

**Reported by:** The Carter Center, Atlanta, Georgia. World Health Organization Collaborating Center for Research, Training, and Eradication of Dracunculiasis, Div of Parasitic Diseases, National Center for Infectious Diseases, CDC.

**CDC Editorial Note:** Dracunculiasis is a parasitic infection caused by *Dracunculus medinensis*. Persons become infected by drinking water from ponds contaminated by copepods (water fleas) that contain immature forms of the parasite; 1 year after entering the infected person, adult worms approximately 1 meter (40 inches) in length emerge through skin lesions, usually on the lower limbs, which frequently develop severe secondary bacterial infections. No effective treatment or vaccine for the disease exists, and infected persons do not become immune to future infections by the parasite. However, dracunculiasis can be prevented by (1) filtering drinking water through a finely woven cloth, (2) treating contaminated water with the larvicide Abate® (temephos), (3) educating persons to avoid entering water sources when Guinea worms are emerging from their bodies, and (4) providing clean water from bore-hole or hand-dug wells.<sup>5</sup>

DEPs continue to make progress toward dracunculiasis eradication in all countries with endemic disease other than Sudan and Ghana. In 2003, for the first time, Benin, Côte d'Ivoire, and Niger appear likely to report <100 indigenous cases. Benin (with 18 indigenous cases), Côte d'Ivoire (39 cases), Mauritania (one case), and Uganda (12 cases) appear close to interrupting transmission of the disease. However, armed conflict is delaying eradication in Côte d'Ivoire, Ethiopia, and Uganda. In Ghana, a substantial reduction in the number of cases is expected as a result of efforts begun in 2002. In Sudan, the ongoing civil war remains the greatest obstacle to eradicating dracunculiasis.<sup>6</sup> Negotiating an end to the war is essential for progress toward disease eradication to be achieved.

In those countries in which the incidence of endemic dracunculiasis has declined substantially, the most formidable obstacles to disease eradication are

apathy and complacency. To help address these obstacles, the Carter Center is beginning a media campaign to publicize the DEP campaign's accomplishments and the remaining challenges for key audiences in countries in which the disease is endemic and the international community. More information about the eradication campaign is available at <http://www.cartercenter.org> and <http://www.cdc.gov/ncidod/dpd/parasites/guineaworm>.

#### REFERENCES

6 available

\*Major program partners include the ministries of health in 20 countries in which dracunculiasis is or was endemic, The Carter Center, United Nations Children's Fund (UNICEF), World Health Organization, Bill and Melinda Gates Foundation, other bilateral and private donors, U.S. Peace Corps, and CDC.

## Cigarette Smoking-Attributable Morbidity—United States, 2000

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1 table omitted

EACH YEAR IN THE UNITED STATES, approximately 440,000 persons die of a cigarette smoking-attributable illness, resulting in 5.6 million years of potential life lost, \$75 billion in direct medical costs, and \$82 billion in lost productivity.<sup>1</sup> To assess smoking-attributable morbidity, the Roswell Park Cancer Institute, Research Triangle Institute, and CDC analyzed data from three sources: the Behavioral Risk Factor Surveillance System (BRFSS), the National Health and Nutrition Examination Survey III (NHANES III), and the U.S. Census. This report summarizes the results of that analysis, which indicate that an estimated 8.6 million persons in the United States have serious illnesses attributed to smoking; chronic bronchitis and emphysema account for 59% of all smoking-attributable diseases. These findings underscore the need to expand surveillance of the disease burden caused

by smoking and to establish comprehensive tobacco-use prevention and cessation efforts to reduce the adverse health impact of smoking.

Data on the number of persons by sex, age group (18-34 years, 35-49 years, 50-64 years, and ≥65 years), and race (white or other race) for each state and the District of Columbia were obtained from the 2000 U.S. Census. National estimates of the prevalence of current, former, and never smokers\* were derived from the combined data from the 1999, 2000, and 2001 BRFSS surveys.

Estimates of the prevalence of smoking-related conditions were obtained from the NHANES III survey for 1988-1994 for current, former, and never smokers for each demographic group to estimate the smoking-attributable fractions of morbid conditions. The smoking-related conditions for which data were collected are those categorized by the U.S. Surgeon General as caused by smoking<sup>2</sup> and addressed in NHANES III. Respondents reported whether a "doctor ever told" them if they had any of the following conditions: stroke, heart attack, emphysema, chronic bronchitis, and specific cancer types, including lung, bladder, mouth/pharynx, esophagus, cervix, kidney, larynx, or pancreas. Smoking-attributable morbidity estimates were obtained in two ways. For one estimate, each person was considered as the unit of analysis, and persons with at least one smoking-related condition were counted as having a condition. For the second estimate, the condition was treated as the unit of analysis, so persons with multiple conditions were counted more than once. Estimates were derived separately for each condition, and the total of all conditions was summed.

The number of persons with a smoking-attributable morbid condition was estimated by state and demographic subpopulations from the following five steps: (1) BRFSS smoking status estimates by demographic group were applied to census data to estimate the number of current, former, and never smokers in each demographic group in each state; (2) NHANES III smoking-

related disease frequency data were applied to the numbers from the first step to estimate the number of adults with a smoking-related condition; (3) attributable fractions for current and former smokers in each demographic group were multiplied by the number of persons with a smoking-related disease to yield an estimate of the number of persons with a disease that is attributable to smoking (attributable fraction =  $[\text{disease prevalence rate}_{\text{exposed}} - \text{disease prevalence rate}_{\text{unexposed}}] / \text{disease prevalence rate}_{\text{exposed}}$ ); (4) the numbers obtained from the third step were summed across all demographic categories in each state to yield an estimate of persons with smoking-attributable conditions in each state; and (5) the numbers of smoking-attributable morbid conditions obtained in each state from step four were summed to yield an overall U.S. estimate. Survey design-adjusted variance estimates were calculated for each smoking and disease prevalence by using SUDAAN. The variance estimate for the attributable fraction was calculated by using standard methodology,<sup>3</sup> and a joint 95% confidence interval (CI) was obtained for each attributable fraction by using Bonferroni's adjustment method.<sup>4</sup>

In 2000, an estimated 8.6 million (95% CI=6.9-10.5 million) persons in the United States had an estimated 12.7 million (95% CI=10.8-15.0 million) smoking-attributable conditions. For current smokers, chronic bronchitis was the most prevalent (49%) condition, followed by emphysema (24%). For former smokers, the three most prevalent conditions were chronic bronchitis (26%), emphysema (24%), and previous heart attack (24%). Lung cancer accounted for 1% of all cigarette smoking-attributable illnesses.

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**CDC Editorial Note:** This report provides the first national estimates of the number of persons with serious chronic illnesses caused by smoking and the total number of their smoking-attributable conditions. The findings indicate that more persons are harmed by tobacco use than is indicated by mortality estimates. Examining trends in tobacco-attributable morbidity provides another way to monitor the progress of tobacco-control efforts.

Smoking-attributable mortality estimates published in 2002<sup>1</sup> differ from the estimates described in this report. Mortality data indicate the number of persons who die of a disease each year, and morbidity data from this study are used to estimate the prevalence of persons living with diseases caused by smoking at a point in time. In addition, mortality estimates are based on official cause of death data and smoking-attributable fractions derived from data from the Cancer Prevention Study II, and the smoking-attributable morbidity fractions in this study are based solely on self-reported survey data on diseases addressed in NHANES III.

The findings in this report are subject to at least three limitations. First, the estimates do not adjust for potential confounders (e.g., diet, exercise, or geography) other than age, sex, and race/ethnicity. The impact of confounding was examined in a prospective cohort study of approximately one million persons; findings indicated that adjusting for several demographic, behavioral, medical, and occupational factors reduced the smoking attributable mortality estimate by only 2.5%. However, no analyses have been performed that examine smoking-attributable morbidity or that use a broader range of potential confounders.<sup>5</sup> Second, disease data are self-reported and might not represent the true rate or type of disease. A Canadian study found that the rate of underreporting of the chronic conditions cancer, stroke, and hypertension was approximately two times greater than

the rate of overreporting.<sup>6</sup> In addition, 63% of NHANES III respondents with documented low-lung function (forced expiratory volume in 1 second was <80% of the predicted value) did not self-report any diagnosis of obstructive lung disease.<sup>7</sup> Therefore, these self-reported data are probably substantial underestimates of a true disease burden. Finally, the scope of diseases considered in this report was limited to those diseases for which survey data were available and those the U.S. Surgeon General implicated smoking as the cause. Various additional chronic and acute conditions affect quality of life and are caused by cigarette smoking. Inclusion of additional diseases would increase the amount of morbidity attributable to smoking.

The findings in this report complement CDC mortality data and estimates of the number of adults with chronic diseases caused by smoking. Approximately 10% of all current and former adult smokers have a smoking-attributable chronic disease. Many of these persons are already experiencing decreased quality of life, and society will likely bear substantial direct and indirect economic costs from these diseases.<sup>1</sup> More persons will experience serious chronic diseases attributable to smoking if they continue to smoke.<sup>8</sup> This report underscores the need to expand the implementation of proven strategies to reduce tobacco use such as increasing the cost of cigarettes, increasing clean indoor air regulations, and implementing comprehensive tobacco-use-prevention and cessation programs.

## REFERENCES

8 available

\*Current smokers were defined as persons who reported smoking  $\geq 100$  cigarettes during their lifetime and who now smoke some days or every day. Former smokers were defined as persons who reported having smoked  $\geq 100$  cigarettes during their lifetime but did not smoke at the time of interview. Never smokers were defined as persons who reported having smoked <100 cigarettes during their lifetime.