Disparities in Cancer Incidence and Mortality Among Delaware Residents, 1998–2002

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CANCER INCIDENCE AND MORTALITY

The results of this investigation demonstrate that among all racial and ethnic groups in Delaware, African Americans have disproportionately high overall cancer incidence and mortality rates. Compared with Whites, African Americans have higher incidence rates for colorectal, lung and bronchus, and prostate cancer. Cancer mortality rates among African Americans are higher than those for Whites for each of the four cancer sites examined, with the greatest disparity in prostate cancer mortality. The patterns of these disparities in incidence and mortality for cancers of the female breast, colon, lung and bronchus, prostate, and all sites combined are consistent with the literature based on national data.

Data trends in cancer incidence and mortality from 1980 to 2002, based on data provided by the Delaware Cancer Registry, show that cancer incidence is decreasing among Whites for all cancer sites examined, except that in recent years an increase in prostate cancer was observed. Among African Americans, incidence rates are decreasing for all cancers combined, female breast, and lung and bronchus cancer, but in recent years the incidence is increasing for colorectal and prostate cancer.

The data show cancer mortality decreasing among all races for all cancer sites except female breast and colorectal cancer. Mortality rates among African Americans for all cancers combined, lung and bronchus cancer, and prostate cancer are decreasing faster than those among Whites, narrowing the disparity over time. However, the disparity in mortality rates between African American and White men for colorectal cancer is increasing over time.

Factors That Contribute to Disparities

The observation that the disparities in incidence, mortality, and time trends are not uniform across cancer sites suggests that there might be disparities in modifiable behavioral risk factors, screening, stage of disease at time of diagnosis, and treatment, which may differ by cancer site. Using BRFS data, we investigated whether there were any notable racial/ethnic differences in access to health care, the prevalence of modifiable cancer risk factors, and the use of screening. The data showed that a smaller percentage of African Americans and Hispanics have health insurance, a personal doctor, and a reliable source of medical care than Whites. It is encouraging to note that for all three measures, minorities in Delaware have greater access to health care than minorities in the rest of the United States.

The prevalence of modifiable behavioral cancer risk factors differed by race/ethnicity. Fewer African Americans than Whites participated in leisure or occupational physical activity and ate five or more fruits and vegetables per day. African Americans had a greater prevalence of obesity than other races. Whites were the most likely to have ever smoked and chronically consumed alcohol. Hispanics had higher rates of obesity than Whites. Education had the strongest and most consistent impact on behavioral risk factors, with individuals with less than a high school education more likely to be at risk. Screening behavior was most influenced by

having a personal doctor; Whites and African Americans were screened at essentially the same rates. There were no strong associations observed between race and stage of diagnosis.

Initial analyses, limited to only Delaware Cancer Registry data for four cancers (female breast, colorectal, lung/bronchus and prostate) diagnosed at local stage of disease, suggested that fewer African Americans than Whites received the study-defined "standard" treatment for these cancers. A statistically significant difference was observed for colorectal cancer. Subsequent, refined analyses, expanded to include facility-based source data and to accommodate legitimate reasons for lack of "standard" treatment (e.g., a patient's decision to decline further treatment, or the presence of co-morbid conditions precluding radiation therapy), demonstrated a statistically significant difference only for treating facility; i.e., there was a strong association between the treating facility and the likelihood of receiving "appropriate" treatment. This association could be due to differences in documentation, rather than differences in practice.

Health Policy and Barriers to Care

Research reveals the impact of patient and system barriers on racial/ethnic cancer health disparities in the United States. Patient barriers, such as poverty, lack of health insurance, and lack of health literacy, affect the delivery of cancer prevention and treatment services received by minorities and the medically underserved. System barriers prevent cancer services from being provided as a continuum of care and create an inequality in the delivery of cancer care. As these barriers continue to contribute to cancer health disparities in the United States, health care delivery systems and Federal, State, and local agencies need to take the initiative to address these barriers and create equality in cancer care for racial/ethnic populations.

COMPARISON OF DISPARITIES IN DELAWARE VERSUS THE UNITED STATES

Disparities in incidence in Delaware were comparable or smaller than were those in the United States. Mortality disparities were smaller in Delaware than in the United States with the exception of colorectal cancer; mortality rates were higher in Delaware for all cancer sites combined and lung and bronchus cancer.

The general pattern for incidence observed in Delaware was seen in the United States; however, the incidence of prostate cancer among African American men was increasing in Delaware, while rates had stabilized nationally. Also, although an increase was observed in the United States in lung and bronchus cancer among African American women, the rate among African American women in Delaware has been declining.

Patterns in mortality rates were similar between Delaware and the United States. The disparity in colorectal cancer mortality was widening in both Delaware and the United States. For female breast cancer, there was a similar pattern in Delaware and the United States, although Delaware had higher rates with less disparity. The general pattern for prostate cancer was similar over time; less disparity was observed in Delaware, and mortality rates were lower (3–5, 9).

Based on data from the BRFS, the Delaware population had a higher percentage of African Americans but a lower percentage of Hispanics than the national average. Educational attainment in Delaware was comparable with national levels, while income was higher in Delaware than in the United States for all races. On all measures of access to health care examined, Delaware residents of all races were more likely to have access than the rest of the United States. There is, however, greater disparity in the prevalence of behavioral risk factors between African Americans and Whites in Delaware than in the United States. Though in Delaware we did not find significant differences in stage at diagnosis, disparities in this area have been documented in some studies (8). Disparities in treatment have been documented in other investigations for early stage female breast, colorectal, and lung and bronchus cancer (32, 43–45).

CAUSES OF DISPARITY

The NIH Strategic Plan to Reduce and Ultimately Eliminate Health Disparities has three major goals: 1) to increase minority health and disparities research, 2) to increase opportunities for disparity research training and career development, and 3) to increase outreach to ensure that the public, health care professionals, and communities are educated about the latest advances in disparities research.

The development of health disparities is a complex process that involves biological, cultural, socioeconomic, and political factors. These in turn can affect health practices, psychosocial and environmental stress, psychosocial resources, and the medical care that is received. Reducing and eliminating these disparities therefore requires a multidisciplinary approach.

Using available data, we chose to examine the components of cancer prevention as potential factors that contribute to disparity. Data from DCR and the BRFS were examined to determine whether hypotheses could be developed regarding disparities observed in primary, secondary, and tertiary prevention efforts with disparities observed in cancer incidence and mortality.

The small disparity in colorectal cancer incidence could be related to behavioral risk factors, including exercise, diet, and obesity. The disparity in colorectal cancer mortality may be due to lower screening rates. Increased lung and bronchus cancer incidence rates observed among African Americans run counter to their lower smoking rates. The substantial disparity observed among African Americans with prostate cancer cannot be explained by either of these factors. African American men were slightly more likely to have cancer risk factors but were also more likely to be screened. They were less likely to have advanced disease; however, their prostate cancer incidence and mortality rates were substantially higher than those of other races. While female breast cancer screening rates between Whites and African Americans were comparable, African Americans were more likely to be diagnosed with advanced disease, which may be a contributing cause of higher breast cancer mortality among African American women.

LIMITATIONS

This investigation had two major limitations. The first was that there were insufficient numbers of cases to examine cancer incidence and mortality rates and time trends consistently for racial/ethnic groups other that Whites and African Americans. This was a function of the size of

Delaware and its smaller Hispanic population relative to the national population (five versus 14 percent). The second limitation was the limited amount of data available from DCR. To make some inferences about the causes of disparity, we would need to examine behavioral cancer risk factors, screening usage, socioeconomic factors, health literacy, and patient and system barriers to health care in the population that developed cancer. This limitation is currently being address by a retrospective study of Delaware residents who were diagnosed with colorectal, female breast, lung and bronchus, and prostate cancer between 1999 and 2003. Study participants are interviewed regarding their demographics, access to health care, risk factors for cancer, screening history, and the cancer treatment received.

1. INTRODUCTION

Cancer is a major public health burden in the United States. In Delaware, as in other States, this burden is not distributed equally along demographic lines. Variations in cancer incidence and mortality exist by race/ethnicity, sex, age, and socioeconomic status. While increased attention is being given to describing cancer-related disparities, the factors that give rise to these disparities, and how they are interrelated, is poorly understood.

This report presents Delaware cancer rates by race/ethnicity to determine the extent of these disparities. The rate of difference in the incidence of and mortality from female breast, colorectal, lung and bronchus, and prostate cancer, and these four major cancers combined among different racial/ethnic groups in Delaware and how these rates compare with those of the United States as a whole is described. The effect of sex, age, and county of residence on disparities in cancer incidence and mortality is also examined, and potential factors that may explain the variations in incidence and mortality by race/ethnicity are presented. Specifically, we include a description of population-based modifiable risk factors and screening measures available. Because stage of disease at diagnosis is a major prognostic factor, one that potentially contributes to differential mortality rates, this report describes variations in the stage of disease for the major cancers. Cancer treatments received are examined and compared across racial groups.

1.1. DELAWARE CANCER STATISTICS

Twenty-five percent of all deaths in Delaware from 1999 to 2002 were caused by cancer (1). The average annual age-adjusted cancer mortality rate from 1998 to 2002 was 211.6 per 100,000 persons in Delaware, compared with 197.9 among all states (2). The American Cancer Society (ACS) estimated that in Delaware in 2005, 3,800 cancer cases would be diagnosed and 1,580 deaths would be attributed to cancer (3). The most commonly diagnosed cancers from 1998 to 2002 were lung and bronchus (16 percent), female breast (15 percent), prostate (15 percent), and colorectal cancer (12 percent). These four cancers are also among the leading causes of cancer deaths in the State (2).

1.2. DISPARITIES IN CANCER BURDEN

Research conducted across the United States has observed that the burden of cancer varies by race/ethnicity and socioeconomic status (4–8). According to the most recently released United States data from 1997 to 2001 for all cancer sites combined, African American men are 20 percent more likely to be diagnosed with cancer than White men, while African American women are 10 percent less likely to be diagnosed with cancer than White women. African American men are 60 percent more likely to be diagnosed with prostate cancer, 50 percent more likely to be diagnosed with lung and bronchus cancer, and 10 percent more likely to be diagnosed with colorectal cancer than White men. Among women, African American women are 20 percent more likely to be diagnosed with colorectal cancer, equally likely to be diagnosed with lung and bronchus cancer, and 20 percent less likely to be diagnosed with breast cancer than White women (9).

There is further evidence of disparity by race/ethnicity in mortality rates. Examining overall data from the United States, African American men are 40 percent more likely to die of cancer than White men, and African American women are 20 percent more likely to die of cancer than White women. The largest disparity is observed in prostate cancer mortality rates, which are 2.4 times higher for African American men than White men. Increased mortality in African Americans is also observed for colorectal, female breast, and lung and bronchus cancer: five-year survival rates are higher for Whites than for African Americans, even after adjusting for differences in the distribution of tumor stage (9).

1.2.1. Factors That Contribute to Disparities

Differences that exist both within and between racial/ethnic groups can be described by many factors. A recent report by the Institute of Medicine proposed that health disparities arise as a result of a complex relationship between social, economic, and cultural factors (10, 11). Potential explanations attribute these racial/ethnic disparities in cancer incidence and mortality to dissimilarities in 1) exposure to cancer risk factors, including unhealthy diets and cancer-causing agents, 2) socioeconomic status, and 3) access to early detection services and quality medical care (10–12).

To address and ultimately eliminate health disparities, Congress passed the Minority Health and Health Disparities Research and Education Act of 2000, which created the National Center on Minority Health and Health Disparities (NCMHD) as a department within the National Institutes of Health (NIH). In addition, the Center to Reduce Cancer Health Disparities was created within the National Cancer Institute (NCI) to focus specifically on the issue of health disparities in cancer. The goal of both these centers is to increase research on health disparities, training for careers in health disparities, and community intervention and information dissemination to minimize health disparities. In the NCMHD strategic plan, the model outlined in figure 1 is used to describe the complex interaction of factors that are thought to create health disparities (13). The items highlighted in red are aspects that are considered in this report.

Figure 1. A model for the development of health disparities

National data suggest that there is evidence of disparities in behavioral risk factors. The national Behavioral Risk Factor Surveillance System (BRFSS) data suggest that minorities are less likely to exercise and more likely to be overweight or obese as compared with Whites (14).

Research has examined the degree to which socioeconomic status affects disparities in cancer incidence and mortality rates among racial/ethnic groups. Studies that examined cancer diagnosis and mortality have found that socioeconomic status is a stronger predictor than race/ethnicity (8). Socioeconomic status, particularly in terms of income and education, is a strong determinant of working in high-risk occupations and of access to health care; these factors are associated with both developing and surviving cancer. Disproportionate numbers of racial/ethnic minorities compared with Whites live at or below the poverty level. African Americans are twice as likely and Hispanics are four times more likely to have less than a high school education than Whites. Income generally increases with educational attainment; however, at each level of education, income is typically higher for Whites and Asians/Pacific Islanders than African Americans and Hispanics. According to a recent report on the health status of the Nation, men aged 25–64 with annual incomes of less than $10,000 were 2.4 times more likely to die of lung and bronchus cancer than those with annual incomes of $25,000 or more (15). Less-educated men and women had mortality rates two to three times higher than individuals with education levels beyond high school (16, 17).

Use of screening tests is strongly associated with health insurance and a reliable source of care (18). National data have shown that, overall, use of screening tests (including female breast examinations and mammography and colorectal and prostate examinations) among African Americans is comparable with their use among Whites. However, in the United States 11 percent of the African American population and almost 23 percent of the Hispanic population report no health insurance or reliable source of care, compared with fewer than seven percent of Whites (19).

1.3. OBJECTIVES

An analysis of cancer incidence and mortality was conducted to measure the racial/ethnic disparities in these outcomes in Delaware. Potential determinants of these disparities were also analyzed, including aspects of primary (behavioral risk factors), secondary (screening), and tertiary (treatment) prevention, and previous literature on societal and policy factors was explored.

Specific objectives of this report include:

- Describing differences in incidence and mortality rates for site-specific cancers and all cancer sites combined among racial/ethnic groups in Delaware by age, sex (where applicable), and county of residence
- Examining changes in cancer incidence and mortality in Delaware over time by race/ethnicity, and sex
- Exploring whether there are disparities in access to health care, modifiable behavioral risk factors, use of screening tests, stage at diagnosis, and cancer treatments received

The literature on cancer-related community knowledge, beliefs, and behaviors; patient and provider factors; and service gaps, policy, and societal factors that may contribute to our understanding of cancer incidence and mortality disparities are briefly summarized.

2. METHODS

The methods section is divided by objective. Within each objective, the data sources are described, created variables are explained, and the analytic methods are outlined. This structure was chosen because each data source had a different subset of information available, and the objective drove the choice of data source and variables.

2.1. INCIDENCE AND MORTALITY DATA

2.1.1. Data Sources

Data used in the analyses derived from both state and federal sources.

2.1.1.1 Delaware Cancer Registry

Delaware cancer incidence data were obtained from the Delaware Cancer Registry (DCR), the State's central cancer information center and part of the Health Information and Epidemiology section of the Delaware Department of Public Health. Delaware is one of 45 States supported by the National Program of Cancer Registries (NPCR) of the Centers for Disease Control and Prevention (CDC).

DCR is population-based, collecting data on all cancer patients who are residents of Delaware at the time of diagnosis. DCR collects information on newly diagnosed cancer cases, cancer treatments received, and cancer deaths, as well as follow-up data. As stated in the Delaware Cancer Control Act of 1980, the purpose of the registry is to "ensure an accurate and continuing source of data concerning cancer and certain specified tumors of a benign nature." The confidentiality of patient information in the registry database is a requirement of this law (20).

Quality assurance is performed by a certified tumor registrar to ensure that the registry database includes complete and accurate data that conform to standards established by the North American Association of Central Cancer Registries (NAACCR) and NPCR.

DCR's 1997, 1998, 1999, and 2002 incidence data have been certified by NAACCR as meeting standards for high-quality data. Table A1 in appendix A lists the criteria for and results of the NAACCR certification for Delaware's 2002 incidence data. DCR also submits data annually to NPCR. DCR's data submission in 2005 of cases diagnosed from 1998 to 2002 met NPCR's standards for quality, completeness, and timeliness.

2.1.1.2 Surveillance, Epidemiology, and End Results Program

The national cancer incidence data used for comparison with the Delaware cancer incidence data were provided by the NCI Surveillance, Epidemiology, and End Results (SEER) Program. SEER was established in support of the National Cancer Act of 1971, which mandates the collection, analysis, and dissemination of data used in the prevention, treatment, and analysis of cancer. Data from five States, six metropolitan areas, and the Alaska Native registries are used in the

national analyses. These areas include Connecticut, Hawaii, Iowa, New Mexico, Utah, Atlanta, Detroit, Los Angeles, San Francisco/Oakland, San Jose/Monterey, and Seattle/Puget Sound and cover approximately 14 percent of the population of the United States. SEER data are currently the most accurate source of cancer incidence data and therefore were used as a proxy for disparities observed in the United States. Table 1 compares some of the demographics for Delaware and the SEER population. Information on SEER characteristics were provided by NCI (21), and Delaware data were collected from the U.S. Census Bureau (22).

Table 1. Comparison of Delaware with the SEER Population

Race/Ethnicity	Delaware	SEER
Whites	77	67
African Americans	20	11
American Indians/Alaska Natives	0.4	1.4
Asians/Pacific Islanders	2.2	7.4
Hispanics	4.8	19
Live below poverty level	6.5	12
High school graduate	83	78
Live in urban areas	80	89
Foreign born	5.7	15

Delaware differs from the SEER population with regard to the factors examined above; this will have considered when comparing Delaware statistics with SEER data.

2.1.1.3 National Center for Health Statistics

National mortality data were obtained from the National Center for Health Statistics (NCHS) and were accessed using SEER*Stat. Cancer deaths from 1980 to 1998 were coded in International Classification of Diseases, Ninth Revision (ICD-9) format, and deaths that occurred between 1999 and 2002 were coded using the ICD, Tenth Revision (ICD-10).

2.1.1.4 Census Data

Population estimates by race/ethnicity, sex, and age for the United States and for Delaware and its three counties (Kent, New Castle, and Sussex) were obtained from NCI's datasets based on data supplied by the U.S. Census Bureau for 1998–2002 (23). All rates were then age-adjusted to the U.S. population using the 2000 census standard distribution. Other cancer reports in Delaware use the Delaware Population Consortium population estimates (24), which may lead to small differences between results included in this report and other reports.

2.1.2 Variable Definitions

Cancer incidence and mortality statistics are provided for all cancer sites combined and individually for female breast, colorectal, lung and bronchus, and prostate cancer. For each cancer site, statistics are provided by race/ethnicity, age, sex, and county of residence.

The category of all cancer sites was defined by:

- Restricting to cases with valid data for age, sex, race/ethnicity, and year of diagnosis
- Restricting to malignant cancers, except for urinary bladder cancer where in situ is included
- Excluding non-melanoma skin cancer
- Excluding prostate cancers with a histology code of 8148

Individual cancers were defined using ICD for Oncology, Third Edition (ICD-O-3) codes for malignant cancers (25). Colorectal cancer was defined using codes C18.0–18.9, C26.0, and C20.9; lung and bronchus cancers were defined using codes C34.0–34.9; female breast cancer was defined using codes C50.0–C50.9, excluding 50.7; and prostate cancer was defined using code 61.9 (except for cases with an ICD-O-3 histology code of 8148).

These definitions and exclusions are similar to those used by NPCR, and the guidelines can be found in the NPCR data submission guidelines (26). All criteria, except the exclusion for prostate cases with a histology code of 8148, were in place during the entire five-year period between 1998 and 2002. The exclusion for prostate cancer came into effect only in 2001, but we excluded it throughout for consistency. This histologic code was rare and lead to the exclusion of only two cases.

There was minimal impact from restricting our analyses to individuals with valid demographic data. Information on individuals missing race/ethnicity information is presented in table A2 in appendix A.

Race/ethnicity was categorized as White, African American, Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native. Individuals of any race with a Hispanic ethnicity were categorized as Hispanic. Age was grouped as follows: 20–39 years, 40–49 years, 50–64 years, 65–79 years, and 80 or older.

2.3 Analytic Methods

2.3.1 Direct Standardization

Five-year average age-adjusted incidence and mortality rates in Delaware and its counties were computed using data from DCR and NCHS. To measure whether there are disparities in cancer incidence and mortality among racial and ethnic minorities, incidence and mortality rates were compiled for all cancer sites combined and four site-specific cancers (female breast, colorectal, lung and bronchus, and prostate cancer). These cancer sites were chosen because they contribute 56 percent of new cancer cases and 52 percent of cancer deaths and were therefore the most likely candidates to provide a sufficient sample size to address our research objectives. Incidence

and mortality rates (per 100,000 population) were calculated as the number of new cancer cases or cancer deaths, respectively, divided by the population counts for subgroups categorized by race/ethnicity, sex, age, and county of residence. Data were combined to compute five-year averages because incidence and mortality case counts for any given year are very small for some subgroups. All rates for State- and county-level analyses were age-standardized by the direct method to the year 2000 standard U.S. population using SEER*Stat (19). We calculated a 95-percent confidence interval around each rate that was computed.

Cancer incidence and mortality rates were also calculated using the SEER population as a proxy for national data. Comparisons between Delaware and the SEER data were made by examining rates and 95-percent confidence intervals. (Rates were determined to be comparable if the confidence intervals overlapped.)

2.3.2 Disparities in Incidence and Mortality

Disparities in cancer rates were measured by comparing age-, sex-, and county-specific rates for the different racial/ethnic groups. In order to estimate excess risk, rate ratios and rate differences were calculated using Whites as the reference category.

The rate ratio was computed by dividing the age-adjusted incidence or mortality rate for any single minority group by the rate for the reference category. When the rate ratio was equal to one, there was no disparity in the rates being compared. If the rate ratio was greater than one, then cancer incidence or mortality was greater in the minority group than among Whites. If the rate ratio was less than one, then cancer incidence or mortality was greater among Whites than in the minority group.

A Taylor series expansion was used to generate the 95-percent confidence intervals for rate ratios comparing minorities with Whites (27), using the software application EpiBasic (28). If the confidence intervals for the two rate ratios did not overlap, the ratios were said to be significantly different from one another.

In addition to disparity rate ratios, disparity rate differences were calculated. Using Whites as the reference group, the rate for Whites was subtracted from the rate for African Americans. Thus, positive differences indicate that African Americans had a higher incidence or mortality rate, while negative differences imply greater rates among Whites. The 95-percent confidence intervals were calculated using EpiBasic.

These two measures are different ways of examining disparity. Rate ratios are used in research to determine causes of an outcome, in this case, racial disparity in cancer incidence and mortality. Rate differences present the absolute difference in the rates between, in this case, African Americans and Whites. Rate differences are more useful for public health research because they allow investigators to understand the scope of and number of people to be impacted by an intervention. A rate ratio of two could indicate a change in a rate from two to four or from 200 to 400, which would have different public health implications. The objective of this analysis is to both understand the causes of racial disparities and inform public health practitioners who will

make recommendations for a cancer control plan to eliminate disparities; therefore, we have presented both measures.

2.2.3 Trends in Cancer Incidence and Mortality

To examine trends in cancer incidence and mortality from 1980 to 2002, we created graphs with a data point representing the five-year average rate for every five-year increment between 1980 and 2002. Trends were plotted for all cancer sites combined and individually for female breast, colorectal, lung and bronchus, and prostate cancer using data from 1980 to 2002. Data are presented only for Whites and African Americans because other racial and ethnic groups did not have sufficient sample sizes to be included. Trends were examined for both incidence and mortality. We separated trends by men and women since the patterns observed differed by sex. The graphs were examined to determine whether rates were increasing or decreasing over time and whether the differences between rates in African Americans and Whites were increasing or decreasing over time.

2.2.4 Data Reporting Rules

In order to maintain the confidentiality of Delaware residents diagnosed with cancer, when frequency data are presented, cells with five or fewer people are not displayed. In addition, rates that are based on 25 or fewer people in the numerator are considered unstable and are not presented.

2.3 BEHAVIORAL CANCER RISK FACTORS AND SCREENING USAGE

2.3.1 Data Sources

The BRFSS was created to survey personal health behaviors and accompanying risk factors that influence premature morbidity and mortality at the State and national levels among individuals aged 18 or older. For this analysis, we selected relevant elements from the BRFSS survey in order to assess potential risk factors and screening measures for identified cancer incidence and mortality rate discrepancies in Delaware. The results were analyzed to determine what health behavior and risk factors could be associated with disparities in cancer detection and treatment in Delaware. Indicators included mammography screening (female breast cancer), tobacco use (lung and bronchus cancer), and various health risk behavior indicators such as health status, alcohol use, and obesity (associated with most forms of cancer). The wording of the BRFSS questions used is included in table C1 of appendix C.

2.3.2 Variable Definitions

For this analysis, BRFSS data collected in 2002 were used to obtain prevalence estimates of modifiable cancer risk factors, including tobacco use, exercise, diet, obesity, and alcohol consumption. The data for 2002 were used because they included all the variables of interest and matched the last year of data from the cancer registry. For each of the five risk factors, we

categorized respondents based on whether they were at risk. Individuals were considered to be at risk if they 1) were current or former smokers, 2) reported no occupational or leisure-time physical activity, 3) ate fewer than five servings of fruits and vegetables a day, 4) had a body mass index (BMI), a ratio between an individual's height and weight, of 25 or greater, or 5) were chronic drinkers (women who drank two or more drinks per day or men who drank three or more drinks per day).

The prevalence of colorectal and prostate cancer screening was estimated among respondents aged 50 years or older. Colorectal cancer screening was estimated using two different tests: 1) a home-administered fecal occult blood test kit within the past year or 2) a sigmoidoscopy or colonoscopy in the past five years. Prostate cancer screening was estimated for men who reported having had a prostate-specific antigen (PSA) test or digital rectal exam in the past year. Prevalence estimates of mammography screening during the past two years were reported for women aged 40 years or older; the prevalence of receiving clinical breast exams in the past two years was reported for all women. It should be noted that for all the screening tests, the BRFSS does not distinguish between tests performed for screening purposes and tests performed for diagnostic purposes.

Race was defined as White, African American, Hispanic, and Other. Other includes Asians, Pacific Islanders, American Indians, and Alaska Natives. Individuals of any race who have a Hispanic ethnicity are included in the Hispanic category, not their race category. For behavioral factors, age was grouped as follows: younger than 40 years, 40–49 years, 50–64 years, 65–79 years, and 80 years or older. Education was categorized as less than high school education, a high school graduate with no further education, a high school graduate with one to three years of college, and college graduates. Income referred to the annual household income from all sources and was categorized as less than $25,000, $25,000–49,999, and $50,000 or more. Health care access was measured by having any type of health insurance coverage, a doctor that the individual considered to be his or her personal doctor, and a usual source of care (defined as seeking non-emergency care in physicians' offices, clinics, or community health centers and not at emergency rooms or urgent care centers).

2.3.3 Analytic Methods

Data analyses were conducted using SAS version 9.1 (29). The prevalence of behavioral risk factors for cancer, access to health care, and use of screening among Delaware residents was compared with BRFSS data for the entire United States (30). Data were presented only for groups that had at least 50 people in the denominator. A table with the denominator for all questions by race/ethnicity is included as table C2 in appendix C. This standard is used by CDC for the presentation of BRFSS data (14).

Multiracial individuals were excluded from the analysis because of small sample sizes. We were also unable to examine the prevalence of cancer screening tests among Hispanics. There were 120 Hispanics included in the 2002 sample of the BRFSS; however, most of the screening tests are sex-specific, which decreased the number by half. Furthermore, 60 percent of the Hispanics were younger than 40, below the minimum age for screening.

All prevalence estimates were weighted to reflect Delaware's population distribution. Multivariate logistic regression models were used to predict each behavioral risk factor or screening test by the following independent variables: race, age, sex, county of residence, socioeconomic status, and access to health care. Models were also created to predict each of the access-to-health-care variables by race, age, sex, county of residence, and socioeconomic status. Therefore, each model was adjusted for all the independent variables. The logistic regression procedure accounted for the sampling and weighting used in the BRFSS. The available variables to measure socioeconomic status were income and education, but we chose to include only education in the model because data on education were available for 99.9 percent of the population, while data on income were available for only 71.3 percent. Education and income have a correlation coefficient of 0.42; this suggests that they are moderately correlated, making education a reasonable marker for income.

2.4 CANCER STAGE AT DIAGNOSIS

2.4.1 Data Sources

The association between stage at diagnosis and variables related to disparities was examined using DCR data. Data were aggregated from 1998 to 2002, the five most recent years of available data. Disparities in the stage at diagnosis for female breast, colorectal, and prostate cancer were examined because these cancers have recommended screening tests.

2.4.2 Variable Definitions

Stage of cancer was categorized using the SEER summary stage, a scale that categorizes cancers as in situ, local, regional, distant, or unstaged, using the following definitions:

- In situ—Presence of malignant cells within the cell group from which they arose
- Local—Invasive neoplasm confined entirely to the site of origin
- Regional—Tumors that have extended beyond the limits of the site of origin
- Distant—Tumors that have spread to parts of the body remote from the primary site of origin
- Unstaged—Tumors with insufficient information to assign a stage

SEER summary stage does not account for tumor size or other pathological features, as does the American Joint Committee on Cancer's tumor, node, and metastasis classification system; however, SEER summary stage is the most routinely collected and allows for comparison with SEER data.

In situ tumors were excluded, but all other stages were examined.

2.4.3 Analytic Methods

Disparities in the stage at diagnosis were examined by race/ethnicity, age, sex, and county of residence. Race/ethnicity data were categorized as White, African American, Hispanic,

Asian/Pacific Islander, and American Indian/Alaska Native. Hispanics included individuals of all races. Data on American Indians/Alaska Natives did not meet the requirement of at least 50 individuals in the denominator and therefore were not presented; data on Hispanics and Asians/Pacific Islanders were presented in crude tables, but the data were too sparse for stratified analyses. Disparities in stage at diagnosis were examined by age to see whether the disparities were observed to a lesser or greater extent in those who were younger than 40 for female breast cancer and younger than 50 for colorectal and prostate cancer because those individuals were too young for screening to be recommended. Older individuals were also examined to determine whether Medicare coverage eliminated disparities. All newly diagnosed cancers between 1998 and 2002 that were coded as unstaged were removed from the analysis. In table A3 in appendix A, the proportion of cases coded as unstaged are presented for each cancer type and compared with the percentage unstaged in the SEER data. All cancers classified as regional or distant were combined to form a category that represented cancers diagnosed at advanced stages. Patients diagnosed with regional and distant cancers usually have a less favorable prognosis than those diagnosed with local cancer.

2.5 CANCER TREATMENT

Initial attempts to examine disparities in cancer treatment used only the treatment-related data resident in the DCR; i.e., did not include review of any source records from which the DCR data derive. The data formats and variable definitions conformed to conventions outlined by the NAACCR version 10.1 data dictionary (31). The analyses were restricted to cancers diagnosed at local disease stage because the treatment guidelines are clearer; table A3 in appendix A shows the proportion of cases that were therefore not included in the treatment analyses. The treatment analyses were restricted to individuals whose cancer was reported from a facility in Delaware and whose cancer was diagnosed or treated – or both diagnosed and treated – at that facility.

To compare treatments, we created a variable to represent "standard" treatment in 2001. Standard treatment was defined using the NCI Physician Data Query as reported in an article by Shaver et al. (32). This variable was created for female breast, colorectal, lung and bronchus, and prostate cancer. A description of the definition and codes used to categorize individuals into treatment groups for each of the cancers examined is included in table A4 of appendix A. The risk of not receiving standard treatment was examined using multivariate logistic regression; analyses were performed using SAS version 9.1 (29).

Results of these initial analyses strongly suggested DCR treatment data were not sufficiently complete/accurate to support this type of analysis without reference to source documents. To address that limitation, the Delaware Cancer Consortium undertook a validation study to determine if the treatment-related data in the DCR accurately reflected the treatment received, as documented in individual facility patient and cancer registry records. The validation study was limited to breast and colorectal cancer cases, and included all cases (n = 334) designated during the initial analyses as not having received standard treatment. All reviews were conducted by the physician oncologist members of the Consortium, and were designed to capture both treatments received and justifiable reasons for a lack of treatment, e.g., patient refusal or the presence of co-morbid conditions precluding certain treatments. Both patients whose source documents reflected receipt of standard treatment and those whose lack of standard treatment was deemed

justifiable were designated as having received "appropriate" treatment. Review results were incorporated into all subsequent treatment analyses.

2.6 DATA INTERPRETATION

Data in this report are presented as rates, rate ratios, and odds ratios, each with a corresponding 95-percent confidence interval. In addition, percentages and percentage differences are displayed. There are a number of ways that the data can be interpreted. From a clinical or public health standpoint, the definition of an important result is a difference that exceeds what is considered clinically acceptable or what we have the knowledge and resources to address. Statistically significant results are defined as rate ratios and odds ratios where the confidence interval does not include one. In situations where there is a comparison of two rates, rate ratios, or odds ratios, statistically significant results are situations where the confidence intervals do not overlap. To give readers the ability to identify statistically significant results, two measures are indicated as being different only if they are statistically significantly different. Results that are potentially important but not statistically significant are noted; however, in these cases it is stated that the data suggest there may be an effect.

3. RESULTS

3.1. CANCER INCIDENCE AND MORTALITY

The objective of this section is to determine whether there are racial/ethnic disparities in cancer incidence and mortality, and in situations where disparities exist to measure the magnitude of the disparity. The results of the analyses using incidence data from DCR and mortality data from NCHS from 1998 to 2002 are reported, and the contribution of race/ethnicity, age, sex, and county of residence to the disparities in cancer incidence and mortality are discussed. The results are presented for all cancer sites combined and by site for female breast, colorectal, lung and bronchus, and prostate cancer. The results are first presented for racial/ethnic disparities, and then, stratifying by race, we present the results for sex, age, and geographic disparities.

3.1.1. Cancer Burden in Delaware

Table 2 presents the number of Delaware residents who were diagnosed with and who died from cancer between 1998 and 2002 for all cancer sites combined and for each of the four major cancer sites by race/ethnicity.

Table 2. Number of New Cancers and Deaths from Cancer in Delaware, by Race/Ethnicity

	Incidence				Mortality			
	White	African American	Hispanic	Asian	White	African American	Hispanic	Asian
All sites	16,416	2,867	187	150	7,002	1,249	80	42
Female breast	2,322	392	23	31	513	115	6	< 6
Colorectal	1,841	324	9	19	676	140	< 6	< 6
Lung and bronchus	2,609	418	18	13	2,128	335	18	8
Prostate	2,448	591	24	13	328	102	< 6	< 6

Sources: DCR; NCHS, 1998–2002.

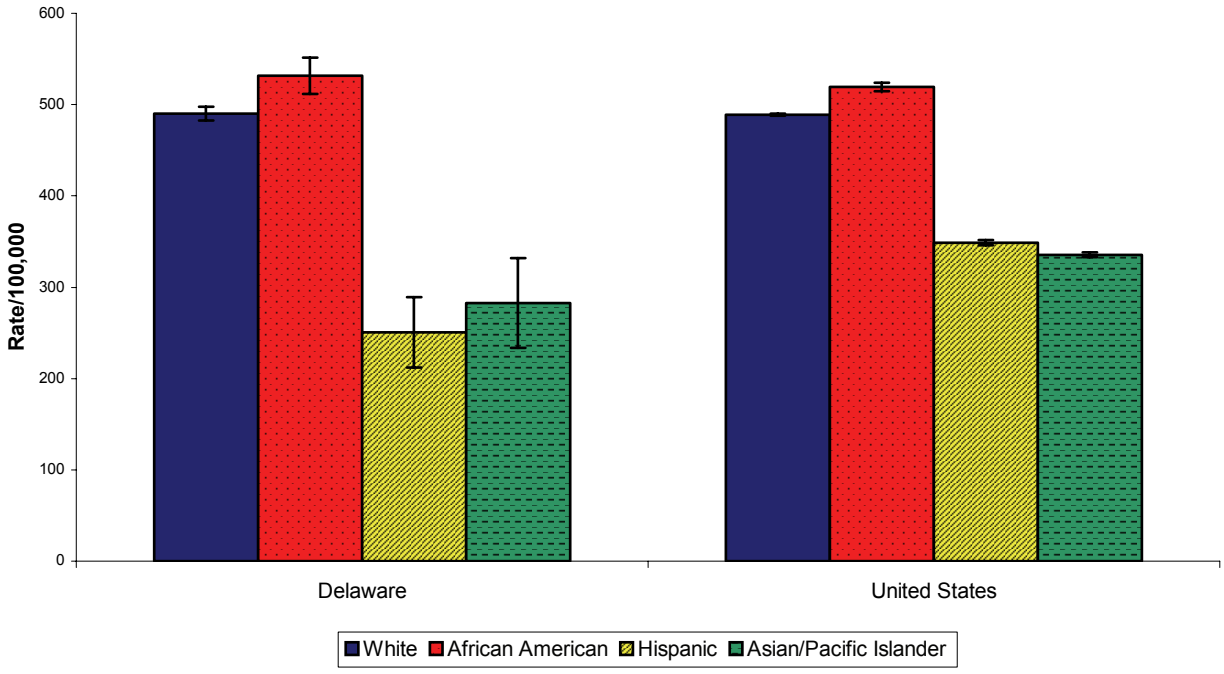
3.1.2. Disparities in Cancer Incidence and Mortality

The Delaware and U.S. age-adjusted incidence and mortality rates from 1998 to 2002 for all cancer sites combined and by site for female breast, colorectal, lung and bronchus, and prostate cancer are presented in this section.

Figures 2 and 3 show the incidence and mortality rates for all cancer sites combined for Whites, African Americans, Hispanics, and Asians/Pacific Islanders in Delaware and the United States. Figures 4 and 5 display the incidence and mortality rates individually for female breast, colorectal, lung and bronchus, and prostate cancer. For the remainder of the section, we present

data only on Whites and African Americans because the data were too sparse for Hispanics and Asians/Pacific Islanders. Table 3 presents the incidence and mortality rate ratios comparing African Americans with Whites for Delaware and the United States. For further detail, the numbers and age-adjusted incidence and mortality rates with 95-percent confidence intervals by race are displayed in appendix B. In section 3.1.2., figures displaying incidence rates use a y-axis ranging from 0/100,000 to 600/100,000, while figures displaying mortality rates range from 0/100,000 to 300/100,000.

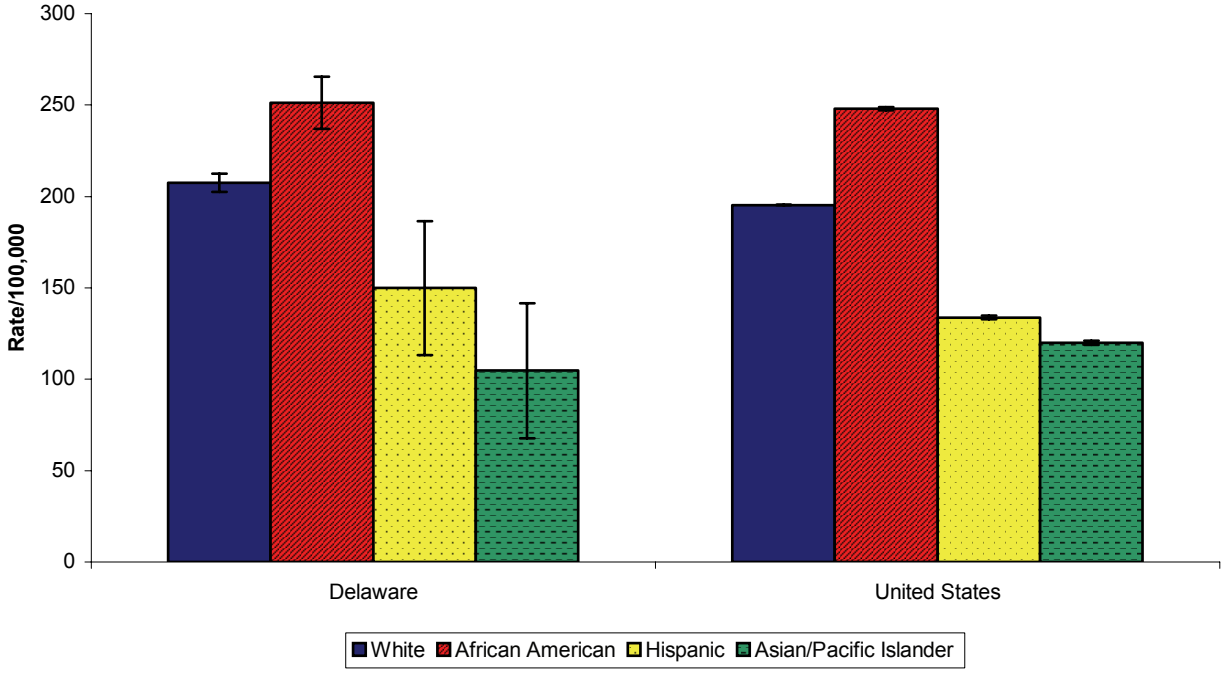
Figure 2. Age-adjusted incidence rates for all cancer sites combined, Delaware and the United States



Sources: DCR; SEER Program, 1998–2002.

- In Delaware, African Americans had a higher cancer incidence than Whites for all cancer sites combined, and rates for Hispanics and Asians/Pacific Islanders were lower than for Whites.
- Among Whites, cancer incidence was similar in Delaware and the United States, but the rate in African Americans was higher in Delaware than in the United States, though not significantly. Cancer incidence rates in Hispanics and Asians/Pacific Islanders were lower in Delaware than in the United States.

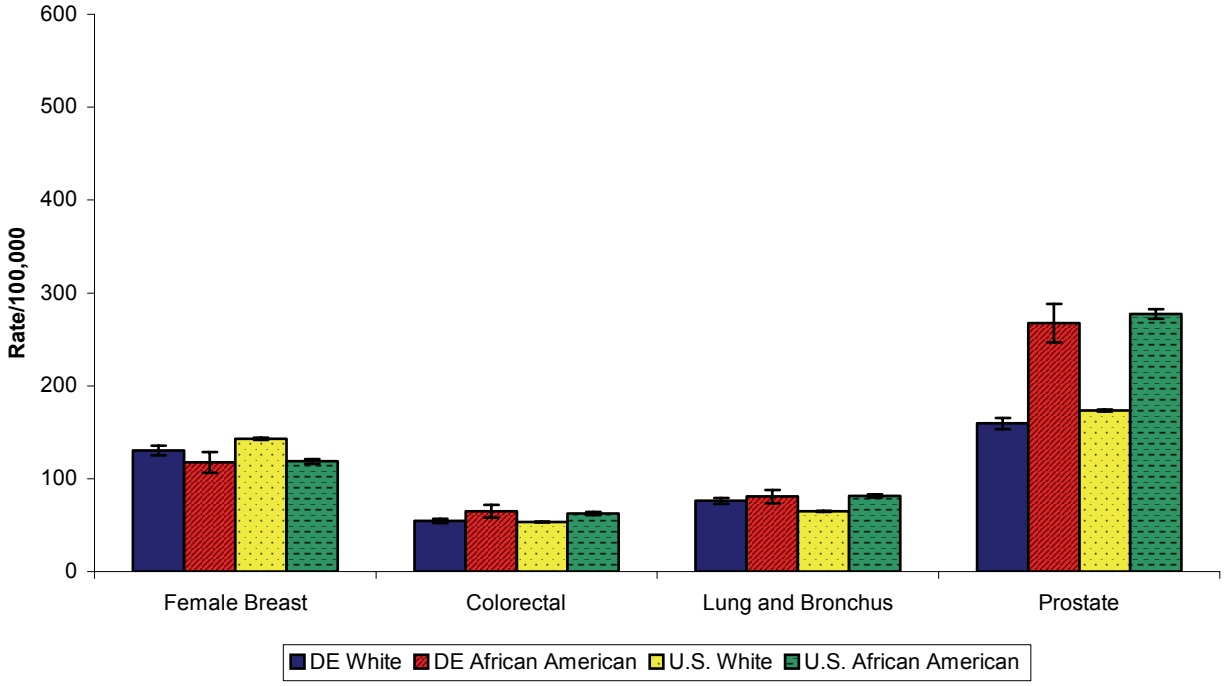
Figure 3. Age-adjusted mortality rates for all cancer sites combined, Delaware and the United States



Source: NCHS, 1998–2002.

- Cancer mortality was higher among African Americans than Whites in Delaware, while rates among Hispanics and Asians/Pacific Islanders were lower than for Whites.
- Mortality rates in Delaware were higher than in the United States for all races/ethnicities except Asians/Pacific Islanders but only significantly higher among Whites.

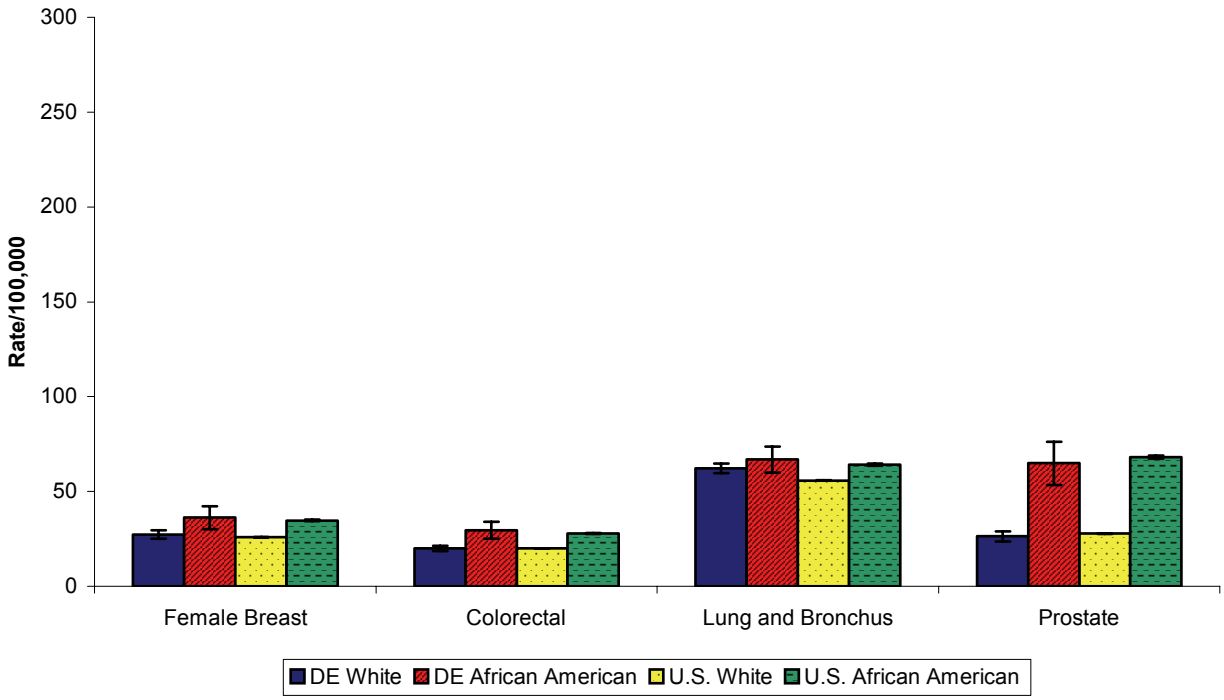
Figure 4. Age-adjusted incidence rates for the four major cancer sites, by race, Delaware and the United States



Sources: DCR; SEER Program, 1998–2002.

- In Delaware, African Americans had a significantly higher incidence than Whites for colorectal and prostate cancer. Incidence rates for lung and bronchus cancer and for female breast cancer did not differ significantly between African Americans and Whites in Delaware.
- No differences were observed between Delaware and the United States for African Americans; i.e., incidence rates for African American Delawareans are similar to those for African Americans throughout the United States..
- Compared with the United States, rates of female breast cancer and of prostate cancer were significantly lower in Delaware among Whites, while rates of lung and bronchus cancer were significantly higher among Whites.

Figure 5. Age-adjusted mortality rates for the four major cancer sites, by race, Delaware and the United States



Source: NCHS, 1998–2002.

- Mortality was higher in Delaware among African Americans for all the major cancer sites - even for female breast cancer, where incidence was lower. The differences were significant for all sites except lung and bronchus cancer.
- For both Whites and African Americans, mortality rates were higher in Delaware than in the United States for most of the major cancer sites; mortality rates were lower in Delaware than in the United States for prostate cancer.

Table 3. Incidence and Mortality Rate Ratios (With 95-Percent Confidence Intervals) Comparing African Americans With Whites in Delaware and the United States

Cancer Site	Incidence Rate Ratios		Mortality Rate Ratios	
	Delaware	United States	Delaware	United States
All sites	1.08 (1.04, 1.13)	1.06 (1.05, 1.07)	1.21 (1.14, 1.29)	1.27 (1.27, 1.28)
Female breast	0.90 (0.81, 1.01)	0.83 (0.81, 0.85)	1.33 (1.09, 1.63)	1.34 (1.32, 1.36)
Colorectal	1.19 (1.06, 1.34)	1.17 (1.14, 1.19)	1.47 (1.22, 1.76)	1.40 (1.38, 1.41)
Lung and bronchus	1.06 (0.96, 1.18)	1.26 (1.23, 1.28)	1.08 (0.96, 1.21)	1.15 (1.14, 1.16)
Prostate	1.68 (1.53, 1.84)	1.60 (1.56, 1.63)	2.48 (1.98, 3.09)	2.46 (2.43, 2.49)

Sources: DCR; SEER Program; NCHS, 1998–2002.

The incidence rate ratio for Hispanics in Delaware was 0.51 (0.44, 0.59), and for Asians the ratio was 0.58 (0.49, 0.68). The mortality rate ratio for Hispanics in Delaware was 0.72 (0.58, 0.90), and for Asians it was 0.50 (0.37, 0.68).

The incidence rate ratios show that:

- Cancer incidence in Delaware among African Americans was 8 percent greater for all sites, 19 percent greater for colorectal cancer, and 68 percent greater for prostate cancer. The data suggest that incidence among African Americans was lower for female breast cancer and slightly elevated for lung and bronchus cancer.
- Rates among Hispanics and Asians were lower than for Whites.
- Disparities in lung and bronchus cancer incidence were lower in Delaware than in the United States; disparities for other cancer sites were comparable.

The mortality rate ratios show that:

- Cancer mortality in Delaware among African Americans was 21 percent higher for all sites, 33 percent higher for female breast cancer, 47 percent higher for colorectal cancer, and 148 percent higher for prostate cancer.
- Cancer mortality was lower among Hispanics and Asians than Whites.
- Disparities in Delaware were comparable to the disparities observed in the United States.

3.1.3. Cancer Disparities by Sex, Age, and County of Residence

Next, the racial disparities in incidence and mortality were examined to determine whether they differed between males and females, by age at diagnosis, and by whether the individual resided in New Castle, Kent, or Sussex County at the time of his or her diagnosis. The number of new cases and deaths and the incidence and mortality rates with 95-percent confidence intervals for all cancer sites combined and the four major cancer sites separately are included in appendix A. Incidence and mortality rate ratios and rate differences are presented for sex, age, and county of residence.

3.1.3.1. Disparities by Sex

In table 4 and in figures 6 and 7, the incidence and mortality rate ratios and rate differences are presented. Data examining disparities between males and females are presented for all cancer sites, colorectal cancer, and lung and bronchus cancer. The figures displaying rate differences in this section use a y-axis that ranges from –15/100,000 to 45/100,000.

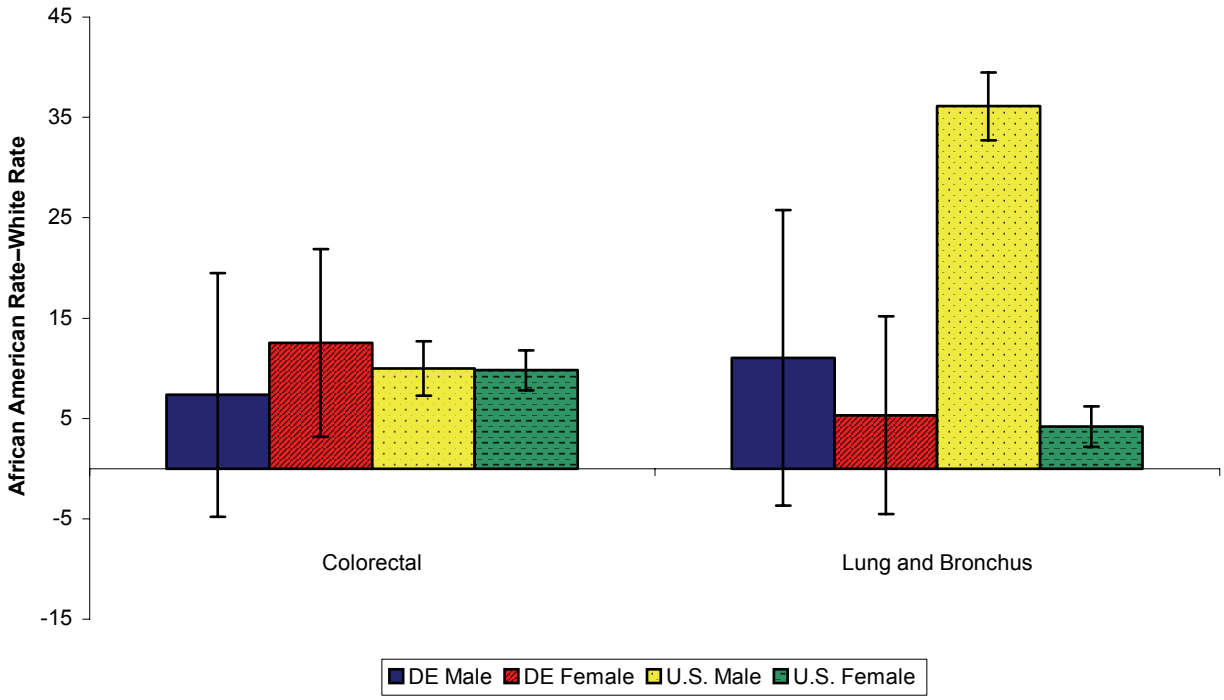
Table 4. Incidence and Mortality Rate Ratios (With 95-Percent Confidence Intervals) Comparing African Americans With Whites, by Sex, in Delaware and the United States

Cancer Site	Incidence Rate Ratios		Mortality Rate Ratios	
	Delaware	United States	Delaware	United States
All sites				
Male	1.19 (1.13, 1.26)	1.22 (1.20, 1.23)	1.30 (1.19, 1.41)	1.40 (1.39, 1.41)
Female	0.98 (0.93, 1.04)	0.93 (0.92, 0.94)	1.17 (1.07, 1.27)	1.18 (1.17, 1.19)
Colorectal				
Male	1.12 (0.94, 1.33)	1.16 (1.12, 1.20)	1.37 (1.05, 1.79)	1.40 (1.38, 1.42)
Female	1.27 (1.08, 1.49)	1.21 (1.17, 1.26)	1.58 (1.23, 2.03)	1.43 (1.41, 1.46)
Lung and bronchus				
Male	1.11 (0.97, 1.28)	1.44 (1.40, 1.49)	1.18 (1.02, 1.37)	1.35 (1.33, 1.36)
Female	1.09 (0.93, 1.27)	1.08 (1.04, 1.12)	0.99 (0.83, 1.19)	0.95 (0.94, 0.97)

Sources: DCR; SEER Program; NCHS, 1998–2002.

- In Delaware, the data suggest there was greater disparity in cancer incidence for all sites combined among men than among women, and greater disparity in colorectal cancer incidence among women than among men. There was no difference by sex for lung and bronchus cancer.
- There was greater disparity among men with lung and bronchus cancer in the United States than in Delaware. For other sites, disparities by sex for cancer incidence were comparable.
- The data suggest that disparity in cancer mortality in Delaware was greater among men for all cancer sites combined and lung and bronchus cancer and greater among women for colorectal cancer.
- Disparities in cancer mortality by sex were comparable in Delaware and the United States.

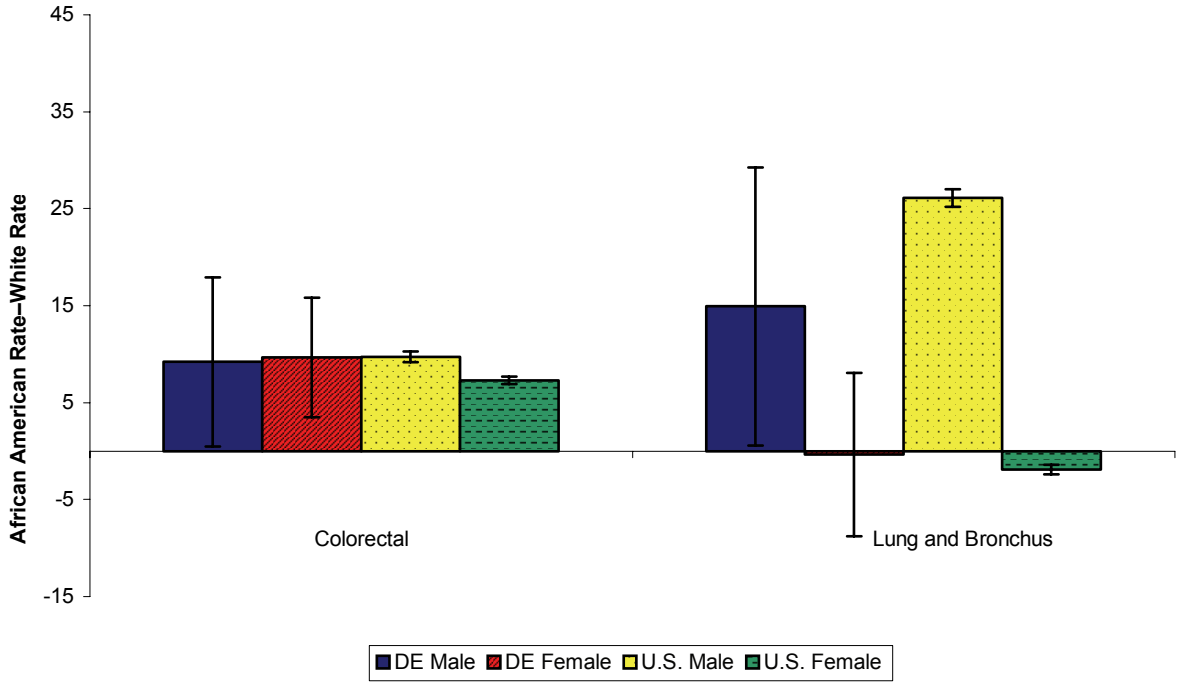
Figure 6. Age-adjusted incidence rate differences comparing African Americans with Whites for colorectal and lung and bronchus cancer, by sex, Delaware and the United States



Sources: DCR; SEER Program, 1998–2002.

- Among women in Delaware there were significant disparities between African Americans and Whites for colorectal cancer. There was no evidence of a difference in disparities between men and women in Delaware and in the United States.
- A difference in disparities in lung and bronchus cancer incidence were observed in the United States, where men had a higher incidence than women, but not in Delaware.

Figure 7. Age-adjusted mortality rate differences comparing African Americans with Whites for colorectal and lung and bronchus cancer, by sex, Delaware and the United States



Source: NCHS, 1998–2002.

- The data suggest that African American women with colorectal cancer were more likely to die than White women, and African American men were more likely to die of lung and bronchus cancer than White men. There was no difference between men and women for lung and bronchus cancer, but the data suggest that disparities were greater among men with lung and bronchus cancer.
- Disparities in the United States were comparable to disparities in Delaware, but the data suggest greater disparity for lung and bronchus cancer among men in the United States than among men in Delaware.

3.1.3.2. Disparities by Age

In table 5 and in figures 8 and 9, the incidence and mortality rate ratios and differences are presented by age at diagnosis. We examined age at diagnosis using age groupings that considered ages for screening recommendations (40+ for female breast cancer and 50+ for colorectal and prostate cancer) and Medicare eligibility (65+), since these factors could be related to access to screening and health care, which may be a cause of cancer disparities. Data are presented for all cancer sites combined and for the four major cancer sites individually. Figures that display the rate differences use graphs with a y-axis that ranges from –400/100,000 to 800/100,000.

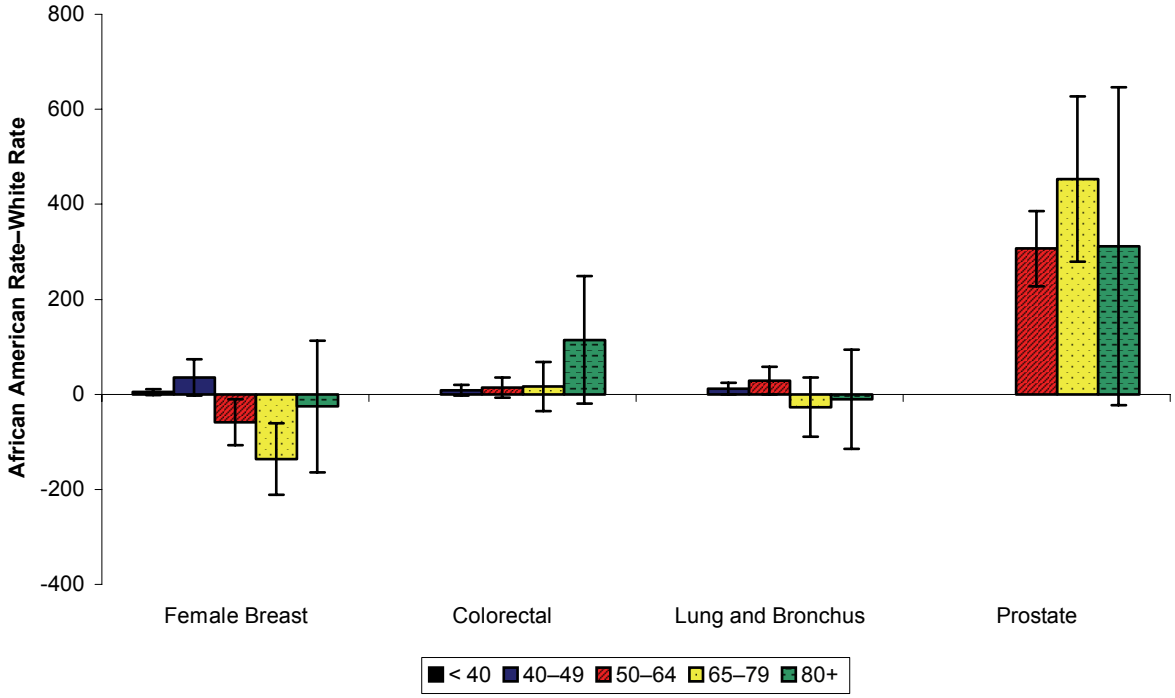
Table 5. Incidence and Mortality Rate Ratios (With 95-Percent Confidence Intervals) Comparing African Americans With Whites, by Age, in Delaware

Age (Years)	Incidence Rate Ratios	Mortality Rate Ratios
All sites		
20–39	0.86 (0.75, 1.00)	0.99 (0.71, 1.38)
40–49	1.17 (1.04, 1.31)	1.53 (1.23, 1.90)
50–64	1.15 (1.08, 1.24)	1.25 (1.11, 1.40)
65–79	1.01 (0.95, 1.08)	1.18 (1.07, 1.29)
80+	1.06 (0.94, 1.20)	1.12 (0.98, 1.29)
Female breast		
20–39	1.36 (0.96, 1.92)	NA
40–49	1.24 (1.00, 1.53)	2.41 (1.46, 3.98)
50–64	0.81 (0.67, 0.98)	1.78 (1.24, 2.53)
65–79	0.70 (0.55, 0.88)	1.06 (0.72, 1.57)
80+	0.94 (0.65, 1.35)	NA
Colorectal		
20–39	NA	NA
40–49	1.43 (0.96, 2.12)	NA
50–64	1.18 (0.94, 1.49)	1.63 (1.13, 2.35)
65–79	1.06 (0.88, 1.28)	1.38 (1.05, 1.82)
80+	1.27 (0.98, 1.65)	1.35 (0.93, 1.96)
Lung and bronchus		
20–39	NA	NA
40–49	1.49 (1.04, 2.14)	1.52 (0.96, 2.40)
50–64	1.20 (1.01, 1.42)	1.15 (0.94, 1.41)
65–79	0.94 (0.80, 1.10)	1.01 (0.85, 1.19)
80+	0.97 (0.70, 1.35)	1.00 (0.73, 1.36)
Prostate		
20–39	NA	NA
40–49	NA	NA
50–64	1.94 (1.69, 2.23)	NA
65–79	1.50 (1.31, 1.72)	3.02 (2.22, 4.11)
80+	1.42 (1.02. 1.97)	2.15 (1.50, 3.09)

NA = Rates based on counts too small to be displayed.
Sources: DCR; NCHS, 1998–2002.

- For both incidence and mortality there was no statistically significant evidence that disparity differed by age at diagnosis or death.
- However, the data suggest some patterns with respect to age:
  - While sufficient data at young ages were not always available, the available data showed that the disparities were greater at younger ages.
  - Disparities among individuals aged 65 or older were usually less than among younger individuals.

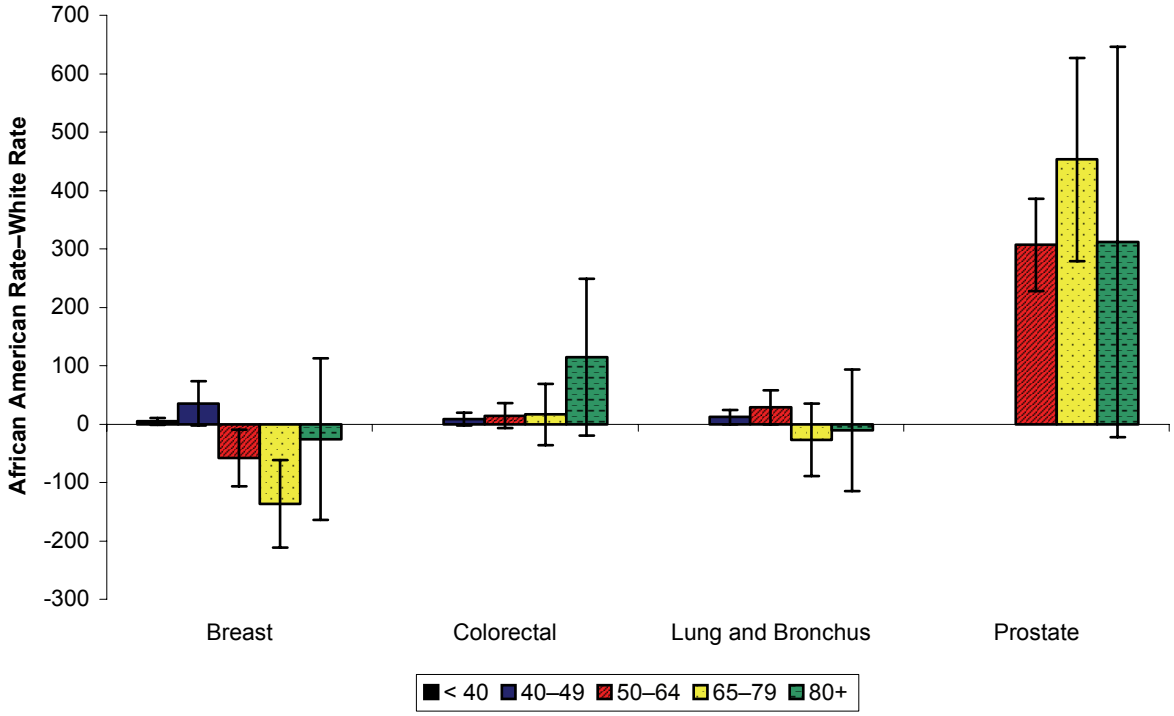
Figure 8. Incidence rate differences comparing African Americans with Whites for the four major cancers, by age, in Delaware



Source: DCR, 1998–2002.

- There was no evidence of significant differences in cancer disparity by age on the absolute scale.

Figure 9. Mortality rate differences comparing African Americans with Whites for the four major cancers, by age, in Delaware



Source: NCHS, 1998–2002.

- The data for colorectal and prostate cancer suggest that disparities in cancer mortality increased with age. Minimal disparity was observed for lung and bronchus cancer.

3.1.3.3. Disparities by County of Residence

In table 6 and in figures 10 and 11, the incidence and mortality rate ratios and differences are presented by county of residence at diagnosis. We examined county of residence for all cancer sites combined and for the four major cancers by site. Figures that display the rate differences use graphs with a y-axis that ranges from –100/100,000 to 200/100,000.

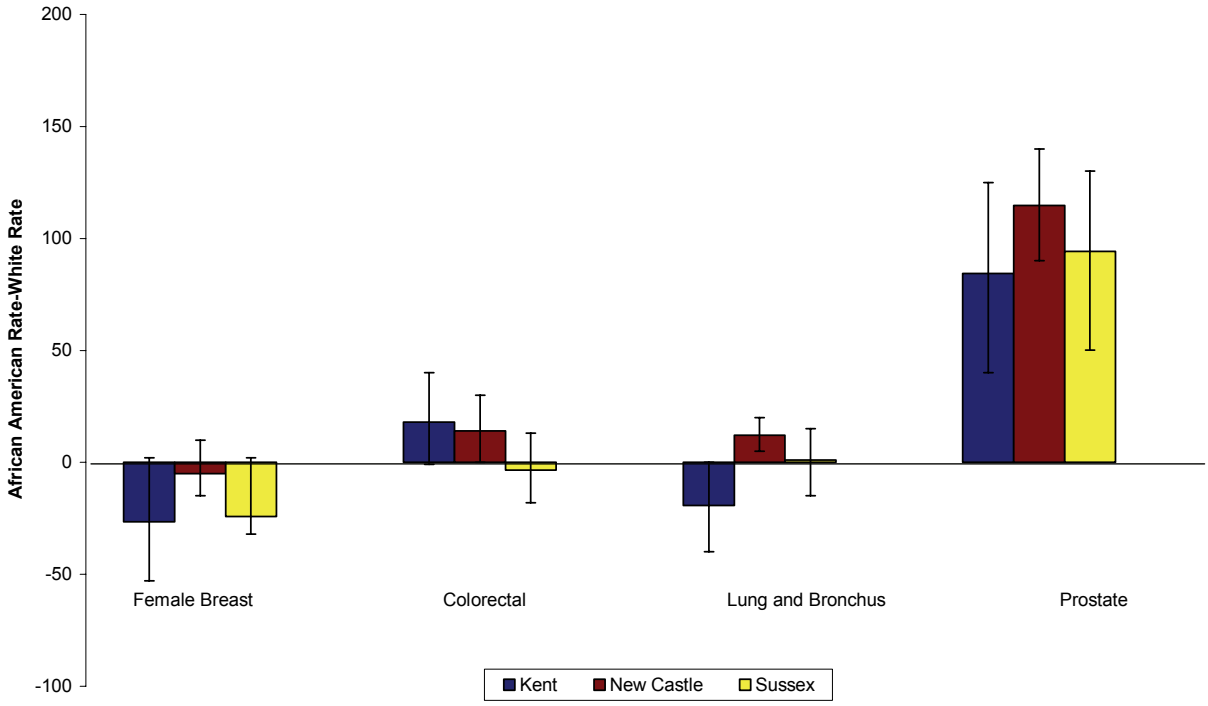
Table 6. Incidence and Mortality Rate Ratios (With 95-Percent Confidence Intervals) Comparing African Americans With Whites, by County of Residence, in Delaware

Cancer Site	Incidence Rate Ratios	Mortality Rate Ratios
All sites		
Kent	0.99 (0.90, 1.10)	1.14 (0.99, 1.32)
New Castle	1.11 (1.06, 1.17)	1.21 (1.12, 1.30)
Sussex	1.04 (0.95, 1.15)	1.24 (1.08, 1.42)
Female breast		
Kent	0.79 (0.59, 1.05)	NA
New Castle	0.96 (0.85, 1.09)	1.31 (1.02, 1.68)
Sussex	0.80 (0.60, 1.06)	1.84 (1.20, 2.83)
Colorectal		
Kent	1.30 (1.00, 1.69)	1.86 (1.20, 2.90)
New Castle	1.22 (1.01, 1.40)	1.40 (1.11, 1.77)
Sussex	0.94 (0.69, 1.27)	1.51 (1.01, 2.24)
Lung and bronchus		
Kent	0.78 (0.59, 1.02)	0.77 (0.58, 1.03)
New Castle	1.17 (1.03, 1.33)	1.15 (1.00, 1.33)
Sussex	1.01 (0.80, 1.28)	1.12 (0.87, 1.45)
Prostate		
Kent	1.67 (1.32, 2.11)	NA
New Castle	1.63 (1.46, 1.82)	1.94 (1.42, 2.66)
Sussex	1.71 (1.37, 2.14)	NA

NA = Rates based on counts too small to be displayed.
Sources: DCR; NCHS, 1998–2002.

- For all sites combined and for the specific sites of interest, there was minimal difference in disparities in cancer incidence and mortality by county of residence.
- For mortality, data were sometimes too sparse to present for all counties. However, the data suggest that colorectal cancer mortality was higher in Kent and Sussex Counties than in New Castle County, and that lung and bronchus cancer mortality was lowest in Kent County.

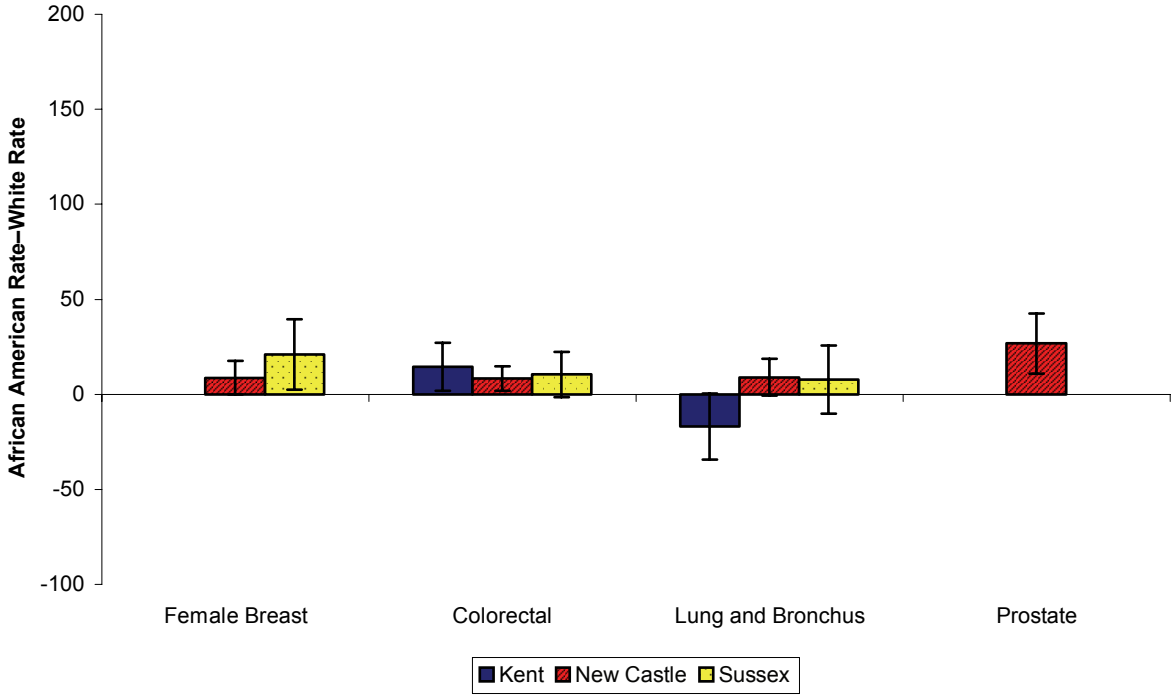
Figure 10. Incidence rate differences comparing African Americans with Whites for the four major cancers, by county of residence, in Delaware



Source: DCR, 1998–2002.

- This figure also presents the differences in cancer incidence among African Americans compared with incidence among Whites, by county.

Figure 11. Mortality rate differences comparing African Americans with Whites for the four major cancers, by county of residence, in Delaware



Source: NCHS, 1998–2002.

- The pattern for disparities in cancer mortality by county differed depending on the cancer site, but no significant interaction by county of residence was observed.

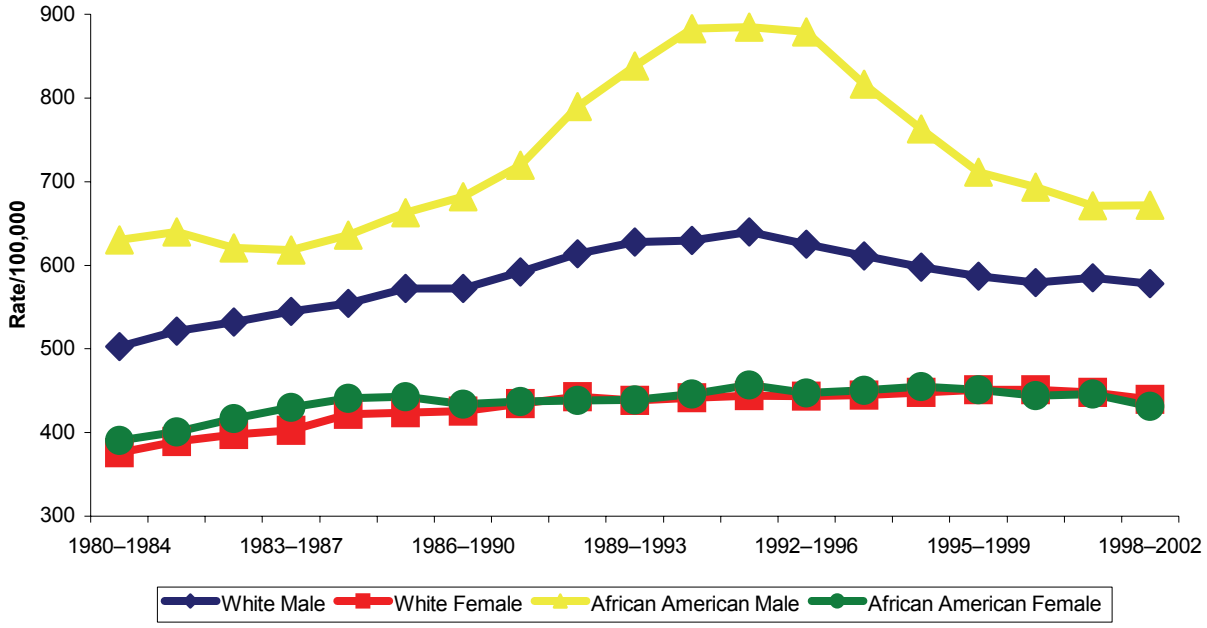
3.2. TRENDS IN CANCER INCIDENCE AND MORTALITY

In this section, Delaware incidence and mortality rates from 1980 to 2002 are presented for all cancer sites combined and for the four major cancer sites. The analysis was restricted to African Americans and Whites because we did not have sufficient data for the other races. Results for all cancer sites combined, colorectal cancer, and lung and bronchus cancer are presented by sex, since this was an important determinant of the trend. Figures 12–16 include the trends for incidence, and figures 17–21 display the trends for mortality. Since the annual number for some cancers and subgroups of interest were small, the five-year average incidence and mortality rates were plotted for each five-year increment from 1980–1984 through 1998–2002. Trends were examined to determine whether advances in cancer prevention behaviors, screening, and treatment have had a similar impact on African Americans and Whites. We examined these trends to determine whether the rates were increasing or decreasing over time and whether the difference in rates between African Americans and Whites was increasing or decreasing. No statistics are presented for the trend analysis; statements about the data reflect visual inspection.

3.2.1. Cancer Incidence in Delaware, 1980–2002

3.2.1.1. All Cancer Sites Combined

Figure 12. Trends in cancer incidence for all sites combined comparing Whites with African Americans, by sex, in Delaware

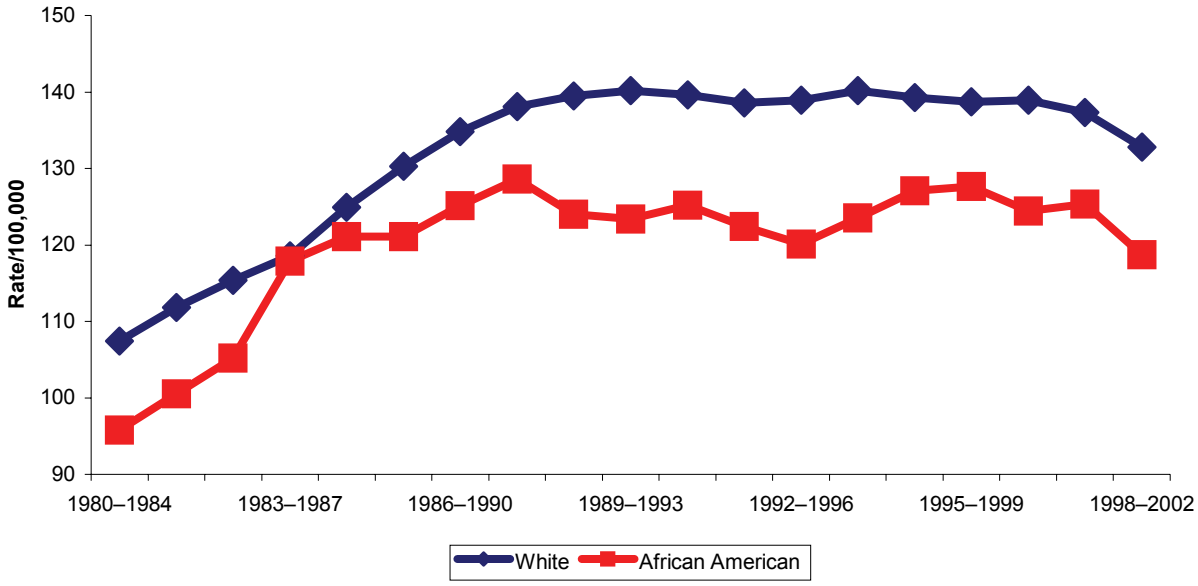


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: DCR, 1980–2002.

- Cancer incidence rates among White men were consistently lower than those of African American men and started to decline earlier: the incidence rate for White men peaked between 1991 and 1995 at 640/100,000, and the rate for African American men peaked between 1992 and 1996 at 878/100,000.
- The five-year average rate for African American men began declining sharply in 1993–1997.
- Little difference existed between White and African American women, whose incidence rates were lower than for men and remained stable over time.

3.2.1.2. Female Breast Cancer

Figure 13. Trends in female breast cancer incidence comparing Whites with African Americans, in Delaware

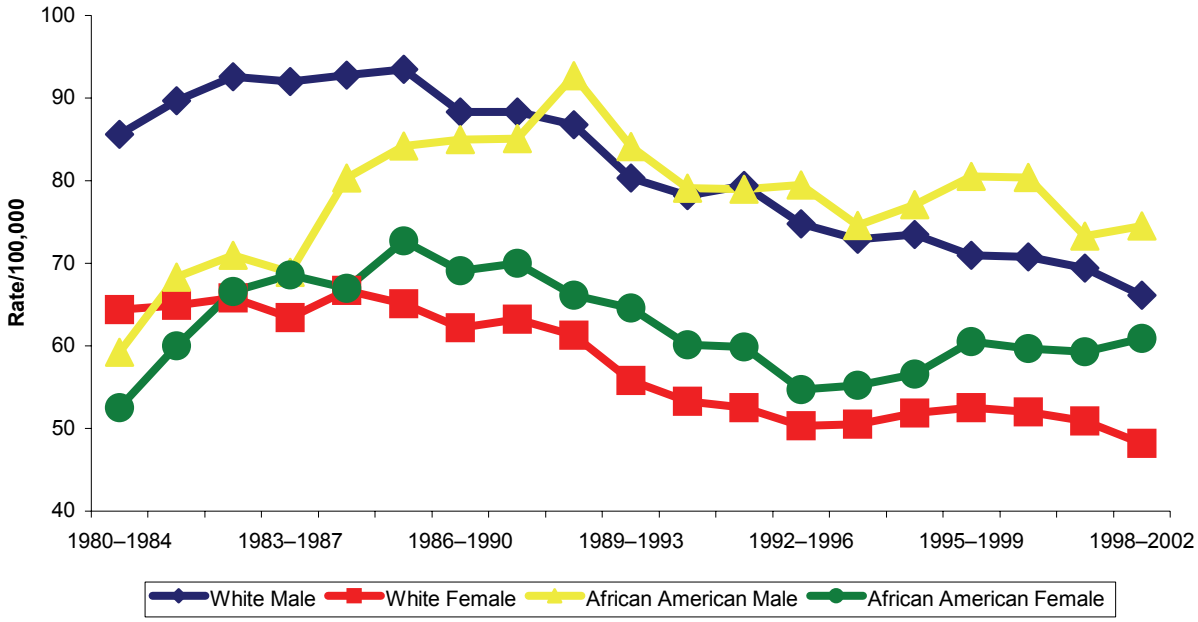


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: DCR, 1980–2002.

- Breast cancer incidence was consistently higher in White women than African American women.
- There were sharp increases in incidence seen in all women in 1983-1987 and 1987-1991. In recent years, incidence decreased for both White and African American women.

3.2.1.3. Colorectal Cancer

Figure 14. Trends in colorectal cancer incidence comparing Whites with African Americans, by sex, in Delaware

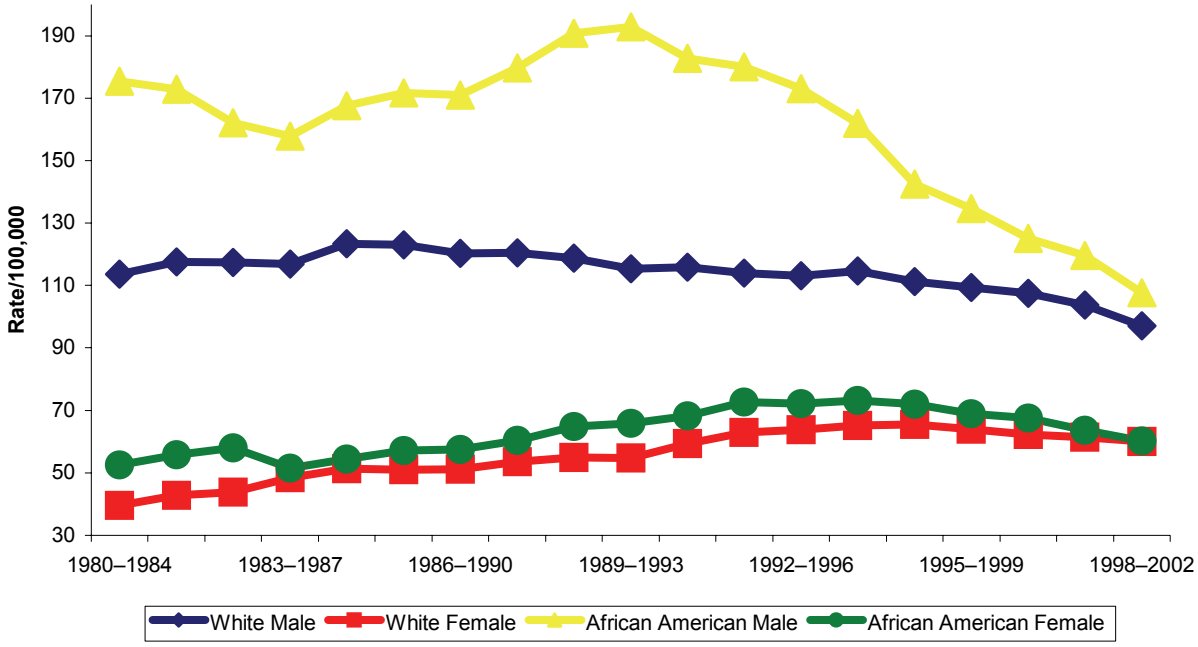


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: DCR, 1980–2002.

- Among men, colorectal cancer incidence rates for African Americans were initially lower than for Whites, but due to a steady upward trend, the rates for African Americans surpassed the rates for White men in 1988-1992 but then began to decline, while the rates for White men declined steadily throughout the entire time period.
- A similar pattern was seen for women. African Americans began with lower rates, then their incidence increased, peaked in 1985-1989, and then declined. However, beginning in 1993-1997 their incidence rates have been increasing.
- The net result is that disparities in the colorectal cancer incidence rate are widening for women and possibly for men.

3.2.1.4. Lung and Bronchus Cancer

Figure 15. Trends in lung and bronchus cancer incidence comparing Whites with African Americans, by sex, in Delaware

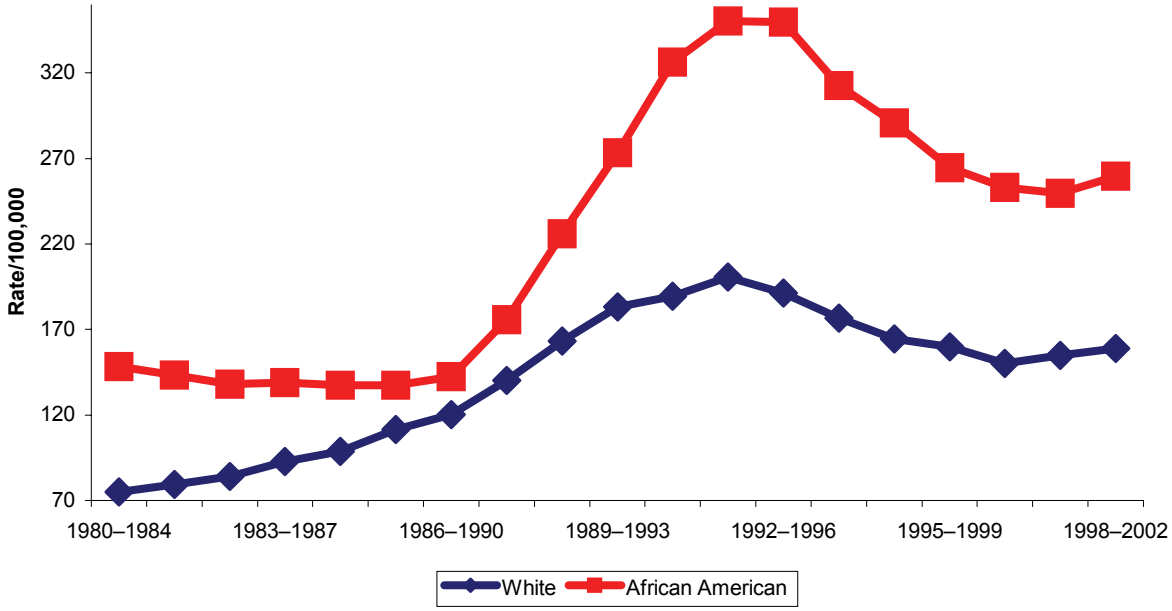


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: DCR, 1980–2002.

- Rates among African American men were higher than among White men. Incidence for African American men peaked in 1989-1993 and has been declining steadily since; it is now approaching the rate observed in White men.
- Lung and bronchus cancer incidence is lower among women than men; however, rates were increasing until the mid-1990s, but are now decreasing. Rates among African American women were higher than among Whites, but in recent years their incidence has been similar.

3.2.1.5. Prostate Cancer

Figure 16. Trends in prostate cancer incidence comparing Whites with African Americans, in Delaware



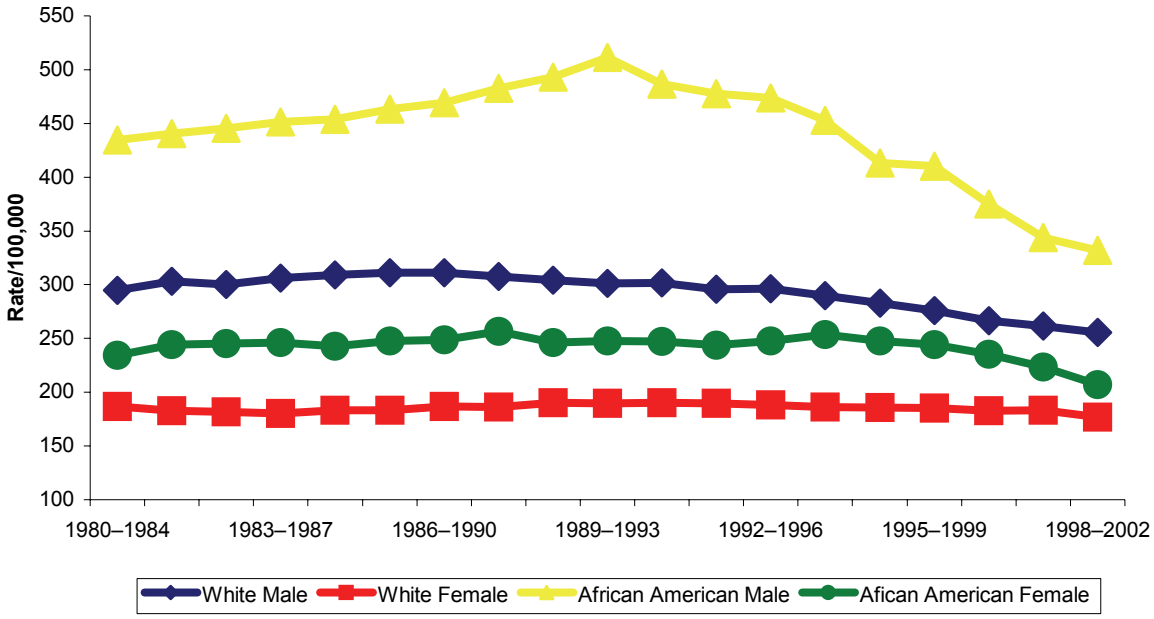
Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: DCR, 1980–2002.

- During the 1980s, prostate cancer incidence rates were low and climbed slowly for Whites; for African Americans there was a decline.
- During the early 1990s, rates increased sharply in both races but to a greater extent among African Americans.
- Rates began to decline in the mid-1990s, but recent data suggest that rates have reached a plateau and are possibly beginning to increase.

3.2.2. Cancer Mortality in Delaware, 1980–2002

3.2.2.1. All Cancer Sites Combined

Figure 17. Trends in cancer mortality for all sites combined comparing Whites with African Americans, by sex, in Delaware

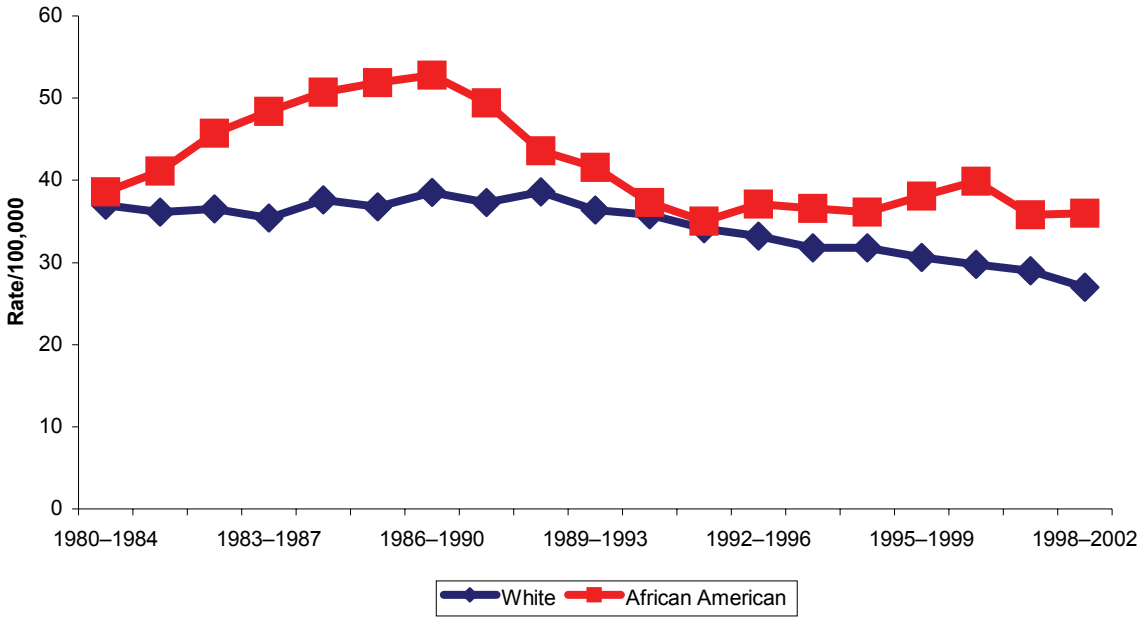


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: NCHS, 1980–2002.

- Cancer mortality was higher among men than women, and for both sexes mortality was greater for African Americans than for Whites.
- Mortality rates for African American men peaked in 1989–1993 and have been declining steadily since.
- For White men and all women, rates declined slightly over time. In White women less than a 10/100,000 difference in mortality was seen over the 20 years examined.

3.2.2.2. Female Breast Cancer

Figure 18. Trends in female breast cancer mortality comparing Whites with African Americans, in Delaware

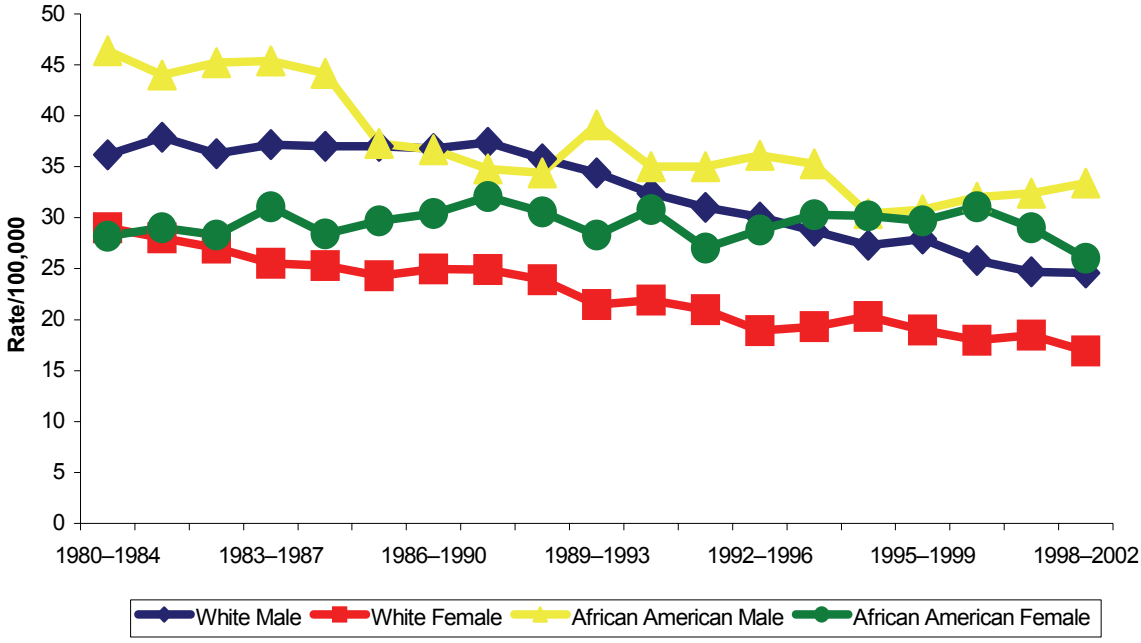


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: NCHS, 1980–2002.

- After 1988-1992, breast cancer mortality consistently decreased among White women.
- Mortality for African American women increased until 1986–1990 then decreased to the extent that in 1991–1995 the rate was comparable to that of White women. However, since then the mortality rate of African American women has been higher than that of White women.

3.2.2.3. Colorectal Cancer

Figure 19. Trends in colorectal cancer mortality comparing Whites with African Americans, by sex, in Delaware

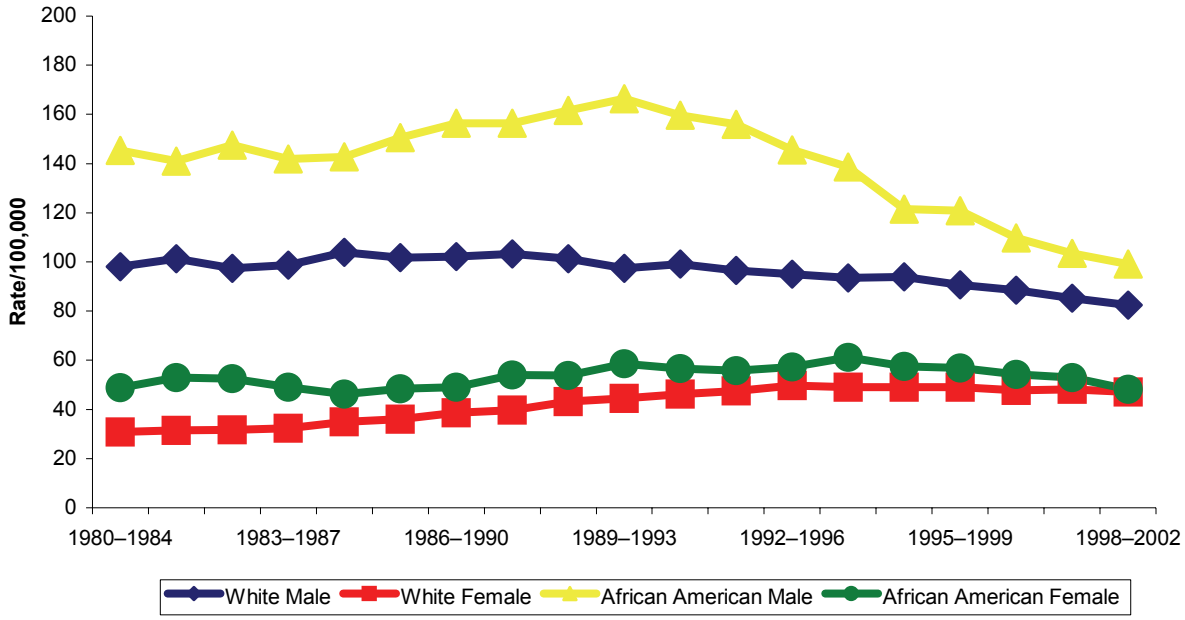


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: NCHS, 1980–2002.

- Colorectal cancer mortality steadily declined among White men and women.
- Except during 1989-1994, rates among African American men decreased until 1994–1998 and are now increasing.
- Rates among African American women increased and decreased over time, but there was little net change.

3.2.2.4. Lung and Bronchus Cancer

Figure 20. Trends in lung and bronchus cancer mortality comparing Whites with African Americans, by sex, in Delaware

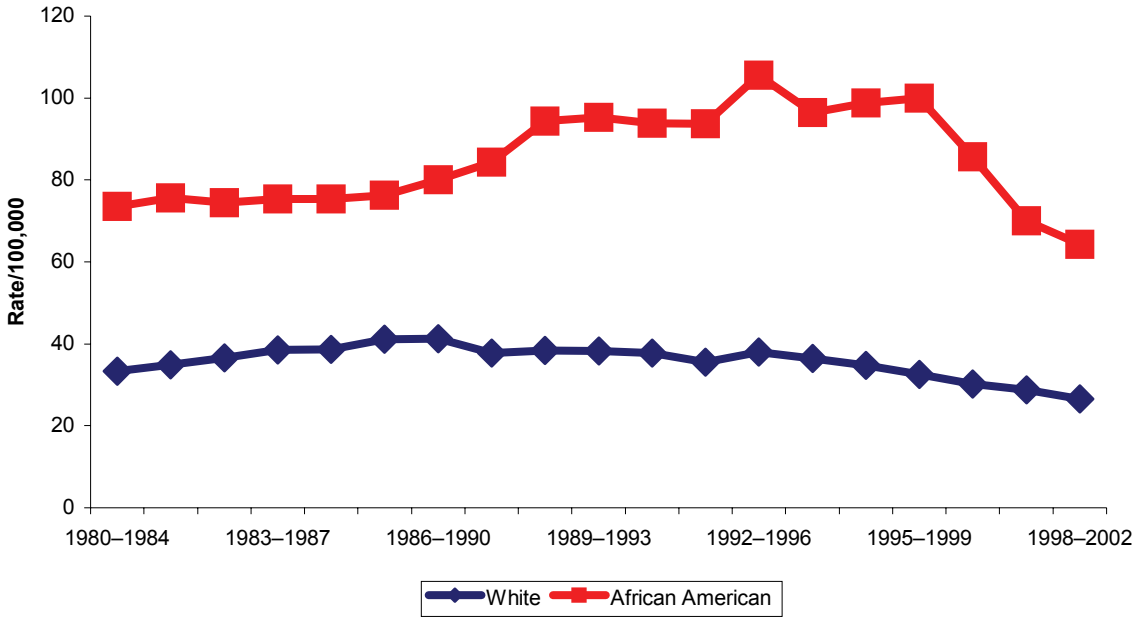


Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: NCHS, 1980–2002.

- After 1989-1994, there was a steady decline in the lung and bronchus cancer mortality rate among African American men; it is now approaching the mortality rate of White men.
- The rate for African American women was slightly but consistently higher than for White women until the mid-90's. The mortality rate of African American women is now similar to the mortality rate of White women.

3.2.2.5. Prostate Cancer

Figure 21. Trends in prostate cancer mortality comparing Whites with African Americans, in Delaware



Note: A data point is included for each of the 20 five-year increments, but due to space limitations only every third point is labeled on the x-axis.
Source: NCHS, 1980–2002.

- The prostate cancer mortality rate has been much higher among African American men than White men.
- Although there has been a steady decline in the prostate cancer mortality rate among White men, the rate for African American men did not decline until after 1992-1996, when it peaked at 105.6/100,000.
- With the mortality rate for African American men declining faster than for White men, the disparity in rate has also been decreasing.

3.3. FACTORS THAT CONTRIBUTE TO DISPARITIES

This section addresses factors that may contribute to the disparities in cancer incidence and mortality observed in Delaware. Four areas that are known to influence cancer prevention and control were examined: 1) risk factors, 2) screening, 3) stage at diagnosis, and 4) treatment.

The following questions were addressed:

- Are there differences in the prevalence of modifiable behavioral risk factors for cancer by race/ethnicity? Are these differences affected by age, sex, county of residence, socioeconomic status, and access to health care?
- Does the use of screening tests differ among racial groups in Delaware? Does the use of screening among racial groups vary by age, sex, county of diagnosis, socioeconomic status, and access to health care?
- Does the distribution of advanced-stage disease differ by race, age, sex, and county of diagnosis?
- Does the proportion of cancer patients with local-stage disease who did not receive the standard treatment differ by race, age, sex, county of diagnosis, and insurance status?

3.3.1. Cancer Risk Factors and Screening Usage

BRFSS data were used to examine behavioral cancer risk factors and cancer screening usage in Delaware and to compare Delaware with the United States. Table 7 compares demographic characteristics of the population of Delaware with the United States.

Table 7. Comparison of Demographic Characteristics Between Delaware and the United States, 2002

	Delaware (%)				United States (%)			
	Total	**White**	**African American**	**Hispanic**	**Total**	**White**	**African American**	**Hispanic**
Race/ethnicity		78	13	5		70	10	14
Age								
20–39	40	37	51	9	42	37	47	8
40–49	21	21	21	23	20	21	21	19
50–64	21	22	17	15	21	23	19	15
65–79	14	16	9	2	13	15	10	7
80+	3	4	2	1	4	4	3	1
Sex								
Male	48	47	43	57	48	48	44	49
Female	52	53	57	43	52	52	56	51
Education								
< High school	9	7	14	36	13	8	16	34
High school graduate	33	34	37	29	31	31	35	29
Some college	26	26	29	17	27	28	29	23
College graduate	32	34	20	18	29	32	20	15
Income								
< $25,000	21	17	32	45	29	23	43	53
$25,000–$49,000	30	29	39	26	32	33	34	29
$50,000+	49	53	29	29	38	44	23	18

Source: BRFSS, 2002.

Compared with the United States:

- Delaware had a comparable age and sex distribution.
- Delaware had a larger African American population and a smaller Hispanic population.
- A lower proportion of the Delaware population had less than a high school education.
- A higher proportion of the Delaware population had incomes of greater than $50,000.

Tables 8–10 display differences by race/ethnicity in the prevalence of access to health care, behavioral risk factors for cancer, and screening usage. A table displaying the denominator for each variable examined by race/ethnicity is included in table C2 in appendix C.

Table 8. Access to Health Care in Delaware and the United States, by Race/Ethnicity

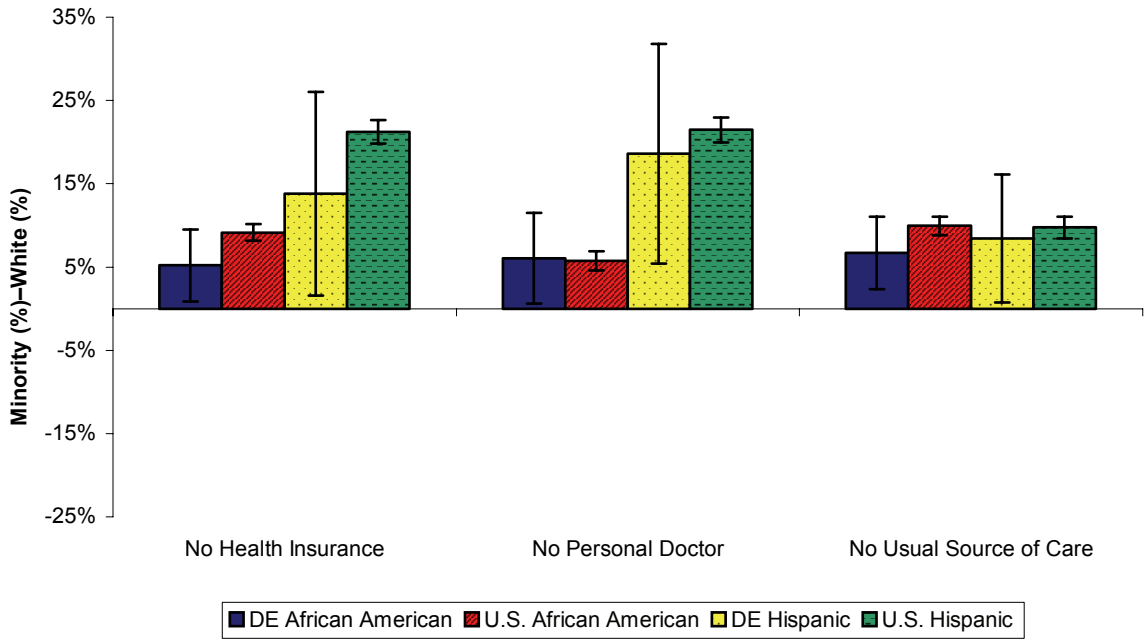
	No Health Insurance	No Personal Doctor	No Usual Source of Care
	% (95% CI)	% (95% CI)	% (95% CI)
Delaware			
White	7.6 (6.2, 9.0)	10.1 (8.0, 12.1)	5.7 (4.6, 6.8)
African American	12.8 (8.7, 16.9)	16.1 (11.1, 21.2)	12.4 (8.2, 16.6)
Hispanic	21.3 (9.0, 33.7)	28.7 (15.5, 41.9)	14.1 (6.4, 21.9)
United States			
White	11.1 (10.9, 11.4)	16.8 (16.5, 17.1)	14.9 (14.6, 15.2)
African American	20.3 (19.3, 21.2)	22.5 (21.4, 23.6)	24.8 (23.7, 25.9)
Hispanic	32.3 (31.0, 33.7)	38.2 (36.8, 39.7)	24.6 (23.3, 25.9)

Source: BRFSS, 2002.

- Delaware residents of any race/ethnicity were more likely to have access to health care compared with residents of the United States. However, due to small numbers, the differences for Hispanics were not always statistically significant.
- In Delaware, Hispanics were less likely to have health insurance, a personal doctor, and a usual source of care than Whites; in most instances, the differences were statistically significant.
- The data suggest that in Delaware, African Americans were also less likely to have health insurance, a personal doctor, and a usual source of care than Whites; the only statistically significant difference was in having a usual source of care.

Figure 22 compares the percentage difference in health care access for minorities versus Whites in Delaware and in the United States. Using the data from table 8, we examined the difference between the percentage observed in Whites and in non-Whites. Larger differences indicate a larger disparity between Whites and non-Whites.

Figure 22. Racial/ethnic disparities in access to health care in Delaware and the United States



Source: BRFSS, 2002.

- For all three measures of access to health care, disparities were observed for African Americans and Hispanics, compared with Whites.
- The data suggest that the disparities in access to health care were greater for Hispanics than African Americans.
- There were no significant differences in the magnitude of the disparity when comparing Delaware with the United States, but the data suggest that in general the disparity was less in Delaware.

Table 9. Comparison of Modifiable Risk Factors for Cancer Between Delaware and the United States, by Race/Ethnicity

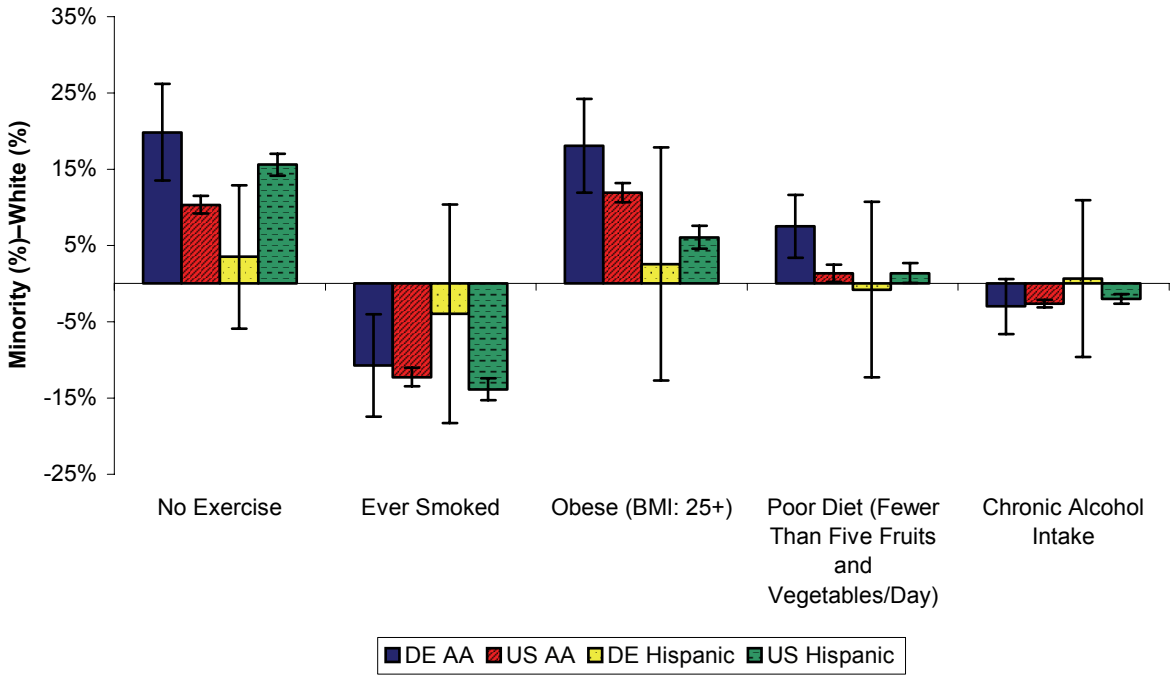
	No Exercise	Former Smokers	Current Smokers	Overweight (BMI: 25–29)	Obese (BMI: 30+)	Poor Diet (Fewer Than Five Fruits and Vegetables/Day)	Chronic Alcohol Intake[1]
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Delaware							
White	17.6 (15.9, 19.4)	28.0 (25.9, 30.2)	25.6 (23.1, 28.1)	35.5 (33.0, 37.9)	20.8 (18.7, 22.8)	79.9 (78.0, 81.7)	8.6 (7.0, 10.2)
African American	37.5 (31.3, 43.6)	17.3 (12.8, 21.8)	25.6 (19.7, 31.4)	41.0 (34.7, 47.5)	33.2 (27.3, 39.2)	87.3 (83.7, 91.1)	5.6 (2.4, 8.9)
Hispanic	21.1 (11.7, 30.5)	31.6 (17.4, 45.8)	18.1 (7.0, 29.1)	40.4 (25.8, 55.0)	18.4 (5.5, 31.3)	79.1 (67.6, 90.6)	9.2 (-1.1, 19.5)
United States							
White	20.3 (20.0, 20.6)	27.1 (26.8, 27.4)	23.4 (23.0, 23.7)	36.8 (36.4, 37.2)	20.5 (20.2, 20.8)	75.7 (75.3, 80.0)	6.3 (6.1, 6.5)
African American	30.6 (29.4, 31.7)	16.4 (15.6, 17.4)	21.8 (20.8, 22.8)	36.1 (34.9, 37.3)	33.2 (32.1, 34.4)	77.0 (76.0, 78.1)	3.7 (3.2, 4.2)
Hispanic	35.9 (34.5, 37.2)	18.1 (17.0, 19.2)	18.6 (17.4, 19.7)	39.4 (38.0, 40.9)	24.0 (22.7, 25.3)	77.0 (75.8, 78.2)	4.3 (3.7, 4.9)

[1] Women who drank two or more drinks per day or men who drank three or more drinks per day.
Source: BRFSS, 2002.

- African Americans were more likely to have no exercise, be obese, and eat fewer than five fruits and vegetables per day than Whites.
- The prevalence of behavioral risk factors was comparable in Whites and Hispanics.
- African Americans in Delaware were more likely to have a poor diet than African Americans in the United States overall. No other differences were statistically significant, but the prevalence of risk factors seemed to be slightly higher in Delaware.

Figure 23 compares the racial/ethnic disparities in cancer risk factors in Delaware with the disparities observed in the rest of the United States. As in figure 22, we examined the difference between the percentage observed in Whites and the percentage observed in non-Whites. Larger differences indicate a greater disparity between Whites and non-Whites. Negative numbers indicate that Whites are more likely to engage in a risk factor than African Americans or Hispanics. We examined the proportion of study respondents who never exercised, were ever smokers, had a BMI greater than 25, ate fewer than five fruits and vegetables per day, and were chronic alcohol drinkers.

Figure 23. Racial/ethnic disparities in behavioral cancer risk factors in Delaware and the United States



Source: BRFSS, 2002.

- The largest disparities for African Americans were in exercise, smoking and obesity. In the case of smoking, African Americans were less likely to have ever smoked than were Whites.
- The disparity in exercise and diet was greater in Delaware than in the United States.
- Numbers were small for Hispanics, but the data suggest that they had less disparity than African Americans and that the disparity was less in Delaware than the United States.

Table 10 shows the differences in screening behavior for colorectal, prostate, and female breast cancer by race. The results show the prevalence of being screened for cancer within the time interval currently recommended by ACS.

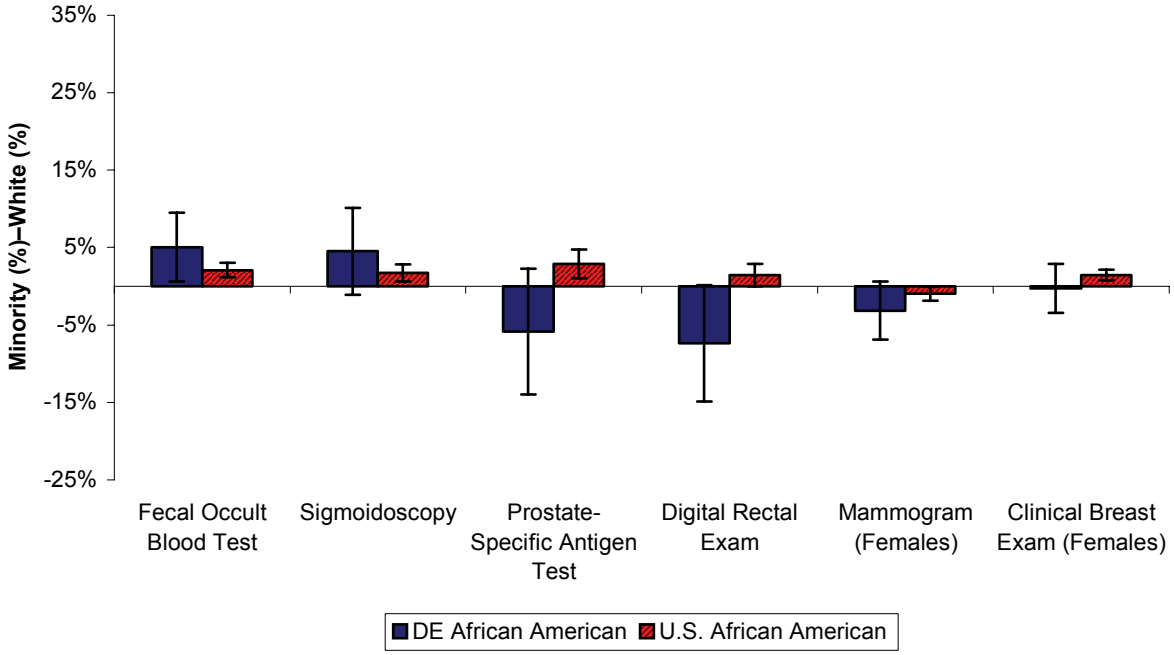
Table 10. Comparison of the Percentage of Individuals Who Have Not Received Cancer-Screening Tests Within the Recommended Time Interval Between Delaware and the United States, by Race

% Not Receiving Test	Fecal Occult Blood Test	Sigmoidoscopy or Colonoscopy	Prostate-Specific Antigen Test	Digital Rectal Exam	Mammogram (Females)	Clinical Breast Exam (Females)
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Delaware						
White	76.2 (73.5, 78.9)	48.6 (45.4, 51.9)	36.6 (31.5, 41.8)	53.1 (48.7, 57.6)	16.0 (13.5, 18.5)	14.6 (12.3, 16.8)
African American	81.3 (73.0, 89.6)	53.1 (42.5, 63.8)	30.8 (15.4, 46.2)	45.8 (31.5, 60.0)	12.8 (5.9, 19.8)	14.3 (8.4, 20.1)
United States						
White	77.5 (77.0, 77.9)	58.7 (58.1, 59.2)	43.6 (42.7, 44.5)	54.5 (53.7, 55.1)	22.8 (22.3, 23.2)	18.2 (17.8, 18.6)
African American	79.6 (77.8, 81.3)	60.4 (58.3, 62.5)	46.5 (43.0, 50.0)	55.9 (53.2, 58.6)	21.9 (20.2, 23.6)	19.7 (18.4, 21.0)

Source: BRFSS, 2002.

- In both Delaware and the United States, there were no significant differences in the proportion not receiving screening when comparing Whites with African Americans.
- Although the difference is not statistically significant, more African Americans than Whites in Delaware received screening for prostate cancer and for female breast cancer.
- The data suggest that Delaware residents were more likely to have received screening than did residents of the United States as a whole.

Figure 24. Racial disparities in cancer screening test usage in Delaware and the United States



Source: BRFSS, 2002.

- No significant differences in disparity were observed between Delaware and the United States.

Tables 11, 13, and 15 present the odds ratios and 95-percent confidence intervals from logistic regression models examining the association between race/ethnicity and the markers of access to health care, behavioral risk factors, and screening usage, respectively. Tables 12, 14, and 16 present the odds ratios and 95-percent confidence intervals from multivariate models examining the association between race/ethnicity and the measures above but also include in the model other, potentially related variables..

Odds ratios greater than one indicate that the subgroup was more likely not to have (or to have, as applicable) the measure than the reference group; odds ratios less than one indicate that the subgroup was more likely to have (or not to have) the measure.

Table 11. Association Between Race/Ethnicity and Access to Health Care in Delaware

Odds Ratio (95% Confidence Interval)	No Health Insurance	No Personal Doctor	No Usual Source of Care
Race/ethnicity			
White	Reference	Reference	Reference
African American	2.0 (1.5, 2.7)	1.4 (1.0, 1.8)	1.9 (1.4, 2.5)
Hispanic	3.1 (1.9, 5.1)	4.0 (2.6, 6.0)	3.5 (2.1, 5.8)

Source: BRFSS, 2002.

- This table indicates that compared with Whites, African Americans and Hispanics are more likely to lack health insurance, a personal doctor, and a usual source of care.

Table 12. Multivariate Regression Model of Predictors of Lack of Access to Health Care

	No Health Insurance	No Personal Doctor	No Usual Source of Care
Race/ethnicity			
White	Reference	Reference	Reference
African American	1.5 (1.1, 2.0)	1.0 (0.76, 1.4)	1.6 (1.2, 2.3)
Hispanic	1.6 (0.93, 2.8)	2.3 (1.4, 3.7)	2.7 (1.5, 4.7)
Age			
< 40	Reference	Reference	Reference
40–49	0.56 (0.41, 0.78)	0.45 (0.33, 0.60)	0.59 (0.41, 0.84)
50–64	0.51 (0.37, 0.70)	0.38 (0.28, 0.51)	0.52 (0.36, 0.73)
65–79	0.70 (0.04, 1.4)	0.24 (0.16, 0.36)	0.51 (0.35, 0.75)
80+	0.20 (0.09, 0.44)	0.23 (0.11, 0.47)	0.58 (0.31, 1.1)
Sex			
Male	Reference	Reference	Reference
Female	0.71 (0.55, 0.90)	0.54 (0.44, 0.67)	0.47 (0.36, 0.60)
Education			
< High school	7.8 (5.1, 12.0)	2.5 (1.7, 3.6)	2.1 (1.4, 3.1)
High school graduate	2.7 (1.9, 3.9)	1.3 (0.95, 1.7)	1.0 (0.75, 1.5)
Some college	1.8 (1.2, 2.7)	1.2 (0.87, 1.6)	1.2 (0.85, 1.7)
College graduate	Reference	Reference	Reference
County			
New Castle	Reference	Reference	Reference
Kent	1.2 (0.88, 1.7)	1.2 (1.0, 1.7)	2.0 (1.4, 2.7)
Sussex	1.7 (1.3, 2.3)	0.97 (0.73, 1.3)	1.3 (0.90, 1.8)

Source: BRFSS, 2002.

- In each column of table 12, the association between race/ethnicity and each marker of access to health care is examined after adjustment for age, sex, education, and county of residence. Therefore in the column for no health insurance, the results are interpreted as African Americans being 1.5 times more likely than Whites to lack health insurance.
- The odds ratios measuring the effect of race were lower after adjusting for other predictors of access to health care, suggesting that some of the disparity observed in table 11 can be explained by the fact that minorities are more likely to have other factors that predict barriers to access to health care. However, since the race/ethnicity effect was not eliminated after adjustment for other variables, this indicates that the other variables in the model cannot account for all of the disparity observed.
- The strongest predictor of not having each of the measures of access to health care was having less than a high school education.

In tables 13 and 14, separate models were developed to examine this relationship with the following measures: 1) physical inactivity, 2) current smoking, 3) chronic drinking, 4) BMI greater than 25, and 5) eating fewer than five fruits and vegetables per day.

Table 13. Association Between Race/Ethnicity and Modifiable Risk Factors for Cancer in Delaware

Race/Ethnicity	No Exercise	Ever Smoked	Obese (BMI: 25+)	Poor Diet (Fewer Than Five Fruits and Vegetables/Day)	Chronic Alcohol Intake[1]
White	Reference	Reference	Reference	Reference	Reference
African American	2.2 (1.8, 2.7)	0.56 (0.46, 0.68)	2.2 (1.7, 2.7)	1.6 (1.2, 2.0)	0.64 (0.40, 1.0)
Hispanic	1.4 (0.94, 2.1)	0.65 (0.45, 0.94)	0.98 (0.67, 1.4)	0.90 (0.58, 1.4)	0.82 (0.35, 1.9)

[1] Women who drank two or more drinks per day or men who drank three or more drinks per day.
Source: BRFSS, 2002.

- African Americans were more likely to report having no exercise, being obese, and eating fewer than five fruits and vegetables per day, and they were less likely to have ever smoked.
- There were no significant differences observed between Hispanics and Whites.

Table 14. Multivariate Regression Model of Predictors of Having Modifiable Risk Factors for Cancer in Delaware

	No Exercise	Ever Smoked	Obese (BMI: 25+)	Poor Diet (Fewer Than Five Fruits and Vegetables/Day)	Chronic Alcohol Intake[1]
Race/ethnicity					
White	Reference	Reference	Reference	Reference	Reference
African American	2.4 (1.9, 3.0)	0.55 (0.45, 0.67)	2.5 (2.0, 3.2)	1.4 (1.1, 1.8)	0.54 (0.33, 0.88)
Hispanic	1.8 (1.1, 3.0)	0.70 (0.46, 1.1)	1.2 (0.75, 1.9)	0.71 (0.43, 1.2)	0.25 (0.06, 1.0)
Age					
< 40	Reference	Reference	Reference	Reference	Reference
40–49	1.3 (0.98, 1.6)	1.3 (1.1, 1.6)	1.4 (1.2, 1.7)	0.96 (0.77, 1.2)	0.88 (0.62, 1.3)
50–64	1.7 (1.3, 2.1)	1.9 (1.6, 2.2)	2.0 (1.6, 2.4)	0.92 (0.73, 1.2)	0.56 (0.38, 0.83)
65–79	2.4 (1.9, 3.1)	1.8 (1.5, 2.2)	1.7 (1.4, 2.1)	0.62 (0.49, 0.79)	0.52 (0.33, 0.81)
80+	3.4 (2.4, 4.8)	0.82 (0.59, 1.1)	0.80 (0.58, 1.1)	0.57 (0.40, 0.82)	0.26 (0.09, 0.73)

	No Exercise	Ever Smoked	Obese (BMI: 25+)	Poor Diet (Fewer Than Five Fruits and Vegetables/Day)	Chronic Alcohol Intake[1]
Sex					
Male	Reference	Reference	Reference	Reference	Reference
Female	1.8 (1.5, 2.2)	0.65 (0.57, 0.74)	0.47 (0.41, 0.54)	0.48 (0.40, 0.57)	0.66 (0.50, 0.87)
Education					
< High school	4.4 (3.3, 5.9)	2.2 (1.7, 2.8)	1.9 (1.5, 2.6)	2.3 (1.6, 3.2)	1.1 (0.58, 2.0)
High school graduate	2.2 (1.8, 2.7)	1.7 (1.4, 2.0)	1.6 (1.3, 1.9)	1.9 (1.6, 2.3)	1.3 (0.89, 1.9)
Some college	1.6 (1.2, 2.0)	1.5 (1.3, 1.8)	1.4 (1.2, 1.7)	1.6 (1.3, 1.9)	1.4 (0.99, 2.1)
College graduate	Reference	Reference	Reference	Reference	Reference
County					
New Castle	Reference	Reference	Reference	Reference	Reference
Kent	1.1 (0.88, 1.3)	1.0 (0.87, 1.2)	1.2 (1.0, 1.5)	1.1 (0.90, 1.3)	0.48 (0.34, 0.70)
Sussex	0.95 (0.78, 1.2)	1.0 (0.85, 1.2)	1.2 (1.0, 1.4)	1.1 (0.90, 1.3)	0.74 (0.54, 1.0)
Health insurance					
Yes	Reference	Reference	Reference	Reference	Reference
No	1.2 (0.85, 1.6)	1.4 (1.1, 1.9)	0.78 (0.58, 1.0)	0.95 (0.68, 1.3)	1.5 (0.95, 2.5)
Personal doctor					
Yes	Reference	Reference	Reference	Reference	Reference
No	1.1 (0.80, 1.5)	0.99 (0.76, 1.3)	0.74 (0.56, 0.98)	1.0 (0.76, 1.5)	1.2 (0.73, 1.9)
Usual source of care					
Yes	Reference	Reference	Reference	Reference	Reference
No	0.81 (0.57, 1.1)	1.3 (0.96, 1.7)	0.94 (0.71, 1.3)	1.1 (0.80, 1.6)	1.6 (0.98, 2.7)

[1] Women who drank two or more drinks per day or men who drank three or more drinks per day.
Source: BRFSS, 2002.

- After adjusting for demographic characteristics and access to health care variables, the odds ratios for the associations between race/ethnicity and exercise and obesity were greater than the crude (i.e., unadjusted) odds ratios. This suggests that after including other potential predictors in the model, the effect between being African American and the risk of not exercising or being obese was stronger.
- Having less than a high school education was a consistent strong predictor of being at risk for each of the five factors examined. Access to health care was not a predictor of being at risk for any factors, except not having health insurance increased the risk of ever smoking.

Multivariate logistic regression models were developed to analyze whether the disparities in the use of cancer screening tests were due to race/ethnicity or were confounded by other factors, including socioeconomic status and access to health care. Separate models were developed for each screening test, and the outcome was the proportion of study respondents who did not receive the screening test within the recommended interval. The recommended time intervals for these analyses were:

- A fecal occult blood test in the past year among individuals aged 50 or older
- A sigmoidoscopy/colonoscopy in the past five years among individuals aged 50 or older
- A prostate-specific antigen test in the past year for men aged 50 or older
- A digital rectal exam in the past year for men aged 40 or older
- A mammogram every two years for women aged 40 or older
- A clinical breast exam in the past two years for women

Odds ratios greater than one indicated that the subgroup was more likely not to have received the screening test within the recommended time interval than the reference group, and odds ratios less than one indicated that the subgroup was more likely to have received the screening test within the recommended interval.

Table 15. Association Between Race and Not Receiving Cancer Screening Tests in Delaware

Race	Fecal Occult Blood Test	Sigmoidoscopy or Colonoscopy	Prostate-Specific Antigen Test	Digital Rectal Exam	Mammogram (Females)	Clinical Breast Exam (Females)
White	Reference	Reference	Reference	Reference	Reference	Reference
African American	1.4 (0.92, 2.1)	1.3 (0.95, 1.8)	0.68 (0.39, 1.2)	0.78 (0.51, 1.2)	0.83 (0.53, 1.3)	0.78 (0.55, 1.1)

Source: BRFSS, 2002.

Table 16. Multivariate Model of Predictors for Not Receiving Cancer Screening Tests in Delaware

	Fecal Occult Blood Test	Sigmoidoscopy or Colonoscopy	Prostate-Specific Antigen Test	Digital Rectal Exam	Mammogram (Females)	Clinical Breast Exam (Females)
Race						
White	Reference	Reference	Reference	Reference	Reference	Reference
African American	1.2 (0.82, 1.9)	1.1 (0.76, 1.5)	0.49 (0.24, 1.0)	0.62 (0.32, 1.0)	0.93 (0.36, 1.1)	0.70 (0.46, 1.1)
Age						
< 40	NA	NA	NA	NA	NA	Reference
40–49	NA	NA	NA	Reference	Reference	1.5 (0.99, 2.2)
50–64	Reference	Reference	Reference	0.29 (0.21, 0.40)	0.35 (0.24, 0.51)	1.3 (0.90, 1.9)
65–79	0.77 (0.60, 0.97)	0.68 (0.55, 0.84)	0.67 (0.46, 0.98)	0.25 (0.17, 0.36)	0.53 (0.36, 0.78)	2.1 (1.4, 3.0)
80+	1.0 (0.70, 1.6)	1.0 (0.73, 1.5)	0.89 (0.46, 1.7)	0.38 (0.20, 0.73)	1.4 (0.85, 2.2)	5.5 (3.4, 8.9)
Sex						
Male	Reference	Reference	NA	NA	NA	NA
Female	1.0 (0.83, 1.3)	1.1 (0.91, 1.4)	NA	NA	NA	NA
Education						
< High school	1.2 (0.80, 1.8)	2.7 (1.9, 3.9)	1.8 (1.0, 3.2)	2.3 (1.4, 3.7)	2.1 (1.2, 3.6)	4.5 (2.8, 7.4)
High school graduate	0.97 (0.73, 1.3)	2.1 (1.6, 2.7)	0.86 (0.55, 1.3)	1.3 (0.94, 1.9)	1.8 (1.2, 2.6)	2.5 (1.7, 3.7)
Some college	0.85 (0.63, 1.2)	1.6 (1.2, 2.1)	0.99 (0.63, 1.6)	0.94 (0.64, 1.4)	1.2 (0.75, 1.8)	2.0 (1.3, 3.0)
College graduate	Reference	Reference	Reference	Reference	Reference	Reference

	Fecal Occult Blood Test	Sigmoidoscopy or Colonoscopy	Prostate-Specific Antigen Test	Digital Rectal Exam	Mammogram (Females)	Clinical Breast Exam (Females)
County						
New Castle	Reference	Reference	Reference	Reference	Reference	Reference
Kent	0.69 (0.51, 0.93)	1.0 (0.81, 1.4)	0.76 (0.48, 1.2)	0.76 (0.53, 1.1)	1.0 (0.68, 1.5)	0.73 (0.53, 1.0)
Sussex	0.60 (0.45, 0.78)	1.1 (0.88, 1.4)	0.92 (0.60, 1.4)	0.86 (0.62, 1.2)	1.2 (0.84, 1.7)	0.73 (0.54, 1.0)
Health insurance						
Yes	Reference	Reference	Reference	Reference	Reference	Reference
No	1.4 (0.74, 2.7)	2.5 (1.4, 4.6)	3.7 (1.6, 8.3)	2.2 (1.1, 4.3)	2.6 (1.5, 4.6)	2.1 (1.4, 3.2)
Personal doctor						
Yes	Reference	Reference	Reference	Reference	Reference	Reference
No	2.5 (1.2, 5.3)	2.3 (1.3, 4.0)	3.8 (1.6, 8.6)	4.0 (2.0, 8.1)	3.5 (1.9, 6.4)	1.7 (1.0, 2.8)
Usual source of care						
Yes	Reference	Reference	Reference	Reference	Reference	Reference
No	0.72 (0.42, 1.2)	0.93 (0.57, 1.5)	0.85 (0.41, 1.8)	1.1 (0.59, 1.9)	1.9 (1.0, 3.5)	2.2 (1.3, 3.5)

Source: BRFSS, 2002.

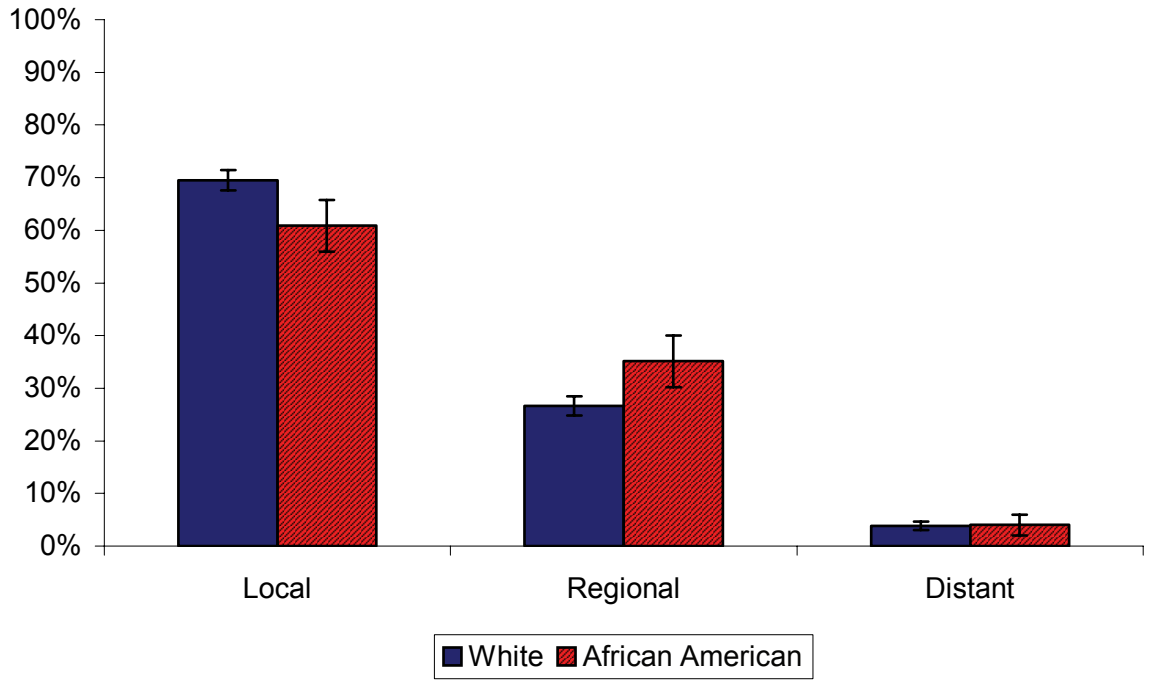
- A lack of health insurance or a personal doctor was associated with not receiving screening exams; lack of a usual source of care appeared to impact only receipt of a clinical breast exam.
- Having less than a high school education was strongly associated with not receiving screening exams.
- With the exception of clinical breast exams, advancing age was most often associated with an increasing likelihood of receipt of screening exams.
- There was no association between race, sex or county of residence and the receipt of screening exams.

3.3.2. Stage at Diagnosis

Stage of disease at site-specific cancer diagnosis was evaluated for the different racial and ethnic groups in Delaware by examining the proportion of individuals who were diagnosed at each cancer stage. The variations in stage at diagnosis for female breast, colorectal, and prostate cancer were examined by county and age at diagnosis. Stage was classified as local, regional, or distant. Regional and distant were combined to form the category of advanced stage.

3.3.2.1. Female Breast Cancer

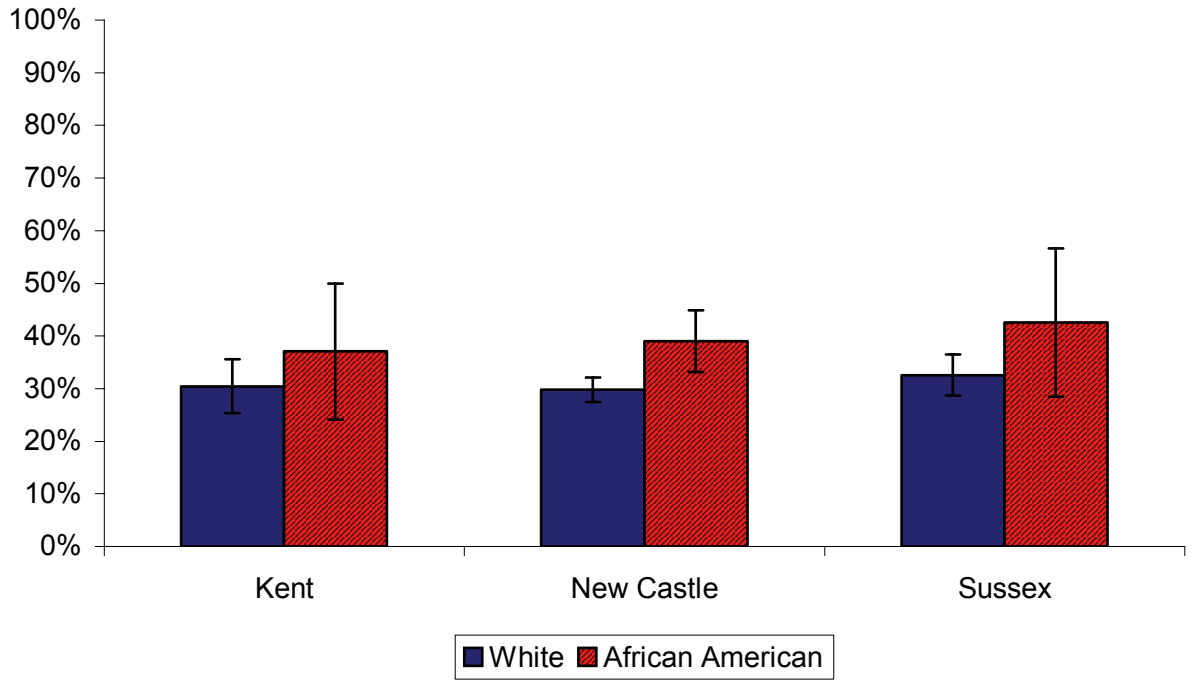
Figure 25. Percentage of female breast cancer cases, by stage at diagnosis and race, in Delaware



Source: DCR, 1998–2002.

- A larger proportion of White women were diagnosed with local disease than African American women, while more African American women were diagnosed with regional disease. White and African American women were equally likely to be diagnosed with distant disease.

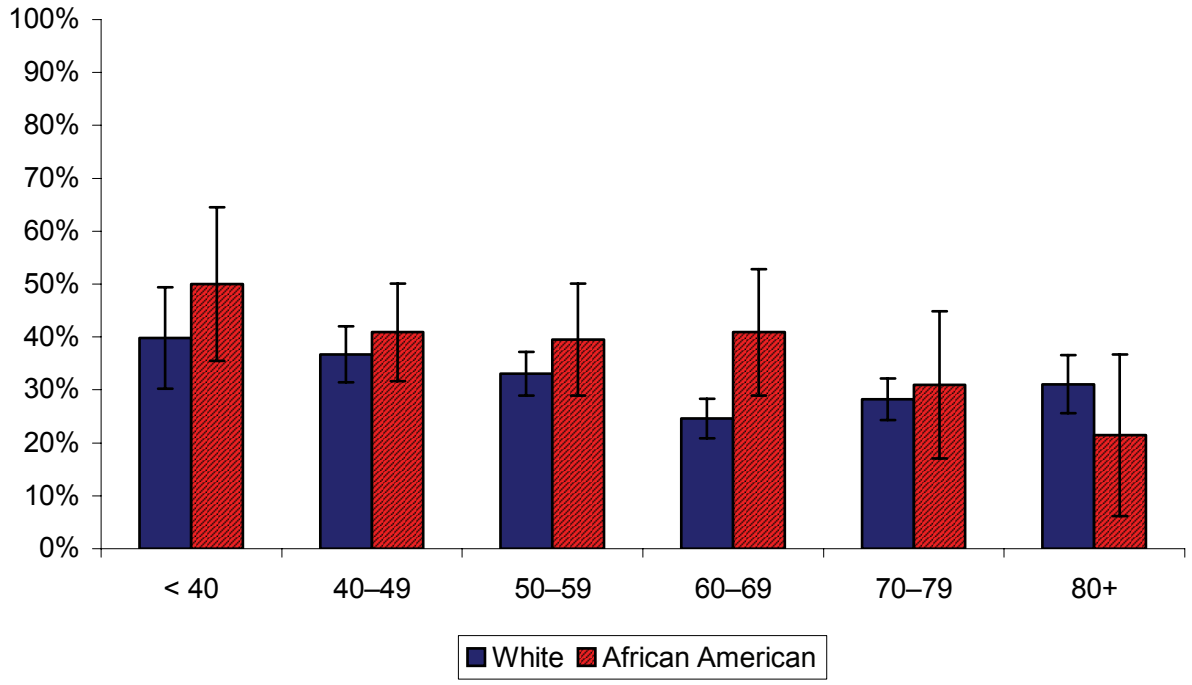
Figure 26. Percentage of female breast cancer cases diagnosed at an advanced stage, by race and county of residence, in Delaware



Source: DCR, 1998–2002.

- African American women residing in all counties in Delaware had a higher percentage of advanced disease than White women, with no strong evidence of differences depending on the county of residence at diagnosis.

Figure 27. Percentage of female breast cancer cases diagnosed at an advanced stage, by race and age at diagnosis, in Delaware

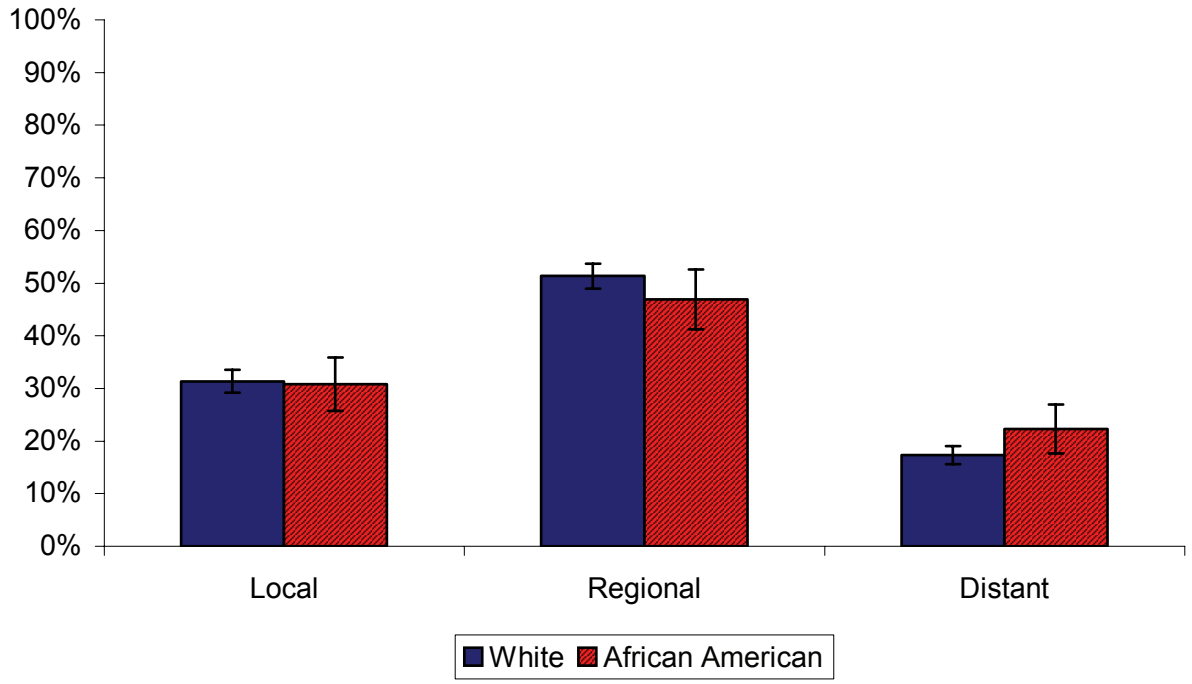


Source: DCR, 1998–2002.

- African American women diagnosed with breast cancer when they were aged 79 or younger were more likely to be diagnosed with advanced disease than White women.
- The effect of age at diagnosis on the proportion diagnosed with advanced disease may depend on race. For African American women the proportion with advanced disease generally decreased with age, while in White women the proportion decreased until age 70, when it began to increase.

3.3.2.2. Colorectal Cancer

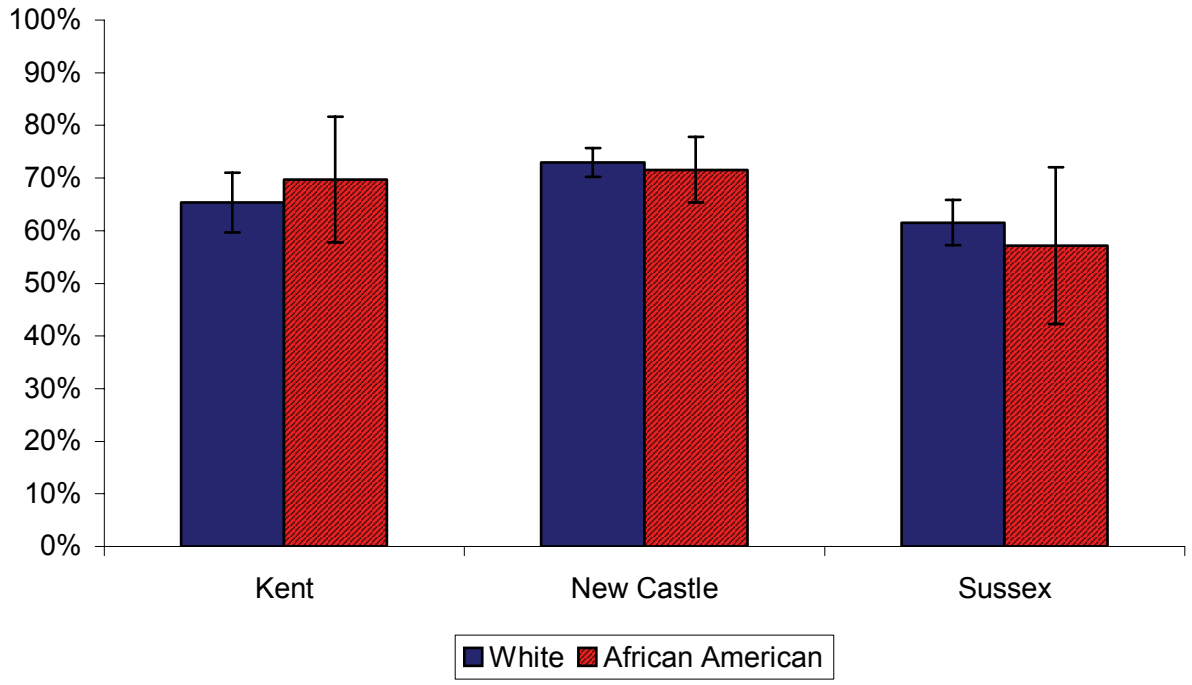
Figure 28. Percentage of colorectal cancer cases, by stage at diagnosis and race, in Delaware



Source: DCR, 1998–2002.

- African Americans were equally likely to be diagnosed with local disease as Whites. The data suggest that Whites may be slightly more likely to be diagnosed with regional disease, and African Americans with distant disease.

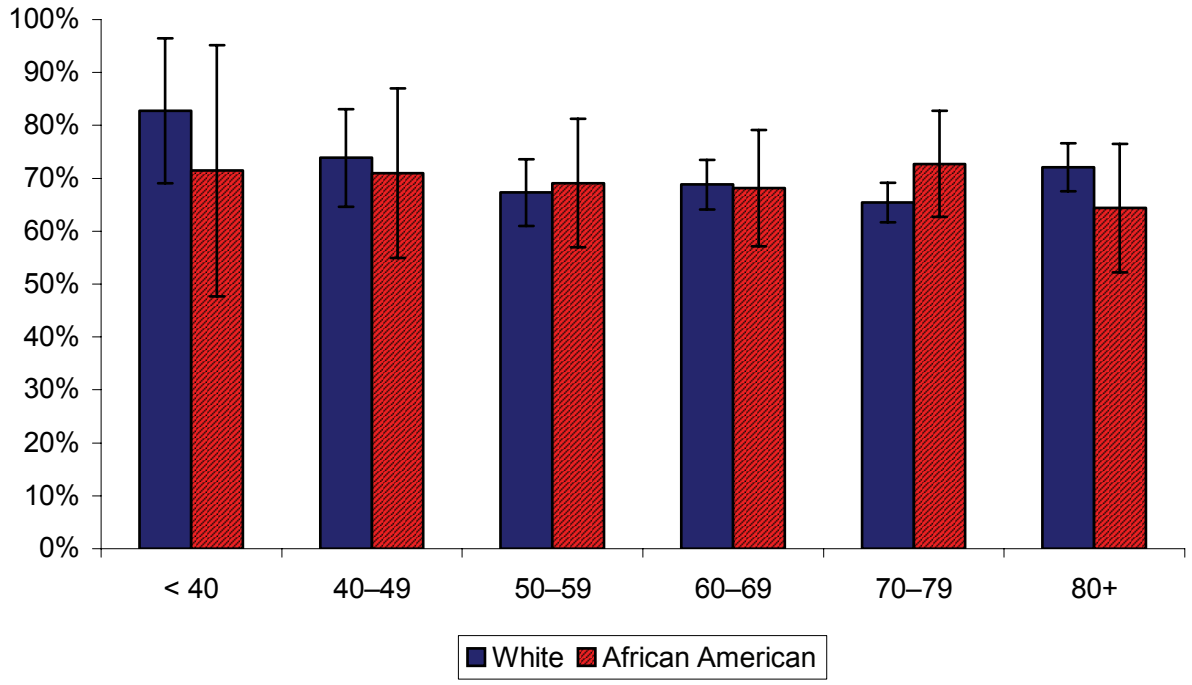
Figure 29. Percentage of colorectal cancer cases diagnosed at an advanced stage, by race and county of residence, in Delaware



Source: DCR, 1998–2002.

- There is no evidence that the proportion of colorectal cancer cases diagnosed at advanced stage differs between Whites and African Americans.
- The data suggest that for all races the proportion diagnosed with advanced disease was highest in New Castle County and lowest in Sussex County.

Figure 30. Percentage of colorectal cancer cases diagnosed at an advanced stage, by race and age at diagnosis, in Delaware

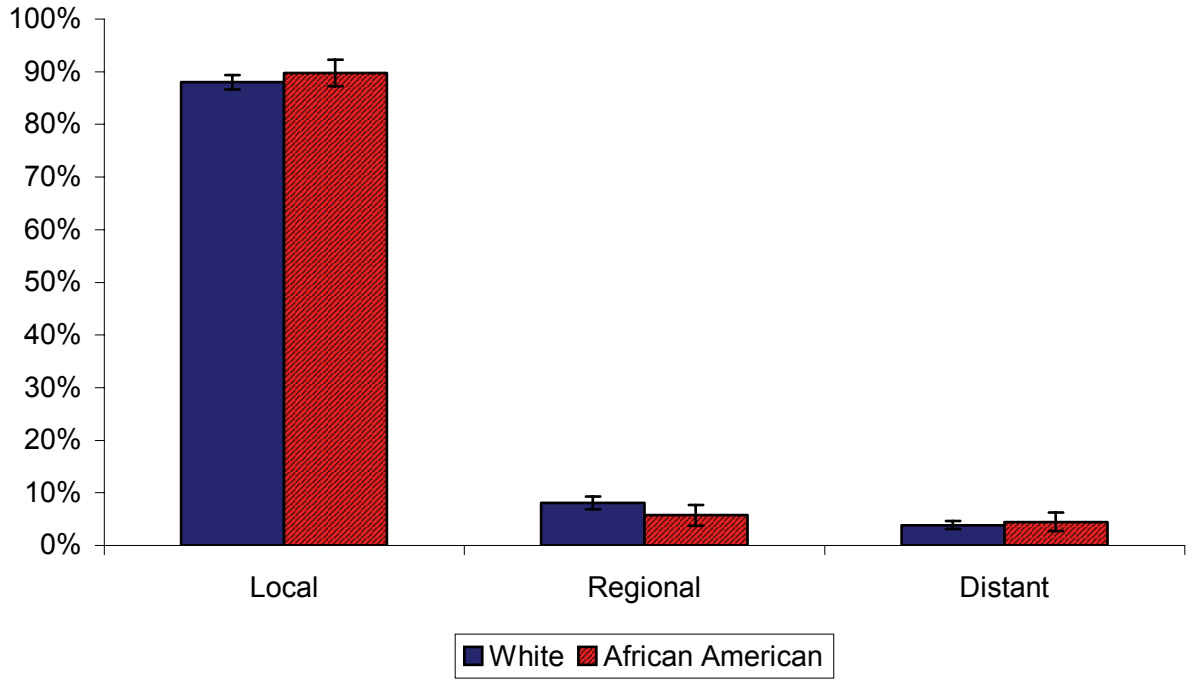


Source: DCR, 1998–2002.

- The proportions of Whites diagnosed with advanced stage disease may decrease with age until after age 80, when it increases.
- The proportion of African Americans diagnosed with advanced stage disease was not affected by age at diagnosis.

3.3.2.3. Prostate Cancer

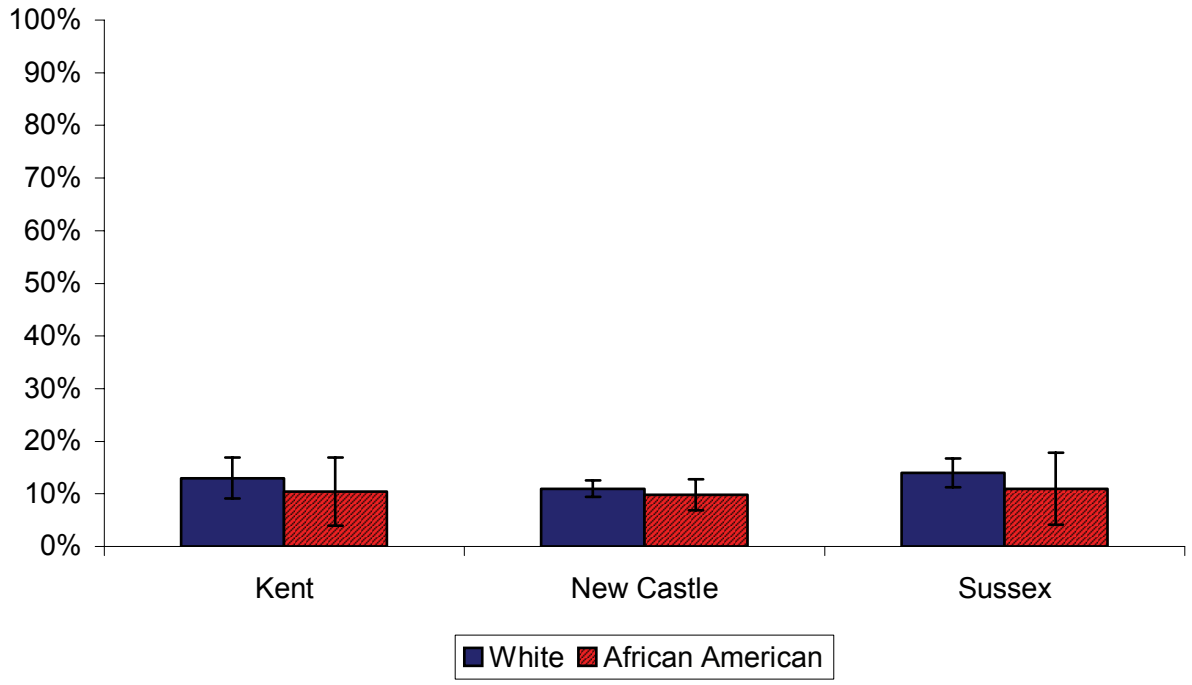
Figure 31. Percentage of prostate cancer cases, by stage at diagnosis and race, in Delaware



Source: DCR, 1998–2002.

- There was minimal difference between Whites and African Americans regarding the stage of disease at diagnosis.

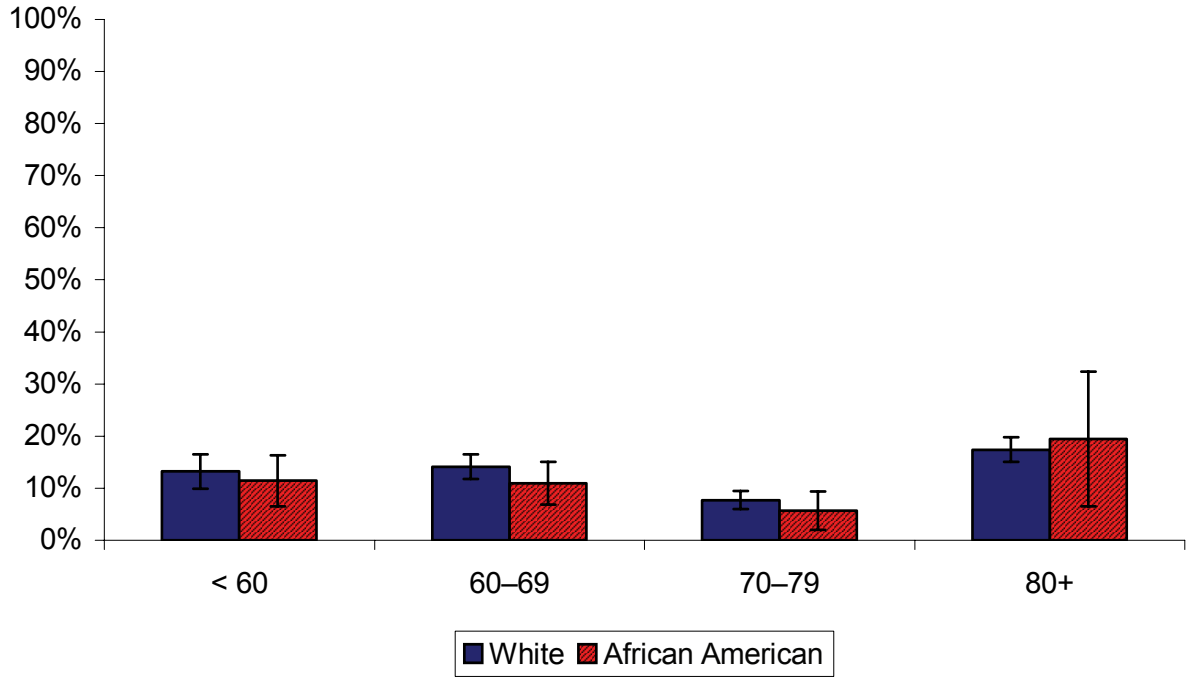
Figure 32. Percentage of prostate cancer cases diagnosed at an advanced stage, by race and county of residence, in Delaware



Source: DCR, 1998–2002.

- There was minimal difference in the proportion diagnosed with advanced stage disease, and it does not appear to differ by county of residence.

Figure 33. Percentage of prostate cancer cases diagnosed at an advanced stage, by race and age at diagnosis, in Delaware



Source: DCR, 1998–2002.

- Men of both races aged 80 or older at diagnosis were the most likely to be diagnosed with advanced stage disease.
- There was little difference in the proportion between Whites and African Americans.

3.3.3. Cancer Treatment

Table 17 displays the results of the validation study undertaken to assess the completeness/ accuracy of the treatment-related data resident in the Delaware Cancer Registry; it reports the number and percentage of cancer cases receiving "standard" treatment (pre-validation study) and "appropriate" treatment (post-validation study).

Table 17. Number and Percentage of Delaware Breast or Colorectal Cancer Patients With Local Disease Treated for Cancer in Delaware, by Receipt of Standard / Appropriate Cancer Treatment

Study	Female Breast # (%)	Colorectal # (%)
Pre-validation study		
Received standard treatment	814 (75.5)	3 (4.1)
Did not receive standard treatment	264 (24.5)	70 (95.9)
Post-validation study		
Received appropriate treatment	1,001 (93.1)	63 (91.3)
Did not receive appropriate treatment	74 (6.9)	6 (8.7)

Source: DCR, 1998–2002 (Pre-validation); DCR + source documents (Post-validation)

- The proportion of patients receiving standard/appropriate treatment changed dramatically between the pre- and post-validation studies: Receipt of appropriate breast cancer treatment increased from 75.5% of patients to 93.1%; receipt of appropriate colorectal cancer treatment increased from 4.1% to 91.3%.

Source document review revealed substantial differences between the treatment documented in patients' medical records and the treatment captured into the DCR. In the case of breast cancer treatment, these differences chiefly took the form of incomplete DCR data; e.g., radiation treatments received post-breast conserving surgery were clearly documented in source records but were not recorded in DCR files. In the case of colorectal cancer, the very substantial change in the proportion of patients receiving appropriate treatment was chiefly due to reviewers' ability to determine that the surgery performed (i.e., polypectomy v. at least partial colectomy) was appropriate, given the specific site and stage of cancer reflected in the surgery and pathology reports.

Table 18 presents the results of an analysis examining the likelihood of an association between receipt of standard treatment and each of three other variables: treating facility, type of cancer, and race. The analysis was done on both the pre-validation dataset and the post-validation dataset.

Table 18. Association Between Receipt of Standard Treatment and Treating Facility, Cancer Type and Race Among Individuals with Local Cancer and Treated in Delaware

Likelihood of Receipt of Standard Treatment	Associated with Facility	Associated with Cancer Type	Associated with Race
Pre-validation study	Statistically significant $p < 0.0001$	Statistically significant $p < 0.0001$	Statistically significant $p < 0.0007$
Post-validation study	Statistically significant $p < 0.0001$	Not statistically significant $p = 0.57$	Not statistically significant $p = 0.33$

Source: DCR, 1998–2002 (Pre-validation); DCR + source documents (Post-validation)

- Treating facility, cancer type and race were all strongly associated with the likelihood of receiving standard treatment in the pre-validation study, which relied solely on DCR data.
- In the post-validation analysis, which included source data not captured in the DCR, only treating facility continued to show a strong association with the likelihood of receiving appropriate treatment.

3.4. HEALTH POLICY, HEALTH SYSTEM, AND SOCIETAL FACTORS

The impact of determinants of disparities that operate on an individual level has been examined in earlier sections of this report. However, research has suggested that some of the explanation for disparities may be the result of societal not individual factors. As we have seen from previous analyses, socioeconomic status is a significant factor affecting racial/ethnic disparities in the cancer burden in the United States. Unfortunately, many of the other societal components were not available in the data sources used. In this section the literature on these societal factors is briefly reviewed. This review considers two aspects of societal factors: patient and system barriers to preventive and cancer care. Patient barriers affect the benefit that minorities receive from the delivery of cancer services, whereas system barriers include factors that determine inequality in the delivery of the services. The relationship between race and ethnicity may be even more complex, as outlined in the model used by the National Center on Minority Health and Health Disparities in its *Strategic Research Plan and Budget to Reduce and Ultimately Eliminate Health Disparities.* Several patient barriers affect morbidity and mortality rates among different racial/ethnic populations. Financial and socioeconomic barriers, including poverty, lack of health insurance, and underinsurance, greatly influence access to appropriate early detection, treatment, and palliative care. Several studies have found that African Americans, especially those without insurance and with a lower household income, are more likely to be diagnosed with later stage cancer, which contributes to an increased mortality rate. Hiatt et al. found that the strongest predictors of cancer screening were private health insurance and frequent use of medical services (33). African Americans have a two-fold increased risk of being diagnosed with advanced-stage prostate cancer compared with non-Hispanic Whites (34). Roetzheim et al. (2000) examined the impact of insurance status among colorectal cancer patients in Florida and found that among non-Medicare patients, those with no health insurance were less likely to undergo surgery than patients with indemnity insurance, after adjustment for stage at diagnosis. Uninsured patients and patients enrolled in health maintenance organization (HMO) plans also had higher mortality rates than patients enrolled in fee-for-service plans.

Physical barriers can also impede a patient's ability to access proper care. Many patients lack transportation, are physically disabled, or are too frail to travel to a medical facility. Competing life demands can become a physical barrier when patients are unable to take time off from a job to receive needed services, particularly when providers lack convenient service hours.

Other patient barriers result from a patient's lack of health literacy or inability to assess information regarding cancer prevention and treatment. In minority communities there is often a lack of knowledge regarding the risks associated with not participating in recommended preventative screenings and not maintaining a healthy lifestyle, resulting in decreased screening

rates in these communities. Even when minority communities are educated about cancer health, recommendations are often not acted on appropriately due to potential embarrassment and discomfort or to confusion about how to seek the needed care. Language barriers and a lack of translators prevent many minorities from accessing both information and treatment. The Breast and Cervical Cancer Intervention Study found low rates of Pap test screening, the key preventive measure against cervical cancer, among non-English-speaking Latina and Chinese women, a finding that may be generalized to apply to other immigrant populations (35). Language is not the only cultural barrier preventing minorities from receiving proper cancer care; a distrust of conventional medical care, fatalism, and modesty among minority communities also contribute to low screening rates (8).

Like patient barriers, health system barriers affect cancer morbidity and mortality rates among minorities. Cancer services are not delivered as a lifetime continuum of care. Many minorities do not receive recommended cancer screenings, and those who do often receive inconsistent followup care. African Americans in some areas of the United States have higher Pap test rates but are still diagnosed in later stages of disease and have higher mortality than Whites. This can be attributed, in part, to the testing being performed in areas without an infrastructure for notification and followup of abnormal results (35). Followup care may be substandard among minority communities, since they may not have access to physicians with adequate training in adult or pediatric oncology or newer or proven therapies. End-of-life care tends to be worse among minority patients due to inequalities in pain management and hospice care; patients seen at outpatient centers that predominantly treat minorities were three times more likely than those treated elsewhere to have inadequate pain management (36). Studies have also shown lower usage of hospice care among minority communities, including African Americans, Asians, and White and non-White Hispanics (8).

Further system barriers stem from failures among Federal, State, and local agencies in implementing or enforcing policies that address racial/ethnic disparities in cancer treatment and prevention. Title VI of the U.S. Civil Rights Act of 1964 prohibits discrimination and recipient practices that have the effect of discrimination on the basis of race, color, and national origin in programs and activities receiving Federal financial assistance (37). In addition to Title VI, national standards for culturally and linguistically appropriate services (CLAS) in health care were published in 2000 by the Department of Health and Human Services' Office of Minority Health and adopted in an effort to implement standards of equality in health care for minorities (38). It is clear, however, that Title VI and the standards set in place in CLAS are not being upheld to the fullest extent possible, since minorities continue to be inadequately insured and face unequal access to quality cancer care. National efforts to combat these inequalities include the National Breast and Cervical Cancer Early Detection Program and the Screen for Life: National Colorectal Action Campaign, both administered by CDC. These programs are aimed at providing preventive education and screening for at-risk populations. Specifically, the National Breast and Cervical Cancer Early Detection Program helps low-income, uninsured, and underserved women gain access to lifesaving screening programs for early detection of female breast and cervical cancers, and the Screen for Life: National Colorectal Action Campaign informs men and women aged 50 years or older about the importance of having regular colorectal cancer screening tests (39, 40). These programs promote national awareness of the importance of cancer prevention and early detection.

More can be done at the State level to increase access to cancer care and reduce cancer risks. Delaware has made progress in passing legislation mandating insurance coverage for annual mammograms for asymptomatic women aged 40 and over, ensuring that annual Pap tests are covered in health insurance contracts, and requiring group and individual health insurers, HMOs, and health service corporations to provide insurance coverage for colorectal cancer screening in certain situations (41). There are two areas where improvement is possible: 1) insurance coverage is ensured for only select phases of clinical trials and 2) the Tobacco Excise Tax is still below the national average. Increasing coverage for clinical trials would give the uninsured access to cutting-edge medical treatments and inform researchers of the efficacy of the treatments in a study group that is more representative of the population of cancer patients. Raising the tobacco excise tax would encourage residents of Delaware to quit smoking due to increased costs.

Even with the presence of antidiscrimination laws, racial/ethnic discrimination still affects cancer service. Research shows that minorities receive a lower quality of care when they are in the health care system, after controlling for social determinants and insurance status. A phone survey of 3,884 people conducted by the Kaiser Family Foundation in 2000 found that 36 percent of Hispanics and 35 percent of African Americans (compared with 15 percent of Whites) felt that they were treated unfairly in the health care system based on their race/ethnicity (42).

Research shows a lack of initiative among health care delivery systems to take on the challenge of eliminating patient and system barriers due to a high initial cost and lack of incentives (11). Further research is necessary to determine the best strategies for the Federal, State, and private sectors to implement in order to jointly address the elimination of cancer disparities.

REFERENCES

(1) Delaware Division of Public Health. Delaware Annual Vital Statistics Report 2002. 2004.

(2) Delaware Division of Public Health. Delaware Cancer Incidence and Mortality Rates. 2005.

(3) American Cancer Society. Mid Atlantic Division: Cancer Facts and Figures 2004. 2005.

(4) American Cancer Society. American Cancer Society Cancer Facts and Figures for African Americans 1998–1999. 1998. Atlanta, GA.

(5) American Cancer Society. American Cancer Society Cancer Facts and Figures 2005. 2005. Atlanta, GA.

(6) Wingo P, Ries L, Giovino G, et al. 1999. Annual report to the nation on the status of cancer, 1973–1996, with a special section on lung cancer and tobacco smoking. *J. Natl. Cancer Inst.,* 91, 675–690.

(7) Singh GK, Miller BA, Hankey BF, Edwards BK. Area socio-economic variations in US cancer incidence, mortality, stage, treatment, and survival 1975–1999. 4. 2003. Bethesda, MD, National Cancer Institute. NIH Publication No. 03-5417. NCI Cancer Surveillance Monograph Series.

(8) Ward E, Jemal A, Cokkinides V, et al. 2004. Cancer disparities by race/ethnicity and socioeconomic status. *CA Cancer J Clin,* Mar–Apr:54(2), 78–93.

(9) American Cancer Society. Cancer Facts and Figures for African Americans 2005–2006. 2005.

(10) Institute of Medicine. Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare. 34. 2002. Washington, DC, National Academy Press.

(11) Institute of Medicine. The Unequal Burden of Cancer: An Assessment of NIH Research and Programs for Ethnic Minorities and the Medically Underserved. 1999. Washington, DC, National Academy Press.

(12) Epstein A, Ayanian J. 2001. Racial disparities in medical care. *N Engl J Med,* 344, 1471–1472.

(13) National Institutes of Health. Strategic Research Plan and Budget to Reduce and Ultimately Eliminate Health Disparities. 2002.

(14) Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Online Prevalence Data, 1995–2004. www.cdc.gov/brfss. 2005.

(15) Centers for Disease Control and Prevention. Health, United States 1998. Lung Cancer Mortality. 1998.

(16) Centers for Disease Control and Prevention. Health, United States 1998. Population, Education. 1998.

(17) Centers for Disease Control and Prevention. Health Status, Causes of Death. 2005.

(18) DeVoe JE, Fryer GE, Phillips R, Green L. 2003. Receipt of preventive care among adults: Insurance status and usual source of care. *Am J Public Health,* 93(5), 786–791.

(19) SEER*Stat. National Cancer Institute, 2005.

(20) 62 Del. Laws c.334 §1; 70 Del. Laws c391 §1. Delaware Cancer Control Act. 1980.

(21) National Cancer Institute. SEER Registries. http://www.seer.cancer.gov/registries/. 2005.

(22) U.S. Census Bureau. www.census.gov. 2005.

(23) U.S. Population Data. http://www.seer.cancer.gov/popdata/download.html. December 13, 2004.

(24) Delaware Population Consortium. http://www.cadsr.udel.edu/demography/consortium.htm. 2005.

(25) SEER ICD-O-3 Coding Materials. http://www.seer.cancer.gov/icd-o-3/. 2005.

(26) National Program of Cancer Registries. Submission Guidelines. https://www.npcrcss.org/utilities/. 2005.

(27) Kleibaum DG, Kupper LL, Morgenstern H. Epidemiologic Research: Principles and Quantitative Methods. Van Norstrand Reinhold, 1982.

(28) EpiBasic. http://www.biostat.au.dk/teaching/software/. 2005.

(29) SAS. Cary, NC. 2003.

(30) U.S. Department of Health and Human Services. Healthy People 2010: Understanding and Improving Health. 2nd ed. Washington, D.C. 2000.

(31) North American Association of Central Cancer Registries. Standards for Cancer Registries Volume II: Data Standards and Data Dictionary Version 10.1. 8th ed. Springfield, IL. 2003.

(32) Shavers VL, Brown ML. 2002. Racial and ethnic disparities in the receipt of cancer treatment. *J Natl Cancer Inst,* 94(5), 334–357.

(33) Hiatt RA, Pasick RJ, Stewart S, et al. 2001. Community-based cancer screening for undeserved women: Design and baseline findings from the Breast and Cervical Cancer Intervention Study. *Preventive Medicine,* 33, 190–203.

(34) Hoffman RM, Gilliland FD, Eley JW, et al. 2001. Racial and ethnic differences in advanced-stage prostate cancer: the Prostate Cancer Outcomes Study. *J Natl Cancer Inst,* 93(5), 388–395.

(35) Garner E. 2003. Cervical cancer: Disparities in screening, treatment, and survival. *Cancer Epidemiology Biomarkers and Prevention,* 12, 242s–247s.

(36) Cleeland CS, Gonin R, Hatfield AK, et al. 1994. Pain and its treatment in outpatients with metastatic cancer. *N Engl J Med.,* 330(9), 592–596.

(37) United States Supreme Court. Title VI of the Civil Rights Act of 1964. 42, 200d et seq. 1964.

(38) Office of Minority Health. National Standards for Culturally and Linguistically Appropriate Services in Health Care. U.S. Department of Health and Human Services, editor. 2001.

(39) National Center for Chronic Disease and Prevention. The National Breast and Cervical Cancer Early Detection Program: Saving Lives Through Screening. Centers for Disease Control and Prevention, editor. www.cdc.gov. 2005.

(40) National Center for Chronic Disease and Prevention. Screen For Life: National Colorectal Cancer Action Campaign. www.cdc.gov. 2005. Centers for Disease Control and Prevention.

(41) National Center for Chronic Disease and Prevention. Cancer Legislative Information. www.cdc.gov. 2005. Centers for Disease Control and Prevention.

(42) Kaiser Family Foundation. Race, Ethnicity, and Medical Care. Kaiser Family Foundation. 2005.

(43) Singh GK, Miller BA, Hankey BF, Edwards BK. Area Socioeconomic Variations in U.S. Cancer Incidence, Mortality, Stage, Treatment, and Survival. 1975–1999. 4. 2003. Bethesda, MD, National Cancer Institute. National Cancer Surveillance Monograph Series.

(44) Bach PB, Cramer LD, Warren JL, Begg CB. 1999. Racial differences in the treatment of early-stage lung cancer. *N Engl J Med,* 341(16), 1198–1205.

(45) Merrill RM, Merrill AV, Mayer LS. 2000. Factors associated with no surgery or radiation therapy for invasive cervical cancer in Black and White women. *Ethn Dis,* 10(2), 248–256.

APPENDIX A:

SUPPLEMENTAL INFORMATION ON REPORT METHODOLOGY

Table A1. NAACCR Certification of the Delaware Cancer Registry's 2002 Incidence Data

NAACCR Registry Certification on Quality, Completeness, and Timeliness of 2002 Data Summary of Certification Measures					
Registry Element	Gold Standard	Silver Standard	Actual Measure	Measurement Error Allowed	Standard Achieved
1. Completeness of case ascertainment	95%	90%	92.2%	1.0%	Silver
2. Completeness of information recorded					
• Missing/unknown "age at diagnosis"	<=2%	<=3%	0.0%	-0.4%	Gold
• Missing/unknown "sex"	<=2%	<=3%	0.1%	-0.4%	Gold
• Missing/unknown "race"	<=3%	<=5%	1.2%	-0.4%	Gold
Missing/unknown "state/province & county"	<=2%	<=3%	0.1%	-0.4%	Gold
3. Death certificate only cases	<=3%	<=5%	1.2%	-0.4%	Gold
4. Duplicate primary cases	<=1 per 1,000	<=2 per 1,000	0.0 per 1,000	-0.4 per 1,000	Gold
5. Passing edits	100%	97%	100%	Not applicable	Gold
6. Timeliness	Data submitted within 24 months of close of accession year				Gold
				Certification Status	Silver

Table A2. Number and Percentage of Cancer Cases, by Race/Ethnicity and Cancer Site, Delaware 1998–2002

Race/Ethnicity	All	Female Breast	Colorectal	Lung and Bronchus	Prostate
Total	19,849	2,792	2,212	3,070	3,134
White	16,416 (83)	2,322 (83)	1,841 (83)	2,609 (85)	2,448 (78)
African American	2,867 (14)	392 (14)	324 (15)	418 (14)	591 (19)
Hispanic	187 (0.9)	23 (0.8)	9 (0.4)	18 (0.6)	24 (0.8)
Asian, Pacific Islanders, American Indians, and Alaska Natives	169 (0.8)	33 (1.2)	20 (0.9)	19 (0.6)	16 (0.5)
Missing	210 (1.1)	22 (0.8)	18 (0.8)	6 (0.2)	55 (1.8)

Table A3. Comparison of the Percentage of Individuals in Each Stage of Diagnosis and Race Group in Delaware and the United States, 1998–2002

	Delaware		United States	
	White	African American	White	African American
Female breast cancer				
Local	67	58	65	53
Regional	26	33	29	36
Distant	4	4	4	7
Unstaged	4	5	2	4
Colorectal cancer				
Local	29	29	40	35
Regional	47	44	38	35
Distant	16	21	17	23
Unstaged	7	6	5	7
Prostate cancer				
Local	83	85	80	79
Regional	8	5	13	12
Distant	4	4	4	6
Unstaged	5	6	3	3

Table A4. Description of the SEER Program Codes and Surgical Procedures Used To Define Standard Treatment for Each of the Cancers Examined

	Female Breast	Colorectal	Lung and Bronchus	Prostate
0	No surgery			
10-19	Local tumor destruction			
20-29	Partial mastectomy	Local tumor excision	Excision of <1 lobe	Local tumor excision
30-39	Subcutaneous mastectomy	Partial colectomy	Partial pneumonectomy	Subtotal prostatectomy
40-49	Total mastectomy	Hemi-colectomy	Extended lobe or bilobectomy	
50-59	Modified radical mastectomy	Total colectomy	Pneumonectomy	Total prostatectomy
60-69	Radical mastectomy	Total proctocolectomy	Extended pneumonectomy	
70-79	Extended radical mastectomy	30-60 with contiguous organs	Extended radical pneumonenctomy	50 with contiguous organs
80	Mastectomy, NOS	Colectomy, NOS	Resection, NOS	Prostatectomy, NOS
90	Surgery, NOS			
99	Unknown			

Cells in blue designate standard treatment, and cells in yellow refer to nonstandard treatment. Cells in green were defined as standard if individuals also received radiation; if they did not receive radiation, they were coded as not receiving standard treatment. The cells in gray were considered to be missing data on surgical procedure.

APPENDIX B:

SUPPLEMENTAL INCIDENCE AND MORTALITY DATA

Table B1. Number of New Cancer Cases and Age-Adjusted Incidence Rates (With 95-Percent Confidence Intervals), by Race in Delaware and the United States, 1998–2002

	White		African American	
	Number	Rate (95% CI)	Number	Rate (95% CI)
Delaware				
All sites	16,416	489.9 (482.5, 497.5)	2,867	531.4 (512.3, 551.3)
Female breast	2,322	130.2 (125.0, 135.6)	392	117.6 (106.5, 129.9)
Colorectal	1,841	54.5 (52.1. 57.1)	324	64.9 (58.2, 72.4)
Lung and bronchus	2,609	76.1 (73.2, 79.1)	418	80.7 (73.3, 88.8)
Prostate	2,448	159.4 (153.2, 165.9)	591	267.6 (246.9, 290.1)
United States				
All sites	508,532	489.1 (487.7, 490.4)	55,966	519.3 (514.9, 523.8)
Female breast	80,260	143.0 (142.0, 144.0)	6,362	118.7 (116.1, 121.4)
Colorectal	55,976	53.6 (53.1, 54.0)	8,421	62.6 (61.1, 64.2)
Lung and bronchus	67,118	65.0 (64.5, 65.4)	11,639	81.7 (79.9, 83.5)
Prostate	78,732	173.5 (172.3, 174.7)	7,907	277.1 (271.9, 282.5)

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.
Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

There were 150 cases of cancer diagnosed among Asians and Pacific Islanders, with a rate of 282.6 (240.8, 331.7), and 187 cases of cancer diagnosed among Hispanics, with a rate of 250.4 (217.0, 289.0).

Table B2. Number of Cancer Deaths and Age-Adjusted Mortality Rates (With 95-Percent Confidence Intervals), by Race in Delaware and the United States, 1998–2002

	White		African American	
	Number	Rate (95% CI)	Number	Rate (95% CI)
Delaware				
All sites	7,002	207.5 (202.6, 212.4)	1,249	251.3 (237.8, 265.6)
Female breast	513	27.2 (25.0, 29.7)	115	36.2 (30.1, 43.4)
Colorectal	676	20.0 (18.6, 21.6)	140	29.4 (24.9, 34.7)
Lung and bronchus	2,128	62.1 (59.5, 64.8)	335	66.8 (60.0, 74.3)
Prostate	328	26.3 (23.5, 29.2)	102	64.9 (53.5, 78.8)
United States				
All sites	2,389,534	195.3 (195.0, 195.5)	309,865	248.1 (247.3, 249.0)
Female breast	176,758	25.9 (25.8, 26.0)	27,078	34.7 (34.3, 35.1)
Colorectal	245,335	20.0 (19.9, 20.0)	33,963	27.9 (27.6, 28.2)
Lung and bronchus	682,251	55.8 (55.6, 55.9)	80,407	64.1 (63.6, 64.5)
Prostate	127,744	27.7 (27.6, 27.9)	26,549	68.1 (67.3, 69.0)

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.
Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

In Delaware, there were 42 deaths from cancer among Asians and Pacific Islanders, with a rate of 104.7 (77.4, 141.6), and there were 80 deaths from cancer among Hispanics, with a rate of 149.9 (120.4, 186.6).

Table B3. Number of New Cancer Cases and Age-Adjusted Incidence Rates (With 95-Percent Confidence Intervals), by Race and Sex in Delaware and the United States, 1998–2002

	White		African American	
	Number	Rate (95% CI)	Number	Rate (95% CI)
Delaware				
All sites				
Male	8,524	570.3 (558.3, 582.5)	1,522	679.3 (646.0, 714.3)
Female	7,892	433.9 (424.4, 443.6)	1,343	426.3 (404.1, 449.7)
Colorectal				
Male	932	63.9 (59.9, 68.2)	149	71.3 (60.7, 83.7)
Female	909	47.0 (44.1, 50.2)	174	59.6 (51.3, 69.1)
Lung and bronchus				
Male	1,467	97.1 (92.3, 102.2)	234	108.2 (95.2, 123.0)
Female	1,142	60.3 (56.9, 63.8)	194	65.6 (57.0, 75.5)
United States				
All sites				
Male	259,777	569.7 (567.5, 571.9)	30,216	692.5 (684.3, 700.9)
Female	248,755	435.6 (433.9, 437.3)	25,750	404.1 (399.1, 409.2)
Colorectal				
Male	28,068	62.9 (62.2, 63.6)	2,995	72.9 (70.2, 75.8)
Female	27,908	46.4 (45.8, 46.9)	3,367	56.2 (54.3, 58.1)
Lung and bronchus				
Male	36,430	81.3 (80.4, 82.1)	4,957	117.4 (114.0, 121.0)
Female	30,688	53.4 (52.8, 54.0)	3,464	57.6 (55.7, 59.6)

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.

Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

Table B4. Number of Cancer Deaths and Age-Adjusted Mortality Rates (With 95-Percent Confidence Intervals), by Race and Sex in Delaware and the United States, 1998–2002

	White		African American	
	Number	Rate (95% CI)	Number	Rate (95% CI)
Delaware				
All sites				
Male	3,615	253.9 (245.8, 262.3)	634	329.8 (305.1, 356.5)
Female	3,387	176.4 (170.6, 182.5)	615	206.2 (190.5, 223.2)
Colorectal				
Male	349	24.8 (22.3, 27.5)	64	34.0 (26.6, 43.4)
Female	327	16.6 (14.9, 18.5)	76	26.3 (21.0, 32.9)
Lung and bronchus				
Male	1,220	82.5 (78.0, 87.2)	198	97.4 (84.7, 111.9)
Female	908	47.2 (44.2, 50.4)	137	46.8 (39.6, 55.4)
United States				
All sites				
Male	1,236,918	242.5 (242.0, 242.9)	163,486	339.4 (337.6, 341.1)
Female	1,152,616	164.5 (164.2, 164.8)	146,379	194.3 (193.3, 195.3)
Colorectal				
Male	122,299	24.3 (24.1, 24.4)	16,175	34.0 (33.4, 34.5)
Female	123,036	16.8 (16.7, 16.9)	17,788	24.1 (23.7, 24.4)
Lung and bronchus				
Male	393,149	75.2 (75.0, 75.5)	50,738	101.3 (100.3, 102.2)
Female	289,102	41.8 (41.7, 42.0)	29,669	39.9 (39.4, 40.3)

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.

Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

There were 41 deaths from cancer in Hispanic men, with a rate of 196.7, and 39 deaths from cancer among Hispanic women, with a rate of 121.9.

Table B5. Number of New Cancer Cases and Age-Adjusted Incidence Rates (With 95-Percent Confidence Intervals), by Race and Age in Delaware, 1998–2002

	White		African American	
Age (Years)	**Number**	**Rate (95% CI)**	**Number**	**Rate (95% CI)**
All sites				
20–39	826	55.1 (51.5, 59.0)	238	47.6 (41.9, 54.1)
40–49	1,257	280.1 (265.0, 296.0)	361	327.2 (295.2, 362.8)
50–64	4,532	922.5 (896.1, 949.8)	984	1,065.1 (1000.6, 1133.8)
65–79	7,307	2,185.3 (2135.8, 2236.0)	980	2,216.1 (2081.6, 2359.3)
80+	2,494	2,308.1 (2219.3, 2400.5)	304	2,450.0 (2189.5, 2741.5)
Female breast				
20–39	99	13.3 (10.9, 16.2)	46	18.0 (13.5, 24.1)
40–49	340	149.8 (134.7, 166.6)	112	185.3 (154.0, 223.0)
50–64	772	303.2 (282.5, 325.3)	122	244.8 (205.0, 292.3)
65–79	824	449.0 (419.3, 480.7)	80	312.6 (251.1, 389.2)
80+	287	401.4 (357.5, 450.6)	32	375.8 (265.7, 531.4)
Colorectal				
20–39	30	2.0 (1.4, 2.9)	< 25	NA
40–49	94	20.9 (17.1, 25.6)	33	29.9 (21.3, 42.1)
50–64	391	79.6 (72.1, 87.9)	87	94.2 (76.3, 116.2)
65–79	875	261.7 (244.9, 279.6)	123	278.1 (233.1, 331.9)
80+	451	417.4 (380.6, 457.7)	66	531.9 (417.9, 677.0)
Lung and bronchus				
20–39	36	2.4 (1.7, 3.3)	< 25	NA
40–49	109	24.3 (20.1, 29.3)	40	36.3 (26.6, 49.4)
50–64	714	145.3 (135.1, 156.4)	161	174.3 (149.3, 203.4)
65–79	1,399	418.4 (397.0, 440.9)	173	391.2 (337.0, 454.1)
80+	351	324.8 (292.6, 360.7)	39	314.3 (229.6, 430.2)
Prostate				
20–39	< 25	NA	< 25	NA
40–49	36	16.2 (11.7, 22.5)	< 25	NA
50–64	775	327.5 (305.3, 351.4)	270	634.6 (563.2, 715.0)
65–79	1,365	904.9 (858.2, 954.2)	253	1,358.0 (1200.6, 1536.1)
80+	271	741.5 (658.3, 835.2)	41	1,053.4 (775.7, 1430.7)

NA = Rates are based on counts too small to be displayed.
Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.
Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

Table B6. Number of Cancer Deaths and Age-Adjusted Mortality Rates (With 95-Percent Confidence Intervals), by Race and Age in Delaware, 1998–2002

	White		African American	
Age (Years)	**Number**	**Rate (95% CI)**	**Number**	**Rate (95% CI)**
All sites				
20–39	142	9.5 (8.0, 11.2)	47	9.4 (7.1, 12.5)
40–49	303	67.5 (60.3, 75.6)	114	103.3 (86.0, 124.2)
50–64	1,450	295.2 (280.4, 310.8)	340	368.0 (330.9, 409.3)
65–79	3,302	987.5 (954.4, 1021.8)	515	1,164.6 (1,068.2, 1,269.6)
80+	1,805	1,670.5 (1,595.2, 1,749.4)	233	1,877.8 (1,651.5, 2,135.1)
Female breast				
20–39	< 25	NA	< 25	NA
40–49	39	17.2 (12.6, 23.5)	25	41.4 (28.0, 61.2)
50–64	118	46.3 (38.7, 55.5)	41	82.3 (60.6, 111.7)
65–79	196	106.8 (92.8, 122.8)	29	113.3 (78.8, 163.1)
80+	147	205.6 (174.9, 241.6)	< 25	NA
Colorectal				
20–39	< 25	NA	< 25	NA
40–49	< 25	NA	< 25	NA
50–64	121	24.6 (20.6, 29.4)	37	40.1 (29.0, 55.3)
65–79	323	96.6 (86.6, 107.7)	59	133.4 (103.4, 172.2)
80+	206	190.6 (166.3, 218.5)	32	257.9 (182.4, 364.7)
Lung and bronchus				
20–39	< 25	NA	< 25	NA
40–49	67	14.9 (11.8, 19.0)	25	22.7 (15.3, 33.5)
50–64	519	105.6 (96.9, 115.1)	112	121.2 (100.7, 145.9)
65–79	1,142	341.5 (322.3, 361.9)	152	343.7 (293.2, 403.0)
80+	384	355.4 (321.6, 392.8)	44	354.6 (263.9, 476.5)
Prostate				
20–39	< 25	NA	<25	NA
40–49	< 25	NA	<25	NA
50–64	< 25	NA	<25	NA
65–79	150	99.4 (84.7, 116.7)	56	300.6 (231.3, 390.6)
80+	157	429.6 (367.4, 502.3)	36	925.0 (667.2, 1,282.3)

NA = Rates are based on counts too small to be displayed.
Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.
Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

Table B7. Number of New Cancer Cases and Age-Adjusted Incidence Rates (With 95-Percent Confidence Intervals), by Race and County of Residence in Delaware, 1998–2002

	White		African American	
	Number	Rate (95% CI)	Number	Rate (95% CI)
All sites				
Kent	2,286	467.4 (448.6, 487.0)	439	463.9 (422.5, 509.4)
New Castle	9,661	500.1 (490.2, 510.2)	1,957	557.2 (533.1, 582.5)
Sussex	4,461	481.3 (467.4, 495.6)	470	501.4 (458.0, 548.8)
Female breast				
Kent	331	125.4 (112.6, 139.6)	55	98.8 (75.8, 128.7)
New Castle	1,397	133.2 (126.4, 140.4)	284	128.1 (114.1, 143.9)
Sussex	573	120.8 (111.3, 131.1)	53	96.6 (73.8, 126.4)
Colorectal				
Kent	291	60.2 (53.6, 67.5)	68	78.1 (61.6, 99.1)
New Castle	1,074	54.6 (50.4, 58.6)	210	66.4 (58.0, 76.0)
Sussex	517	54.5 (50.0, 59.4)	46	51.0 (38.2, 68.1)
Lung and bronchus				
Kent	422	85.4 (77.6, 93.9)	60	66.2 (51.4, 85.2)
New Castle	1,394	71.7 (68.0, 75.5)	283	83.8 (74.6, 94.1)
Sussex	793	80.5 (75.1, 86.3)	75	81.5 (65.0, 102.1)
Prostate				
Kent	286	126.1 (112.3, 141.6)	91	210.4 (171.4, 258.4)
New Castle	1,542	182.5 (173.6, 191.9)	411	297.2 (269.8, 327.4)
Sussex	620	132.8 (122.7, 143.6)	88	227.0 (184.2, 279.8)

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.

Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

Table B8. Number of Cancer Deaths and Age-Adjusted Mortality Rates (With 95-Percent Confidence Intervals), by Race and County of Residence in Delaware, 1998–2002

	White		African American	
	Number	Rate (95% CI)	Number	Rate (95% CI)
All sites				
Kent	1,048	215.7 (203.0, 229.2)	214	246.7 (215.8, 282.1)
New Castle	4,055	208.9 (202.6, 215.4)	806	252.1 (235.3, 270.1)
Sussex	1,899	202.4 (193.5, 211.8)	229	251.1 (220.6, 285.8)
Female breast				
Kent	76	28.0 (22.3, 35.0)	< 25	NA
New Castle	315	28.2 (25.2, 31.5)	76	36.8 (29.4, 46.1)
Sussex	122	24.9 (20.8, 29.7)	25	45.9 (31.0, 67.9)
Colorectal				
Kent	81	16.8 (13.5, 20.9)	26	31.3 (21.3, 46.0)
New Castle	401	20.7 (18.7, 22.8)	86	28.9 (23.4, 35.7)
Sussex	194	20.7 (18.0, 23.8)	28	31.1 (21.5, 45.1)
Lung and bronchus				
Kent	363	73.8 (66.6, 81.8)	51	57.0 (43.3, 75.0)
New Castle	1,148	58.9 (55.6, 62.4)	219	67.8 (59.4, 77.4)
Sussex	617	63.2 (58.4, 68.4)	65	71.0 (55.7, 90.5)
Prostate				
Kent	37	20.9 (15.2, 28.9)	< 25	NA
New Castle	199	28.3 (24.6, 32.5)	59	66.3 (41.6, 72.8)
Sussex	92	24.4 (19.9, 30.0)	< 25	NA

NA = Rates are based on counts too small to be displayed.
Rates are per 100,000 and age-adjusted to the 2000 U.S. standard million population; rates based on counts of fewer than 25 are suppressed.
Sources: Delaware Department of Health, Delaware Cancer Registry, 2002; SEER Program, based on the November 2003 submission; and National Center for Health Statistics.

Table B9. Rate Ratios and Rate Difference Measuring Disparities in Five-Year Average Cancer Incidence Rates in Three Time Periods Between 1980 and 2002

	1980–1984		1990–1994		1998–2002	
	Rate Ratio	Rate Difference	Rate Ratio	Rate Difference	Rate Ratio	Rate Difference
All sites						
Male	1.3	127.3	1.4	253.2	1.2	93.9
Female	1.0	14.8	1.0	4.3	1.0	-8.2
Female breast	0.89	-11.6	0.90	-14.4	0.89	-14.1
Colorectal						
Male	0.7	-26.4	1.0	0.9	1.1	8.4
Female	0.8	-11.9	1.1	6.8	1.3	12.7
Lung and bronchus						
Male	1.5	61.7	1.6	67.0	1.1	10.7
Female	1.3	13.0	1.1	8.8	1.0	0.1
Prostate	2.0	73.5	1.7	137	1.6	100.7

Table B10. Rate Ratios and Rate Difference Measuring Disparities in Five-Year Average Cancer Mortality Rates in Three Time Periods Between 1980 and 2002

	1980–1984		1990–1994		1998–2002	
	Rate Ratio	Rate Difference	Rate Ratio	Rate Difference	Rate Ratio	Rate Difference
All sites						
Male	1.5	139.4	1.6	184.7	1.3	75.9
Female	1.3	47.7	1.3	56.6	1.2	30.3
Female breast	1.0	1.6	1.0	1.5	1.3	9.0
Colorectal						
Male	1.3	10.2	1.1	2.6	1.4	8.8
Female	1.0	-0.8	1.4	8.9	1.5	9.1
Lung and bronchus						
Male	1.5	47.2	1.6	60.5	1.2	16.7
Female	1.6	17.9	1.2	10.3	1.0	1.0
Prostate	2.2	40.2	2.5	56.2	2.4	37.7

APPENDIX C:

SUPPLEMENTAL BRFSS INFORMATION

Table C1. Wording of the BRFSS Questions for Each of the Variables Used in This Analysis

Demographic Variables

What county do you live in?
- Kent
- Sussex
- New Castle
- Don't know/not sure
- Refused

What is your age?

Indicate sex of respondent. (Ask only if necessary)
- Male
- Female

Are you Hispanic or Latino?
- Yes
- No
- Don't know/not sure
- Refused

Which one of the following groups would you say best represents your race?
- White
- Black or African American
- Asian
- Native Hawaiian or Other Pacific Islander
- American Indian, Alaska Native
- Other (specify) _____
- Don't know/not sure
- Refused

What is the highest grade or year of school you completed? (Read as necessary)
- Never attended school or only attended kindergarten
- Grades 1 through 8 (elementary school)
- Grades 9 through 11 (some high school)
- Grade 12 or GED (high school graduate)
- College 1 year to 3 years (some college or technical school)
- College 4 years or more (college graduate)
- Refused

Is your annual household income from all sources:

01 Less than $25,000 *(If "no," skip to 5, if "yes," ask 2)*
02 Less than $20,000 *(If "no," code 1, if "yes," ask 3)*
03 Less than $15,000 *(If "no," code 2, if "yes," ask 4)*
04 Less than $10,000 *(If "no," code 2, if "yes" code 4)*
05 Less than $35,000 *(If "no," ask 6, if "yes" code 5)*
06 Less than $50,000 *(If "no," ask 7, if "yes" code 6)*
07 Less than $75,000 *(If "no," code 8, if "yes" code 7)*
08 $75,000 or more
77 Don't remember / Don't know
99 Refused

Access to Health Care Variables

Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?

Yes
No
Don't know/not sure
Refused

Do you have one person you think of as your personal doctor or health care provider?

Yes, only one
Yes, more than one
No
Don't know/not sure
Refused

In the year prior to your cancer diagnosis, when you were sick or needed advice about your health, to which one of the following places did you usually go?

A doctor's office
A public health clinic or community health center
A hospital outpatient department
A hospital emergency room
Urgent care center
Some other kind of place (specify) _____
No usual place
Don't remember / Don't know
Refused

Modifiable Risk Factor Variables

When you are at work, which of the following best describes what you do?

Mostly sitting or standing
Mostly walking
Mostly heavy labor or physically demanding work
Don't know/not sure
Refused

During the past month, other than your regular job, did you participate in any physical activities or exercise, such as running, calisthenics, golf, gardening, or walking for exercise?

Yes
No
Don't know/not sure
Refused

Have you smoked at least 100 cigarettes in your entire life?

Yes
No
Don't know/not sure
Refused

Do you now smoke cigarettes every day, some days, or not at all?

Every day
Some days
Not at all
Refused

About how much do you weigh without shoes?

__ __ __ Weight in pounds
7 7 7 Don't know/not sure
9 9 9 Refused

About how tall are you without shoes?

__/__ __ Height in ft/inches
7 7 7 Don't know/not sure
9 9 9 Refused

The number of servings of fruit and vegetables was calculated by asking respondents each of the following questions individually using the response categories below.

How often do you drink fruit juices such as orange, grapefruit, or tomato?
Not counting juice, how often do you eat fruit?
How often do you eat green salad?
How often do you eat potatoes, not including French fries, fried potatoes, or potato chips?
How often do you eat carrots?
Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?

1 __ __ per day
2 __ __ per week
3 __ __ per month
4 __ __ per year
5 __ __ never
7 7 7 Don't know/not sure
9 9 9 Refused

A drink of alcohol is one 12 oz. can or bottle of beer, one glass of wine, one 12 oz. can or bottle of wine cooler, 1 cocktail, or 1 shot of liquor. During the past 30 days, how many days per week or per month did you have at least 1 drink of any alcoholic beverage?

__ __ Days per week (specify number of days)
__ __ Days in 30 prior to diagnosis (specify number of days)
No drinks in past 30 days
Don't know/not sure
Refused

On the days when you drank, about how many drinks did you drink on the average?

__ __ Number of drinks
Don't know/not sure
Refused

Screening Test Variables

The questions for each of the six screening tests were worded similarly. First the respondent was asked if they had ever received the test then when they had last received the test. The explanation for each test and the response categories are listed below.

A blood stool test is a test that may use a special kit at home to determine whether the stool contains blood. Have you ever had this test with a home kit?

Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the bowel for signs of cancer or other health problems. Have you ever had either of these exams? A prostate-specific antigen test, also called a PSA test, is a blood test used to check men for prostate cancer. Have you ever had a PSA test?

A digital rectal exam is an exam in which a doctor, nurse, or other health professional places a gloved finger into the rectum to feel the size, shape, and hardness of the prostate gland. Have you ever had a digital rectal exam?

A clinical breast exam is when a doctor, nurse, or other health professional feels the breast for lumps. Have you ever had a clinical breast exam?

A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?

Yes
No
Don't know/not sure
Refused

How long has it been since you had your last blood stool test using a home kit?
How long has it been since you had your last sigmoidoscopy or colonoscopy?
How long has it been since you had your last PSA test?
How long has it been since you had your last digital rectal exam?
How long has it been since you had your last mammogram?
How long had it been since your last clinical breast exam?

Within the past year (any time less than 12 months ago)
Within the past 2 years (1 year but less than 2 years ago)
Within the past 5 years (2 years but less than 5 years ago)
5 or more years ago
Don't know/not sure
Refused

Table C2. Number of Individuals With Valid Data Who Were Included in the Denominator for Each Variable Analyzed, by Race/Ethnicity in Delaware and the United States

	Delaware			United States		
	White	African American	Hispanic	White	African American	Hispanic
Health insurance	3,228	508	118	192,113	19,075	18,088
Personal doctor	3,230	510	119	192,194	19,087	18,111
Usual source of care	3,141	496	104	189,304	18,704	17,606
Exercise	3,232	510	120	192,459	19,127	18,147
Smoking	3,226	507	120	192,052	19,061	18,110
Obesity	3,075	476	110	184,312	18,075	16,795
Diet (fewer than five servings of fruits and vegetables a day)	3,232	510	120	190,522	18,830	17,769
Alcohol intake	3,214	506	114	190,738	18,826	17,849
Fecal occult blood test	1,612	159	26*	91,400	6,824	5,614
Sigmoidoscopy	1,615	161	26*	91,035	6,714	5,612
Prostate-specific antigen test	592	65	11*	33,641	2,304	2,091
Digital rectal exam	886	95	18*	51,216	3,724	3,448
Mammogram (females)	1,362	169	31*	78,214	6,846	5,531
Clinical breast exam (females)	1,925	325	70	111,676	12,069	10,610

* We did not examine the prevalence of screening tests among Hispanics because the denominator in Delaware was less than our minimum of 50.

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