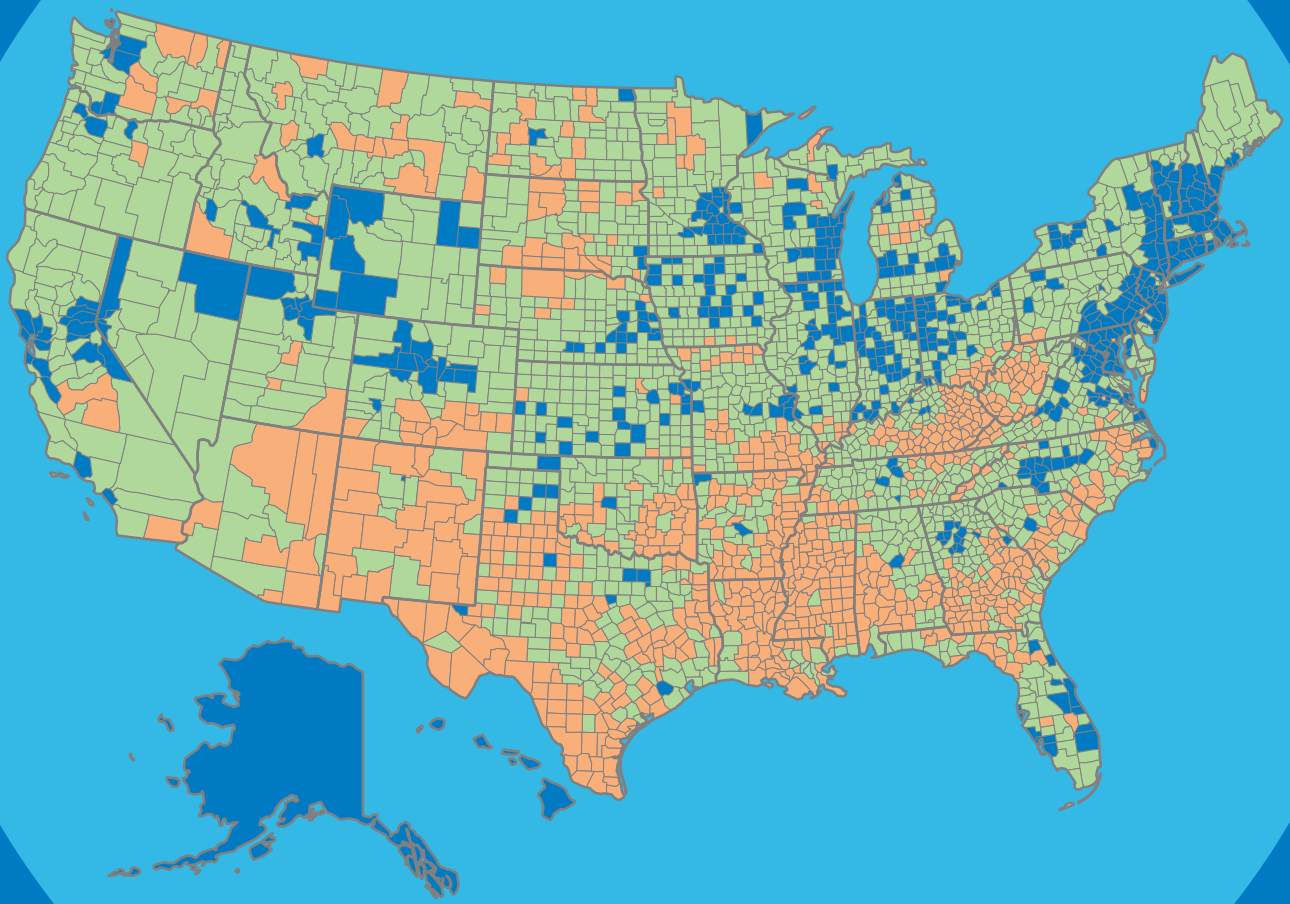
NCI
Cancer Surveillance
Monograph Series,
Number 4

Area Socioeconomic Variations
in U.S. Cancer Incidence, Mortality, Stage, Treatment, and Survival, 1975–1999



U. S. Department of Health and Human Services
National Institutes of Health
National Cancer Institute

Area Socioeconomic Variations in U.S. Cancer Incidence, Mortality, Stage, Treatment, and Survival, 1975–1999

This publication was prepared by:

Gopal K. Singh, Ph.D.
Barry A. Miller, Dr.P.H.
Benjamin F. Hankey, Sc.D.
Brenda K. Edwards, Ph.D.

Surveillance Research Program
Division of Cancer Control and Population Sciences
National Cancer Institute
6116 Executive Blvd., Suite 504
Bethesda, Maryland 20892-8316
Fax: 301-496-9949

Suggested citation for the monograph:

Singh GK, Miller BA, Hankey BF, Edwards BK. *Area Socioeconomic Variations in U.S. Cancer Incidence, Mortality, Stage, Treatment, and Survival, 1975–1999*. NCI Cancer Surveillance Monograph Series, Number 4. Bethesda, MD: National Cancer Institute, 2003. NIH Publication No. 03-5417.

This publication is available on the SEER web site: **http://seer.cancer.gov**

Copyright information:

All material in this report is in the public domain and may be reproduced or copied without permission; citation as to source, however, is appreciated.

Acknowledgments

The authors wish to thank the Principal Investigators and the staffs of the SEER contract organizations who provided the cancer incidence data for this report. These organizations, funded through National Cancer Institute (NCI) contracts, include:

Contracting Organization	Principal Investigator
Northern California Cancer Center	Dr. Dee W. West
Connecticut State Department of Health	Dr. Anthony P. Polednak Mr. Daniel Savino
Emory University	Dr. John L. Young, Jr. Dr. Jonathan M. Liff
University of Hawaii	Dr. Marc T. Goodman Dr. Laurence N. Kolonel
The Fred Hutchinson Cancer Research Center	Dr. Thomas L. Vaughan Dr. Steve Schwartz
University of Iowa	Dr. Charles F. Lynch Dr. Charles E. Platz
Wayne State University	Dr. Ann Schwartz Dr. Kendra Schwartz
University of New Mexico	Dr. Charles R. Key
University of Southern California	Dr. Ronald K. Ross Dr. Dennis Deapen Dr. Leslie Bernstein
University of Utah	Dr. Charles L. Wiggins

The production of this report would not have been possible without the efforts of the NCI staff who ensure the quality and completeness of the SEER data: Benjamin Hankey, Margaret Adamo, Limin Clegg, Milton Eisner, April Fritz, Carol Johnson, Carol Kosary, Denise Lewis, Barry Miller, Lynn Ries, Gopal Singh, and Elliott Ware of the Cancer Statistics Branch, and Brenda Edwards of the Surveillance Research Program.

Computer support services were provided by Information Management Services (IMS), Inc.

Special appreciation for database creation and programming support is given to Scott Depuy, Todd Gibson, and Steve Scoppa of IMS, Inc. Thanks are owed to Dr. Frank Boscoe for developing county maps.

Dr. Lihua Liu of the University of Southern California and Drs. Marsha E. Reichman and B. Sue Bell of NCI provided the peer review. Their thoughtful comments and critique are greatly appreciated.

Table of Contents

Foreword 1

Abstract 3

Highlights 5

Introduction 11

Data and Methods 15

Selecting an Area Socioeconomic Measure—The Poverty Rate 15

Socioeconomic and Demographic Characteristics of Area Poverty Groups 16

Computing Incidence and Mortality Rates for Area Poverty Groups 17

Computing Five-Year Cause-Specific Survival Rates for Area Poverty Groups 18

Statistical Significance and Suppression of Rates and Counts 18

Use of County Versus Census Tract Poverty Rates for U.S. Mortality and SEER Databases 19

Incidence and Mortality 25

All Cancers 25
- Trends in Mortality 25
- Cross-Sectional Patterns in Mortality 25
- Trends in Incidence 26
- Cross-Sectional Patterns in Incidence 26

Lung Cancer 26
- Trends in Mortality 26
- Cross-Sectional Patterns in Mortality 27
- Trends in Incidence 27
- Cross-Sectional Patterns in Incidence 27

Colorectal Cancer 28
Trends in Mortality 28
Cross-Sectional Patterns in Mortality 28
Trends and Cross-Sectional Patterns in Incidence 29

Prostate Cancer 29
Trends in Mortality 29
Cross-Sectional Patterns in Mortality 29
Trends and Cross-Sectional Patterns in Incidence 29

Female Breast Cancer 30
Trends in Mortality 30
Cross-Sectional Patterns in Mortality 30
Trends in Incidence 30
Cross-Sectional Patterns in Incidence 30

Cervical Cancer 30
Trends in Mortality 30
Cross-Sectional Patterns in Mortality 31
Trends in Incidence 31
Cross-Sectional Patterns in Incidence 31

Melanoma of the Skin 31
Trends in Mortality 31
Cross-Sectional Patterns in Mortality 31
Trends in Incidence 32
Cross-Sectional Patterns in Incidence 32

The Area Poverty and Cancer Incidence and Mortality Continuum 32

Stage of Disease at Diagnosis 69

The Summary Staging Classification 69

Area Socioeconomic and Racial/Ethnic Patterns in Early- and Late-Stage Cancer Diagnoses 69

Trends in Area Socioeconomic Gradients in the Stage Distribution 70

Treatment (Cancer-Directed Surgery) 87

Non-Small-Cell Lung Cancer, Stages I or II 87

Prostate Cancer, Localized or Regional Stage 87

Breast Cancer, Stages I or II, <= 2 cm 88

Survival 95

Area Socioeconomic and Racial/Ethnic Patterns in Survival, the 1988–1994 Patient Cohort 95

Trends in Survival from Cancers of the Prostate and Female Breast 96

Summary and Discussion 119

References 131

Tables

Table 2.1. Selected Socioeconomic and Demographic Characteristics of Area (Census Tract and County) Poverty Groups, 1990: United States and 11 SEER Registration Areas 24

Table 3.1. U.S. Site-Specific Cancer Deaths and Age-Adjusted Mortality Rates and 95% Confidence Intervals by Sex, Race/Ethnicity, and County Poverty Rate, 1995–1999 64

Table 3.2. SEER Site-Specific Cancer Incidence (Invasive) Cases and Age-Adjusted Incidence Rates and 95% Confidence Intervals by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1992: 11 SEER Registration Areas 66

Table 4.1. Distribution of SEER Site-Specific Cancer (Invasive) Cases by Stage, Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999: 11 SEER Registration Areas 86

Table 5.1. Number and Percentage of AJCC Stages I and II Non-Small-Cell Lung Cancer Patients Receiving Surgical Treatment by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999: 11 SEER Registration Areas 92

Table 5.2. Number and Percentage of Localized- and Regional-Stage Prostate Cancer Patients Undergoing Radical Prostatectomy by Age, Race/Ethnicity and Census Tract Poverty Rate, 1995–1999: 11 SEER Registration Areas 93

Table 5.3. Number and Percentage of AJCC Stages I and II Female Breast Cancer Patients With Tumor Size <= 2 cm Undergoing Breast-Conserving Surgery by Race/Ethnicity and Census Tract Poverty Rate, 1995–1998: 11 SEER Registration Areas 93

Table 6.1. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas 114

Table 6.2. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) for Localized-Stage Cancers by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas 115

Table 6.3. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) for Regional-Stage Cancers by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas 116

Table 6.4. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) for Distant-Stage Cancers by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas 117

Table 7.1. Correlations Among Poverty, Behavioral Factors, Cancer Screening, and Age-Adjusted Cancer Mortality Rates Using State-Level Data: United States, 1990–1999 (N = 51) 129

Foreword

This monograph presents one of the most comprehensive analyses yet on socioeconomic patterns in cancer incidence and outcomes in the United States. The extensive amount of data assembled in this report will be extremely useful in furthering our understanding of the relationship of socioeconomic status to the overall cancer burden as well as to the magnitude and causes of current social inequalities in cancer between major racial and ethnic groups in the United States. Documenting and monitoring the extent of socioeconomic inequalities in cancer incidence, mortality, disease stage, treatment, and survival remain central to cancer surveillance research in terms of generating hypotheses for population health research and the evidence for comprehensive population-based strategies for cancer prevention and control. This monograph is an excellent example of how linkage of census-based area measures with the national mortality and SEER databases can be used to track socioeconomic trends in cancer rates and to improve our capacity to monitor progress toward reducing the cancer burden among various segments of the U.S. population.

Disparities documented here are not necessarily the experience of each individual. Rather, they indicate differences in cancer incidence and outcomes among population groups or geographic areas that are stratified with respect to key social and economic resources, such as education, income, or poverty level. These group- or area-based differences in cancer may be related to a variety of factors, including the social and physical environment, health behaviors (smoking and diet being two main cancer-related behaviors), and health care.

This monograph also makes a significant contribution to the burgeoning literature on social determinants of health. Although the role of socioeconomic factors as determinants of such major chronic diseases as heart disease, stroke, diabetes, and respiratory diseases are well established, their relationship with cancer is less well studied. As shown here, the relationship between socioeconomic position and cancer is a complex one and varies according to cancer type and secular time. Despite overall improvements in mortality and patient survival, socioeconomic inequalities in cancer persist, but in some instances they may be changing direction, lessening or widening over time. Like other diseases and health outcomes, differences in cancer incidence, mortality, disease stage, and survival are shown to exist across the entire range of social hierarchy, not just between rich and poor, privileged and disadvantaged. It is hoped that the data and findings of this report will stimulate future research aimed at identifying major social, environmental, health care, behavioral, and biologic determinants underlying these cancer disparities.

I would like to congratulate my former colleagues at the National Cancer Institute for completing this important work, which highlights the value of the SEER program as a national resource. It is an exciting example of the kinds of results we can expect from an expanded perspective on what can be accomplished by surveillance research. I, with the authors, hope that this publication will be a major stimulus for innovative work by cancer researchers, novel insights by policy makers, and ultimately improvement of the public health.

Robert A. Hiatt, M.D., Ph.D.
Director of Population Sciences
UCSF Comprehensive Cancer Center
Professor of Epidemiology
UCSF School of Medicine
University of California, San Francisco

Abstract

Objectives. This report analyzes area socioeconomic differentials and trends in incidence, mortality, stage of disease, treatment, and survival for all cancers combined and for six major cancers (lung, colon/rectum, prostate, breast, uterine cervix, and melanoma of the skin) by sex and race/ethnicity in the United States.

Methods. County and census tract poverty rates from the 1990 census were linked to U.S. mortality, SEER cancer incidence, stage, treatment, and survival data from 1975 to 1999. Age-adjusted incidence and mortality rates were calculated for each area poverty group, and differences in rates were tested for statistical significance at the 0.05 level.

Results. Substantial area socioeconomic gradients in both incidence and mortality were observed for various cancers. The association between area socioeconomic position and cancer mortality changed markedly over the past 25 years. Socioeconomic inequalities in male lung and prostate cancer mortality widened, while those in colorectal and breast cancer mortality narrowed over time and even appear to have reversed in the late 1990s. There was a marked increase in incidence for breast cancer and melanoma of the skin in all socioeconomic groups, with a positive gradient remaining throughout the study period. Socioeconomic inequalities in cervical cancer also persisted against a backdrop of declining incidence and mortality rates. For each of the cancers considered, regardless of race/ethnicity, both men and women in high poverty areas (poverty rates 20% or higher) had substantially higher rates of late-stage cancer diagnosis and lower rates of cancer survival than those in low poverty areas (poverty rates less than 10%). Cancer survival rates for residents of higher poverty areas remained lower even after controlling for differences in stage. Residents of higher poverty areas were also less likely to receive preferred treatment for lung and breast cancers and to undergo radical prostatectomy.

Conclusions. Area socioeconomic differentials in cancer incidence and mortality vary substantially by sex, race/ethnicity, and time period. Area socioeconomic disparities may be associated with similar disparities in the distribution of smoking, diet, physical activity, cancer screening, and treatment. Area socioeconomic measures, when linked to cancer registration and vital statistics data, enhance cancer surveillance research and monitoring.

Key Words. SEER, cancer, incidence, mortality, survival, stage of disease, treatment, area-based measure, socioeconomic status, poverty, deprivation, health disparities, race/ethnicity.

Highlights

The Surveillance Research Program of the National Cancer Institute is pleased to release this monograph on area socioeconomic variations in cancer in the United States from 1975 through 1999. Cancer is the second leading cause of death after heart disease and is responsible for more estimated years of life lost than any other cause of death in the United States. Cancer as a disease also exacts an enormous toll in terms of financial costs of cancer care and emotional and psychological distress among people affected by it. As shown in this monograph, the cancer burden varies greatly among various ethnic and socioeconomic groups in the United States, and the magnitude of socioeconomic inequalities for some cancers may be widening over time. This monograph focuses on six major cancers—lung, colorectum, breast, prostate, uterine cervix, and melanoma of the skin—the cancers for which cancer control interventions have been introduced into the general population. The analysis of cancer rates and trends by socioeconomic characteristics may shed important light on the potential contribution of major cancer control efforts such as smoking reduction and cancer screening on reducing the cancer burden among the various segments of the U.S. population. Some of the highlights from the monograph are listed herein:

Monograph Data

- Incidence, stage, treatment, and survival data are from the 11 population-based SEER cancer registries that cover 14% of the U.S. population.

- For incidence trend analysis, 2.4 million newly diagnosed invasive cancer cases between 1975 and 1999 were used. Stage of disease analyses included 1.8 million invasive cancer cases diagnosed between 1988 and 1999.

- The analysis of patient survival included 442,415 men and 398,147 women who were diagnosed with primary invasive cancers during 1988–1994 and were followed for vital status through December 31, 1999.

- Mortality data are presented both for the SEER areas and the entire U.S. population.

- For mortality trend analysis, 6.3 million male cancer deaths and 5.5 million female cancer deaths occurring between 1975 and 1999 were used.

- The poverty rate, the percentage of the population below the poverty level, was used as the area socioeconomic measure and was derived from the 1990 decennial census at either the county or census tract level.

Incidence and Mortality

All Cancers

• Area socioeconomic gradients in all-cancer mortality among U.S. men widened between 1975 and 1999. In 1975, total male cancer mortality was only 2% greater in high poverty areas (county poverty rate of 20% or higher) than in low poverty areas (county poverty rate less than 10%). But in 1999, total cancer mortality among men was 13% greater in high poverty areas than in low poverty areas.

• Area socioeconomic patterns in all-cancer mortality among U.S. women reversed between 1975 and 1999. Compared to the rate for women in low poverty counties, the total cancer mortality rate for U.S. women in high poverty counties was 3% lower in 1975 but was 3% greater in 1999.

Lung Cancer

• The higher the county poverty rate, the greater the lung cancer mortality rate among U.S. men. However, area socioeconomic gradients in lung cancer mortality among U.S. men widened between 1975 and 1999. Compared to the rate for men in low poverty counties, the lung cancer mortality rate for U.S. men in high poverty counties was 7% greater in 1975 and 25% greater in 1999.

• Lung cancer incidence during 1988–1992 increased with increasing census tract poverty rate for non-Hispanic white and black men and women and Asian/Pacific Islander (API) men. In contrast, for Hispanic men and women, lung cancer incidence rates were higher in low poverty census tracts than in high poverty census tracts.

Colorectal Cancer

• Area socioeconomic patterns in colorectal cancer mortality among U.S. men and women reversed between 1975 and 1999. Compared to the rates in low poverty counties, the colorectal cancer mortality rates in high poverty counties were 12% lower in 1975 but at least 5% higher in 1999. Although colorectal cancer mortality showed a downward trend in all poverty groups, the reversal in patterns occurred largely as a result of a faster decline in mortality among men and women in low poverty counties.

• Colorectal cancer incidence was only weakly or inconsistently related to census tract poverty rate.

Prostate Cancer

• Prostate cancer mortality did not vary much by area poverty rates from 1975 through 1989. However, since 1990 there has been a widening of the area socioeconomic gradient, with men in high poverty counties in 1999 experiencing a 22% higher prostate cancer mortality rate than men in low poverty counties.

• The higher the census tract poverty rate, the lower the prostate cancer incidence during 1988–1992. Compared to the rates for their counterparts in high poverty census tracts, the prostate cancer incidence rates for non-Hispanic white, black, American Indian, API, and

Hispanic men were respectively 20%, 17%, 16%, 46%, and 48% higher in low poverty census tracts.

Female Breast Cancer

• Socioeconomic differences in U.S. female breast cancer mortality have narrowed over time and appear to have reversed in the late 1990s. Compared to the rate for women in low poverty counties, breast cancer mortality for women in high poverty counties was 15% lower in 1976 but 4% greater in 1999.

• Time trends in SEER female breast cancer incidence from 1975 to 1999 indicate consistently higher rates among lower poverty groups, with incidence rates increasing more rapidly in low poverty counties than in high poverty counties.

• The higher the census tract poverty rate, the lower the breast cancer incidence during 1988–1992. Compared to the rates for their counterparts in high poverty areas, the breast cancer incidence rates for non-Hispanic white, black, API, and Hispanic women were respectively 10%, 16%, 49%, and 50% higher in low poverty areas.

Cervical Cancer

• Although cervical cancer mortality decreased consistently for all county poverty groups between 1975 and 1999, socioeconomic inequalities in U.S. cervical cancer mortality did not diminish during this time period. In the 1990s, U.S. women experienced at least 71% higher cervical cancer mortality in high poverty counties than in low poverty counties.

• U.S. cervical cancer mortality increased with increasing area poverty for women in all racial/ethnic groups. During 1995–1999, American Indian and Hispanic women in high poverty counties had almost twice the cervical cancer mortality of their counterparts in low poverty counties. The cervical cancer mortality rates were respectively 45% and 37% higher for non-Hispanic white women and black women in high poverty counties than in low poverty counties.

• The SEER cervical cancer incidence rates also showed a downward trend for all county poverty groups during 1975–1999. However, a substantial socioeconomic gradient in cervical cancer incidence remained, with women in high poverty counties having at least a one-third higher incidence rate than those in low poverty counties throughout the study period.

• The higher the census tract poverty rate, the greater the cervical cancer incidence during 1988–1992. Compared to the rates for their counterparts in low poverty census tracts, the cervical cancer incidence rates for non-Hispanic white, black, American Indian, API, and Hispanic women were respectively 97%, 30%, 292%, 44%, and 83% higher in high poverty census tracts.

Melanoma of the Skin

• The higher the county poverty rate, the lower the U.S. mortality from melanoma of the skin. While mortality from melanoma of the skin showed an increasing trend between 1975 and 1999 for men in all county poverty groups, the trend was relatively stable for women.

• Between 1975 and 1999, the SEER incidence rates for melanoma of the skin increased two- to three-fold for men and women in all county poverty groups, with low poverty counties maintaining substantially higher incidence rates than high poverty counties throughout the study period.

• The higher the census tract poverty rate, the lower the incidence for melanoma of the skin during 1988–1992. The rates were respectively 2.7 and 3 times higher for men and women in low poverty census tracts than in high poverty census tracts.

Stage of Disease at Diagnosis

• For each of the cancers considered, men and women in high poverty areas (census tracts with poverty rates 20% or higher) had a higher percentage of late-stage cancer diagnoses than those in low poverty areas (census tracts with poverty rates less than 10%). Conversely, patients in low poverty areas were generally more likely to be diagnosed with early-stage (localized) cancers. These patterns generally held for each racial/ethnic group.

• The largest socioeconomic gradients occurred for patients diagnosed with distant-stage melanoma of the skin, distant-stage prostate cancer, and distant-stage female breast cancer. Compared to their counterparts in low poverty areas, men and women in high poverty areas were respectively 2.5 and 2.2 times more likely to be diagnosed with distant-stage melanoma of the skin. Patients in high poverty areas were respectively 1.9 and 1.7 times more likely to be diagnosed with distant-stage cancers of the prostate and female breast.

• The percentage of prostate cancers diagnosed at local or regional stage increased from 1988 through 1999 in all socioeconomic groups. A socioeconomic gradient persisted over the time period, with the lowest poverty group having the largest percentage of local/regional-stage cancers. This pattern coincides with the rising utilization of the prostate-specific antigen (PSA) test for prostate cancer screening since the late 1980s.

• The stage distribution of female breast cancer cases remained stable from 1988 to 1999. A consistent socioeconomic gradient is also apparent over this time period.

• Socioeconomic differences in the stage distribution for cervical cancer cases were large and consistent throughout the 1990s.

• The percentage of regional- or distant-stage melanoma diagnoses appeared to have increased during 1995–1999 among men in high poverty areas.

Treatment (Cancer-Directed Surgery)

• Men with stage I or II non-small-cell lung cancer showed a consistent area socioeconomic gradient in surgery rates for each racial/ethnic group; those in the lowest census tract poverty group (the highest SES group) had the highest likelihood of undergoing surgery. Among women, the socioeconomic gradient was apparent only for non-Hispanic whites.

• The lack of a consensus on the therapeutic management of prostate cancer leads to variations in practice that may be linked to both clinical and nonclinical factors. There were clear socioeconomic gradients in the frequency of prostatectomy for non-Hispanic white and black men aged under 70 years, with the highest surgery frequency occurring in the lowest poverty group.

• The percentage of black patients receiving radical prostatectomy was the lowest among the four racial/ethnic groups within each area poverty group. There was no clear socioeconomic pattern in the frequency of surgery for Asian/Pacific Islander men.

• Among women diagnosed during 1995–1999 with stage I or II breast cancers, 2 cm or less in diameter, there was a consistent socioeconomic gradient in the percentage receiving breast-conserving surgery (BCS). BCS was most commonly performed in low poverty census tracts (high SES areas), and this relationship held for each racial/ethnic group.

• The percentage of women receiving BCS increased steadily in each socioeconomic group over the period 1988–1998, although women in the lowest poverty group consistently showed the highest levels of BCS.

Survival

• For all cancers combined as well as for the individual cancers considered, both men and women in high poverty areas (census tracts with poverty rates 20% or higher) generally had lower rates of cancer survival than those in low poverty areas (census tracts with poverty rates less than 10%).

• Among men diagnosed with cancer between 1988 and 1994, the five-year survival rate for all cancers combined was 61% in low poverty areas but only 49% in high poverty areas.

• Among women diagnosed with cancer between 1988 and 1994, the five-year survival rate for all cancers combined was 63% in low poverty areas and only 53% in high poverty areas.

• The pattern of lower cancer survival associated with higher poverty levels held for each racial/ethnic group except American Indians/Alaska natives. For example, for black men diagnosed with cancer between 1988 and 1994, the five-year survival rate for all cancers combined was 58% in low poverty areas and only 45% in high poverty areas.

• Among women diagnosed with breast cancer between 1988 and 1994, five-year survival was 86% for those in low poverty areas and only 78% for those in high poverty areas. Large socioeconomic differentials in survival were also observed for melanoma of the skin and for colorectal, prostate, and cervical cancers.

• For all cancers combined and for many types of cancer, significant racial/ethnic differences in cancer survival remained within each area poverty group. However, racial/ethnic differences in survival were substantially reduced after controlling for stage of disease at diagnosis. For example, for non-Hispanic white and black women diagnosed with breast cancer (all stages combined) between 1988 and 1994 in high poverty census tracts, the five-year survival rates were 82% and 72% respectively. However, among women diagnosed with localized-stage breast cancer in high poverty census tracts, the five-year survival rate was 94% for non-Hispanic white women and 90% for black women.

• Socioeconomic gradients in cancer survival were generally most pronounced for regional-stage disease. For example, the five-year survival rates for women diagnosed with regional-stage breast cancer were 80% among those living in low poverty census tracts and 71% for those in high poverty census tracts. Socioeconomic differences in survival were also substantial for localized-stage lung cancer and distant-stage cervical cancer.

• Five-year survival rates for all cancers combined improved between 1988 and 1994 for men in all area poverty groups, although substantial socioeconomic differences remained. Trends in overall cancer survival among women remained stable between 1988 and 1994, with women in higher poverty areas experiencing significantly lower cancer survival throughout the period.

• Prostate cancer survival improved between 1988 and 1994 for men in all area poverty groups, with socioeconomic inequalities diminishing slightly because of somewhat larger gains in survival among men in high poverty areas.

• Socioeconomic differentials in female breast cancer survival appear to be relatively unchanged between 1988 and 1994, with little or no improvement in survival among women in each area group.

Introduction

Since the launching of the national initiative in disease prevention and health promotion *Healthy People 2000* more than a decade ago, socioeconomic inequalities in health and disease in the United States have been documented with increasing frequency. This health initiative presented a national strategy for reducing health disparities among Americans. The current initiative, *Healthy People 2010*, has taken an even bolder step, calling for the elimination of health disparities among racial/ethnic and socioeconomic groups during this decade (1).

Socioeconomic characteristics have long been studied in relation to health, disease, and mortality differentials in the United States as well as in other industrialized countries (2–12). Individuals of lower socioeconomic status (SES) or geographic areas with higher levels of socioeconomic disadvantage have generally been associated with poorer health than their more advantaged counterparts (2–14). The relationship between SES and health, both at the individual and area levels, is not simply confined to the difference between the most and least disadvantaged strata. Rather, a social gradient exists, implying that as we move along the socioeconomic continuum or the deprivation scale, we tend to observe a corresponding improvement or deterioration in health (4,5,13,14). Cancer incidence and mortality have also been associated with both individual- and area-level socioeconomic position, although the pattern of association varies for specific cancers (15–38). Moreover, socioeconomic patterns for some cancers can change substantially over time (16–17). Contemporary data indicate that higher SES is consistently associated with lower incidence or mortality rates of lung, stomach, cervical, esophageal, oropharyngeal, and liver cancer and higher rates of breast cancer and melanoma (18,20–23,25,27,31,34–36). Current research also indicates consistently higher rates of advanced stage of cancer at diagnosis (39–42) and lower rates of survival among cancer patients of lower socioeconomic position or among patients residing in more disadvantaged areas (43–44). Furthermore, the major behavioral, environmental, and health care determinants of cancer, such as smoking, diet, alcohol use, reproductive behavior, occupational and environmental exposures, and cancer screening are themselves substantially influenced by individual- and area-level socioeconomic factors (7,18,45–51).

Documenting socioeconomic disparities in cancer is important for several reasons (13,52,53). First, estimating the cancer-related health disparities between the least and most advantaged socioeconomic groups can tell us about the extent to which improvements in specific cancer outcomes can be achieved in a given population. Second, presenting cancer statistics according to socioeconomic factors can help identify socioeconomic groups or areas

that are at greatest risk of cancer morbidity, mortality, or poor survival and that may therefore benefit from focused social and medical interventions. Third, analysis of such data may provide important insights into cancer rates and trends, particularly with regard to the impact of cancer control interventions that are known to vary by socioeconomic characteristics (16,17). Fourth, although socioeconomic factors may not be direct determinants of cancer, they may represent underlying factors that (1) create conditions that give rise to risk factors such as smoking, alcohol use, fatty diet, lack of physical activity, and environmental exposures to carcinogens, and (2) influence health care accessibility and use (such as cancer screening and treatment) that may be more directly linked to cancer mortality and survival (13,53). An understanding of the extent and causes of socioeconomic inequalities in cancer incidence, mortality, and survival is therefore crucial to the development and implementation of a comprehensive and effective strategy for cancer control and prevention and for general health improvement (13,18).

Individual-level data on key socioeconomic variables, such as educational attainment, occupation, and income, are not available for cancer patients in the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database (16,54–56). Reliable socioeconomic data are also lacking on U.S. death certificates, which provide the basis for computing cancer mortality rates for various demographic groups and geographic areas (16,17,57). Consequently, population-based surveillance studies of cancer incidence, mortality, and patient survival in the U.S. have mostly relied on ecological SES data linked to both individual- and aggregate-level cancer data.

In this report, we focus on all cancers combined and six major cancers: lung and bronchus, colon/rectum, breast, prostate, uterine cervix, and melanoma of the skin. These are not only among the most commonly diagnosed cancers, but most are also leading causes of cancer mortality in the United States (55,57–59). Taken together, these six cancers accounted for 53% of all cancer deaths in the U.S. in 1999 and 62% of all new cancer cases diagnosed in 1999 in the 11 SEER registration areas (55,57). These are also the cancers for which cancer control interventions have been introduced into the general population (16).

In this report, we use "the percentage of population below the poverty level" as the area socioeconomic measure, our primary covariate of interest. We link this area measure to the U.S. cancer mortality data using the county of residence of the decedent and to the cancer incidence data from the 11 population-based SEER cancer registries using the county and census tract residence of the cancer patient at the time of diagnosis. We examine the extent to which socioeconomic differentials in cancer outcomes vary by race/ethnicity and sex. Where possible, we present socioeconomic differentials separately for specific racial/ethnic groups. This allows one to assess how the impact of area socioeconomic position on cancer varies according to race/ethnicity and the extent to which racial/ethnic differences in cancer may be accounted for by differences in area SES.

The results in this report have been organized into four sections: incidence and mortality, stage of disease at diagnosis, treatment (cancer-directed surgery), and survival. These sections contain interpretive and analytic text and graphical presentations of the most important data and findings, followed by detailed tables. Wherever possible, both temporal patterns and recent cross-sectional data are presented. Data are first analyzed for mortality and incidence rates because variations in cancer mortality rates could logically be interpreted in terms of variations in incidence rates, stage distribution, treatment, and survival rates.

Data and Methods

Selecting an Area Socioeconomic Measure—The Poverty Rate

A variety of socioeconomic variables at the ecological level, such as poverty rate, median family income, percentage of population with at least a high school education, percentage employed in white collar occupations, unemployment rate, housing tenure, household crowding, and automobile ownership, as well as composite indices that combine some or all of these variables, have been used to analyze area socioeconomic inequalities in cancer outcomes (16,17,21–23,25,26,28,30,34,36,39–42). These single and composite area measures are generally taken to represent important aspects of the social environment—such as economic deprivation, social inequality, resource availability, opportunity structure, or living conditions (6,16,17,34,60).

Although all of the above variables are useful in describing socioeconomic inequalities in cancer, the poverty rate (the percentage of population below the poverty level) was chosen as the preferred area measure for a variety of reasons. In the United States, the poverty rate refers to the percentage of families or individuals classified as being below the official poverty threshold. The poverty thresholds are updated annually by the U.S. Bureau of the Census to reflect changes in the Consumer Price Index. In the 1990 decennial census, the official poverty threshold for a family of four was $12,674, and 12.8% of the U.S. population was below this poverty threshold (61,62). The poverty rate is a measure of economic deprivation and an uneven distribution of economic resources in a given population. It also correlates highly with other measures of socioeconomic position and deprivation, such as educational attainment, unemployment rate, and occupational composition. For example, for the U.S. as a whole, the weighted correlation coefficients of the 1990 county poverty rate with other socioeconomic variables were as follows: percentage of population with at least a high school education (–0.73), median family income (–0.77), percentage of population in white collar occupations (–0.43), and unemployment rate (0.78). The corresponding national correlations at the census tract level were –0.67, –0.66, –0.51, and 0.72. Similar county- and census tract-level correlations were also observed for the combined 11 SEER registration areas. Moreover, poverty rate had one of the largest relative weights in generating a composite area socioeconomic index for the U.S. (16,17).

Yet another advantage for choosing poverty rate as an area measure is that a priori cutpoints may be specified based on prior empirical research and policy relevance (21). The following cutpoints for poverty rate were selected: < 10%, 10%–19.99%, ≥ 20%. Areas

with a poverty rate of 20% or higher are often considered to be distressed or severely disadvantaged areas. For other area variables, quintiles or quartiles of a distribution that classify an equal number of areas or an equal amount of population into the given categories are measures generally used to denote cutpoints. Although quintiles and quartiles are useful statistical categories, they are intrinsically less meaningful from a programmatic and policy standpoint than the aforementioned poverty categories.

In all of the analyses, the poverty rate is measured at either the county or census tract level and is derived from the 1990 decennial census. Figures 2.1–2.3, pages 20–22, show respectively the county-level distribution of poverty rate, median family income, and percentage of population with at least a high school diploma in 1990, indicating a fairly similar geographic distribution of socioeconomic disadvantage in the U.S. The socioeconomic classification of counties based on the 1990 poverty rate is also temporally stable for the study period 1975–1999 in that the 1990 poverty rate is highly correlated with the 1980 rate (r = 0.91 for the U.S. and 0.90 for the SEER regions). Similar associations were observed when the three-category poverty variable was compared in 1990 and 1980 (γ = 0.94 for the U.S. and 0.91 for the SEER regions; Figures 2.1 and 2.4, pages 20 and 23).

Socioeconomic and Demographic Characteristics of Area Poverty Groups

Table 2.1, page 24, shows the distribution of selected sociodemographic characteristics across the three area poverty groups in 1990. For the U.S. as a whole, 13% of the population lived in counties with poverty rates of 20% or more and 31% of the population lived in counties with a poverty rate of less than 10%. However, the population distribution varied substantially by race/ethnicity. Whereas 27% of blacks, 31% of American Indians/Alaska natives, and 21% of the Hispanic population lived in counties with poverty rates of 20% or more, only 7% of Asians and Pacific Islanders and 10% of non-Hispanic whites were represented in the highest poverty county group. The three poverty groups also varied substantially in terms of median family income, concentration of high school and college graduates, white collar employment, and unemployment rate. Also, the high poverty county group had a higher proportion of rural population than the low poverty county group.

Taken together, the 11 SEER registration areas were somewhat more well off than the total U.S. population. Eight percent of the SEER population lived in high poverty counties and 43% of the SEER population lived in low poverty counties, as compared with 13% and 31% respectively of the U.S. population. Moreover, the SEER county poverty groups did not differ much in their urbanization levels.

The area poverty groups for the 11 SEER registries based on census tracts differed from those based on counties in that a higher

proportion of the population was concentrated in the high poverty census tract group than in the high poverty county group (18% vs. 8%). Moreover, more than 40% of the black, American Indian/Alaska native, and Hispanic population lived in census tracts with a poverty rate of 20% or higher, as compared with 23%, 32%, and 6% respectively of the black, American Indian/Alaska native, and Hispanic populations living in counties with a poverty rate of 20% or higher. Income, education, occupation, and unemployment differentials between area poverty groups were also greater for census tracts than for counties.

Computing Incidence and Mortality Rates for Area Poverty Groups

To compute cancer incidence and mortality rates, three categories of area poverty rate were used to classify all U.S. counties, SEER counties, and SEER census tracts into three population groups, which ranged from being the least disadvantaged (richest) to the most disadvantaged (poorest) area group. While the county geocode in the national mortality database refers to the residence of the decedent at the time of cancer death (57), the county or census tract geocode in SEER relates to the place of residence at the time of cancer diagnosis (63).

The analysis of census tract-level socioeconomic patterns in incidence were based on 379,070 men and 347,245 women newly diagnosed with invasive cancers between January 1, 1988, and December 31, 1992, in 11 population-based SEER cancer registries (55). The analysis of census tract-level socioeconomic patterns in stage of disease were based on 942,839 men and 881,216 women diagnosed with invasive cancers between January 1, 1988, and December 31, 1999. The 11 SEER registries cover about 14% of the total U.S. population and include the states of Connecticut, Hawaii, Iowa, New Mexico, and Utah, and the metropolitan areas of Atlanta, Detroit, Los Angeles, San Francisco and Oakland, San Jose and Monterey, and Seattle. For the analysis of temporal county-level socioeconomic patterns in cancer incidence, data from 9 SEER registries (excluding Los Angeles and San Jose/Monterey from the above list) were used, which consisted of 1,210,279 male and 1,153,028 female incidence cases during the 1975–1999 time period. All analyses of SEER data were based on the November 2001 data submission (55). Demographic and medical variables from the SEER database used in this report included age at diagnosis, sex, race/ethnicity, county and census tract of residence, stage of disease at diagnosis, therapy/treatment (cancer surgery), survival time (months) and vital status, and year of diagnosis (63).

The analysis of mortality trends was based on 6,277,958 male and 5,516,968 female cancer deaths drawn from the annual national mortality data files from 1975 through 1999. Age-sex-race-county-specific population estimates from 1975 to 1999 served as denominators for computing cancer mortality rates and county-based poverty-specific incidence rates over time (64). Age-sex-race-census tract-specific decennial census populations in 1990, multiplied by 5, served as denominators for computing average annual

cancer incidence rates for the 1988–1992 time period (65). Of the 11.8 million U.S. cancer deaths and 2.36 million newly diagnosed cancers cases from 9 SEER registries between 1975 and 1999, 12 cancer deaths and 231 cancer incidence cases could not be matched with the county poverty rate because of missing or invalid county geocode. Of the 1.82 million invasive cancer cases diagnosed in 11 SEER registries during 1988–1999, 2.57% (46,904) had missing census tract information and hence could not be linked to the area poverty rate. The proportion of cancer cases with missing census tract data was somewhat higher among men than among women (2.81% vs. 2.32%) and among American Indians/Alaska natives (6.37%), Asian and Pacific Islanders (4.76%), Hispanics (3.17%), and non-Hispanic whites (2.17%) than among blacks (1.32%). The higher proportion of American Indian/Alaska native and API cases with missing data was due to a higher proportion of cases with unknown census tracts in the New Mexico, San Jose/Monterey, and Hawaii registries, which have a substantially higher concentration of the American Indian and API populations respectively. However, the cancer cases with and without census tract codes were similar in their age distribution, nativity and marital status composition, stage, and year of diagnosis.

Incidence and mortality rates for each area poverty group were age-adjusted by the direct method using the age composition of the 2000 U.S. standard population and five-year age-specific cancer incidence and mortality rates (55). While trends in mortality rates for the U.S. are presented on an annual basis, trends in SEER incidence and mortality are analyzed as three-year moving average rates. The moving average smoothing technique allows the identification of a trend more clearly by reducing some of the variability associated with the small populations represented in the SEER annual rates.

Computing Five-Year Cause-Specific Survival Rates for Area Poverty Groups

The analysis of patient survival included 442,415 men and 398,147 women (with known census tract poverty rates) in 11 SEER registries who were diagnosed with primary invasive cancers during 1988–1994 and were followed for vital status through December 31, 1999. Five-year cause-specific survival rates were computed for each poverty group. Survival times were measured in months. The patients lost to follow-up, those alive at the end of the five-year follow-up, and those dying of causes other than the underlying cancer during the follow-up period were treated as censored observations (66). Cancer patients who died of unknown causes, those whose initial diagnosis was found on the death certificate or at autopsy, and those who were not being actively followed were excluded from the analysis.

Statistical Significance and Suppression of Rates and Counts

Socioeconomic gradients were generally described in terms of relative incidence and mortality rate ratios. Rate ratios and differences in rates were tested for statistical significance at

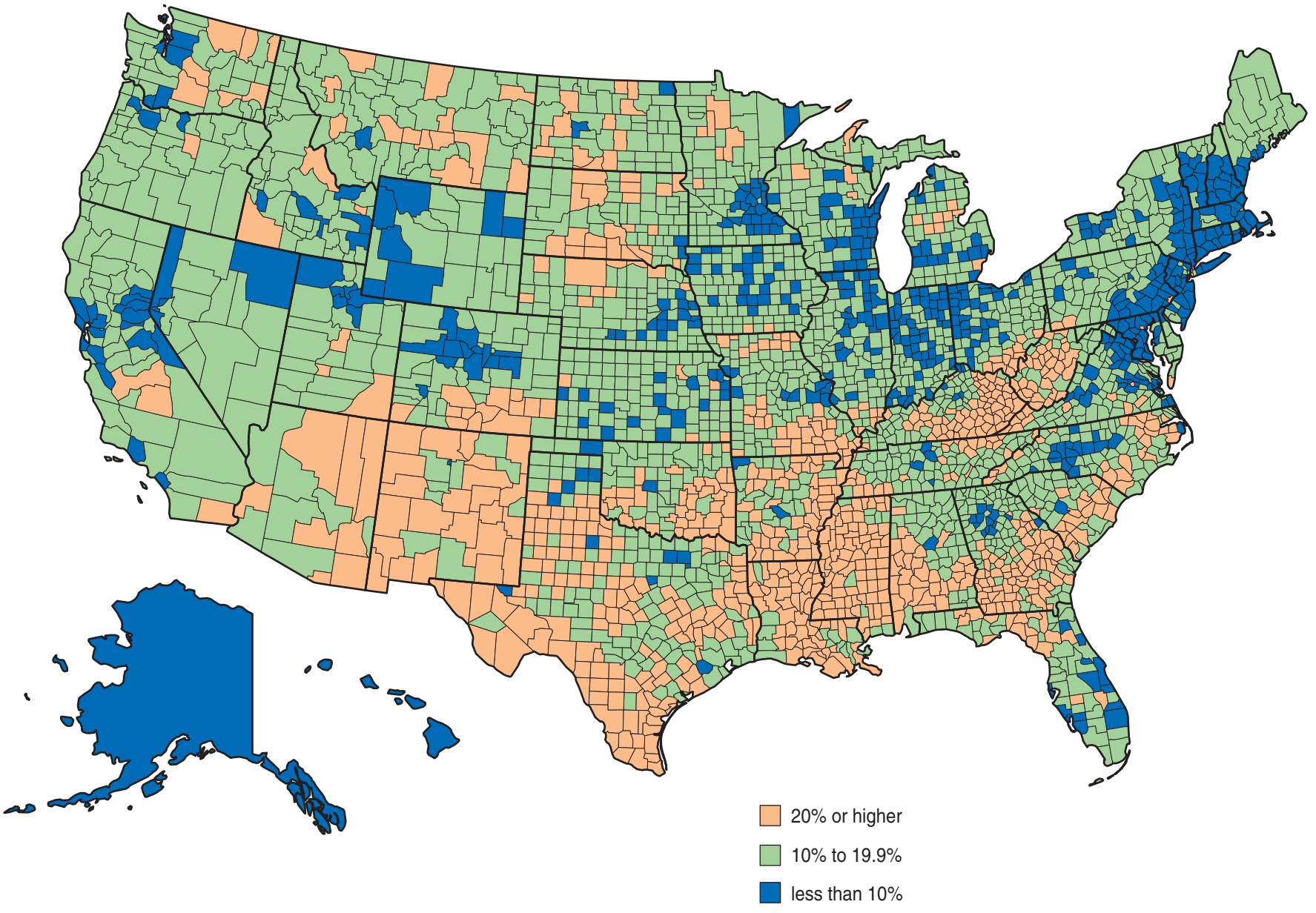
the 0.05 level (54,55). In all analyses, the lowest area poverty group was selected as the reference category. When the number of incidence cases or deaths used to compute incidence or mortality rates are small, those rates tend to have poor reliability. Therefore, to discourage misinterpretation and misuse of rates or counts that are unstable and to protect confidentiality of cancer patients and decedents because of the small numbers of cases or deaths, incidence and mortality rates as well as case and death counts are not shown in tables and figures if the case or death counts are fewer than 16. A case or a death count of less than approximately 16 results in a standard error of the incidence or mortality rate that is approximately 25% or more as large as the rate itself. Equivalently, a case or death count of less than approximately 16 results in the width of the 95% confidence interval around the rate being at least as large as the rate itself. These relationships were derived under the assumption of a Poisson process and with the standard population age distribution close to the observed population age distribution (67). Because of the small numbers of cases and the above criteria for rate reliability, stage, treatment, and survival analyses for American Indians/Alaska natives are deemed unreliable and are generally not presented in this report.

Use of County Versus Census Tract Poverty Rates for U.S. Mortality and SEER Databases

Counties are far more heterogeneous in their socioeconomic and demographic composition than smaller geographic areas such as census tracts, zip codes, or block groups (16). As such, census tracts are preferable to counties for the purposes of classifying areas into socioeconomic groups and for examining area socioeconomic patterns in health outcomes, especially over a relatively short time horizon. For confidentiality protection of individual information on death certificates, however, the national mortality database does not include data for geographic areas smaller than counties. Therefore, for all analyses of temporal and cross-sectional mortality data, the county-level poverty rate was used.

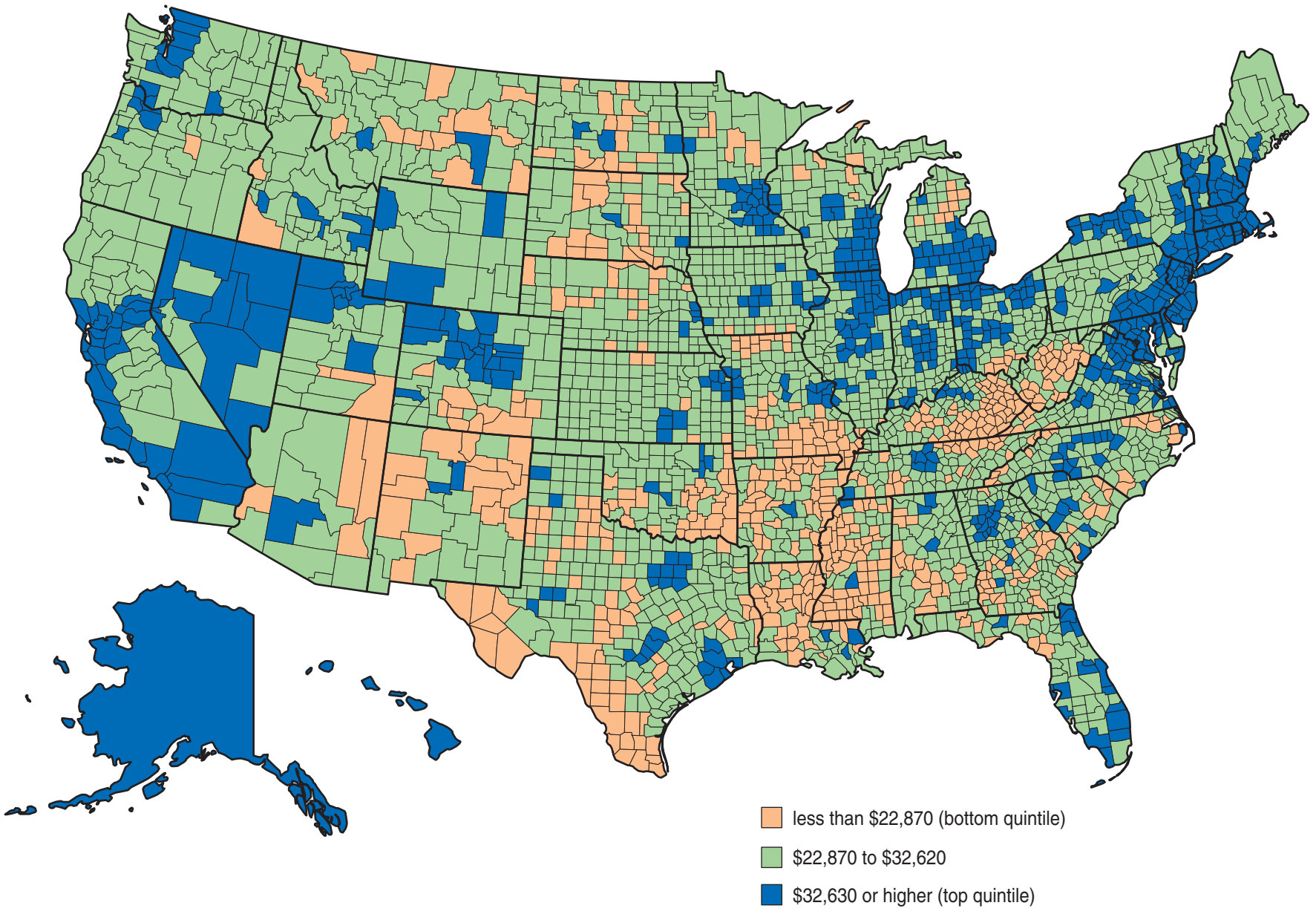
The SEER database, on the other hand, contained the county geocode from 1975 to 1999 and the census tract geocode from 1988 to 1999. Therefore, for the SEER incidence trend analyses from 1975 through 1999, the county poverty rate was used. However, for cross-sectional racial/ethnic and socioeconomic patterns in cancer incidence for the 1988–1992 period, the census tract poverty rate was used. Socioeconomic patterns in SEER cancer incidence, using the census tract poverty rate, could not be assessed for a more recent time period or in a temporal fashion because of a lack of relevant population denominator data at the census tract level. All stage, treatment, and survival analyses in this report involved the use of numerator-based SEER data; hence, for both temporal and cross-sectional analyses, the census tract poverty rate was used.

Figure 2.1. Percentage of County Population Below Poverty Level, United States, 1990



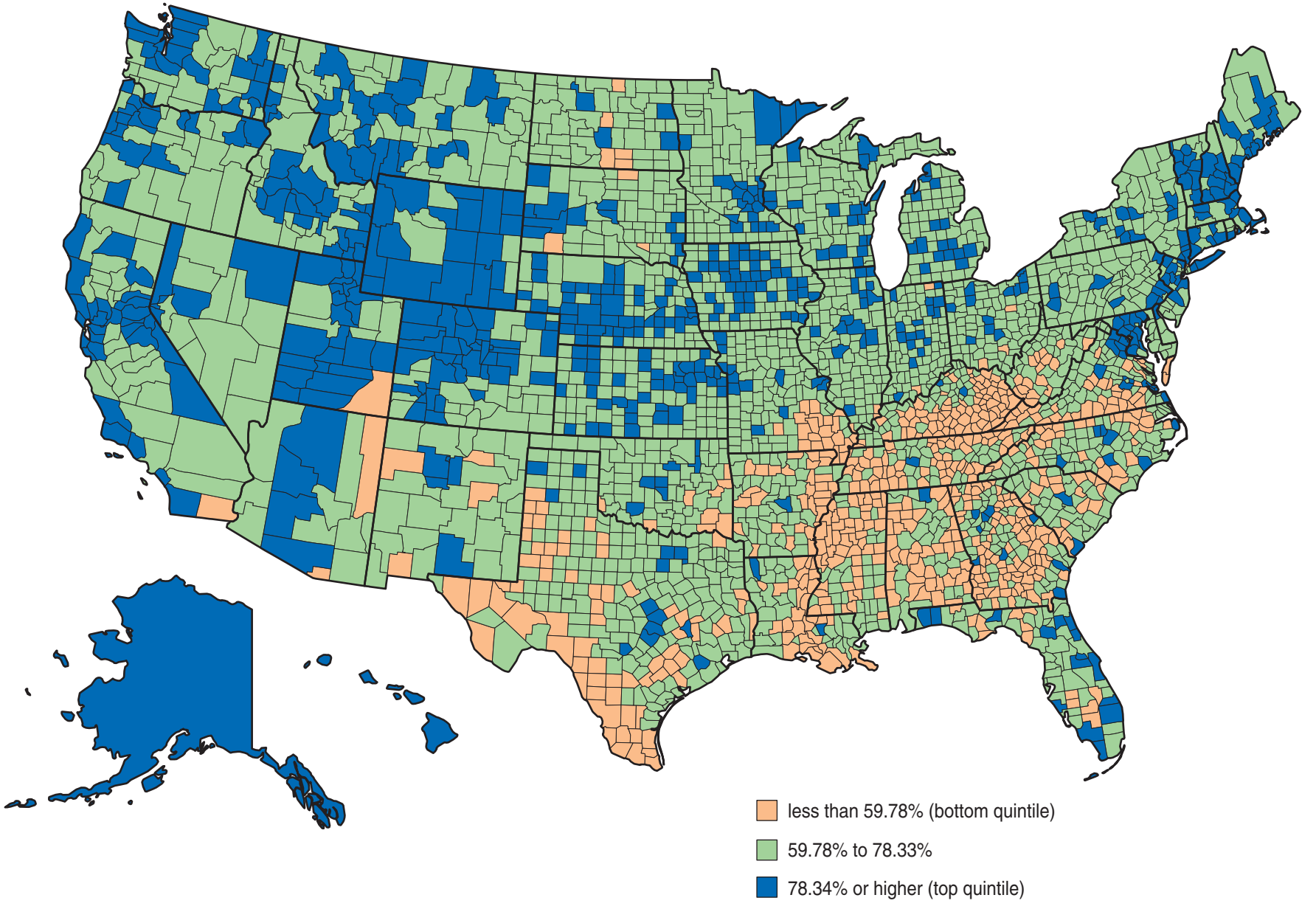
Source: U.S. Bureau of the Census. Data for Alaska and Hawaii are shown at the state level.

Figure 2.2. Median Family Income by County, United States, 1990



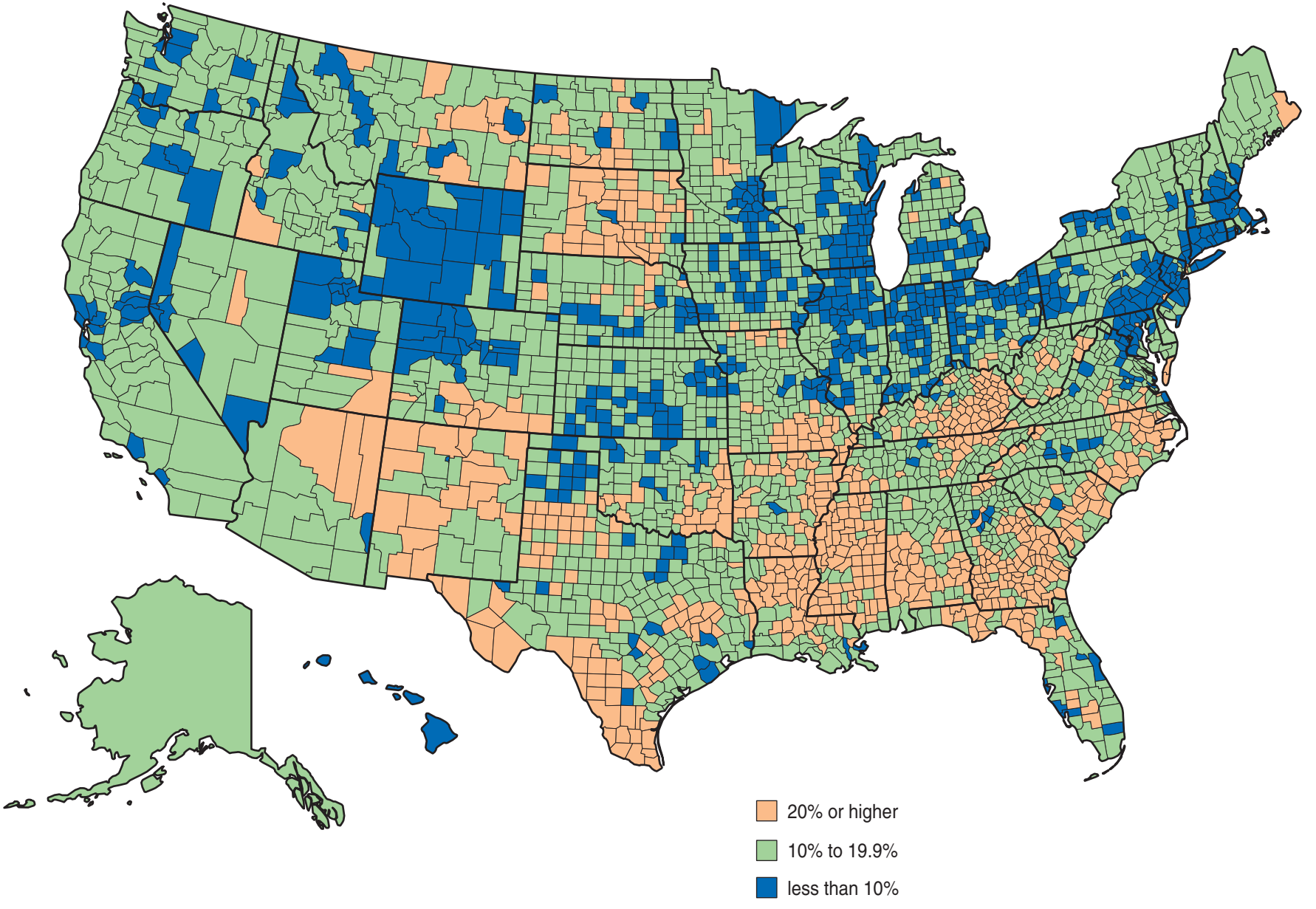
Source: U.S. Bureau of the Census. Data for Alaska and Hawaii are shown at the state level.

Figure 2.3. Percentage of Population With at Least a High School Diploma, United States, 1990



Source: U.S. Bureau of the Census. Data for Alaska and Hawaii are shown at the state level.

Figure 2.4. Percentage of County Population Below Poverty Level, United States, 1980



Source: U.S. Bureau of the Census. Data for Alaska and Hawaii are shown at the state level.

Table 2.1. Selected Socioeconomic and Demographic Characteristics of Area (Census Tract and County) Poverty Groups, 1990: United States and 11 SEER Registration Areas

Area Poverty Rate (% Population Below Poverty Level)	% Total Population	% Non-Hispanic White Population	% Black Population	% American Indian Population	% Asian & Pacific Islander Population	% Hispanic Population	% Population Age Group < 25 Years	% Population Age Group 65+ Years	% High School Diploma or More	% College Graduates	% White Collar Occupation	Median Family Income ($)	Unemployment Rate (%)	% Urban Population
United States County Poverty Rate														
Less than 10%	31.17	35.08	16.72	18.69	40.82	17.54	34.99	11.87	81.42	24.90	62.41	44,555	4.63	78.39
10% to 19.99%	55.76	54.70	56.15	49.94	51.86	61.80	36.51	12.84	74.44	18.94	56.10	33,765	6.56	76.04
20% or higher	13.06	10.22	27.13	31.37	7.32	20.66	38.74	13.04	63.43	14.92	51.41	25,447	9.71	64.07
Total	100.00	100.00	100.00	100.00	100.00	100.00	36.12	12.54	75.20	20.30	58.10	35,338	6.30	75.20
11 SEER Registration Areas County Poverty Rate														
Less than 10%	43.44	52.14	27.83	23.55	49.81	18.72	35.09	11.01	83.06	27.42	64.91	46,058	4.70	88.50
10% to 19.99%	48.30	40.97	49.00	44.40	49.36	75.37	37.75	10.93	74.78	22.90	59.18	39,035	6.66	90.20
20% or higher	8.27	6.89	23.17	32.25	0.83	5.91	38.73	12.17	69.39	13.91	53.76	34,099	11.75	87.39
Total	100.00	100.00	100.00	100.00	100.00	100.00	36.99	11.04	78.00	24.30	61.70	39,035	6.20	89.20
11 SEER Registration Areas Census Tract Poverty Rate														
Less than 10%	59.28	72.55	24.96	29.42	60.22	28.31	33.72	11.42	85.03	29.32	67.13	48,077	4.27	86.65
10% to 19.99%	22.90	20.41	25.58	23.03	23.75	31.06	38.46	11.48	73.53	17.39	52.50	32,041	7.01	80.82
20% or higher	17.82	7.04	49.46	47.54	16.03	40.66	45.69	9.02	56.31	11.05	43.50	21,458	14.85	91.20
Total	100.00	100.00	100.00	100.00	100.00	100.00	36.99	11.04	78.00	24.30	61.70	40,112	6.20	89.20

Notes: The 11 SEER registries include the states of Connecticut, Hawaii, Iowa, New Mexico, and Utah, and the metropolitan areas of Atlanta, Detroit, Los Angeles, San Francisco and Oakland, San Jose and Monterey, and Seattle. Median family income for each area group is the weighted median of the county or census tract median family income values.

Incidence and Mortality

Incidence and mortality rates are the two most commonly used measures for assessing the cancer burden in the general population. As shown below, the association between area socioeconomic position and cancer mortality in particular has changed markedly over the past 25 years, and the relationship between area socioeconomic position and incidence or mortality varies among the major racial/ethnic groups in terms of magnitude and sometimes in direction. While variations in cancer incidence may occur primarily through behavioral and environmental mechanisms, differences in mortality rates may represent the cumulative effects of health-risk behaviors, social and environmental factors, health care access, and medical care services. Data are first presented for mortality and then for incidence because mortality data pertain both to the entire U.S. and SEER regions, whereas incidence data are limited to the SEER regions.

All Cancers

Trends in Mortality

Area socioeconomic gradients in all-cancer mortality among U.S. men widened between 1975 and 1999 (Figure 3.1, page 33). In 1975, total male cancer mortality was only 2% greater in high poverty areas (county poverty rate of 20% or higher) than in low poverty areas (county poverty rate less than 10%). But in 1999, total cancer mortality among men was 13% greater in high poverty areas than in low poverty areas. Although temporal socioeconomic gradients in all-cancer mortality among men in the SEER regions were less consistent than those for the U.S. as a whole, all-cancer mortality among men in the SEER regions was at least 9% greater in high poverty areas than in low poverty areas throughout the study period (Figure 3.2, page 33).

Area socioeconomic patterns in all-cancer mortality among U.S. women reversed between 1975 and 1999 (Figure 3.3, page 34). Compared to the rate for women in low poverty areas, the total cancer mortality rate for U.S. women in high poverty areas was 3% lower in 1975 but 3% greater in 1999. Temporal socioeconomic patterns in all-cancer female mortality in the SEER regions differed from those for the U.S. as a whole. The differential in the mortality rates between the low and high poverty areas in the SEER regions remained stable throughout the 1980s and 1990s, with women in high poverty areas experiencing at least 4% higher mortality than those in low poverty areas (Figure 3.4, page 34).

Cross-Sectional Patterns in Mortality

During 1995–1999, area socioeconomic gradients in total cancer mortality among U.S. men were most pronounced for Hispanics

(Table 3.1, page 64, and Figure 3.5, page 35). Total cancer mortality was 45% higher for Hispanic men in high poverty areas than in low poverty areas. The rates for non-Hispanic white men, black men, and for the total U.S. male population were respectively 9%, 10%, and 15% higher in high poverty areas than in low poverty areas. The gradient was in the opposite direction for API men, whose cancer mortality rate was 13% lower in high poverty areas than in low poverty areas.

During 1995–1999, area socioeconomic gradients in total cancer mortality among U.S. women were most pronounced for Hispanics (Table 3.1, page 64, and Figure 3.6, page 35). Total cancer mortality was 35% higher for Hispanic women in high poverty areas than in low poverty areas. For non-Hispanic white women and for the total U.S. female population, the rates were respectively 2% and 3% higher in high poverty areas than in low poverty areas. The gradient was in the opposite direction for API women, whose cancer mortality rate was 14% lower in high poverty areas than in low poverty areas.

Trends in Incidence

Trends in SEER male cancer incidence did not reveal consistent socioeconomic gradients. However, during the 1980s and 1990s, the incidence rate for men in high poverty counties was at least 3% greater than the rate for men in low poverty counties (Figure 3.7, page 36). As for trends in SEER female cancer incidence by county poverty levels, the patterns were less consistent during the 1980s. However, in the mid-1970s and late 1990s, higher female cancer incidence rates were associated with lower poverty levels (Figure 3.8, page 36).

Cross-Sectional Patterns in Incidence

During 1988–1992, when census tract-level poverty information could be used, SEER total cancer incidence rates increased with increasing area (census tract) poverty rate for non-Hispanic white and black men but decreased for Hispanic men (Table 3.2, page 66, and Figure 3.9, page 37). The total cancer incidence rates for non-Hispanic white and black men were respectively 11% and 7% higher in high poverty areas (census tracts) than in low poverty areas. The total cancer incidence rate for Hispanic men was 28% higher in low poverty areas than in high poverty areas.

During 1988–1992, SEER total cancer incidence rates decreased with increasing area (census tract) poverty rate for all women and for API and Hispanic women (Table 3.2, page 66, and Figure 3.10, page 37). The cancer incidence rates for the total female population and for API and Hispanic women were respectively 10%, 14%, and 22% higher in low poverty areas (census tracts) than in high poverty areas.

Lung Cancer

Trends in Mortality

Area socioeconomic gradients in lung cancer mortality among U.S. men increased between 1975 and 1999 (Figure 3.11, page 38). Compared to the rate for men in low poverty

areas, the lung cancer mortality rate for U.S. men in high poverty areas was 7% greater in 1975 and 25% greater in 1999. Temporal socioeconomic patterns in male lung cancer mortality in the SEER regions differed from those for the U.S. as a whole. The differential in the mortality rates between the low and high poverty areas in the SEER regions remained stable throughout 1975–1999, with men in high poverty areas experiencing at least 18% higher mortality than men in low poverty areas (Figure 3.12, page 38).

In 1975, U.S. women in high poverty areas had a 7% lower lung cancer mortality rate than those in low poverty areas. But the area socioeconomic differences diminished in the 1990s, and the 1999 data indicate no statistically significant differentials between the area poverty groups (Figure 3.13, page 39). Temporal socioeconomic patterns in female lung cancer mortality in the SEER regions, however, differed from those for the U.S. as a whole. The rate was highest in the counties with poverty rates exceeding 20%, followed by counties with poverty rates less than 10%, with counties with poverty levels between 10% and 20% having the lowest rates (Figure 3.14, page 39).

Cross-Sectional Patterns in Mortality

During 1995–1999, lung cancer mortality among U.S. men increased with increasing area poverty rates for non-Hispanic whites, blacks, and Hispanics, but did not change significantly with poverty rates for APIs (Table 3.1, page 64, and Figure 3.15, page 40). The lung cancer mortality rates were respectively 16%, 29%, and 56% higher for black, non-Hispanic white, and Hispanic men in high poverty areas than in low poverty areas.

During 1995–1999, area socioeconomic gradients in U.S. lung cancer mortality among women differed by race/ethnicity (Table 3.1, page 64, and Figure 3.16, page 40). Compared to the rates for their counterparts in low poverty areas, the lung cancer mortality rates for non-Hispanic white women and Hispanic women were respectively 6% and 29% higher in high poverty areas. The rates for API and American Indian/Alaska native women were respectively 26% and 24% lower in high poverty areas than in low poverty areas.

Trends in Incidence

Trends in male lung cancer incidence were similar to the SEER mortality trends, with the incidence rate for men in high poverty counties during 1975–1999 being at least 12% greater than the rate for men in low poverty counties (Figure 3.17, page 41). Trends in female lung cancer incidence were also similar to the SEER mortality trends, with the incidence rate for women in high poverty counties during 1975–1999 being at least 11% greater than the rate for women in counties with poverty levels between 10% and 20% (Figure 3.18, page 41).

Cross-Sectional Patterns in Incidence

The area socioeconomic gradient in SEER lung cancer incidence during 1988–1992 was steeper for men than for women (Table 3.2, page 66).

The lung cancer incidence rate increased with increasing area (census tract) poverty rate for non-Hispanic white and black men and women and API men (Figures 3.19 and 3.20, page 42). Compared to the rates for their counterparts in low poverty areas, the lung cancer incidence rates for non-Hispanic white, black, and API men were respectively 45%, 46%, and 23% higher in high poverty areas. The incidence rates for non-Hispanic white and black women were respectively 23% and 19% higher in high poverty areas than in low poverty areas. In contrast, for Hispanic men and women, lung cancer incidence rates were respectively 21% and 34% higher in low poverty areas than in high poverty areas.

Colorectal Cancer

Trends in Mortality

Area socioeconomic patterns in colorectal cancer mortality among U.S. men reversed between 1975 and 1999 (Figure 3.21, page 43). Compared to the rate for men in low poverty areas, the colorectal cancer mortality rate for men in high poverty areas was 12% lower in 1975 but 5% higher in 1999. Although colorectal cancer mortality showed a downward trend for men in all poverty groups, the reversal in patterns occurred largely as a result of a faster decline in colorectal cancer mortality among men in low poverty areas. No consistent pattern in the SEER male colorectal cancer mortality trends was found prior to the mid-1980s. In the late 1990s, however, higher male mortality was associated with higher poverty levels. During 1997–1999, for example, the male colorectal cancer mortality rate was 12% higher in high poverty areas than in low poverty areas of the SEER regions (Figure 3.22, page 43).

Temporal area socioeconomic patterns in colorectal cancer mortality among U.S. women were similar to those for U.S. men. Area socioeconomic patterns in colorectal cancer mortality reversed between 1975 and 1999, with women in low poverty areas experiencing a faster decline in mortality than those in high poverty areas (Figure 3.23, page 44). Compared to the rate for women in low poverty areas, the colorectal cancer mortality rate for women in high poverty areas was 12% lower in 1975 but 7% higher in 1999. No consistent pattern in the SEER female colorectal cancer mortality trends was found until the late 1980s. From the 1988 to 1990 period onwards, however, higher female mortality was generally associated with higher poverty levels. During 1997–1999, for example, the female colorectal cancer mortality rate was 8% higher in high poverty areas than in low poverty areas of the SEER regions (Figure 3.24, page 44).

Cross-Sectional Patterns in Mortality

During 1995–1999, the colorectal cancer mortality rate increased with increasing area (county) poverty rate for the total male population and for Hispanic men (Table 3.1, page 64, and Figure 3.25, page 45). The mortality rate for Hispanic men was 33% higher in high poverty areas than in low poverty areas. A consistent gradient in mortality was also observed for Hispanic women, with the rate being 39% higher in high poverty areas than in low poverty areas (Figure 3.26, page 45).

Trends and Cross-Sectional Patterns in Incidence

Regarding the SEER colorectal cancer incidence trends by county poverty levels, no consistent pattern was found for either men or women (Figures 3.27 and 3.28, page 46). During 1988–1992, the SEER colorectal cancer incidence rate was 9% higher for men in low poverty areas (census tracts) than in high poverty areas (Table 3.2, page 66, and Figure 3.29, page 47). The gradient was most pronounced for Hispanic men and women, whose colorectal cancer incidence rates were respectively 37% and 48% higher in low poverty areas (census tracts) than in high poverty areas (Figures 3.29 and 3.30, page 47).

Prostate Cancer

Trends in Mortality

U.S. prostate cancer mortality rates did not vary much by area poverty rates from 1975 through 1989. However, since 1990 there has been a widening of the area socioeconomic gradient, with men in the two highest poverty groups in 1999 experiencing respectively 7% and 22% higher prostate cancer mortality rates than men in the lowest poverty group (Figure 3.31, page 48). Similar patterns were observed in SEER prostate cancer mortality during the 1990s. During 1997–1999, for example, men in the two highest poverty groups in the SEER regions experienced respectively 6% and 23% higher prostate cancer mortality rates than men in the lowest poverty group (Figure 3.32, page 48). Moreover, men in the highest poverty group in the SEER regions had significantly higher mortality rates than those in the lowest poverty group throughout the 1975–1999 period.

Cross-Sectional Patterns in Mortality

During 1995–1999, U.S. prostate cancer mortality increased with increasing poverty rates for the total population and for Hispanic and American Indian men, but decreased with increasing poverty rates for API men (Table 3.1, page 64, and Figure 3.33, page 49). Compared to the rates for their counterparts in low poverty areas, the prostate cancer mortality rates for Hispanic and American Indian/Alaska native men were respectively 51% and 58% higher in high poverty areas. The rate for API men was 38% lower in high poverty areas than in low poverty areas.

Trends and Cross-Sectional Patterns in Incidence

During the 1990s, the prostate cancer incidence rate for men in high poverty counties in the SEER regions was at least 12% higher than the rate for men in low poverty counties (Figure 3.34, page 50). During 1988–1992, SEER prostate cancer incidence rates were higher in lower poverty areas (census tracts) for the total population and for all racial/ethnic groups (Table 3.2, page 66 and Figure 3.35, page 50). Compared to the rates for their counterparts in high poverty areas, the prostate cancer incidence rates for non-Hispanic white, black, American Indian/Alaska native, API, and Hispanic men were respectively 20%, 17%, 16%, 46%, and 48% higher in low poverty areas.

Female Breast Cancer

Trends in Mortality

Socioeconomic differences in U.S. female breast cancer mortality have narrowed over time, and appear to have reversed in the late 1990s (Figure 3.36, page 51). In 1976, breast cancer mortality was 15% lower in high poverty areas than in low poverty areas. In the early 1990s, no significant differences in breast cancer mortality between area poverty groups were found. In 1999, breast cancer mortality was 4% higher in high poverty areas than in low poverty areas. The SEER breast cancer mortality trends differed from the national trends. In the 1990s, breast cancer mortality was higher in high poverty areas than in low poverty areas. During 1995–1997, for example, breast cancer mortality was 17% greater in high poverty areas than in low poverty areas of the SEER regions (Figure 3.37, page 51).

Cross-Sectional Patterns in Mortality

During 1997–1999, U.S. breast cancer mortality was 3% lower for non-Hispanic white women in high poverty areas than in low poverty areas (Table 3.1, page 64, and Figure 3.38, page 52). However, breast cancer mortality was 41% higher for Hispanic women in high poverty areas than in low poverty areas.

Trends in Incidence

During 1975–1999, SEER female breast cancer incidence rates were higher in lower poverty areas (counties), with incidence rates increasing more rapidly in lower poverty groups than in higher poverty groups (Figure 3.39, page 53). During 1997–1999, compared to the rate for women in the lowest poverty county group, the breast cancer incidence rates were respectively 6% and 18% lower among women in the two highest poverty groups.

Cross-Sectional Patterns in Incidence

During 1988–1992, SEER breast cancer incidence rates were higher in lower poverty areas (census tracts) for the total population and for all racial/ethnic groups except American Indians/Alaska natives (Table 3.2, page 66, and Figure 3.40, page 53). Compared to the rates for their counterparts in high poverty areas, the breast cancer incidence rates for all women and for non-Hispanic white, black, API, and Hispanic women were respectively 31%, 10%, 16%, 49%, and 50% higher in low poverty areas.

Cervical Cancer

Trends in Mortality

Although cervical cancer mortality rates decreased consistently for all area poverty groups between 1975 and 1999, the area socioeconomic gradient in U.S. cervical cancer mortality did not diminish during this period (Figure 3.41, page 54). In the 1990s, U.S. women experienced at least 71% higher cervical cancer mortality in high poverty counties than in low poverty counties. Similar temporal socioeconomic patterns were observed in SEER cervical cancer mortality (Figure 3.42, page 54).

Cross-Sectional Patterns in Mortality

U.S. cervical cancer mortality increased with increasing area poverty for women in all racial/ethnic groups (Table 3.1, page 64, and Figure 3.43, page 55). During 1995–1999, American Indian/Alaska native and Hispanic women in high poverty areas had almost twice the cervical cancer mortality of their counterparts in low poverty areas. The cervical cancer mortality rates were respectively 45% and 37% higher for non-Hispanic white women and black women in high poverty areas than in low poverty areas.

Trends in Incidence

The SEER cervical cancer incidence rates also showed a downward trend for all county poverty groups during 1975–1999 (Figure 3.44, page 56). However, a substantial area socioeconomic gradient in cervical cancer incidence remained, with women in high poverty counties having at least a one-third higher incidence rate than those in low poverty counties throughout the study period.

Cross-Sectional Patterns in Incidence

The higher the census tract poverty rate, the greater the cervical cancer incidence during 1988–1992. Compared to the rates for their counterparts in low poverty census tracts, the cervical cancer incidence rates for all women and for non-Hispanic white, black, American Indian, API, and Hispanic women were respectively 119%, 97%, 30%, 292%, 44%, and 83% higher in high poverty census tracts (Table 3.2, page 66, and Figure 3.45, page 56).

Melanoma of the Skin

Trends in Mortality

Mortality from melanoma of the skin showed an increasing trend between 1975 and 1999 for U.S. men in all area (county) poverty groups, with higher mortality rates observed in lower poverty areas (Figure 3.46, page 57). Mortality from melanoma of the skin was 19% higher in 1975 and 32% higher in 1999 among U.S. men in low poverty counties than among men in high poverty counties. Trends in male mortality for the SEER regions were similar (Figure 3.47, page 57).

The trend in mortality from melanoma of the skin remained stable between 1975 and 1999 among U.S. women in all area poverty groups (Figure 3.48, page 58). Although mortality from melanoma of the skin did not vary by county poverty levels in 1975, the mortality rate was 25% higher in low poverty counties than in high poverty counties in 1999. Trends in mortality were less consistent for the SEER regions, although in the 1990s, the mortality rate for women in the SEER regions was higher in low poverty counties than in high poverty counties (Figure 3.49, page 58).

Cross-Sectional Patterns in Mortality

During 1995–1999, mortality from melanoma of the skin among U.S. men was 27% higher and among U.S. women 24% higher in low poverty counties than in high poverty counties (Figures 3.50 and 3.51, page 59). However, mortality rates did not vary significantly by county

poverty levels for any of the racial/ethnic groups (Table 3.1, page 64).

Trends in Incidence

Between 1975 and 1999, the SEER incidence rates for melanoma of the skin increased two- to three-fold for men and women in all county poverty groups (Figures 3.52 and 3.53, page 60). The skin melanoma incidence rate was 117% higher during 1975–1977 and 69% higher during 1997–1999 among men in low poverty counties than among men in high poverty counties. The skin melanoma incidence rate was 85% higher in 1975–1977 and 82% higher in 1997–1999 among women in low poverty counties than among women in high poverty counties.

Cross-Sectional Patterns in Incidence

During 1988–1992, SEER skin melanoma incidence rates were respectively 2.7 and 3 times higher for men and women in low poverty areas (census tracts) than in high poverty areas (Table 3.2, page 66). The skin melanoma incidence rates for non-Hispanic white and Hispanic men were respectively 30% and 89% higher in low poverty areas (census tracts) than in high poverty areas (Figure 3.54, page 61). The skin melanoma incidence rates for non-Hispanic white and Hispanic women were respectively 33% and 99% higher in low poverty areas (census tracts) than in high poverty areas (Figure 3.55, page 61).

The Area Poverty and Cancer Incidence and Mortality Continuum

The relationship between area poverty and cancer mortality and incidence is not confined to the difference between the low and high poverty areas. Rather, as we move along the poverty continuum, we might expect to see a corresponding increase or decrease in the incidence and/or mortality rates. For instance, the scatter plots in Figures 3.56 and 3.57, page 62, appear to indicate increasing U.S. male lung cancer and cervical cancer mortality rates at higher county poverty rates during the 1990–1999 time period. The weighted linear regression models, with weights being the number of deaths in each county, were fitted to the data, yielding the correlation between county poverty and male lung cancer mortality to be 0.42 and that between county poverty and cervical cancer mortality to be 0.56.

The weighted linear regression models applied to the SEER incidence data during the 1988–1992 period, with weights being the number of incidence cases in each census tract, yielded a correlation of 0.49 between census tract poverty rate and male lung cancer incidence and 0.36 between census tract poverty and cervical cancer incidence (Figures 3.58 and 3.59, page 63).

Figure 3.1. Trends in All-Cancer Mortality Among U.S. Men, 1975–1999

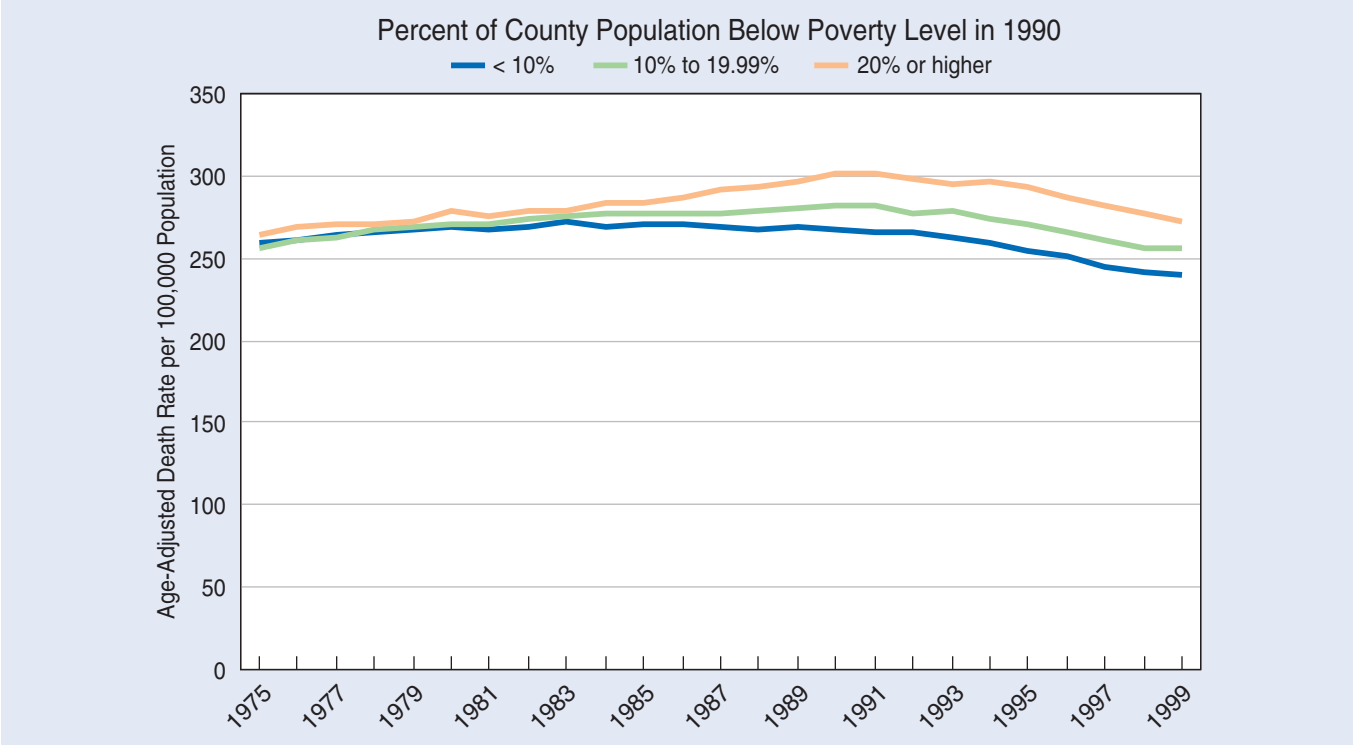
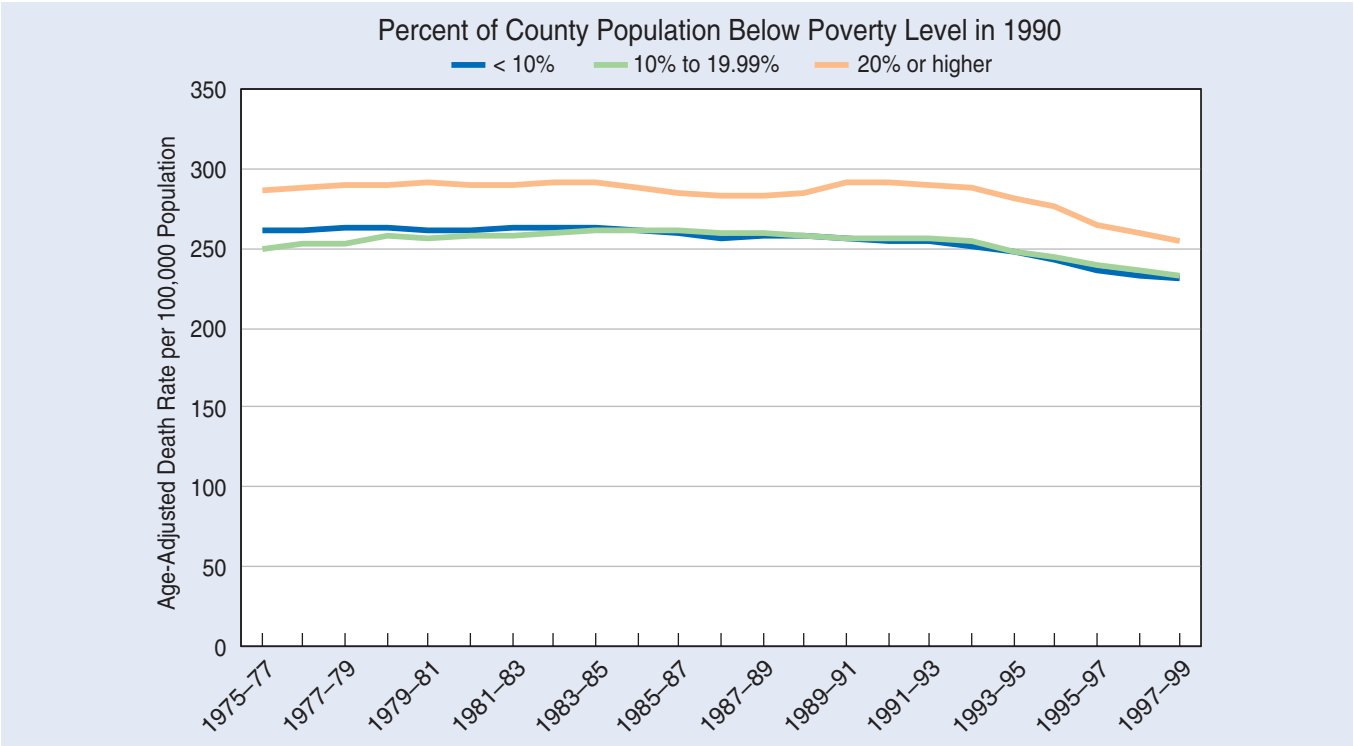


Figure 3.2. Trends in SEER All-Cancer Mortality Among Men (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.3. Trends in All-Cancer Mortality Among U.S. Women, 1975–1999

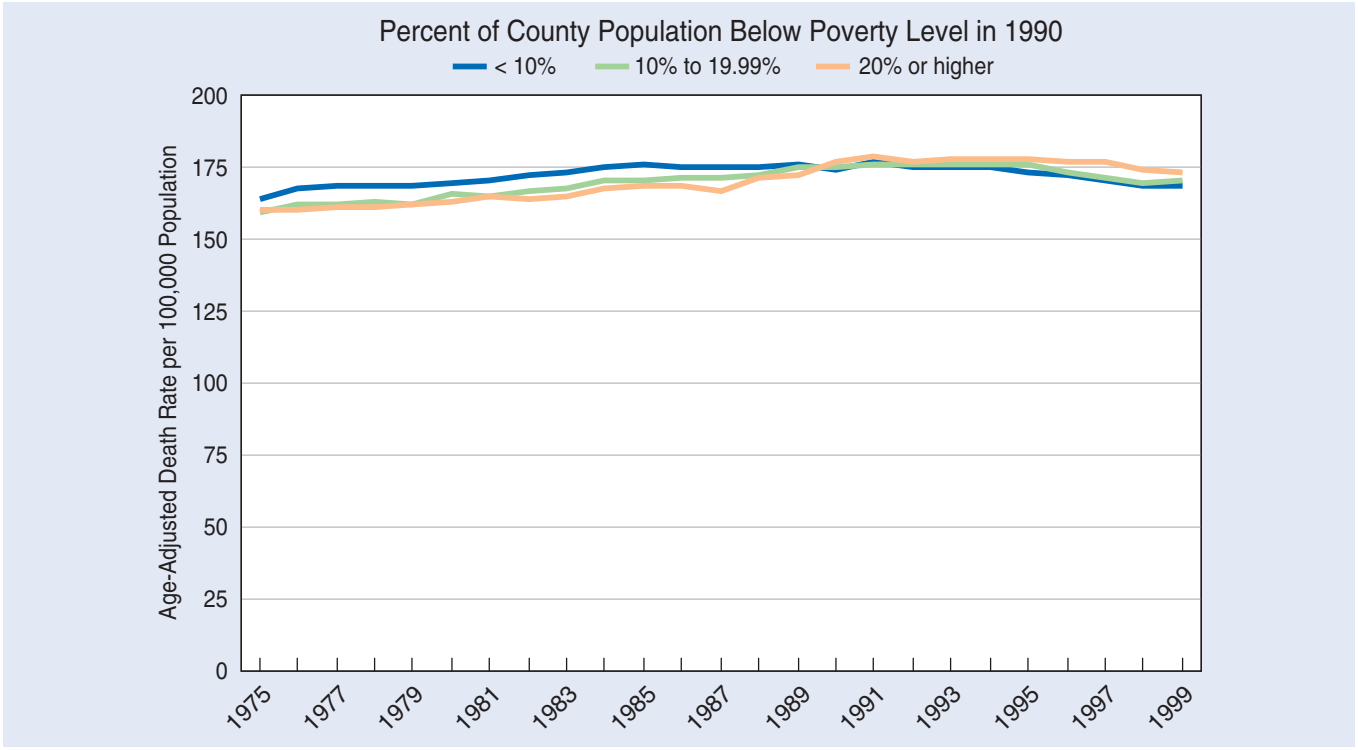
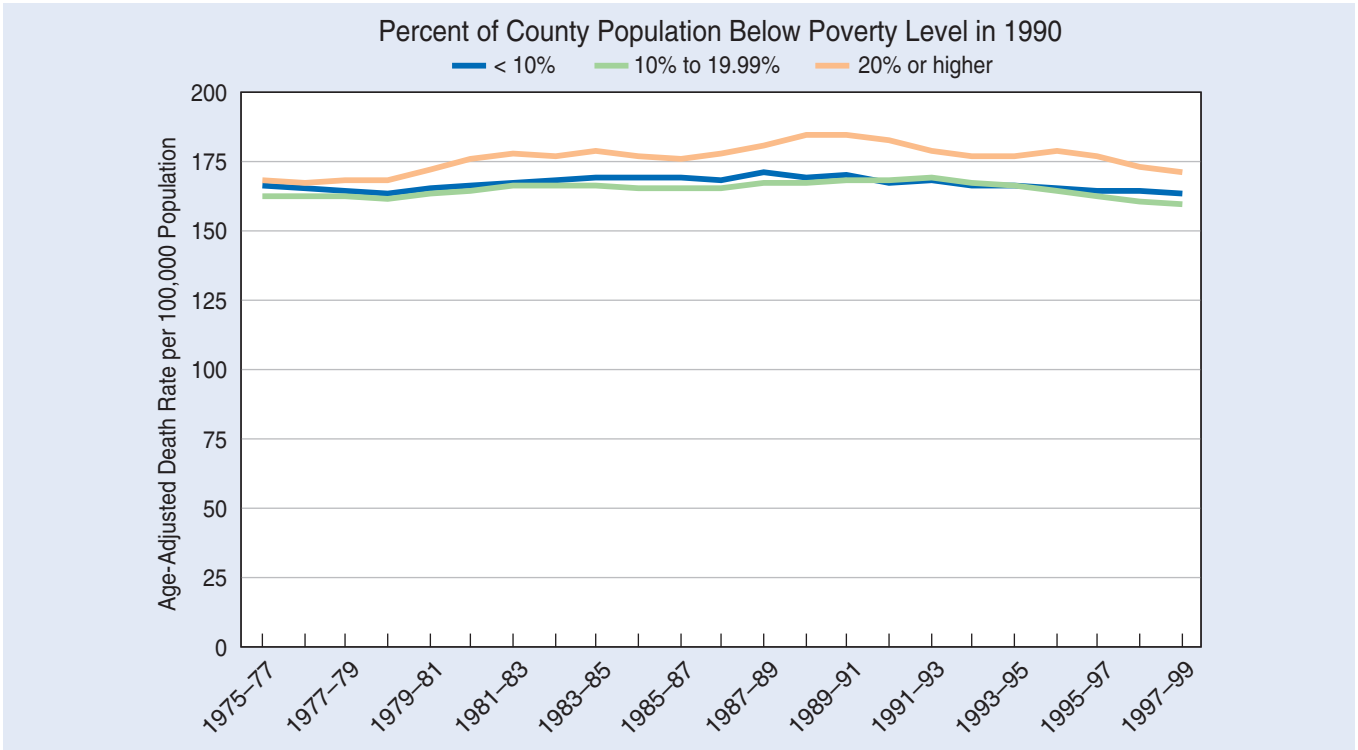


Figure 3.4. Trends in SEER All-Cancer Mortality Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.5. All-Cancer Mortality Among U.S. Men, 1995–1999

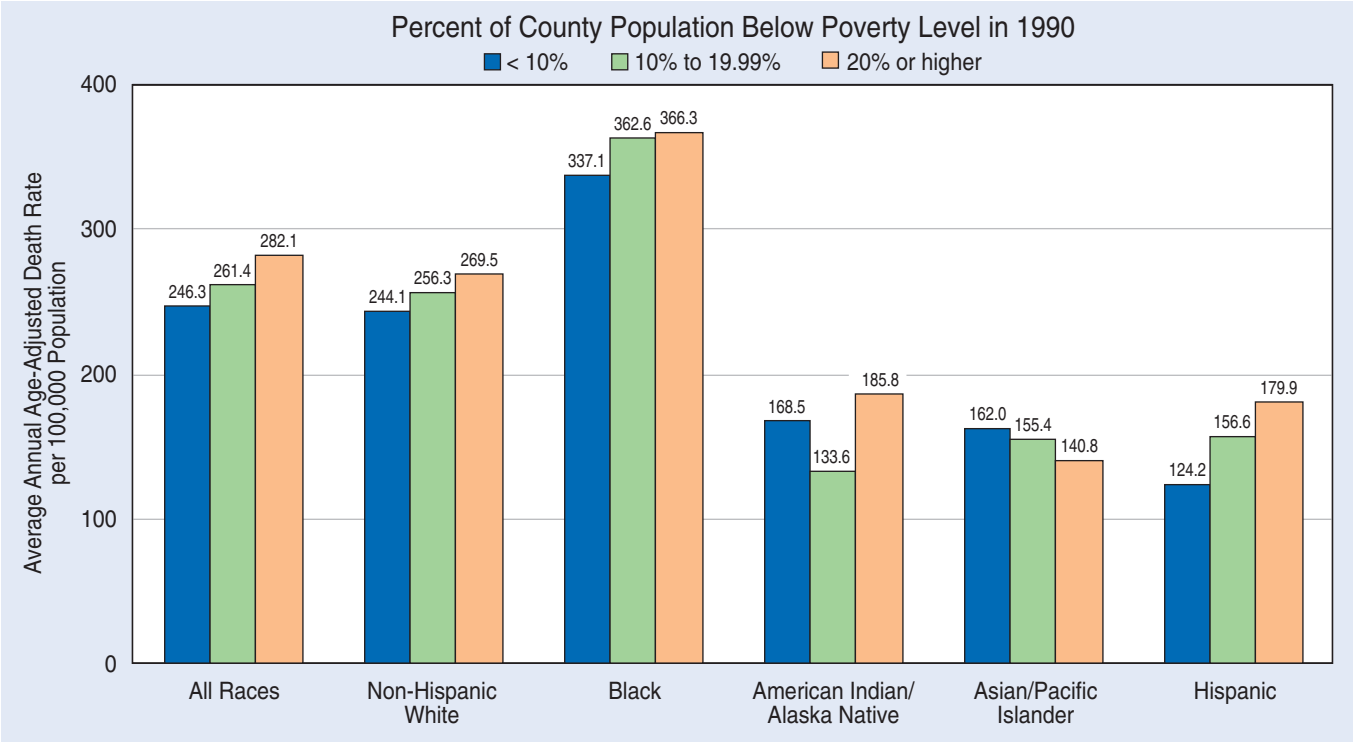
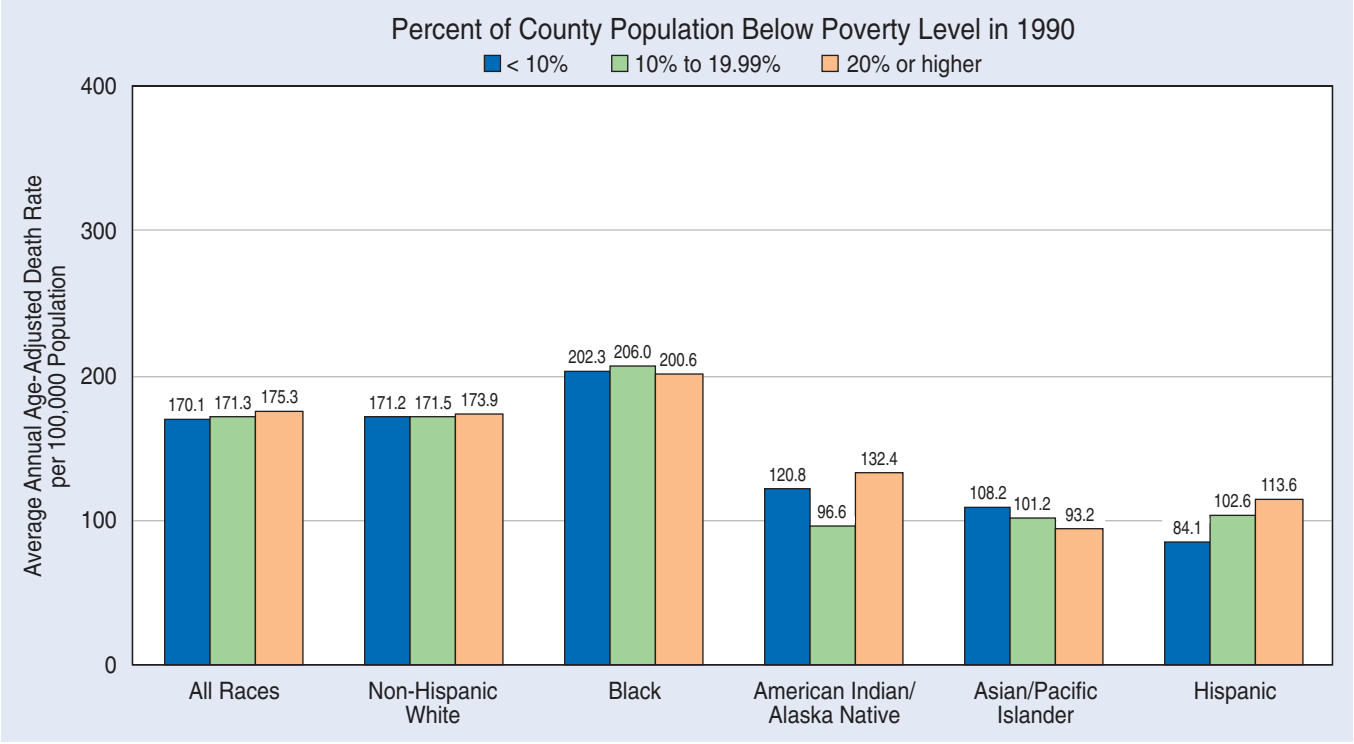


Figure 3.6. All-Cancer Mortality Among U.S. Women, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.7. Trends in SEER Cancer (All Sites Combined) Incidence Among Men (Three-Year Moving Averages), 1975–1999

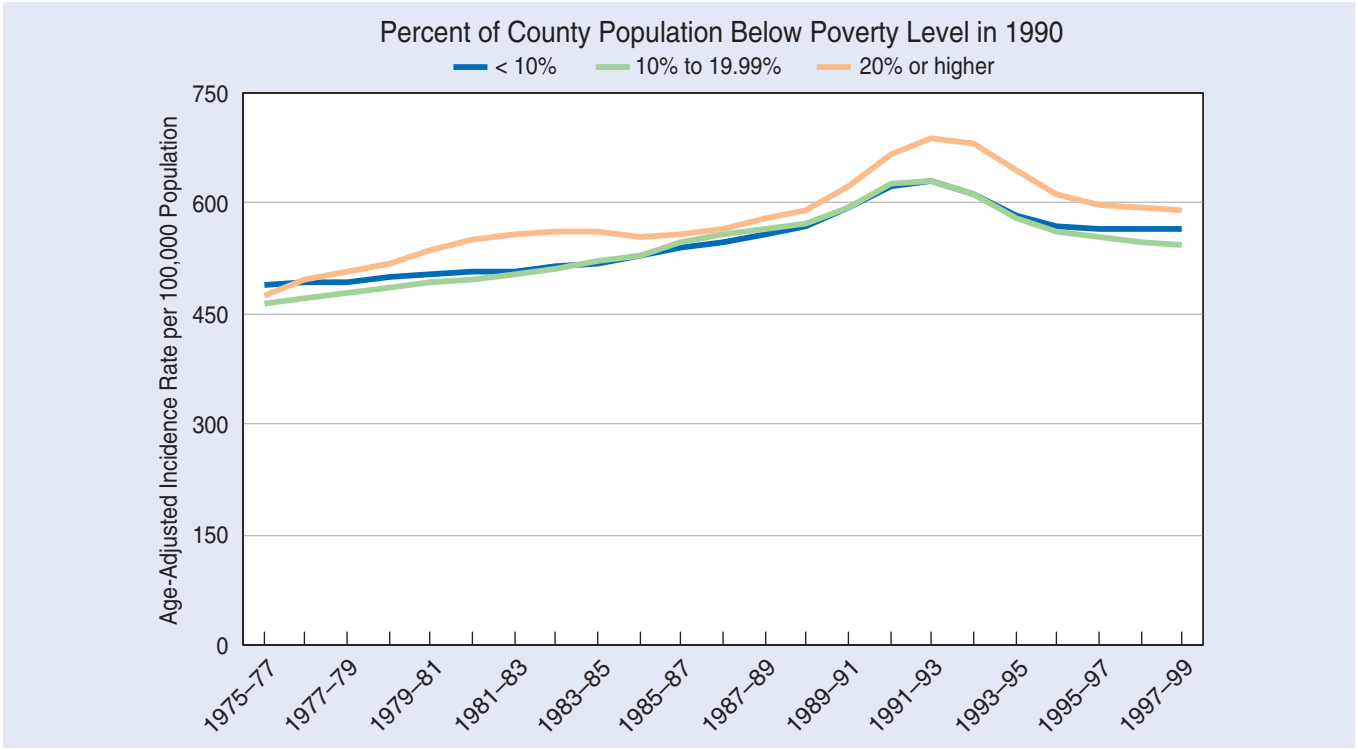
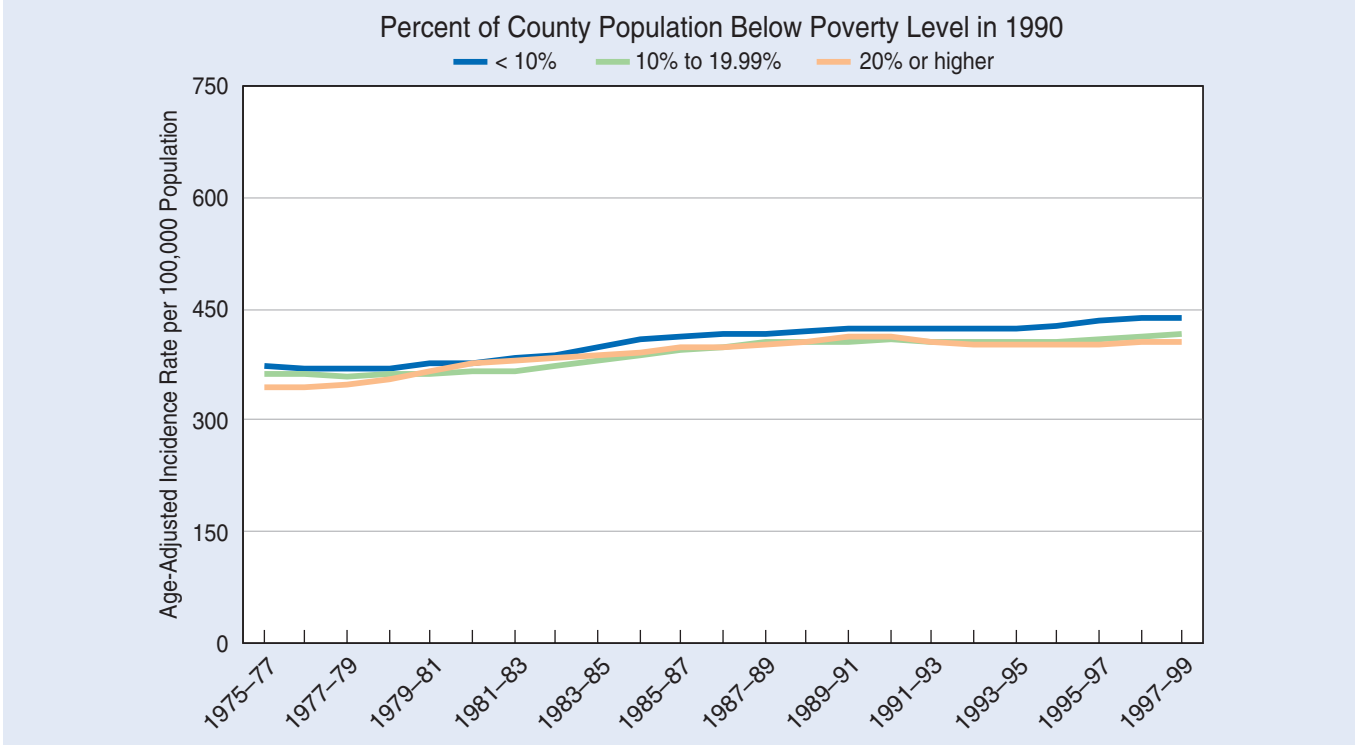


Figure 3.8. Trends in SEER Cancer (All Sites Combined) Incidence Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.9. SEER Cancer (All Sites Combined) Incidence Among Men, 1988–1992

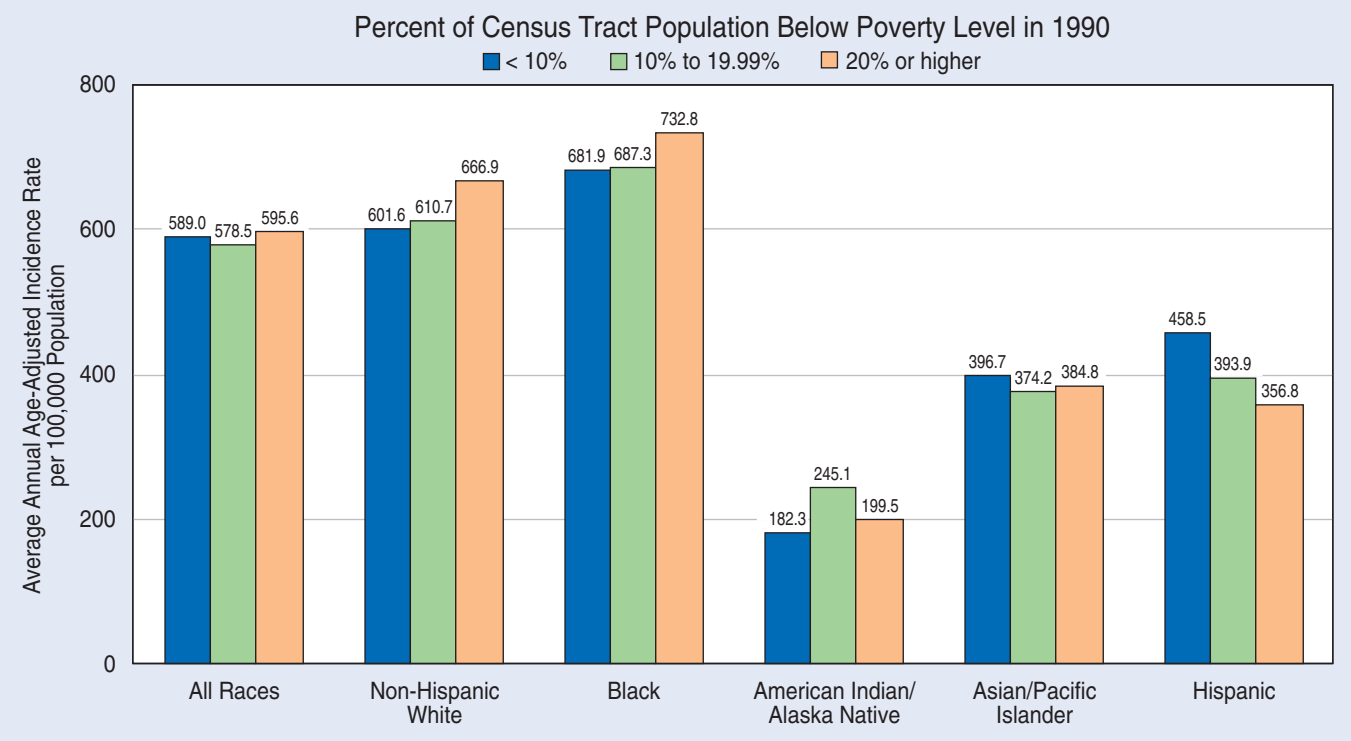
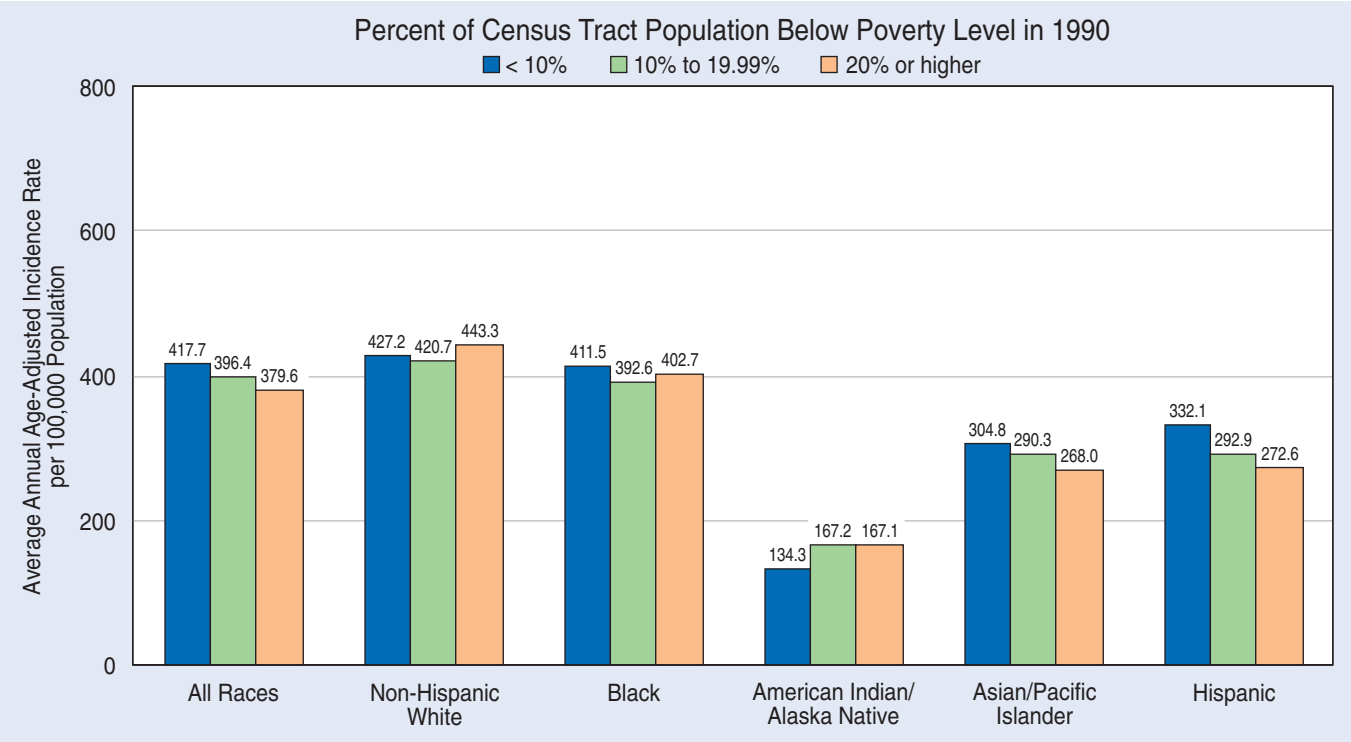


Figure 3.10. SEER Cancer (All Sites Combined) Incidence Among Women, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.11. Trends in Lung Cancer Mortality Among U.S. Men, 1975–1999

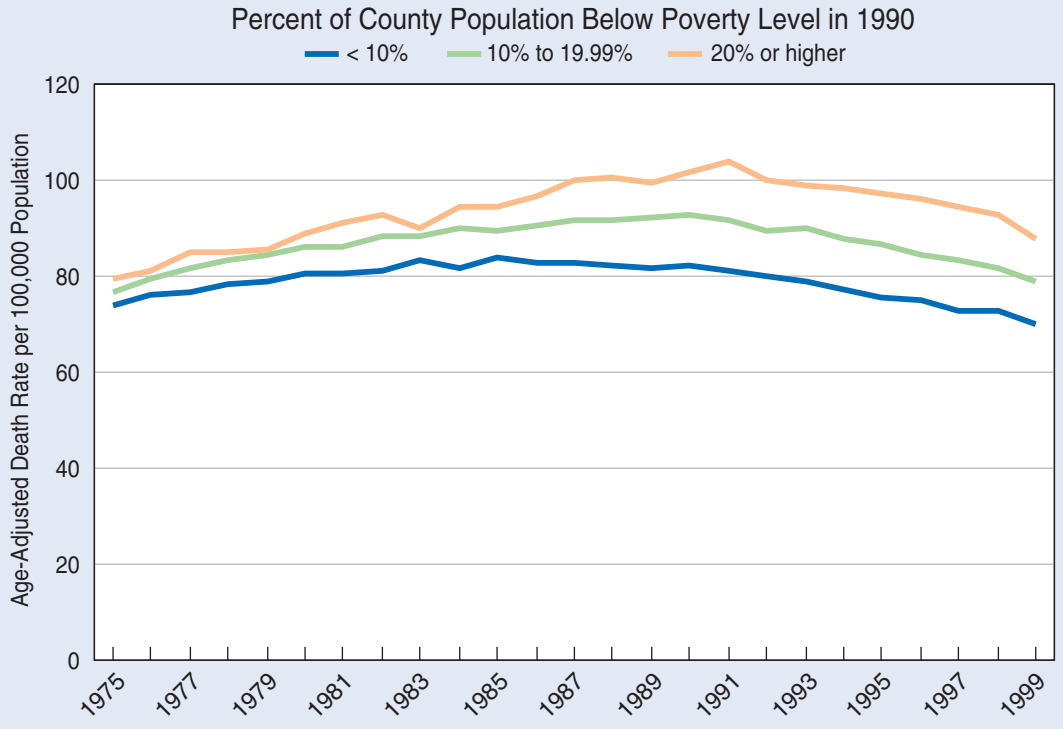
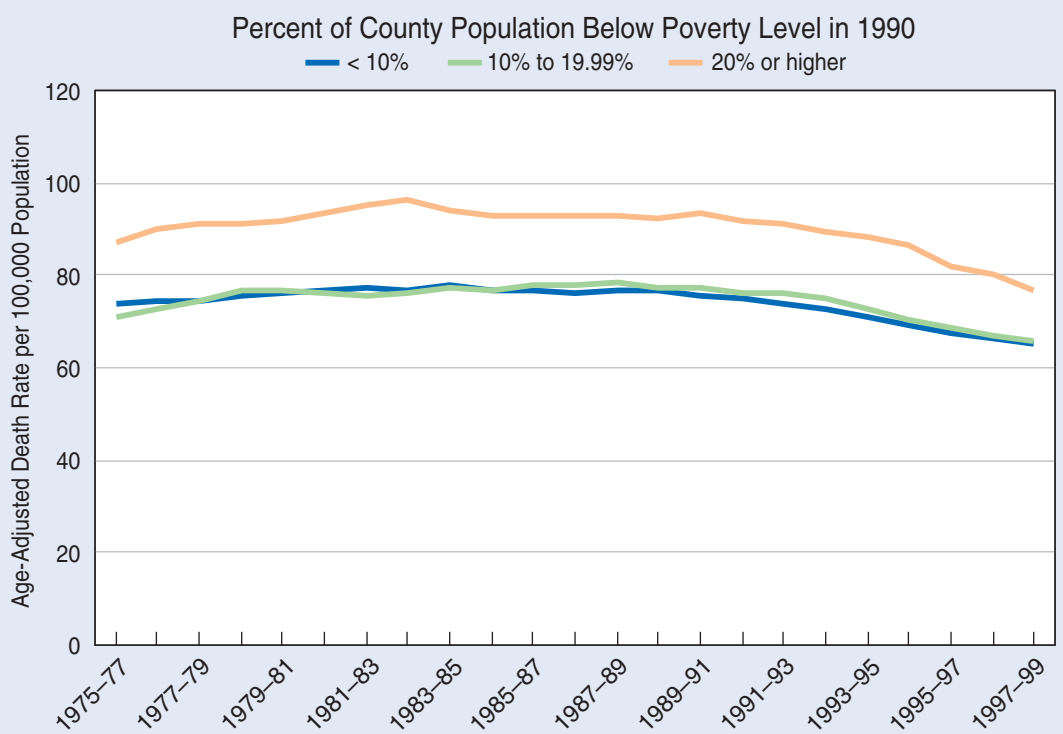


Figure 3.12. Trends in SEER Lung Cancer Mortality Among Men (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.13. Trends in Lung Cancer Mortality Among U.S. Women, 1975–1999

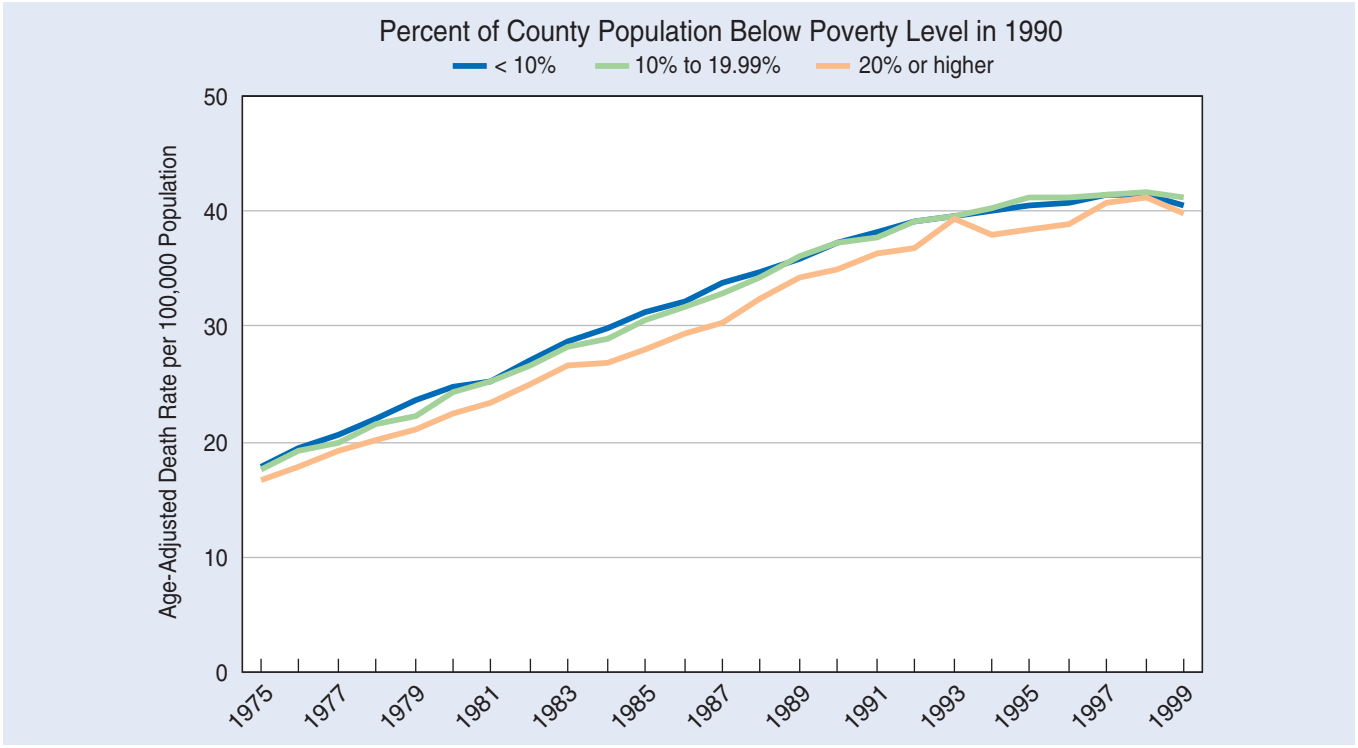
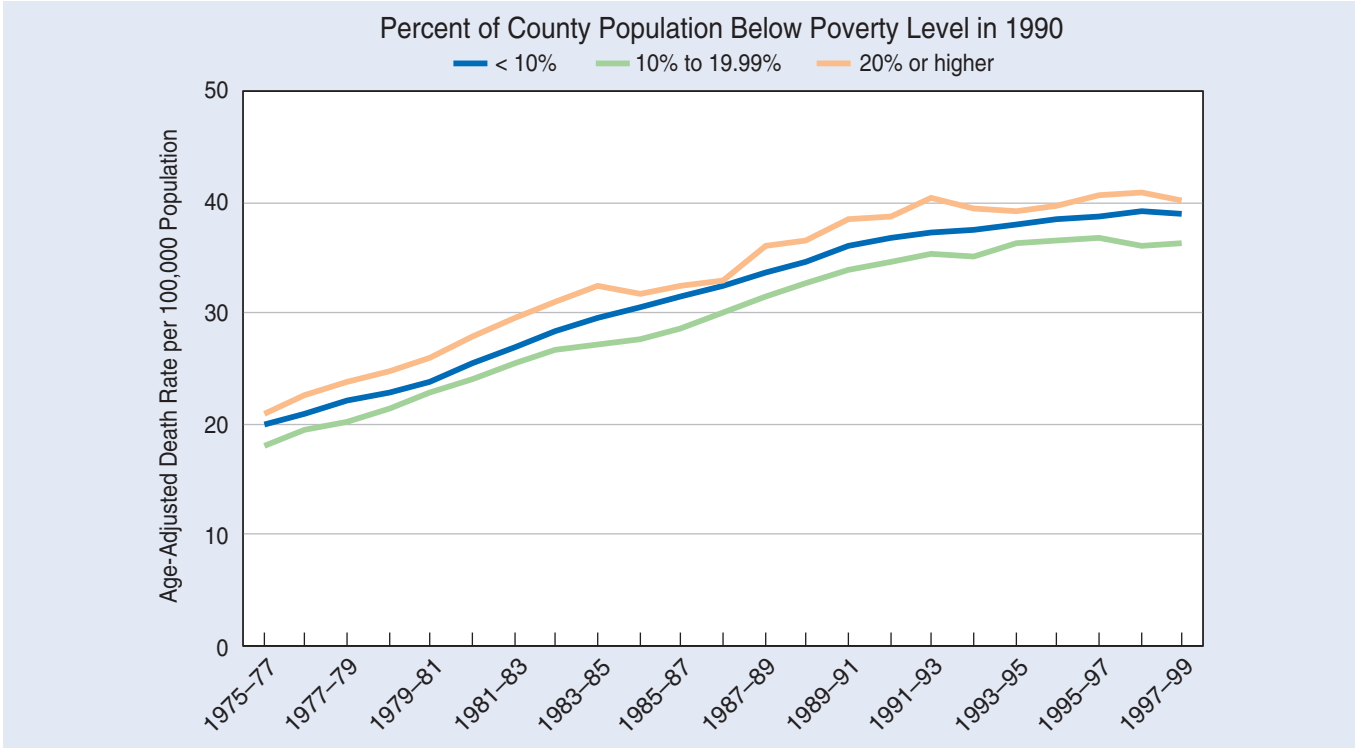


Figure 3.14. Trends in SEER Lung Cancer Mortality Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.15. Lung Cancer Mortality Among U.S. Men, 1995–1999

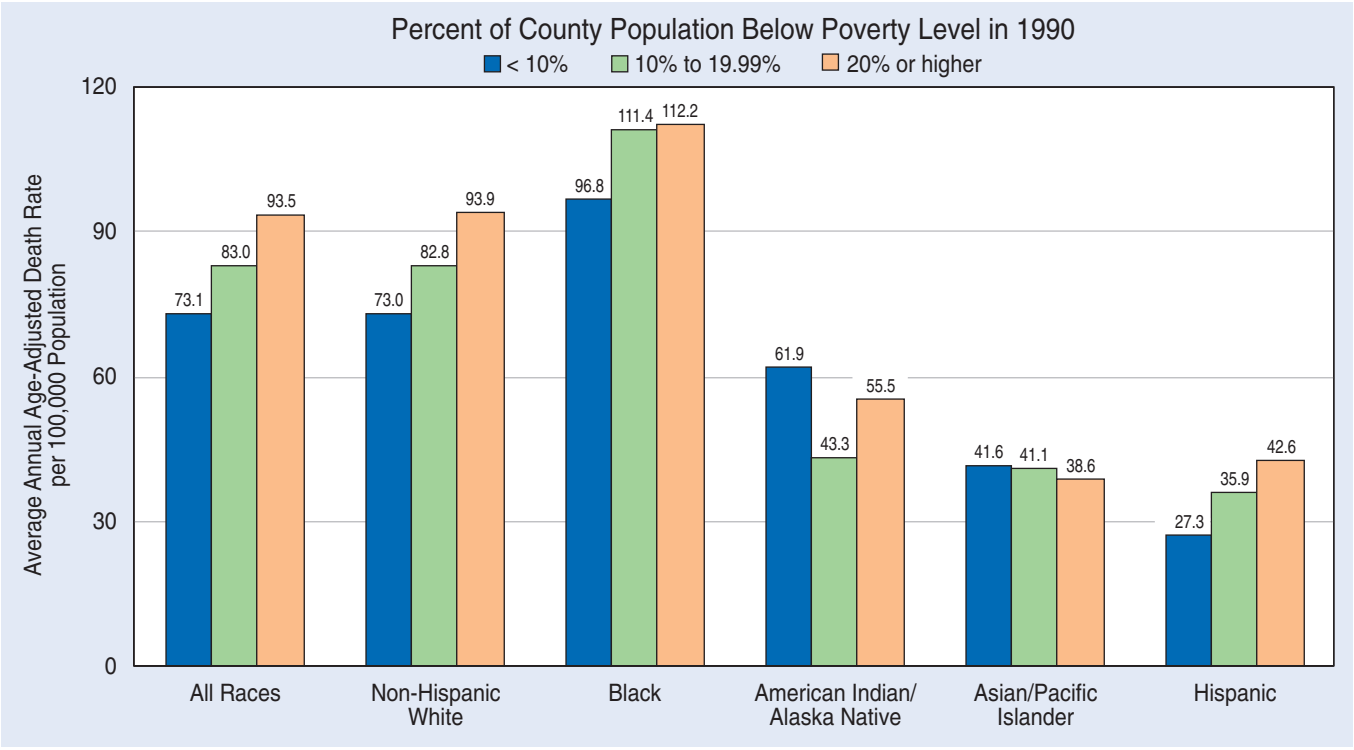
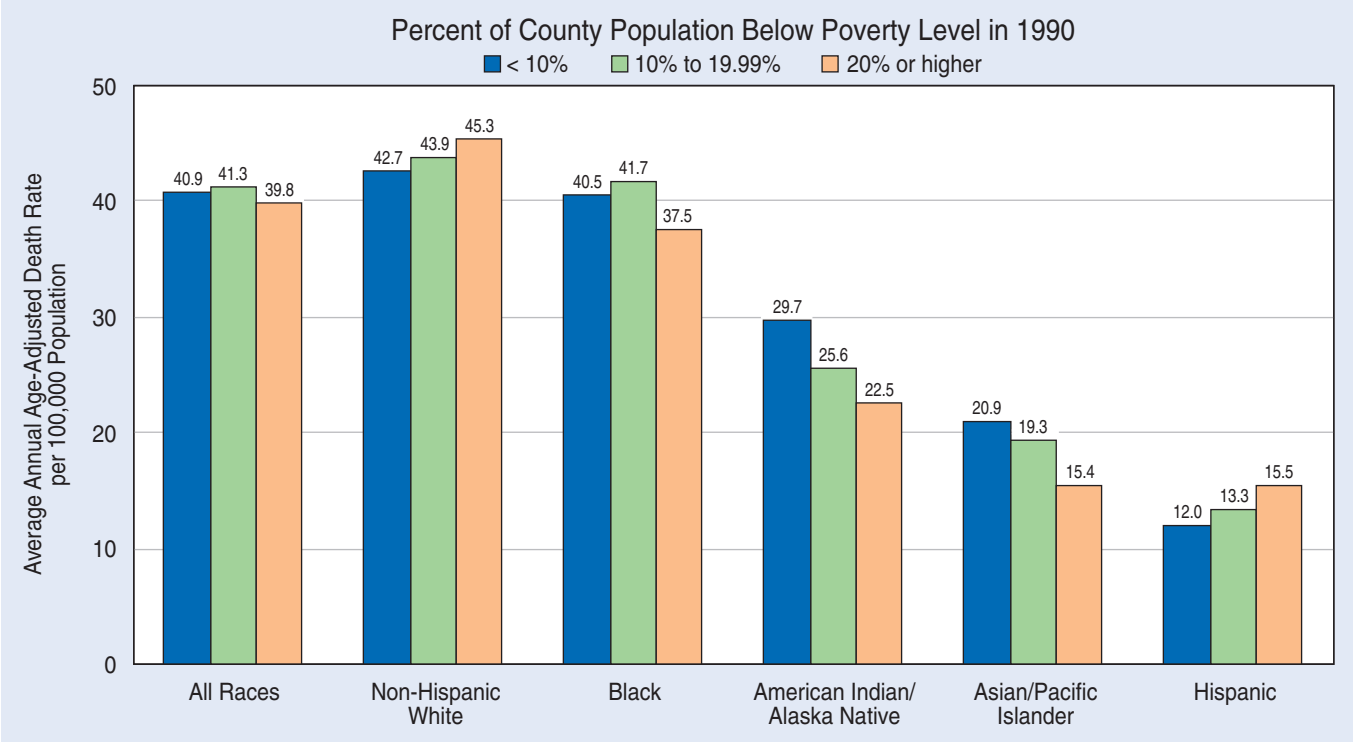


Figure 3.16. Lung Cancer Mortality Among U.S. Women, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.17. Trends in SEER Lung Cancer Incidence Among Men (Three-Year Moving Averages), 1975–1999

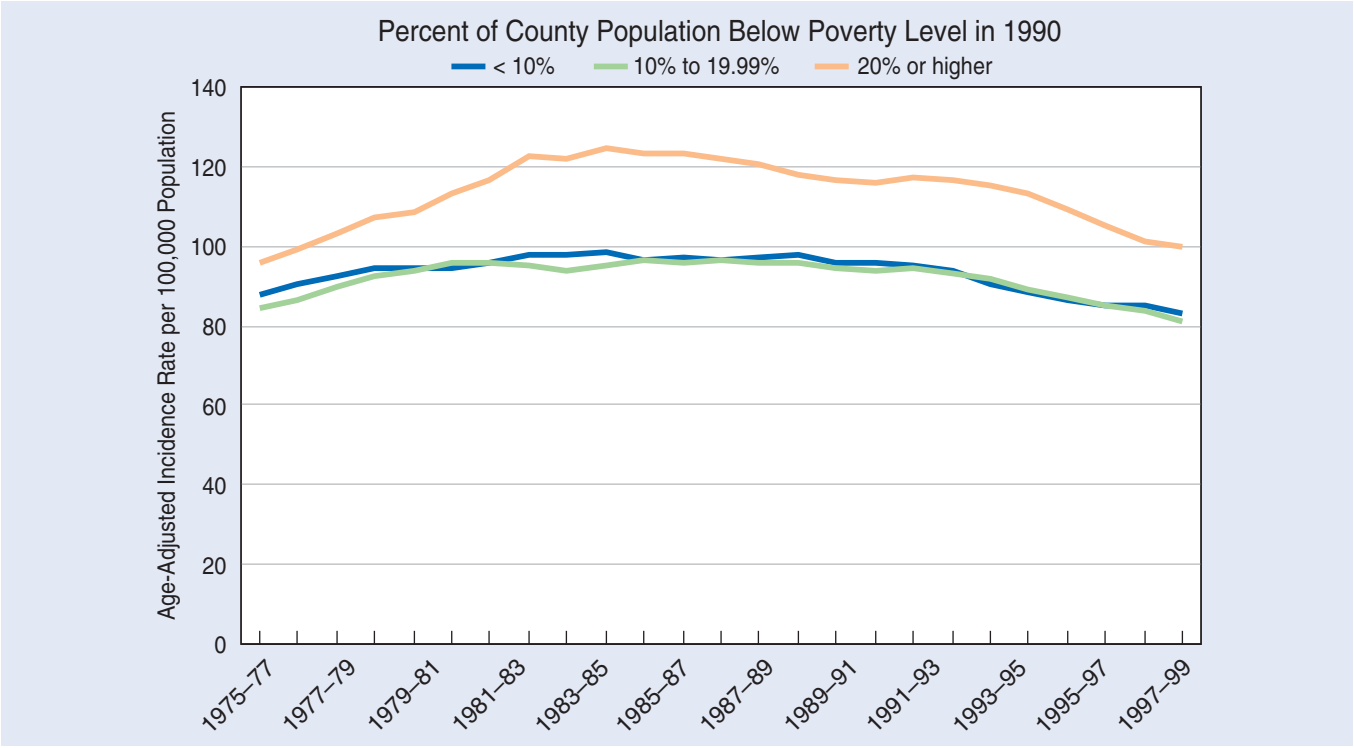
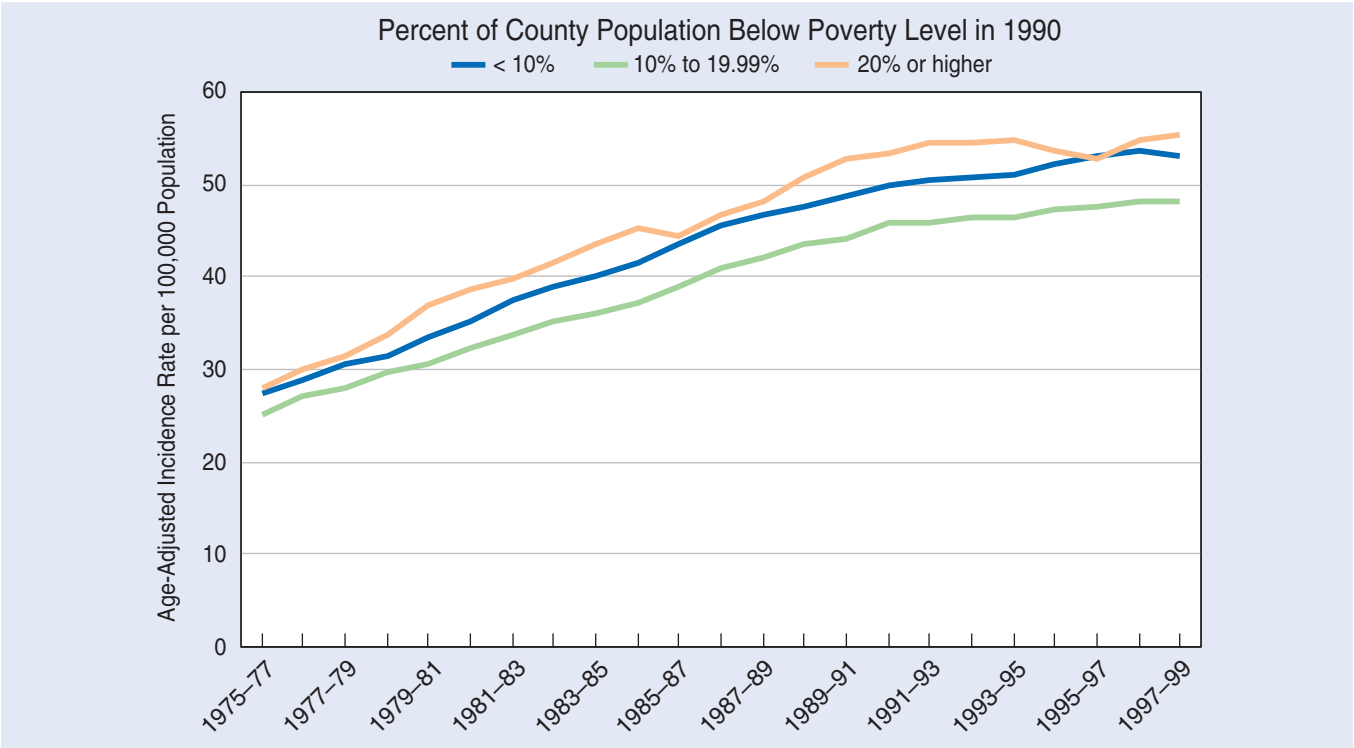


Figure 3.18. Trends in SEER Lung Cancer Incidence Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.19. SEER Lung Cancer Incidence Among Men, 1988–1992

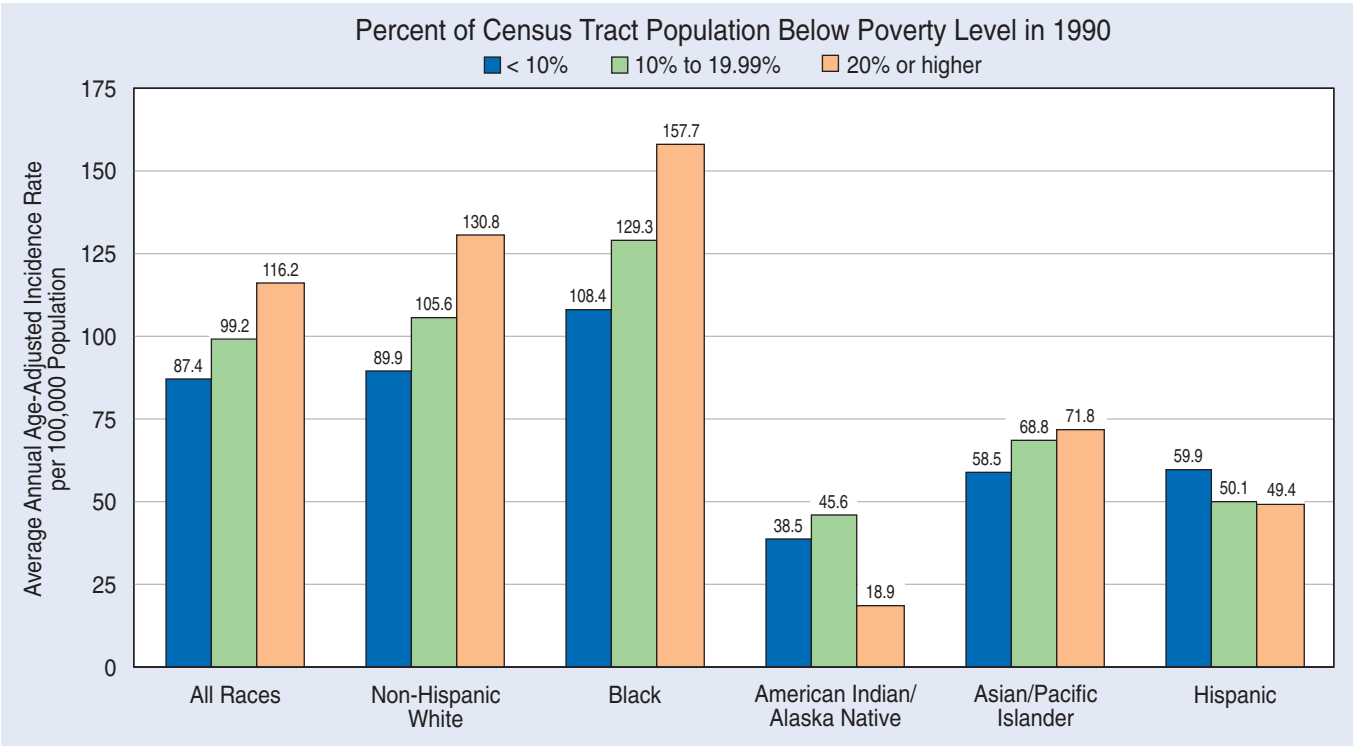
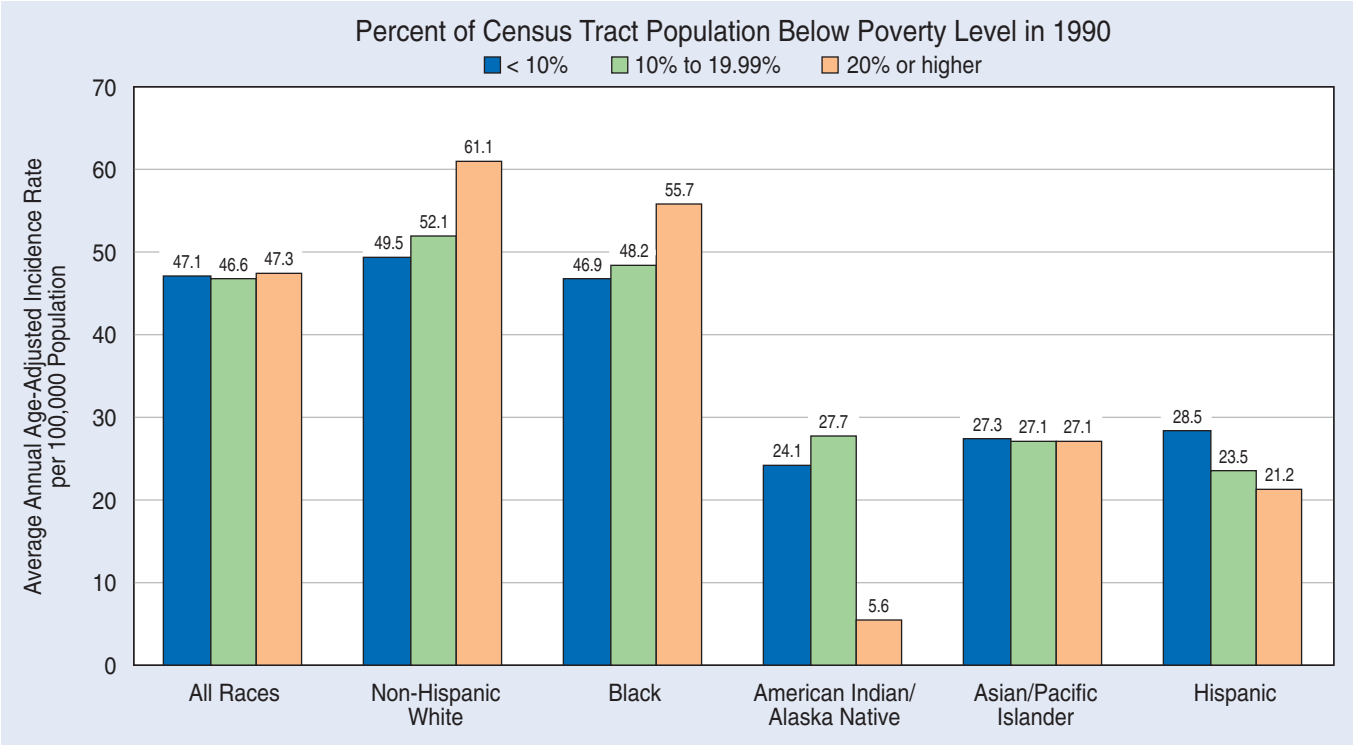


Figure 3.20. SEER Lung Cancer Incidence Among Women, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.21. Trends in Colorectal Cancer Mortality Among U.S. Men, 1975–1999

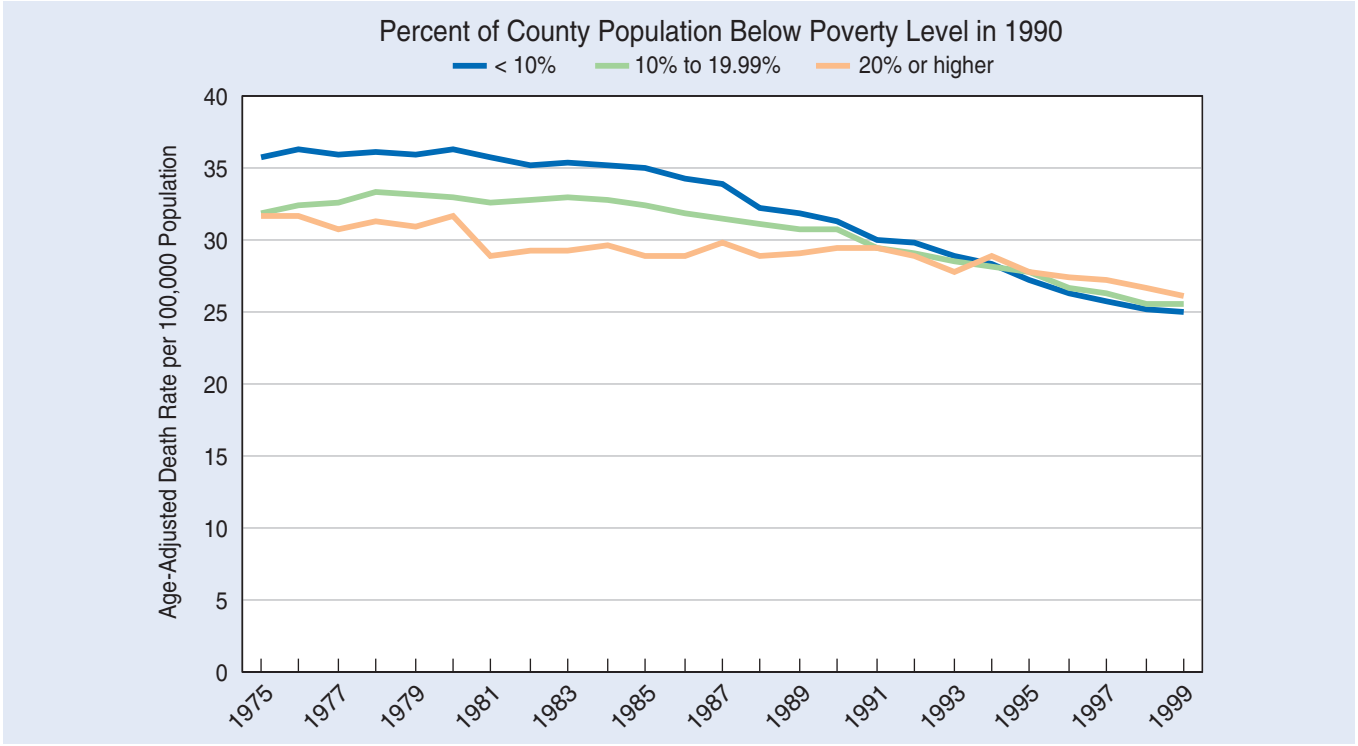
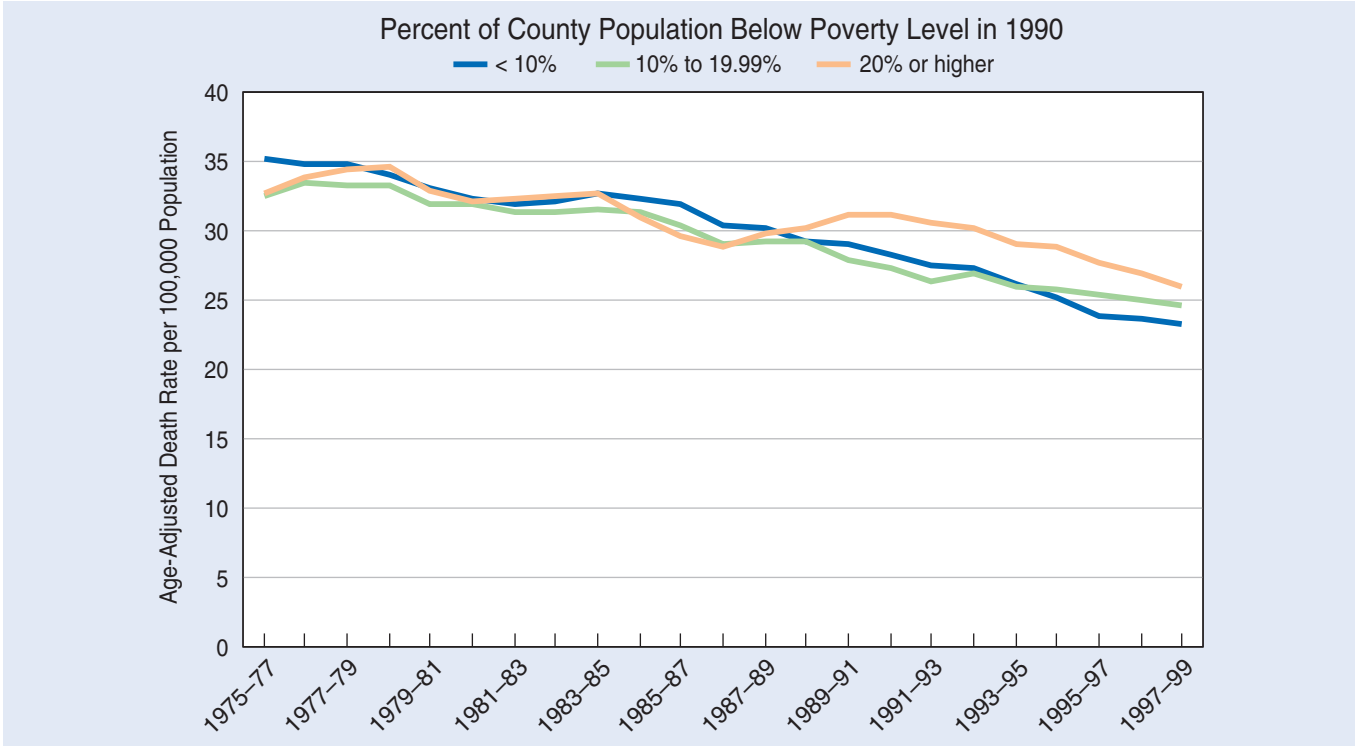


Figure 3.22. Trends in SEER Colorectal Cancer Mortality Among Men (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.23. Trends in Colorectal Cancer Mortality Among U.S. Women, 1975–1999

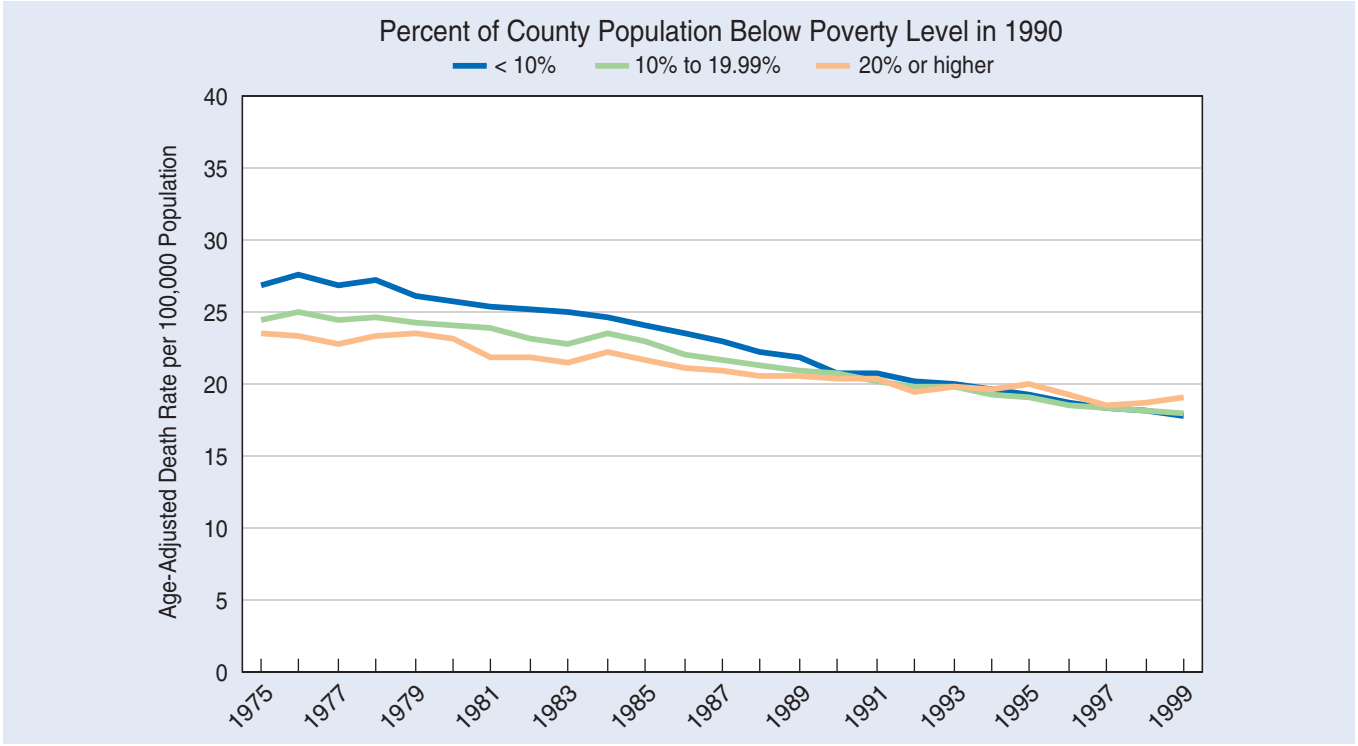
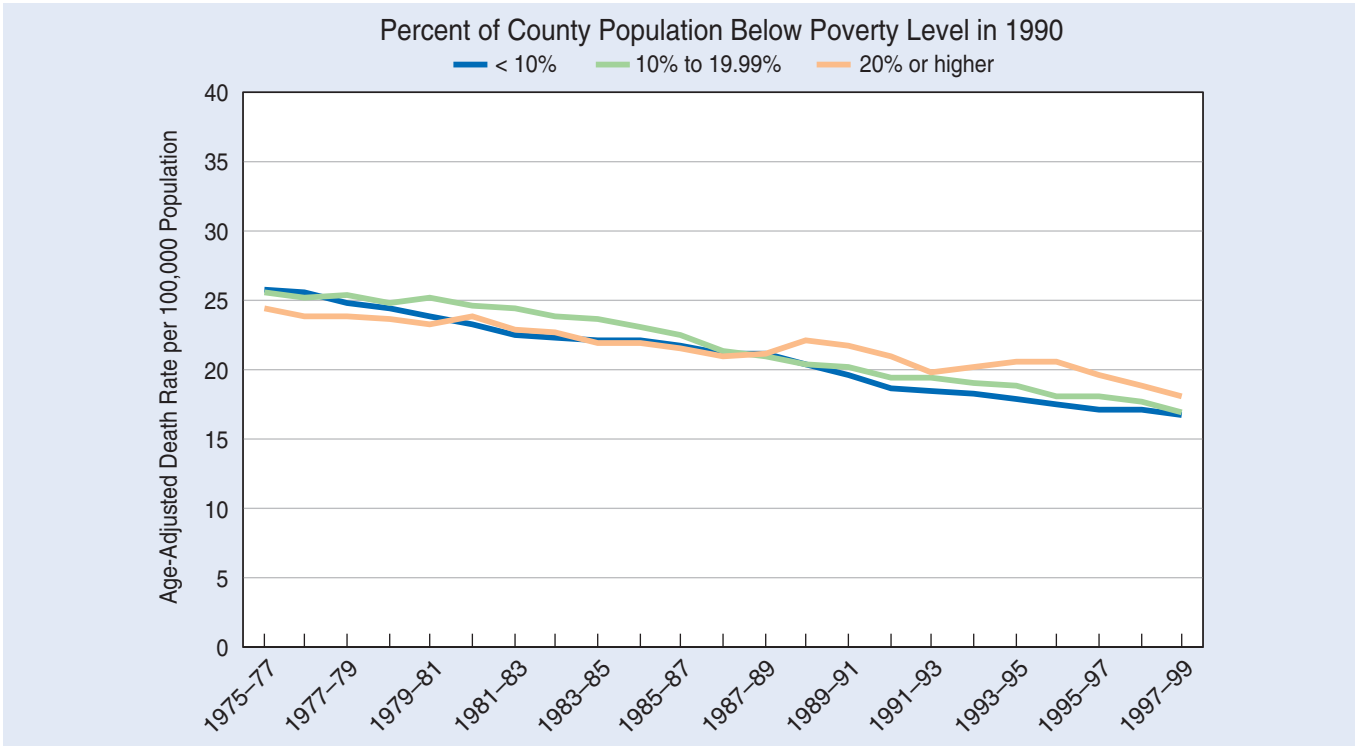


Figure 3.24. Trends in SEER Colorectal Cancer Mortality Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.25. Colorectal Cancer Mortality Among U.S. Men, 1995–1999

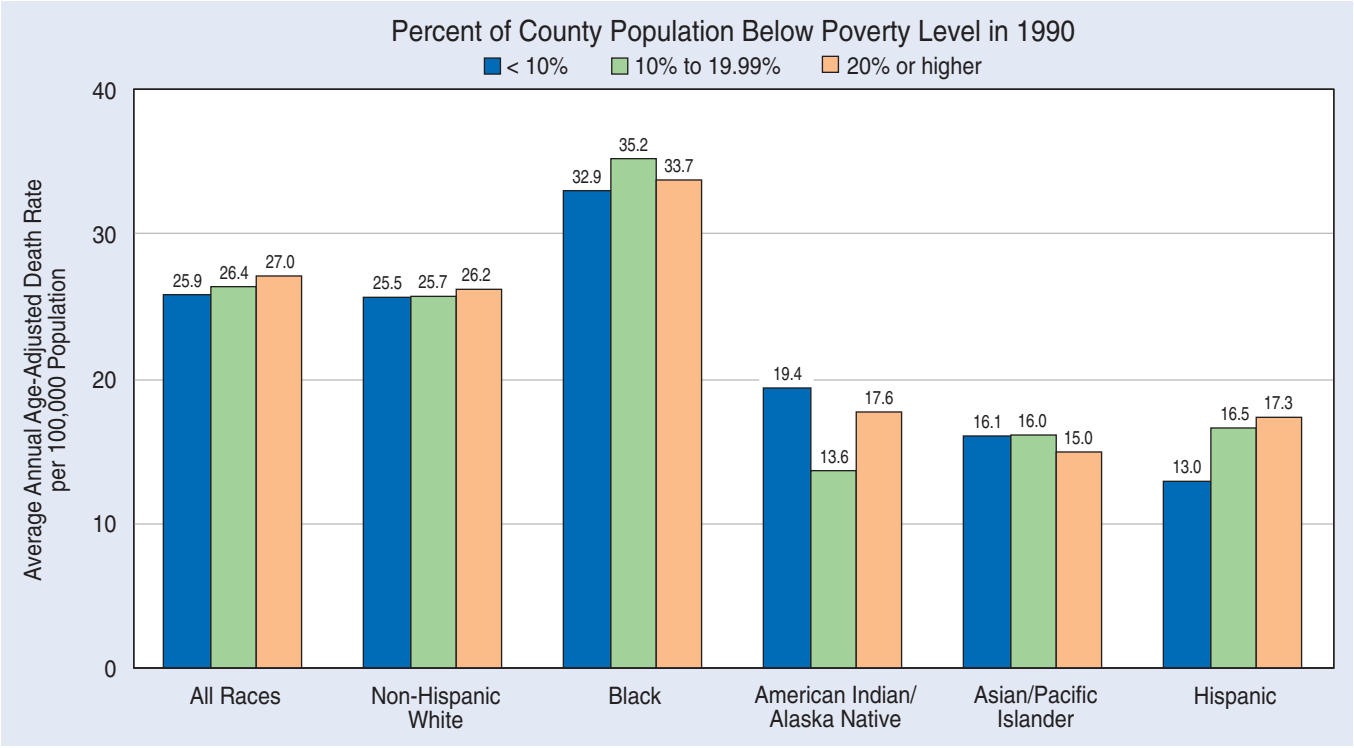
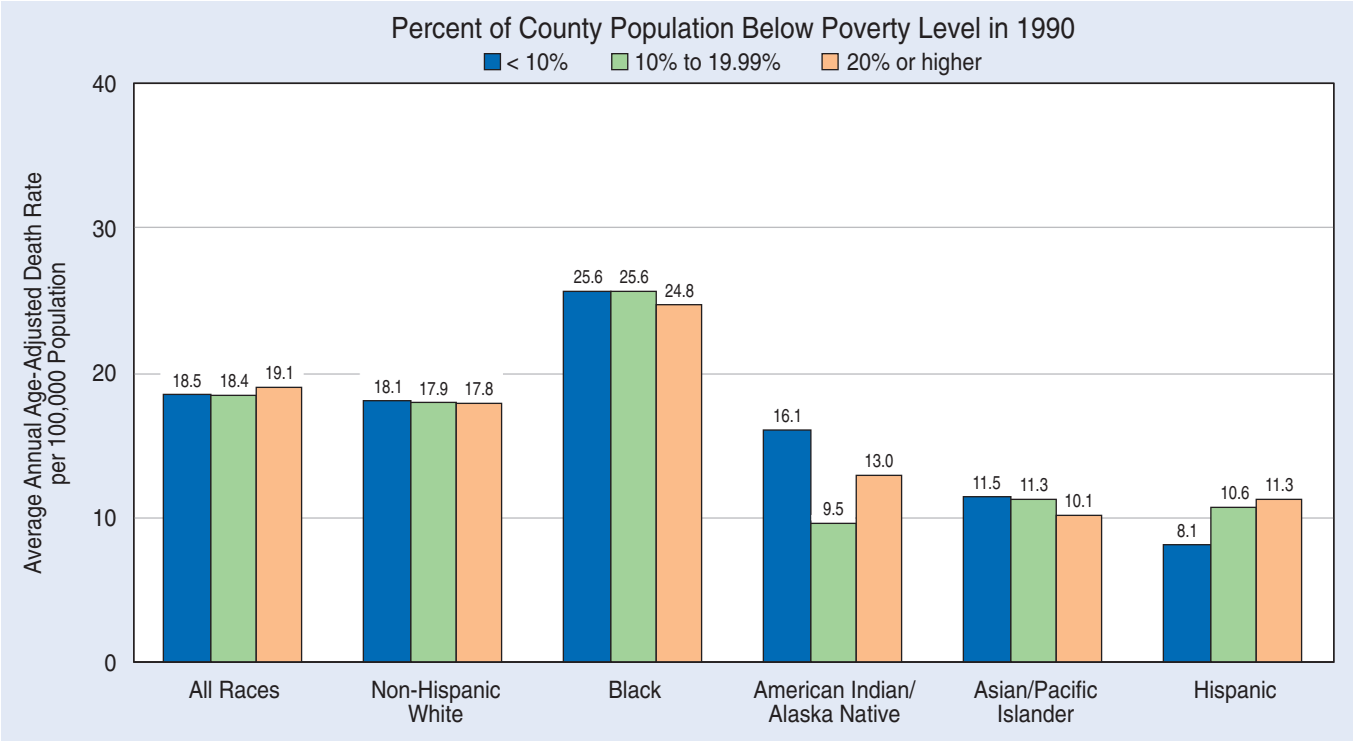


Figure 3.26. Colorectal Cancer Mortality Among U.S. Women, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.27. Trends in SEER Colorectal Cancer Incidence Among Men (Three-Year Moving Averages), 1975–1999

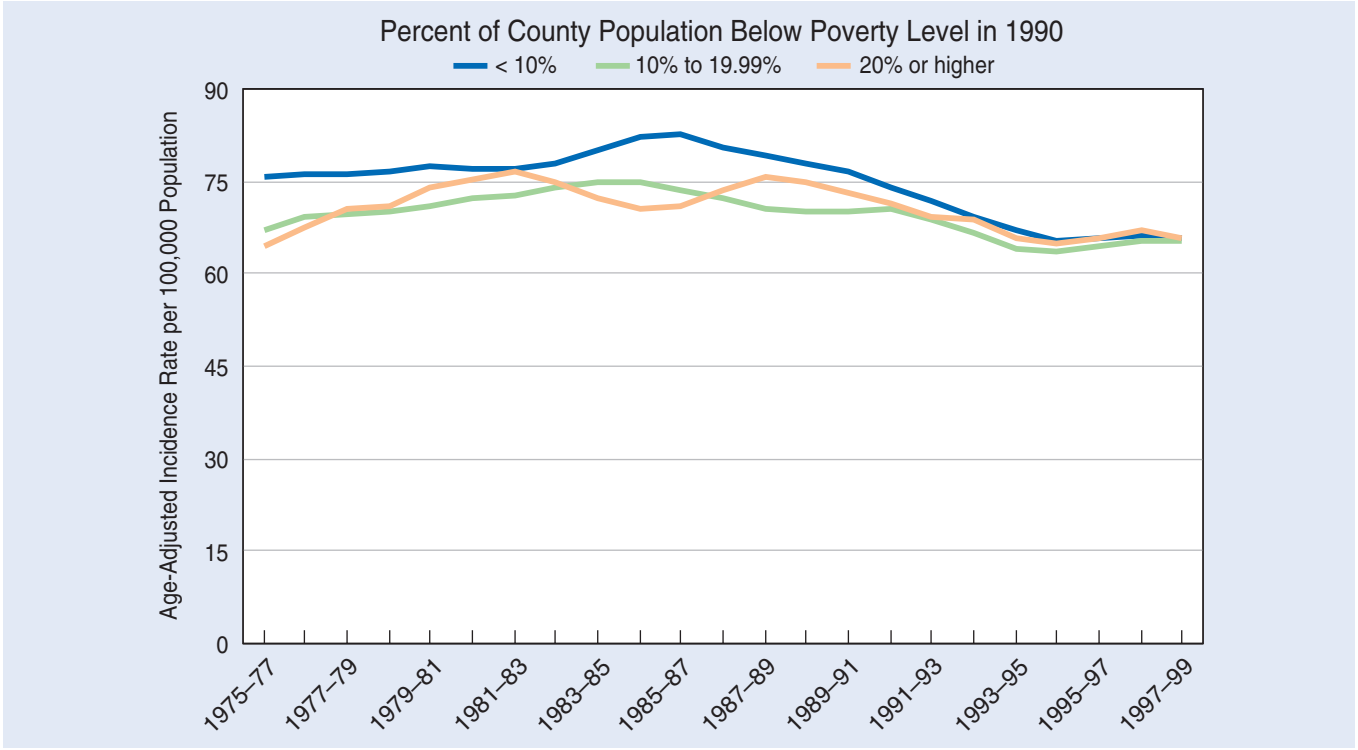
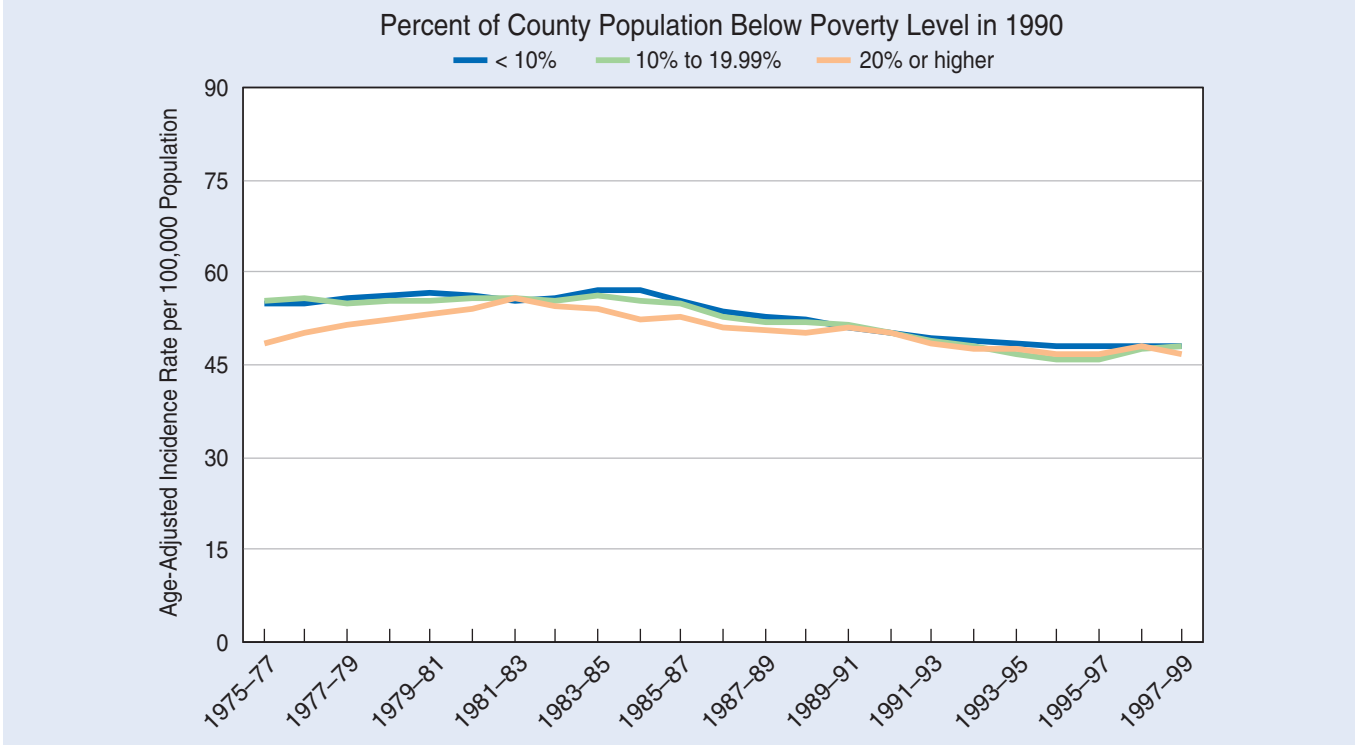


Figure 3.28. Trends in SEER Colorectal Cancer Incidence Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.29. SEER Colorectal Cancer Incidence Among Men, 1988–1992

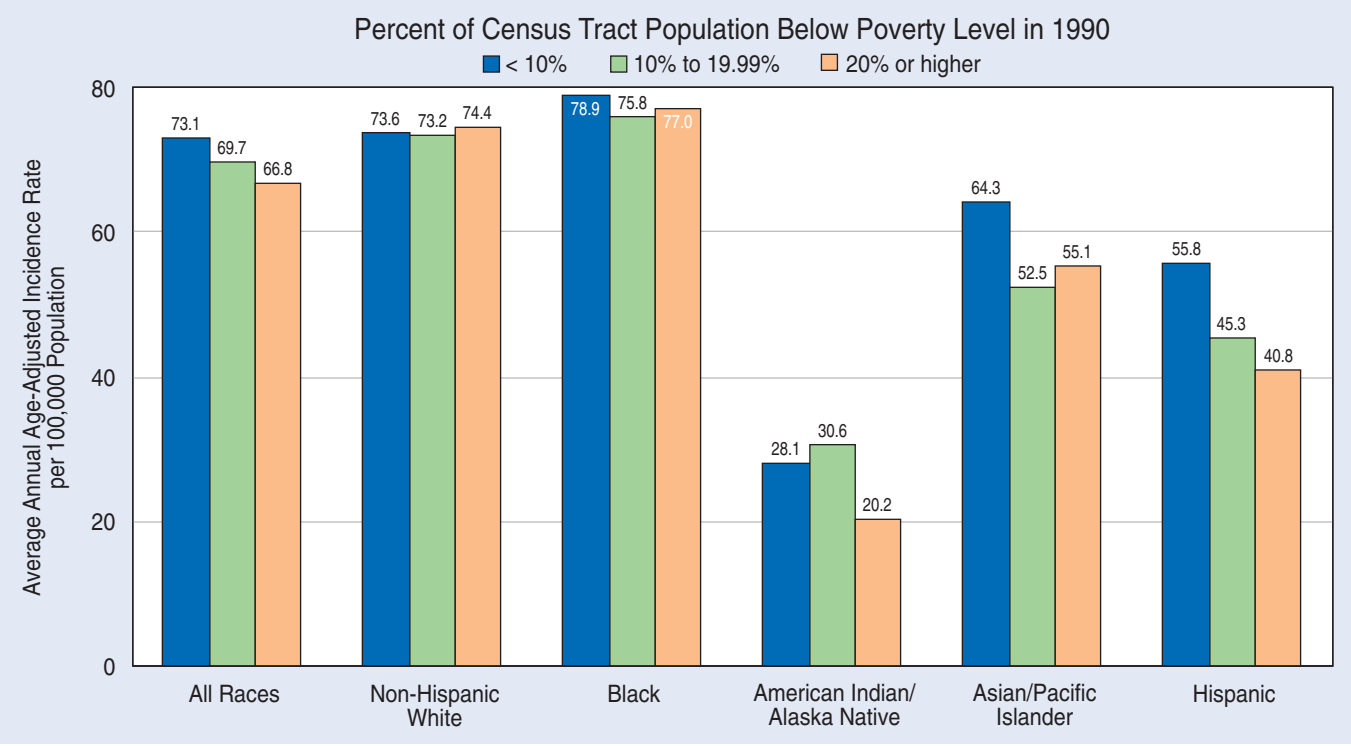
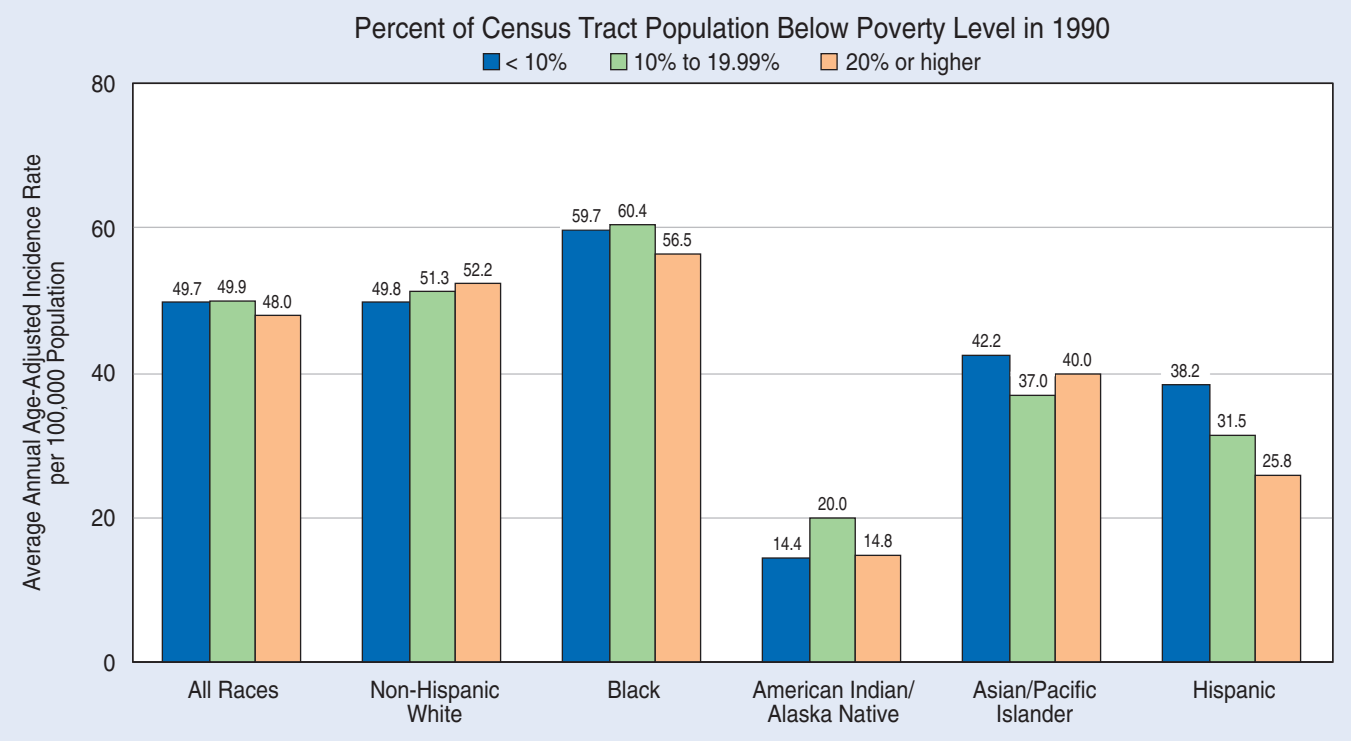


Figure 3.30. SEER Colorectal Cancer Incidence Among Women, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.31. Trends in U.S. Prostate Cancer Mortality, 1975–1999

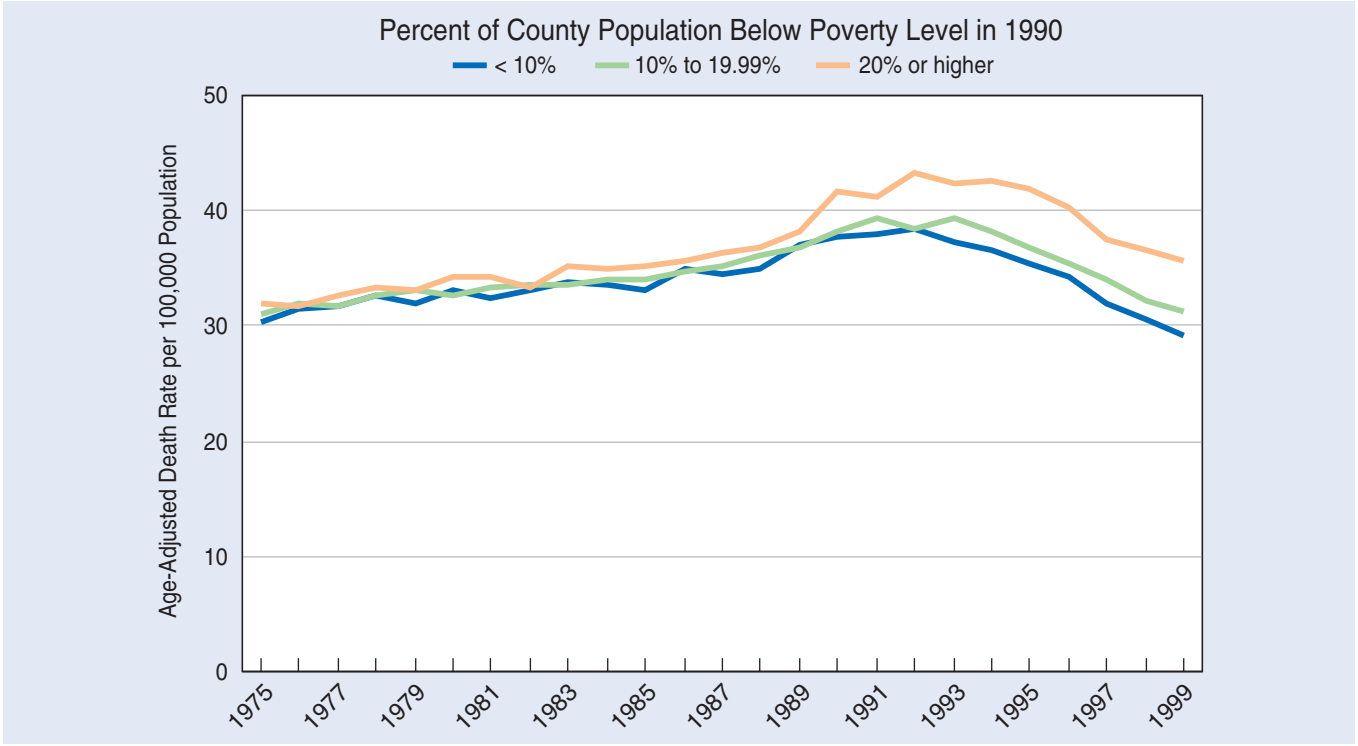
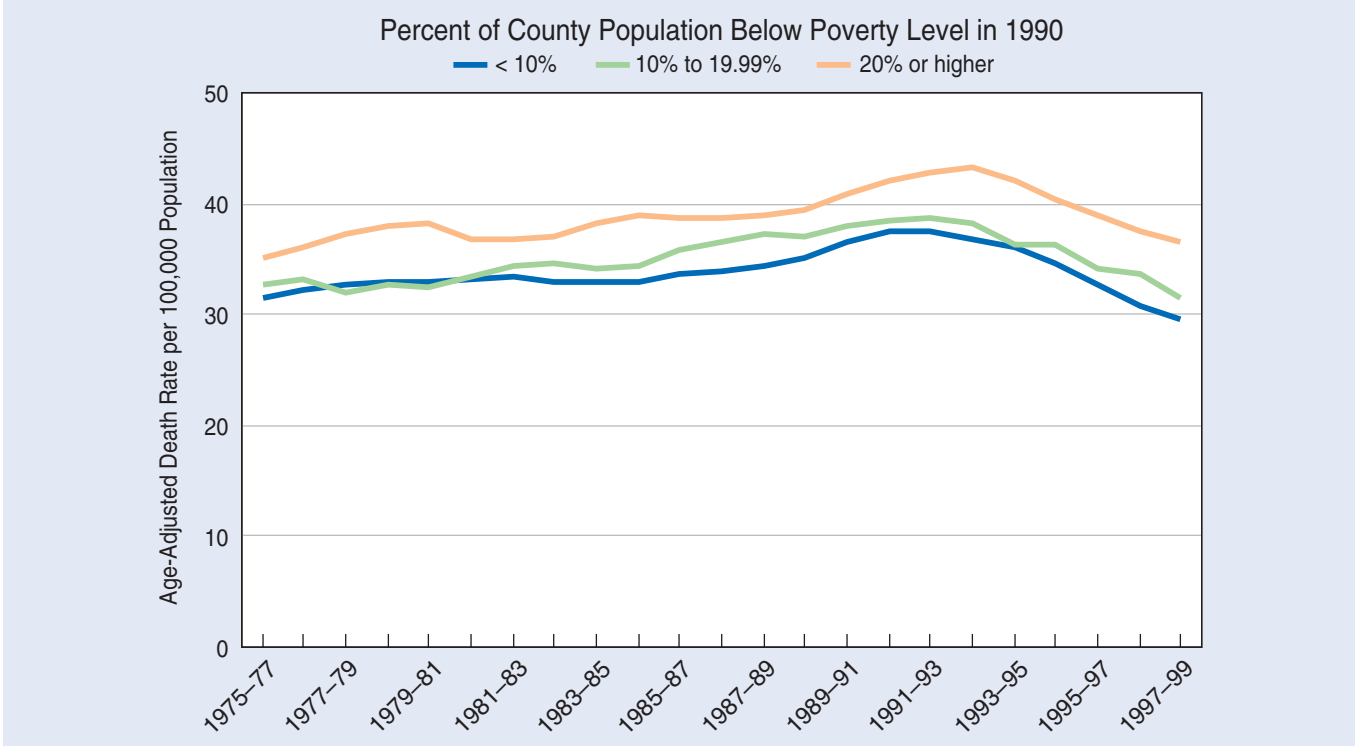
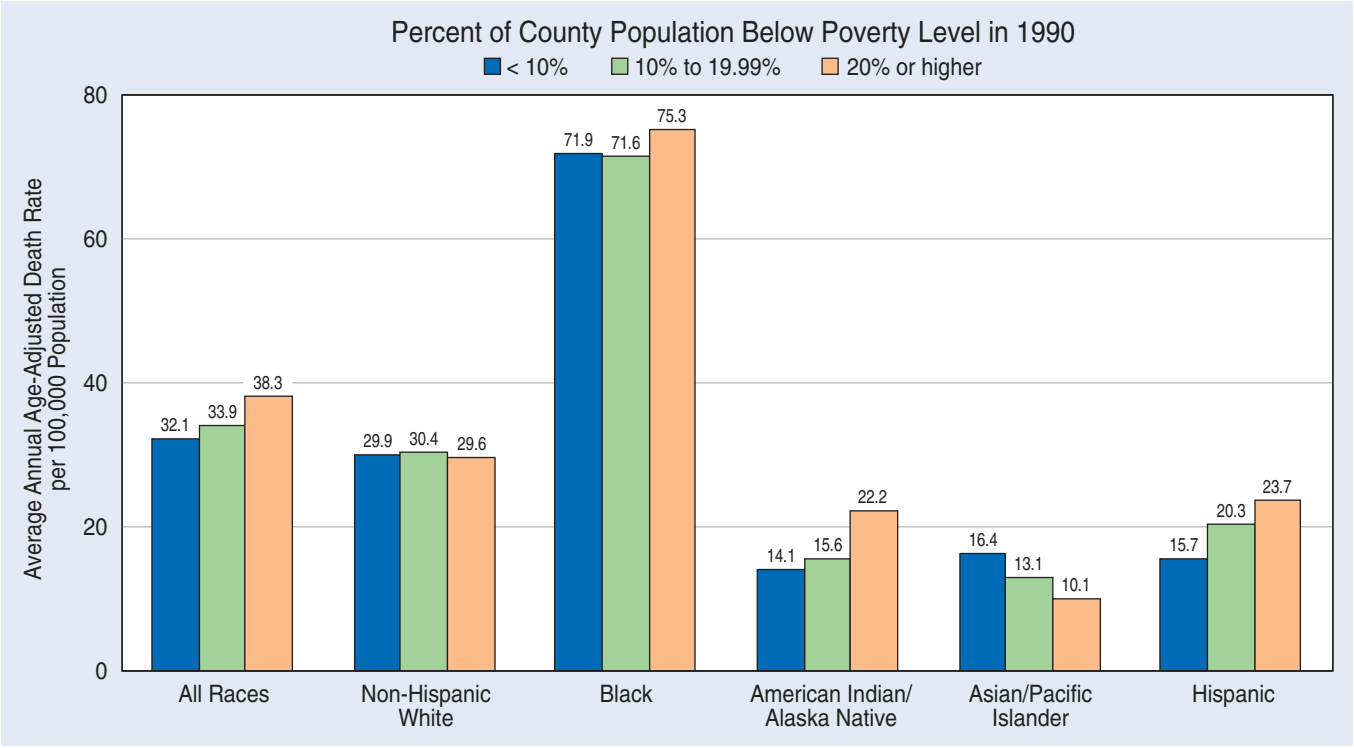


Figure 3.32. Trends in SEER Prostate Cancer Mortality (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.33. U.S. Prostate Cancer Mortality, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.34. Trends in SEER Prostate Cancer Incidence (Three-Year Moving Averages), 1975–1999

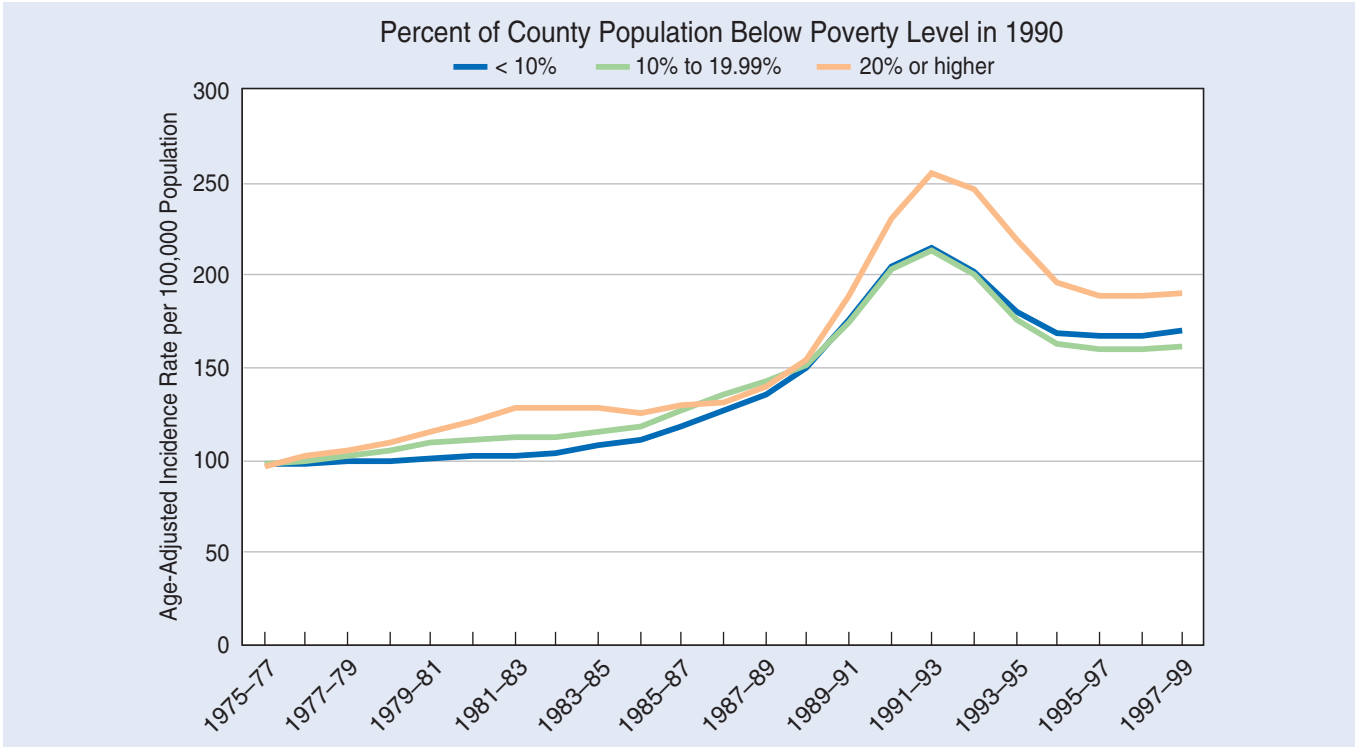
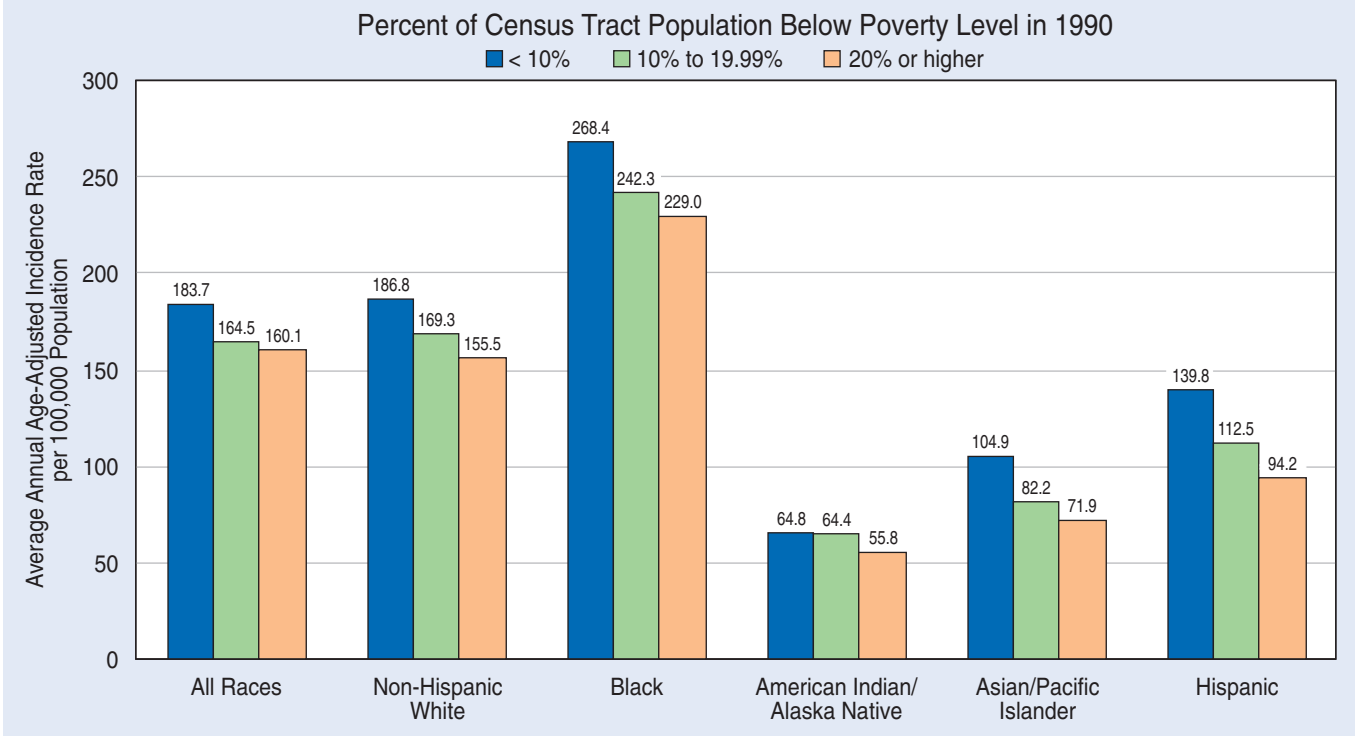


Figure 3.35. SEER Prostate Cancer Incidence, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates in Figures 3.34 and 3.35 are based on data from 9 and 11 SEER registries, respectively. See "Data and Methods" for a list of SEER registries.

Figure 3.36. Trends in U.S. Female Breast Cancer Mortality, 1975–1999

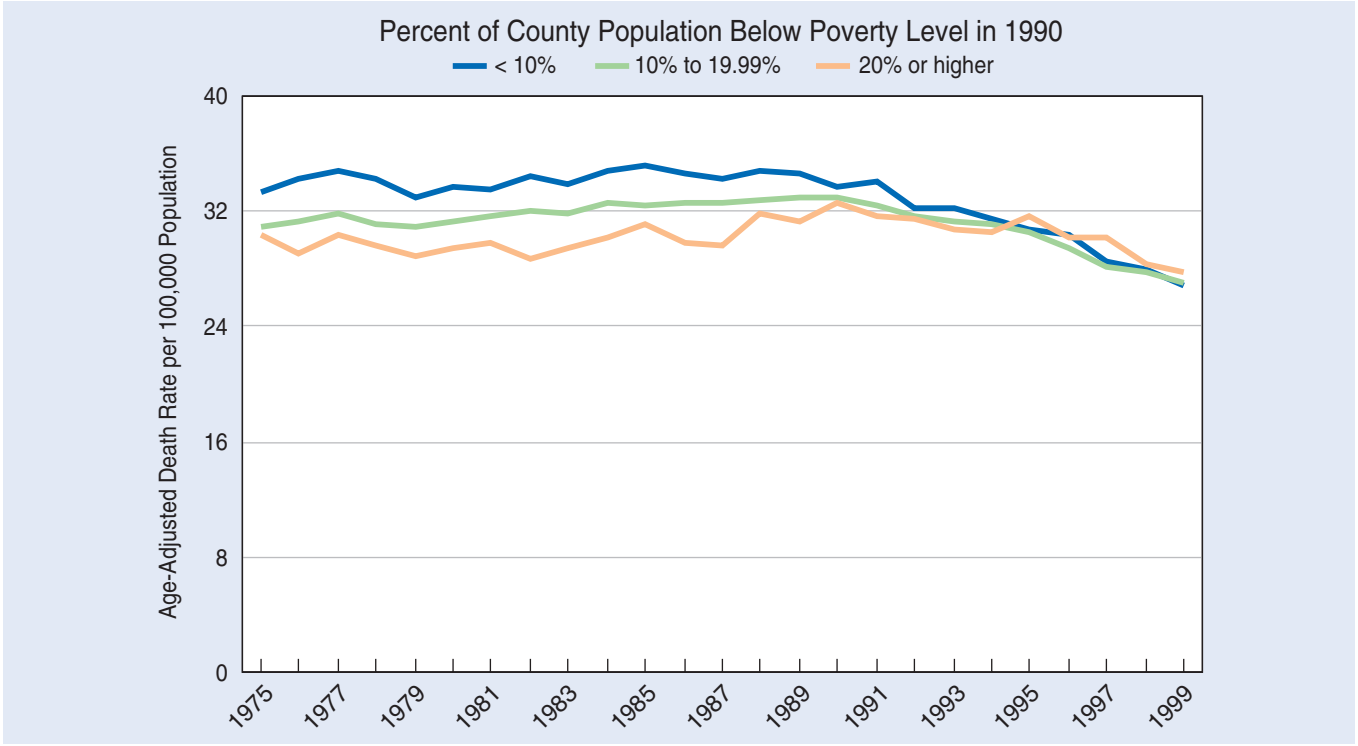
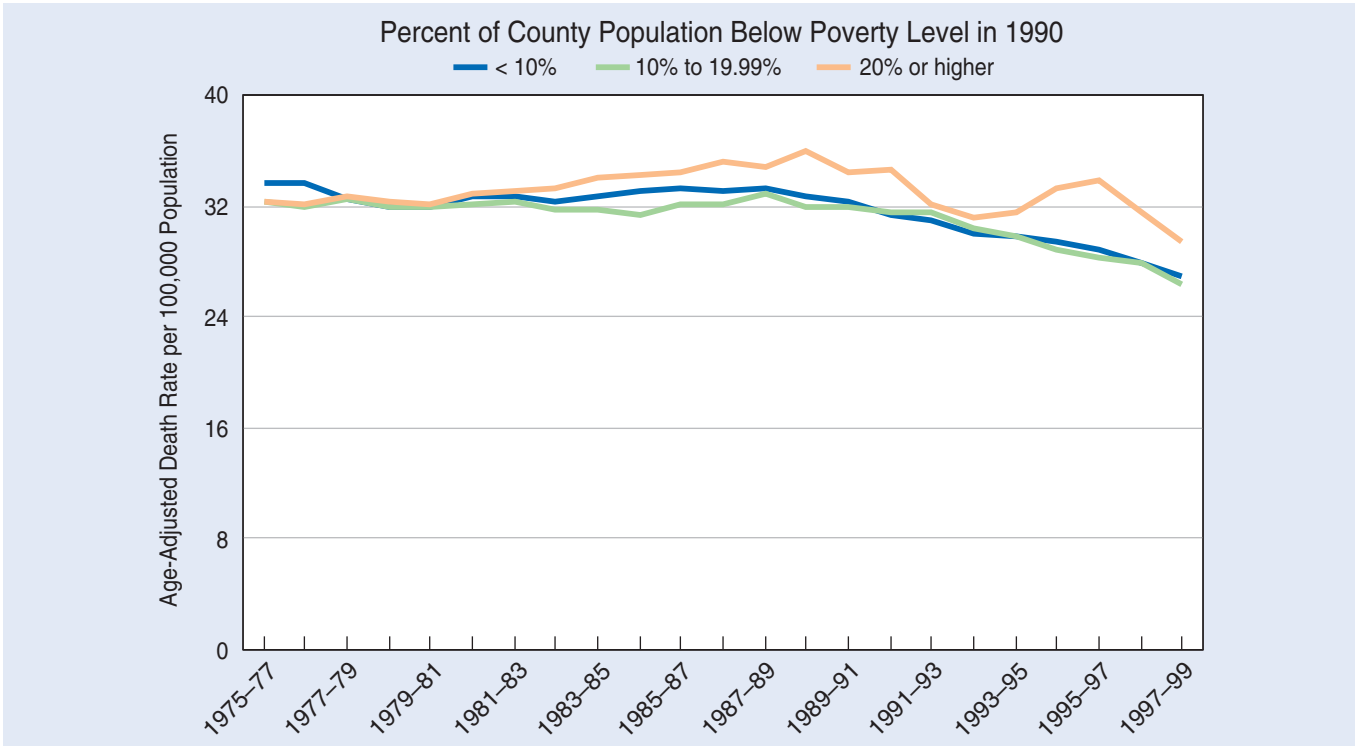
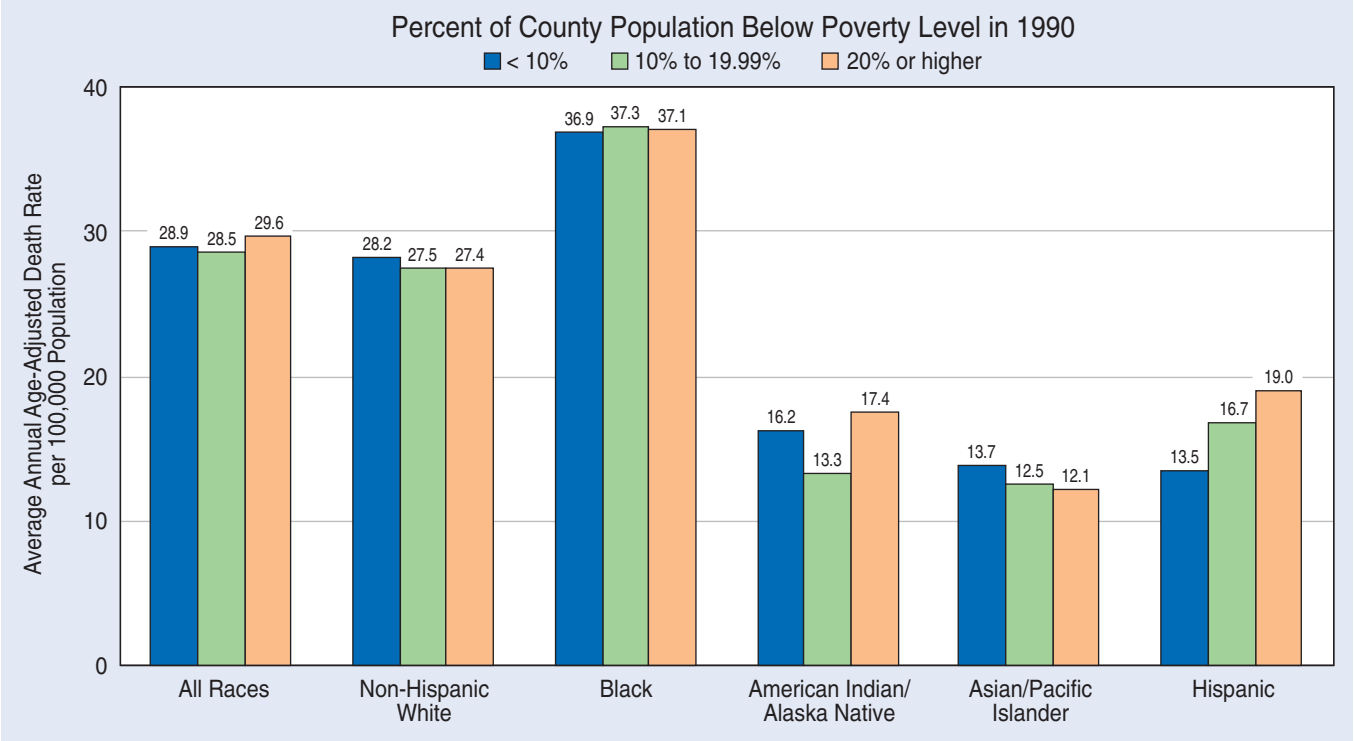


Figure 3.37. Trends in SEER Female Breast Cancer Mortality (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.38. Breast Cancer Mortality Among U.S. Women, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.39. Trends in SEER Female Breast Cancer Incidence (Three-Year Moving Averages), 1975–1999

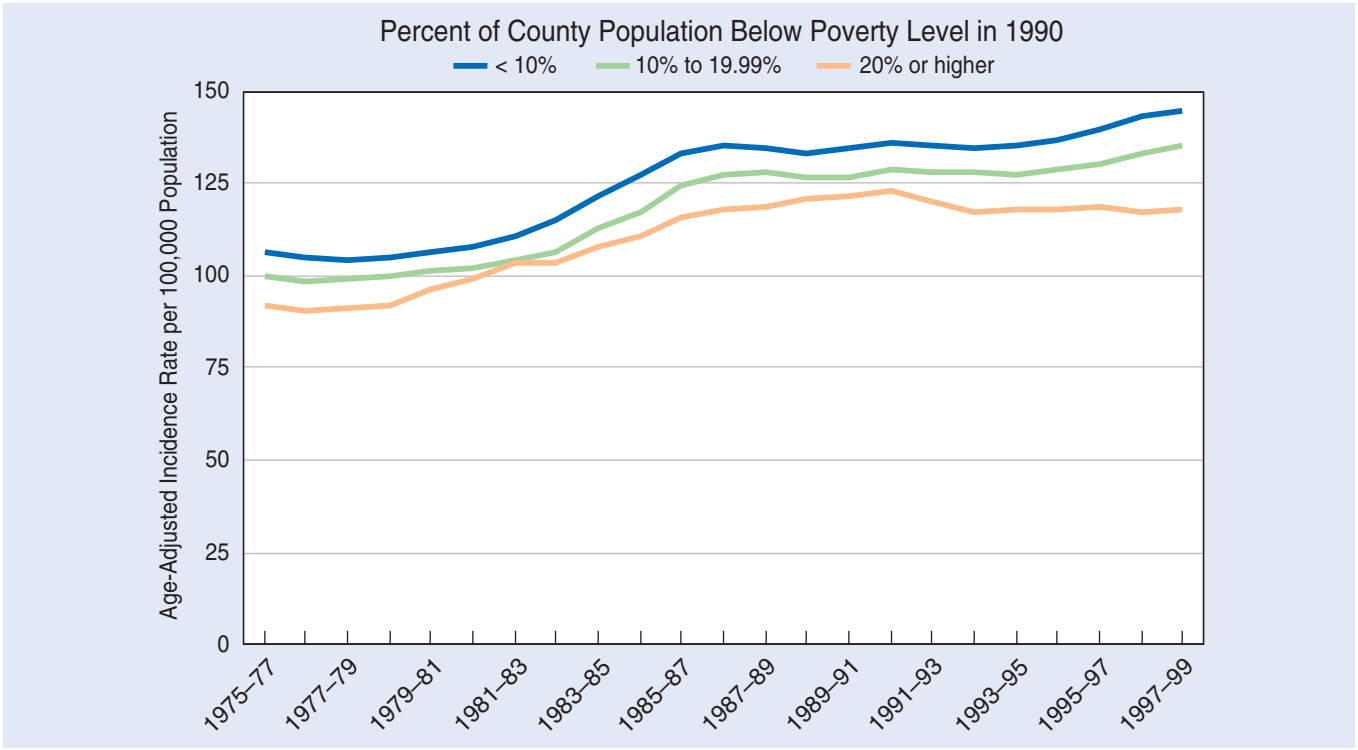
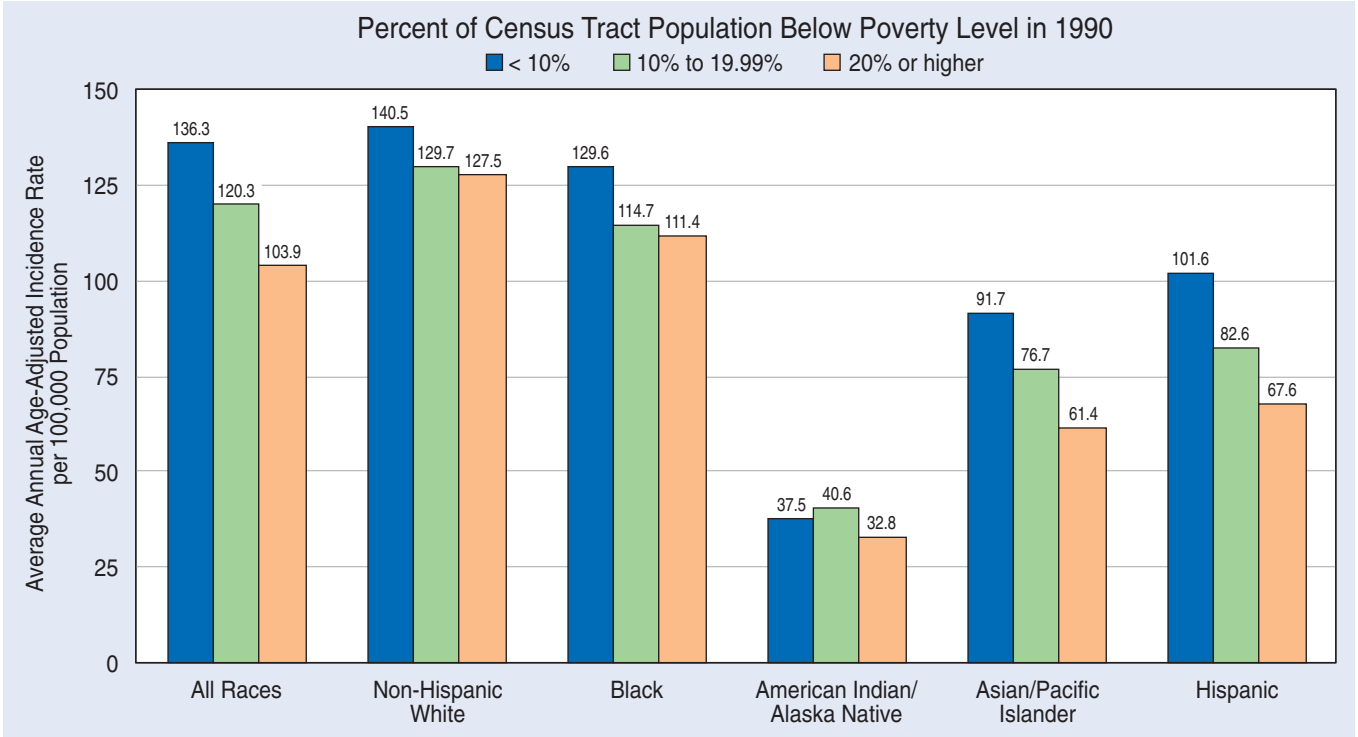


Figure 3.40. SEER Female Breast Cancer Incidence, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates in Figures 3.39 and 3.40 are based on data from 9 and 11 SEER registries, respectively. See "Data and Methods" for a list of SEER registries.

Figure 3.41. Trends in U.S. Cervical Cancer Mortality, 1975–1999

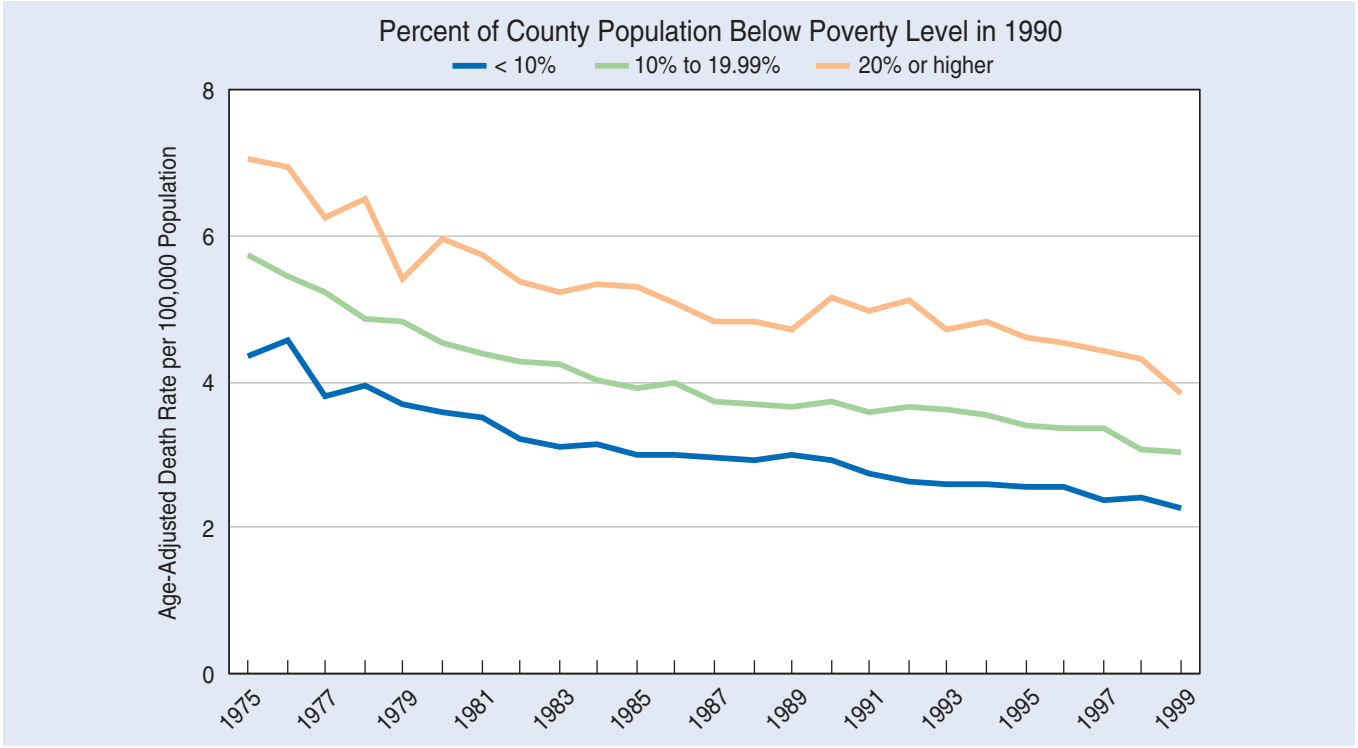
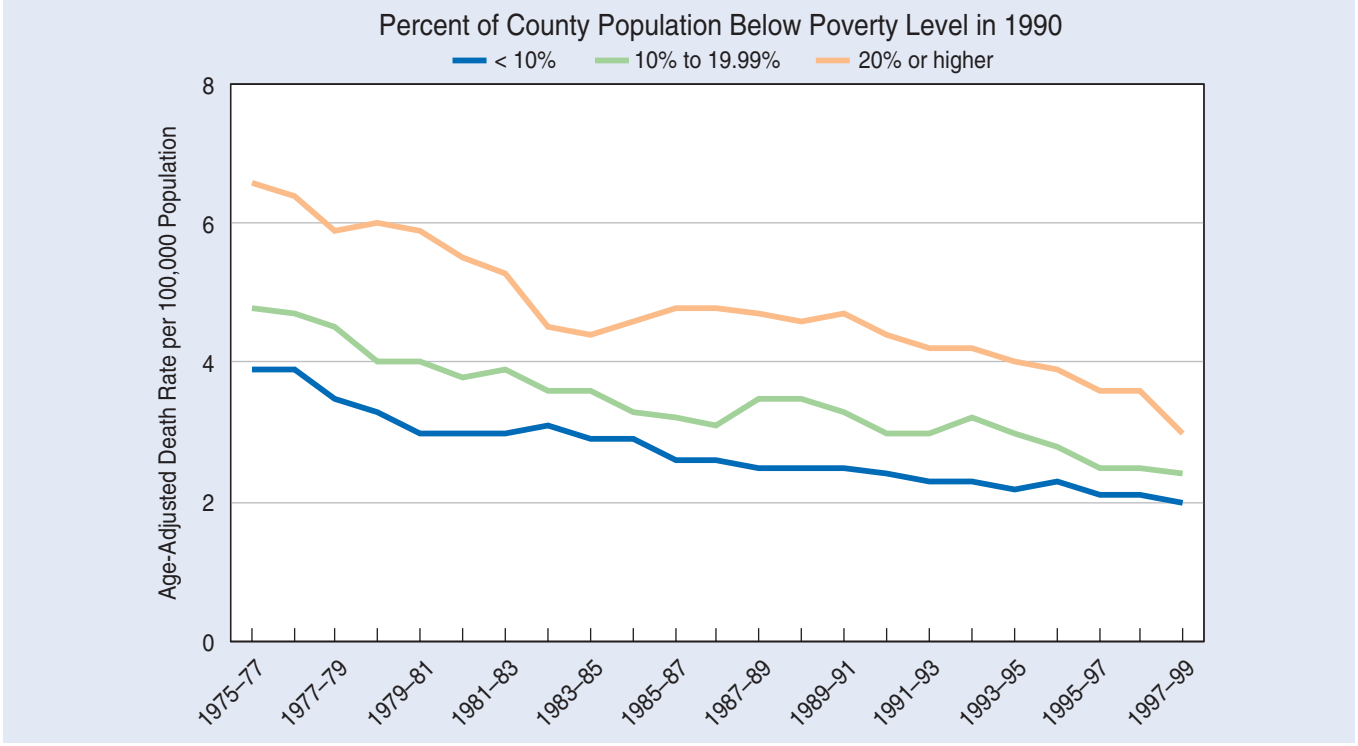
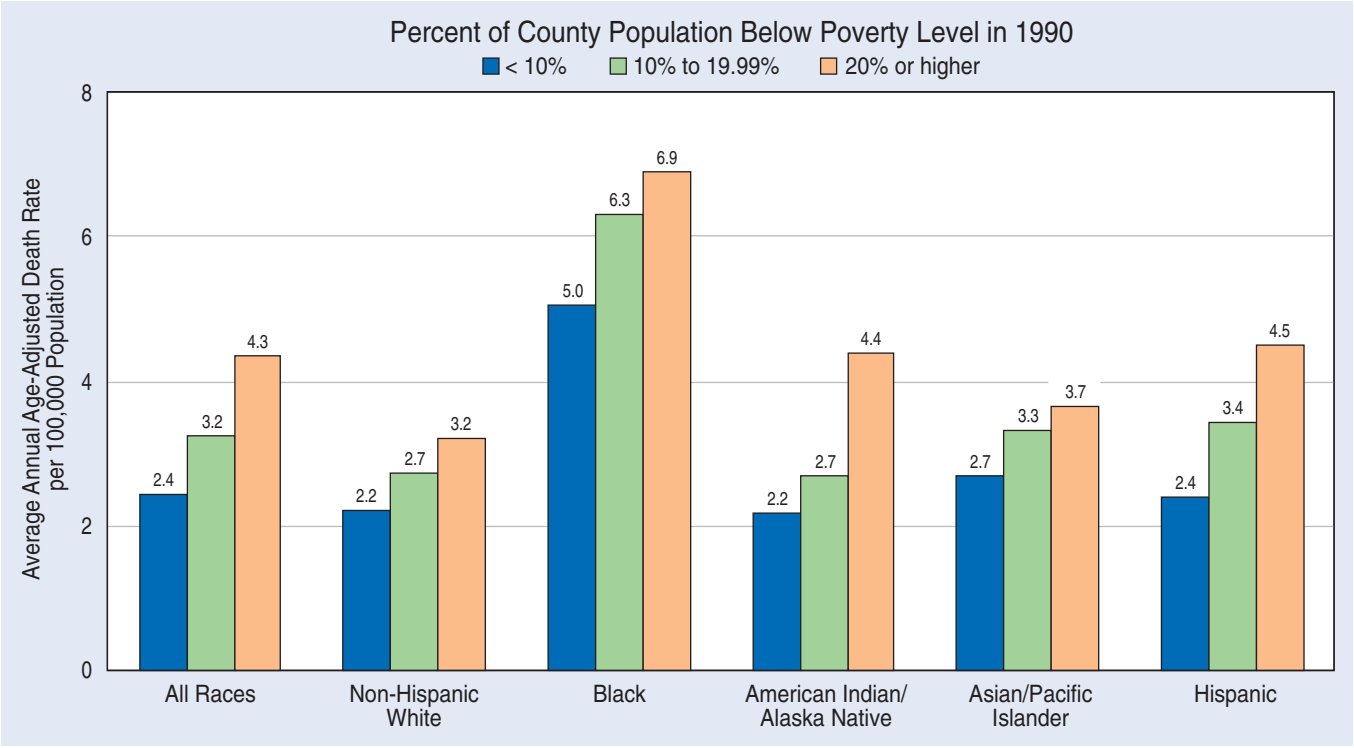


Figure 3.42. Trends in SEER Cervical Cancer Mortality (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.43. U.S. Cervical Cancer Mortality, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.44. Trends in SEER Cervical Cancer Incidence (Three-Year Moving Averages), 1975–1999

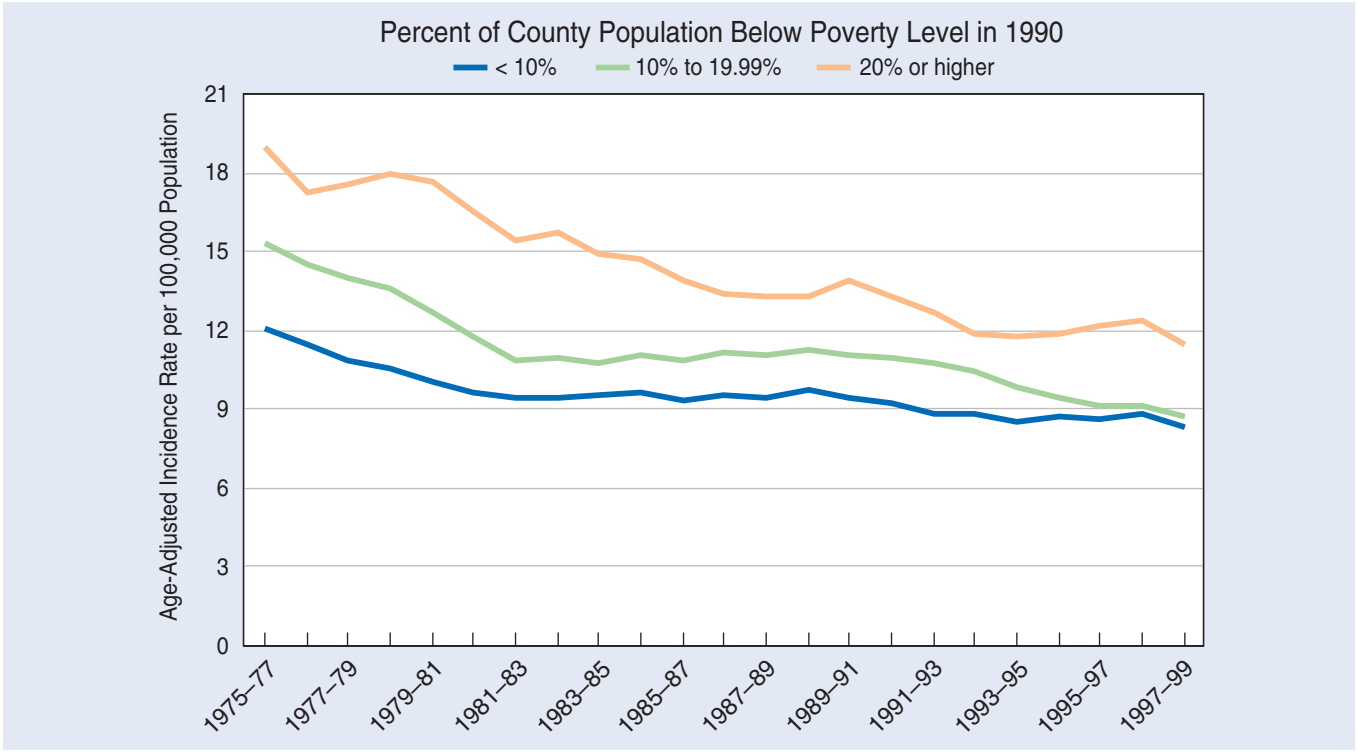
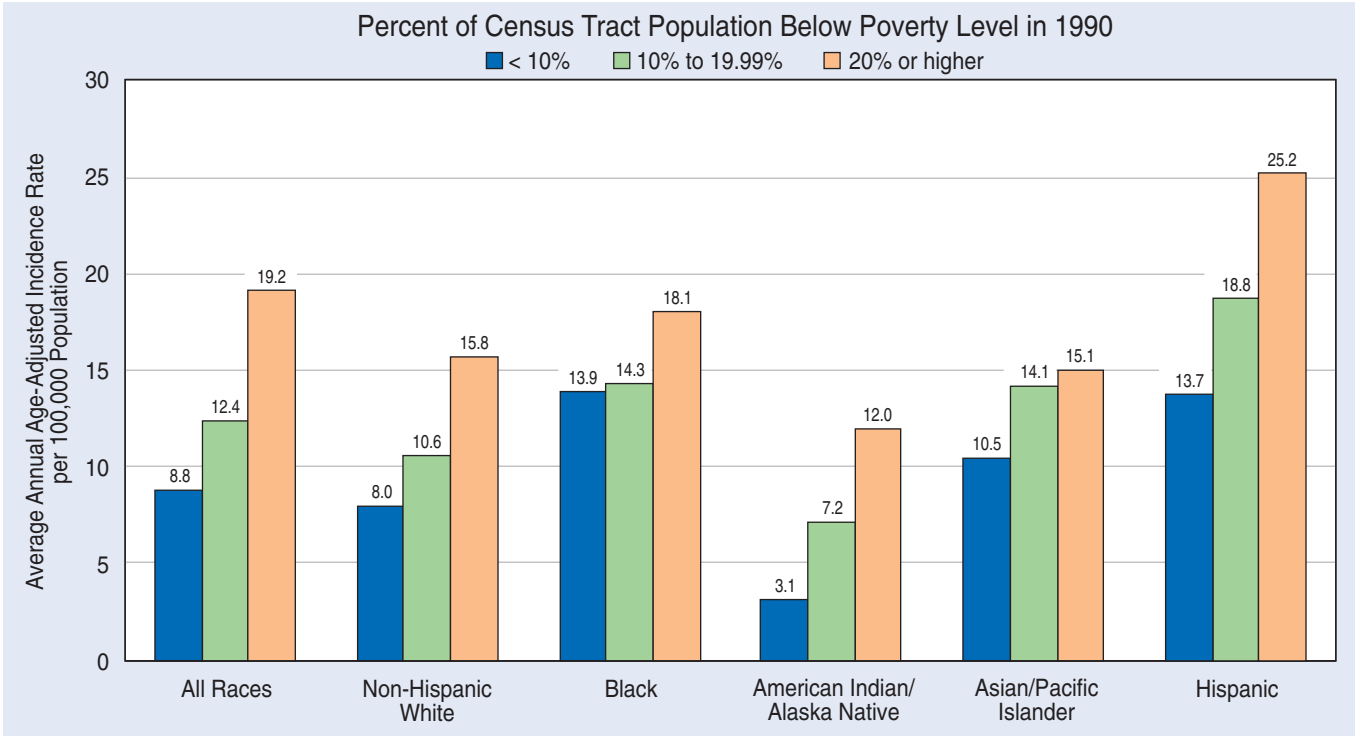


Figure 3.45. SEER Cervical Cancer Incidence, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates in Figures 3.44 and 3.45 are based on data from 9 and 11 SEER registries, respectively. See "Data and Methods" for a list of SEER registries.

Figure 3.46. Trends in Mortality from Melanoma of the Skin Among U.S. Men, 1975–1999

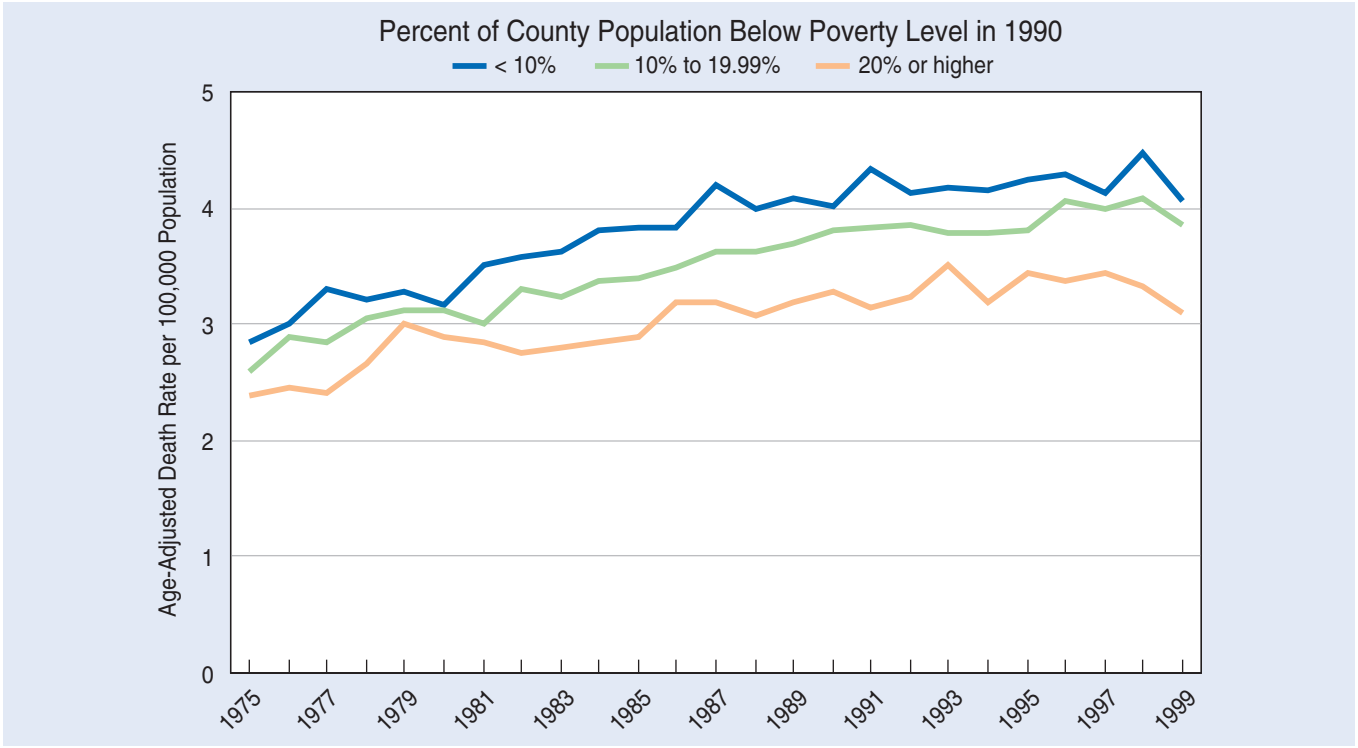
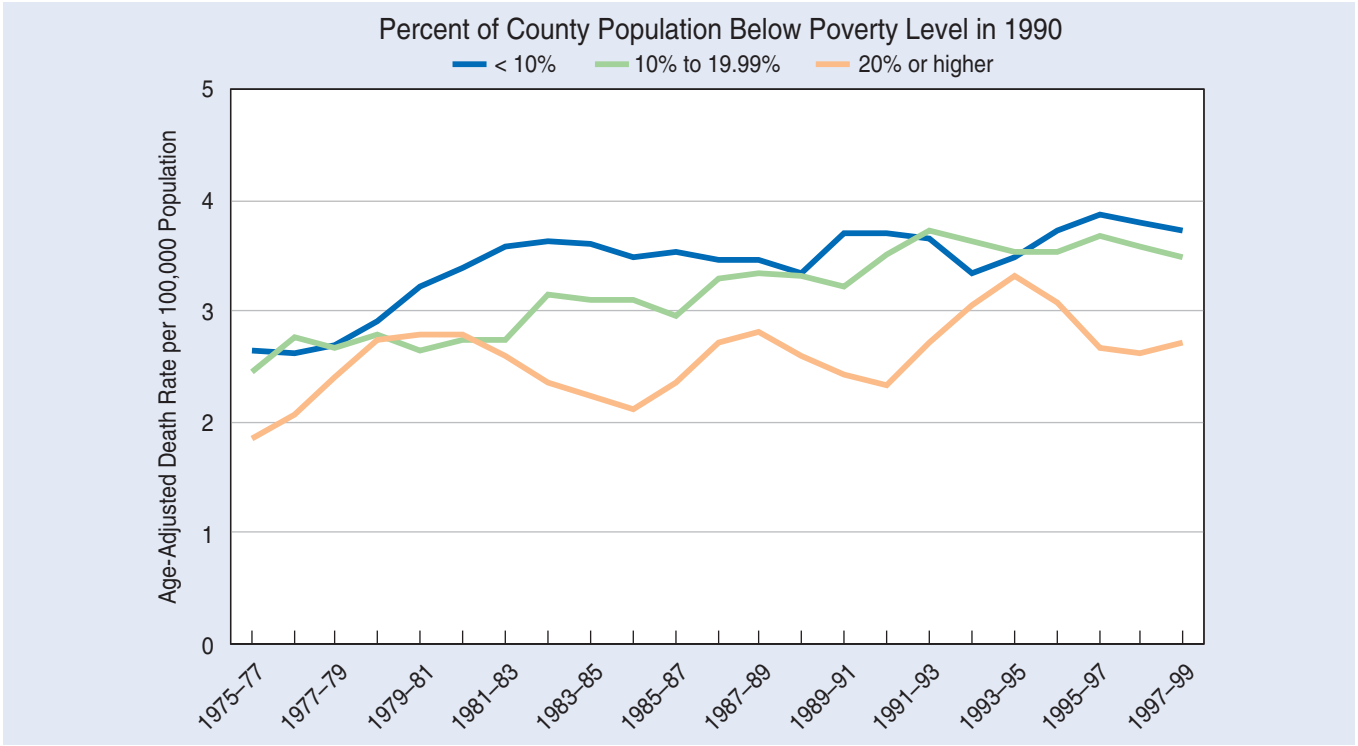


Figure 3.47. Trends in SEER Mortality from Melanoma of the Skin Among Men (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.48. Trends in Mortality from Melanoma of the Skin Among U.S. Women, 1975–1999

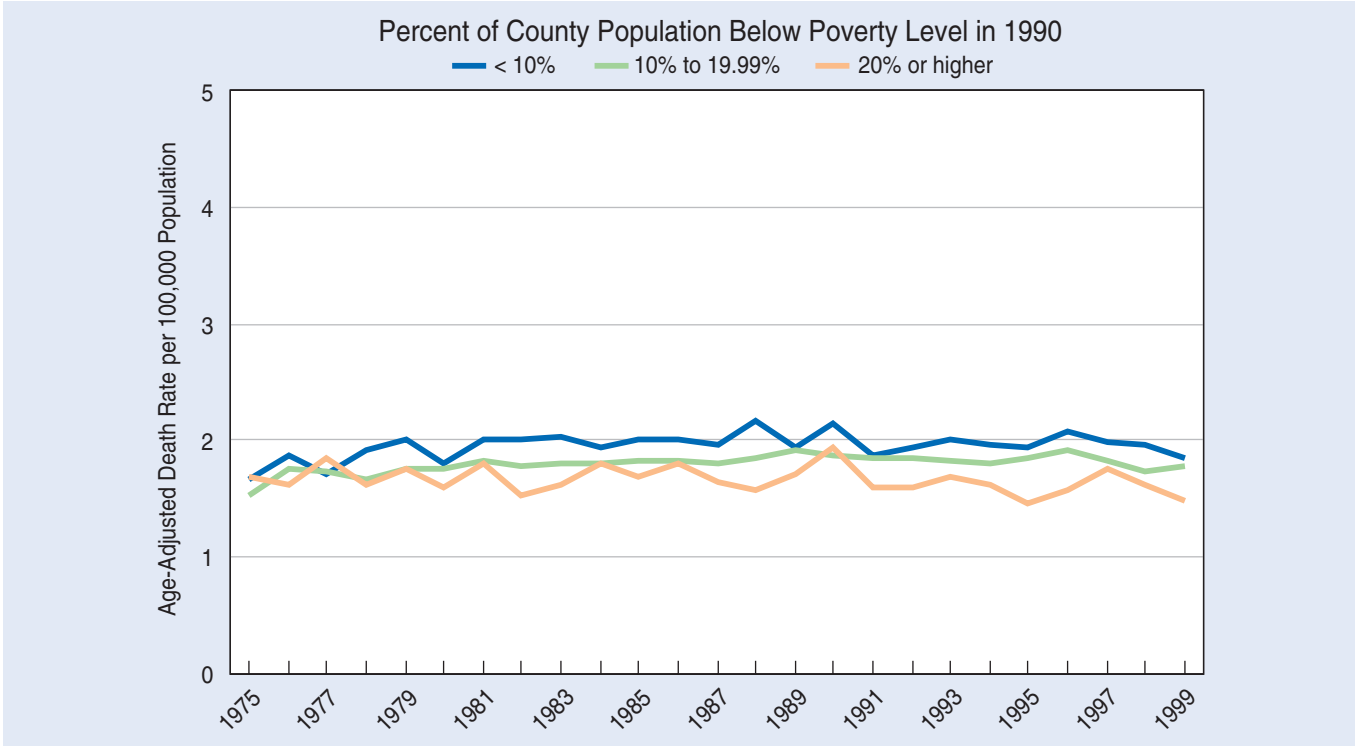
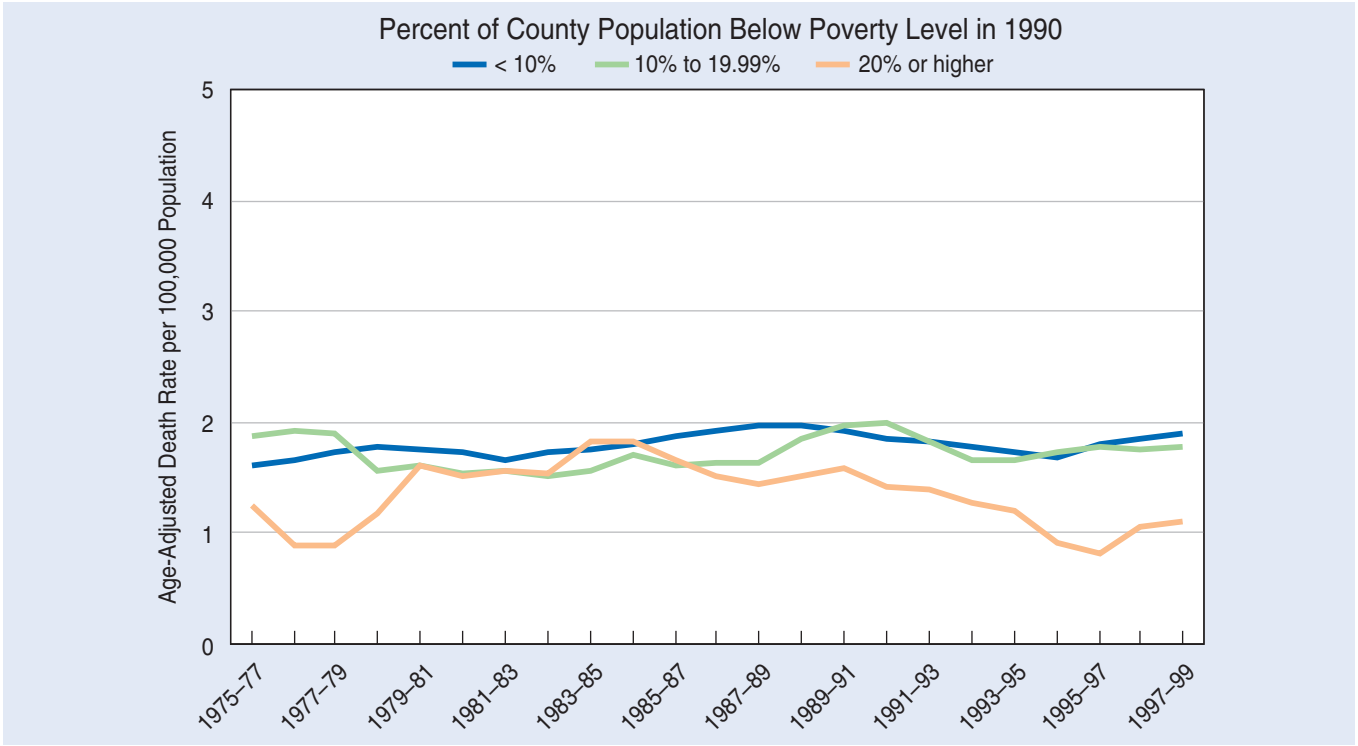


Figure 3.49. Trends in SEER Mortality from Melanoma of the Skin Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER mortality rates are based on data for 9 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 3.50. Mortality from Melanoma of the Skin, U.S. Men, 1995–1999

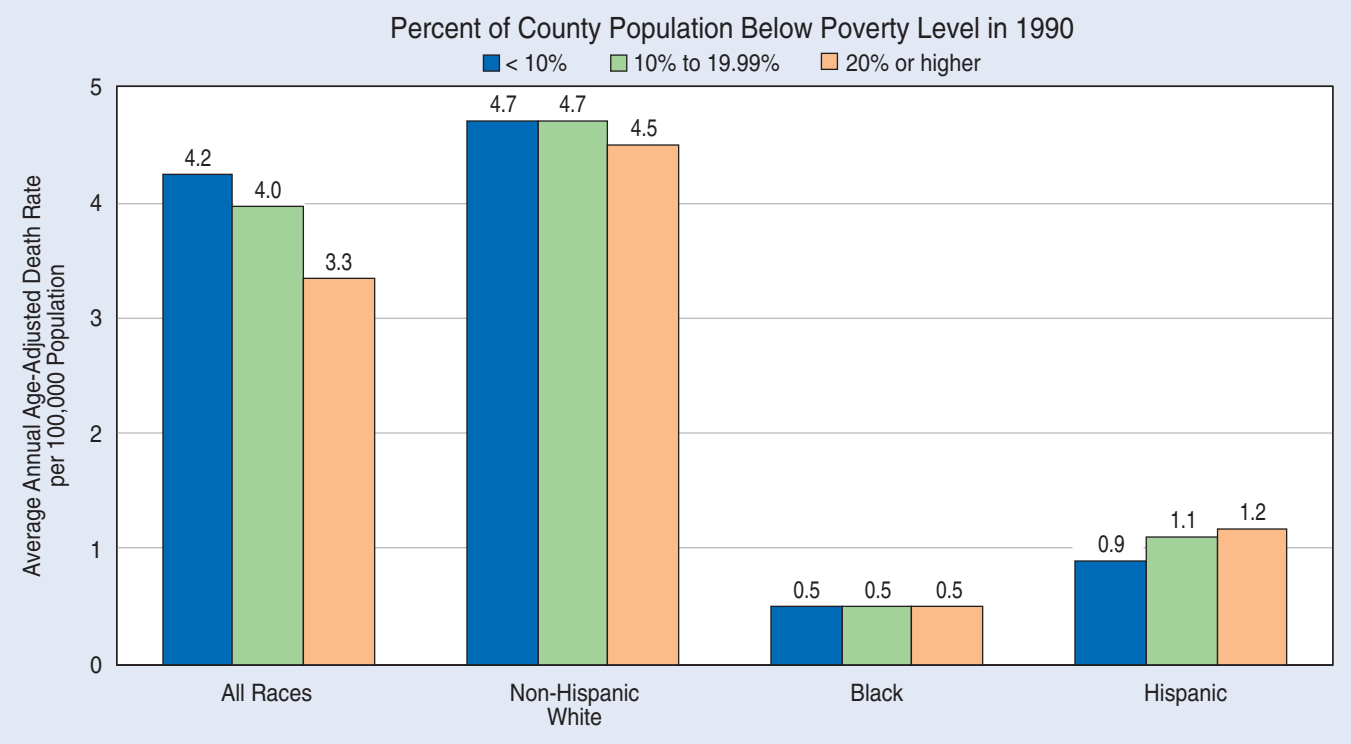
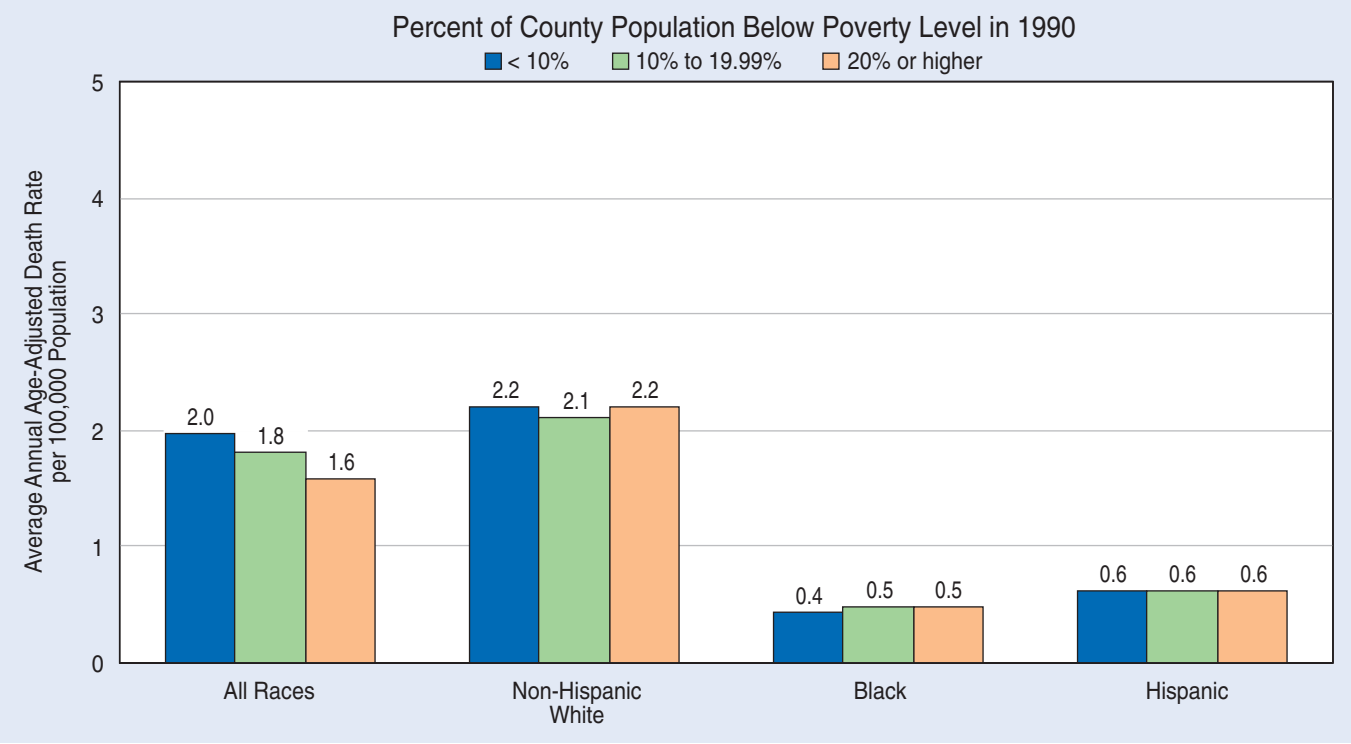


Figure 3.51. Mortality from Melanoma of the Skin, U.S. Women, 1995–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates for Hispanics and non-Hispanic whites are based on 1997–1999 data.

Figure 3.52. Trends in SEER Incidence, Melanoma of the Skin Among Men (Three-Year Moving Averages), 1975–1999

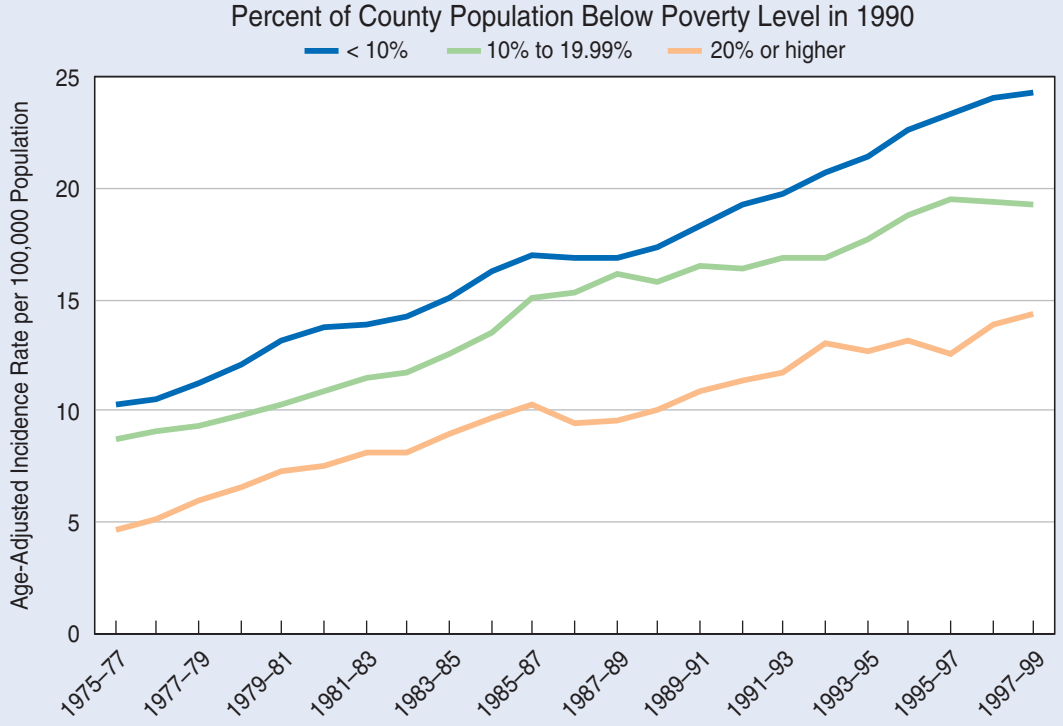
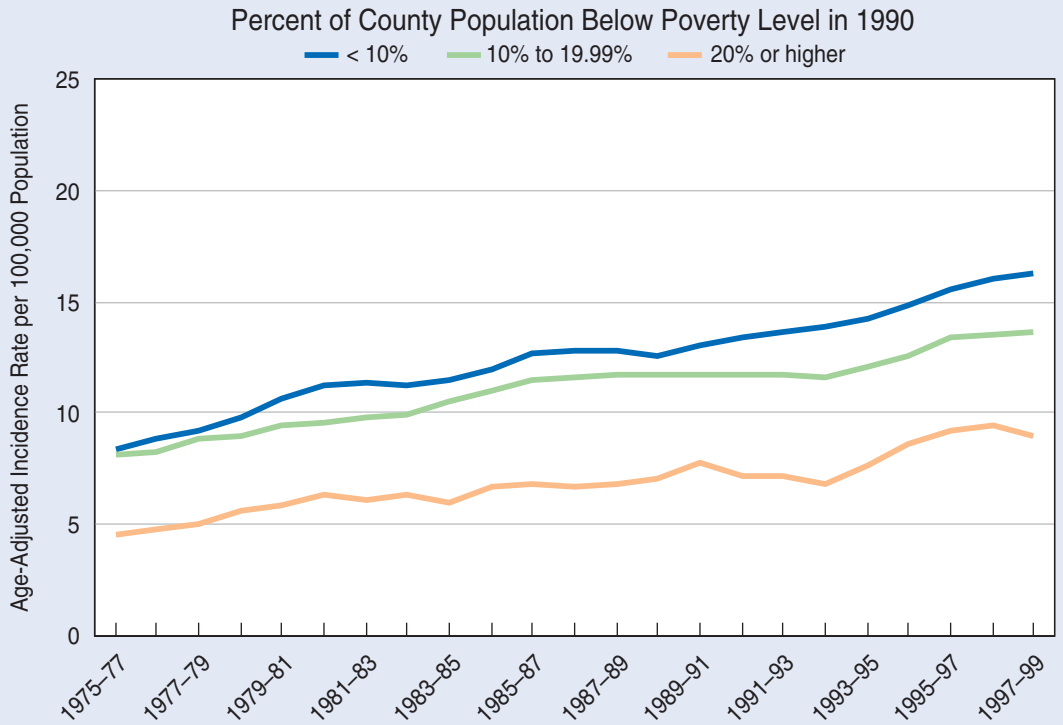


Figure 3.53. Trends in SEER Incidence, Melanoma of the Skin Among Women (Three-Year Moving Averages), 1975–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 9 registries.
See "Data and Methods" for a list of SEER registries.

Figure 3.54. SEER Incidence of Melanoma of the Skin (Invasive) Among Men, 1988–1992

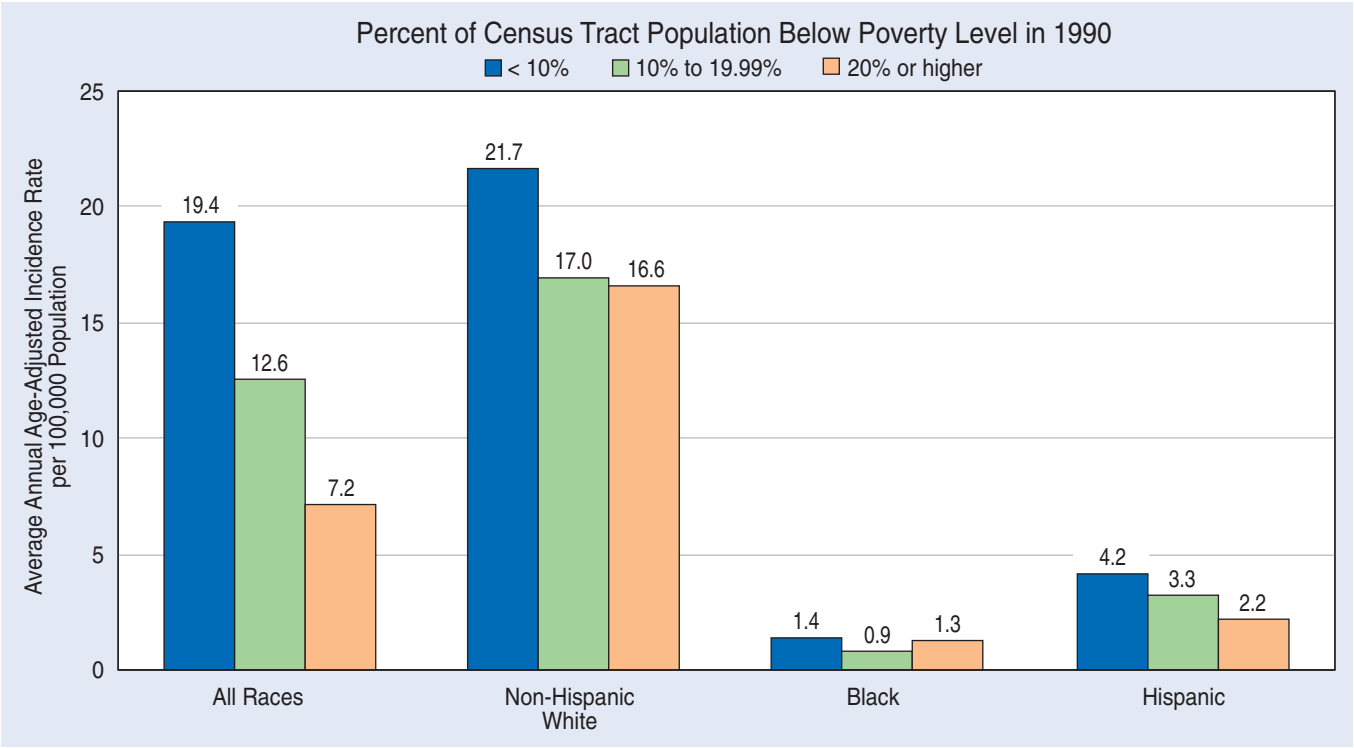
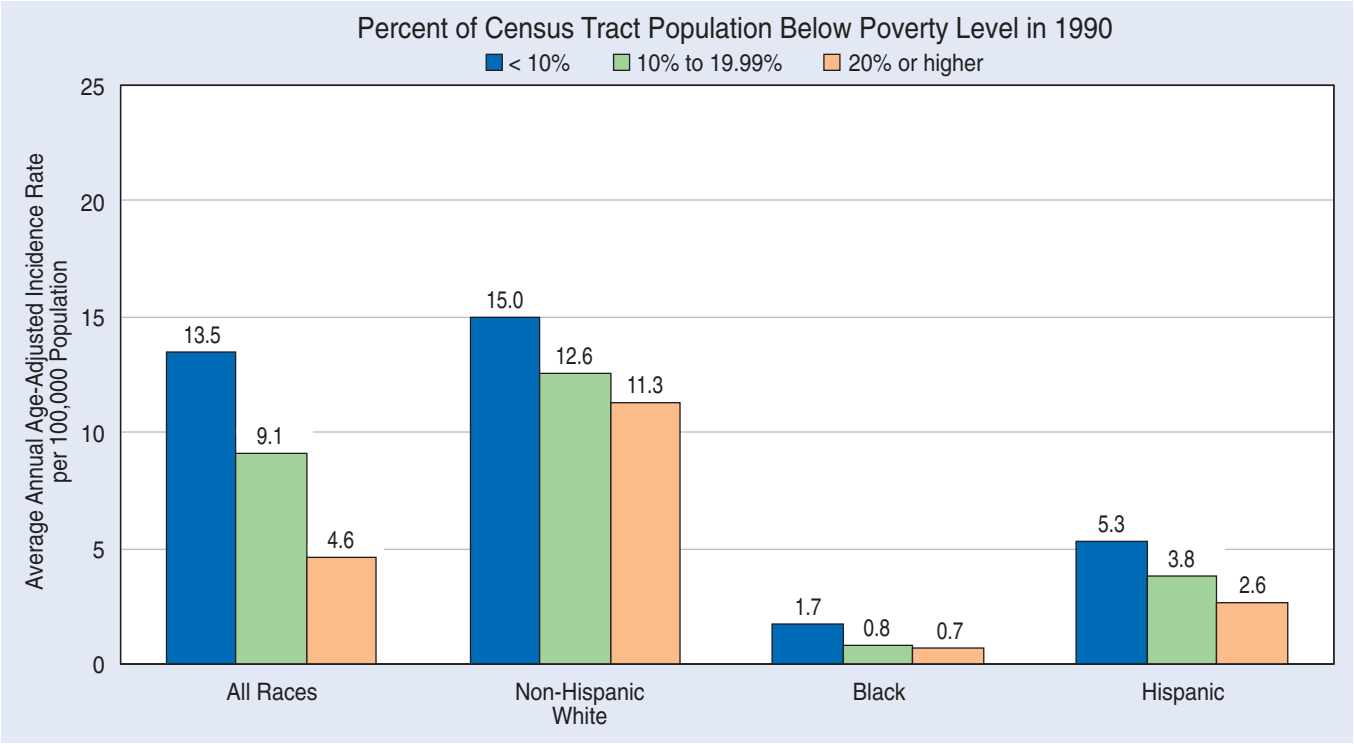


Figure 3.55. SEER Incidence of Melanoma of the Skin (Invasive) Among Women, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population. Rates are based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries

Figure 3.56. Relationship Between County Poverty Rate and Lung Cancer Mortality Among U.S. Men, 1990–1999

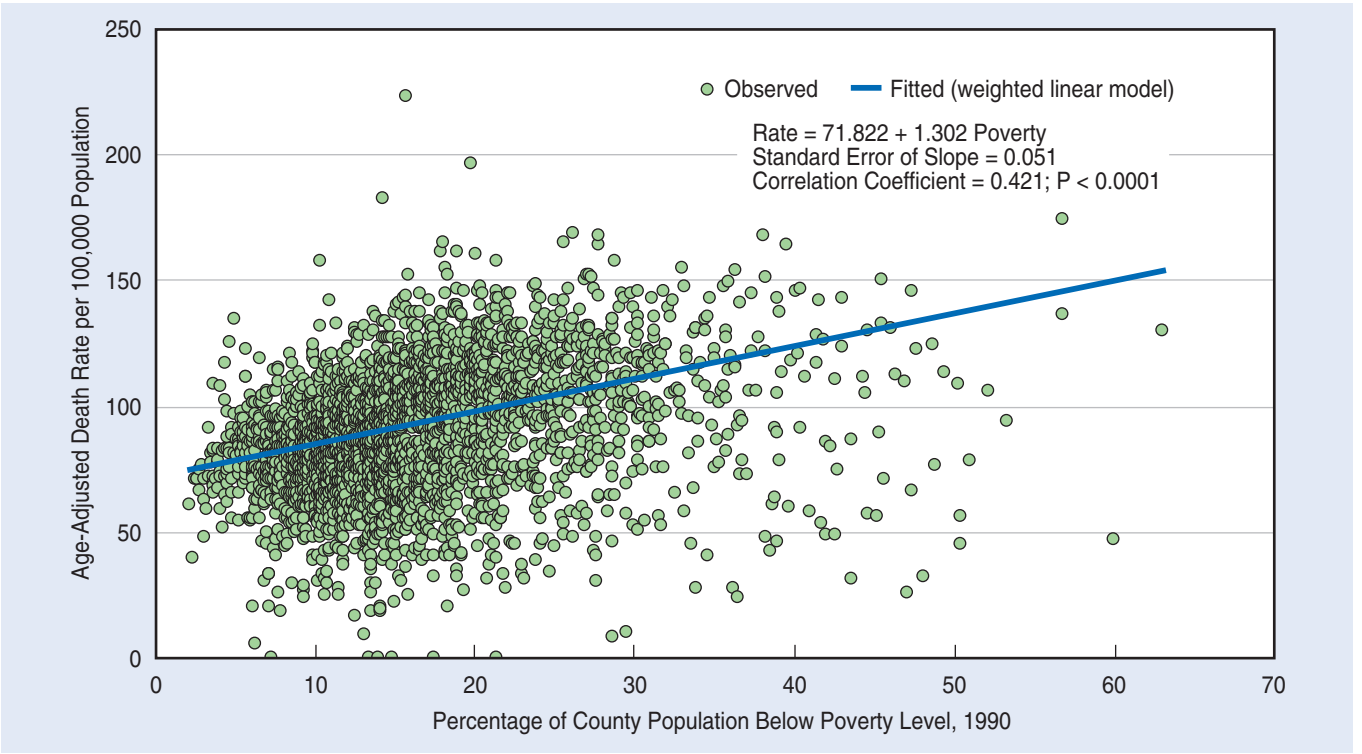
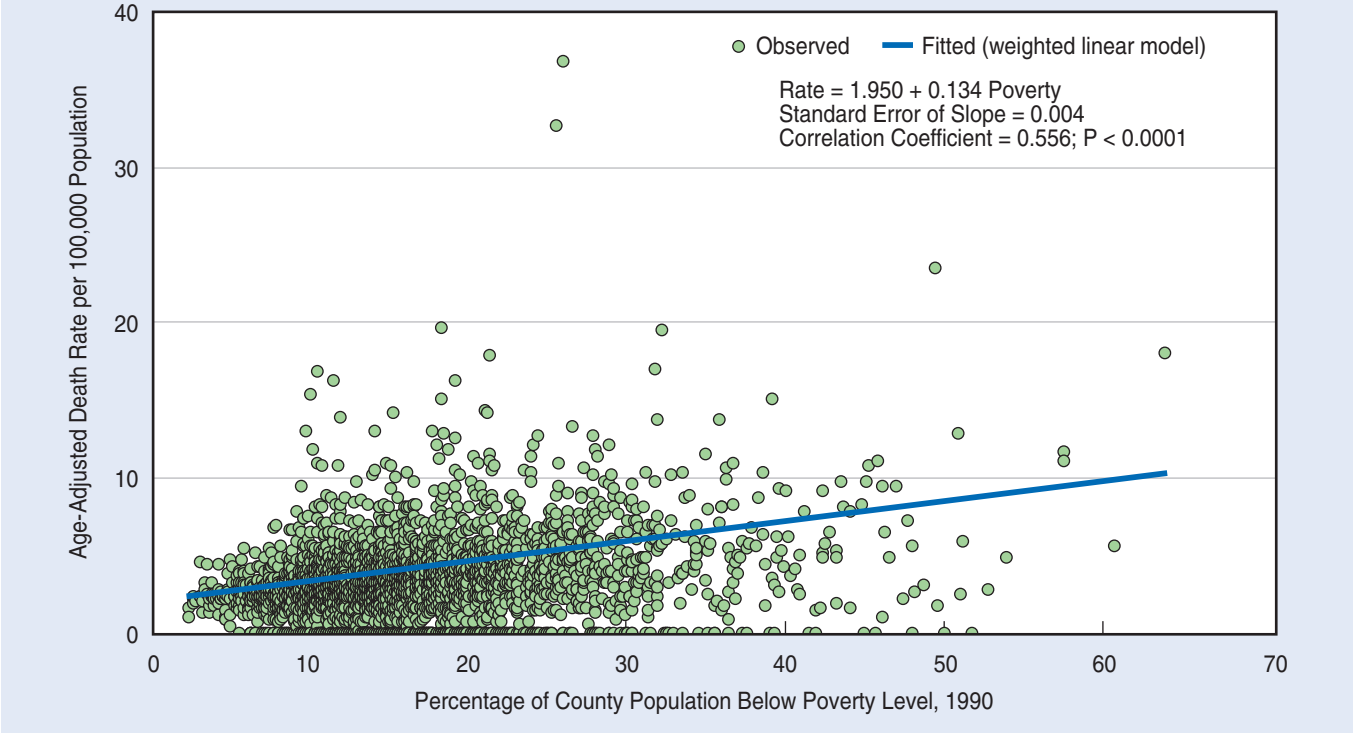


Figure 3.57. Relationship Between County Poverty Rate and U.S. Cervical Cancer Mortality, 1990–1999



Note: Rates are age-adjusted to the 2000 U.S. standard population.

Figure 3.58. Relationship Between Census Tract Poverty Rate and SEER Male Lung Cancer Incidence Rate, 1988–1992

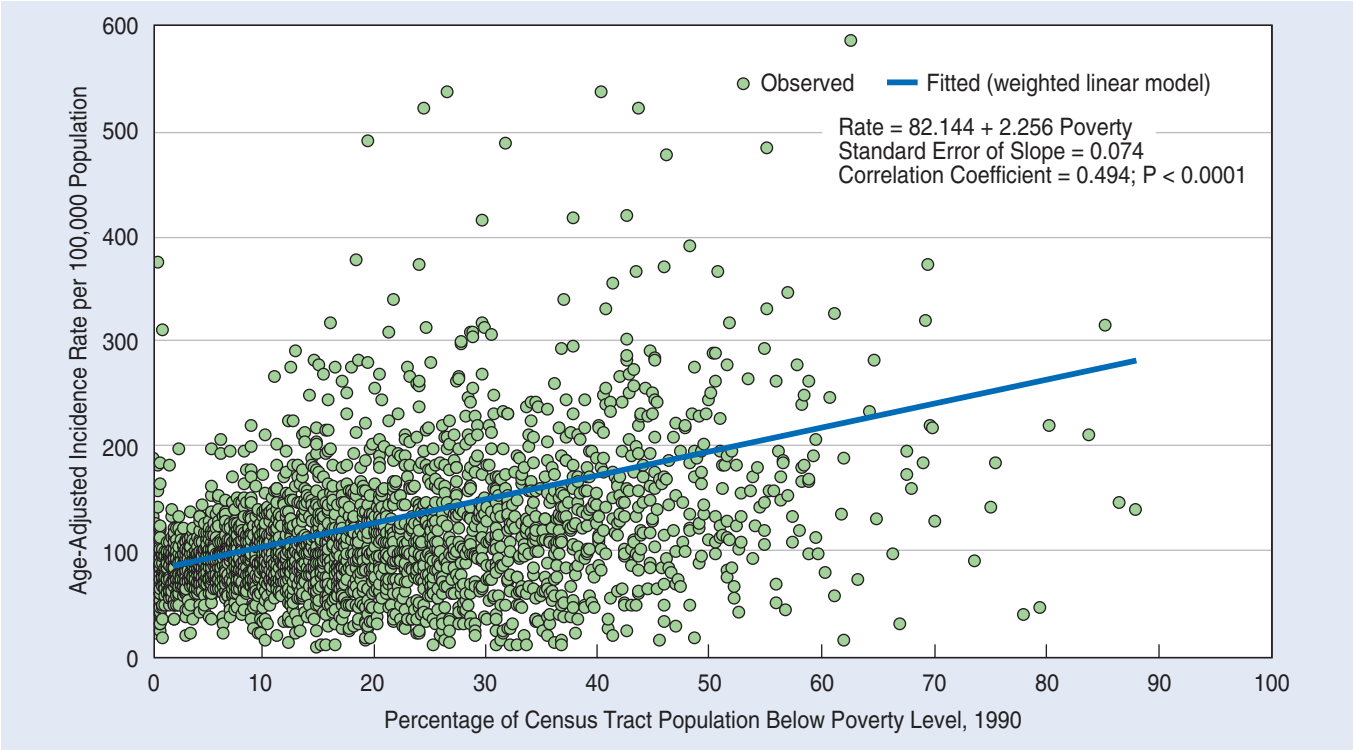
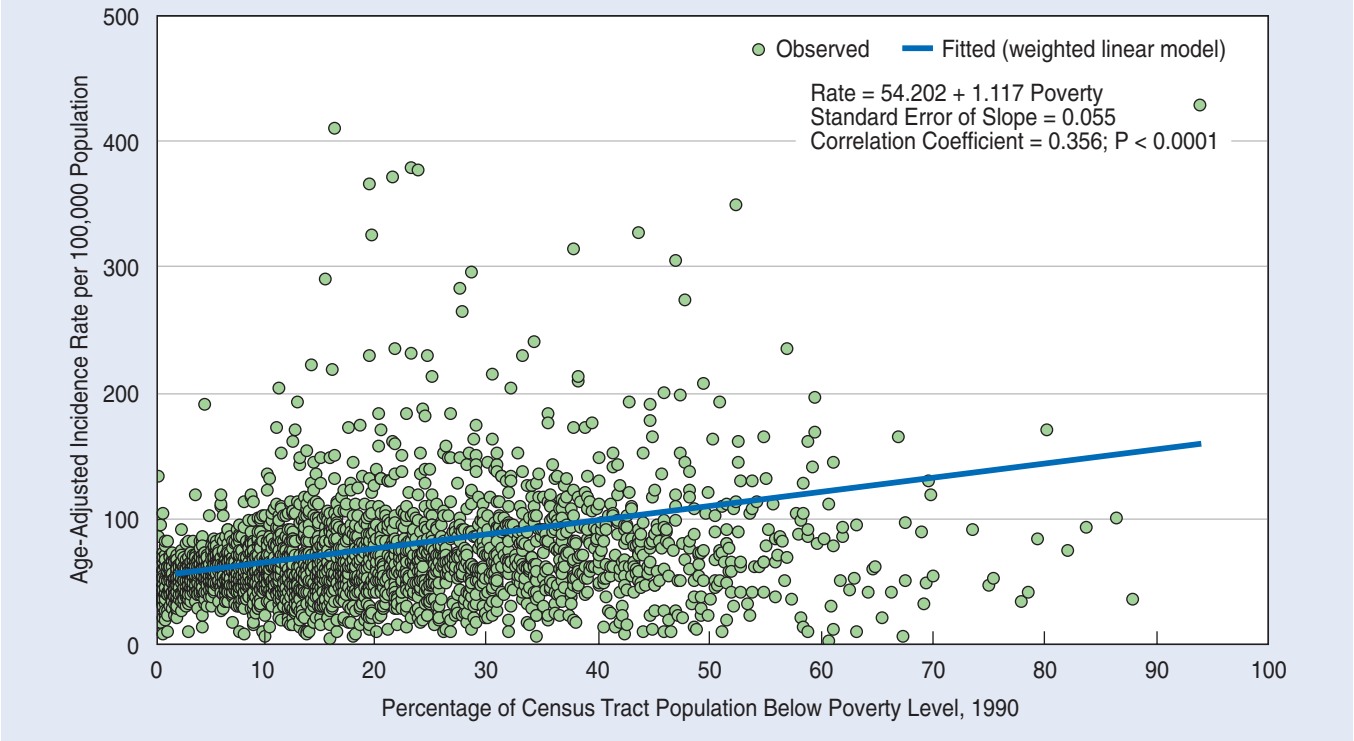


Figure 3.59. Relationship Between Census Tract Poverty Rate and SEER Cervical Cancer Incidence Rate, 1988–1992



Note: Rates are age-adjusted to the 2000 U.S. standard population.

Table 3.1. U.S. Site-Specific Cancer Deaths and Age-Adjusted Mortality Rates and 95% Confidence Intervals by Sex, Race/Ethnicity, and County Poverty Rate, 1995–1999

	Percent of County Population Below Poverty Level in 1990														
	< 10%					10% to 19.99%					20% or higher				
	# Deaths	Rate	SE	Lower CI	Upper CI	# Deaths	Rate	SE	Lower CI	Upper CI	# Deaths	Rate	SE	Lower CI	Upper CI
All Cancers, Male															
All Races	419,470	246.32	0.39	245.56	247.09	797,659	261.35	0.30	260.77	261.94	195,455	282.10	0.65	280.83	283.37
Non-Hispanic White	227,970	244.07	0.52	243.05	245.09	395,887	256.32	0.41	255.52	257.13	78,559	269.52	0.97	267.62	271.43
Black	23,663	337.08	2.39	332.42	341.81	93,141	362.56	1.25	360.12	365.01	47,134	366.29	1.72	362.92	369.69
American Indian	893	168.46	6.09	156.73	180.96	2,008	133.57	3.13	127.51	139.88	1,651	185.81	4.73	176.66	195.37
Asian/Pacific Islander	9,502	162.03	1.76	158.60	165.52	10,426	155.43	1.63	152.24	158.67	1,442	140.80	3.93	133.20	148.77
Hispanic	4,178	124.19	2.11	120.10	128.41	18,957	156.59	1.22	154.20	159.01	7,865	179.86	2.13	175.70	184.10
All Cancers, Female															
All Races	401,329	170.10	0.27	169.57	170.63	723,847	171.33	0.20	170.93	171.73	171,297	175.30	0.43	174.46	176.14
Non-Hispanic White	220,484	171.18	0.37	170.46	171.90	362,719	171.52	0.29	170.96	172.09	69,371	173.93	0.67	172.61	175.26
Black	20,818	202.30	1.43	199.50	205.13	79,939	205.95	0.73	204.52	207.40	41,148	200.55	0.99	198.61	202.50
American Indian	835	120.81	4.30	112.52	129.59	1,892	96.59	2.26	92.22	101.14	1,574	132.38	3.37	125.85	139.18
Asian/Pacific Islander	8,194	108.21	1.25	105.78	110.69	9,324	101.17	1.10	99.02	103.36	1,147	93.22	2.88	87.66	99.09
Hispanic	3,845	84.06	1.41	81.32	86.87	16,734	102.61	0.81	101.02	104.22	6,820	113.63	1.40	110.90	116.41
Lung, Male															
All Races	128,060	73.13	0.21	72.72	73.54	260,867	83.01	0.16	82.69	83.34	66,498	93.49	0.37	92.77	94.21
Non-Hispanic White	69,969	72.95	0.28	72.40	73.50	131,534	82.77	0.23	82.31	83.22	28,133	93.94	0.56	92.84	95.06
Black	7,059	96.82	1.24	94.41	99.29	29,777	111.37	0.67	110.06	112.69	14,872	112.16	0.94	110.34	114.02
American Indian	324	61.87	3.66	54.89	69.62	659	43.32	1.75	39.96	46.93	489	55.49	2.56	50.58	60.80
Asian/Pacific Islander	2,437	41.62	0.88	39.91	43.39	2,658	41.14	0.84	39.50	42.83	381	38.55	2.07	34.59	42.88
Hispanic	867	27.27	0.99	25.37	29.30	4,189	35.94	0.58	34.81	37.11	1,800	42.64	1.05	40.61	44.75
Lung, Female															
All Races	95,189	40.88	0.13	40.62	41.14	173,396	41.29	0.10	41.09	41.49	38,723	39.78	0.20	39.38	40.18
Non-Hispanic White	54,058	42.67	0.18	42.31	43.03	91,876	43.87	0.15	43.58	44.16	17,858	45.33	0.34	44.66	46.01
Black	4,103	40.53	0.64	39.28	41.82	16,149	41.72	0.33	41.08	42.37	7,668	37.51	0.43	36.68	38.37
American Indian	194	29.65	2.17	25.54	34.27	480	25.64	1.18	23.37	28.08	263	22.49	1.40	19.84	25.42
Asian/Pacific Islander	1,523	20.87	0.55	19.80	21.99	1,679	19.32	0.49	18.36	20.31	181	15.38	1.19	13.13	17.94
Hispanic	512	12.02	0.54	10.98	13.14	2,057	13.33	0.30	12.75	13.93	887	15.49	0.53	14.47	16.56
Colorectal, Male															
All Races	43,275	25.87	0.13	25.62	26.12	79,103	26.36	0.10	26.18	26.55	18,431	27.01	0.20	26.62	27.41
Non-Hispanic White	23,491	25.54	0.17	25.21	25.88	39,115	25.66	0.13	25.41	25.92	7,533	26.16	0.30	25.56	26.76
Black	2,284	32.93	0.75	31.48	34.45	8,877	35.18	0.39	34.42	35.96	4,270	33.69	0.53	32.66	34.74
American Indian	95	19.41	2.15	15.43	24.25	203	13.62	1.00	11.73	15.78	157	17.62	1.45	14.89	20.77
Asian/Pacific Islander	951	16.09	0.55	15.03	17.22	1,044	15.96	0.53	14.94	17.04	136	15.01	1.35	12.48	17.93
Hispanic	423	12.95	0.68	11.65	14.39	1,949	16.53	0.40	15.76	17.33	753	17.27	0.66	16.00	18.62
Colorectal, Female															
All Races	44,878	18.47	0.09	18.30	18.64	80,357	18.41	0.07	18.28	18.54	19,243	19.07	0.14	18.80	19.35
Non-Hispanic White	24,372	18.14	0.12	17.91	18.37	39,783	17.91	0.09	17.73	18.09	7,540	17.82	0.21	17.42	18.24
Black	2,506	25.63	0.52	24.62	26.68	9,698	25.64	0.26	25.13	26.16	5,063	24.76	0.35	24.08	25.46
American Indian	104	16.12	1.61	13.11	19.65	185	9.53	0.71	8.19	11.05	152	12.98	1.06	10.98	15.26
Asian/Pacific Islander	834	11.49	0.42	10.68	12.34	973	11.32	0.38	10.58	12.10	117	10.14	0.98	8.31	12.29
Hispanic	351	8.11	0.44	7.26	9.03	1,636	10.64	0.27	10.13	11.18	656	11.29	0.45	10.43	12.20

Continued on page 65

Table 3.1. U.S. Site-Specific Cancer Deaths and Age-Adjusted Mortality Rates and 95% Confidence Intervals by Sex, Race/Ethnicity, and County Poverty Rate, 1995–1999 (continued)

	Percent of County Population Below Poverty Level in 1990														
	< 10%					10% to 19.99%					20% or higher				
	# Deaths	Rate	SE	Lower CI	Upper CI	# Deaths	Rate	SE	Lower CI	Upper CI	# Deaths	Rate	SE	Lower CI	Upper CI
Prostate															
All Races	48,383	32.14	0.15	31.85	32.43	92,916	33.89	0.11	33.66	34.11	24,118	38.30	0.25	37.81	38.80
Non-Hispanic White	25,139	29.93	0.19	29.55	30.31	43,085	30.38	0.15	30.09	30.67	8,025	29.61	0.34	28.96	30.28
Black	3,855	71.89	1.22	69.50	74.33	15,157	71.61	0.60	70.43	72.81	8,554	75.33	0.83	73.71	76.97
American Indian	58	14.08	1.94	10.53	18.53	186	15.57	1.18	13.35	18.08	168	22.24	1.75	18.95	25.98
Asian/Pacific Islander	730	16.40	0.62	15.20	17.68	643	13.09	0.54	12.06	14.19	79	10.12	1.17	7.96	12.72
Hispanic	397	15.73	0.82	14.16	17.45	1,888	20.31	0.49	19.37	21.28	850	23.71	0.84	22.09	25.42
Breast, Female															
All Races	66,923	28.86	0.11	28.64	29.08	116,897	28.54	0.08	28.38	28.71	27,936	29.62	0.18	29.27	29.98
Non-Hispanic White	35,493	28.18	0.15	27.89	28.48	55,927	27.50	0.12	27.27	27.73	10,408	27.41	0.27	26.87	27.95
Black	4,108	36.91	0.59	35.76	38.09	14,872	37.26	0.31	36.66	37.87	7,602	37.08	0.43	36.25	37.92
American Indian	120	16.22	1.53	13.37	19.57	270	13.26	0.82	11.70	14.99	215	17.44	1.20	15.17	19.98
Asian/Pacific Islander	1,178	13.74	0.41	12.94	14.58	1,345	12.50	0.36	11.82	13.23	161	12.08	1.00	10.21	14.25
Hispanic	661	13.45	0.54	12.41	14.57	2,884	16.69	0.32	16.07	17.32	1,200	19.02	0.56	17.94	20.15
Cervix															
All Races	5,518	2.43	0.03	2.36	2.49	12,648	3.23	0.03	3.18	3.29	3,920	4.34	0.07	4.20	4.48
Non-Hispanic White	2,640	2.20	0.04	2.12	2.29	5,027	2.73	0.04	2.65	2.81	1,087	3.20	0.10	3.01	3.40
Black	584	5.04	0.22	4.63	5.49	2,598	6.30	0.12	6.05	6.55	1,432	6.90	0.18	6.55	7.27
American Indian	19	2.16	0.52	1.27	3.56	60	2.69	0.36	2.03	3.51	55	4.39	0.60	3.30	5.76
Asian/Pacific Islander	230	2.68	0.18	2.34	3.08	351	3.32	0.19	2.96	3.71	49	3.66	0.55	2.67	4.95
Hispanic	137	2.40	0.22	2.00	2.88	662	3.43	0.14	3.17	3.71	299	4.51	0.27	4.01	5.07
Melanoma of the Skin, Male															
All Races	7,670	4.24	0.05	4.14	4.34	12,511	3.96	0.04	3.89	4.03	2,368	3.34	0.07	3.20	3.47
Non-Hispanic White	4,606	4.70	0.07	4.56	4.84	7,382	4.71	0.06	4.60	4.82	1,312	4.51	0.13	4.27	4.76
Black	39	0.49	0.09	0.33	0.72	125	0.48	0.05	0.40	0.58	68	0.51	0.06	0.39	0.65
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	30	0.49	0.09	0.33	0.73	37	0.53	0.09	0.36	0.77	~	~	~	~	~
Hispanic	31	0.88	0.17	0.57	1.33	148	1.09	0.10	0.91	1.31	60	1.18	0.16	0.89	1.57
Melanoma of the Skin, Female															
All Races	4,563	1.96	0.03	1.91	2.02	7,447	1.82	0.02	1.78	1.86	1,509	1.58	0.04	1.50	1.66
Non-Hispanic White	2,673	2.16	0.04	2.07	2.24	4,189	2.11	0.03	2.05	2.18	821	2.20	0.08	2.05	2.36
Black	41	0.42	0.07	0.30	0.57	184	0.47	0.04	0.41	0.55	93	0.45	0.05	0.37	0.56
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	25	0.30	0.06	0.19	0.46	36	0.37	0.06	0.26	0.53	~	~	~	~	~
Hispanic	28	0.61	0.12	0.40	0.90	96	0.56	0.06	0.45	0.69	34	0.56	0.10	0.38	0.79

Notes: Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population by the direct method. Data for Hispanics and non-Hispanic whites are provided for 1997–1999. SE = standard error of the rate. CI = confidence interval. ~ Counts or rates are suppressed if based on fewer than 16 deaths.

Table 3.2. SEER Site-Specific Cancer Incidence (Invasive) Cases and Age-Adjusted Incidence Rates and 95% Confidence Intervals by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1992: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990														
	< 10%					10% to 19.99%					20% or higher				
	# Cases	Rate	SE	Lower CI	Upper CI	# Cases	Rate	SE	Lower CI	Upper CI	# Cases	Rate	SE	Lower CI	Upper CI
All Cancers, Male															
All Races	232,653	588.99	1.29	586.47	591.52	83,244	578.46	2.06	574.43	582.52	54,510	595.56	2.64	590.39	600.77
Non-Hispanic White	204,999	601.58	1.39	598.86	604.32	63,807	610.69	2.46	605.87	615.54	23,801	666.87	4.41	658.25	675.59
Black	6,316	681.93	10.33	661.84	702.69	7,984	687.29	8.56	670.62	704.41	20,042	732.75	5.40	722.21	743.45
American Indian	187	182.30	16.08	152.15	218.93	195	245.09	19.43	208.49	287.64	367	199.45	11.17	178.17	222.87
Asian/Pacific Islander	11,209	396.73	4.05	388.84	404.79	4,313	374.22	6.02	362.51	386.29	2,981	384.81	7.31	370.61	399.50
Hispanic	7,715	458.50	6.07	446.68	470.64	6,421	393.88	5.63	382.92	405.14	7,144	356.83	4.79	347.49	366.39
All Cancers, Female															
All Races	216,894	417.74	0.90	415.97	419.52	76,807	396.42	1.46	393.56	399.29	46,869	379.62	1.79	376.13	383.14
Non-Hispanic White	190,103	427.19	0.99	425.25	429.14	58,551	420.74	1.82	417.18	424.33	20,170	443.29	3.35	436.75	449.93
Black	5,504	411.47	6.04	399.73	423.52	6,781	392.57	4.92	383.00	402.36	16,148	402.67	3.22	396.37	409.04
American Indian	198	134.27	10.46	114.55	157.10	184	167.16	13.25	142.20	196.16	415	167.06	8.54	150.73	184.86
Asian/Pacific Islander	11,110	304.76	3.09	298.74	310.90	4,136	290.34	4.75	281.11	299.85	2,566	267.97	5.42	257.45	278.84
Hispanic	8,108	332.13	3.91	324.50	339.92	6,692	292.90	3.79	285.52	300.46	7,455	272.62	3.37	266.05	279.33
Lung, Male															
All Races	34,895	87.43	0.49	86.47	88.40	14,230	99.20	0.85	97.55	100.88	10,569	116.17	1.15	113.92	118.46
Non-Hispanic White	31,096	89.91	0.53	88.87	90.96	11,100	105.56	1.02	103.57	107.58	4,692	130.80	1.94	127.01	134.67
Black	1,047	108.39	3.91	100.86	116.57	1,534	129.31	3.59	122.36	136.70	4,428	157.73	2.44	152.98	162.63
American Indian	42	38.47	7.04	25.94	58.07	34	45.60	8.31	30.79	66.82	33	18.85	3.38	12.82	27.14
Asian/Pacific Islander	1,684	58.47	1.51	55.55	61.56	809	68.81	2.51	63.97	74.02	552	71.77	3.14	65.74	78.31
Hispanic	879	59.94	2.26	55.60	64.61	715	50.12	2.05	46.18	54.37	851	49.40	1.81	45.91	53.12
Lung, Female															
All Races	24,704	47.14	0.30	46.55	47.74	9,051	46.62	0.50	45.65	47.61	5,768	47.27	0.63	46.04	48.53
Non-Hispanic White	22,455	49.51	0.33	48.86	50.17	7,310	52.08	0.63	50.84	53.34	2,772	61.06	1.24	58.66	63.55
Black	568	46.93	2.07	42.95	51.22	828	48.24	1.71	44.95	51.74	2,242	55.71	1.20	53.39	58.11
American Indian	33	24.13	4.52	16.09	35.59	29	27.72	5.31	18.30	41.48	13	5.59	1.58	2.92	9.93
Asian/Pacific Islander	910	27.34	0.96	25.48	29.32	366	27.06	1.48	24.24	30.18	260	27.08	1.71	23.83	30.68
Hispanic	614	28.46	1.19	26.18	30.92	478	23.50	1.11	21.39	25.80	483	21.21	0.99	19.32	23.26
Colorectal, Male															
All Races	27,530	73.06	0.47	72.15	73.98	9,681	69.71	0.73	68.29	71.15	5,822	66.81	0.90	65.06	68.61
Non-Hispanic White	23,981	73.58	0.50	72.60	74.57	7,504	73.18	0.86	71.51	74.89	2,617	74.39	1.48	71.52	77.36
Black	690	78.86	3.61	71.93	86.49	839	75.84	2.89	70.28	81.87	2,029	77.02	1.79	73.56	80.63
American Indian	25	28.05	6.78	16.38	47.49	22	30.59	7.14	18.24	49.79	37	20.18	3.53	13.86	28.77
Asian/Pacific Islander	1,803	64.30	1.63	61.15	67.61	596	52.48	2.26	48.14	57.21	423	55.13	2.77	49.82	60.94
Hispanic	865	55.81	2.15	51.69	60.26	684	45.30	1.89	41.67	49.24	708	40.82	1.65	37.64	44.24
Colorectal, Female															
All Races	25,818	49.71	0.31	49.10	50.32	10,104	49.86	0.50	48.88	50.86	6,009	48.00	0.63	46.78	49.24
Non-Hispanic White	22,771	49.80	0.33	49.15	50.46	7,977	51.29	0.60	50.13	52.48	2,742	52.17	1.05	50.12	54.30
Black	686	59.70	2.42	55.04	64.68	957	60.44	2.00	56.58	64.51	2,255	56.45	1.20	54.11	58.87
American Indian	19	14.35	3.50	8.33	23.94	18	19.95	4.92	11.49	33.17	33	14.80	2.62	10.11	21.11
Asian/Pacific Islander	1,390	42.22	1.21	39.88	44.69	488	37.04	1.77	33.65	40.72	374	39.99	2.11	35.96	44.38
Hispanic	806	38.23	1.41	35.52	41.12	610	31.51	1.32	28.98	34.23	592	25.79	1.10	23.69	28.05

Continued on page 67

Table 3.2. SEER Site-Specific Cancer Incidence (Invasive) Cases and Age-Adjusted Incidence Rates and 95% Confidence Intervals by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1992: 11 SEER Registration Areas (continued)

	Percent of Census Tract Population Below Poverty Level in 1990														
	< 10%					10% to 19.99%					20% or higher				
	# Cases	Rate	SE	Lower CI	Upper CI	# Cases	Rate	SE	Lower CI	Upper CI	# Cases	Rate	SE	Lower CI	Upper CI
Prostate															
All Races	69,032	183.72	0.74	182.28	185.17	22,738	164.48	1.12	162.30	166.69	13,592	160.09	1.41	157.33	162.88
Non-Hispanic White	61,596	186.75	0.79	185.20	188.30	17,751	169.33	1.29	166.80	171.88	5,566	155.54	2.12	151.42	159.75
Black	2,052	268.41	6.79	255.26	282.26	2,477	242.34	5.34	231.98	253.17	5,922	228.97	3.11	222.91	235.19
American Indian	52	64.84	10.33	46.20	90.74	43	64.37	10.36	45.70	89.57	83	55.78	6.30	44.12	69.80
Asian/Pacific Islander	2,569	104.91	2.21	100.63	109.36	831	82.23	3.01	76.44	88.41	518	71.87	3.26	65.62	78.64
Hispanic	1,893	139.81	3.53	132.97	146.98	1,434	112.52	3.17	106.39	118.98	1,415	94.20	2.63	89.12	99.53
Breast, Female															
All Races	69,948	136.33	0.52	135.31	137.35	22,420	120.34	0.82	118.74	121.97	12,348	103.85	0.95	101.99	105.73
Non-Hispanic White	61,344	140.53	0.57	139.41	141.66	17,115	129.67	1.04	127.63	131.73	5,431	127.47	1.86	123.85	131.19
Black	1,908	129.62	3.23	123.38	136.16	2,061	114.68	2.60	109.64	119.91	4,372	111.42	1.71	108.08	114.84
American Indian	61	37.45	5.22	27.93	50.12	49	40.56	6.12	29.46	55.74	84	32.77	3.65	26.01	41.01
Asian/Pacific Islander	3,578	91.67	1.61	88.55	94.91	1,146	76.70	2.35	72.16	81.50	577	61.36	2.61	56.35	66.73
Hispanic	2,535	101.58	2.11	97.49	105.83	1,914	82.62	1.97	78.81	86.59	1,850	67.55	1.64	64.37	70.87
Cervix															
All Races	4,665	8.78	0.13	8.53	9.04	2,300	12.38	0.27	11.87	12.92	2,381	19.19	0.41	18.40	20.00
Non-Hispanic White	3,489	8.00	0.14	7.74	8.28	1,263	10.59	0.31	10.00	11.22	583	15.76	0.69	14.43	17.19
Black	244	13.86	0.99	11.98	16.02	273	14.32	0.91	12.60	16.26	742	18.06	0.68	16.76	19.46
American Indian	~	~	~	~	~	~	~	~	~	~	30	11.96	2.28	7.92	17.59
Asian/Pacific Islander	441	10.47	0.52	9.47	11.58	217	14.12	0.99	12.24	16.28	147	15.06	1.27	12.67	17.81
Hispanic	427	13.74	0.71	12.38	15.25	519	18.80	0.88	17.11	20.65	868	25.21	0.93	23.43	27.13
Melanoma of the Skin, Male															
All Races	8,530	19.36	0.22	18.94	19.80	1,927	12.55	0.30	11.98	13.15	713	7.18	0.28	6.64	7.77
Non-Hispanic White	8,023	21.66	0.25	21.17	22.16	1,777	16.97	0.41	16.17	17.80	593	16.60	0.70	15.25	18.04
Black	18	1.42	0.43	0.71	3.03	~	~	~	~	~	35	1.27	0.22	0.86	1.83
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	33	1.01	0.19	0.67	1.54	~	~	~	~	~	~	~	~	~	~
Hispanic	96	4.19	0.48	3.30	5.38	71	3.25	0.45	2.43	4.38	55	2.22	0.36	1.58	3.11
Melanoma of the Skin, Female															
All Races	7,142	13.52	0.16	13.21	13.84	1,743	9.05	0.22	8.62	9.50	593	4.57	0.19	4.20	4.97
Non-Hispanic White	6,518	15.01	0.19	14.64	15.38	1,564	12.55	0.33	11.91	13.22	459	11.31	0.57	10.23	12.50
Black	22	1.69	0.41	0.99	2.77	~	~	~	~	~	28	0.72	0.14	0.47	1.05
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	46	1.11	0.18	0.79	1.55	~	~	~	~	~	~	~	~	~	~
Hispanic	158	5.25	0.45	4.40	6.25	95	3.75	0.42	2.97	4.69	81	2.64	0.33	2.04	3.39

Notes: Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population by the direct method. SE = standard error of the rate. CI = confidence interval. ~ Counts or rates are suppressed if based on fewer than 16 cases.

Stage of Disease at Diagnosis

Cancer staging is a method for grouping patients based on the extent of the spread of their cancer from its site of origin. Detecting cancers at an early, more treatable stage is a major goal of cancer control efforts, and knowledge of the stage of disease at the time of diagnosis is essential for determining the choice of therapy and in assessing prognosis. Numerous studies have documented the association of an early cancer stage at diagnosis with higher socioeconomic position (39–42,68).

The Summary Staging Classification

The localized-regional-distant summary staging scheme has been used for many years in descriptive and statistical analyses of tumor registry data (69) and is defined below:

Localized: An invasive malignant neoplasm confined entirely to the organ of origin with no lymph node involvement.

Regional: A malignant neoplasm that (1) has extended beyond the limits of the organ of origin directly into surrounding organs or tissues; or (2) involves regional lymph nodes by way of the lymphatic system; or (3) has both regional extension and involvement of regional lymph nodes.

Distant: A malignant neoplasm that has spread to parts of the body remote from the primary tumor either by direct extension or by discontinuous metastasis (e.g., implantation or seeding) to distant organs, tissues, or via the lymphatic system to distant lymph nodes.

The best available information on stage of disease, as it appears in the medical record within two months of diagnosis, was used to classify the cancers. Thus, staging is based on a combination of clinical and operative/pathological assessment. Since many surgically treated prostate cancer cases undergoing radical prostatectomy are reclassified from clinically localized- to regional-stage disease based on the more accurate information obtained from the operative or pathology report (70), localized- and regional-stage prostate cancers are combined for the analyses by stage in this report.

Area Socioeconomic and Racial/Ethnic Patterns in Early- and Late-Stage Cancer Diagnoses

During 1988–1999, for each of the cancers considered, men and women in high poverty census tracts had a higher percentage of late-stage cancer diagnoses than those in low

poverty census tracts (Figures 4.1–4.18, pages 72–85; Table 4.1, page 86). This was also generally true for each racial/ethnic group. The largest socioeconomic gradients occurred for patients diagnosed during 1995–1999 with distant-stage melanoma of the skin (ratio of percent diagnosed with distant-stage disease in highest:lowest poverty areas = 9.17:3.73 = 2.5 for men and 5.42:2.52 = 2.2 for women), distant-stage prostate cancer (highest:lowest poverty areas = 9.06:4.76 = 1.9), and distant-stage female breast cancer (highest:lowest poverty areas = 8.59:5.04 = 1.7). The socioeconomic gradients for distant-stage colorectal cancer in men and women and for cervical cancer were similar (highest:lowest poverty areas = 9.77:8.22 = 1.2). The majority of lung cancer cases are diagnosed at distant stage, and a socioeconomic gradient, with persons in the highest poverty areas more likely to be diagnosed at distant stage, consistently appears for men and women in each racial/ethnic group with the exception of black women.

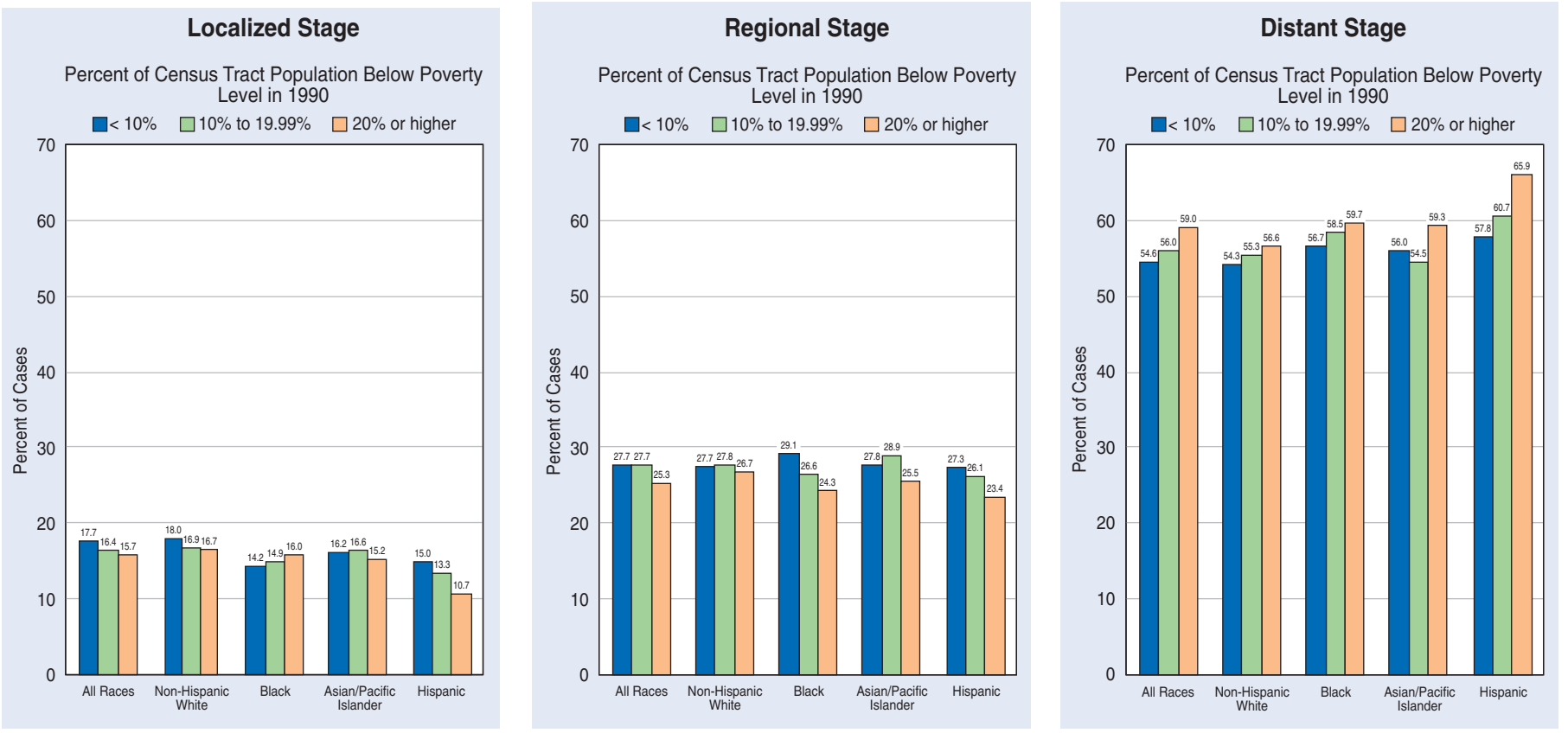
Patients in low poverty areas were generally more likely to be diagnosed with early-stage (localized) cancers. The largest socioeconomic gradient for localized diagnoses occurred for male patients with melanoma of the skin (lowest:highest poverty areas = 1.2 for men and 1.1 for women). Sixty-seven percent of female breast cancer patients in the lowest poverty areas were diagnosed with localized-stage disease, whereas only 59% of those in the high poverty areas were diagnosed at this stage. A similar difference was seen for cervical cancer, with nearly 60% of the diagnoses in low poverty areas being at the localized stage while only 52% of the diagnoses in high poverty areas were localized.

Trends in Area Socioeconomic Gradients in the Stage Distribution

Time trends in the stage of disease distribution for each of the specific cancers are included in Figures 4.10–4.18, pages 81–85. The socioeconomic gradients noted in the cross-sectional data above persisted throughout the 1988–1999 time period and, with the exception of prostate cancer, were generally stable. The percentage of prostate cancers diagnosed at local or regional stage increased from 1988 through 1999 in all socioeconomic groups. A socioeconomic gradient persisted over the time period, with the lowest poverty group having the largest percentage of local/regional-stage cancers. As expected, the rise in local/regional-stage cancers was accompanied by a decline in the percentage of distant-stage cancers over the time period. A socioeconomic gradient was also evident among the distant-stage prostate cancers; however, the association was reversed, with the highest poverty group having the highest percentage of distant-stage cancers. These patterns coincide with the rising utilization of the prostate-specific antigen (PSA) test for prostate cancer screening since the late 1980s (71). The stage distribution of female breast cancer cases remained stable from 1988 to 1999. A consistent socioeconomic

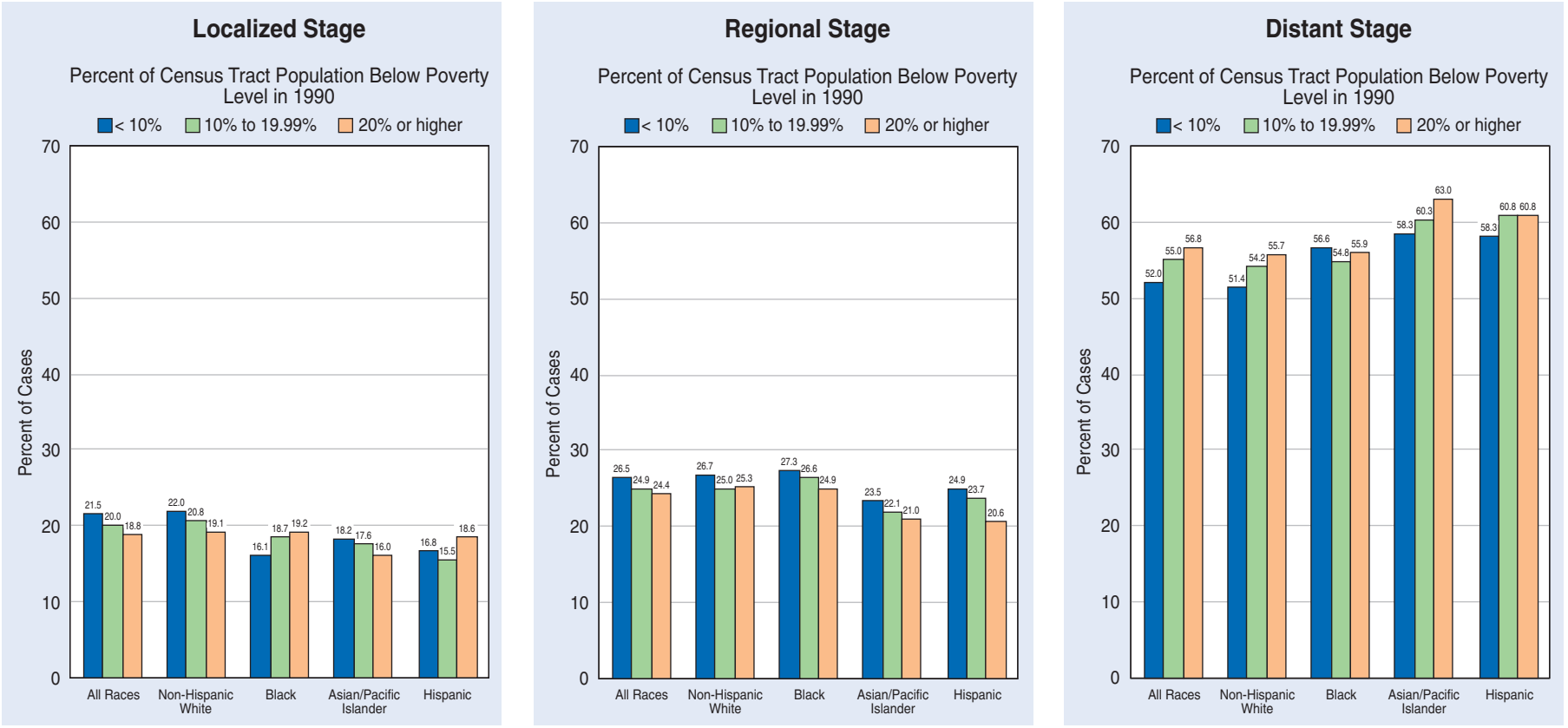
gradient was also apparent over this time period. Data are grouped into three-year moving average categories for cancers of the lung, colorectum, uterine cervix, and melanoma of the skin to help visualize patterns by stage of disease when the data are sparse. Trends in the stage distribution for cervical cancer diagnoses indicate persistent and substantial socio-economic differences in the percentage of localized- or regional/distant-stage cancers, with little or no change in the gradient in the 1990s. For melanoma of the skin, the percentage of cases diagnosed at regional or distant stage appeared to be increasing during 1995–1999 among men in the high poverty group. This is a disturbing finding that deserves further study.

Figure 4.1. Distribution of SEER Lung Cancer Cases Among Men by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



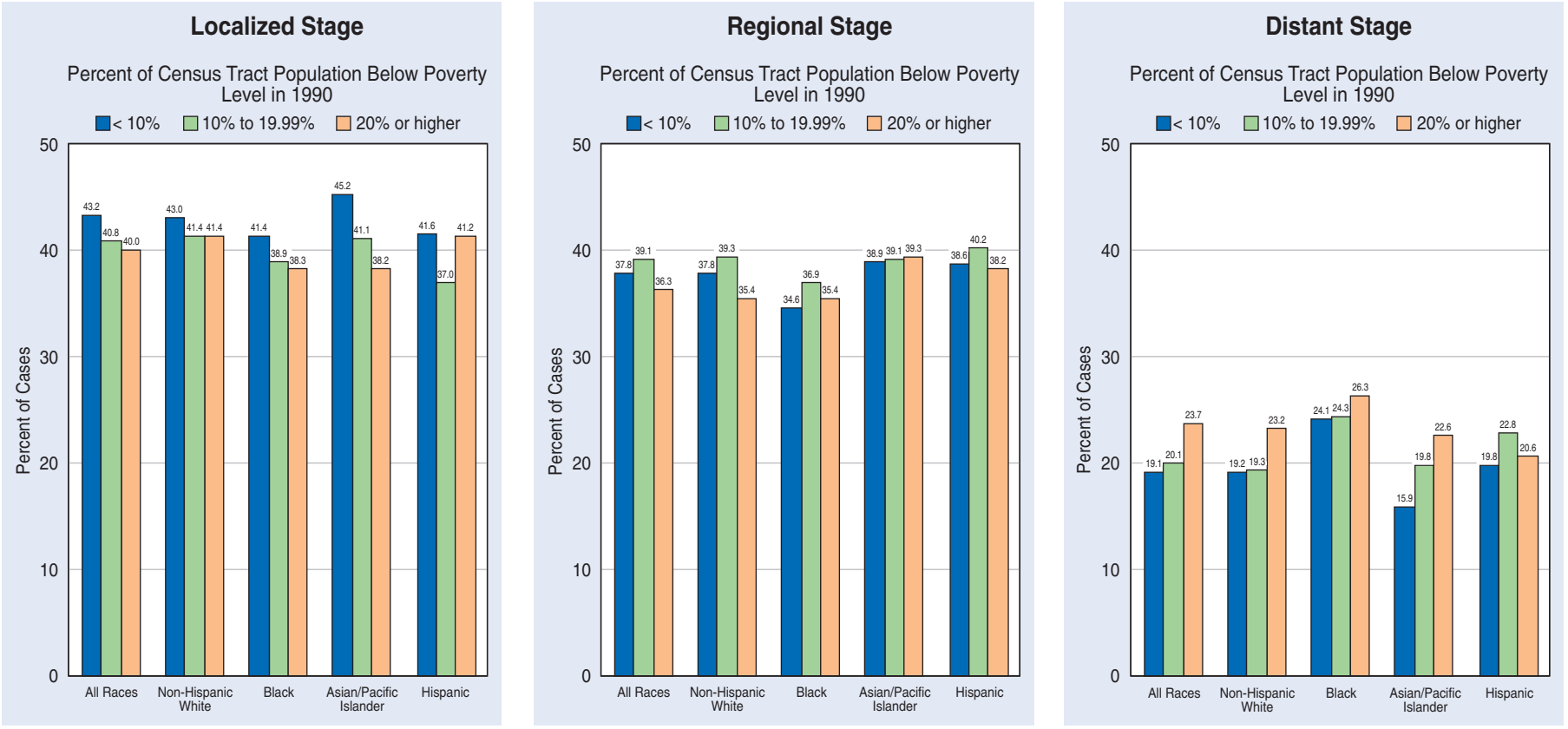
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.2. Distribution of SEER Lung Cancer Cases Among Women by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



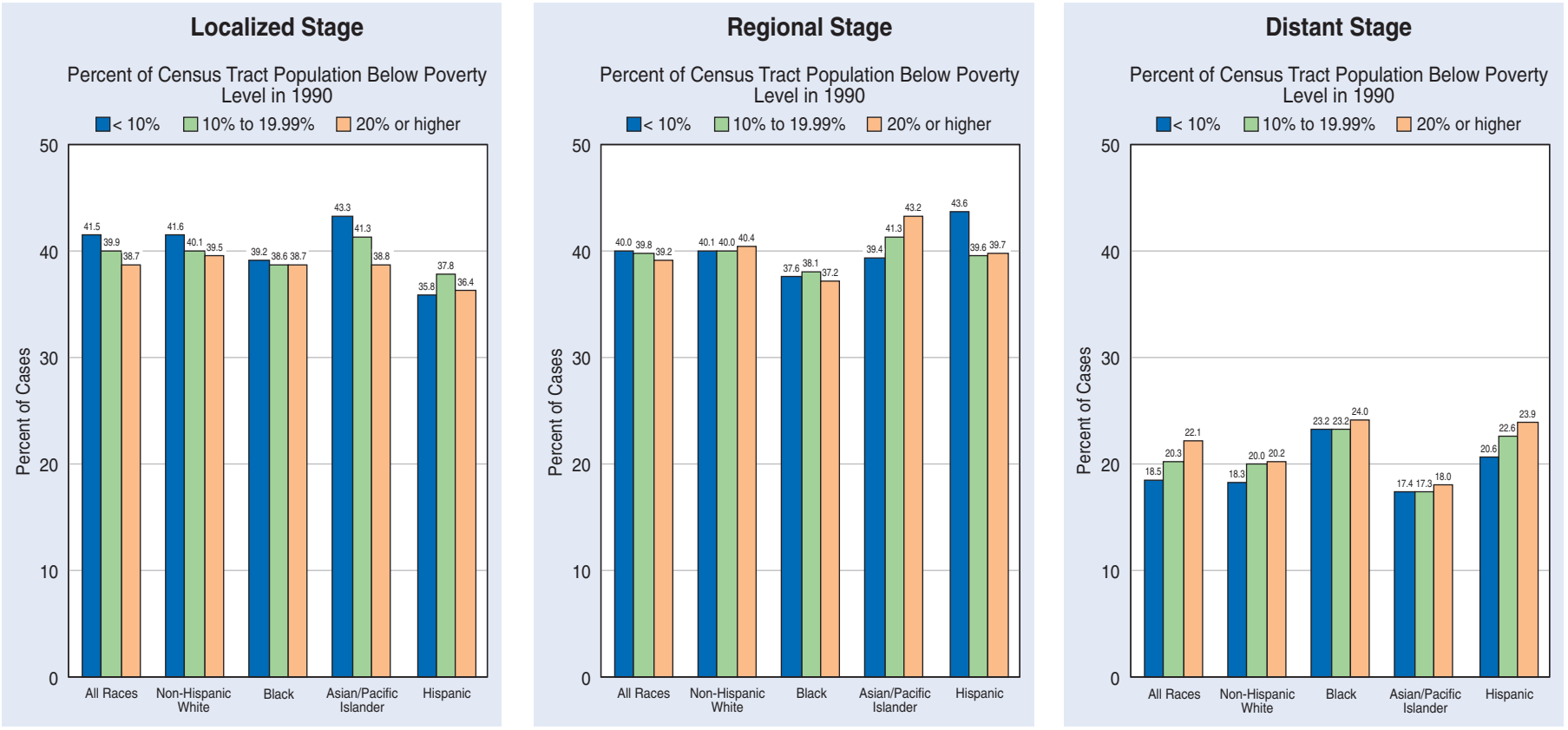
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.3. Distribution of SEER Colorectal Cancer Cases Among Men by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



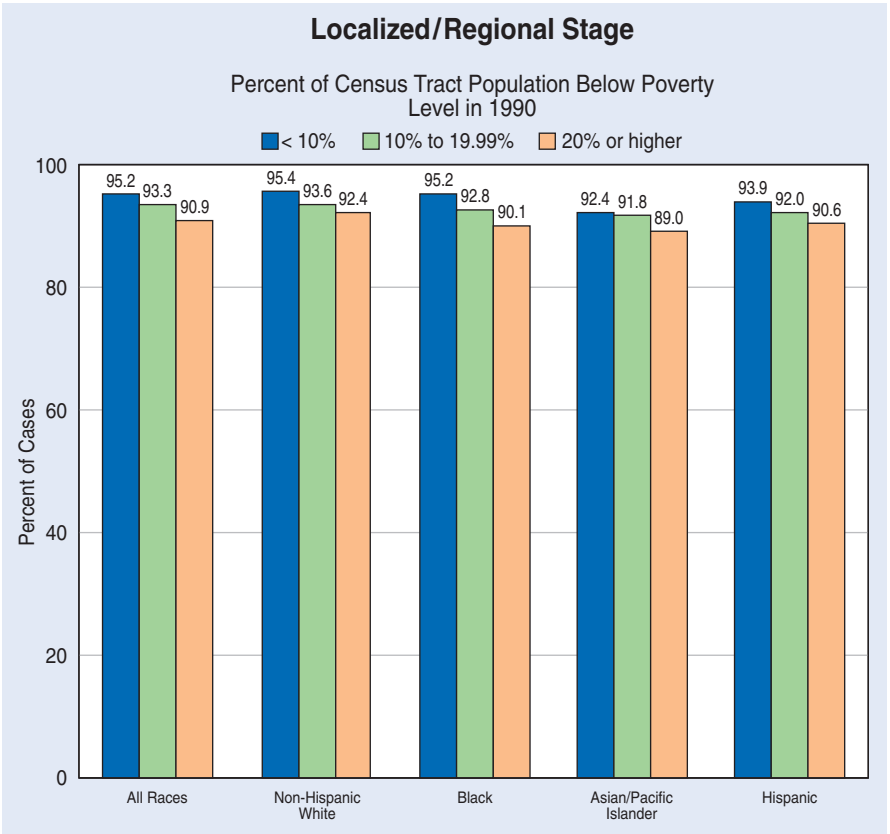
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

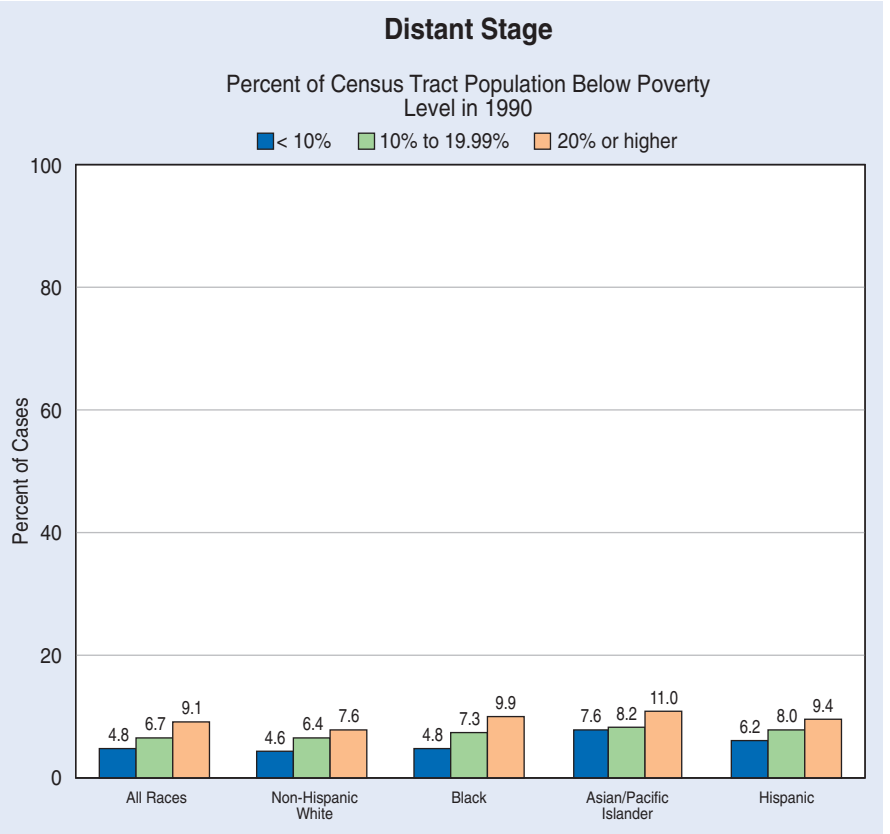
Figure 4.4. Distribution of SEER Colorectal Cancer Cases Among Women by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

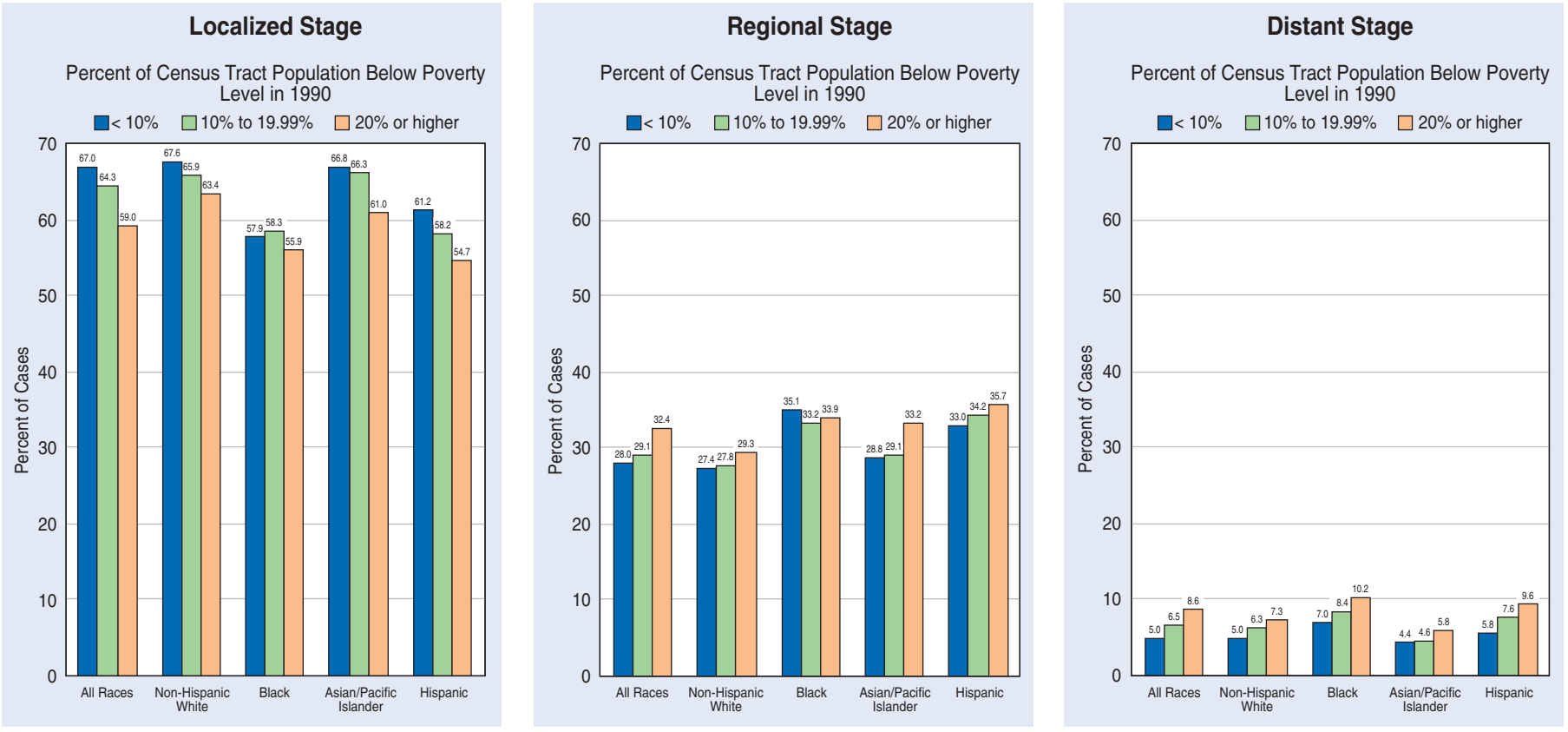
Figure 4.5. Distribution of SEER Prostate Cancer Cases by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999





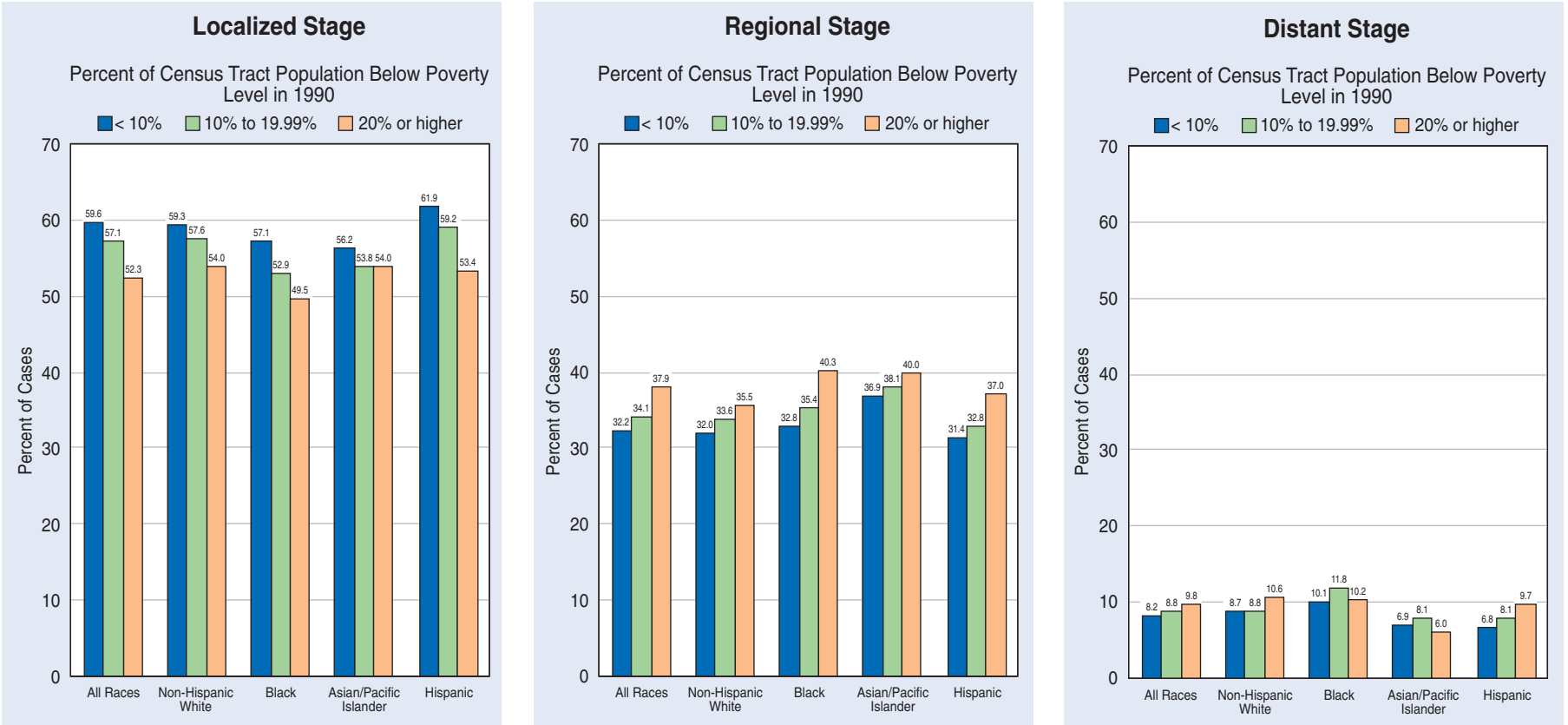
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.6. Distribution of SEER Female Breast Cancer Cases by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



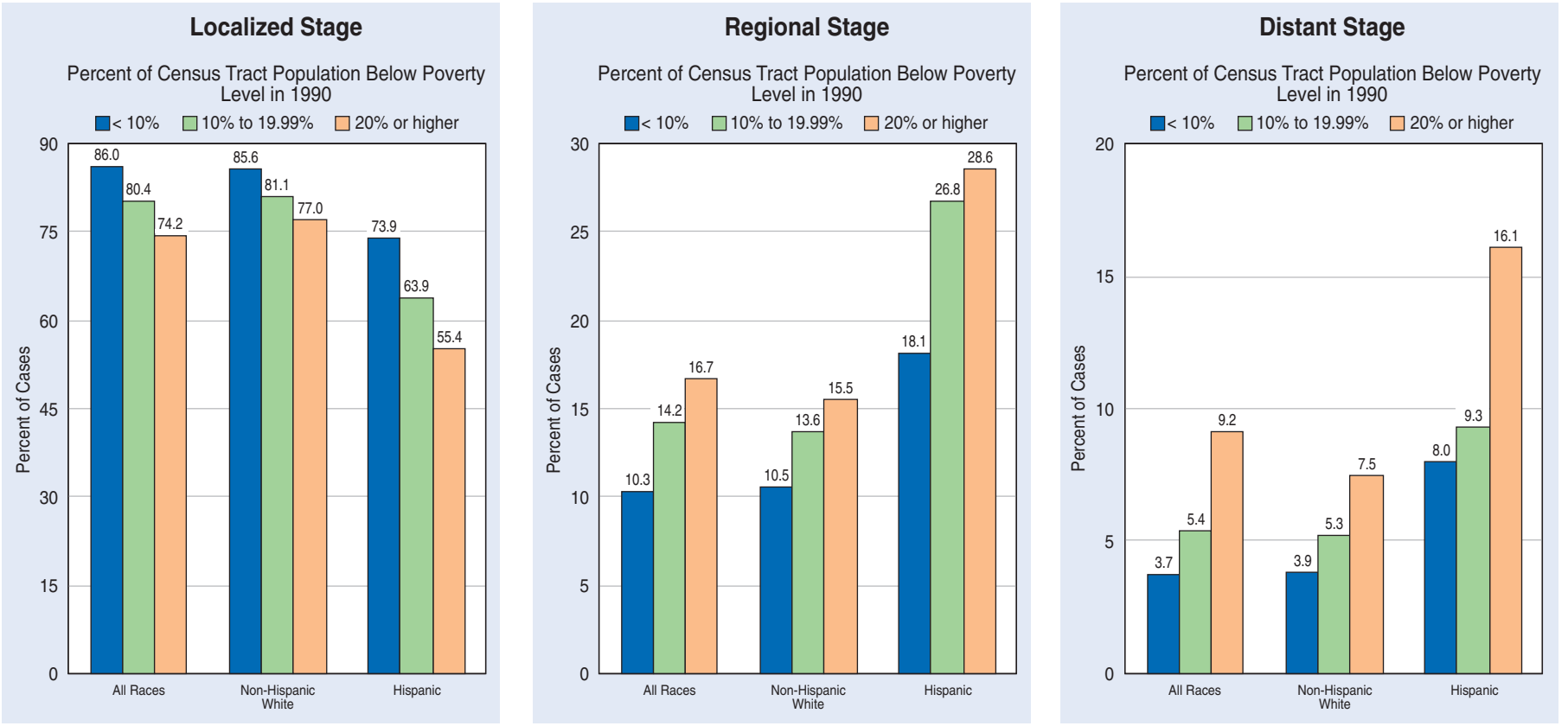
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.7. Distribution of SEER Cervical Cancer Cases by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



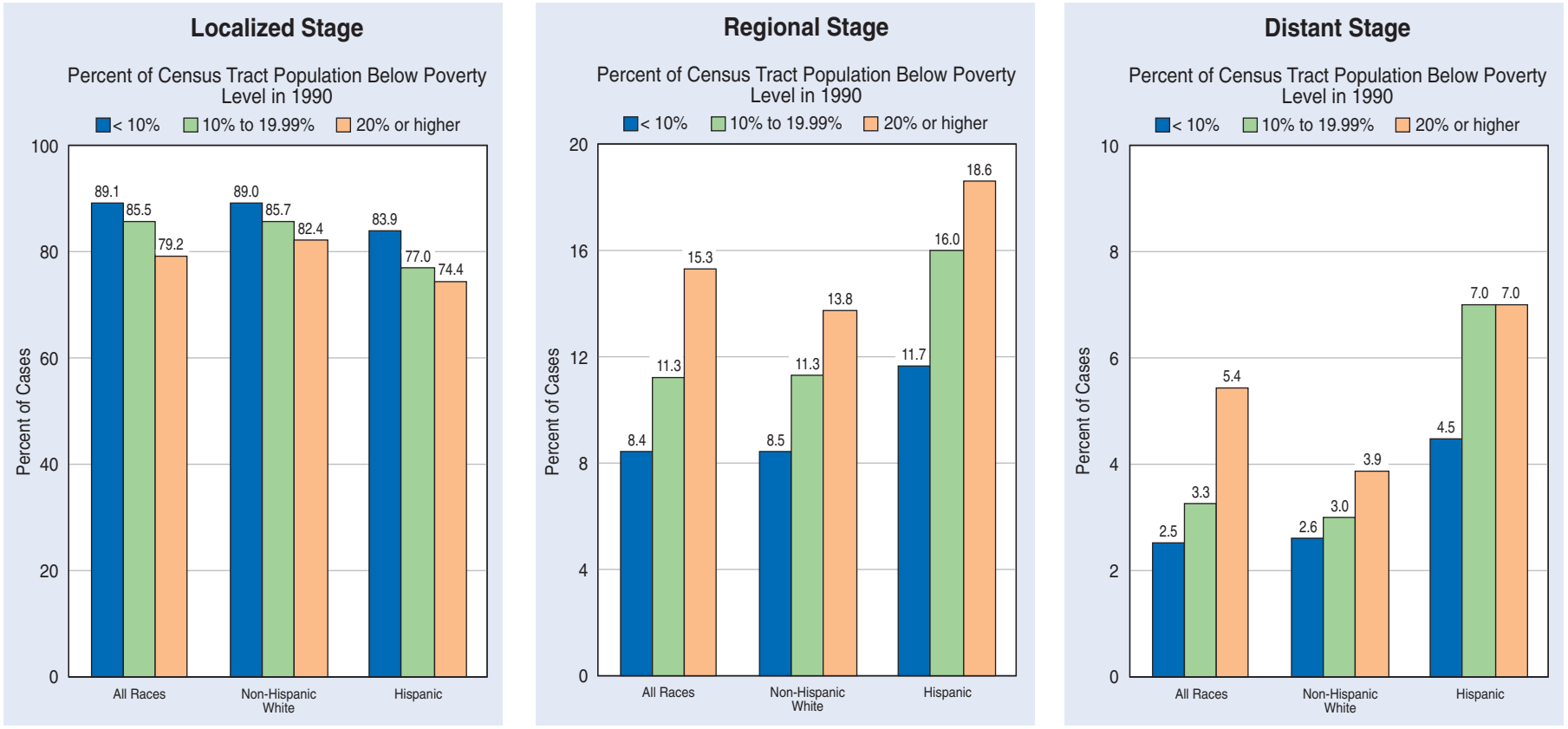
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.8. Distribution of SEER Skin Melanoma Cases Among Men by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.9. Distribution of SEER Skin Melanoma Cases Among Women by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 4.10. Trends in Lung Cancer Diagnoses Among Men by Stage (Three-Year Moving Averages), 1988–1999

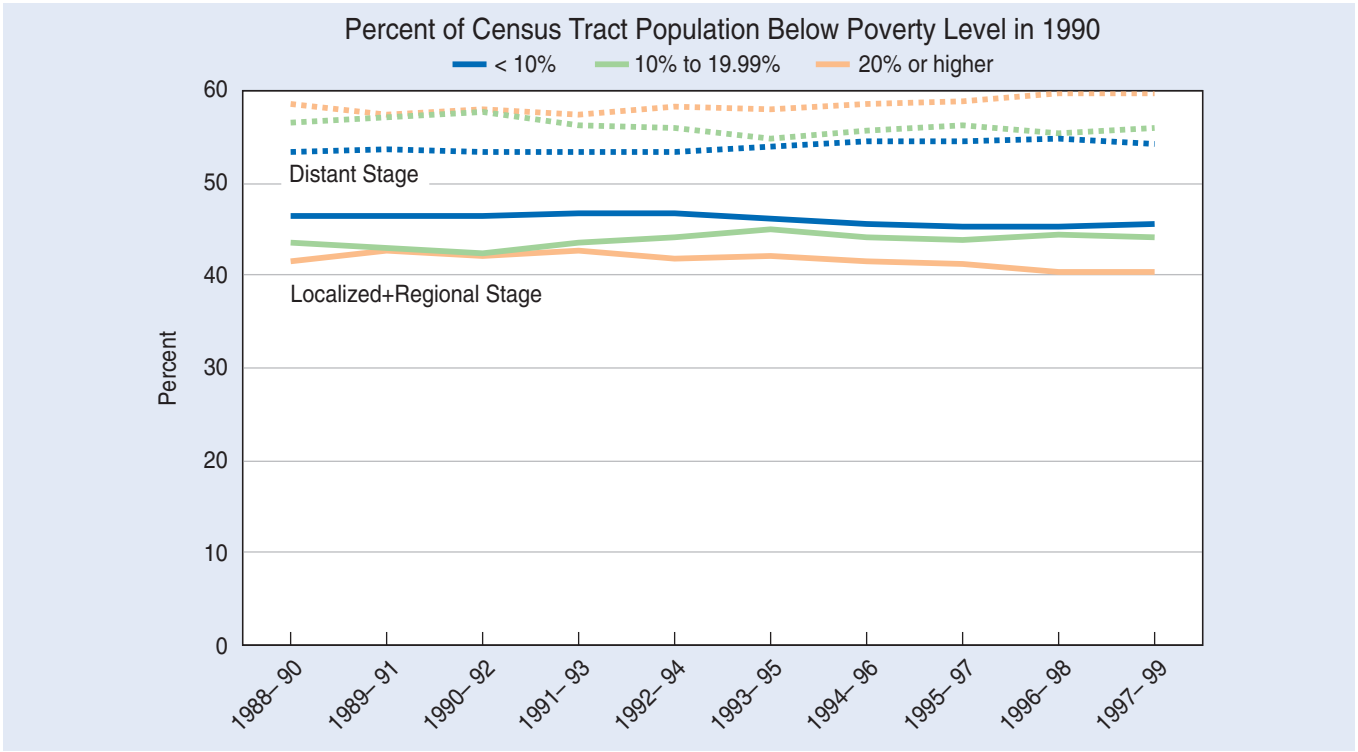
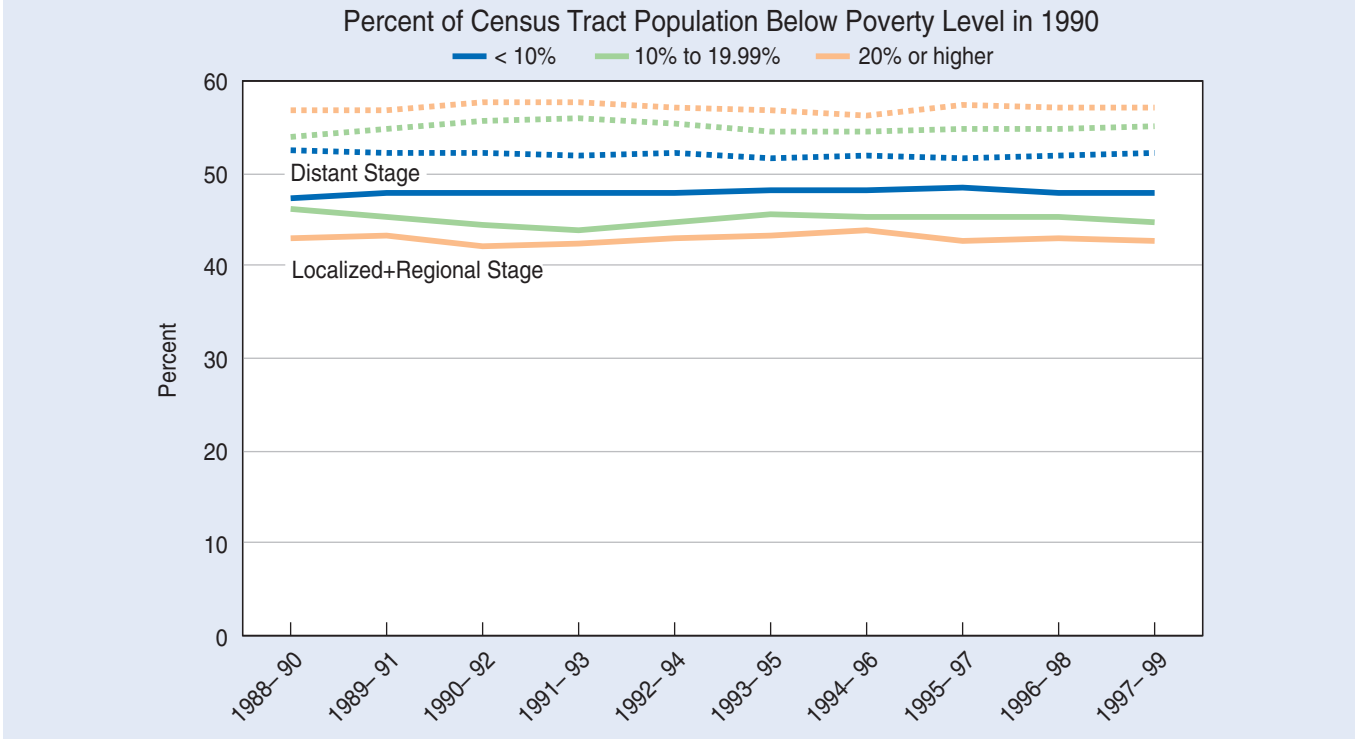


Figure 4.11. Trends in Lung Cancer Diagnoses Among Women by Stage (Three-Year Moving Averages), 1988–1999



Note: Based on data from 11 SEER registries. Los Angeles registry data from 1988 to 1991 were not available.
See "Data and Methods" for a list of SEER registries.

Figure 4.12. Trends in Colorectal Cancer Diagnoses Among Men by Stage (Three-Year Moving Averages), 1988–1999

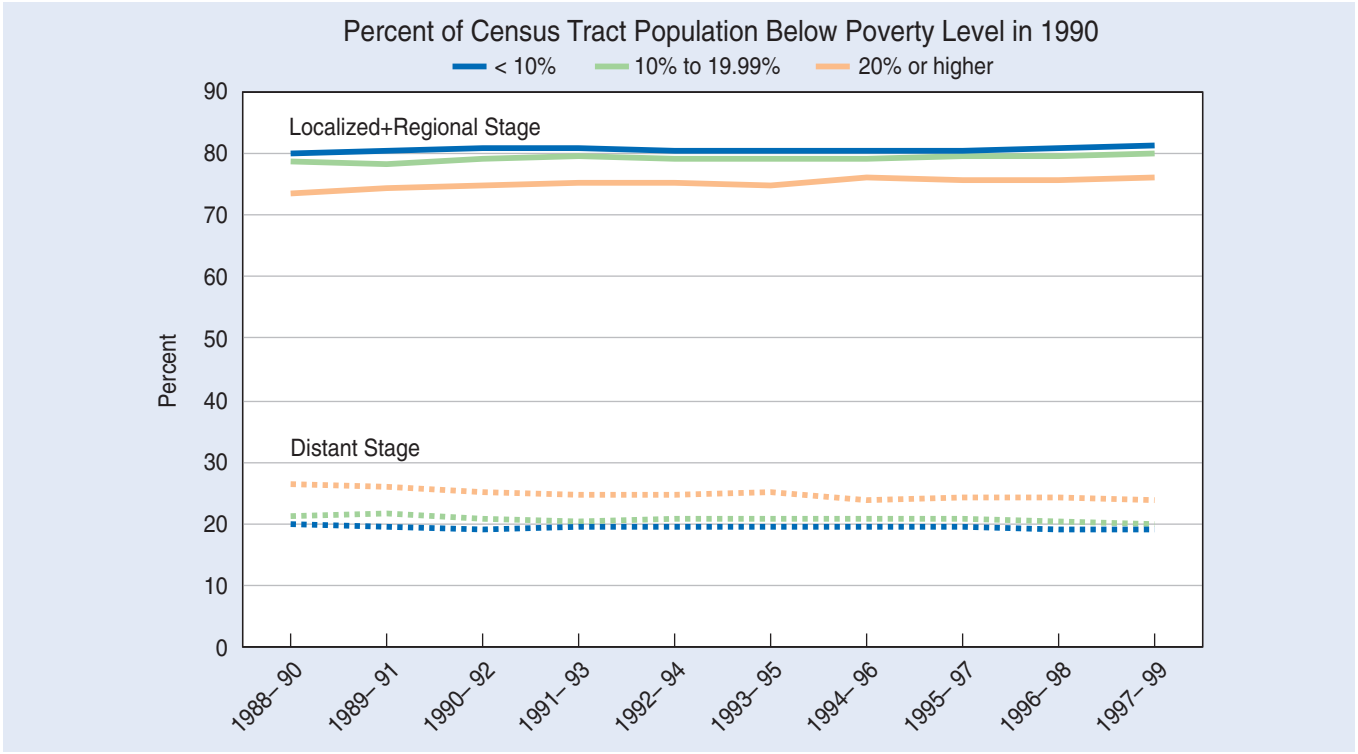
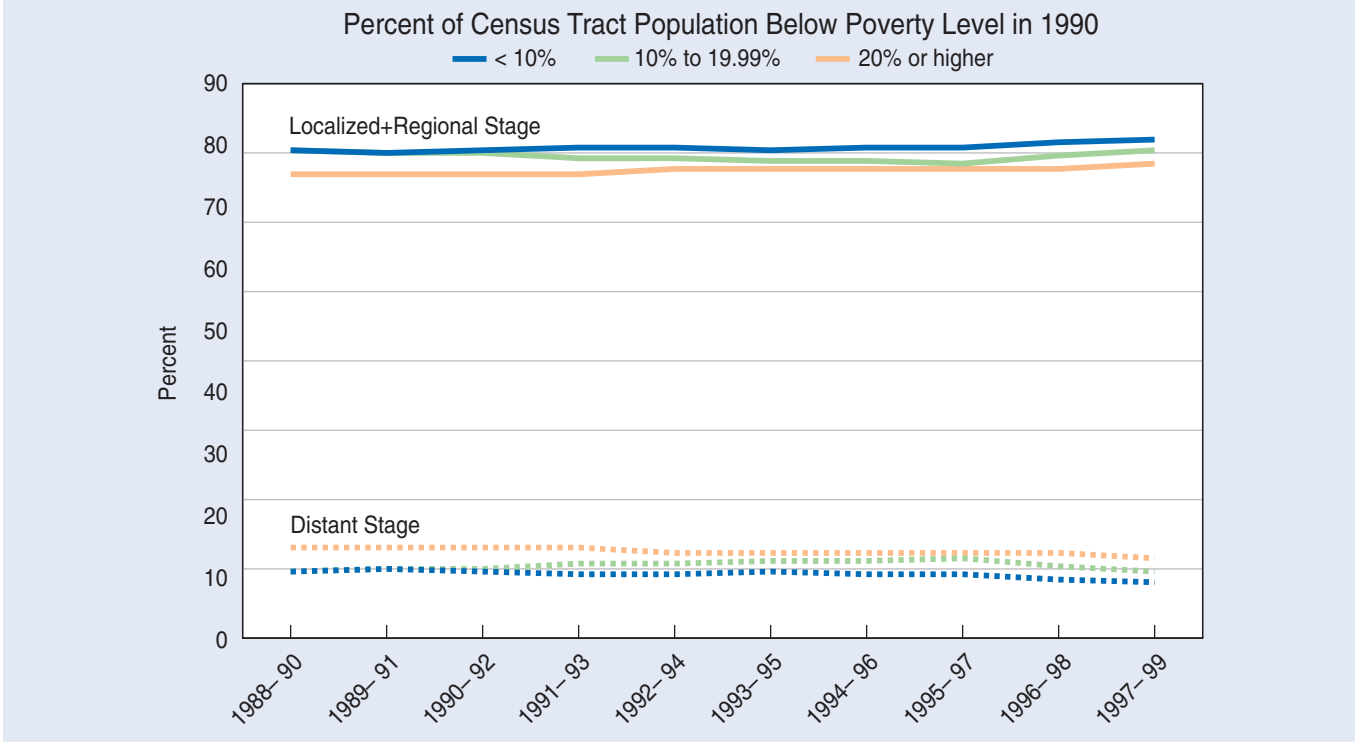


Figure 4.13. Trends in Colorectal Cancer Diagnoses Among Women by Stage (Three-Year Moving Averages), 1988–1999



Note: Based on data from 11 SEER registries. Los Angeles registry data from 1988 to 1991 were not available.
See "Data and Methods" for a list of SEER registries.

Figure 4.14. Trends in Prostate Cancer Diagnoses by Stage, 1988–1999

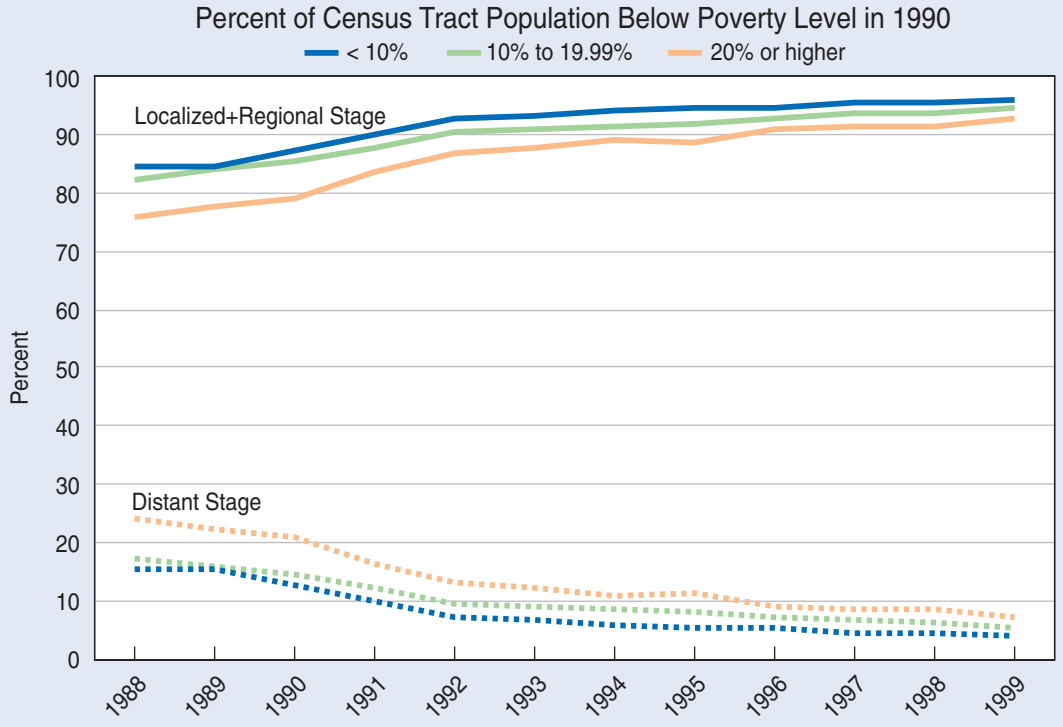
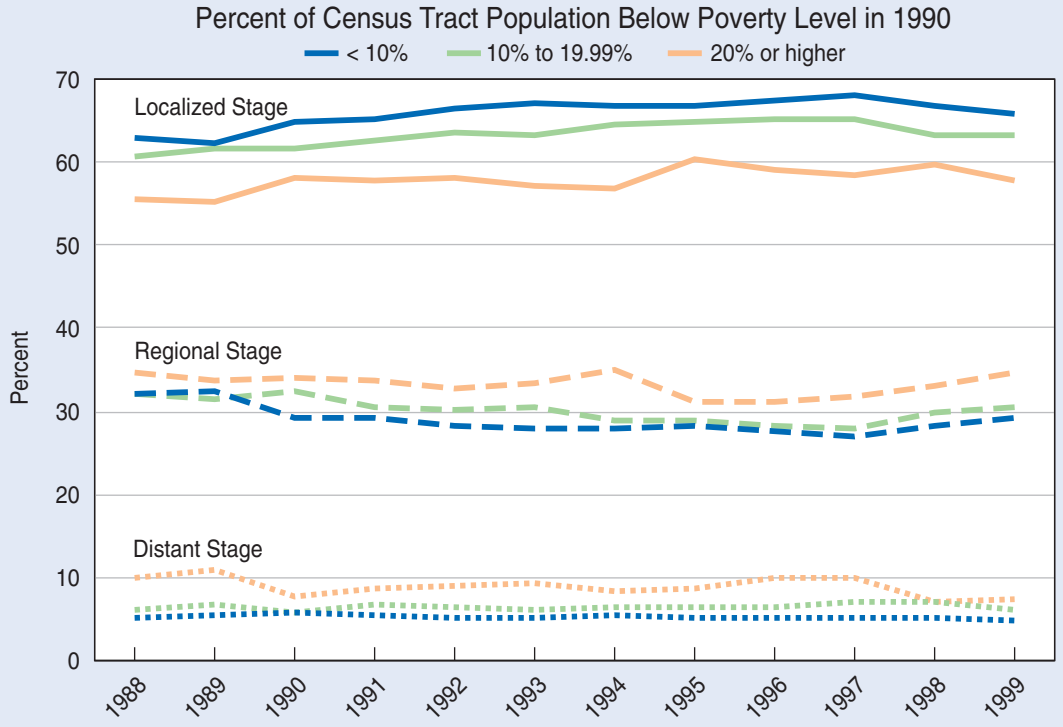
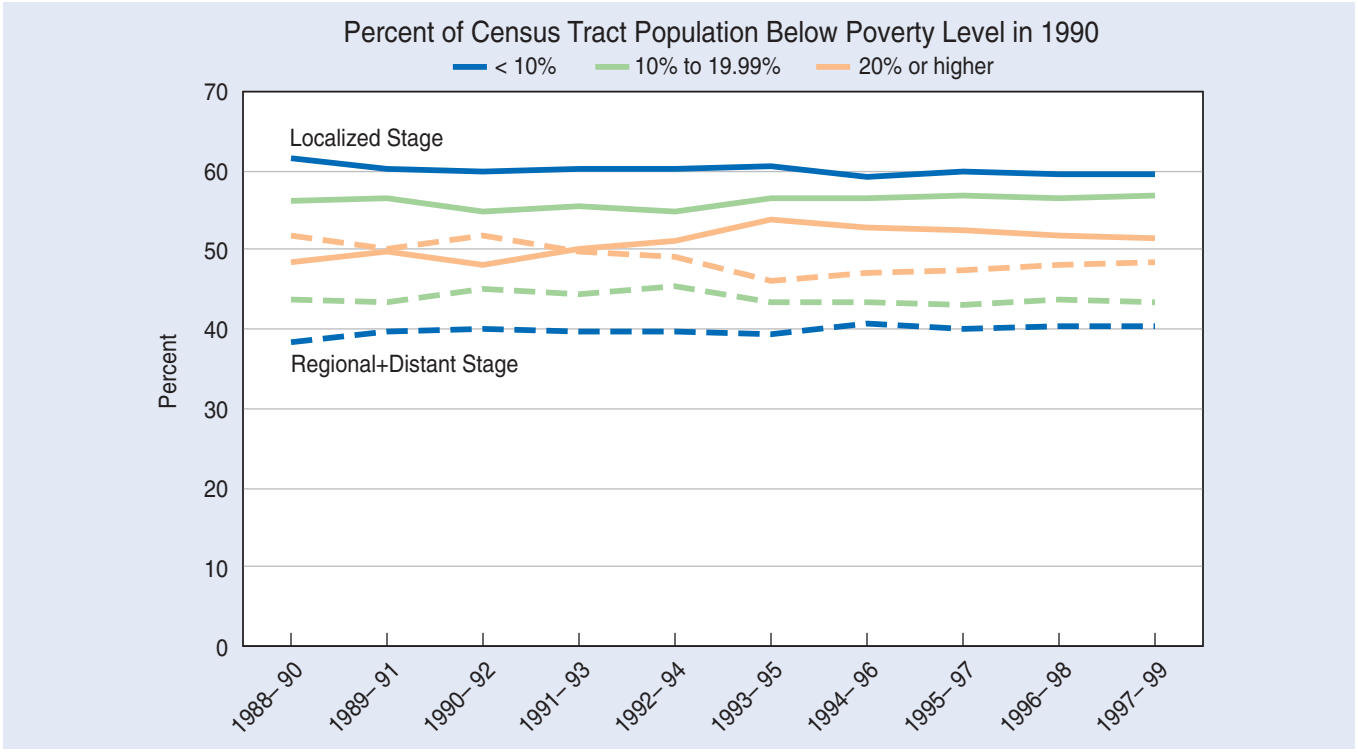


Figure 4.15. Trends in Female Breast Cancer Diagnoses by Stage, 1988–1999



Note: Based on data from 11 SEER registries. Los Angeles registry data from 1988 to 1991 were not available.
See "Data and Methods" for a list of SEER registries.

Figure 4.16. Trends in Cervical Cancer Diagnoses by Stage (Three-Year Moving Averages), 1988–1999



Note: Based on data from 11 SEER registries. Los Angeles registry data from 1988 to 1991 were not available.
See "Data and Methods" for a list of SEER registries.

Figure 4.17. Trends in Melanoma of the Skin Diagnoses Among Men by Stage (Three-Year Moving Averages), 1988–1999

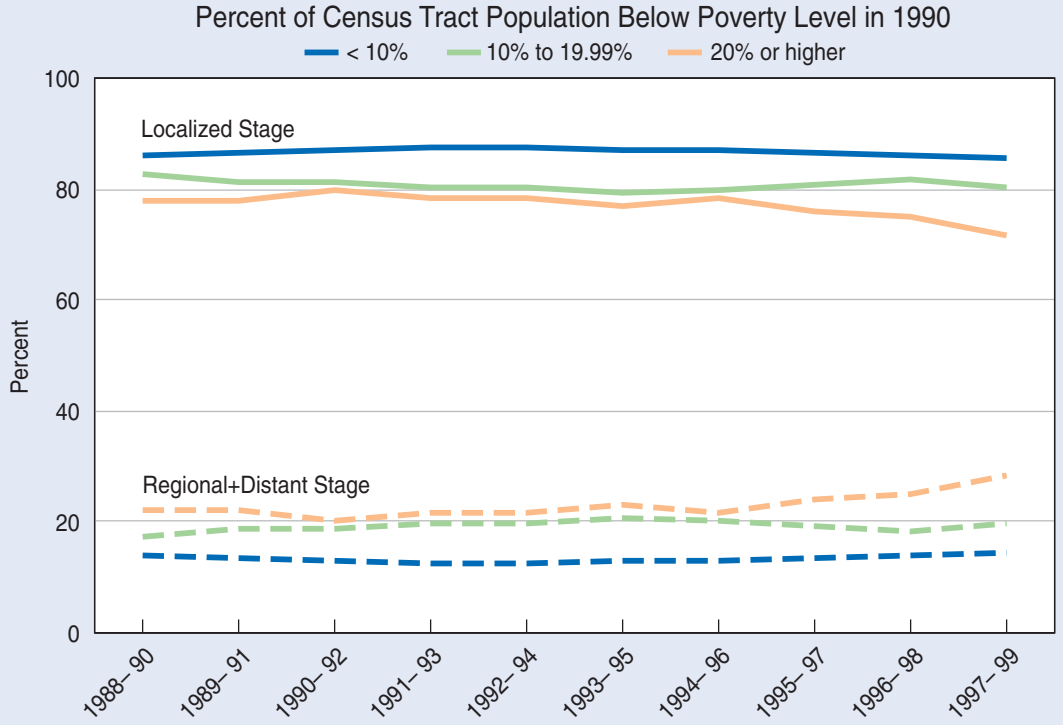
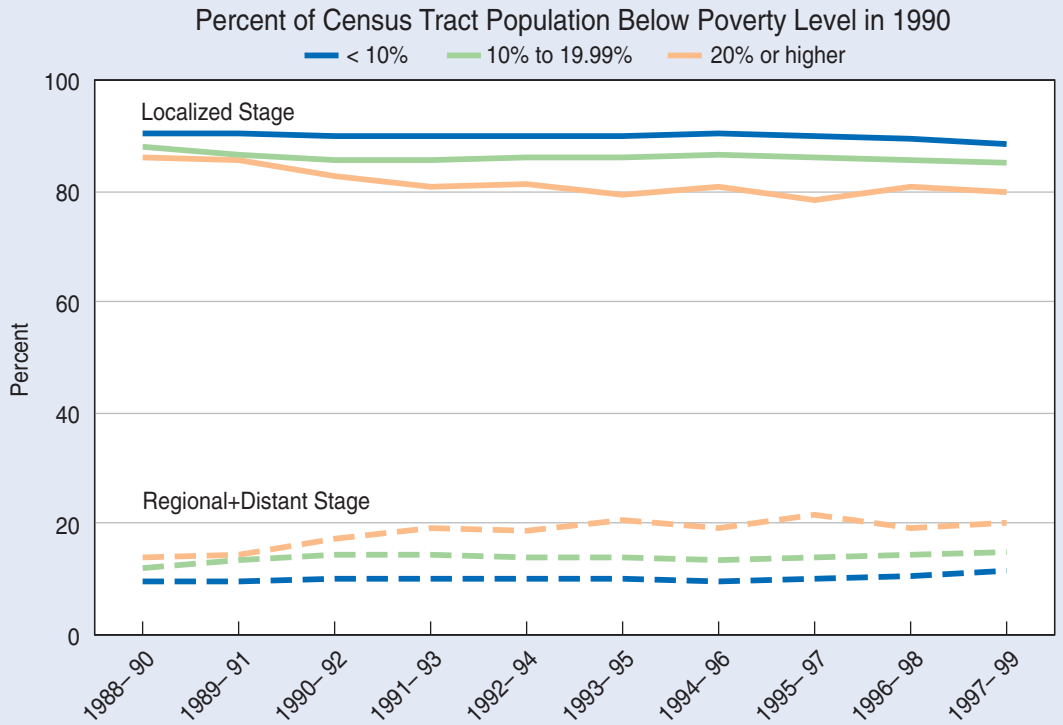


Figure 4.18. Trends in Melanoma of the Skin Diagnoses Among Women by Stage (Three-Year Moving Averages), 1988–1999



Note: Based on data from 11 SEER registries. Los Angeles registry data from 1988 to 1991 were not available.
See "Data and Methods" for a list of SEER registries.

Table 4.1. Distribution of SEER Site-Specific Cancer (Invasive) Cases by Stage, Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990																	
	< 10%						10% to 19.99%						20% or higher					
	Localized Stage		Regional Stage		Distant Stage		Localized Stage		Regional Stage		Distant Stage		Localized Stage		Regional Stage		Distant Stage	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Lung, Male																		
All Races	5,350	17.69	8,383	27.71	16,518	54.60	1,851	16.35	3,136	27.70	6,336	55.96	1,230	15.68	1,984	25.29	4,630	59.03
Non-Hispanic White	4,708	18.04	7,225	27.68	14,168	54.28	1,412	16.89	2,328	27.84	4,621	55.27	507	16.67	813	26.73	1,721	56.59
Black	169	14.21	346	29.10	674	56.69	201	14.89	359	26.59	790	58.52	545	15.97	830	24.32	2,038	59.71
American Indian	~	~	~	~	26	70.27	~	~	~	~	24	72.73	~	~	~	~	26	61.90
Asian/Pacific Islander	336	16.16	578	27.80	1,165	56.04	141	16.57	246	28.91	464	54.52	93	15.22	156	25.53	362	59.25
Hispanic	118	14.96	215	27.25	456	57.79	94	13.26	185	26.09	430	60.65	79	10.73	172	23.37	485	65.90
Lung, Female																		
All Races	5,498	21.53	6,753	26.45	13,283	52.02	1,691	20.09	2,099	24.94	4,627	54.97	909	18.83	1,178	24.40	2,740	56.76
Non-Hispanic White	4,979	21.97	6,045	26.67	11,641	51.36	1,351	20.79	1,624	24.99	3,524	54.22	395	19.07	523	25.25	1,153	55.67
Black	122	16.14	206	27.25	428	56.61	169	18.69	240	26.55	495	54.76	380	19.24	491	24.86	1,104	55.90
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	240	18.17	311	23.54	770	58.29	87	17.61	109	22.06	298	60.32	48	16.00	63	21.00	189	63.00
Hispanic	115	16.84	170	24.89	398	58.27	77	15.46	118	23.69	303	60.84	84	18.58	93	20.58	275	60.84
Colorectal, Male																		
All Races	11,661	43.19	10,197	37.76	5,144	19.05	3,706	40.79	3,554	39.12	1,826	20.10	1,983	39.95	1,803	36.32	1,178	23.73
Non-Hispanic White	9,669	42.95	8,520	37.84	4,325	19.21	2,709	41.38	2,574	39.32	1,263	19.29	797	41.36	683	35.44	447	23.20
Black	359	41.36	300	34.56	209	24.08	353	38.83	335	36.85	221	24.31	665	38.26	616	35.44	457	26.29
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	26	50.98	~	~
Asian/Pacific Islander	1,055	45.22	908	38.92	370	15.86	306	41.13	291	39.11	147	19.76	176	38.18	181	39.26	104	22.56
Hispanic	458	41.60	425	38.60	218	19.80	314	37.03	341	40.21	193	22.76	316	41.20	293	38.20	158	20.60
Colorectal, Female																		
All Races	10,835	41.51	10,441	40.00	4,824	18.48	3,699	39.92	3,686	39.78	1,882	20.31	1,977	38.69	2,003	39.20	1,130	22.11
Non-Hispanic White	9,146	41.60	8,810	40.08	4,027	18.32	2,744	40.07	2,738	39.98	1,366	19.95	803	39.48	821	40.36	410	20.16
Black	374	39.20	359	37.63	221	23.17	384	38.63	379	38.13	231	23.24	769	38.74	739	37.23	477	24.03
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	20	42.55	17	36.17
Asian/Pacific Islander	855	43.25	778	39.35	344	17.40	260	41.34	260	41.34	109	17.33	149	38.80	166	43.23	69	17.97
Hispanic	359	35.83	437	43.61	206	20.56	281	37.82	294	39.57	168	22.61	240	36.36	262	39.70	158	23.94
Prostate																		
All Races	67,773	95.24			3,388	4.76	20,125	93.27			1,452	6.73	12,053	90.94			1,201	9.06
Non-Hispanic White	56,467	95.44			2,698	4.56	13,734	93.59			940	6.41	4,011	92.38			331	7.62
Black	3,457	95.18			175	4.82	3,070	92.75			240	7.25	5,450	90.13			597	9.87
American Indian	39	92.86			~	~	40	93.02			~	~	90	84.91			16	15.09
Asian/Pacific Islander	3,488	92.37			288	7.63	1,097	91.80			98	8.20	566	88.99			70	11.01
Hispanic	2,596	93.85			170	6.15	1,839	92.00			160	8.00	1,736	90.61			180	9.39
Breast, Female																		
All Races	54,058	66.95	22,619	28.01	4,072	5.04	15,051	64.33	6,817	29.14	1,527	6.53	7,189	59.01	3,946	32.39	1,047	8.59
Non-Hispanic White	45,891	67.60	18,613	27.42	3,380	4.98	10,995	65.94	4,632	27.78	1,046	6.27	2,967	63.40	1,372	29.32	341	7.29
Black	1,682	57.92	1,020	35.12	202	6.96	1,493	58.32	851	33.24	216	8.44	2,386	55.92	1,448	33.93	433	10.15
American Indian	42	51.85	30	37.04	~	~	32	49.23	27	41.54	~	~	62	54.87	41	36.28	~	~
Asian/Pacific Islander	3,902	66.82	1,681	28.78	257	4.40	1,099	66.28	483	29.13	76	4.58	544	60.99	296	33.18	52	5.83
Hispanic	2,093	61.20	1,130	33.04	197	5.76	1,360	58.24	798	34.18	177	7.58	1,206	54.72	787	35.71	211	9.57
Cervix																		
All Races	2,560	59.59	1,383	32.19	353	8.22	1,162	57.07	695	34.14	179	8.79	1,055	52.31	765	37.93	197	9.77
Non-Hispanic White	1,756	59.32	946	31.96	258	8.72	572	57.60	334	33.64	87	8.76	228	53.90	150	35.46	45	10.64
Black	136	57.14	78	32.77	24	10.08	130	52.85	87	35.37	29	11.79	291	49.49	237	40.31	60	10.20
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	318	56.18	209	36.93	39	6.89	127	53.81	90	38.14	19	8.05	81	54.00	60	40.00	9	6.00
Hispanic	284	61.87	144	31.37	31	6.75	323	59.16	179	32.78	44	8.06	437	53.36	303	37.00	79	9.65
Melanoma of the Skin, Male																		
All Races	9,625	85.98	1,152	10.29	417	3.73	1,900	80.41	335	14.18	128	5.42	534	74.17	120	16.67	66	9.17
Non-Hispanic White	8,907	85.61	1,096	10.53	401	3.85	1,742	81.10	293	13.64	113	5.26	472	77.00	95	15.50	46	7.50
Black	32	76.19	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	62	83.78	11	14.86	1	1.35	~	~	~	~	~	~	~	~	~	~	~	~
Hispanic	102	73.91	25	18.12	11	7.97	62	63.92	26	26.80	~	~	31	55.36	16	28.57	~	~
Melanoma of the Skin, Female																		
All Races	7,890	89.07	745	8.41	223	2.52	1,678	85.48	221	11.26	64	3.26	439	79.24	85	15.34	30	5.42
Non-Hispanic White	7,185	88.95	683	8.46	210	2.60	1,510	85.70	199	11.29	53	3.01	341	82.37	57	13.77	16	3.86
Black	26	86.67	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	55	79.71	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Hispanic	187	83.86	26	11.66	10	4.48	77	77.00	16	16.00	~	~	64	74.42	16	18.60	~	~

Notes: Stage distribution data for prostate cancer cases are presented for distant stage and the combined category of localized/regional stage. ~ Counts or percentages are suppressed if based on fewer than 16 cases.

Treatment (Cancer-Directed Surgery)

Several studies have reported associations between the type of medical treatment given to cancer patients and socioeconomic and demographic factors, even after controlling for differences in clinical presentation (72–86). Age (72,75,76,81,82,86), race (74,77,78), marital status (84,85), geographic location (83), type of medical insurance (73), education (75,76,78,80,82), and income (75,79,80) have all been found to play a role. In this section, we describe socioeconomic patterns (as measured by the census tract poverty variable) in the surgical treatment given to patients with three types of cancer. Since published treatment recommendations (87) often refer to the American Joint Committee on Cancer 0–IV staging classification scheme (88), we present some of the results using this scheme instead of the localized-regional-distant summary staging scheme used elsewhere.

Non-Small-Cell Lung Cancer, Stages I or II

Surgical resection has been shown to confer a definitive benefit to patients with stage I or II non-small-cell lung cancer (89). Among men diagnosed with this type and stage of lung cancer, there was a consistent area socioeconomic gradient in surgery rates for each racial/ethnic group; those in the lowest census tract poverty group (highest SES group) had the highest likelihood of undergoing surgery (Table 5.1, page 92, and Figure 5.1, page 89). Among women, the socioeconomic gradient was apparent only for non-Hispanic whites. Black women tended to be less likely to undergo surgery than other racial/ethnic groups (Figure 5.2, page 89).

Prostate Cancer, Localized or Regional Stage

The optimal course of treatment for nonmetastatic prostate cancer is controversial given the paucity of definitive evidence on the efficacy of aggressive therapies (radical prostatectomy or radiation therapy) compared to conservative management (hormonal therapy or observation) (90). This lack of a consensus on the therapeutic management of prostate cancer leads to variations in practice that may be linked to both clinical and nonclinical factors (78,91). Since radical prostatectomy is infrequently performed in older men, Figure 5.3, page 90, only shows surgery patterns among men under age 70 by race/ethnicity and area socioeconomic status. Table 5.2, page 93, however, contains surgery data for men aged under 70 as well as those aged 70 years or older. There were clear socioeconomic gradients in the frequency of prostatectomy for non-Hispanic white and black men aged under 70 years, with

the highest surgery frequency occurring in the lowest poverty group. The percentage of black patients receiving radical prostatectomy was the lowest among the four racial/ethnic groups within each area socioeconomic group. Radical prostatectomy was most common among Hispanic men, with only a slight drop in the frequency in the highest poverty group. There was no clear socioeconomic pattern in the frequency of surgery for Asian and Pacific Islanders.

Breast Cancer, Stages I or II, <= 2 cm

Breast-conserving surgery has become the preferred method of treatment for many patients with stage I or II breast cancers (92). Among women diagnosed during 1995–1998 with stage I or II breast cancers, 2 cm or less in diameter, there was a consistent socioeconomic gradient in the percentage receiving breast-conserving surgery (BCS). For this analysis, BCS was defined to include partial or segmental mastectomy, quadrantectomy, tylectomy, wedge resection, nipple resection, lumpectomy, and excisional biopsy with or without dissection of axillary lymph nodes. BCS was most commonly performed in low poverty census tracts (high SES areas), and this relationship held for each racial/ethnic group (Table 5.3, page 93, and Figure 5.4, page 90). The percentage of black patients receiving BCS was somewhat higher than other racial/ethnic groups within each socioeconomic group. BCS was performed less frequently among API women, however, than among other racial/ethnic groups. This was due to the greater likelihood of API women to undergo mastectomies (data not shown). These findings are similar to those reported in other, smaller studies (93–96). The percentage of women receiving BCS increased steadily in each socioeconomic group over the time period 1988–1998, though women in the lowest poverty group consistently showed the highest levels of BCS (Figure 5.5, page 91).

Figure 5.1. Percentage of Stages I and II Non-Small-Cell Male Lung Cancer Patients Undergoing Surgery, 1995–1999

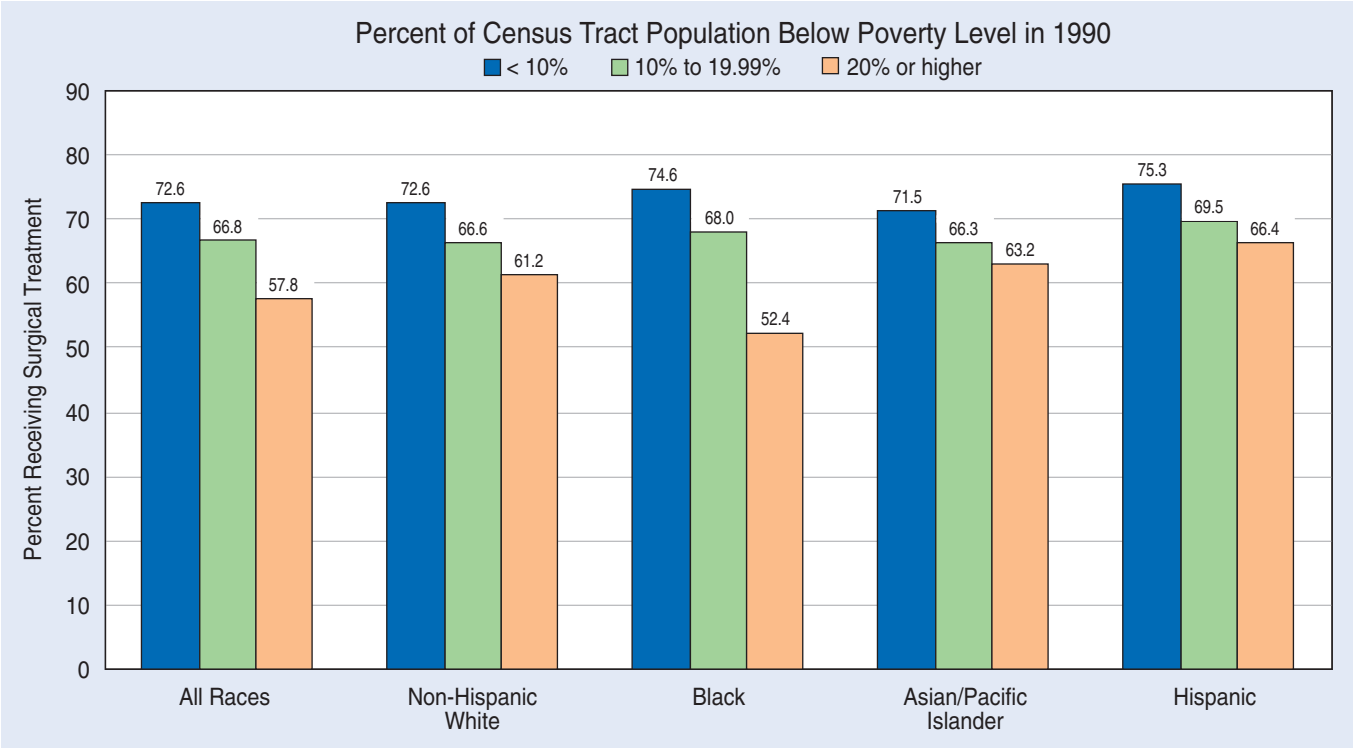
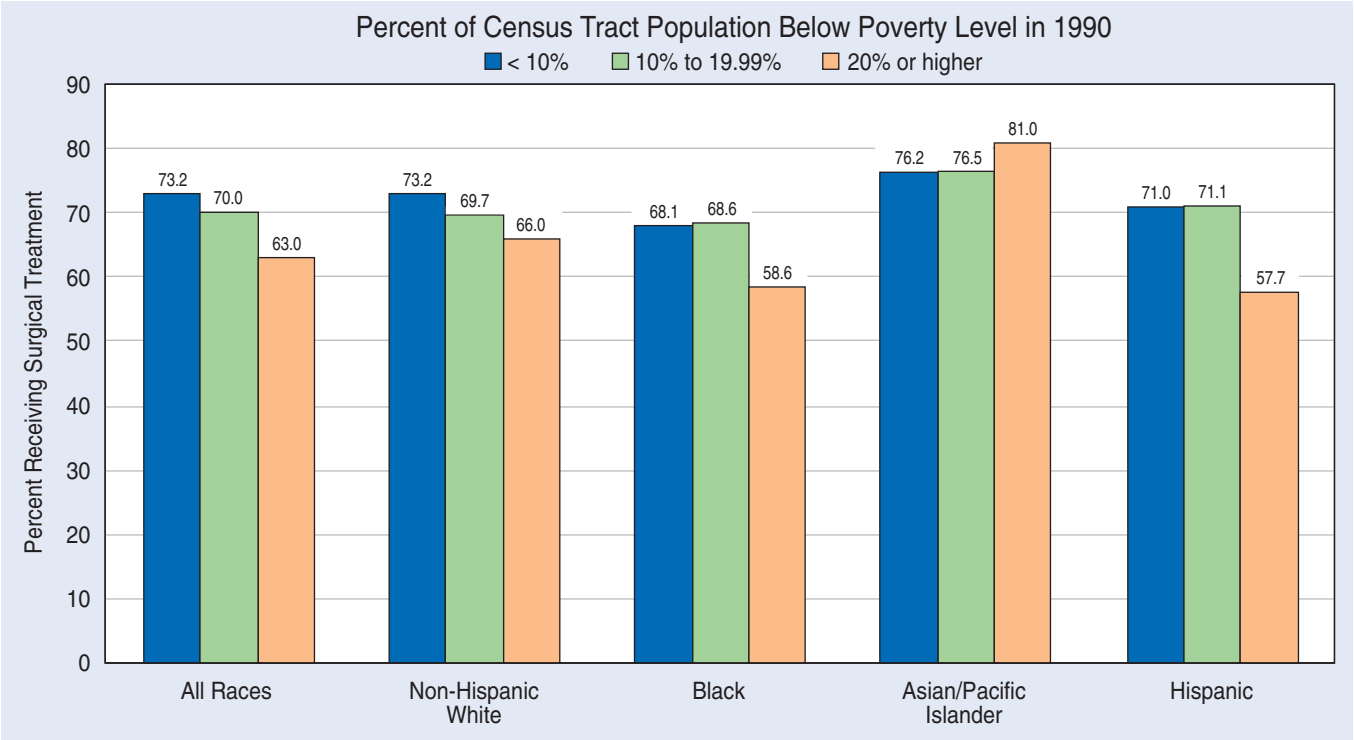


Figure 5.2. Percentage of Stages I and II Non-Small-Cell Female Lung Cancer Patients Undergoing Surgery, 1995–1999



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 5.3. Percentage of SEER Localized- and Regional-Stage Prostate Cancer Patients Aged Less Than 70 Years Undergoing Radical Prostatectomy, 1995–1999

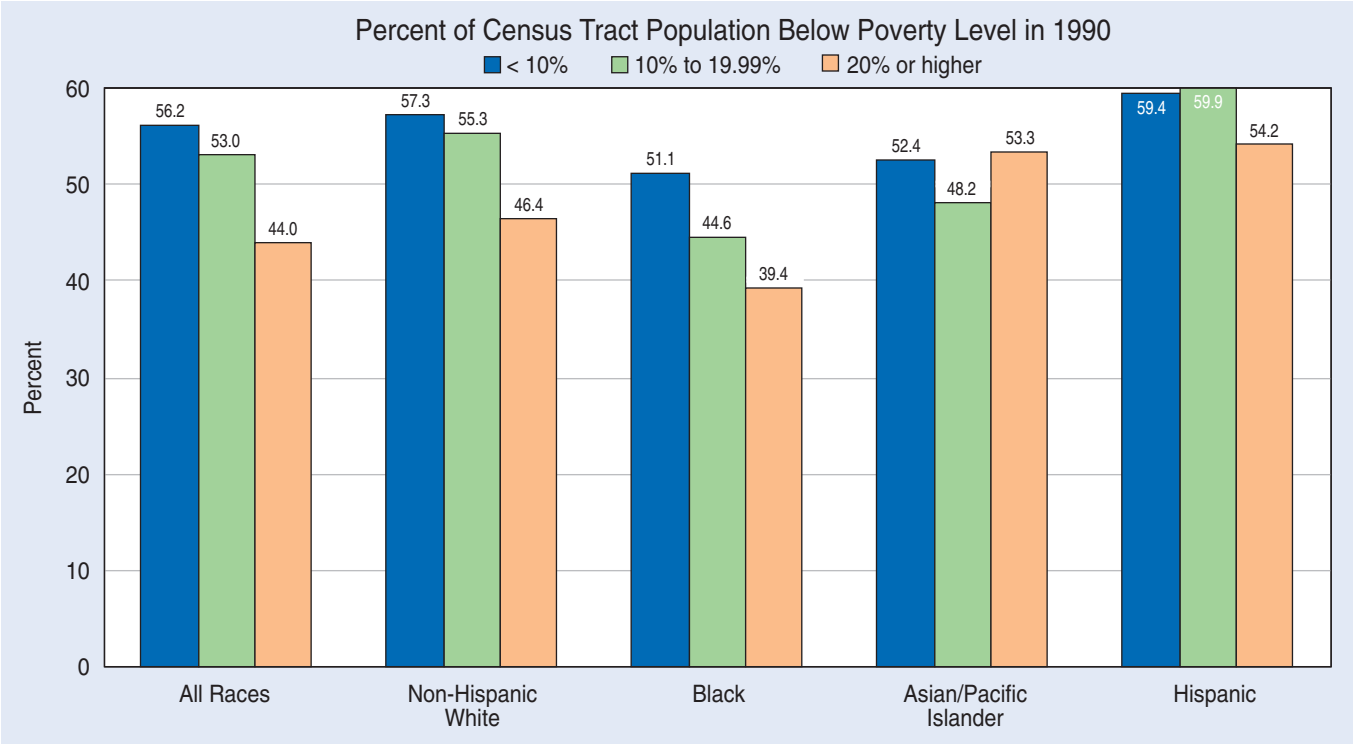
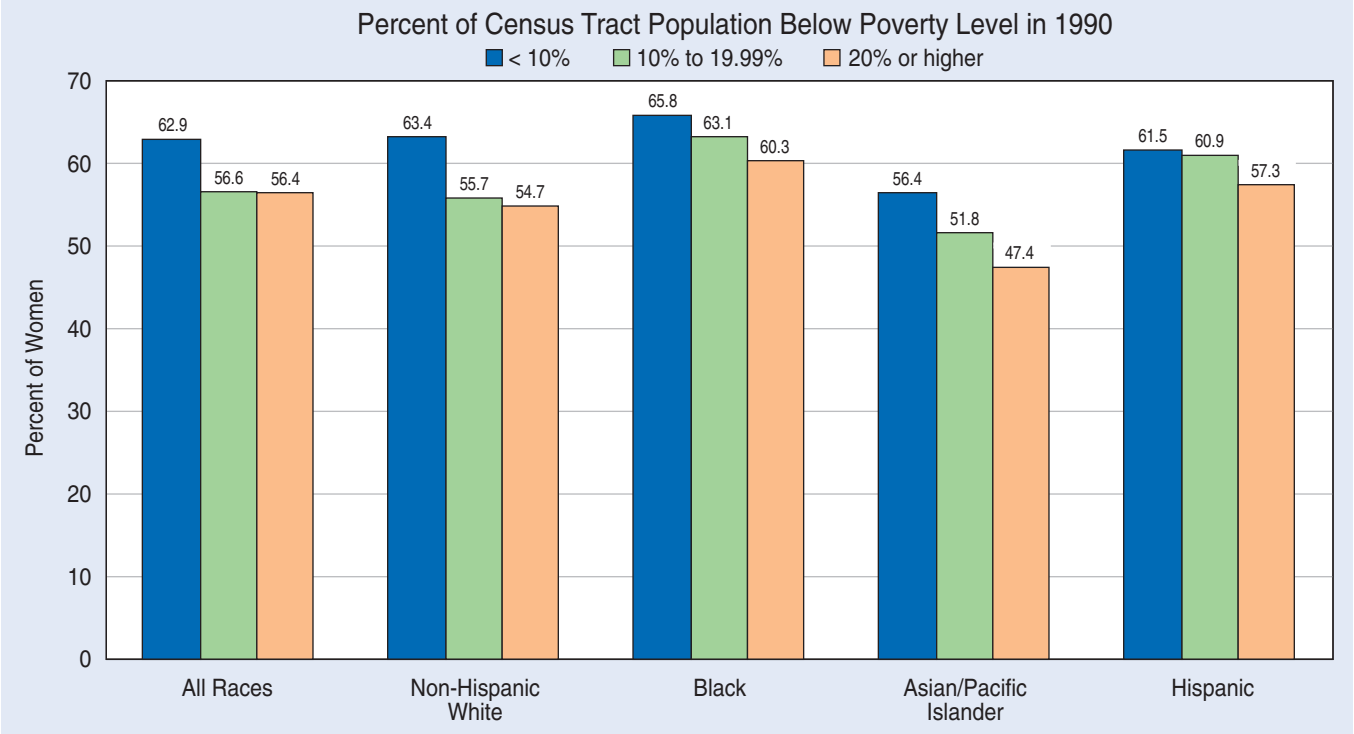
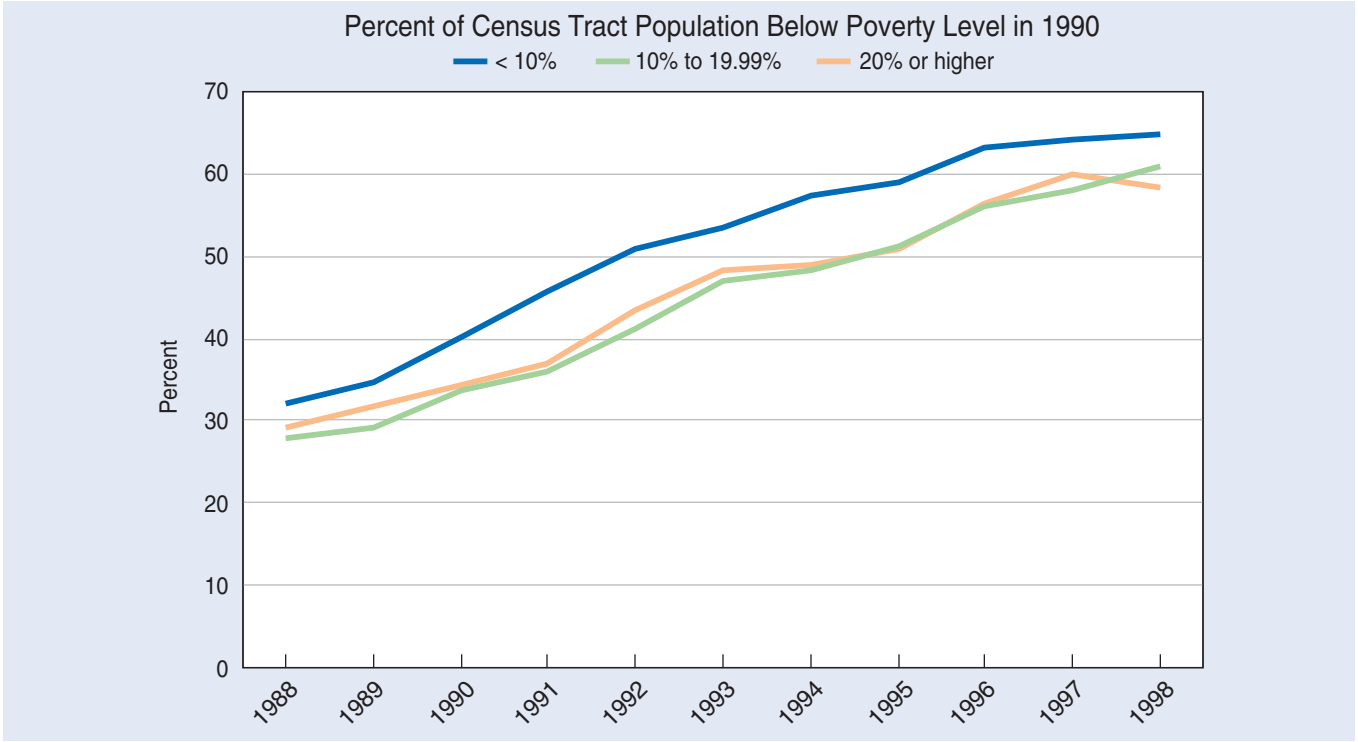


Figure 5.4. Percentage of Stages I and II Female Breast Cancer Patients With Tumor Size <= 2 cm Undergoing Breast-Conserving Surgery, 1995–1998



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 5.5. Percentage of Stages I and II Female Breast Cancer Patients With Tumor Size <= 2 cm Undergoing Breast-Conserving Surgery, 1988–1998



Note: Based on data from 11 SEER registries. Los Angeles registry data from 1988 to 1991 were not available.
See "Data and Methods" for a list of SEER registries.

Table 5.1. Number and Percentage of AJCC Stages I and II Non-Small-Cell Lung Cancer Patients Receiving Surgical Treatment by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990					
	< 10%		10% to 19.99%		20% or higher	
	Number	Percent	Number	Percent	Number	Percent
Male						
All Races	5,316	72.63	1,697	66.76	928	57.75
Non-Hispanic White	4,647	72.62	1,297	66.55	407	61.20
Black	188	74.60	189	67.99	365	52.37
Asian/Pacific Islander	343	71.46	126	66.32	79	63.20
Hispanic	125	75.30	82	69.49	73	66.36
Female						
All Races	4,925	73.15	1,428	70.00	672	62.98
Non-Hispanic White	4,439	73.17	1,107	69.67	301	66.01
Black	111	68.10	164	68.62	269	58.61
Asian/Pacific Islander	249	76.15	88	76.52	51	80.95
Hispanic	98	71.01	64	71.11	49	57.65

Table 5.2. Number and Percentage of Localized- and Regional-Stage Prostate Cancer Patients Undergoing Radical Prostatectomy by Age, Race/Ethnicity, and Census Tract Poverty Rate, 1995–1999: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990					
	< 10%		10% to 19.99%		20% or higher	
	Number	Percent	Number	Percent	Number	Percent
Age Under 70 Years						
All Races	20,844	56.16	5,461	52.97	2,787	43.95
Non-Hispanic White	17,537	57.31	3,646	55.27	922	46.42
Black	1,336	51.07	888	44.56	1,222	39.38
Asian/Pacific Islander	837	52.44	219	48.24	106	53.27
Hispanic	924	59.38	655	59.93	500	54.17
Age 70 Years or Older						
All Races	3,903	12.76	1,269	12.95	520	9.12
Non-Hispanic White	3,382	13.09	942	13.22	202	10.00
Black	85	10.14	103	9.56	150	6.39
Asian/Pacific Islander	233	12.36	70	10.94	45	12.33
Hispanic	175	16.84	148	19.84	120	14.76

Table 5.3. Number and Percentage of AJCC Stages I and II Female Breast Cancer Patients With Tumor Size <= 2 cm Undergoing Breast-Conserving Surgery by Race/Ethnicity and Census Tract Poverty Rate, 1995–1998: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990					
	< 10%		10% to 19.99%		20% or higher	
	Number	Percent	Number	Percent	Number	Percent
All Races	24,081	62.88	5,831	56.61	2,593	56.36
Non-Hispanic White	20,756	63.37	4,286	55.69	1,101	54.72
Black	730	65.77	598	63.08	893	60.34
Asian/Pacific Islander	1527	56.41	381	51.77	162	47.37
Hispanic	876	61.47	514	60.90	406	57.26

Survival

Stage of disease at diagnosis is the most important factor affecting cancer patient survival (20,96). Many studies have also shown consistently poorer survival among cancer patients of lower socioeconomic status (43,44,68,93,98–102). Patients of lower socioeconomic status or those living in more disadvantaged areas have substantially higher rates of late-stage diagnoses of breast, prostate, and colorectal cancers than their higher SES counterparts (39–42,103–105). Since a late-stage diagnosis is associated with reduced survival, cancer survival would be expected to be lower among low SES than high SES patients, all else being equal. However, stage at diagnosis does not fully account for the socioeconomic differences in survival (68).

Area Socioeconomic and Racial/Ethnic Patterns in Survival, the 1988–1994 Patient Cohort

The survival measure used in this report represents the percentage of patients diagnosed with cancer between 1988 and 1994 who did not die of the neoplasm within five years from the time of diagnosis. For all cancers combined as well as for the individual cancers considered, both men and women in high poverty census tracts generally had lower rates of cancer survival than those in low poverty census tracts (Tables 6.1–6.4, pages 114–117; Figures 6.1–6.24, pages 97–113). Among men, the five-year survival rate for all cancers combined was about 61% in low poverty areas but only 49% in high poverty areas (Table 6.1, page 114; Figure 6.3, page 98). The pattern among women was similar, with five-year survival for all cancers at 63.4% in low poverty areas and only 53.1% in high poverty areas. Socioeconomic differentials in cancer survival were apparent within each racial/ethnic group with the exception of American Indians/Alaska natives.

Among women with breast cancer, five-year survival was 86.4% for those in census tracts with a poverty rate of less than 10% and only 77.5% for those in census tracts with a 20% or higher poverty rate. Socioeconomic differentials in survival were also large among men and women with melanoma of the skin and colorectal cancers. Moderate socioeconomic differentials in survival were seen for cancers of the cervix uteri and prostate. Even though five-year survival rates for lung cancer patients are consistently low, a socioeconomic gradient is apparent.

For many types of cancer, ethnic differentials in cancer survival were apparent within each area socioeconomic group. These racial/ethnic differences in cancer survival were substantially reduced, however, after controlling for stage of disease at diagnosis (Tables 6.2–6.4, pages 115–117). Socioeconomic gradients in survival were generally most pronounced for regional-stage disease (Table 6.3, page 116). For example, five-year cause-specific survival rates for women diagnosed with regional-stage breast cancer were 79.6% among those living in low poverty census tracts and 71.2% for those in high poverty census tracts. Socioeconomic differences in survival were also substantial for localized-stage lung cancer (Table 6.2, page 115) and distant-stage cancer of the cervix uteri (Table 6.4, page 117).

Trends in Survival from Cancers of the Prostate and Female Breast

Trends in the survival rates from 1988 through 1994 are shown for the two most frequently diagnosed cancers: male prostate and female breast (Figures 6.13 and 6.16, pages 105 and 107, respectively). Area socioeconomic differences persisted throughout the time period for both cancers. Prostate cancer survival improved between 1988 and 1994 for men in all area poverty groups, with socioeconomic inequalities diminishing slightly because of somewhat larger gains in survival among men in high poverty areas. Socioeconomic differentials in female breast cancer survival appear to be relatively unchanged between 1988 and 1994, with little or no improvement in survival among women in each area group.

Figure 6.1. Trends in SEER Cancer (All Sites Combined) Survival Among Men, 1988–1994

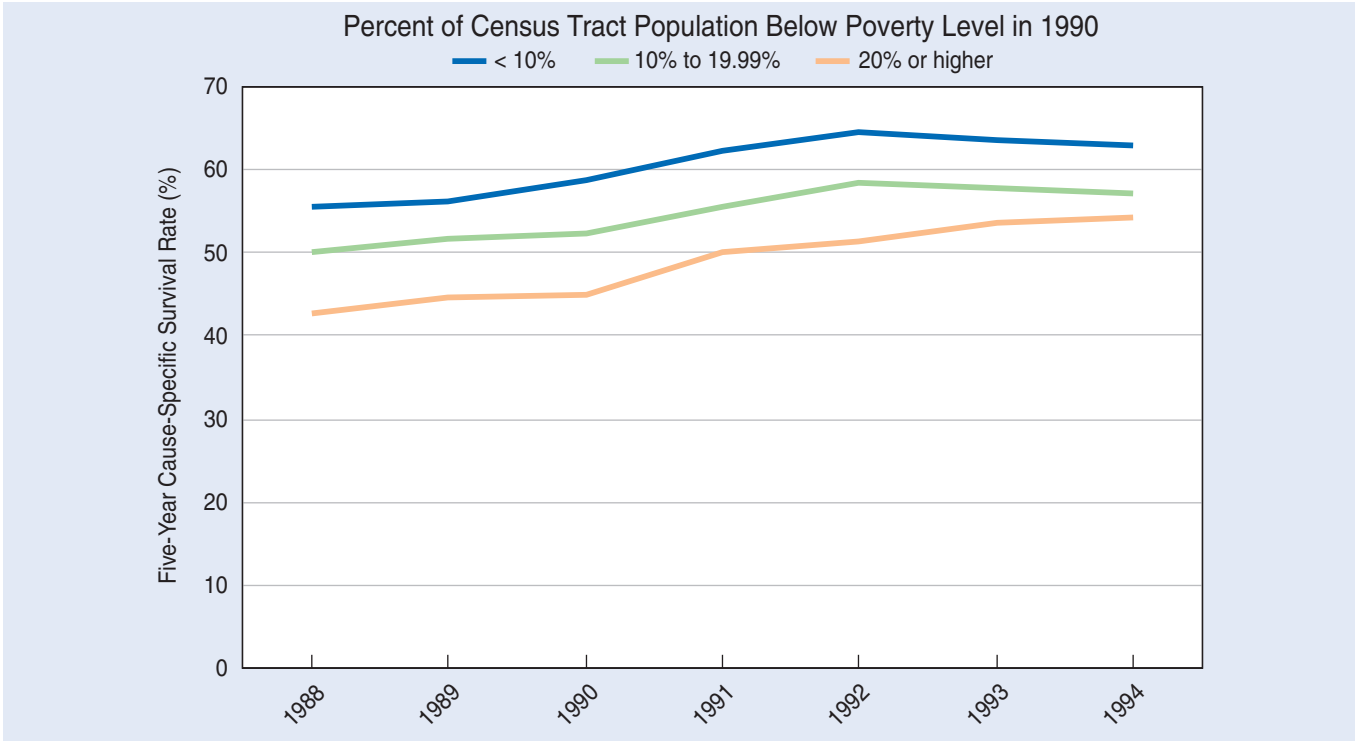
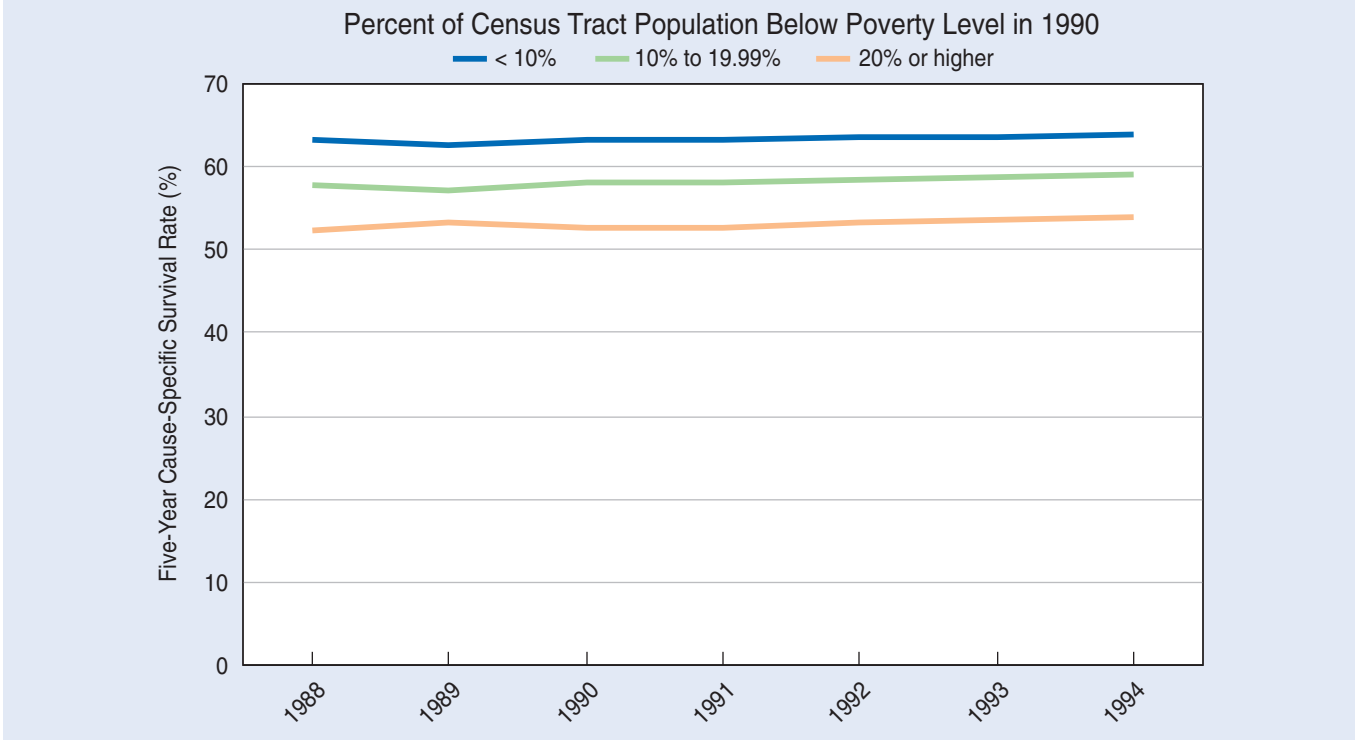


Figure 6.2. Trends in SEER Cancer (All Sites Combined) Survival Among Women, 1988–1994



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.3. SEER Cancer (All Sites Combined) Survival Among Men, 1988–1994 Patient Cohort

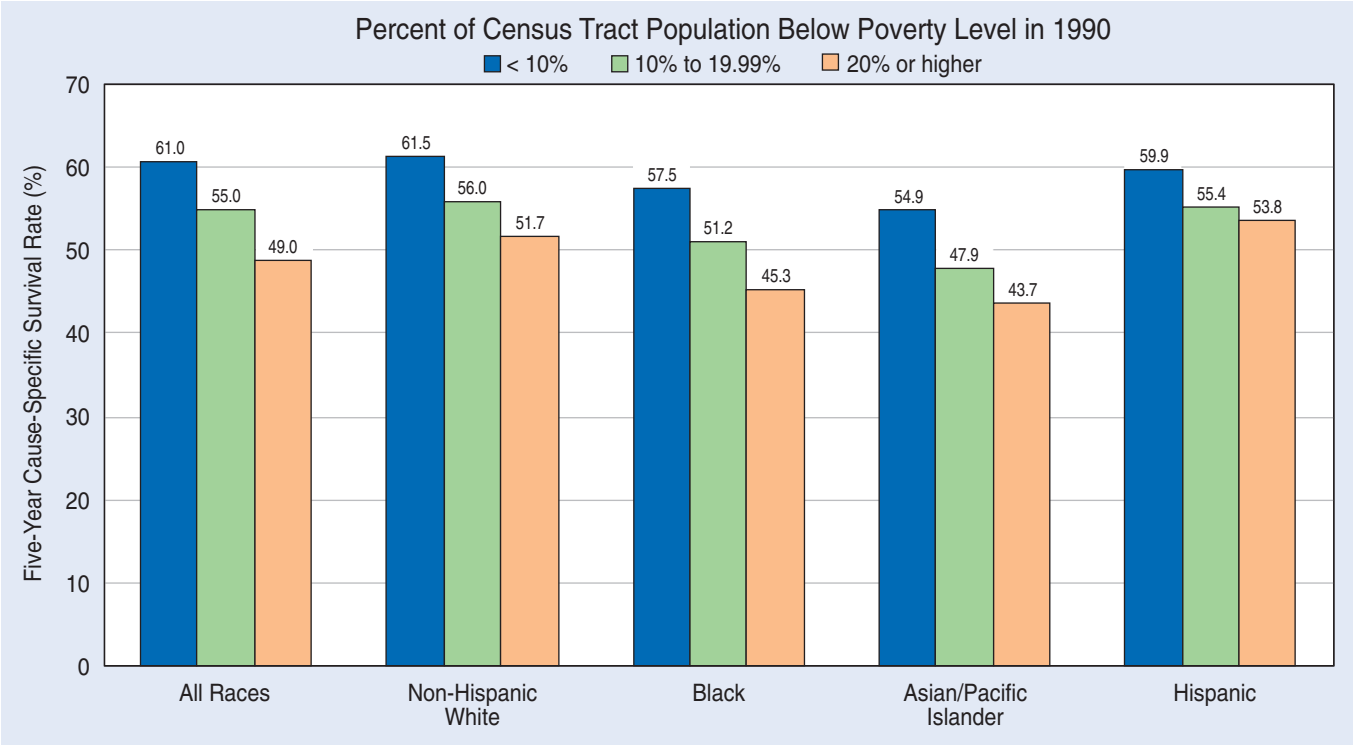
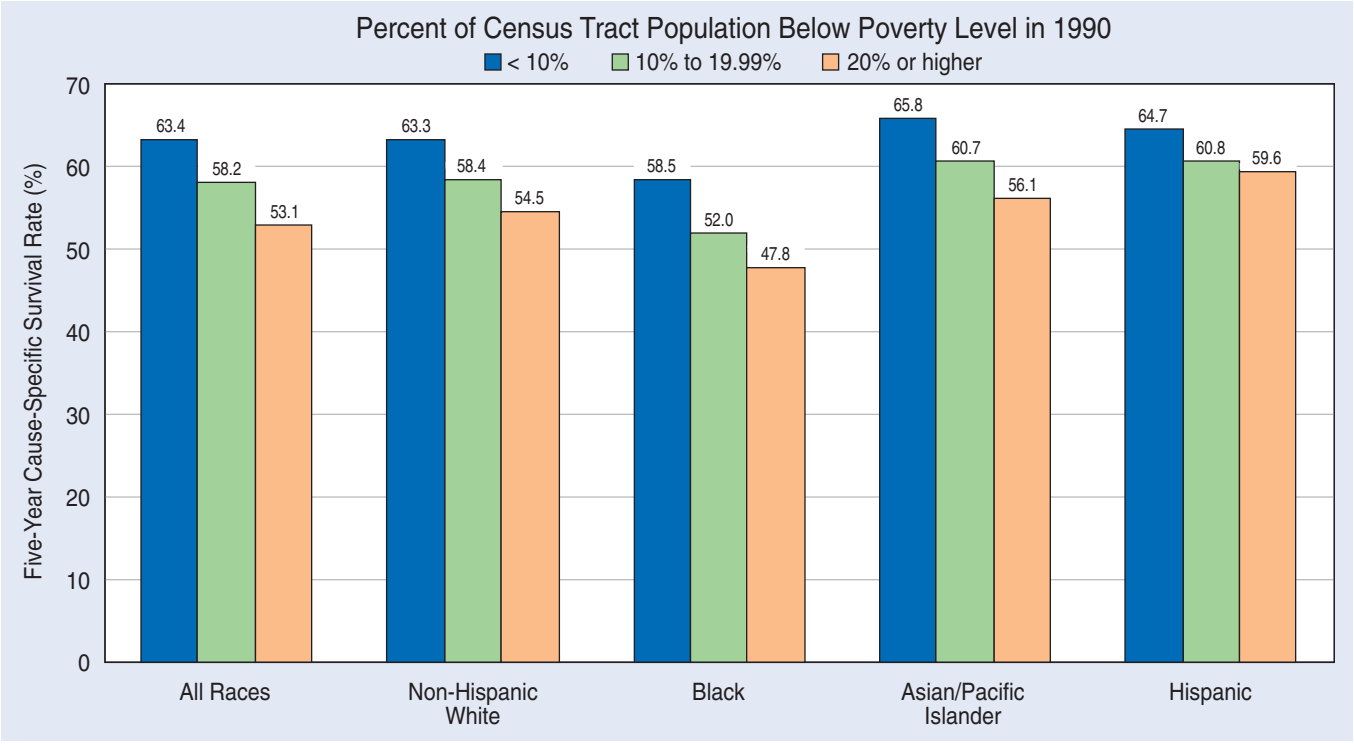


Figure 6.4. SEER Cancer (All Sites Combined) Survival Among Women, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.5. SEER Lung Cancer Survival Among Men, 1988–1994 Patient Cohort

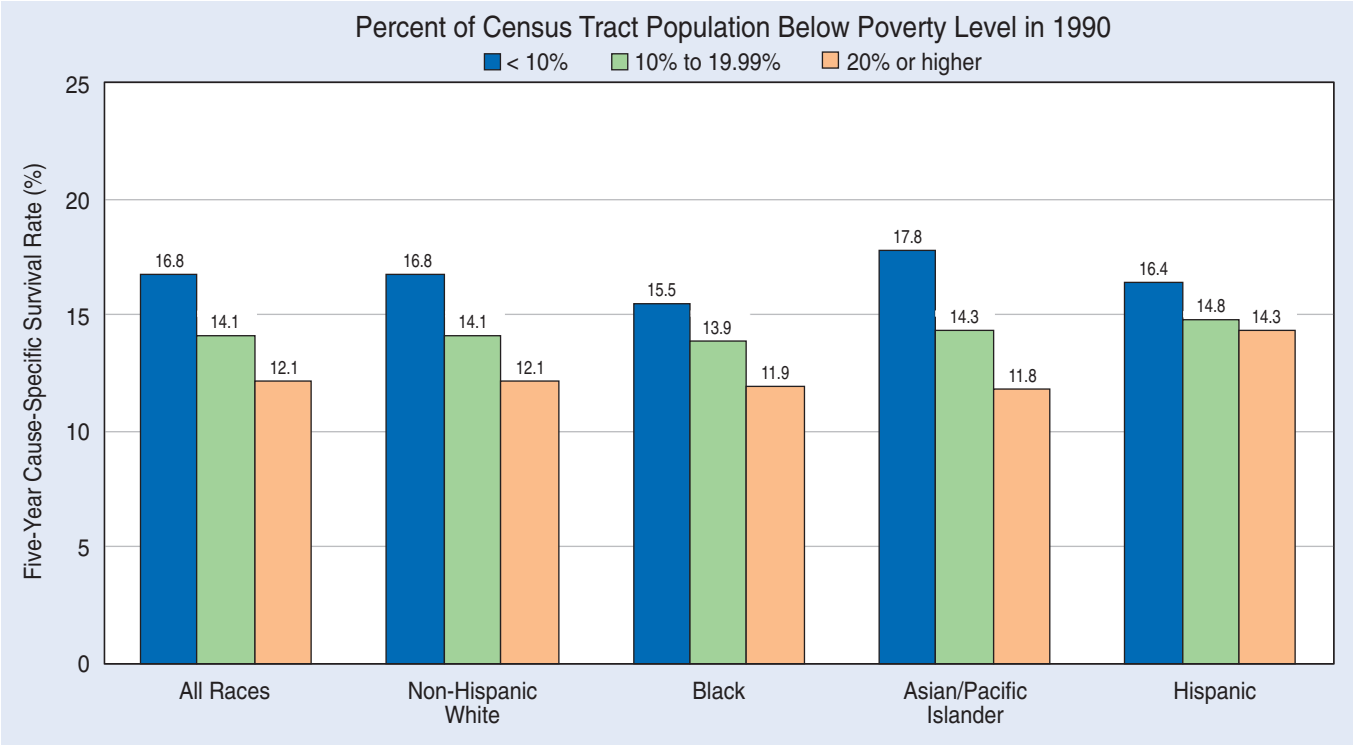
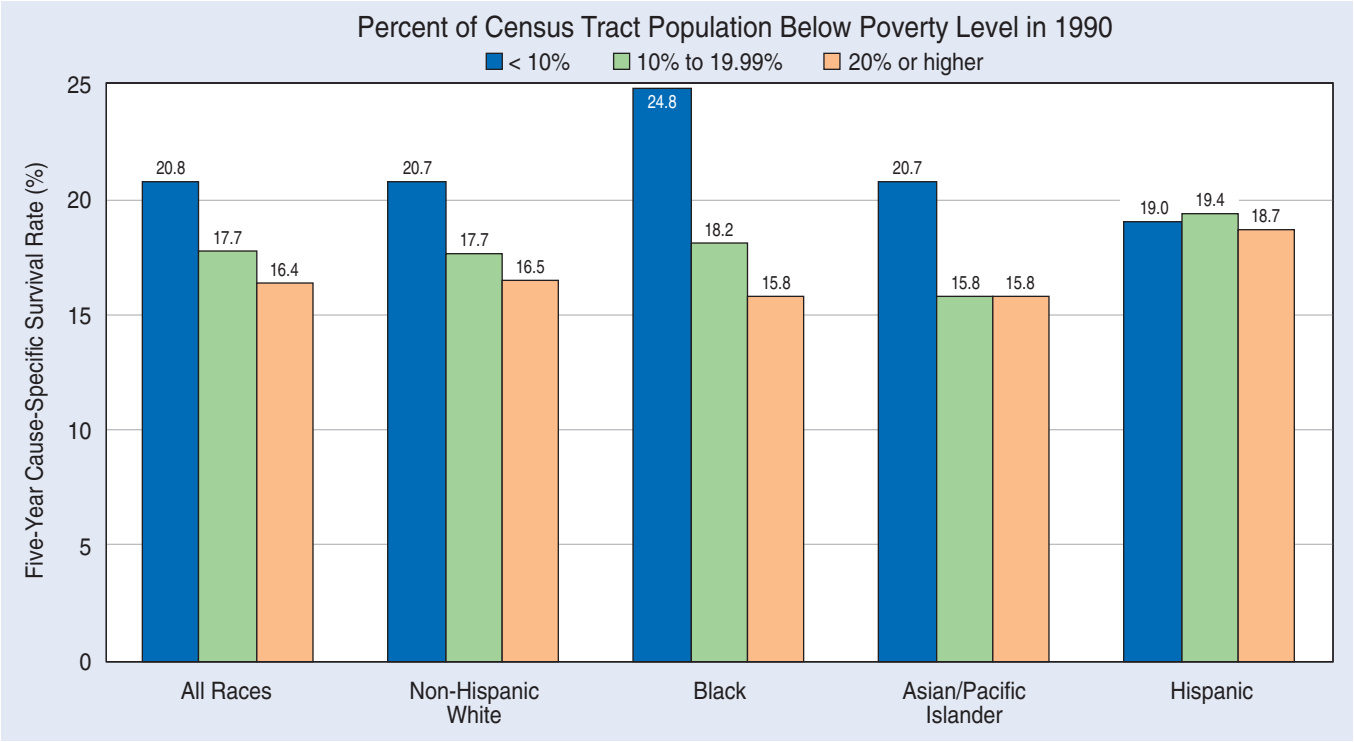
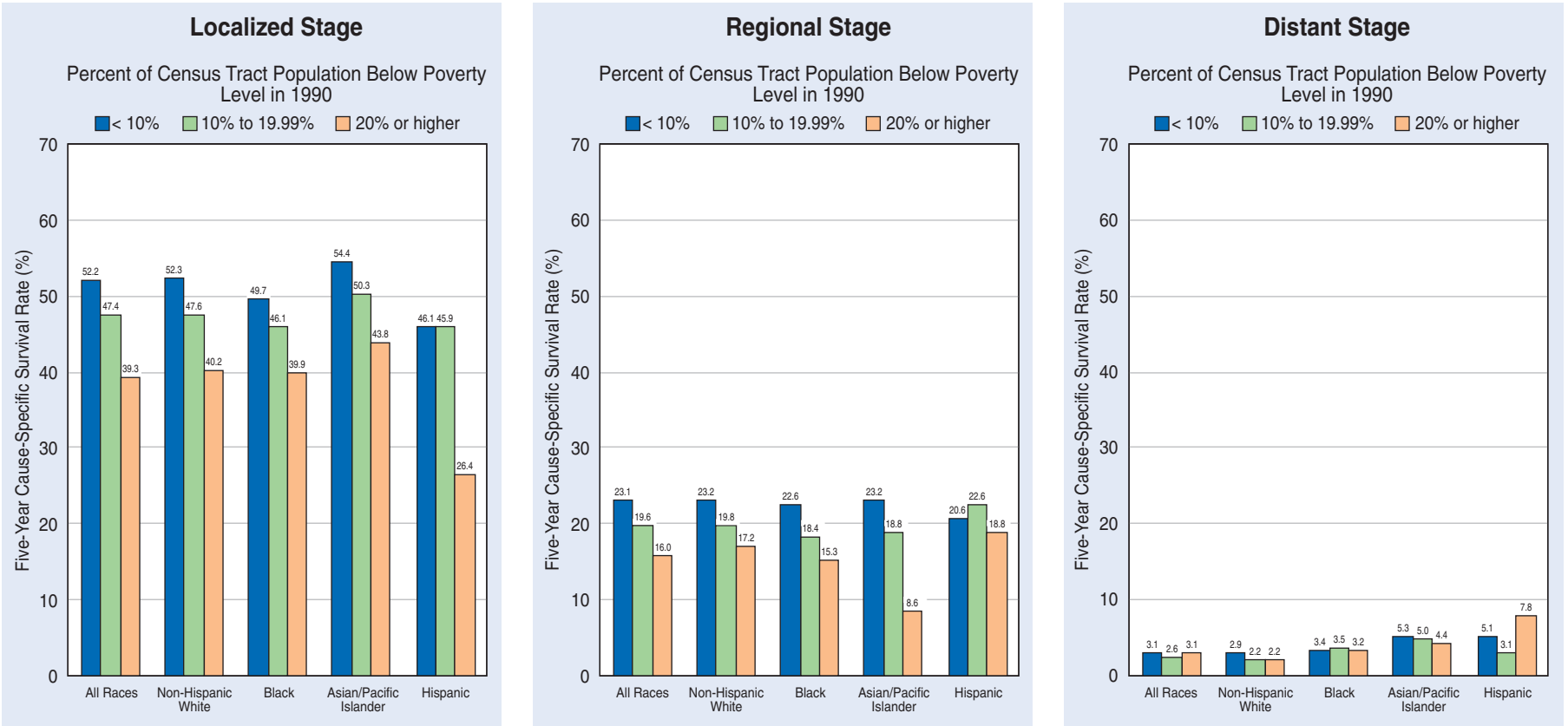


Figure 6.6. SEER Lung Cancer Survival Among Women, 1988–1994 Patient Cohort



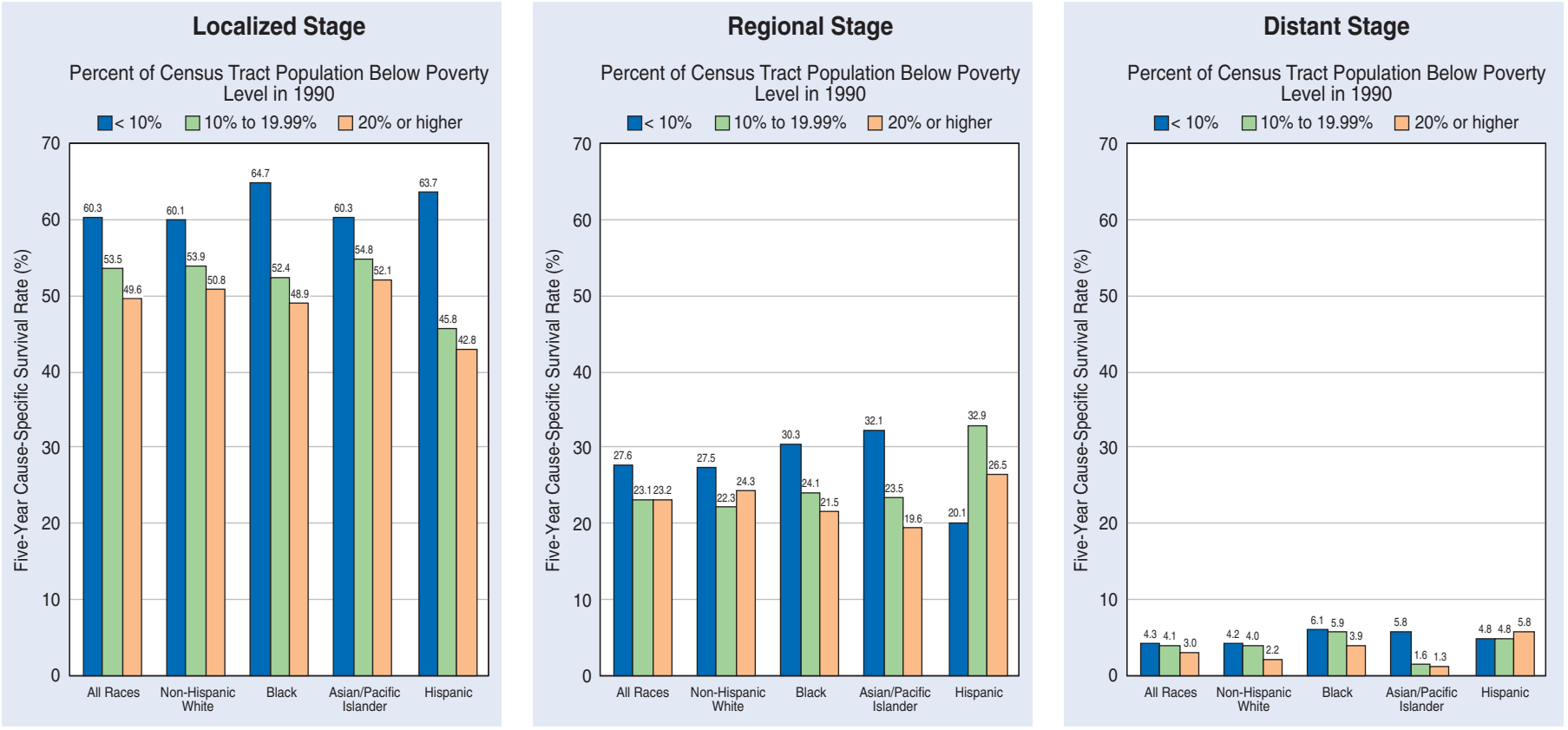
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.7. SEER Lung Cancer Survival Among Men by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.8. SEER Lung Cancer Survival Among Women by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.9. SEER Colorectal Cancer Survival Among Men, 1988–1994 Patient Cohort

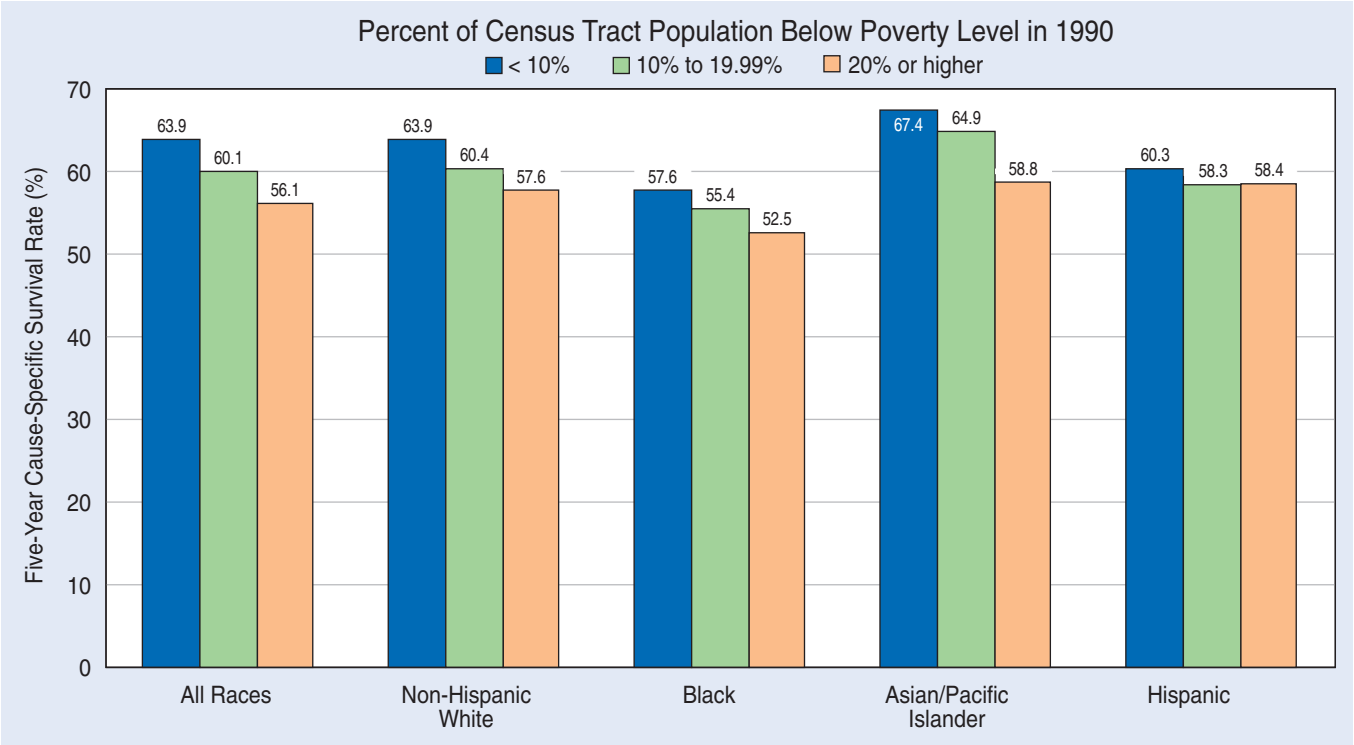
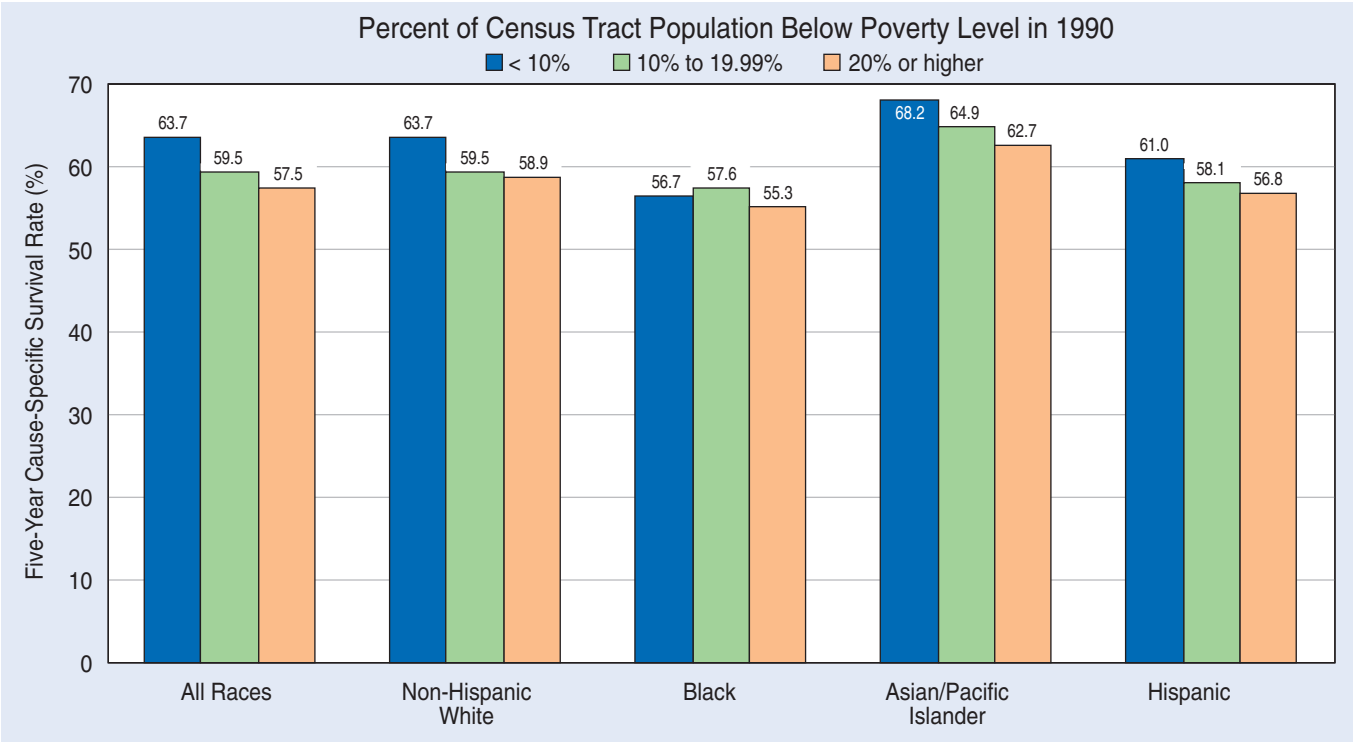
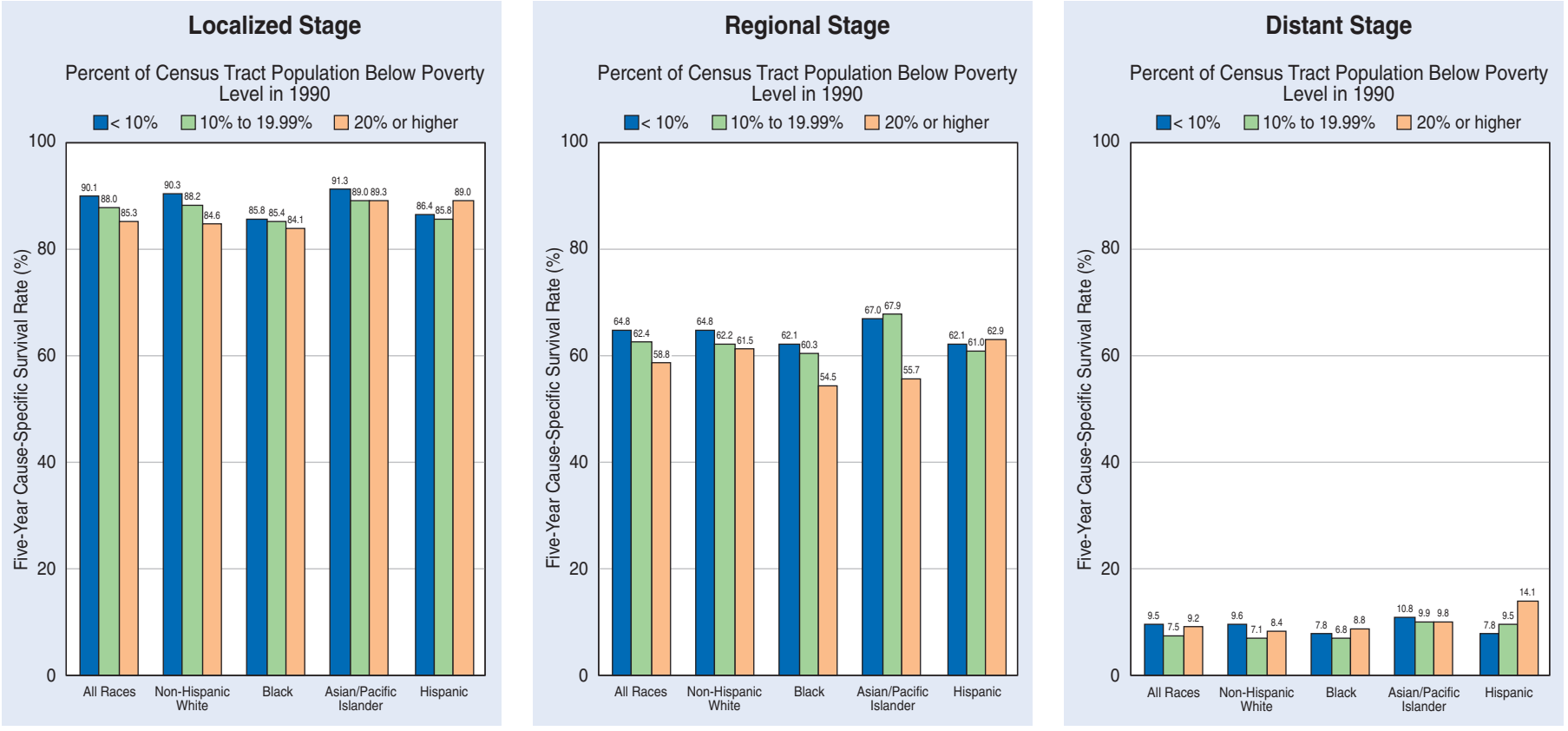


Figure 6.10. SEER Colorectal Cancer Survival Among Women, 1988–1994 Patient Cohort



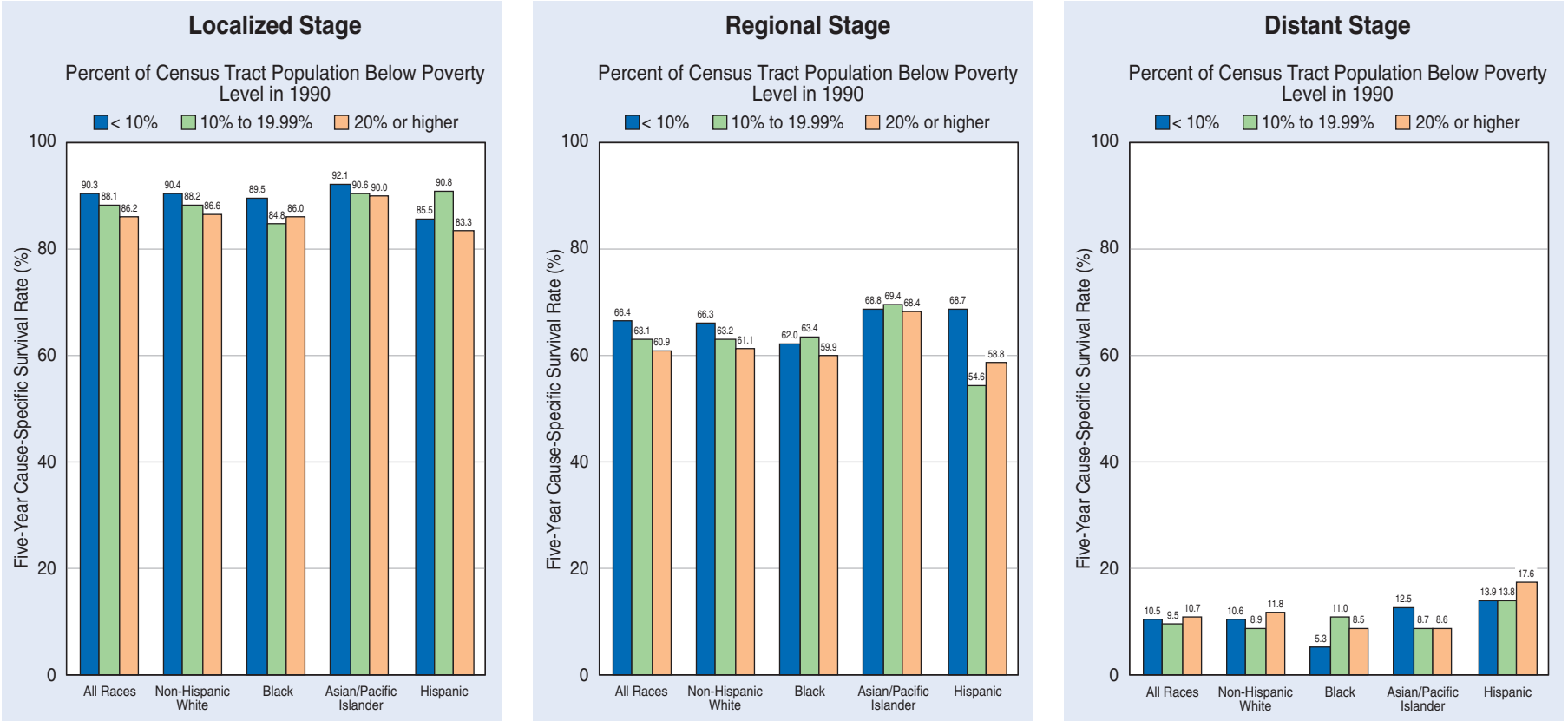
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.11. SEER Colorectal Cancer Survival Among Men by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.12. SEER Colorectal Cancer Survival Among Women by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.13. Trends in SEER Prostate Cancer Survival, 1988–1994

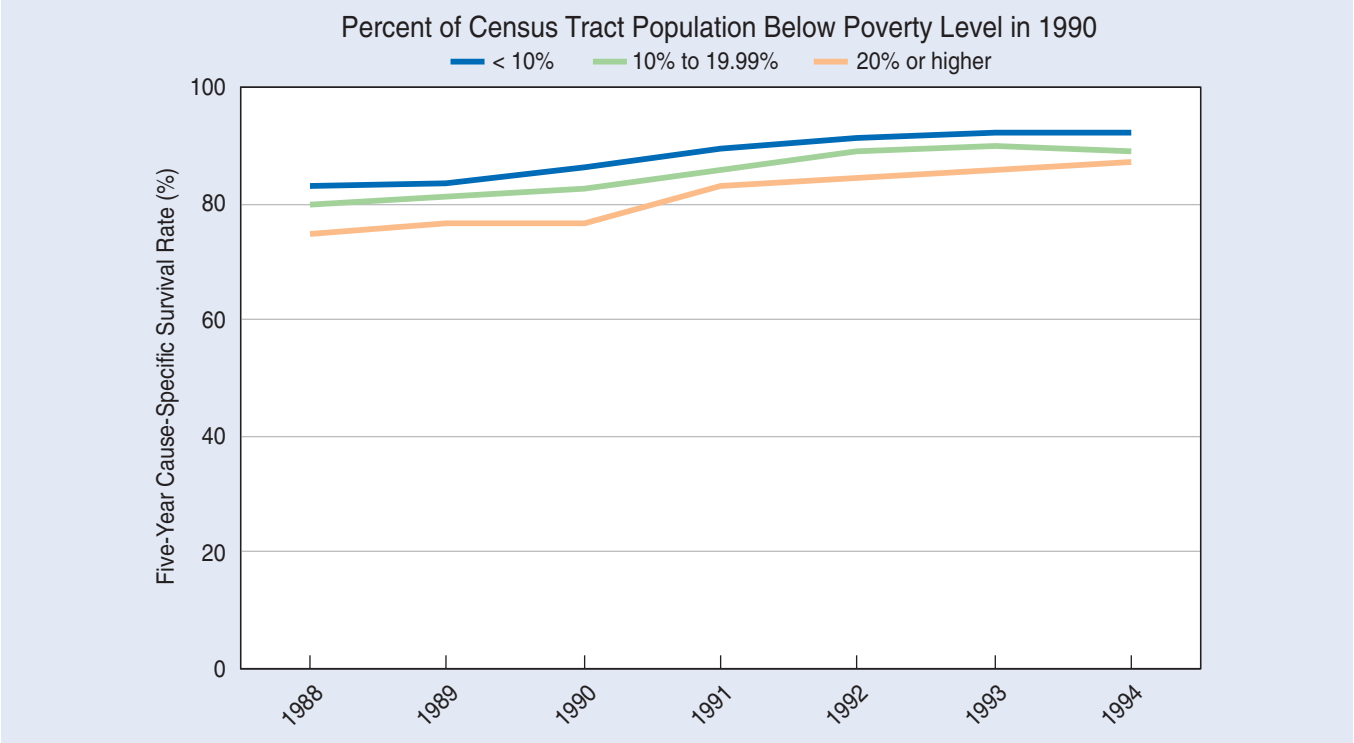
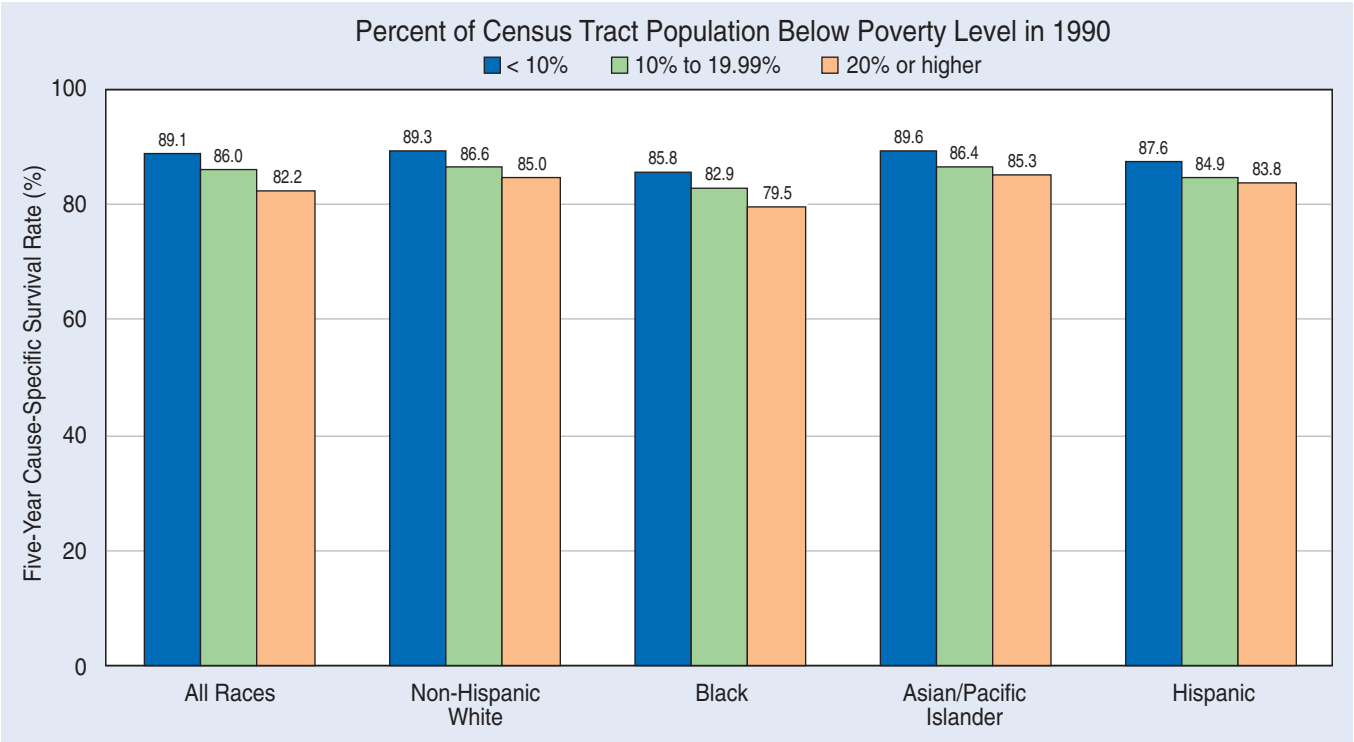
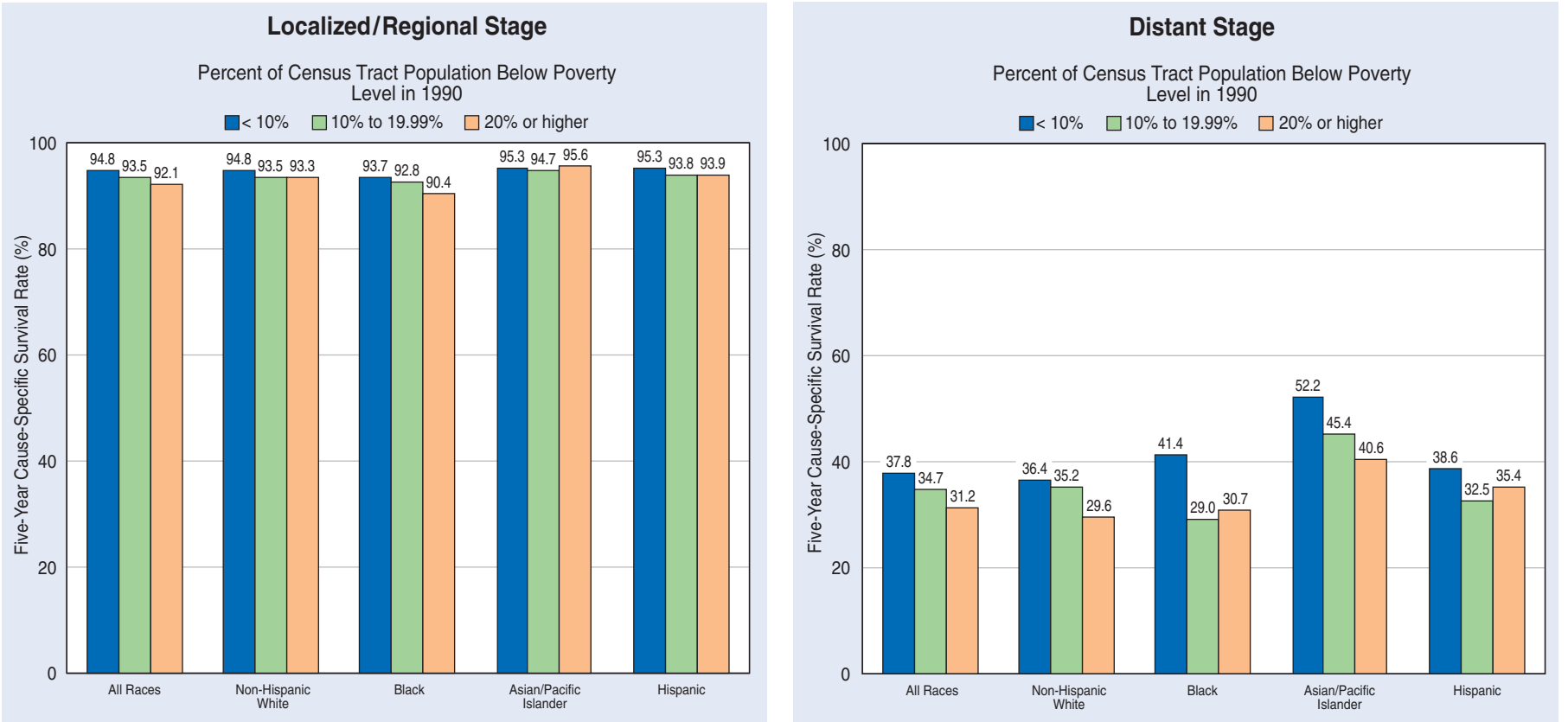


Figure 6.14. SEER Prostate Cancer Survival, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.15. SEER Prostate Cancer Survival by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.16. Trends in SEER Female Breast Cancer Survival, 1988–1994

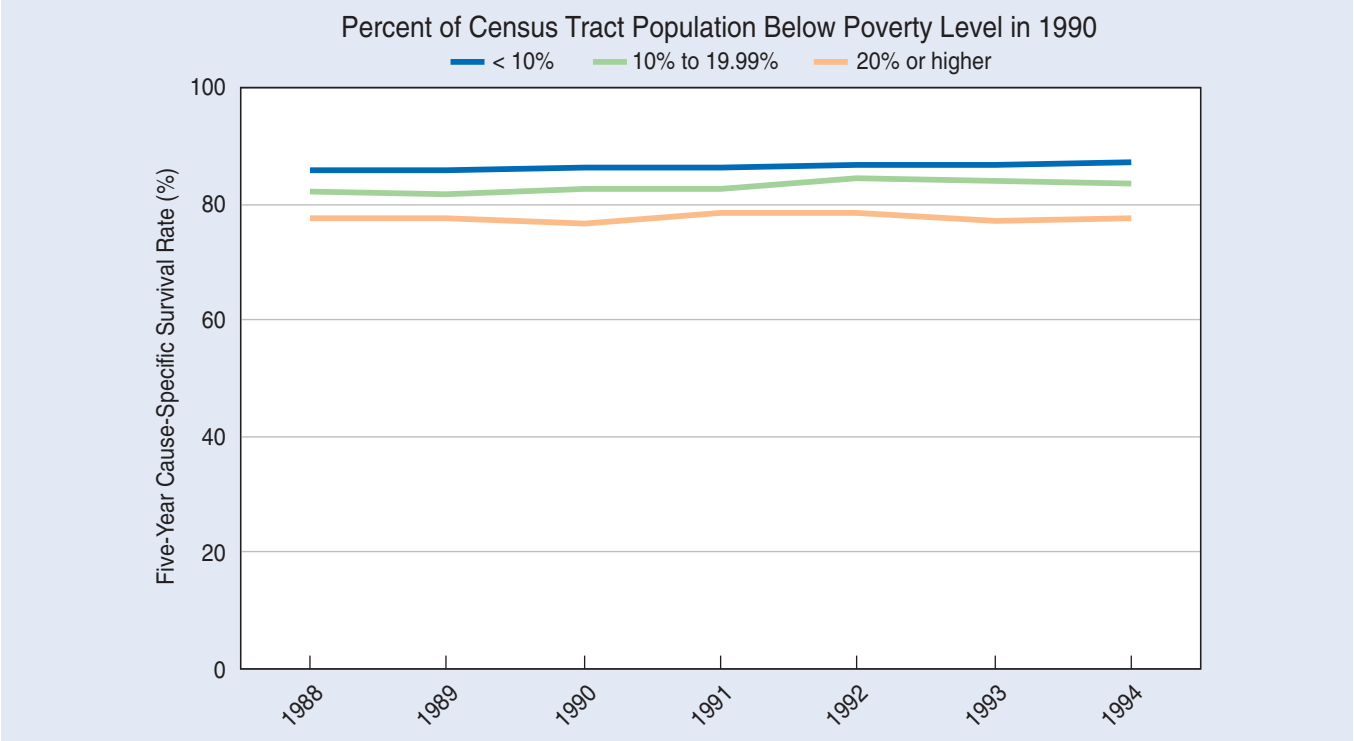
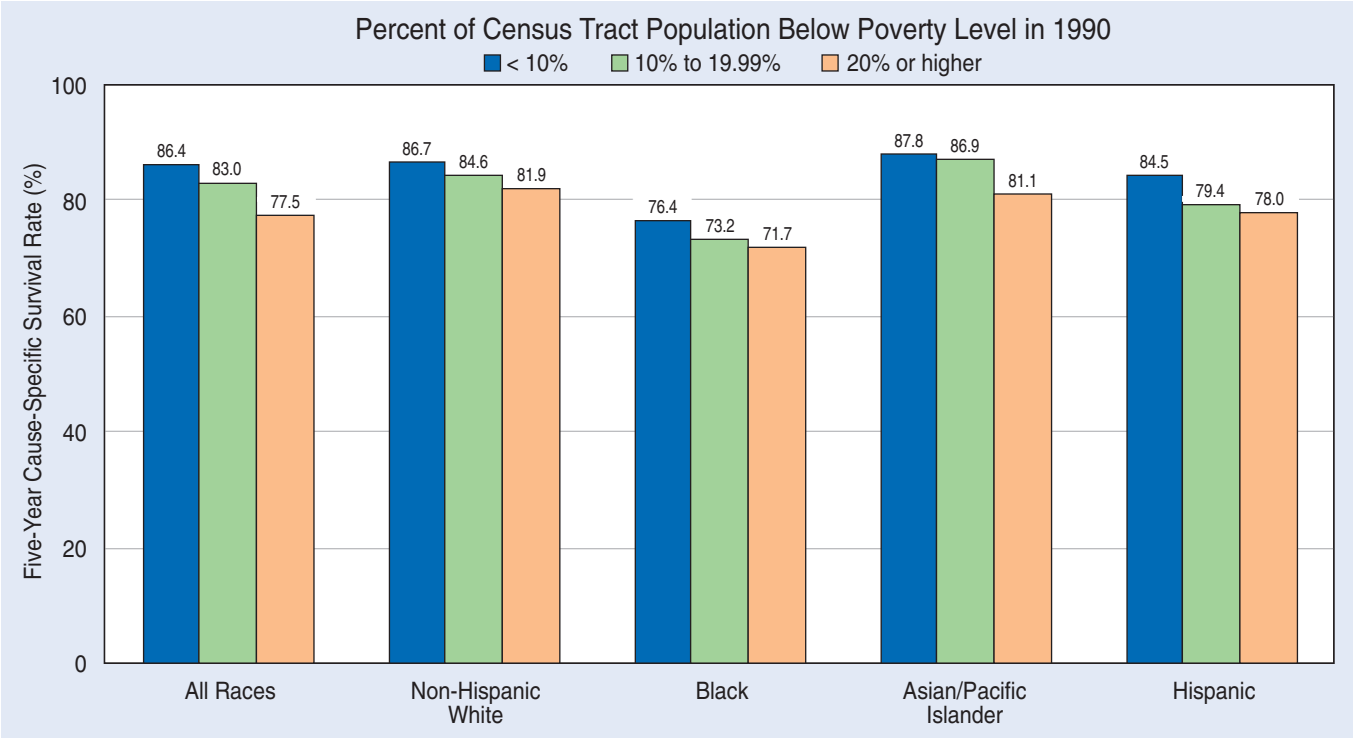
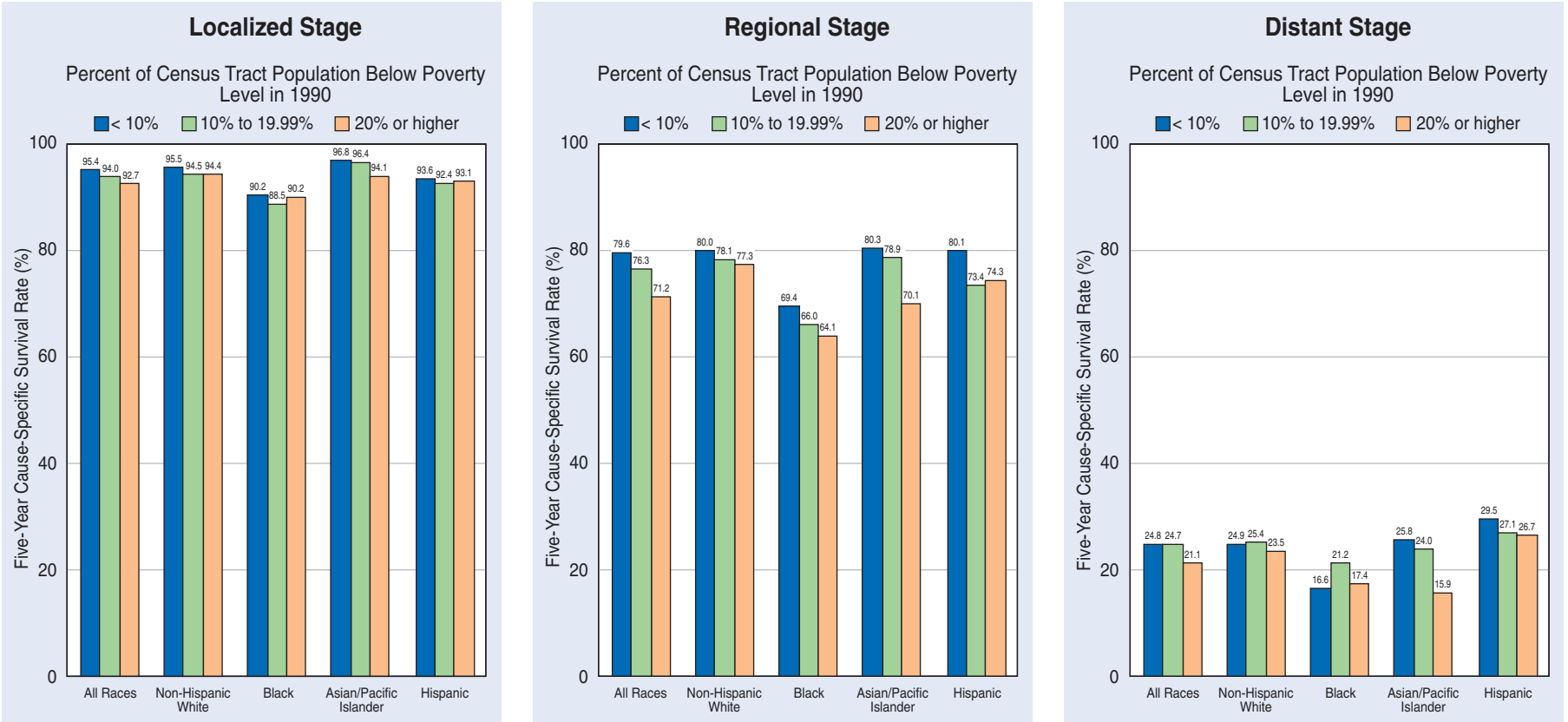


Figure 6.17. SEER Female Breast Cancer Survival, 1988–1994 Patient Cohort



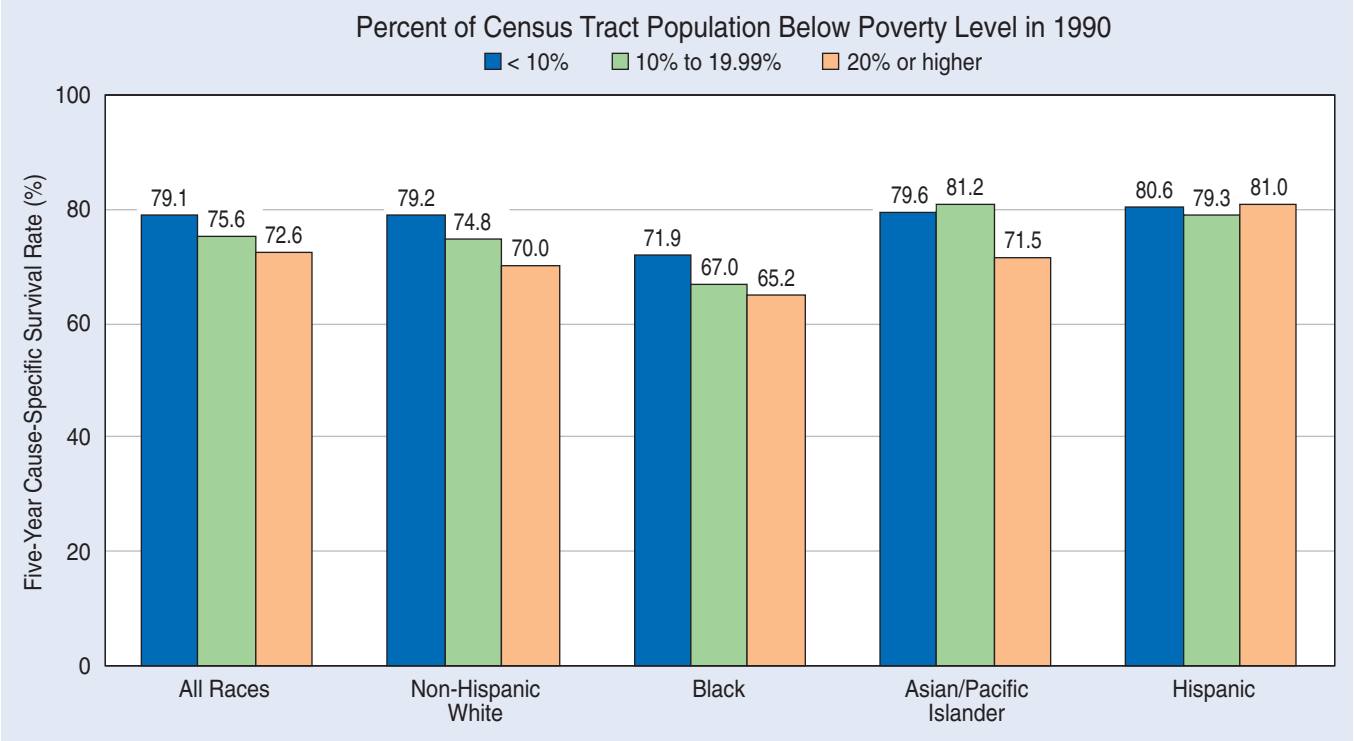
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.18. SEER Female Breast Cancer Survival by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



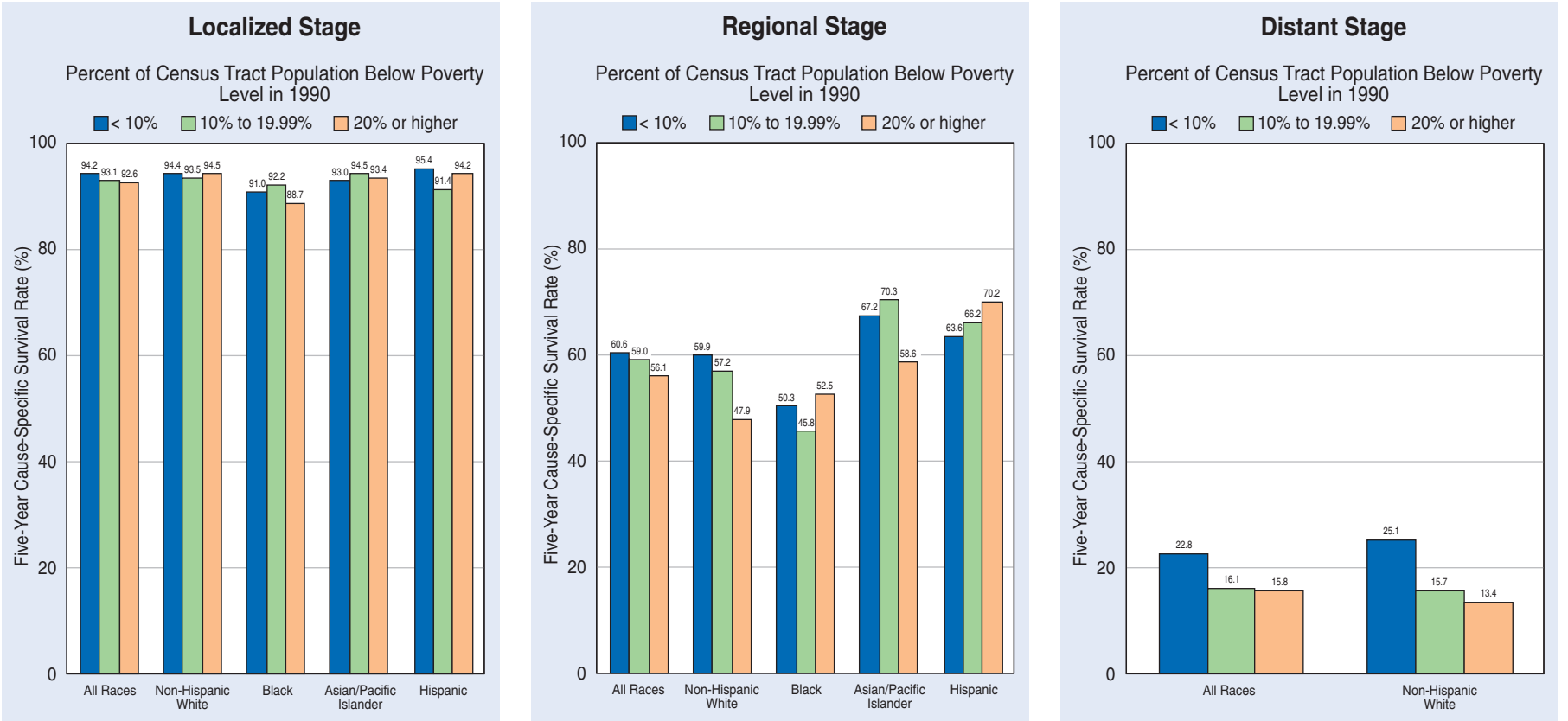
Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.19. SEER Cervical Cancer Survival, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.20. SEER Cervical Cancer Survival by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.21. SEER Cancer Survival Among Men, Melanoma of the Skin, 1988–1994 Patient Cohort

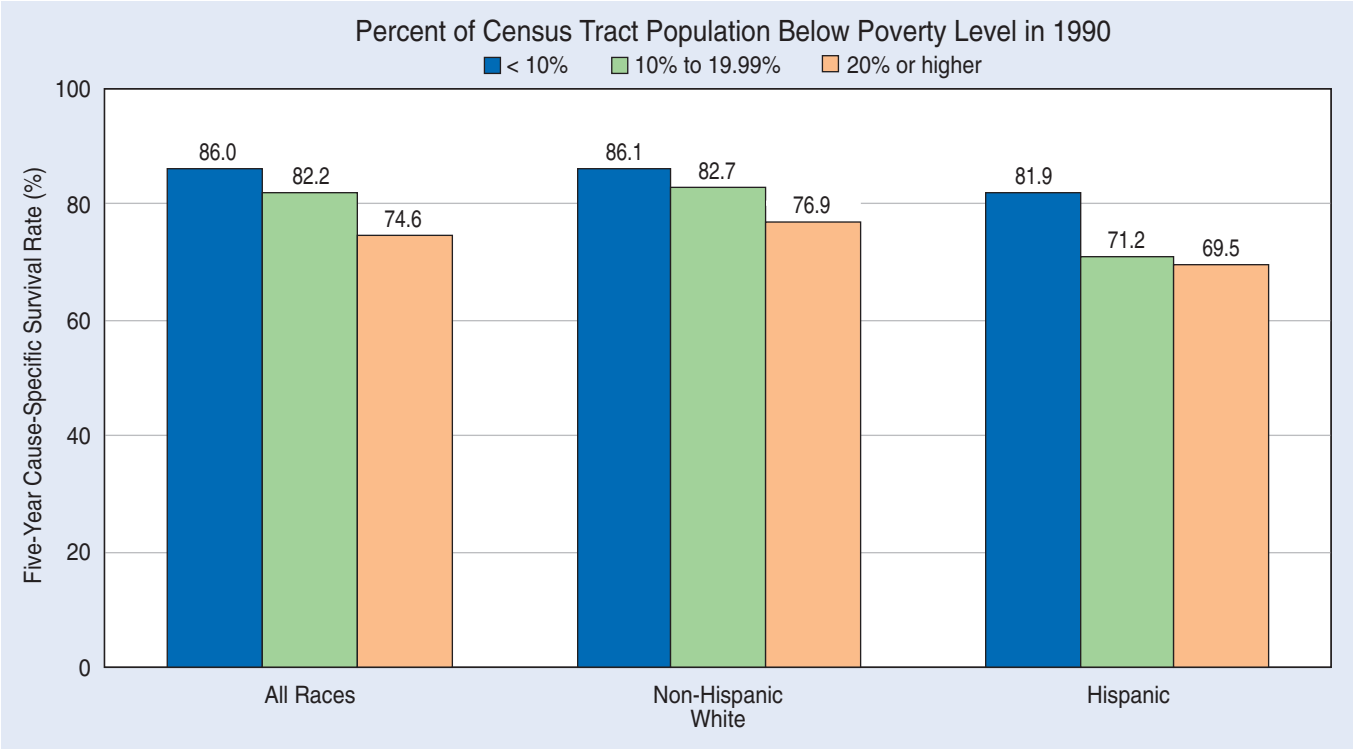
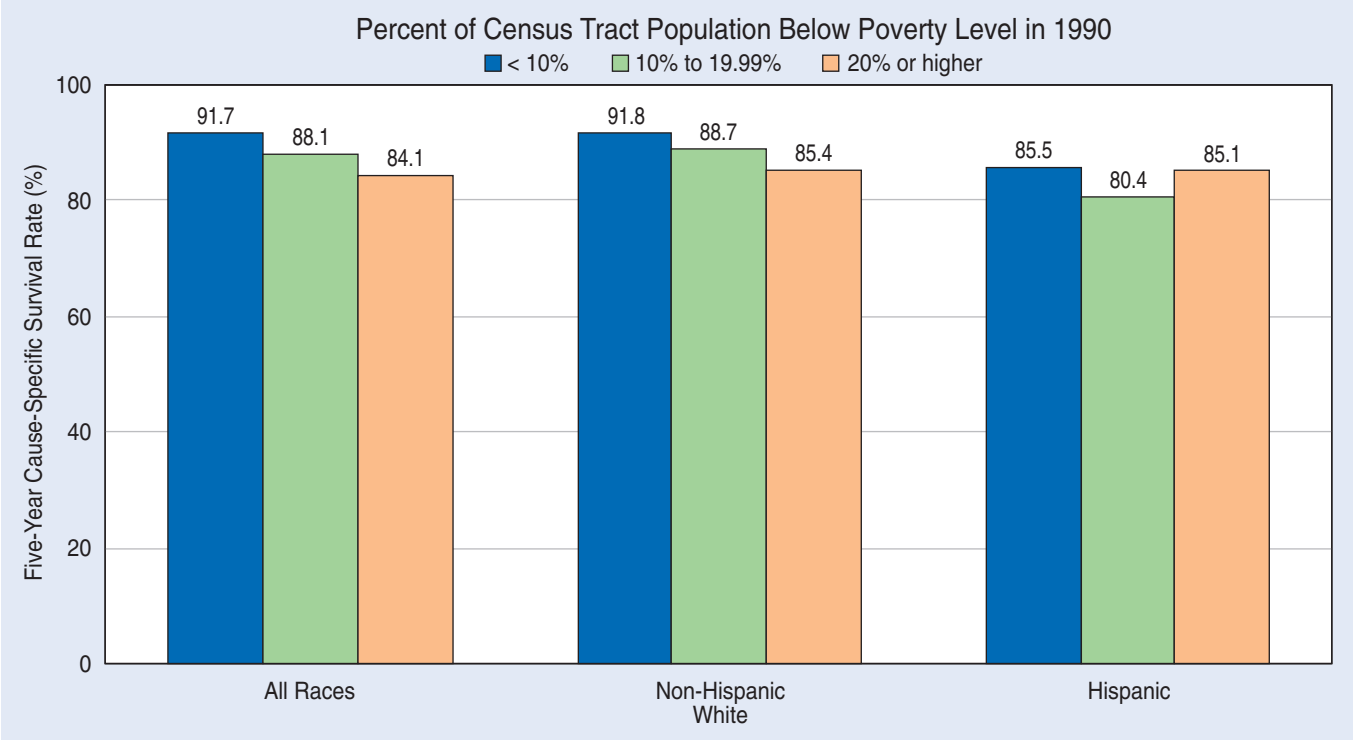
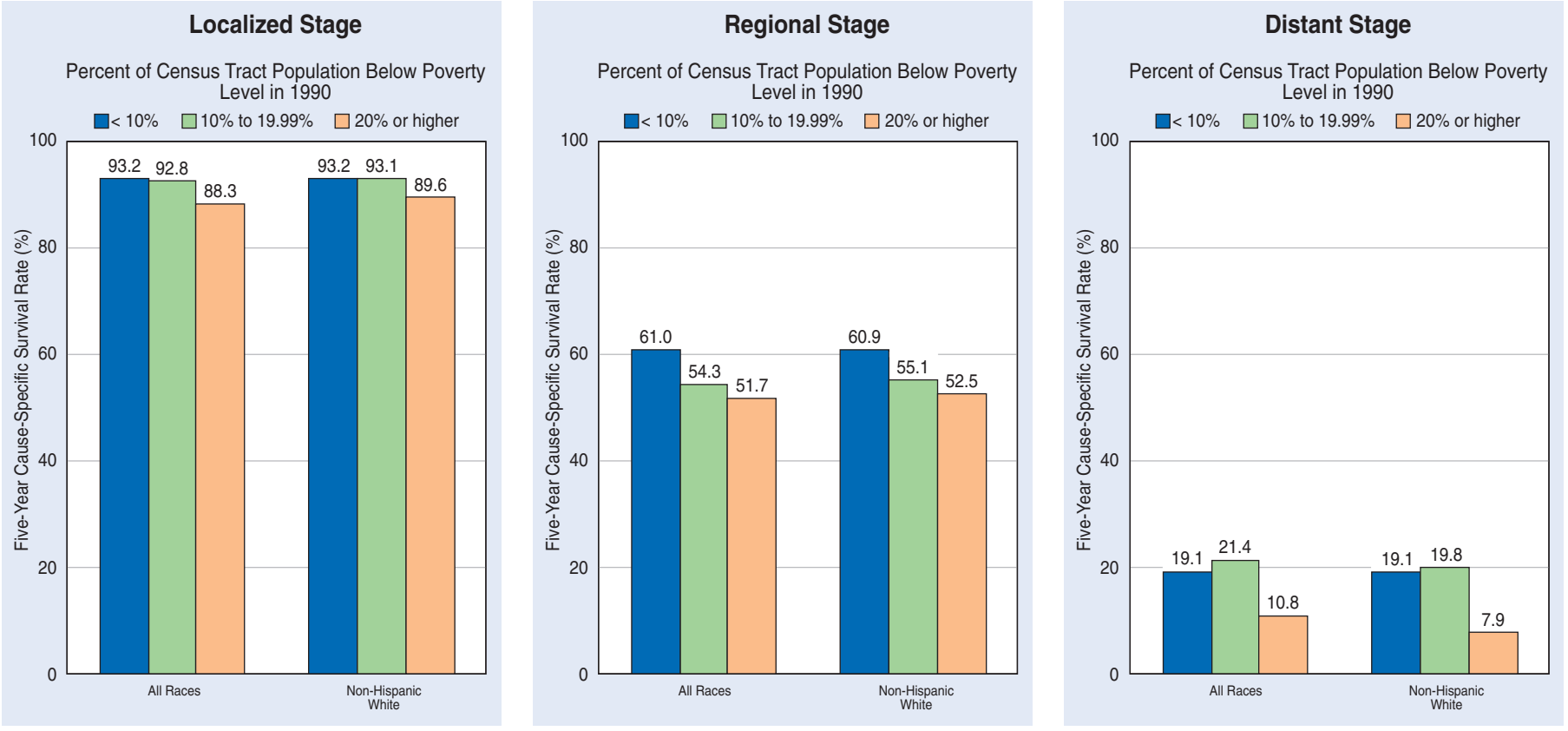


Figure 6.22. SEER Cancer Survival Among Women, Melanoma of the Skin, 1988–1994 Patient Cohort



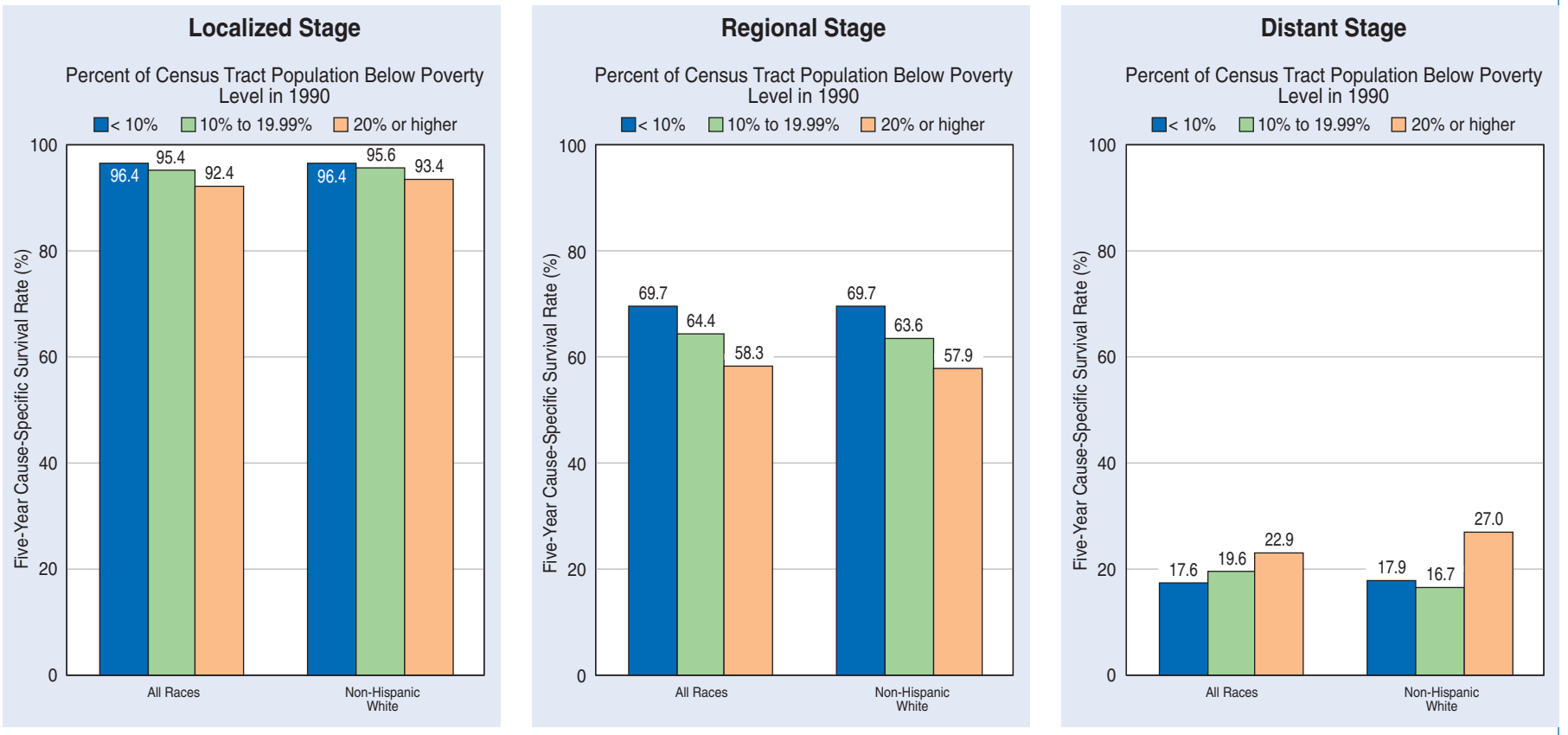
Note: Based on data from 11 SEER registries. See "Data and Methods" for a list of SEER registries.

Figure 6.23. SEER Cancer Survival Among Men, Melanoma of the Skin, by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Figure 6.24. SEER Cancer Survival Among Women, Melanoma of the Skin, by Stage, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort



Note: Based on data from 11 SEER registries. Stage data for the Los Angeles registry from 1988 to 1991 were not available. See "Data and Methods" for a list of SEER registries.

Table 6.1. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990								
	< 10%			10% to 19.99%			20% or higher		
	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE
All Cancers, Male									
All Races	279,061	60.95	0.10	98,473	54.95	0.17	64,881	48.98	0.21
Non-Hispanic White	244,994	61.48	0.10	74,143	55.98	0.20	27,025	51.70	0.33
Black	8,487	57.54	0.56	10,155	51.15	0.53	24,552	45.28	0.34
American Indian	243	38.03	3.37	242	46.17	3.41	508	42.06	2.34
Asian/Pacific Islander	14,619	54.85	0.43	5,600	47.85	0.70	3,794	43.68	0.85
Hispanic	9,933	59.92	0.52	8,209	55.35	0.59	9,063	53.84	0.57
All Cancers, Female									
All Races	254,798	63.39	0.10	88,955	58.16	0.17	54,394	53.11	0.23
Non-Hispanic White	222,281	63.31	0.11	66,709	58.43	0.20	22,196	54.50	0.35
Black	7,068	58.49	0.61	8,303	51.97	0.57	19,190	47.79	0.38
American Indian	221	44.13	3.46	231	46.40	3.42	543	53.17	2.21
Asian/Pacific Islander	14,528	65.84	0.40	5,225	60.65	0.70	3,280	56.12	0.90
Hispanic	9,963	64.69	0.49	8,357	60.79	0.55	9,250	59.58	0.53
Lung, Male									
All Races	39,387	16.77	0.21	15,994	14.14	0.31	11,860	12.14	0.35
Non-Hispanic White	34,853	16.80	0.22	12,304	14.14	0.35	5,138	12.10	0.53
Black	1,266	15.47	1.12	1,795	13.88	0.91	5,059	11.90	0.53
American Indian	51	9.77	4.52	40	6.96	4.50	43	13.97	5.90
Asian/Pacific Islander	2,104	17.75	0.91	972	14.30	1.24	661	11.78	1.37
Hispanic	1,011	16.36	1.30	868	14.81	1.37	967	14.33	1.31
Lung, Female									
All Races	28,067	20.75	0.26	10,162	17.71	0.42	6,446	16.37	0.51
Non-Hispanic White	25,399	20.72	0.28	8,087	17.65	0.47	2,980	16.45	0.75
Black	696	24.83	1.79	1,010	18.15	1.36	2,594	15.80	0.81
American Indian	33	6.82	4.63	29	11.18	6.25	20	30.45	10.94
Asian/Pacific Islander	1,144	20.72	1.30	470	15.84	1.83	309	15.84	2.26
Hispanic	712	19.03	1.59	548	19.35	1.82	548	18.71	1.85
Colorectal, Male									
All Races	30,943	63.85	0.29	10,739	60.09	0.50	6,399	56.09	0.67
Non-Hispanic White	26,716	63.92	0.31	8,171	60.35	0.58	2,753	57.64	1.02
Black	837	57.60	1.78	999	55.43	1.66	2,246	52.52	1.13
American Indian	32	52.12	9.01	29	57.27	9.37	50	65.72	7.00
Asian/Pacific Islander	2,243	67.43	1.04	730	64.86	1.86	515	58.83	2.29
Hispanic	1,035	60.28	1.58	803	58.25	1.84	844	58.35	1.82
Colorectal, Female									
All Races	28,632	63.68	0.30	11,103	59.46	0.49	6,624	57.50	0.65
Non-Hispanic White	24,975	63.69	0.32	8,623	59.46	0.56	2,857	58.91	0.99
Black	869	56.66	1.76	1,110	57.61	1.57	2,552	55.26	1.05
American Indian	~	~	~	20	46.27	11.69	35	57.18	8.71
Asian/Pacific Islander	1,743	68.18	1.15	580	64.87	2.07	464	62.68	2.36
Hispanic	948	61.04	1.65	748	58.13	1.89	720	56.78	1.96
Prostate									
All Races	88,589	89.11	0.11	28,768	85.98	0.22	18,008	82.23	0.31
Non-Hispanic White	85,457	89.17	0.11	26,619	86.05	0.23	15,854	82.02	0.33
Black	3,142	85.77	0.65	3,530	82.90	0.67	8,274	79.45	0.48
American Indian	53	67.87	6.92	55	75.54	6.21	123	71.94	4.42
Asian/Pacific Islander	3,655	89.57	0.53	1,193	86.42	1.05	743	85.29	1.38
Hispanic	2,722	87.64	0.66	2,029	84.89	0.84	2,079	83.81	0.86
Breast, Female									
All Races	83,704	86.37	0.12	26,130	83.03	0.24	14,446	77.51	0.36
Non-Hispanic White	73,078	86.68	0.13	19,522	84.55	0.27	6,001	81.92	0.52
Black	2,475	76.41	0.88	2,587	73.17	0.90	5,293	71.66	0.65
American Indian	73	70.03	5.65	57	70.88	6.38	130	80.31	3.53
Asian/Pacific Islander	4,725	87.83	0.49	1,500	86.90	0.89	740	81.10	1.49
Hispanic	3,112	84.51	0.67	2,436	79.40	0.85	2,295	77.97	0.89
Cervix									
All Races	5,782	79.07	0.56	2,875	75.58	0.84	2,969	72.56	0.87
Non-Hispanic White	4,298	79.26	0.65	1,577	74.76	1.15	700	69.96	1.81
Black	307	71.91	2.70	341	67.02	2.66	907	65.16	1.70
American Indian	~	~	~	~	~	~	35	55.15	9.08
Asian/Pacific Islander	612	79.57	1.71	282	81.17	2.41	211	71.52	3.20
Hispanic	547	80.60	1.77	662	79.28	1.68	1,130	81.04	1.25
Melanoma of the Skin, Male									
All Races	10,145	86.00	0.36	2,334	82.24	0.83	822	74.56	1.61
Non-Hispanic White	9,884	86.14	0.36	2,211	82.72	0.84	704	76.91	1.68
Black	23	75.42	9.62	~	~	~	34	55.13	8.95
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	50	71.36	6.49	16	74.75	10.93	~	~	~
Hispanic	127	81.91	3.59	84	71.18	5.22	65	69.48	5.86
Melanoma of the Skin, Female									
All Races	8,362	91.73	0.31	2,071	88.13	0.74	702	84.11	1.45
Non-Hispanic White	8,016	91.83	0.32	1,912	88.74	0.75	544	85.36	1.58
Black	25	100.00	0.00	~	~	~	35	65.61	8.53
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	58	90.95	3.87	15	85.66	9.41	~	~	~
Hispanic	189	85.49	2.64	111	80.44	3.84	103	85.09	3.83

Note: ~ Counts or rates are suppressed if based on fewer than 16 cases.

Table 6.2. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) for Localized-Stage Cancers by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990								
	< 10%			10% to 19.99%			20% or higher		
	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE
Lung, Male									
All Races	5,009	52.18	1.51	1,804	47.38	2.53	1,179	39.31	3.14
Non-Hispanic White	4,487	52.27	1.60	1,441	47.55	2.84	560	40.20	4.61
Black	140	49.72	9.11	193	46.05	7.63	476	39.93	4.96
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	270	54.44	6.50	91	50.28	11.43	53	43.76	14.21
Hispanic	105	46.09	10.30	68	45.93	13.11	85	26.36	10.71
Lung, Female									
All Races	4,048	60.25	1.61	1,305	53.46	2.94	766	49.59	3.84
Non-Hispanic White	3,703	60.07	1.68	1,091	53.89	3.21	397	50.79	5.30
Black	108	64.74	9.36	114	52.39	10.13	285	48.91	6.32
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	137	60.34	8.71	46	54.81	15.05	29	52.08	19.22
Hispanic	94	63.72	10.47	51	45.78	15.39	53	42.83	14.98
Colorectal, Male									
All Races	10,828	90.14	0.61	3,436	87.97	1.19	1,832	85.30	1.77
Non-Hispanic White	9,430	90.26	0.65	2,728	88.22	1.33	877	84.60	2.63
Black	230	85.83	4.81	264	85.41	4.65	615	84.05	3.16
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	849	91.28	2.04	241	89.03	4.24	128	89.29	5.88
Hispanic	296	86.37	4.12	198	85.78	5.30	199	89.00	4.66
Colorectal, Female									
All Races	9,556	90.33	0.63	3,252	88.11	1.19	1,895	86.21	1.68
Non-Hispanic White	8,393	90.37	0.68	2,626	88.16	1.32	898	86.63	2.42
Black	248	89.46	4.08	287	84.84	4.43	706	85.97	2.77
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	626	92.10	2.21	150	90.60	4.97	125	89.96	5.51
Hispanic	267	85.47	4.42	180	90.79	4.55	156	83.33	6.23
Prostate (Localized+Regional)									
All Races	63,651	94.79	0.18	19,554	93.46	0.38	11,347	92.13	0.54
Non-Hispanic White	56,947	94.82	0.19	15,298	93.51	0.42	4,636	93.27	0.79
Black	2,075	93.67	1.12	2,158	92.82	1.17	4,933	90.38	0.90
American Indian	33	85.78	13.23	45	82.45	12.12	87	87.61	7.80
Asian/Pacific Islander	2,716	95.28	0.85	803	94.70	1.66	417	95.62	2.15
Hispanic	1,767	95.34	1.04	1,239	93.82	1.44	1,290	93.87	1.41
Breast, Female									
All Races	46,723	95.37	0.20	13,130	93.98	0.43	6,363	92.73	0.68
Non-Hispanic White	41,456	95.47	0.21	10,394	94.52	0.46	3,030	94.35	0.87
Black	1,101	90.22	1.85	1,084	88.52	1.99	2,198	90.16	1.32
American Indian	35	87.63	11.59	25	91.38	11.67	63	95.19	5.42
Asian/Pacific Islander	2,681	96.78	0.70	719	96.39	1.42	314	94.10	2.78
Hispanic	1,394	93.61	1.35	905	92.43	1.81	763	93.08	1.89
Cervix									
All Races	2,922	94.18	0.89	1,235	93.12	1.49	1,004	92.62	1.71
Non-Hispanic White	2,264	94.41	0.99	766	93.53	1.83	297	94.54	2.75
Black	141	90.96	4.99	122	92.19	5.00	286	88.67	3.91
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	285	92.99	3.10	113	94.49	4.38	61	93.36	6.42
Hispanic	231	95.40	2.84	229	91.36	3.90	353	94.17	2.60
Melanoma of the Skin, Male									
All Races	7,213	93.22	0.61	1,497	92.81	1.39	509	88.28	3.01
Non-Hispanic White	7,075	93.24	0.62	1,440	93.13	1.39	459	89.59	3.01
Black	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	~	~	~	~	~	~	~	~	~
Hispanic	63	91.39	7.37	34	79.96	14.71	35	85.10	12.33
Melanoma of the Skin, Female									
All Races	6,369	96.41	0.48	1,486	95.40	1.13	470	92.38	2.56
Non-Hispanic White	6,151	96.44	0.49	1,403	95.58	1.14	387	93.37	2.62
Black	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	~	~	~	~	~	~	~	~	~
Hispanic	122	93.81	4.54	60	93.23	6.53	54	87.50	9.56

Note: ~ Counts or rates are suppressed if based on fewer than 16 cases.

Table 6.3. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) for Regional-Stage Cancers by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990								
	< 10%			10% to 19.99%			20% or higher		
	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE
Lung, Male									
All Races	8,757	23.11	0.97	3,096	19.64	1.56	2,276	15.95	1.70
Non-Hispanic White	7,787	23.19	1.04	2,423	19.79	1.78	1,000	17.19	2.61
Black	255	22.59	5.52	356	18.37	4.39	1,022	15.34	2.54
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	505	23.20	3.99	196	18.84	6.09	113	8.60	5.64
Hispanic	195	20.64	6.41	114	22.60	8.51	132	18.77	7.48
Lung, Female									
All Races	5,706	27.55	1.26	1,860	23.12	2.08	1,149	23.22	2.71
Non-Hispanic White	5,162	27.45	1.32	1,500	22.30	2.29	518	24.31	4.06
Black	149	30.30	8.29	180	24.06	6.79	502	21.47	4.03
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	244	32.12	6.30	86	23.52	9.70	40	19.55	13.94
Hispanic	138	20.07	7.13	90	32.90	10.27	87	26.49	10.17
Colorectal, Male									
All Races	10,058	64.75	1.01	3,380	62.41	1.77	1,815	58.77	2.47
Non-Hispanic White	8,738	64.79	1.08	2,664	62.17	2.00	826	61.47	3.64
Black	265	62.05	6.25	285	60.25	6.10	603	54.45	4.32
American Indian	~	~	~	~	~	~	19	68.97	23.41
Asian/Pacific Islander	737	67.03	3.65	222	67.90	6.49	156	55.74	8.35
Hispanic	301	62.11	5.79	200	61.01	7.23	214	62.89	6.98
Colorectal, Female									
All Races	9,783	66.39	1.00	3,750	63.09	1.66	1,946	60.93	2.36
Non-Hispanic White	8,594	66.30	1.07	3,002	63.22	1.86	891	61.11	3.51
Black	261	62.04	6.31	328	63.43	5.60	712	59.93	3.90
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	644	68.78	3.76	202	69.42	6.72	129	68.41	8.65
Hispanic	278	68.69	5.79	207	54.56	7.28	204	58.78	7.32
Breast, Female									
All Races	21,848	79.58	0.56	6,831	76.32	1.07	3,972	71.22	1.50
Non-Hispanic White	19,026	79.97	0.60	5,065	78.06	1.21	1,612	77.25	2.20
Black	736	69.38	3.50	732	65.98	3.62	1,589	64.10	2.52
American Indian	31	50.86	18.84	17	60.74	25.11	50	69.89	13.01
Asian/Pacific Islander	1,226	80.27	2.33	398	78.91	4.23	159	70.08	7.49
Hispanic	813	80.07	2.87	628	73.36	3.63	567	74.33	3.80
Cervix									
All Races	1,548	60.55	2.65	781	58.95	3.75	824	56.14	3.75
Non-Hispanic White	1,141	59.86	3.08	441	57.17	5.04	218	47.93	7.18
Black	88	50.30	11.45	99	45.82	10.51	296	52.47	6.46
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	188	67.21	7.31	96	70.27	9.81	74	58.62	12.32
Hispanic	128	63.61	9.18	142	66.15	8.49	224	70.20	6.65
Melanoma of the Skin, Male									
All Races	797	60.99	3.63	243	54.28	6.83	93	51.71	11.10
Non-Hispanic White	775	60.89	3.69	229	55.13	7.04	72	52.48	12.95
Black	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	~	~	~	~	~	~	~	~	~
Hispanic	~	~	~	~	~	~	~	~	~
Melanoma of the Skin, Female									
All Races	494	69.71	4.35	158	64.38	8.20	68	58.28	13.20
Non-Hispanic White	472	69.72	4.45	145	63.56	8.60	48	57.91	15.33
Black	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	~	~	~	~	~	~	~	~	~
Hispanic	16	64.65	25.68	~	~	~	~	~	~

Note: ~ Counts or rates are suppressed if based on fewer than 16 cases.

Table 6.4. SEER Site-Specific Five-Year Cause-Specific Cancer Survival Rates (%) and Standard Errors (SE) for Distant-Stage Cancers by Sex, Race/Ethnicity, and Census Tract Poverty Rate, 1988–1994 Patient Cohort: 11 SEER Registration Areas

	Percent of Census Tract Population Below Poverty Level in 1990								
	< 10%			10% to 19.99%			20% or higher		
	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE	# Cases	Rate (%)	SE
Lung, Male									
All Races	16,618	3.12	0.33	6,701	2.56	0.48	4,977	3.13	0.63
Non-Hispanic White	14,735	2.92	0.34	5,263	2.20	0.51	2,173	2.17	0.85
Black	552	3.35	1.86	747	3.52	1.64	2,235	3.20	0.96
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	904	5.31	1.76	381	4.97	2.61	234	4.36	2.97
Hispanic	383	5.05	2.67	304	3.13	2.60	325	7.83	3.51
Lung, Female									
All Races	11,508	4.34	0.45	4,098	4.06	0.74	2,740	3.04	0.83
Non-Hispanic White	10,420	4.23	0.46	3,278	4.00	0.82	1,267	2.18	1.02
Black	274	6.06	3.54	406	5.87	2.84	1,157	3.87	1.44
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	515	5.77	2.46	221	1.64	2.20	127	1.25	2.45
Hispanic	270	4.79	3.01	179	4.84	3.86	181	5.81	4.37
Colorectal, Male									
All Races	5,363	9.54	0.89	1,876	7.48	1.35	1,273	9.16	1.89
Non-Hispanic White	4,676	9.56	0.95	1,439	7.05	1.50	552	8.42	2.79
Black	160	7.78	4.80	196	6.78	4.02	497	8.80	2.93
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	355	10.78	3.63	117	9.91	6.15	76	9.81	7.67
Hispanic	165	7.77	4.69	119	9.45	6.11	143	14.11	6.81
Colorectal, Female									
All Races	4,795	10.51	0.98	1,872	9.46	1.52	1,193	10.73	2.05
Non-Hispanic White	4,232	10.55	1.04	1,479	8.88	1.66	495	11.82	3.30
Black	181	5.26	3.58	200	11.03	5.22	523	8.49	2.82
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	229	12.53	4.86	90	8.74	7.11	63	8.63	8.30
Hispanic	144	13.90	6.35	99	13.77	7.27	110	17.58	8.18
Prostate									
All Races	6,564	37.76	1.33	2,583	34.68	2.11	2,146	31.20	2.28
Non-Hispanic White	5,619	36.43	1.43	1,880	35.15	2.49	663	29.58	4.04
Black	323	41.43	5.99	386	28.96	5.10	1,167	30.74	3.12
American Indian	~	~	~	~	~	~	23	21.30	20.02
Asian/Pacific Islander	405	52.21	5.41	146	45.43	9.15	89	40.60	11.44
Hispanic	197	38.61	7.66	164	32.50	8.17	204	35.42	7.39
Breast, Female									
All Races	3,843	24.79	1.49	1,369	24.73	2.52	1,045	21.11	2.71
Non-Hispanic White	3,352	24.91	1.60	1,009	25.36	2.97	417	23.46	4.52
Black	161	16.61	6.47	188	21.15	6.28	458	17.40	3.77
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	196	25.79	6.62	56	24.00	12.73	38	15.85	12.61
Hispanic	122	29.52	8.70	115	27.12	8.94	124	26.71	8.48
Cervix									
All Races	350	22.75	5.19	171	16.06	6.88	171	15.75	6.44
Non-Hispanic White	268	25.08	6.13	115	15.74	7.83	46	13.44	11.41
Black	21	8.64	15.77	~	~	~	73	7.90	7.44
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	27	14.61	15.14	~	~	~	~	~	~
Hispanic	33	21.37	16.15	21	20.40	25.94	34	33.92	18.84
Melanoma of the Skin, Male									
All Races	349	19.09	4.68	113	21.39	8.82	53	10.78	9.72
Non-Hispanic White	333	19.08	4.78	101	19.79	8.92	41	7.87	9.91
Black	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	~	~	~	~	~	~	~	~	~
Hispanic	~	~	~	~	~	~	~	~	~
Melanoma of the Skin, Female									
All Races	195	17.60	6.08	65	19.56	11.67	30	22.91	17.61
Non-Hispanic White	180	17.92	6.38	60	16.71	11.77	21	27.00	20.91
Black	~	~	~	~	~	~	~	~	~
American Indian	~	~	~	~	~	~	~	~	~
Asian/Pacific Islander	~	~	~	~	~	~	~	~	~
Hispanic	~	~	~	~	~	~	~	~	~

Note: ~ Counts or rates are suppressed if based on fewer than 16 cases.

Summary and Discussion

Although socioeconomic disparities in cancer have been noted previously, this report provides one of the most comprehensive analyses yet of area socioeconomic variations in cancer incidence, mortality, stage, treatment and survival in the United States, using population-based SEER incidence and national mortality data. The results provide important insights into the extent of area socioeconomic disparities in cancer for the total population as well as for the major racial and ethnic groups in the United States and are generally consistent with the findings of previous studies.

One of the most important findings of this report concerns the dynamic nature of the association between area socioeconomic position and cancer mortality. The association changed markedly over the past 25 years for all cancers combined and for lung, colorectal, prostate, and breast cancers. While socioeconomic inequalities in male lung and prostate cancer mortality have been widening, those in colorectal and breast cancer mortality narrowed over time and even appear to have reversed in the late 1990s. Against the backdrop of falling mortality rates, substantial socioeconomic inequalities in cervical cancer have persisted.

Temporal changes in area socioeconomic patterns in cancer incidence were less pronounced than those in cancer mortality. There was a marked increase in incidence for breast cancer and melanoma of the skin in all area SES groups, and a positive socioeconomic gradient remained throughout the study period. On the other hand, a negative but somewhat diminishing socioeconomic gradient in cervical cancer incidence was observed as incidence rates declined substantially for all area groups during 1975–1999.

As regards the other cancer outcomes, for each of the cancers considered, both men and women in high poverty areas had substantially higher rates of late-stage cancer diagnosis and lower rates of cancer survival than those in low poverty areas. Cancer survival rates for residents of higher poverty areas remained lower even after controlling for differences in stage. Residents of higher poverty areas were also less likely to receive preferred treatment for lung and breast cancers and to undergo radical prostatectomy.

Another important finding of the report relates to the substantial effect of area socioeconomic position on cancer risks for each racial/ethnic group. Poorer survival and smaller probabilities of early detection and preferred treatment of cancers were associated with lower SES for each racial/ethnic group. The socioeconomic gradients in incidence and mortality from some cancers, however, varied by ethnicity not only in magnitude but sometimes

in direction as well. An example of the differential pattern is lung cancer incidence, which increased during 1988–1992 with increasing poverty rate for non-Hispanic white and black men and women and API men, but decreased with increasing poverty rate for Hispanic men and women. Such differences in pattern may partially reflect the impact of acculturation on smoking patterns for Hispanics and to some extent APIs (106). While area SES does contribute to racial/ethnic differences in cancer outcomes, ethnic differences remain within each area poverty group. Residual ethnic differences may reflect differences in individual socioeconomic and cultural characteristics as well as differences in area socioeconomic position not completely accounted for by poverty rates.

Do socioeconomic patterns in cancer based on poverty rates that are reported here also apply to other frequently used area measures, such as median family income and percentage of population with at least a high school diploma? To address this question, we compared differentials in cancer incidence, mortality, stage, treatment, and survival by area poverty levels with those based on median family income and education. Similar patterns in cancer incidence, mortality, and survival were observed for all of the area measures, and the size of the gradients associated with education and family income corresponded fairly closely with that based on area poverty levels.

Because of temporal proximity, the 1980 poverty rate is more likely than the 1990 poverty rate to accurately characterize the socioeconomic characteristics of counties during 1975–1984. Despite a high correlation and categorical correspondence between the 1980 and 1990 poverty rates, we wanted to examine the impact on cancer mortality and incidence trends of any potential area misclassification that may have arisen from using the 1990 poverty rate throughout the study period. As shown in Figure 7.1, page 124, for cervical cancer as an example, the use of the 1980 and 1990 county poverty rates produced essentially similar trends in mortality and incidence during 1975–1999.

For most of the analyses in this report, we selected three broad poverty categories for a simpler presentation of data and for minimizing the extent of potential misclassification of areas over time. However, it is important to emphasize that the impact of socioeconomic position on cancer is not limited to the differences between the lowest and highest poverty areas. Rather, a graded relationship may be observed for many of the cancers across the entire range of the social hierarchy, as shown for lung and cervical cancer incidence and mortality in Figures 3.56–3.59, pages 62–63. Moreover, within the broad category of areas with poverty rates < 10%, the areas with lower poverty rates generally had a significantly lower likelihood of a late-stage cancer diagnosis than those with higher poverty rates (e.g., men in census tracts with poverty rates < 2% were 34% less likely to be diagnosed with distant-stage prostate cancer than men in census tracts with poverty rates between 8% and 10%). Similarly, within the broad category of areas with poverty rates ≥ 20%, the likelihood of late-stage cancer

diagnosis increased with increasing poverty rates (e.g., men in census tracts with poverty rates exceeding 50% were 38% more likely to be diagnosed with distant-stage prostate cancer than men in census tracts with poverty rates between 20% and 23%). Similar heterogeneity in survival can be noted within the three broad poverty categories. For example, for the 1988–1994 patient cohort, 83.9% of men diagnosed with prostate cancer and living in census tracts with poverty rates between 20% and 23% had survived at least five years, as compared with 79.9% of men in census tracts with poverty rates exceeding 50%.

While temporal socioeconomic patterns in cancer rates may be related to increasing temporal differences in socioeconomic conditions between areas, such patterns can be examined in terms of how social patterns in behavioral and lifestyle factors have changed over time. Specifically, area socioeconomic gradients in cancer incidence and mortality may be related to area differences in smoking rates, tobacco regulation and advertising, availability of cigarettes, public awareness of the harmful health effects of smoking, fatty diet, physical inactivity, reproductive factors, human papillomavirus (HPV) infection, sun exposure, or other factors. Individual-level data on many of these variables demonstrate a faster rate of smoking decline or a more rapid adoption of healthier lifestyles (including the availability of cancer screening) over time among the members of higher SES groups (7,16,17). Temporal and cross-sectional ecological data (especially at the small area level) on social, environmental, behavioral, and health care disparities by area SES are particularly lacking in the U.S.

To address these data gaps and to help interpret the above area socioeconomic gradients in cancer incidence and mortality, we used a variety of national databases (107–112) to determine cross-sectional associations between poverty, tobacco control policy, behavioral factors, cancer screening, and cancer mortality at the state level (Table 7.1, page 129, and Figures 7.2–7.7, pages 125–127). These data illustrate a high degree of correlation between poverty and behavioral and health care factors such as smoking, physical activity, and cancer screening, as well as between behavioral factors, policy variables, and cancer mortality at the area level. Of particular interest is the substantial association of poverty with current smoking rates, anti-smoking policy measures, physical inactivity, obesity, mammography use and colorectal cancer screening rates, and lack of health insurance. Several of the behavioral and policy variables, such as current smoking rates, obesity and physical inactivity levels, and workplace and home restrictions on smoking are, in turn, strongly linked to overall cancer mortality and mortality from lung, colorectal, prostate, and breast cancers (Table 7.1, page 129). For example, states with higher rates of workplace and home restrictions on tobacco use in 1993 generally had substantially lower smoking prevalence in 1996 (r = –0.62 and –0.72 respectively) and lung cancer mortality rates during 1995–1999 (r = –0.58 and –0.64 respectively).

Data presented in this report are subject to several potential limitations. The association between area socioeconomic position and cancer incidence, stage, and survival for specific racial/ethnic groups may be affected by the degree of ethnic misclassification in patient records. Information on race/ethnicity in the SEER cancer registries is routinely obtained from the patient's medical record or death certificate and often reflects a subjective assessment made by hospital personnel or a funeral director or coroner (113). Hispanic ethnicity may also be derived by using the census surname list. However, not all persons with Hispanic surnames are Hispanic, and name changes are especially problematic when classifying women. Cancer registry data for whites and blacks are expected to be reasonably accurate, though published data evaluating this issue are generally lacking (113). Registry data for Hispanics were found to be problematic in a study completed by the Greater Bay Area cancer registry in California (114). The investigators determined that the percentage of self-identified Hispanics who were classified as Hispanic in registry records was just 68%. A similar study of misclassification of Vietnamese in the same cancer registry reported that 74% of patients that the registry classified as Vietnamese agreed with this classification during a telephone interview (115). Misclassification of Asian ethnicity might be expected to be less of a factor in this report, however, since the composite grouping of all Asian and Pacific Islanders was used.

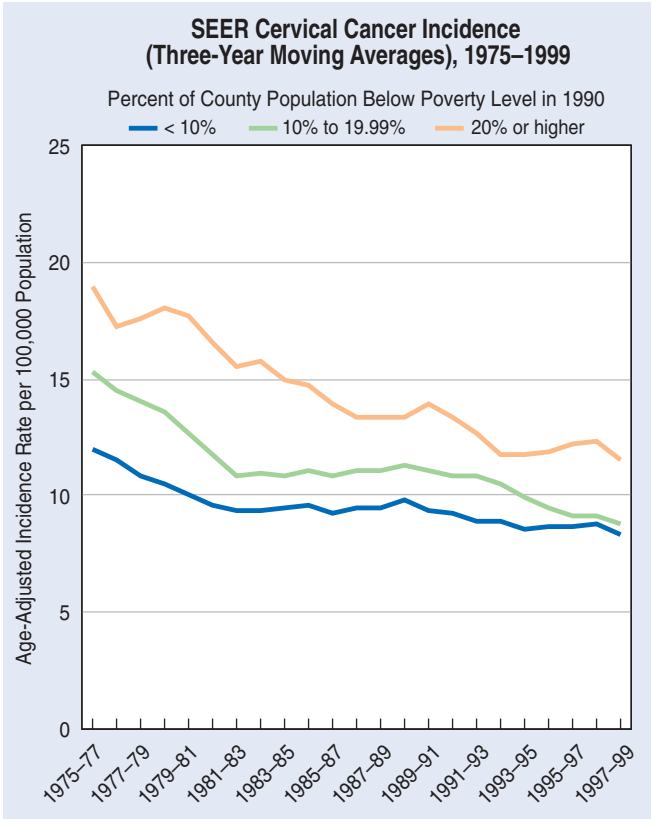
Caution should also be exercised when comparing mortality rates among various racial/ethnic groups. Mortality rates shown in this report are based on the death certificate data. Two potential sources of error—the misclassification of race/ethnicity on the death certificate (resulting in an underreporting of deaths for ethnic minority groups such as APIs, American Indians, and Hispanics) and the undercoverage of ethnic minority groups in the census and resultant population estimates—may affect ethnic comparisons in mortality rates (116–118). The joint effect of these two sources of error may result in an underestimation of mortality for American Indians, APIs, and Hispanics by 17.1%, 9.7%, and 1.6% respectively, and an overestimation of mortality for whites and blacks by 1% and 5% respectively (116,117).

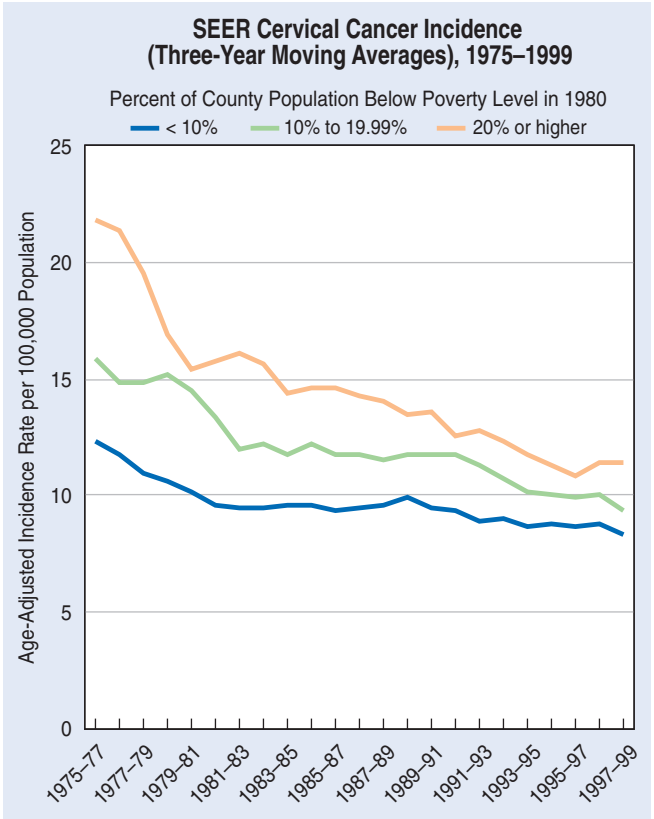
The data shown in this report could also be affected by the extent to which patients in SEER were incorrectly geocoded or assigned to specific census tracts. The area socioeconomic effects would be underestimated if patients in poorer and rural census tracts were more likely to have missing census tract information than their wealthier, urban counterparts. Area effects could also be biased if the area socioeconomic category associated with residence at the time of diagnosis or death differed from that at exposure.

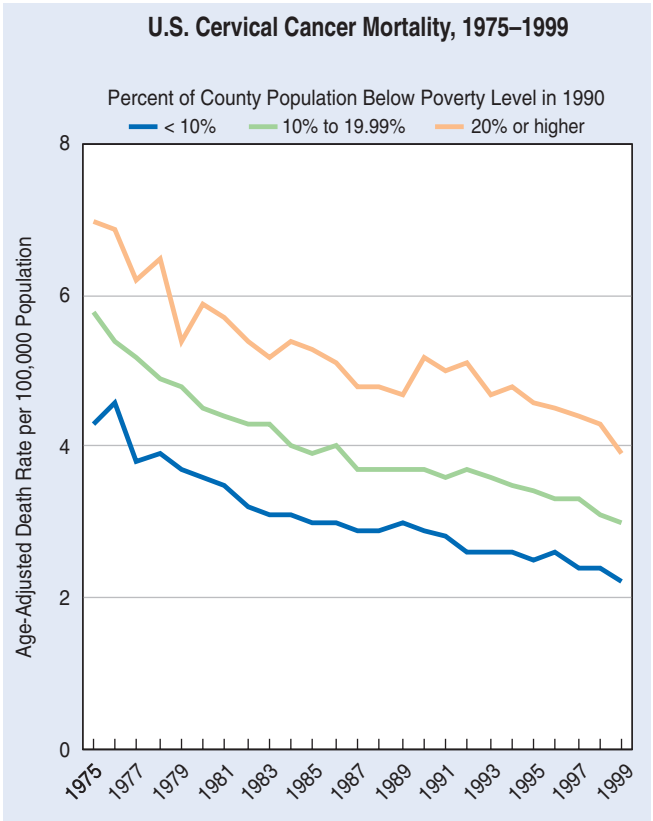
Area socioeconomic variations in cancer incidence, mortality, stage, and survival should not be considered as proxies for socioeconomic differentials at the individual level. Such consideration may lead to the ecological fallacy, implying that the socioeconomic effects at the aggregate level are being interpreted as those occurring at the individual level (10,16,17,119). In this report, area variations in cancer outcomes, particularly incidence and mortality rates, were analyzed as a function of an ecological variable, area poverty rate. Although area socioeconomic patterns in several of the cancer outcomes are generally consistent with those at the individual level, the area-level effects shown here may be smaller in magnitude than individual socioeconomic effects (6,10,15–18,120). This may be partly due to the compositional heterogeneity of the areas examined, particularly counties, which, unlike census tracts, may contain substantial socioeconomic variability (16,17).

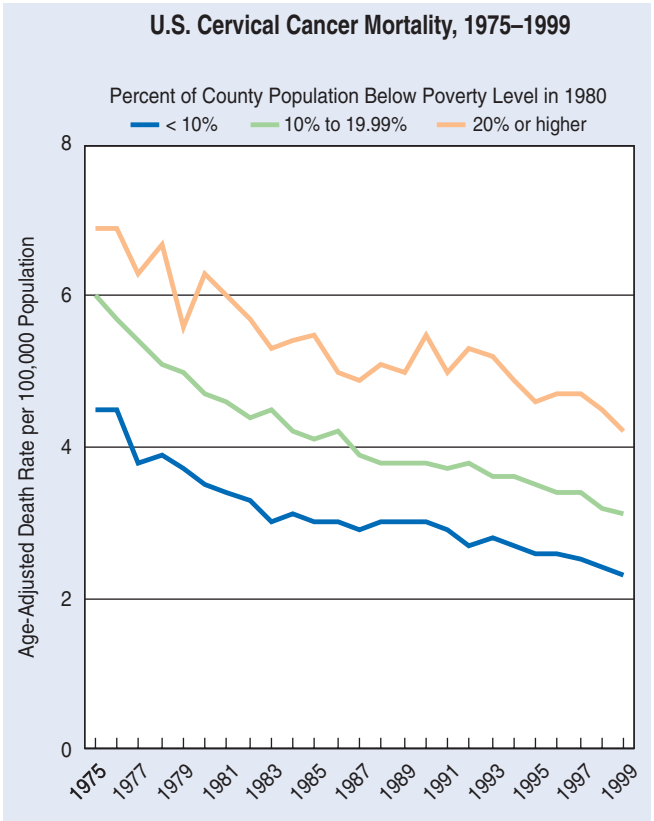
Census-based area socioeconomic measures, including the poverty rate, can serve as valuable surveillance tools for documenting social inequalities in cancer and monitoring trends in the extent of cancer-related health inequalities over time. In the absence of individual-level socioeconomic data, characterization of patterns in cancer incidence, stage, treatment, survival, and mortality by area socioeconomic measures may be useful in cancer control planning and resource allocation (16). Area socioeconomic measures can also be used in conjunction with other ecological variables, such as rural-urban continuum or behavioral factors, to examine differences in cancer outcomes after adjusting for area socioeconomic position. While policy interventions (e.g., smoking prevention and cancer control programs) aimed at reducing disparities in cancer generally should target socioeconomically disadvantaged areas, there may be a need to develop ethnic, cultural, and gender-specific programs. Obviously, social policy actions can have a profound effect on the magnitude of social inequalities in cancer. Although reducing poverty, improving access to education and employment opportunities, and improving working conditions remain the fundamental social policy measures for reducing health inequalities (4,53), improving access to health care and specific cancer screening programs and cancer control interventions among the disadvantaged has the potential to substantially reduce the cancer burden and cancer disparities among population groups and geographic areas.

Figure 7.1. Comparison of Trends in U.S. Cervical Cancer Mortality and SEER Cervical Cancer Incidence by 1990 and 1980 County Poverty Rates









Note: Rates are age-adjusted to the 2000 U.S. standard population. SEER incidence rates are based on data from 9 SEER registries.

Figure 7.2. Relationship Between State-Specific Physical Inactivity Levels and Total Cancer Mortality, United States, 1995–1999 (N = 51)

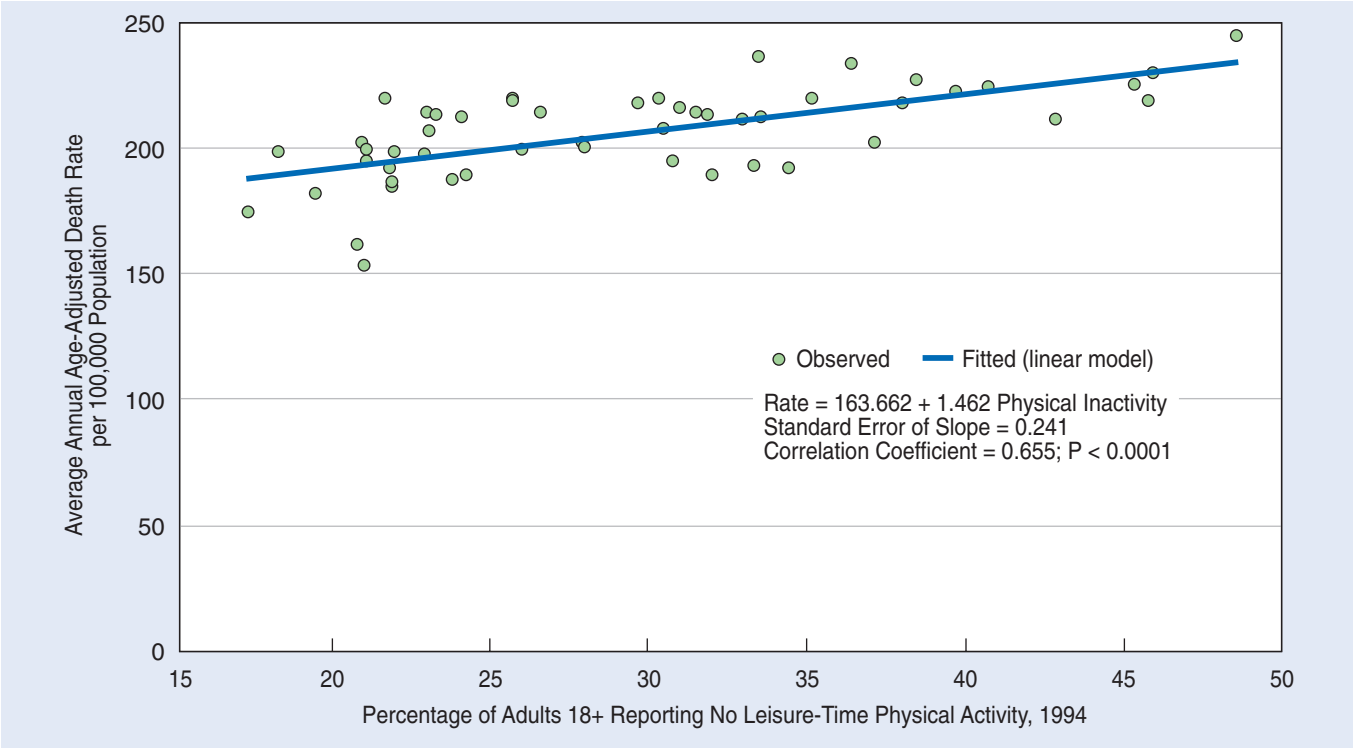
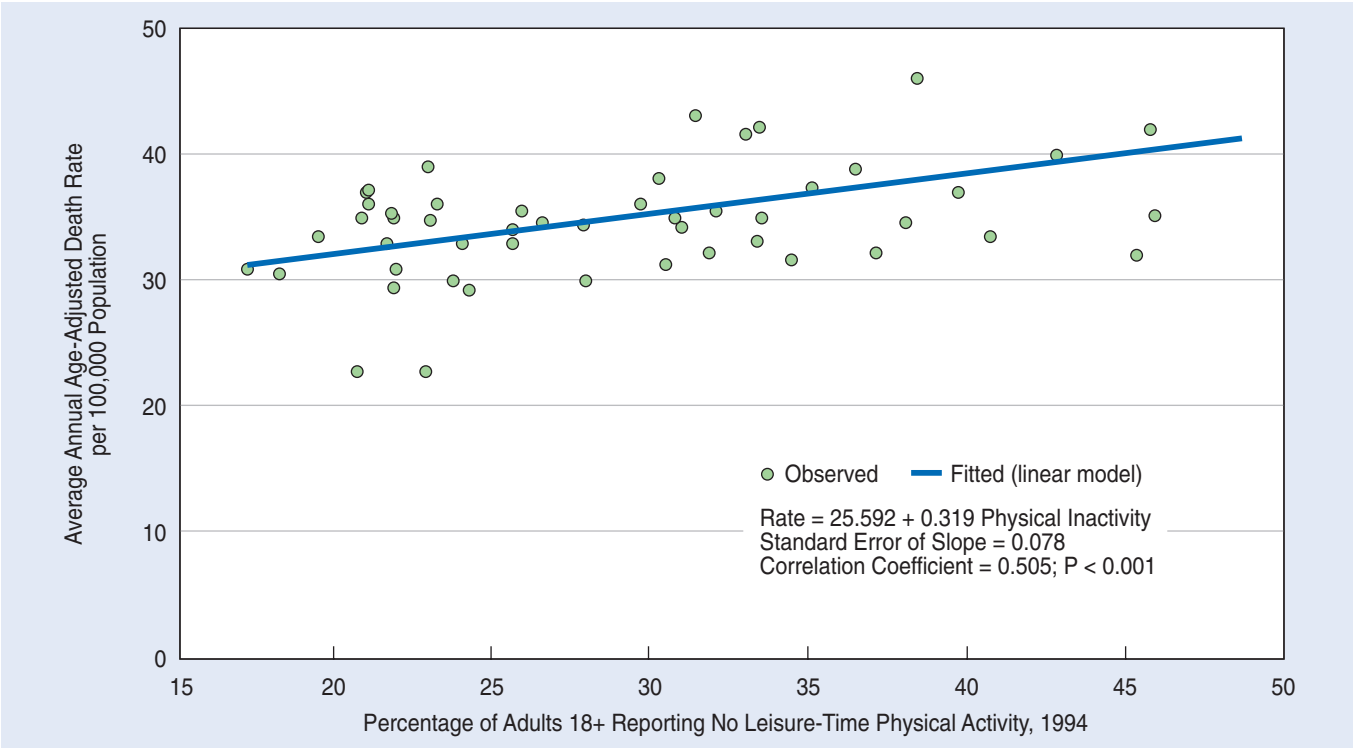
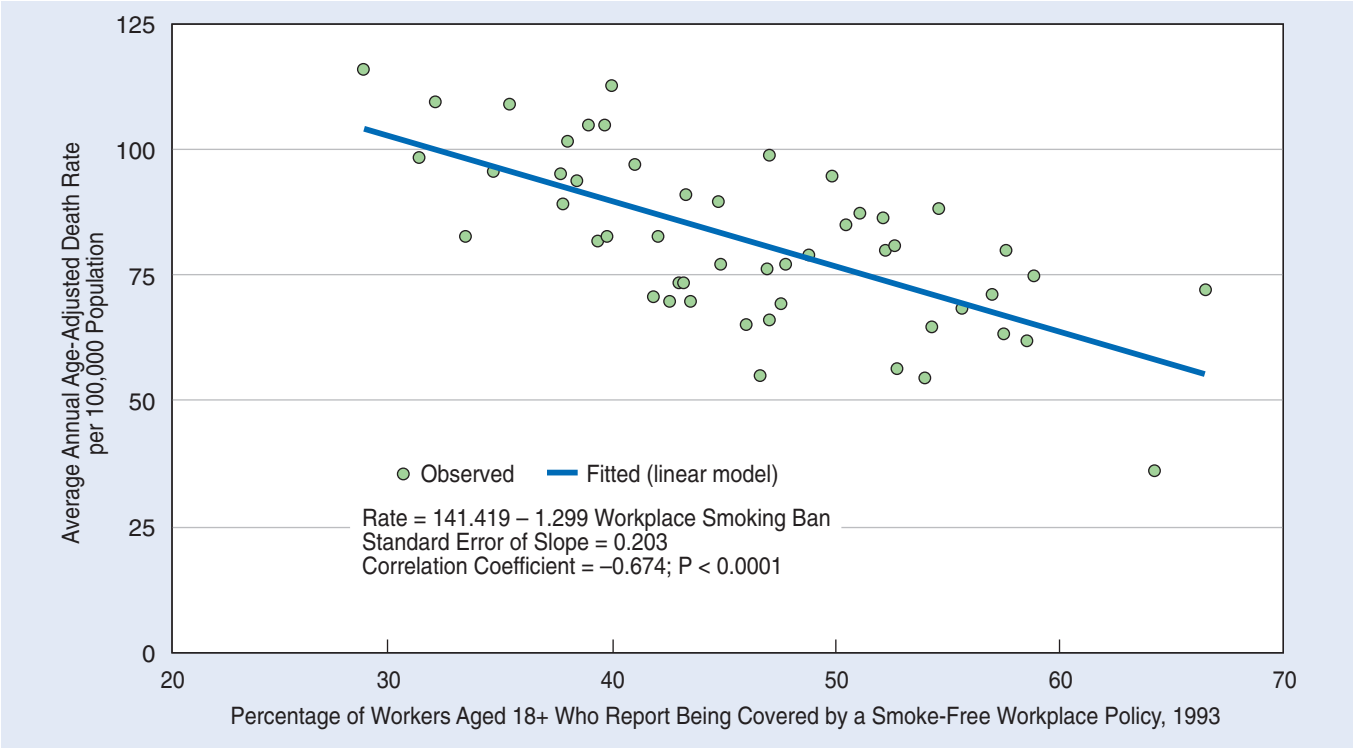


Figure 7.3. Relationship Between State-Specific Physical Inactivity Levels and Prostate Cancer Mortality, United States, 1995–1999 (N = 51)



Note: Rates are age-adjusted to the 2000 U.S. standard population.

Figure 7.4. Relationship Between State-Level Smoke-Free Workplace Policy and Male Lung Cancer Mortality, United States, 1995–1999 (N = 51)



Note: Rates are age-adjusted to the 2000 U.S. standard population.

Figure 7.5. Relationship Between State-Specific Poverty Rates and Physical Inactivity Levels, United States, 1994 (N = 51)

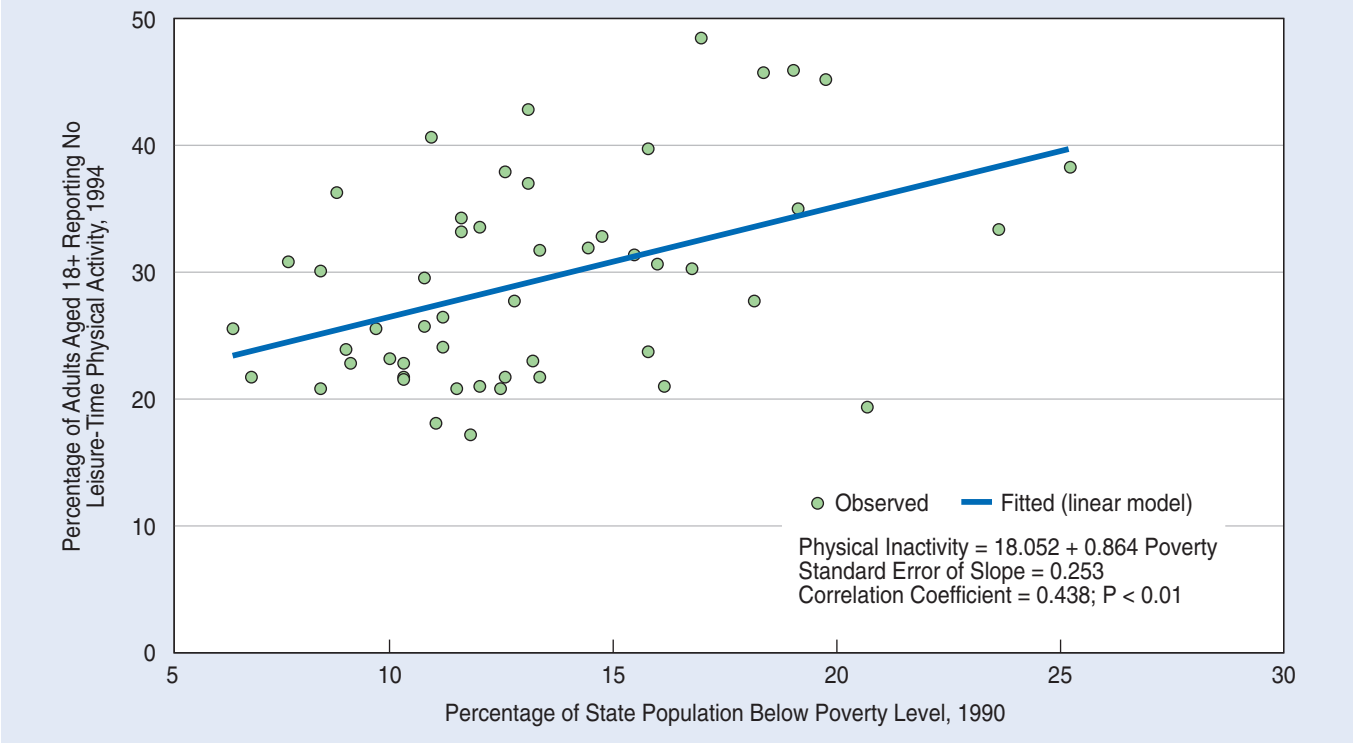


Figure 7.6. Relationship Between State-Specific Poverty Rates and Recent Mammography Use, United States, 1995 (N = 51)

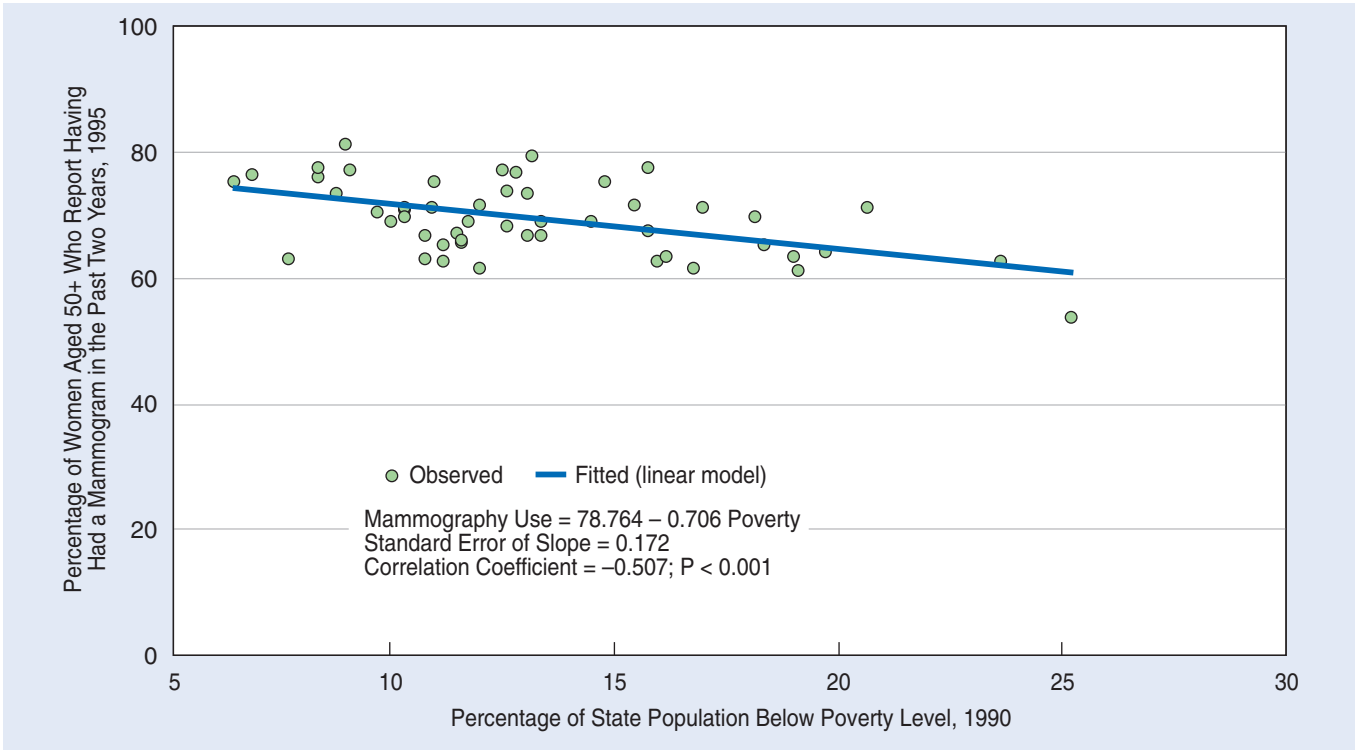
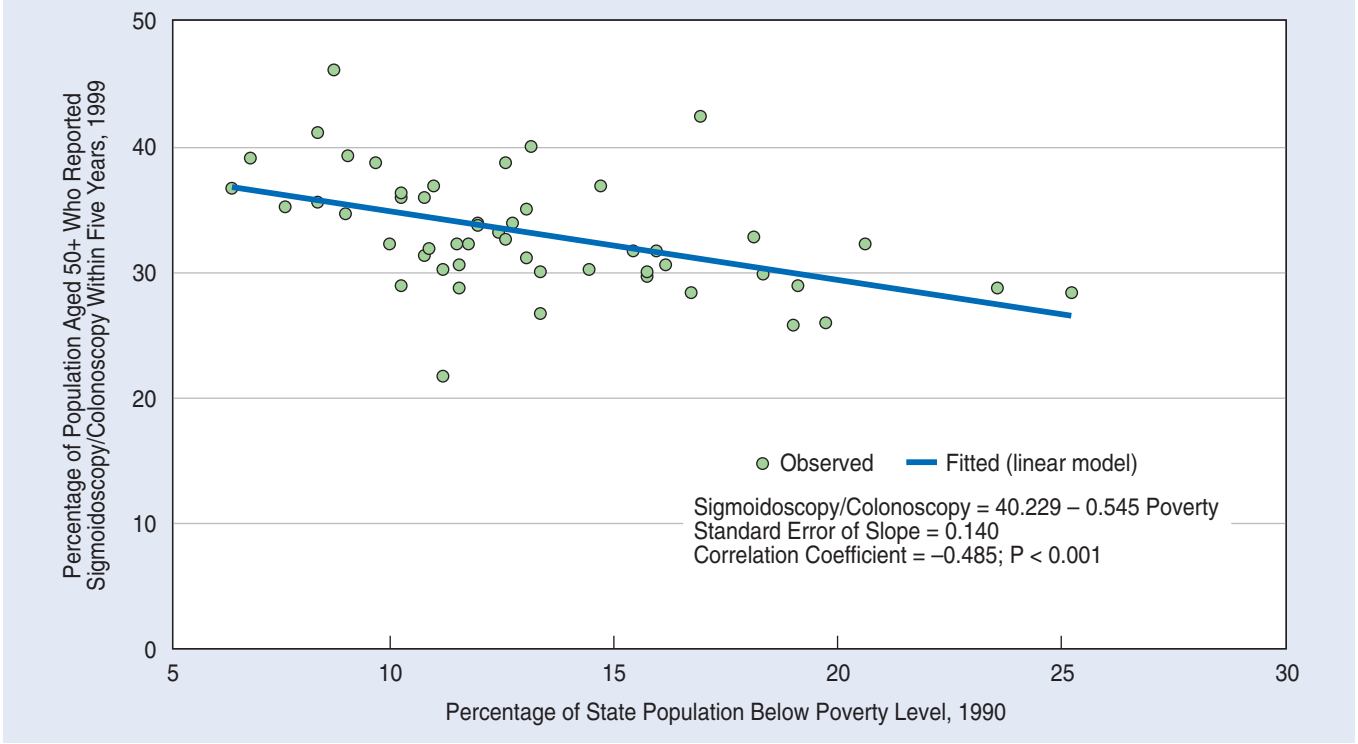


Figure 7.7. Relationship Between State-Specific Poverty Rates and Colorectal Cancer Screening, United States, 1999 (N = 51)



Legend for Variables in the Correlation Matrix (Table 7.1)

1. Poverty = Percentage of population below poverty level, 1990. Data source: 1990 Census.

2. Inactive = Percentage of adults aged 18 years or older who reported no leisure-time physical activity, 1994. Data source: 1994 Behavioral Risk Factor Surveillance Survey (BRFSS).

3. Overweight = Percentage of adults 18 years or older who reported being overweight, 1995. Data source: 1995 Behavioral Risk Factor Surveillance Survey (BRFSS).

4. Current Smoker, 1993 = Percentage of adults 18 years or older who reported cigarette smoking, 1993. Data source: 1992–1993 Current Population Survey—Tobacco Use Supplement.

5. Current Smoker, 1996 = Percentage of adults 18 years or older who reported cigarette smoking, 1996. Data source: 1995–1996 Current Population Survey—Tobacco Use Supplement.

6. Cigarette Sales/Capita = Per capita tax paid on sales of cigarette packs, 1997. Data source: The Tobacco Institute; *MMWR*, Vol. 47, No. 3, November 6, 1998.

7. Workplace Smoking Ban, 1993 = Percentage of indoor workers 18 years or older who reported being covered by a smoke-free workplace policy, 1993. Data source: 1992–1993 Current Population Survey—Tobacco Use Supplement.

8. Workplace Smoking Ban, 1996 = Percentage of indoor workers 18 years or older who reported being covered by a smoke-free workplace policy, 1996. Data source: 1995–1996 Current Population Survey—Tobacco Use Supplement.

9. Home Smoking Ban, 1993 = Percentage of adults 18 years or older who reported no smoking allowed anywhere in the home, 1993. Data source: 1992–1993 Current Population Survey—Tobacco Use Supplement.

10. Home Smoking Ban, 1996 = Percentage of adults 18 years or older who reported no smoking allowed anywhere in the home, 1996. Data source: 1995–1996 Current Population Survey—Tobacco Use Supplement.

11. Smoking Advertising Ban, 1993 = Percentage of adults 18 years or older who think advertising of tobacco products should not be allowed at all, 1993. Data source: 1992–1993 Current Population Survey—Tobacco Use Supplement.

12. Smoking Advertising Ban, 1996 = Percentage of adults 18 years or older who think advertising of tobacco products should not be allowed at all, 1996. Data source: 1995–1996 Current Population Survey—Tobacco Use Supplement.

13. Alcohol Consumption = Average alcohol consumption per drinker in gallons, 1991 (based on annual alcoholic beverage sales data). Data source: Alcohol Epidemiologic Data System; the National Institute on Alcohol Abuse and Alcoholism (NIAAA).

14. Recent Pap Test = Percentage of women 18 years or older with an intact uterine cervix who reported having had a Pap smear in the past three years, 1995. Data source: 1995 Behavioral Risk Factor Surveillance Survey (BRFSS).

15. Pap Test Ever = Percentage of women 18 years or older with an intact uterine cervix who reported ever having had a Pap smear, 1995. Data source: 1995 Behavioral Risk Factor Surveillance Survey (BRFSS).

16. Recent Mammography Use = Percentage of women aged 50 years or older who reported having had a mammogram in the past 2 years, 1995. Data source: 1995 Behavioral Risk Factor Surveillance Survey (BRFSS).

17. Mammography Ever Use = Percentage of women aged 40 years or older who reported ever having had a mammogram, 1995. Data source: 1995 Behavioral Risk Factor Surveillance Survey (BRFSS).

18. Colonoscopy/Sigmoidoscopy = Percentage of population aged 50 years or older who reported having colonoscopy/sigmoidoscopy within the past 5 years, 1999. Data source: 1999 Behavioral Risk Factor Surveillance Survey (BRFSS).

19. FOBT = Percentage of population aged 50 years or older who reported having a fecal occult blood test (FOBT) within the past 1 year, 1999. Data source: 1999 Behavioral Risk Factor Surveillance Survey (BRFSS).

20. No Health Insurance = Percentage of population without health insurance, 1994. Data source: 1994 Current Population Survey—March Supplement.

21. Total Cancer Mortality = Average annual age-adjusted death rate for all cancers and both sexes combined per 100,000 2000 U.S. standard population, 1995–1999.

22. Male Cancer Mortality = Average annual age-adjusted death rate for men from all cancers combined per 100,000 2000 U.S. standard population, 1995–1999.

23. Female Cancer Mortality = Average annual age-adjusted death rate for women from all cancers combined per 100,000 2000 U.S. standard population, 1995–1999.

24. Total Lung Cancer Mortality = Average annual age-adjusted death rate for lung cancer (both sexes combined) per 100,000 2000 U.S. standard population, 1995–1999.

25. Male Lung Cancer Mortality = Average annual age-adjusted death rate for male lung cancer per 100,000 2000 U.S. standard population, 1995–1999.

26. Female Lung Cancer Mortality = Average annual age-adjusted death rate for female lung cancer per 100,000 2000 U.S. standard population, 1995–1999.

27. Total Colorectal Cancer Mortality = Average annual age-adjusted death rate for colorectal cancer (both sexes combined) per 100,000 2000 U.S. standard population, 1995–1999.

28. Male Colorectal Cancer Mortality = Average annual age-adjusted death rate for male colorectal cancer per 100,000 2000 U.S. standard population, 1995–1999.

29. Female Colorectal Cancer Mortality = Average annual age-adjusted death rate for female colorectal cancer per 100,000 2000 U.S. standard population, 1995–1999.

30. Total Mortality from Melanoma of the Skin = Average annual age-adjusted death rate for melanoma of the skin (both sexes combined) per 100,000 2000 U.S. standard population, 1995–1999.

31. Male Mortality from Melanoma of the Skin = Average annual age-adjusted death rate for men from melanoma of the skin per 100,000 2000 U.S. standard population, 1995–1999.

32. Female Mortality from Melanoma of the Skin = Average annual age-adjusted death rate for women from melanoma of the skin per 100,000 2000 U.S. standard population, 1995–1999.

33. Prostate Cancer Mortality = Average annual age-adjusted death rate for prostate cancer per 100,000 2000 U.S. standard population, 1995–1999.

34. Female Breast Cancer Mortality = Average annual age-adjusted death rate for female breast cancer per 100,000 2000 U.S. standard population, 1995–1999.

35. Cervical Cancer Mortality = Average annual age-adjusted death rate for cervical cancer per 100,000 2000 U.S. standard population, 1995–1999. Data source for Variables 21 through 35: National Mortality Database, 1995–1999.

See “Page 129.pdf” for Table 7.1.

Table 7.1. Correlations Among Poverty, Behavioral Factors, Cancer Screening, and Age-Adjusted Cancer Mortality Rates Using State-Level Data: United States, 1990–1999 (N = 51)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
1. Poverty	1.00	0.44	0.26	0.35	0.27	0.14	–0.34	–0.43	–0.22	–0.26	0.02	–0.07	0.40	–0.24	–0.03	–0.51	–0.54	–0.48	–0.44	0.62	0.24	0.39	–0.01	0.30	0.45	–0.04	–0.10	–0.03	–0.14	–0.17	–0.14	–0.17	0.44	–0.04	0.48	1
P-value		< .01	0.06	0.01	0.05	0.34	0.01	0.00	0.12	0.07	0.91	0.64	< .01	0.09	0.83	< .01	< .01	< .01	< .01	< .01	0.09	< .01	0.92	0.03	< .01	0.77	0.50	0.85	0.32	0.24	0.32	0.22	< .01	0.77	< .01	
2. Physical Inactivity		1.00	0.45	0.45	0.38	0.43	–0.54	–0.32	–0.59	–0.59	–0.32	–0.23	0.43	–0.13	–0.16	–0.34	–0.36	–0.18	0.04	0.15	0.65	0.74	0.47	0.61	0.72	0.29	0.46	0.48	0.45	–0.23	–0.21	–0.14	0.50	0.43	0.71	2
P-value			< .01	< .01	0.01	< .01	< .01	0.02	< .01	< .01	0.02	0.11	< .01	0.36	0.26	0.02	0.01	0.20	0.77	0.30	< .01	< .01	< .01	< .01	< .01	0.04	< .01	< .01	< .01	0.11	0.14	0.32	< .01	< .01	< .01	
3. Overweight			1.00	0.47	0.48	0.42	–0.47	–0.47	–0.47	–0.44	–0.20	–0.28	0.00	–0.23	0.07	–0.28	–0.24	–0.22	–0.38	–0.09	0.39	0.43	0.28	0.48	0.53	0.26	0.29	0.28	0.29	–0.07	–0.06	–0.05	0.22	0.11	0.30	3
P-value				< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.15	0.05	0.99	0.10	0.65	0.05	0.09	0.11	0.01	0.53	< .01	< .01	0.05	< .01	< .01	0.06	0.04	0.05	0.04	0.65	0.69	0.74	0.13	0.43	0.03	
4. Current Smoking, 1993				1.00	0.90	0.65	–0.59	–0.61	–0.69	–0.70	–0.51	–0.45	0.29	0.03	0.27	–0.29	–0.27	–0.33	–0.23	0.04	0.56	0.57	0.44	0.73	0.70	0.58	0.32	0.29	0.33	0.10	0.08	0.14	0.12	0.01	0.40	4
P-value					< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.04	0.85	0.06	0.04	0.06	0.02	0.10	0.80	< .01	< .01	< .01	< .01	< .01	< .01	0.02	0.04	0.02	0.50	0.60	0.34	0.39	0.96	< .01	
5. Current Smoking, 1996					1.00	0.67	–0.62	–0.69	–0.72	–0.74	–0.57	–0.53	0.23	–0.07	0.25	–0.30	–0.28	–0.34	–0.22	–0.02	0.54	0.52	0.46	0.70	0.65	0.59	0.37	0.36	0.34	0.11	0.09	0.12	0.09	0.06	0.40	5
P-value						< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.10	0.65	0.07	0.03	0.05	0.02	0.12	0.88	< .01	< .01	< .01	< .01	< .01	< .01	0.01	0.01	0.01	0.46	0.51	0.39	0.54	0.67	< .01	
6. Cigarette Sales/Capita						1.00	–0.56	–0.47	–0.65	–0.64	–0.56	–0.49	0.20	–0.06	0.25	–0.34	–0.28	–0.31	–0.10	–0.08	0.54	0.56	0.43	0.66	0.66	0.48	0.42	0.37	0.43	0.34	0.34	0.34	0.21	0.11	0.37	6
P-value							< .01	< .01	< .01	< .01	< .01	< .01	0.16	0.67	0.08	0.01	0.04	0.03	0.47	0.58	< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.01	< .01	0.02	0.02	0.02	0.15	0.45	0.01	
7. Workplace Smoking Ban, 1993							1.00	0.85	0.78	0.80	0.55	0.57	–0.20	0.28	0.06	0.46	0.43	0.41	0.24	0.03	–0.49	–0.57	–0.30	–0.59	–0.67	–0.30	–0.38	–0.47	–0.28	0.13	0.12	0.07	–0.25	–0.16	–0.43	7
P-value								< .01	< .01	< .01	< .01	< .01	0.15	0.05	0.67	< .01	< .01	< .01	0.09	0.84	< .01	< .01	0.03	< .01	< .01	0.03	0.01	< .01	0.05	0.38	0.41	0.63	0.08	0.27	< .01	
8. Workplace Smoking Ban, 1996								1.00	0.59	0.61	0.44	0.49	–0.22	0.25	–0.16	0.42	0.36	0.48	0.47	–0.10	–0.32	–0.39	–0.15	–0.52	–0.56	–0.30	–0.09	–0.18	0.01	0.04	0.03	0.05	–0.13	0.09	–0.29	8
P-value									< .01	< .01	< .01	< .01	0.12	0.08	0.25	< .01	0.01	< .01	< .01	0.47	0.02	< .01	0.29	< .01	< .01	0.04	0.54	0.22	0.97	0.79	0.82	0.74	0.38	0.54	0.04	
9. Home Smoking Ban, 1993									1.00	0.96	0.50	0.42	–0.11	0.17	–0.01	0.37	0.36	0.25	–0.04	0.22	–0.65	–0.68	–0.53	–0.64	–0.69	–0.42	–0.65	–0.69	–0.60	0.12	0.15	–0.02	–0.31	–0.36	–0.45	9
P-value										< .01	< .01	< .01	0.45	0.23	0.94	0.01	0.01	0.07	0.76	0.12	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.40	0.29	0.91	0.03	0.01	< .01	
10. Home Smoking Ban, 1996										1.00	0.49	0.41	–0.08	0.22	0.02	0.44	0.42	0.33	0.03	0.17	–0.61	–0.64	–0.50	–0.64	–0.69	–0.42	–0.61	–0.64	–0.56	0.07	0.10	–0.06	–0.24	–0.31	–0.45	10
P-value											< .01	< .01	0.58	0.13	0.89	< .01	< .01	0.02	0.82	0.23	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.65	0.49	0.65	0.09	0.03	< .01	
11. Smoking Advertising Ban, 1993											1.00	0.82	–0.23	–0.02	–0.30	0.12	–0.05	0.20	–0.09	0.12	–0.31	–0.32	–0.24	–0.42	–0.41	–0.33	–0.25	–0.25	–0.22	0.01	–0.08	0.10	–0.07	–0.07	–0.28	11
P-value												< .01	0.11	0.90	0.03	0.40	0.74	0.16	0.52	0.41	0.02	0.02	0.09	< .01	< .01	0.02	0.08	0.08	0.13	0.96	0.56	0.48	0.65	0.62	0.04	
12. Smoking Advertising Ban, 1996												1.00	–0.26	–0.06	–0.39	0.16	–0.03	0.17	0.06	0.03	–0.22	–0.26	–0.14	–0.32	–0.36	–0.18	–0.10	–0.10	–0.09	–0.06	–0.16	0.05	–0.14	–0.05	–0.23	12
P-value													0.06	0.70	< .01	0.27	0.84	0.23	0.65	0.85	0.12	0.06	0.33	0.02	0.01	0.22	0.48	0.47	0.52	0.67	0.27	0.71	0.33	0.72	0.11	
13. Alcohol Use (Intensity)													1.00	0.26	0.04	–0.02	–0.07	–0.02	0.05	0.32	0.38	0.42	0.24	0.31	0.34	0.17	0.07	0.05	0.08	–0.24	–0.16	–0.32	0.46	0.25	0.57	13
P-value														0.06	0.80	0.88	0.64	0.88	0.74	0.02	0.01	< .01	0.08	0.03	0.01	0.24	0.62	0.72	0.60	0.09	0.27	0.02	< .01	0.08	< .01	
14. Recent Pap Test														1.00	0.48	0.51	0.44	0.47	0.31	–0.01	0.00	–0.02	0.02	–0.01	–0.04	0.05	–0.20	–0.28	–0.11	–0.14	–0.12	–0.12	–0.01	0.01	–0.06	14
P-value															< .01	< .01	< .01	< .01	0.03	0.96	0.98	0.90	0.89	0.94	0.75	0.74	0.17	0.05	0.46	0.33	0.42	0.41	0.96	0.95	0.70	
15. Pap Test—Ever Use															1.00	0.08	0.40	–0.08	–0.08	–0.02	–0.15	–0.14	–0.16	–0.01	–0.03	0.00	–0.30	–0.39	–0.22	0.21	0.23	0.11	–0.10	–0.35	–0.17	15
P-value																0.56	< .01	0.59	0.56	0.91	0.31	0.32	0.25	0.96	0.82	0.98	0.03	< .01	0.11	0.15	0.11	0.42	0.49	0.01	0.23	
16.Recent Mammography Use																1.00	0.82	0.59	0.46	–0.06	–0.16	–0.28	0.02	–0.17	–0.32	0.12	–0.16	–0.18	–0.14	–0.13	–0.06	–0.19	–0.32	0.06	–0.25	16
P-value																	< .01	< .01	< .01	0.69	0.26	0.04	0.88	0.22	0.02	0.40	0.26	0.20	0.33	0.38	0.66	0.17	0.02	0.67	0.07	
17.Mammography—Ever Use																	1.00	0.51	0.39	–0.18	–0.25	–0.38	–0.06	–0.29	–0.43	0.02	–0.19	–0.25	–0.15	–0.05	0.02	–0.17	–0.32	–0.01	–0.31	17
P-value																		< .01	< .01	0.21	0.08	0.01	0.68	0.04	0.00	0.90	0.18	0.08	0.30	0.74	0.87	0.23	0.02	0.94	0.02	
18. Colonoscopy/Sigmoidoscopy	1.00	0.45	–0.11	0.07	–0.04	0.24	–0.13	–0.23	0.10	0.05	–0.01	0.10	–0.25	–0.23	–0.19	0.09	0.38	–0.04	18
P-value		< .01	0.46	0.62	0.77	0.10	0.35	0.10	0.51	0.72	0.93	0.47	0.08	0.11	0.19	0.54	0.01	0.77	
19. Fecal Occult Blood Test (FOBT)		1.00	–0.27	0.22	0.14	0.35	–0.01	–0.07	0.15	0.42	0.40	0.42	–0.17	–0.13	–0.15	0.11	0.55	0.04	19
P-value			0.05	0.11	0.33	0.01	0.93	0.61	0.30	< .01	< .01	< .01	0.23	0.36	0.29	0.43	< .01	0.80	
20. Lack of Health Insurance			1.00	0.13	0.16	0.05	0.19	0.19	0.13	–0.22	–0.20	–0.23	0.02	0.11	–0.12	0.15	0.00	0.38	20
P-value				0.36	0.27	0.70	0.18	0.18	0.37	0.13	0.16	0.11	0.90	0.43	0.42	0.28	0.98	0.01	
21. Total Cancer Mortality				1.00	0.96	0.93	0.89	0.85	0.77	0.77	0.76	0.74	–0.05	0.00	–0.02	0.56	0.73	0.78	21
P-value					< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.74	0.99	0.90	< .01	< .01	< .01	
22. Male Cancer Mortality					1.00	0.79	0.87	0.92	0.61	0.67	0.69	0.63	–0.11	–0.06	–0.07	0.68	0.65	0.80	22
P-value						< .01	< .01	< .01	< .01	< .01	< .01	< .01	0.45	0.70	0.64	< .01	< .01	< .01	
23. Female Cancer Mortality						1.00	0.78	0.64	0.85	0.83	0.78	0.81	0.04	0.07	0.06	0.37	0.79	0.63	23
P-value							< .01	< .01	< .01	< .01	< .01	< .01	0.80	0.61	0.68	0.01	< .01	< .01	
24. Total Lung Cancer Mortality							1.00	0.95	0.85	0.56	0.56	0.52	0.11	0.15	0.12	0.30	0.40	0.69	24
P-value								< .01	< .01	< .01	< .01	< .01	0.42	0.28	0.42	0.03	< .01	< .01	
25. Male Lung Cancer Mortality								1.00	0.64	0.50	0.53	0.46	0.03	0.07	0.05	0.45	0.37	0.74	25
P-value									< .01	< .01	< .01	< .01	0.85	0.63	0.71	< .01	0.01	< .01	
26. Female Lung Cancer Mortality									1.00	0.56	0.53	0.54	0.23	0.25	0.20	0.02	0.43	0.47	26
P-value										< .01	< .01	< .01	0.11	0.07	0.17	0.91	< .01	< .01	
27. Total Colorectal Cancer Mortality										1.00	0.96	0.97	0.00	–0.01	0.09	0.34	0.75	0.49	27
P-value											< .01	< .01	1.00	0.95	0.52	0.01	< .01	< .01	
28. Male Colorectal Cancer Mortality											1.00	0.88	–0.07	–0.06	0.01	0.36	0.76	0.51	28
P-value												< .01	0.65	0.69	0.94	0.01	< .01	< .01	
29. Female Colorectal Cancer Mortality												1.00	0.05	0.02	0.16	0.33	0.72	0.46	29
P-value													0.75	0.88	0.27	0.02	< .01	< .01	
30. Total Mortality from Skin Melanoma													1.00	0.95	0.89	–0.24	–0.21	–0.13	30
P-value														< .01	< .01	0.09	0.14	0.37	
31. Male Mortality from Skin Melanoma														1.00	0.72	–0.17	–0.12	–0.01	31
P-value															< .01	0.22	0.38	0.97	
32. Female Mortality from Skin Melanoma															1.00	–0.23	–0.21	–0.22	32
P-value																0.10	0.14	0.11	
33. Prostate Cancer Mortality																1.00	0.59	0.60	33
P-value																	< .01	< .01	
34. Female Breast Cancer Mortality																	1.00	0.60	34
P-value																		< .01	
35. Cervical Cancer Mortality																		1.00	35
P-value																			

References

1. U.S. Department of Health and Human Services. *Tracking Healthy People 2010*. Washington, DC: U.S. Government Printing Office, 2000.
2. Kitagawa EM, Hauser PM. *Differential Mortality in the United States: A Study in Socioeconomic Epidemiology*. Cambridge, MA: Harvard University Press, 1973.
3. Townsend P, Davidson N, Whitehead M. *Inequalities in Health: The Black Report and the Health Divide*. London: Penguin Group, 1992.
4. Wilkinson R, Marmot M, editors. *Social Determinants of Health: The Solid Facts*. Copenhagen, Denmark: World Health Organization, 1998.
5. Adler NE, Ostrove JM. Socioeconomic status and health: What we know and what we don't. In: *Socioeconomic Status and Health in Industrial Nations*. Adler NE, Marmot M, McEwen BS, Stewert J, editors. New York: The New York Academy of Sciences, 1999, 3–15.
6. Krieger N, Williams DR, Moss NE. Measuring social class in U.S. public health research: Concepts, methodologies, and guidelines. *Annu Rev Public Health* 1997;18:341–78.
7. National Center for Health Statistics. *Health, United States, 1998 With Socioeconomic and Health Chartbook*. Hyattsville, MD, 1998.
8. Sorlie PD, Backlund E, Keller JB. U.S. mortality by economic, demographic, and social characteristics: The National Longitudinal Mortality Study. *Am J Public Health* 1995;85:949–56.
9. Pappas G, Queen S, Hadden W, Fisher G. The increasing disparity in mortality between socioeconomic groups in the United States, 1960 and 1986. *N Engl J Med* 1993;329:103–9.
10. Davey Smith G, Neaton JD, Wentworth D, Stamler R, Stamler J. Socioeconomic differentials in mortality risk among men screened for the Multiple Risk Factor Intervention Trial: I–White Men. *Am J Public Health* 1996;86:486–96.
11. Davey Smith G, Wentworth D, Neaton JD, Stamler R, Stamler J. Socioeconomic differentials in mortality risk among men screened for the Multiple Risk Factor Intervention Trial: II–Black Men. *Am J Public Health* 1996;86:497–504.
12. Singh GK, Wilkinson AV, Song FF, Rose TP, Adrian M, Fonner E, Tarlov AR. *Health and Social Factors in Kansas: A Data and Chartbook, 1997–98*. Lawrence, KS: Allen Press, 1998.
13. Singh GK. Socioeconomic and behavioral differences in health, morbidity, and mortality in Kansas: Empirical data, models, and analyses. In: *The Society and Population Health Reader, Volume II: A State and Community Perspective*. Tarlov AR, St. Peter RF, editors. New York, NY: The New Press, 2000, 15–56.
14. Kawachi I, Subramanian SV, Almeida-Filho N. A glossary for health inequalities. *J Epidemiol Community Health* 2002;56:647–52.
15. Singh GK, Siahpush M. All-cause and cause-specific mortality of immigrants and native born in the United States. *Am J Public Health* 2001;91:392–99.
16. Singh GK, Miller BA, Hankey BF, Feuer EJ, Pickle LW. Changing area socioeconomic patterns in U.S. cancer mortality, 1950–1998: Part I—All cancers among men. *J Natl Cancer Inst* 2002; 94:904–15.
17. Singh GK, Miller BA, Hankey BF. Changing area socioeconomic patterns in U.S. cancer mortality, 1950–1998: Part II—Lung and colorectal cancers. *J Natl Cancer Inst* 2002;94:916–25.

18. Kogevinas M, Pearce N, Susser M, Boffetta P, editors. *Social Inequalities and Cancer.* IARC Scientific Publication No. 138. Lyon, France: International Agency for Research on Cancer, 1997.

19. Tomatis L. Poverty and cancer. In: *Social Inequalities and Cancer.* Kogevinas M, Pearce N, Susser M, Boffetta P, editors. IARC Scientific Publication No. 138. Lyon, France: International Agency for Research on Cancer, 1997, 25–39.

20. Mackillop WJ, Zhang-Salomons J, Boyd CJ, Groome PA. Associations between community income and cancer incidence in Canada and the United States. *Cancer* 2000;89:901–12.

21. Krieger N, Chen JT, Waterman PD, Soobader M, Subramanian SV, Carson R. Geocoding and monitoring of U.S. socioeconomic inequalities in mortality and cancer incidence: Does the choice of area-based measure and geographical level matter? The public health disparities geocoding project. *Am J Epidemiol* 2002;156:471–82.

22. Krieger N, Quesenberry C, Peng T, Horn-Ross P, Stewart S, Brown S, et al. Social class, race/ethnicity, and incidence of breast, cervix, colon, lung, and prostate cancer among Asian, black, Hispanic, and white residents of the San Francisco Bay Area, 1988–92 (United States). *Cancer Causes Control* 1999;10:525–37.

23. Baquet CR, Horm JW, Gibbs T, Greenwald P. Socioeconomic factors and cancer incidence among blacks and whites. *J Natl Cancer Inst* 1991;83:551–57.

24. McWhorter WP, Schatzkin AG, Horm JW, Brown CC. Contribution of socioeconomic status to black/white differences in cancer incidence. *Cancer* 1989;63:982–87.

25. Liu L, Deapen D, Bernstein L. Socioeconomic status and cancers of the female breast and reproductive organs: A comparison across racial/ethnic populations in Los Angeles County, California (United States). *Cancer Causes Control* 1998;9:369–80.

26. Liu L, Cozen W, Bernstein L, Ross RK, Deapen D. Changing relationship between socioeconomic status and prostate cancer incidence. *J Natl Cancer Inst* 2001; 93:705–9.

27. Williams J, Clifford C, Hopper J, Giles G. Socioeconomic status and cancer mortality and incidence in Melbourne. *Eur J Cancer* 1991;27:917–21.

28. Gorey KM, Vena JE. The association of near poverty status with cancer incidence among black and white adults. *J Community Health* 1995;20:359–66.

29. Gorey KM, Vena JE. Cancer differentials among U.S. blacks and whites: Quantitative estimates of socioeconomic-related risks. *J Natl Med Assoc* 1994;86:209–15.

30. Wagener DK, Schatzkin A. Temporal trends in the socioeconomic gradient for breast cancer mortality among U.S. women. *Am J Public Health* 1995;84:1003–6.

31. Geller AC, Miller DR, Lew RA, Clapp RW, Wenneker MB, Koh HK. Cutaneous melanoma mortality among the socioeconomically disadvantaged in Massachusetts. *Am J Public Health* 1996;86:538–44.

32. Harrison RA, Haque AU, Roseman JM, Soong SJ. Socioeconomic characteristics and melanoma incidence. *Ann Epidemiol* 1998;8:327–33.

33. Kirkpatrick CS, Lee JA, White E. Melanoma risk by age and socio-economic status. *Int J Cancer* 1990;46:1–4.

34. Yost K, Perkins C, Cohen R, Morris C, Wright W. Socioeconomic status and breast cancer incidence in California for different race/ethnic groups. *Cancer Causes Control* 2001;12:703–11.

35. van Loon AJM, Burg J, Goldbohm RA, van den Brandt PA. Differences in cancer incidence and mortality among socioeconomic groups. *Scand J Soc Med* 1995;23:110–20.

36. Devesa SS, Diamond EL. Socioeconomic and racial differences in lung cancer incidence. *Am J Epidemiol* 1983;118:818–31.

37. Liu T, Wang X, Waterbor JW, Weiss HL, Soong S. Relationship between socioeconomic status and race-specific cervical cancer incidence in the United States, 1973–1992. *J Health Care Poor Underserved* 1998;9:420–32.

38. Davey Smith G, Leon D, Shipley M, Rose G. Socioeconomic differentials in cancer among men. *Int J Epidemiol* 1991;20:339–45.

39. Miller BA, Hankey BF, Thomas TL. Impact of sociodemographic factors, hormone receptor status, and tumor grade on ethnic differences in tumor stage and size for breast cancer in U.S. women. *Am J Epidemiol* 2002;155:534–45.

40. Mandelblatt J, Andrews H, Kerner J, Zauber A, Burnett W. Determinants of late stage diagnosis of breast and cervical cancer: The impact of age, race, social class, and hospital type. *Am J Public Health* 1991;81:646–49.

41. Mandelblatt J, Andrews H, Kao R, Wallace R, Kerner J. The late-stage diagnosis of colorectal cancer: Demographic and socioeconomic factors. *Am J Public Health* 1996;86:1794–797.

42. Polednak AP. Stage at diagnosis of prostate cancer in Connecticut by poverty and race. *Ethn Dis* 1997;7:215–20.

43. Kogevinas M, Porta M. Socioeconomic differences in cancer survival: A review of the evidence. In: *Social Inequalities and Cancer.* Kogevinas M, Pearce N, Susser M, Boffetta P, editors. IARC Scientific Publication No. 138. Lyon, France: International Agency for Research on Cancer, 1997, 177–206.

44. Greenwald HG, Borgatta EF, McCorkle R, Polissar N. Explaining reduced cancer survival among the disadvantaged. *The Milbank Quarterly* 1996;74: 215–38.

45. Tseng M, Yeatts K, Millikan R, Newman B. Area-level characteristics and smoking in women. *Am J Public Health* 2001;91:1847–850.

46. Reijneveld SA. The impact of individual and area characteristics on urban socioeconomic differences in health and smoking. *Int J Epidemiol* 1998;27:33–40.

47. Duncan C, Jones K, Moon G. Smoking and deprivation: Are there neighborhood effects? *Soc Sci Med* 1999;48:497–505.

48. Diehr P, Koepsell T, Cheadle A, Psaty BM, Wagner E, Curry S. Do communities differ in health behaviors? *J Clin Epidemiol* 1993;46:1141–149.

49. Segan N. Socioeconomic status and cancer screening. In: *Social Inequalities and Cancer.* Kogevinas M, Pearce N, Susser M, Boffetta P, editors. IARC Scientific Publication No. 138. Lyon, France: International Agency for Research on Cancer, 1997, 369–76.

50. Hiatt RA, Klabunde C, Breen N, Swan J, Ballard-Barbash R. Cancer screening practices from National Health Interview Surveys: Past, Present, and Future. *J Natl Cancer Inst* 2002;94:1837–846.

51. Hoffman-Goetz L, Breen NL, Meissner H. The impact of social class on the use of cancer screening within three racial/ethnic groups in the United States. *Ethn Dis* 1998;8:43– 51.

52. Blane D. Social determinants of health: Socioeconomic status, social class, and ethnicity. *Am J Public Health* 1995;85:903–5.

53. Link BG, Phelan JC. Understanding sociodemographic differences in health: The role of fundamental social causes. *Am J Public Health* 1996;86:471–73.

54. Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg LX, Edwards BK, editors. *SEER Cancer Statistics Review, 1973–1997*. Bethesda, MD: National Cancer Institute, 2000, NIH Publication No. 00–2789.

55. Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg LX, Edwards BK, editors. *SEER Cancer Statistics Review, 1973–1999*. Bethesda, MD: National Cancer Institute; 2002, **http://seer.cancer.gov/csr/1973_1999**.

56. Hankey BF, Ries LA, Edwards BK. The Surveillance, Epidemiology, and End Results Program: A national resource. *Cancer Epidemiol Biomarkers Prev* 1999;8:1117–121.

57. National Center for Health Statistics. *Vital Statistics of the United States, 1950–1999, Volume II: Mortality, Parts A and B*. Washington, DC: Public Health Service, 2001.

58. American Cancer Society. *Cancer Facts & Figures–2002*. Atlanta, GA, 2002.

59. Edwards BK, Howe HL, Ries LA, Thun MJ, Rosenberg HM, Yancik R, et al. Annual report to the nation on the status of cancer, 1973–1999, featuring implications of age and aging on U.S. cancer burden. *Cancer* 2002; 94:2766–792.

60. Berkman LF, Macintyre S. The measurement of social class in health studies: Old measures and new formulations. In: *Social Inequalities and Cancer.* Kogevinas M, Pearce N, Susser M, Boffetta P, editors. IARC Scientific Publication No. 138. Lyon, France: International Agency for Research on Cancer, 1997, 51–64.

61. U.S. Bureau of the Census. *Census of Population and Housing, 1990: Summary Tape File 3A on CD-ROM*. Washington, DC, 1992.

62. U.S. Bureau of the Census. *Statistical Abstract of the United States: 1993*. Washington, DC, 1993.

63. Ries LAG, Fritz A, editors. *The SEER Program Code Manual,* 3rd ed. Bethesda, MD: National Cancer Institute, 1999, NIH Publication No. 99–2313.

64. National Cancer Institute. *U.S. Population Data—1969–1999,* 2002. Available from URL: **http://seer.cancer.gov/popdata**.

65. U.S. Bureau of the Census. *Census of Population and Housing, 1990: Summary Tape File 2 Technical Documentation*. Washington, DC, 1991.

66. Clegg LX, Li FP, Hankey BF, Chu K, Edwards BK. Cancer survival among U.S. whites and minorities. *Arch Intern Med* 2002;162:1985–993.

67. U.S. Cancer Statistics Working Group. *United States Cancer Statistics: 1999 Incidence*. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute, 2002.

68. Auvinen A, Karjalainen S. Possible explanations for social class differences in cancer patient survival. In: *Social Inequalities and Cancer.* Kogevinas M, Pearce N, Susser M, Boffetta P, editors. IARC Scientific Publication No. 138. Lyon, France: International Agency for Research on Cancer, 1997, 377–97.

69. Seiffert J, editor. *SEER Program Comparative Staging Guide for Cancer, Version 1.1*. Bethesda, MD: National Cancer Institute, 1993. NIH Publication No. 93–3640.

70. Stanford JL, Stephenson RA, Coyle LM, Cerhan J, Correa R, Eley JW, Gilliland F, Hankey B, Kolonel LN, Kosary C, et al. *Prostate Cancer Trends 1973–1995*. Bethesda, MD: SEER Program, National Cancer Institute, 1999. NIH Publication No. 99–4543.

71. Legler JM, Feuer EJ, Potosky AL, Merrill RM, Kramer BS. The role of prostate-specific antigen (PSA) testing patterns in the recent prostate cancer incidence decline in the United States. *Cancer Causes Control* 1998;9:519–27.

72. VanEenwyk J, Campo JS, Ossiander EM. Socioeconomic and demographic disparities in treatment for carcinomas of the colon and rectum. *Cancer* 2002;95:39–46.

73. Roetzheim RG, Pal N, Gonzales EC, Ferrante J, Van Durme DJ, Krischer JP. Effects of health insurance and race on colorectal cancer treatments and outcomes. *Am J Public Health* 2000;90:1746–754.

74. Bach PB, Cramer LC, Warren JL, Begg CB. Racial differences in the treatment of early-stage lung cancer. *N Engl J Med* 1999;341:1198–205.

75. Morris CR, Snipes KP, Schlag R, Wright WE. Sociodemographic factors associated with prostatectomy utilization and concordance with the physician data query for prostate cancer (United States). *Cancer Causes Control* 1999; 10:503–11.

76. Albain KS, Green SR, Lichter AS, Hutchins LF, Wood WC, Henderson IC, Ingle JN, O'Sullivan J, Osborne CK, Martino S. Influence of patient characteristics, socioeconomic factors, geography, and systemic risk on the use of breast-sparing treatment in women enrolled in adjuvant breast cancer studies: An analysis of two intergroup trials. *J Clin Oncol* 1996;14:3009–17.

77. Greenwald HP, Polissar NL, Borgatta EF, McCorkle R, Goodman G. Social factors, treatment, and survival in early-stage non-small cell lung cancer. *Am J Public Health* 1998; 88:1681–684.

78. Klabunde CN, Potosky AL, Harlan LC, Kramer BS. Trends and black/white differences in treatment for nonmetastatic prostate cancer. *Med Care* 1998;36:1337–348.

79. Polednak AP. Prostate cancer treatment in black and white men: The need to consider both stage at diagnosis and socioeconomic status. *J Natl Med Assoc* 1998;90:101–4.

80. Michalski TA, Nattinger AB. The influence of black race and socioeconomic status on the use of breast-conserving surgery for Medicare beneficiaries. *Cancer* 1997;79:314–19.

81. Hillner BE, Penberthy L, Desch CE, McDonald MK, Smith TJ, Retchin SM. Variation in staging and treatment of local and regional breast cancer in the elderly. *Breast Cancer Res Treat* 1996;40: 75–86.

82. Smith TJ, Penberthy L, Desch CE, Whittemore M, Newschaffer C, Hillner BE, McClish D, Retchin SM. Differences in initial treatment patterns and outcomes of lung cancer in the elderly. *Lung Cancer* 1995;13:235–52.

83. Farrow DC, Hunt WC, Samet JM. Geographic variation in the treatment of localized breast cancer. *N Engl J Med* 1992;326:1097–101.

84. Greenberg ER, Chute CG, Stukel T, Baron JA, Freeman DH, Yates J, Korson R. Social and economic factors in the choice of lung cancer treatment. A population-based study in two rural states. *N Engl J Med* 1988;318:612–17.

85. Goodwin JS, Hunt WC, Key CR, Samet JM. The effect of marital status on stage, treatment, and survival of cancer patients. *JAMA* 1987;258: 3125–130.

86. Samet J, Hunt WC, Key C, Humble CG, Goodwin JS. Choice of cancer therapy varies with age of patient *JAMA* 1986;255:3385–390.

87. *PDQ® Cancer Information Summaries: Treatment.* National Cancer Institute, February 2003. Available from URL: **http://www.cancer.gov/cancer_information/list.aspx?viewid=5f35036e-5497-4d86-8c2c-714a9f7c8d25**.

88. Beahrs OH, Henson DE, Hutter RV, Myers MH, editors. *Manual for Staging of Cancer*, 3rd ed. Philadelphia, PA: Lippincott, 1988.

89. Ettinger DS, Cox JD, Ginsberg RJ, Komaki R, Kris MG, Livingston RB, Sugarbaker DJ. NCCN non-small cell lung cancer practice guidelines. *Oncology* 1996;10(Suppl S81– S111).

90. Fowler FJ Jr, McNaughton Collins M, Albertsen PC, Zietman A, Elliott DB, Barry MJ. Comparison of recommendations by urologists and radiation oncologists for treatment of clinically localized prostate cancer. *JAMA* 2000;283:3217–222.

91. Harlan LC, Potosky A, Gilliland FD, Hoffman R, Albertsen PC, Hamilton AS, Eley JW, Stanford JL, Stephenson RA. Factors associated with initial therapy for clinically localized prostate cancer: Prostate cancer outcomes study. *J Natl Cancer Inst* 2001;93:1864–871.

92. Morrow M, Strom EA, Bassett LW, Dershaw DD, Fowble B, Giuliano A, et al. Standard for breast conservation therapy in the management of invasive breast carcinoma. *CA Cancer J Clin* 2002;52:277–300.

93. Bradley CJ, Given CW, Roberts C. Race, socioeconomic status, and breast cancer treatment and survival. *J Natl Cancer Inst* 2002;94:490–96.

94. Prehn AW, Topol B, Stewart S, Glaser SL, O'Connor L, West DW. Differences in treatment patterns for localized breast carcinoma among Asian/Pacific islander women. *Cancer* 2002;95:2268–275.

95. Morris CR, Cohen R, Schlag R, Wright WE. Increasing trends in the use of breast-conserving surgery in California. *Am J Public Health* 2000;90:281–84.

96. Johantgen ME, Coffey RM, Harris R, Levy H, Clinton JJ. Treating early-stage breast cancer: Hospital characteristics associated with breast-conserving surgery. *Am J Public Health* 1995; 85:1432–434.

97. Ecsedy J, Hunter D. The origin of cancer. In: *Textbook of Cancer Epidemiology.* Adami H-O, Hunter D, Trichopoulos D, editors. New York: Oxford University Press, 2002, 29–53.

98. Gorey KM, Holowaty EJ, Fehringer G, et al. An international comparison of cancer survival: Toronto, Ontario, and Detroit, Michigan metropolitan areas. *Am J Public Health* 1997; 87:1156–163.

99. Polednak AP. Survival of breast cancer patients in Connecticut in relation to socioeconomic and health care access indicators. *J Urban Health* 2002;79:211–18.

100. Robbins AS, Whittemore AS, Thom DH. Differences in socioeconomic status and survival among white and black men with prostate cancer. *Am J Epidemiol* 2000;151: 409–16.

101. Marcella S, Miller JE. Racial differences in colorectal cancer mortality: The importance of stage and socioeconomic status. *J Clin Epidemiol* 2000;151:409–16.

102. Hodgson DC, Fuchs CS, Ayanian JZ. Impact of patient and provider characteristics on the treatment and outcomes of colorectal cancer. *J Natl Cancer Inst* 2001;93:501–15.

103. Merkin SS, Stevenson L, Powe N. Geographic socioeconomic status, race, and advanced-stage breast cancer in New York City. *Am J Public Health* 2002;92:64–70.

104. Breen N, Figueroa JB. Stage of breast and cervical cancer diagnosis in disadvantaged neighborhoods: A prevention policy perspective. *Am J Prev Med* 1996;12:319–26.

105. Ndubuisi SC, Kofie VY, Andoh JY, Schwartz EM. Black-white differences in the stage at presentation of prostate cancer in the District of Columbia. *Urology* 1995;46:71–77.

106. Singh GK, Siahpush M. Ethnic-immigrant differentials in health behaviors, morbidity, and cause-specific mortality in the United States: An analysis of two national data bases. *Hum Biol* 2002;74:83–109.

107. Powell-Griner E, Anderson JE, Murphy W. State- and sex-specific prevalence of selected characteristics—behavioral risk factor surveillance system, 1994 and 1995. *MMWR CDC Surveill Summ* 1997;46(3):1–31.

108. Shopland DR, Hartman AM, Gibson JT, Mueller MD, Kessler LG, Lynn WR. Cigarette smoking among U.S. adults by state and region: Estimates from the current population survey. *J Natl Cancer Inst* 1996;88:1748–758.

109. Gilpin EA, Stillman FA, Hartman AM, Gibson JT, Pierce JP. Index for U.S. state tobacco control initial outcomes. *Am J Epidemiol* 2000;152: 727–38.

110. Shopland DR, Gerlach KK, Burns DM, Hartman AM, Gibson JT. State-specific trends in smoke-free workplace policy coverage: The current population survey tobacco use supplement, 1993 to 1999. *J Occ Environ Med* 2001;43: 680–86.

111. Centers for Disease Control and Prevention. State-specific adult smoking prevalence, smokeless tobacco prevalence and state tax-paid per capita sales of cigarettes—United States, 1997. *MMWR* 1998;47(43):922–26.

112. Williams GD, Stinson FS, Stewart SL, et al. *Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977–93.* Surveillance Report #35. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, 1995.

113. Blustein J. The reliability of racial classifications in hospital discharge abstract data. *Am J Public Health* 1994;84:1018–21.

114. Stewart SL, Swallen KC, Glaser SL, Horn-Ross PL, West DW. Comparison of methods for classifying Hispanic ethnicity in a population-based cancer registry. *Am J Epidemiol* 1999;149: 1063–71.

115. Swallen KC, Glaser SL, Stewart SL, West DW, Jenkins CNH, McPhee SJ. Accuracy of racial classification of Vietnamese patients in a population-based cancer registry. *Ethn Dis* 1998;8:218–27.

116. Minino AM, Arias E, Kochanek KD, Murphy SL, Smith BL. Deaths: Final data for 2000. *Natl Vital Stat Rep* 2002;50(15):1–120.

117. Rosenberg HM, Maurer JD, Sorlie PD, Johnson NJ, et al. Quality of death rates by race and Hispanic origin: A summary of current research. *Vital Health Stat* 1999;2(128):1–13.

118. Sorlie PD, Rogot E, Johnson NJ. Validity of demographic characteristics on the death certificate. *Epidemiology* 1992;3(2):181–84.

119. MacRae K. Socioeconomic deprivation and health and the ecological fallacy. *BMJ* 1994; 309:1478–479.

120. Ben-Shlomo Y, Davey Smith G. Socioeconomic position should be measured accurately. *BMJ* 1999;318:844–45.