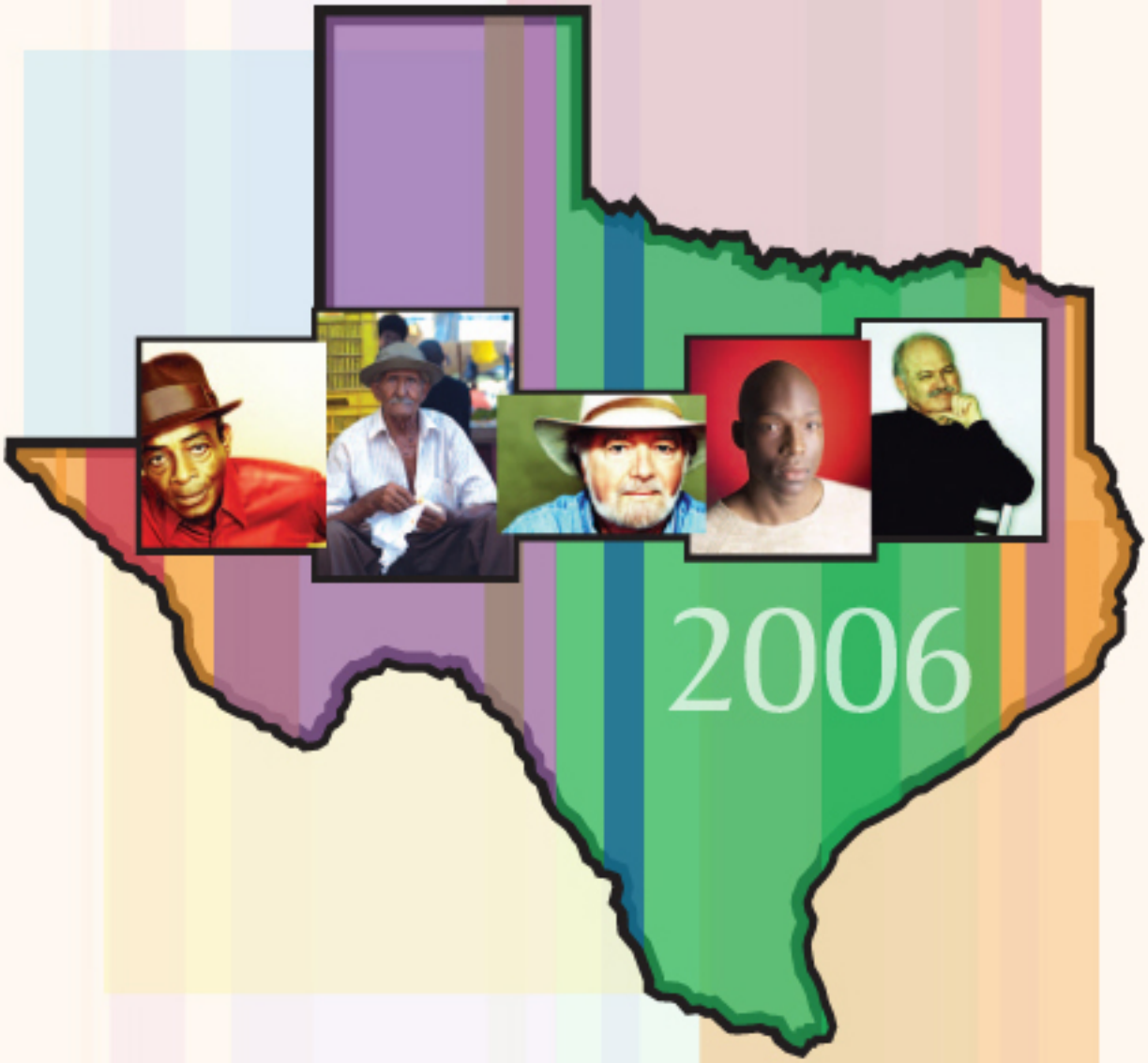
Prostate Cancer in Texas



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A special thanks to the dedication and hard work of Texas' cancer registrars and others responsible for cancer data collection across the State.

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Prostate Cancer Incidence

Prostate Cancer In Texas, 2006, represents just one of the steps taken by the Texas Cancer Registry, Texas Department of State Health Services to describe and better understand the impact of prostate cancer on the residents of our State. Each number and statistic presented not only represents the cancer patient but also family, friends, and countless others affected by this disease. Information provided in this report can be used to describe the epidemiology of prostate cancer in Texas, to better plan cancer control activities, target and evaluate interventions, and ultimately save lives.

Prostate Cancer Incidence, 1998–2002

Of the 40,699 male cancers diagnosed annually in Texas during 1998-2002, prostate cancer was the most common. Prostate cancer accounted for 27.4 percent of all cancers among this group, with an average of 11,172 newly diagnosed cases per year (Figure 1). The overall age-adjusted prostate cancer incidence rate for males of all races combined was 149.9 per 100,000 men.

Prostate Cancer Incidence by Race/Ethnicity, 1998–2002

Prostate cancer was the most common cancer among males in each individual race/ethnic group. Black males in Texas had the highest incidence of prostate cancer (Figure 2). The age-adjusted incidence rate for Black men in Texas (217.7 per 100,000 men) was twice the rate for Hispanics (108.6 per 100,000 men), and over 40 percent higher than the rate for non-Hispanic white men (152.7 per 100,000 men). Black men throughout the United States experience the highest prostate cancer incidence rates of any racial/ethnic group.[1]

Prostate Cancer Incidence by Age and Race/Ethnicity, 1998–2002

Of the 11,172 average annual cases of prostate cancer diagnosed among Texas males from 1998-2002, 10,179 (91.1%) were diagnosed in men 55 years of age or older, confirming that prostate cancer is primarily a disease of older men (Table 1). Prostate cancer is almost nonexistent until the age of 45, after which the incidence rate rises rapidly with age. This pattern is apparent in all three race/ethnicity sub groups (Figure 3). The highest rates of prostate cancer occur among Black males in every age group.

Over 65 percent of men are age 65 or older at the time of diagnosis. The average annual age-adjusted prostate cancer incidence rate for males under 65 for all races combined was 49.8 per 100,000 men. The average annual age-adjusted prostate cancer incidence rate for males 65 and older for all races combined was 841.5 per 100,000 men.

Prostate Cancer Incidence by Regional Councils of Government, 1998–2002

Comparisons of prostate cancer incidence by Councils of Government (COG) with statewide rates revealed several regional differences. For all races combined, statistically significantly increased prostate cancer incidence occurred in the Panhandle (1), Rio Grande (8), Deep East Texas (14), and Houston-Galveston (16) COGs. Significantly lower prostate cancer incidence was seen in Permian Basin (9), Heart of Texas (11), South Texas (19), Coastal Bend

(20), Lower Rio Grande Valley (21), and Middle Rio Grande (24) COGs (Figure 4).

For non-Hispanic whites, the Panhandle (1), Rio Grande (8), Concho Valley (10), Deep East Texas (14), Houston-Galveston (16) and Alamo Area (18) COGs had significantly higher prostate cancer incidence rates compared to Texas non-Hispanic whites. The Nortex (3), North Central Texas (4), East Texas (6), West Central Texas (7), Permian Basin (9), and Heart of Texas (11) COGs had significantly lower prostate cancer incidence when compared to statewide rates (Figure 5).

Among Hispanics, the Rio Grande (8) COG had significantly higher prostate incidence compared to Hispanics statewide. The North Central Texas (4), Brazos Valley (13), Lower Rio Grande Valley (21), and Central Texas (23) COGs had significantly lower Hispanic prostate cancer incidence (Figure 6).

For Blacks, the Rio Grande (8), Alamo Area (18), and Central Texas (23) COGs had significantly higher prostate cancer incidence compared to Blacks statewide, while the North Central Texas (4), Heart of Texas (11), Golden Crescent (17), and Coastal Bend (20) COGs had significantly lower prostate cancer incidence (Figure 7).

The reasons for the regional variations are not known, but may be the result of screening disparities or differences in completeness of prostate cancer reporting in the various regions.

Prostate Cancer Incidence Compared with California and the U.S., Surveillance Epidemiology and End Results Program (SEER), 1998–2002

Incidence rates for prostate cancer were lower in Texas men compared to California and U.S. SEER (Figure 8) for each race/ethnic group, as well as all races combined.[2,3,4] For each of the race/ethnic group males and all races combined, the Texas prostate cancer incidence rate was statistically significantly lower than the California comparison population. These differences may represent under reporting of prostate cancer in Texas males (Table 2).

Stage of Disease at Diagnosis by Race/Ethnicity, 1998–2002

Staging denotes the physical characteristics of malignant tumors, particularly size and the degree of growth and spread. In prostate cancer, as in most cancers, the stage at diagnosis determines treatment options as well as provides an estimate of prognosis. While many different kinds of detailed staging systems have been developed for different kinds of cancer, the basic classifications are very similar for summary stage. In prostate cancer, tumors are classified in the following three categories:

Localized – tumor is entirely confined to the prostate gland.

Regional – tumor has penetrated the capsule that surrounds the prostate gland and has extended directly to adjacent organs, tissues, or lymph nodes.

Distant – tumor has spread to distant organs or lymph nodes, a process known as metastasis.

As the stage at diagnosis moves across the categories into more advanced or extensive stages, the chance of cure decreases. Black males in Texas had the highest percentage of cases diagnosed at the distant stage (6.1%),

which is two times that of non-Hispanic whites (3.0%) (see Figure 9). This likely contributes to higher mortality from prostate cancer in Black men.

Blacks and Hispanics had very similar percentages in reference to diagnosis stage, yet the mortality rate for Blacks with prostate cancer was three times that of Hispanics. However, it is important to note that over 18 percent of the prostate cancer cases were unstaged in each of the racial/ethnic groups.

Prostate Cancer Screening by Race/Ethnicity

Prostate cancer screening rates are assessed by the Texas Behavioral Risk Factor Surveillance System. In a 2002 survey of more than 800 Texas men age 50 and older, more than two-thirds of all respondents reported having a PSA test within the past five years. A similar number indicated they had a digital rectal exam within the past five years. Men 65 and over and non-Hispanic white men were more likely to have had the recommended screenings. Hispanic males and males with less than a high school education had the lowest prostate cancer screening rates (Table 3).

Prostate Cancer Mortality

Prostate Cancer Mortality in Texas, 1993–2002

Prostate cancer was the second leading cause of cancer deaths among Texas males for the years 1993-2002, with an average of 1,870 deaths each year, surpassed only by lung cancer with 5,728 average deaths per year. Prostate cancer accounted for approximately 10.8 percent of the total cancer deaths (Figure 10). The age-adjusted prostate cancer mortality rate for Texas males, all races combined was 33.6 per 100,000 men.

Prostate Cancer Mortality by Race/Ethnicity, 1993–2002

Among Texas race/ethnic groups, Black men had the highest age-adjusted prostate cancer mortality rate (73.0 per 100,000), which was three times that of Hispanic men (23.8 per 100,000), and over twice that of non-Hispanic whites (31.8 per 100,000) (see Figure 11). The age-adjusted prostate cancer mortality rate for Blacks in Texas is over twice the rate for all races combined.

Prostate Cancer Mortality by Age and Race/Ethnicity, 1993–2002

Of the 1,870 average annual prostate cancer deaths among Texas males from 1993-2002, 1,713 (92%) were among men 65 years of age and over (Table 4). In all three racial/ethnic groups, prostate cancer mortality is almost nonexistent until age 45, when mortality rates increase with each subsequent decade (Figure 12).

The highest rates of prostate cancer deaths occur among Black males in every age group.

Prostate Cancer Mortality by Regional Councils of Government, 1993–2002

Several regional differences are apparent when comparing prostate cancer mortality rates by COG with the rest of the state. For all races combined, statistically significantly increased prostate cancer mortality occurred in the East Texas (6) and Houston-Galveston (16) COGs. Significantly lower prostate cancer mortality occurred in the Concho Valley (10), South Texas (19), Coastal Bend (20), and Lower Rio Grande Valley (21) COGs (Figure 13).

When comparing prostate cancer mortality among non-Hispanic whites by COG, there were no regions with statistically significantly higher prostate cancer mortality rates compared to Texas non-Hispanic whites. The Lower Rio Grande Valley (21) COG experienced significantly lower prostate cancer mortality (Figure 14).

Among Hispanics, the Panhandle (1), Rio Grande (8), and Middle Rio Grande (24) COGs had significantly higher prostate cancer mortality compared to Texas Hispanics. The Permian Basin (9) and Houston-Galveston (16) COGs had significantly lower Hispanic prostate cancer mortality (Figure 15).

For Blacks, the North Central Texas (4) COG had significantly higher prostate cancer mortality compared to Texas Blacks, while the Alamo Area (18) COG experienced significantly lower prostate cancer mortality (Figure 16).

Prostate Cancer Mortality Compared with California and the U.S., 1998–2002

Prostate cancer mortality rates were most similar for Texas non-Hispanic white males compared to California and U.S. non-Hispanic white males, and were slightly lower for Texas Hispanic men compared to California Hispanic males. Texas Black males experienced higher prostate cancer mortality compared to California but lower mortality than the U.S. (Figure 17). Overall, prostate cancer mortality did not vary significantly by race/ethnicity when compared to California, but was statistically significantly elevated for all races combined (Table 5).

Prostate Cancer Mortality Trends in Texas by Race/Ethnicity, 1993–2002

Figure 18 presents trends in prostate cancer mortality rates by race/ethnicity over the ten-year period 1993-2002. Since 1993, prostate cancer mortality decreased for all three race/ethnic groups and for all races combined. All mortality decreases were statistically significant ($p<0.05$). For non-Hispanic white males, Black males and all races combined, prostate cancer mortality decreased over 4 percent annually. However, the mortality rate decreased by less than 2 percent for Hispanic males.

The more sizeable decrease in the mortality rate for non-Hispanic white and Black males probably reflects improvements in the detection of prostate cancer following the introduction and widespread use of the prostate specific antigen (PSA) test in the late 1980s. However, given the smaller decrease in mortality for Hispanic men, increased screening efforts do not appear to be benefiting this racial/ethnic subgroup to the same extent as non-Hispanic white and Black males.

Prostate Cancer Risks

Relative Risk of Being Diagnosed with Prostate Cancer Compared to the Relative Risk of Dying from Prostate Cancer

Prostate cancer rates in Texas Blacks and Hispanics were compared with rates for non-Hispanic whites, resulting in a relative risk measure. The relative risk of being diagnosed with or dying from prostate cancer in Texas Blacks and Hispanics compared with Texas non-Hispanic whites is shown in Figure 19.

Texas Black males had statistically significantly higher prostate cancer incidence and mortality rates than Texas non-Hispanic white males. However, Texas Hispanic males have consistently lower prostate cancer incidence and mortality rates than Texas non-Hispanic white males.

The reasons for the significantly higher rates of prostate cancer in Black males compared with non-Hispanic white males are unknown. However, it is particularly noteworthy that while Black prostate cancer incidence is 40 percent higher than non-Hispanic white males, prostate cancer mortality is dramatically higher at 130 percent. This disparity in incidence and mortality rates could be due to a variety of factors, such as later diagnosis of prostate cancer, less timely and appropriate treatment, and overall health. Some studies have also suggested that prostate cancer is more aggressive in Blacks than other races.[5]

Prostate Cancer Risk Factors

While the causes of prostate cancer are not yet completely understood, researchers have found several factors that are consistently associated with an increased risk of developing this disease.

Age: Age is the strongest risk factor for prostate cancer. Prostate cancer primarily affects men over 50 years of age. The risk of developing prostate cancer increases as a man gets older.

Race/Ethnicity: Prostate cancer is more common among Black men than among non-Hispanic white men and Hispanic men. Prostate cancer is much more common in North America and Europe than in the Near East, Africa, Central America, and South America.

Family History: Having a brother or father diagnosed with prostate cancer doubles a man's risk of this disease. The risk is even higher for men with several affected relatives, particularly if their relatives were young at the time of diagnosis.

Diet: Men with a high fat diet are at increased risk for prostate cancer. Some studies suggest consuming high levels of fruits and vegetables may lower prostate cancer risk.

Physical Activity: Regular physical activity and maintaining a healthy weight may help reduce prostate cancer risk.

Summary

In summary, prostate cancer remains a major public health problem. In Texas and the United States, prostate cancer is the most frequently diagnosed invasive cancer among men and is the second leading cause of cancer death. Prostate cancer incidence and mortality vary by age, race/ethnicity, and geographic region. Prostate cancer is primarily a disease of older men, with over 65% being diagnosed over the age of 65. Consistent with the United States, Texas Black men experienced the highest prostate cancer incidence and mortality compared with any other racial/ethnic group. Black prostate cancer incidence was 40% higher than non-Hispanic white males, while prostate cancer mortality was drastically higher at 130%. Such dramatic differences in the Black prostate cancer experience suggest disparities in screening and early diagnosis, timely and appropriate treatment, aggressiveness of prostate cancer in Blacks, and overall health.

In addition, prostate cancer mortality rates were declining (ranging from 1.5 percent decrease per year in Hispanics, to 4.6 percent decrease per year in non-Hispanic Whites), and these decreases were statistically significant in every group.

Technical Notes

Sources of Data

The Texas Cancer Registry (TCR) is a population based cancer surveillance (reporting) system that includes incident reports of certain benign, borderline, in-situ, and malignant neoplasms occurring in Texas among state residents. The TCR was first established in 1979 with passage of the Texas cancer reporting laws, but statewide, population-based reporting of newly diagnosed cancer cases was not fully implemented until 1995. Regional offices cover the entire state and assist with data collection and record processing.

Texas hospitals and cancer treatment centers are the primary sources of case reporting. Reports also are received from outpatient clinics, free-standing pathology labs, and other state central cancer registries when a Texas resident is diagnosed or treated at a facility outside of Texas. The data used in this report were primarily abstracted from medical records and pathology reports.

Cancer mortality data for 1998–2002 were extracted from electronic files provided by the DSHS, Center for Health Statistics, and collected by the Texas DSHS Vital Statistics Unit. These files contained demographic and cause of death information from Texas death certificates for all deaths occurring among Texas residents.

Confidentiality

Protecting the confidentiality of persons whose cancers are reported to the TCR is the highest priority of the Registry in all aspects of operations, and required by state law and rule (Health and Safety Code, §82.009; Texas Administrative Code, Title 25, Part 1, Chapter 91, Subchapter A). No data presented in this report are intended to be used to identify individuals who have been diagnosed with cancer.

Classification by Anatomic Site

Primary anatomic site and histologic type were coded for each cancer incident case using the International Classification of Diseases for Oncology (ICD-O). For cases diagnosed from 1998–2000, the second edition was used (ICD-O-2)[6] and cases were then recoded to ICD-O-3 for analysis. For cases diagnosed from 2001–2002, the third edition was used (ICD-O-3).[7] Cases were then recoded into SEER program site recode groups for classifying types of cancer, using SeerPrep version 2.3.2 software. The ICD-O code corresponding to the prostate cancer site category in this report is C619 (excluding morphologic types 9050: 9055, 9140, 9590: 9989).

For cancer mortality data, the TCR classifies anatomic site according to the SEER "Cause of Death Recode." as given by the SEER Cause of Death Recode 1969+ (9/17/2004) (http://seer.cancer.gov/codrecode/1969+_d09172004/index.html). For reporting of cancer mortality data, SEER has defined major site groups based on the ICD versions 9[8] and 10.[9] These site groups are defined consistently across time to facilitate reporting of long-term trends. The ICD 10 code used for prostate cancer mortality in this report is C61.

Classification by Race/Ethnicity

Race/ethnicity for cancer cases is based primarily on information contained in the patient's medical record. This information may be supplied directly by the patient, may be determined by admissions staff or other medical personnel, and/or can be based on last name, race/ethnicity of parents, birthplace, or maiden name. The reporting of race/ethnicity may be influenced by the race/ethnic distribution of the local population, by local interpretation of data collection guidelines, and other factors. Race/ethnicity information for cancer deaths is based on the information coded on the death certificate. This information is provided by the informant, who may be next-of-kin, friend, medical examiner, funeral director, attending physician, justice of the peace, or other source. This method is consistent with the classification schema used by other state programs. It is possible that some differences in race/ethnic-specific rates reflect biases of classification rather than true differences in risk.

The race and ethnicity of each cancer patient and death is classified according to the categories defined in the North American Association of Central Cancer Registries (NAACCR) coding manual.[10] The race/ethnic groups used in this report for generating incidence and mortality rates include the following mutually-exclusive categories: non-Hispanic white, Black, Hispanic, and Other Races (includes Asians and Pacific Islanders and American Indians and Alaskan Natives). The Hispanic designation can therefore be of any race, but in 2000, 98.8 percent of Hispanics in Texas diagnosed with cancer were of the white race. Unless persons of unknown race are coded as Hispanic (only 1.6% in 1998–2002), they are not included in any of the race/ethnic-specific categories but are included in the total for All Races. Therefore, the four race/ethnic sub-categories provided in this report will not sum to the total for All Races.

Data Quality

The Texas Cancer Registry employs multiple procedures to assure the quality of incoming data, and these are described in the Texas Cancer Registry Cancer Reporting Handbook,[11] distributed to all cancer reporters in the state. Numerous quality assurance procedures were applied to the data based on National Program of Cancer Registries-Centers for Disease Control and Prevention (NPCR), NAACCR, SEER and TCR standards. Quality control included both internal and external processes to insure the reliability, completeness, consistency, and comparability of TCR data. Examples of internal consolidation and quality assurance processes include 1) a review of multiple abstracts on the same patient for multiple primaries, 2) identifying possible duplicate records, 3) correcting unacceptable codes or inter-field inconsistencies, and 4) reviewing unusual code combinations for

site/sex, age/site, age/morphology or site/morphology. Inconsistencies and unknown values for date of birth, race, ethnicity, sex, county of residence, date of diagnosis, site, and histologic type were rectified to the greatest extent possible. External procedures included training of reporting facility staff, on-site case-finding, and re-abstracting studies. Cancer death certificate files were also matched against reported incident cases for an additional reporting completeness check. To further assist identifying any cancer cases not reported to the TCR, information on all death certificates with the underlying cause of death due to a malignant neoplasm were obtained from the Center for Health Statistics (CHS), DSHS. Institutions listed on the death certificates as the place of death were queried for additional cancer case information. Missed cases not identified from any institution were added to the cancer database as "death certificate only" (DCO) cases. These DCO cases for which the only available information is from the death certificate, were included in this report.

Data Analysis

Texas Cancer Registry cancer incidence and mortality analysis files were created using NCI SEER*Prep software (version 2.3.2). Calculation of incidence and mortality rates were done using SEER*Stat software (version 5.1.3). This software was developed by the NCI SEER program to analyze population-based cancer registry data, and provides the age-adjusted incidence and mortality rates for a standard set of cancer sites and site groups. More detailed information regarding availability and use of this software can be found on the SEER web site: http://seer.ims.nci.gov/Scientific Systems.

The Texas population distribution in 1998–2002 by race/ethnicity includes non-Hispanic whites, with 54.3 percent of the total population, Hispanics, 31.0 percent, followed by Blacks (11.6%), and Other Races (3.1%). Population-at-risk data used in the calculation of age-adjusted rates were for 1998–2002 and provided by the CHS-DSHS. Average annual cancer incidence and mortality rates (1998–2002) were age-adjusted using the direct method, with 18 five-year age groups up to age 85+. Age-adjustment enables the direct comparison of incidence or mortality rates by eliminating the effect of differences in the age-distributions between various comparison populations. Direct standardization weights the age-specific rates for a given sex, race/ethnicity, or geographic area by the age distribution of the standard population. The 2000 United States standard population (19 age groups) was used as the standard for all calculations.[12]

Incidence data in this report are based on Texas resident primary cancer cases and diagnosed from January 1, 1998 through December 31, 2002, and in the Texas Cancer Registry database by December 1, 2004. Case reporting for 1998–2002 was estimated to be over 96.3 percent complete at that time. However, additional cases diagnosed during this time period will continue to be reported and included in the TCR analytic database. As a result, future analyses which include 1998–2002 data will vary slightly from this publication in the number of cancer cases included.

Comparisons of Cancer Rates

Figure 18 in this report makes comparisons of the relative risk of being diagnosed with or dying from prostate cancer in Texas Blacks and Hispanics compared with Texas non-Hispanic whites. This is calculated by dividing the age-adjusted rate in the relevant Black or Hispanic population by the age-adjusted rate in the corresponding non-Hispanic white population. A relative risk of 1.0 therefore means the incidence or mortality from cancer is the same in each group. If the relative risk is greater than 1.0, the cancer incidence or mortality rate is higher in the group being studied (Blacks or Hispanics) than in the comparison population (non-Hispanic white). If the relative risk is lower than 1.0, the cancer incidence or mortality rates are lower in the group being studied (Blacks or Hispanics) than in the comparison population (non-Hispanic white).

The differences between these rates were then tested for statistical significance by calculating the 95% confidence interval for the ratio of the rate in one group compared with the other, and determining whether that confidence interval excluded 1.0. The 95% confidence intervals were obtained by the logarithmic transformation of the pooled rate ratio.[13]

Readers are cautioned that statistically significant variation in rates can occur for a variety of unknown factors, and additional assessment of any significant differences may be needed to determine which differences represent true public health problems. Statistical significance also does not necessarily reflect the overall importance of the result (that is non-significant differences may be important, and statistically significant differences may be unimportant).

Mapping

The age-adjusted all races and race/ethnicity-specific prostate cancer rates were calculated for each COG and compared with the respective age-adjusted race/ethnicity-specific prostate rate for the whole state. The ratio of these rates was then tested for statistical significance by calculation of the 95% confidence intervals.

Maps were then color-coded by COG to indicate statistically significant ($p < 0.05$) excesses and deficits of ten percent or greater. COGs with fewer than 20 cases or deaths for the respective time periods and race/ethnicity were excluded from mapping, due to statistical instability.

Trend Analysis

The Annual Percent Change (APC) represents the average percent increase or decrease in cancer rates per year over a specified period of time. The APC is calculated by fitting a linear regression to the natural logarithm of the annual rates, using calendar year as a predictor variable (formula: $\ln(r) = m(\text{year}) + b$). From the slope of the regression line, m, APC is calculated as:

$$APC = 100 \times (e^{m} - 1).$$

Testing the hypothesis that the APC is equal to zero is equivalent to testing the hypothesis that the slope of the line in the regression is equal to zero. Statistical significance was set at alpha = 0.05, thus a trend in rates was considered statistically significant if there was less than a five percent chance that the difference was the result of random variation. The APC assumes that the cancer rate is changing at a constant rate over the interval examined.[14]

Asterisks indicate that the change is statistically significant ($p < 0.05$). Trends should be interpreted with caution because of the relatively short time period for which data are available.

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