OBESITY, INFLAMMATION, STRESS, AND CANCER DISPARITIES

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Professor, Department of Public Health Sciences, MUSC

Presentation Outline

- Part I – Overview of Cancer Disparities in the US
- Part II – Combating Cancer Disparities in South Carolina: MUSC Hollings Cancer Center Cancer Disparities Program

Part I

- Overview of Cancer Disparities in the US


Diabetes
Sleep Apnea
Heart Disease
Obesity
Cancer
GERD (Acid Reflux)
High Blood Pressure


280
40
300
20
0
320

What is the Body Mass Index (BMI)?

$$BMI = \frac{\text{weight (lb)} * 703}{\text{height}^2\ (\text{in}^2)}$$

OR

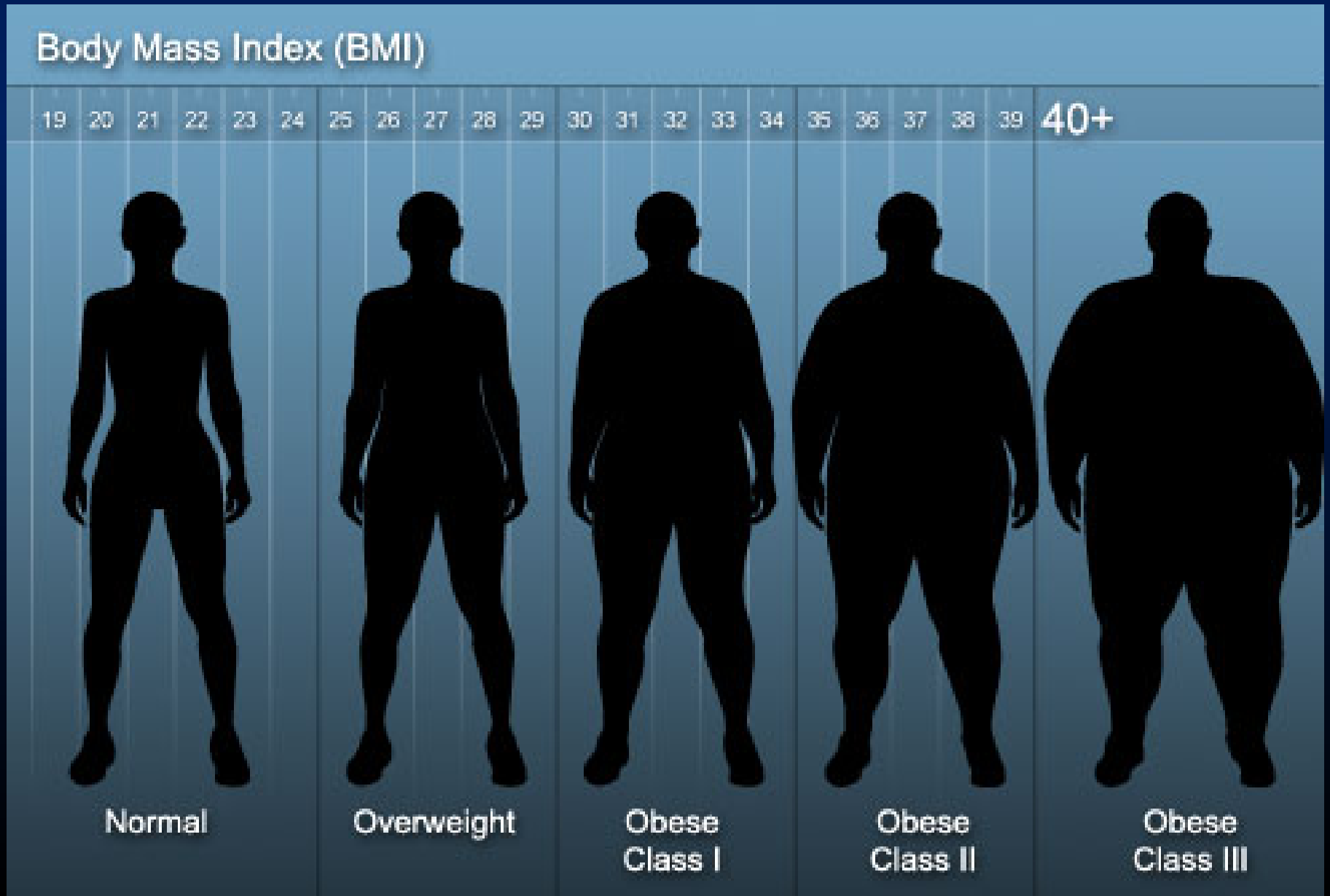
$$BMI = \frac{\text{weight (kg)}}{\text{height}^2\ (\text{m}^2)}$$

(metric)

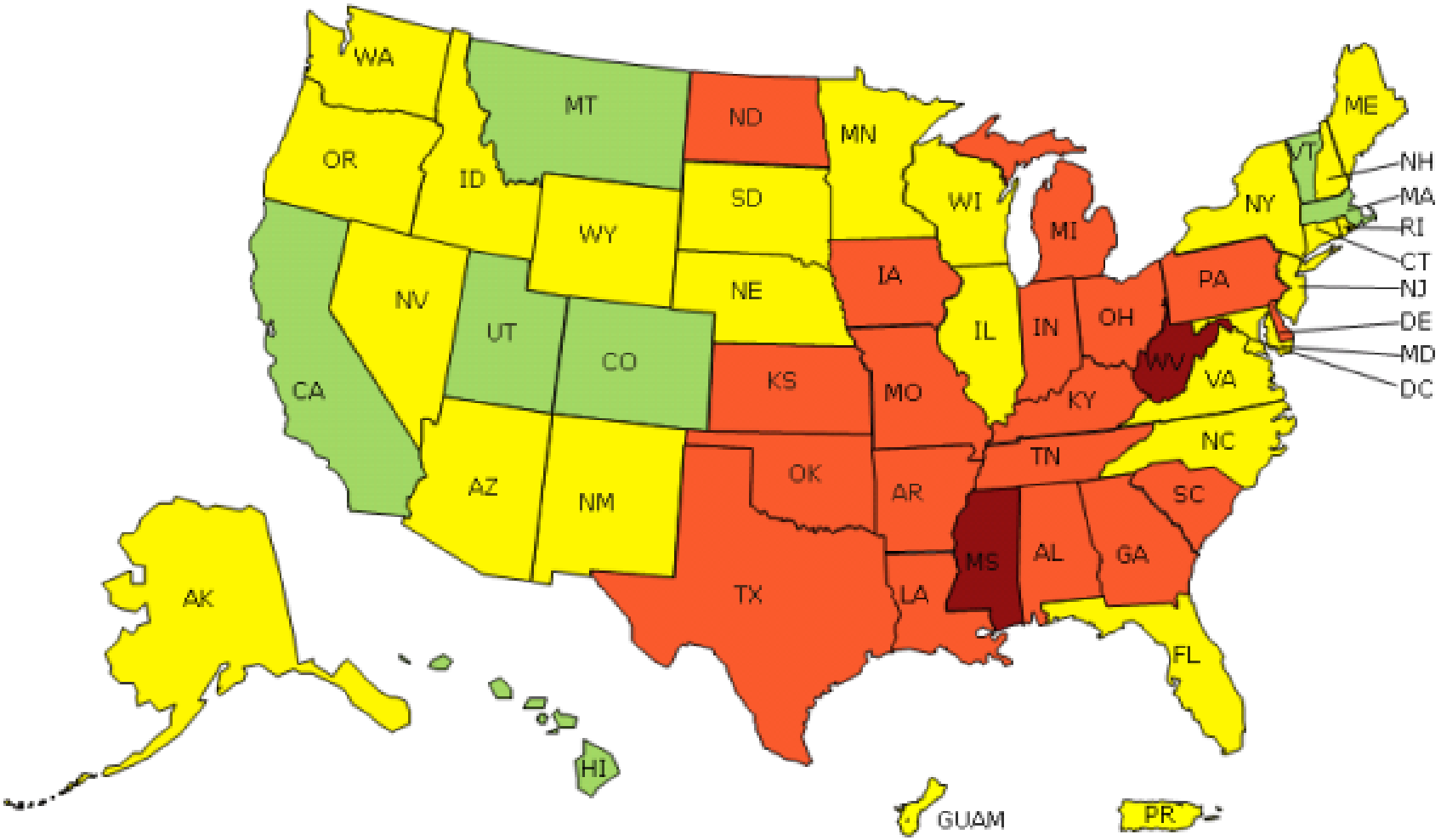
What is the Body Mass Index BMI)?

What is the Body Mass Index (BMI)?

What is the Body Mass Index (BMI)?

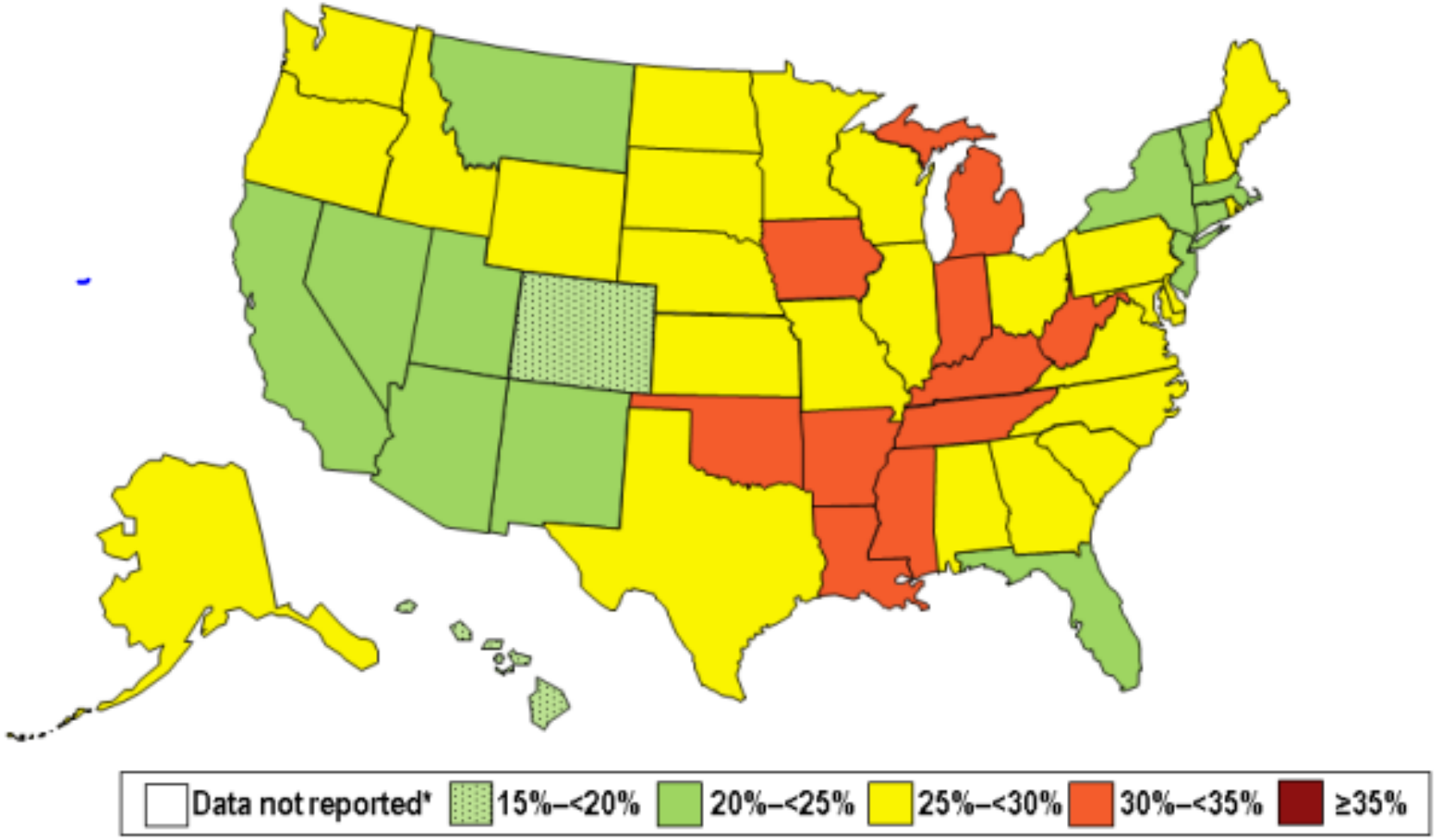


Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013



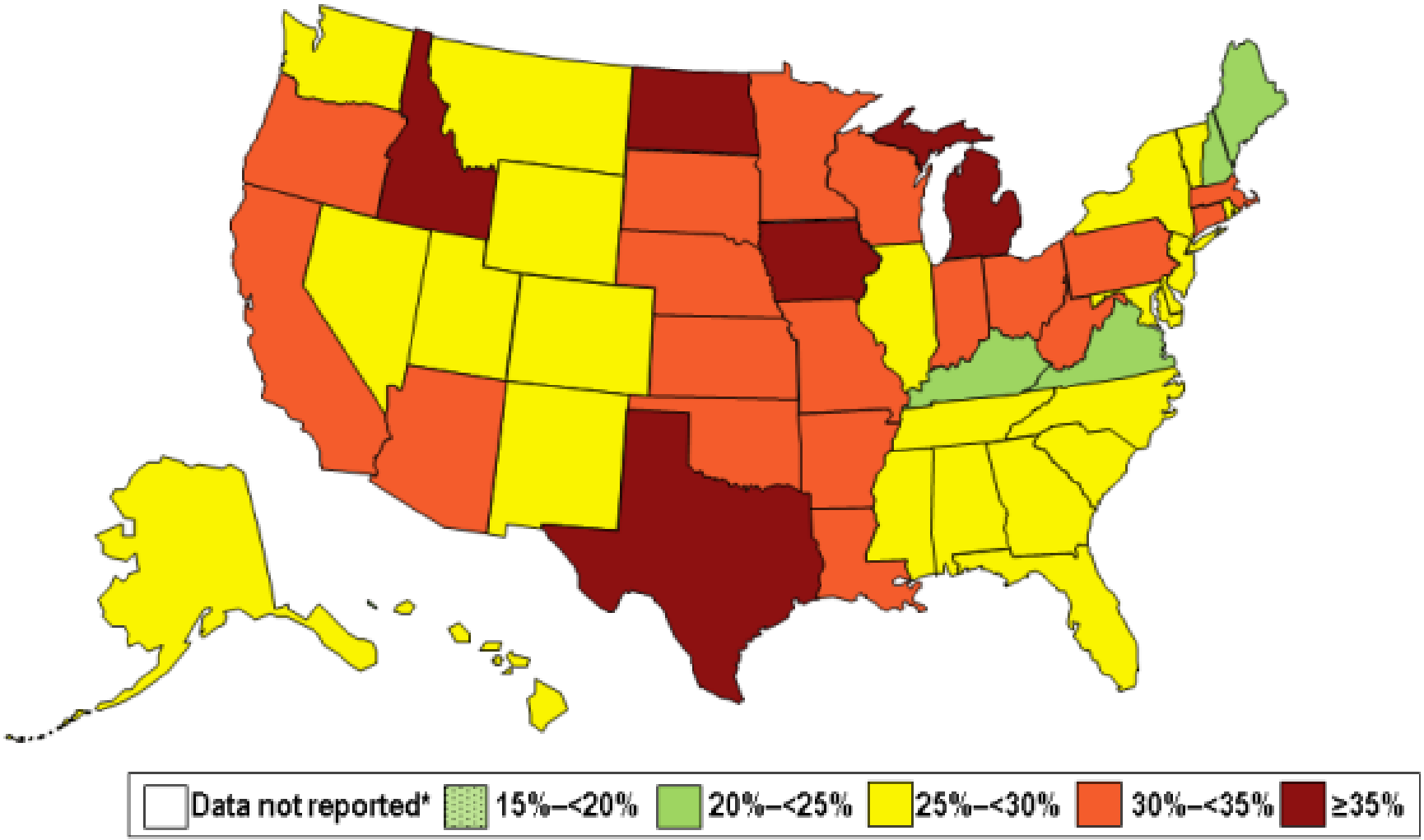
Source: Behavorial Risk Factor Surveillance Systems, CDC.

Prevalence of Self-Reported Obesity Among Non-Hispanic White Adults by State, BRFSS, 2011-2013



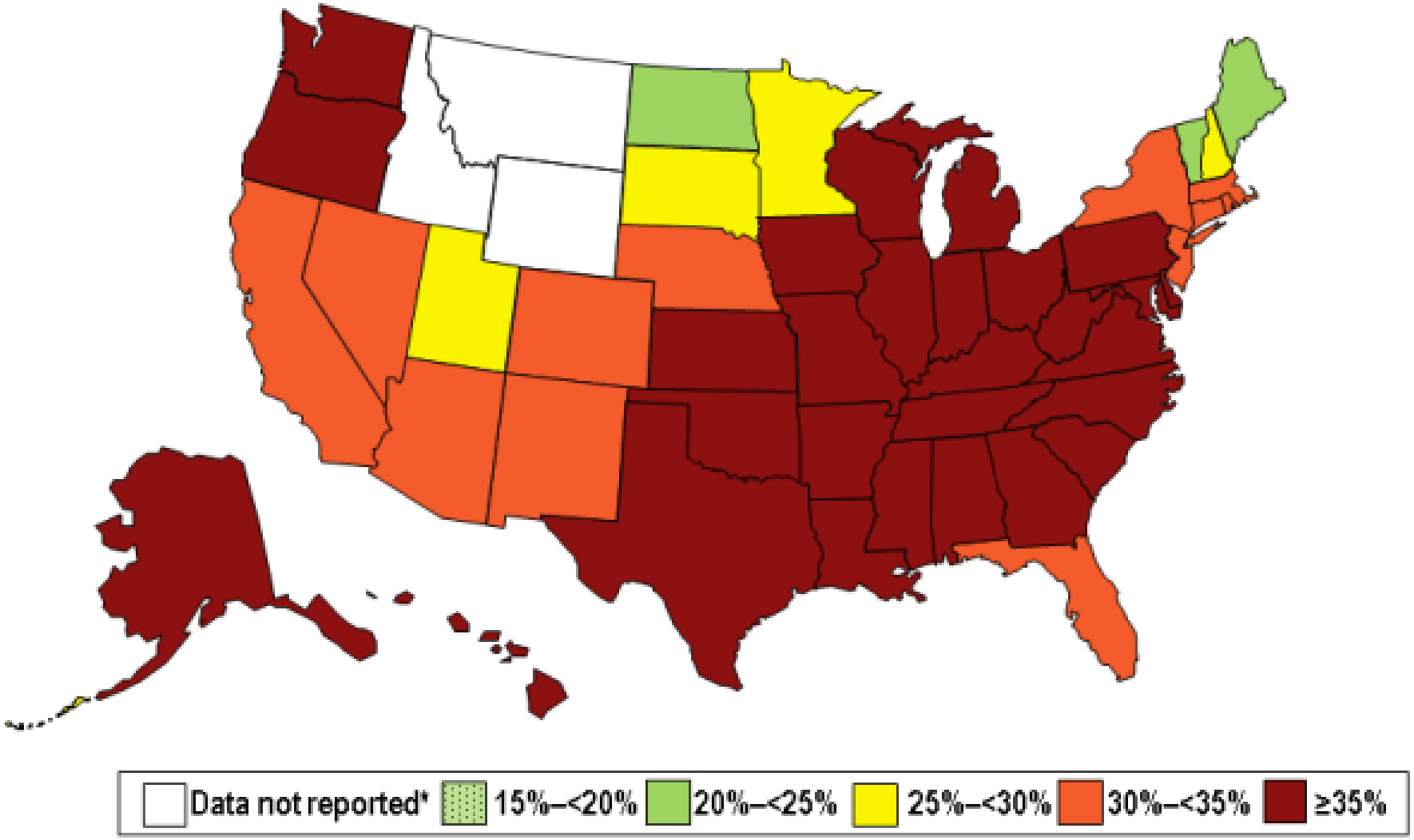
Source: Behavioral Risk Factor Surveillance System

Prevalence of Self-Reported Obesity Among Hispanic Adults by State, BRFSS, 2011-2013



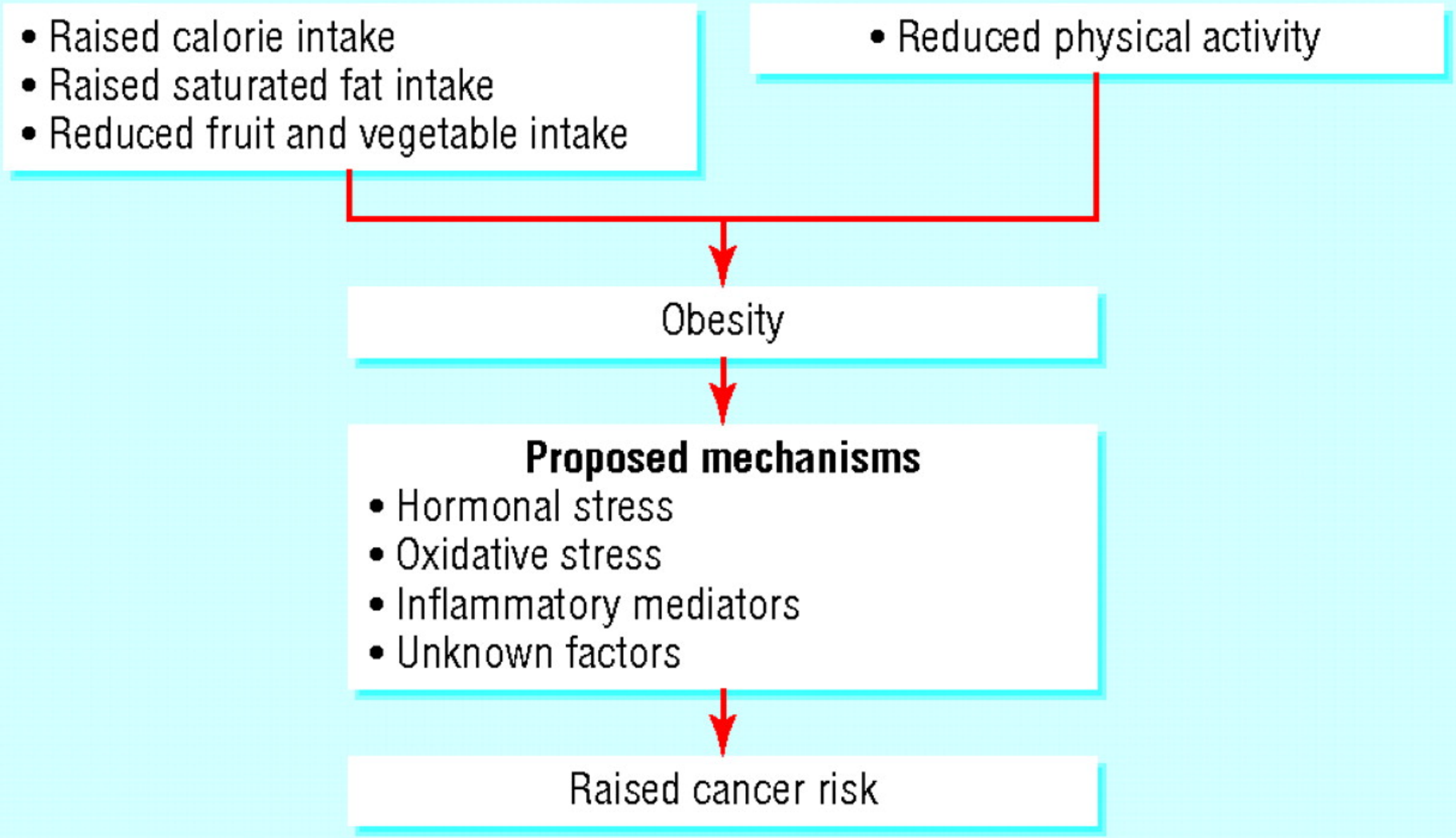
Source: Behavioral Risk Factor Surveillance System

Prevalence of Self-Reported Obesity Among Non-Hispanic Black Adults by State, BRFSS, 2011-2013



Source: Behavioral Risk Factor Surveillance System

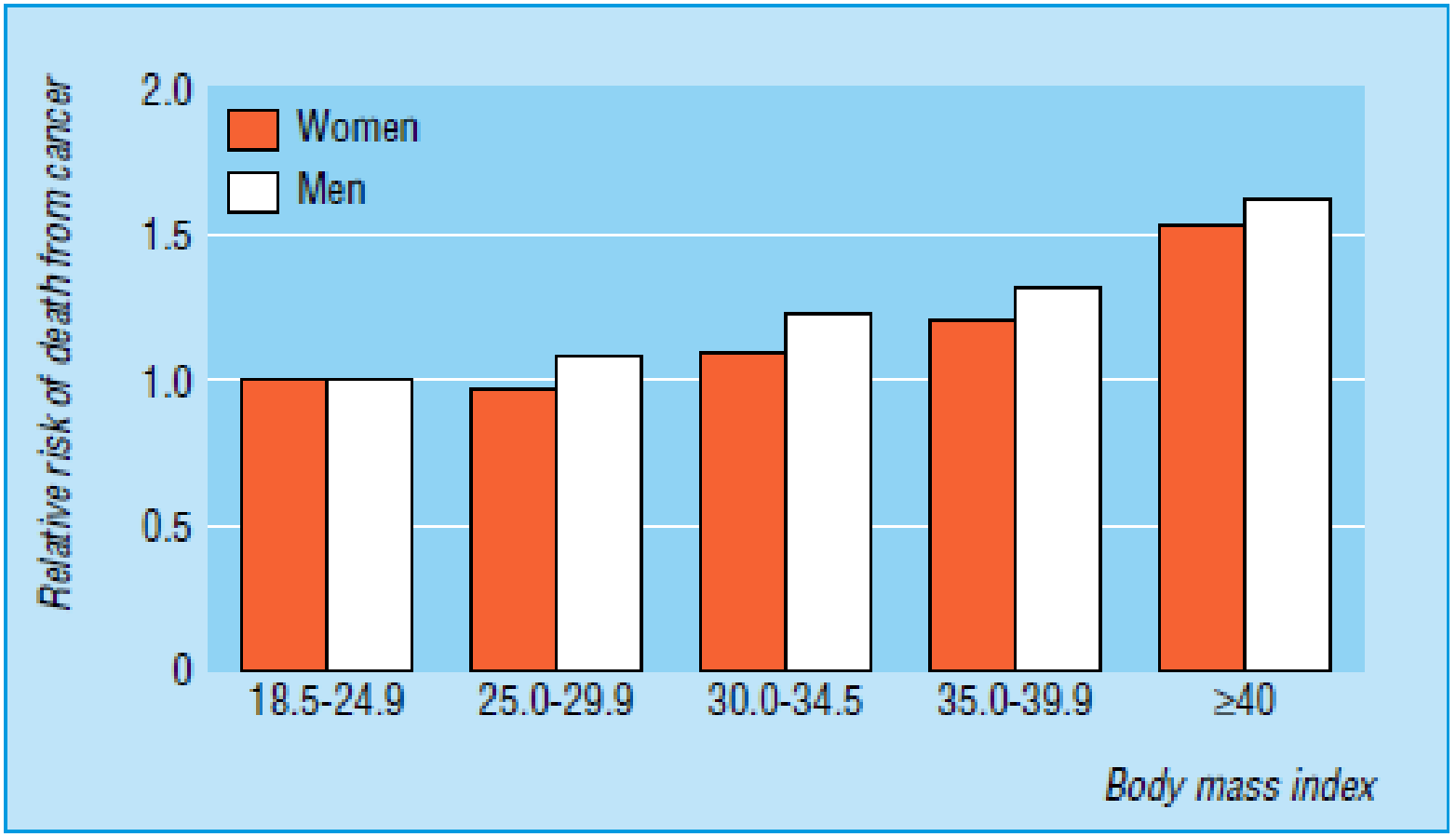
The Obesity-Cancer Link



The Obesity-Cancer Link (continued)

- Fatty tissue expresses and releases pro-inflammatory cytokines
- These cytokines have been associated with obesity
- Cytokines are also associated with many chronic diseases, such as cancer (as well as diabetes and cardiovascular disease)

More Pounds = Greater Risk of Dying from Cancer



Contribution of overweight and obesity to mortality from cancer in the United States, 1982-98. Adapted from Adami H-O et al (*N Engl J Med* 2003;348:1623-4)

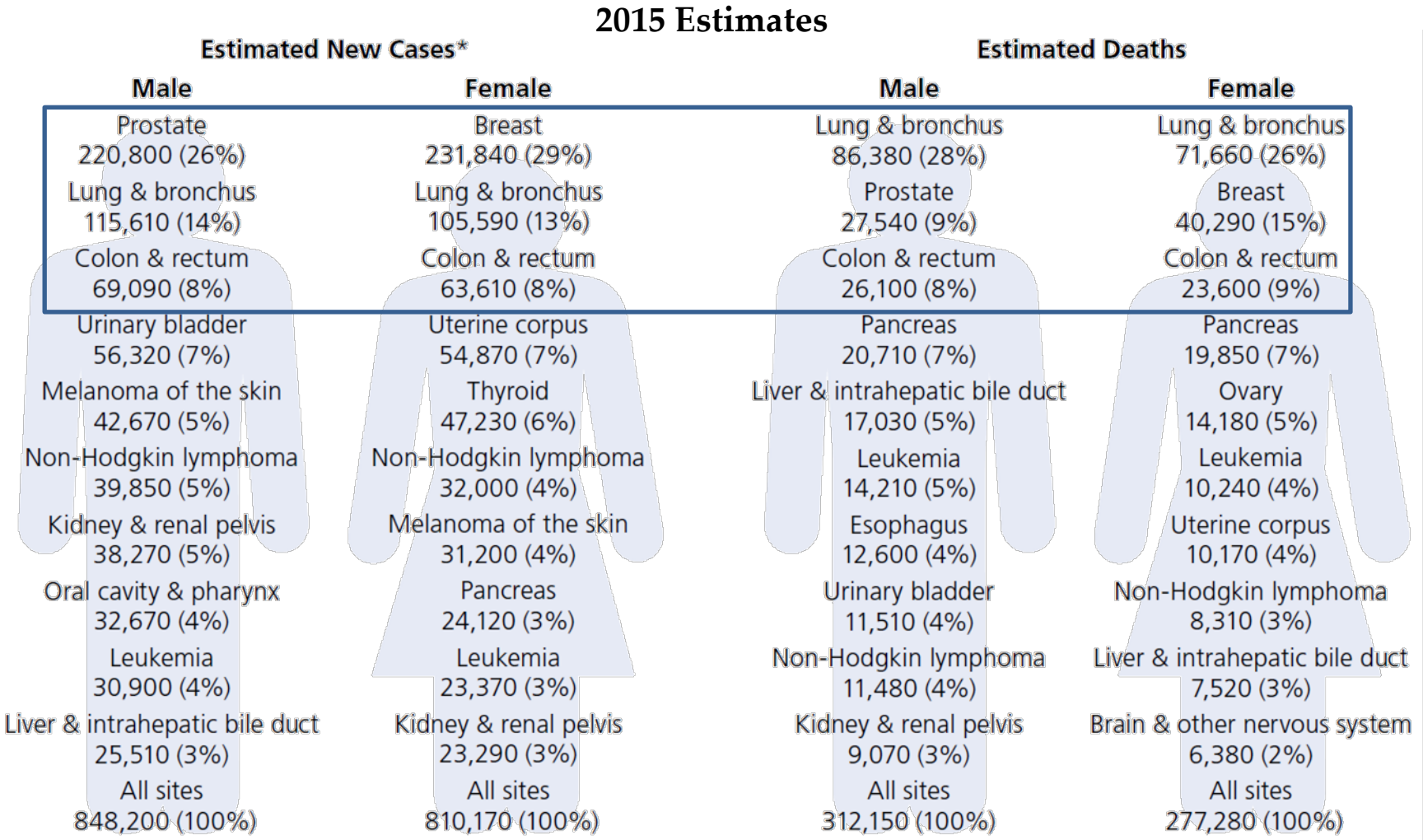
Bloomberg Businessweek

Healthier Lifestyles May Prevent 340,000 U.S. Cancers a Year: Study

- **Regular exercise, balanced diet, limited alcohol help ward off disease, researchers find**

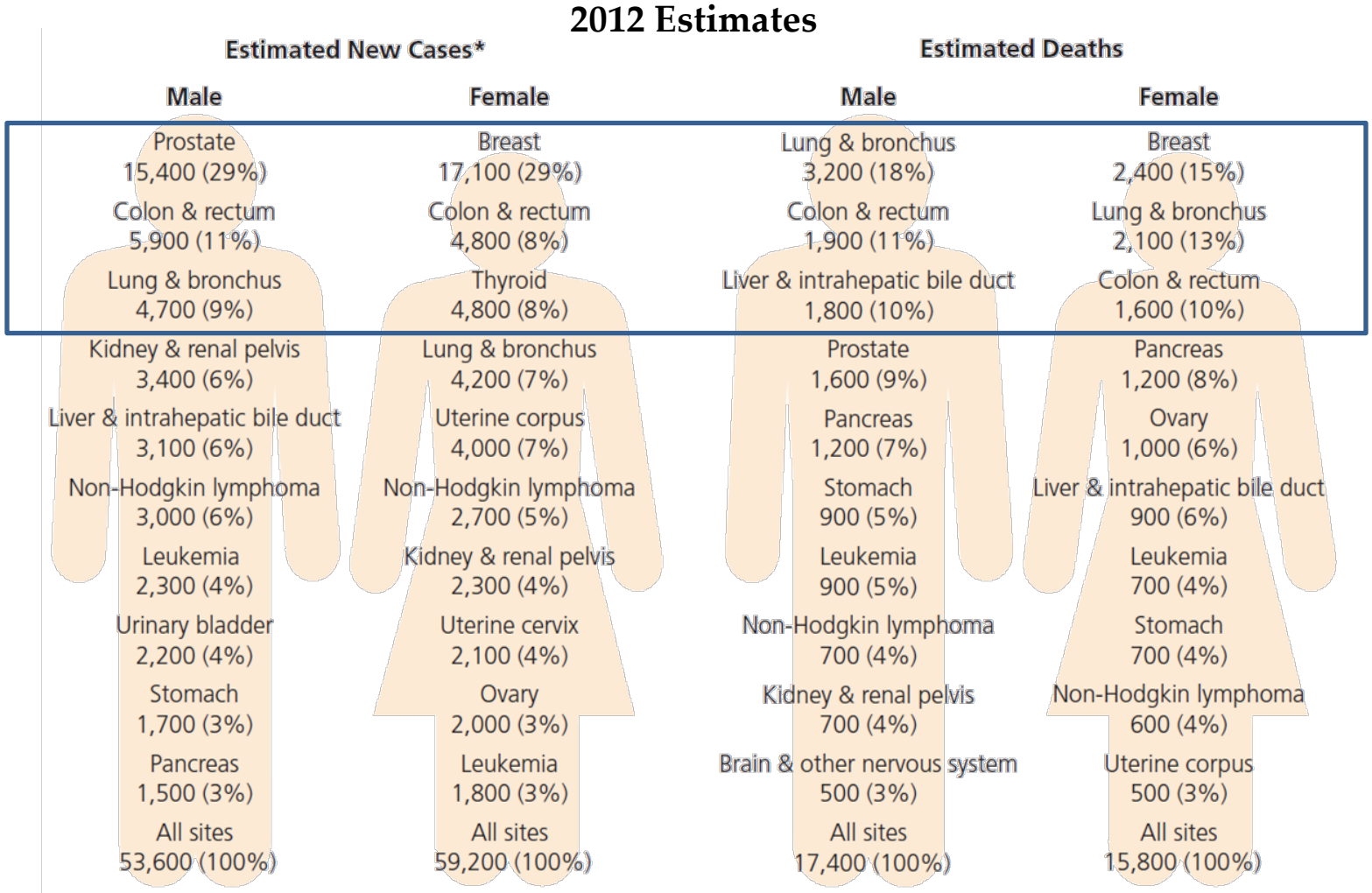
- **SOURCE: World Cancer Research Fund, News Release, February 3, 2011**

Cancer Incidence and Mortality in the US, 2015



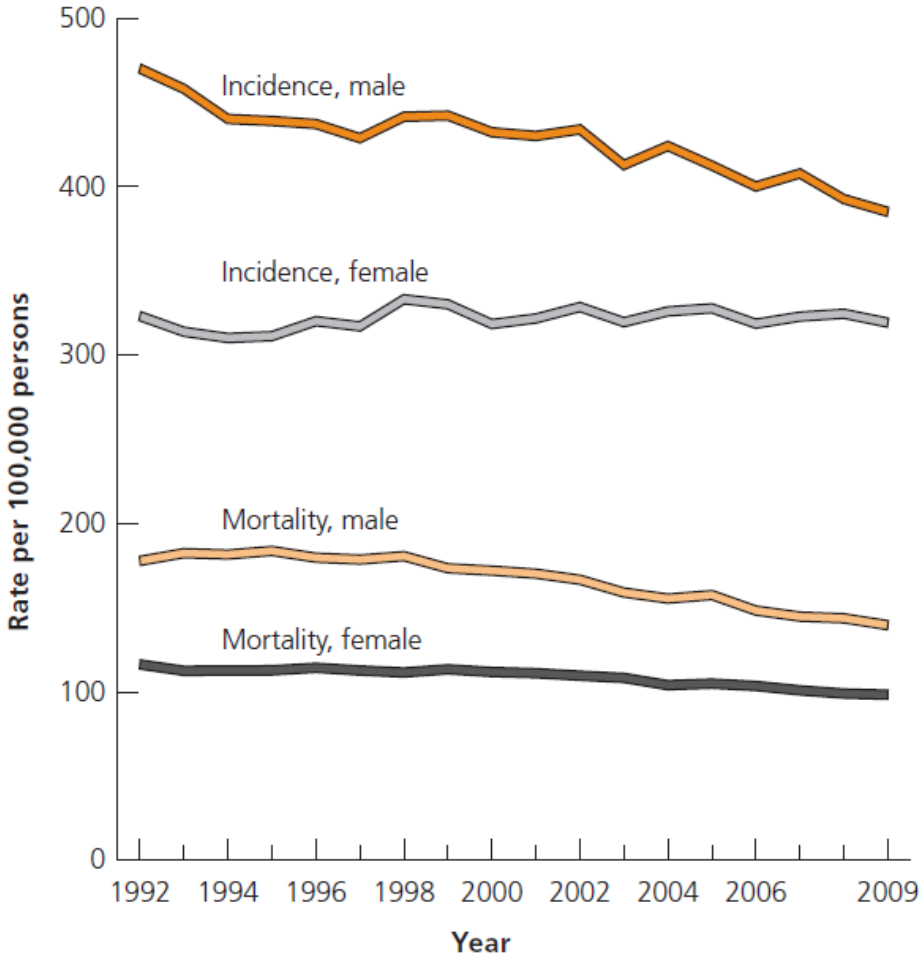
*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Cancer Incidence and Mortality in US Hispanics/Latinos, 2012



* Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates are rounded to the nearest 100.

Trends in Incidence and Death Rates for all Cancers Combined Among Hispanics

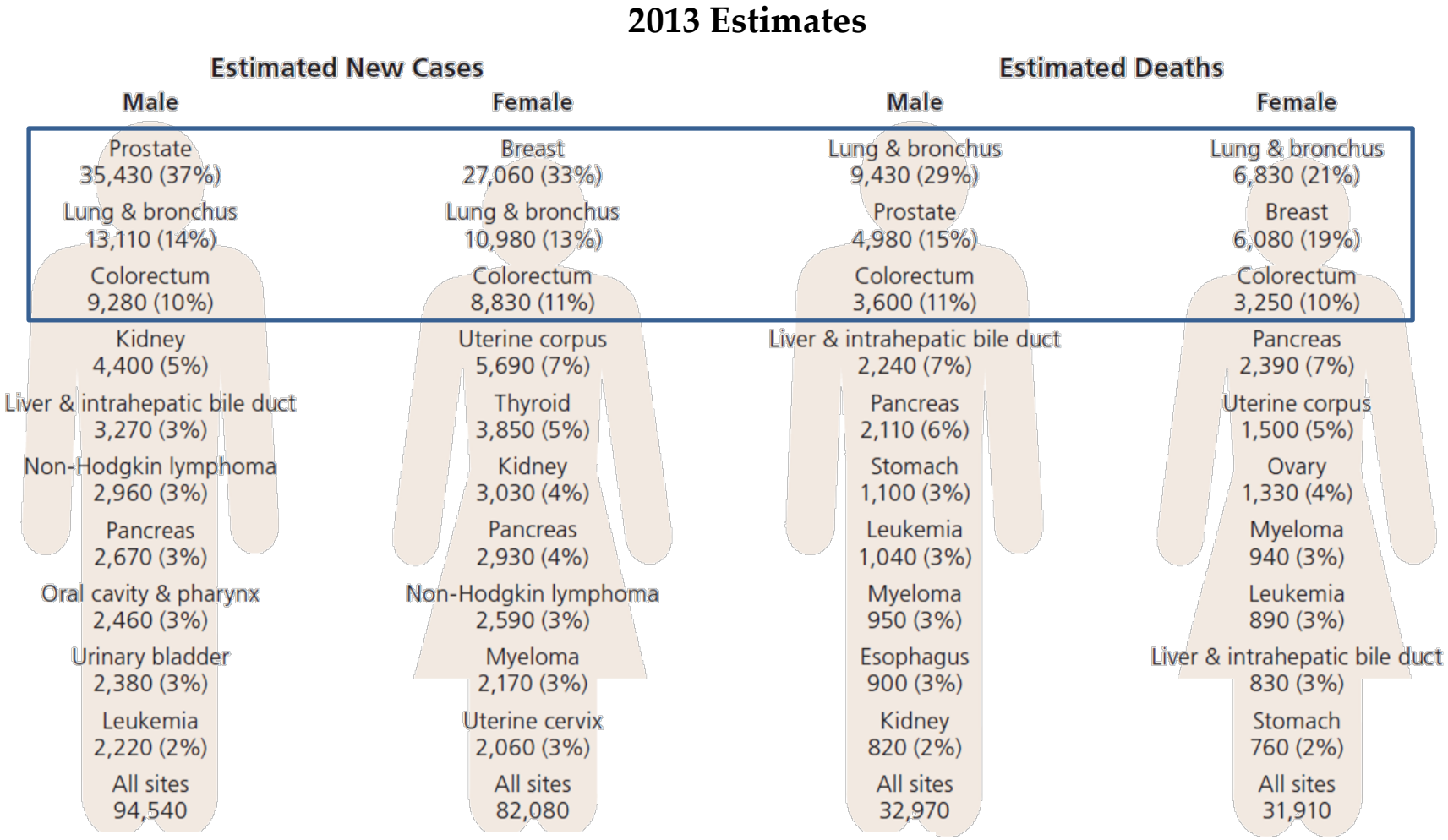


Hispanic Epidemiological Paradox

- Strong Social Support
- Less acculturated in US

Source: Surveillance, and End Results Program, 2012

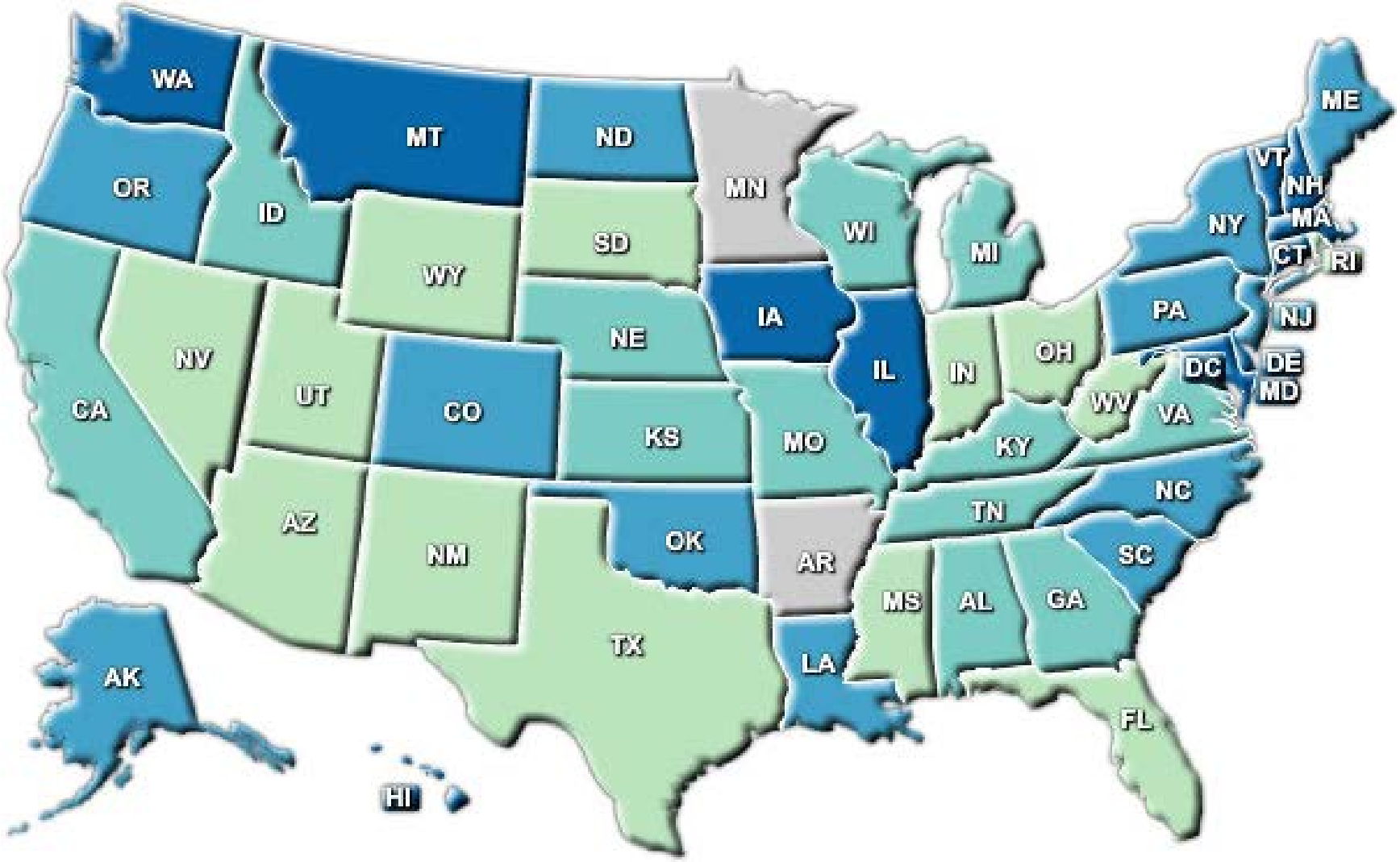
Cancer Incidence and Mortality* in US Blacks, 2013



*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

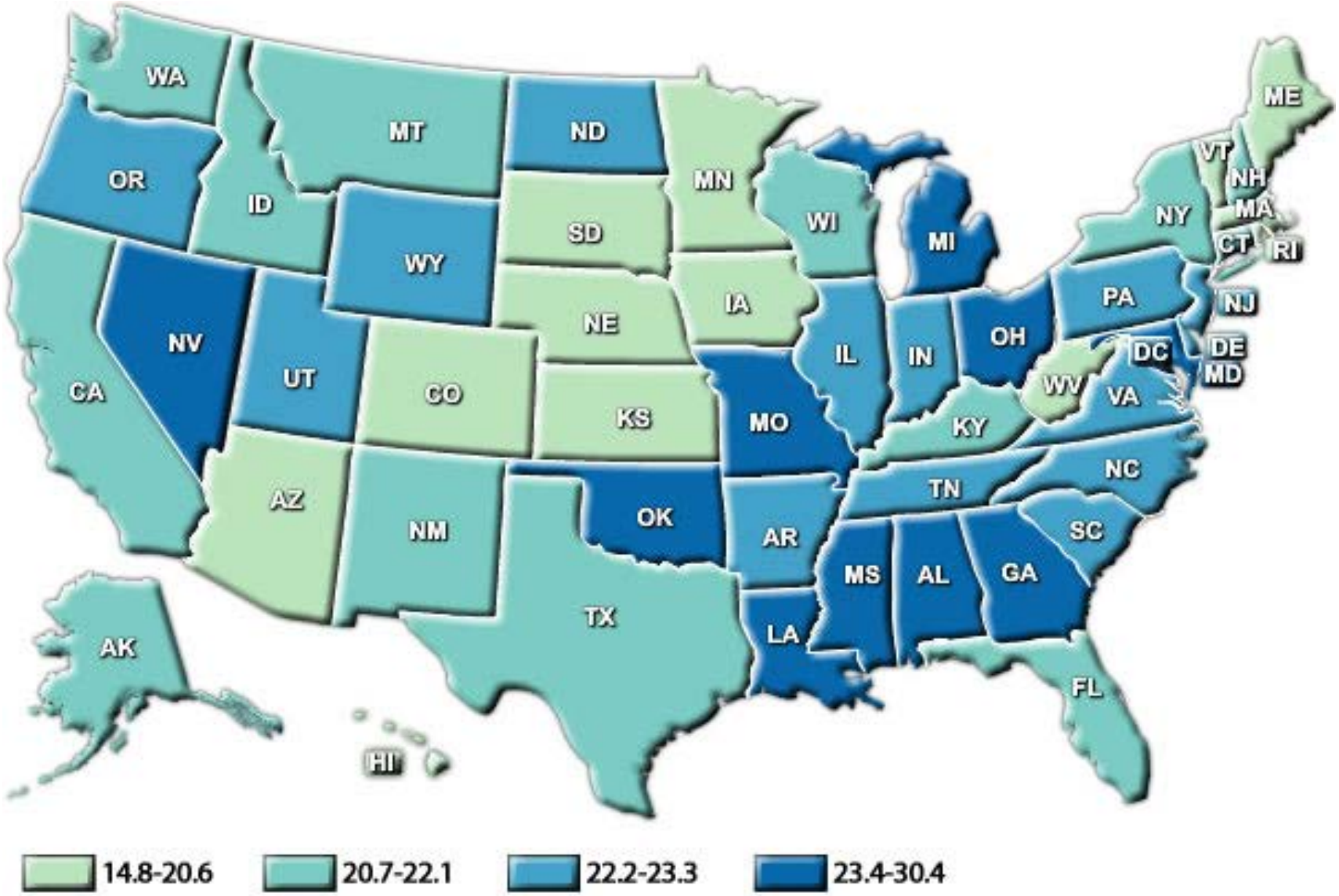
Note: Percentages may not total 100% due to rounding.

Female Breast Cancer Incidence Rates by State, 2010



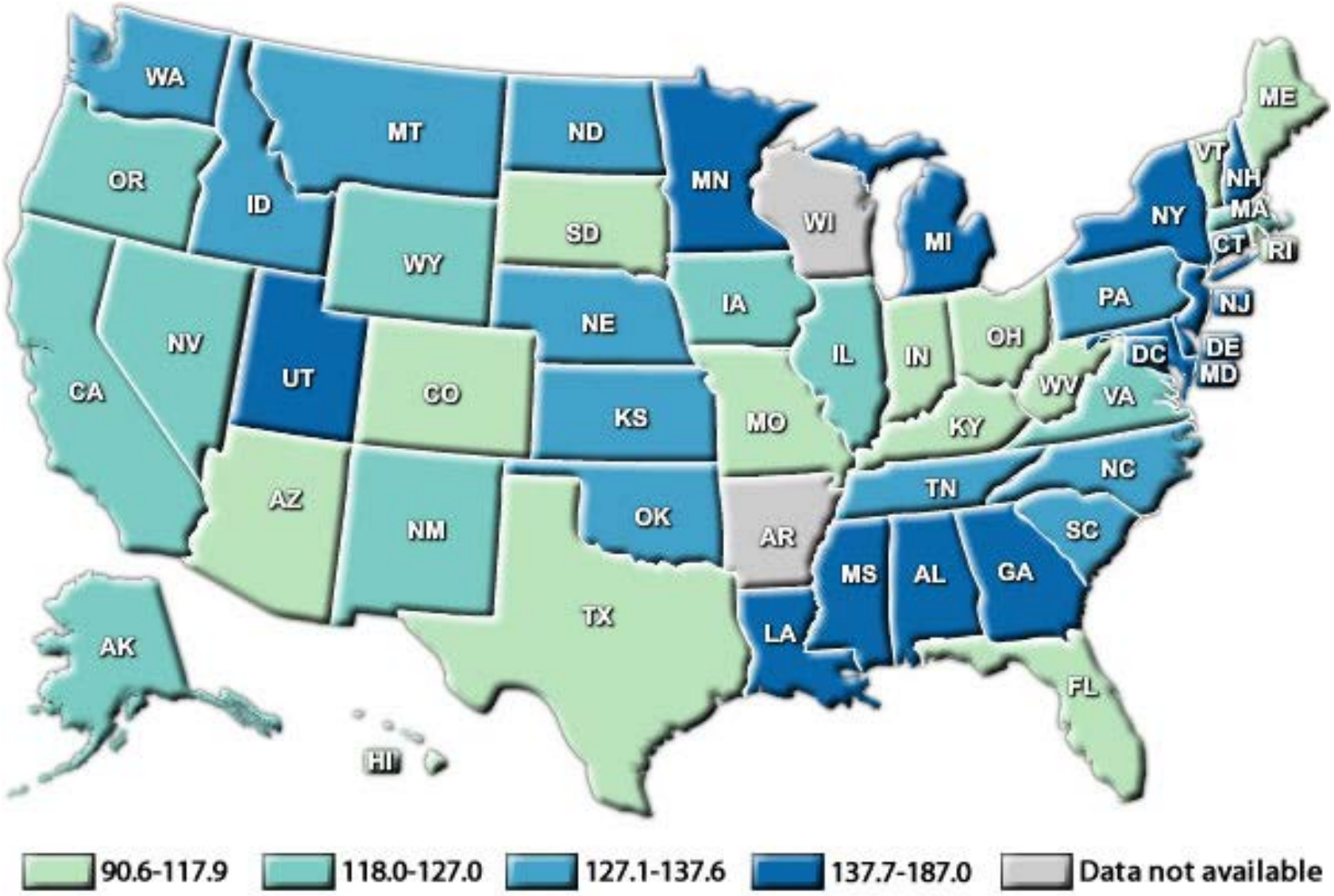
http://www.cdc.gov/cancer/breast/statistics/state.htm

Female Breast Cancer Death Rates by State, 2010



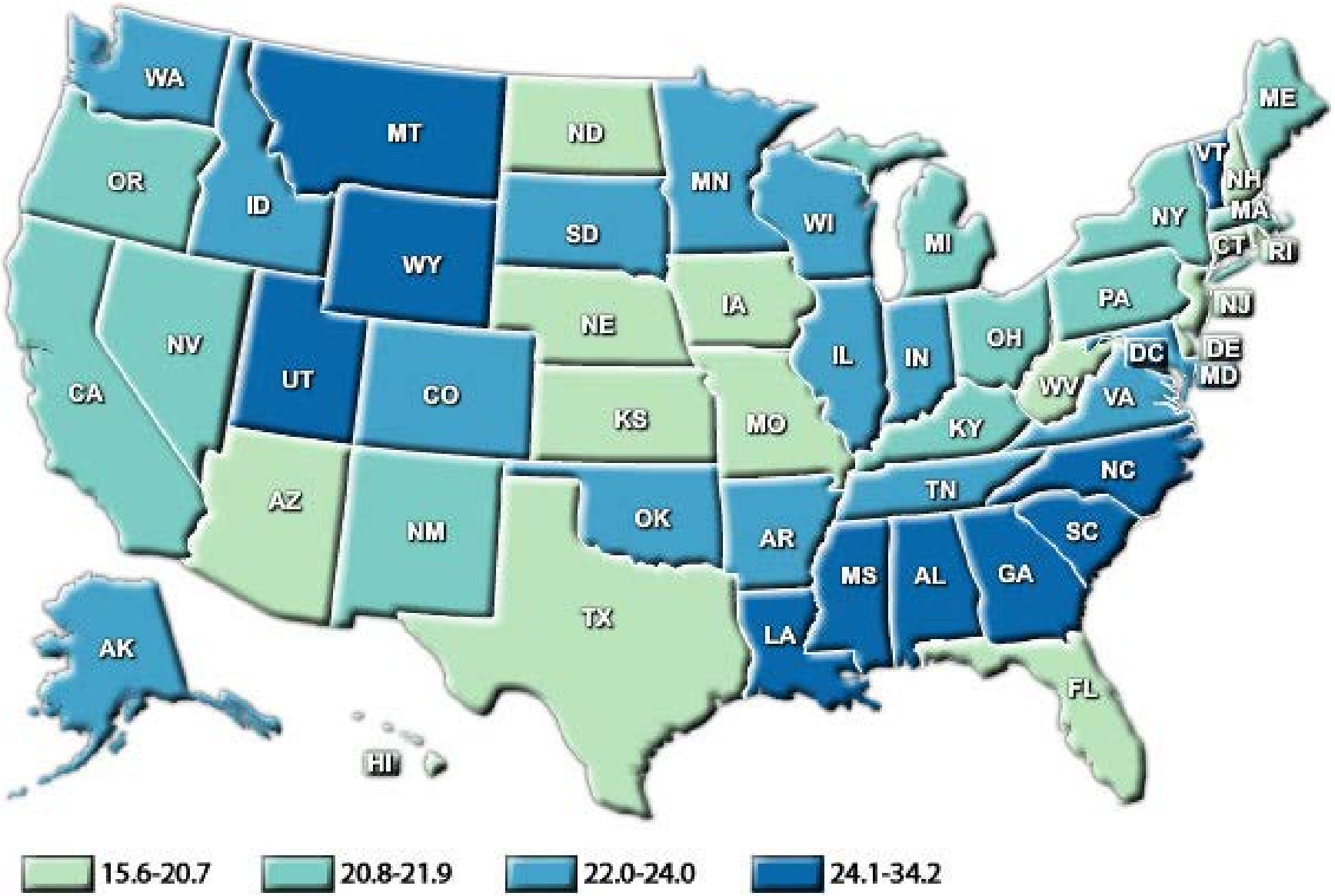
http://www.cdc.gov/cancer/breast/statistics/state.htm

Prostate Cancer Incidence Rates by State, 2010



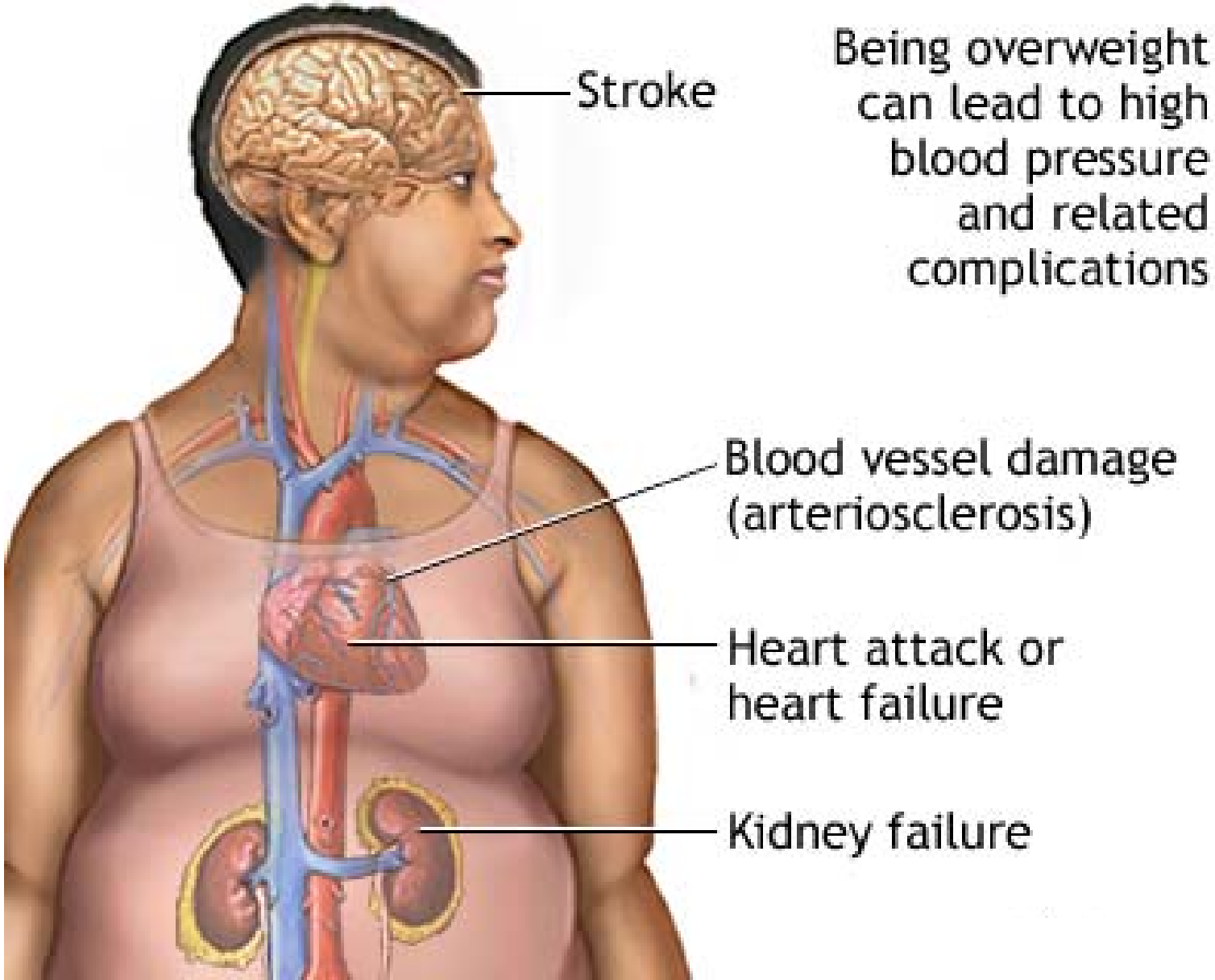
http://www.cdc.gov/cancer/prostate/statistics/state.htm

Prostate Cancer Death Rates by State, 2010



http://www.cdc.gov/cancer/prostate/statistics/state.htm

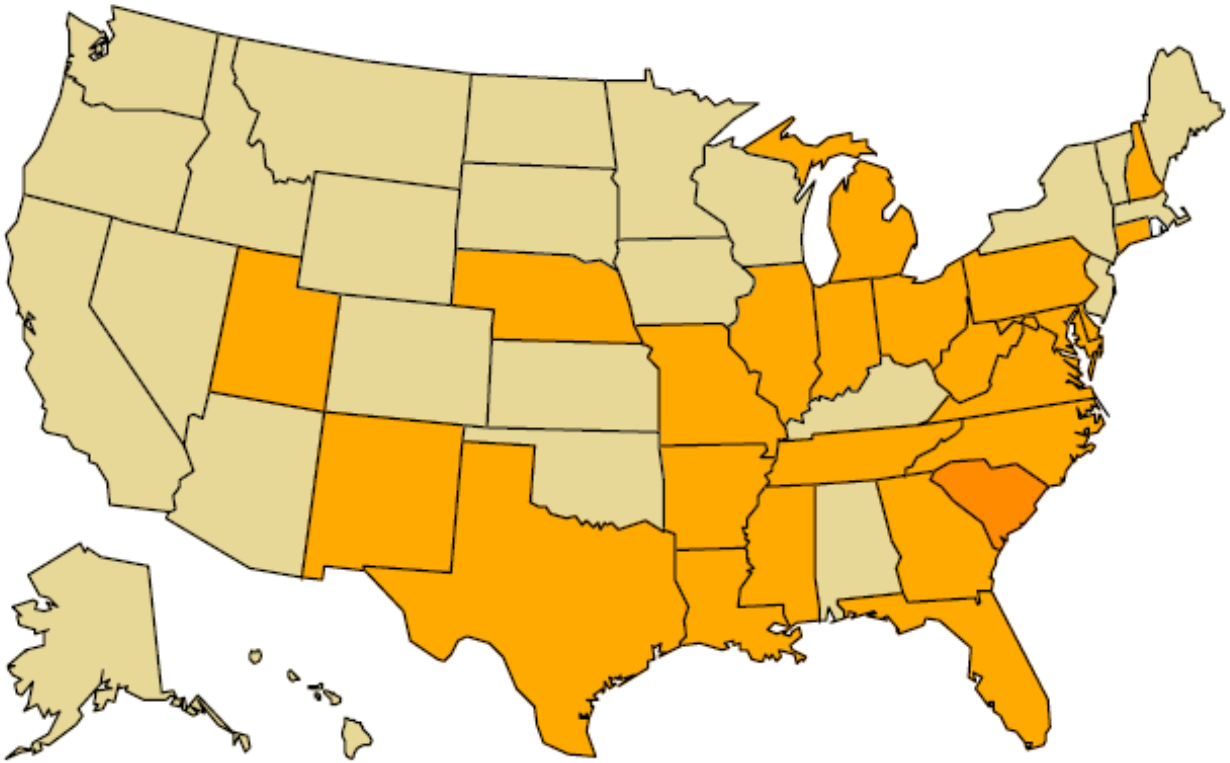
Obesity and Other Diseases



Diabetes

Age-Adjusted Prevalence of Diagnosed Diabetes Among U.S. Adults

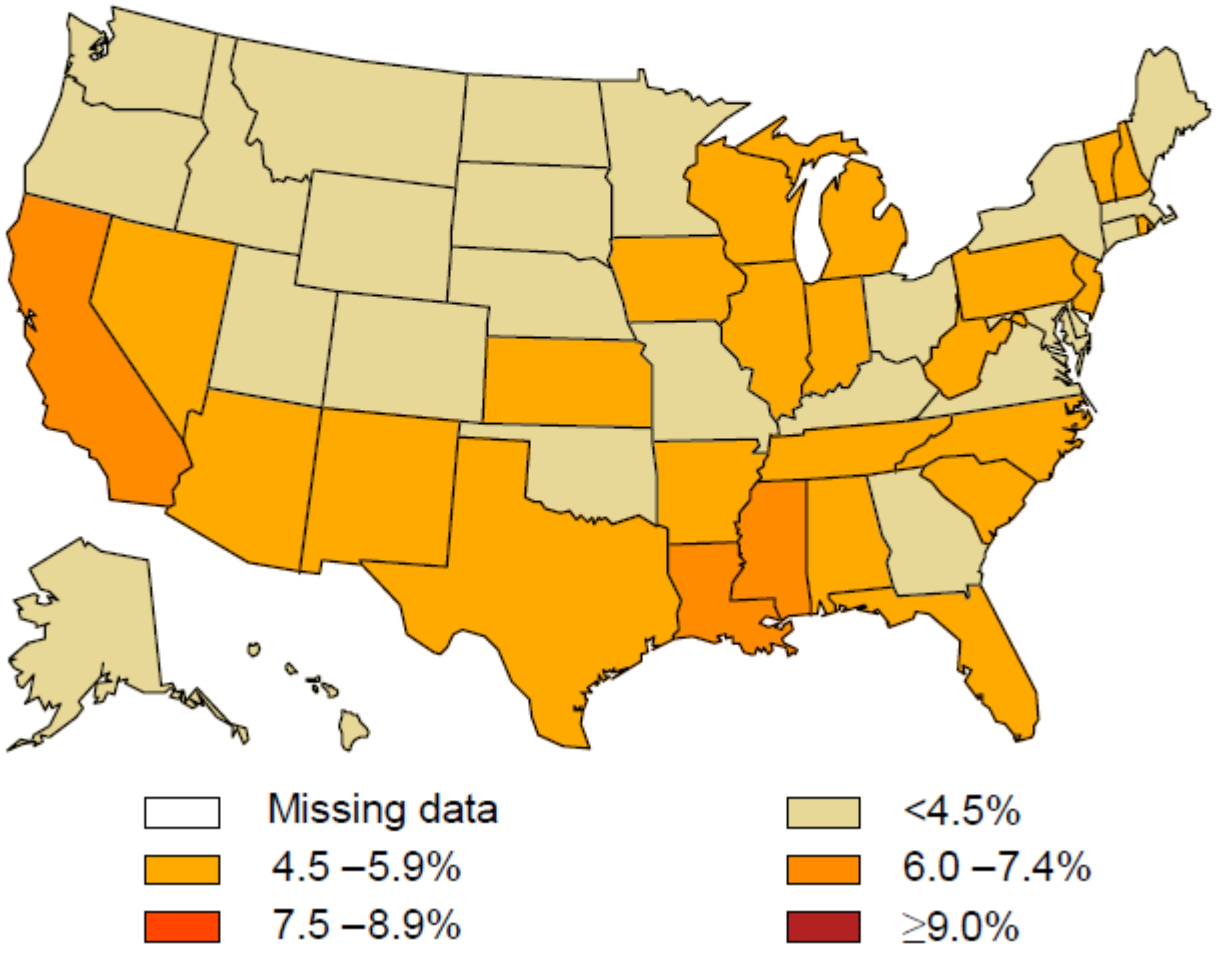
1994



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics

Age-Adjusted Prevalence of Diagnosed Diabetes Among U.S. Adults

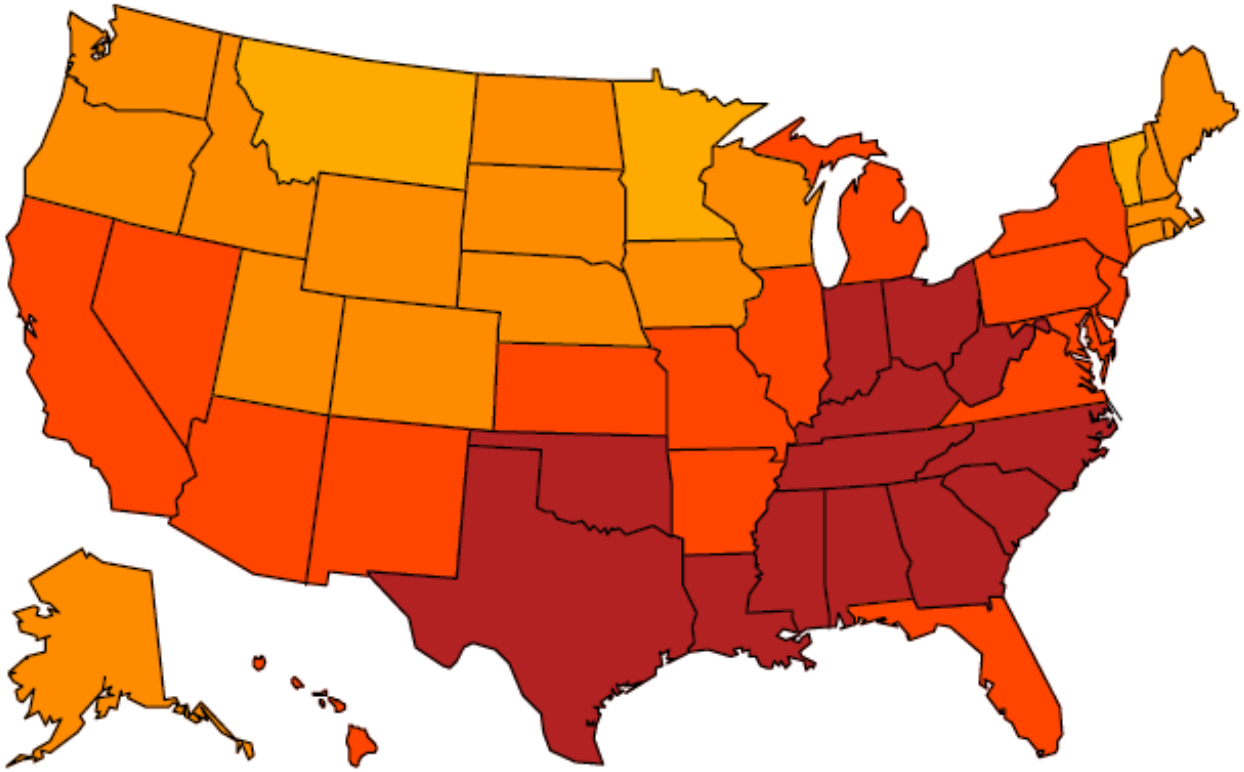
1995



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics

Age-Adjusted Prevalence of Diagnosed Diabetes Among U.S. Adults

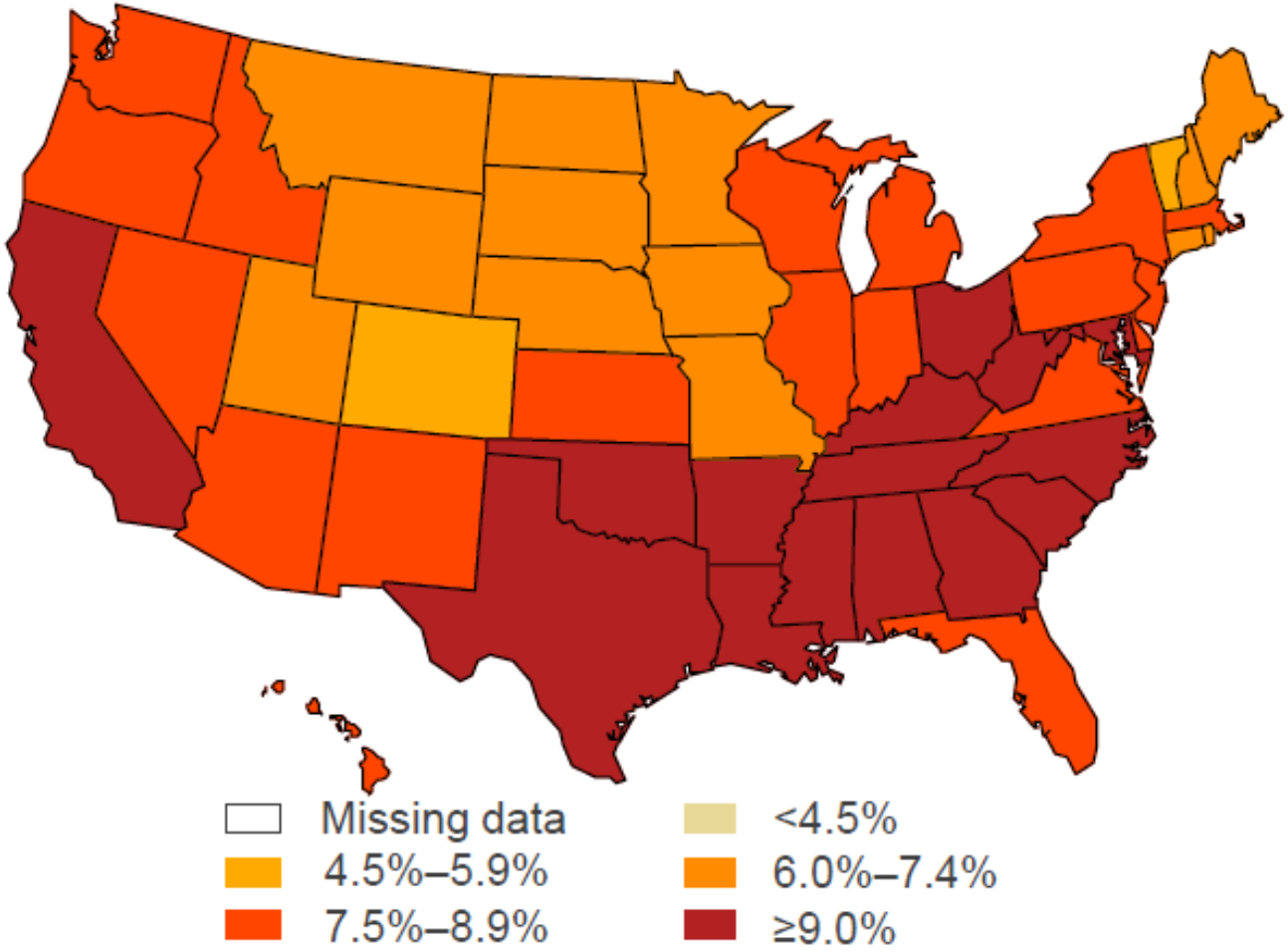
2008



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics

Age–Adjusted Prevalence of Diagnosed Diabetes Among U.S. Adults

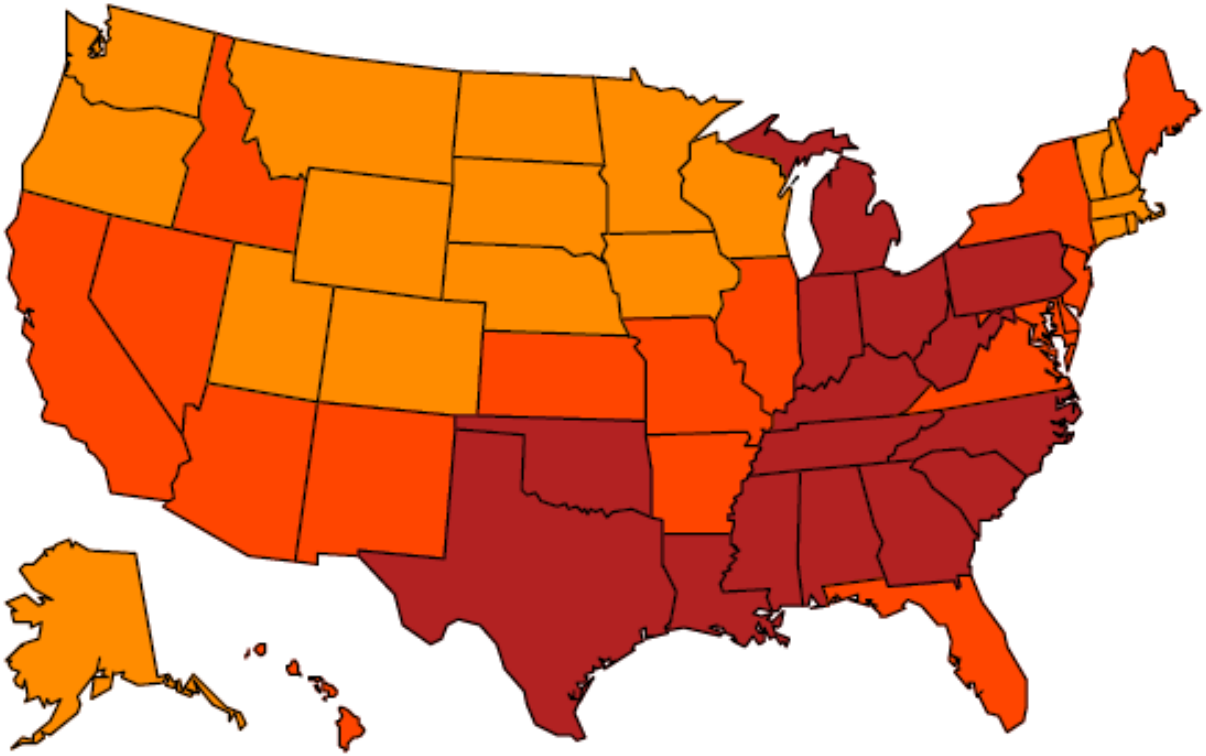
2009



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics

Age–Adjusted Prevalence of Diagnosed Diabetes Among U.S. Adults

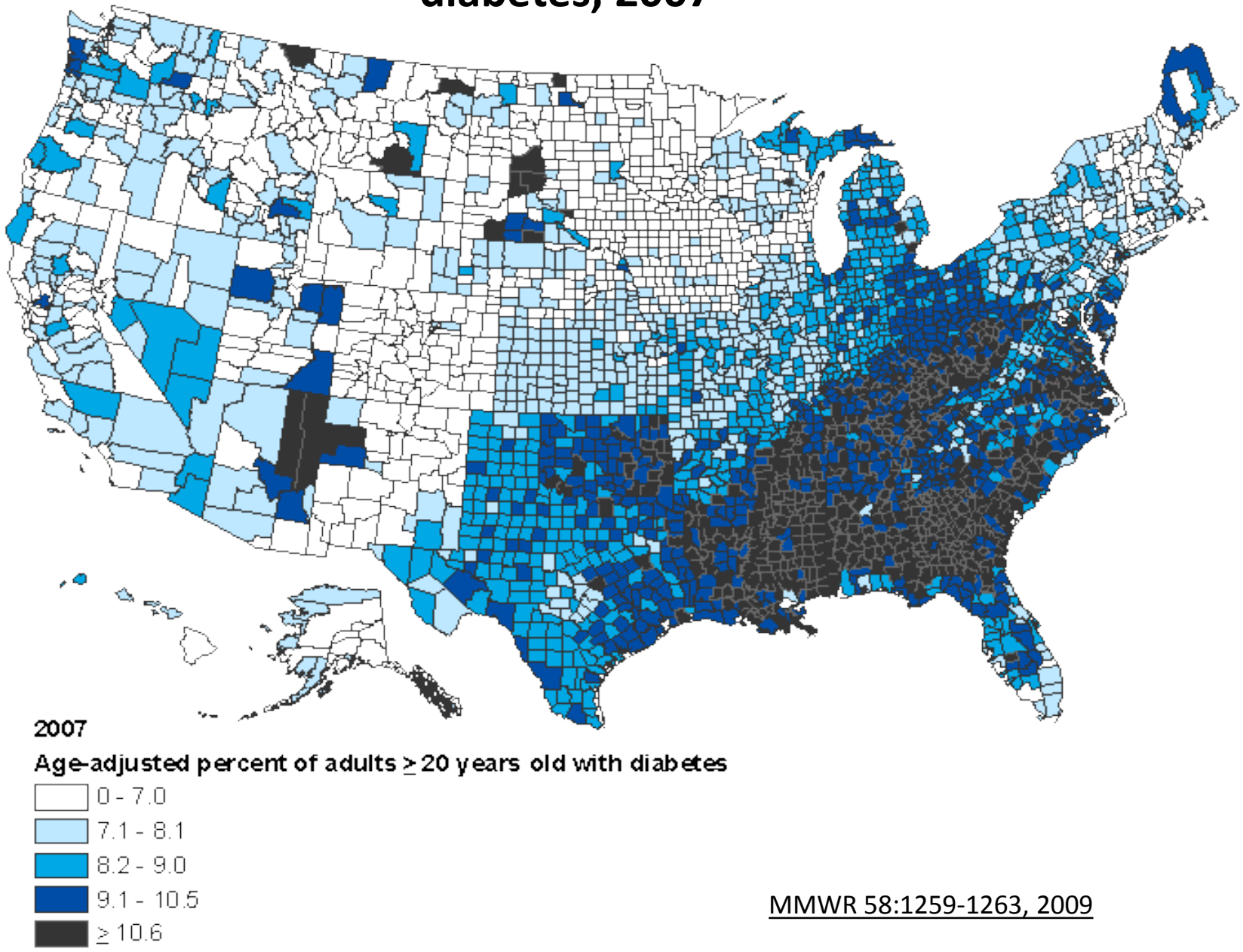
2010



Missing data
<4.5%
4.5%–5.9%
6.0%–7.4%
7.5%–8.9%
≥9.0%

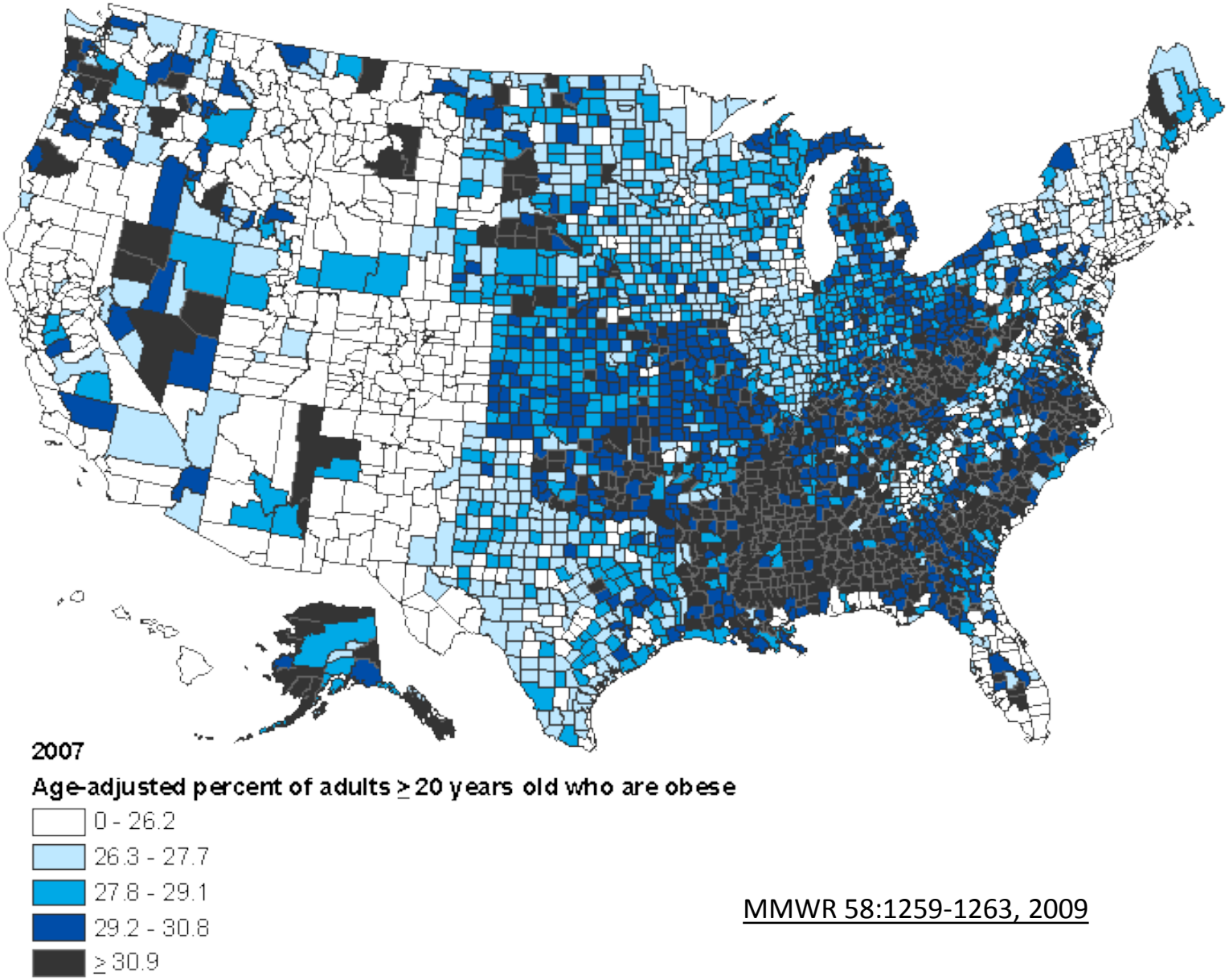
CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics

Age-adjusted percentage of adults aged ≥20 years with diagnosed diabetes, 2007



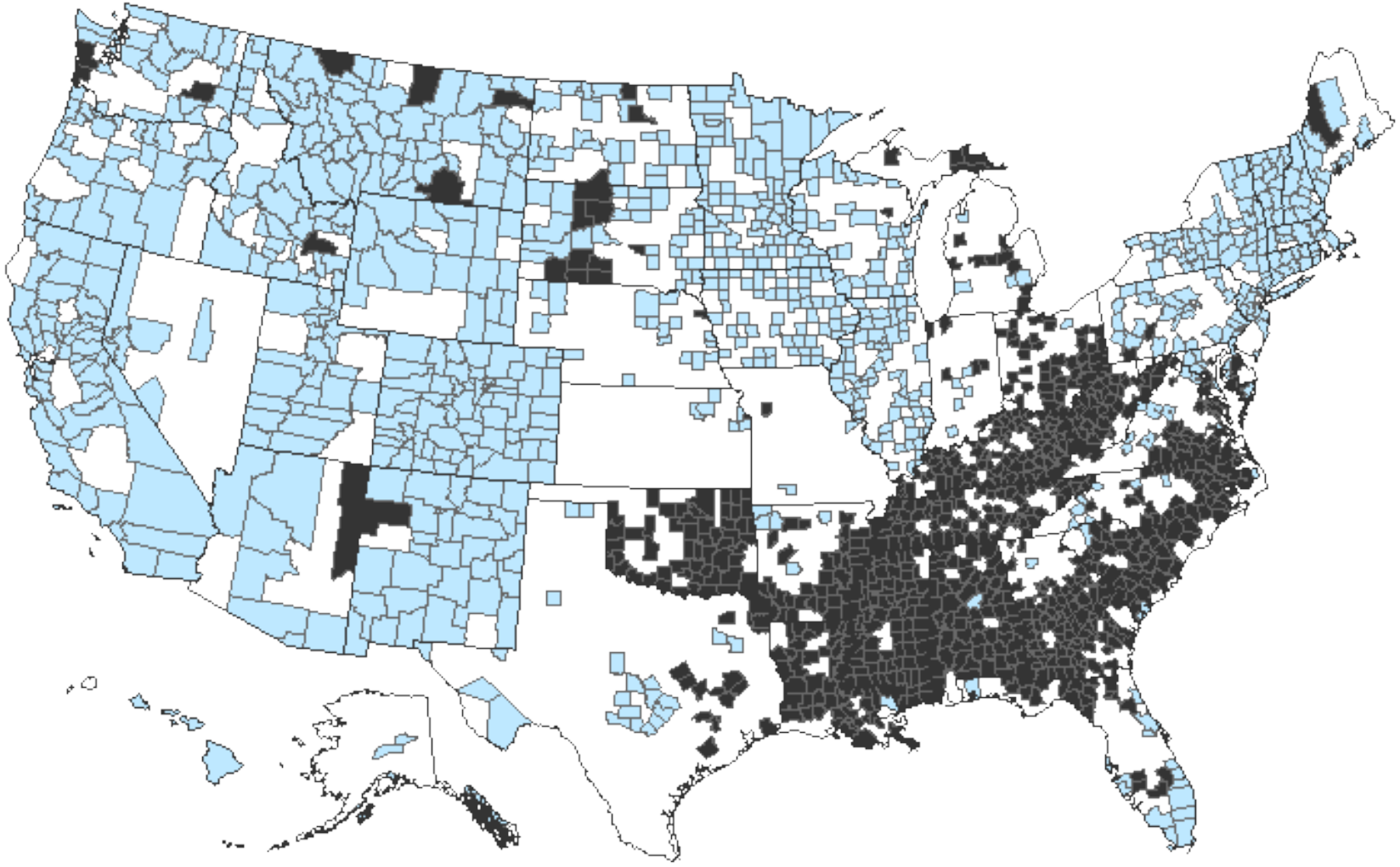
MMWR 58:1259-1263, 2009

Age-adjusted percentage of adults aged ≥20 years who are obese, 2007



MMWR 58:1259-1263, 2009

Counties in the top and bottom two quintiles of both diabetes and obesity, 2007

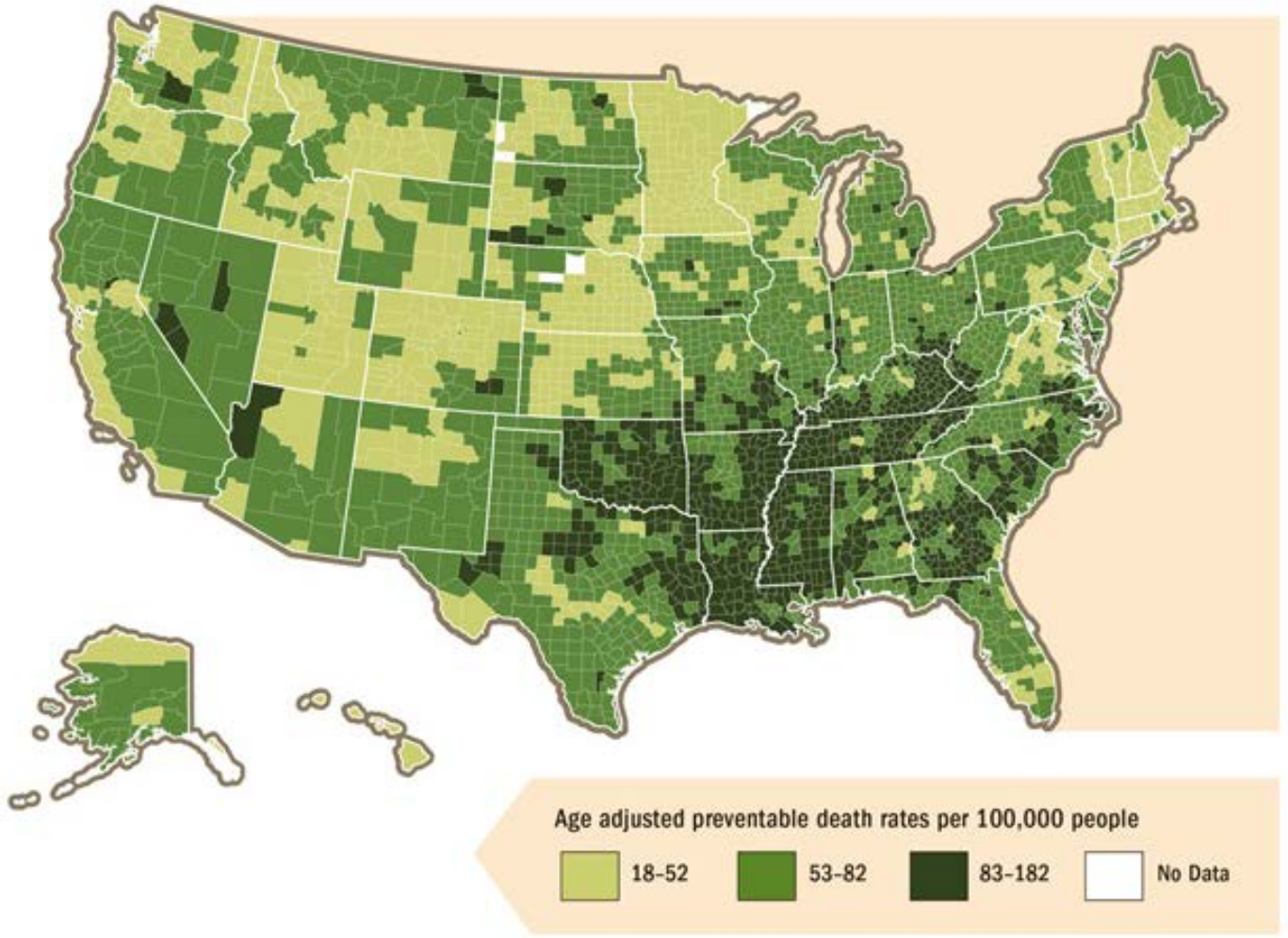


MMWR 58:1259-1263, 2009

Heart Disease and Stroke

Heart Disease and Stroke Mortality Rates

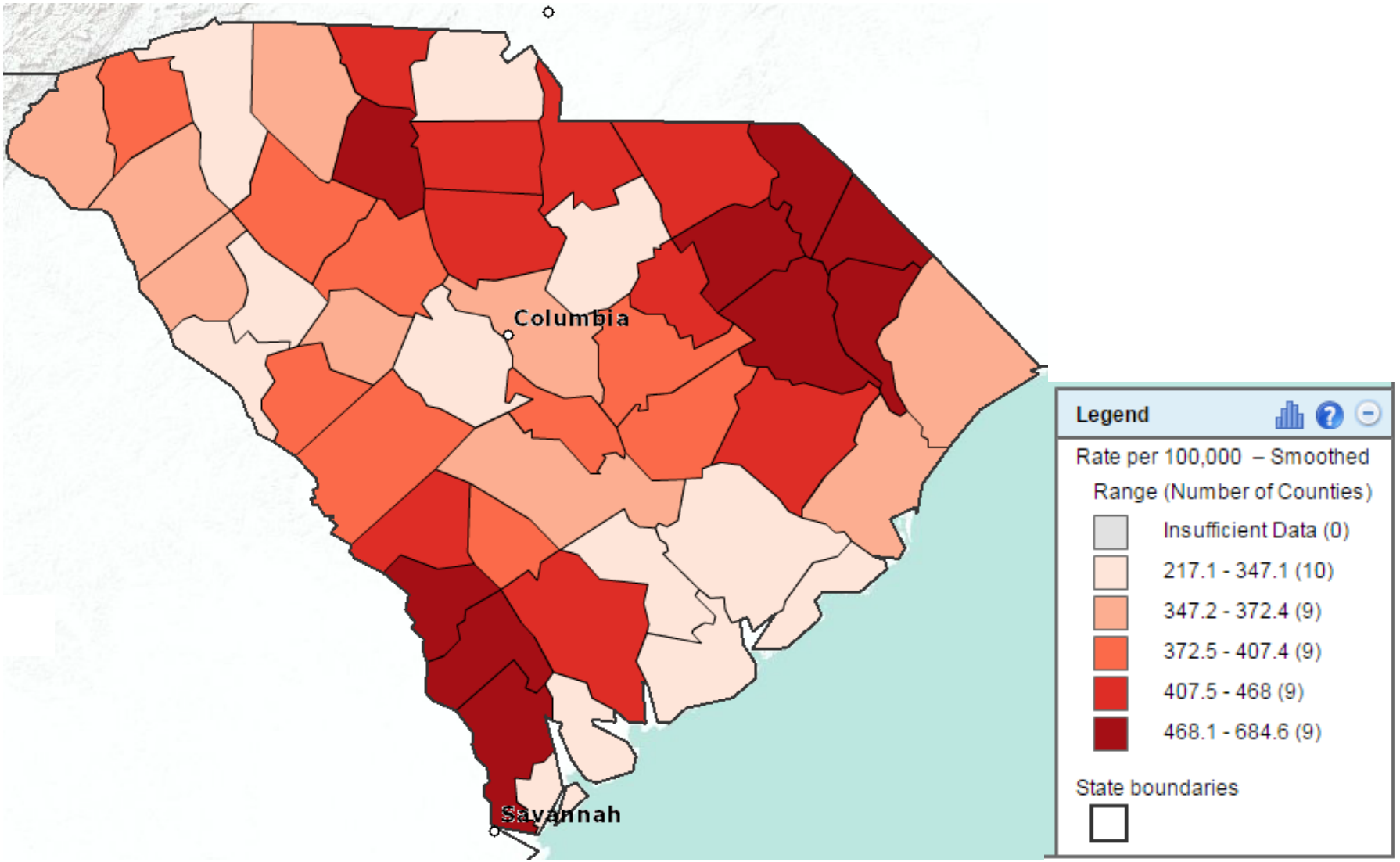
Counties in southern states have the greatest risk overall



SOURCE: National Vital Statistics System, US Census Bureau, 2008-2010.

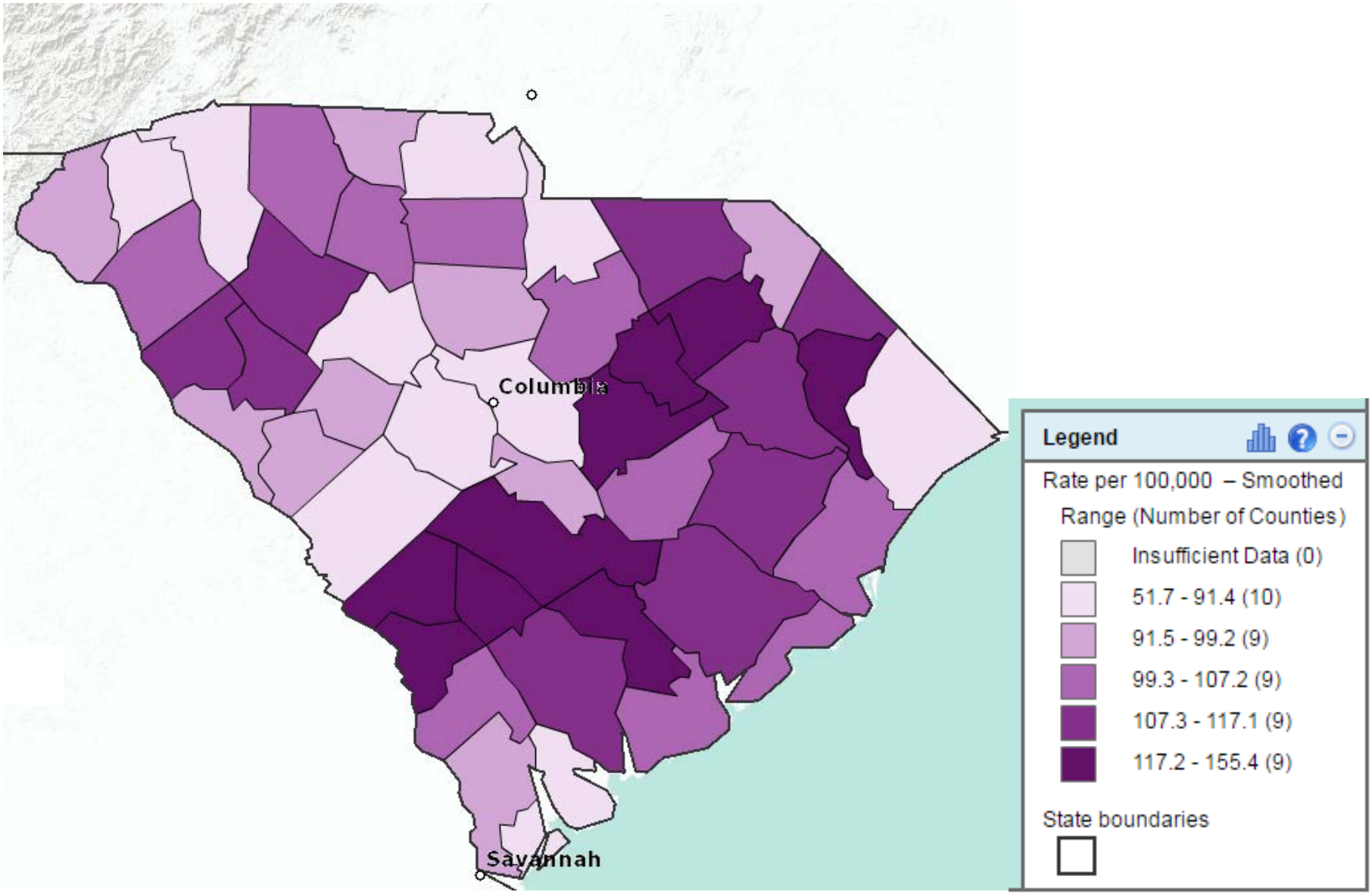
View more maps at the Interactive Atlas for Heart Disease and Stroke.

South Carolina: Heart Disease Death Rate per 100,000, 35+, All Race, All Gender, 2008-2010



http://nccd.cdc.gov/DHDSPAtlas/viewer.aspx?state=SC

South Carolina: Stroke Death Rate per 100,000, 35+, All Race, All Gender, 2008-2010

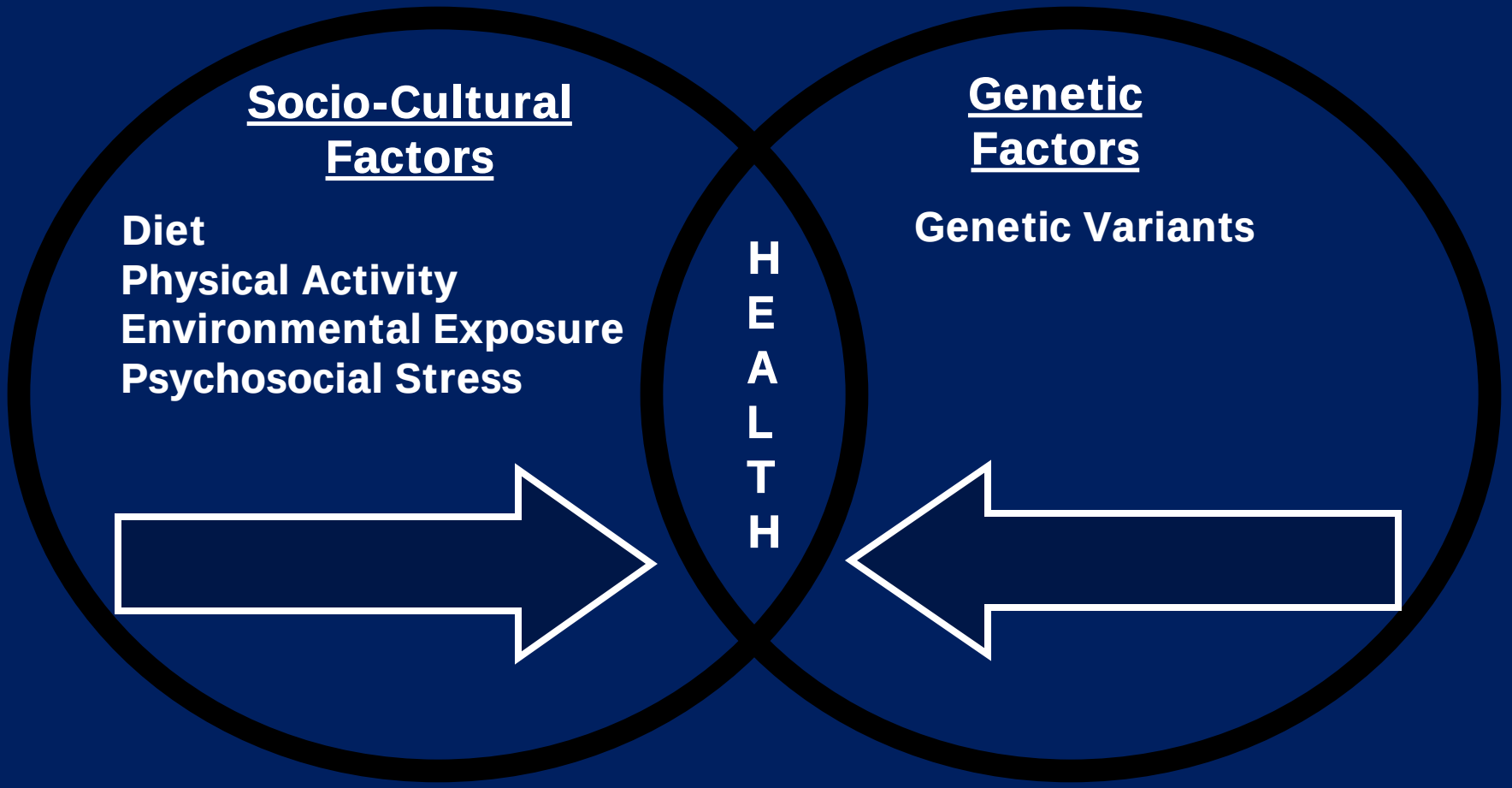


http://nccd.cdc.gov/DHDSPAtlas/viewer.aspx?state=SC

Social Determinants of Health

- Factors in the social environment that contribute to or detract from the health of individuals and communities
- Social determinants of health may generate hypotheses regarding the pathways between the social environment and health outcomes

Racial Differences in Health Outcomes as a Combination of Socio-cultural and Genetic Factors



Williams et al. 2010. Race, SES, and Health. Ann NY Acad. Sci 2010;1186:69-101.

“Weathering” Stress Hypothesis

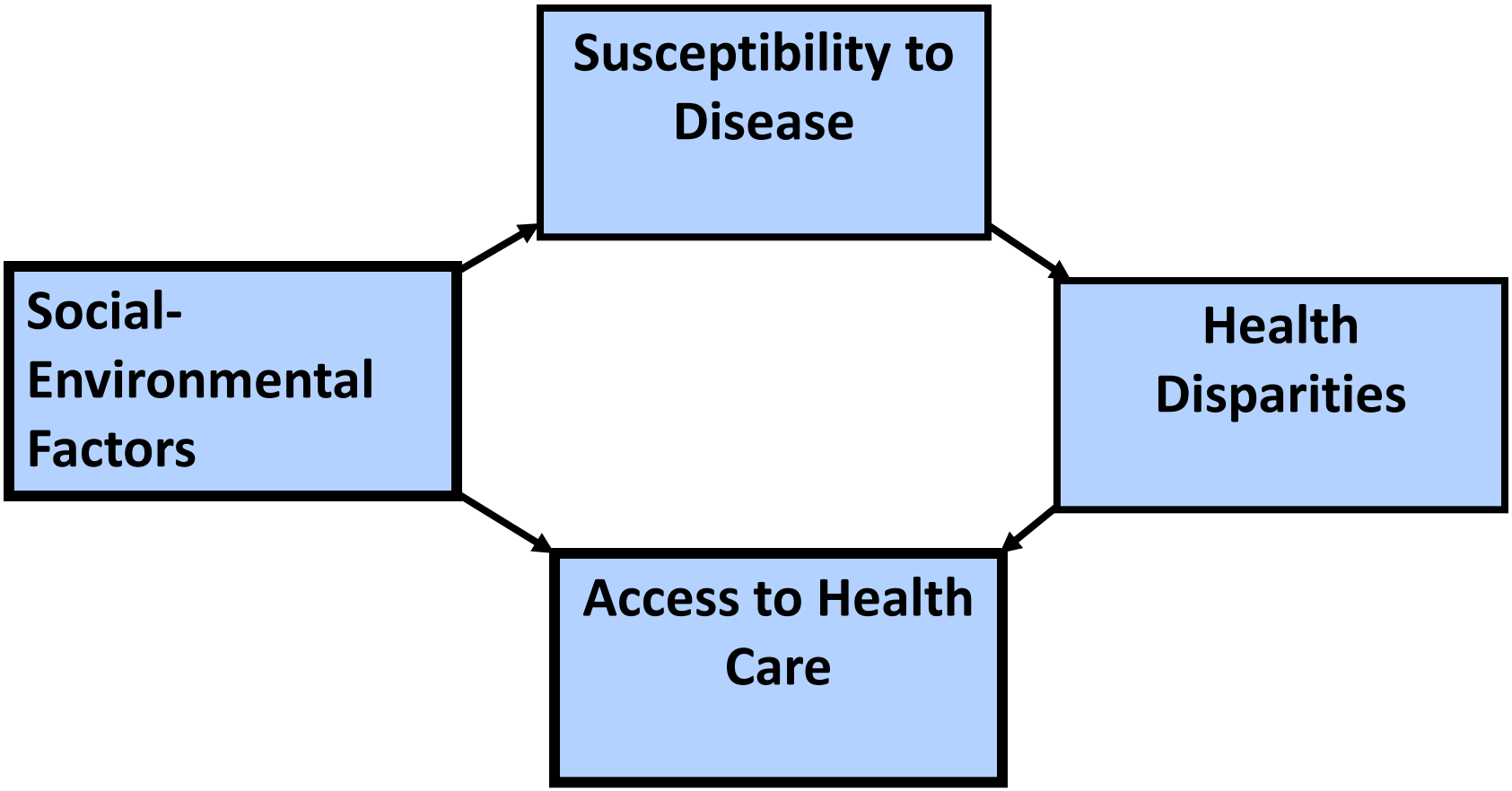
- African Americans experience early health deterioration as a consequence of the cumulative impact of repeated stressful experiences with social or economic adversity and political marginalization

“Weathering” Stress Hypothesis (continued)

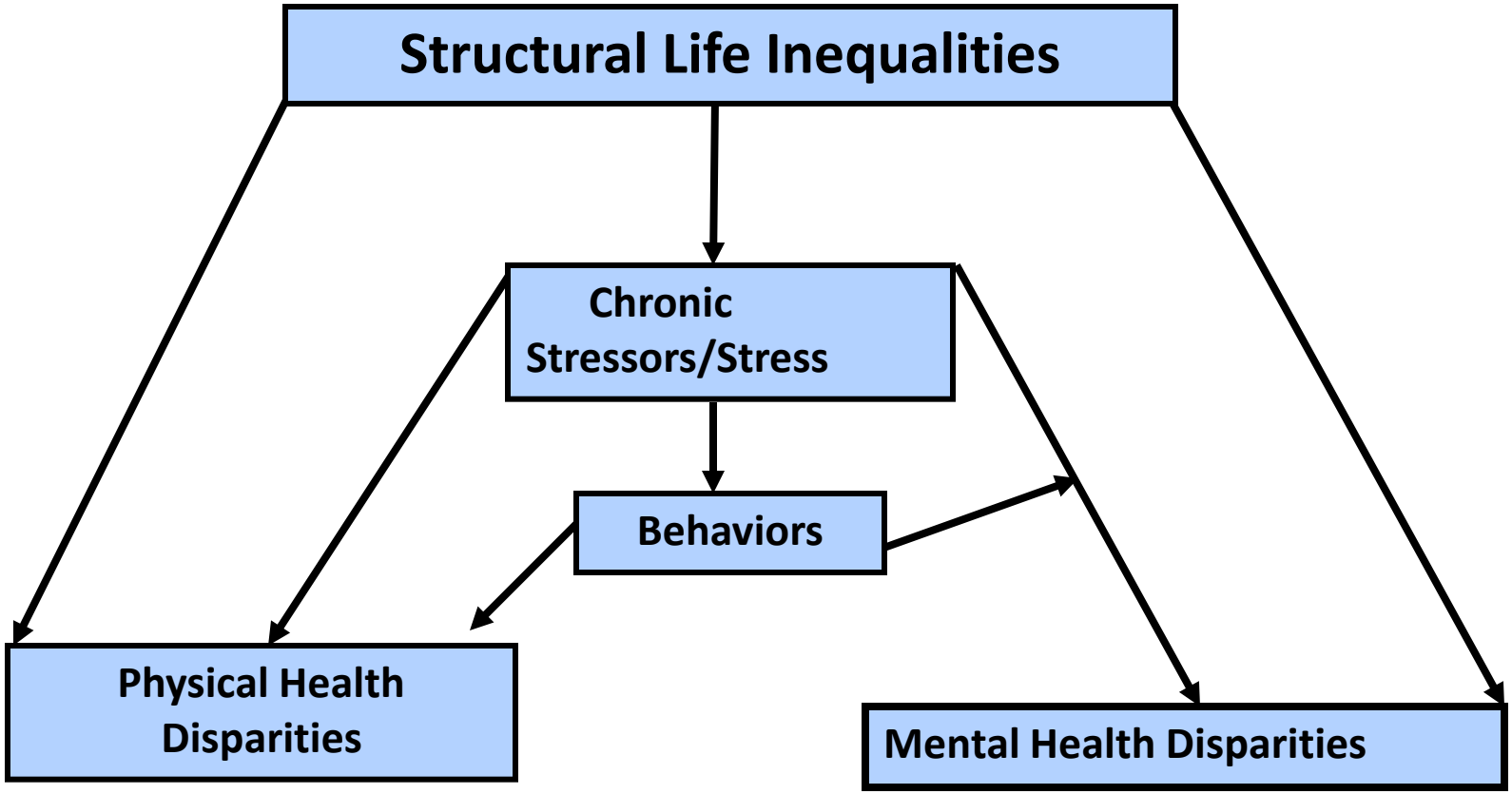
- African Americans experience poor health at earlier ages than European Americans
- This deterioration in health accumulates

Social Environment and Stress

- Stressful social interactions impact health outcomes



Relationships among Structural Life Inequalities, Chronic Stress, Negative Behaviors, and Physical and Mental Health Disparities



Chronic Stressors (continued)

- Higher economic status in African Americans appears to be more protective against early mortality than against early morbidity
- Racial differences in health reflect more than differences in economic resources alone

http://www.cdc.gov/dhdsp/maps/social_determinants_maps.htm

Chronic Stressors (continued)

- African Americans experience earlier deterioration of heath than do European Americans
- The stress of living in a race-conscious society may lead to early health deterioration in African American women through a complex mechanism that involves chronic inflammation

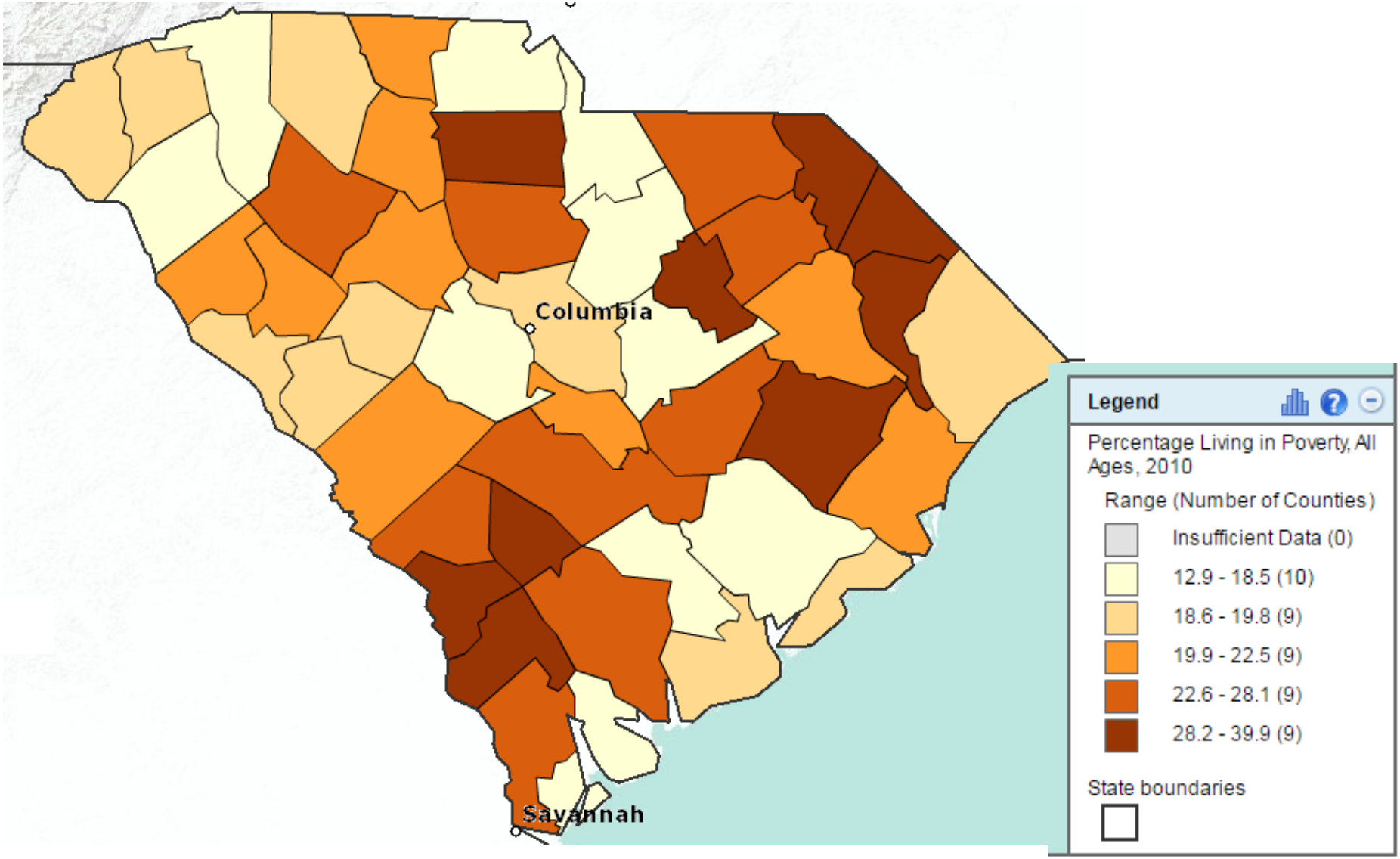
Chronic Stressors (continued)

- Racial/ethnic differences in inflammation are small in the late teens and early 20s
- Differences widen rapidly beginning in young adult through middle age
- Racial/ethnic differences are largest between the ages of 35 and 64 years

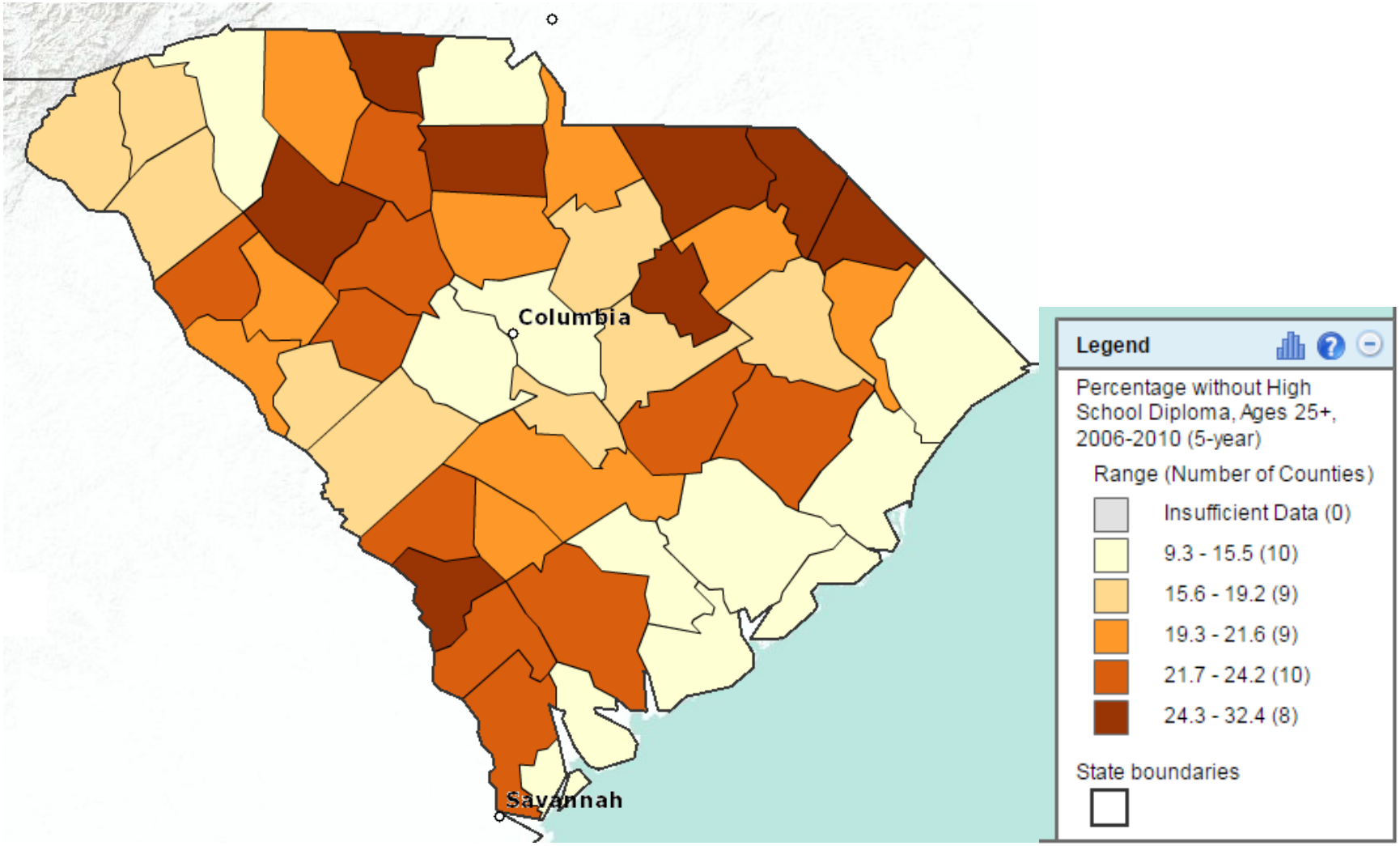
Chronic Stressors (continued)

- The impact of chronic stress on health has important implications for individuals and for the population as a whole

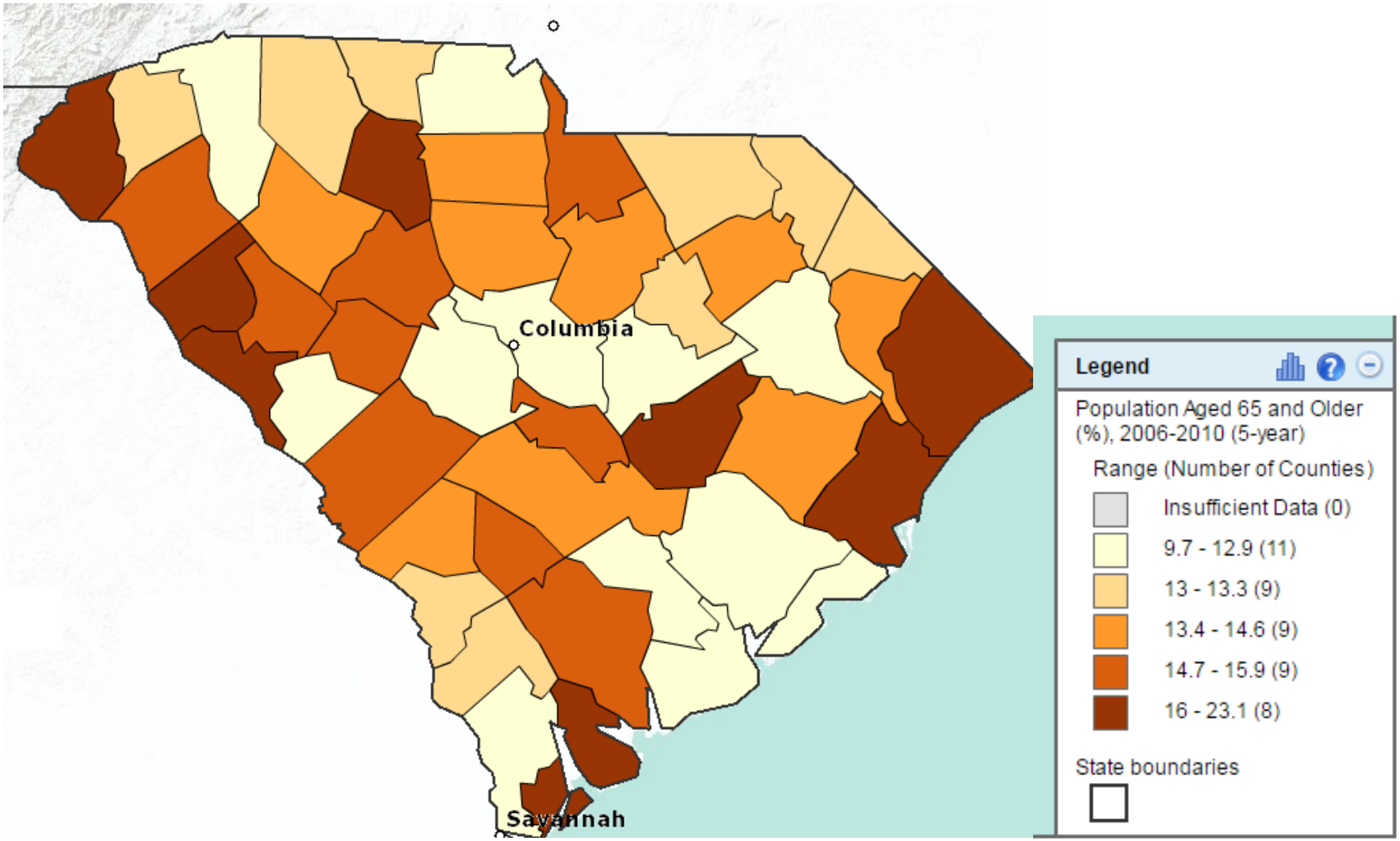
South Carolina: Percentage Living in Poverty, All Ages, 2010



South Carolina: Percentage without High School Diploma, Ages 25+, 2006-2010 (5-year)



South Carolina: Population Aged 65 and Older (%), 2006-2010 (5-year)



Wrong Zip Code Can Mean Shorter Life Expectancy

Different neighborhoods in New Orleans had some of the most dramatic differences in life expectancy.

Courtesy of the Robert Wood Johnson Foundation

Part II: Combating Cancer Disparities in South Carolina

- MUSC Hollings Cancer Center Cancer Disparities Program

HCC Cancer Disparities Program
3-Point Action Plan Objectives

1. Conduct cancer disparities activities with partners in South Carolina (SC)

2. Develop specific, targeted research interventions to reduce cancer disparities

3. Increase the number of investigators in SC who conduct cancer disparities research

HCC Cancer Disparities Program
3-Point Action Plan Objectives

Objective 1: Conduct Cancer Disparities Activities with Partners in South Carolina

- Community Based Cancer Education and Awareness

Objective 1: Conduct Cancer Disparities Activities with Partners in South Carolina

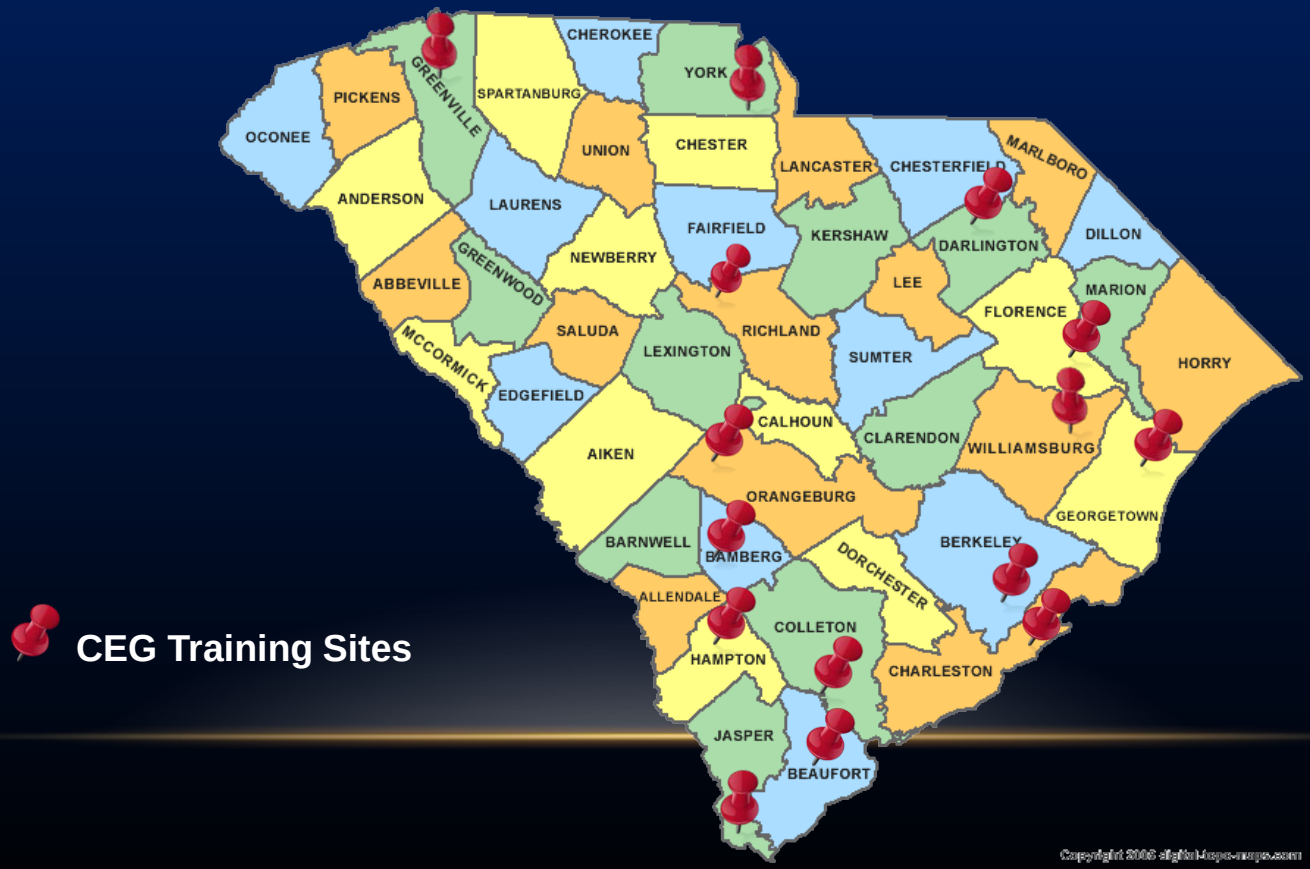
Example: Cancer Education Guide (CEG) Training Seminar

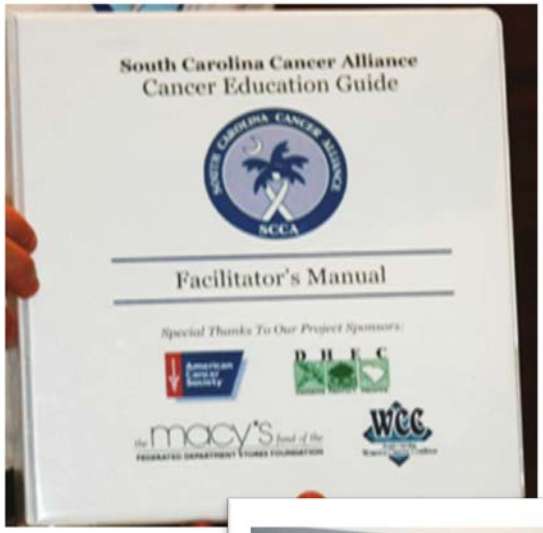
An evidence-based 4-hour dynamic, hands-on session using a “Train the Trainer” model developed by the South Carolina Cancer Alliance

- **3-hour component focusing on general cancer knowledge**
  - Cancer risk factors
  - Screening guidelines for early cancer detection
  - Cancer treatments
  - Steps to reduce cancer risk by improving overall health
- **30-minute component focusing on prostate cancer knowledge**
- **30-minute component focusing on cancer clinical trials information**

Objective 1: Conduct Cancer Disparities Activities with Partners in South Carolina

CEG Service Delivery Area




South Carolina Cancer Alliance
Cancer Education Guide
SCCA
Facilitator's Manual
Special Thanks To Our Project Sponsors:
American Cancer Society
macy's
WCC

Patient Education and Counseling 83 (2011) 256–260

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.elsevier.com/locate/pateducou

Educational/Counseling Model Health Care

Evaluating an intervention to increase cancer knowledge in racially diverse communities in South Carolina

Marvella E. Ford [a,b,*], Amy E. Wahlquist [b], Celina Ridgeway [c], June Streets [d], Katie A. Mitchum [e], R. Remus Harper Jr. [f], Ian Hamilton [g], J. James W. Etheredge [a], Melanie S. Jefferson [a], Heidi Varner [h], Katora Campbell [g], Elizabeth Garrett-Mayer [b]

SPECIAL ARTICLE

Assessing an Intervention to Improve Clinical Trial Perceptions Among Predominately African-American Communities in South Carolina

Marvella Ford, PhD[1], Amy Wahlquist, MS[1], Rashell Blake[2], CoDanielle Green[3], June Streets[4], Ebonie Fuller[3], Erica Johnson, MD[1], Melanie Jefferson[1], James Etheredge, MPA[1], Heidi Varner[5], Shannon Johnson[6], Saundra Glover, PhD[7], David Turner, PhD[1], Elizabeth Garrett-Mayer, PhD[1]

(1) Medical University of South Carolina, Vorhees College; (2) Voorhees College; (3) South Carolina State University; (4). Georgetown University; (5) Ridgeville, South Carolina; (6) South Carolina Cancer Alliance; (7) University of South Carolina

Submitted 1 August 2011, revised 14 February 2012, accepted 20 March 2012.

HCC Cancer Disparities Program
3-Point Action Plan Objectives

Objective 2: Develop Specific, Targeted Research Interventions to Reduce Cancer Disparities

- Collaborative Intervention Research Initiatives

Objective 2: Develop Specific, Targeted Research Interventions to Reduce Cancer Disparities

- **Improving Resection Rates Among African Americans with Non-small Cell Lung Cancer (NSCLC)**

  5RO1MD005892-04 (MPIs: Ford and Esnaola)

  - Evaluates the impact of a patient navigation intervention in reducing potential barriers to surgical cancer care and improving rates among African Americans with early stage NSCLC

- **SC Cancer Disparities Research Center (SC CaDRe)**

  5P20CA15707104 (PIs: Ford and Salley)

  - Identifies factors that may influence participation in a breast cancer genetic research study

- **Optimizing Survivorship and Surveillance after Treatment for Colon Cancer**

  5R21CA152865 (PI: Ford, Co-Is: Zapka and Sterba)(ended 8/31/14)

  - Investigate the role of multilevel factors on participation of colon cancer survivors in guideline-based post-treatment surveillance and care.

HCC Cancer Disparities Program
3-Point Action Plan Objectives

Objective 3: Increase the Number of Investigators in SC Who Conduct Cancer Disparities Research

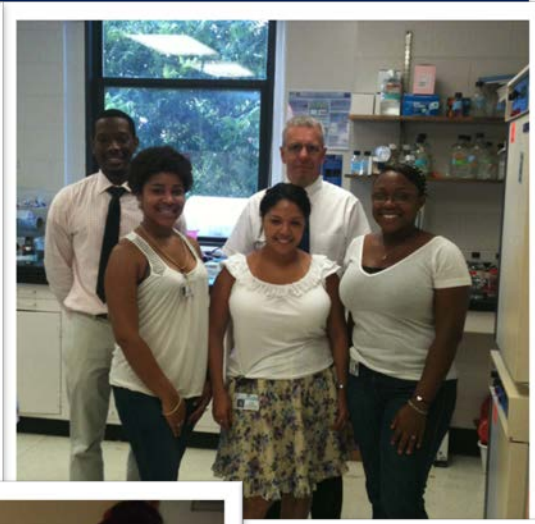
- DoD Collaborative Undergraduate HBCU Student Summer Training Program in Prostate Cancer Research (PI: Ford, Coordinator: Cannady)
- P20 SC CaDRe HBCU Student Summer Cancer Research Training in Breast and Prostate Cancer Research (PI: Ford, Coordinator: Cannady)
- MUSC HCC Cancer Research Training
- Student Forum of the National Conference on Health Disparities (Chair: Ford, Co-Chair: Greene, Coordinator: Cannady)

Objective 3: Increase the Number of Investigators in SC Who Conduct Cancer Disparities Research

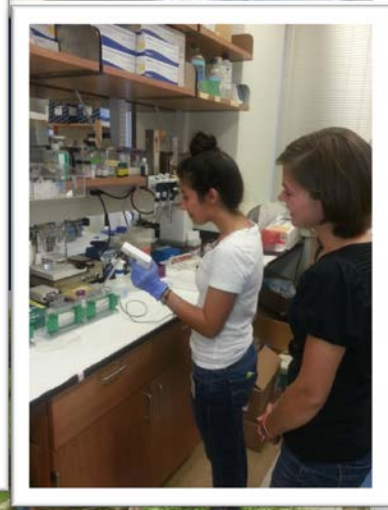
DoD Collaborative Undergraduate HBCU Student Summer Training Program in Prostate Cancer Research

- **Partnership with:**
  - Claflin University
  - South Carolina State University
  - Voorhees College
- **A 10-week program that runs concurrent with the MUSC Summer Undergraduate Research Program (SURP)**
- **Funds 4-6 students/summer**
  - Breast and Prostate Cancer Training Curriculum (2 seminars/week)
  - Weekly GRE Preparation Course
  - Cultural Activities


eBioscience




MUSC Health
HOLLINGS CANCER CENTER
HALL OF HONOR



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Conceptual Framework of the HCC Cancer Disparities Program

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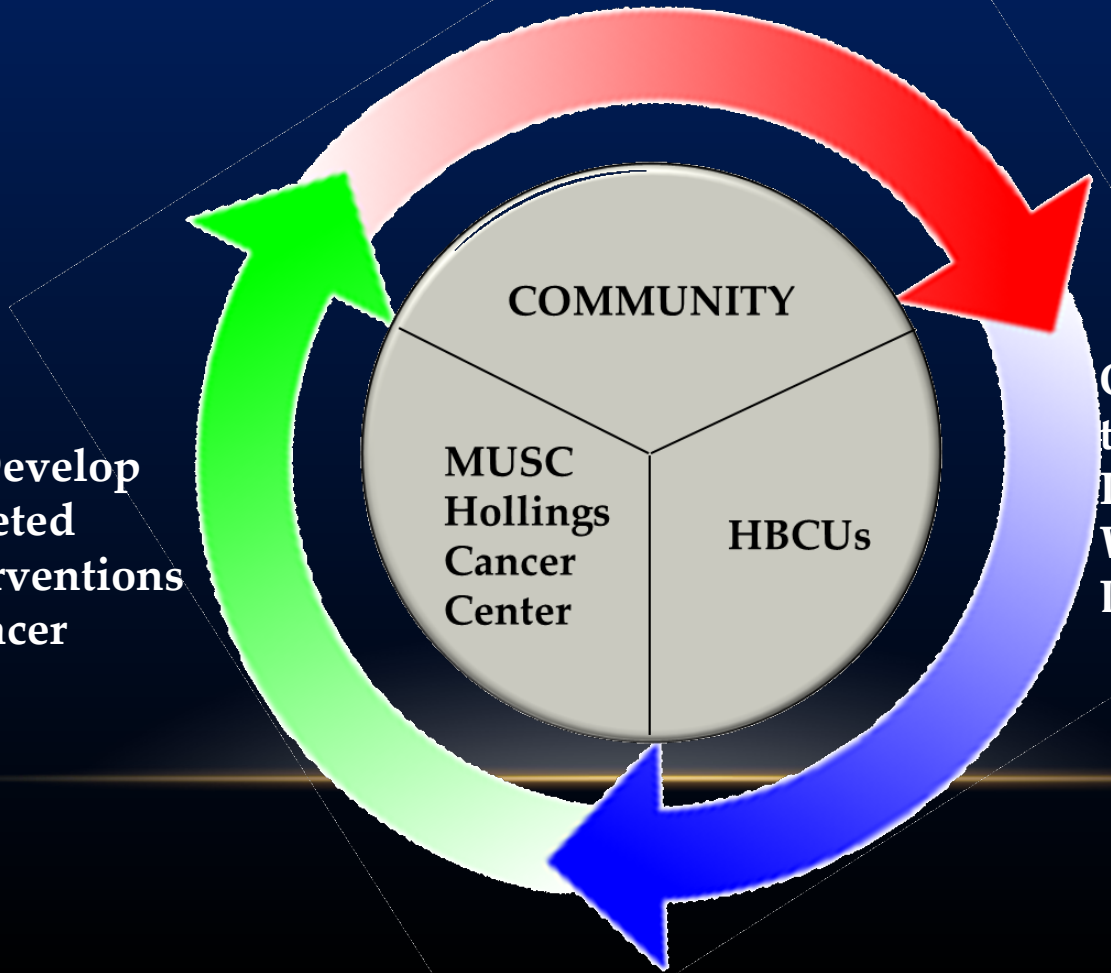

Objective 2: Develop Specific, Targeted Research Interventions to Reduce Cancer Disparities

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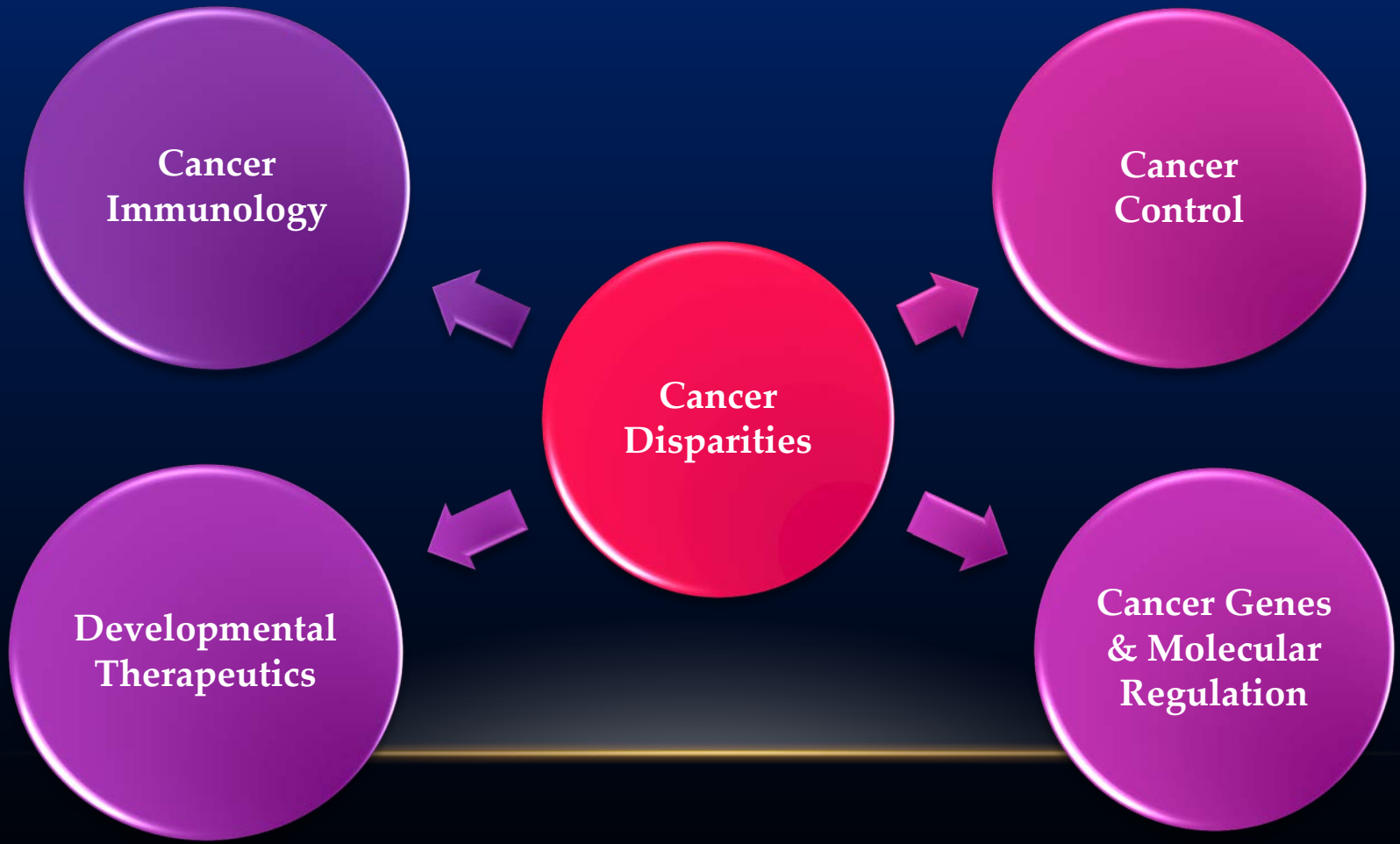

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Courtesy of the Sidney Kimmel Cancer Center

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HCC Cancer Disparities Program
3-Point Action Plan Objectives

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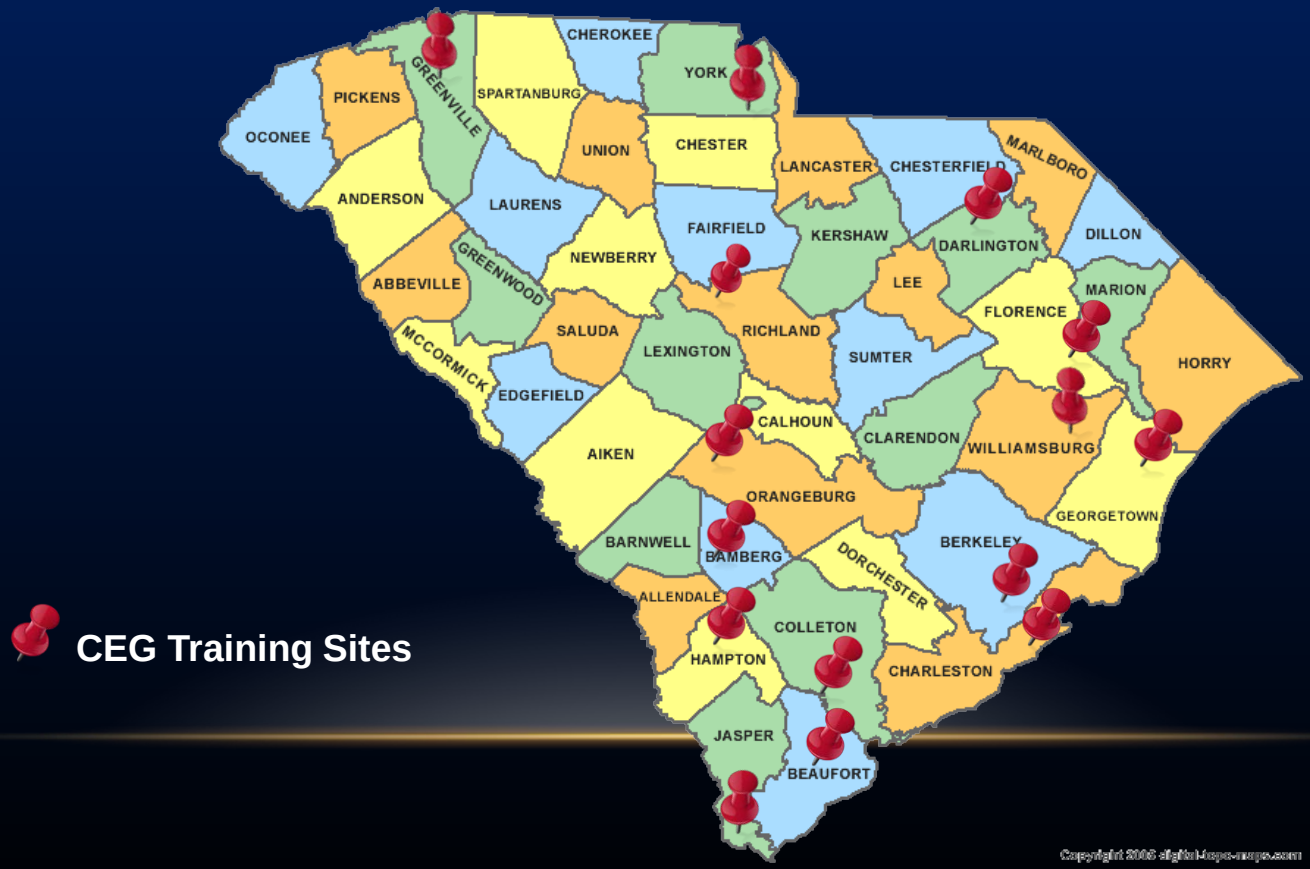

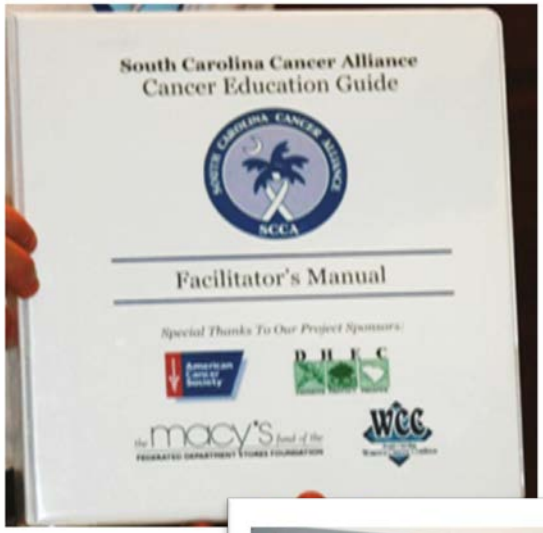
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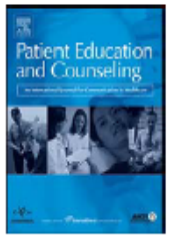

Educational/Counseling Model Health Care

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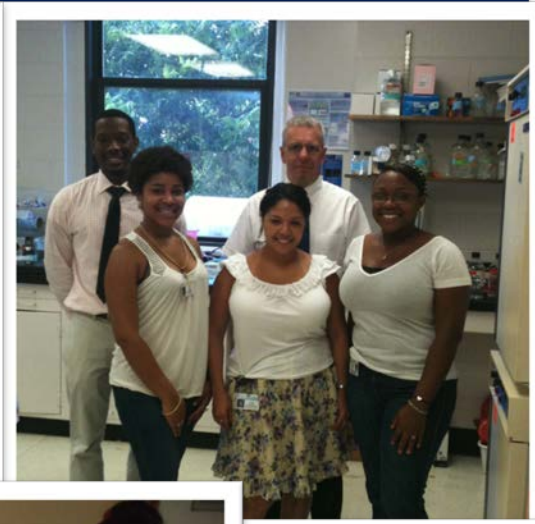


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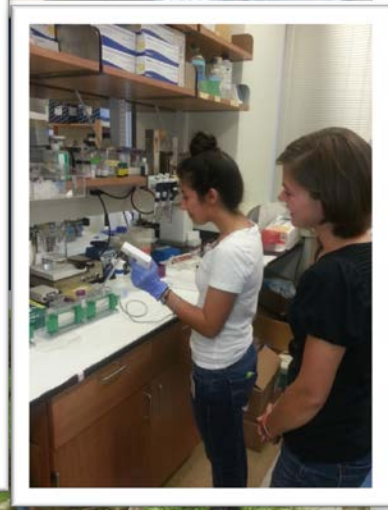

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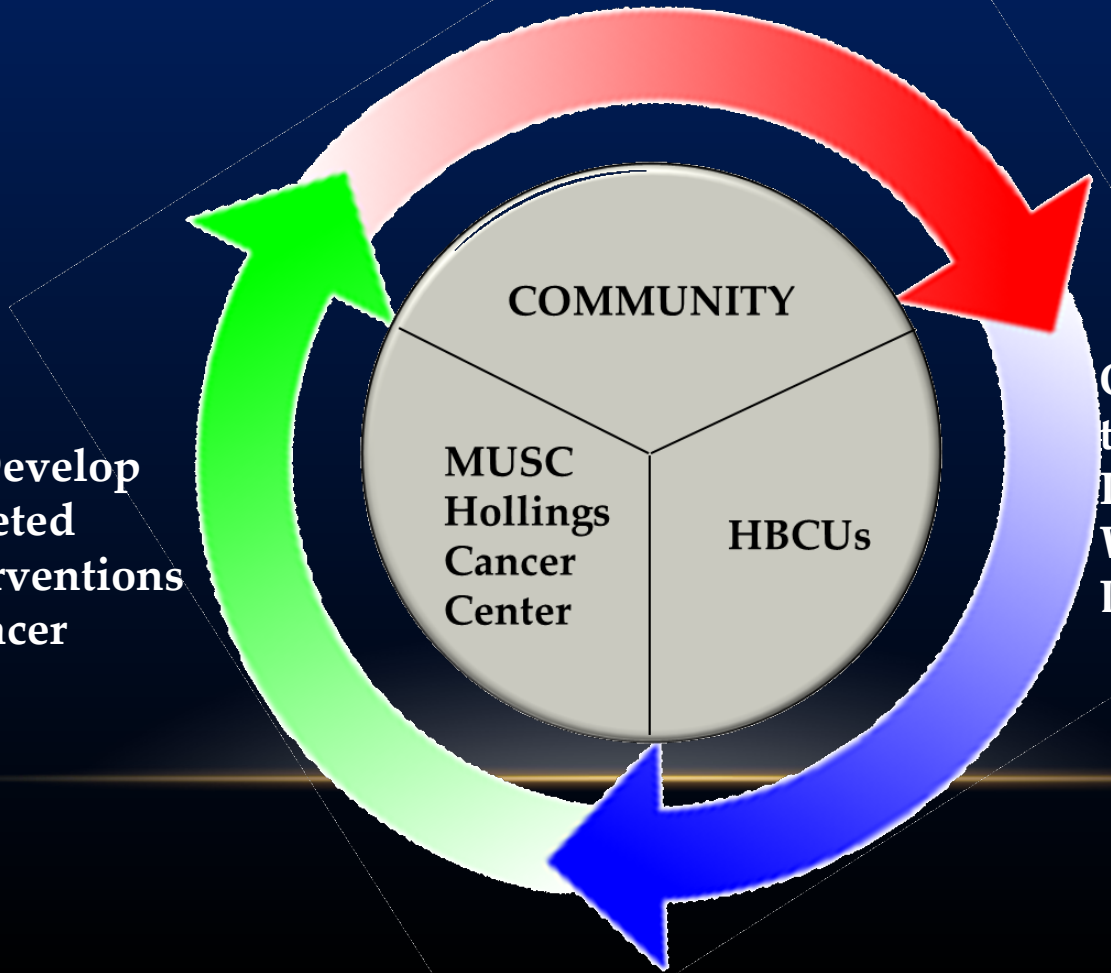

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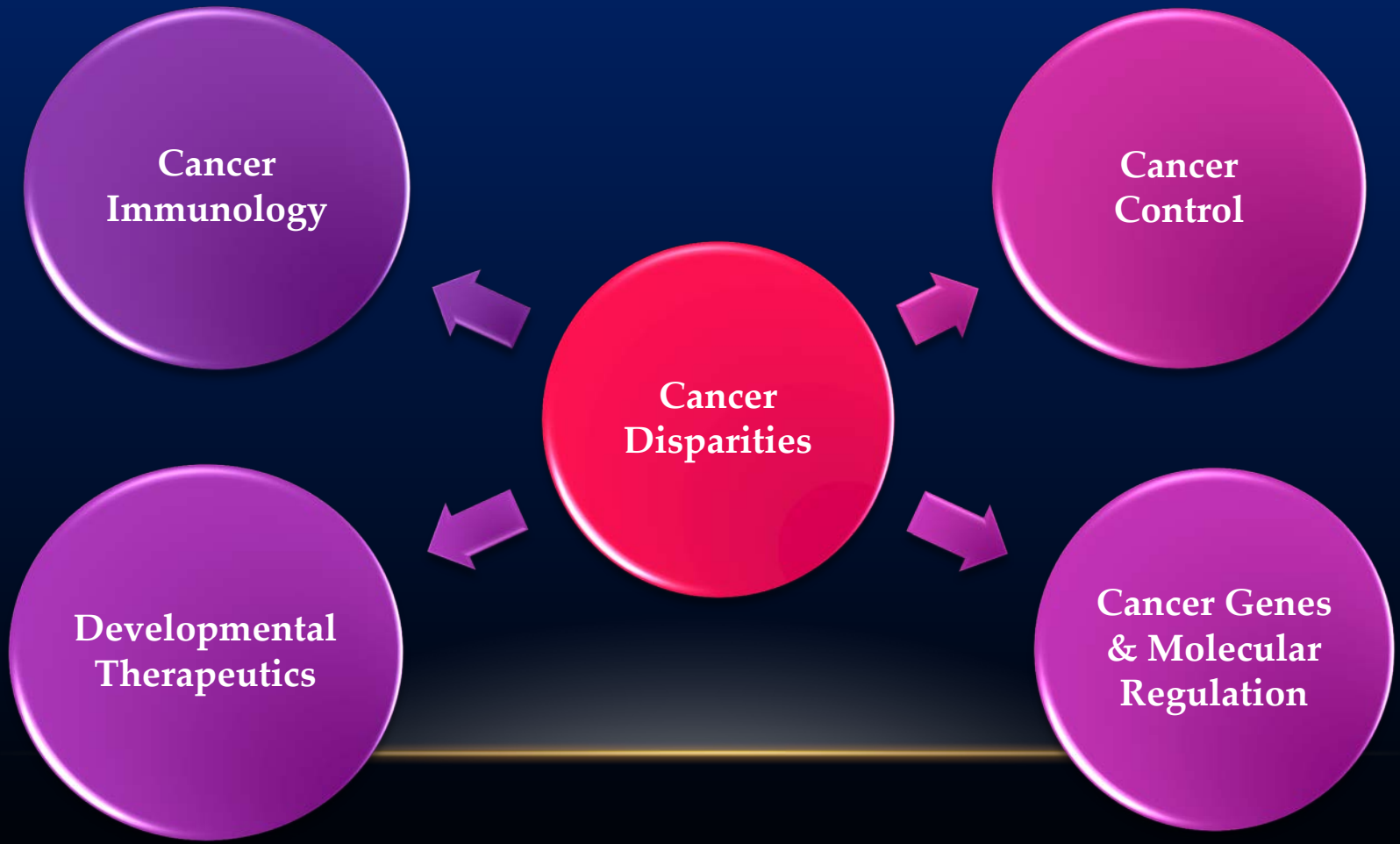

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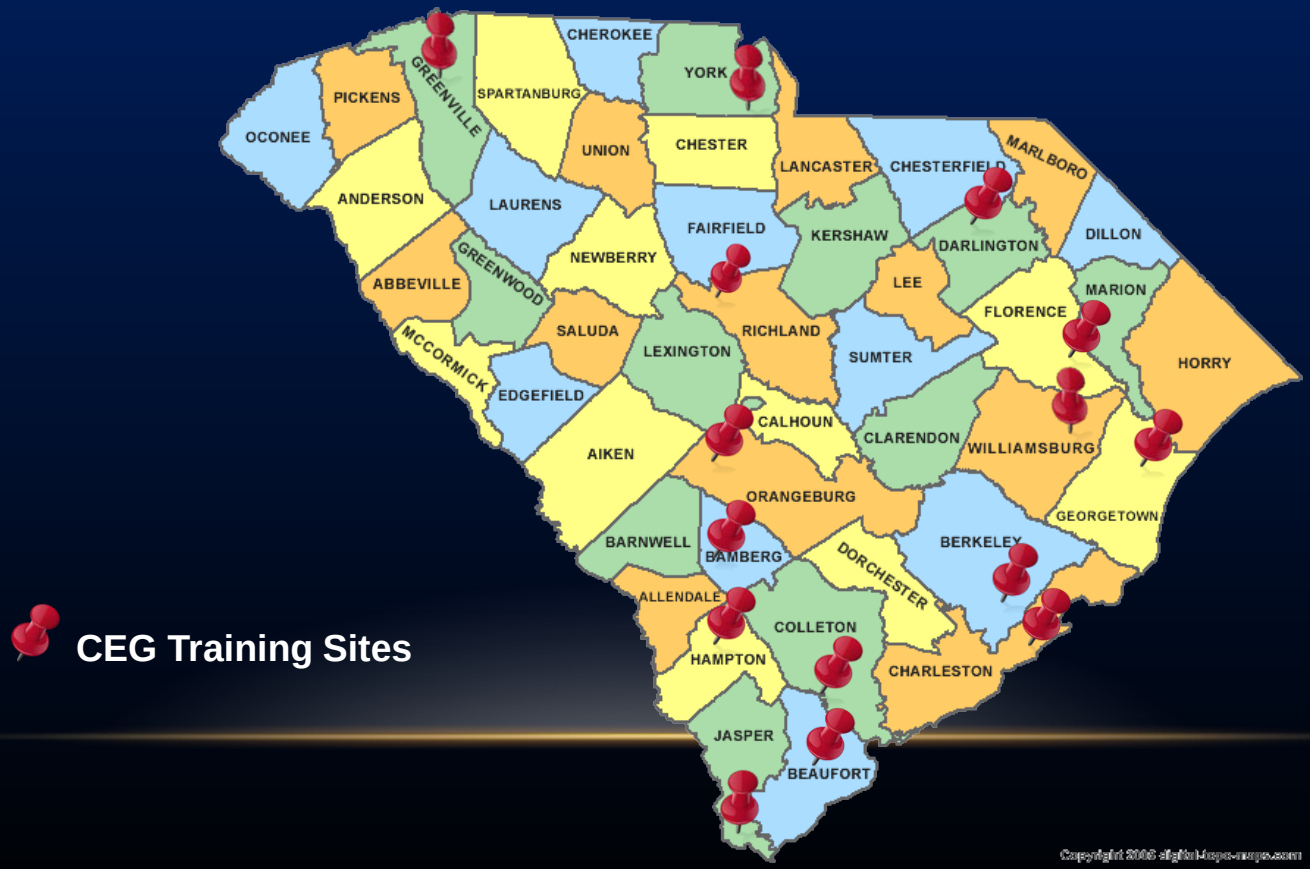

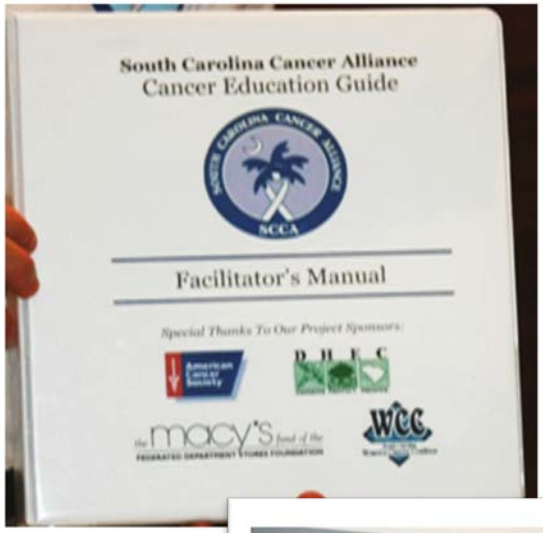
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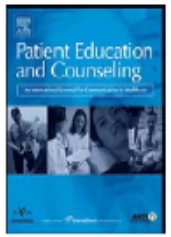

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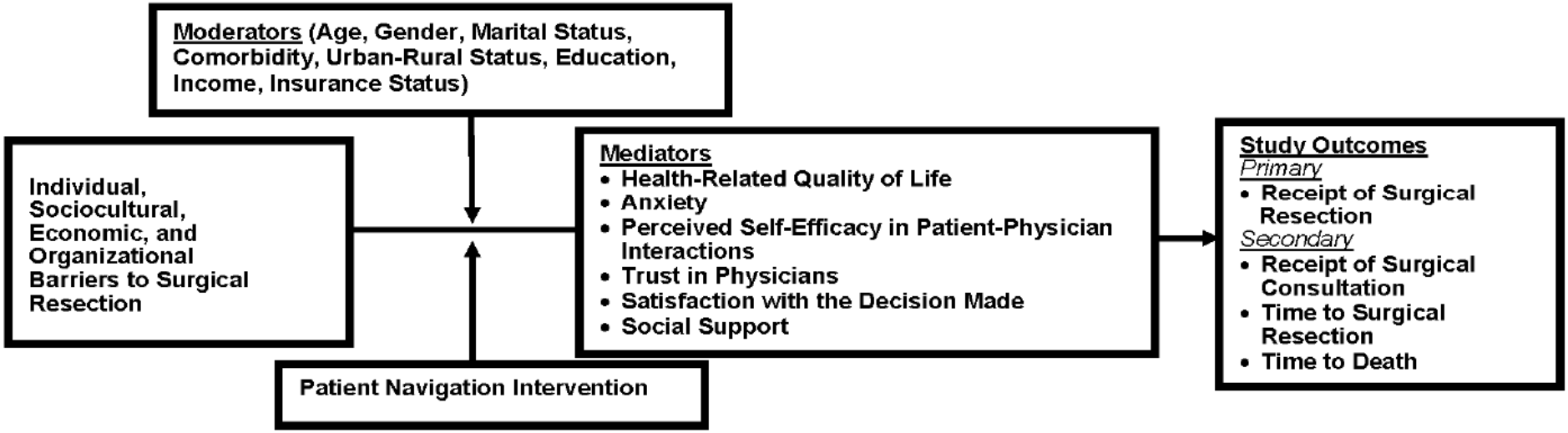
Figure 3.B. Hypothesized Relationships Among the Study Variables



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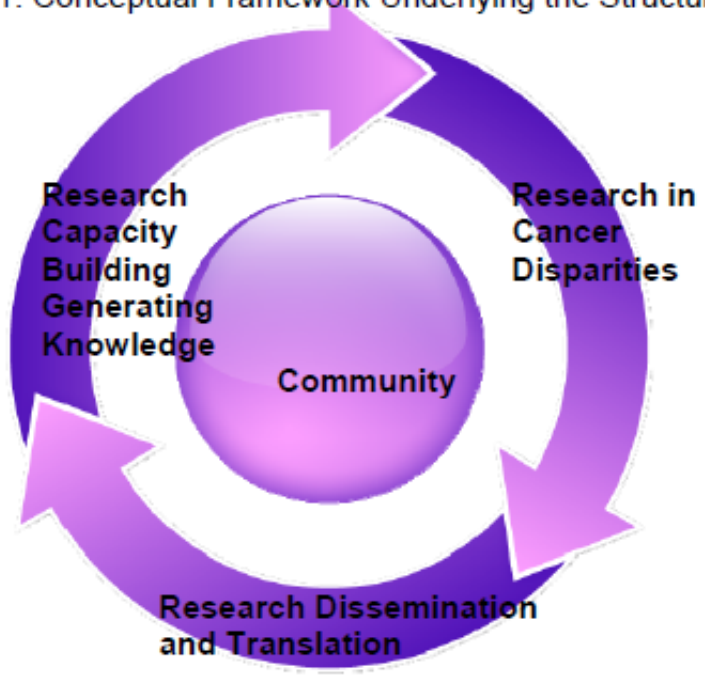

Figure 2. Community Engagement in the SC CaDRE

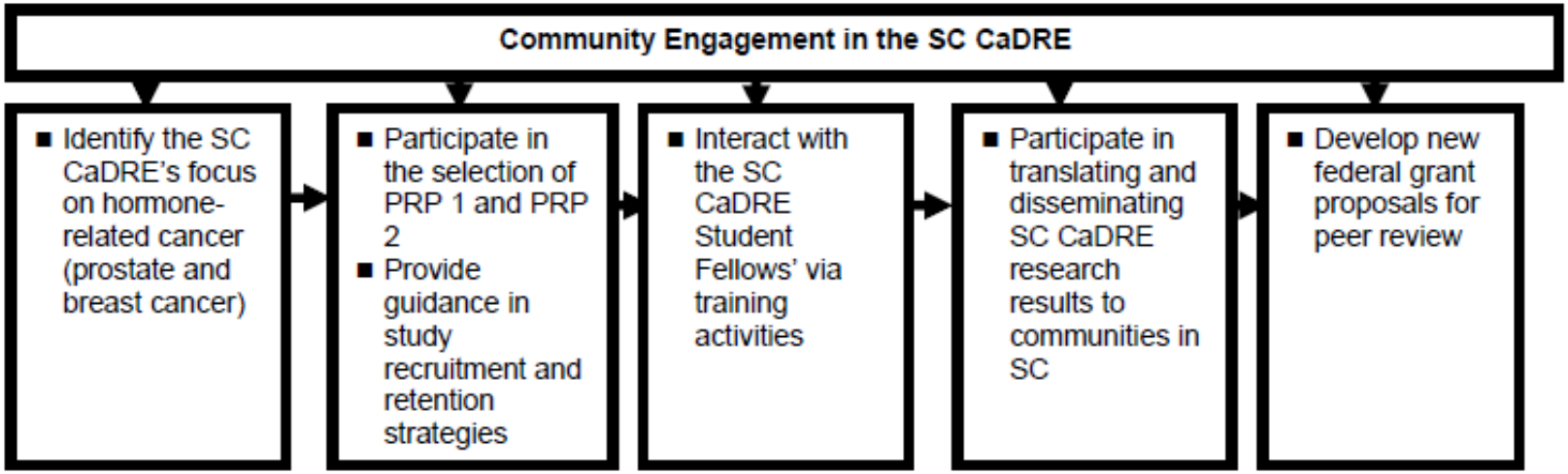

Figure 4.C.2. Triple-Level Research Mentoring Strategy for the SC CaDRe

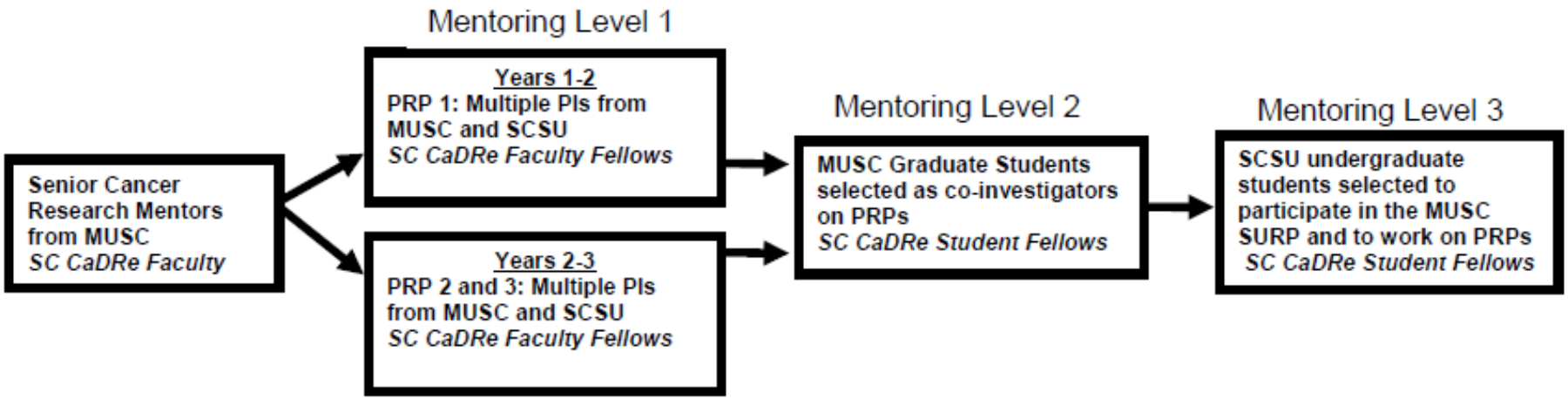

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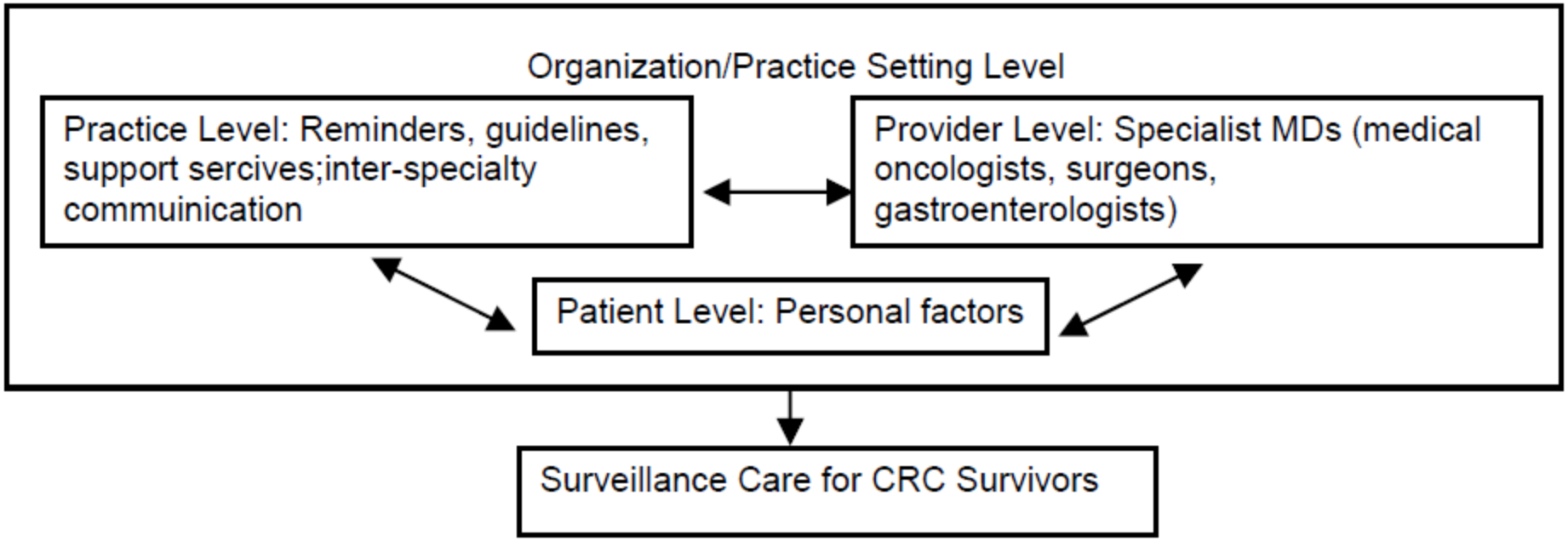
Figure D.3.2. Surveillance Care for CRC Survivors: The Interfaces between Primary Care Physicians, Oncology Specialists, and Patients



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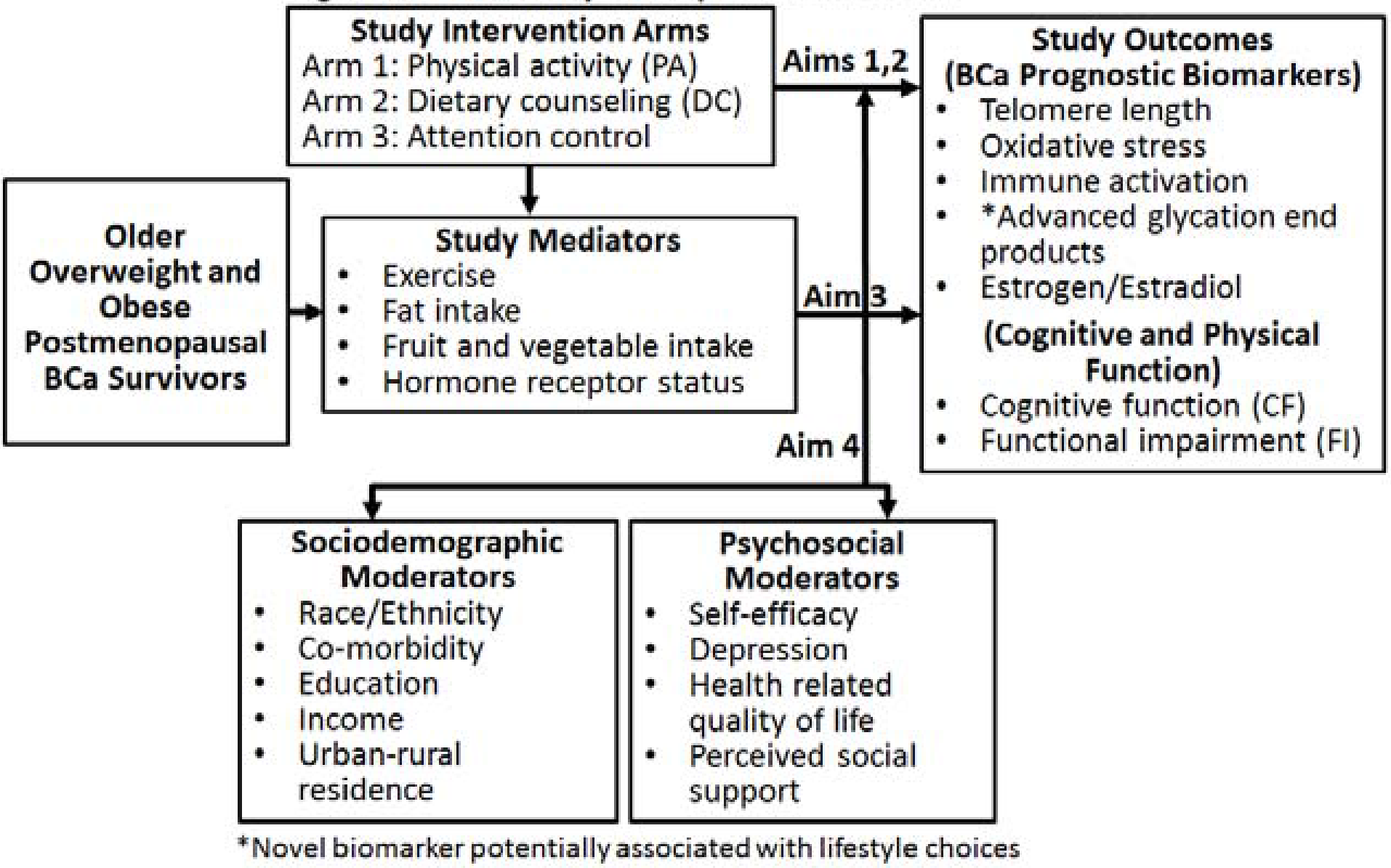
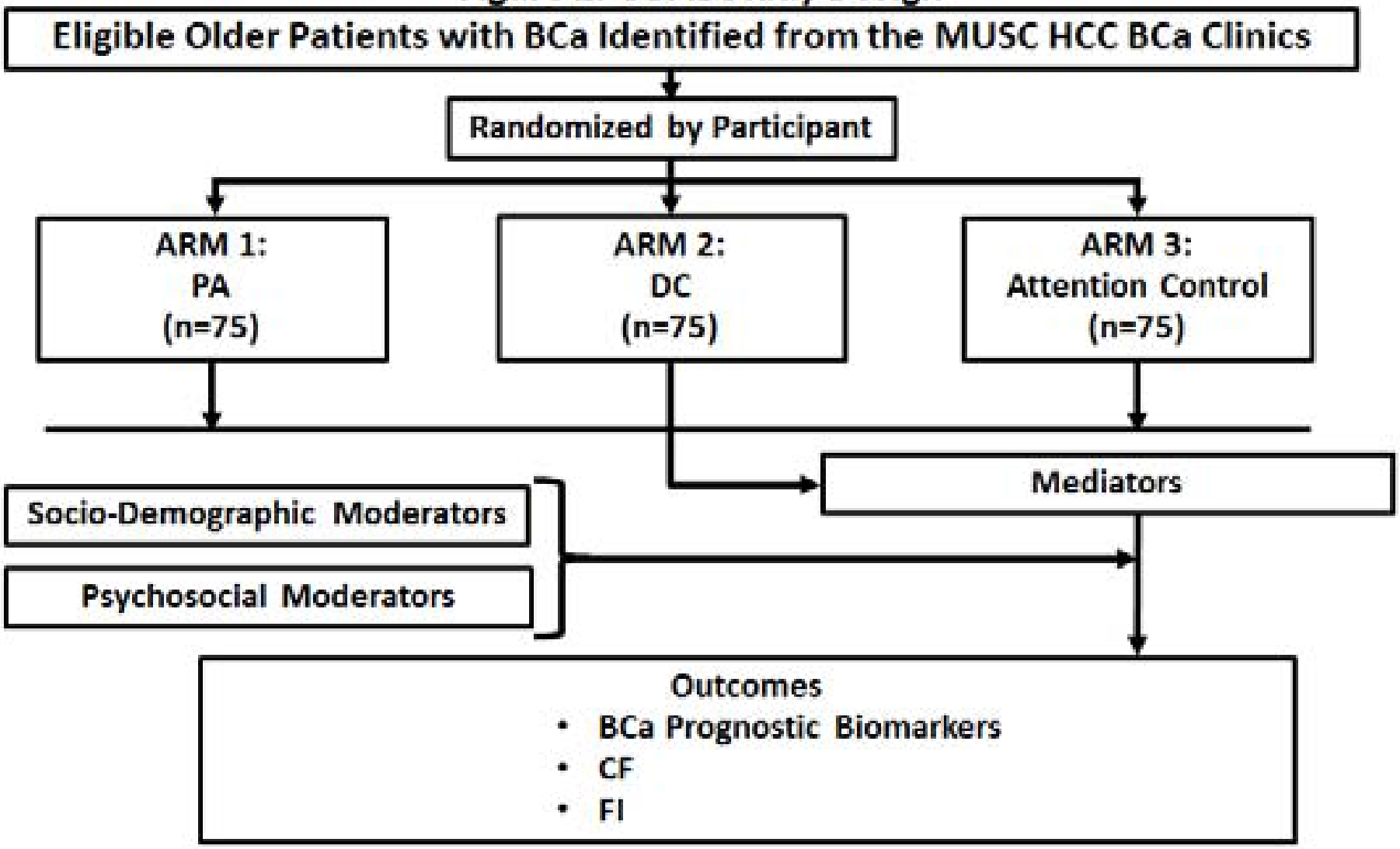


*Novel biomarker potentially associated with lifestyle choices

Figure 2. GOAL Study Design



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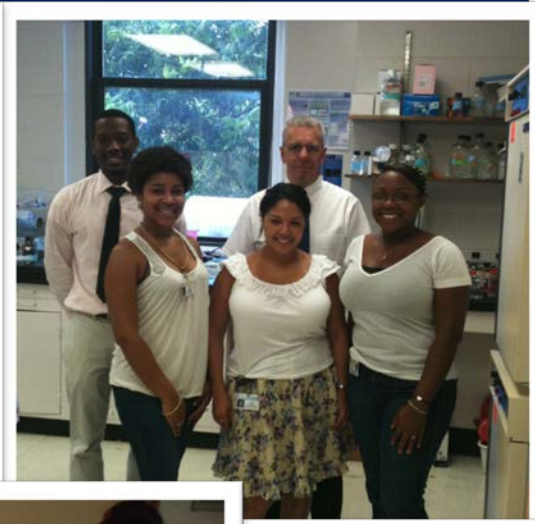


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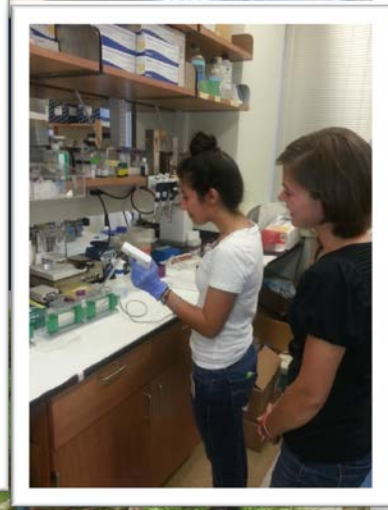

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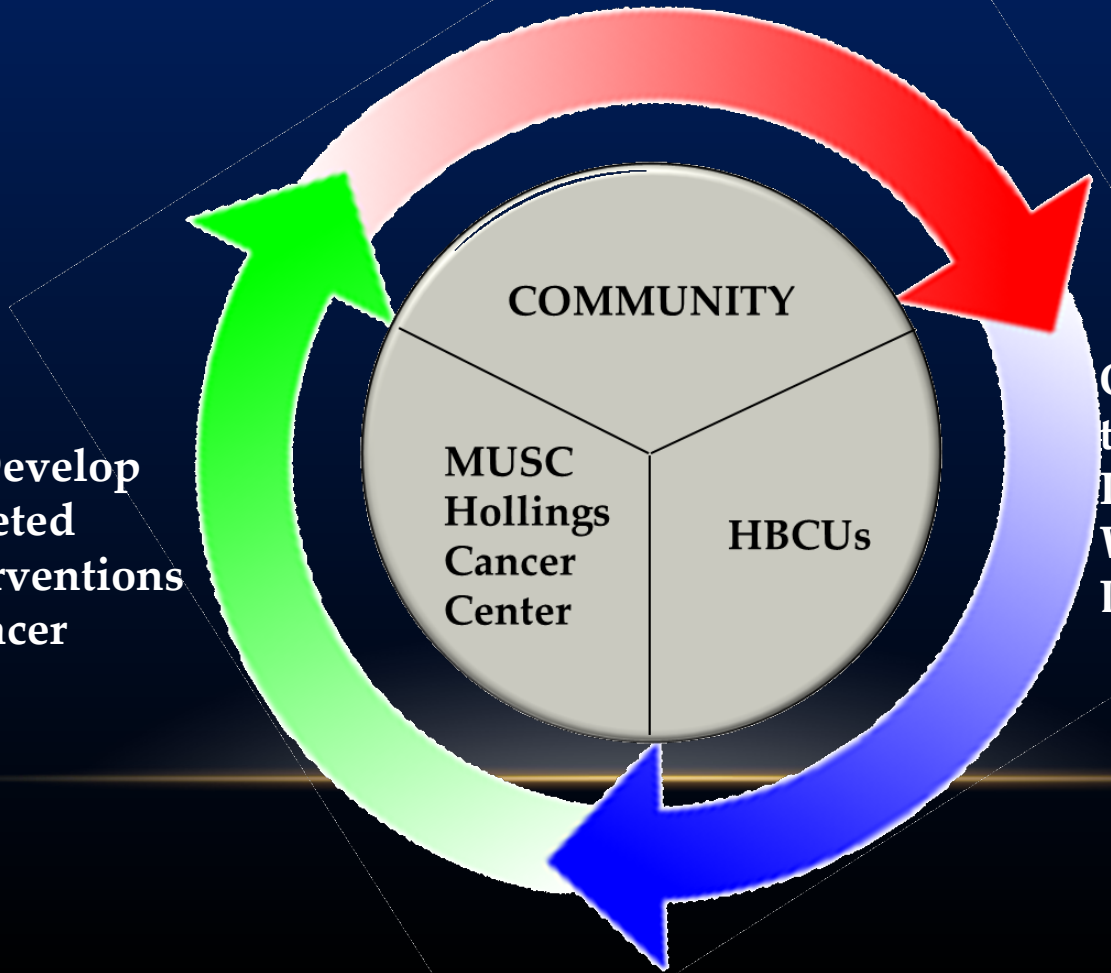

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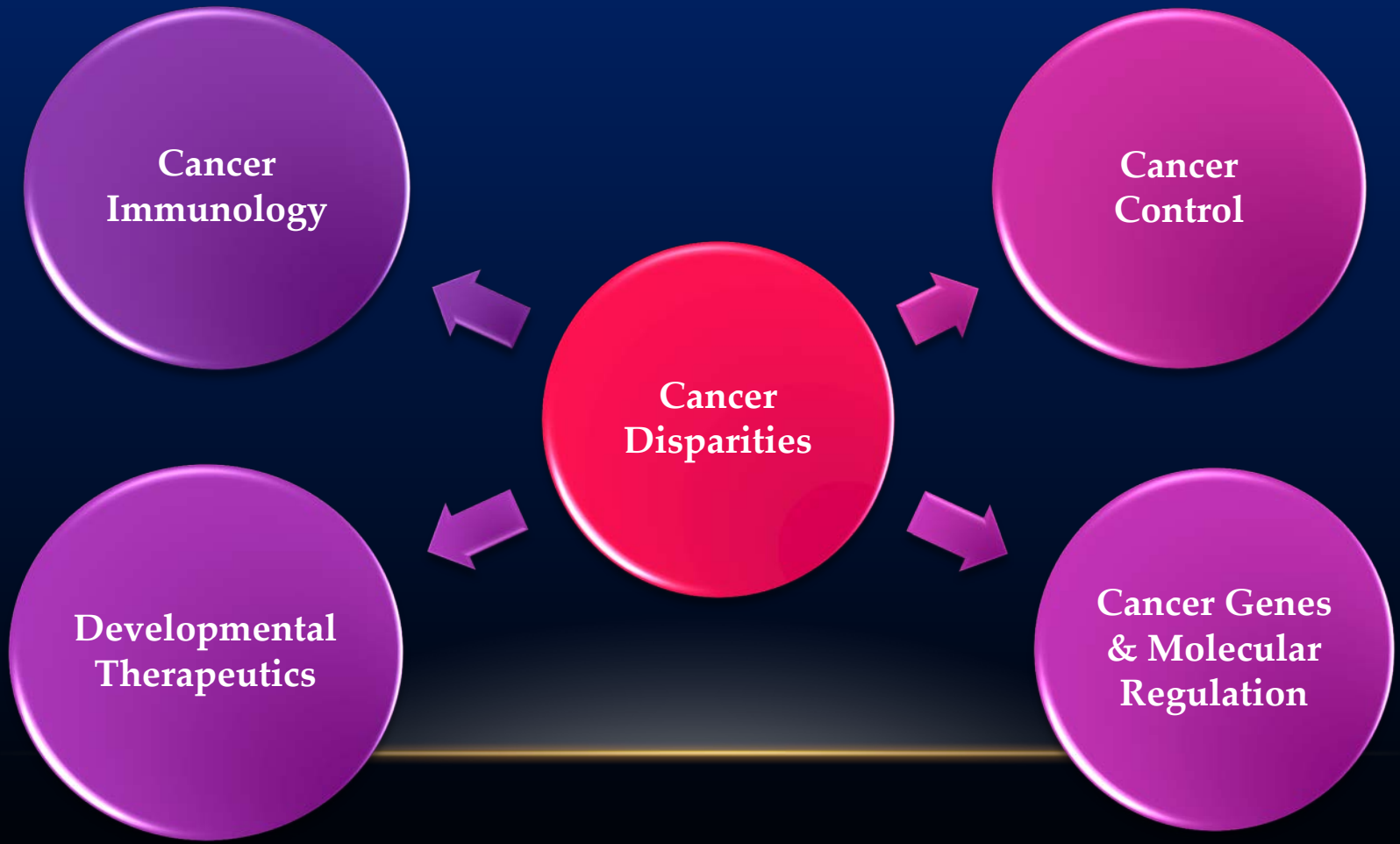

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