

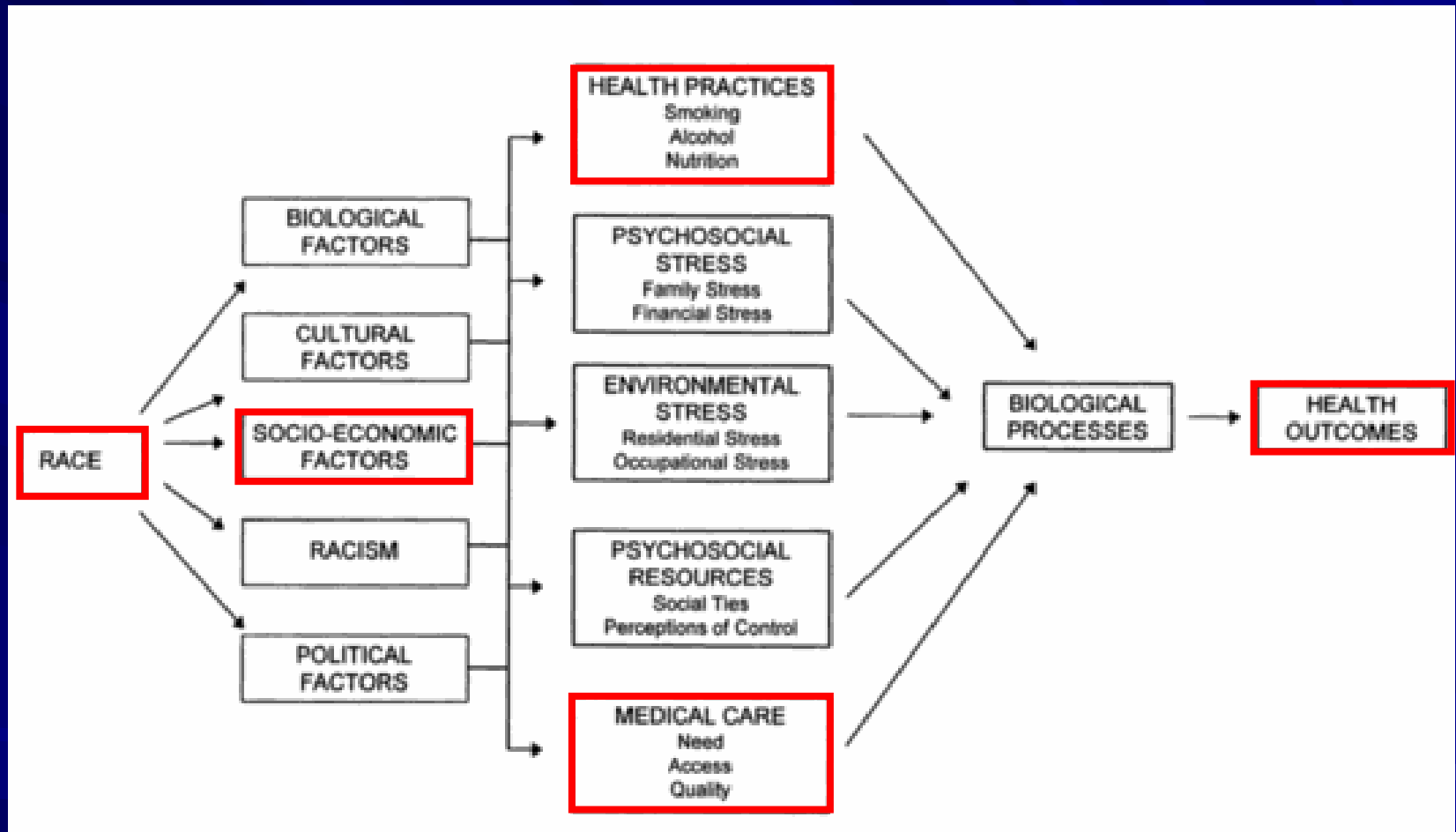
Disparities in Cancer Incidence and Mortality in Delaware

Prepared by: DE Division of Public Health

Presented to: Disparities Committee, DE Cancer Consortium

March 21, 2006

Multifactorial Basis of Racial Disparities



Society and Health, Oxford University Press, 1995

Objectives

- To examine differences in cancer incidence and mortality by race, sex, age, and county of residence
- To examine trends in cancer incidence and mortality by race and sex
- To examine whether there are differences in access to health care, behavioral cancer risk factors, screening usage, stage of disease, and cancer treatment

Objective 1

- To examine differences in cancer incidence and mortality by race, sex, age, and county of residence

Notes: Counts of five or fewer people appear as “<6.”

Rates based on <25 people in the numerator are considered unstable/unreliable, and are not presented.

All rate ratios are computed by dividing the age-adjusted incidence/mortality rate for the minority group by the rate for the reference group. A rate ratio of one indicates an absence of disparity.





Data Sources

- Delaware Cancer Registry
 - Central, state-level Registry
 - Compiles incidence data submitted by hospitals, other facilities, laboratories, physicians into one central repository
 - Submits data annually to, e.g., CDC
- National Center for Health Statistics
 - Captures vital statistics data, including mortality

Number of New Cancers and Deaths From Cancer in Delaware

| | Incidence (1998 – 2002) | | | | Mortality (1998 – 2002) | | | |
|-------------|-------------------------|-------|------|-------|-------------------------|-------|------|-------|
| | White | AA | Hisp | Asian | White | AA | Hisp | Asian |
| All Cancers | 16,416 | 2,867 | 187 | 150 | 7,002 | 1,249 | 80 | 42 |
| Breast | 2,322 | 392 | 23 | 31 | 513 | 115 | 6 | <6 |
| Colorectal | 1,841 | 324 | 9 | 19 | 676 | 140 | <6 | <6 |
| Lung | 2,609 | 418 | 18 | 13 | 2,128 | 335 | 18 | 8 |
| Prostate | 2,448 | 591 | 24 | 13 | 328 | 102 | <6 | <6 |

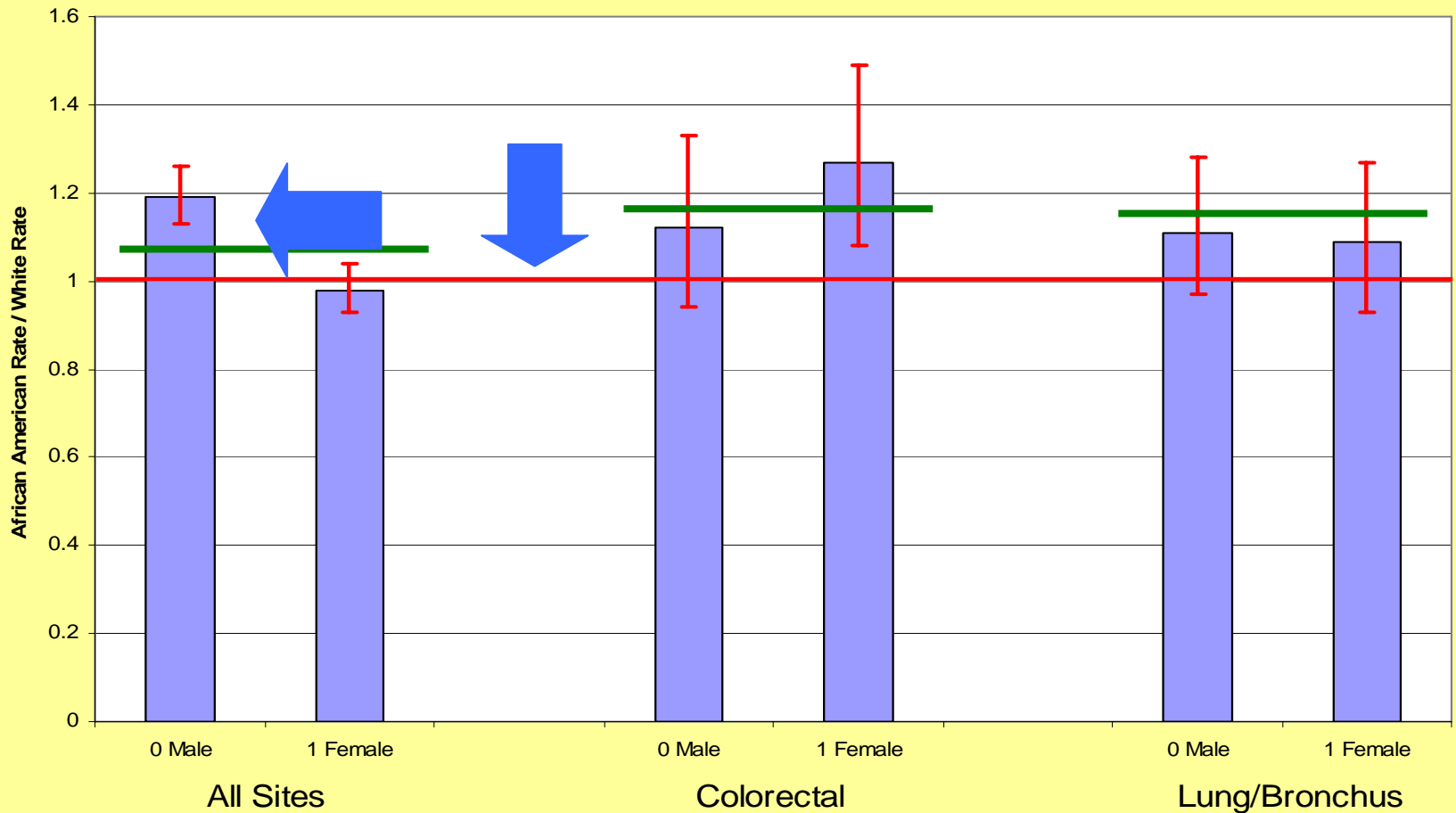
Disparities in Cancer Incidence Comparing Minorities* and Whites in Delaware, 1998–2002

| | | Incidence RR (95% CI) |
|-------------|---|-----------------------|
| All Cancers | | 1.08 (1.04–1.13) |
| | | 0.51 (0.44–0.59) |
| | | 0.58 (0.49–0.68) |
| Breast |  | 0.90 (0.81–1.01) |
| Colorectal |  | 1.19 (1.06–1.34) |
| Lung |  | 1.06 (0.96–1.18) |
| Prostate |  | 1.68 (1.53–1.84) |

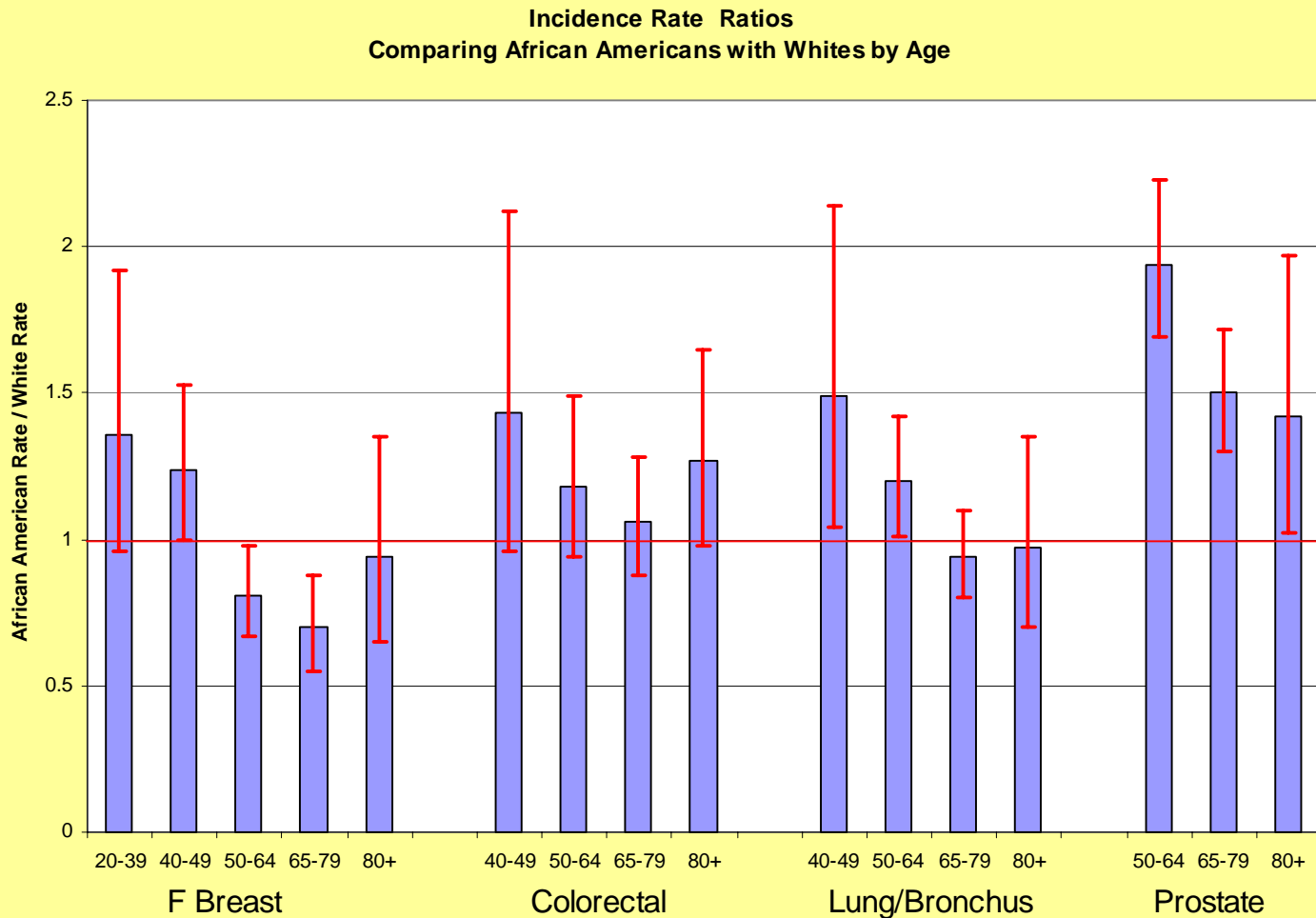
*African American, Hispanic, Asian/Pacific Islander

Are racial disparities in cancer incidence dependent on sex?

Incidence Rate Ratios
Comparing African Americans to Whites by Sex

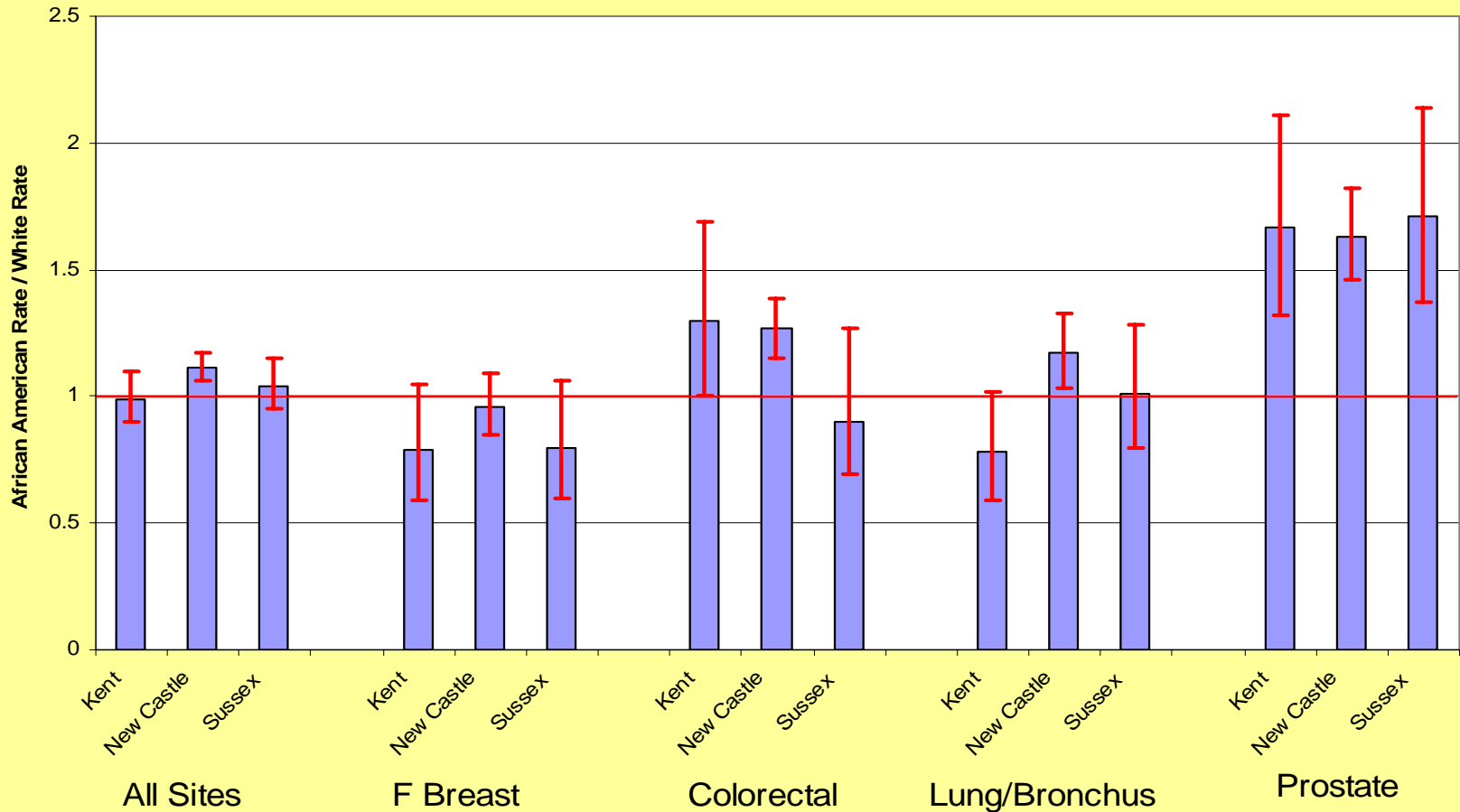


Are racial disparities in cancer incidence dependent on age?







Are racial disparities in cancer incidence dependent on the county of residence?

Incidence Rate Ratios
Comparing African Americans with Whites by County

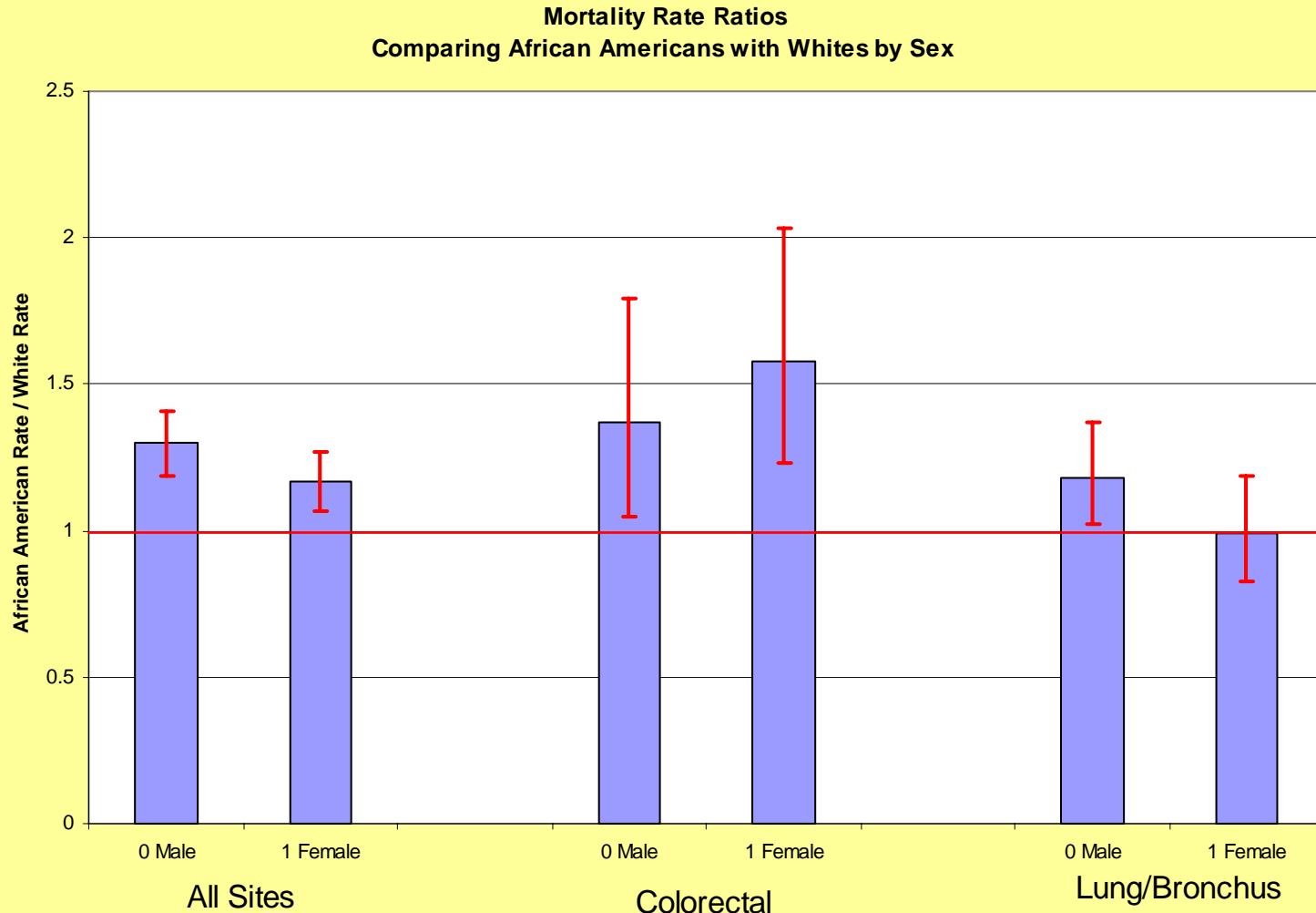


Disparities in Cancer Mortality Between Minorities* and Whites in Delaware, 1999–2002

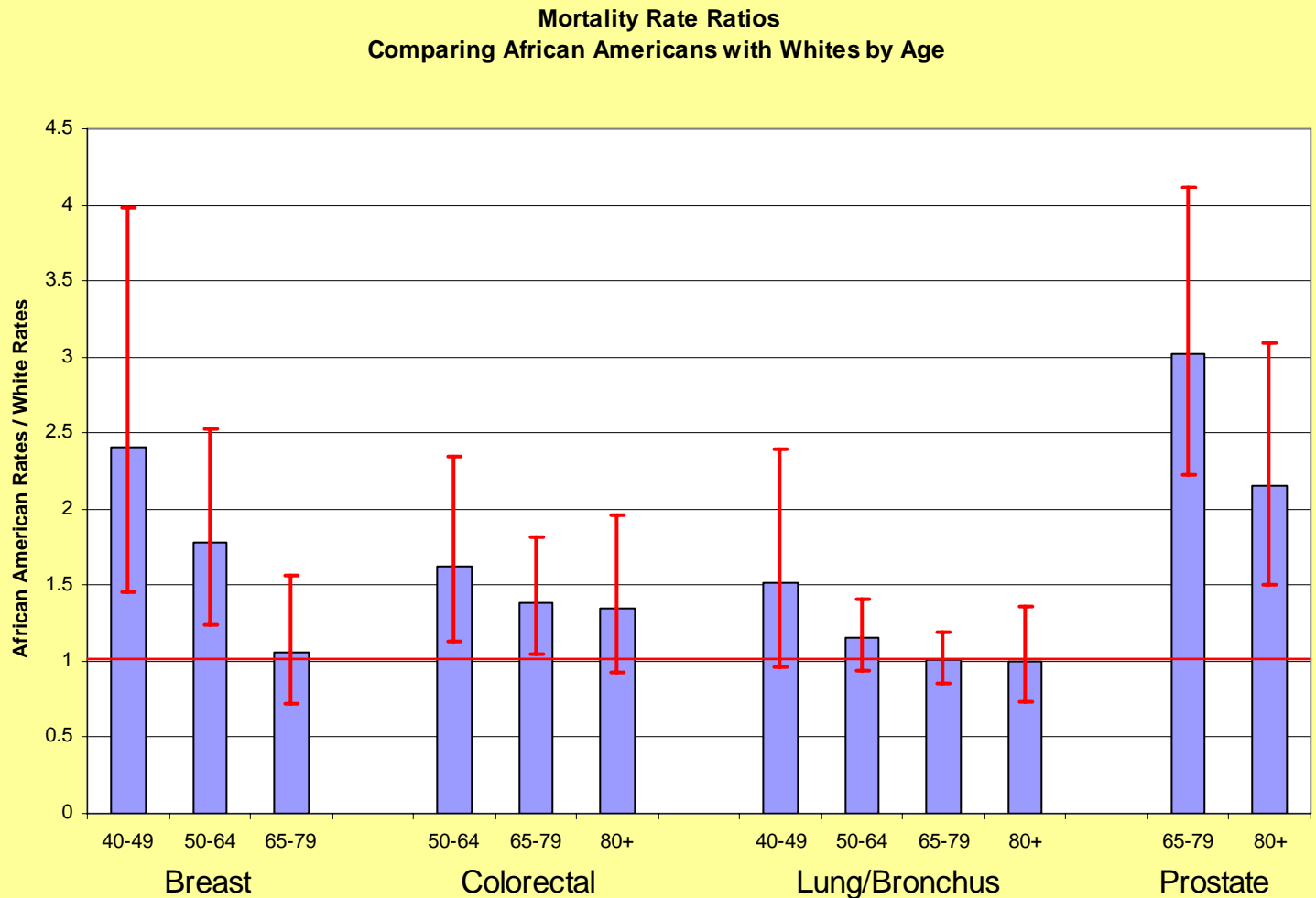
| | | Mortality RR (95% CI) |
|-------------|---|-----------------------|
| All Cancers | | 1.21 (1.14–1.29) |
| | | 0.72 (0.58–0.90) |
| | | 0.50 (0.37–0.68) |
| Breast |  | 1.33 (1.09–1.63) |
| Colorectal |  | 1.47 (1.22–1.76) |
| Lung |  | 1.08 (0.96–1.21) |
| Prostate |  | 2.48 (1.98–3.09) |

*African American, Hispanic, Asian/Pacific Islander

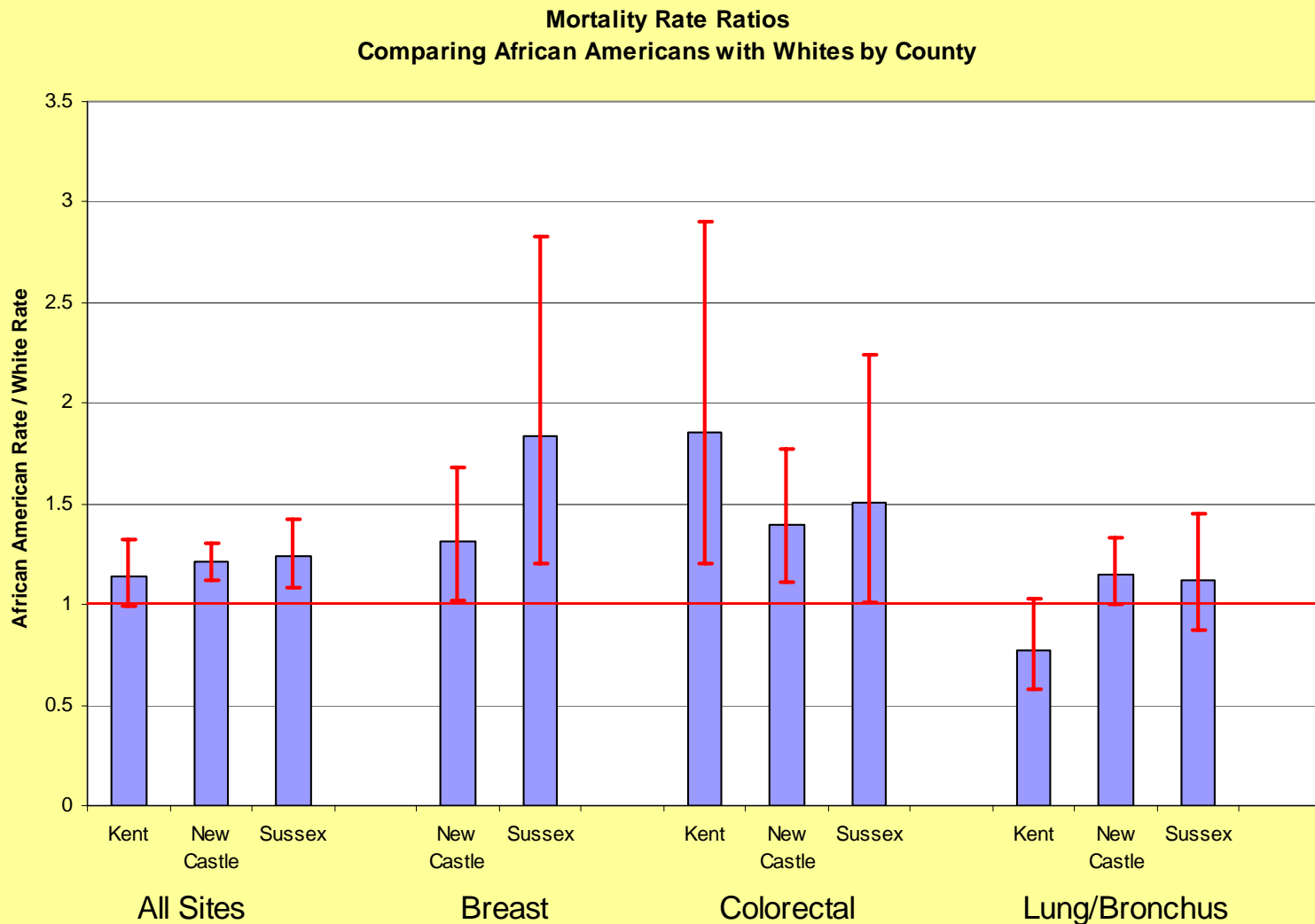
Are racial disparities in cancer mortality dependent on sex?



Are racial disparities in cancer mortality dependent on age?



Are racial disparities in cancer mortality dependent on county of residence?



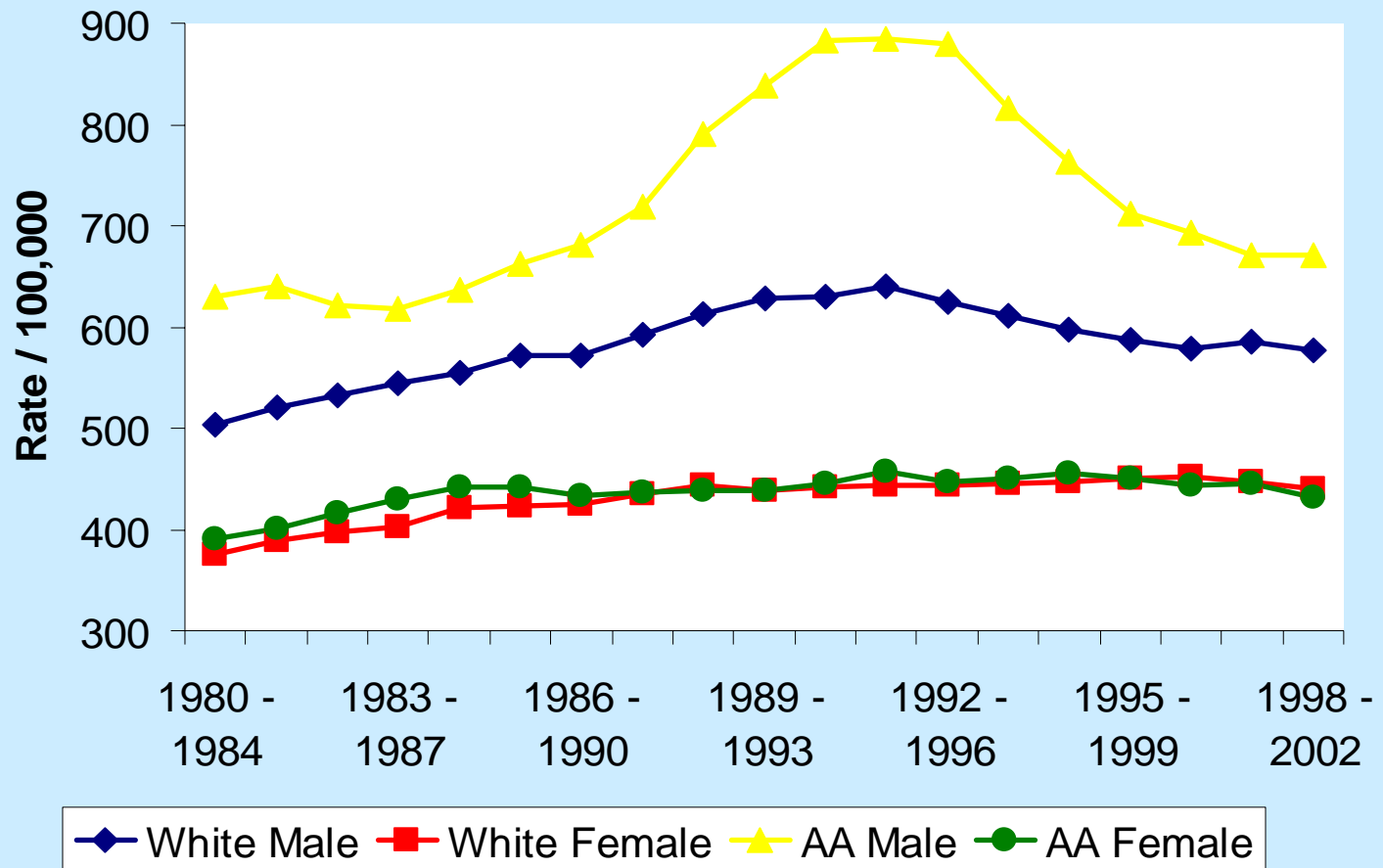
Objective 2

- To examine trends in cancer incidence and mortality by race and sex

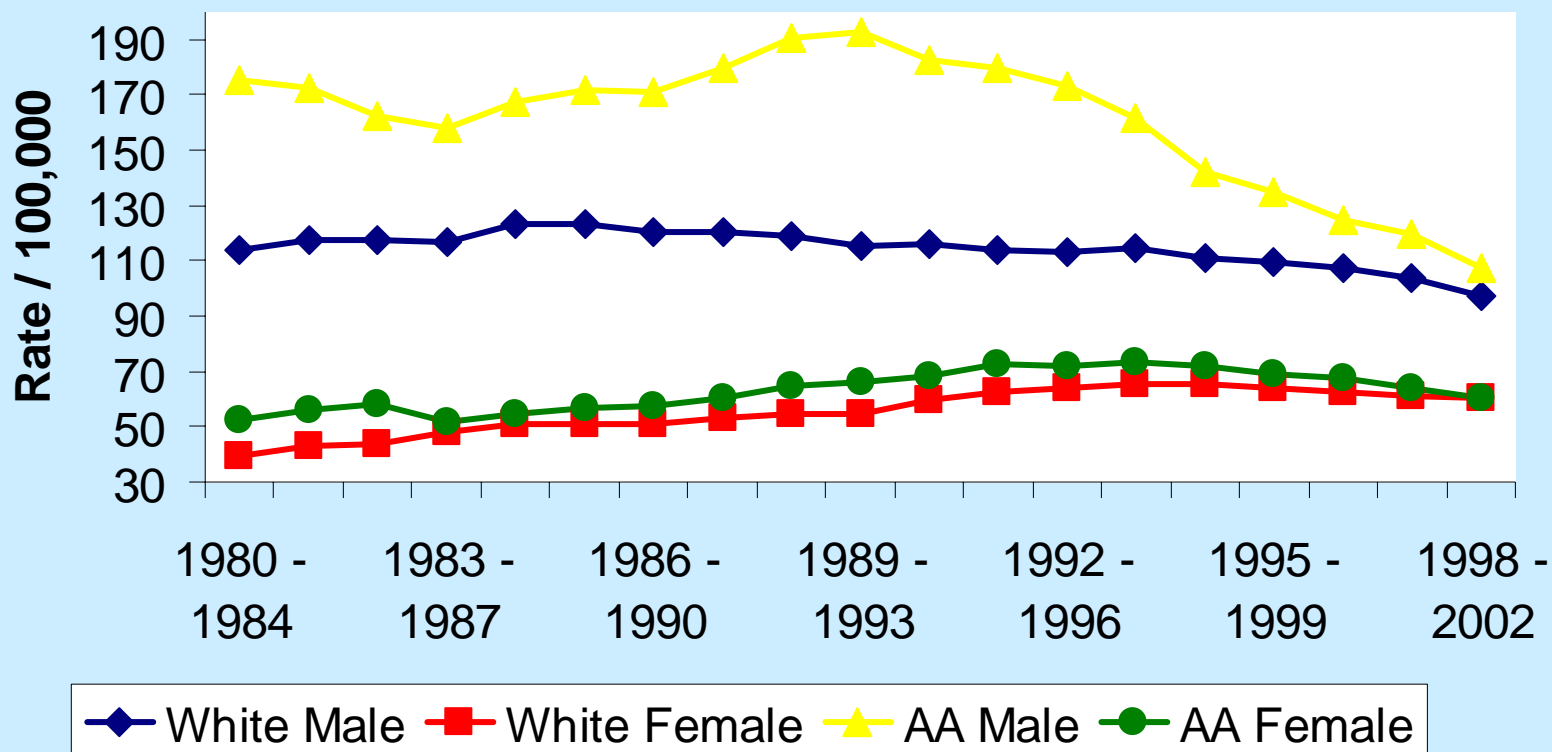
Data Sources

- Delaware Cancer Registry
- National Center for Health Statistics

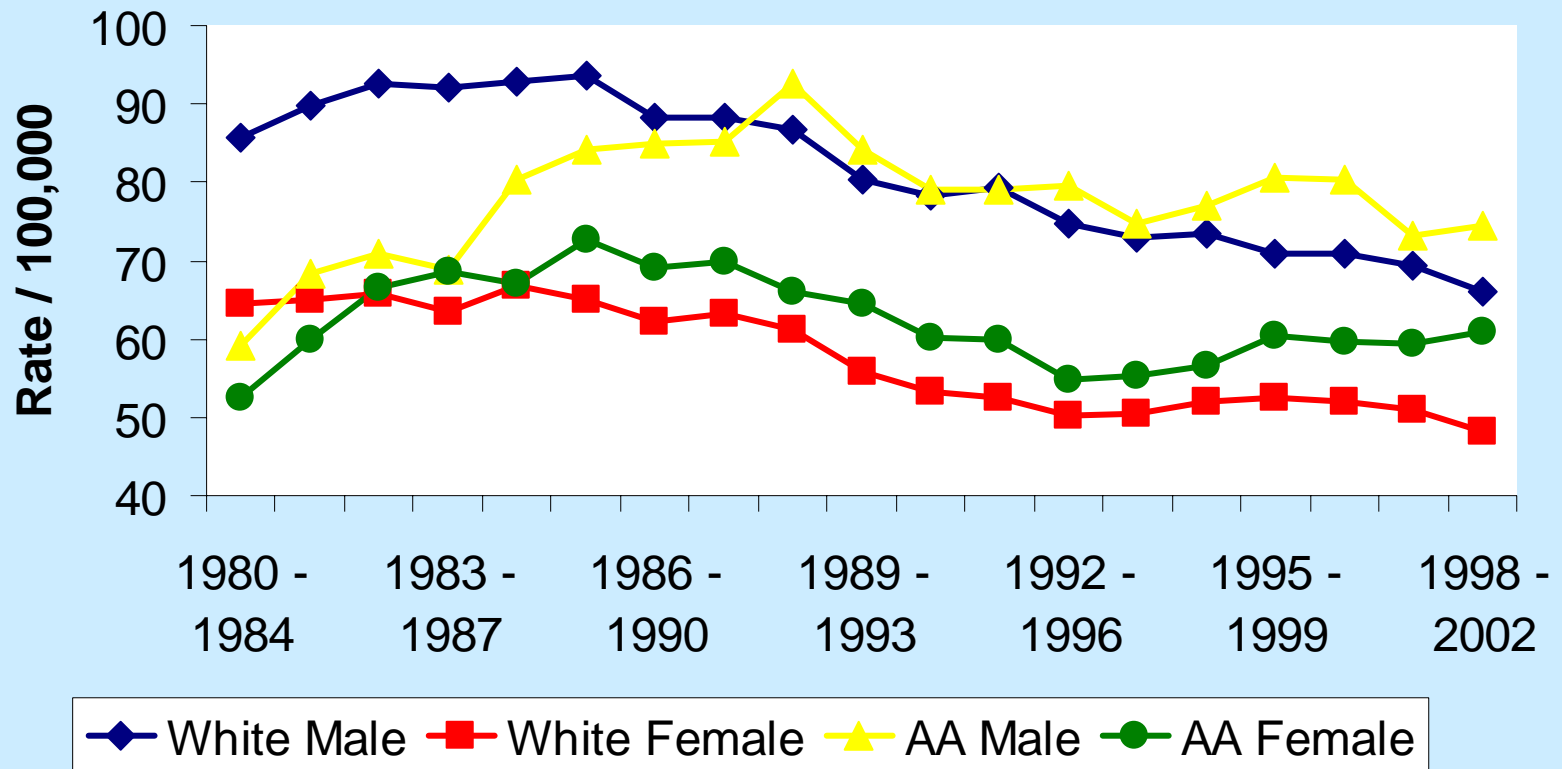
Trends in Incidence Rates - All Cancers Delaware 1980 - 2002



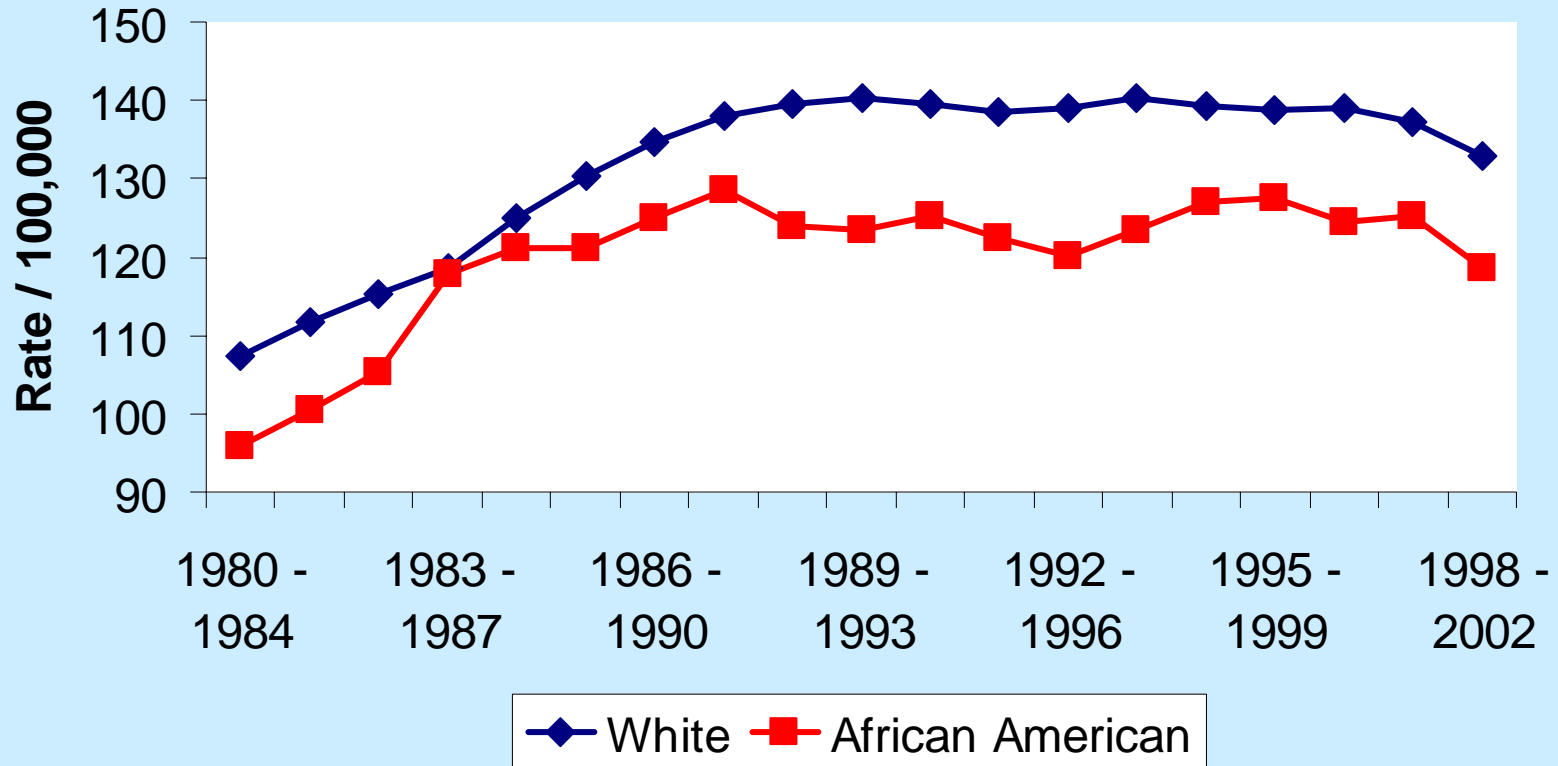
Trends in Incidence Rates - Lung Cancer Delaware 1980 - 2002



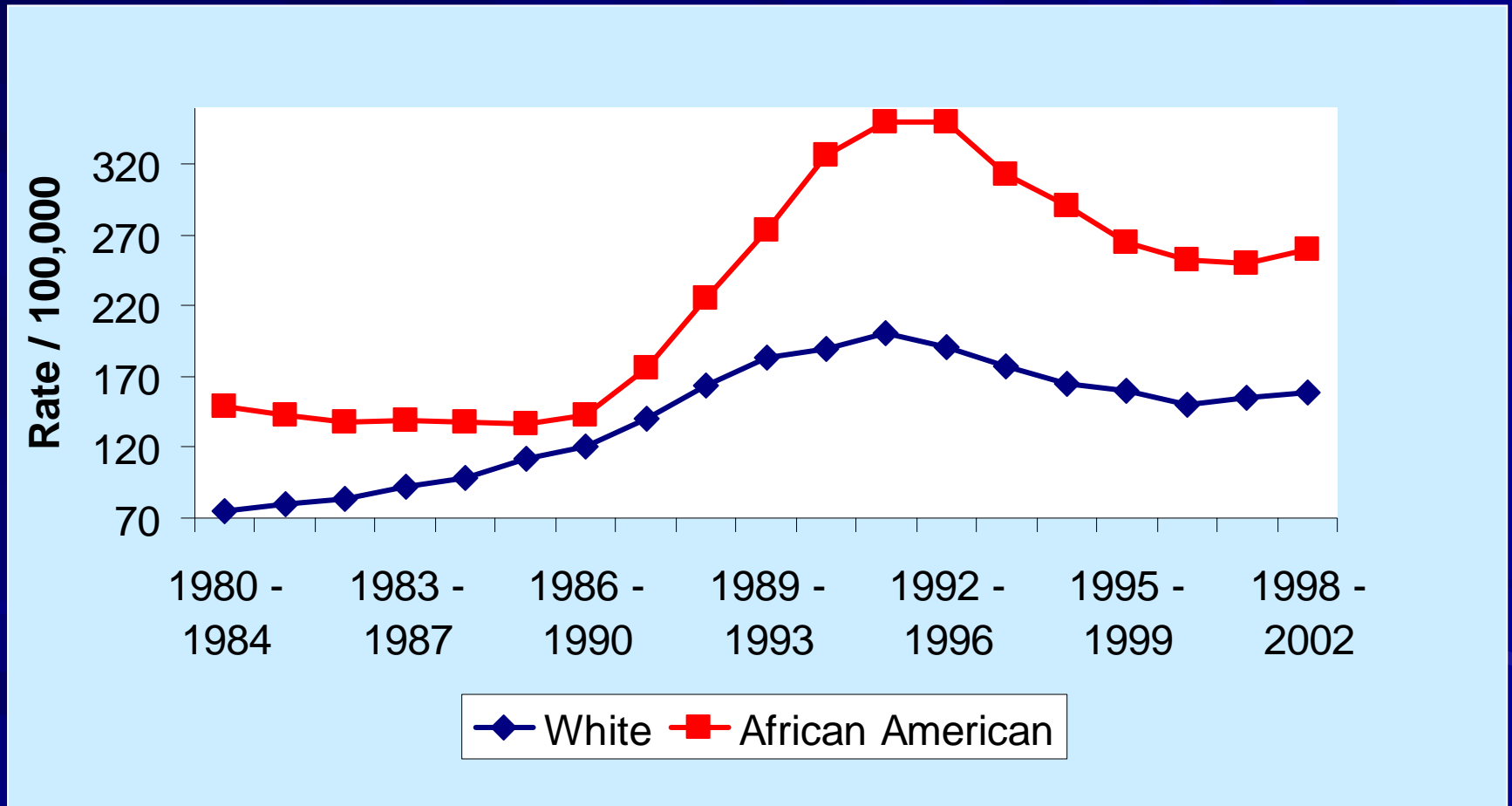
Trends in Incidence Rates - Colorectal Cancer Delaware 1980 - 2002



Trends in Incidence Rates - Breast Cancer Delaware 1980 - 2002

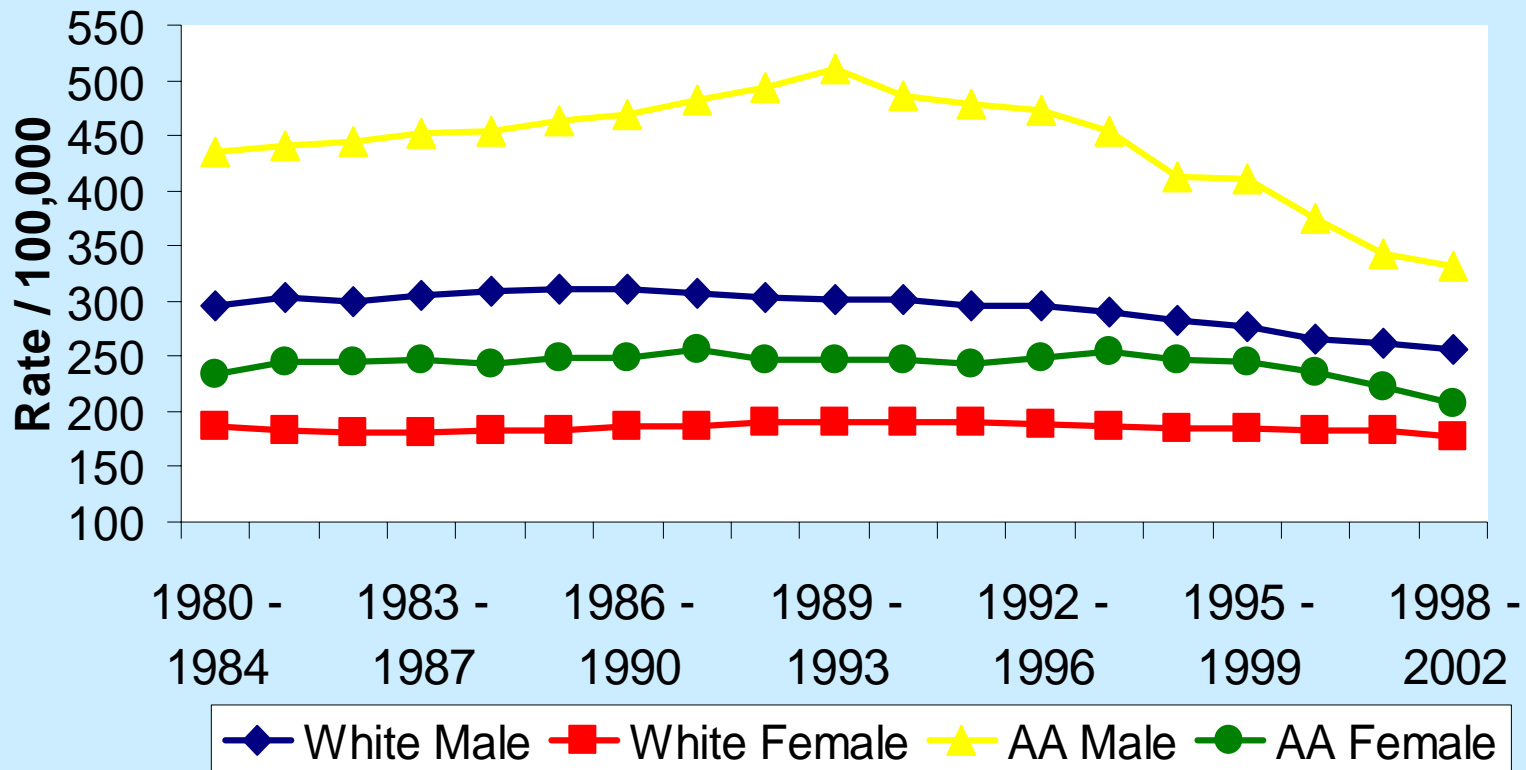


Trends in Incidence Rates - Prostate Cancer Delaware 1980 - 2002

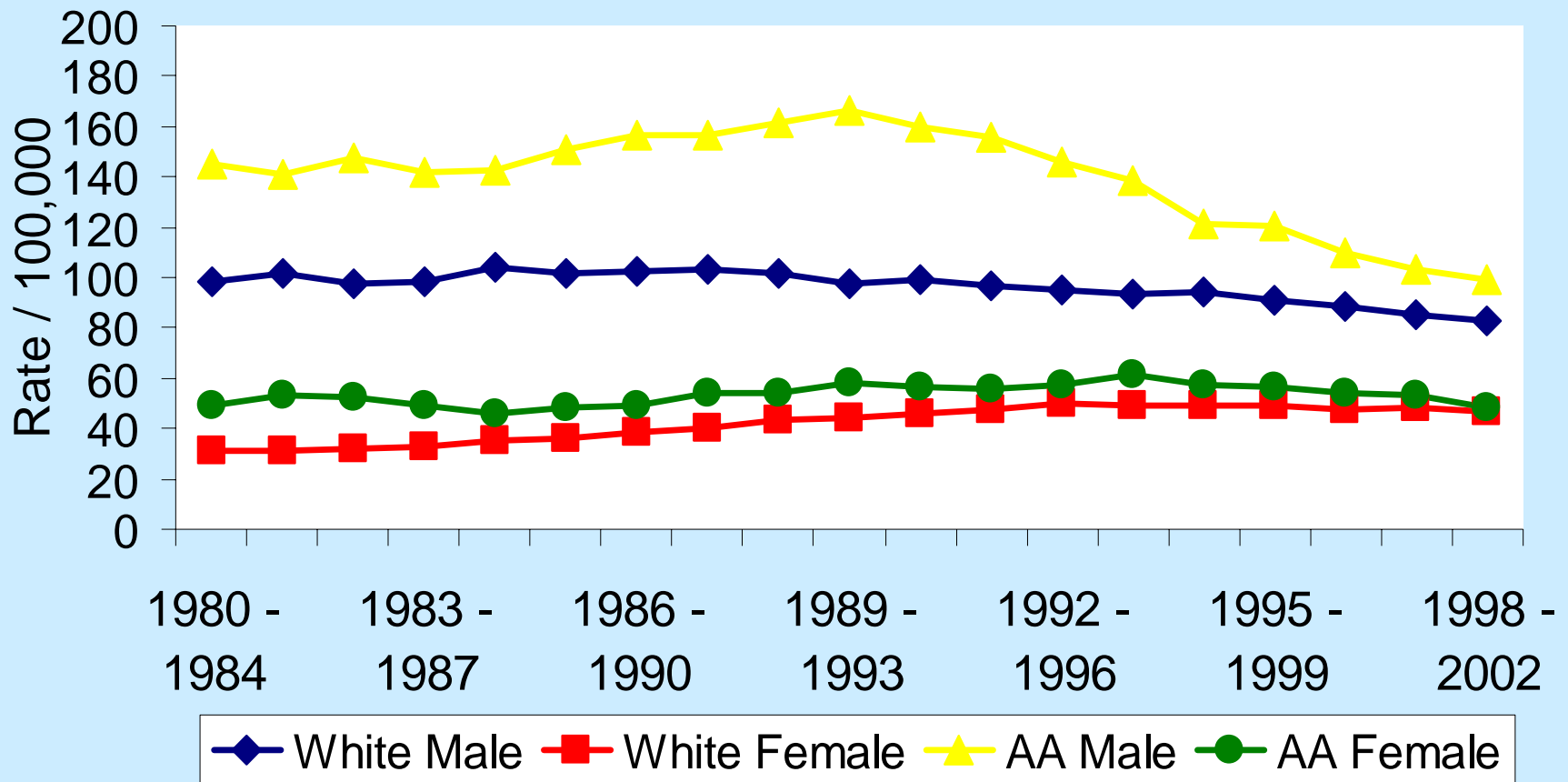


Trends in Mortality Rates - All Cancers

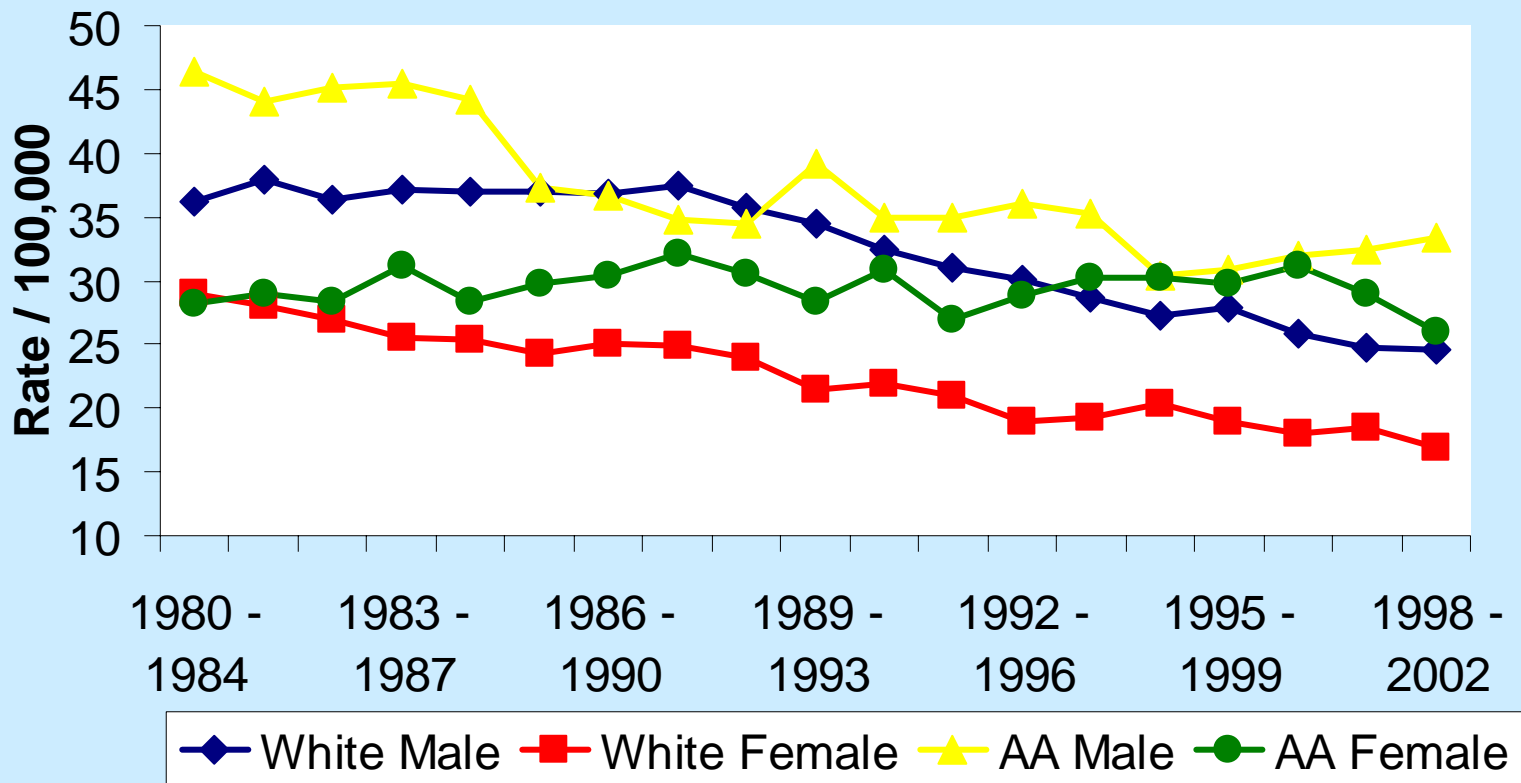
Delaware 1980 - 2002



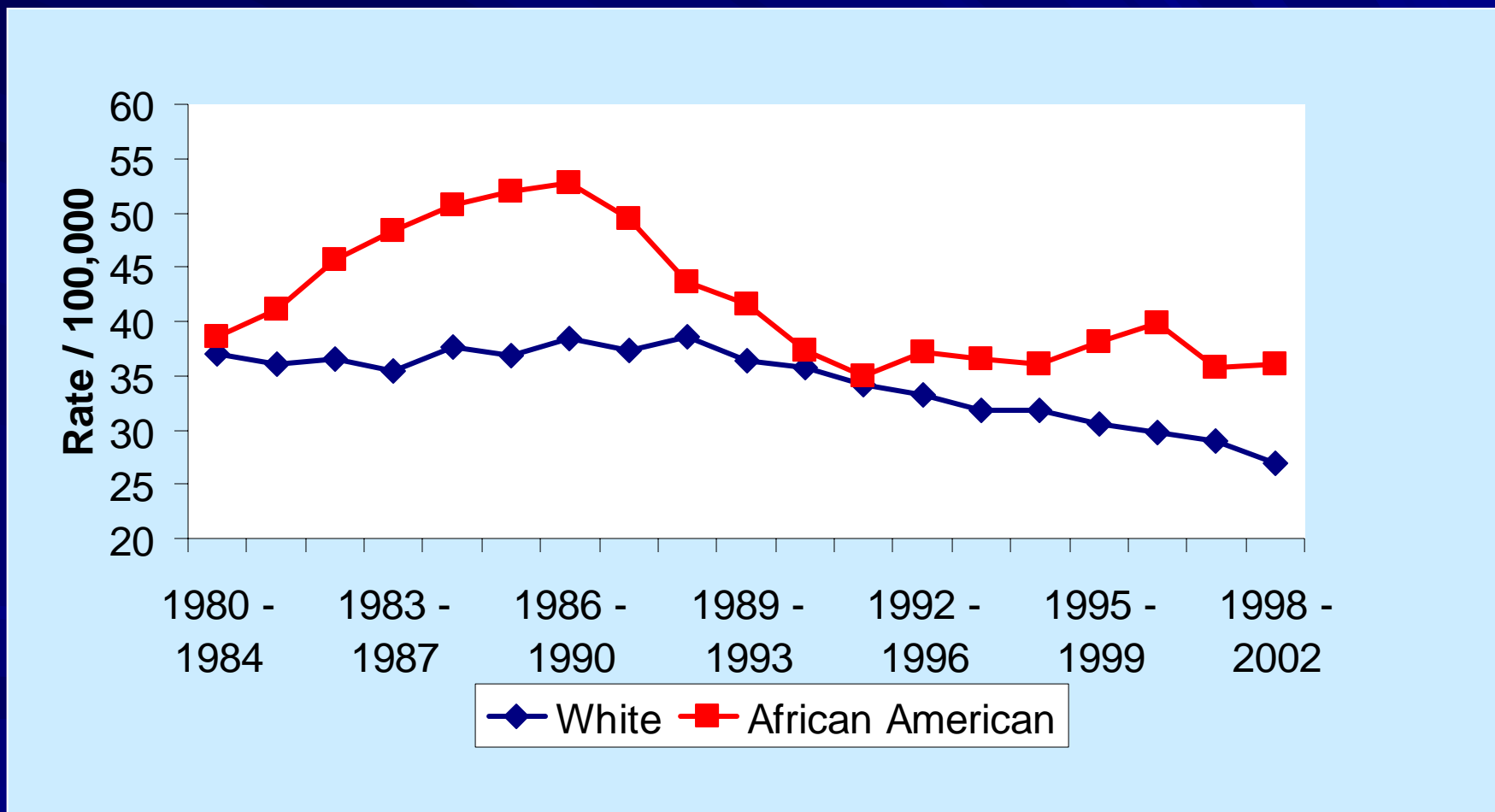
Trends in Mortality Rates - Lung Cancer Delaware 1980 - 2002



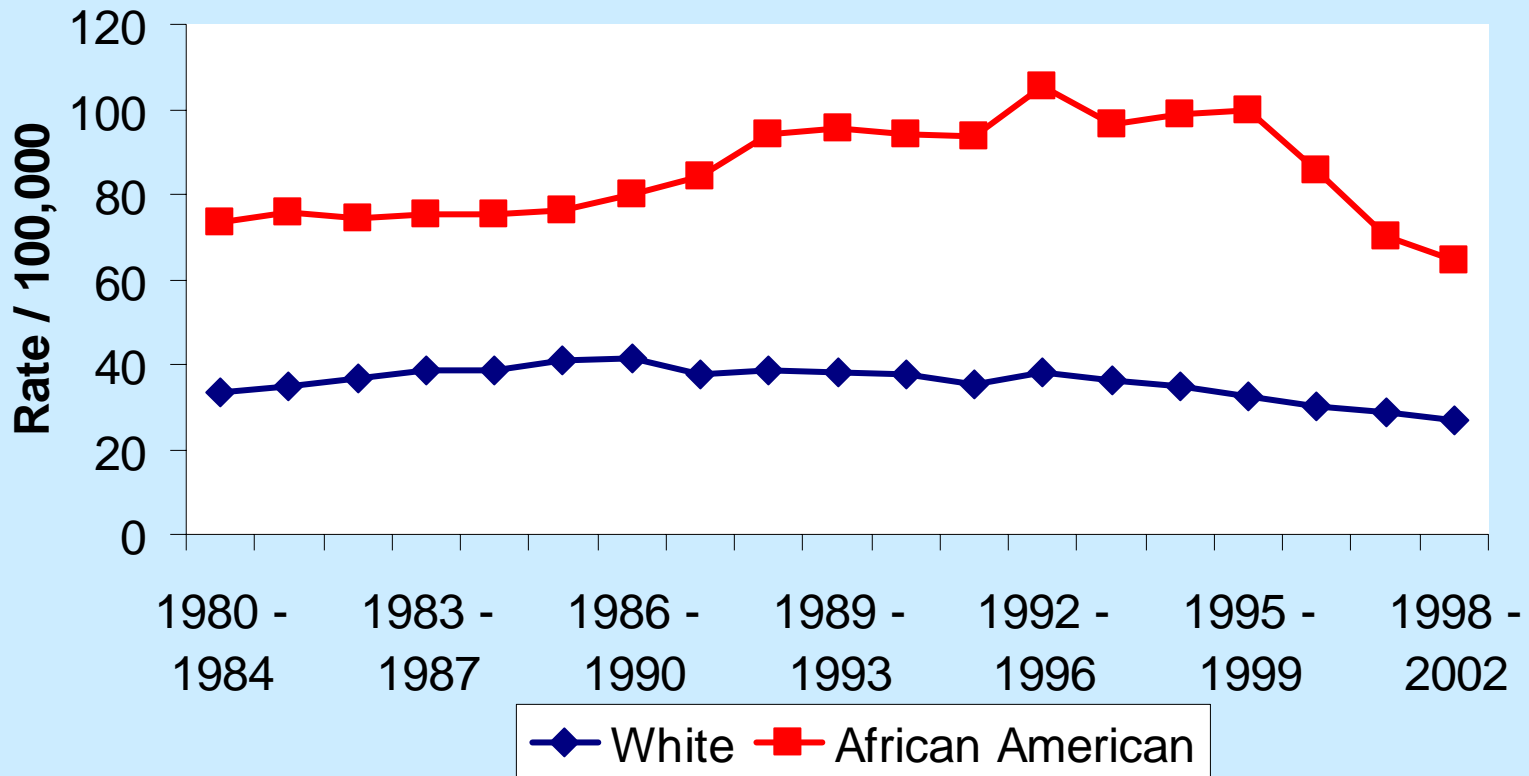
Trends in Mortality Rates - Colorectal Cancer Delaware 1980 - 2002



Trends in Mortality Rates - Breast Cancer Delaware 1980 - 2002



Trends in Mortality Rates - Prostate Cancer Delaware 1980 - 2002



Objective 3

- To examine whether there are differences in access to health care, behavioral cancer risk factors, screening usage, stage of disease, or cancer treatment

Data Sources

- Behavioral Risk Factor Surveillance System (BRFSS): Access to health care, behavioral cancer risk factors, and screening usage
- Delaware Cancer Registry: Stage of disease (at diagnosis) and treatment

BRFS Limitations

- Self-reported; no examination data
- Phone-related issues:

| Parameter | No phone | Cell only |
|------------------|-----------------|------------------|
| South | 6.0% | 6.7% |
| Black | 7.9% | 6.3% |
| Hispanic | 9.1% | 7.2% |
| Other | 3.5% | 5.4% |
| Age 35+ | 3.9-4.1% | 2.5-5.0% |

Source: Tucker C, Brick JM, Morganstein B. *Household Telephone Service and Usage Patterns in the US in 2004*. Bureau of Labor Statistics & Westat.




BRFS Limitations

- Sample size issues:

- Large overall sample = high validity and reliability for total population and county estimates
- Small sample = unstable / unreliable estimates – or NO estimates, if numbers very small

Example Sample-Size Issue: BRFSS

Men responding to question about receipt of colonoscopy:

- Total sample = 4,028
- Number of men = 1,593
- Men age 50+ = 721 
- African American men age 50+ = 63 
- Hispanic men age 50+ = 11 

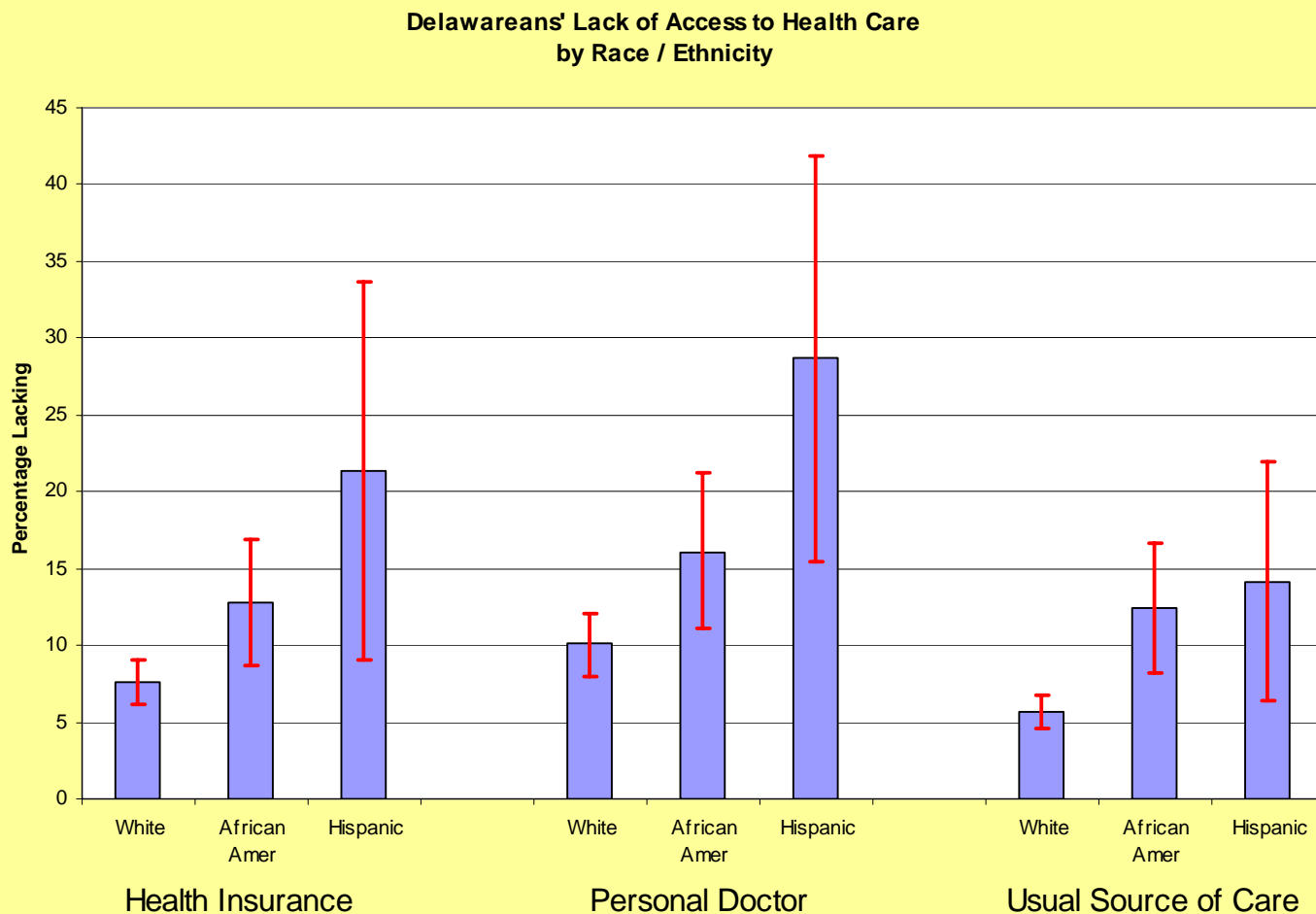
DE Cancer Registry Limitations

- Treatment data collected only once, upon initial submission – i.e., no update required during subsequent update submissions
- Treatment data not currently edited / audited by organizations to which data is annually submitted
- Treatment data minimally audited at reporting facilities (~10% / year)
- Though all cancers submitted – not just a sample – some populations nonetheless small

Example Small Population Issue: DCR

| | Incidence (1998 – 2002) | | | | Mortality (1998 – 2002) | | | |
|-------------|-------------------------|-------|------|-------|-------------------------|-------|------|-------|
| | White | AA | Hisp | Asian | White | AA | Hisp | Asian |
| All Cancers | 16,416 | 2,867 | 187 | 150 | 7,002 | 1,249 | 80 | 42 |
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| Prostate | 2,448 | 591 | 24 | 13 | 328 | 102 | <6 | <6 |

Lack of Access to Health Care Among Delawareans



Can racial/ethnic differences
in access to health care be
explained by differences in
age, sex, or
education level?

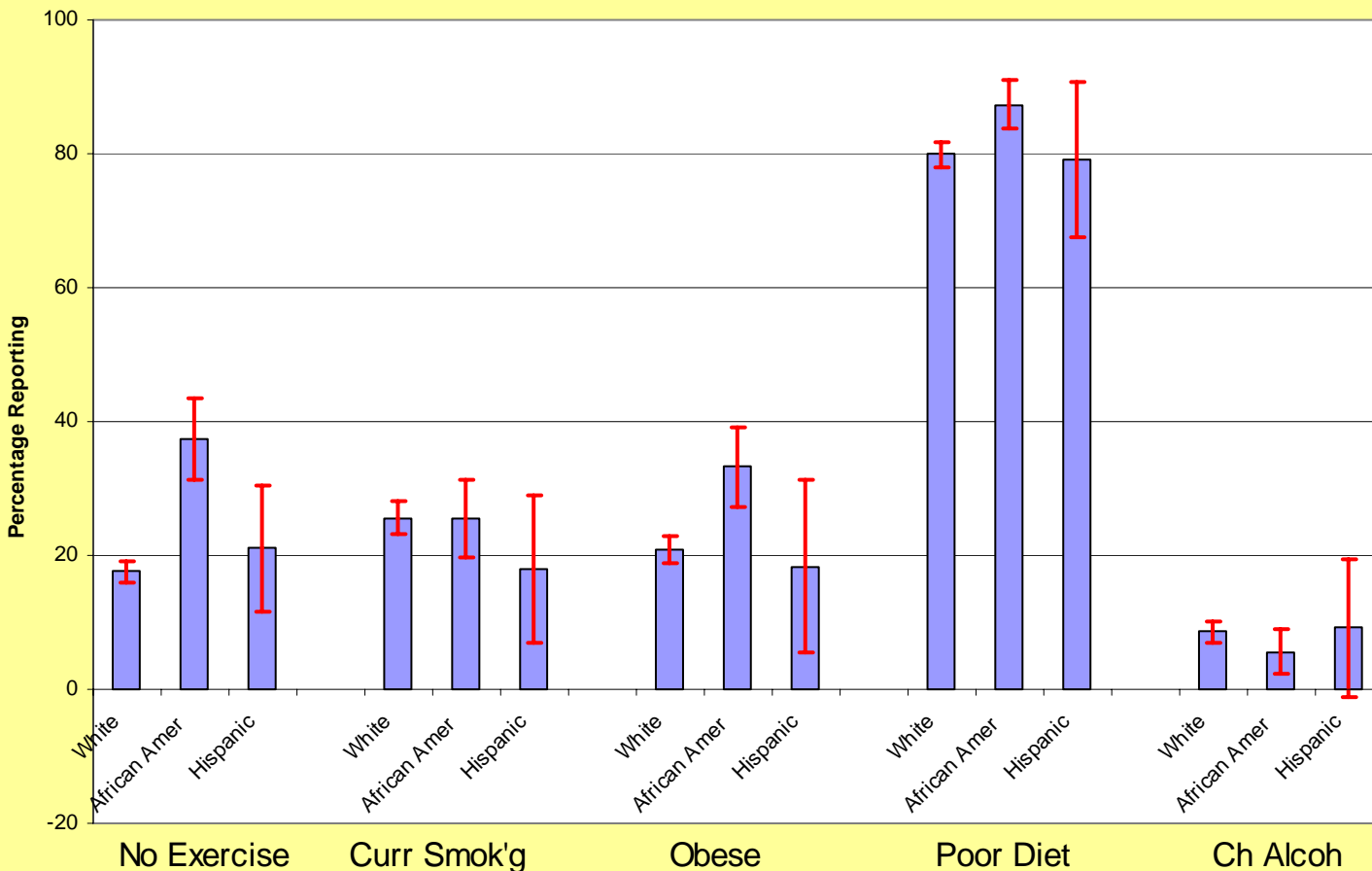
Predictors of Lack of Access to Health Care: Delaware 2002

| | Insurance | Personal Doctor | Usual Source of Care |
|-------------------|----------------------|----------------------|----------------------|
| African American | 1.5 (1.1-2.0) | 1.0 (0.7-1.4) | 1.6 (1.2-2.3) |
| Hispanic | 1.6 (0.9-2.8) | 2.3 (1.4-3.7) | 2.7 (1.5-4.7) |
| Non-H.S. Graduate | 7.8(5.1-12.0) | 2.5 (1.7-3.6) | 2.1 (1.4-3.1) |
| H.S. Graduate | 2.7 (1.9-3.9) | 1.3 (0.9-1.7) | 1.0 (0.7-1.5) |
| Some College | 1.8 (1.2-2.7) | 1.2 (0.8-1.6) | 1.3 (0.8-1.7) |

Data are presented as odds ratios from three separate multivariate logistic regression models with access to care as the dependent variables.

Rates of Modifiable Behavioral Risks Among Delawareans

Comparison of Delawareans' Modifiable Risk Factors by Race / Ethnicity



Can racial/ethnic differences in behavioral risk factors be explained by differences in age, sex, education level, and access to health care?

Predictors of Differences in Modifiable Behavioral Risk Factors: Delaware 2002

| | Exercise | Smoking | Alcohol |
|-------------------|----------------------|----------------------|----------------|
| African American | 2.4 (1.9-3.0) | 0.55 (0.5-0.7) | 0.54 (0.3-0.9) |
| Hispanic | 1.8 (1.1-3.0) | 0.70 (0.5-1.1) | 0.25 (0.1-1.0) |
| Non-H.S. Graduate | 4.4 (3.3-5.9) | 2.2 (1.7-2.8) | 1.1 (0.6-2.0) |
| H.S. Graduate | 2.2 (1.8-2.7) | 1.7 (1.4-2.0) | 1.3 (0.9-1.9) |
| Some College | 1.6 (1.2-2.0) | 1.5 (1.3-1.8) | 1.4 (1.0-2.1) |
| Age 65-79 | 2.4 (1.9-3.1) | 1.8 (1.5-2.2) | 0.52 (0.3-0.8) |

Data are presented as odds ratios from five separate multivariate logistic regression models with behavioral risk factors as the dependent variables.

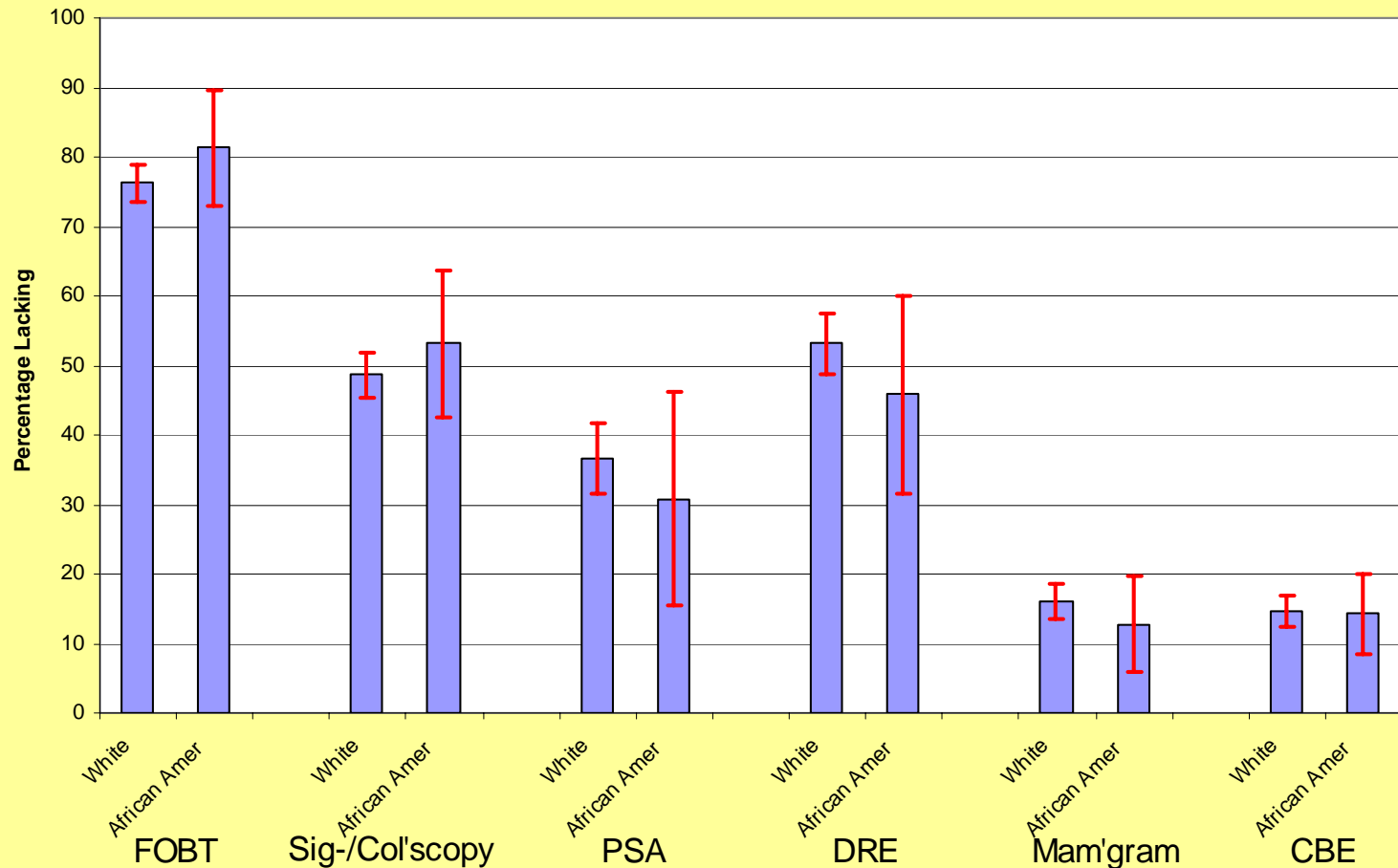
Predictors of Differences in Modifiable Behavioral Risk Factors: Delaware 2002

| | Obesity | Diet |
|-------------------|----------------------|----------------------|
| African American | 2.5 (2.0-3.2) | 1.4 (1.1-1.8) |
| Hispanic | 1.2 (0.8-1.9) | 0.71 (0.4-1.2) |
| Non-H.S. Graduate | 1.9 (1.5-2.6) | 2.3 (1.6-3.2) |
| H.S. Graduate | 1.6 (1.3-1.9) | 1.9 (1.6-2.3) |
| Some College | 1.4 (1.2-1.7) | 1.6 (1.3-1.9) |
| Age 65-79 | 1.7 (1.4-2.1) | 0.62 (0.5-0.8) |

Data are presented as odds ratios from five separate multivariate logistic regression models with behavioral risk factors as the dependent variables.

Lack of Cancer Screening Tests Among Delawareans

Delawareans' Lack of Cancer Screening Tests
by Race / Ethnicity



There were no differences in the proportions lacking screening when comparing Whites and African Americans. Factors which *were* predictors of a difference were:

Predictors of Disparities in Screening Usage: Delaware 2002

| | FOBT | Sig-/Colo | PSA |
|---------------------|----------------------|----------------------|----------------------|
| Non-H.S. Graduate | 1.2 (0.8-1.8) | 2.7 (1.9-3.9) | 1.8 (1.0-3.2) |
| H.S. Graduate | 1.0 (0.7-1.3) | 2.1 (1.6-2.7) | 0.9 (0.6-1.3) |
| No Health Insurance | 1.4 (0.7-2.7) | 2.5 (1.4-4.6) | 3.7 (1.6-8.3) |
| No Personal Doctor | 2.5 (1.2-5.3) | 2.3 (1.3-4.0) | 3.8 (1.6-8.6) |

Data are presented as odds ratios from six separate multivariate logistic regression models with the screening tests as the dependent variables.

Predictors of Disparities in Screening Usage: Delaware 2002

| | DRE | Mam | CBE |
|---------------------|----------------------|----------------------|----------------------|
| Non-H.S. Graduate | 2.3 (1.4-3.7) | 2.1 (1.2-3.6) | 4.5 (2.8-7.4) |
| H.S. Graduate | 1.3 (0.9-1.9) | 1.8 (1.2-2.6) | 2.5 (1.7-3.7) |
| No Health Insurance | 2.2 (1.1-4.3) | 2.6 (1.5-4.6) | 2.1 (1.4-3.2) |
| No Personal Doctor | 4.0 (2.0-8.1) | 3.5 (1.9-6.4) | 1.7 (1.0-2.8) |

Data are presented as odds ratios from six separate multivariate logistic regression models with the screening tests as the dependent variables.

Distribution of Cancer Cases by Stage: Delaware 1998 - 2002

| | Colorectal | | Breast | | Prostate | |
|----------|------------|-----|--------|-----|----------|-----|
| | White | AA | White | AA | White | AA |
| Local | 29% | 29% | 67% | 58% | 83% | 85% |
| Regional | 47% | 44% | 26% | 33% | 8% | 5% |
| Distant | 16% | 21% | 4% | 4% | 4% | 4% |

Restricted to cancer sites with available screening test.

Which brings us to...

- Cancer treatment
- Three analyses:
 - Initial analysis
 - Initial subset analysis
 - Post-review subset analysis

Receipt of “Standard” Treatment

Limited to:

- People with breast, colorectal, lung/bronchus or prostate cancer
- People diagnosed at local stage disease
- Delaware residents treated at Delaware facilities
- First course of treatment

“Standard” Treatment

- Standard during the study period (1998-2002)
- As defined by the National Cancer Institute, Physician Data Query
- Based solely on treatment data contained in Delaware Cancer Registry
- Included 3,845 cases

“Standard” Treatment

- Breast cancer (n = 1,675; 87% W, 13% AA):
 - Mastectomy
 - Breast conserving surgery (BCS) + radiation
- Colorectal cancer (n = 570; 84% W, 16% AA):
 - Partial colectomy (at least)

“Standard” Treatment

- Lung/bronchus cancer (n = 514; 88% W, 12% AA):
 - Wedge, segmental or bronchial sleeve resection or
 - Resection of at least one lobe of lung
- Prostate cancer (n = 1,086; 72% W, 28% AA):
 - Subtotal, segmental or simple prostatectomy (men aged <70)

Results, Initial Analysis

Characteristics Associated with a Lack of "Standard" Treatment

| | Breast | Colorectal | Lung/Bron | Prostate |
|-----------------|--------|------------|-----------|----------|
| Race | | X | | |
| Age 65-79 | | | X | |
| Age 80+ | X | | X | (NA) |
| Kent Cnty (res) | X | | X | |
| No Health Ins | | | | X |

Only statistically significant results displayed

Results, Initial Analysis

Looking across all four cancers combined, statistically significant associations found between likelihood of receiving standard treatment and:

- Facility ($p < 0.0001$)
- Cancer type ($p < 0.0001$)
- Race ($p < 0.0007$)

Issues with Initial Treatment Analysis

- “Standard” treatment not equally “standard” for all cancers included:
 - Variations are common / appropriate for lung / bronchus cancer
 - “Enroll in clinical trial” may be best approach
 - Outcome – no matter what treatment is used – is generally poor
 - Variations are common / appropriate for prostate cancer
 - “Watchful waiting” (i.e., no treatment, in terms of data capture) is entirely legitimate

Plan Developed to Address

- Limit analysis to cancers where treatment approach is ~universally agreed:
 - Breast
 - Colorectal
- Limit patients analyzed to those who:
 - Received *some* treatment (indicator of candidacy for treatment)
 - Lacked “*standard*” treatment

Plan Developed to Address

- Breast cancer (n = 1,078; 88% W, 12% AA)
 - Received breast conserving surgery, but not follow-up radiation
- Colorectal cancer (n = 73; 78% W, 22% AA)
 - Received polypectomy, but not at least a partial colectomy

Results, Initial Subset Analysis

(n=1,151)

Statistically significant associations found between likelihood of receiving standard treatment and:

- Facility ($p < 0.0001$)
- Cancer type ($p < 0.0001$)
- Race – both cancers combined ($p < 0.004$)
- Race – breast cancer only ($p < 0.04$)

Issues with Subset Treatment Analysis

- Still depended solely on data in DCR
- DCR treatment data not routinely audited by any accrediting organization for completeness or accuracy
- Treatment data collected from reporting facilities only on initial submission to DCR (i.e., not included in follow-up submissions)
- Treatment data minimally audited at facility level (~10% of annual cases)
- No accommodation of justifiable variations from “standard”
 - Patient choice
 - Co-morbidities precluding more extensive surgery / radiation

Plan Developed to Address

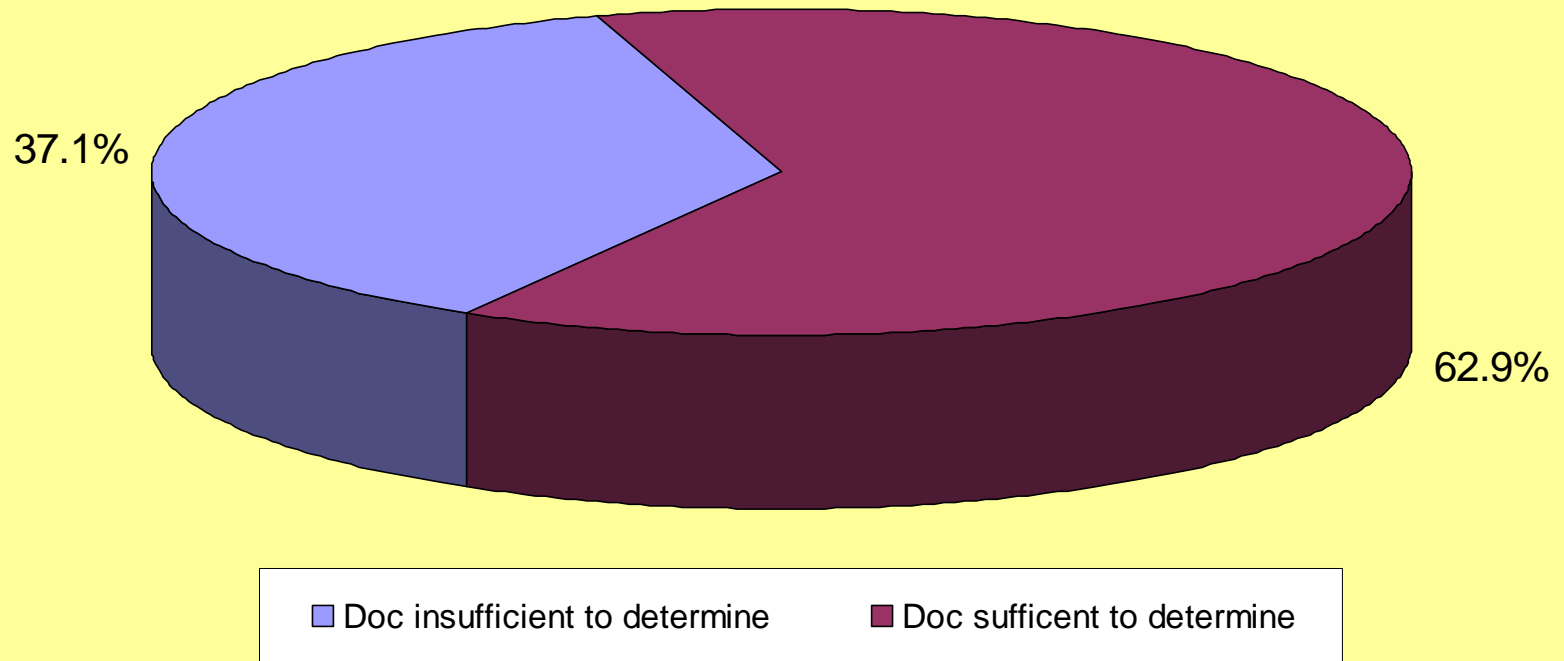
- Identify all (subset analysis) cases who did not receive “standard” treatment (n = 334)
- Conduct on-site reviews at each facility to validate DCR data used in analyses
- Revise dataset to reflect results of reviews (if indicated)
- Re-run subset analysis, using revised dataset

Plan Implemented

- Physician / oncologist members of Cancer Consortium formed review team
- Team visited six facilities between mid-December 2005 and early-February 2006
- Reviewed all available records for each case (e.g., inpatient, radiation facility, facility-based registry)
- Documented review findings

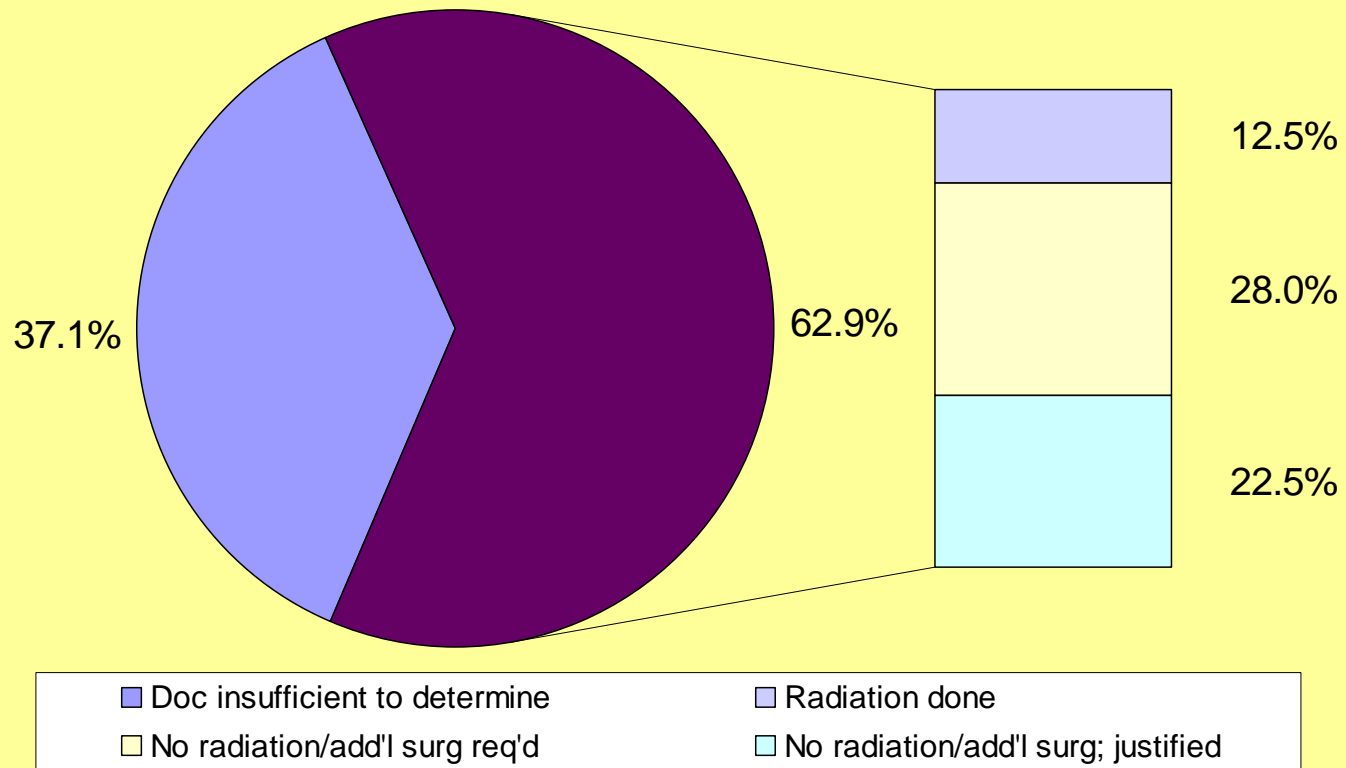
Review Results

Percentage of Cases by Review Outcome
All (6) Facilities



Review Results

Percentage of Cases by Review Outcome
All (6) Facilities



Results, Post-Review Subset Analysis (n=1,144*)

Statistically significant associations found
between likelihood of receiving
“appropriate” treatment and:

- Facility ($p < 0.0001$)

* Seven (7) cases eliminated due to non-analytic case type or incorrect staging – i.e., review revealed disease not diagnosed at local stage.

Remaining Treatment Issue

- *Where* patients receive treatment still appears to impact likelihood of receiving “appropriate” treatment
- Possible contributing factor:
 - Results may be more reflective of quality of *documentation* than quality of *treatment*

Remaining Treatment Issue

■ Plan:

- Continue follow-up on cases not yet resolved

■ Progress to date:

- Follow-up plan developed
- Implementation in progress
 - Cases sought at one facility to date (21 resolved)
 - Plan in place to ask other facilities to search for remaining outstanding cases

Remaining Data Issue

- Reviews revealed numerous issues with DCR data and with some facility-specific registry data
 - DCR data – considered alone – do not support analysis of treatment (nor have they – historically – been intended to)
 - DCR data and facility registry data often differ
 - Registry data at some facilities found to be especially problematic during study time frame – e.g., staging inaccuracies

Remaining Data Issue

- Problems identified have implications for more than just our study...
 - In-state: Staging inaccuracies impact, e.g., program evaluations that track stage-at-diagnosis as a measure of success
 - Out-of-state: Data – both DCR- and facility-registry-specific – are submitted to other databases, certifying agencies, etc., and are used to develop Delaware “profiles”

Remaining Data Issue

■ Plan:

- To be developed by, e.g., Cancer Consortium Advisory Council and DCR Advisory Committee
- Considerations include:
 - Scope, e.g., do we want to look to DCR for treatment data
 - Policy, e.g., should required update fields be redefined; should some intra-state body routinely oversee / audit DCR (and/or facility) data
 - IT capabilities, e.g., should DCR move toward electronic, perhaps web-based, data capture
 - Staffing support, e.g., what are appropriate facility registry staffing levels

Remaining Report Issue

- Current treatment section of Disparities Report does not accurately reflect what we now know
 - Reflects analysis of original DCR data
 - All four cancers
 - Registry data only, w/o benefit of source document review
 - Includes no subsequent analysis results

Remaining Report Issue

■ Plan:

- Release rest of report, but hold off on treatment section?
- Hold entire report till treatment section can be rewritten to include all analyses?
 - Include only those done to date?
 - Await completion of current follow-up project?
- Other options?

Remaining Disparities Issues

- What are the factors that contribute to the increased cancer incidence rates among African Americans in Delaware?

| | Incidence RR (95% CI) |
|-------------|-----------------------|
| All Cancers | 1.08 (1.04–1.13) |
| Colorectal | 1.19 (1.06–1.34) |
| Prostate | 1.68 (1.53–1.84) |

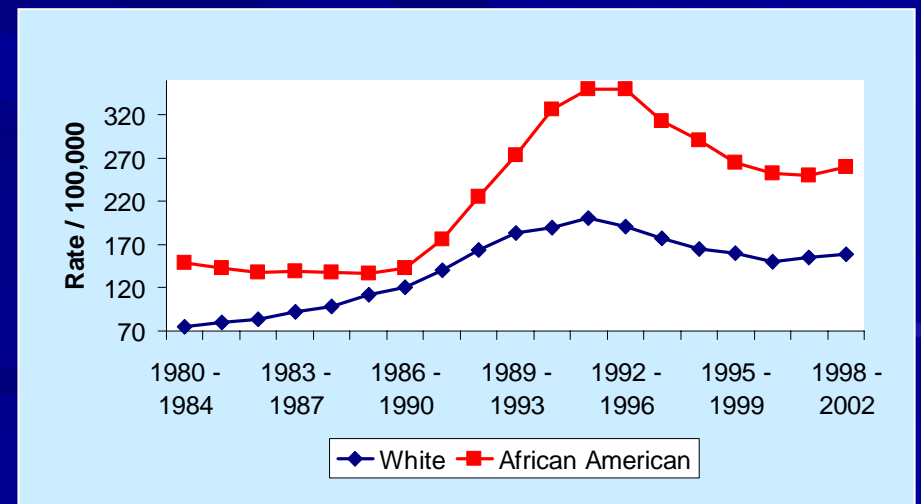
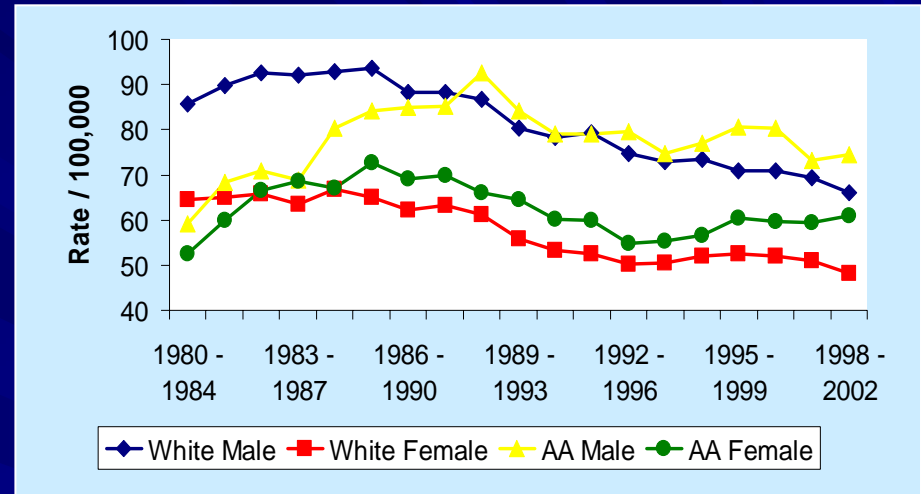
Remaining Disparities Issues

- What are the factors that contribute to the increased cancer mortality rates among African Americans in Delaware?

| | Mortality RR (95% CI) |
|-------------|-----------------------|
| All Cancers | 1.21 (1.14–1.29) |
| Breast | 1.33 (1.09–1.63) |
| Colorectal | 1.47 (1.22–1.76) |
| Prostate | 2.48 (1.98–3.09) |

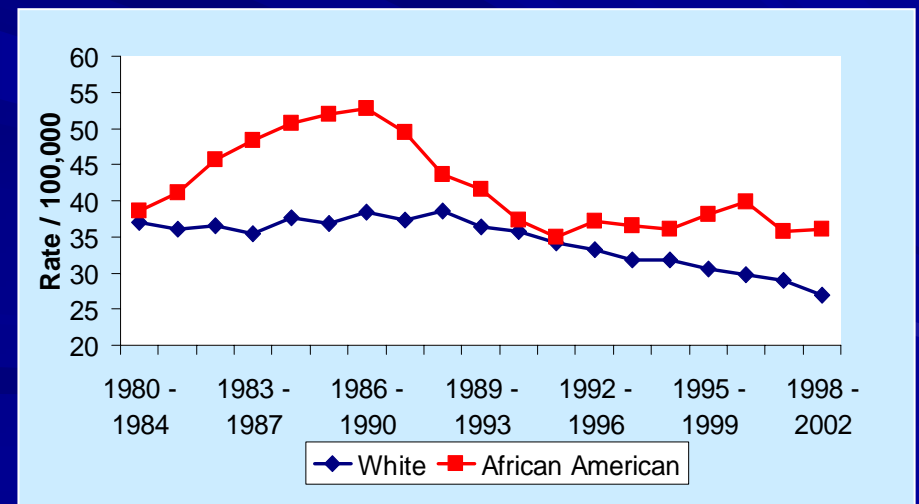
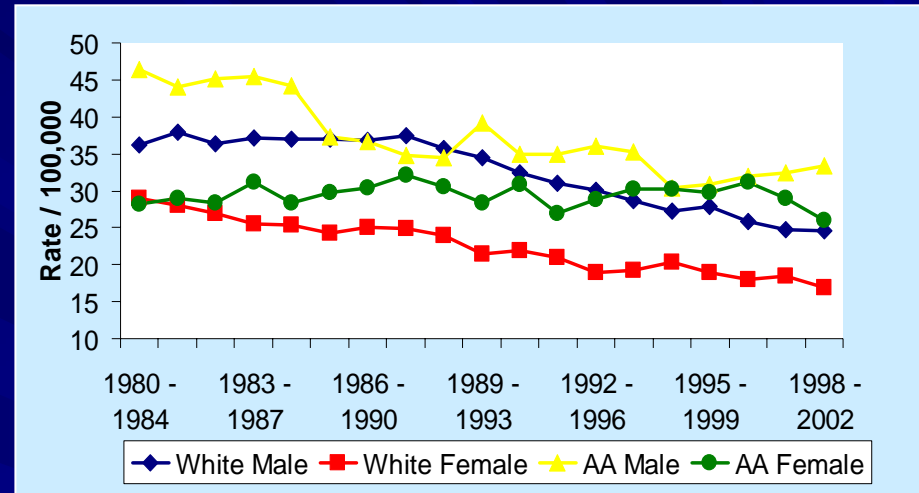
Remaining Disparities Issues

■ Why are we observing increases in colorectal and prostate cancer incidence?



Remaining Disparities Issues

■ Why are we observing increases in colorectal and breast cancer mortality?



Remaining Disparities Issues

African Americans, Hispanics and people with less than a high school education are more likely to lack access to health care.

| | Insurance | Personal Doctor | Usual Source of Care |
|-------------------|-----------|-----------------|----------------------|
| African American | X | | X |
| Hispanic | | X | X |
| Non-H.S. Graduate | X | X | X |

Remaining Disparities Issues

African Americans, people with less than a college education, and those age 50-79 are more likely to exhibit behavioral risks.

| | No Exercise | Smoking | Obesity | Poor Diet |
|-------------------|-------------|---------|---------|-----------|
| African American | X | | X | X |
| Non-H.S. Graduate | X | X | X | X |
| H.S. Graduate | X | X | X | X |
| Some College | X | X | X | X |
| Age 50-64 | X | X | X | |
| Age 65-79 | X | X | X | |

Remaining Disparities Issues

People with less than a high school education, those who lack health insurance, and those who lack a personal doctor are less likely to undergo routine screenings.

| | FOBT | Sig-/Colo | PSA | DRE | Mam | CBE |
|---------------------|------|-----------|-----|-----|-----|-----|
| Non-H.S. Graduate | | X | | X | X | X |
| No Health Insurance | | X | X | X | X | X |
| No Personal Doctor | X | X | X | X | X | |

Remaining Disparities Issues

- Common, likely inter-relating themes:
 - Race and a lack of education are factors in healthcare access
 - Race and a lack of education are factors in behavioral risks
 - Lack of education and lack of healthcare access (insurance, personal doctor) are factors in screening receipt

Remaining Disparities Issues

- Social, cultural and political factors, beyond the scope of this analysis:
 - Patient barriers
 - Poverty
 - Language / cultural barriers
 - Health literacy
 - Health insurance (benefits-specific)
 - System barriers
 - Equal access
 - Interactions with healthcare system
 - Insurance / self-insurance

Where shall we go from here?

