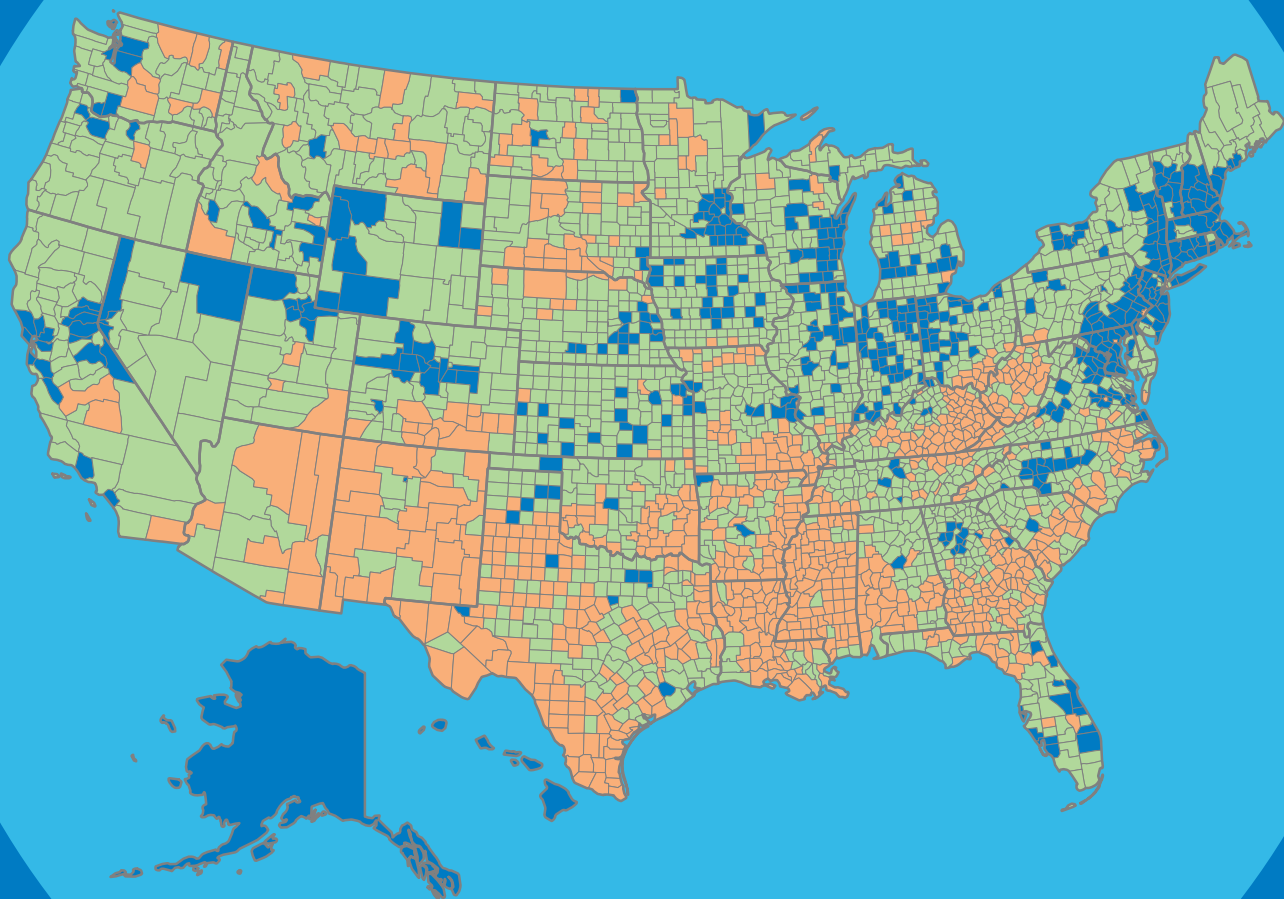


NCI
Cancer Surveillance
Monograph Series,
Number 4

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

Northern California Cancer Center

Connecticut State Department of Health

Emory University

University of Hawaii

The Fred Hutchinson Cancer Research Center

University of Iowa

Wayne State University

University of New Mexico

University of Southern California

University of Utah

Principal Investigator

Dr. Dee W. West

Dr. Anthony P. Polednak
Mr. Daniel Savino

Dr. John L. Young, Jr.
Dr. Jonathan M. Liff

Dr. Marc T. Goodman
Dr. Laurence N. Kolonel

Dr. Thomas L. Vaughan
Dr. Steve Schwartz

Dr. Charles F. Lynch
Dr. Charles E. Platz

Dr. Ann Schwartz
Dr. Kendra Schwartz

Dr. Charles R. Key

Dr. Ronald K. Ross
Dr. Dennis Deapen
Dr. Leslie Bernstein

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.

