

The Burden of Cardiovascular Disease in North Carolina



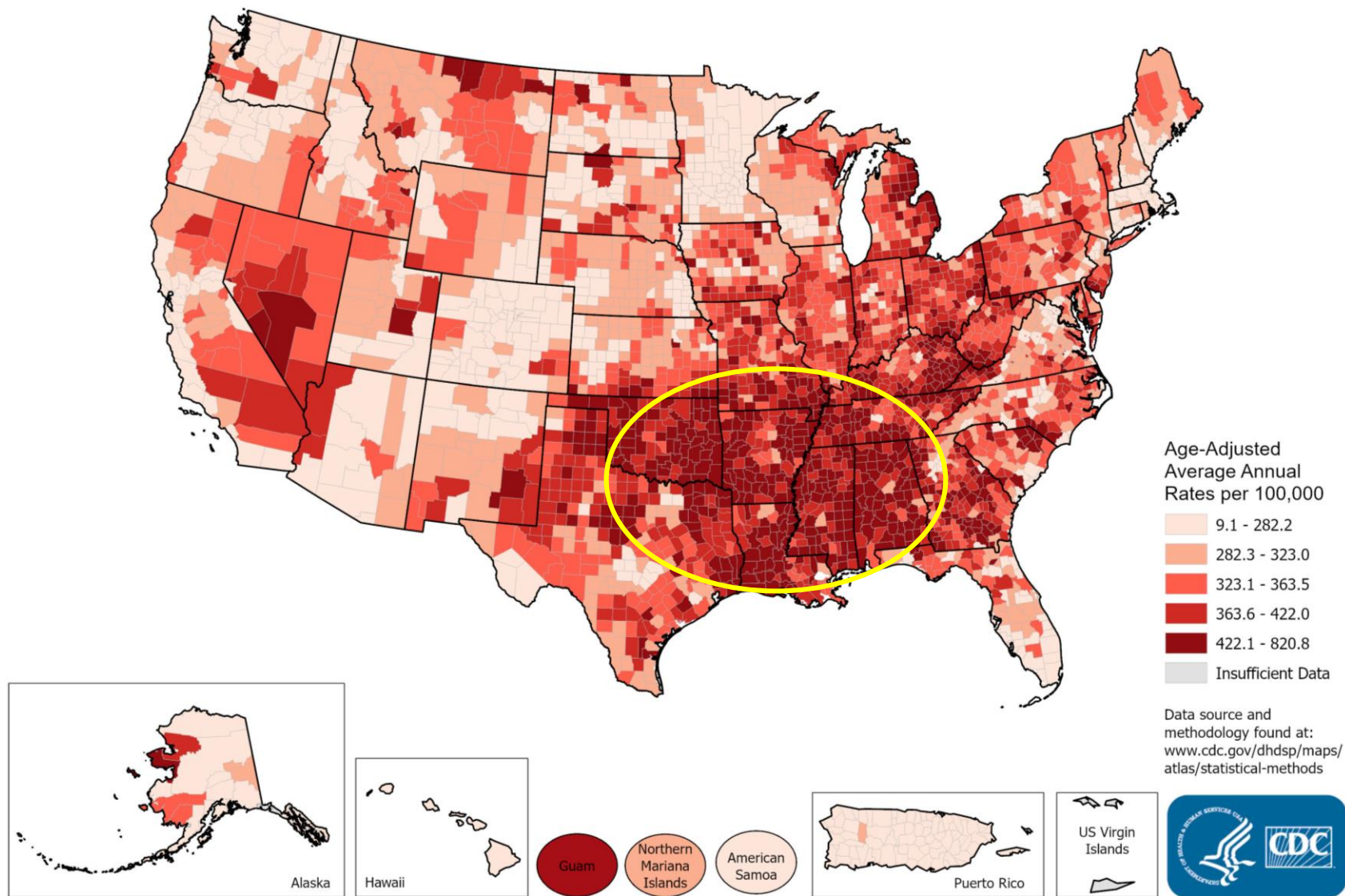
*Justus-Warren Heart Disease
& Stroke Prevention Task Force*

Justus-Warren Heart Disease and Stroke Prevention
Task Force
2024

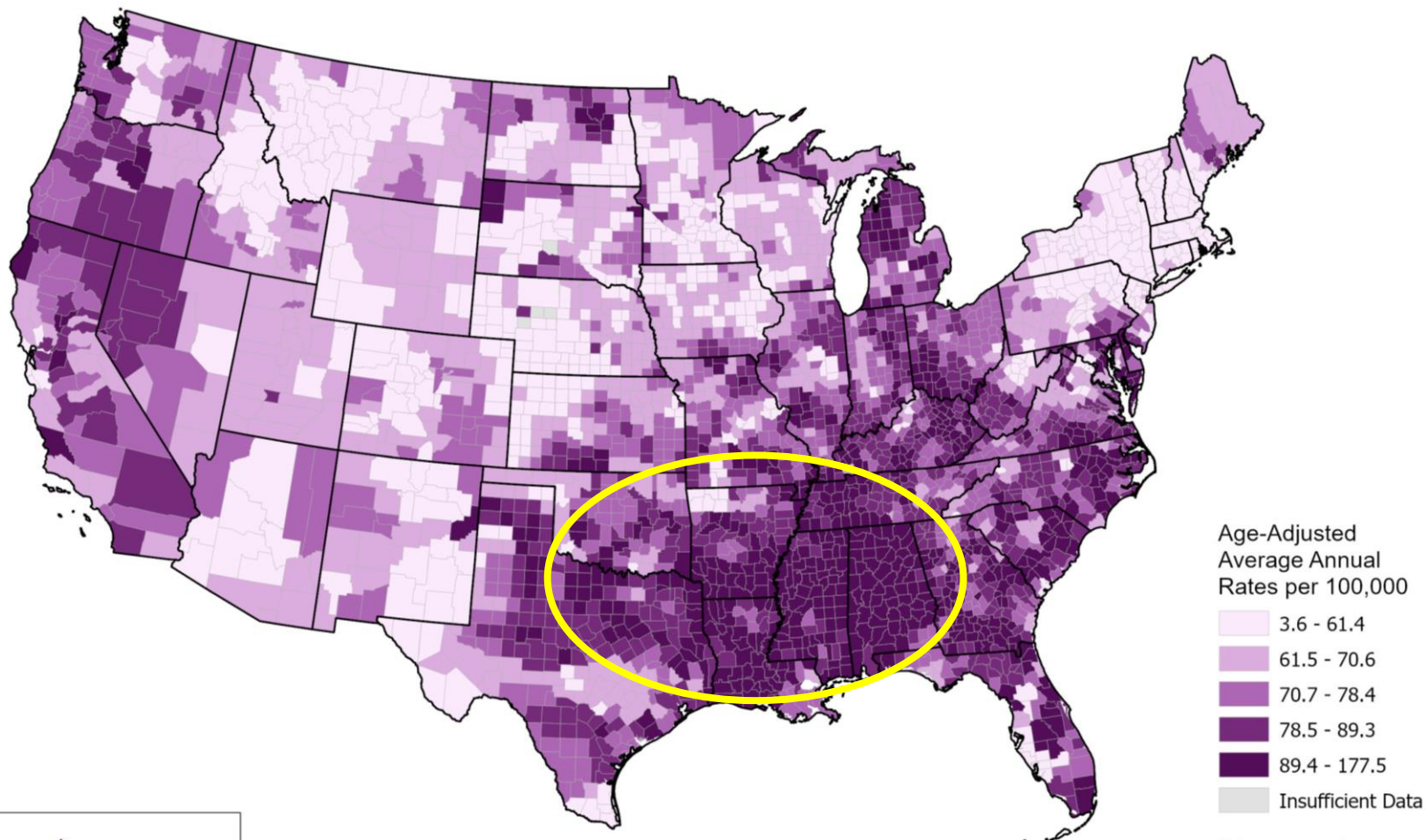
Purpose

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

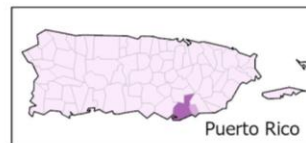
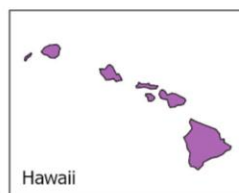
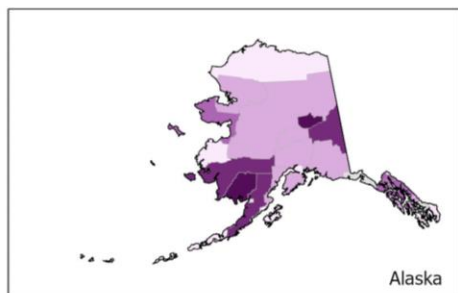
US Heart Disease Death Rates by County, Ages 35+, 2018 - 2020



US Stroke Death Rates by County, Adults Ages 35+, 2018-2020



Data source and
methodology found at:
[www.cdc.gov/dhds/maps/
atlas/statistical-methods](http://www.cdc.gov/dhds/maps/atlas/statistical-methods)



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.

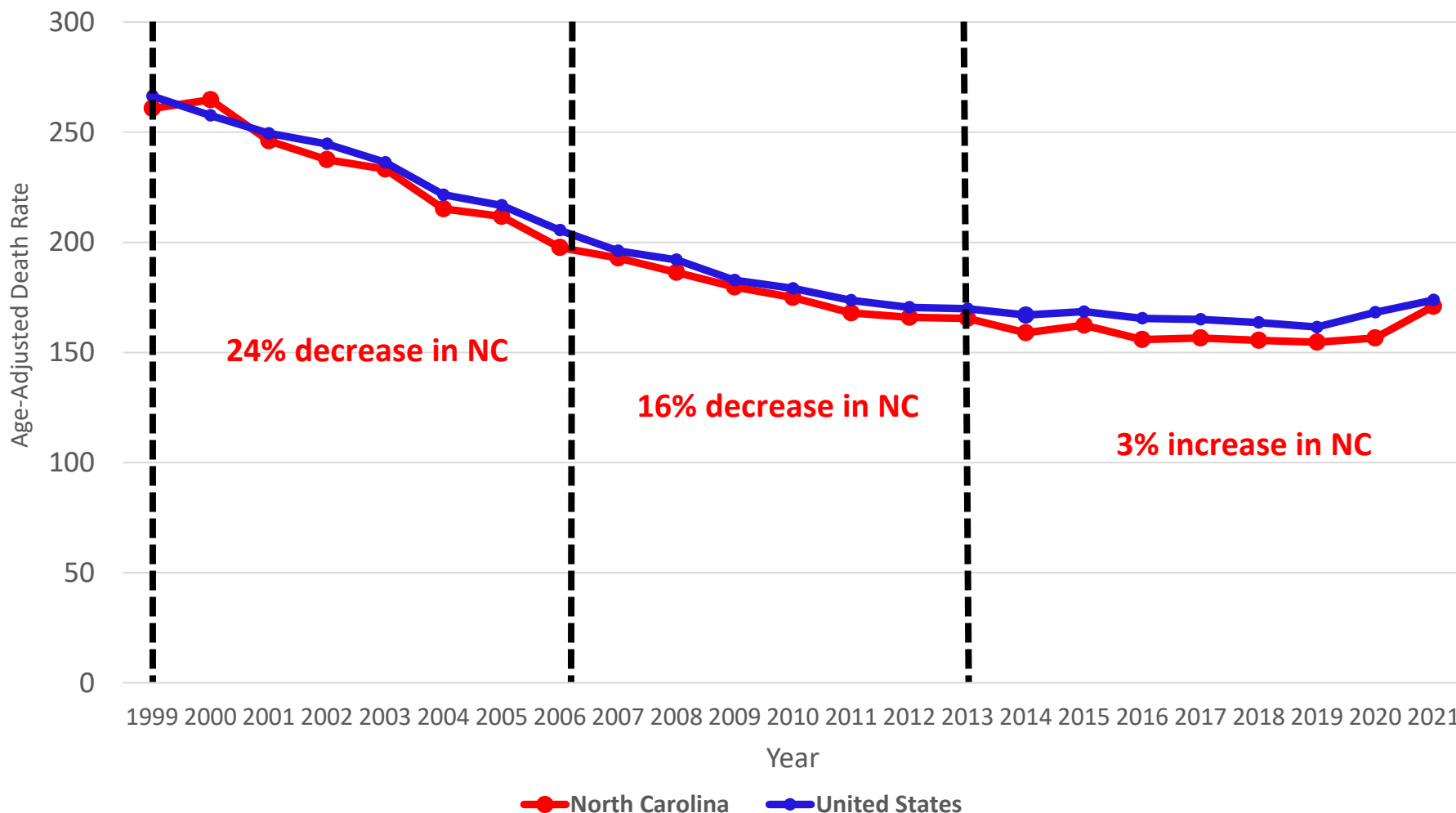
US Stroke Death Rates and Ranking by State, 2017 - 2021

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



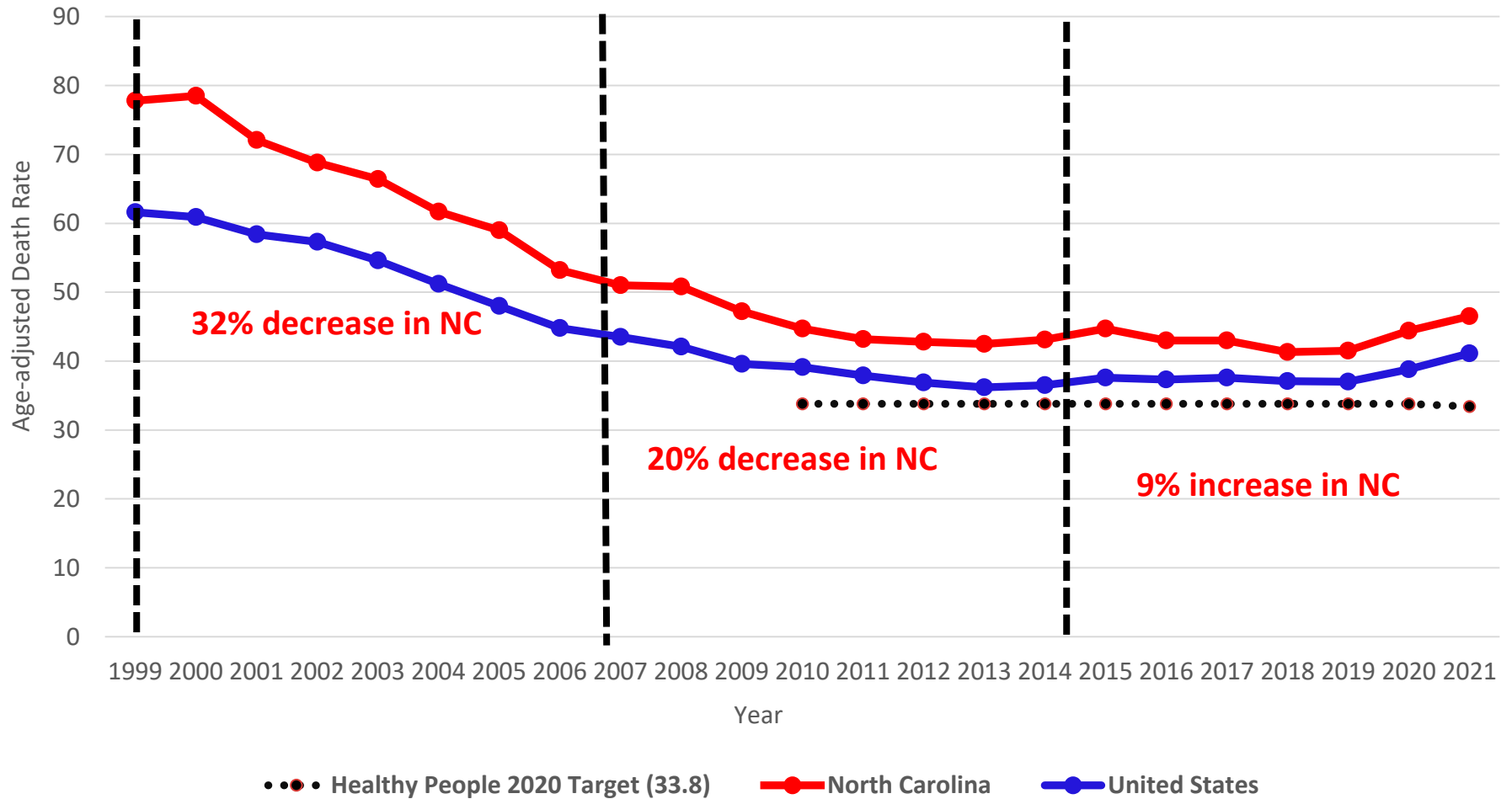
Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51

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



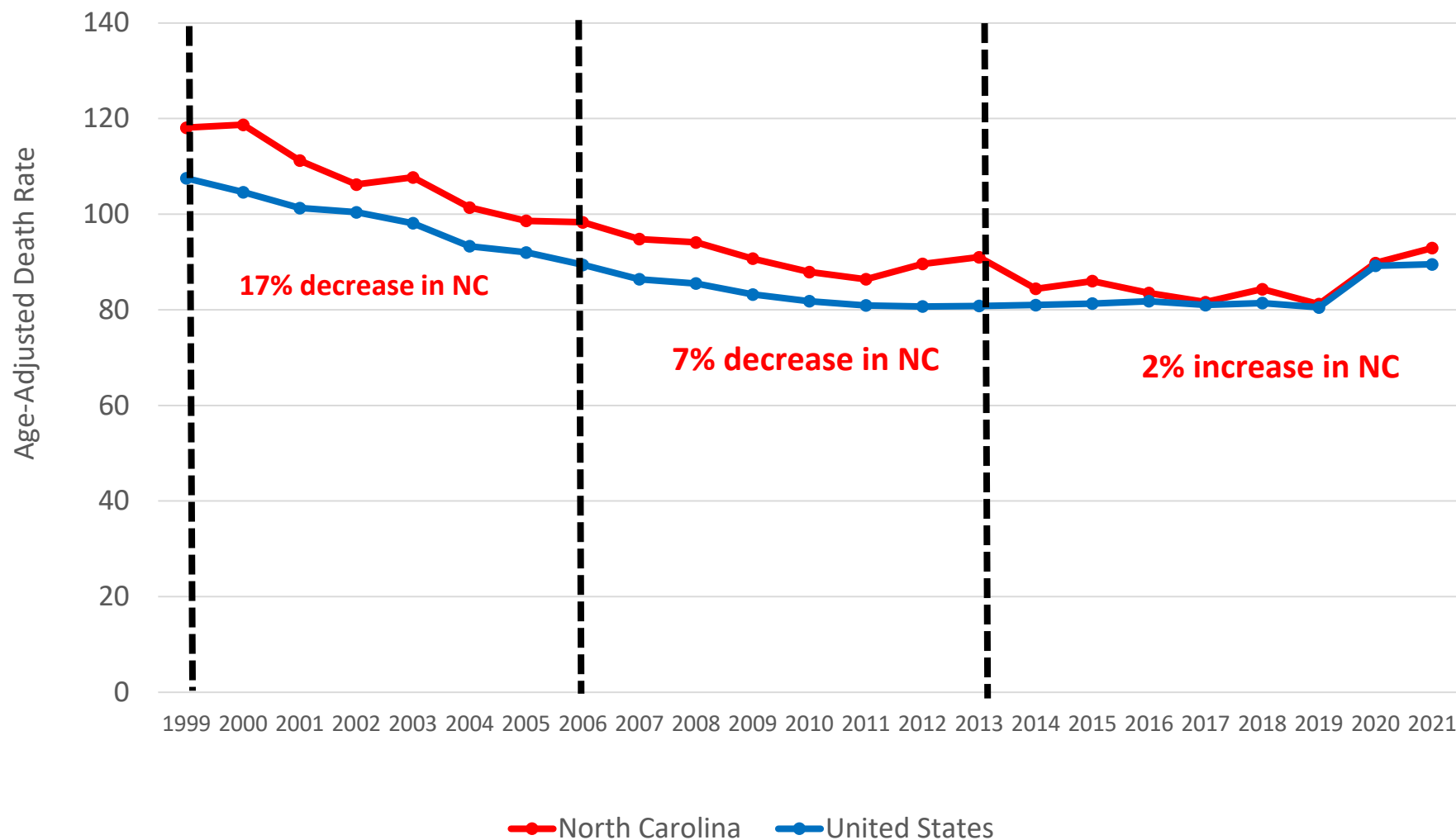
Stroke: ICD-10 codes I60-I69

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



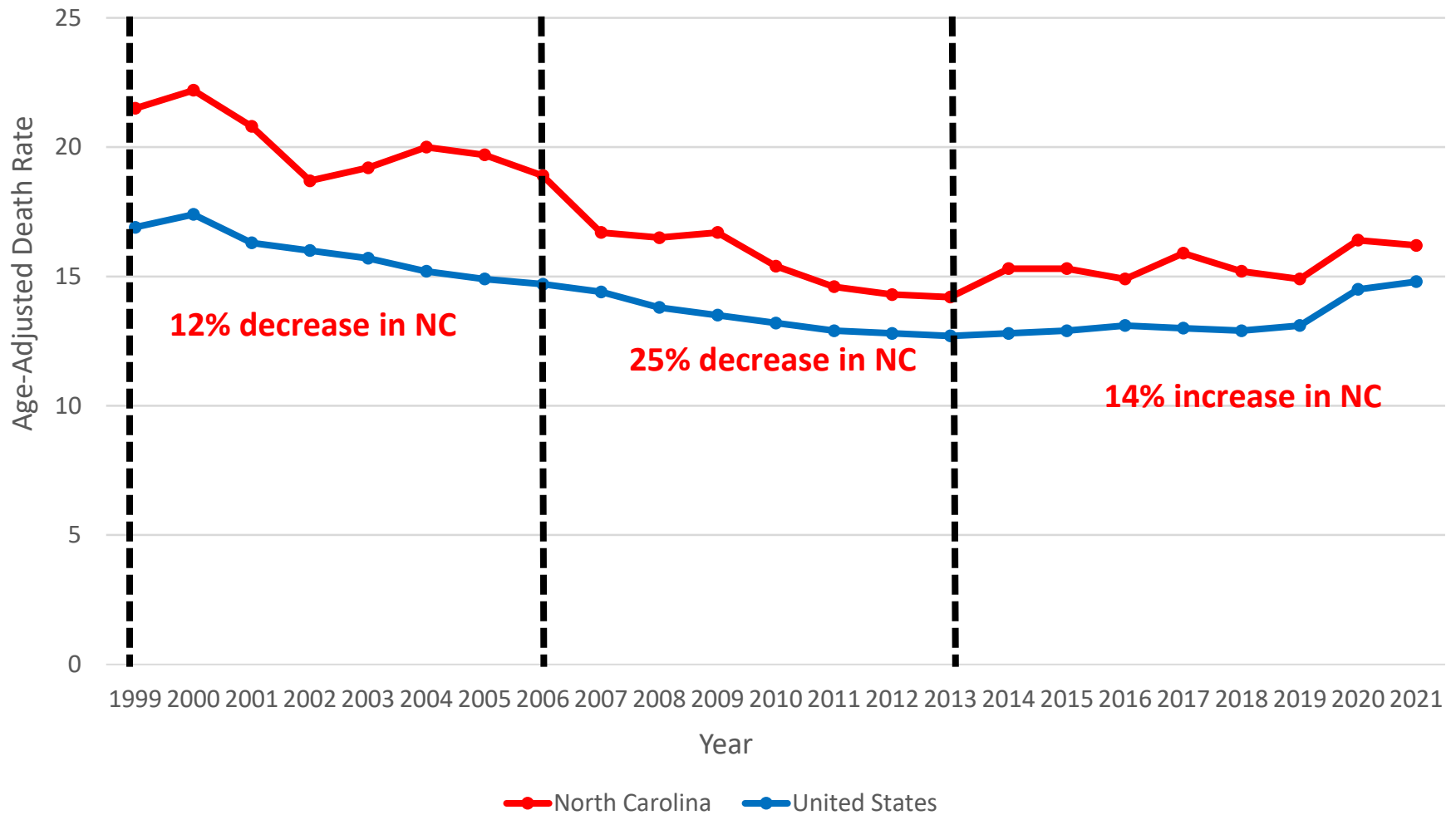
Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51'

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



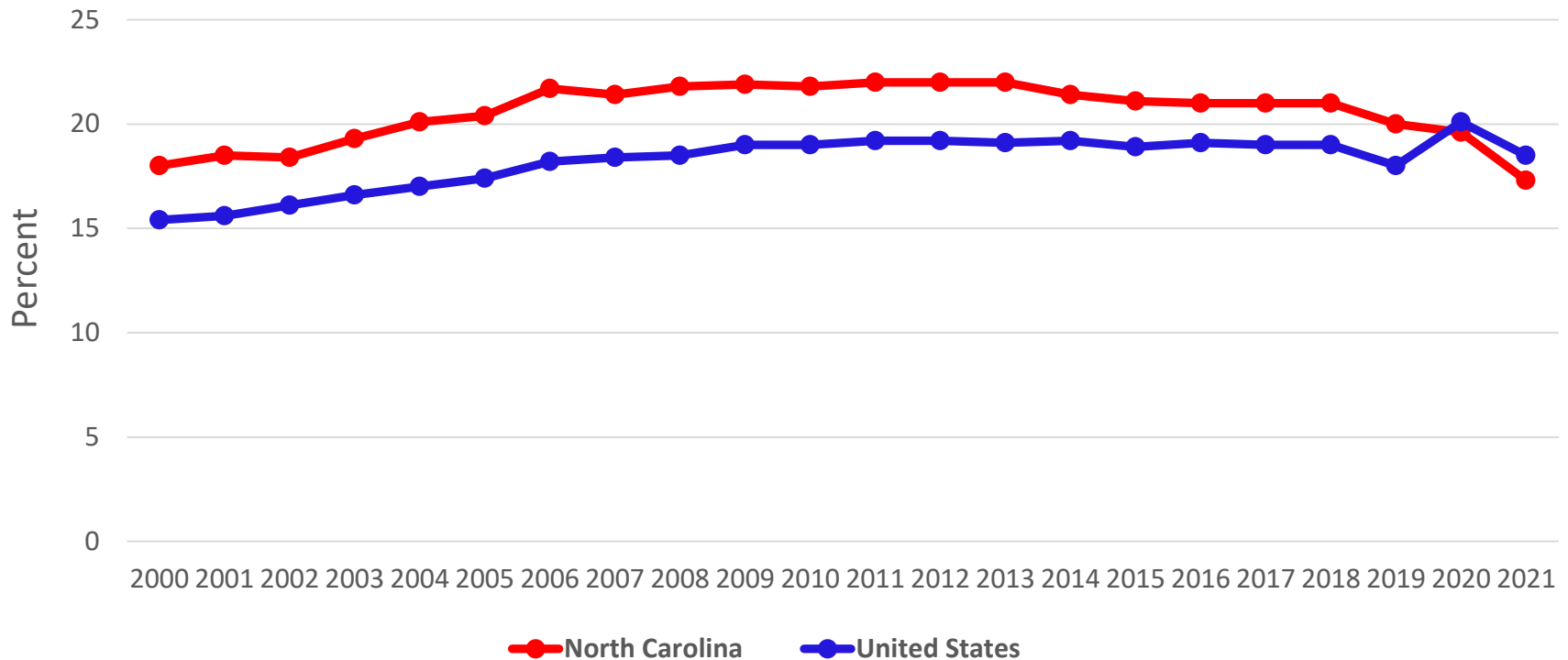
Stroke: ICD-10 codes I60-I69

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

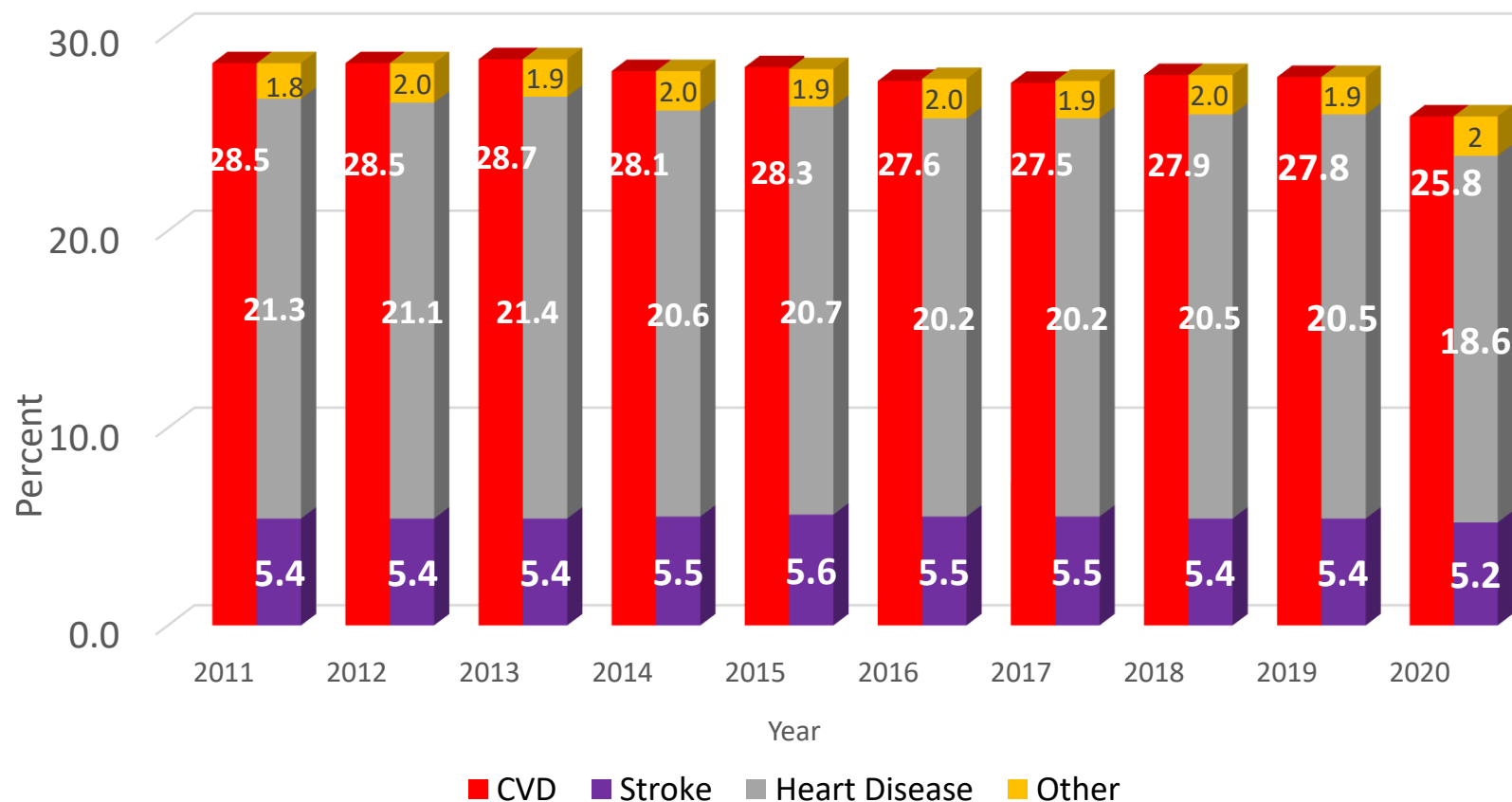
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File, 1999-2019. CDC WONDER Online Database. Accessed at <https://wonder.cdc.gov/ucd-icd10.html> on January 31, 2024.

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

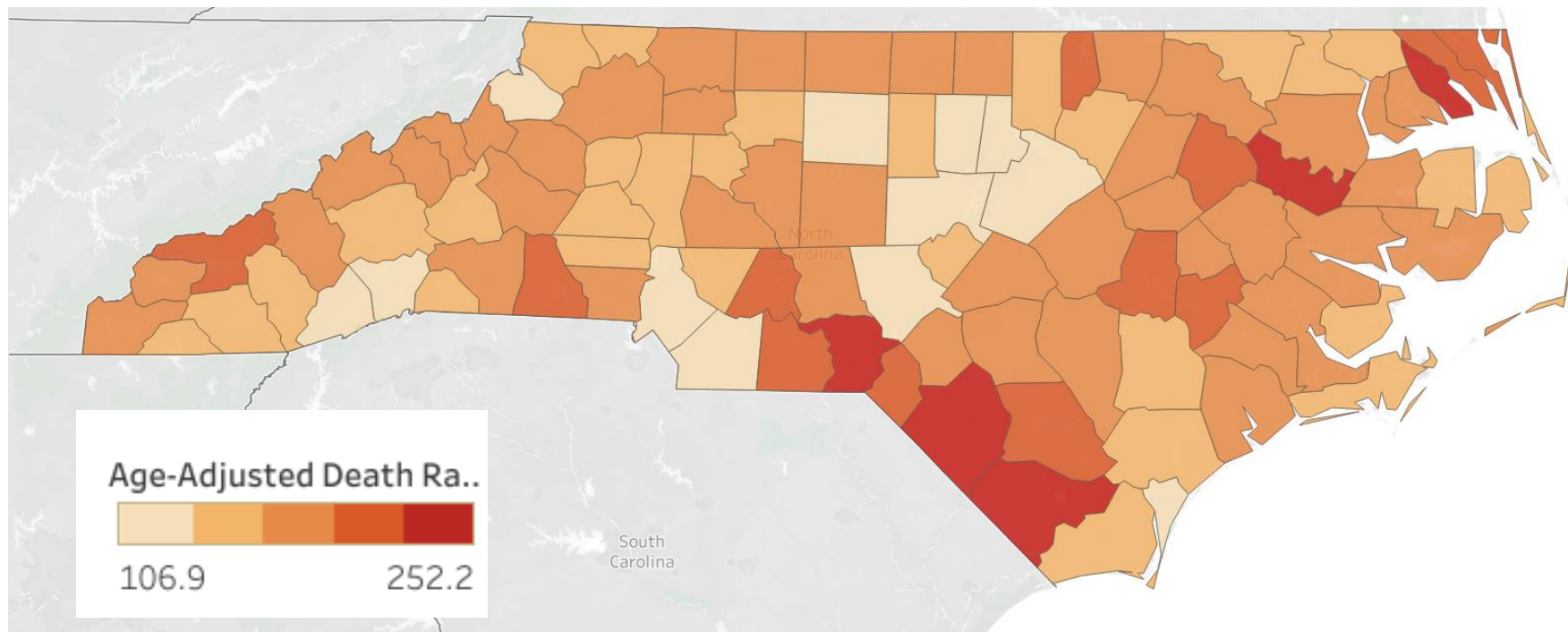
Percentage of Deaths Caused by CVD, NC, 2011 - 2020



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.

Heart Disease Death Rates by County of Residence, NC, 2016 - 2020



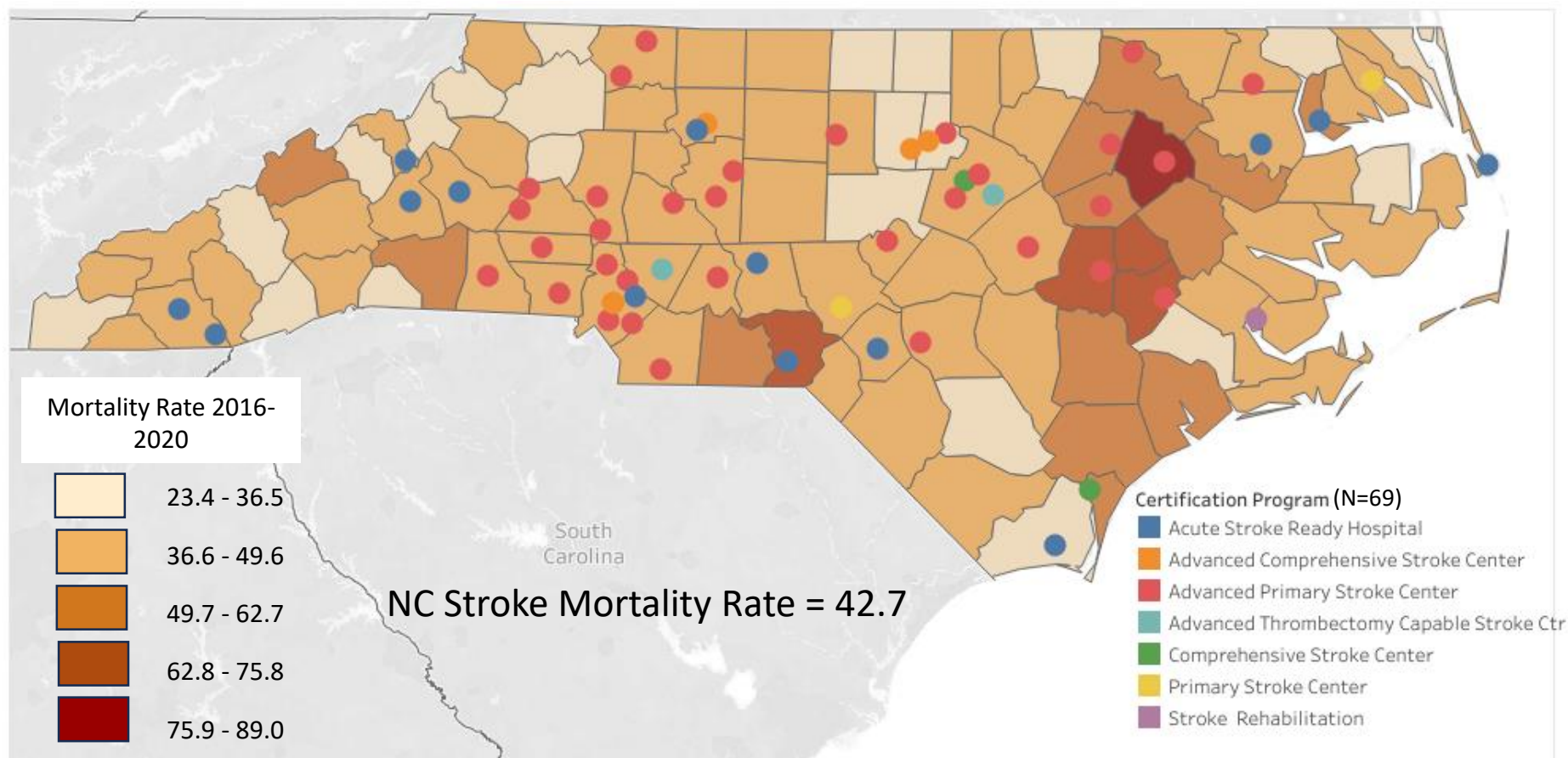
NC Heart Disease Mortality Rate = 156.1

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.

N.C. Data 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*. Accessed at <https://schs.dph.ncdhhs.gov/data/vital/lcd/2020/> on January 31, 2024.

Stroke Death Rates by County of Residence, NC, 2016 - 2020



Stroke: ICD-10 codes I60-I69.

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

The Joint Commission Stroke Certification. Accessed at www.qualitycheck.org/StrokeCertificationList.aspx on January 31, 2024.

N.C. Data 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. Accessed at <https://schs.dph.ncdhs.gov/data/vital/lcd/2020/> on January 31, 2024.

Morbidity, NC, 2023

- Nearly 1 in 10 adult North Carolinians (9.8% of the adult population) have a history of either heart attack, coronary heart disease or stroke¹
- Cardiovascular disease (CVD) is one of the leading cause of hospitalization in North Carolina²
 - 145,373 CVD hospital discharges in 2022
 - 30,662 stroke
 - 102,427 heart disease

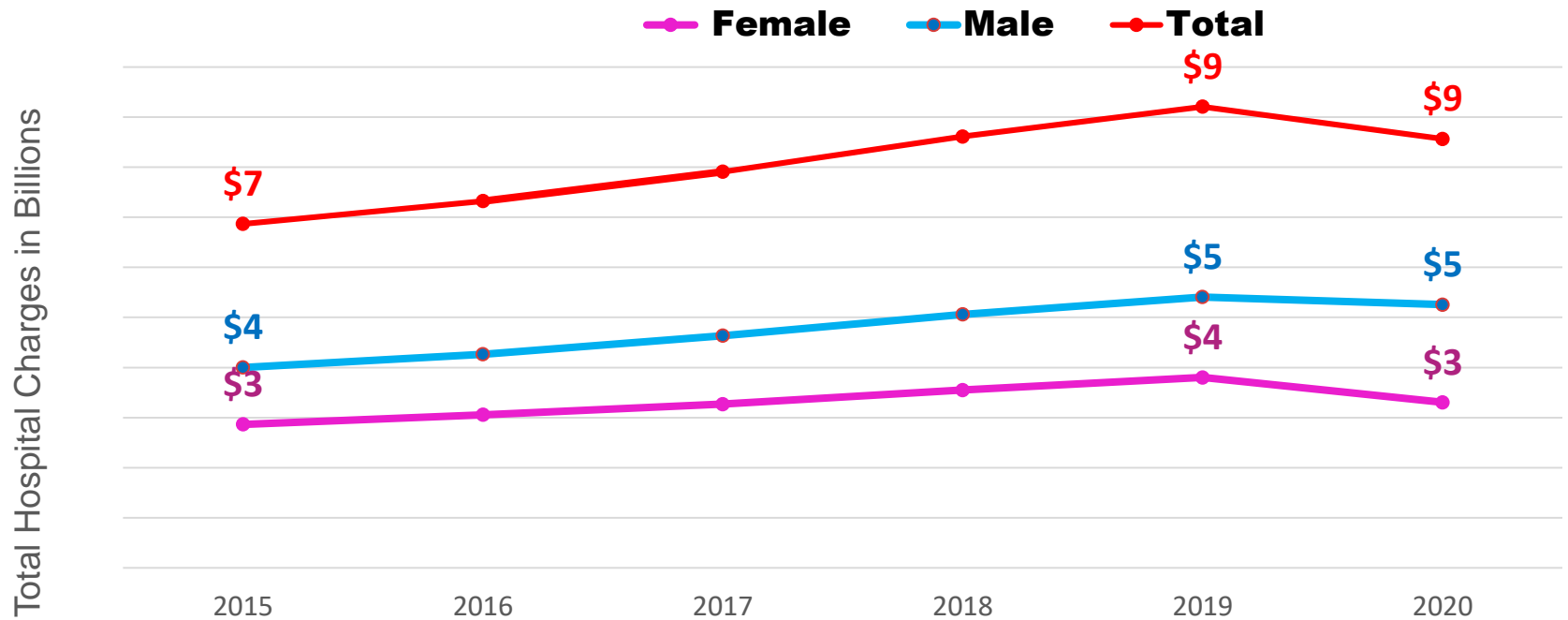
Stroke ICD-10 codes I60-I69; Heart Disease ICD 10 codes I00-I09, I11, I13, I20 - I51; and Major Cardiovascular Disease ICD 10 codes I00-I78.

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.
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.

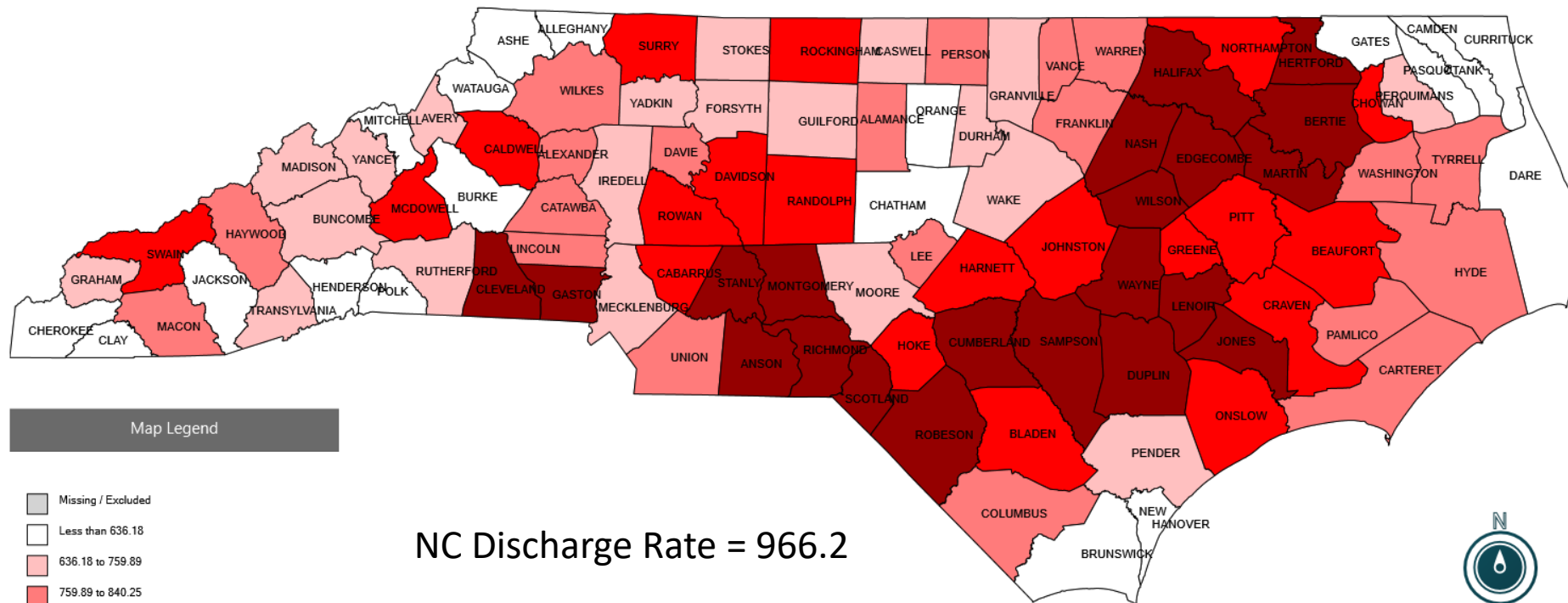
Medicaid Expenditures on Beneficiaries with Selected Cardiovascular Disease Conditions and Risk Factors, NC, 2019

DIAGNOSTIC CATEGORY	TOTAL CHARGES	BENEFICIARIES	CHARGE PER BENEFICIARY
HEART DISEASE	\$805 Million	171,384	\$4,700
STROKE	\$413 Million	53,471	\$7,731
CORONARY HEART DISEASE	\$277 Million	71,861	\$3,851
HEART FAILURE	\$361 Million	59,778	\$6,046
DIABETES MELLITUS	\$677 Million	160,771	\$4,212
HYPERTENSION	\$224 Million	69,779	\$3,216

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 Medical Assistance. Data produced on request on March 31, 2020.

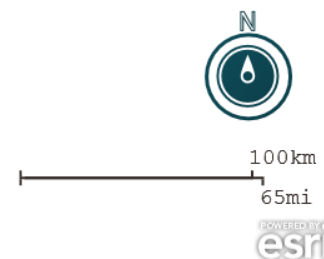
Heart Disease Hospital Discharge Rates by County of Residence, NC, 2022



NC Discharge Rate = 966.2

- Map Legend**
- Missing / Excluded
 - Less than 636.18
 - 636.18 to 759.89
 - 759.89 to 840.25
 - 840.25 to 1004.33
 - 1004.33 and above

Min: 240.180801734667 (CURRITUCK)
 Max: 1288.48195344003 (ANSON)

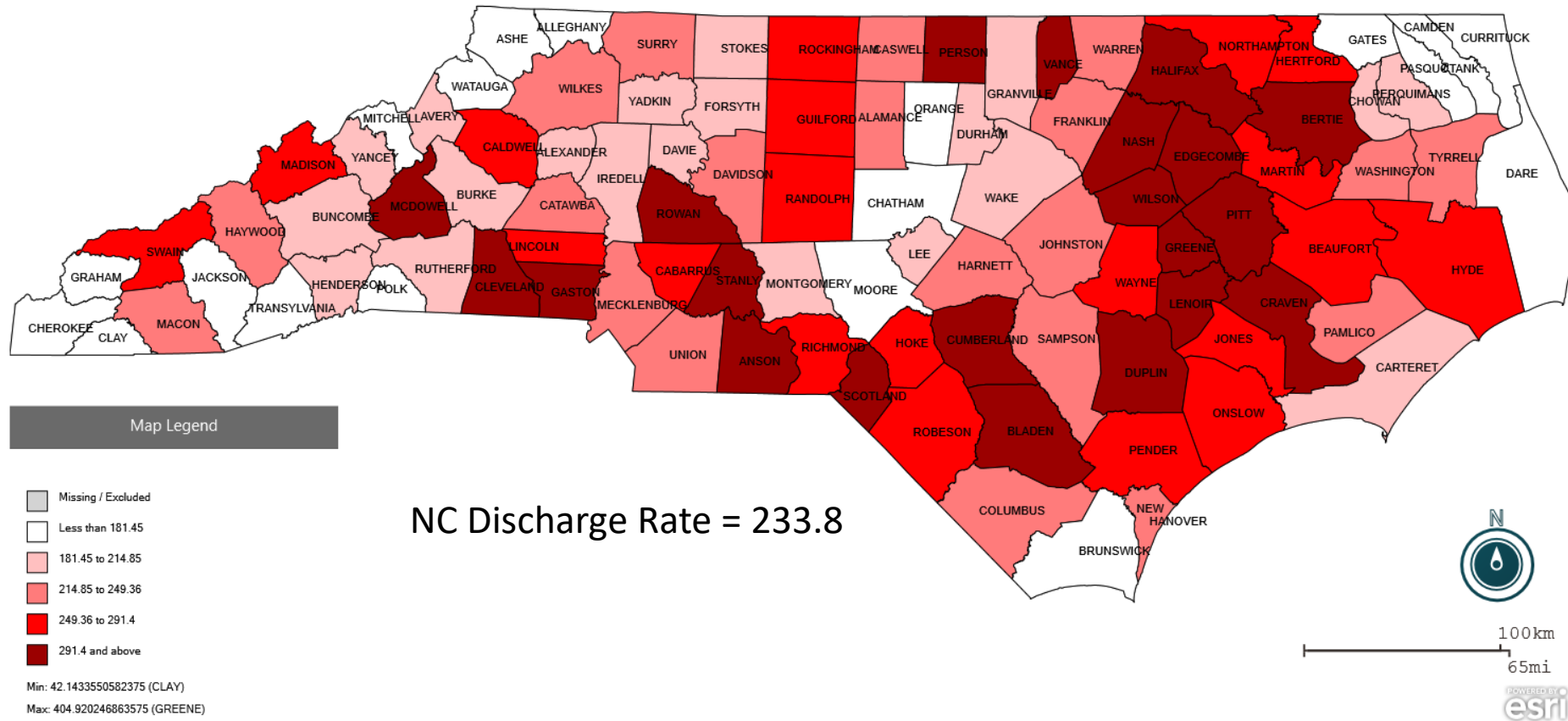


Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51. Principal diagnosis only; N.C. residents only.

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.

Stroke Hospital Discharge Rates by County of Residence, NC, 2022



Stroke: ICD-10 codes I60-I69. Principal diagnosis only; N.C. residents only.

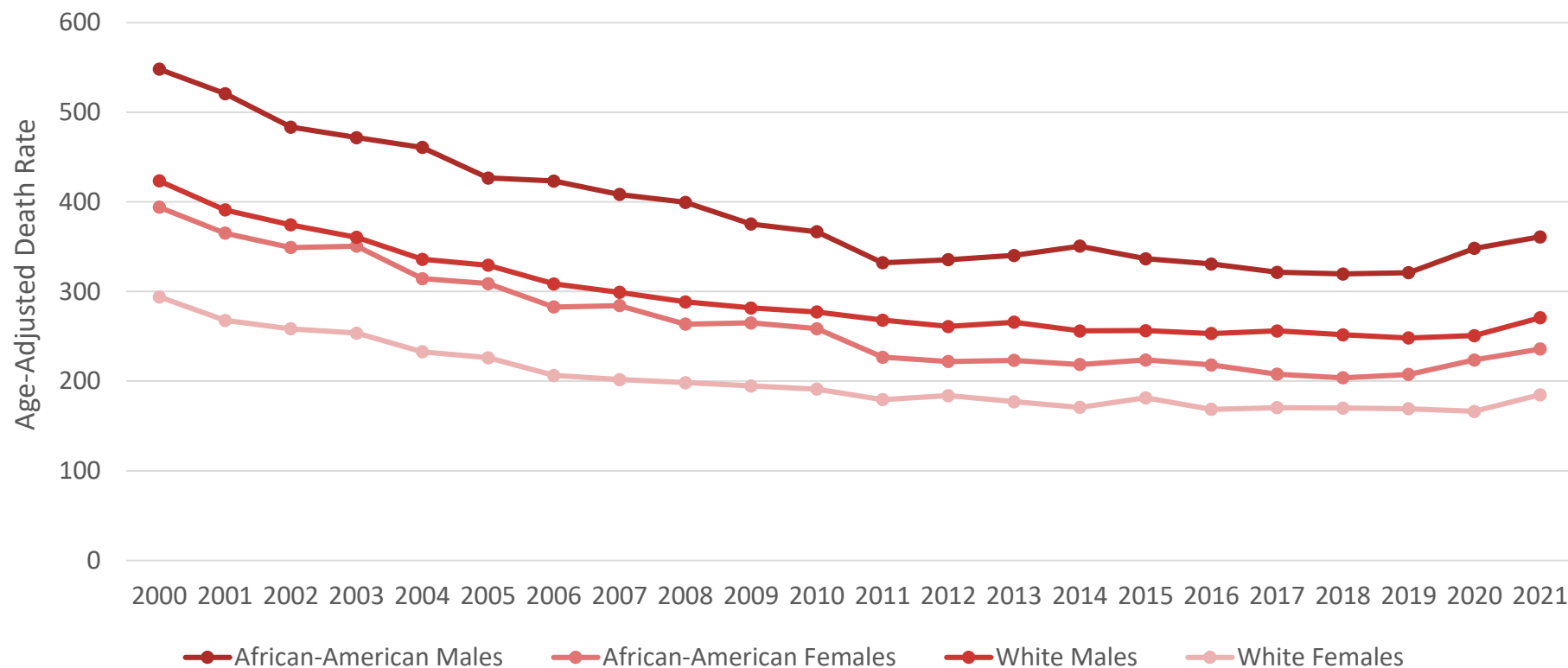
Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.

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 likely 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

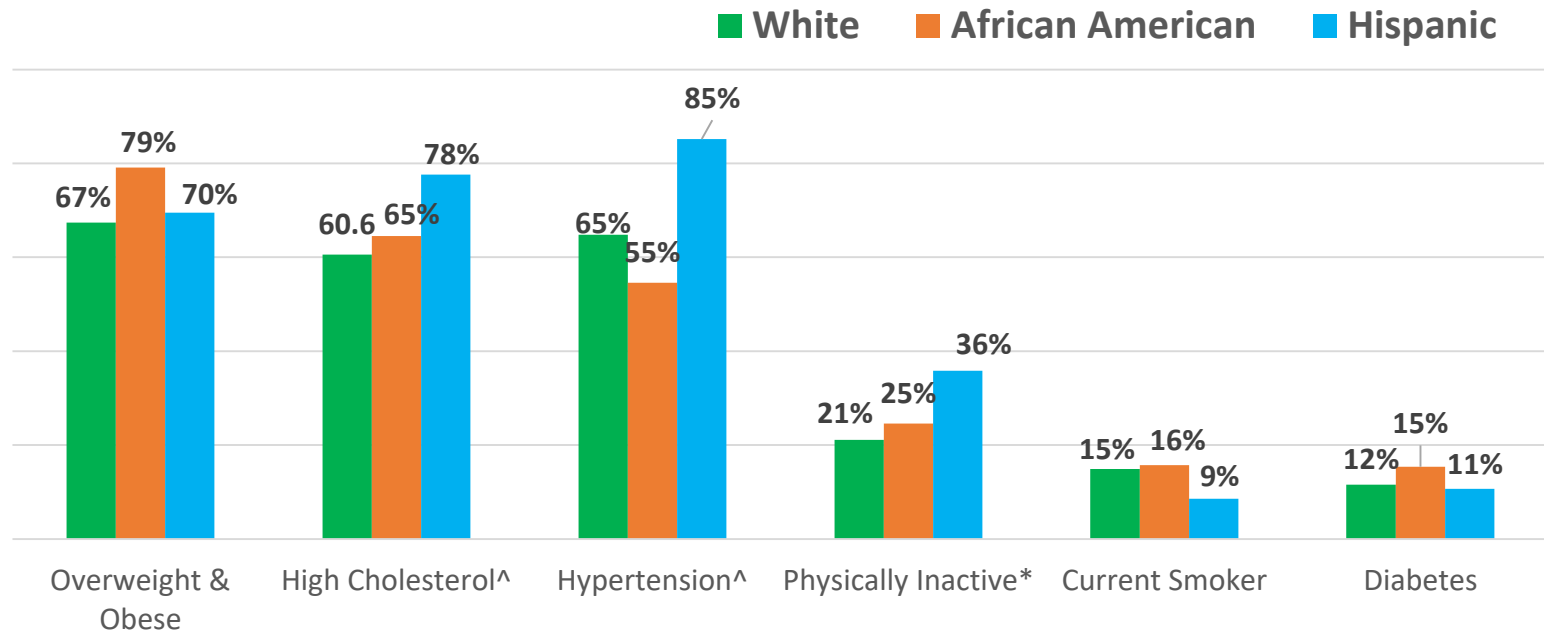


Major Cardiovascular Disease: ICD-10 codes I00-I78

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

In the United States, cardiovascular diseases cause:



1 IN 3 DEATHS

or more than 859,000
people each year.



\$216 BILLION

in health care system costs.

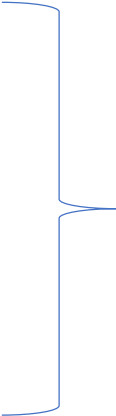


\$147 BILLION

in lost productivity
on the job from
premature death.

Risk Factors for Stroke

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

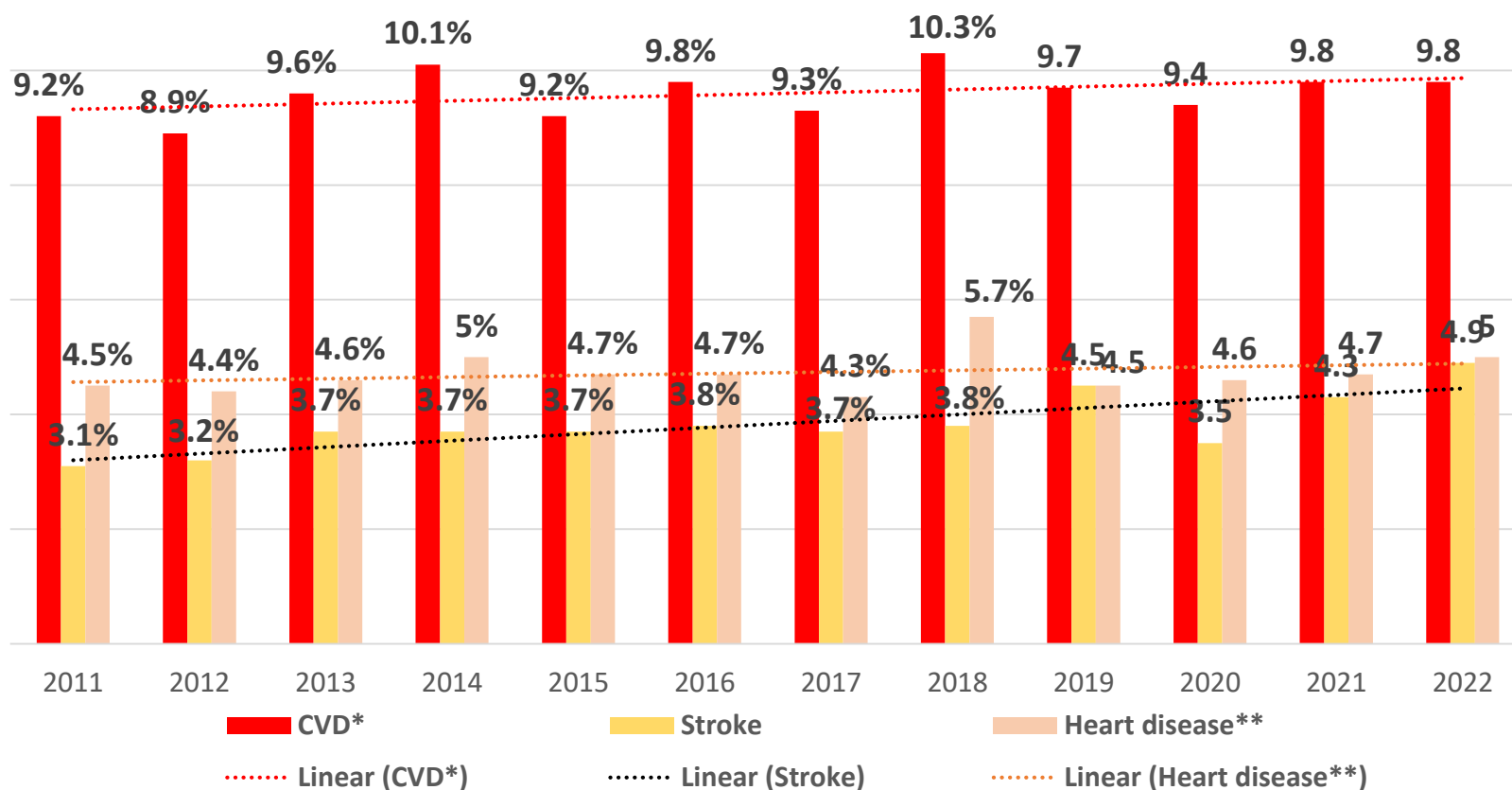


1 in 3 U.S. adults has at least one of these conditions or habits

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

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

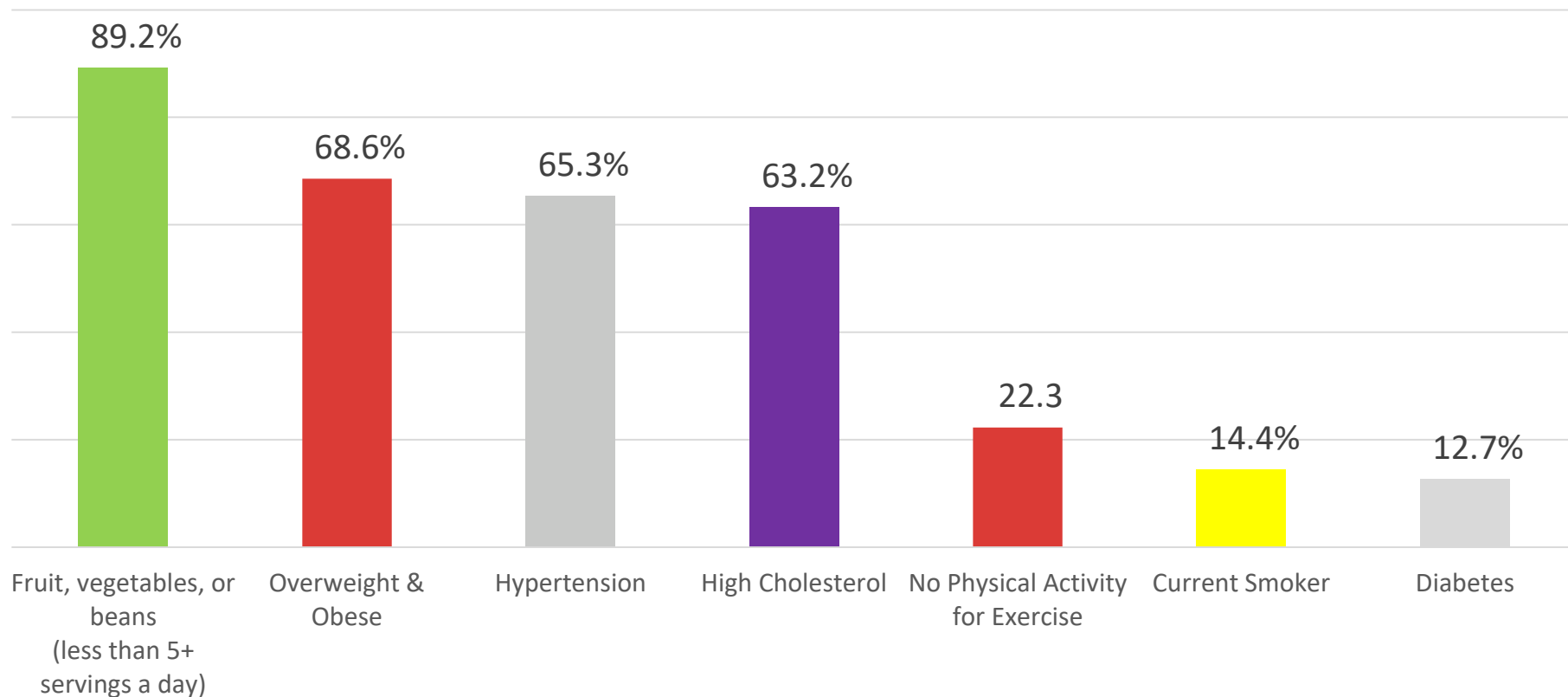


*History of Any Cardiovascular Diseases (heart attack or coronary heart disease or stroke)

** 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.

Racial Disparities in Cardiovascular Health

Cardiovascular Health in African Americans¹

- 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. Cardiovascular Health in African Americans: A Scientific Statement From the American Heart Association.

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>

Racial and Geographic Disparities in Stroke Mortality

The Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study¹

- An ongoing national cohort study designed with the primary aim of documenting and finding possible explanations for geographic (Stroke belt and buckle vs. rest of the US) and racial/ethnic (African-American vs. White) differences in stroke
- For more information visit [REGARDS Study](#)

1. Howard VJ, Cushman M, Pulley L, Gomez C, Go R, Prineas RJ, Graham A, Moy CS, Howard G. The Reasons for Geographic And Racial Differences in Stroke (REGARDS) Study: Objectives and design. *Neuroepidemiology* 2005;25:135-143.

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

- My Life Check - Life's Simple 7

For resources and to conduct a heart self-assessment, visit heart.org

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



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