The Burden of Cardiovascular Disease in North Carolina
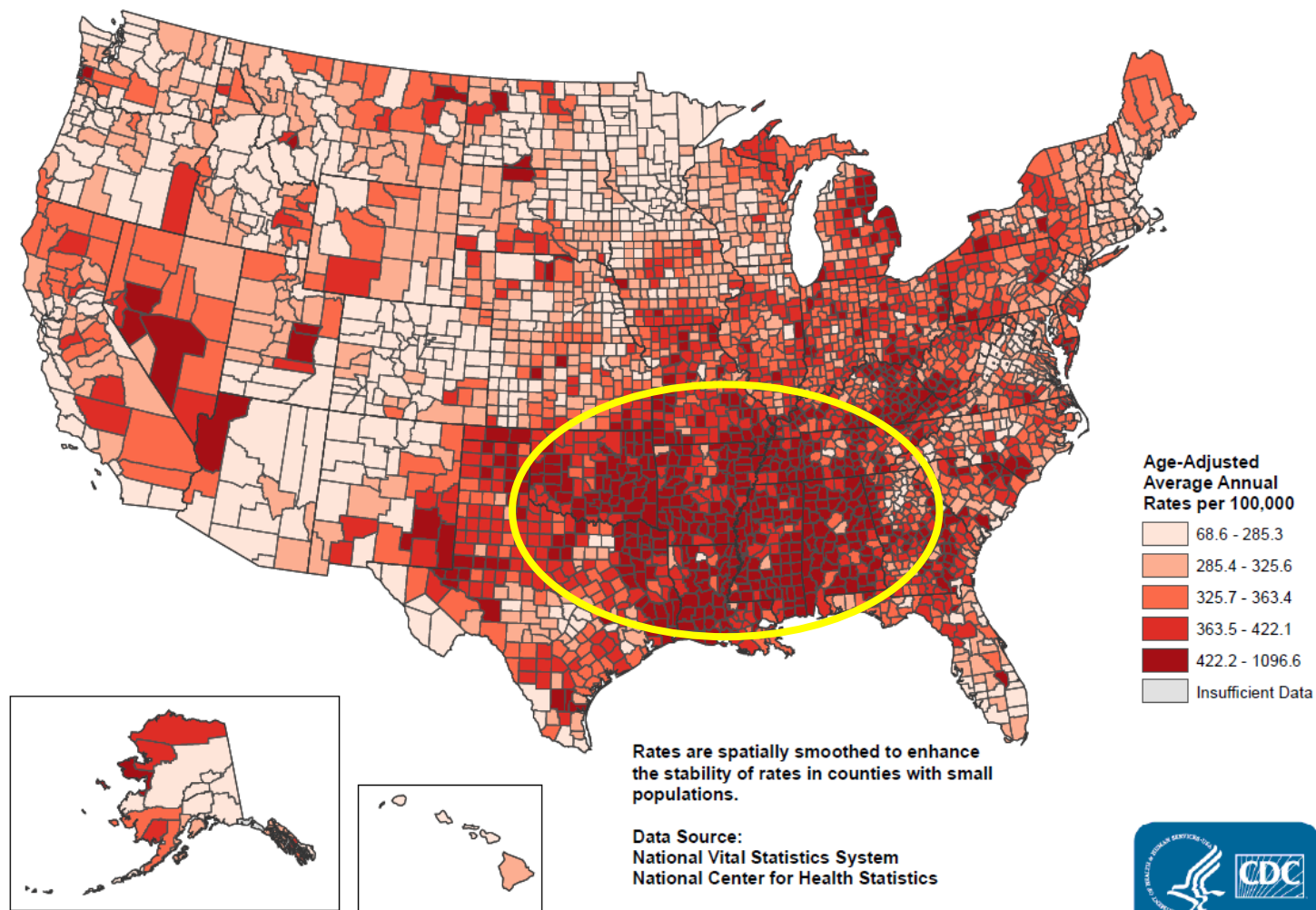
Start With **Your Heart** ®
Justus-Warren Heart Disease
& Stroke Prevention Task Force

Justus-Warren Heart Disease and Stroke Prevention Task Force
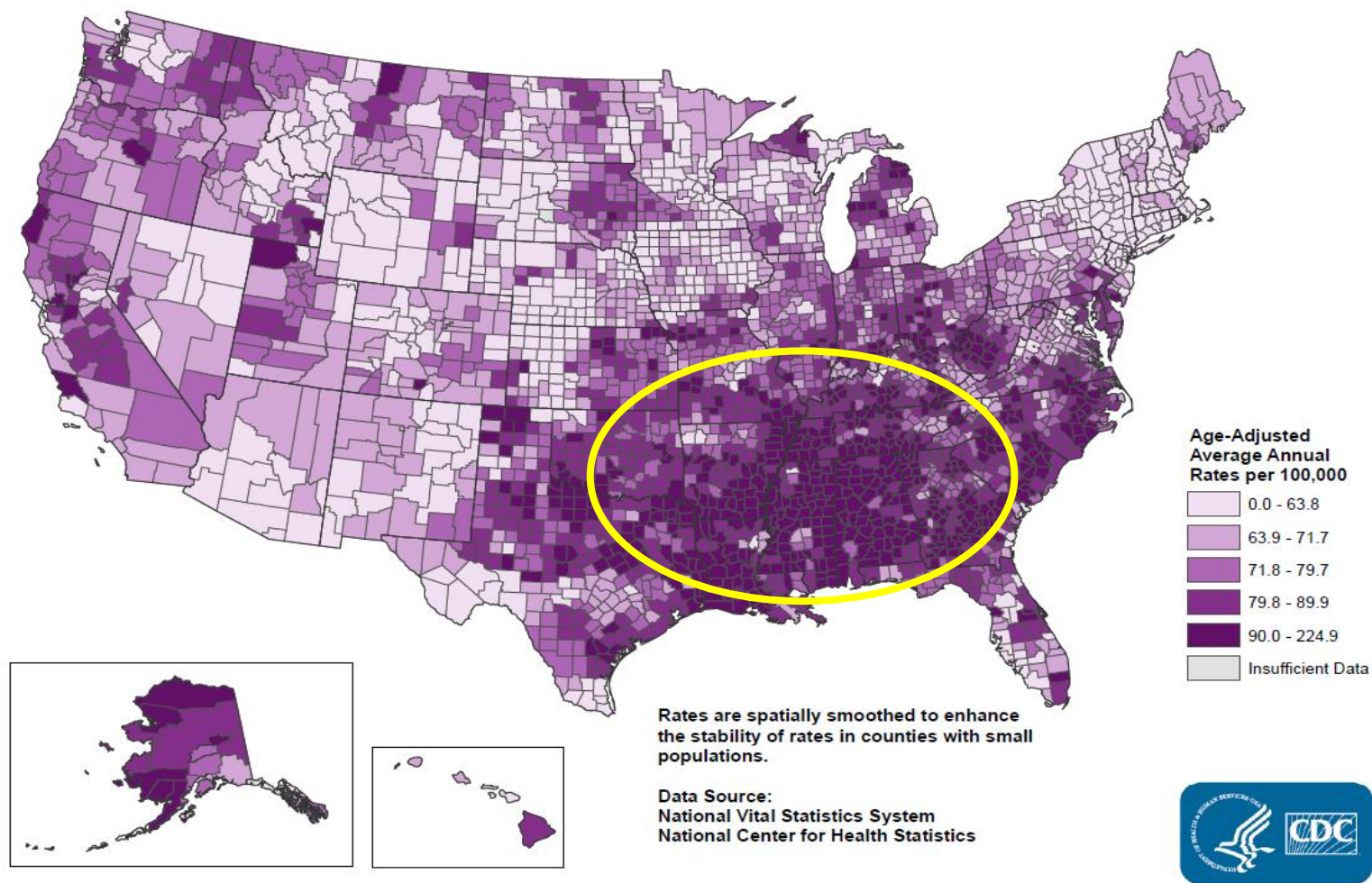2021

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+, 2015 - 2017

Age-Adjusted Average Annual Rates per 100,000

- 68.6 - 285.3
- 285.4 - 325.6
- 325.7 - 363.4
- 363.5 - 422.1
- 422.2 - 1096.6
- Insufficient Data

Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics

www.cdc.gov/dhdsp/maps

US Stroke Death Rates by County, Adults Ages 35+, 2015 – 2017

Age-Adjusted Average Annual Rates per 100,000

	0.0 - 63.8
	63.9 - 71.7
	71.8 - 79.7
	79.8 - 89.9
	90.0 - 224.9
	Insufficient Data

Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics

US Heart Disease Death Rates and Ranking by State, 2015 - 2019

State	2015		2016		2017		2018		2019	
	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
Maryland	169.3	21	164.3	22	164.5	21	161.9	24	159.3	24
Rhode Island	160.4	26	152.4	33	155.7	29	158.9	27	159.3	25
Wisconsin	156.0	31	154.9	30	157.6	27	157.8	29	158.8	26
New Mexico	142.4	43	150.6	36	151.4	33	148.2	35	158.2	27
South Dakota	150.9	38	153.4	32	150.1	35	156.3	30	158.1	28
New Jersey	166.7	22	164.7	21	162.3	24	163.0	23	158.0	29
Montana	155.8	32	154.4	31	155.0	30	163.2	22	157.1	30
North Carolina	162.4	24	155.8	29	156.5	28	155.5	31	154.7	31
Delaware	165.2	23	163.2	23	158.4	25	159.1	25	154.3	32
Vermont	152.5	37	158.8	27	152.5	32	150.5	34	151.6	33
Idaho	156.4	30	160.0	25	162.4	23	157.9	28	150.7	34
Wyoming	159.4	27	157.8	28	148.9	38	152.7	32	150.4	35
Virginia	154.2	34	150.7	35	154.5	31	147.9	36	149.1	36

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.

US Stroke Death Rates and Ranking by State, 2015 - 2019

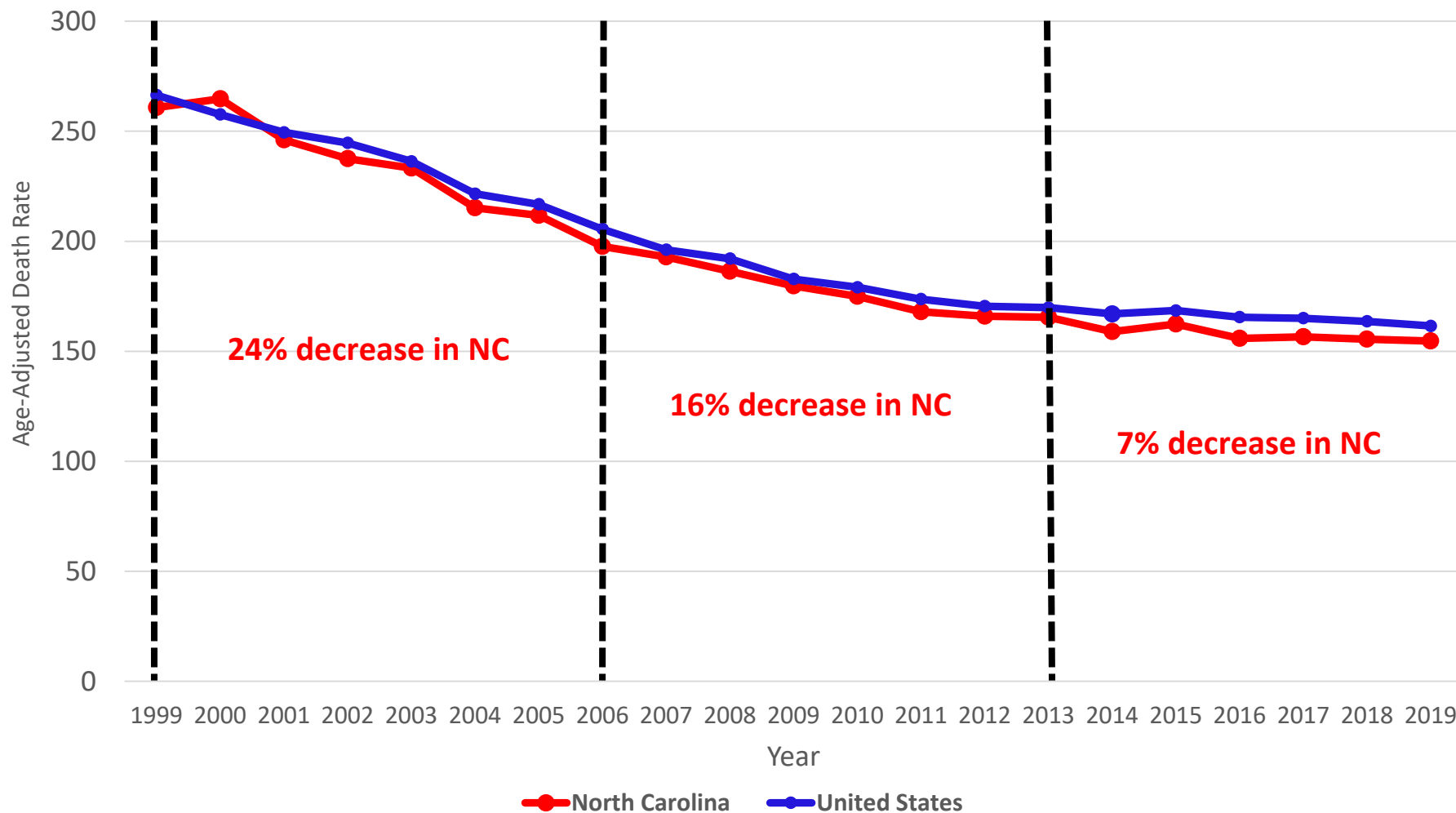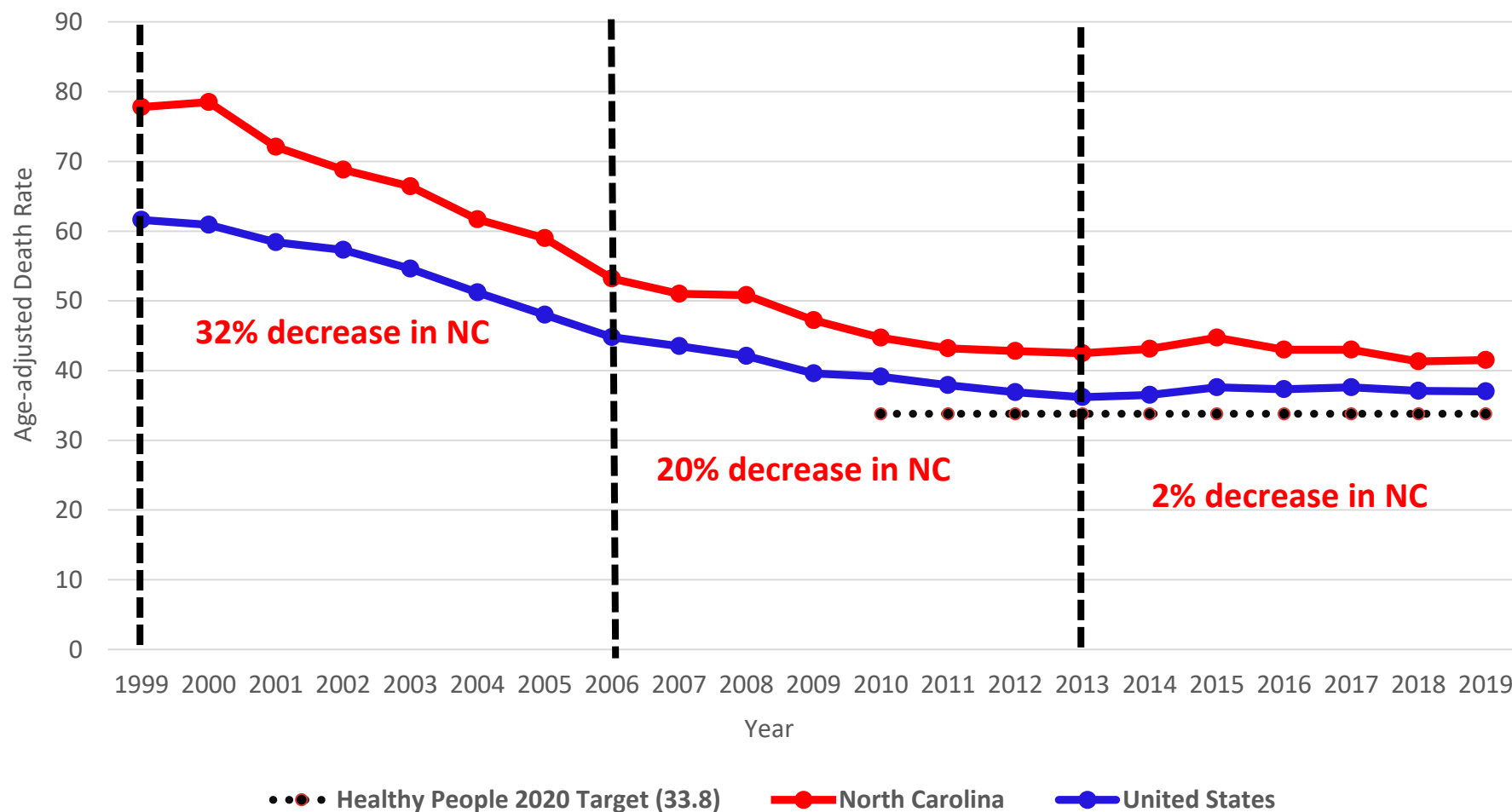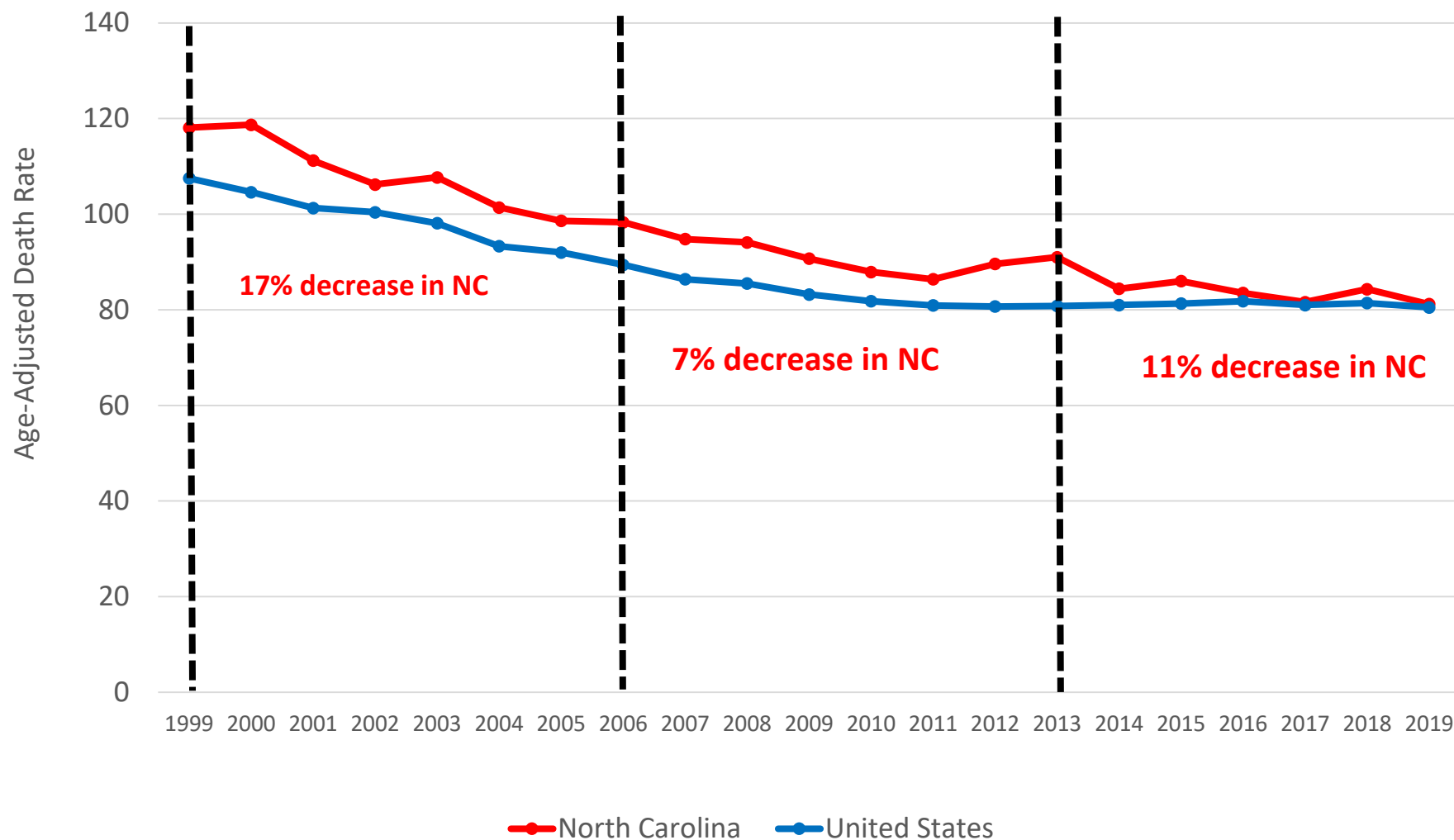| State	2015 Age Adjusted Death Rate	2015 US Rank	2016 Age Adjusted Death Rate	2016 US Rank	2017 Age Adjusted Death Rate	2017 US Rank	2018 Age Adjusted Death Rate	2018 US Rank	2019 Age Adjusted Death Rate	2019 US Rank
Louisiana	46.0	5	46.0	3	47.4	3	46.7	3	44.1	4
Kentucky	40.8	12	40.4	14	39.4	18	41.5	10	42.5	5
Ohio	40.7	14	40.6	13	42.8	11	42.6	8	42.2	6
South Carolina	46.7	4	45.5	6	44.9	6	45.5	5	42.2	7
Georgia	45.3	7	44.3	7	43.5	8	43.4	7	41.9	8
Maryland	37.8	24	39.7	16	40.2	16	40.3	12	41.8	9
Tennessee	46.0	6	46.0	4	45.0	5	43.6	6	41.8	10
North Carolina	44.7	8	43.0	8	43.0	10	41.3	11	41.5	11
Indiana	39.1	16	39.5	17	40.2	15	39.3	18	41.4	12
Arkansas	46.8	3	45.6	5	43.8	7	41.5	9	40.7	13
Florida	37.1	28	37.3	26	38.9	20	39.6	17	40.4	14
West Virginia	43.8	9	41.7	11	41.8	12	38.6	20	40.2	15
Oregon	37.5	27	37.8	25	39.9	17	38.0	22	39.5	16

Stroke: ICD-10 codes I60-I69.

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

Heart Disease Death Rates, NC vs. US, 1999 - 2019

24% decrease in NC

16% decrease in NC

7% decrease in NC

Y-axis: Age-Adjusted Death Rate (0, 50, 100, 150, 200, 250, 300)

X-axis: Year (1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019)

Legend: ● North Carolina ● United States

Stroke Death Rates NC vs. US, 1999 - 2019

Stroke: ICD-10 codes I60-I69

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

<u>Data Source</u>: 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.

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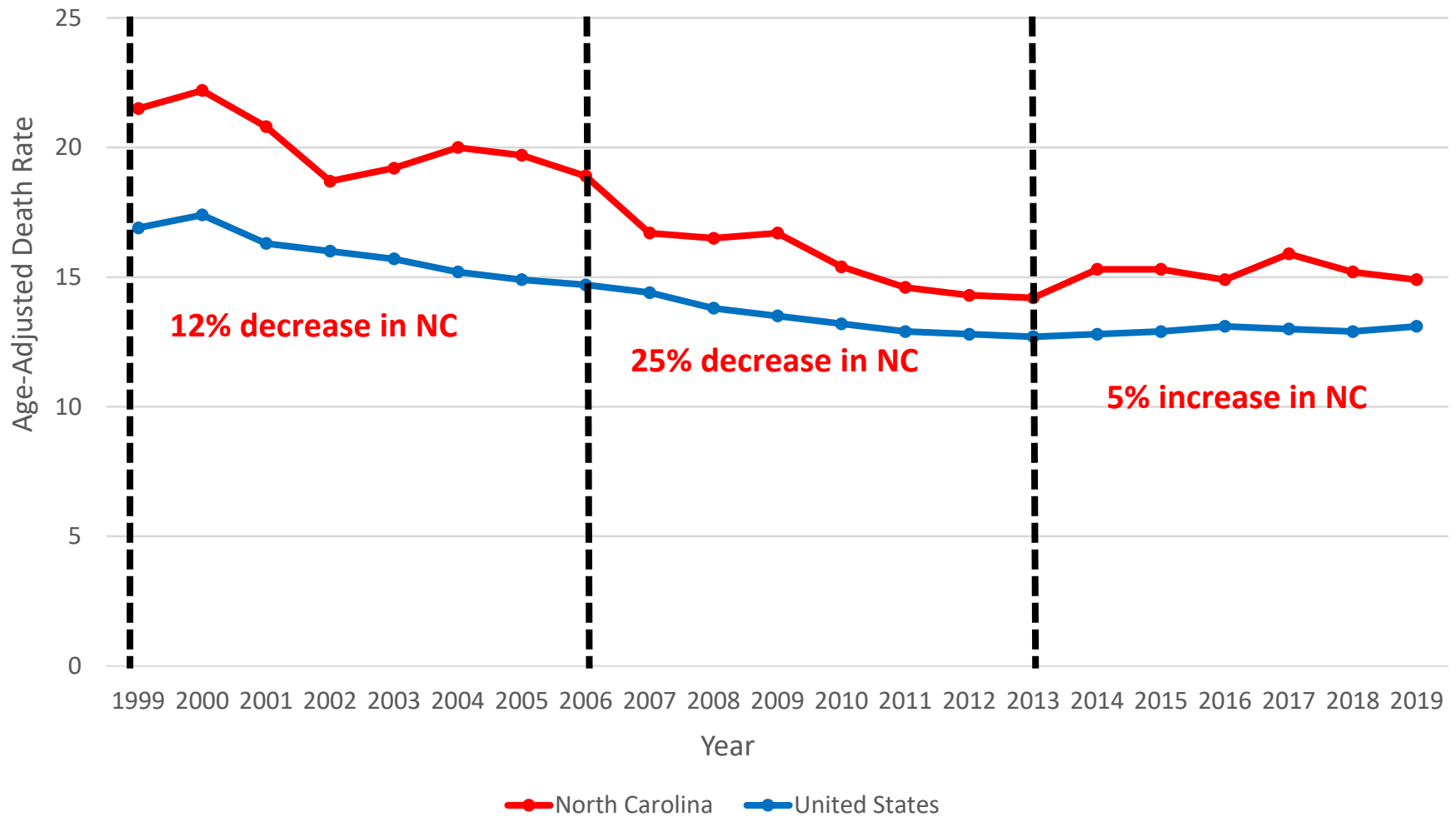# Heart Disease Death Rates, Ages 35-64 Years, NC vs. US, 1999 - 2019

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.

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Stroke Death Rates, Ages 35-64 Years, NC vs. US, 1999 - 2019


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.

Cardiovascular Disease Deaths Under 65 Years, NC vs. US, 2000 - 2019
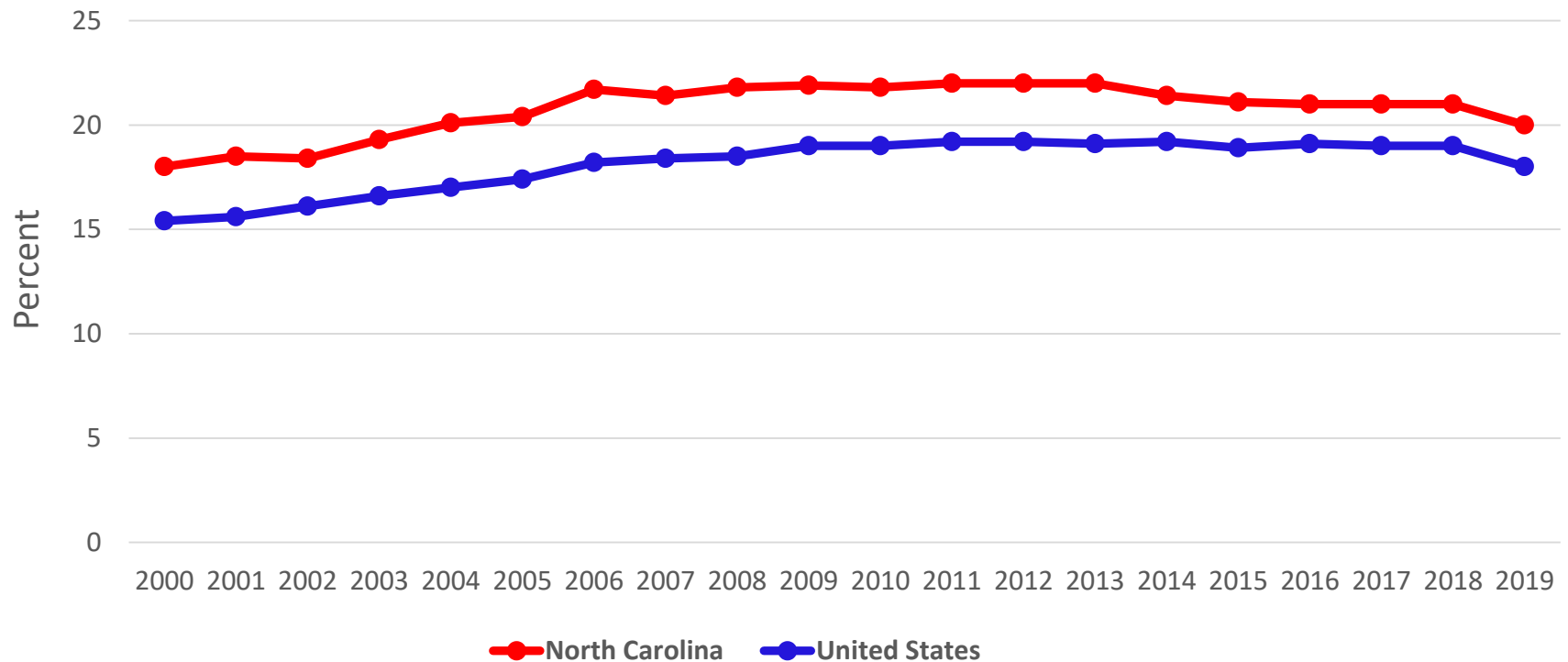

Cardiovascular Disease: ICD-10 codes I00-I78

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 February 03, 2021.

Leading Causes of Death, NC, 2019

| Rank	Cause	Number	%
1	Cancer	19,963	20.8
2	**Diseases of heart**	**19,661**	**20.5**
3	Chronic lower respiratory diseases	5,411	5.6
4	**Cerebrovascular diseases**	**5,203**	**5.4**
5	All other unintentional injuries	4,683	4.9
6	Alzheimer's disease	4,508	4.7
7	Diabetes mellitus	3,127	3.3
8	Nephritis, nephrotic syndrome and nephrosis	2,121	2.2
9	Influenza and pneumonia	1,733	1.8
10	Motor vehicle injuries	1,608	1.7
	All other causes (Residual)	27,933	29.1
	Total Deaths -- All Causes	95,951	100

Percentage of Deaths Caused by CVD, NC, 2011 - 2019
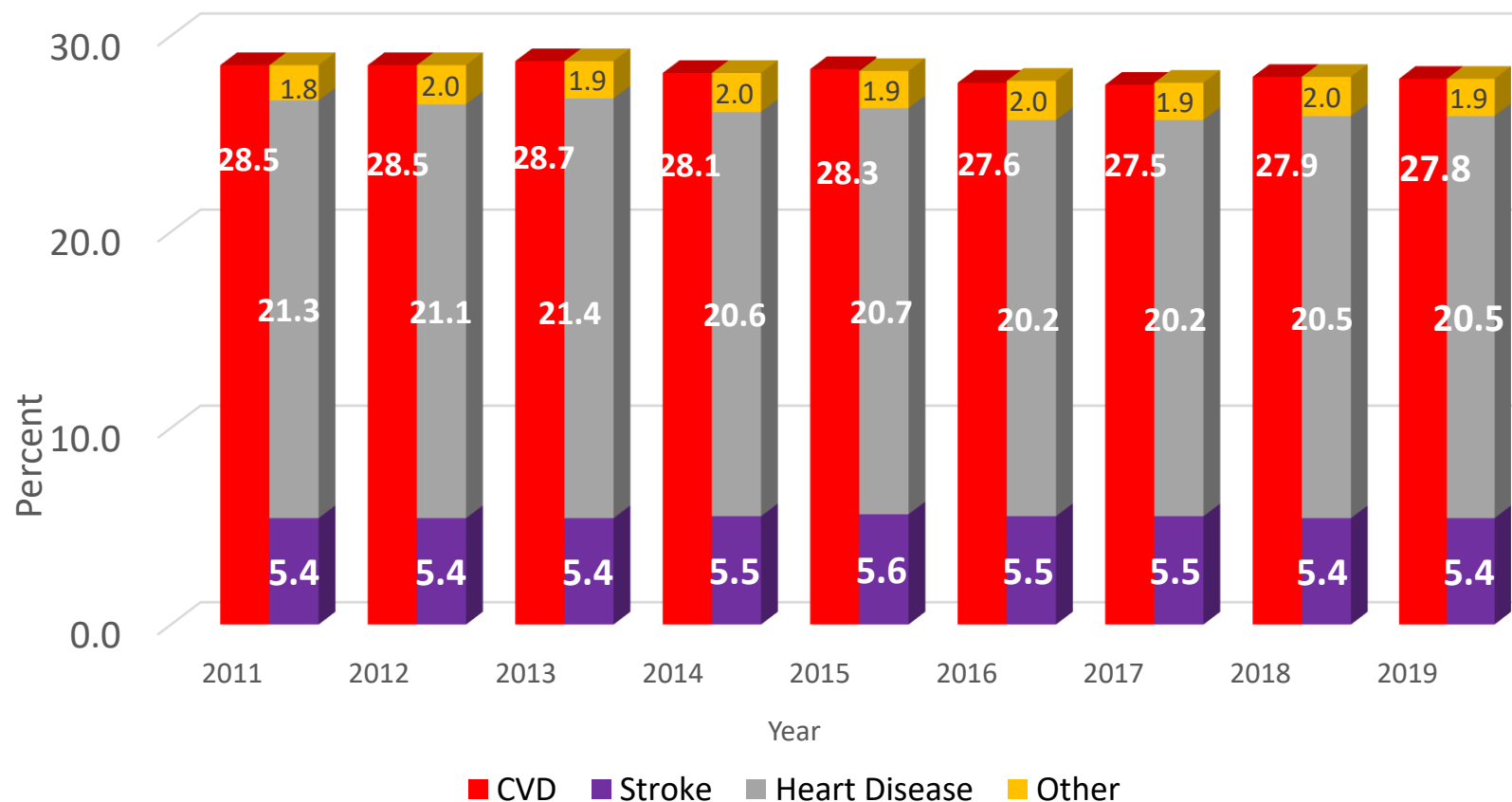
CVD Deaths includes deaths from ICD-10 codes I00-I78; Heart Disease ICD -10 codes I00-I09, I11, I13, I20-I51.; Stroke ICD -10 codes I60-I69.
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Detailed Mortality Statistics for North Carolina. SCHS Online Database, accessed at https://schs.dph.ncdhhs.gov/data/vital.cfm on January 4, 2021.

Heart Disease Death Rates by County of Residence, NC, 2014 - 2018
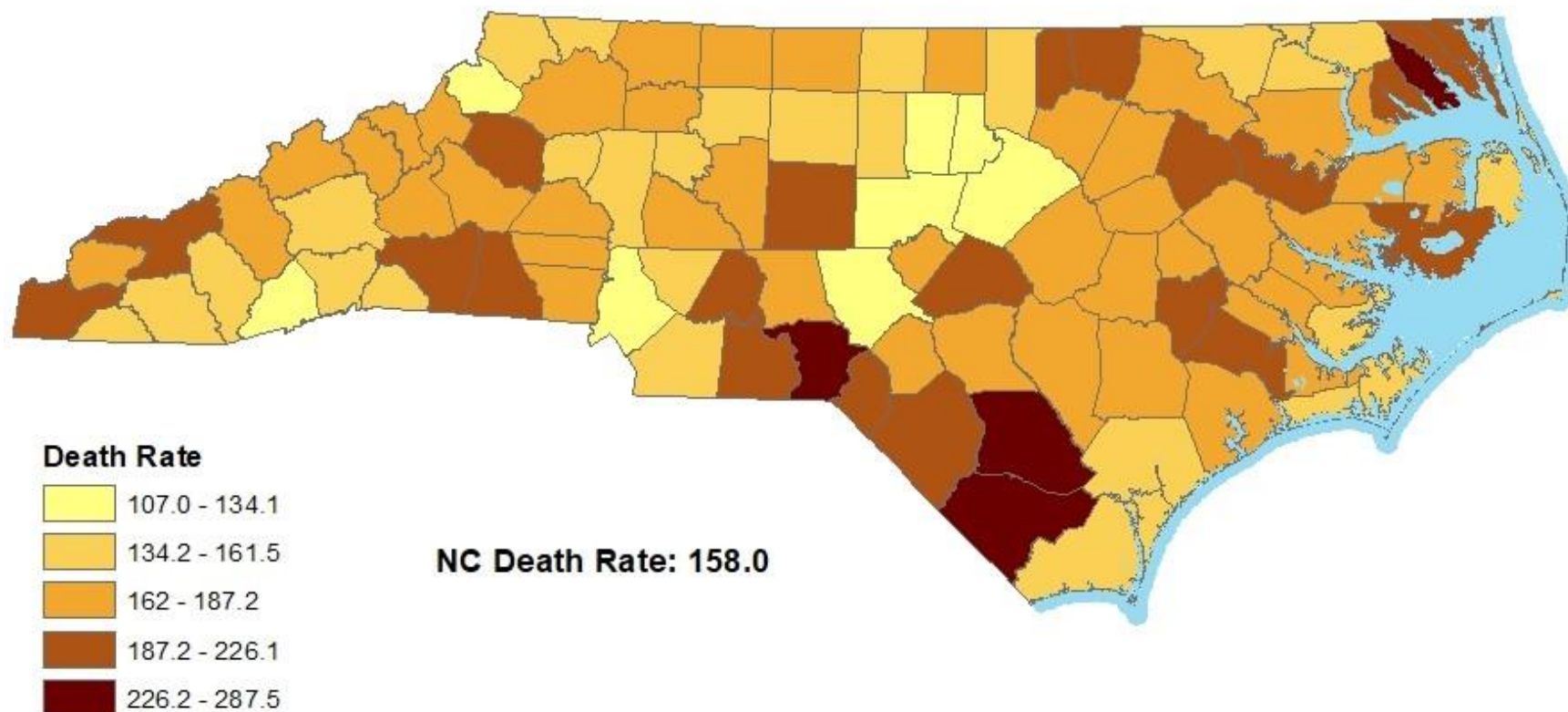
Death Rate

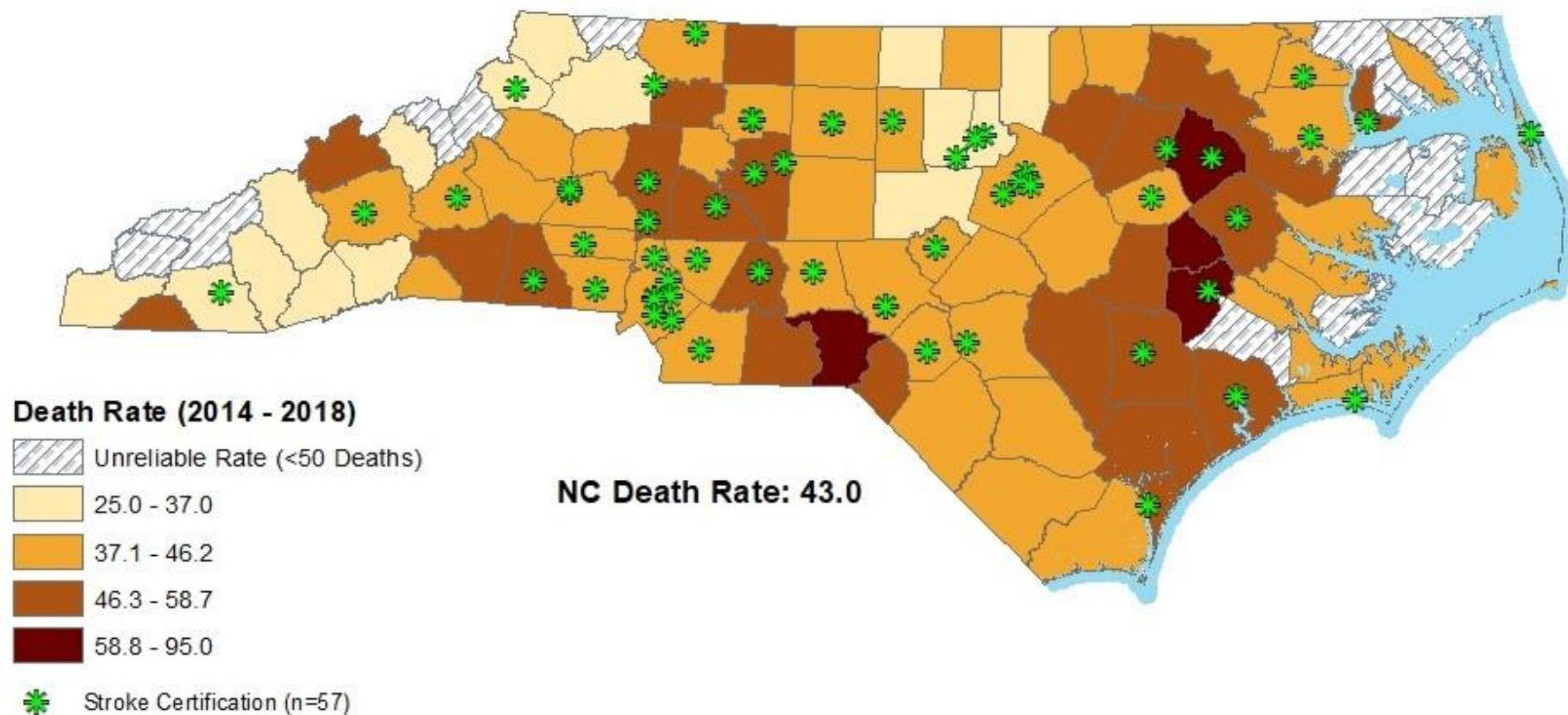|	
	107.0 - 134.1
	134.2 - 161.5
	162 - 187.2
	187.2 - 226.1
	226.2 - 287.5

NC Death Rate: 158.0

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 2014-2018, SCHS Online Database*.
Accessed at http://www.schs.state.nc.us/data/vital/lcd/2018/ on January 29, 2021.

Stroke Death Rates by County of Residence, NC, 2014 - 2018

Death Rate (2014 - 2018)

- Unreliable Rate (<50 Deaths)
- 25.0 - 37.0
- 37.1 - 46.2
- 46.3 - 58.7
- 58.8 - 95.0

✳ Stroke Certification (n=57)

NC Death Rate: 43.0

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 February 01, 2021.
N.C. Data Source: North Carolina Division of Public Health, State Center for Health Statistics. *Volume 2: Leading Causes of Death in North Carolina 2014-2018, SCHS Online Database*.
Accessed at http://www.schs.state.nc.us/data/vital/lcd/2018/ on January 29, 2021.

Morbidity, NC, 2019

- About 800,000 adult North Carolinians (9.7% of the adult population) have a history of either heart attack, coronary heart disease or stroke[1]

- Cardiovascular disease (CVD) is the leading cause of hospitalization in North Carolina[2]

  o 158,243 CVD hospital discharges (16% of all discharges) in 2019
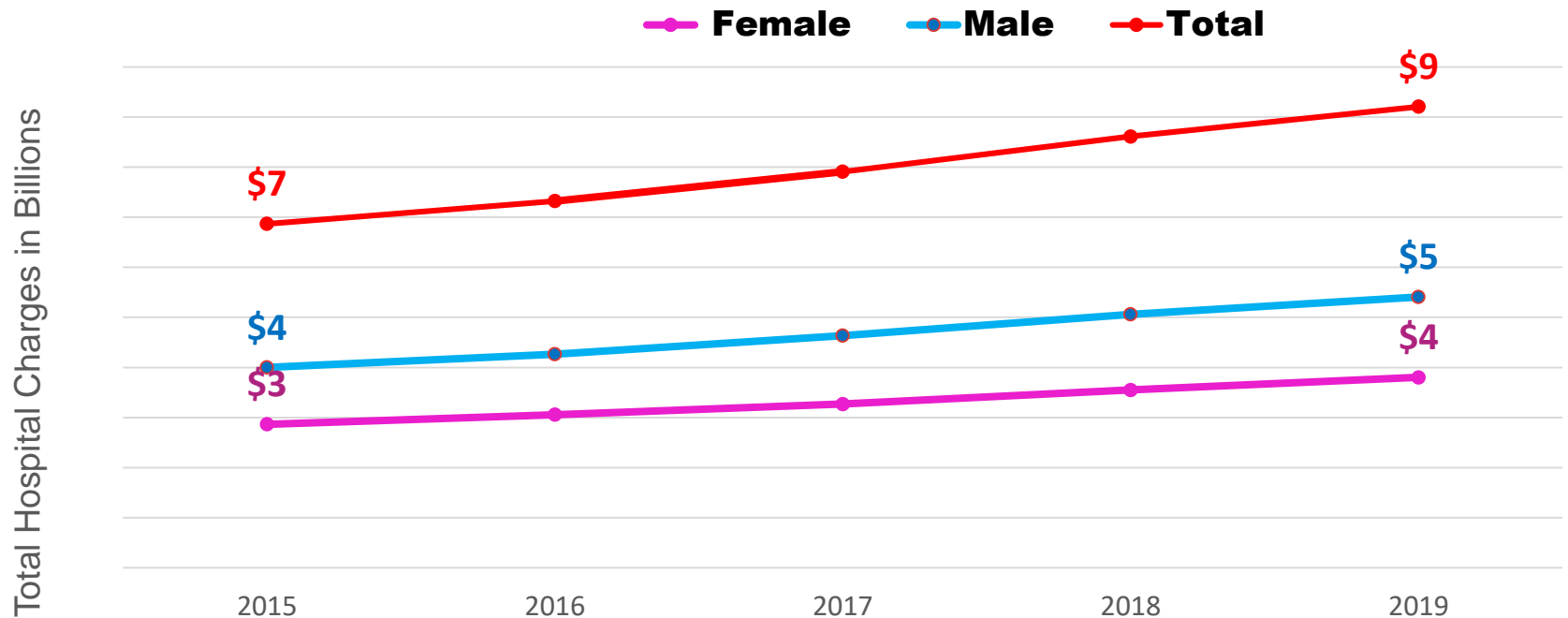
    - 31,878 stroke

    - 112,956 heart disease

Cardiovascular Disease Hospital Charges, NC, 2015-2019

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.

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Hospitalization Charges for Selected Cardiovascular Disease Conditions and Risk Factors, NC, 2019

DIAGNOSTIC CATEGORY	TOTAL CHARGES	TOTAL CASES	CHARGE PER CASE
HEART DISEASE	$6.5 Billion	112,956	$57,517
STROKE	$1.8 Billion	31,878	$56,426
CORONARY HEART DISEASE	$2.6 Billion	30,654	$83,650
HEART FAILURE	$182 Million	3,521	$51,740
DIABETES MELLITUS	$893 Million	24,817	$35,992
HYPERTENSION	$1.6 Billion	42,387	$38,241

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 October 20, 2020.

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, 2019

Discharge Rate

- 269 - 588
- 589 - 891
- 892 - 1086
- 1087 - 1315
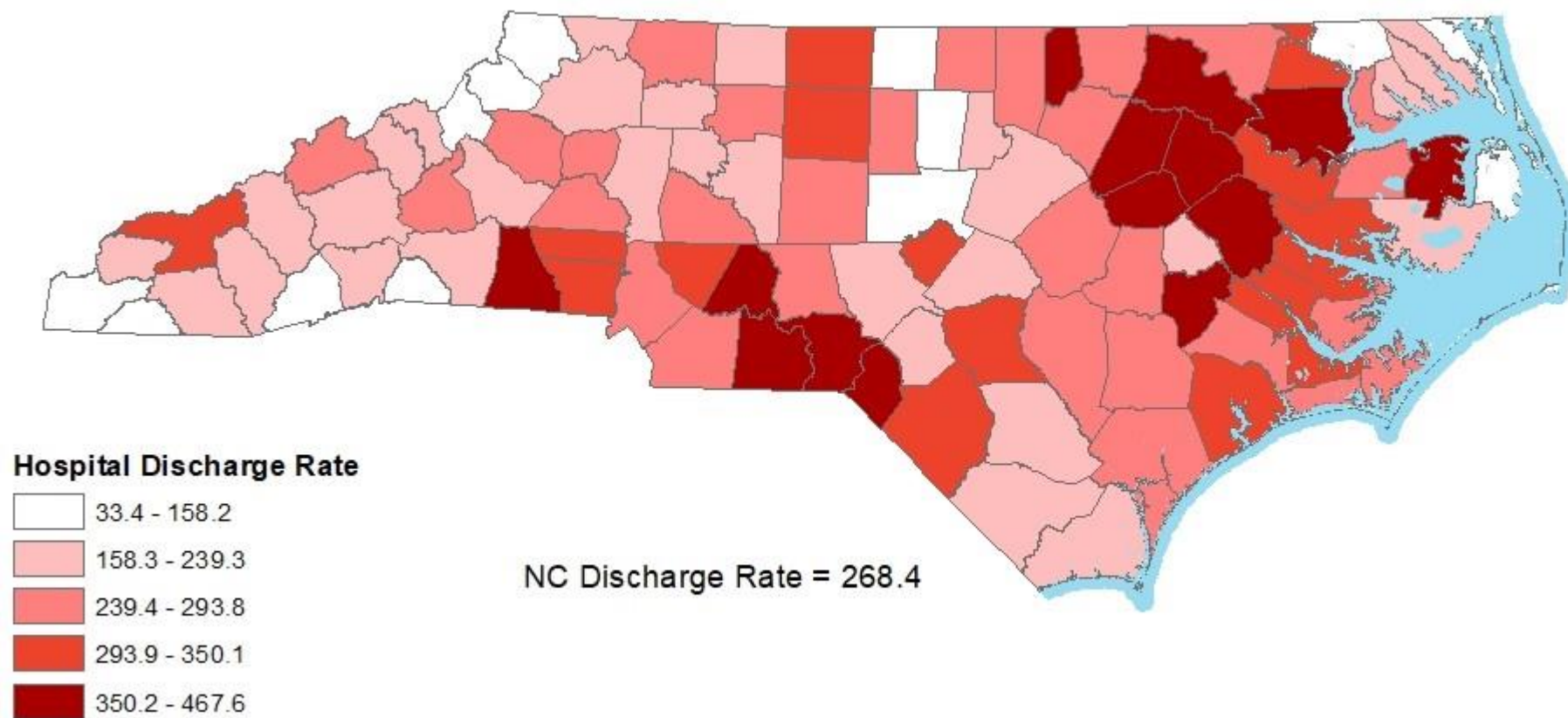- 1316 - 1786

NC Discharge Rate = 956.4
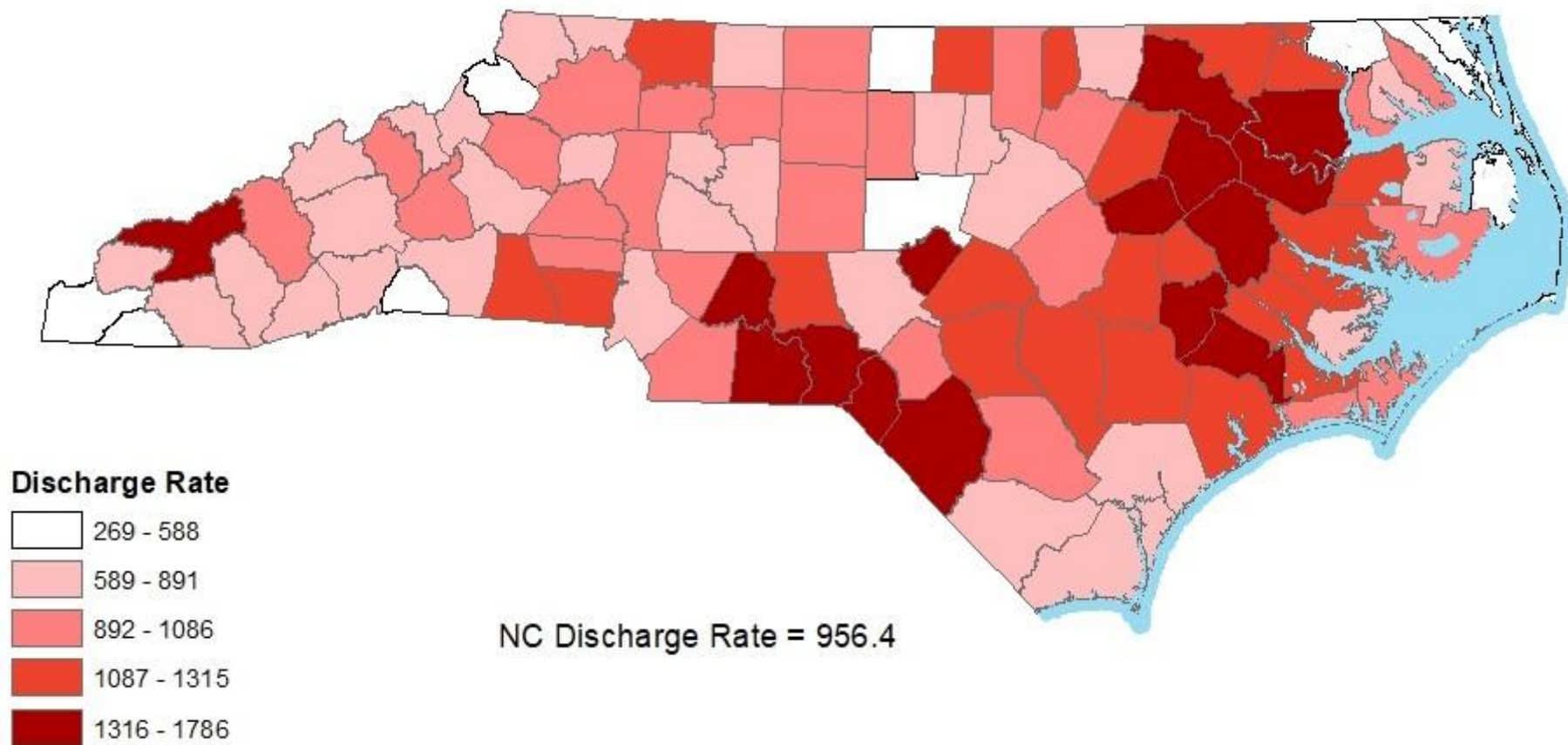
Heart Disease: ICD-10 codes I00-I09, I11, I13, I20-I51. Principal diagnosis only; N.C. residents only.
Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.
Data Source: North Carolina Division of Public Health, State Center for Health Statistics. Data produced on request by NC State Center for Health Statistics on February 02, 2021.

Stroke Hospital Discharge Rates by County of Residence, NC, 2019

Hospital Discharge Rate

- 33.4 - 158.2
- 158.3 - 239.3
- 239.4 - 293.8
- 293.9 - 350.1
- 350.2 - 467.6

NC Discharge Rate = 268.4

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 February 02, 2021.

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 - 2019
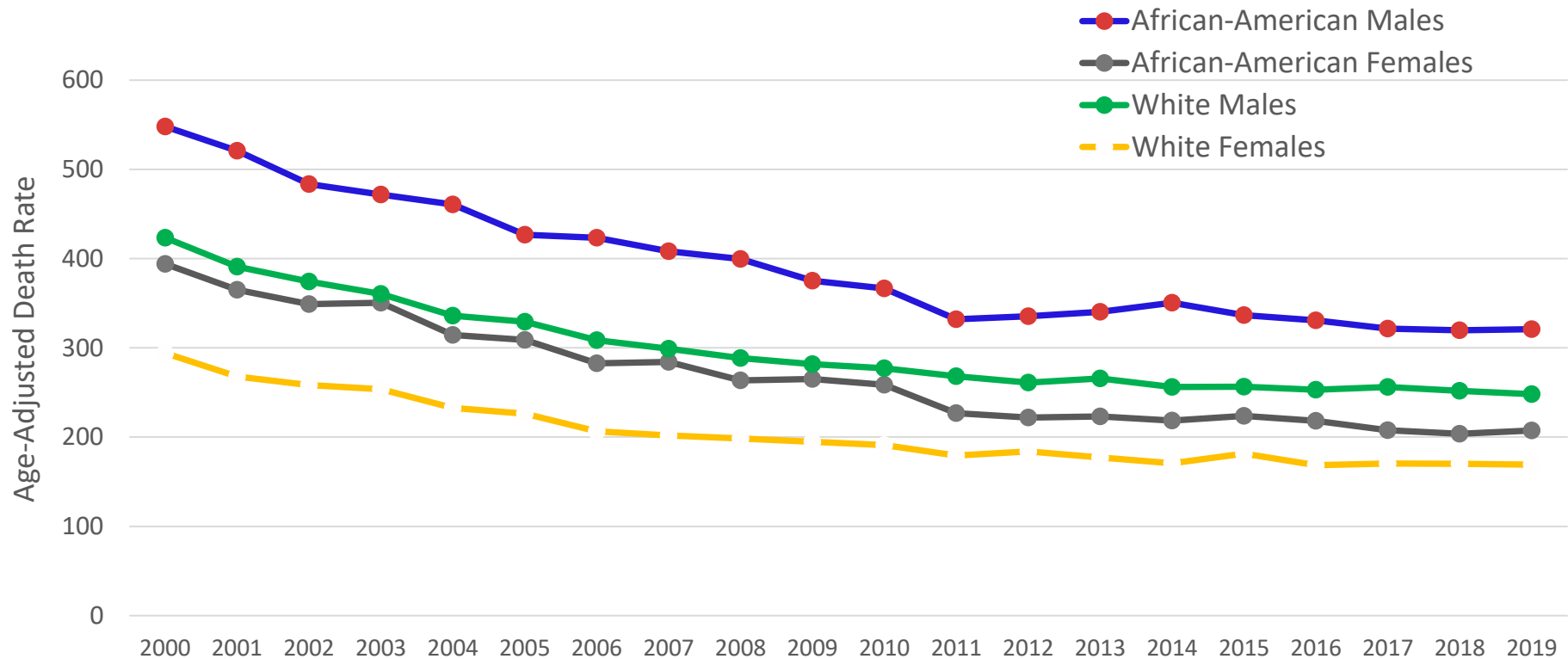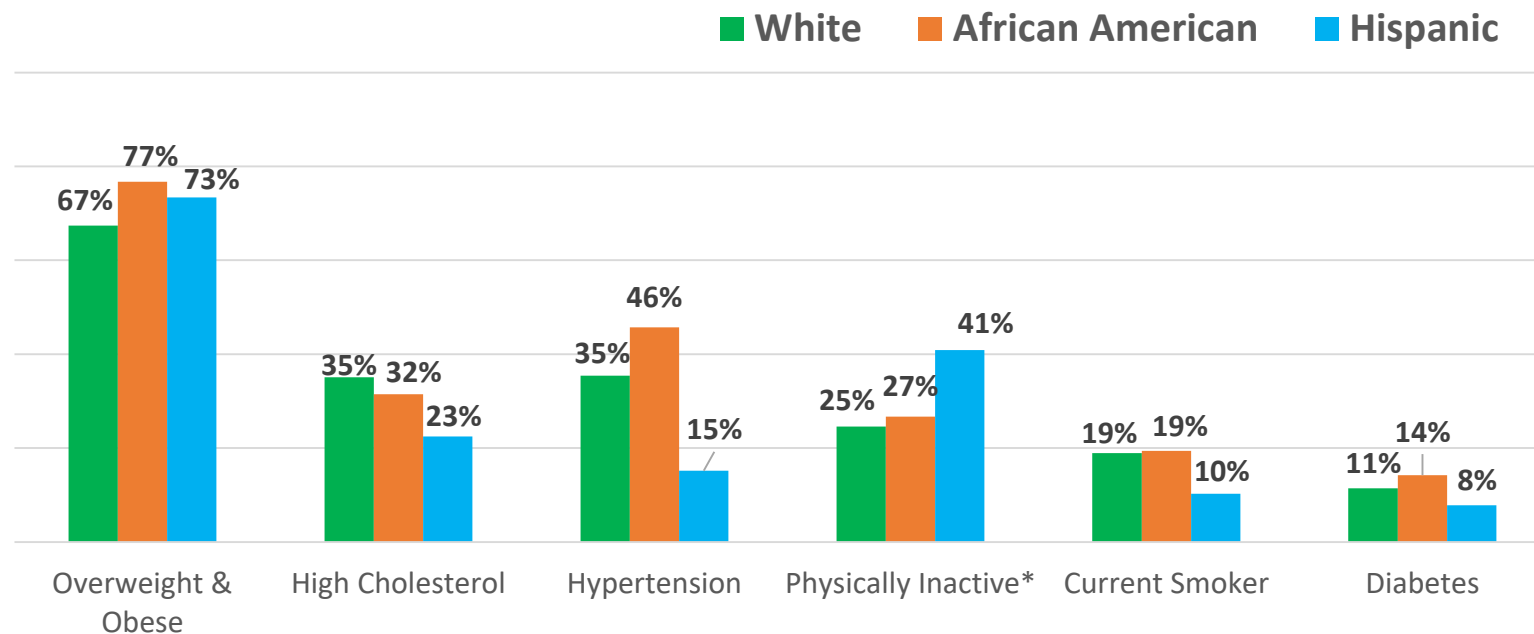
Major Cardiovascular Disease: ICD-10 codes I00-I78
Rates per 100,000 population, age-adjusted to the 2000 U.S. standard population.
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2019 on CDC WONDER Online Database, released in 2020. Accessed at https://wonder.cdc.gov/ucd-icd10.html on January 5, 2021.

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Prevalence of CVD Risk Factors by Race and Ethnicity, NC, 2019

■ White ■ African American ■ Hispanic

	White	African American	Hispanic
Overweight & Obese	67%	77%	73%
High Cholesterol	35%	32%	23%
Hypertension	35%	46%	15%
Physically Inactive*	25%	27%	41%
Current Smoker	19%	19%	10%
Diabetes	11%	14%	8%

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?

Data Source: North Carolina Division of Public Health, State Center for Health Statistics. *North Carolina Behavioral Risk Factor Surveillance System, 2019*. Accessed at https://schs.dph.ncdhhs.gov/data/brfss/2019/nc/all/topics.htm on February 03, 2021.

Risk Factors for Heart Disease

- High blood pressure

- High LDL cholesterol

- Smoking

- Overweight and obesity

- Unhealthy eating

- Physical inactivity

- Excessive alcohol use

- Diabetes

49% of Americans have at least 1 of these 3 risk factors

Source: Centers for Disease Control and Prevention, Division of Heart Disease and Stroke Prevention. Heart Disease Fact Sheet.
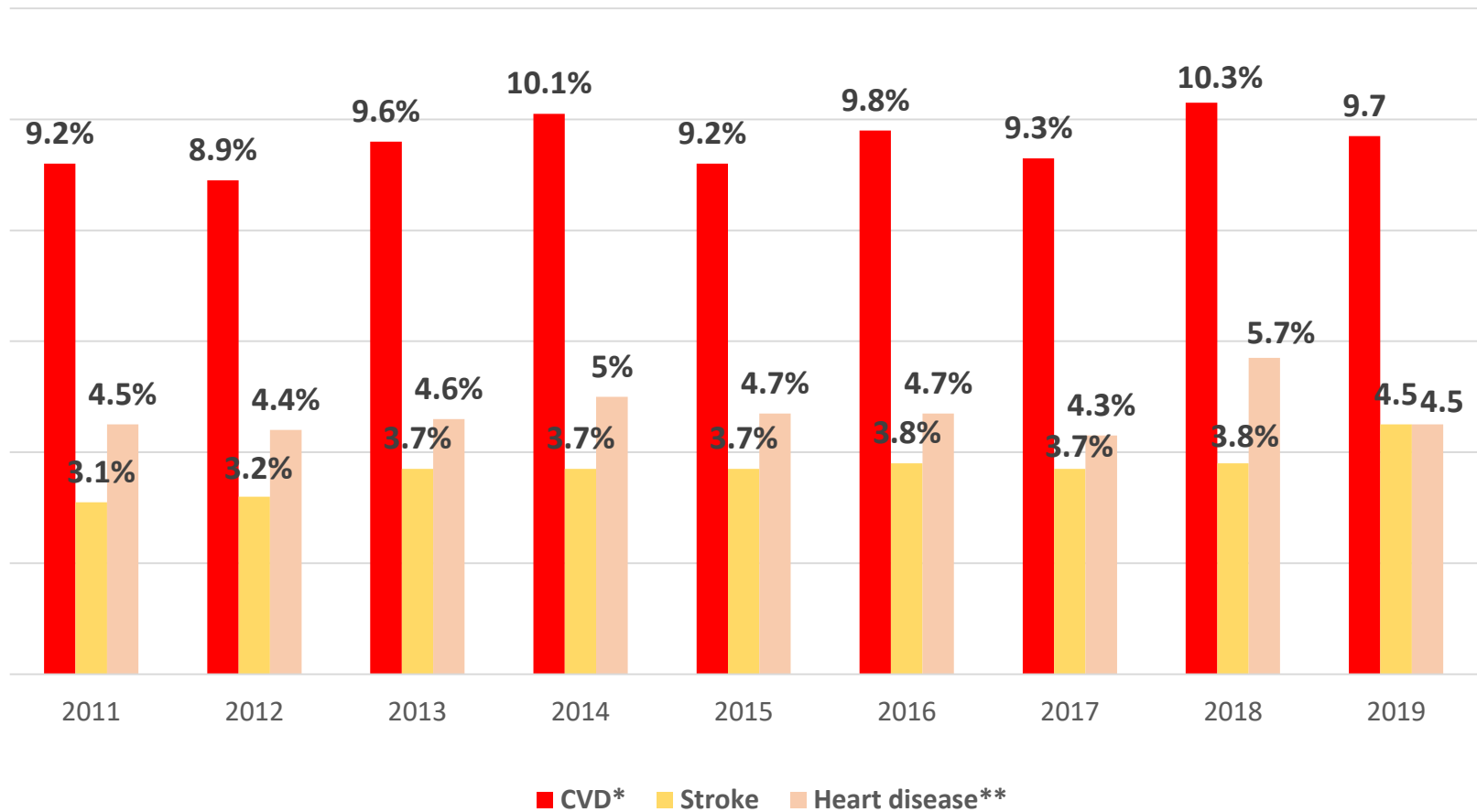
Risk Factors for Stroke

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

Source: Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. Stroke Fact Sheet.

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.

Prevalence of Cardiovascular Disease in Adults, NC, 2011 - 2019
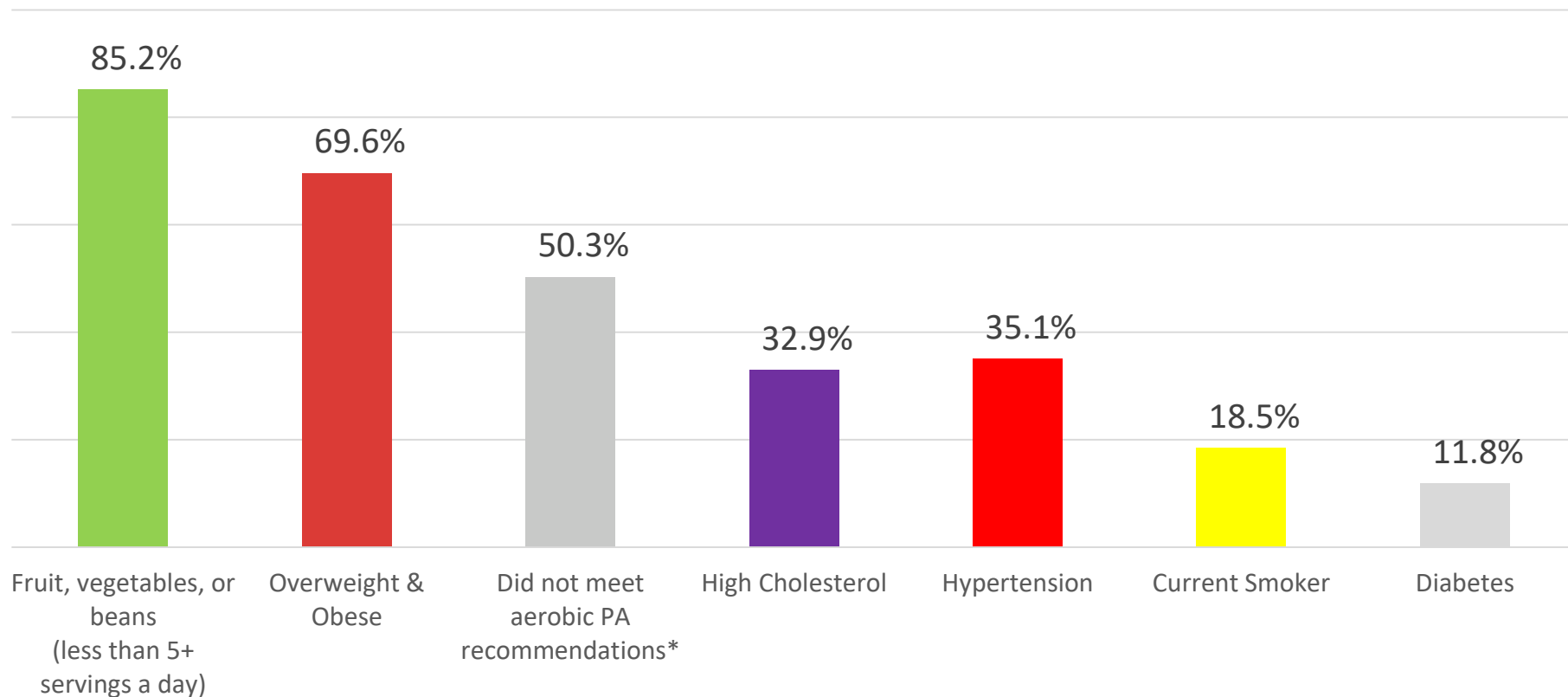

*History of Any Cardiovascular Diseases (heart attack or coronary heart disease or stroke)
** Had angina or coronary heart disease

Prevalence of CVD Risk Factors, NC, 2019

Bar chart showing:
- Fruit, vegetables, or beans (less than 5+ servings a day): 85.2%
- Overweight & Obese: 69.6%
- Did not meet aerobic PA recommendations*: 50.3%
- High Cholesterol: 32.9%
- Hypertension: 35.1%
- Current Smoker: 18.5%
- Diabetes: 11.8%

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 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. Cardiovascular Health in African Americans: A Scientific Statement From the American Heart Association.
Mercedes R Carnethon, Jia Pu, George Howard, Michelle A. Albert, Cheryl A.M. Anderson, Alain G. Bertoni, Mahasin S. Mujahid, Latha Palaniappan, Herman A. Taylor, Monte Willis, Clyde W. Yancy and On behalf of the American Heart Association Council on Epidemiology and Prevention; Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; Council on Functional Genomics and Translational Biology; and Stroke Council.
http://circ.ahajournals.org/content/early/2017/10/20/CIR.0000000000000534

Racial and Geographic Disparities in Stroke Mortality

The Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study[1]

- 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.

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