
ORIGINAL COMMUNICATIONS

COMPARISONS OF BLACK AND WHITE SMOKING-ATTRIBUTABLE MORTALITY, MORBIDITY, AND ECONOMIC COSTS IN THE DISTRICT OF COLUMBIA

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Cigarette smoking is generally considered to be the most important preventable cause of death in the United States. To determine the public health impact of smoking in the District of Columbia, the DC Commission of Public Health calculated smoking-attributable mortality, morbidity, and economic costs in this predominantly black population. In 1985, an estimated 933 district residents died from smoking-related diseases, resulting in 3535 years of potential life lost. Cigarette smoking contributed to approximately 13.5% of all District deaths in 1985 (N = 6921) and accounted for 30% of all deaths of persons over age 20, far exceeding the affect of other potentially preventable causes of mortality. Black residents, especially black men, shared a disproportionately greater burden of smoking-attributable mortality when compared with white residents. These smoking-attributable deaths resulted in over \$110 million in direct medical and indirect morbidity and mortality costs to District of Columbia residents. The results indicate that

cigarette smoking is a major contributing cause of the black-white disparity in health status in the District of Columbia.

A compelling body of research suggests that cigarette smoking is the principal, single, preventable cause of death and disability in the United States.¹ According to the Surgeon General, cigarette smoking claims an estimated 390 000 lives each year in the US.¹ It is estimated that 30% of all cancer deaths, 87% of lung cancer deaths (the leading cause of cancer mortality), 21% of deaths from coronary heart disease, 18% of stroke deaths, and 82% of deaths from chronic obstructive pulmonary disease are attributable to smoking.¹ In addition to the burden of mortality and morbidity, smoking places an enormous economic burden on the nation. The Office of Technology Assessment has estimated that smoking costs the United States about \$65 billion each year in health care costs and lost productivity²

Smoking may be the single most important preventable risk factor affecting the health of black Americans. According to the 1985 National Health Interview Survey, 41% of black men smoke cigarettes compared with 32% of white men.³ Among women, the smoking prevalence was 32% among blacks compared with 27% among whites. In the District of Columbia, data obtained from a 1985 telephone survey indicate that

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38% of black men and 15% of white men reported smoking cigarettes.⁴ The corresponding smoking prevalence among women was 30% for blacks and 14% for whites. (Smoking prevalence data are for persons 18 years of age and older and are age-adjusted to account for any differences in the distribution of ages of the various sex and race groups.)

Because the smoking prevalence of District blacks is more than twice that of whites, blacks more likely experience a greater burden of smoking-related morbidity and mortality. Although national smoking-attributable mortality data provide an indication of the overall affect of cigarette smoking, states and cities, especially those with substantial black and other minority populations, may benefit from a quantification of the local economic and illness burden of smoking. These data could serve numerous purposes, including assistance in planning, education, and legislative efforts to reduce tobacco consumption.

The District of Columbia comprises 627 400 residents, of whom over 75% are blacks and other minorities.⁵ This report presents the smoking-attributable mortality, morbidity, and economic costs in the District of Columbia for 1985.

METHODS

The Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC) software, developed by the Minnesota Department of Health, was used to calculate the economic and illness burden of smoking.⁶ The SAMMEC software uses the methodology of Rice et al⁷ for estimating, in a defined population, smoking-attributable mortality, years of potential life lost, and economic costs resulting from smoking. This method relies on the epidemiologic measure of smoking-related attributable risk to quantify the fraction of 19 smoking-related conditions. These attributable fractions were calculated based on mortality ratios for the smoking-related diseases and were derived from the landmark studies of Hammond,⁸ Doll and Peto,⁹ and Doll et al.¹⁰

To measure the effect of smoking on the District population, the number of years of potential life lost attributable to smoking was calculated. Years of potential life lost is an epidemiologic measure that accounts for the age at death for each decedent.¹¹ In this analysis, years of potential life lost were calculated by subtracting the age at death of each decedent from age 65. The sum of these numbers provided the total years of productive life lost for each race and sex. Total years of potential life lost were then multiplied by the appropriate attributable fraction to determine that

portion of years lost due to smoking. Compared with mortality data, smoking-attributable years of potential life lost is a more sensitive measure of deaths among younger age groups and may thus be a more accurate indication of the impact of smoking on public health.

The SAMMEC program also estimates smoking-attributable direct and indirect health care costs. Direct costs are defined by Schultz⁶ as costs of medical care in the prevention, diagnosis, treatment and rehabilitation of illness and disease. Direct costs include those incurred for hospitalization, physician services, nursing home care, medications, and other professional services as a result of smoking-attributable illness.

The smoking-attributable indirect morbidity and mortality costs are estimates of lost income and productivity resulting from disability and premature death due to smoking-related disease. Productivity losses are measured as wages, salaries, and supplements from days lost at work and long-term disability from and hospitalization for smoking-attributable illness. The methodology for this calculation also relies on attributable risk and is presented elsewhere.⁷

Data were obtained regarding mortality (cause of death by race, sex, and 5- year age groups), prevalence of smoking, and health care costs. The Department of Human Services Research and Statistics Division provided mortality statistics for the District of Columbia for 1985.⁵ Data on smoking prevalence in the District were obtained from the Commission of Public Health Behavioral Risk Factor Survey carried out in 1985.⁴

Health care costs were computed from statistics obtained from the US Health Care Financing Administration. Per capita District health care expenditures were obtained by adjusting average health care costs for 1982 for Maryland, Virginia, and the District of Columbia to 1985 values. The purpose of obtaining a combined state per capita health care expenditure figure is to reduce the inflated figure generally obtained by dividing total health care costs of the District by its population. This methodology was used because health services for the District are not used exclusively by District residents but are also used by those who live in the Washington, DC, metropolitan area.

RESULTS

Smoking-Attributable Mortality

The extent of smoking-attributable mortality delineated by disease category, race, and sex is presented in Table

TABLE 1. NUMBER OF SMOKING-ATTRIBUTABLE DEATHS BY RACE AND SEX, ADULTS 20 YEARS OF AGE OR OLDER, DISTRICT OF COLUMBIA, 1985

Diagnostic Group (ICD-9)*	Men		Women		Both Sexes	
	White	Black	White	Black	Total	(%)
Lung Cancer (162)	33	155	12	43	243	(26.0)
Other Neoplasms (140-151, 157, 161, 180, 188, 189)	16	94	13	34	157	(16.8)
Ischemic Heart Disease (410-414)	22	59	18	34	133	(14.3)
Other Cardiovascular Disease (401-405, 427.5, 430-438, 440, 441)	15	88	36	104	243	(26.0)
Nonmalignant Respiratory Diseases (480-487, 491-492, 496, 010-012)	38	59	19	23	139	(14.9)
Gastrointestinal Diseases (531-534)	1	12	3	5	18	(2.0)
Total	125	466	100	242	933	(100.0)
Crude Rate†	187	314	124	133	195	
Relative Rate (Black/White)		1.68		1.07		

* From the *International Classification of Diseases*, 9th edition.

† Expressed as the number of smoking-attributable deaths per 100 000 population aged 20 years and above.

1. During 1985, 933 (13.5%) of the 6921 total deaths among District residents were directly attributable to smoking. An estimated 30% of all deaths of persons over age 20 were attributable to smoking. Of the 933 smoking-related deaths, 43% were due to cancer, 40% to cardiovascular disease, and 15% to nonmalignant pulmonary diseases.

Cigarette smoking accounts for a significant percentage of premature deaths among adults in the District of Columbia. The study results indicate that 30% of all deaths between ages 20 and 64 are directly attributable to smoking. The crude smoking-attributable mortality rate by race and sex is shown in Figure 1. Black men have the highest crude mortality rate, followed by white men, black women, and white women.

When examining race and gender differences, black men, who constitute 34% of the total District population, accounted for 50% of the 933 deaths. Black women, who constitute 39% of the population, accounted for 26% of the deaths. Similarly, white men (13% of the population) accounted for 14% of the deaths and white women (14.5% of the population) for 11%. The percent of smoking-attributable deaths from all causes among blacks aged 20 and over was 32%, significantly higher ($P < 0.05$) than the 25% observed among whites. Among adult black men, 40% of the

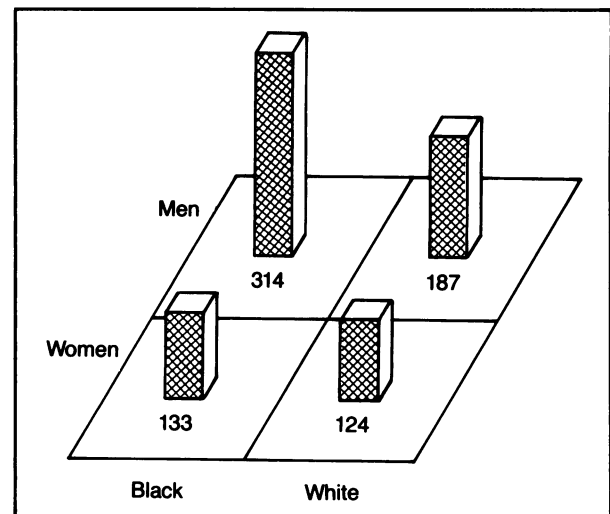


Figure 1. Crude smoking-attributable mortality rates by race and sex, District of Columbia, 1985. Expressed as number of deaths per 100 000 population 20 years of age or older.

deaths were attributed to smoking, significantly higher ($P < 0.05$) than the 31% among white men.

Years of Potential Life Lost

In Table 2, data are presented on years of potential

TABLE 2. SMOKING-ATTRIBUTABLE YEARS OF PRODUCTIVE LIFE LOST* BY RACE AND SEX, ADULT AGES 20-64 YEARS, DISTRICT OF COLUMBIA, 1985

Diagnostic Group (ICD-9)†	Men		Women		Both Sexes	
	White	Black	White	Black	Total	(%)
Lung Cancer (162)	103	680	6	171	960	(27.2)
Other Neoplasms (140-151, 157, 161, 180, 188, 189)	40	527	20	171	758	(21.4)
Ischemic Heart Disease (410-414)	37	424	3	142	606	(17.1)
Other Cardiovascular Diseases (401-405, 427.5, 430-438, 440, 441)	23	457	18	328	826	(23.4)
Nonmalignant Respiratory Diseases (480-487, 491-492, 496, 010-012)	43	182	9	72	306	(8.7)
Gastrointestinal Diseases (531-534)	3	76	0	0	79	(2.2)
Total	249	2346	56	884	3535	(100.0)
Crude Rate‡	434	1803	91	578	879	
Relative Rate (Black/White)	4.15		6.35			

* Years of productive life lost are calculated up to age 65 years.

† From the *International Classification of Diseases*, 9th edition.

‡ Expressed as the number of YPLLs per 100 000 population aged 20-64 years.

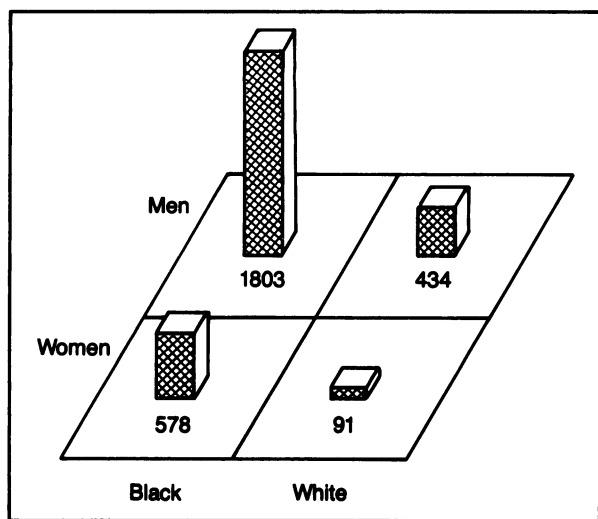


Figure 2. Crude smoking-attributable years of potential life lost rates by race and sex, District of Columbia, 1985. Expressed as number of years of potential life lost per 100 000 population 20-64 years of age.

life lost attributed to smoking for adults aged 20 years or more. Of the estimated 3535 years of productive life lost directly due to smoking, 73% were accounted for by men and only 27% by women. A breakdown by race and sex shows that black men accounted for 66% of the

total years of productive life lost, followed by black women with 25%, white men with 7%, and white women with 2%.

Lung cancer and other neoplastic diseases accounted for the largest percentage of years of potential life lost (49%), followed by cardiovascular diseases with 40%, and nonneoplastic pulmonary diseases with 9%. Black men have consistently higher rates of years of potential life lost than black women for all disease categories; the same is true for white men compared with white women.

Data on smoking-attributable years of potential life lost by race and sex are presented in Figure 2. Black men experienced the highest rate of smoking-attributable years of potential life lost. However, although white men had a higher crude-smoking attributable mortality rate than black women, the order is reversed when smoking-attributable years of potential life lost measures are used. This suggests that black women are dying from smoking-related diseases at a much earlier age than white men.

Smoking-Attributable Morbidity and Costs

Table 3 shows smoking-attributable direct and indirect costs by gender. Cigarette smoking accounted for an estimated \$16 million in direct personal health care expenditures in the District in 1985. This

**TABLE 3. SMOKING-ATTRIBUTABLE DIRECT AND INDIRECT HEALTH CARE COST BY SEX,*
DISTRICT OF COLUMBIA, 1985**

Health Care Cost	Men	Women	Total	(%)
Direct	8858	7139	15 997	(14.5)
Indirect Mortality	56 755	14 892	71 647	(64.9)
Indirect Morbidity	17 286	5539	22 825	(20.6)
Total (%)	82 899 (75.0)	27 570 (25.0)	110 469	(100.0)
Per Capita Cost to Society	285.00	82.00	176.00	

* Expressed in \$1000 units.
Figures may not add due to rounding.

represents 16% of all direct health care expenditures in the District of Columbia. In addition, cigarette smoking accounted for an estimated \$94 million in indirect morbidity and mortality costs. This represents lost income and productivity to District residents from disability and deaths caused by smoking in 1985.

Overall, smoking-attributable disease and death resulted in more than \$110 million in direct medical and indirect morbidity and mortality costs. This translates into a per capita annual cost of \$176 to every citizen in the District of Columbia.

DISCUSSION

According to the Secretary's Task Force Report on Black and Minority Health, blacks and other minorities under age 70 experience 60 000 excess deaths each year compared with the number expected based on white mortality rates.¹² Cardiovascular disease (ie, heart disease and stroke), cancer, and infant mortality account for over 60% of these excess deaths, many of which are attributed to smoking.

The health status of District of Columbia residents mirrors this national picture. Each year an average of 1493 excess premature deaths occur among black District residents, accounting for over 27 500 excess years of potential life lost.¹³ Cardiovascular disease, cancer, and infant prematurity account for half of these excess deaths.

Although a full understanding of the gap between the health of blacks and whites is lacking, most likely a series of complex interrelated factors, rather than a single factor, accounts for the disparity. These factors may include lifestyle elements, such as diet, smoking, alcohol consumption, exercise, as well as access to and utilization and quality of early detection and treatment services. Additional factors may include socioeconomic

variables, such as income, level of educational attainment, and occupational status. This article examined the contribution of only one risk factor, cigarette smoking, to these excess deaths.

According to the Centers for Disease Control, the District of Columbia experienced the highest rate of smoking-attributable years of potential life lost in 1985 when compared with all states.¹⁴ The rate of smoking-attributable years of potential life lost in the District of Columbia in 1985 was 773.6 per 100 000 persons less than 65 years of age—a rate that exceeded the national average of 447.8 per 100 000 persons by 73%. This high rate is likely a reflection of the large proportion of black smokers in the District population and indicates the devastating toll cigarette smoking has taken on blacks in America.

The magnitude of the problem for the District can be put in better perspective by comparing smoking-attributable deaths with mortality due to other causes of public health importance during 1985. In that year in the District of Columbia, there were 272 deaths due to injuries, 204 infant deaths, 168 deaths from liver cirrhosis, 155 drug overdose deaths, 149 homicides, and 143 deaths from acquired immunodeficiency syndrome (AIDS). The 933 smoking-attributable deaths exceeded injury-related deaths by threefold, infant mortality by more than fourfold, and homicide, drug overdose, or acquired immunodeficiency syndrome deaths by more than fivefold.

Many factors may account for this excess smoking-attributable mortality among blacks. In national studies, the probability of smoking is similar among both blacks and whites when socioeconomic variables such as income, education, and employment status are taken into account.¹⁵ For example, smoking prevalence among those without a high school diploma is twice as

high as among college graduates.¹⁶ This suggests that occupational status, low income, and low educational attainment are the key risk factors linked with the unexpectedly high burden of smoking-attributable mortality among black Americans.

In addition, the pattern of smoking differs among blacks and whites in several respects. Black smokers, both men and women, smoke fewer cigarettes per day than whites. However, blacks tend to smoke mentholated brands of cigarettes and those that are higher tar and nicotine.¹⁷ Further, blacks are less likely than whites to quit smoking, regardless of socioeconomic status.¹⁸ Therefore, reducing the disproportionate illness burden of smoking will require development and evaluation of successful smoking prevention and cessation strategies for minorities and disadvantaged populations.^{16,17,19}

In the United States, 5000 new smokers must be recruited to replace the 1000 smokers who die each day from smoking-attributable causes and the 4000 smokers who either quit or die from a non-smoking-related disease.²⁰ Because smoking has become increasingly less attractive to the higher income and more educated segment of America, a larger portion of the annual \$2 billion tobacco industry advertising and promotion budget is being targeted toward groups in which the negative social stigma of smoking has not yet taken hold. The poor, the less educated, blue collar workers, women, and minorities are well-known targets for cigarette advertising.^{1,21,22} Clearly, these same groups should be targeted by public health officials and health professionals for smoking prevention and cessation activities to counteract the effect of current cigarette advertising and promotional strategies.

As the life expectancy for blacks in the United States continues to drop and the concern for the declining health status of black Americans is raised, greater attention will be focused on identifying modifiable causes associated with these problems. This analysis demonstrates that cigarette smoking is a significant preventable factor contributing to the black-white health gap in the District of Columbia. The impact of cigarette smoking on the white population as well, underscores the need for increased national and local efforts to achieve a smoke-free society by the year 2000. Making this goal a reality will require leadership from the black and minority health professional and lay communities as well as a new infusion of resources and creativity aimed at controlling the nation's greatest public health threat.

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