Courting adoption of healthier lifestyles and risk-reduction activities.

REFERENCES
9 Available.

* Categorized as normal weight (body mass index [BMI] of <25 kg/m²), overweight (25 to <30 kg/m²), or obese (≥30 kg/m²), using height and weight reported by participant.

** Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses—United States, 2000-2004

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1 Table omitted

Cigarette smoking and exposure to tobacco smoke are associated with premature death from chronic diseases, economic losses to society, and a substantial burden on the United States health-care system. Smoking is the primary causal factor for at least 30% of all cancer deaths, for nearly 80% of deaths from chronic obstructive pulmonary disease, and for early cardiovascular disease and death.1 In 2005, to assess the economic and public health burden from smoking, CDC published results of an analysis of smoking-attributable mortality (SAM), years of potential life lost (YPLL), and productivity losses in the United States from smoking during 1997-2001.2 The analysis was based on data from CDC's Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC) system,* which estimates SAM, YPLL, and productivity losses based on data from the National Health Interview Survey and death certificate data from the National Center for Health Statistics. This report presents an update of that analysis for 2000-2004, the most recent years for which source data are available. The updated analysis indicated that, during 2000-2004, cigarette smoking and exposure to tobacco smoke resulted in at least 443,000 premature deaths, approximately 5.1 million YPLL, and $96.8 billion in productivity losses annually in the United States. Comprehensive, national tobacco-control recommendations have been provided to the public health community with the goal of reducing smoking so substantially that it is no longer a significant public health problem in the United States.3,4

The adult and maternal and child health SAMMEC software modules were used to estimate SAM, YPLL, and productivity losses attributed to diseases caused by smoking. Sex- and age-specific smoking-attributable deaths were calculated by multiplying the total number of deaths for 19 adult and four infant disease categories by estimates of the smoking-attributable fraction (SAF)† of preventable deaths. The attributable fractions provide estimates of the public health burden of each risk factor and the relative importance of risk factors for multifactorial diseases. Because of the effect of interactions between various risk factors, attributable fractions for a given disease can total more than 100%. For adults, SAFs were derived using sex-specific relative risk (RR) estimates from the American Cancer Society's Cancer Prevention Study-II (CPS-II) for current and former smokers for each cause of death for the period 1982-1988. For ischemic heart disease and cerebrovascular disease deaths, RR estimates also were stratified by age (35-64 years and ≥65 years). Sex- and age-specific (35-64 years and ≥65 years) current and former cigarette smoking prevalence estimates from the National Health Interview Survey also were used to calculate SAFs. For infants, SAFs were calculated by using pediatric RR estimates and maternal smoking prevalence estimates from birth certificates. Smoking-attributable YPLL and productivity losses were estimated by multiplying sex- and age-specific SAM by remaining life expectancy5 and lifetime earnings data.6 In addition, smoking-attributable residential fire-related deaths7 and lung cancer and heart disease deaths attributable to exposure to secondhand smoke8,9 were included in the SAM, but not in YPLL and productivity loss estimates.

During 2000-2004, smoking resulted in an estimated annual average of 269,655 deaths among males and 173,940 deaths among females in the United States. The three leading specific causes of smoking-attributable death were lung cancer (128,922), ischemic heart disease (126,005), and chronic obstructive pulmonary disease (COPD)† (92,915). Among adults aged ≥35 years, 160,848 (41.0%) smoking-attributable deaths were caused by cancer, 128,497 (32.7%) by cardiovascular diseases, and 103,338 (26.3%) by respiratory diseases (excluding deaths from secondhand smoking and from residential fires). Smoking during pregnancy resulted in an estimated 776 infant deaths annually during 2000-2004. An estimated 49,400 lung cancer and heart disease deaths annually were attributable to exposure to secondhand smoke. The average annual SAM estimates also included 736 deaths from smoking-attributable residential fires.

During 2000-2004, on average, smoking accounted for an estimated 3.1 million YPLL for males and approximately 2.0 million YPLL for females annually, excluding deaths from smoking-attributable residential fires and adult deaths from secondhand smoke. Estimates for average annual smoking-attributable productivity losses were approximately $96.8 billion ($64.2 billion for males and $32.6 billion for females) during this period.

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CDC Editorial Note: During 2000-2004, an estimated 443,000 persons in the United States died prematurely each year as a result of smoking or exposure to secondhand smoke. This figure is higher than the average annual estimate of approximately 438,000 deaths during 1997-2001.3 The number of smoking-attributable deaths varies according to trends in smoking prevalence and the number of deaths from diseases caused by smoking. SAM estimates also change when a causal re-
of diseases it causes has remained stable. Although smoking prevalence has declined dramatically since its peak in the 1960s, the number of smoking-attributable deaths has remained relatively unchanged, primarily because of increases in population size (particularly among older age groups). Even with declines in the rates of various smoking-related diseases (e.g., coronary heart disease), the absolute number of deaths is increasing as the total population increases. In addition, cohorts of smokers with the highest peak prevalence have now reached the ages with the highest incidence of smoking-attributable diseases.

The relative risk estimates used in the calculation of SAM have remained the same. In general, the magnitude of the relationship between smoking and the diseases it causes has remained stable over time. However, CDC is continuing to monitor whether the RRs for smoking are changing over time. Future SAMMEC estimates might contain updated RRs, particularly for females, because their adoption of smoking (and hence their duration of smoking) lagged that of males during the early to mid-1900s. Prevalence of smoking among females peaked in the 1960s and in recent cohorts of smokers more closely follows the trend for male smokers. Smoking-attributable fractions are higher for cancers and COPD than for cardiovascular diseases; however, because the absolute number of deaths is highest for coronary heart disease, it contributes a large number of smoking-attributable deaths.

Preventing smoking and increasing cessation rates need to remain priorities of public health professionals who are working to prevent heart disease and stroke. Dramatic declines in smoking-attributable deaths can be achieved by further reducing smoking prevalence rates. Leading causes of death, such as lung cancer and COPD, could become relatively uncommon in future generations if the prevalence of smoking was substantially reduced.

The findings in this report are subject to at least six limitations. First, the estimates understate deaths attributable to tobacco use because estimates of deaths attributable to cigar smoking, pipe smoking, and smokeless tobacco use were excluded. Although the overall prevalence rates of cigar and pipe smoking and use of smokeless tobacco have remained relatively stable, increased public health concerns about these products might warrant including estimates of deaths attributable to these tobacco products in the future. Second, RRs were based on deaths during 1982–1988 among birth cohorts who might have had different smoking histories than current or former smokers (e.g., age of initiation and duration of smoking before quitting). Third, this report used a death–certificate–based definition of COPD, including codes for bronchitis/emphysema and chronic airway obstruction (ICD-10 J44). Therefore, the COPD SAM estimate used for this report might differ from other estimates that use other definitions of COPD.

Fourth, RRs were adjusted for the effects of age but not for other potential confounders. However, research suggests that education, alcohol, and other confounders had negligible additional effects on SAM estimates for lung cancer, COPD, ischemic heart disease, and cerebrovascular disease in CPS-II. Fifth, productivity losses understate the total costs of smoking because costs associated with smoking-attributable health-care expenditures, smoking-related disability, employee absenteeism, and secondhand-smoke–attributable disease morbidity and mortality were not included. Finally, the estimates do not account for the sampling variability in smoking prevalence estimates or RRs.

Cigarette smoking continues to impose substantial health and financial costs on society. During 2001–2004, average annual smoking-attributable health-care expenditures were approximately $96 billion. Accounting for direct health-care expenditures and productivity losses (approximately $97 billion), the total economic burden of smoking is approximately $193 billion per year. By comparison, investments in comprehensive, state-based tobacco prevention and control programs in fiscal year 2007 totaled $595 million, approximately 325 times less than the smoking-attributable costs. Comprehensive statewide tobacco-control programs significantly accelerate declines in consumption and smoking prevalence. By increasing their investment in such programs to the levels recommended by CDC, states can further hasten the reduction in cigarette use and reduce the health and economic burden of smoking.