4.8
5	Chronic Lower Respiratory Diseases	4,742	4.0
6	Alzheimer's Disease	4,262	3.6
7	Unintentional Poisoning	3,968	3.4
8	Diabetes Mellitus	3,932	3.3
9	Unintentional Injuries	2,707	2.3
10	Nephritis, Nephrosis and Necrotic Syndrome	2,240	1.9
	All other causes (Residual)	11,031	9.3
	Total Deaths -- All Causes	118,040	100

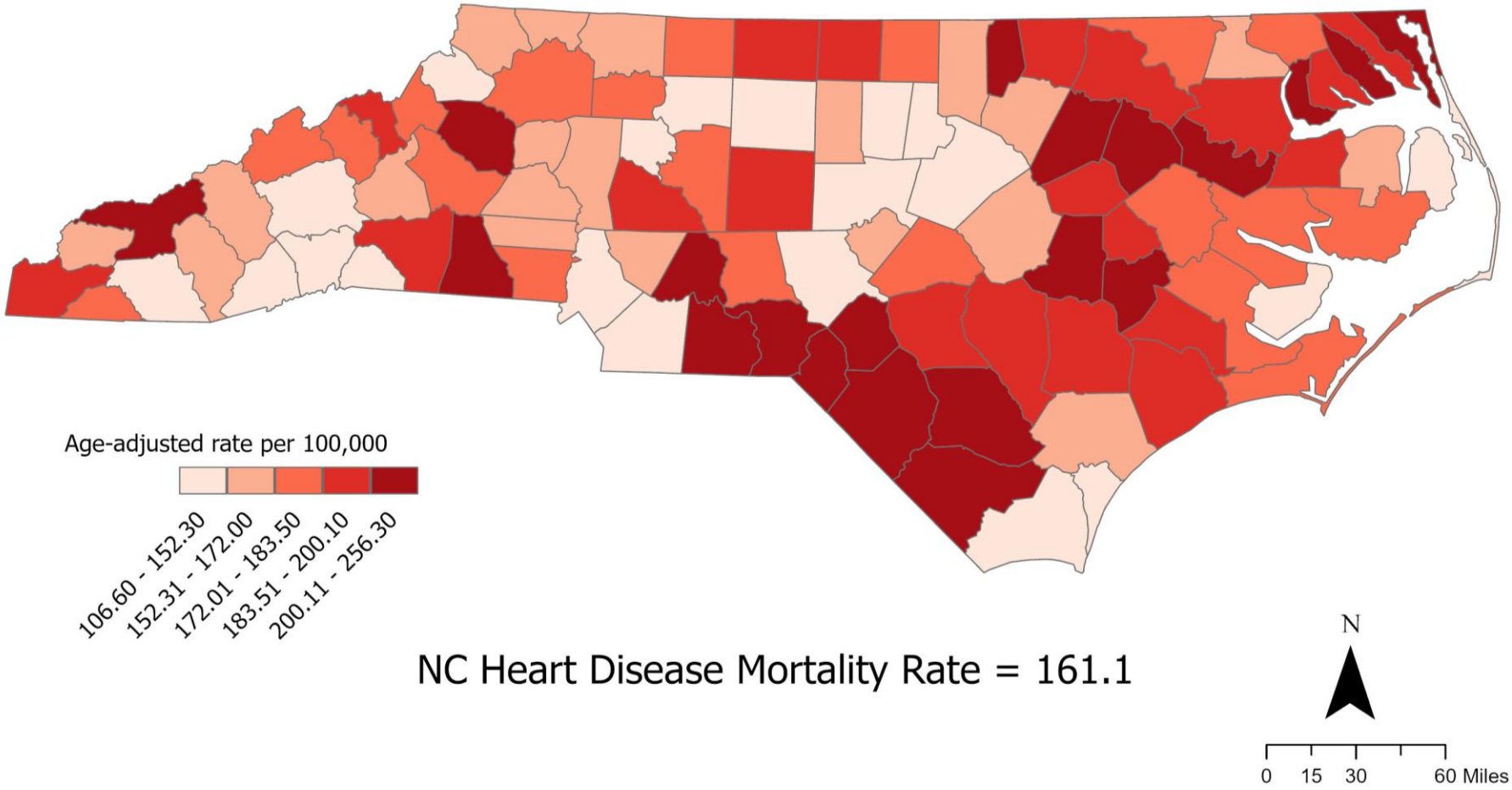
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Leading causes of death in NC. Accessed at https://schs.dph.ncdhhs.gov/data/provisional/Death/2021/CY2021PD19ResidentDeathsbyCODbyGender.html on December 5, 2023

Percentage of Deaths Caused by CVD, NC, 2011 - 2020



CVD Deaths includes deaths from ICD-10 codes I00-I78; Heart Disease ICD -10 codes I00-I09, I11, I13, I20-I51.; Stroke ICD -10 codes I60-I69.
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Detailed Mortality Statistics for North Carolina. SCHS Online Database, accessed at https://schs.dph.ncdhhs.gov/data/vital/dms/2020/ on December 5, 2023.

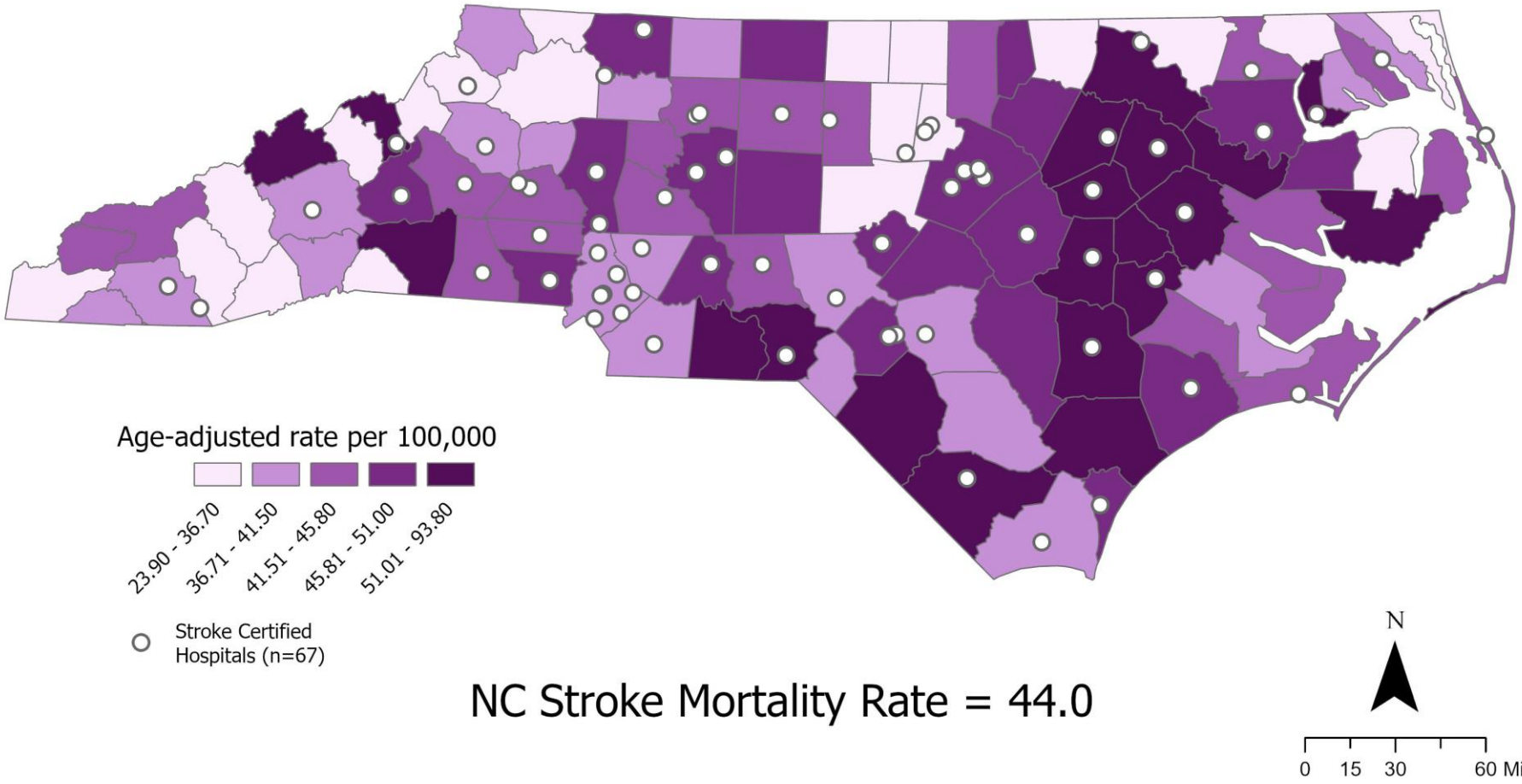
NC Heart Disease Death Rates by County of Residence, All Ages, 2017-2021



NC Heart Disease Mortality Rate = 161.1

Author: Stacey Burgin
Source: North Carolina Division of Public Health, State Center for Health Statistics. Volume 2: Leading Causes of Death in North Carolina 2021, SCHS Online Database, Heart Disease. Accessed at https://schs.dph.ncdhhs.gov/data/vital/lcd/2021/ on November 18, 2024.
Date: 11/18/2024

NC Stroke Death Rates by County, All Ages, 2017-2021



NC Stroke Mortality Rate = 44.0

Author: Stacey Burgin
Source: North Carolina Division of Public Health, State Center for Health Statistics. Volume 2: Leading Causes of Death in North Carolina 2020, SCHS Online Database, Cerebrovascular Disease. Accessed at https://schs.dph.ncdhhs.gov/data/vital/lcd/2020/ on 11/18/2024. The Joint Commission Stroke Certified Hospitals as of August, 2024. DNV Healthcare Stroke Certified Hospitals as of August, 2024.
Date: November 18, 2024

Morbidity, NC, 2023

- Nearly 1 in 10 North Carolinians (9.8% of the adult population) self-reports a history of either heart attack, coronary heart disease or stroke.[1]
- Cardiovascular disease (CVD) is one of the leading cause of hospitalization in North Carolina.[2]
  - 145,373 CVD hospital discharges in 2022
    - 30,662 stroke
    - 102,427 heart disease

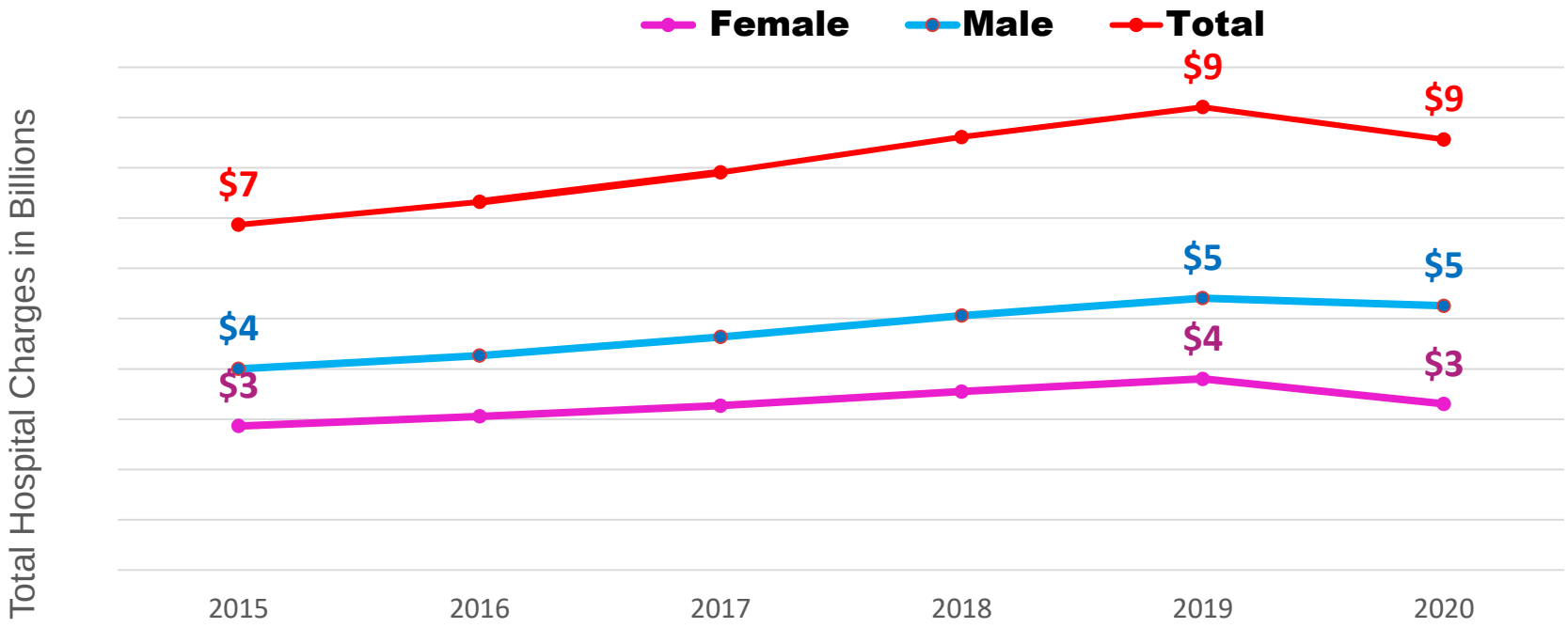
Stroke ICD-10 codes I60-I69; Heart Disease ICD 10 codes I00-I09, I11, I13, I20 - I51; and Major Cardiovascular Disease ICD 10 codes I00-I78.

Data Sources:

1. North Carolina Division of Public Health, State Center for Health Statistics. Behavioral Risk Factor Surveillance System (BRFSS) accessed at https://schs.dph.ncdhhs.gov/data/brfss/2022/nc/all/topics.htm on December 19, 2023.

2. North Carolina Division of Public Health, State Center for Health Statistics. Inpatient Hospital Utilization and Charges by Principal Diagnosis. Data produced on request on January 31, 2024.

Cardiovascular Disease Hospital Charges, NC, 2015-2020



Cardiovascular Disease: ICD 10 Codes I00-I78. Principal diagnosis only.
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Produced by: State Center for Health Statistics on request on February 02, 2021.
Accessed at https://datatools.ahrq.gov/hcupnet/ on December 19, 2023.

Hospitalization Charges for Selected Cardiovascular Disease Conditions and Risk Factors, NC, 2022

DIAGNOSTIC CATEGORY	TOTAL CHARGES	TOTAL DISCHARGES	AVG CHARGE PER BENEFICIARY
HEART DISEASE	**$7.3 Billion**	**112,956**	**$71,462**
STROKE	**$2.1 Billion**	**30,662**	**$69,574**
CORONARY HEART DISEASE	$2.6 Billion	26,160	$100,740
HEART FAILURE	$253 Million	3,772	$67,066
DIABETES MELLITUS	$1.1 Billion	24,304	$43,367
HYPERTENSION	$1.8 Billion	37,526	$48,028

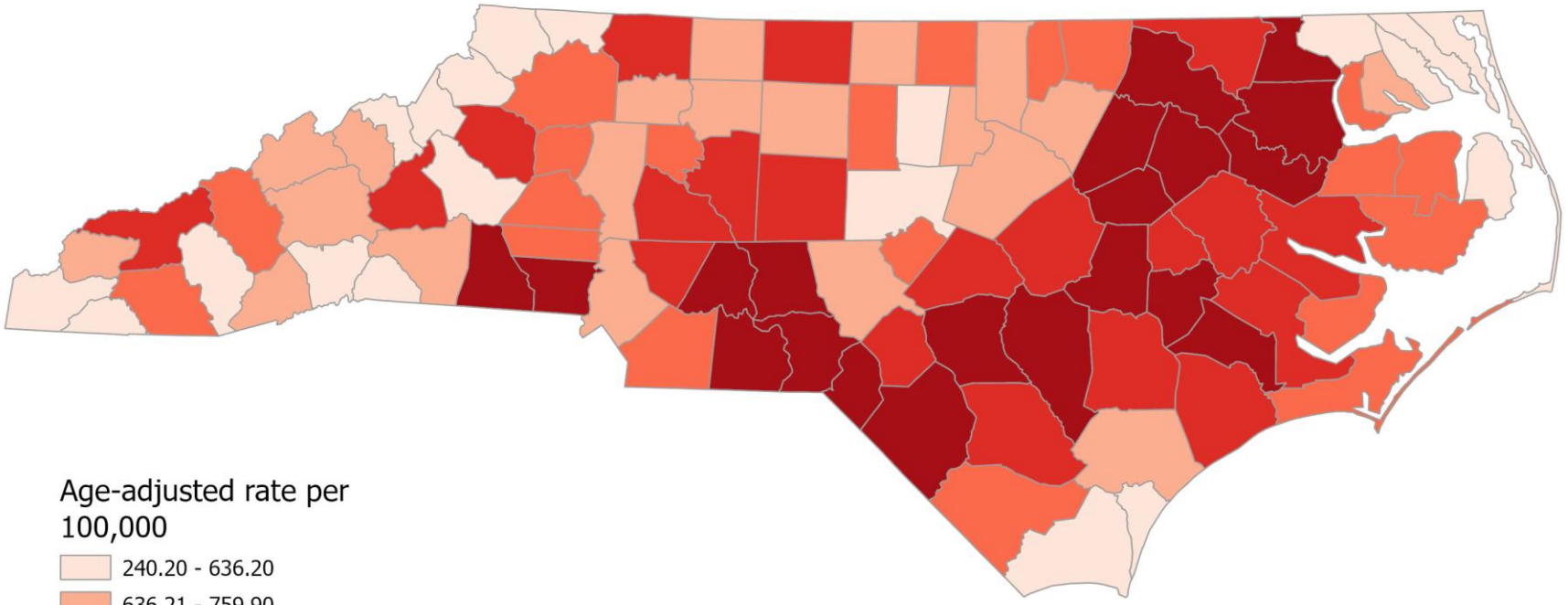
ICD-10 codes: Heart Disease (I00-I09, I11, I13, I20-I51), Stroke (I60 – I69), Coronary Heart Disease (I20 – I25), Heart Failure (I50), Diabetes Mellitus (E10-E11), Hypertension (I10-I15). Data includes only NC residents served in NC hospitals.
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Inpatient Hospital Utilization and Charges by Principal Diagnosis. Data produced on request on January 31, 2024.

Medicaid Expenditures on Beneficiaries with Selected Cardiovascular Disease Conditions and Risk Factors, NC, 2023

DIAGNOSTIC CATEGORY	TOTAL CHARGES	BENEFICIARIES	CHARGE PER BENEFICIARY
HEART DISEASE	**$570 Million**	**121,252**	**$4,695**
STROKE	**$528 Million**	**33,983**	**$15,537**
CORONARY HEART DISEASE	$118 Million	33,944	$3,480
HEART FAILURE	$131 Million	29,118	$4,495
DIABETES MELLITUS	$346 Million	128,375	$2,693
HYPERTENSION	$455 Million	186,505	$2,437

ICD-10 codes: Heart Disease (I00-I09, I11, I13, I20-I51), Stroke (I60 – I69), Coronary Heart Disease (I20 – I25), Heart Failure (I50), Diabetes Mellitus (E10-E11), Hypertension (I10-I15). Medicaid costs only by principal diagnosis.
Data Source: North Carolina Division of Health Benefits. Data produced on request on March 20, 2024.

NC Heart Disease Hospital Discharges by County of Residence, 2022



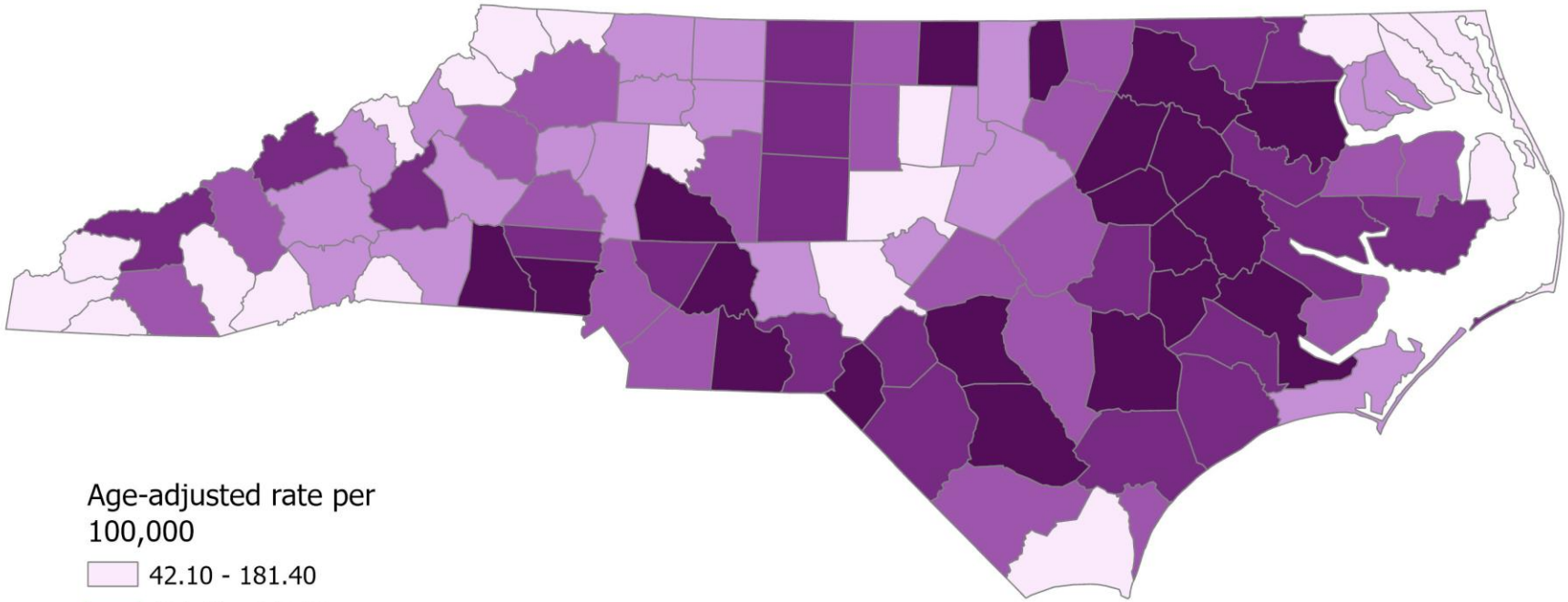
NC Hospital Discharge Rate = 784.7

Author: Stacey Burgin

Notes: Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51. Principal diagnosis only; N.C. residents only. Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Data produced on request by NC State Center for Health Statistics on January 31, 2024.

NC Stroke Hospital Discharge Rates by County of Residence, 2022



NC Stroke Hospital Discharge Rate = 233.8

N

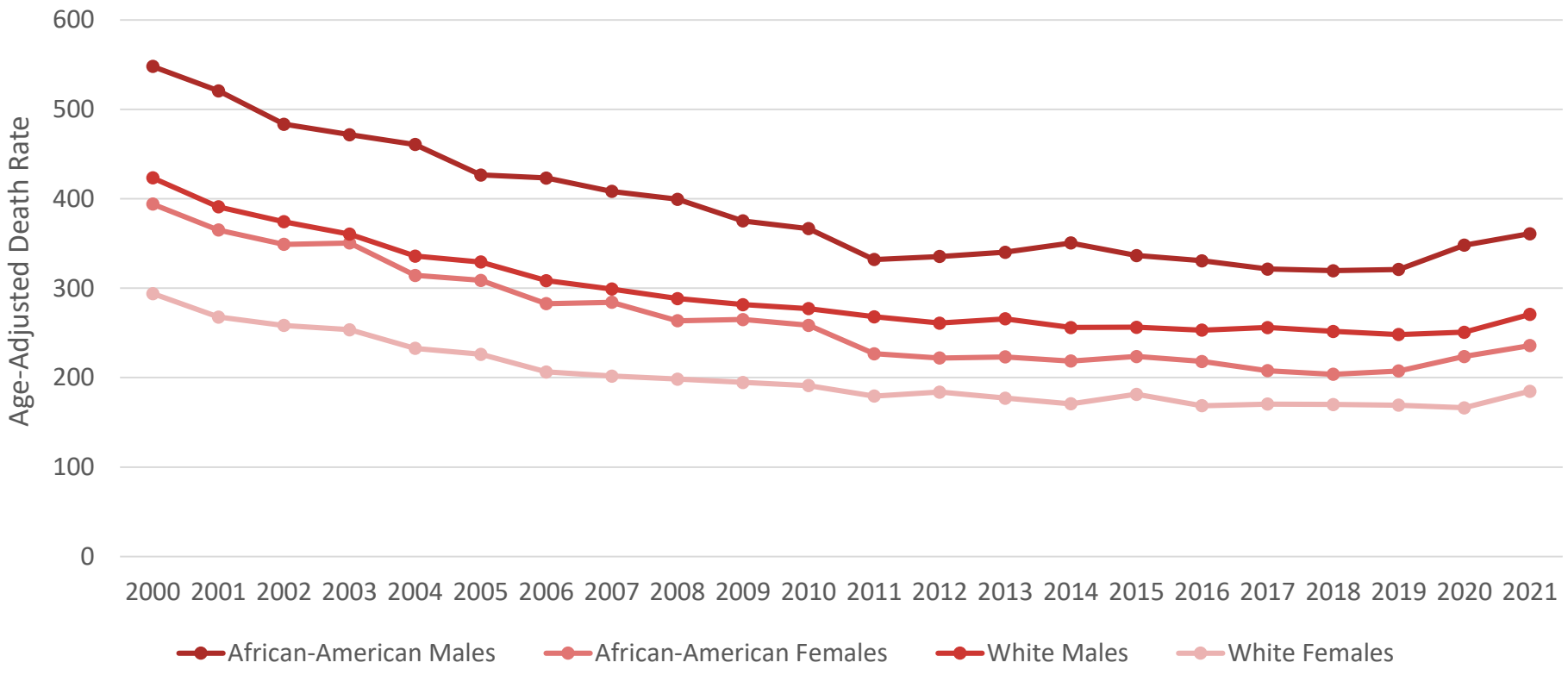
0 15 30 60 Miles

Author: Stacey Burgin
Notes: Stroke: ICD-10 codes I60-I69. Principal diagnosis only; N.C. residents only. Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Data produced on request by NC State Center for Health Statistics on January 31, 2024.

Non-Modifiable Risk Factors

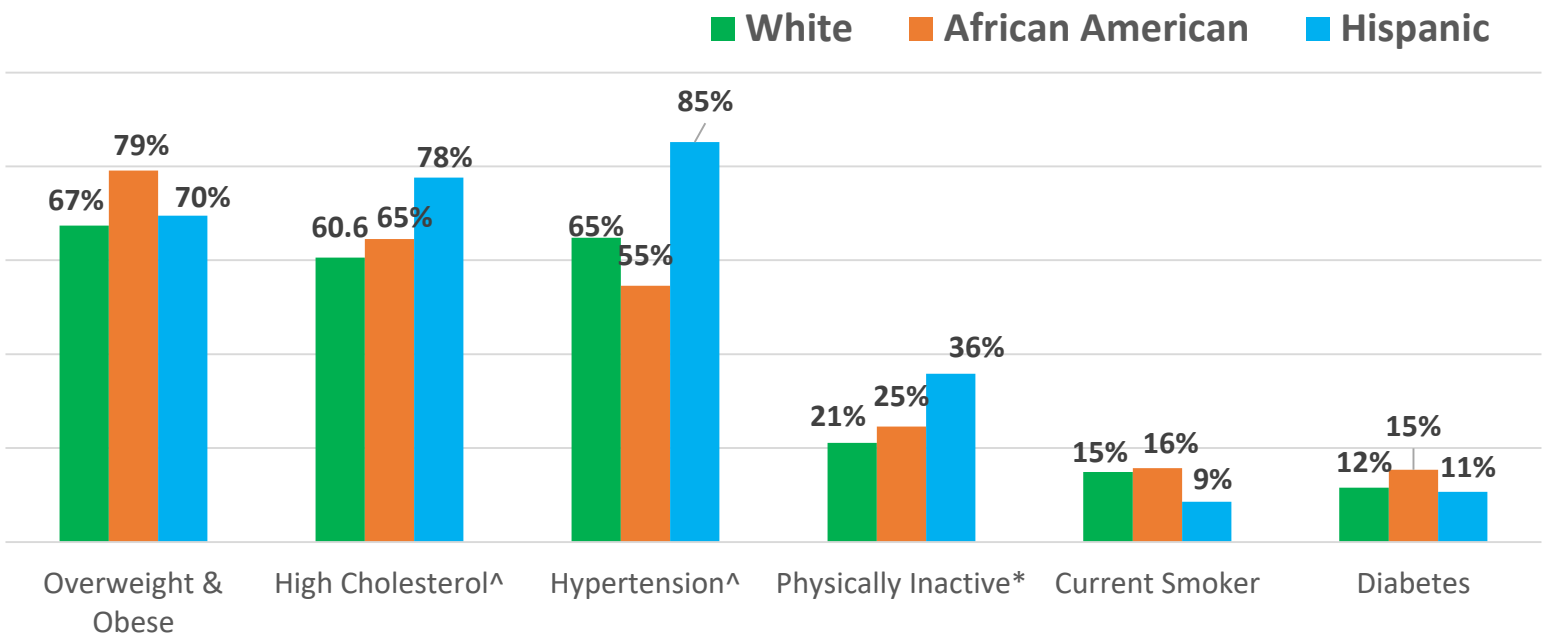
- **Race/Ethnicity:** African Americans are more likely to suffer overall and premature mortality and morbidity from CVD compared to Whites.
- **Gender:** Men are more like to have or die from CVD and at an earlier age (<55 years) than women.
- **Age:** Risk of CVD increases with age irrespective of the presence of potentially modifiable risk factors.
- **Geographical location:** NC has a greater burden of CVD -especially stroke.

Major Cardiovascular Disease Death Rates by Race and Gender, NC, 1999 - 2021



Major Cardiovascular Disease: ICD-10 codes I00-I78
Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2021 on CDC WONDER Online Database, released in 2023. Accessed at https://wonder.cdc.gov/ on December 19,2023.

Prevalence of CVD Risk Factors by Race and Ethnicity, NC, 2022



Adults=18+

*Physically Inactivity=Respondent answered "No" to During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

^High Cholesterol and Hypertension data are 2021 data

Data Source: North Carolina Division of Public Health, State Center for Health Statistics. *North Carolina Behavioral Risk Factor Surveillance System, 2022*. Accessed at https://schs.dph.ncdhhs.gov/data/brfss/2022/ on December 19,2023.

North Carolina Division of Public Health, State Center for Health Statistics. *North Carolina Behavioral Risk Factor Surveillance System, 2021*. Accessed at https://schs.dph.ncdhhs.gov/data/brfss/2021/ on December 19,2023.

Risk Factors for Heart Disease

- High blood pressure
- High LDL cholesterol
- Smoking
- Overweight and obesity
- Unhealthy eating
- Physical inactivity
- Diabetes

Source: Centers for Disease Control and Prevention, Division of Heart Disease and Stroke Prevention. Heart Disease Fact Sheet. Accessed at https://www.cdc.gov/chronicdisease/resources/publications/factsheets/heart-disease-stroke.htm

Risk Factors for Stroke

- High blood pressure
- High cholesterol
- Diabetes
- Overweight/obesity
- Smoking
- Unhealthy eating
- Physical inactivity
- Heart disease

1 in 3 U.S. adults has at least one of these conditions or habits

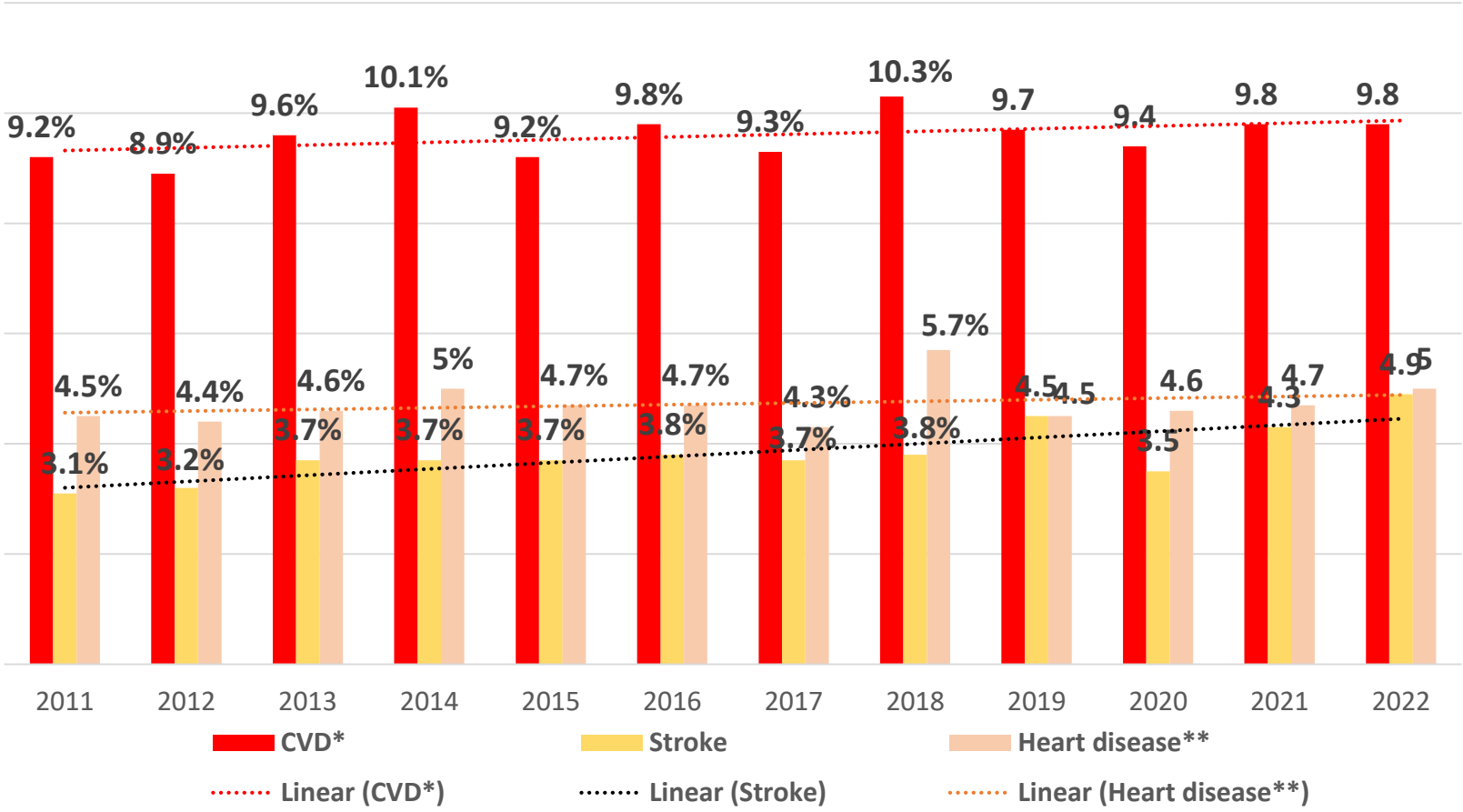
Source: Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Stroke Fact Sheet. Accessed at https://www.cdc.gov/stroke/facts.htm

High Blood Pressure

- Primary or contributing cause for 45% of all CVD deaths
- If completely eliminated from the population, there will be 34.6% fewer cases of stroke and 17.9% fewer cases of myocardial infarction
- Responsible for about 45% of all strokes occurring in hypertensive individuals

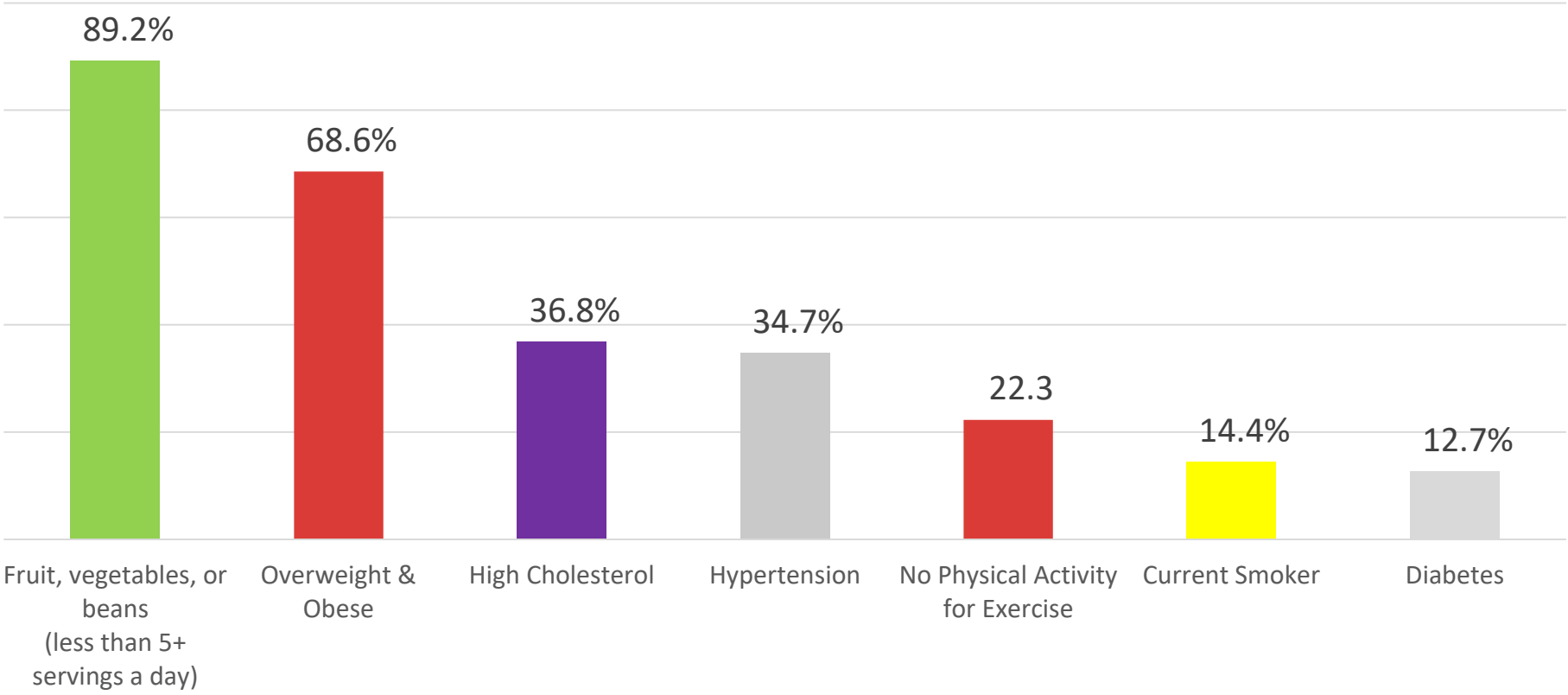
IOM (Institute of Medicine), 2010. A Population-Based Policy and Systems Change Approach to Prevent and Control Hypertension. https://www.ncbi.nlm.nih.gov/books/NBK220087/

Prevalence of Cardiovascular Disease in Adults, NC, 2011 - 2022



*History of Any Cardiovascular Diseases (heart attack or coronary heart disease or stroke)
** Had angina or coronary heart disease
Data Source: NC State Center for Health Statistics. Behavioral Risk Factor Surveillance System (BRFSS) accessed at http://www.schs.state.nc.us/data/brfss/survey.htm on December 19, 2023.

Prevalence of CVD Risk Factors, NC, 2021



Adults=18+; *PA = Physical activity

Data Source: North Carolina Division of Public Health, State Center for Health Statistics. North Carolina Behavioral Risk Factor Surveillance System (BRFSS). Accessed at *https://schs.dph.ncdhhs.gov/data/brfss/survey.htm* on January 4, 2021.

African Americans, Heart Disease, and Stroke

Cardiovascular Health in African Americans[1]

- Higher prevalence of traditional risk factors (e.g., hypertension, diabetes mellitus, obesity)
- Adverse health behaviors (e.g., unhealthy eating, physical inactivity, smoking)
- Comorbidities (renal disease, sickle cell disease, HIV/AIDS)
- Contribution of genetics

1. Carnethon, M. R., Pu, J., Howard, G., Albert, M. A., Anderson, C. A. M., Bertoni, A. G., Mujahid, M. S., Palaniappan, L., Taylor, H. A., Willis, M., & Yancy, C. W. (2017). Cardiovascular health in African Americans: A scientific statement from the American Heart Association. *Circulation*, *136*(21). https://doi.org/10.1161/cir.0000000000000534
2. American Heart Association. Black People, Heart Disease and Stroke. *What is Cardiovascular Disease?* Accessed November 21, 2024 at https://www.heart.org/en/health-topics/consumer-healthcare/what-is-cardiovascular-disease/african-americans-and-heart-disease-stroke

Structural Racism as a Fundamental Driver of Health Disparities

American Heart Association's Call to Action: Structural Racism as a Fundamental Driver of Health Disparities finds, "*racism persists; racism is experienced; and the task of dismantling racism must belong to all of society. It cannot be accomplished by affected individuals alone.*"[1]

Address cardiovascular health risk factors:

- Blood pressure
- Lipids
- Glucose
- Weight

Place equal focus on ensuring the elimination of structural racism so that all individuals have equitable access to the following:

- High-quality education
- Affordable and safe housing and neighborhoods
- Fair treatment in the criminal justice system
- Accessible, quality health care

1. Churchwell, K., Elkind, M. S.V., Benjamin, R., et al. (2020). Call to Action: Structural Racism as a Fundamental Driver of Health Disparities: A Presidential Advisory from the American Heart Association. *Circulation, 142(24).* https://doi.org/10.1161/CIR.0000000000000936

Resources for Preventing Cardiovascular Disease

- Maintaining a healthy weight or losing weight.
  For information on achieving a healthy weight, visit esmmweighless.com

- Engaging in regular physical activity and healthy eating (including reducing sodium intake)
  For information on physical activity and healthy eating, visit eatsmartmovemorenc.com

- Avoiding tobacco products and secondhand smoke for non-smokers and quitting for current smokers
  For information visit quitlinenc.com or call 1-800-QUIT-NOW (1-800-784-8669)

- Working with your health care team to manage diabetes
  For information visit diabetesnc.com

Resources for Preventing Cardiovascular Disease

- Managing high blood pressure
  For resources and information visit startwithyourheart.com
- Limiting alcohol consumption.
  For more information visit cdc.gov/alcohol
- Healthy for Good
  For resources to Eat Smart. Add Color. Move More. Be Well, visit healthyforgood.heart.org
- Life's Essential 8
  For resources and to conduct a heart self-assessment, visit https://www.heart.org/en/healthy-living/healthy-lifestyle/lifes-essential-8

Visit startwithyourheart.com for more data, fact sheets, and resources.

Start With Your Heart®

Justus-Warren Heart Disease & Stroke Prevention Task Force