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SMOKING-ATTRIBUTABLE MORTALITY NEW JERSEY, 1996-1998

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Abstract
This report examines the impact smoking tobacco has on mortality in New Jersey. 1996-1998 New Jersey resident death certificate files, Behavioral Risk Factor Surveillance System prevalence estimates, and a computer algorithm which uses prevalence and relative risks to create smoking-attributable fractions were used to estimate deaths attributable to smoking cigarettes. The average annual New Jersey population for 1996-1998 was used to calculate rates and the 1940 U.S. standard million was used to compute age-adjusted rates.

Introduction

One out of every five deaths in the United States is related to cigarette smoking, even though smoking is the most preventable cause of premature death.[1] On average, smokers die nearly seven years earlier than nonsmokers.[2] Despite substantial decreases in the prevalence of smoking among American adults in the 37 years since the first Surgeon General's Report on Smoking and Health, the percentage of adults who are current smokers remains above 20 percent (24.1% in 1998).[3] The most recent Report of the Surgeon General on Women and Smoking noted that approximately 3 million U.S. women have died prematurely of smoking-related diseases since 1980.[4] Currently, women account for 39 percent of all smoking-related deaths in the U.S., a proportion that has more than doubled since 1965.[4] Annually, smoking claims 430,000 lives in the U.S., compared to 41,000 in automobile accidents, 19,000 homicides, and 17,000 deaths to AIDS.[5] Of those deaths attributable to smoking, 29 percent are from lung cancer and 24 percent are from ischemic heart disease.[6]

Data and Methods

To aid in estimating the disease impact of smoking, the U.S. Centers for Disease Control and Prevention (CDC) developed an algorithm which estimates smoking-attributable mortality (SAM). The algorithm, known as SAMMEC, combines data on relative risks and smoking prevalence to create smoking-attributable fractions which are applied to mortality data by age, sex, and cause of death for persons aged 35 and over. The result is an estimate of the number of deaths in each age-sex-cause group which may be attributed to smoking. For this report, the algorithm has been applied to New Jersey resident deaths and smoking prevalence estimates from 1996 to 1998.

The SAMMEC algorithm produces an estimate of deaths attributable to smoking. A few caveats are in order. This estimate is generated through a process which relates smoking prevalence to mortality

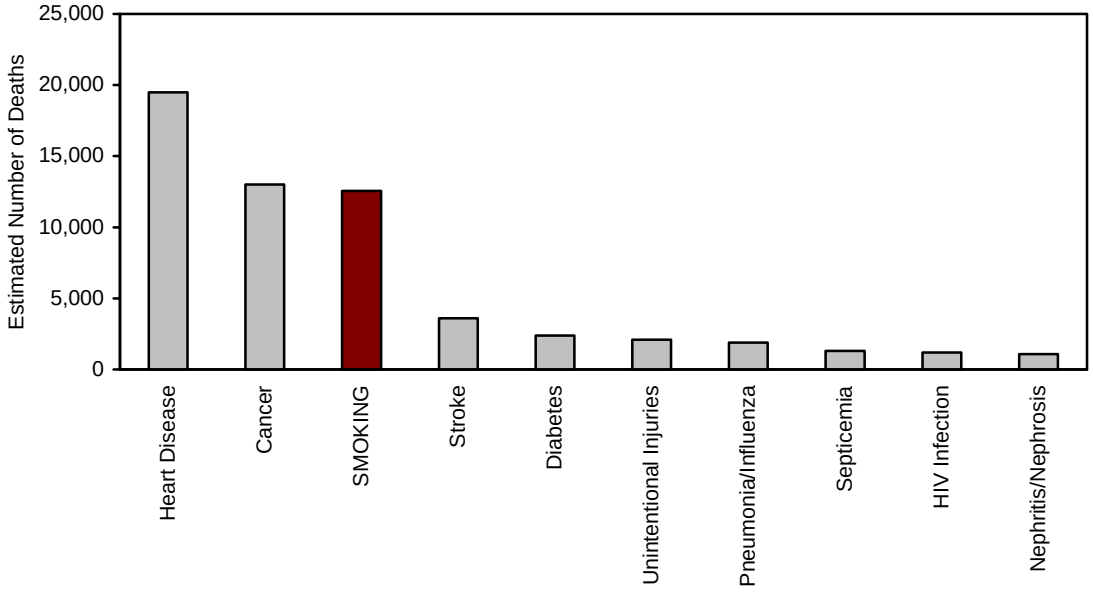
and is based on certain assumptions about initiation and cessation behavior and the average duration of smoking by current and former smokers. Periodically, the model is updated to reflect changes in smoking behavior and treatment-related changes in survival from smoking related causes of death. The model assumes further that smokers are no more likely than non-smokers to die of non-smoking related causes, and that net interstate migration is similar for smokers and non-smokers. These assumptions have left SAMMEC susceptible to criticism by some tobacco groups such as Smokers' Rights Action Group and Forces International.[7] However, the public health community views it as a useful if somewhat crude tool for quantifying the impact of smoking. Additional modules of SAMMEC which estimate smoking-attributable morbidity and economic costs are currently under development by CDC.

Results

It is estimated that 12,564 New Jersey residents died annually during 1996-1998 because of smoking, constituting 17.4 percent of all deaths. The crude mortality rate was 895.4 for all causes of death and the smoking-attributable rate was 156.0 per 100,000 population. The overall age-adjusted mortality rate for 1996-1998 was 461.0. The smoking-attributable age-adjusted mortality rate was 82.7 per 100,000 standard population.

If smoking were considered as a cause of death and deaths due to smoking were removed from the standard cause groups used for ranking, smoking would have been the third leading cause of death in New Jersey in 1996-1998 after heart disease and cancer. Stroke, which is traditionally the third leading cause of death, would then be a distant fourth in rank (Figure 1).

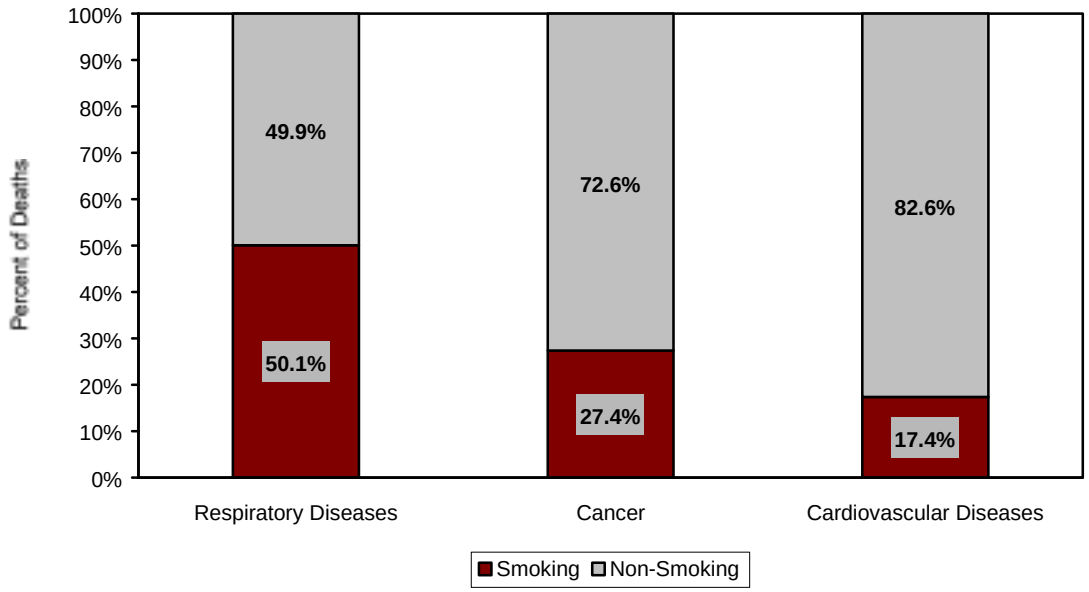
Figure 1. Comparative Causes of Death
New Jersey, 1996-1998 Annual Average



Smoking-attributable causes of death may be grouped into three broad categories: all cancer, cardiovascular diseases (CVD), and respiratory diseases. Smoking is responsible for a significant proportion of all deaths from these causes. Half of respiratory disease deaths, over a quarter of all cancer deaths, and nearly 20 percent of CVD deaths in New Jersey in 1996-1998 were attributable to smoking cigarettes (Figure 2). For more specific causes, the fraction attributable to smoking is even

higher. For example, over three-quarters of trachea, lung, and bronchus cancer deaths; larynx cancer deaths; lip, oral cavity, and pharynx cancer deaths; esophageal cancer deaths; bronchitis and emphysema deaths; and chronic airways obstruction deaths were attributable to smoking.

Figure 2. Percent of Deaths Attributable to Smoking
New Jersey, 1996-1998



As is true nationally, in New Jersey, men are more likely to smoke than women. Between 1996 and 1998, the average annual prevalence of smoking among males 35 and older was 22 percent, as compared with 17 percent for females. Additionally, 37 percent of males and 27 percent of females aged 35 and over reported themselves to be former smokers.[8] Over the three-year period, an average of 7,573 men and 4,991 women died annually in New Jersey due to smoking. The algorithm does not provide relative risks by race or ethnicity and because we cannot assume that smoking effects persons of different races/ethnicities equally, we cannot calculate SAM by race or ethnicity.

Just as smoking prevalence differs for males and females, relative risks differ by gender as well. Conditional upon smoking, males and females do not face equally heightened probabilities of death from common smoking-attributable causes.[4] For example, the relative risks for males for lung cancer is 22.36, while for females it is 11.94. The ranking of the three broad smoking-attributable cause of death groups (CVD, cancer, and respiratory diseases) were the same for both males and females. However, a higher proportion of smoking-attributable deaths among females were from respiratory diseases, relative to males. In fact, the numbers of female smoking-attributable CVD and cancer deaths were about 60 percent of the male numbers but the number of smoking-attributable respiratory disease deaths for women was 93 percent of the number for men (Table 1).

In absolute terms, for all smoking-attributable causes of death, more males died than females with the exception of pancreatic cancer (0.5 male deaths to 1 female death), asthma (0.8:1), rheumatic heart disease (0.8:1), and chronic airways obstruction (0.99:1). The ratio of male deaths to female deaths was highest for kidney and other urinary cancers (7.5 male deaths to 1 female death), followed by larynx cancer (3.7:1), aortic aneurysm (3.4:1), esophageal cancer (3.3:1), and lip, oral cavity, and pharynx cancers (3.2:1) (Table 1).

TABLE 1. SMOKING-ATTRIBUTABLE MORTALITY (SAM) BY SEX AND CAUSE GROUP

ADULTS AGED 35+

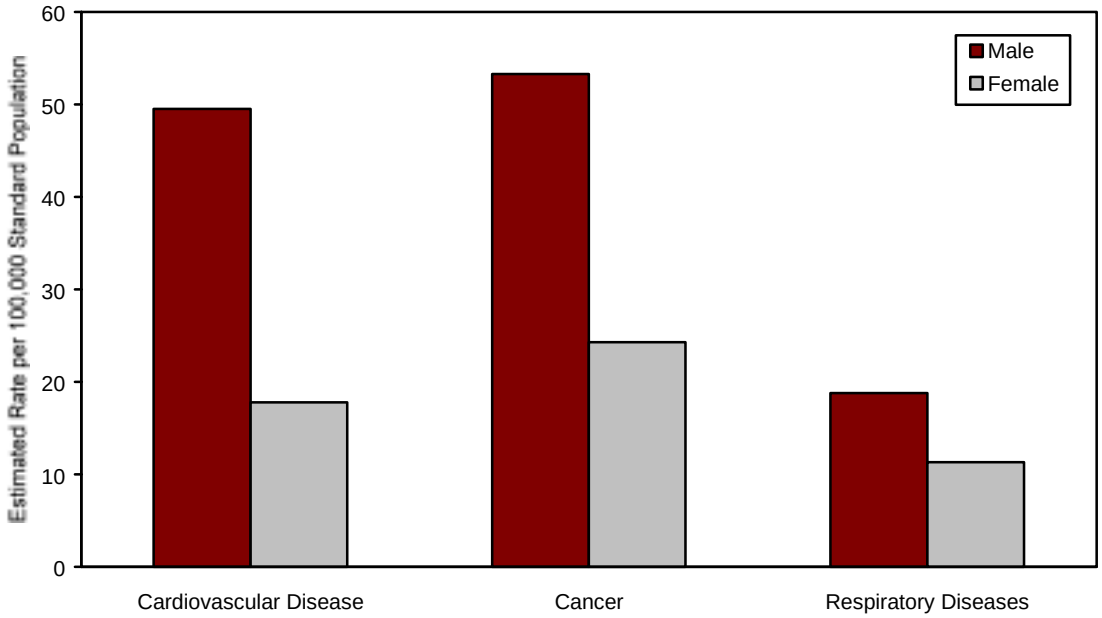
NEW JERSEY, 1996-1998 ANNUAL AVERAGE

SMOKING-RELATED CAUSES OF DEATH (ICD-9 CODES)	MALE	FEMALE	TOTAL
Cancer	**3,087**	**1,816**	**4,903**
Lip, Oral Cavity, Pharynx (140-149)	138	43	181
Esophagus (150)	207	63	270
Pancreas (157)	75	137	212
Larynx (161)	82	22	104
Trachea, Lung, Bronchus (162)	2,377	1,455	3,832
Cervix Uteri (180)	N/A	40	40
Urinary Bladder (188)	118	44	162
Kidney, Other Urinary (189)	90	12	102
Cardiovascular Diseases	**3,133**	**1,915**	**5,048**
Rheumatic Heart Disease (390-398)	10	12	22
Hypertension (401-404)	108	72	180
Ischemic Heart Disease (410-414)	1,657	1,109	2,766
Pulmonary Heart Disease (415-417)	35	24	59
Cardiac Arrest/Other Heart Disease (420-429)	611	338	949
Cerebrovascular Disease (430-438)	398	207	605
Atherosclerosis (440)	95	63	158
Aortic Aneurysm (441)	154	45	199
Other Arterial Disease (442-448)	65	45	110
Respiratory Diseases	**1,353**	**1,260**	**2,613**
Respiratory Tuberculosis (10-12)	2	1	3
Pneumonia, Influenza (480-487)	312	246	558
Bronchitis, Emphysema (490-492)	256	221	477
Asthma (493)	11	14	25
Chronic Airways Obstruction (496)	772	778	1,550
Total	**7,573**	**4,991**	**12,564**

Source: New Jersey Department of Health and Senior Service, Center for Health Statistics
SAMMEC 3.0

Age-adjusted SAM rates were higher for males than for females for all three broad cause of death groups. The total age-adjusted SAM was 121.6 for males and 53.3 for females per 100,000 standard population. Male and female age-adjusted SAM rates for the broad cause groups were as follows: 49.5 and 17.8 for CVD, 53.3 and 24.3 for cancer, and 18.8 and 11.3 for respiratory diseases, respectively (Figure 3). This is due to higher male smoking prevalence and relative risks.

Figure 3. Age-Adjusted SAM Rates by Sex and Cause Group, Adults Aged 35+
New Jersey, 1996-1998 Annual Average



Years of potential life lost (YPLL) is a measure of the number of years of life not lived by each individual who dies before reaching a predetermined age, usually 65. The YPLL for a population is computed as the sum of all the individual YPLL for individuals who died during a specific time period. The average annual YPLL for all causes of death in New Jersey for 1996-1998 for persons 35-64 years old was 171,340 years. Of that, 28,925 YPLL (16.9%) was due to smoking. By sex, 18.1 percent of male YPLL and 14.9 percent of female YPLL for ages 35-64 was due to smoking.

Cancer was the leading cause of smoking-attributable YPLL in New Jersey in 1996-1998, causing 13,340 years of potential life to be lost (8,275 male and 5,065 female). CVD caused a loss of 13,125 years (9,530 male and 3,595 female) and respiratory diseases caused 2,460 years to be lost (1,415 male and 1,045 female).

Another way to consider the impact of smoking on mortality would be to imagine what would happen if no one smoked tobacco. To do this, we must recompute mortality rates without the smoking-attributable deaths. If none of the approximately 830,000 current and 1,360,000 former smokers over age 35 in New Jersey had ever smoked, the average annual number of deaths in 1996-1998 would have been 59,533, the crude death rate would have been 739.4, and the age-adjusted death rate would have been 378.3. Deaths due to lip, oral cavity, and pharynx cancer; esophageal cancer; larynx cancer; trachea, lung, and bronchus cancer; bronchitis and emphysema; and chronic airways obstruction would each decrease by over 70 percent. Life expectancy at birth would increase from 77.2 to 79.6 years.

Conclusion

One-fifth of New Jersey residents over age 35 currently smoke. One-sixth of all New Jersey resident deaths are attributable to smoking. Additionally, smoking has a considerable impact on morbidity and direct and indirect economic costs to society. This analysis has shown that decreases in prevalence could have a sizable impact on deaths, years of potential life lost, and life expectancy. While the prevalence of smoking among Americans has decreased substantially over the past three decades, continued progress must be made to reduce the health impact of cigarette smoking. This includes efforts to promote smoking cessation, prevent initiation of tobacco use, and protect nonsmokers from environmental exposure to tobacco smoke.[1]

References

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