
Prostate Cancer Disparities in South Carolina: Early Detection, Special Programs, and Descriptive Epidemiology

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Cancer of the prostate (PrCA) is the most commonly diagnosed cancer among men in the United States, accounting for 30% of all male cancer diagnoses. The American Cancer Society predicts that one out of five men will develop PrCA sometime during his life.¹ Based primarily on autopsy results, PrCA appears to be much more common than published incidence data would indicate.^{2,3} In fact, if screening continued past age 74 years, virtually all men in the US would be found to have pathological/histological evidence of the disease.^{2,4} Despite the relative indolence of the disease, especially in older men, PrCA is a major cause of cancer-related deaths, second only to lung cancer among men in South Carolina⁵ and in the U.S. as a whole.⁶ PrCA rates have declined slightly in recent years among all groups; however, South Carolina's PrCA mortality rate ranks consistently among the highest in the nation.⁶ African-American (AA) men in South Carolina have the highest age-adjusted death rate for PrCA in the nation.¹ The problem may be exacerbated

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in AAs for characteristics related to socio-economic status, among others. Two of these factors—over half of AAs are poor or almost poor and 20% have no health insurance—are predictors of health care utilization and health status.⁷

Recommendations for Early Detection

Over the past few decades there have been modest advances in our capacity to treat prostate cancer.^{2,8,9} Therefore, it is disappointing that only 50% of patients are curable at diagnosis.¹ Epidemiologic evidence suggests that men who have had their PrCA detected in the early stages have markedly better five-year survival rates (94%) compared to men who have their cancer diagnosed at more advanced stages (30%).¹⁰ Although PrCA tends to be a relatively indolent disease, studies also have shown that AA men are at significantly higher risk for being diagnosed with advanced-stage prostate cancer than European-American (EA) men. AA men also tend to be diagnosed with more aggressive disease at younger ages.¹¹ Given the higher rates of PrCA, the migration toward lower ages, and the related tendency to be diagnosed with later-stage disease, efforts aimed at early detection may be a better strategy in AA men in relation to their EA counterparts.

According to the South Carolina Behavioral Risk Factor and Surveillance System data there is no significant change over time in the number of individuals receiving a prostate-specific antigen (PSA) test or a significant difference in the percentage of EAs (69% in 2001; 66% in 2004) vs. AAs (64% in 2001; 66% in 2004) receiving the PSA test.

Conversely, a larger percentage of EA men report having received a digital rectal exam (DRE) than AA men (84.5% vs. 75.0% for years 2001-2004).¹²

There is a lack of convincing data of a mortality benefit associated with prostate cancer screening. However, there are some groups for whom more aggressive screening beginning at younger ages may be a practical means of reducing PrCA mortality, such as AA men and others with a family history of the disease. There are currently substantial differences of opinion regarding prostate cancer screening. Essentially, the debate revolves around issues of disease aggressiveness and its relationship to age—essentially the tension between over-treatment of indolent disease and under-treatment of aggressive disease.¹³⁻¹⁵ In general, PrCA screening efforts have resulted in a stage migration to more organ-confined tumors at the time of diagnosis, and have been temporally associated with a slight decrease in PrCA mortality. It is well known, however, that the screening methods currently in widespread use are far from perfect.¹⁶ Whenever we increase the rate of screening without changing the specificity (and therefore the false positive rate) of the test we are simply encouraging the identification of cancers that would not shorten the man's life or detract from his quality of life if left undetected (and therefore untreated).^{13,17-19} The argument against PSA screening among asymptomatic men is that clinically localized prostate cancer usually progresses slowly, and most men with PrCA will die of other causes,^{13,17,20} without any deleterious effects resulting from never really knowing if he had the

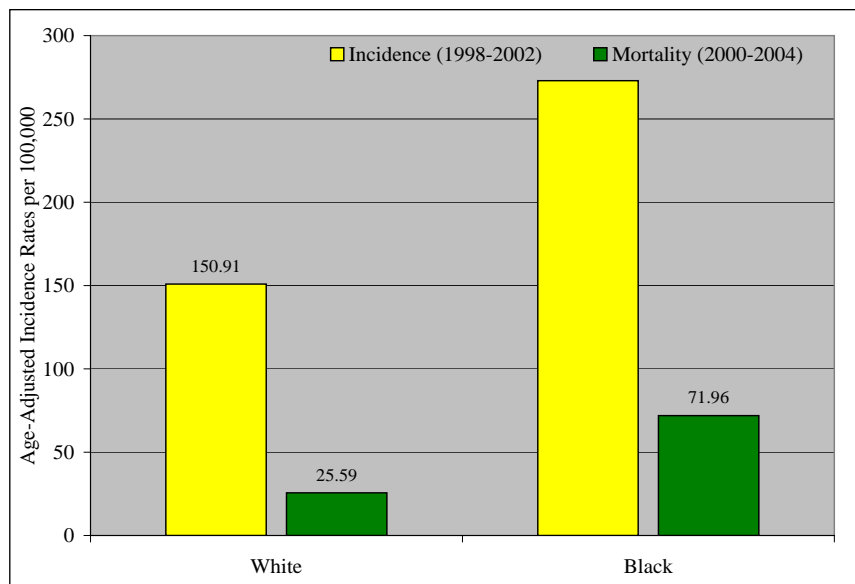


Figure 1. Prostate Cancer Age-Adjusted Incidence (1998-2002) and Mortality (2000-2004) Rates per 100,000 in SC by Race

disease. Underlining the problems with PSA screening, only one man out of three with a PSA level > 4.0 ng/mL will be found to have PrCA, and the remaining three will endure an unnecessary biopsy.¹⁶ Conversely, there will be a small fraction of men with very aggressive disease who may present with a PSA level < 4.0 ng/mL.^{2,17,21}

In the early 1990s, the American Cancer Society and the American Urological Association advocated that all men over 50 years of age receive PSA tests annually.²² This recommendation was opposed by specialty groups of primary care physicians (American College of Physicians (ACP) and the American Academy of Family Physicians (AAFP)), as well as the United States Preventive Service Task Force (USPSTF).²³ The majority of physician organizations oppose routine prostate cancer screening, whereas most community-based organizations such as the Prostate Cancer Foundation and the American Foundation for Urologic Disease have recommendations for screening that include modifications for differences in age, race/ethnicity, and family history.^{22,23}

Somewhat less controversial is the rec-

ommendation in most guidelines; i.e., that PSA be used in combination with DRE as an aid to diagnosis.²² For the majority of these guidelines, the target population are men 50 years of age or older with a life expectancy of at least ten years. Early detection may start at the age of 45 years in African-American men or in men with a positive family history.²² Given the consequences of either over-treating indolent PrCA or under-treating aggressive disease, patients (and their family members) should be well informed about the potential consequences prior to PSA testing. This is difficult under any circumstance, but perhaps especially so in a high-incidence,²⁴ high-mortality,⁶ low-literacy area such as South Carolina.²⁵⁻²⁶

Most organizations, including USPSTF, ACP and AAFP, recommend that health-care providers discuss testing and arrive at informed decisions with their male patients. Despite the lack of recommendations for or against routine screening for prostate cancer in these organizations, family practitioners and general practitioners in internal medicine have been ordering PSA tests frequently for their asymptomatic patients over 50 years of age. Studies have shown that some of

these tests are ordered without discussing the benefits and limitations with the patient; in some instances tests have been ordered even without his consent.^{23,27,28} Informed decision-making (IDM) is an important component in prostate cancer screening and may reduce the stress and anxiety that may accompany decisions involved in this controversial screening process. Understanding the issues involved is one of the centerpieces of community-based participatory research (CBPR), which is a focal point of the South Carolina Cancer Disparities Community Network (SCDCN). Not only will IDM lead to a better result for individual men and their families, but it may help to engage the community in both understanding the issues around prostate cancer screening and in both designing and in encouraging participation in PrCA research programs.

Special Programs Addressing Screening in South Carolina

A number of PrCA programs in South Carolina focus on both screening and education. As mentioned earlier, most organizations recommend education with an option for screening. South Carolina organizations (civic, medical and governmental) are collaborating to develop and implement a number of community-based programs to reduce PrCA mortality overall and among the most affected subgroup, African-American men. In this population it may be especially useful to engage the community in existing community-based programs as well as CBPR. Some of the available programs and collaborations are described below.

The South Carolina Department of Health and Environmental Control Office of Minority Health (SC DHEC-OMH) received funding from the U.S. Department of Health and Human Services in 1998 to develop a program called "Real Men Checkin' It Out." This initiative is a community-driven, culturally appropriate education and communication prototype that addresses PrCA in the AA community and is implemented in various community/

faith-based organizations. SC DHEC-OMH partnered with the Palmetto Health Richland hospital system in 2000 to educate 5,500 men and women. Through this program, 5,356 men received screening and 48 prostate cancers were diagnosed between 2000 and 2004. These results were the efforts of Palmetto Health's Grant Awards Program. Over, 157 churches in the Lexington, Fairfield, Richland and Pickens counties participate.

SC DHEC awarded two cancer control mini-grant projects related to PrCA in 2005. One was given to SC DHEC Region II and the other award was to a partnership between Region IV and the McLeod Health Cancer Care and Research Center. The Region II project, Prostate Cancer Education, Screening & Referral project, uses an American Cancer Society Prostate Cancer Awareness Program to institute a "train the trainer" method in barbershops, salons and members of the faith community to allow the community at large to be informed by their peers. The trainers then recruit men for free community-wide screenings to include a PSA test and digital rectal exams. The Pee Dee Cancer Awareness Prevention & Early Detection project in Region IV, focuses on cancer awareness and prevention education is provided to the African-American population through 18 churches and civic organizations in addition to screenings and follow-up referrals provided by McLeod Health at no cost to the patients.

Charged with addressing the racial and ethnic disparities in PrCA in South Carolina, a group of public health professionals, researchers, and community members formed the South Carolina African American Prostate Cancer Network. This network serves as a resource for promoting, developing and implementing culturally competent strategies to address prostate cancer, prevention, screening and treatment for African-American males.

National cancer prevention organiza-

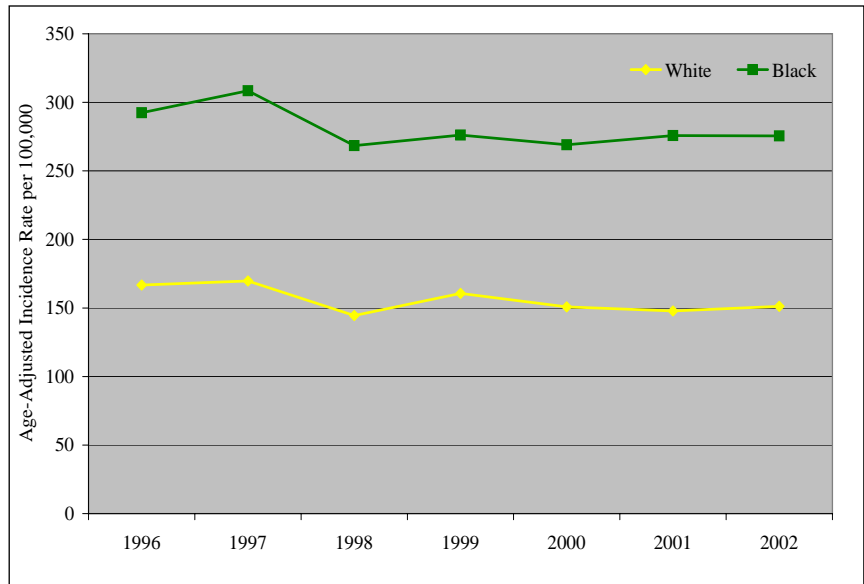


Figure 2. Prostate Cancer Age-Adjusted Incidence Rates per 100,000 in SC by Race & Year of Diagnosis, 1996-2002

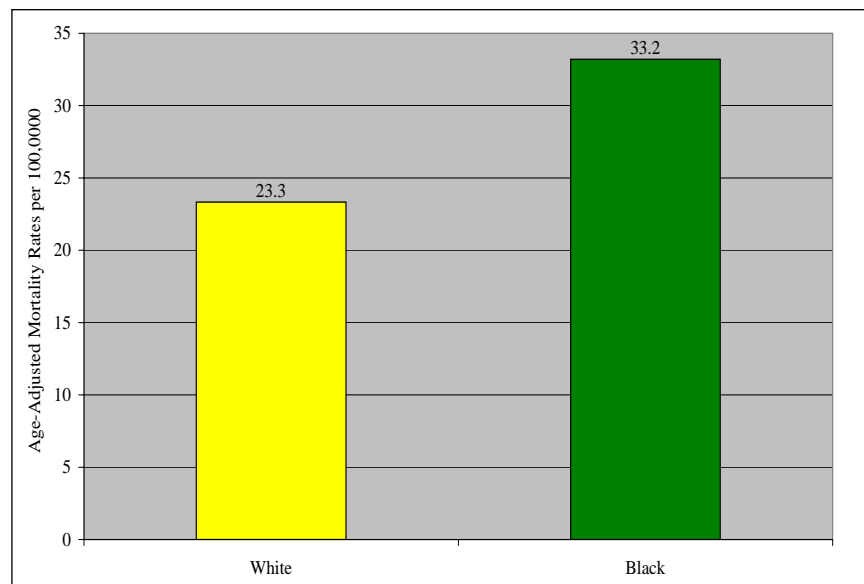


Figure 3. Prostate Cancer Age-Adjusted Mortality Rates per 100,000 in SC by Race & Year of Death, 1994-2004

tions that have local chapters in South Carolina also promote education and raise prostate cancer awareness. Such examples are the National Black Leadership Initiative on Cancer II: Network Project and UsTOO's Minority and Underserved Populations Prostate Cancer Awareness Program. Additionally, the social fraternity, Phi Beta Sigma has established a collaborative partnership with the American Cancer Society to

develop and implement Sigma's Waging War against Cancer to reduce PrCA incidence through fundraising, advocacy, and community service.

Descriptive Epidemiology

Most recent South Carolina data indicate that 3,304 new cases of PrCA were diagnosed in 2002 and 495 men died of the disease in 2004. Data over six years (1996-2002) indicates that, on average,

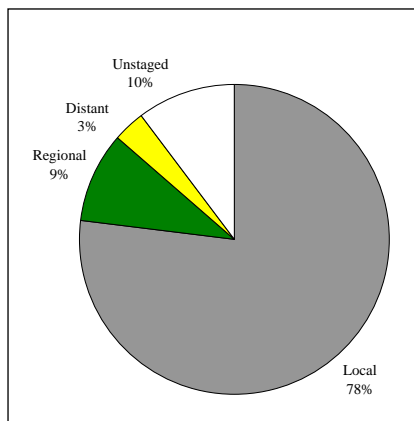


Figure 4. Prostate Cancer Stage at Diagnosis in SC among White Men, 1998-2002

67% of new cases and 57% of deaths occur among EA men (despite their much higher representation in the population).²⁹ Statistics in relative incidence and mortality reflect a large racial disparity between AA and EA men. Nationally, AA men have about 55% higher incidence of PrCA than EA, while in South Carolina the differential is about 80%. This is exclusively due to the higher rates of cancer in AA men, as the EA rates in South Carolina are identical to those of the nation as a whole.²⁴ During the period 1998-2002, the invasive PrCA incidence rate for White (primarily EA) men in South Carolina was 150.9 per 100,000 compared to 272.9 per 100,000 among Black (primarily AA) men (see Figure 1). Mortality rates are even more divergent; AA men are over two-and-a-half times more likely to die of PrCA.^{6,24} Over the five-year period from 2000 to 2004 in South Carolina, AAs had almost three times greater mortality (71.9 deaths per 100,000/year) than EAs (25.6 per 100,000) (see Figure 1). The trend in incidence rates does not correspond to the mortality rate trend for AAs and EAs. Though incidence has decreased over the period of 1996 to 2002 for both AAs and EAs, the difference between the two groups has remained fairly consistent (see Figure 2). However, the same relationship is not seen among mortality rates. The total percent reduction from 1994 to 2003 in mortality is over one-and-a-half time greater among EA than

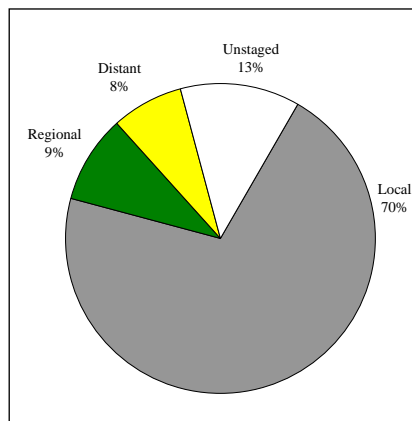


Figure 5. Prostate Cancer Stage at Diagnosis in SC among Black Men, 1998-2002

AA men (see Figure 3).

Differences in disease virulence have important implications for screening and treatment decisions by race and age.^{4, 13-15,29} As noted, AA men develop PrCA at earlier ages; at younger ages prostate cancer tends to be a much more virulent disease than that observed in older men.^{13,14} It is equally important to understand that across racial groups, most men are likely to have PrCA detected after 60 years of age. Screening at older ages will tend to increase apparent incidence rates to a very large extent. Indeed, examination of incidence rates over the period that PSA screening became popular (i.e., in the early to mid 1990s) indicates a large increase in overall incidence.⁶ Therefore, age differences in incidence by race may have more to do with screening practices and differences in disease virulence than real differences in incidence rates. While incidence rates appear to decrease after 70 years of age in EAs, these rates remain significantly higher in older AA men.

As for many types of cancer, the prognosis of PrCA is related to the stage and grade of disease at diagnosis. Stage refers to the anatomic spread of the cancer; i.e., ranging from being confined to the prostate gland to having spread outside the gland to nearby regions or to distant locations within the body.¹⁸ Both in South Carolina and in the U.S. as a

whole, AA men are more likely to be diagnosed at later stages (i.e., with regional and distant spread) than EA men.^{29,30} As shown in Figures 4 and 5, 17% of AA men compared to 12% of EA men are diagnosed at regional and distant stages. Grade, expressed in four levels, refers to the histo-pathologic characterization of the cancer and is a measure of disease severity.¹⁸ Although AA men have higher rates of PrCA across all grades of disease, they tend to have the largest proportional increases in Grade III (poorly differentiated) disease, which is associated with much poorer prognoses than more well-differentiated disease (see Figure 6).

In addition, a comparison of incidence and mortality rates by county among AA men compared to the state rate for EA men shows the dramatic racial disparity that exists in South Carolina (see Figures 7 and 8). PrCA incidence in AA men is significantly higher than in EA in 40 of 46 counties in South Carolina. Similarly, the PrCA mortality rate in AA men is significantly higher than in EA men in 38 of 46 counties. Furthermore, African-American men in a majority of South Carolina counties have a significantly greater risk of dying from PrCA than their counterparts in the nation as a whole.^{6,29,31}

Disparities in Prostate Cancer Risk Factors

The reasons for the large disparities we have presented are not yet understood, although factors ranging from socioeconomic status to lifestyle factors³²⁻³⁷ to genetics³⁸⁻⁴⁰ have been invoked. As we have noted earlier, comparing within-country rates of disease to across-country rates can help broaden and deepen our understanding of the causes of many cancers, including PrCA.⁴¹⁻⁴³ Dramatic international variations in age-adjusted incidence and mortality rates provide clues to the etiology of prostate cancer. Qidong County in China, for example, has an incidence rate of only 0.5 per 100,000 men, whereas the rate in the

U.S. is >150 per 100,000.^{24,44,45} Japanese men, like Chinese men, also have much lower PrCA incidence and mortality rates than Americans. However, upon migration to the U.S., their rates increase four- to nine-fold within one generation and approximate American rates by the second generation.^{44,46,47} This suggests that environmental (non-genetic), rather than genetic, factors appear to account for most of these differences in incidence. The clear dominance of environmental factors in “explaining” rapid changes in incidence should not, however, lead one to underestimate the role of genetic factors in determining risk profiles—either individually or across races (or other identifiable population subgroups). There may very well be subsets of the population who are particularly sensitive to the influences of environmental factors because of their genetic constitution. Indeed, a major frontier in cancer epidemiology is the search for gene-environment interactions that can help explain risk and thereby help to identify individuals who are sensitive to particular lifestyle and other environmental influences.^{44,46,47}

Epidemiologic studies that have used different study designs suggest that, among environmental influences, dietary factors constitute the most important of modifiable risk factors. Total fat and meat consumption is associated with overall increased incidence of prostate cancer as well as with incidence of more aggressive tumors.^{52,53} Saturated fat, primarily from meat and dairy intake, is the most strongly associated fat subtype.^{42,54,55} Conversely, intake of whole grains and soy products is associated with decreased mortality.⁴² In cross-national comparison studies of both prostate and breast cancers, we can use “disappearance data” (i.e., the difference between population-level estimates of production + imports – exports – estimates of food wastage) to estimate population-level estimates of food intake. Using these data, which are available from UN sources, we have been able to explain up

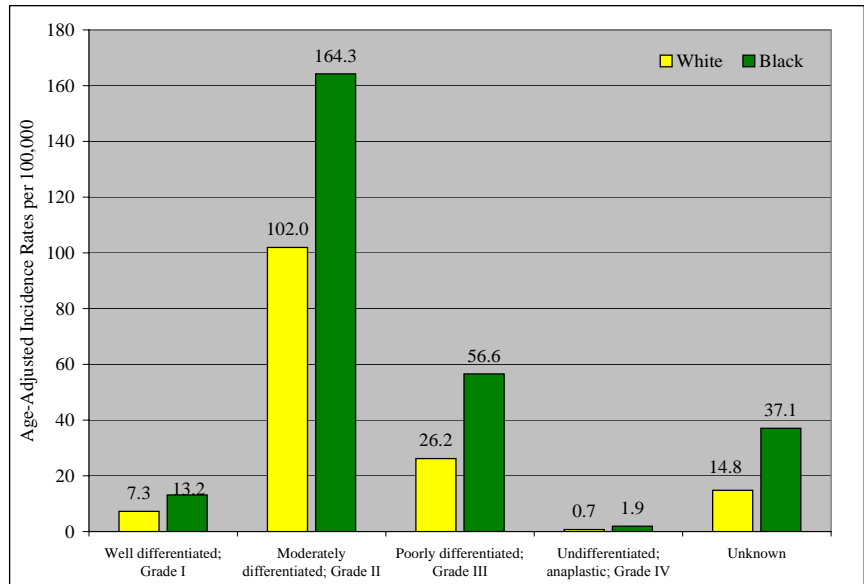


Figure 6. Prostate Cancer Age-Adjusted Incidence Rates (1998-2002) per 100,000 in SC by Race & Grade

to 90% of variability in PrCA mortality with dietary factors accounting the vast majority of the variation.^{42,56} In contrast to mortality differences within the U.S., which are about 2.5 times higher in AA than EA men, mortality rates ranged over 100-fold from the country with the highest mortality rate to the one with the lowest rate. Results from laboratory animal experiments are consistent with the findings of the international studies: fat restriction has been shown to inhibit growth of transplanted prostate cancer cells in rodents.^{42,57,58} Both fat restriction⁵⁹ and feeding of genistein,⁶⁰ a soy isolate, inhibit growth of the LNCaP human prostate cancer cell line. Preliminary evidence also suggests that PrCA may continue to be sensitive to dietary factors even after development of metastases. Substantive dietary changes, marked by adoption of plant-based diets, have been associated with prolonged survival and instances of remission of bone metastases in men with advanced disease,⁶¹ findings which may be explained in part by the demonstrated ability of very low-fat, high-fiber diets to modulate circulating androgen levels.^{62,63}

Unlike dietary factors, there is no reposi-

tory of physical activity “disappearance” data that can be used to exploit the huge variations in cancer rates observed across countries of the world. Recent reviews of the physical activity (PA) and PrCA association have therefore had to rely exclusively on results of studies conducted at the level of the individual. Findings from such studies have been divergent.^{64,65} Friendenreich⁶⁵ concluded, using criteria previously used to assess diet - cancer relationships,⁶⁶ that the association was “probable,” based on findings that 15 of 26 published studies demonstrating that higher levels of activity are associated with reduced risk and that nine of 19 reported a dose-response effect. However, a more recent review by Lee⁶⁴ has found that favorable results for an association between PA and PrCA have not been replicated in recent studies. This may be due to the increasing use of the PSA test and its more frequent use by men with more positive health-seeking behaviors. Therefore, epidemiologic data do not support a role of PA in preventing PrCA.⁶⁴ Also, the American Cancer Society’s Guidelines on Nutrition and Physical Activity for Cancer Prevention, reviewing the same evidence, suggested that the epidemiologic evidence for a beneficial effect of

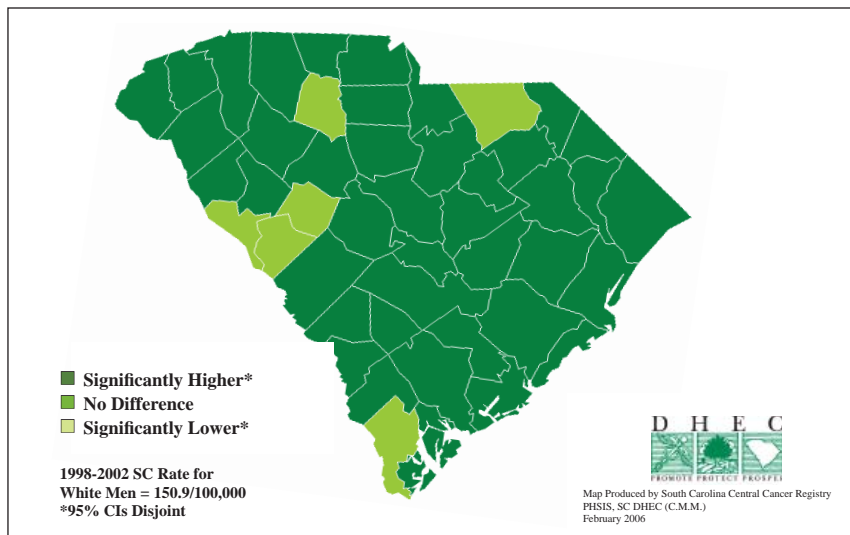


Figure 7. South Carolina Prostate Cancer: Comparison of the Age-Adjusted, County-Specific Incidence Rate for Black Men vs. the Age-Adjusted, State-Specific Incidence Rate for White Men (1998-2002)

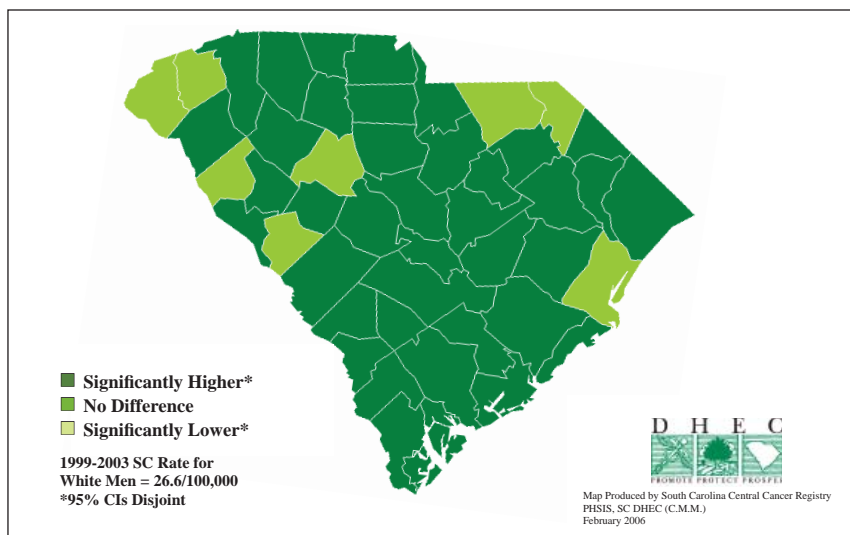


Figure 8. South Carolina Prostate Cancer: Comparison of the Age-Adjusted, County-Specific Mortality Rate for Black Men vs. the Age-Adjusted, State-Specific Mortality Rate for White Men (1999-2003)

physical activity was “insufficient.”⁶⁷

While the interpretation of available evidence is inconsistent, our knowledge of the biologic mechanisms linking PA to PrCA needs to be strengthened. A leading biological mechanism is the effect of PA on endogenous androgens or on Sex Hormone Binding Globulin (SHBG), or both.⁶⁸ However, much less is known about the effects of regular physical activity participation on important emo-

tional, physical, and survival outcomes following the diagnosis of PrCA.^{69,70} even though regular participation in PA is thought to enhance emotional (e.g., depression, anxiety) and physical functioning following diagnosis and treatment,⁷¹ and many patients are interested in lifestyle interventions at this time in their lives.⁷² Accordingly, more well-designed studies are urgently needed to enhance our understanding of the biological link between PA and PrCA and

improved quality of life following treatment.⁷³

In a review of studies that have assessed obesity with PrCA mortality, higher grade and advanced stage disease have consistently produced results showing that obesity may not increase the risk of PrCA, but rather promote growth of the tumor once established. Biologically active polypeptides, called adipokines have been linked to a number of carcinogenic mechanisms, such as cell proliferation, metastasis and alterations in sex-steroid hormone levels.⁷⁴

Summary

Available evidence suggests that there may be qualitative differences in the natural history of PrCA by race.^{30,75-77} If this is true then additional etiologic research is needed to identify places in the causal chain where we can intervene to lower PrCA rates in AA men. South Carolina may prove to be a useful context in which to study prostate cancer etiology, because of the presence of unique environmental exposures. For example, soil selenium and cadmium concentrations unique to South Carolina might have a differential affect in the rural areas of the state where ground water use is more common and where AAs are more likely to live. These metals are important in terms of prostate metabolism and cancer.⁷⁸⁻⁸⁰ The possible interaction of geological factors with underlying biological factors such as metal transporter gene expression by race needs to be explored in South Carolina.^{81,82} Diet and exercise are consistently seen as possible primary prevention strategies for prostate and other cancers, as noted above. There may be very good reasons to intervene on diet and physical activity, but if the intention is to make a health claim with real, specific meaning for PrCA prevention and control then studies must be designed to test the effect of these modalities in rigorous ways at specific points in the natural history of prostate carcinogenesis. Nutrition and exercise programs need to be developed in South Carolina that are

seen as acceptable by people at risk of PrCA; and they will need to focus on effective ways to prevent the development of PrCA, other cancers, and other health outcomes. Implementing diet and nutrition programs in rural parts of the state, possibly through schools or churches, offer benefit to both youth and adults alike. So, it would be possible, indeed it would be desirable, to create programs that may be used for research in one part of the population (e.g., men with PrCA), but are equally beneficial for others (e.g., their spouses and children). Organizing studies that can focus on promising new areas of research and changing the paradigms under which the research community currently operates probably will require re-conceptualizing research strategies employing methods that entail CBPR approaches.

Because much of South Carolina's African-American population resides in rural parts of the state, outreach presents a challenge for both researchers and clinicians.²⁵ Individuals living in rural areas are more likely than urban residents to live in poverty,⁸³ report poorer health status, and not have private health insurance. Americans living in rural areas face disparities in access to basic public health services compared to those living in metropolitan areas.^{84,85} In very practical ways, local public health departments are absent in many rural communities, and rural hospitals continue to close removing needed services.⁸⁵ Closing of public hospitals has been shown to significantly increase the percentage of people without a primary health care provider as well as the percentage of people denied care.⁸⁶ Public health departments are of particular importance to rural residents as they serve as the main avenue for public health and clinical care for this group.⁸⁷

Issues such as access to care, lack of frequent physician's visits and quality of medical care have a negative impact on outcomes for men with PrCA, particu-

larly in relationship to staging. If better outcomes are to be achieved in South Carolina, then more must be done to reach the community and provide better access to care in more rural areas of the state. Small media interventions, such as those presented in churches and barbershops may be an effective means for reaching the rural AA population. Our ability to reach out to and interact with the high-risk pockets in the state will be necessary for screening, treatment, and research (which, if conducted competently, will affect screening efficacy, treatment effectiveness, and primary prevention).

It is believed that currently available decision-making materials for PrCA screening may not be appropriate due to socioeconomic as well as health literacy differences present in all male groups. It is unclear whether men in the lower socioeconomic groups are given appropriate information that allows them to make educated, informed decisions around PrCA screenings. Considering the number of males in the lower socioeconomic groups in South Carolina and the large AA male population, research evaluating the appropriateness of the existing materials could have an impact - both within the state and in national efforts. Patient education is a promising strategy, but educating the patient in the context of his family seems to be a more effective strategy for this population. Family networks and faith-based networks offer a strong support base for the patient when making health-related decisions, particularly for the African-American male. In collaboration with the SCCDCN, the South Carolina Cancer Alliance (SCCA) is currently developing a proposal to create a decision guide for prostate screening that is targeted toward the African-American male. The SCCA plans to pilot test new, culturally appropriate materials in the Low Country of South Carolina because of its comparatively large African-American population and its high rate of resi-

dential stability.

South Carolina is one of only a few states to adopt expanded Medicaid coverage for the treatment of breast cancer. PrCA needs to receive equal recognition. This year alone in South Carolina 3,290 women will be diagnosed with breast cancer and 630 will die from the disease. Likewise, the American Cancer Society estimated 3,770 men in South Carolina would be diagnosed with prostate cancer and 440 will die from the disease in 2006.¹ The \$1 million set aside in South Carolina budget by lawmakers for treatment of breast and cervical cancer patients makes no mention of prostate cancer, which is an unfair omission.

Finally, there currently exists a number of high-quality PrCA treatment, research, and referral resources in the state. Collaborations across agencies, institutes and organizations throughout South Carolina would prove to be beneficial in reaching the most rural (and therefore hardest to reach) populations. Collaborative arrangements will be pursued to increase positive outcomes and better futures for South Carolinians.

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