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Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States

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CONTENTS

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Introduction to the Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States

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With this 2016 *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, CDC is publishing official statistics for the occurrence of nationally notifiable noninfectious conditions and disease outbreaks for the second time in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases and Conditions* (*1*). As was the case for the 2015 *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* (*2*), this joint publication is the result of a request by the Council of State and Territorial Epidemiologists (CSTE) to provide readers with information on all nationally notifiable conditions and disease outbreaks in a single publication.

The 2016 *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* includes for the first time a chapter on acute pesticide-related illness and injury from nonoccupational pesticide exposure whereas the 2015 *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* included only acute pesticide-related illness and injury from occupational exposure (*2*). This summary includes seven chapters addressing the following subjects: acute pesticide-related illness and injury arising from occupational exposure (*3*), acute nonoccupational pesticide-related illness and injury (*4*), cancer (*5*), elevated blood lead levels among children (*6*), elevated blood lead levels among adults (*7*), silicosis (*8*), and foodborne and waterborne disease outbreaks (*9*).

Information on elevated lead exposure is provided in two separate chapters (*6,7*) because the principal source of elevated blood lead levels in children (lead paint in homes) is different from the principal source in adults (lead exposure at work). Responsibilities for monitoring blood lead levels are assigned to different Centers at CDC. The National Center for Environmental Health (NCEH) has primary responsibility for preventing disease from environmental hazards (principally nonoccupational) and manages the Childhood Blood Lead Surveillance (CBLS) system (*7*). The National Institute for Occupational Safety and Health (NIOSH) is responsible for preventing disease from workplace hazards and manages the Adult Blood Lead Epidemiology and Surveillance (ABLES) system (*6*). Information on acute pesticide-related illness and injury also is provided in separate chapters for occupational and nonoccupational exposure (*3,4*). NIOSH led preparation of the chapter on acute occupational pesticide-related illness and injury (*3*), and NCEH led preparation of the chapter on acute nonoccupational pesticide-related illness and injury (*4*). NCEH obtained data on acute nonoccupational pesticide related illness from the NIOSH Sentinel Event Notification System for Occupational Risks (SENSOR)–Pesticides program, which collects data from some states on both occupational and nonoccupational cases.

Each of the seven chapters in this summary presents the most recent statistics available to the applicable CDC program. Local, state, and territorial health departments and other agencies in their jurisdictions (e.g., departments of labor, environmental protection agencies, cancer registries, and their agents) submit data to the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), the National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), NCEH, and NIOSH.

CDC's Center for Surveillance, Epidemiology, and Laboratory Services (CSELS) coordinated the development and publication of this annual summary. Comments and suggestions from readers on this new combined publication are encouraged, including ones about whether the information presented could be made more useful. Comments should be sent to the following e-mail account: NNDSSweb@cdc.gov, and display the term "Noninfectious Disease *MMWR* Report" in the subject line.

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Background

As with nationally notifiable infectious diseases, to prevent and control nationally notifiable noninfectious conditions and disease outbreaks, public health authorities require regular, frequent, and timely information. A brief history of the reporting of nationally notifiable conditions in the United States is available at http://wwwn.cdc.gov/nndss/history.html. In 1961, responsibility for collecting data on nationally notifiable diseases and deaths in 122 U.S. cities was transferred from the National Office of Vital Statistics to CDC.

CDC's collection of data on nationally notifiable noninfectious conditions and disease outbreaks is based primarily on surveillance conducted at the local, state, and territorial levels by health departments and other agencies on reportable conditions in each jurisdiction. Legislation, regulation, or other rules in those jurisdictions require health care providers, hospitals, laboratories, and others to provide information on reportable conditions to public health authorities or their agents. The list of reportable conditions in each jurisdiction varies over time and across jurisdictions. More information is available at http://www.cste.org/?SRCA. Public health surveillance of noninfectious conditions and disease outbreaks at the local, state, and territorial levels protects the public's health by ensuring the proper identification of conditions and health hazards. Public health officials use these data to monitor trends in these conditions, identify populations or geographic areas at high risk, plan prevention and control policies and other interventions, allocate resources effectively, coordinate activities, and assess the effectiveness of their efforts. Local, state, and territorial health departments also use these data to assist the federal government in meeting requirements under the International Health Regulations to identify, respond to, and share information about adverse health events that might constitute a Public Health Emergency of International Concern (PHEIC) (http://www.cdc.gov/globalhealth/ihr). Health departments have agreed to report information about a potential PHEIC to federal agencies (including CDC) that have primary responsibility at the national level for monitoring such events. After evaluating whether an event constitutes a potential PHEIC, CDC notifies the U.S. Department of Health and Human Services (HHS). HHS, after further evaluation, reports potential PHEICs to the World Health Organization (WHO), which might declare the event a PHEIC. More detailed information on this process is found in the *Summary of Notifiable Infections Diseases and Conditions* (*1*) and from WHO (http://apps.who.int/iris/bitstream/10665/43883/1/9789241580410_eng.pdf).

A selected set of reportable conditions is designated as nationally notifiable. For most of these conditions, notifications are submitted to CDC by state, local, and territorial health departments. Public health officials at state, local, and territorial health departments and CDC collaborate in identifying conditions to consider for national notification. CSTE, in consultation with CDC, recommends revisions to the list of nationally notifiable conditions. Conditions are added to the list as new pathogens, environmental hazards, or conditions emerge as public health concerns. Conditions are deleted when surveillance is not found to be useful. Current and historic lists of nationally notifiable conditions and definitions used for classifying and counting cases consistently at the national level across jurisdictions are available at http://wwwn.cdc.gov/nndss. CDC uses these data to monitor trends at the national level, develop and implement programs, allocate resources, and assess the effectiveness of national efforts at prevention and control.

Reporting of conditions at the local, state, and territorial levels is mandated by legislation or regulations at those levels, and submission of notifications to CDC is voluntary. Underreporting of noninfectious conditions and disease outbreaks to local and state health departments occurs, and completeness of reporting and therefore of notification to CDC varies by condition (*3*–*15*).

Although the sources of data for nationally notifiable infectious diseases and nationally notifiable noninfectious conditions and disease outbreaks are the same (i.e., local, state, and territorial jurisdictions' data on reportable conditions) and the purpose is the same (i.e., monitoring and responding to the condition to improve population health), there are a number of variations and differences among the conditions in this annual summary (*1*,*3*–*8*) (https://wwwn.cdc.gov/nndss/conditions/). Case-based surveillance of such nationally notifiable conditions as acute pesticide-related illness or injury, silicosis, and cancer is focused on detecting persons who have a condition that meets the criteria specified in national disease-specific case definitions and on collecting information about those persons' conditions. In contrast, surveillance of outbreaks of foodborne and waterborne illness seeks to identify clusters of sick persons with a common exposure (as opposed to persons with a specific disease). Foodborne disease outbreaks are defined as two or more cases of similar illness resulting from common ingestion of a food. Waterborne disease outbreaks are defined as two or more cases of a similar illness resulting from common exposure to water or water-associated chemicals. Information is collected about the characteristics of the disease outbreaks, including data from epidemiologic and environmental investigations. Even among conditions for which case-based surveillance methods are used, substantial variation exists regarding the meaning of a condition. For example, for a condition such as elevated blood lead levels, surveillance identifies persons who have been exposed to a hazard on the basis of a laboratory test.

In contrast, for many other conditions, a diagnosis based on clinical and/or pathological criteria is needed to meet the case definition for a notification to CDC. This variability makes it challenging for readers to compare statistics easily across conditions and geographic locations.

The meaning of the date of the occurrence of the condition varies among the conditions. For infectious diseases, the meaning of the date varies across jurisdictions as well as by condition and might be a date of symptom or disease onset, diagnosis, or laboratory result; date of death; date the case was reported to a jurisdiction or date the case notification was sent to CDC; or date the criteria in the national surveillance case definition were met (http://wwwn.cdc.gov/nndss/document/MMWR_Week_overview.pdf). For cancer, as for some infectious diseases (including the arboviral diseases, tuberculosis, and human immunodeficiency virus infection diagnosis), the date of occurrence is the date the condition was diagnosed. For silicosis, the date of occurrence is the date of the initial report (e.g., the date of a hospital discharge report, clinician report, or a workers' compensation claim). For lead screening test results, the date of occurrence is the date of a test. For disease outbreaks, the date of occurrence is the date of the illness onset of the first person with a case in the outbreak.

The source and definitions of race and ethnicity also vary over time and among conditions. For example, information about race and ethnicity for lead exposure is based on self-report, whereas for cancer incidence, such information is based on medical records, which might or might not be based on self-report, or comes from matching the names of persons with cancer with lists of surnames for different ethnic groups or with tribal registries. For silicosis, race and ethnicity are based on self-report, report from next-of-kin, or information from medical records. Race- and ethnicity-specific information among the conditions also might vary depending on differences in the jurisdictions' systems for submitting notifications to CDC and the need to protect confidentiality of private health information.

The chapters in this summary use U.S. Census Bureau data sets for the denominators in the rate estimates. However, there is variation across the chapters in which specific U.S. Census Bureau data sets are used.

There are additional notable differences among the chapters in this annual summary concerning the criteria used by CDC programs to determine which case notifications are summarized and published in *MMWR* (i.e., publication criteria). For data on both infectious and noninfectious conditions submitted to CDC from the jurisdictions, the condition or disease must have been designated as a reportable condition in that jurisdiction for the year of notification to CDC. However, CDC publishes information on foodborne and waterborne disease outbreaks in this annual summary even if the condition was not on the jurisdiction's reportable conditions list. Additional criteria, based on characteristics that define the conditions and disease outbreaks (http://wwwn.cdc.gov/nndss/conditions), are used in making a final determination on publication in this annual summary (Box).

BOX. Criteria defining nationally notifiable conditions and disease outbreaks used to determine whether notifications to CDC are published in the annual *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks*

Condition/Outbreak	Classification
Acute nonoccupational pesticide-related illness	Definite, probable, possible, and suspicious
Acute occupational pesticide-related illness	Definite, probable, possible, and suspicious
Cancer	Confirmed
Lead exposure test results in children	Confirmed
Lead exposure test results in adults	Confirmed
Silicosis	Confirmed
Foodborne disease outbreak	Two or more cases of a similar illness resulting from the ingestion of the same food
Waterborne disease outbreak	Two or more cases of a similar illness linked epidemiologically by time and location to exposure to water or water-associated chemicals volatized into the air

Data Sources

Final data for nationally notifiable noninfectious conditions and disease outbreaks are derived from the surveillance systems of the CDC Centers listed below. Requests for further information regarding these data should be directed to the appropriate Division or program:

- **National Center for Chronic Disease Prevention and Health Promotion**
  - Division of Cancer Prevention and Control
    - National Program of Cancer Registries (cancer)
- **National Center for Emerging and Zoonotic Infectious Diseases**
  - Division of Foodborne, Waterborne, and Environmental Diseases
    - Foodborne Disease Outbreak Surveillance System (foodborne disease outbreaks)
    - Waterborne Disease and Outbreak Surveillance System (waterborne disease outbreaks)
- **National Center for Environmental Health**
  - Division of Environmental Hazards and Health Effects
    - Environmental Public Health Tracking Program (acute nonoccupational pesticide-related illness) (from NIOSH Sentinel Event Notification System for Occupational Risks (SENSOR)–Pesticides Program and California Department of Pesticide Regulation)
  - Division of Emergency and Environmental Health Services
    - Childhood Blood Lead Surveillance (lead exposure test results in children)
- **National Institute for Occupational Safety and Health**
  - Division of Surveillance, Hazard Evaluations, and Field Studies
    - SENSOR-Pesticides Program (acute occupational pesticide-related illness)
    - Adult Blood Lead Epidemiology and Surveillance (ABLES) Program (lead exposure test results in adults)
  - Respiratory Health Division
    - State-Based Silicosis Surveillance (silicosis)

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Acute Nonoccupational Pesticide-Related Illness and Injury — United States, 2007–2011

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Preface

CDC's National Institute for Occupational Safety and Health (NIOSH) collects data on acute pesticide-related illness and injury reported by 12 states (California, Florida, Iowa, Louisiana, Michigan, North Carolina, Nebraska, New Mexico, New York, Oregon, Texas, and Washington). This report summarizes the data on illnesses and injuries arising from nonoccupational exposure to conventional pesticides that were reported during 2007–2011. Conventional pesticides include insecticides, herbicides, fungicides, and fumigants. They exclude disinfectants (e.g., chlorine and hypochlorites) and biological pesticides (*1*). This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States,* which encompasses various surveillance years but is being published in 2016 (*2*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases* (*3*). In a separate report, data on illnesses and injuries from occupational exposure to conventional pesticides during 2007–2011 are summarized (*4*).

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Background

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating pests such as insects, mice and small animals, weeds, and fungi (*5*). Types of pesticides include insecticides, herbicides, and fungicides (*5*). In the United States, plant or insect growth regulators, defoliants, and desiccants also are referred to as pesticides (*5*). In 2007, approximately 5.1 billion pounds of pesticides were used in the United States; 17% (857 million pounds) were conventional pesticides. Of the conventional pesticides used in the United States during 2007, approximately 61% were herbicides, 15% were fumigants, 11% were insecticides, 9% were fungicides, and 3% were other conventional pesticides (*6*). During 2007, approximately 80% of conventional pesticide use in the United States was for agricultural use; 12% was for nonagricultural industry, commercial, or government use; and 8% was for home and garden use (*6*).

Pesticides are used in agricultural, residential, recreational, and other settings. Nonoccupational, unintentional exposure to pesticides can occur from any of those uses. Persons might be exposed to low levels of pesticides used commonly in a variety of settings including homes, schools, and hospitals. Exposure could occur from pesticide drift or overspray from an airplane, tractor, or home sprayer onto persons living or going to school near agricultural fields or other application sites. Exposure could occur from consumption of contaminated water or food. Exposure also could occur from improper use, storage, or application of household pesticides such as insect

repellents, foggers, rodent poisons, weed killers, and mosquito or flea and tick control products (*7*).

Pesticides are toxic substances, and exposure to them can cause acute or chronic adverse health effects. This report focuses on pesticide-related illnesses and injuries from acute exposure events (i.e., a single, repeated, or continuous exposure to one or more pesticides that generally occurs for ≤8 hours) (*8*,*9*). U.S. poison control centers collect data on pesticide-related illnesses and injuries from exposure calls, and upload them to the National Poison Data System (*8*). In 2013, of the approximately 2 million exposures that were reported to U.S. poison control centers, approximately 3% were attributed to acute exposures to pesticides (*8*). Pesticides were the eighth most frequent category of substances in poison exposures (intentional and unintentional combined) among children aged ≤5 years and the seventh most frequent category of poison exposures in persons aged ≥20 years (*8*). During 2013, a total of 15,430 pesticide-related illnesses or injuries were documented from 79,405 single substance pesticide exposure calls. Those results consisted of 13,313 minor health outcomes, 2,095 major and moderate health outcomes, and 22 deaths (*8*). Although 94% of the single substance pesticide exposures reported by poison control centers in 2013 were unintentional, 16 of the 22 deaths from pesticides were found to be either intentional suicide or the result of intentional misuse or abuse (*8*).

Surveillance of pesticide-related illness and injury instances can be used to monitor disease trends, detect disease outbreaks, design interventions for disease control and prevention, evaluate the effects of interventions, identify new pesticide-exposure problems, and identify research needs (*9*,*10*). Since 1987, NIOSH has provided financial and technical support for state-based acute pesticide-related illness and injury surveillance programs (i.e., the Sentinel Event Notification System for Occupational Risk [SENSOR]–Pesticides program) (*9*). The Environmental Protection Agency (EPA) also provides funding to NIOSH and three states (Florida, Louisiana, and North Carolina) that participate in the SENSOR-Pesticides program (*9*). All SENSOR-Pesticides program states report cases of acute pesticide-related illnesses and injury to NIOSH. However, not all of the state SENSOR-Pesticides programs collect data on nonoccupational exposures.

Data Sources

Among the 12 states that participate in the SENSOR-Pesticides program, seven states (Florida, Louisiana, Michigan, North Carolina, New York, Oregon, and Washington) routinely collect information on nonoccupational pesticide-related illness and injury. This report summarizes data from these seven SENSOR-Pesticides program states. More information on the SENSOR-Pesticides program is available at http://www.cdc.gov/niosh/topics/pesticides/overview.html.

State-level pesticide-related illness and injury surveillance programs receive case reports about pesticide-related illness and injury from hospitals and health care facilities, laboratories, regional or state poison control centers, agriculture departments, and affected persons or family members (*9*,*11*,*12*). Case ascertainment sources and the agencies to which cases are reported vary by state (*12*).

In Florida, health care practitioners and laboratories are required to report new cases of pesticide-related illness and injury within 24 hours of discovery (*13*). The Florida program also accepts reports from exposed person(s), witnesses, legal services, farmworker advocacy groups, other state agencies, news media representatives, and others willing to report (*14*). In Michigan, health care facilities, health care professionals, and Michigan's Poison Control Center are required to provide reports of chemical poisonings only by request, except in cases of intentional or medicinal poisonings (*15*). The Michigan Department of Health and Human Services (previously known as the Department of Community Health) makes routine and broad-based requests for all unintentional pesticide-related illness reports. Requested reports must be provided within 10 days. Data requests from the state to hospitals are made quarterly. Washington requires that physicians and other health professionals report pesticide-related illness and injury cases to the state health department. Serious or fatal poisonings in Washington must be reported immediately; all others must be reported within 3 days (*16*). In Louisiana, health care providers and poison control centers must report pesticide-related illness to the Louisiana Department of Health and Hospitals (*17*). New York operates a pesticide poisoning registry; physicians and other health care professionals are required to report suspected or confirmed pesticide-related illness and injury cases within 48 hours (*18*). In addition, the program receives reports from the two state poison control centers and pesticide product registrants. In North Carolina, health care providers must report cases of acute pesticide-related illness and injury resulting in death immediately to the state health department or state poison control center; other confirmed or suspicious cases must be reported within 48 hours of diagnosis (*19*). In Oregon, health care providers must report pesticide-related illness and injury cases to their local health department within 24 hours (*20*).

Case Definition

The SENSOR-Pesticides program case definitions for acute pesticide-related illness and injury and reporting details are described in detail elsewhere (*9*). A case of acute pesticide-related illness and injury is characterized by an acute onset of symptoms that are dependent on the formulation of the pesticide product and involve one or more of the following: 1) systemic signs or symptoms (including respiratory, gastrointestinal, allergic, and neurologic), 2) dermatologic lesions, and 3) ocular lesions (*9*). An illness and injury case is considered nonoccupational if the pesticide exposure occurred at some place other than the patient's place of work (*9*).

State SENSOR-Pesticides programs classify pesticide-related illness and injury cases as definite, probable, possible, suspicious, unlikely, insufficient information, asymptomatic, or unrelated. Only definite, probable, possible, or suspicious cases are reportable to NIOSH (*9*). Cases are considered definite if objective evidence (e.g., laboratory, clinical, or environmental evidence) confirms the occurrence of both an exposure and adverse health effects (*9*). A case is considered probable if there is objective evidence of either exposure or adverse health effects. A case is possible if only subjective information (e.g., self-reported information of exposure or adverse health effects) is available. With respect to identifying cases as definite, probable, and possible, the reported health effects must be consistent with the known toxicology of the pesticide to which the patient was exposed. A case is considered suspicious if available toxicologic information is not sufficient (e.g., the pesticide is relatively new and limited human toxicologic data are available) to confirm a causal relationship between the exposure and the adverse health effects (*9*).

The SENSOR-Pesticides program uses standardized criteria to categorize the severity of acute pesticide-related illnesses and injuries (*21*). The program has four categories of severity: death, high severity, moderate severity, and low severity. Death is reported if the outcome of a pesticide-related illness or injury is fatal (*21*). High-severity illness and injury means that the condition is life threatening and requires treatment, usually hospitalization, to prevent death (*21*). Under this category, time lost from work or leisure activity might exceed 5 days. Permanent or long-term disability might result from this level of exposure (*21*). Moderate severity means that the person has systemic signs or symptoms of pesticide-related illness and injury and might lose 3–5 days from work or leisure-time activity. Although adverse effects might be prolonged, no permanent disability or impairment results. In low-severity illnesses and injuries, the person might have signs and symptoms of exposure (e.g., skin, eye, or upper respiratory irritation; headache; fever; fatigue; or dizziness). However, these conditions might resolve without treatment, and <3 days are lost from work or other activities (*21*).

Data Processing and Analyses

During 2007–2011, a total of 5,795 reported cases met the criteria for inclusion in this report. Totals and incidence rates of acute nonoccupational pesticide-related illness and injury cases were calculated by state, sex, and year. U.S. Census Bureau population estimates were used to calculate the incidence rates of pesticide-related illnesses and injury per 100,000 population by state, gender, and year (*22*). Sums of acute nonoccupational pesticide-related illness and injury cases were calculated by pesticide functional classes (i.e., insecticides, herbicides, fungicides, fumigants, rodenticides, and repellents) for the total population. Data were stratified by three age groups: ≤5 years, 6 to <18 years, and ≥18 years. The analyses determined the pesticide categories most often implicated in acute nonoccupational pesticide-related illnesses and injuries for exposure to a single substance and exposure to multiple substances.

Interpreting Data

For several reasons, the data provided in this report (Table 1) (Table 2) are likely to be underestimates of the actual magnitude of acute nonoccupational pesticide-related illness and injury. First, nonoccupational exposure calls reported to poison control centers are self-reported. State surveillance systems rarely capture data on persons who neither call a poison control center nor seek medical care (*8*,*23*,*24*). In addition, an exposed person might not link symptoms to a pesticide exposure, and therefore might not report it (*23*). Second, pesticide-related illnesses and injuries can be difficult to diagnose. The signs and symptoms of pesticide-related illnesses and injuries are similar to other common illnesses (e.g., upper respiratory illness), and some physicians might not recognize and diagnose pesticide-related illnesses and injuries (*23*). Other challenges in diagnosing pesticide-related illnesses and injuries include lack of sufficient environmental data on the exposure and a general lack of clinical tools to diagnose pesticide exposures (*23*). Therefore, the counts and rates presented in this report likely underestimate the magnitude of acute nonoccupational pesticide-related illnesses and injuries.

The higher incident rates of acute nonoccupational pesticide-related illness and injury observed in Louisiana and North Carolina might reflect better case identification and follow-up

TABLE 1. Number and incidence per 100,000 population of acute nonoccupational pesticide-related illness and injury cases — Sentinel Event Notification System for Occupational Risk–Pesticides program, United States, 2007–2011

Characteristic	No.	Population*	Incidence rate†
State			
Florida	1,759	93,477,327	1.88
Louisiana	741	22,423,404	3.30
Michigan	594	49,600,502	1.20
North Carolina	1,547	47,087,962	3.29
New York	346	96,552,793	0.36
Oregon	379	19,004,910	1.99
Washington	429	33,254,981	1.29
Sex§			
Male	2,664	176,658,988	1.51
Female	3,108	184,742,891	1.68
Year			
2007	1,141	71,179,083	1.60
2008	1,220	71,762,644	1.70
2009	1,314	72,278,541	1.82
2010	1,083	72,804,820	1.49
2011	1,037	73,376,791	1.41

* U.S. Census population estimates, summed for the years 2007–2011.
† Per 100,000 population.
§ Information on sex was not available for 23 cases (0.4%) that were excluded from analyses.

TABLE 2. Number and percentage of acute nonoccupational pesticide-related illness and injury cases, by age group, pesticide functional class, and illness and injury severity — Sentinel Event Notification System for Occupational Risk–Pesticides program, United States,* 2007–2011

	Age group (yrs)			
Characteristic	≤5 years† No. (%)	6 to <18 years† No. (%)	≥18 years† No. (%)	All No. (%)
Functional class				
Insecticides	366 (10.0)	383 (10.5)	2,765 (75.9)	3,645 (62.9)
Herbicides	36 (6.0)	58 (9.7)	457 (76.3)	599 (10.3)
Insect repellents	183 (37.3)	106 (21.6)	191 (39.0)	490 (8.5)
Fumigants	14 (13.9)	8 (7.9)	77 ((76.2)	101 (1.7)
Rodenticides	23 (39.0)	3 (5.1)	33 (55.9)	59 (1.0)
Fungicides	0	4 (8.2)	38 (77.6)	49 (0.8)
Other§	47 (11.4)	46 (11.2)	301 (73.2)	411 (7.1)
Multiple	38 (8.6)	42 (9.5)	341 (77.3)	441 (7.6)
Total	707 (12.2)	650 (11.2)	4,203 (72.5)	5,795
Severity				
Low	632 (12.2)	604 (11.7)	3,716 (71.8)	5,173 (89.3)
Moderate	61 (11.2)	44 (8.1)	428 (78.5)	545 (9.4)
High	14 (19.4)	1 (1.4)	55 (76.4)	72 (1.2)
Death	0	1 (20.0)	4 (80.0)	5 (0.1)
Total	**707 (12.2)**	**650 (11.2)**	**4,203 (72.5)**	**5,795**

* Florida, Louisiana, Michigan, North Carolina, New York, Oregon, and Washington.
† Percentages might not total 100% because information on age was lacking for 235 cases (4%) that were excluded from analyses.
§ Includes insect growth regulators, antifouling agents, and other pesticides not otherwise categorized.

rather than a greater prevalence of illness and injuries. In addition, some cases not related to work might have been missed because NIOSH advises states to give priority to work-related cases when staffing limitations preclude follow-up of all cases. Furthermore, some persons might have been identified incorrectly as having acute, nonoccupational pesticide-related illness because the signs and symptoms of pesticide-related illnesses and injuries are similar to those of other causes. Some physicians might not be familiar with the effects of pesticide exposures and diagnostic tests might not be available or rarely performed (*23*).

The pesticides most often implicated in acute nonoccupational pesticide-related illness and injury are listed (Table 3). Data are stratified by whether the person was exposed to a single substance (i.e., the active ingredient). When a person is exposed to a single substance, that substance likely was responsible for illness or injury. This might not be so for persons exposed to multiple substances because any of the other substances in the mixture might have produced the illness or injury (*25*). Pesticide products also contain solvents and other nonactive ingredients, some of which can produce illness (*25*). Because inert ingredients in pesticide products are almost never identified, attribution of illness and injury to these ingredients is not possible (*25*). This report includes only illnesses and injuries caused by exposure to conventional pesticides. Illnesses and injuries caused by chlorine, hypochlorites, and other disinfectants were not included because not all states track such illnesses (often because of resource constraints in the state health department) and therefore including them would have made the rate estimates not comparable across the seven states.

Publication Criteria

This report is limited to cases of unintentional nonoccupational pesticide-related illness and injury, classified as definite, probable, possible, or suspicious. Disinfectant-related cases were excluded because not all state SENSOR-Pesticides programs report these cases.

Highlights

Among the 5,795 cases of acute nonoccupational pesticide-related illness and injury that were reported, 3,108 occurred among females and 2,664 occurred among males (Table 1). Most of cases (73%) occurred among persons aged ≥18 years, and 12% occurred in children aged ≤5 years (Table 2).

Florida had the highest number of cases (1,759), followed by North Carolina (1,547), and Louisiana (741). North Carolina and Louisiana had the highest incidence of cases per 100,000 population (3.29 and 3.30, respectively), followed by Oregon (1.99) (Table 1).

TABLE 3. Number of cases of acute nonoccupational pesticide-related illness and injury, by pesticides most often implicated —Sentinel Event Notification System for Occupational Risk–Pesticides program, United States,* 2007–2011

Pesticide category	Pesticide functional class	No. exposed to single substance†	No. exposed to multiple substances§	Total§
Pyrethroids	Insecticide	1,168	1,541	2,709
Pyrethrins	Insecticide	322	600	922
Organophosphates	Insecticide	282	280	562
Glyphosate	Herbicide	171	128	299
Carbamates	Insecticide	181	84	265
Naphthalene	Insect repellent	135	27	162
Triazines	Herbicides	37	18	55
Imidacloprid	Insecticide	0	88	88
Fipronil	Insecticide	16	95	111
Phosphorus	Fumigant	8	0	8
Thiocarbamates	Fumigant	27	5	32
Sulfur	Insecticide/ Fungicide	38	65	103
Dipyridyls	Herbicide	20	65	85
Pyraclostrtrobin	Fungicide	1	5	6
Chloropicrin	Fumigant	10	5	15
Organochlorines	Insecticides	13	18	31
All other		829	661	1,490
Total		**3,258**	**2,537**	**5,795**

* Florida, Louisiana, Michigan, North Carolina, New York, Oregon, and Washington
† Pesticide active ingredient.
§ Pesticide categories are not mutually exclusive for multiple exposures. Case counts for persons exposed to multiple substances are included in the totals of more than one pesticide category. Therefore, the sum of all case counts (6,943) exceeds the total number of exposed persons (5,795).

Insecticides were responsible for most of the cases (63%), followed by herbicides (10%), and insect repellents (9%) (Table 2). Children aged ≤5 years comprised 39% of all persons with rodenticide cases and 37% of all those with insect repellent cases. Pyrethroids, pyrethrins, and organophosphates were the pesticides most often implicated in single-substance or multiple-substance exposures (Table 3).

Approximately 1% of all cases were fatal or had a high severity of illness and injury. Among the high-severity illness and injury cases, 19% involved children aged ≤5 years, but no deaths were reported for that age group (Table 2).

Children aged ≤5 years accounted for 39% of all cases from exposure to rodenticides and 37% of all cases from exposure to insect repellents. Exposure to rodenticides might be more common in children because rodenticide baits, which are designed to be attractive to animals, might be attractive to children. Therefore, parents should exercise caution when using rodenticides (e.g., store them out of sight and use them out of the reach of children) (*26*). EPA recommends reading and following the usage recommendations on the product label of insect repellents (*27*). EPA also recommends that young children should not handle or spray insect repellents themselves. In addition, parents should not apply these products to children's hands because children frequently put their hands near their eyes or in their mouths (*27*).

Insecticides were responsible for most of the cases across all age groups. EPA recommends the following for the safe use of all pesticides, including insecticides: 1) read and follow the instructions on the label of the pesticide product, 2) keep pesticides in their original containers (do not transfer them to containers that someone might drink from by mistake), 3) use pesticides indoors only when necessary and with adequate ventilation, and 4) store pesticides in a locked cabinet out of reach of children (*28*).

The pesticides most often implicated in acute, nonoccupational pesticide-related illness and injury were pyrethroids and pyrethrins. When used as intended at low levels, the toxicity of these pesticides to humans is low (*29*). However, they can cause harm when not used as recommended (e.g., in larger amounts). Instructions on the product labels should be followed when using these pesticides.

Surveillance of acute nonoccupational pesticide-related illness and injury provides some information on pesticide-related mortality and morbidity incidence and on the pesticides primarily implicated in illness and injury. Obtaining a more in-depth occupational and environmental exposure history (e.g., occupation, name of pesticide product, intended use of pesticide, amount of pesticide exposed to, and route of exposure) in the several settings where these cases are identified could improve identification of pesticide-related illness and injury cases and the pesticide(s) implicated (*23*,*30*).

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Acute Occupational Pesticide-Related Illness and Injury — United States, 2007–2011

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Preface

CDC's National Institute for Occupational Safety and Health (NIOSH) collects data on acute pesticide-related illness and injury reported by 12 states (California, Florida, Iowa, Louisiana, Michigan, Nebraska, North Carolina, New Mexico, New York, Oregon, Texas, and Washington). This report summarizes the data on illnesses and injuries arising from occupational exposure to conventional pesticides from 2007 through 2011. This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, which encompasses various surveillance years but is being published in 2016 (*1*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases* (*2*). In a separate report, data on illnesses and injuries from nonoccupational exposure to pesticides during 2007–2011 are summarized (*3*).

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Background

Pesticides are substances or mixtures of substances intended to prevent, destroy, repel, or mitigate pests (pests include insects, rodents, fungi, and weeds). In 2007, the year with the most currently available data, an estimated 2.1 billion pounds of conventional pesticides were used in the United States (*4*), which represents approximately 22% of the entire worldwide use of these pesticides. Conventional pesticides include insecticides, insect repellents, herbicides, fungicides, and fumigants and exclude chlorine, hypochlorites, and other biocides.

The benefits of pesticides are well recognized and primarily include their role in protecting the food supply and in controlling disease vectors (*5*). However, no form of pest control using pesticides is perfectly safe. Tracking the associated health effects of pesticides can help ensure that no pesticides pose an unreasonable burden (*6*). For this reason, public health surveillance of acute pesticide-related illness and injury serves a vital societal role by assessing the magnitude and characteristics of such illness and injury. Surveillance of acute pesticide-related illness and injury has been endorsed by several professional organizations and federal agencies including the American Medical Association (*7*), the Council of State and Territorial Epidemiologists (*8*), NIOSH (*9*) and the U.S. Government Accountability Office (*10*).

Pesticide products must pass an extensive battery of testing prior to being registered by the Environmental Protection Agency (EPA). This testing forms the basis for the human health and environmental risk assessments conducted by EPA that guide identification of the conditions under which a pesticide can be used. These conditions of use are reflected in pesticide product labeling. Compliance with these use conditions is expected to prevent unreasonable adverse effects to human health and the environment. To verify the real-world effectiveness of pesticide product labeling in preventing adverse human health effects, EPA reviews findings from acute pesticide-related illness and injury surveillance systems. These surveillance data assist EPA in determining whether labeling is effective or if labeling improvements are needed. When health effects occur despite adherence to label instructions, and EPA determines the magnitude to be unreasonable, EPA requires that interventions be instituted that involve changing pesticide use conditions and/or modifying regulatory measures (*11*). Acute pesticide-related illness and injury also can occur because of lack of compliance with existing pesticide regulations. The appropriate interventions for these cases include enhanced training and enforcement.

Data Sources

Acute occupational pesticide-related illness and injury is one of several conditions under surveillance by NIOSH. In 1987, NIOSH established the Sentinel Event Notification System for Occupational Risks (SENSOR)–Pesticides program to track pesticide-related illness and injury in the United States. Detailed information on this program is available at http://www.cdc.gov/niosh/topics/pesticides/overview.html. During 2007–2011, a total of 12 states (California, Florida, Iowa, Louisiana, Michigan, Nebraska [2011 only], North Carolina, New Mexico [2007–2008 only], New York, Oregon, Texas, and Washington) participated in the SENSOR-Pesticides program. All 12 states that participate in the SENSOR-Pesticides program require physicians to report confirmed and suspected cases of pesticide-related illness and injury to state health authorities. Besides identifying, classifying, and tabulating pesticide poisoning cases, states periodically perform in-depth investigations of pesticide-related events, and develop interventions aimed at particular industries or pesticide hazards.

Case ascertainment sources used by the state programs include poison control centers, specific government agencies (e.g., a state's Department of Agriculture), workers' compensation documents, and physician reports. In some states, there are other sources that infrequently identify cases (e.g., medical record reviews, news reports, and reports from worker representatives) (*12*). Staff from some state surveillance programs attempt to interview persons to obtain more details about the event. All states use standardized variables to code available information about a case systematically (*12*).

Persons are considered to have an occupational pesticide-related illness or injury if they became ill or injured soon (i.e., within seconds to hours) after exposure to one or more pesticides. An illness and injury is considered occupational if the pesticide exposure occurred at the person's place of work. Agricultural cases are defined as cases among persons employed in an industry with one of the following codes: agricultural production, excluding livestock (1990 Census Industry Code [CIC]: 010; 2002 CIC: 0170); agricultural production, including livestock (1990 CIC: 011; 2002 CIC: 0180); and agricultural services (1990 CIC: 030; 2002 CIC: 0290). All other occupational cases with known industry are defined as "nonagricultural" cases.

The SENSOR-Pesticides case definition has been described in detail elsewhere (*12*). The definition requires information about pesticide exposure and health effects, which is compared with the known toxicology of the pesticide. Cases are categorized as definite, probable, possible, and suspicious on the basis of the level of detail known for each case. Cases are defined as definite exclusively on the basis of objective data about exposure and health effects (e.g., residues were measured to confirm exposure, and health effects were observed by the examining clinician). Cases are defined as probable on the basis of a mix of objective and self-reported data. Cases are defined as possible on the basis of self-reported exposure and health effects data. With respect to definite, probable, and possible cases, the reported health effects are consistent with the known toxicology of the pesticide that the case was exposed to. Suspicious cases arise when toxicologic information is insufficient to determine a causal relationship between pesticide exposure and illness, often because the given pesticide is relatively new and limited toxicologic data involving humans exist. Often reports of illness and injury cannot be categorized as definite, probable, possible, or suspicious because insufficient information is available about the circumstances of the exposure event or because available evidence suggests that the pesticide exposure either was unrelated to or was unlikely to have caused the observed health effects. Such exposures are not included in the analysis of confirmed illness and injury cases provided in this report.

Illness and injury severity was categorized into four groups using standardized criteria for state-based surveillance programs (*12*). In low-severity cases, the condition usually resolves without treatment and <3 days are lost from work. In moderate-severity cases, the condition is not life threatening but requires medical treatment. No residual impairment is expected, and

time lost from work is ≤5 days. In high-severity cases, the condition is life threatening, requires hospitalization, often has >5 days lost from work, and might result in permanent impairment. Fatal cases of pesticide poisoning were placed in a separate category.

To calculate incidence rates (IRs) of acute occupational pesticide-related illness and injury, CDC obtained denominator data (i.e., hours worked) from the Current Population Survey (CPS) (*13*). The hours worked data were used to derive full time equivalent (FTE) estimates, with one FTE equal to 2,000 hours worked. Denominator data correspond to the states and time periods of numerator availability.

This report includes only acute pesticide-related illness and injury arising from occupational exposures. Furthermore, 12 occupational cases involving exposures with suicidal or homicidal intent were excluded. During 2007–2011, of the 8,383 cases reported to SENSOR-Pesticides not involving suicidal or homicidal intent, 2,606 (31%) were from occupational exposures and are included in the analyses.

Interpreting Data

For multiple reasons, the data provided in this report (Table 1) (Table 2) are likely to be underestimates of the actual magnitude of acute occupational pesticide-related illness and injury (*14*). Many cases of pesticide-related illness or injury never are ascertained because affected persons neither seek medical care, nor call appropriate authorities. Furthermore, because the signs and symptoms of acute pesticide-related illnesses are not pathognomonic, and because most health care professionals are not acquainted with the recognition and management of these illnesses, many persons who seek medical care might not receive an accurate diagnosis (*15*). Even among those who do receive an accurate diagnosis, many cases are not reported to state surveillance systems, despite the fact that each of the participating states has mandatory reporting of occupational pesticide-related illness and injury (*6*). For these reasons, the reported counts and rates provided in this report must be considered minimum estimates. In contrast, some persons might have been categorized incorrectly as having

TABLE 1. Distribution of cases of acute occupational pesticide-related illness and injury, FTE estimates, and incidence rates per 100,000 FTEs, by industrial sector, state, sex, and year of exposure — Sentinel Event Notification System for Occupational Risk–Pesticides program, United States, 2007–2011

	Industrial Sector (CIC codes)								
	All			Agricultural (010–030)			Nonagricultural (all other codes)		
Characteristic	No.*	FTE estimates†	Incidence rate§	No.	FTE estimates†	Incidence rate§	No.	FTE estimates†	Incidence rate§
State¶									
California	**858**	**77,468,156**	**1.1**	306	1,529,999	20.0	483	75,938,157	0.6
Florida	**171**	**40,035,419**	**0.4**	13	222,155	5.9	87	39,823,264	0.2
Iowa	**170**	**7,447,061**	**2.3**	88	344,047	25.6	22	7,103,014	0.3
Louisiana	**98**	**9,394,549**	**1.0**	14	85,432	16.4	40	9,309,117	0.4
Michigan	**190**	**20,083,617**	**0.9**	23	287,402	8.0	153	19,796,215	0.8
Nebraska	**22**	**920,350**	**2.4**	6	61,932	9.7	1	858,418	0.1
New Mexico	**9**	**1,767,303**	**0.5**	0	47,773	0	4	1,719,530	0.2
New York	**38**	**42,269,131**	**<0.1**	5	219,275	2.3	20	42,049,856	<0.1
North Carolina	**168**	**19,837,941**	**0.8**	49	216,678	22.6	103	19,621,263	0.5
Oregon	**55**	**8,253,984**	**0.7**	8	281,245	2.8	28	7,972,739	0.4
Texas	**363**	**54,490,716**	**0.7**	25	882,039	2.8	276	53,608,677	0.5
Washington	**464**	**14,786,285**	**3.1**	296	308,556	95.9	160	14,477,729	1.1
Sex**									
Male	**1,734**	**169,412,691**	1.0	631	3,550,759	17.8	823	165,861,932	0.5
Female	**864**	**127,351,821**	0.7	202	935,774	21.5	550	126,416,047	0.4
Year									
2007	**637**	**61,979,631**	1.0	210	876,815	24.0	334	61,102,816	0.5
2008	**555**	**61,751,566**	0.9	202	909,306	22.2	288	60,842,260	0.5
2009	**431**	**57,059,520**	0.8	125	831,358	15.0	261	56,228,162	0.5
2010	**462**	**57,295,585**	0.8	139	883,451	15.7	249	56,412,134	0.4
2011	**521**	**58,678,210**	0.9	157	985,603	15.9	245	57,692,607	0.4
Total	**2,606**	**296,764,512**	**0.9**	**833**	**4,486,533**	**18.6**	**1,377**	**292,277,979**	**0.5**

Abbreviations: CIC codes = Bureau of the Census industry codes; FTE = full-time equivalent.

* For 396 cases (15%), information on industry was missing.

† The full-time equivalent (FTE) estimates were derived from the hours worked data obtained from the Current Population Survey (CPS) and summed for the years 2007 through 2011 (*9*). One FTE equals 2,000 hours worked. Denominator data corresponds to the states and time periods of numerator availability.

§ Incidence rate per 100,000 FTEs.

¶ All states provided data for 2007–2011 except Nebraska (2011 only) and New Mexico (2007 and 2008 only). The summed FTE estimates include only the years for which there are case data.

** For eight cases, information about sex was missing.

TABLE 2. Distribution of cases of acute occupational pesticide-related illness and injury by industrial sector, pesticide functional class and illness and injury severity— Sentinel Event Notification System for Occupational Risk–Pesticides program, United States, 2007–2011

	Industrial sector (CIC codes)		
	All	Agricultural (010–030)	Nonagricultural (all other codes)
Characteristic	No. (%)	No. (%)	No. (%)
Pesticide functional class			
Insecticides	**912 (35)**	207 (25)	526 (38)
Herbicides	**464 (18)**	146 (18)	246 (18)
Fungicides	**129 (5)**	82 (10)	36 (3)
Fumigants	**229 (9)**	73 (9)	135 (10)
Insecticides and fungicides	**179 (7)**	128 (15)	37 (3)
Other *	**401 (15)**	49 (6)	291 (21)
Multiple†	**292 (11)**	148 (18)	106 (8)
Severity category			
Low	**2,093 (80)**	665 (80)	1,105 (80)
Moderate	**479 (18)**	153 (18)	257 (19)
High and death	**34 (1)**	15 (2)	15 (1)
Total	**2,606**	**833**	**1,377**

Abbreviation: CIC = Bureau of the Census industry codes.

* This category includes plant growth regulators, insect growth regulators, wood treatment products, preservatives and insect repellants.

† Exposed to pesticide products that were classified into more than one functional class, or to more than one pesticide product with each having a different functional class.

acute occupational pesticide-related illness because symptoms for acute illnesses associated with pesticides are nonspecific and not pathognomonic, and diagnostic tests are either not available or rarely performed. In addition, rates of pesticide illness and injury might have been affected by inaccurate estimates of the agricultural industry population. Many workers in this industry are difficult to count because of the transient employment of seasonal and migrant farmworkers and because workers with undocumented U.S. immigration status tend to avoid government contact (*16*). In addition, many agricultural workers have more than one job, and one of these other jobs not involving farming might be the one at which they work the greatest part of the day (*17*). Because CPS employment estimates include only the one job at which the worker worked the largest number of hours, some persons employed in agriculture might not be included in the agricultural employment estimates (*18*). Furthermore, the denominator inaccuracies might vary across states because some states might be more likely to have agricultural workers whose usual residence is elsewhere. Agricultural workers are not included in the CPS population estimates of those states in which they reside only temporarily (*18*).

Although the incidence rates for acute occupational pesticide-related illness and injury were highest in Washington, this finding might not necessarily mean that pesticide exposures are more hazardous or more prevalent in that state. Washington has stronger protections for agricultural workers and a larger and more robust pesticide illness and injury surveillance program when compared to other states, which likely accounts for some of the differences in incidence rates. As an example of stronger worker protections, Washington gives farmworkers the right to organize and bargain collectively, and requires cholinesterase monitoring for some pesticide handlers (*6*). These protections might make farmworkers in Washington less hesitant to seek medical care for pesticide illness and injury. In addition, Washington has a larger number of surveillance program staff (3.75 full-time equivalents [FTEs] versus an average of 1.3 FTEs in other states), and all but one are bilingual Spanish/English speakers. The odds of identifying agricultural worker cases might be improved when surveillance programs have a bilingual staff of ample size, as agricultural workers are often Spanish-speaking (*19*). Although workers' compensation systems can be an important source of case reports, only two states (Washington and California) received reports from this source between 2007 and 2011. The workers' compensation system can be an especially useful reporting source when it is organized as in Washington. For example, the Washington workers' compensation system covers the first visit for any suspected work-related illness or injury, even if the illness or injury is determined not to be work-related. In so far as is known, this benefit does not exist in any other state. In addition, unless Washington employers are able to self-insure, workers' compensation insurance is provided by an exclusive state-fund operated by the Washington State Department of Labor and Industries. No other private workers' compensation insurers exist in the state. This avoids problems that can occur in other states when state authorities either do not receive or incorrectly process information from private workers' compensation insurers. No other SENSOR-Pesticides state provides workers' compensation insurance through an exclusive state-funded program. For all these reasons, case estimates might be more accurate for Washington than for other states, although even the Washington estimates likely underestimate the actual level of occupational pesticide-related illness and injury.

The pesticides most often implicated in acute occupational pesticide-related illness and injury are listed (Table 3). Data are stratified by whether the affected person was exposed to a single substance (i.e., a pesticidal active ingredient). When affected persons were exposed to a single substance, it is very likely that that substance was responsible for illness or injury. However, this might not be so for persons who were exposed to multiple substances because one of the other substances might have produced the illness or injury. Furthermore, pesticide products also contain solvents and other nonactive ingredients, some of which might produce illness. Because the

TABLE 3. Number and percentage of acute occupational pesticide-related illness and injury, by pesticides most often implicated — Sentinel Event Notification System for Occupational Risk–Pesticides program, United States, 2007–2011

		Exposed to single substance*	Exposed to multiple substances	Total
Pesticide category	**Pesticide functional class**	**No. (%)**	**No. (%)**	**No. (%)**
Pyrethroids	Insecticide	299 (54)	256 (46)	**555 (21)**
Organophosphorous compounds	Insecticide	188 (56)	150 (44)	**337 (14)**
Glyphosate	Herbicide	135 (64)	76 (36)	**211 (8)**
Sulfur compounds	Insecticide/Fungicide	83 (39)	128 (61)	**211 (8)**
Pyrethrins	Insecticide	76 (47)	85 (53)	**161 (6)**
Chloropicrin	Fumigant	4 (5)	82 (95)	**86 (3)**
Organochlorine compounds	Insecticide	12 (16)	62 (84)	**74 (3)**
N-methyl carbamates	Insecticide	47 (64)	27 (36)	**74 (3)**
Dipyridyls	Herbicide	34 (49)	36 (51)	**70 (3)**
Phosphorus	Fumigant	61 (95)	3 (5)	**64 (2)**
Thiocarbamates/Dithiocarbamates	Fumigant	46 (79)	12 (21)	**58 (2)**
Pyraclostrobin	Fungicide	33 (67)	16 (33)	**49 (2)**
Fipronil	Insecticide	6 (13)	39 (87)	**45 (2)**
Imidacloprid	Insecticide	1 (2)	40 (98)	**41 (2)**
Triazines	Herbicide	16 (41)	23 (59)	**39 (1)**
Naphthalene	Insect repellent/Fumigant	23 (70)	10 (30)	**33 (1)**
All other		525 (50)	525 (50)	**1,050 (40)**
Total		**1,589 (61)**	**1,017 (39)**	**2,606 (100)**

* A substance is a pesticidal active ingredient.
† Pesticide categories are not mutually exclusive for multiple exposures. Case counts for persons exposed to multiple substances are included in the totals of more than one pesticide category. Therefore, the sum of all case counts (3,158) exceeds the total number of exposed persons (2,606).

identity of nonactive ingredients present in pesticide products is almost never available, attribution of illness and injury to these ingredients is rarely possible. In addition, only illnesses and injuries caused by exposure to conventional pesticides were included in this report. Illnesses and injuries caused by chlorine, hypochlorites, and other disinfectants are not included in this report because not all states capture such illnesses (often because of resource constraints in the state health department) and therefore including them would have made the rate estimates not comparable across the 12 states.

Publication Criteria

Cases met the print criteria if the affected person had confirmed acute occupational pesticide-related illness or injury, the person was exposed to conventional pesticides, the pesticide exposure occurred at the person's place of work, no suicidal or homicidal intent was associated with the exposure, and the illness occurred during January 1, 2007–December 31, 2011.

Highlights

During 2007–2011, a total of 2,606 cases of acute occupational pesticide-related illness and injury were identified in 12 states (Table 1). Rates of illness and injury among agricultural industry workers (18.6/100,000) were 37 times greater than the rates for nonagricultural workers (0.5/100,000). Rates were found to be highest in Washington. Most affected persons were exposed to insecticides or herbicides (Table 2). Among persons exposed to insecticides, the chemical classes most often involved were pyrethroids, organophosphates, sulfur compounds, and pyrethrins (Table 3). Among persons exposed to herbicides, the specific herbicides most commonly involved were glyphosate and the dipyridyls (i.e., paraquat and diquat). A total of 80% of cases were classified as low severity, 18% were moderate severity, and 1% were high severity. Two affected persons died.

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Surveillance for Cancer Incidence and Mortality — United States, 2012

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Preface

This report provides, in tabular and graphic form, official federal statistics on the occurrence of cancer for 2012 and trends for 1999–2012 as reported by CDC and the National Cancer Institute (NCI) (*1*). Cancer incidence data are from population-based cancer registries that participate in CDC's National Program of Cancer Registries (NPCR) and NCI's Surveillance, Epidemiology, and End Results (SEER) program reported as of November 2014. Cancer mortality data are from death certificate information reported to state vital statistics offices through 2012 and compiled into a national file for the entire United States by CDC's National Center for Health Statistics' (NCHS) National Vital Statistics System (NVSS). This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, which encompasses various surveillance years but is being published in 2016 (*2*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases* (*3*).

This report presents information on new cancer cases and deaths for 2012. The number and rate of cancer cases and deaths are stratified by the primary cancer sites as reported for 2012; information is provided by demographic characteristic (e.g., sex, age, race, and ethnicity) and primary cancer site (68 selected sites among men and 72 selected sites among women). Age-adjusted cancer incidence and death rates are shown by primary site and year for the period 1999–2012. Age-adjusted cancer incidence and death rates for the most common sites are shown by race, sex, and ethnicity for 2012, the most recent year for which incidence data are available. Maps of the United States display age-adjusted cancer incidence and death rates, presented by quartiles, for 2012. Time trends in age-adjusted cancer incidence and death rates during 1999–2012 are shown by race, sex, and ethnicity for all sites combined, colorectal, lung and bronchus, prostate, and female breast.

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Background

Cancer comprises a diverse mix of diseases occurring in every part of the body and is a leading cause of death in the United States (*4*). More than half of cancer cases could be prevented (*5*). Surveillance of cancer incidence and mortality can help public health officials target areas for control efforts (*6*) and track progress toward meeting the national health objectives set forth in *Healthy People 2020* (*7*). Cancer is a reportable disease in every state and thus all hospitals, physicians' offices, pathology laboratories, and other medical facilities are required to submit data on all reportable cancer diagnoses to a central cancer registry at the state or territorial level. A cancer registry is a database that contains individual records of all reportable cancer cases in a defined population and includes patient demographics, tumor characteristics (e.g., cancer site and pathology), and information about the notifying health provider or facility. In 1992, Congress established NPCR by enacting the Cancer Registries Amendment Act (Public Law 102-515) (*8*). Administered by CDC, NPCR collects data on the occurrence of cancer and the type, extent, and location of the cancer. Before NPCR was established, 10 states had no registry, and most states with registries lacked the resources and state legislation needed to gather complete data (*9*). Presently, NPCR supports central cancer registries in 45 states, the District of Columbia (DC), Puerto Rico, and the U.S. Pacific Island Jurisdictions. NPCR data represent 96% of the overall U.S. population. Together, NPCR and NCI's SEER Program collect data for the entire U.S. population. Cancer control planners and others can identify variations in cancer rates by population subgroups and monitor trends over time to guide the planning and evaluation of cancer prevention and control programs and allocation of health resources.

Data Sources

Data about cancer incidence and mortality in the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* come from the official federal statistics on cancer, the U.S. Cancer Statistics (USCS) dataset (*1*). The USCS dataset includes cancer incidence data from NPCR registries in 45 states and

DC (cancer incidence data from Puerto Rico and the U.S. Pacific Island Jurisdictions were not available for this analysis) and from SEER program registries in the remaining five states (Connecticut, Hawaii, Iowa, New Mexico, and Utah) and cancer mortality data from NVSS.

Incidence Data

The primary source of data on cancer incidence is medical records. Staff at health care facilities abstract data from patients' medical records, enter it into the facility's own cancer registry if it has one, and then send the data to the regional or state registry. Both NPCR and SEER registries collect data using uniform data items and codes as documented by the North American Association of Central Cancer Registries (NAACCR). This uniformity ensures that data items collected by the two federal programs are comparable (*10*,*11*). Information on primary site and histology is coded according to the International Classification of Diseases for Oncology, Third Edition (ICD-O-3) and categorized according to the revised SEER recodes dated January 27, 2003, which define standard groupings of primary cancer sites (http://seer.cancer.gov/siterecode) (*12*). Beginning with 2010 diagnoses, cases were first classified by anatomic site using ICD-O-3; cases with hematopoetic histologies were further classified by using the 2008 WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues (*13*). Data from the NPCR registries provided in this report were reported to CDC as of November 30, 2014. Data from SEER registries were reported to NCI as of November 1, 2014.

NPCR and SEER cancer registries consider as reportable all incident cases with a behavior code of 2 (in situ, noninvasive) or 3 (malignant, primary site only) in ICD-O-3. Exceptions include in situ cancer of the cervix and all basal and squamous cell carcinomas of the skin, except for those on the skin of the genital organs (*12*). Beginning with 2001 diagnoses, several cancers that are coded as malignant in ICD-O-3 were not coded as malignant in ICD-O-2 (*10*). Additional information is provided in the USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IncidenceDataSources).

Mortality Data

Cancer mortality statistics are based on information from all death certificates filed in the 50 states and DC and processed by NVSS at NCHS (*14*). The cancer mortality data were compiled in accordance with World Health Organization regulations, which specify that member nations classify and code causes of death in accordance with the current revision of the International Classification of Diseases (ICD) (*15*). For consistency with the data on cancer incidence, the cancer sites in mortality data were grouped according to the revised SEER recodes dated January 27, 2003 (available at http://seer.cancer.gov/codrecode). Data for a specific calendar year are based on records of deaths that occurred during that calendar year and received by a particular date; for example, mortality data for 2012 are based on records of deaths that occurred during 2012 and were received as of June 30, 2014. Additional information is provided in the USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=MortalityDataSources).

Population Estimates

Population denominators are race-specific, ethnicity-specific, and sex-specific county population estimates from the U.S. Census, modified by SEER and aggregated to the state and national level. Additional details about population data are available at http://seer.cancer.gov/popdata/index.html.

Interpreting Data

Incidence Data

Each year, state cancer registries submit cancer cases for a new diagnosis year and an updated version of the previous years' cancer cases to CDC or NCI. Therefore, each year, when USCS data are published, updates to the previous year's data are published, using the most recent data submission and the most recent population data. Users of cancer incidence data published by federal agencies should be mindful of the data submission dates for all data used in their analyses.

Mortality Data

Cancer mortality statistics in USCS are influenced by the accuracy of information on the death certificate. Unlike incidence data, mortality data for a calendar year are considered complete when submitted and so are not updated after the aggregate data file is released. Mortality data for the entire United States refer only to deaths that occurred within the United States; data for geographic areas are provided by the decedent's place of residence.

Race and Ethnicity Data

For cancer incidence, race and ethnicity data are abstracted from medical records and grouped into categories (*11*). When cancer mortality is reported, race and ethnic origin are recorded separately on the death certificate by the funeral director as

provided by an informant or, in the absence of an informant, on the basis of observation (*16*).

Differences in rates among racial and ethnic populations should be interpreted with caution. A study using SEER incidence data suggests that the quality of data on race in cancer registries is considered excellent for whites, blacks, and Asians/Pacific Islanders, good for Hispanics, and poor for American Indians/Alaska Natives (*17*). Previous studies involving cancer mortality data demonstrate that death rates for whites and blacks generally are estimated accurately whereas death rates for Asians/Pacific Islanders, American Indians/Alaska Natives, and Hispanics are underestimated (*18*). For this reason, incidence and mortality data provided in this report might be underestimated for these groups, possibly because of misclassification of race or Hispanic ethnicity.

Three NPCR registries (Delaware, Kentucky, and South Carolina) opted not to present state-specific Asian/Pacific Islander counts and rates. Five NPCR registries (Delaware, Kentucky, Massachusetts, Pennsylvania, and South Carolina) opted not to present state-specific Hispanic (classified by the NAACCR Hispanic Identification [NHIA] Algorithm) counts and rates (*19*). Cancer registries regularly link their database to the Indian Health Service patient registration dataset to reduce misclassification of race for American Indian/Alaska Native cases. Seven NPCR registries (Delaware, Illinois, Kansas, Kentucky, New Jersey, New York, and South Carolina) opted not to present state-specific American Indian/Alaska Native counts and rates. However, in each of these cases, the aggregate national rates presented in this report include data for these registries.

Methods for Identifying Cancer

Medical facilities such as hospitals, doctors' offices, and pathology laboratories send information about cancer cases to their cancer registry. Most information comes from hospitals, where highly trained cancer registrars transfer the information from the patient's medical record to the registry's computer software using standardized codes. The data are then sent to the central cancer registry. Every year the central cancer registries electronically submit incidence, demographic, and clinical data to NPCR or SEER.

Population Coverage

The population coverage for incidence data varies by diagnosis year. Population coverage might be affected by the suppression of state incidence data, if a state did not meet the publication criteria or did not submit data. In addition, state incidence data might be suppressed if <16 cases were reported or if the state requested that the data be suppressed. Additional information is provided by the USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=CensusRegionPubCriteria). Mortality data from malignant neoplasms (i.e., cancers) as recorded in the NVSS from the 50 states and DC are available in USCS, and thus 100% of the U.S. population is covered each year. However, state death data might be suppressed if <16 deaths were reported.

Suppression of Rates and Counts

When the numbers of cases or deaths used to compute rates are small, those rates tend to have poor reliability. Therefore, in an effort to discourage misinterpretation or use of rates or counts that are unstable because case or death counts are small, incidence and death rates and counts of <16 are not shown in tables and figures. The use of a threshold value for suppressing cells helps protect the confidentiality of patients by reducing or eliminating the risk for disclosure of their identity. Additional information is provided in the USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=Suppression).

Publication Criteria

Cancer incidence data that appear in this report are derived from state cancer registries that have high-quality cancer incidence data for individual (e.g., 2012) and combined (e.g., 1999–2012) years as demonstrated by meeting all of the following criteria on data quality for all cancer sites combined:

- case ascertainment is ≥90% (margin of error +5%) complete,
- ≤5% of cases are ascertained solely on the basis of a death certificate,
- ≤3% of cases are missing information on sex,
- ≤3% of cases are missing information on age,
- ≤5% of cases are missing information on race, and
- ≥97% of the registry's records passed a set of single-field and inter-field computerized edits that test the validity and logic of data components.

Additional information about USCS is available at http://www.cdc.gov/uscs/.

Highlights

Incidence and Death Rates

In 2012, approximately 1.5 million invasive cancers were diagnosed in the United States, an annual incidence rate of 440 cases per 100,000 persons (Table 1). In the same year,

approximately 582,600 persons died of cancer nationally, an annual death rate of 166 deaths per 100,000 persons (Table 2). By state, overall (all cancer sites combined) cancer incidence rates in 2012 ranged from 371 to 515 cases per 100,000 persons (Table 3), and overall cancer death rates ranged from 129 to 201 deaths per 100,000 persons (Table 4).

Cancer incidence (Table 5) and death (Table 6) rates increase with age. In 2012, among persons in the youngest age group (<15 years), 9,967 new cancer cases (rate: 17 cases per 100,000 persons) and 1,367 cancer deaths (rate: two deaths per 100,000 persons) were reported. Among persons aged ≥65 years, 826,841 new cancer cases (rate: 1,933 cases per 100,000 persons) and 403,497 cancer deaths (rate: 935 deaths per 100,000 persons) were reported. Overall, 54% of cancer cases and 69% of cancer deaths in 2012 occurred among persons aged ≥65 years.

Overall and for many cancer sites, males had higher incidence (Table 7) and death rates (Table 8) than did females. In 2012, blacks had the highest cancer incidence (Table 9) and death (Table 10) rates in the United States, and American Indians/Alaska Natives and Asians/Pacific Islanders had the lowest cancer incidence and death rates. Overall and for most cancer sites, Hispanics had lower cancer incidence (Table 11) and death rates (Table 12) than did non-Hispanics. Differences in cancer rates by race and ethnicity (Figure 1) might reflect differences in risk factors, screening, and treatment although rates among some populations might be underestimated because of problems ascertaining race or ethnicity.

By state and site, cancer incidence rates in 2012 ranged from 70 to 157 per 100,000 males for prostate cancer, 107 to 141 per 100,000 females for breast cancer, 4 to 10 per 100,000 females for cervical cancer, 29 to 92 per 100,000 persons for lung cancer, and 30 to 49 per 100,000 persons for colorectal cancer (Figure 2). By state and site, cancer death rates in 2012 ranged from 13 to 32 per 100,000 males for prostate cancer, 16 to 31 per 100,000 females for breast cancer, 1 to 5 per 100,000 females for cervical cancer, 20 to 69 per 100,000 persons for lung cancer, and 11 to 19 per 100,000 persons for colorectal cancer (Figure 3).

Differing rates of cancer by race, ethnicity, and state of residence indicate that for some populations, *Healthy People 2020* objectives have already been achieved, whereas objectives for other populations have not been met and these populations might benefit from targeted cancer prevention and control efforts.

Four cancer sites accounted for 49% of all cases diagnosed in 2012, including 224,147 female breast cancers, 210,828 lung and bronchus cancers (111,395 among men and 99,433 among women), 177,489 prostate cancers, and 134,784 colon and rectum cancers (70,204 among men and 64,580 among women) (Table 13). These four sites also accounted for 48% of cancer deaths in 2012, including 157,423 lung cancer deaths, 51,516 colon and rectum cancer deaths, 41,150 female breast cancer deaths, and 27,244 prostate cancer deaths (Table 14).

Time Trends in Incidence and Death Rates

On the basis of data from registries meeting data quality criteria during 1999–2012, cancer incidence rates declined from 484 cancer cases per 100,000 population in 1999 to 434 cases in 2012 (Table 15). Although lung cancer incidence declined steadily among men from 1999 to 2012, it increased among women from 1999 to 2005 and has since declined from 2005 to 2012. Prostate cancer incidence declined from 170 cases per 100,000 men in 1999 to 105 cases in 2012. Colorectal cancer incidence declined from 56 cases per 100,000 persons in 1999 to 39 cases in 2012. Female breast cancer incidence declined from 135 cases per 100,000 women in 1999 to 121 cases in 2005, increased to 125 cases in 2009, and declined again to 122 cases in 2012. Time trends in cancer incidence rates are presented by cancer site, sex, and race (Figure 4) and by cancer site, sex, and ethnicity (Figure 5). During 1999–2012, cancer death rates declined from 201 deaths per 100,000 persons in 1999 to 166 deaths in 2012; during the same period, death rates declined for each of the four most common cancers (Table 16). Time trends in cancer death rates are presented by cancer site, sex, and race (Figure 6) and by cancer site, sex, and ethnicity (Figure 7).

National cancer surveillance data help public health officials track progress toward achieving the national cancer objectives set forth in *Healthy People 2020* (*20*). For the national cancer burden to be reduced and *Healthy People 2020* targets to be met, behavioral and environmental factors that increase cancer risk must be reduced, and high-quality screening services, timely follow-up, and evidence-based treatments must be available and accessible to all persons. Several effective primary and secondary prevention measures, such as vaccination against infectious agents that cause cancer (i.e., hepatitis B virus and human papillomavirus), help with smoking cessation, and cancer screening, when effectively implemented and sustained, could reduce the number of new cancer cases and prevent many cancer-related deaths (*21*). Evidence-based interventions can be implemented at both the individual level and the population level to reduce cancer risk factors, promote healthy living, and encourage cancer screening (*5*).

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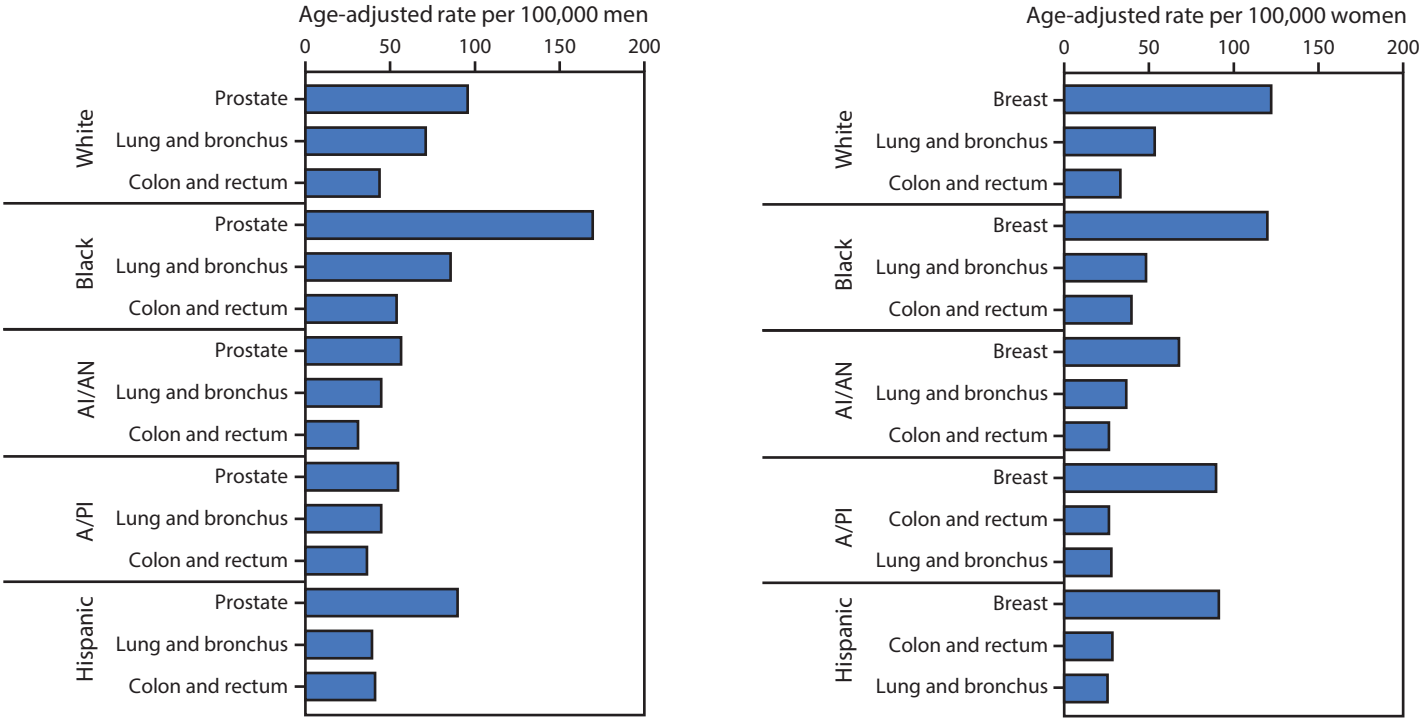
FIGURE 1. Age-adjusted rate* of invasive† cancer cases for most common sites, by sex and race/ethnicity§ — United States, 2012¶



Abbreviations: AI/AN = American Indian/Alaska Native; A/PI = Asian/Pacific Islander.

Sources: CDC's National Program of Cancer Registries and National Cancer Institute's Surveillance, Epidemiology, and End Results program.

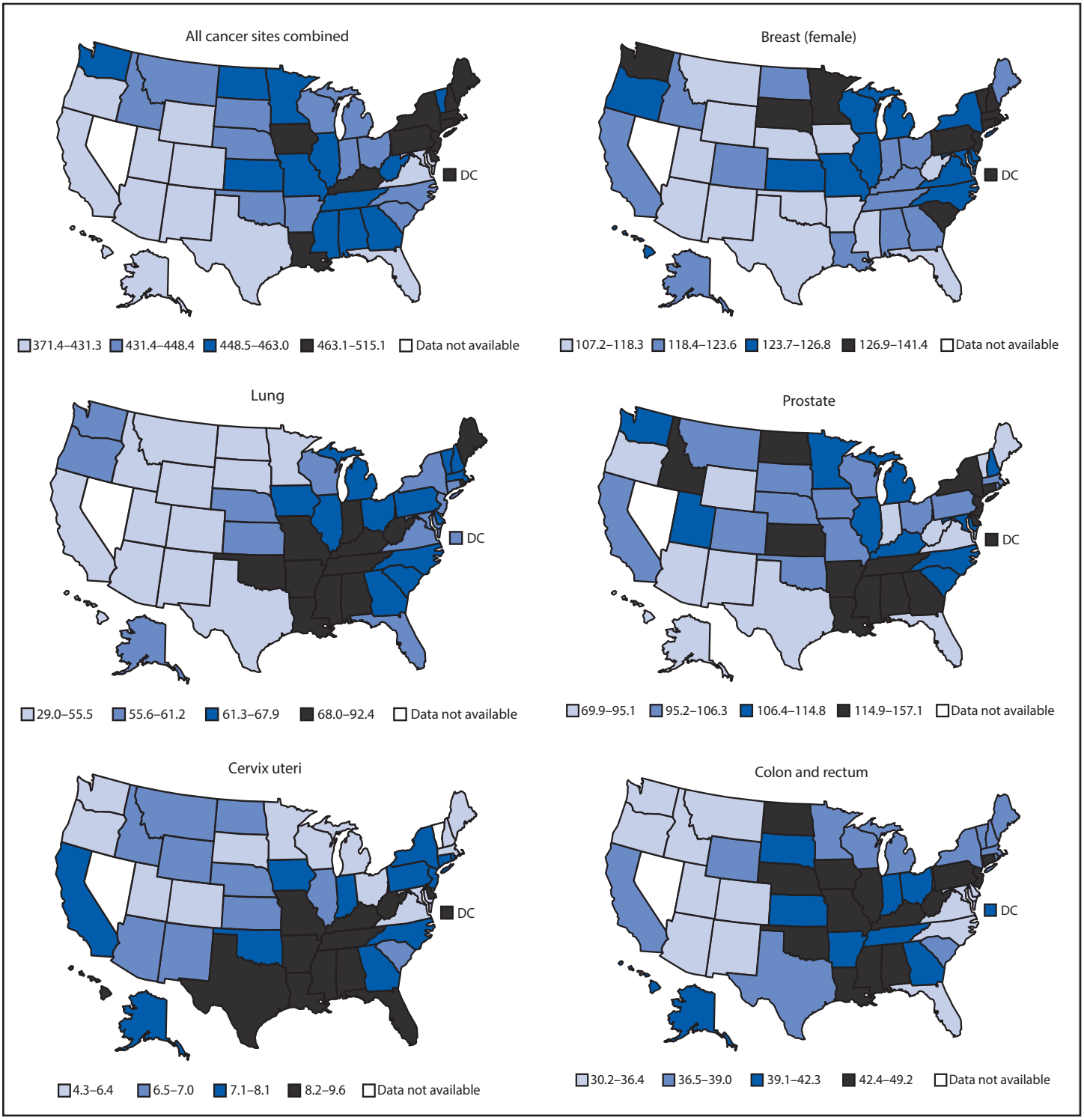
* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Race categories are not mutually exclusive from Hispanic origin. Rates are not presented for persons of unknown or other race. Data for specified racial or ethnic populations other than white and black should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

¶ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria. Caution should be used when comparing incidence and death rates because of the difference in population coverage.

FIGURE 2. Age-adjusted rate* of invasive† cancer cases, by primary cancer site and state — United States, 2012§

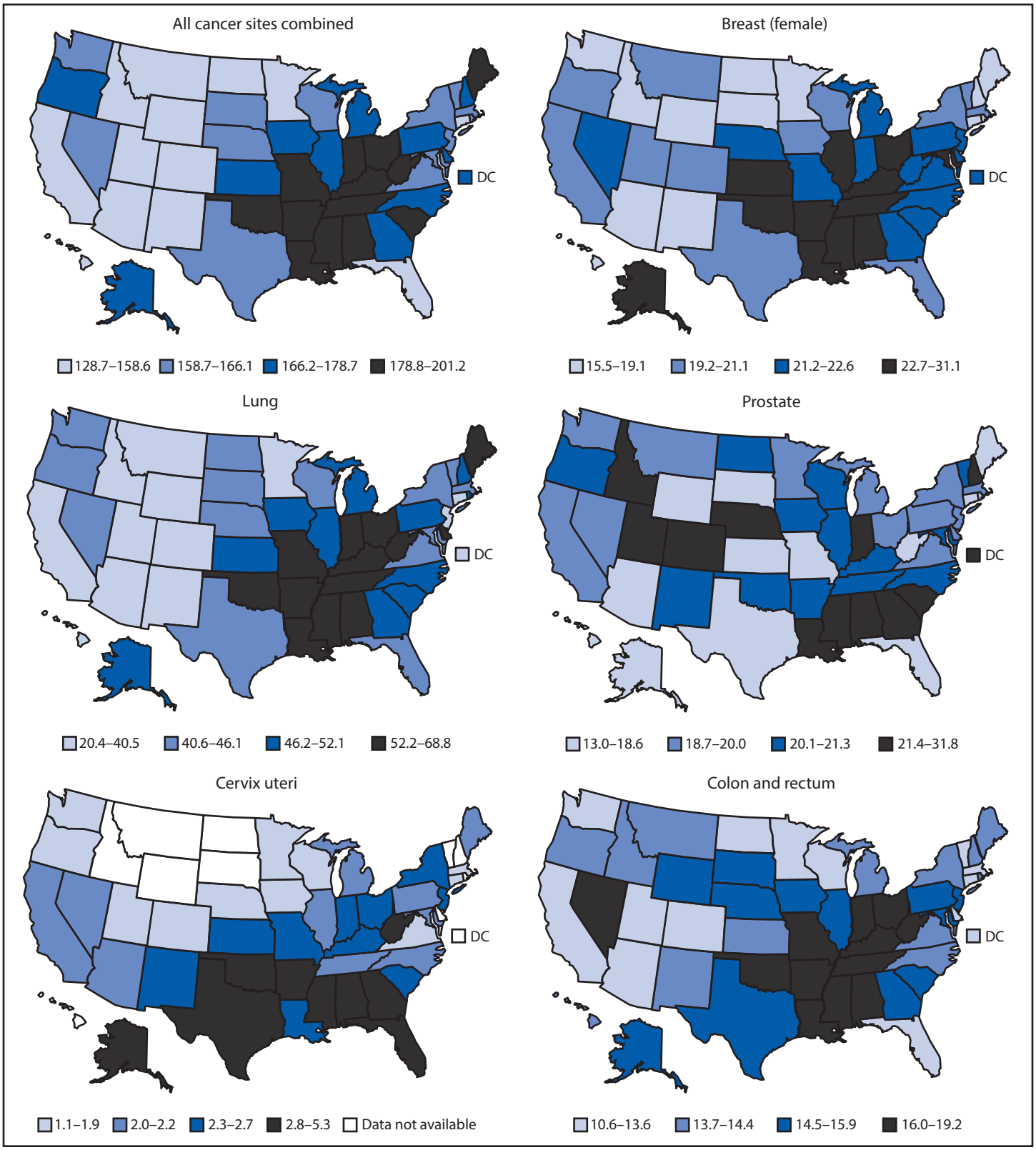


* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria. Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

FIGURE 3. Age-adjusted rate* of cancer deaths, by primary cancer site and state — United States, 2012†



* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS Technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS). Data for death rates cover 100% of the U.S. population. Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

FIGURE 4. Age-adjusted rate* of invasive† cancer cases, by primary cancer site, race,§ and sex — United States, 1999–2012¶

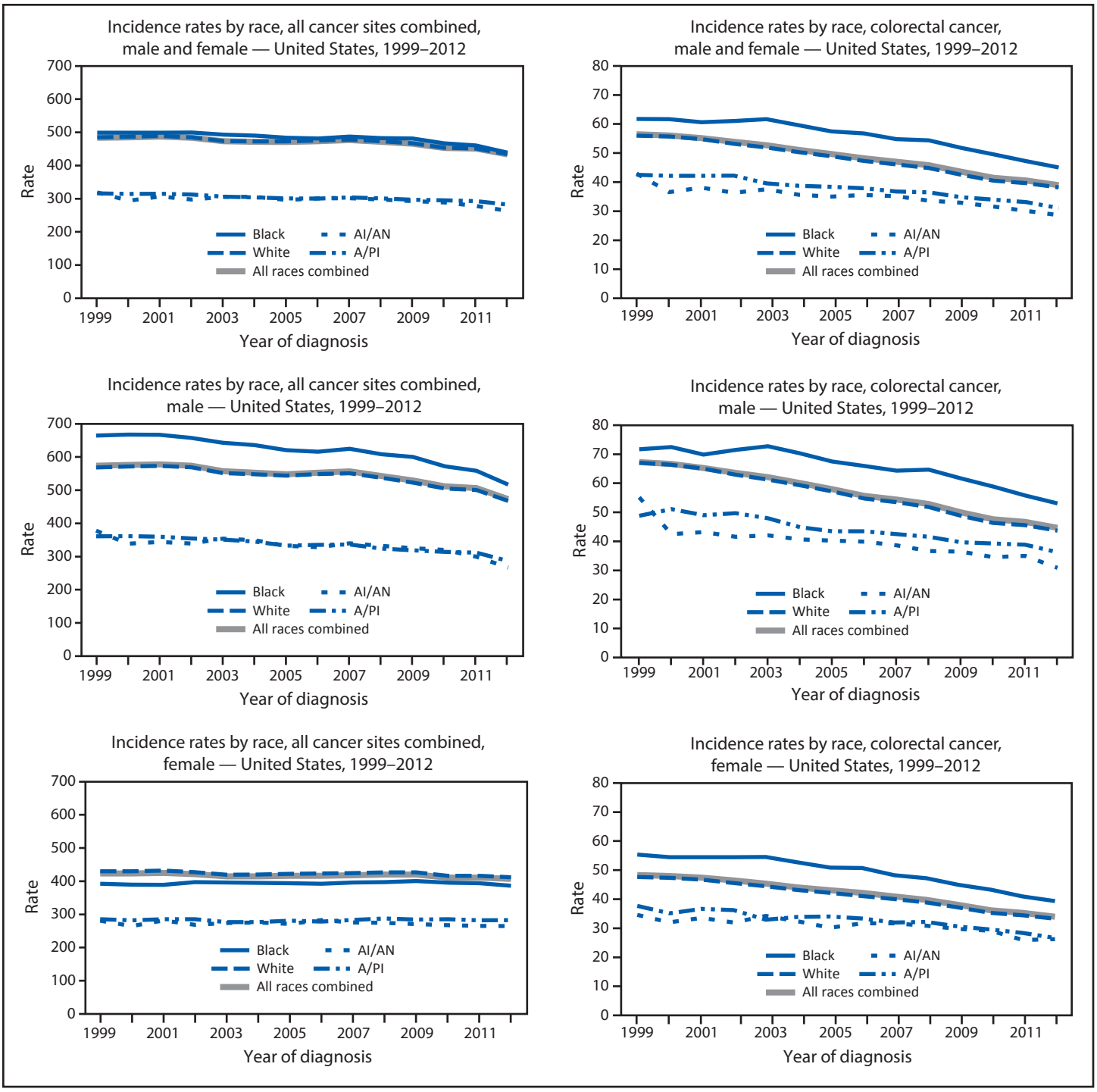


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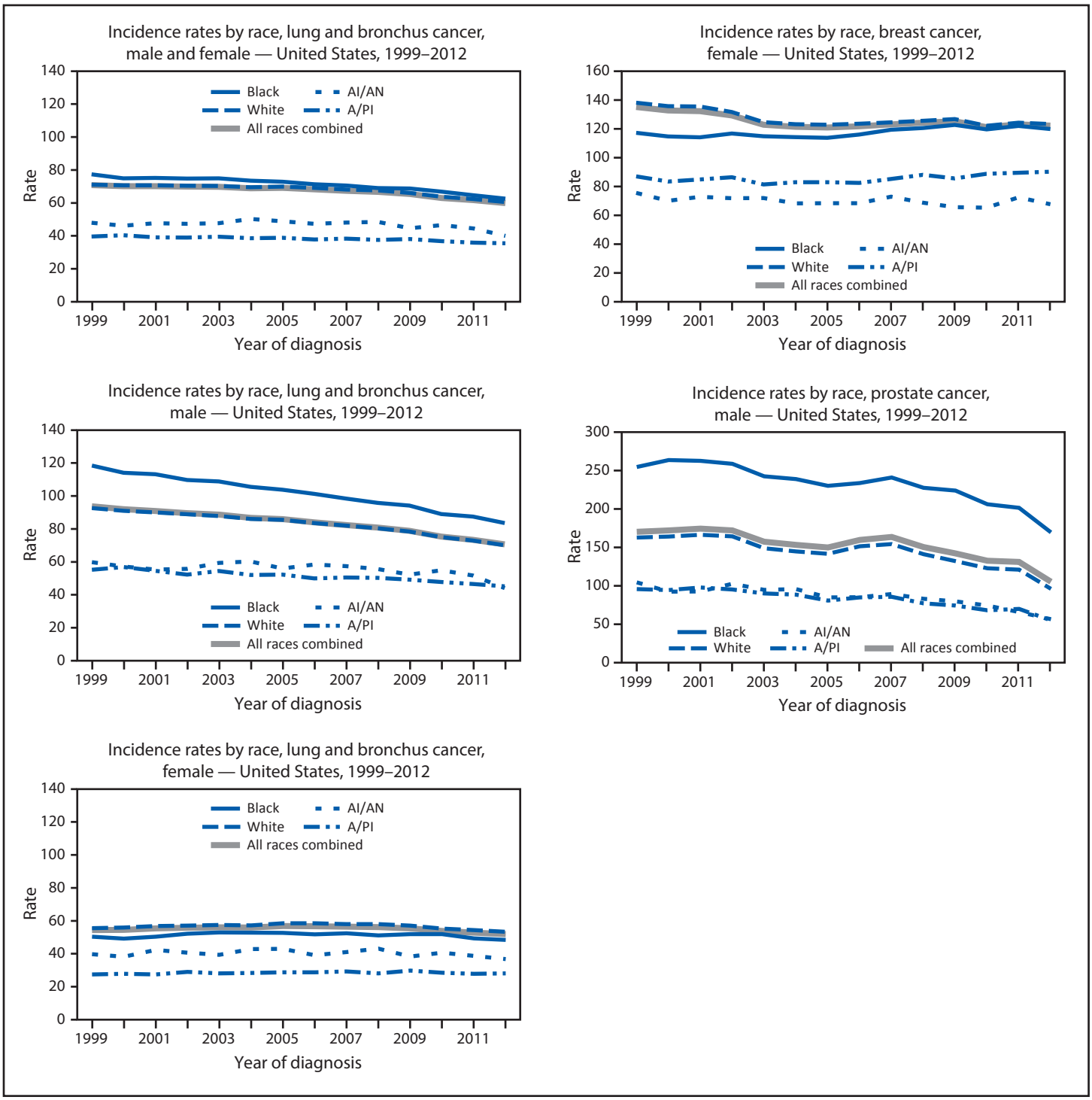
FIGURE 4. (*Continued*) Age-adjusted rate* of invasive† cancer cases, by primary cancer site, race,§ and sex — United States, 1999–2012¶



Abbreviations: AI/AN = American Indian/Alaska Native; A/PI = Asian/Pacific Islander.

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Rates are not presented for persons of unknown or other race. Data for specified racial populations other than white and black should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

¶ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined for all years, 1999–2012 (covering approximately 92% of the U.S. population). See registry-specific data quality information for all years, 1999–2012 (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria). Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

FIGURE 5. Age-adjusted rate* of invasive† cancer cases, by primary cancer site, ethnicity,§ and sex — United States, 1999–2012¶

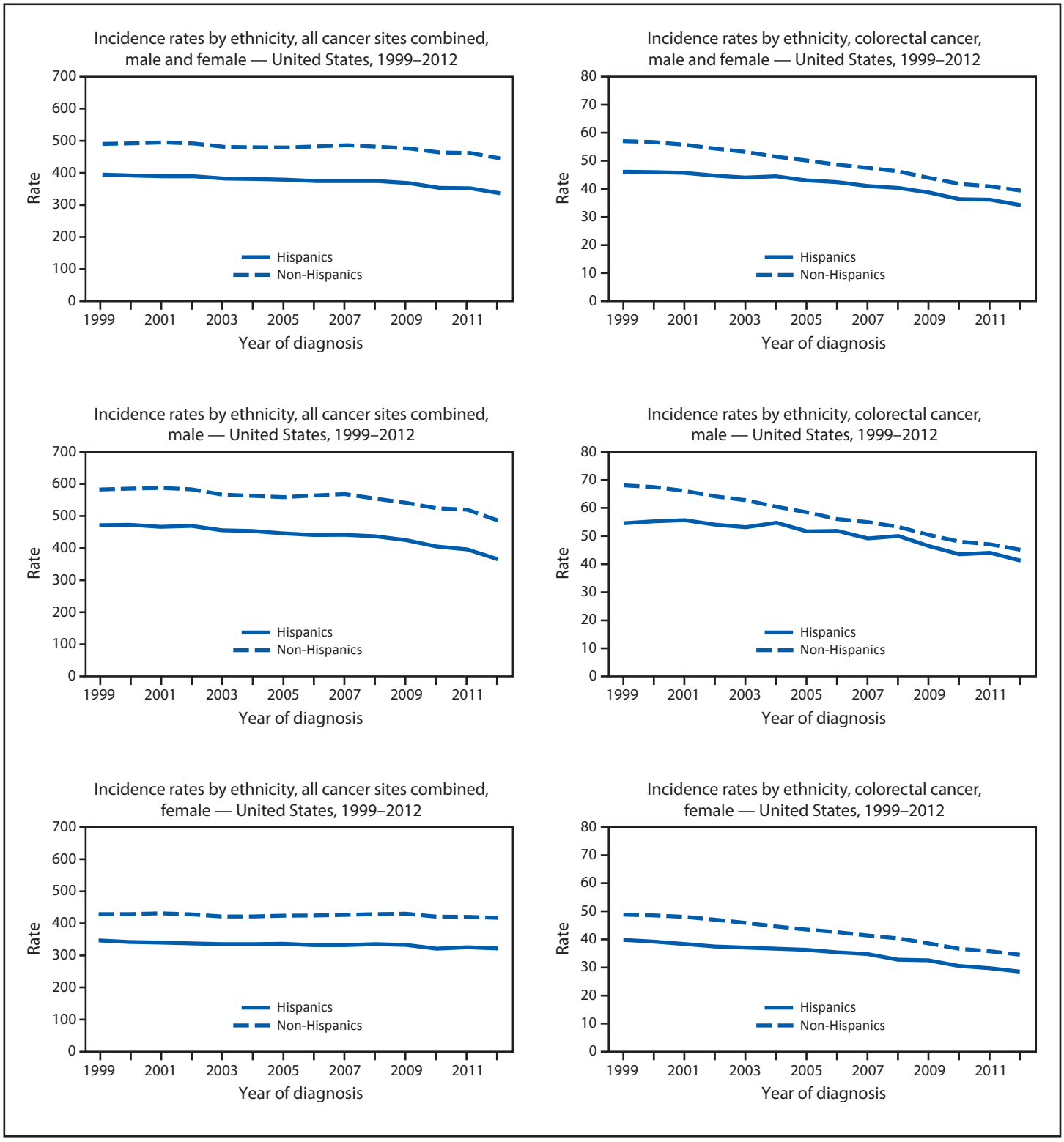


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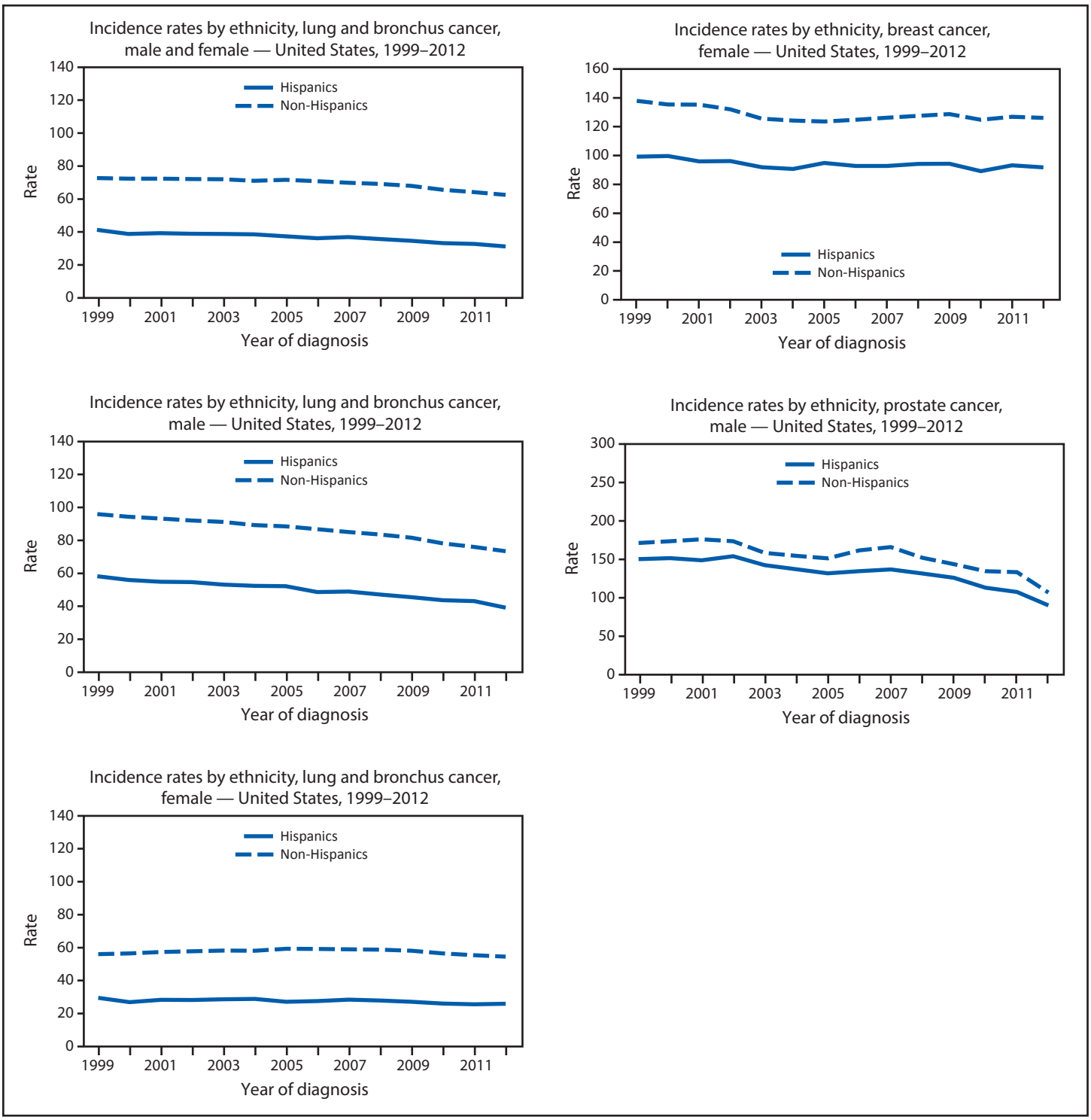
FIGURE 5. (*Continued*) Age-adjusted rate* of invasive† cancer cases, by primary cancer site, ethnicity,§ and sex — United States, 1999–2012¶



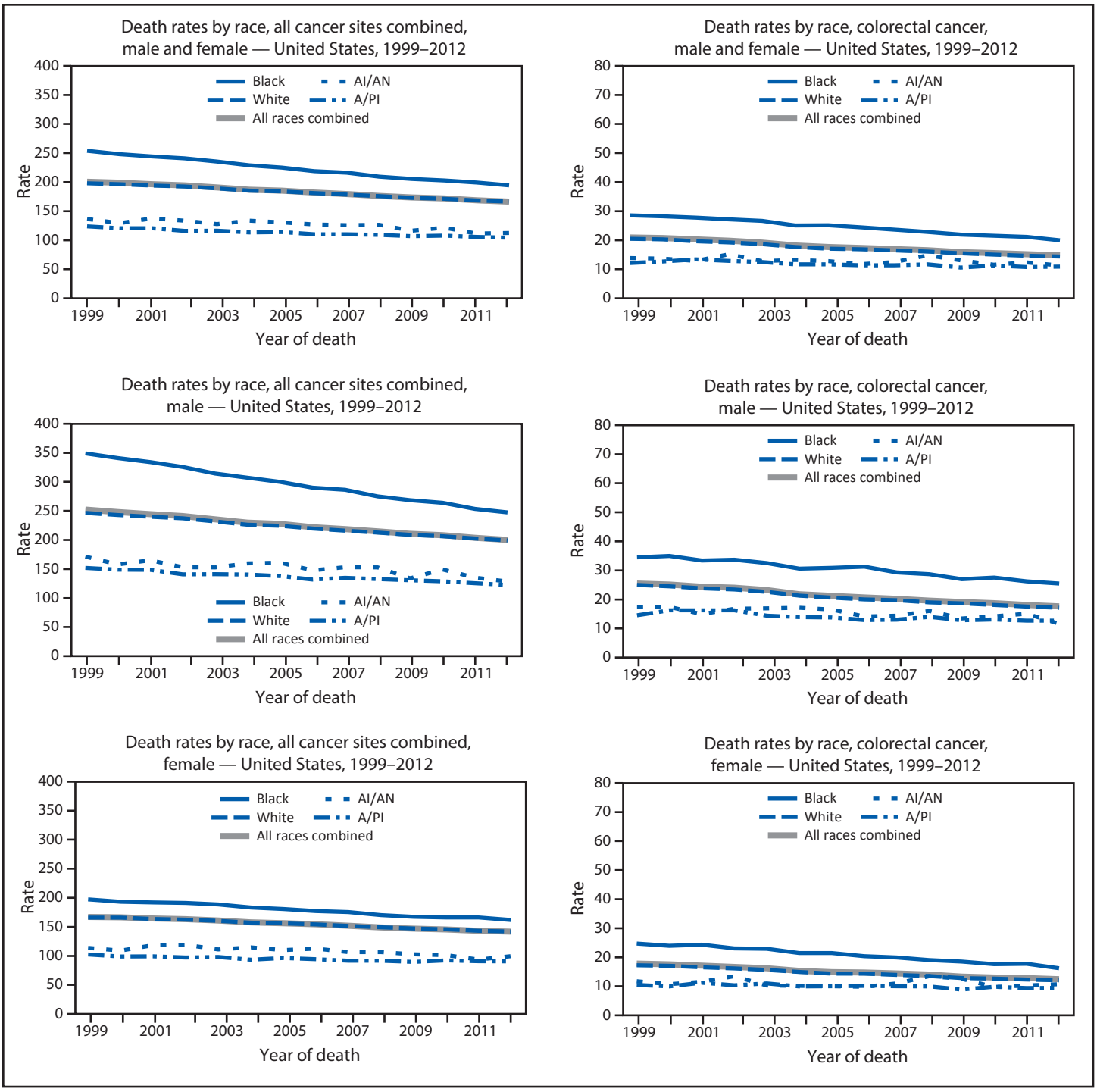
* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data for specified ethnical populations should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

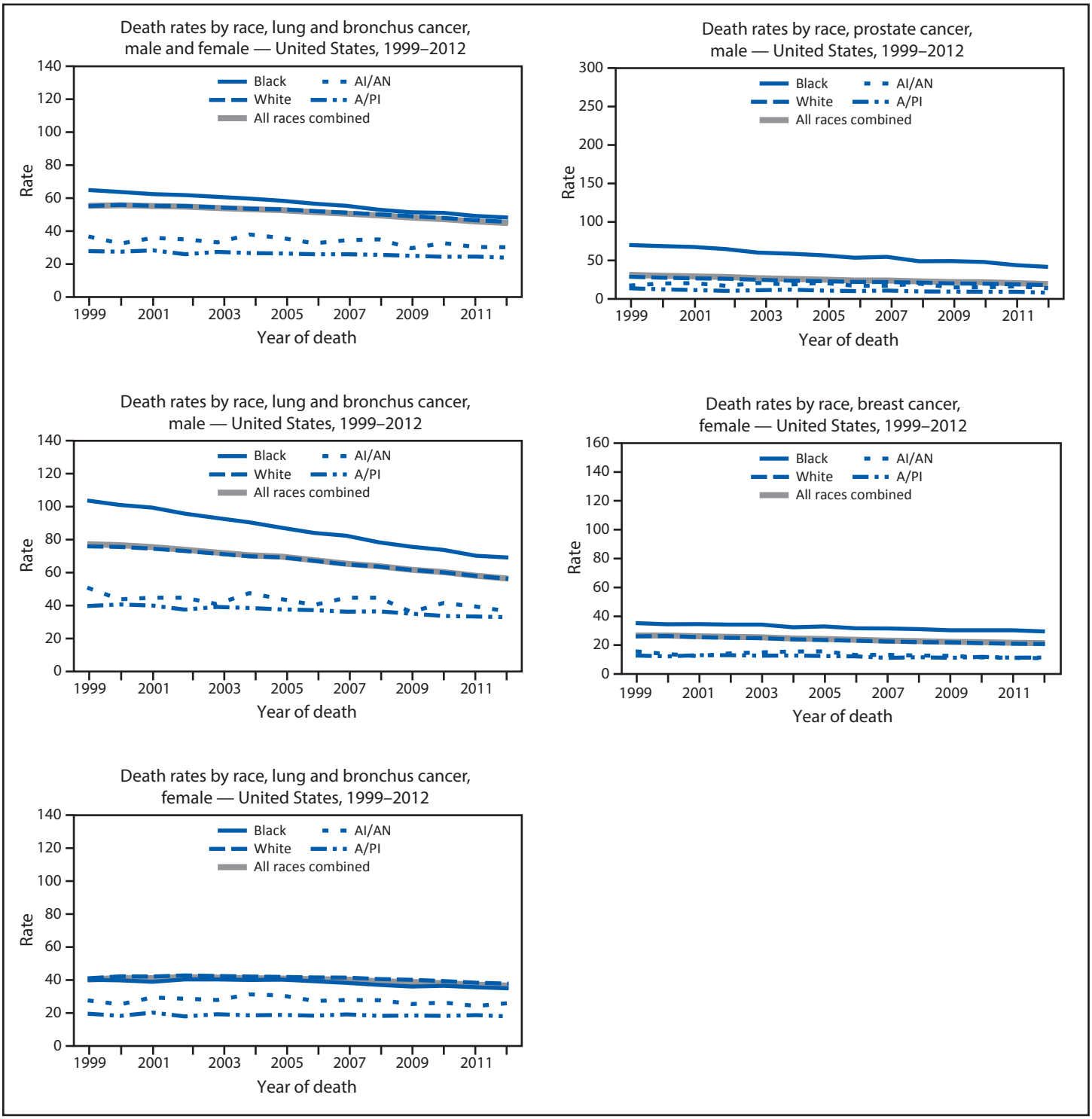
¶ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined for all years, 1999–2012 (covering approximately 92% of the U.S. population). See registry-specific data quality information for all years, 1999-2012 (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria). Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

FIGURE 6. Age-adjusted rate* of cancer deaths, by primary cancer site, race,† and sex — United States, 1999–2012§



See figure footnotes on the next page.

FIGURE 6. (*Continued*) Age-adjusted rate* of cancer deaths, by primary cancer site, race,† and sex — United States, 1999–2012§



Abbreviations: AI/AN = American Indian/Alaska Native; A/PI = Asian/Pacific Islander.

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Rates are not presented for persons of unknown or other race. Data for specified racial populations other than white and black should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

§ Data are from the National Vital Statistics System (NVSS). Data for death rates cover 100% of the U.S. population. Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

FIGURE 7. Age-adjusted rate* of cancer deaths, by primary cancer site, ethnicity,† and sex — United States, 1999–2012§

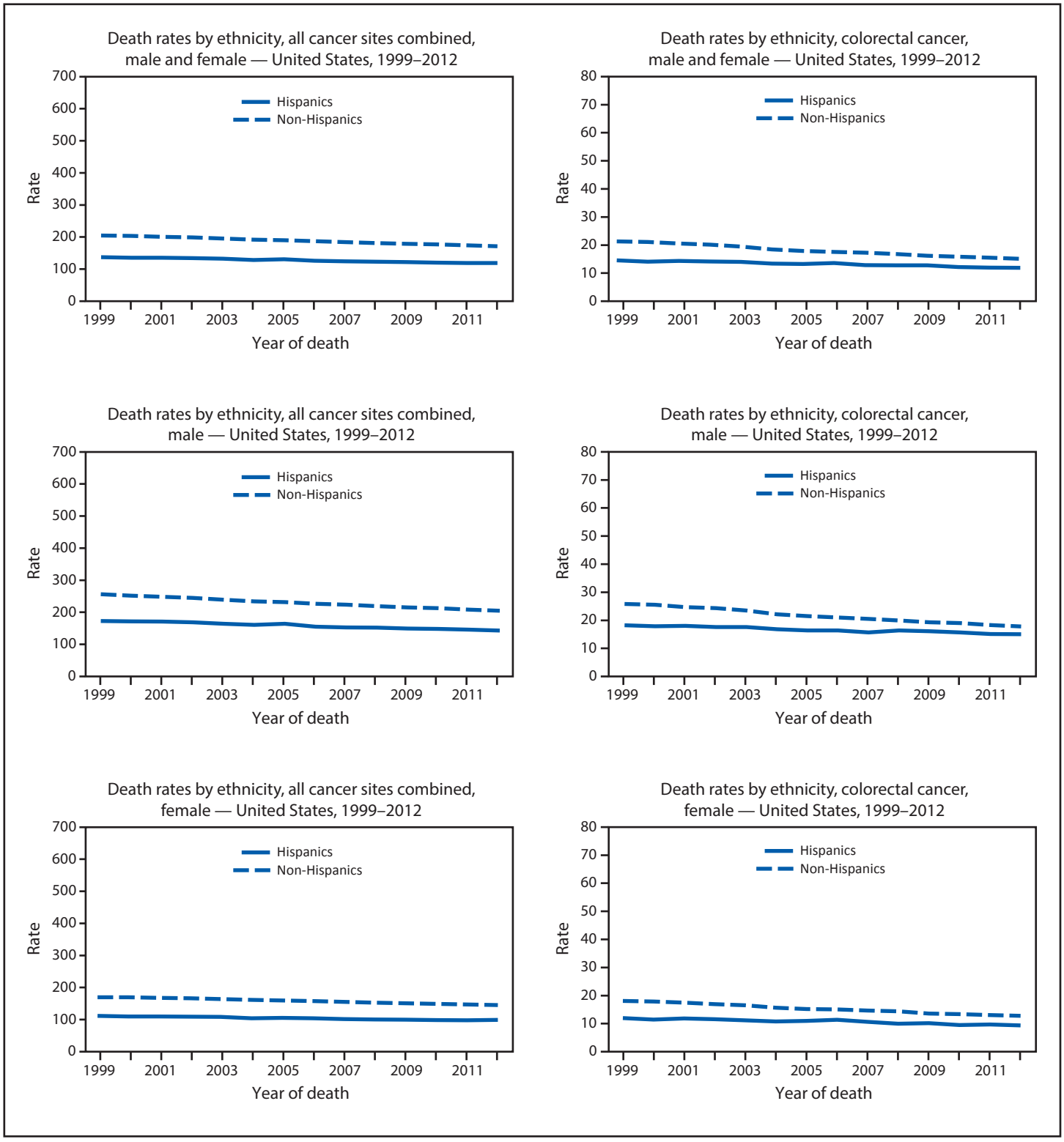


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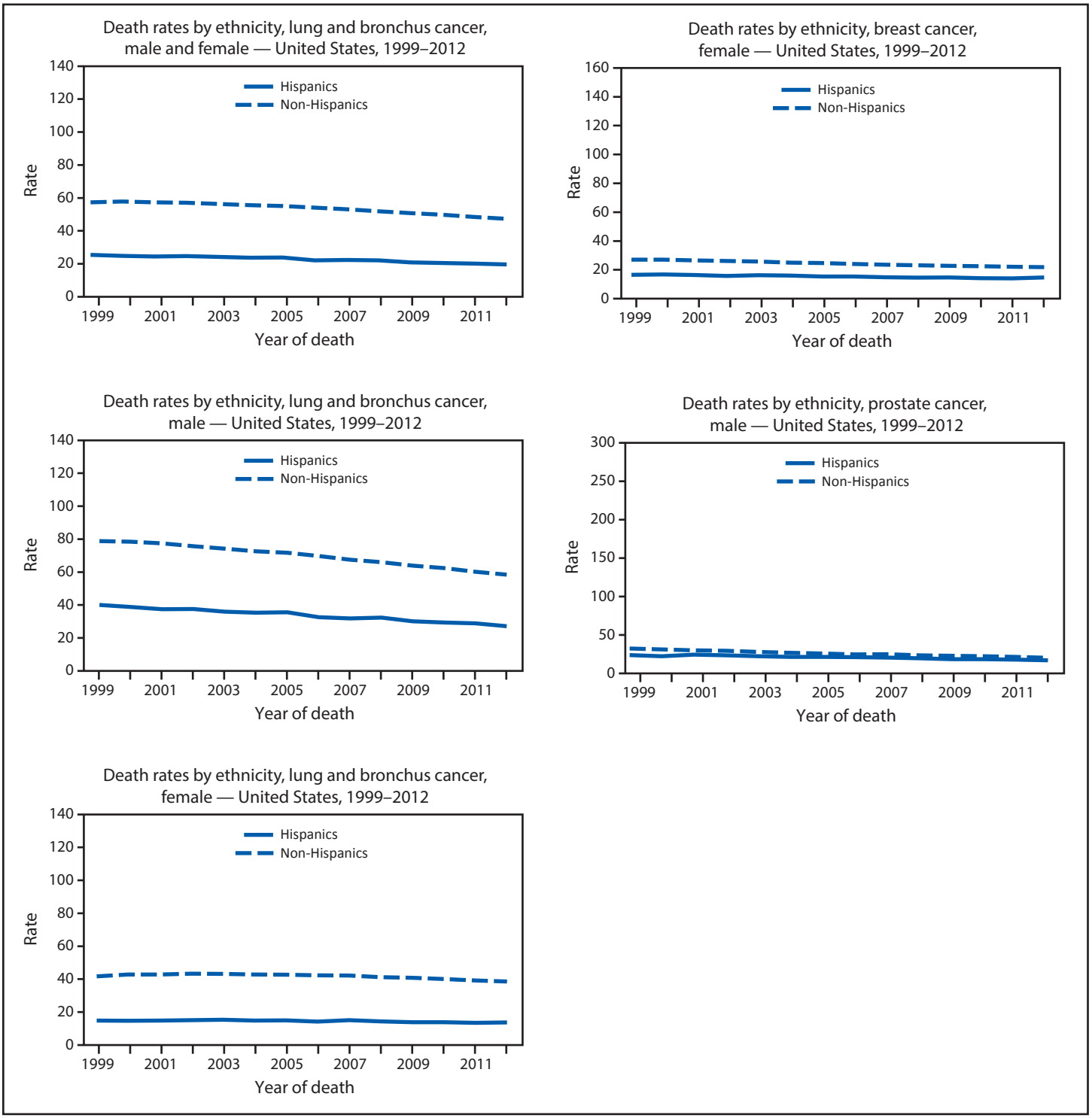
FIGURE 7. (*Continued*) Age-adjusted rate* of cancer deaths, by primary cancer site, ethnicity,† and sex — United States, 1999–2012§



* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data for specified ethnic populations should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

§ Data are from the National Vital Statistics System (NVSS). Data for death rates cover 100% of the U.S. population. Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

TABLE 1. Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site — United States, 2012§

Cancer site	All races/ethnicities	
	No.	Rate
All cancer sites combined	**1,529,078**	**440.3**
Oral cavity and pharynx	**39,879**	**11.2**
Lip	1,842	0.5
Tongue	12,374	3.4
Salivary gland	4,254	1.3
Floor of mouth	1,936	0.5
Gum and other mouth	5,331	1.5
Nasopharynx	1,758	0.5
Tonsil	7,330	2.0
Oropharynx	1,733	0.5
Hypopharynx	2,281	0.6
Other oral cavity and pharynx	1,040	0.3
Digestive system	**273,535**	**78.3**
Esophagus	15,993	4.5
Stomach	22,623	6.6
Small intestine	7,894	2.3
Colon and rectum	134,784	38.9
Colon excluding rectum	95,962	27.8
Rectum and rectosigmoid junction	38,822	11.1
Anus, anal canal, and anorectum	6,338	1.8
Liver and Intrahepatic bile duct	28,012	7.7
Gallbladder	3,835	1.1
Other biliary	5,963	1.7
Pancreas	43,213	12.3
Retroperitoneum	1,321	0.4
Peritoneum, omentum, and mesentery	1,924	0.5
Other digestive organs	1,635	0.5
Respiratory system	**225,933**	**64.7**
Nose, nasal cavity, and middle ear	2,274	0.7
Larynx	12,152	3.4
Lung and bronchus	210,828	60.4
Pleura	105	0
Trachea, mediastinum, and other respiratory organs	574	0.2
Bones and joints	**2,951**	**0.9**
Soft tissue including heart	**10,728**	**3.2**
Skin excluding basal and squamous	**73,181**	**21.5**
Melanoma of the skin	67,753	19.9
Other nonepithelial skin	5,428	1.6
Male and female breast	**226,272**	**65.6**
Female breast	224,147	122.2
Male breast	2,125	1.4
Female genital system	**90,303**	**48.8**
Cervix	12,042	7.4
Corpus and uterus, NOS	49,154	25.7
Corpus	47,570	24.9
Uterus, NOS	1,584	0.8
Ovary	20,785	11.3
Vagina	1,296	0.7
Vulva	4,851	2.6
Other female genital organs	2,175	1.2
Male genital system	**187,308**	**111.8**
Prostate	177,489	105.3
Testis	8,189	5.5
Penis	1,283	0.8
Other male genital organs	347	0.2
Urinary system	**128,103**	**37.0**
Urinary bladder	69,974	20.2
Kidney and renal pelvis	55,231	15.9
Ureter	1,918	0.6
Other urinary organs	980	0.3
Eye and orbit	**2,733**	**0.8**
Brain and other nervous system	**21,490**	**6.5**
Brain	20,151	6.0
Cranial nerves other nervous system	1,339	0.4
Endocrine system	**48,594**	**15.0**
Thyroid	46,279	14.3
Other endocrine including thymus	2,315	0.7
Lymphomas	**71,692**	**21.1**
Hodgkin lymphoma	8,273	2.6
Non-Hodgkin lymphoma	63,419	18.5
Myeloma	**21,829**	**6.3**
Leukemias	**44,396**	**13.2**
Acute lymphocytic leukemia	4,846	1.6
Chronic lymphocytic leukemia	14,821	4.2
Acute myeloid leukemia	13,820	4.1
Chronic myeloid leukemia	5,543	1.7
Other leukemias	5,366	1.6
Mesothelioma	**3,199**	**0.9**
Kaposi Sarcoma	**1,076**	**0.3**
Miscellaneous	**55,876**	**16.3**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf.

TABLE 2. Reported number and age-adjusted rate* of cancer deaths, by primary cancer site — United States, 2012†

Cancer site	All races/ethnicities	
	No.	Rate
All cancer sites combined	**582,607**	**166.4**
Oral cavity and pharynx	**8,924**	**2.5**
Lip	71	0
Tongue	2,224	0.6
Salivary gland	869	0.2
Floor of mouth	75	0
Gum and other mouth	1,275	0.4
Nasopharynx	666	0.2
Tonsil	879	0.2
Oropharynx	891	0.2
Hypopharynx	356	0.1
Other oral cavity and pharynx	1,618	0.4
Digestive system	**147,024**	**41.6**
Esophagus	14,649	4.1
Stomach	11,191	3.2
Small intestine	1,293	0.4
Colon and rectum	51,516	14.7
Colon excluding rectum	41,867	12.0
Rectum and rectosigmoid junction	9,649	2.7
Anus, anal canal, and anorectum	889	0.3
Liver and intrahepatic bile duct	22,972	6.3
Gallbladder	2,102	0.6
Other biliary	1,519	0.4
Pancreas	38,797	11.0
Retroperitoneum	207	0.1
Peritoneum, omentum, and mesentery	750	0.2
Other digestive organs	1,139	0.3
Respiratory system	**161,851**	**46.2**
Nose, nasal cavity, and middle ear	458	0.1
Larynx	3,662	1.0
Lung and bronchus	157,423	45.0
Pleura	82	0
Trachea, mediastinum, and other respiratory organs	226	0.1
Bones and joints	**1,399**	**0.4**
Soft tissue including heart	**4,559**	**1.3**
Skin excluding basal and squamous	**12,463**	**3.6**
Melanoma of the skin	9,251	2.7
Other nonepithelial skin	3,212	0.9
Male and female breast	**41,555**	**11.8**
Female breast	41,150	21.3
Male breast	405	0.3
Female genital system	**29,405**	**15.2**
Cervix	4,074	2.3
Corpus and uterus, NOS	8,911	4.5
Corpus	3,812	1.9
Uterus, NOS	5,099	2.6
Ovary	14,404	7.4
Vagina	429	0.2
Vulva	1,034	0.5
Other female genital organs	553	0.3
Male genital system	**27,955**	**20.0**
Prostate	27,244	19.6
Testis	386	0.3
Penis	273	0.2
Other male genital organs	52	0
Urinary system	**29,594**	**8.5**
Urinary bladder	15,245	4.4
Kidney and renal pelvis	13,518	3.8
Ureter	378	0.1
Other urinary organs	453	0.1
Eye and orbit	**279**	**0.1**
Brain and other nervous system	**15,276**	**4.4**
Endocrine system	**2,660**	**0.8**
Thyroid	1,690	0.5
Other endocrine including thymus	970	0.3
Lymphomas	**21,518**	**6.2**
Hodgkin lymphoma	1,130	0.3
Non-Hodgkin lymphoma	20,388	5.9
Myeloma	**11,821**	**3.4**
Leukemias	**23,309**	**6.8**
Acute lymphocytic leukemia	1,408	0.4
Chronic lymphocytic leukemia	4,598	1.3
Acute myeloid leukemia	9,484	2.8
Chronic myeloid leukemia	1,017	0.3
Other leukemias	6,802	2.0
Mesothelioma	**2,686**	**0.8**
Miscellaneous	**40,276**	**11.5**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see UCSC technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS).

TABLE 3. Reported number and age-adjusted rate* of invasive† cancer cases, all cancer sites combined, by geographic division and area — United States, 2012§

Area	All races/ethnicities	
	No.	Rate
Northeast	**311,842**	**474.3**
New England	**81,778**	**469.6**
Connecticut	20,371	477.1
Maine	8,417	475.1
Massachusetts	35,774	463.1
New Hampshire	7,576	473.5
Rhode Island	6,095	484.0
Vermont	3,545	449.0
Middle Atlantic	**230,064**	**476.1**
New Jersey	48,545	477.7
New York	105,941	475.8
Pennsylvania	75,578	476.1
Midwest	345,611	448.8
East North Central	**237,817**	**446.2**
Illinois	64,402	459.0
Indiana	31,852	439.4
Michigan	51,809	444.5
Ohio	59,848	438.0
Wisconsin	29,906	447.7
West North Central	**107,794**	**454.7**
Iowa	17,000	463.4
Kansas	14,614	460.3
Minnesota	27,833	462.8
Missouri	31,643	450.6
Nebraska	8,953	432.6
North Dakota	3,577	450.5
South Dakota	4,174	434.3
South	**566,112**	**434.9**
South Atlantic	**307,360**	**430.4**
Delaware	5,306	483.5
District of Columbia	2,954	474.9
Florida	105,651	414.2
Georgia	45,623	459.6
Maryland	27,870	430.8
North Carolina	48,367	443.0
South Carolina	24,737	447.7
Virginia	35,743	403.1
West Virginia	11,109	461.3
East South Central	**100,201**	**470.0**
Alabama	25,225	451.0
Kentucky	25,845	515.1
Mississippi	15,084	457.4
Tennessee	34,047	459.4
West South Central	**158,551**	**424.0**
Arkansas	15,259	442.8
Louisiana	24,062	483.4
Oklahoma	18,785	442.8
Texas	100,445	406.2
West	—¶	—
Mountain	—	—
Arizona	27,680	373.4
Colorado	21,614	405.5
Idaho	7,452	437.0
Montana	5,424	434.4
Nevada	—	—
New Mexico	8,726	371.4
Utah	9,582	404.0
Wyoming	2,516	396.0
Pacific	**222,519**	**418.1**
Alaska	2,601	401.8
California	158,944	410.1
Hawaii	6,802	415.6
Oregon	19,531	422.2
Washington	34,641	460.1

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria.

¶ Rates and counts are not presented for the West Census Region, the Mountain Census Division, or Nevada because data from Nevada are not included in this analysis.

TABLE 4. Reported cancer deaths and age-adjusted death rates,* all cancer sites combined, by geographic division and area — United States, 2012†

Area	All races/ethnicities	
	No.	Rate
United States	**582,607**	**166.4**
Northeast	**110,175**	**164.1**
New England	28,904	162.6
Connecticut	6,681	152.0
Maine	3,226	179.0
Massachusetts	12,864	163.3
New Hampshire	2,660	167.7
Rhode Island	2,148	163.6
Vermont	1,325	164.8
Middle Atlantic	**81,271**	**164.7**
New Jersey	16,483	160.3
New York	35,881	159.5
Pennsylvania	28,907	174.8
Midwest	**135,511**	**174.1**
East North Central	**94,939**	**176.9**
Illinois	24,562	175.5
Indiana	13,368	184.2
Michigan	20,496	174.3
Ohio	25,261	182.1
Wisconsin	11,252	166.1
West North Central	**40,572**	**167.8**
Iowa	6,438	167.9
Kansas	5,429	167.7
Minnesota	9,424	155.6
Missouri	12,919	182.0
Nebraska	3,479	164.6
North Dakota	1,253	150.7
South Dakota	1,630	162.0
South	**221,435**	**171.4**
South Atlantic	**118,858**	**165.8**
Delaware	1,935	176.1
District of Columbia	1,081	178.4
Florida	42,187	157.8
Georgia	16,020	169.6
Maryland	10,524	166.0
North Carolina	18,405	170.5
South Carolina	9,728	179.0
Virginia	14,294	165.3
West Virginia	4,684	191.1
East South Central	**40,547**	**192.0**
Alabama	10,274	184.8
Kentucky	10,012	201.2
Mississippi	6,496	200.0
Tennessee	13,765	187.9
West South Central	**62,030**	**170.5**
Arkansas	6,540	188.6
Louisiana	9,308	190.5
Oklahoma	8,040	189.6
Texas	38,142	160.6
West	**115,486**	**151.9**
Mountain	**34,819**	**147.7**
Arizona	11,085	148.3
Colorado	7,306	143.7
Idaho	2,572	152.0
Montana	1,954	154.2
Nevada	4,610	163.8
New Mexico	3,461	148.0
Utah	2,876	128.7
Wyoming	955	154.6
Pacific	**80,667**	**153.7**
Alaska	925	169.0
California	57,675	151.0
Hawaii	2,284	134.6
Oregon	7,832	168.3
Washington	11,951	161.8

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS).

TABLE 5. Reported number and rate* of invasive† cancer cases, by primary cancer site and age group — United States, 2012§

	Age group (yrs)											
	<15		15–24		25–39		40–64		≥65		Total	
Cancer site	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate (crude)
All cancer sites combined	**9,967**	**16.5**	**12,634**	**29**	**58,709**	**95.9**	**620,927**	**603**	**826,841**	**1,932.60**	**1,529,078**	**491.5**
Oral cavity and pharynx	84	0.1	259	0.6	1,152	1.9	21,140	20.5	17,244	40.3	**39,879**	**12.8**
Esophagus	—¶	—	—	—	127	0.2	6,383	6.2	9,480	22.2	**15,993**	**5.1**
Stomach	—	—	—	—	649	1.1	8,153	7.9	13,764	32.2	**22,623**	**7.3**
Colon and rectum	34	0.1	340	0.8	3,526	5.8	51,746	50.2	79,138	185	**134,784**	**43.3**
Liver and intrahepatic bile duct	222	0.4	78	0.2	292	0.5	14,698	14.3	12,722	29.7	**28,012**	**9.0**
Pancreas	—	—	—	—	391	0.6	14,178	13.8	28,585	66.8	**43,213**	**13.9**
Larynx	—	—	—	—	107	0.2	5,966	5.8	6,068	14.2	**12,152**	**3.9**
Lung and bronchus	27	0	99	0.2	893	1.5	66,105	64.2	143,704	335.9	**210,828**	**67.8**
Melanomas of the skin	107	0.2	897	2.1	5,507	9.0	28,901	28.1	32,341	75.6	**67,753**	**21.8**
Female breast	—	—	—	—	9,605	31.5	114,962	218.7	99,396	411.9	**224,147**	**141.8**
Cervix	—	—	—	—	2,795	9.2	6,730	12.8	2,368	9.8	**12,042**	**7.6**
Corpus and uterus, NOS	—	—	—	—	1,616	5.3	26,341	50.1	21,129	87.6	**49,154**	**31.1**
Ovary	102	0.3	348	1.6	1,071	3.5	9,564	18.2	9,700	40.2	**20,785**	**13.2**
Prostate	—	—	—	—	77	0.3	77,236	153.2	100,156	536.9	**177,489**	**115.9**
Testis	54	0.2	1,425	6.4	4,073	13.2	2,440	4.8	197	1.1	**8,189**	**5.3**
Urinary bladder††	20	0	65	0.1	548	0.9	18,019	17.5	51,322	120.0	**69,974**	**22.5**
Kidney and renal pelvis	527	0.9	180	0.4	1,986	3.2	25,557	24.8	26,981	63.1	**55,231**	**17.8**
Brain and nervous system	2,103	3.5	968	2.2	2,084	3.4	8,127	7.9	8,208	19.2	**21,490**	**6.9**
Thyroid	197	0.3	2,029	4.7	9,545	15.6	24,876	24.2	9,632	22.5	**46,279**	**14.9**
Hodgkin lymphoma	340	0.6	1,599	3.7	2,245	3.7	2,614	2.5	1,475	3.4	**8,273**	**2.7**
Non-Hodgkin lymphoma	595	1.0	933	2.1	2,899	4.7	23,101	22.4	35,891	83.9	**63,419**	**20.4**
Myeloma	—	—	—	—	266	0.4	7,887	7.7	13,663	31.9	**21,829**	**7.0**
Leukemias	2,948	4.9	1,163	2.7	2,243	3.7	13,517	13.1	24,525	57.3	**44,396**	**14.3**
Mesothelioma	—	—	—	—	36	0.1	666	0.6	2,486	5.8	**3,199**	**1.0**
Kaposi Sarcoma	—	—	—	—	321	0.5	448	0.4	269	0.6	**1,076**	**0.3**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of cases per 100,000 persons. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria.

¶ Counts and rates are suppressed if <16 cases were reported in a specific category. Some counts and rates are suppressed as complementary cell suppression.

TABLE 6. Reported number and rate* of cancer deaths, by primary cancer site and age group — United States, 2012†

	Age group (yrs)											
	<15		15–24		25–39		40–64		≥65		Total (all ages)	
Cancer site	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate (crude)
All cancer sites combined	**1,367**	**2.2**	**1,574**	**3.6**	**7,391**	**12**	**168,778**	**162.5**	**403,497**	**935.2**	**582,607**	**185.6**
Oral cavity and pharynx	—§	—	—	—	128	0.2	3,677	3.5	5,100	11.8	**8,924**	**2.8**
Esophagus	—	—	—	—	74	0.1	5,358	5.2	9,213	21.4	**14,649**	**4.7**
Stomach	—	—	—	—	271	0.4	3,590	3.5	7,309	16.9	**11,191**	**3.6**
Colon and rectum	—	—	—	—	775	1.3	15,199	14.6	35,480	82.2	**51,516**	**16.4**
Liver and intrahepatic bile duct	32	0.1	34	0.1	186	0.3	9,837	9.5	12,883	29.9	**22,927**	**7.3**
Pancreas	—	—	—	—	151	0.2	10,962	10.6	27,676	64.1	**38,797**	**12.4**
Larynx	—	—	—	—	18	0	1,374	1.3	2,269	5.3	**3,662**	**1.2**
Lung and bronchus	—	—	—	—	430	0.7	43,463	41.8	113,499	263.1	**157,423**	**50.2**
Melanomas of the skin	—	—	—	—	300	0.5	3,179	3.1	5,746	13.3	**9,251**	**2.9**
Female breast	—	—	—	—	971	3.2	16,104	30.4	24,062	98.9	**41,150**	**25.8**
Cervix	—	—	—	—	437	1.4	2,259	4.3	1,369	5.6	**4,074**	**2.6**
Corpus and uterus, NOS	—	—	—	—	108	0.4	2,855	5.4	5,944	24.4	**8,911**	**5.6**
Ovary	—	—	—	—	176	0.6	4,822	9.1	9,378	38.6	**14,404**	**9.0**
Prostate	—	—	—	—	—	—	2,962	5.8	24,271	128.9	**27,244**	**17.6**
Testis	—	—	—	—	131	0.4	149	0.3	51	0.3	**386**	**0.2**
Urinary bladder	—	—	—	—	35	0.1	2,390	2.3	12,814	29.7	**15,245**	**4.9**
Kidney and renal pelvis	30	0	31	0.1	109	0.2	4,134	4.0	9,214	21.4	**13,518**	**4.3**
Brain and nervous system	458	0.7	252	0.6	744	1.2	6,177	5.9	7,645	17.7	**15,276**	**4.9**
Thyroid	—	—	—	—	23	0	450	0.4	1,212	2.8	**1,690**	**0.5**
Hodgkin lymphoma	—	—	—	—	134	0.2	353	0.3	604	1.4	**1,130**	**0.4**
Non-Hodgkin lymphoma	36	0.1	85	0.2	344	0.6	4,304	4.1	15,619	36.2	**20,388**	**6.5**
Myeloma	—	—	—	—	32	0.1	2,624	2.5	9,164	21.2	**11,821**	**3.8**
Leukemias	378	0.6	356	0.8	649	1.1	4,627	4.5	17,299	40.1	**23,309**	**7.4**
Mesothelioma	—	—	—	—	16	0	479	0.5	2,190	5.1	**2,686**	**0.9**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of deaths per 100,000 persons. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS).

§ Counts and rates are suppressed if <16 deaths were reported in a specific category. Some counts and rates are suppressed as complementary cell suppression.

TABLE 7. Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site and sex — United States, 2012§

	Male		Female		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
All cancer sites combined	**767,366**	**483.0**	**761,712**	**411.7**	**1,529,078**	**440.3**
Oral cavity and pharynx	**27,997**	**16.8**	**11,882**	**6.3**	**39,879**	**11.2**
Lip	1,353	0.9	489	0.3	**1,842**	**0.5**
Tongue	8,777	5.2	3,597	1.9	**12,374**	**3.4**
Salivary gland	2,404	1.6	1,850	1.0	**4,254**	**1.3**
Floor of mouth	1,333	0.8	603	0.3	**1,936**	**0.5**
Gum and other mouth	2,915	1.8	2,416	1.3	**5,331**	**1.5**
Nasopharynx	1,263	0.8	495	0.3	**1,758**	**0.5**
Tonsil	5,977	3.4	1,353	0.7	**7,330**	**2.0**
Oropharynx	1,325	0.8	408	0.2	**1,733**	**0.5**
Hypopharynx	1,838	1.1	443	0.2	**2,281**	**0.6**
Other oral cavity and pharynx	812	0.5	228	0.1	**1,040**	**0.3**
Digestive system	**151,713**	**95.6**	**121,822**	**63.9**	**273,535**	**78.3**
Esophagus	12,628	7.8	3,365	1.7	**15,993**	**4.5**
Stomach	13,964	9.0	8,659	4.6	**22,623**	**6.6**
Small intestine	4,187	2.6	3,707	2.0	**7,894**	**2.3**
Colon and rectum	70,204	44.8	64,580	34.1	**134,784**	**38.9**
Colon excluding rectum	47,448	30.7	48,514	25.4	**95,962**	**27.8**
Rectum and rectosigmoid junction	22,756	14.1	16,066	8.6	**38,822**	**11.1**
Anus, anal canal, and anorectum	2,304	1.4	4,034	2.1	**6,338**	**1.8**
Liver and Intrahepatic bile duct	20,207	11.8	7,805	4.0	**28,012**	**7.7**
Gallbladder	1,221	0.8	2,614	1.4	**3,835**	**1.1**
Other biliary	3,246	2.1	2,717	1.4	**5,963**	**1.7**
Pancreas	22,101	14.1	21,112	10.9	**43,213**	**12.3**
Retroperitoneum	653	0.4	668	0.4	**1,321**	**0.4**
Peritoneum, omentum, and mesentery	157	0.1	1,767	0.9	**1,924**	**0.5**
Other digestive organs	841	0.5	794	0.4	**1,635**	**0.5**
Respiratory system	**122,785**	**78.5**	**103,148**	**54.0**	**225,933**	**64.7**
Nose, nasal cavity, and middle ear	1,376	0.9	898	0.5	**2,274**	**0.7**
Larynx	9,565	5.8	2,587	1.3	**12,152**	**3.4**
Lung and bronchus	111,395	71.6	99,433	52.1	**210,828**	**60.4**
Pleura	60	0	45	0	**105**	**0**
Trachea, mediastinum, and other respiratory organs	389	0.3	185	0.1	**574**	**0.2**
Bones and joints	**1,674**	**1.1**	**1,277**	**0.8**	**2,951**	**0.9**
Soft tissue including heart	**5,881**	**3.8**	**4,847**	**2.8**	**10,728**	**3.2**
Skin excluding basal and squamous	**42,992**	**27.8**	**30,189**	**17.0**	**73,181**	**21.5**
Melanoma of the skin	39,673	25.5	28,080	15.9	**67,753**	**19.9**
Other nonepithelial skin	3,319	2.3	2,109	1.1	**5,428**	**1.6**
Male and female breast	**NA**	**NA**	**NA**	**NA**	**226,272**	**65.6**
Female breast	NA	NA	224,147	122.2	**NA**	**NA**
Male breast	2,125	1.4	NA	NA	**NA**	**NA**
Female genital system	**NA**	**NA**	**90,303**	**48.8**	**NA**	**NA**
Cervix	NA	NA	12,042	7.4	**NA**	**NA**
Corpus and uterus, NOS	NA	NA	49,154	25.7	**NA**	**NA**
Corpus	NA	NA	47,570	24.9	**NA**	**NA**
Uterus, NOS	NA	NA	1,584	0.8	**NA**	**NA**
Ovary	NA	NA	20,785	11.3	**NA**	**NA**
Vagina	NA	NA	1,296	0.7	**NA**	**NA**
Vulva	NA	NA	4,851	2.6	**NA**	**NA**
Other female genital organs	NA	NA	2,175	1.2	**NA**	**NA**

See table footnotes on page 40.

TABLE 7. (*Continued*) Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site and sex — United States, 2012§

Cancer site	Male		Female		Total	
	No.	Rate	No.	Rate	No.	Rate
Male genital system	**187,308**	**111.8**	**NA**	**NA**	**NA**	**NA**
Prostate	177,489	105.3	NA	NA	**NA**	**NA**
Testis	8,189	5.5	NA	NA	**NA**	**NA**
Penis	1,283	0.8	NA	NA	**NA**	**NA**
Other male genital organs	347	0.2	NA	NA	**NA**	**NA**
Urinary system	**89,322**	**58.0**	**38,781**	**20.5**	**128,103**	**37.0**
Urinary bladder	53,006	35.4	16,968	8.7	**69,974**	**20.2**
Kidney and renal pelvis	34,459	21.3	20,772	11.2	**55,231**	**15.9**
Ureter	1,195	0.8	723	0.4	**1,918**	**0.6**
Other urinary organs	662	0.5	318	0.2	**980**	**0.3**
Eye and orbit	**1,494**	**1.0**	**1,239**	**0.7**	**2,733**	**0.8**
Brain and other nervous system	**11,951**	**7.6**	**9,539**	**5.5**	**21,490**	**6.5**
Brain	11,263	7.2	8,888	5.1	**20,151**	**6.0**
Cranial nerves other nervous system	688	0.5	651	0.4	**1,339**	**0.4**
Endocrine system	**12,497**	**7.9**	**36,097**	**21.9**	**48,594**	**15.0**
Thyroid	11,313	7.1	34,966	21.3	**46,279**	**14.3**
Other endocrine including thymus	1,184	0.8	1,131	0.7	**2,315**	**0.7**
Lymphomas	**39,074**	**25.3**	**32,618**	**17.8**	**71,692**	**21.1**
Hodgkin lymphoma	4,569	3.0	3,704	2.3	**8,273**	**2.6**
Non-Hodgkin lymphoma	34,505	22.3	28,914	15.5	**63,419**	**18.5**
Myeloma	**12,199**	**7.8**	**9,630**	**5.0**	**21,829**	**6.3**
Leukemias	**25,699**	**16.9**	**18,697**	**10.3**	**44,396**	**13.2**
Acute lymphocytic leukemia	2,732	1.8	2,114	1.4	**4,846**	**1.6**
Chronic lymphocytic leukemia	9,004	5.8	5,817	3.0	**14,821**	**4.2**
Acute myeloid leukemia	7,646	5.1	6,174	3.4	**13,820**	**4.1**
Chronic myeloid leukemia	3,118	2.1	2,425	1.4	**5,543**	**1.7**
Other leukemias	3,199	2.1	2,167	1.2	**5,366**	**1.6**
Mesothelioma	**2,407**	**1.7**	**792**	**0.4**	**3,199**	**0.9**
Kaposi Sarcoma	**951**	**0.6**	**125**	**0.1**	**1,076**	**0.3**
Miscellaneous	**29,297**	**19.6**	**26,579**	**13.7**	**55,876**	**16.3**

Abbreviations: NA = not applicable; NOS = not otherwise specified.

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria.

TABLE 8. Reported number and age-adjusted rate* of cancer deaths, by primary cancer site and sex — United States, 2012†

	Male		Female		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
All cancer sites combined	**305,661**	**200.6**	**276,946**	**141.9**	**582,607**	**166.4**
Oral cavity and pharynx	**6,263**	**3.9**	**2,661**	**1.3**	**8,924**	**2.5**
Lip	44	0	27	0	**71**	**0**
Tongue	1,488	0.9	736	0.4	**2,224**	**0.6**
Salivary gland	581	0.4	288	0.1	**869**	**0.2**
Floor of mouth	54	0	21	0	**75**	**0**
Gum and other mouth	746	0.5	529	0.3	**1,275**	**0.4**
Nasopharynx	454	0.3	212	0.1	**666**	**0.2**
Tonsil	714	0.4	165	0.1	**879**	**0.2**
Oropharynx	653	0.4	238	0.1	**891**	**0.2**
Hypopharynx	268	0.2	88	0	**356**	**0.1**
Other oral cavity and pharynx	1,261	0.8	357	0.2	**1,618**	**0.4**
Digestive system	**83,782**	**53.4**	**63,242**	**32.0**	**147,024**	**41.6**
Esophagus	11,697	7.3	2,952	1.5	**14,649**	**4.1**
Stomach	6,611	4.3	4,580	2.4	**11,191**	**3.2**
Small intestine	689	0.5	604	0.3	**1,293**	**0.4**
Colon and rectum	26,866	17.6	24,650	12.4	**51,516**	**14.7**
Colon excluding rectum	21,383	14.1	20,484	10.3	**41,867**	**12.0**
Rectum and rectosigmoid junction	5,483	3.5	4,166	2.1	**9,649**	**2.7**
Anus, anal canal, and anorectum	368	0.2	521	0.3	**889**	**0.3**
Liver and intrahepatic bile duct	15,563	9.4	7,409	3.8	**22,972**	**6.3**
Gallbladder	687	0.5	1,415	0.7	**2,102**	**0.6**
Other biliary	739	0.5	780	0.4	**1,519**	**0.4**
Pancreas	19,718	12.7	19,079	9.6	**38,797**	**11.0**
Retroperitoneum	110	0.1	97	0.1	**207**	**0.1**
Peritoneum, omentum, and mesentery	78	0	672	0.3	**750**	**0.2**
Other digestive organs	656	0.4	483	0.2	**1,139**	**0.3**
Respiratory system	**90,091**	**58.4**	**71,760**	**37.0**	**161,851**	**46.2**
Nose, nasal cavity, and middle ear	285	0.2	173	0.1	**458**	**0.1**
Larynx	2,925	1.8	737	0.4	**3,662**	**1.0**
Lung and bronchus	86,689	56.2	70,734	36.4	**157,423**	**45.0**
Pleura	51	0	31	0	**82**	**0**
Trachea, mediastinum, and other respiratory organs	141	0.1	85	0	**226**	**0.1**
Bones and joints	**818**	**0.5**	**581**	**0.3**	**1,399**	**0.4**
Soft tissue including heart	**2,394**	**1.6**	**2,165**	**1.2**	**4,559**	**1.3**
Skin excluding basal and squamous	**8,329**	**5.5**	**4,134**	**2.1**	**12,463**	**3.6**
Melanoma of the skin	6,013	4.0	3,238	1.7	**9,251**	**2.7**
Other nonepithelial skin	2,316	1.6	896	0.4	**3,212**	**0.9**
Male and female breast	**NA**	**NA**	**NA**	**NA**	**41,555**	**11.8**
Female breast	NA	NA	41,150	21.3	**NA**	**NA**
Male breast	405	0.3	NA	NA	**NA**	**NA**

See table footnotes on page 42.

TABLE 8. (*Continued*) Reported number and age-adjusted rate* of cancer deaths, by primary cancer site and sex — United States, 2012†

Cancer site	Male		Female		Total	
	No.	Rate	No.	Rate	No.	Rate
Female genital system	**NA**	**NA**	**29,405**	**15.2**	**NA**	**NA**
Cervix	NA	NA	4,074	2.3	**NA**	**NA**
Corpus and uterus, NOS	NA	NA	8,911	4.5	**NA**	**NA**
Corpus	NA	NA	3,812	1.9	**NA**	**NA**
Uterus, NOS	NA	NA	5,099	2.6	**NA**	**NA**
Ovary	NA	NA	14,404	7.4	**NA**	**NA**
Vagina	NA	NA	429	0.2	**NA**	**NA**
Vulva	NA	NA	1,034	0.5	**NA**	**NA**
Other female genital organs	NA	NA	553	0.3	**NA**	**NA**
Male genital system	**27,955**	**20.0**	**NA**	**NA**	**NA**	**NA**
Prostate	27,244	19.6	NA	NA	**NA**	**NA**
Testis	386	0.3	NA	NA	**NA**	**NA**
Penis	273	0.2	NA	NA	**NA**	**NA**
Other male genital organs	52	0	NA	NA	**NA**	**NA**
Urinary system	**20,136**	**13.6**	**9,458**	**4.7**	**29,594**	**8.5**
Urinary bladder	10,886	7.6	4,359	2.1	**15,245**	**4.4**
Kidney and renal pelvis	8,772	5.6	4,746	2.4	**13,518**	**3.8**
Ureter	212	0.1	166	0.1	**378**	**0.1**
Other urinary organs	266	0.2	187	0.1	**453**	**0.1**
Eye and orbit	**164**	**0.1**	**115**	**0.1**	**279**	**0.1**
Brain and other nervous system	**8,666**	**5.4**	**6,610**	**3.5**	**15,276**	**4.4**
Endocrine system	**1,264**	**0.8**	**1,396**	**0.7**	**2,660**	**0.8**
Thyroid	775	0.5	915	0.5	**1,690**	**0.5**
Other endocrine including thymus	489	0.3	481	0.3	**970**	**0.3**
Lymphomas	**11,902**	**8.0**	**9,616**	**4.9**	**21,518**	**6.2**
Hodgkin lymphoma	638	0.4	492	0.3	**1,130**	**0.3**
Non-Hodgkin lymphoma	11,264	7.6	9,124	4.6	**20,388**	**5.9**
Myeloma	**6,338**	**4.2**	**5,483**	**2.8**	**11,821**	**3.4**
Leukemias	**13,466**	**9.2**	**9,843**	**5.1**	**23,309**	**6.8**
Acute lymphocytic leukemia	810	0.5	598	0.3	**1,408**	**0.4**
Chronic lymphocytic leukemia	2,837	2.0	1,761	0.9	**4,598**	**1.3**
Acute myeloid leukemia	5,401	3.6	4,083	2.2	**9,484**	**2.8**
Chronic myeloid leukemia	546	0.4	471	0.2	**1,017**	**0.3**
Other leukemias	3,872	2.7	2,930	1.5	**6,802**	**2.0**
Mesothelioma	**2,112**	**1.5**	**574**	**0.3**	**2,686**	**0.8**
Miscellaneous	**21,538**	**14.1**	**18,738**	**9.4**	**40,276**	**11.5**

Abbreviations: NA = not applicable; NOS = not otherwise specified.

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS).

TABLE 9. Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site and race§ —United States, 2012¶

	AI/AN§		API§		Black		White		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
All cancer sites combined	**8,139**	**269.0**	**45,364**	**285.7**	**165,559**	**446.1**	**1,282,703**	**440.4**	**1,529,078**	**440.3**
Oral cavity and pharynx	**227**	**6.8**	**1,267**	**7.7**	**3,574**	**9.1**	**34,263**	**11.5**	**39,879**	**11.2**
Lip	—**	—	—	—	42	0.1	1,718	0.6	**1,842**	**0.5**
Tongue	51	1.5	288	1.8	786	2.0	11,082	3.7	**12,374**	**3.4**
Salivary gland	18	0.5	180	1.1	393	1.0	3,597	1.3	**4,254**	**1.3**
Floor of mouth	—	—	26	0.2	206	0.5	1,666	0.5	**1,936**	**0.5**
Gum and other mouth	24	0.8	207	1.3	511	1.4	4,500	1.5	**5,331**	**1.5**
Nasopharynx	21	0.6	384	2.2	263	0.7	1,064	0.4	**1,758**	**0.5**
Tonsil	45	1.2	81	0.5	625	1.5	6,512	2.2	**7,330**	**2.0**
Oropharynx	—	—	20	0.1	241	0.6	1,449	0.5	**1,733**	**0.5**
Hypopharynx	21	0.7	54	0.3	390	1.0	1,796	0.6	**2,281**	**0.6**
Other oral cavity and pharynx	16	0.5	—	—	117	0.3	879	0.3	**1,040**	**0.3**
Digestive system	**1,722**	**58.4**	**11,016**	**72.1**	**34,404**	**94.8**	**223,154**	**75.7**	**273,535**	**78.3**
Esophagus	73	2.6	303	2.0	1,514	4.1	13,963	4.7	**15,993**	**4.5**
Stomach	167	6.1	1,571	10.5	3,532	10.2	17,056	5.8	**22,623**	**6.6**
Small intestine	25	0.8	181	1.1	1,301	3.5	6,300	2.2	**7,894**	**2.3**
Colon and rectum	835	28.5	4,772	30.8	16,402	45.5	111,041	38.0	**134,784**	**38.9**
Colon excluding rectum	547	19.7	3,073	20.3	12,256	34.6	79,012	27.1	**95,962**	**27.8**
Rectum and rectosigmoid junction	288	8.8	1,699	10.5	4,146	10.9	32,029	11.0	**38,822**	**11.1**
Anus, anal canal, and anorectum	33	0.9	81	0.5	703	1.8	5,450	1.8	**6,338**	**1.8**
Liver and Intrahepatic bile duct	280	8.5	2,008	12.7	4,097	10.0	21,223	7.0	**28,012**	**7.7**
Gallbladder	48	1.9	204	1.4	558	1.6	2,979	1.0	**3,835**	**1.1**
Other biliary	28	0.9	363	2.5	506	1.5	5,023	1.7	**5,963**	**1.7**
Pancreas	197	7.0	1,340	9.3	5,293	15.1	36,001	12.1	**43,213**	**12.3**
Retroperitoneum	—	—	43	0.3	164	0.4	1,088	0.4	**1,321**	**0.4**
Peritoneum, omentum, and mesentery	—	—	70	0.4	135	0.4	1,698	0.6	**1,924**	**0.5**
Other digestive organs	—	—	80	0.5	199	0.6	1,332	0.5	**1,635**	**0.5**
Respiratory system	**1,167**	**42.3**	**5,369**	**36.8**	**24,484**	**68.6**	**193,417**	**65.2**	**225,933**	**64.7**
Nose, nasal cavity, and middle ear	—	—	94	0.6	232	0.6	1,908	0.7	**2,274**	**0.7**
Larynx	56	1.8	159	1.0	1,706	4.4	10,123	3.3	**12,152**	**3.4**
Lung and bronchus	1,096	40.1	5,088	35.0	22,475	63.3	180,823	61.0	**210,828**	**60.4**
Pleura	—	—	—	—	—	—	91	0	**105**	**0**
Trachea, mediastinum, and other respiratory organs	—	—	26	0.2	61	0.2	472	0.2	**574**	**0.2**
Bones and joints	**19**	**0.4**	**109**	**0.6**	**308**	**0.7**	**2,458**	**1.0**	**2,951**	**0.9**
Soft tissue including heart	**72**	**2.1**	**356**	**2.1**	**1,308**	**3.4**	**8,809**	**3.2**	**10,728**	**3.2**
Skin excluding basal and squamous	**167**	**5.6**	**315**	**2.0**	**664**	**1.8**	**68,552**	**24.2**	**73,181**	**21.5**
Melanoma of the skin	141	4.7	197	1.2	332	0.9	63,875	22.6	**67,753**	**19.9**
Other nonepithelial skin	26	0.8	118	0.8	332	0.9	4,677	1.6	**5,428**	**1.6**
Male and female breast	**1,145**	**36.1**	**8,416**	**49.3**	**25,927**	**68.5**	**188,474**	**65.5**	**226,272**	**65.6**
Female breast	1,143	67.8	8,357	89.7	25,630	120.1	186,726	123.3	**224,147**	**122.2**
Male breast	—	—	59	0.8	297	2.0	1,748	1.3	**2,125**	**1.4**
Female genital system	**598**	**33.9**	**3,279**	**34.9**	**10,015**	**46.9**	**75,241**	**49.4**	**90,303**	**48.8**
Cervix	119	6.3	576	6.1	1,907	9.0	9,174	7.1	**12,042**	**7.4**
Corpus and uterus, NOS	290	15.9	1,704	17.9	5,334	24.7	41,235	26.1	**49,154**	**25.7**
Corpus	281	15.3	1,648	17.3	4,995	23.1	40,082	25.3	**47,570**	**24.9**
Uterus, NOS	—	—	56	0.6	339	1.6	1,153	0.7	**1,584**	**0.8**
Ovary	138	8.4	810	8.7	1,959	9.3	17,671	11.6	**20,785**	**11.3**
Vagina	—	—	37	0.4	199	1.0	1,031	0.7	**1,296**	**0.7**
Vulva	24	1.5	66	0.8	413	2.0	4,285	2.7	**4,851**	**2.6**
Other female genital organs	16	1.0	86	1.0	203	1.0	1,845	1.2	**2,175**	**1.2**

See table footnotes on page 44.

TABLE 9. (*Continued*) Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site and race§ —United States, 2012¶

	AI/AN§		API§		Black		White		Total	
Cancer site	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Male genital system	**832**	**60.1**	**3,975**	**57.1**	**28,484**	**172.2**	**146,244**	**103.0**	**187,308**	**111.8**
Prostate	750	56.4	3,755	54.5	28,003	169.4	137,488	95.6	**177,489**	**105.3**
Testis	76	3.2	164	1.8	305	1.5	7,410	6.3	**8,189**	**5.5**
Penis	—	—	37	0.6	142	1.0	1,070	0.8	**1,283**	**0.8**
Other male genital organs	—	—	19	0.3	34	0.2	276	0.2	**347**	**0.2**
Urinary system	**710**	**23.9**	**2,443**	**16.4**	**10,399**	**28.8**	**112,781**	**38.4**	**128,103**	**37.0**
Urinary bladder	222	8.6	1,208	8.6	3,778	11.3	63,564	21.5	**69,974**	**20.2**
Kidney and renal pelvis	480	15.0	1,165	7.3	6,420	16.9	46,625	16.0	**55,231**	**15.9**
Ureter	—	—	53	0.4	80	0.2	1,769	0.6	**1,918**	**0.6**
Other urinary organs	—	—	17	0.1	121	0.3	823	0.3	**980**	**0.3**
Eye and orbit	**—**	**—**	**36**	**0.2**	**93**	**0.2**	**2,513**	**0.9**	**2,733**	**0.8**
Brain and other nervous system	**114**	**3.2**	**622**	**3.6**	**1,615**	**4.1**	**18,858**	**6.9**	**21,490**	**6.5**
Brain	107	3.1	576	3.4	1,465	3.7	17,765	6.5	**20,151**	**6.0**
Cranial nerves other nervous system	—	—	46	0.3	150	0.4	1,093	0.4	**1,339**	**0.4**
Endocrine system	**285**	**7.4**	**2,822**	**15.6**	**3,893**	**9.9**	**40,662**	**15.6**	**48,594**	**15.0**
Thyroid	275	7.2	2,677	14.8	3,529	8.9	38,888	14.9	**46,279**	**14.3**
Other endocrine including thymus	—	—	145	0.8	364	0.9	1,774	0.7	**2,315**	**0.7**
Lymphomas	**340**	**11.6**	**2,154**	**13.7**	**6,185**	**16.1**	**61,671**	**21.7**	**71,692**	**21.1**
Hodgkin lymphoma	32	0.9	212	1.1	1,096	2.6	6,787	2.7	**8,273**	**2.6**
Non-Hodgkin lymphoma	**308**	**10.8**	**1,942**	**12.5**	**5,089**	**13.5**	**54,884**	**19.0**	**63,419**	**18.5**
Myeloma	**116**	**4.1**	**491**	**3.2**	**4,392**	**12.4**	**16,480**	**5.6**	**21,829**	**6.3**
Leukemias	252	7.9	1,200	7.5	3,838	10.5	37,968	13.5	**44,396**	**13.2**
Acute lymphocytic leukemia	51	1.2	242	1.4	440	1.0	4,011	1.7	**4,846**	**1.6**
Chronic lymphocytic leukemia	51	1.9	172	1.1	1,066	3.1	12,921	4.3	**14,821**	**4.2**
Acute myeloid leukemia	86	2.8	495	3.2	1,294	3.6	11,808	4.2	**13,820**	**4.1**
Chronic myeloid leukemia	36	1.2	177	1.1	564	1.5	4,631	1.7	**5,543**	**1.7**
Other leukemias	28	0.8	114	0.7	474	1.3	4,597	1.6	**5,366**	**1.6**
Mesothelioma	**—**	**—**	**35**	**0.3**	**162**	**0.5**	**2,963**	**1.0**	**3,199**	**0.9**
Kaposi Sarcoma	**—**	**—**	**27**	**0.1**	**320**	**0.8**	**648**	**0.3**	**1,076**	**0.3**
Miscellaneous	**342**	**12.9**	**1,432**	**10.0**	**5,494**	**16.0**	**47,547**	**16.2**	**55,876**	**16.3**

Abbreviations: AI/AN = American Indian/Alaska Native; A/PI = Asian/Pacific Islander; NOS = not otherwise specified.

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Rates are not presented for persons of unknown or other race, therefore categories do not sum to total. Data for specified racial populations other than white and black should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

¶ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria.

** Counts and rates are suppressed if <16 cases were reported.

TABLE 10. Reported number and age-adjusted rate* of cancer deaths, by primary cancer site and race† — United States, 2012§

	AI/AN†		API†		Black		White		Total	
Cancer site	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
All cancer sites combined	**3,018**	**112.5**	**15,339**	**104.2**	**67,374**	**194.4**	**496,876**	**166.4**	**582,607**	**166.4**
Oral cavity and pharynx	**48**	**1.6**	**320**	**2.0**	**1,074**	**2.9**	**7,482**	**2.5**	**8,924**	**2.5**
Lip	—¶	—	—	—	—	—	68	0	**71**	**0**
Tongue	—	—	58	0.4	200	0.5	1,956	0.6	**2,224**	**0.6**
Salivary gland	—	—	19	0.1	67	0.2	781	0.3	**869**	**0.2**
Floor of mouth	—	—	—	—	—	—	71	0	**75**	**0**
Gum and other mouth	—	—	41	0.3	118	0.3	1,108	0.4	**1,275**	**0.4**
Nasopharynx	—	—	141	0.8	100	0.3	419	0.1	**666**	**0.2**
Tonsil	—	—	—	—	108	0.3	753	0.2	**879**	**0.2**
Oropharynx	—	—	17	0.1	146	0.4	723	0.2	**891**	**0.2**
Hypopharynx	—	—	—	—	50	0.1	297	0.1	**356**	**0.1**
Other oral cavity and pharynx	—	—	21	0.1	281	0.8	1,306	0.4	**1,618**	**0.4**
Digestive system	**908**	**33.1**	**5,511**	**37.5**	**18,930**	**53.9**	**121,675**	**40.5**	**147,024**	**41.6**
Esophagus	67	2.5	241	1.6	1,387	3.7	12,954	4.3	**14,649**	**4.1**
Stomach	100	3.9	832	5.7	2,001	5.9	8,258	2.8	**11,191**	**3.2**
Small intestine	—	—	32	0.2	199	0.5	1,060	0.4	**1,293**	**0.4**
Colon and rectum	301	11.2	1,578	10.8	6,861	19.9	42,776	14.3	**51,516**	**14.7**
Colon excluding rectum	246	9.2	1,270	8.8	5,727	16.8	34,624	11.6	**41,867**	**12.0**
Rectum and rectosigmoid junction	55	2.0	308	2.0	1,134	3.2	8,152	2.7	**9,649**	**2.7**
Anus, anal canal, and anorectum	—	—	—	—	99	0.3	778	0.3	**889**	**0.3**
Liver and intrahepatic bile duct	207	7.0	1,499	9.9	3,190	8.3	18,076	5.9	**22,972**	**6.3**
Gallbladder	24	1.1	86	0.6	285	0.8	1,707	0.6	**2,102**	**0.6**
Other biliary	—	—	61	0.4	121	0.4	1,327	0.4	**1,519**	**0.4**
Pancreas	180	6.5	1,113	7.9	4,595	13.4	32,909	10.9	**38,797**	**11.0**
Retroperitoneum	—	—	—	—	16	0	184	0.1	**207**	**0.1**
Peritoneum, omentum, and mesentery	—	—	18	0.1	50	0.1	679	0.2	**750**	**0.2**
Other digestive organs	—	—	37	0.3	126	0.4	967	0.3	**1,139**	**0.3**
Respiratory system	**818**	**31.1**	**3,528**	**24.6**	**17,484**	**50.3**	**140,021**	**46.9**	**161,851**	**46.2**
Nose, nasal cavity, and middle ear	—	—	19	0.1	40	0.1	397	0.1	**458**	**0.1**
Larynx	18	0.6	56	0.4	628	1.7	2,960	1.0	**3,662**	**1.0**
Lung and bronchus	796	30.4	3,441	24.0	16,780	48.4	136,406	45.7	**157,423**	**45.0**
Pleura	—	—	—	—	—	—	75	0	**82**	**0**
Trachea, mediastinum, and other respiratory organs	—	—	—	—	31	0.1	183	0.1	**226**	**0.1**
Bones and joints	**—**	**—**	**42**	**0.3**	**165**	**0.4**	**1,186**	**0.4**	**1,399**	**0.4**
Soft tissue including heart	**35**	**1.1**	**147**	**0.9**	**567**	**1.5**	**3,810**	**1.3**	**4,559**	**1.3**
Skin excluding basal and squamous	**32**	**1.3**	**90**	**0.6**	**273**	**0.8**	**12,068**	**4.1**	**12,463**	**3.6**
Melanoma of the skin	19	0.8	58	0.4	138	0.4	9,036	3.1	**9,251**	**2.7**
Other nonepithelial skin	—	—	32	0.2	135	0.4	3,032	1.0	**3,212**	**0.9**
Male and female breast	**173**	**5.9**	**1,036**	**6.3**	**6,246**	**17.2**	**34,100**	**11.4**	**41,555**	**11.8**
Female breast	172	10.8	1,032	11.3	6,186	29.4	33,760	20.7	**41,150**	**21.3**
Male breast	—	—	—	—	60	0.4	340	0.3	**405**	**0.3**

See table footnotes on page 46.

TABLE 10. (*Continued*) Reported number and age-adjusted rate* of cancer deaths, by primary cancer site and race† — United States, 2012§

	AI/AN†		API†		Black		White		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
Female genital system	**171**	**11.1**	**858**	**9.6**	**3,984**	**19.4**	**24,392**	**15.0**	**29,405**	**15.2**
Cervix	41	2.3	154	1.7	780	3.7	3,099	2.1	**4,074**	**2.3**
Corpus and uterus, NOS	47	3.1	280	3.2	1,666	8.2	6,918	4.1	**8,911**	**4.5**
Corpus	21	1.2	131	1.5	646	3.2	3,014	1.8	**3,812**	**1.9**
Uterus, NOS	26	1.8	149	1.7	1,020	5.0	3,904	2.3	**5,099**	**2.6**
Ovary	74	5.0	385	4.3	1,359	6.6	12,586	7.7	**14,404**	**7.4**
Vagina	—	—	—	—	56	0.3	360	0.2	**429**	**0.2**
Vulva	—	—	—	—	64	0.3	952	0.6	**1,034**	**0.5**
Other female genital organs	—	—	16	0.2	59	0.3	477	0.3	**553**	**0.3**
Male genital system	**134**	**14.4**	**441**	**8.6**	**4,655**	**42.1**	**22,725**	**18.6**	**27,955**	**20.0**
Prostate	127	14.0	429	8.4	4,595	41.8	22,093	18.1	**27,244**	**19.6**
Testis	—	—	—	—	26	0.1	347	0.3	**386**	**0.3**
Penis	—	—	—	—	27	0.2	241	0.2	**273**	**0.2**
Other male genital organs	—	—	—	—	—	—	44	0	**52**	**0**
Urinary system	**148**	**5.5**	**507**	**3.7**	**2,411**	**7.2**	**26,528**	**8.8**	**29,594**	**8.5**
Urinary bladder	33	1.3	232	1.8	1,090	3.5	13,890	4.6	**15,245**	**4.4**
Kidney and renal pelvis	107	3.9	256	1.7	1,267	3.6	11,888	4.0	**13,518**	**3.8**
Ureter	—	—	—	—	—	—	351	0.1	**378**	**0.1**
Other urinary organs	—	—	—	—	41	0.1	399	0.1	**453**	**0.1**
Eye and orbit	**—**	**—**	**—**	**—**	**—**	**—**	**260**	**0.1**	**279**	**0.1**
Brain and other nervous system	**63**	**2.0**	**336**	**2.1**	**1,009**	**2.7**	**13,868**	**4.8**	**15,276**	**4.4**
Endocrine system	**—**	**—**	**134**	**0.9**	**311**	**0.9**	**2,208**	**0.8**	**2,660**	**0.8**
Thyroid	—	—	90	0.6	165	0.5	1,430	0.5	**1,690**	**0.5**
Other endocrine including thymus	—	—	44	0.3	146	0.4	778	0.3	**970**	**0.3**
Lymphomas	75	3.2	587	4.1	1,595	4.6	19,261	6.5	**21,518**	**6.2**
Hodgkin lymphoma	—	—	20	0.1	133	0.3	974	0.3	**1,130**	**0.3**
Non-Hodgkin lymphoma	72	3.2	567	4.0	1,462	4.3	18,287	6.2	**20,388**	**5.9**
Myeloma	**48**	**2.0**	**241**	**1.7**	**2,085**	**6.3**	**9,447**	**3.2**	**11,821**	**3.4**
Leukemias	**96**	**3.4**	**599**	**4.1**	**1,965**	**5.8**	**20,649**	**7.1**	**23,309**	**6.8**
Acute lymphocytic leukemia	—	—	53	0.3	121	0.3	1,222	0.5	**1,408**	**0.4**
Chronic lymphocytic leukemia	—	—	38	0.3	365	1.2	4,183	1.4	**4,598**	**1.3**
Acute myeloid leukemia	44	1.5	323	2.2	768	2.2	8,349	2.9	**9,484**	**2.8**
Chronic myeloid leukemia	—	—	21	0.1	108	0.3	885	0.3	**1,017**	**0.3**
Other leukemias	**25**	**1.0**	**164**	**1.2**	**603**	**1.8**	**6,010**	**2.0**	**6,802**	**2.0**
Mesothelioma	**—**	**—**	**28**	**0.2**	**125**	**0.4**	**2,519**	**0.9**	**2,686**	**0.8**
Miscellaneous	**236**	**8.9**	**930**	**6.5**	**4,471**	**12.9**	**34,639**	**11.5**	**40,276**	**11.5**

Abbreviations: AI/AN = American Indian/Alaska Native; A/PI = Asian/Pacific Islander; NOS = not otherwise specified.

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data for specified racial populations other than white and black should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

§ Data are from the National Vital Statistics System (NVSS).

¶ Counts and rates are suppressed if <16 deaths were reported.

TABLE 11. Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site and ethnicity§ — United States, 2012¶

	Hispanic		Non-Hispanic		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
All cancer sites combined	**111,815**	**340.5**	**1,417,061**	**451.4**	**1,529,078**	**440.3**
Oral cavity and pharynx	**2,318**	**6.9**	**37,561**	**11.7**	**39,879**	**11.2**
Lip	87	0.3	1,755	0.6	**1,842**	**0.5**
Tongue	629	1.9	11,745	3.6	**12,374**	**3.4**
Salivary gland	324	0.9	3,930	1.3	**4,254**	**1.3**
Floor of mouth	90	0.3	1,846	0.6	**1,936**	**0.5**
Gum and other mouth	366	1.2	4,965	1.6	**5,331**	**1.5**
Nasopharynx	148	0.4	1,610	0.5	**1,758**	**0.5**
Tonsil	364	1.0	6,966	2.1	**7,330**	**2.0**
Oropharynx	97	0.3	1,636	0.5	**1,733**	**0.5**
Hypopharynx	139	0.4	2,142	0.6	**2,281**	**0.6**
Other oral cavity and pharynx	74	0.2	966	0.3	**1,040**	**0.3**
Digestive system	**24,117**	**78.3**	**249,370**	**78.5**	**273,535**	**78.3**
Esophagus	847	2.8	15,143	4.7	**15,993**	**4.5**
Stomach	2,926	9.5	19,694	6.2	**22,623**	**6.6**
Small intestine	561	1.7	7,333	2.3	**7,894**	**2.3**
Colon and rectum	10,585	34.0	124,186	39.5	**134,784**	**38.9**
Colon excluding rectum	7,158	23.8	88,791	28.3	**95,962**	**27.8**
Rectum and rectosigmoid junction	3,427	10.2	35,395	11.2	**38,822**	**11.1**
Anus, anal canal, and anorectum	449	1.4	5,888	1.9	**6,338**	**1.8**
Liver and Intrahepatic bile duct	4,066	12.7	23,937	7.2	**28,012**	**7.7**
Gallbladder	539	1.9	3,295	1.0	**3,835**	**1.1**
Other biliary	650	2.2	5,313	1.7	**5,963**	**1.7**
Pancreas	3,079	10.7	40,116	12.5	**43,213**	**12.3**
Retroperitoneum	128	0.3	1,193	0.4	**1,321**	**0.4**
Peritoneum, omentum, and mesentery	134	0.4	1,790	0.6	**1,924**	**0.5**
Other digestive organs	153	0.5	1,482	0.5	**1,635**	**0.5**
Respiratory system	**9,655**	**34.4**	**216,231**	**67.5**	**225,933**	**64.7**
Nose, nasal cavity, and middle ear	191	0.6	2,083	0.7	**2,274**	**0.7**
Larynx	736	2.4	11,413	3.5	**12,152**	**3.4**
Lung and bronchus	8,648	31.2	202,136	63.2	**210,828**	**60.4**
Pleura	—**	—	101	0	—	**0**
Trachea, mediastinum, and other respiratory organs	76	0.1	498	0.2	**574**	**0.2**
Bones and joints	**415**	**0.9**	**2,536**	**0.9**	**2,951**	**0.9**
Soft tissue including heart	**1,092**	**2.8**	**9,636**	**3.3**	**10,728**	**3.2**
Skin excluding basal and squamous	**1,726**	**5.1**	**71,452**	**23.6**	**73,181**	**21.5**
Melanoma of the skin	1,423	4.2	66,328	21.9	**67,753**	**19.9**
Other nonepithelial skin	303	0.9	5,124	1.7	**5,428**	**1.6**
Male and female breast	**17,129**	**49.0**	**209,135**	**67.6**	**226,272**	**65.6**
Female breast	17,014	91.3	207,125	125.9	**224,147**	**122.2**
Male breast	115	0.8	2,010	1.4	**2,125**	**1.4**
Female genital system	**8,557**	**44.5**	**81,736**	**49.1**	**90,303**	**48.8**
Cervix	1,998	9.5	10,044	7.1	**12,042**	**7.4**
Corpus and uterus, NOS	4,135	21.8	45,015	26.0	**49,154**	**25.7**
Corpus	3,976	20.9	43,593	25.2	**47,570**	**24.9**
Uterus, NOS	159	0.9	1,422	0.8	**1,584**	**0.8**
Ovary	1,885	10.0	18,894	11.4	**20,785**	**11.3**
Vagina	108	0.6	1,188	0.7	**1,296**	**0.7**
Vulva	268	1.7	4,583	2.7	**4,851**	**2.6**
Other female genital organs	163	0.9	2,012	1.2	**2,175**	**1.2**

See table footnotes on page 48.

TABLE 11. (*Continued*) Reported number and age-adjusted rate* of invasive† cancer cases, by primary cancer site and ethnicity§ — United States, 2012¶

	Hispanic		Non-Hispanic		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
Male genital system	**13,653**	**95.7**	**173,628**	**113.7**	**187,308**	**111.8**
Prostate	12,121	89.8	165,342	107.0	**177,489**	**105.3**
Testis	1,311	4.4	6,877	5.7	**8,189**	**5.5**
Penis	204	1.4	1,079	0.8	**1,283**	**0.8**
Other male genital organs	17	0.1	330	0.2	**347**	**0.2**
Urinary system	**8,518**	**27.4**	**119,571**	**37.9**	**128,103**	**37.0**
Urinary bladder	3,041	11.1	66,925	21.1	**69,974**	**20.2**
Kidney and renal pelvis	5,350	15.9	49,875	15.9	**55,231**	**15.9**
Ureter	80	0.3	1,838	0.6	**1,918**	**0.6**
Other urinary organs	47	0.2	933	0.3	**980**	**0.3**
Eye and orbit	**206**	**0.5**	**2,527**	**0.9**	**2,733**	**0.8**
Brain and other nervous system	**1,990**	**4.9**	**19,497**	**6.7**	**21,490**	**6.5**
Brain	1,846	4.6	18,302	6.3	**20,151**	**6.0**
Cranial nerves other nervous system	144	0.3	1,195	0.5	**1,339**	**0.4**
Endocrine system	**5,806**	**13.7**	**42,783**	**15.4**	**48,594**	**15.0**
Thyroid	5,555	13.1	40,722	14.6	**46,279**	**14.3**
Other endocrine including thymus	251	0.6	2,061	0.7	**2,315**	**0.7**
Lymphomas	**6,462**	**18.9**	**65,222**	**21.5**	**71,692**	**21.1**
Hodgkin lymphoma	1,029	2.3	7,244	2.7	**8,273**	**2.6**
Non-Hodgkin lymphoma	5,433	16.6	57,978	18.7	**63,419**	**18.5**
Myeloma	**1,869**	**6.2**	**19,955**	**6.3**	**21,829**	**6.3**
Leukemias	**3,988**	**10.3**	**40,403**	**13.4**	**44,396**	**13.2**
Acute lymphocytic leukemia	1,264	2.2	3,582	1.5	**4,846**	**1.6**
Chronic lymphocytic leukemia	542	1.9	14,278	4.5	**14,821**	**4.2**
Acute myeloid leukemia	1,272	3.6	12,546	4.1	**13,820**	**4.1**
Chronic myeloid leukemia	490	1.4	5,051	1.7	**5,543**	**1.7**
Other leukemias	420	1.2	4,946	1.6	**5,366**	**1.6**
Mesothelioma	**200**	**0.7**	**2,997**	**1.0**	**3,199**	**0.9**
Kaposi Sarcoma	**198**	**0.5**	**878**	**0.3**	**1,076**	**0.3**
Miscellaneous	**3,916**	**13.6**	**51,943**	**16.5**	**55,876**	**16.3**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Rates and counts are not presented for persons of unknown ethnicity, therefore categories do not sum to total. Data for specified ethnic populations should be interpreted with caution. For more information, see USCS technical notes http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

¶ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined (covering approximately 99% of the U.S. population). Registry-specific data quality information is available at http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria.

** Counts and rates are suppressed if <16 cases were reported. Some counts and rates are suppressed as complementary cell suppression.

TABLE 12. Reported number and age-adjusted rate* of cancer deaths, by primary cancer site and ethnicity† — United States, 2012§

Cancer site	Hispanic§		Non-Hispanic		Total	
	No.	Rate	No.	Rate	No.	Rate
All cancer sites combined	**34,146**	**117.8**	**547,027**	**170.4**	**582,607**	**166.4**
Oral cavity and pharynx	**476**	**1.6**	**8,421**	**2.6**	**8,924**	**2.5**
Lip	—¶	—	65	0	**71**	**0**
Tongue	118	0.4	2,099	0.6	**2,224**	**0.6**
Salivary gland	48	0.2	819	0.3	**869**	**0.2**
Floor of mouth	—	—	68	0	**75**	**0**
Gum and other mouth	66	0.2	1,206	0.4	**1,275**	**0.4**
Nasopharynx	37	0.1	627	0.2	**666**	**0.2**
Tonsil	39	0.1	835	0.3	**879**	**0.2**
Oropharynx	43	0.1	848	0.3	**891**	**0.2**
Hypopharynx	25	0.1	329	0.1	**356**	**0.1**
Other oral cavity and pharynx	87	0.3	1,525	0.5	**1,618**	**0.4**
Digestive system	**11,382**	**39.3**	**135,287**	**41.8**	**147,024**	**41.6**
Esophagus	621	2.1	13,995	4.3	**14,649**	**4.1**
Stomach	1,590	5.2	9,570	3.0	**11,191**	**3.2**
Small intestine	68	0.2	1,221	0.4	**1,293**	**0.4**
Colon and rectum	3,349	11.8	48,034	15.0	**51,516**	**14.7**
Colon excluding rectum	2,737	9.7	39,017	12.2	**41,867**	**12.0**
Rectum and rectosigmoid junction	612	2.0	9,017	2.8	**9,649**	**2.7**
Anus, anal canal, and anorectum	40	0.1	845	0.3	**889**	**0.3**
Liver and intrahepatic bile duct	2,780	9.3	20,135	6.1	**22,972**	**6.3**
Gallbladder	262	1.0	1,833	0.6	**2,102**	**0.6**
Other biliary	136	0.5	1,383	0.4	**1,519**	**0.4**
Pancreas	2,407	8.6	36,307	11.2	**38,797**	**11.0**
Retroperitoneum	16	0	190	0.1	**207**	**0.1**
Peritoneum, omentum, and mesentery	46	0.1	703	0.2	**750**	**0.2**
Other digestive organs	67	0.2	1,071	0.3	**1,139**	**0.3**
Respiratory system	**5,503**	**20.4**	**155,925**	**48.4**	**161,851**	**46.2**
Nose, nasal cavity, and middle ear	37	0.1	420	0.1	**458**	**0.1**
Larynx	214	0.8	3,433	1.0	**3,662**	**1.0**
Lung and bronchus	5,225	19.4	151,793	47.1	**157,423**	**45.0**
Pleura	—	—	77	0	**82**	**0**
Trachea, mediastinum, and other respiratory organs	22	0.1	202	0.1	**226**	**0.1**
Bones and joints	**136**	**0.3**	**1,262**	**0.4**	**1,399**	**0.4**
Soft tissue including heart	**390**	**1.1**	**4,155**	**1.4**	**4,559**	**1.3**
Skin excluding basal and squamous	**350**	**1.2**	**12,085**	**3.8**	**12,463**	**3.6**
Melanoma of the skin	224	0.7	9,010	2.9	**9,251**	**2.7**
Other nonepithelial skin	126	0.5	3,075	0.9	**3,212**	**0.9**
Male and female breast	**2,627**	**8.1**	**38,826**	**12.1**	**41,555**	**11.8**
Female breast	2,613	14.7	38,436	21.9	**41,150**	**21.3**
Male breast	—	—	390	0.3	**405**	**0.3**

See table footnotes on page 50.

TABLE 12. (Continued) Reported number and age-adjusted rate* of cancer deaths, by primary cancer site and ethnicity† — United States, 2012§

	Hispanic§		Non-Hispanic		Total	
Cancer site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**
Female genital system	**2,212**	**12.8**	**27,113**	**15.4**	**29,405**	**15.2**
Cervix	520	2.7	3,536	2.2	**4,074**	**2.3**
Corpus and uterus, NOS	619	3.7	8,269	4.6	**8,911**	**4.5**
Corpus	245	1.5	3,555	2.0	**3,812**	**1.9**
Uterus, NOS	374	2.2	4,714	2.6	**5,099**	**2.6**
Ovary	963	5.8	13,407	7.5	**14,404**	**7.4**
Vagina	32	0.2	396	0.2	**429**	**0.2**
Vulva	45	0.3	986	0.5	**1,034**	**0.5**
Other female genital organs	33	0.2	519	0.3	**553**	**0.3**
Male genital system	**1,706**	**17.1**	**26,189**	**20.2**	**27,955**	**20.0**
Prostate	1,592	16.5	25,595	19.8	**27,244**	**19.6**
Testis	75	0.2	309	0.2	**386**	**0.3**
Penis	36	0.3	237	0.2	**273**	**0.2**
Other male genital organs	—	—	48	0	**52**	**0**
Urinary system	**1,660**	**6.0**	**27,875**	**8.6**	**29,594**	**8.5**
Urinary bladder	584	2.3	14,630	4.5	**15,245**	**4.4**
Kidney and renal pelvis	1,042	3.6	12,451	3.8	**13,518**	**3.8**
Ureter	—	—	362	0.1	**378**	**0.1**
Other urinary organs	19	0.1	432	0.1	**453**	**0.1**
Eye and orbit	**18**	**0.1**	**260**	**0.1**	**279**	**0.1**
Brain and other nervous system	**1,049**	**3.0**	**14,194**	**4.6**	**15,276**	**4.4**
Endocrine system	**248**	**0.8**	**2,409**	**0.8**	**2,660**	**0.8**
Thyroid	168	0.6	1,521	0.5	**1,690**	**0.5**
Other endocrine including thymus	80	0.2	888	0.3	**970**	**0.3**
Lymphomas	**1,551**	**5.4**	**19,914**	**6.3**	**21,518**	**6.2**
Hodgkin lymphoma	123	0.4	1,005	0.3	**1,130**	**0.3**
Non-Hodgkin lymphoma	1,428	5.0	18,909	6.0	**20,388**	**5.9**
Myeloma	**782**	**2.9**	**11,019**	**3.4**	**11,821**	**3.4**
Leukemias	**1,603**	**5.0**	**21,661**	**6.9**	**23,309**	**6.8**
Acute lymphocytic leukemia	325	0.7	1,080	0.4	**1,408**	**0.4**
Chronic lymphocytic leukemia	125	0.5	4,463	1.4	**4,598**	**1.3**
Acute myeloid leukemia	582	1.9	8,885	2.9	**9,484**	**2.8**
Chronic myeloid leukemia	76	0.3	936	0.3	**1,017**	**0.3**
Other leukemias	495	1.7	6,297	2.0	**6,802**	**2.0**
Mesothelioma	**132**	**0.5**	**2,545**	**0.8**	**2,686**	**0.8**
Miscellaneous	**2,313**	**8.2**	**37,842**	**11.7**	**40,276**	**11.5**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS).

§ Data for specified ethnic populations should be interpreted with caution. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=IntRaceEthnicityData).

¶ Counts and rates are suppressed if <16 deaths were reported.

TABLE 13. Reported number of invasive* cancer cases by primary cancer site and year — United States, 1999–2012†

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All cancer sites combined	**1,227,562**	**1,249,559**	**1,273,017**	**1,285,618**	**1,279,510**	**1,296,877**	**1,318,814**	**1,349,590**	**1,387,116**	**1,402,567**	**1,414,111**	**1,403,565**	**1,424,734**	**1,399,978**
Oral cavity and pharynx	**27,491**	**27,954**	**28,236**	**28,904**	**29,506**	**29,980**	**30,315**	**31,314**	**32,798**	**34,214**	**34,619**	**35,395**	**36,790**	**36,990**
Lip	2,444	2,393	2,309	2,333	2,041	1,961	1,859	1,880	1,883	1,867	1,832	1,952	1,886	1,725
Tongue	6,640	6,859	7,017	7,478	7,737	8,091	8,298	8,725	9,399	10,100	10,224	10,282	11,118	11,476
Salivary gland	2,982	3,147	3,180	3,220	3,305	3,357	3,470	3,599	3,628	3,754	3,774	3,762	3,792	3,986
Floor of mouth	2,074	2,053	2,075	2,018	1,940	1,916	1,827	1,944	1,923	1,934	1,920	1,924	1,838	1,787
Gum and other mouth	4,357	4,197	4,312	4,236	4,387	4,348	4,338	4,372	4,564	4,759	4,663	4,846	4,927	4,915
Nasopharynx	1,471	1,527	1,416	1,535	1,622	1,559	1,618	1,565	1,722	1,713	1,601	1,660	1,635	1,640
Tonsil	3,409	3,584	3,780	4,032	4,316	4,570	4,756	5,068	5,307	5,730	6,263	6,348	6,754	6,786
Oropharynx	995	1,060	1,106	1,110	1,277	1,295	1,298	1,404	1,416	1,479	1,460	1,666	1,704	1,598
Hypopharynx	2,187	2,153	2,085	2,066	2,163	2,131	2,120	2,034	2,131	2,082	2,127	2,074	2,124	2,106
Other oral cavity and pharynx	932	981	956	876	718	752	731	723	825	796	755	881	1,012	971
Digestive system	**232,437**	**235,790**	**238,113**	**239,050**	**242,294**	**243,671**	**244,545**	**246,111**	**249,358**	**252,542**	**252,284**	**250,837**	**254,183**	**254,508**
Esophagus	12,691	12,886	13,082	13,105	13,606	14,152	14,058	14,522	14,535	15,092	15,220	14,598	14,998	14,884
Stomach	19,350	19,227	19,184	19,418	19,689	19,653	19,392	19,400	19,827	19,674	20,036	20,925	21,054	21,168
Small intestine	4,312	4,314	4,614	4,882	5,038	5,379	5,593	5,974	6,179	6,502	6,706	7,124	7,188	7,336
Colon and rectum	142,816	144,059	143,905	142,685	142,037	140,094	138,690	136,944	136,405	135,443	131,492	127,515	127,219	124,944
Colon excluding rectum	104,182	105,255	105,235	104,439	103,760	102,098	100,503	99,464	98,772	98,055	94,444	91,344	91,134	88,810
Rectum and rectosigmoid junction	38,634	38,804	38,670	38,246	38,277	37,996	38,187	37,480	37,633	37,388	37,048	36,171	36,085	36,134
Anus, anal canal, and anorectum	3,467	3,541	3,626	3,801	4,198	4,314	4,506	4,503	4,967	5,230	5,614	5,442	5,694	5,876
Liver and Intrahepatic bile duct	12,470	13,415	13,502	14,451	15,221	16,460	17,381	18,426	20,097	21,264	23,130	23,862	25,028	26,279
Gallbladder	3,102	2,992	3,149	2,980	3,122	3,140	3,231	3,279	3,314	3,330	3,550	3,538	3,607	3,614
Other biliary	3,356	3,544	4,221	4,401	4,565	4,624	4,677	4,862	4,874	5,141	5,349	5,437	5,635	5,603
Pancreas	28,024	28,801	29,421	29,804	31,085	31,922	32,985	34,137	34,961	36,519	36,950	38,112	39,242	40,229
Retroperitoneum	990	963	1,033	1,062	1,038	1,057	1,125	1,094	1,114	1,136	1,135	1,151	1,227	1,257
Peritoneum, omentum, and mesentery	1,101	1,188	1,391	1,472	1,646	1,818	1,813	1,751	1,895	1,981	1,838	1,808	1,835	1,791
Other digestive organs	758	860	985	989	1,049	1,058	1,094	1,219	1,190	1,230	1,264	1,325	1,456	1,527
Respiratory system	193,612	194,368	196,473	198,631	201,452	202,402	206,455	207,257	208,946	211,173	211,521	208,570	207,967	207,627
Nose, nasal cavity, and middle ear	1,805	1,799	1,765	1,870	1,815	1,928	1,966	1,953	2,116	2,080	2,104	2,005	2,045	2,126
Larynx	11,696	11,513	11,409	11,081	11,202	11,427	11,373	11,457	11,507	11,489	11,499	11,627	11,400	11,106
Lung and bronchus	179,444	180,405	182,729	185,079	187,813	188,372	192,465	193,219	194,673	196,903	197,245	194,261	193,906	193,768
Pleura	104	101	77	97	92	98	93	83	102	99	104	103	92	100
Trachea, mediastinum, and other respiratory organs	563	550	493	504	530	577	558	545	548	602	569	574	524	527
Bones and joints	**2,472**	**2,462**	**2,627**	**2,645**	**2,577**	**2,640**	**2,752**	**2,692**	**2,755**	**2,687**	**2,808**	**2,708**	**2,766**	**2,769**
Soft tissue including heart	**7,333**	**7,687**	**7,846**	**8,035**	**8,383**	**8,792**	**9,025**	**8,897**	**9,449**	**9,589**	**9,707**	**9,978**	**9,810**	**10,000**
Skin excluding basal and squamous	**42,231**	**45,624**	**49,078**	**50,756**	**51,026**	**54,246**	**58,466**	**58,591**	**60,959**	**63,467**	**65,477**	**65,306**	**67,704**	**68,633**
Melanoma of the skin	38,867	41,925	45,141	46,757	46,935	50,040	54,096	54,225	56,303	58,484	60,335	60,397	62,674	63,502
Other nonepithelial skin	3,364	3,699	3,937	3,999	4,091	4,206	4,370	4,366	4,656	4,983	5,142	4,909	5,030	5,131
Male and female breast	**187,922**	**187,408**	**189,541**	**188,438**	**181,949**	**182,828**	**185,308**	**189,451**	**194,935**	**200,299**	**205,221**	**201,894**	**208,322**	**210,356**
Female breast	186,459	185,946	188,139	186,934	180,386	181,216	183,738	187,819	193,211	198,411	203,405	199,991	206,446	208,404
Male breast	1,463	1,462	1,402	1,504	1,563	1,612	1,570	1,632	1,724	1,888	1,816	1,903	1,876	1,952
Female genital system	**71,591**	**72,193**	**72,986**	**72,698**	**71,893**	**72,881**	**74,556**	**75,675**	**77,446**	**79,354**	**81,185**	**81,437**	**83,020**	**84,199**
Cervix	12,991	12,984	12,399	12,079	11,726	11,491	11,719	11,653	11,705	11,623	11,807	11,395	11,339	11,145
Corpus and uterus, NOS	33,458	33,501	34,731	34,927	34,388	35,868	36,928	37,859	39,260	40,755	42,496	43,347	44,709	45,902
Corpus	32,350	32,366	33,573	33,763	33,224	34,727	35,751	36,721	38,124	39,440	41,081	41,970	43,247	44,449
Uterus, NOS	1,108	1,135	1,158	1,164	1,164	1,141	1,177	1,138	1,136	1,315	1,415	1,377	1,462	1,453
Ovary	19,875	20,339	20,361	20,075	20,187	19,805	20,113	20,175	20,131	20,409	20,000	19,569	19,524	19,382
Vagina	1,020	1,088	1,075	1,100	1,052	1,103	1,010	1,083	1,097	1,146	1,154	1,163	1,178	1,199
Vulva	3,401	3,348	3,494	3,515	3,551	3,579	3,700	3,788	3,986	4,017	4,201	4,223	4,355	4,502
Other female genital organs	846	933	926	1,002	989	1,035	1,086	1,117	1,267	1,404	1,527	1,740	1,915	2,069

See table footnotes on page 52.

TABLE 13. Reported number of invasive* cancer cases by primary cancer site and year — United States, 1999–2012†

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Male genital system	**194,920**	**200,489**	**206,681**	**208,978**	**196,114**	**195,842**	**196,522**	**214,202**	**226,520**	**215,968**	**211,749**	**203,731**	**207,234**	**173,864**
Prostate	186,717	192,151	198,257	200,678	187,529	187,229	187,731	205,526	217,631	206,730	202,691	194,600	198,110	164,613
Testis	6,937	7,052	7,160	7,017	7,251	7,355	7,501	7,346	7,509	7,690	7,650	7,673	7,579	7,724
Penis	1,004	1,008	991	1,025	1,053	988	997	1,025	1,099	1,211	1,106	1,143	1,206	1,194
Other male genital organs	262	278	273	258	281	270	293	305	281	337	302	315	339	333
Urinary system	**89,166**	**91,902**	**94,178**	**97,018**	**100,211**	**103,654**	**106,689**	**108,167**	**111,587**	**114,459**	**115,944**	**115,668**	**117,650**	**119,465**
Urinary bladder	55,822	56,845	57,153	58,168	59,242	60,732	61,706	60,721	62,484	63,354	64,138	64,051	64,872	65,494
Kidney and renal pelvis	31,073	32,824	34,756	36,629	38,706	40,615	42,661	44,965	46,608	48,383	49,203	49,018	50,068	51,269
Ureter	1,553	1,536	1,560	1,565	1,573	1,608	1,600	1,721	1,668	1,701	1,723	1,720	1,764	1,783
Other urinary organs	718	697	709	656	690	699	722	760	827	1,021	880	879	946	919
Eye and orbit	**2,185**	**2,266**	**2,283**	**2,258**	**2,441**	**2,459**	**2,440**	**2,484**	**2,538**	**2,514**	**2,537**	**2,438**	**2,474**	**2,589**
Brain and other nervous system	**17,611**	**17,830**	**17,766**	**18,267**	**18,353**	**18,879**	**18,993**	**19,201**	**19,512**	**19,858**	**20,019**	**19,809**	**19,893**	**19,929**
Brain	16,446	16,581	16,541	17,069	17,000	17,542	17,661	17,975	18,204	18,543	18,709	18,587	18,703	18,727
Cranial nerves other nervous system	1,165	1,249	1,225	1,198	1,353	1,337	1,332	1,226	1,308	1,315	1,310	1,222	1,190	1,202
Endocrine system	**19,093**	**21,074**	**22,594**	**24,401**	**25,856**	**28,353**	**31,030**	**33,174**	**36,000**	**39,386**	**41,693**	**42,584**	**43,924**	**45,696**
Thyroid	17,385	19,322	20,731	22,557	23,905	26,263	28,946	31,071	33,816	37,089	39,506	40,322	41,814	43,523
Other endocrine including thymus	1,708	1,752	1,863	1,844	1,951	2,090	2,084	2,103	2,184	2,297	2,187	2,262	2,110	2,173
Lymphomas	56,381	57,054	58,147	59,578	60,948	62,813	63,613	63,762	65,116	66,350	67,262	67,800	67,173	67,005
Hodgkin lymphoma	7,272	7,461	7,346	7,678	7,617	7,726	7,981	7,905	7,972	8,273	8,012	8,069	7,884	7,704
Non-Hodgkin lymphoma	49,109	49,593	50,801	51,900	53,331	55,087	55,632	55,857	57,144	58,077	59,250	59,731	59,289	59,301
Myeloma	**14,184**	**14,849**	**15,308**	**15,608**	**15,901**	**16,548**	**16,879**	**16,946**	**17,236**	**18,122**	**18,828**	**19,416**	**19,942**	**20,284**
Leukemias	**32,688**	**34,533**	**35,367**	**34,808**	**35,970**	**36,580**	**36,752**	**37,614**	**37,875**	**38,508**	**39,192**	**41,214**	**41,530**	**41,569**
Acute lymphocytic leukemia	3,670	3,823	3,939	3,916	3,970	4,131	4,066	4,269	4,380	4,536	4,491	4,600	4,701	4,536
Chronic lymphocytic leukemia	10,499	11,455	12,049	12,149	12,669	13,133	13,511	13,683	13,352	13,548	13,605	13,759	13,897	13,938
Acute myeloid leukemia	9,535	10,089	10,192	9,895	10,143	10,132	10,015	10,292	10,407	10,824	10,938	12,208	12,448	12,883
Chronic myeloid leukemia	4,122	4,305	4,343	4,104	4,302	4,437	4,370	4,612	4,643	4,758	5,045	5,278	5,305	5,223
Other leukemias	4,862	4,861	4,844	4,744	4,886	4,747	4,790	4,758	5,093	4,842	5,113	5,369	5,179	4,989
Mesothelioma	**2,825**	**2,889**	**2,891**	**2,935**	**2,925**	**2,964**	**3,074**	**2,978**	**2,974**	**3,012**	**3,048**	**3,070**	**3,079**	**3,002**
Kaposi Sarcoma	**1,406**	**1,399**	**1,391**	**1,306**	**1,349**	**1,315**	**1,355**	**1,226**	**1,263**	**1,191**	**1,172**	**1,112**	**1,113**	**1,036**
Miscellaneous	**32,014**	**31,788**	**31,511**	**31,304**	**30,362**	**30,030**	**30,045**	**29,848**	**29,849**	**29,874**	**29,845**	**30,598**	**30,160**	**30,457**

Abbreviation: NOS = not otherwise specified.

* Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

† Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined for all years, 1999–2012 (covering approximately 92% of the U.S. population). See registry-specific data quality information for all years, 1999–2012 (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria). Caution should be used when comparing number of cases and deaths because of potential differences in population coverage.

TABLE 14. Reported number of cancer deaths, by primary cancer site and year — United States, 1999–2012*

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All cancer sites combined	**549,829**	**553,080**	**553,760**	**557,264**	**556,890**	**553,880**	**559,303**	**559,880**	**562,867**	**565,460**	**567,614**	**574,738**	**576,685**	**582,607**
Oral cavity and pharynx	**7,486**	**7,492**	**7,701**	**7,737**	**7,777**	**7,826**	**7,773**	**7,720**	**8,067**	**8,019**	**7,922**	**8,474**	**8,657**	**8,924**
Lip	52	67	77	74	72	74	60	51	66	68	57	69	83	71
Tongue	1,738	1,767	1,818	1,887	1,875	1,881	1,948	1,906	2,034	1,983	1,971	2,125	2,089	2,224
Salivary gland	656	663	685	722	696	697	701	699	742	718	795	827	820	869
Floor of mouth	180	153	135	149	147	122	135	114	102	99	109	93	84	75
Gum and other mouth	1,215	1,213	1,179	1,152	1,176	1,168	1,118	1,108	1,109	1,160	1,091	1,212	1,245	1,275
Nasopharynx	638	650	621	628	598	637	615	633	677	645	662	701	630	666
Tonsil	543	518	612	638	608	592	647	654	688	724	736	795	842	879
Oropharynx	600	547	592	606	626	658	655	650	721	734	720	806	861	891
Hypopharynx	385	359	348	323	318	368	281	301	324	294	279	324	322	356
Other oral cavity and pharynx	1,479	1,555	1,634	1,558	1,661	1,629	1,613	1,604	1,604	1,594	1,502	1,522	1,681	1,618
Digestive system	**130,070**	**131,455**	**131,726**	**132,541**	**133,010**	**132,215**	**133,562**	**135,140**	**136,419**	**138,469**	**139,200**	**142,680**	**144,007**	**147,024**
Esophagus	11,917	12,232	12,529	12,700	12,860	13,023	13,499	13,685	13,592	13,714	13,908	14,490	14,446	14,649
Stomach	12,711	12,645	12,319	12,198	12,110	11,859	11,514	11,345	11,388	11,352	11,184	11,390	11,035	11,191
Small intestine	1,036	1,057	1,082	1,017	1,070	1,115	1,117	1,091	1,083	1,192	1,195	1,218	1,256	1,293
Colon and rectum	57,222	57,434	56,808	56,603	55,783	53,580	53,005	53,196	53,219	52,857	51,848	52,045	51,783	51,516
Colon excluding rectum	48,962	49,019	48,292	47,987	47,248	44,988	44,325	44,331	44,247	43,650	42,471	42,245	42,181	41,867
Rectum and rectosigmoid junction	8,260	8,415	8,516	8,616	8,535	8,592	8,680	8,865	8,972	9,207	9,377	9,800	9,602	9,649
Anus, anal canal, and anorectum	462	492	511	539	555	589	583	623	644	718	818	813	863	889
Liver and intrahepatic bile duct	12,382	12,916	13,351	14,047	14,706	15,321	16,075	16,525	17,146	18,213	19,352	20,304	21,608	22,972
Gallbladder	2,059	1,949	1,971	1,907	1,915	1,936	1,989	2,000	1,914	1,971	2,048	2,105	2,101	2,102
Other biliary	1,531	1,717	1,630	1,501	1,491	1,461	1,464	1,427	1,436	1,377	1,384	1,519	1,510	1,519
Pancreas	29,081	29,331	29,802	30,263	30,777	31,771	32,759	33,454	34,117	35,234	35,628	36,888	37,344	38,797
Retroperitoneum	220	262	220	219	191	219	238	190	204	226	186	202	219	207
Peritoneum, omentum, and mesentery	429	503	543	616	602	686	648	698	721	695	703	702	807	750
Other digestive organs	1,020	917	960	931	950	655	671	906	955	920	946	1,004	1,035	1,139
Respiratory system	**156,708**	**160,051**	**160,602**	**162,148**	**162,589**	**162,400**	**163,751**	**163,134**	**163,065**	**163,141**	**162,492**	**162,730**	**161,376**	**161,851**
Nose, nasal cavity, and middle ear	456	419	485	444	457	458	484	426	475	516	530	495	416	458
Larynx	3,815	3,861	3,797	3,722	3,791	3,668	3,796	3,821	3,634	3,760	3,630	3,691	3,732	3,662
Lung and bronchus	152,061	155,426	155,969	157,630	157,990	158,006	159,217	158,599	158,683	158,592	158,081	158,248	156,953	157,423
Pleura	99	76	84	73	76	78	67	64	48	54	55	54	61	82
Trachea, mediastinum, and other respiratory organs	277	269	267	279	275	190	187	224	225	219	196	242	214	226
Bones and joints	**1,224**	**1,212**	**1,298**	**1,194**	**1,262**	**1,301**	**1,391**	**1,340**	**1,362**	**1,357**	**1,384**	**1,378**	**1,423**	**1,399**
Soft tissue including heart	**3,679**	**3,693**	**3,646**	**3,554**	**3,651**	**3,722**	**3,849**	**3,960**	**4,023**	**4,093**	**4,229**	**4,376**	**4,408**	**4,559**
Skin excluding basal and squamous	**9,530**	**9,672**	**9,992**	**9,904**	**10,214**	**10,301**	**10,798**	**11,068**	**11,234**	**11,337**	**12,130**	**12,089**	**12,212**	**12,463**
Melanoma of the skin	7,215	7,420	7,542	7,513	7,818	7,952	8,345	8,441	8,461	8,623	9,199	9,154	9,128	9,251
Other nonepithelial skin	2,315	2,252	2,450	2,391	2,396	2,349	2,453	2,627	2,773	2,714	2,931	2,935	3,084	3,212
Male and female breast	**41,528**	**42,300**	**41,809**	**41,883**	**41,998**	**41,316**	**41,491**	**41,209**	**40,969**	**41,026**	**41,076**	**41,435**	**41,374**	**41,555**
Female breast	41,144	41,872	41,394	41,514	41,619	40,954	41,116	40,820	40,598	40,589	40,676	40,996	40,931	41,150
Male breast	384	428	415	369	379	362	375	389	371	437	400	439	443	405

See table footnotes on page 54.

TABLE 14. (*Continued*) Reported number of cancer deaths, by primary cancer site and year — United States, 1999–2012*

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female genital system	**25,881**	**26,411**	**26,838**	**27,091**	**27,011**	**27,049**	**27,259**	**27,848**	**27,739**	**27,813**	**27,817**	**28,770**	**29,027**	**29,405**
Cervix	4,204	4,200	4,092	3,952	3,919	3,850	3,924	3,976	4,021	4,008	3,909	3,939	4,092	4,074
Corpus and uterus, NOS	6,468	6,585	6,783	6,853	6,899	6,990	7,096	7,384	7,456	7,675	7,713	8,402	8,641	8,911
Corpus	3,121	3,139	3,185	3,187	3,261	3,272	3,259	3,449	3,377	3,436	3,333	3,644	3,714	3,812
Uterus, NOS	3,347	3,446	3,598	3,666	3,638	3,718	3,837	3,935	4,079	4,239	4,380	4,758	4,927	5,099
Ovary	13,627	14,060	14,414	14,682	14,657	14,716	14,787	14,857	14,621	14,362	14,436	14,572	14,346	14,404
Vagina	403	405	382	378	391	416	382	396	376	417	398	423	428	429
Vulva	762	752	765	794	775	806	809	862	865	921	946	942	1,022	1,034
Other female genital organs	417	409	402	432	370	271	261	373	400	430	415	492	498	553
Male genital system	**32,349**	**31,675**	**31,300**	**31,084**	**30,176**	**29,627**	**29,514**	**29,022**	**29,703**	**29,120**	**28,744**	**29,276**	**28,630**	**27,955**
Prostate	31,728	31,078	30,719	30,446	29,554	29,002	28,905	28,372	29,093	28,471	28,088	28,560	27,970	27,244
Testis	378	338	335	393	344	357	359	358	326	358	376	399	380	386
Penis	202	217	205	209	250	231	217	245	246	246	234	258	239	273
Other male genital organs	41	42	41	36	28	37	33	47	38	45	46	59	41	52
Urinary system	**23,666**	**24,344**	**24,910**	**25,443**	**25,422**	**25,928**	**26,404**	**26,649**	**27,319**	**27,682**	**27,941**	**28,726**	**29,317**	**29,594**
Urinary bladder	11,910	12,002	12,225	12,627	12,483	13,030	13,253	13,474	13,843	14,036	14,201	14,730	15,014	15,245
Kidney and renal pelvis	11,116	11,736	12,078	12,165	12,286	12,313	12,517	12,379	12,703	12,895	12,995	13,219	13,559	13,518
Ureter	345	302	294	297	323	334	347	361	340	354	371	350	338	378
Other urinary organs	295	304	313	354	330	251	287	435	433	397	374	427	406	453
Eye and orbit	**227**	**236**	**226**	**240**	**231**	**208**	**252**	**219**	**249**	**262**	**278**	**283**	**280**	**279**
Brain and other nervous system	**12,765**	**12,655**	**12,609**	**12,830**	**12,901**	**12,829**	**13,152**	**12,886**	**13,234**	**13,724**	**14,176**	**14,164**	**14,491**	**15,276**
Endocrine system	**2,146**	**2,210**	**2,299**	**2,231**	**2,155**	**2,272**	**2,354**	**2,404**	**2,488**	**2,555**	**2,634**	**2,641**	**2,689**	**2,660**
Thyroid	1,241	1,328	1,354	1,367	1,312	1,409	1,462	1,518	1,562	1,649	1,707	1,686	1,747	1,690
Other endocrine including thymus	905	882	945	864	843	863	892	886	926	906	927	955	942	970
Lymphomas	**24,205**	**24,016**	**23,628**	**23,262**	**22,822**	**22,214**	**22,145**	**21,920**	**21,799**	**21,539**	**21,639**	**21,525**	**21,485**	**21,518**
Hodgkin lymphoma	1,403	1,287	1,323	1,352	1,347	1,276	1,272	1,327	1,271	1,171	1,250	1,231	1,168	1,130
Non-Hodgkin lymphoma	22,802	22,729	22,305	21,910	21,475	20,938	20,873	20,593	20,528	20,368	20,389	20,294	20,317	20,388
Myeloma	**10,508**	**10,639**	**10,714**	**10,913**	**10,809**	**10,578**	**10,758**	**10,712**	**10,872**	**10,606**	**10,690**	**11,022**	**11,411**	**11,821**
Leukemias	**21,071**	**21,397**	**21,532**	**21,581**	**21,608**	**21,472**	**21,716**	**22,016**	**21,928**	**22,431**	**22,688**	**22,673**	**23,194**	**23,309**
Acute lymphocytic leukemia	1,361	1,395	1,433	1,432	1,429	1,371	1,460	1,393	1,418	1,424	1,423	1,436	1,432	1,408
Chronic lymphocytic leukemia	4,476	4,323	4,386	4,443	4,476	4,342	4,391	4,498	4,471	4,395	4,557	4,486	4,608	4,598
Acute myeloid leukemia	6,932	7,413	7,749	7,914	8,126	8,214	8,267	8,539	8,568	8,962	9,223	9,150	9,491	9,484
Chronic myeloid leukemia	1,788	1,802	1,649	1,367	1,233	1,164	1,067	1,077	984	1,000	1,003	1,019	1,091	1,017
Other leukemias	6,514	6,464	6,315	6,425	6,344	6,381	6,531	6,509	6,487	6,650	6,482	6,582	6,572	6,802
Mesothelioma	**2,343**	**2,384**	**2,371**	**2,430**	**2,476**	**2,504**	**2,553**	**2,452**	**2,432**	**2,538**	**2,606**	**2,574**	**2,651**	**2,686**
Miscellaneous	**44,401**	**41,176**	**40,519**	**41,144**	**40,723**	**40,070**	**40,534**	**40,140**	**39,920**	**39,700**	**39,926**	**39,886**	**40,002**	**40,276**

Abbreviation: NOS = not otherwise specified.

* Data are from the National Vital Statistics System (NVSS). Data for deaths cover 100% of the U.S. population. Use caution when comparing numbers of cases and deaths because of potential differences in population coverage. For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

TABLE 15. Age-adjusted rate* of invasive† cancer cases, by primary cancer site and year — United States, 1999–2012§

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All cancer sites combined	**483.9**	**485.1**	**487.2**	**483.7**	**473.1**	**471.6**	**470.9**	**473.4**	**476.5**	**471.8**	**466.0**	**453.2**	**450.9**	**433.7**
Oral cavity and pharynx	**10.9**	**10.8**	**10.8**	**10.8**	**10.8**	**10.8**	**10.7**	**10.8**	**11.1**	**11.3**	**11.2**	**11.2**	**11.4**	**11.2**
Lip	1.0	0.9	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5
Tongue	2.6	2.7	2.7	2.8	2.8	2.9	2.9	3.0	3.1	3.3	3.3	3.2	3.4	3.4
Salivary gland	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.2	1.2	1.3
Floor of mouth	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.5
Gum and other mouth	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.6	1.6	1.5	1.6	1.6	1.5
Nasopharynx	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.5
Tonsil	1.4	1.4	1.4	1.5	1.6	1.6	1.6	1.7	1.7	1.8	2.0	1.9	2.0	2.0
Oropharynx	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Hypopharynx	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6
Other oral cavity and pharynx	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3
Digestive system	**91.8**	**91.6**	**91.2**	**90.1**	**89.7**	**88.7**	**87.3**	**86.3**	**85.6**	**84.8**	**82.9**	**80.7**	**80.1**	**78.4**
Esophagus	5.0	5.0	5.0	4.9	5.0	5.1	5.0	5.0	4.9	5.0	4.9	4.6	4.6	4.5
Stomach	7.6	7.5	7.4	7.3	7.3	7.2	7.0	6.8	6.8	6.7	6.6	6.8	6.7	6.6
Small intestine	1.7	1.7	1.8	1.8	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3
Colon and rectum	56.4	56.0	55.1	53.8	52.6	51.0	49.6	48.1	46.9	45.7	43.4	41.3	40.4	38.8
Colon excluding rectum	41.1	40.9	40.4	39.4	38.5	37.3	36.0	35.0	34.1	33.2	31.3	29.7	29.0	27.7
Rectum and rectosigmoid junction	15.2	15.1	14.8	14.4	14.1	13.8	13.6	13.1	12.8	12.5	12.1	11.6	11.4	11.1
Anus, anal canal, and anorectum	1.4	1.4	1.4	1.4	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.7	1.8	1.8
Liver and Intrahepatic bile duct	4.9	5.2	5.2	5.4	5.6	5.9	6.1	6.3	6.8	7.0	7.4	7.4	7.6	7.8
Gallbladder	1.2	1.2	1.2	1.1	1.2	1.1	1.2	1.2	1.1	1.1	1.2	1.2	1.1	1.1
Other biliary	1.3	1.4	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.7
Pancreas	11.1	11.2	11.3	11.2	11.5	11.6	11.8	12.0	12.0	12.3	12.2	12.3	12.4	12.4
Retroperitoneum	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Peritoneum, omentum, and mesentery	0.4	0.5	0.5	0.6	0.6	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6
Other digestive organs	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Respiratory system	**76.3**	**75.6**	**75.4**	**74.9**	**74.7**	**73.9**	**74.0**	**73.1**	**72.1**	**71.3**	**69.9**	**67.5**	**65.8**	**64.0**
Nose, nasal cavity, and middle ear	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Larynx	4.6	4.5	4.4	4.1	4.1	4.1	4.0	3.9	3.9	3.8	3.7	3.6	3.5	3.3
Lung and bronchus	70.7	70.1	70.1	69.9	69.7	68.8	69.1	68.2	67.3	66.6	65.3	62.9	61.5	59.8
Pleura	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trachea, mediastinum, and other respiratory organs	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Bones and joints	**1.0**	**0.9**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**0.9**	**1.0**	**0.9**	**0.9**	**0.9**
Soft tissue including heart	**2.9**	**3.0**	**3.0**	**3.0**	**3.1**	**3.2**	**3.3**	**3.2**	**3.3**	**3.3**	**3.3**	**3.3**	**3.2**	**3.2**
Skin excluding basal and squamous	**16.6**	**17.7**	**18.7**	**19.1**	**18.9**	**19.8**	**21.0**	**20.7**	**21.1**	**21.6**	**21.9**	**21.5**	**21.9**	**21.7**
Melanoma of the skin	15.3	16.2	17.2	17.6	17.4	18.2	19.4	19.1	19.5	19.9	20.2	19.8	20.2	20.1
Other nonepithelial skin	1.3	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.6	1.6	1.6
Male and female breast	**74.3**	**72.7**	**72.3**	**70.6**	**66.9**	**66.1**	**65.7**	**66.0**	**66.7**	**67.2**	**67.6**	**65.3**	**66.3**	**65.7**
Female breast	135.2	132.8	132.3	129.3	122.9	121.5	121.0	121.9	123.2	124.4	125.3	121.2	123.2	122.3
Male breast	1.4	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.4	1.3	1.3

See table footnotes on page 56.

TABLE 15. (*Continued*) Age-adjusted rate* of invasive† cancer cases, by primary cancer site and year — United States, 1999–2012§

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female genital system	**51.9**	**51.6**	**51.4**	**50.4**	**49.0**	**48.9**	**49.1**	**49.1**	**49.3**	**49.6**	**49.9**	**49.0**	**49.1**	**48.9**
Cervix	9.7	9.6	9.1	8.7	8.4	8.2	8.2	8.1	8.1	7.9	8.0	7.6	7.5	7.4
Corpus and uterus, NOS	24.2	23.8	24.3	24.0	23.2	23.8	24.0	24.2	24.5	24.9	25.4	25.4	25.7	25.8
Corpus	23.4	23.1	23.6	23.3	22.5	23.0	23.3	23.4	23.8	24.1	24.6	24.6	24.9	25.0
Uterus, NOS	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8
Ovary	14.3	14.4	14.2	13.8	13.6	13.2	13.1	13.0	12.7	12.7	12.2	11.8	11.6	11.3
Vagina	0.7	0.8	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Vulva	2.4	2.3	2.4	2.4	2.4	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.6
Other female genital organs	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.2
Male genital system	**176.5**	**178.4**	**180.6**	**178.4**	**163.7**	**159.7**	**156.4**	**166.0**	**170.1**	**157.0**	**148.7**	**139.2**	**137.5**	**111.7**
Prostate	170.0	171.9	174.1	172.0	157.1	153.1	149.7	159.5	163.4	150.1	142.0	132.5	130.9	105.1
Testis	5.3	5.4	5.4	5.3	5.5	5.5	5.6	5.5	5.5	5.7	5.6	5.6	5.5	5.5
Penis	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.9	0.8
Other male genital organs	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2
Urinary system	**35.2**	**35.7**	**36.1**	**36.6**	**37.1**	**37.8**	**38.2**	**38.1**	**38.5**	**38.7**	**38.4**	**37.5**	**37.4**	**37.1**
Urinary bladder	22.0	22.1	21.9	22.0	22.0	22.2	22.2	21.5	21.7	21.5	21.3	20.9	20.7	20.4
Kidney and renal pelvis	12.3	12.7	13.3	13.7	14.3	14.7	15.2	15.7	16.0	16.2	16.2	15.8	15.8	15.9
Ureter	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Other urinary organs	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Eye and orbit	**0.9**	**0.9**	**0.9**	**0.8**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.8**	**0.8**	**0.8**
Brain and other nervous system	**6.9**	**6.9**	**6.8**	**6.9**	**6.8**	**6.9**	**6.9**	**6.8**	**6.8**	**6.8**	**6.8**	**6.6**	**6.5**	**6.4**
Brain	6.4	6.4	6.3	6.4	6.3	6.4	6.4	6.4	6.4	6.4	6.3	6.2	6.1	6.0
Cranial nerves other nervous system	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.4
Endocrine system	**7.5**	**8.1**	**8.6**	**9.2**	**9.6**	**10.4**	**11.2**	**11.8**	**12.7**	**13.7**	**14.3**	**14.5**	**14.7**	**15.2**
Thyroid	6.8	7.4	7.9	8.5	8.9	9.6	10.5	11.1	11.9	12.9	13.6	13.7	14.0	14.5
Other endocrine including thymus	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.7
Lymphomas	**22.2**	**22.1**	**22.2**	**22.4**	**22.6**	**22.9**	**22.9**	**22.6**	**22.6**	**22.7**	**22.6**	**22.4**	**21.8**	**21.3**
Hodgkin lymphoma	2.8	2.9	2.8	2.9	2.8	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.7	2.6
Non-Hodgkin lymphoma	19.3	19.2	19.4	19.5	19.8	20.1	19.9	19.7	19.8	19.7	19.8	19.5	19.0	18.6
Myeloma	**5.6**	**5.8**	**5.9**	**5.9**	**5.9**	**6.0**	**6.0**	**5.9**	**5.9**	**6.1**	**6.2**	**6.3**	**6.3**	**6.3**
Leukemias	**12.9**	**13.4**	**13.5**	**13.1**	**13.4**	**13.4**	**13.3**	**13.4**	**13.2**	**13.2**	**13.2**	**13.6**	**13.5**	**13.3**
Acute lymphocytic leukemia	1.4	1.5	1.5	1.5	1.5	1.6	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.6
Chronic lymphocytic leukemia	4.1	4.5	4.6	4.6	4.7	4.8	4.8	4.8	4.6	4.6	4.5	4.4	4.4	4.3
Acute myeloid leukemia	3.7	3.9	3.9	3.7	3.8	3.7	3.6	3.7	3.6	3.7	3.7	4.1	4.1	4.1
Chronic myeloid leukemia	1.6	1.7	1.7	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.8	1.7	1.7
Other leukemias	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.8	1.7	1.7	1.8	1.7	1.6
Mesothelioma	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
Kaposi Sarcoma	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
Miscellaneous	**12.6**	**12.4**	**12.1**	**11.8**	**11.2**	**10.9**	**10.7**	**10.5**	**10.3**	**10.1**	**9.8**	**9.9**	**9.6**	**9.4**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of cases per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Invasive cancer excludes basal and squamous cell carcinomas of the skin except when these occur on the skin of the genital organs, and in situ cancers except urinary bladder. Urinary bladder cancer includes invasive and in situ.

§ Data are compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined for all years, 1999–2012 (covering approximately 92% of the U.S. population). See registry-specific data quality information for all years, 1999–2012 (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf#nameddest=RegistriesPubCriteria). Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

TABLE 16. Age-adjusted rate* of cancer deaths, by primary cancer site and year — United States, 1999–2012†

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All cancer sites combined	**200.7**	**198.8**	**196.3**	**194.4**	**190.9**	**186.8**	**185.2**	**182.0**	**179.3**	**176.3**	**173.4**	**171.8**	**168.7**	**166.4**
Oral cavity and pharynx	**2.7**	**2.7**	**2.7**	**2.7**	**2.6**	**2.6**	**2.5**	**2.5**	**2.5**	**2.5**	**2.4**	**2.5**	**2.5**	**2.5**
Lip	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tongue	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Salivary gland	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Floor of mouth	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0
Gum and other mouth	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4
Nasopharynx	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Tonsil	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Oropharynx	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Hypopharynx	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other oral cavity and pharynx	0.5	0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.4
Digestive system	**47.5**	**47.3**	**46.7**	**46.2**	**45.6**	**44.5**	**44.1**	**43.8**	**43.3**	**43.0**	**42.3**	**42.3**	**41.8**	**41.6**
Esophagus	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.2	4.2	4.3	4.2	4.1
Stomach	4.6	4.5	4.4	4.3	4.2	4.0	3.8	3.7	3.6	3.5	3.4	3.4	3.3	3.2
Small intestine	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4
Colon and rectum	20.9	20.7	20.2	19.8	19.1	18.1	17.6	17.3	16.9	16.5	15.8	15.5	15.1	14.7
Colon excluding rectum	17.9	17.6	17.1	16.8	16.2	15.2	14.7	14.4	14.1	13.6	13.0	12.6	12.3	12.0
Rectum and rectosigmoid junction	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.9	2.8	2.9	2.8	2.9	2.8	2.7
Anus, anal canal, and anorectum	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Liver and intrahepatic bile duct	4.5	4.6	4.7	4.9	5.0	5.1	5.3	5.3	5.4	5.6	5.8	5.9	6.1	6.3
Gallbladder	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Other biliary	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.4	0.4
Pancreas	10.6	10.5	10.6	10.6	10.5	10.7	10.8	10.9	10.8	11.0	10.8	11.0	10.9	11.0
Retroperitoneum	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Peritoneum, omentum, and mesentery	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Other digestive organs	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Respiratory system	**57.1**	**57.5**	**57.0**	**56.6**	**55.8**	**54.8**	**54.3**	**53.2**	**52.1**	**51.0**	**49.7**	**48.7**	**47.3**	**46.2**
Nose, nasal cavity, and middle ear	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1
Larynx	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.2	1.1	1.1	1.1	1.0
Lung and bronchus	55.4	55.8	55.3	55.0	54.2	53.4	52.9	51.7	50.7	49.6	48.4	47.4	46.0	45.0
Pleura	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trachea, mediastinum, and other respiratory organs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bones and joints	**0.4**	**0.4**	**0.5**	**0.4**	**0.4**	**0.4**	**0.5**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
Soft tissue including heart	**1.3**	**1.3**	**1.3**	**1.2**	**1.2**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**
Skin excluding basal and squamous	**3.5**	**3.5**	**3.5**	**3.4**	**3.5**	**3.5**	**3.6**	**3.6**	**3.6**	**3.5**	**3.7**	**3.6**	**3.6**	**3.6**
Melanoma of the skin	2.6	2.7	2.7	2.6	2.7	2.7	2.8	2.7	2.7	2.7	2.8	2.7	2.7	2.7
Other nonepithelial skin	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.9	0.9	0.9
Male and female breast	**15.2**	**15.2**	**14.8**	**14.5**	**14.3**	**13.8**	**13.6**	**13.2**	**12.9**	**12.7**	**12.4**	**12.3**	**12.0**	**11.8**
Female breast	26.6	26.6	26.0	25.6	25.3	24.5	24.1	23.6	23.0	22.6	22.2	21.9	21.5	21.3
Male breast	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

See table footnotes on page 58.

TABLE 16. (*Continued*) Age-adjusted rate* of cancer deaths, by primary cancer site and year — United States, 1999–2012†

Cancer site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female genital system	**16.7**	**16.7**	**16.8**	**16.7**	**16.4**	**16.2**	**16.0**	**16.1**	**15.8**	**15.5**	**15.2**	**15.5**	**15.3**	**15.2**
Cervix	2.8	2.8	2.7	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3
Corpus and uterus, NOS	4.1	4.1	4.2	4.2	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.5	4.5	4.5
Corpus	2.0	2.0	2.0	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.8	1.9	1.9	1.9
Uterus, NOS	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.6	2.6
Ovary	8.8	8.9	9.0	9.0	8.9	8.8	8.7	8.6	8.3	8.0	7.9	7.8	7.5	7.4
Vagina	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Vulva	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Other female genital organs	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Male genital system	**32.1**	**30.9**	**30.0**	**29.2**	**27.7**	**26.7**	**25.8**	**24.7**	**24.7**	**23.5**	**22.6**	**22.3**	**21.2**	**20.0**
Prostate	31.6	30.4	29.5	28.7	27.2	26.2	25.4	24.2	24.2	23.0	22.1	21.8	20.8	19.6
Testis	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Penis	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Other male genital organs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urinary system	**8.7**	**8.8**	**8.8**	**8.9**	**8.7**	**8.8**	**8.8**	**8.7**	**8.7**	**8.6**	**8.5**	**8.6**	**8.6**	**8.5**
Urinary bladder	4.4	4.3	4.3	4.4	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Kidney and renal pelvis	4.1	4.2	4.3	4.2	4.2	4.1	4.1	4.0	4.0	4.0	3.9	3.9	3.9	3.8
Ureter	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other urinary organs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eye and orbit	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Brain and other nervous system	**4.6**	**4.5**	**4.4**	**4.5**	**4.4**	**4.3**	**4.3**	**4.2**	**4.2**	**4.3**	**4.3**	**4.2**	**4.3**	**4.4**
Endocrine system	**0.8**	**0.8**	**0.8**	**0.8**	**0.7**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**
Thyroid	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Other endocrine including thymus	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Lymphomas	**8.8**	**8.6**	**8.4**	**8.1**	**7.8**	**7.5**	**7.4**	**7.2**	**7.0**	**6.8**	**6.7**	**6.5**	**6.4**	**6.2**
Hodgkin lymphoma	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
Non-Hodgkin lymphoma	8.3	8.2	7.9	7.7	7.4	7.1	6.9	6.7	6.6	6.4	6.3	6.1	6.0	5.9
Myeloma	**3.8**	**3.8**	**3.8**	**3.8**	**3.7**	**3.6**	**3.6**	**3.5**	**3.5**	**3.3**	**3.3**	**3.3**	**3.4**	**3.4**
Leukemias	**7.7**	**7.7**	**7.6**	**7.5**	**7.4**	**7.3**	**7.3**	**7.2**	**7.1**	**7.1**	**7.1**	**6.9**	**6.9**	**6.8**
Acute lymphocytic leukemia	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
Chronic lymphocytic leukemia	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3
Acute myeloid leukemia	2.5	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.8	2.8	2.8
Chronic myeloid leukemia	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3
Other leukemias	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0
Mesothelioma	**0.9**	**0.9**	**0.8**	**0.9**	**0.9**	**0.9**	**0.9**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**
Miscellaneous	**16.2**	**14.8**	**14.4**	**14.4**	**14.0**	**13.5**	**13.4**	**13.0**	**12.7**	**12.4**	**12.2**	**11.9**	**11.7**	**11.5**

Abbreviation: NOS = not otherwise specified.

* Rates are the number of deaths per 100,000 persons and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25-1130). For more information, see USCS technical notes (http://www.cdc.gov/cancer/npcr/uscs/pdf/uscs-2012-technical-notes.pdf).

† Data are from the National Vital Statistics System (NVSS). Data for deaths cover 100% of the U.S. population. Caution should be used when comparing incidence and death rates because of potential differences in population coverage.

Elevated Blood Lead Levels Among Employed Adults — United States, 1994–2013

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Preface

CDC's National Institute for Occupational Safety and Health (NIOSH) and state health departments collect data on laboratory-reported adult blood lead levels (BLLs). This report presents data on elevated BLLs among employed adults (defined as persons aged ≥16 years) in the United States for 1994–2013. This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, which encompasses various surveillance years but is being published in 2016 (*1*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of the Morbidity Mortality Weekly Report (*MMWR)* as the annual *Summary of Notifiable Infectious Diseases* (*2*).

Background

Since 1987, NIOSH and state health departments have maintained the Adult Blood Lead Epidemiology and Surveillance (ABLES) Program, a state-based surveillance program of laboratory-reported adult BLLs (*3*). The BLL is an often-used estimate of recent external exposure to lead (*4*,*5*). This report summarizes data on elevated BLLs among employed adults during January 1, 1994–December 31, 2013.

Information is provided by geographic division and reporting state, for "all cases" reported by a state (these include cases among adult residents in the reporting state plus cases identified by the reporting state but occurring among persons who reside in another state) and "state-residents" only, by exposure source, for BLLs ≥10 μg/dL (definition of elevated BLL from 2009 until 2014) (*3*,*6*–*8*), and for BLLs ≥25 μg/dL (previous definition of elevated BLL) (*9*). The current case definition (BLL ≥5 μg/dL) was adopted in 2015 and became effective in 2016, on the basis of mounting evidence for adverse health outcomes among adults with BLLs between 5 μg/dL and 25 μg/dL (*4*,*5*). State prevalence rates of elevated BLLs (≥10 μg/dL) for 2013 are categorized into two groups (above or below the national prevalence rate) (Figure 1). Trends of national prevalence rates of BLLs ≥10 μg/dL and BLLs ≥25 μg/dL from 1994 to 2013 are provided (Figure 2).

ABLES is the only program conducting nationwide adult lead exposure surveillance. It has provided the occupational safety and health community with essential information for setting research and intervention priorities. ABLES' impact is achieved through its longstanding strategic partnerships with state ABLES programs, federal agencies, and worker-affiliated organizations. For example, in 2008, the Occupational Safety and Health Administration (OSHA) updated its National Lead Emphasis Program to reduce occupational lead exposure by targeting unsafe conditions and high-hazard industries (*10*). To accomplish this objective, OSHA used national ABLES data to identify industries whose employees exhibit high BLLs. OSHA has agreements with state ABLES programs to use their lead exposure data to target workplace inspections.

Although federal funding for state ABLES programs was discontinued in September 2013, a total of 30 states continue to collaborate with NIOSH (down from a peak of 41 states) to provide data. In August 2015, funding to support adult BLL surveillance was resumed at a reduced level. To sustain lead exposure surveillance and prevention activities, state ABLES programs share resources with two other CDC programs: the Childhood Lead Poisoning Prevention Program and the Environmental Public Health Tracking Program. Since September 2013, NIOSH has continued to provide technical assistance to states with adult blood lead surveillance programs and maintains the ABLES website for reporting ABLES findings.

The BLL is a direct index of a worker's exposure to lead as well as an indication of the potential for adverse effects from that exposure (*4*,*5*). The half-life of lead in blood is approximately 40 days in males (*11*), so the BLL is an estimate primarily of recent exposure to lead. Because lead accumulates in bone and BLL is in equilibrium with bone lead, the BLL might be elevated in some persons who have not had recent exposure to lead. Because this equilibrium can lead to persistent BLL elevations, the public health burden of elevated BLLs in adults is measured as prevalence. In contrast, the public health burden of elevated BLLs in children aged <3 years is measured as incidence because these young children have little lead

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storage in their bones at birth and thus their early childhood blood lead tests reflect recent exposures.

Over the past several decades in the United States, a marked reduction has occurred in environmental sources of lead, and protection from occupational lead exposure has improved. As a result, there is an overall decreasing trend in the mean BLL and in the prevalence of elevated BLLs among adults. During 2011–2012, the mean BLL in adults in the United States was 1.09 μg/dL (*12*). Nonetheless, lead exposures among adults continue to occur at unacceptable levels (*3*).

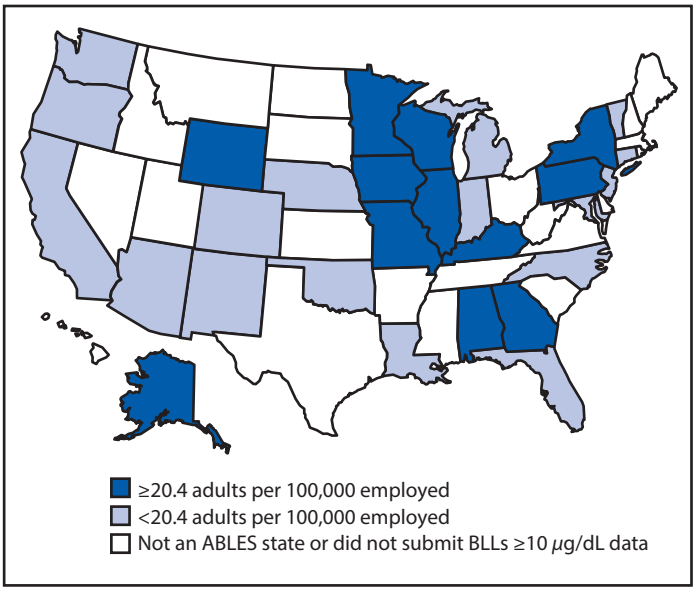
Data Sources

The ABLES program is a state-based surveillance system of adult BLLs. The number of cases (numerator) is currently provided by ABLES programs in 30 states (29 states provided data on BLLs ≥10 μg/dL). The number of employed adults (denominator) is obtained from the Local Area Unemployment Statistics (LAUS), Bureau of Labor Statistics, in the U.S. Department of Labor (http://www.bls.gov/data). A direct link to annual averages of states' employment status of the civilian noninstitutionalized population is available (http://www.bls.gov/lau/staadata.txt). NIOSH consolidates data from reporting state ABLES programs, conducts data quality control, analyzes the data, and disseminates the findings among stakeholders. State ABLES programs 1) collect data on adult BLLs from laboratories and physicians through mandatory reporting; 2) assign unique identifiers to each adult to account for multiple BLL records per person, protect individual privacy, and permit longitudinal analyses; 3) follow-up on adults with BLLs ≥10 or ≥25 μg/dL with laboratories, health care providers, employers, or workers to ensure completeness of information (e.g., the industry in which the adult is employed and whether the exposure source is occupational, nonoccupational, or both); 4) provide guidance and information to workers and employers to prevent lead exposures; and 5) submit data annually to NIOSH. Most ABLES states submit data on all BLLs (both occupational and nonoccupational) to NIOSH, including records from adults whose BLLs fall below the state mandatory reporting requirement.

Interpreting Data

The primary measure of adult lead exposure in the United States is the national prevalence rate of elevated BLLs among employed adults. This measure is provided by the ABLES program and can be used to estimate the magnitude and monitor trends of lead exposures and to target areas requiring further investigation or interventions.

FIGURE 1. Prevalence rate* of adults with blood lead levels (BLLs) ≥10 μg/dL, by state — State Adult Blood Lead Epidemiology and Surveillance (ABLES) programs, United States, 2013†



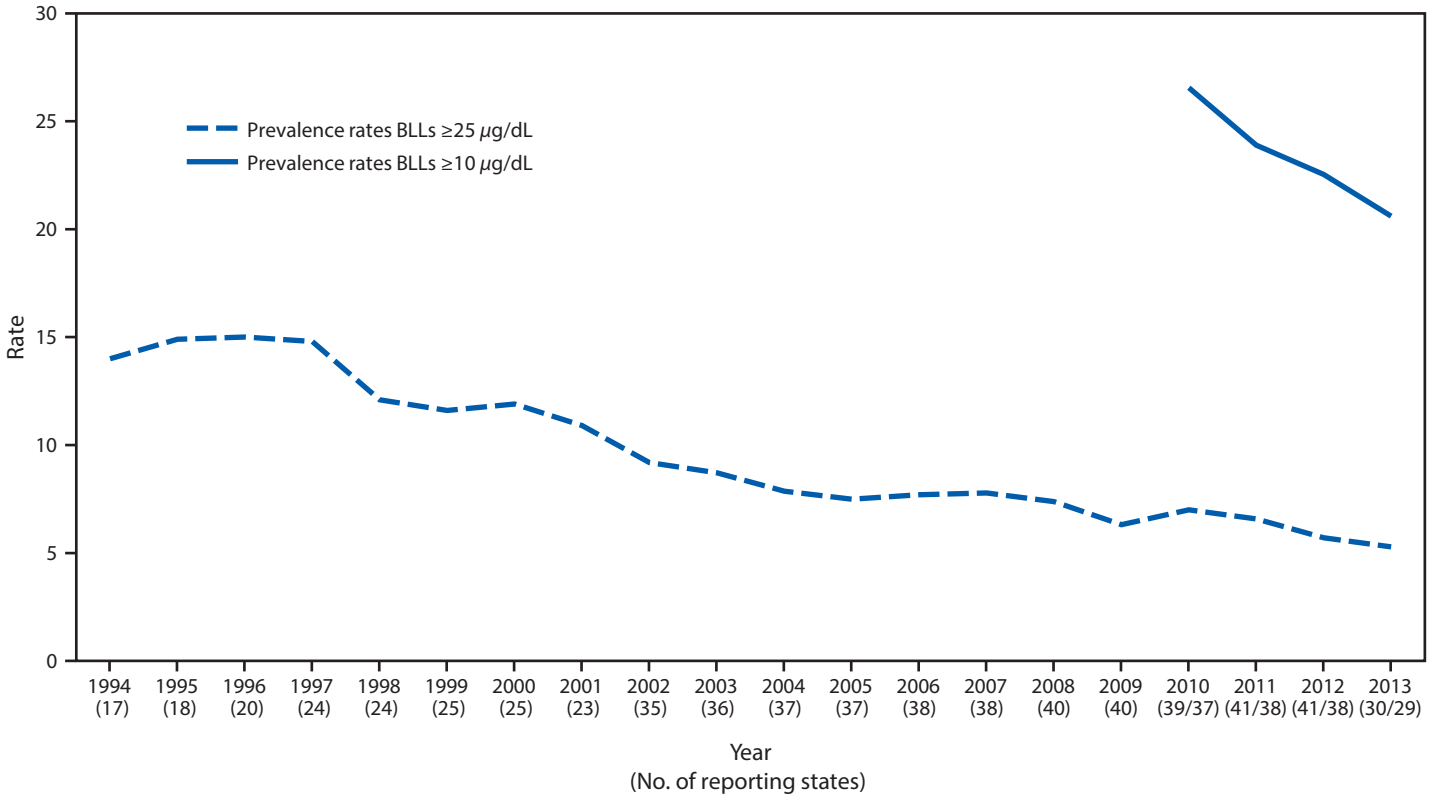
* Rate per 100,000 employed adults aged ≥16 years. State-resident prevalence rate might be lower for some states. Data from the Adult Blood Epidemiology and Surveillance (ABLES) Program, National Institute for Occupational Safety and Health (NIOSH/CDC). Denominators for 2013 extracted from 2015 U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics program (http://www.bls.gov/lau/staadata.txt).

† The national rate in 2013 was 20.4 cases per 100,000 employed adults aged ≥16 years. A total of 30 states submitted data in 2013: Alabama, Alaska, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Oregon, Pennsylvania, Vermont, Washington, Wisconsin, and Wyoming. Massachusetts provided data for BLLs ≥25 μg/dL. In 2013, Missouri (111.8) and Iowa (53.7) reported the highest prevalence rates of elevated blood lead levels.

Efforts to reduce lead exposures have resulted in considerable progress in reducing the prevalence of elevated BLLs. However, many adults in the United States continue to have BLLs known to be associated with acute and chronic adverse effects in multiple organ systems ranging from subclinical changes in function to symptomatic intoxication. These include neurologic, cardiovascular, reproductive, hematologic, and kidney adverse effects. The risks for adverse chronic health effects are even higher if the exposure is maintained for many years (*4*,*5*). Current research has found decreased renal function associated with BLLs at ≤5 μg/dL and increased risk of hypertension and essential tremor at BLLs <10 μg/dL (*13*).

Prevalence rates of adults with BLLs ≥25 μg/dL are available since 1994. Beginning in 2002, state ABLES programs reported individual BLL laboratory test results and state of residence. Formerly, state resident and nonresident data could not be separated. When an adult has multiple blood lead tests in a given year, only the highest BLL for that adult in that year is counted. Prevalence rates of BLLs ≥10 μg/dL are available for

FIGURE 2. National prevalence rate* of reported cases of elevated blood lead levels,† by year — State Adult Blood Epidemiology and Surveillance Programs, United States, 1994–2013§



Abbreviation: BLL = blood lead level.

* Per 100,000 employed adults aged ≥16 years. Denominator data extracted from 2015 U.S. Department of Labor, Bureau of labor Statistics Local Area Unemployment Statistics (LAUS) program (http://www.bls.gov/lau/staadata.txt).

† Since 2009, the case definition for an elevated blood lead level is a BLL ≥10 μg/dL. For historical comparisons, prevalence rates at the previous case definition (BLL ≥25 μg/dL) are provided.

§ A total of 30 states submitted data in 2013 (down from 41 states in 2012): Alabama, Alaska, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Oregon, Pennsylvania, Vermont, Washington, Wisconsin, Wyoming. Massachusetts provided data for BLLs ≥25 μg/dL. For 2013, the first number is the number of states reporting BLLs ≥25 μg/dL (i.e., 30 states in 2013), and the second number is the number of states reporting BLLs ≥10 μg/dL (i.e., 29 states in 2013).

2010 forward. Prevalence rates of BLLs ≥25 μg/dL are a subset of prevalence rates of BLLs ≥10 μg/dL. In the United States, most lead exposures among adults are occupational (*9*). A total of 29 states submitted work-relatedness information in 2013. Prevalence rate differences across states could reflect improved compliance with required OSHA monitoring in some states.

These counts and rates of elevated BLLs must be considered minimum estimates of the actual magnitude of the problem of lead exposures in the United States. This is for multiple reasons:

- not all states participate in the ABLES program;
- not all employers provide BLL testing to lead-exposed workers as required by OSHA regulations;
- not all nonoccupationally exposed adults are tested; and
- some laboratories might not report all tests as required by state laws or regulations.

For specific explanations, interpretation, and possible updates on data for any individual state, the state ABLES program investigator should be contacted directly. Contact information is available at http://www.cdc.gov/niosh/topics/ABLES/state.html.

Methods for Identifying Elevated BLLs Among Employed Adults

Beginning in 2016, a nationally reportable case of an employed adult with an elevated BLL is defined as a case in an employed person aged ≥16 years at the time of blood collection with a venous blood lead level ≥5 μg/dL of whole blood. The standardized diagnostic test is the BLL test using a venous blood sample. All participating state health departments have a requirement for laboratories and/or health care providers

to report laboratory blood lead results to the state health department. However, this requirement varies among ABLES states, ranging from the reporting of all BLLs to reporting only BLLs ≥40 μg/dL (*3*). The ABLES program ultimately aims to establish a national database for all BLL tests among adults and encourages all states to share information with NIOSH.

Publication Criteria

Cases meet the publication criteria if the employed adult (aged ≥ 16 years) had a venous BLL ≥25 μg/dL during 1994–2013 or a venous BLL ≥10 μg/dL during 2010–2013. When an adult had multiple blood lead tests in a given year, only the highest BLL for that adult in that year was counted. Prevalence rates of BLLs ≥25 μg/dL are a subset of prevalence rates of BLLs ≥10 μg/dL and are included for historic comparison.

Highlights

In 2013, the prevalence rate of BLLs ≥10 μg/dL was 20.4 adults per 100,000 employed population, calculated from 29 reporting states. In 2013, a total of 30 states submitted data on 5,504 adults with BLLs ≥25 μg/dL, and 29 states submitted data on 20,880 adults with BLLs ≥10μg/dL (Table 1). A total of 23 states submitted individual level data, and seven states submitted count data only. Overall, the national prevalence rate of BLLs ≥10 μg/dL declined from 26.6 adults per 100,000 employed in 2010 (among 37 states) to 20.4 in 2013 (among 29 reporting states). In 2013, of the 29 reporting states, 12 had prevalence rates of BLLs ≥10μg/dL equal to or above the national prevalence rate (20.4/100,000) (Figure 1). The national prevalence rate of BLLs ≥25 μg/dL among state residents and nonresidents declined from 14.0 adults per 100,000 employed in 1994 (among 17 states) to 5.2 in 2013 (among 30 states).

Historically, in the United States, most lead exposures among adults have been occupational. In 2013, a total of 29 states submitted data on 5,491 adults with BLLs ≥25 μg/dL of which 944 (17.2%) had no known exposure history (Table 2). Among the 4,547 adults with known exposure, 93.7% had occupational exposure, ranging from 42.9% to 100% among reporting states. Individual level data on 2,313 occupational cases with BLLs ≥25 μg/dL were available from 22 states. The majority of these adults were employed in four main industry sectors: manufacturing (n = 1,227 [53.1%]), construction (n = 468 [20.2%]), services (n = 194 [8.4%]), and mining (n = 182 [7.9%]). Within manufacturing, the majority of cases (n = 878; 71.6%) were among workers employed in storage battery manufacturing (North American Industry Classification System [NAICS] 33591), alumina and aluminum production and processing (NAICS 33131), and nonferrous metal (except copper and aluminum) rolling, drawing, extruding, and alloying (NAICS 33149) industries. Within construction, the majority of cases (n = 329 [70.3%]) were among workers employed in painting and wall covering contractors (NAICS 23832); highway, street, and bridge construction (NAICS 23731); and residential building construction (NAICS 23611) industries. Within the services sector, the majority of cases (n = 128 [66%]) were among workers employed in remediation services (NAICS 56291); all other amusement and recreation industries (NAICS 71399); automotive, mechanical, and electrical repair and maintenance (NAICS 81111); and fitness and recreational sports centers (NAICS 71394). Copper, nickel, lead, and zinc mining (NAICS 21223) accounted for 98.9% of the mining cases.

TABLE 1. Reported numbers of cases and prevalence rates of adults* with blood lead levels ≥10 μg/dL and blood lead levels ≥25 μg/dL, by geographic division and area — state Adult Blood Lead Epidemiology and Surveillance programs, United States, 2013†

Division/State	No. of employed state-resident adults (in 1,000s)	Blood lead levels ≥10 μg/dL				Blood lead levels ≥25 μg/dL§			
		All cases¶		State residents**		All cases		State residents	
		No.	(Rate)	No.	(Rate)	No.	(Rate)	No.	(Rate)
Total	**105,474**	**20,880**	**(20.4)**	**19,603**	**(19.2)**	**5,504**	**(5.2)**	**5,183**	**(4.9)**
New England									
Connecticut	1,724	331	(19.2)	313	(18.2)	62	(3.6)	61	(3.5)
Massachusetts	3,272	—††	(—)	—	(—)	126	(3.9)	105	(3.2)
Vermont	336	47	(14.0)	47	(14.0)	12	(3.6)	12	(3.6)
Mid Atlantic									
New Jersey	4,164	832	(20.0)	832	(20.0)	158	(3.8)	158	(3.8)
New York	8,891	1,873	(21.1)	1,731	(19.5)	295	(3.3)	270	(3.0)
Pennsylvania	5,964	2,928	(49.1)	2,915	(48.9)	1,533	(25.7)	1,527	(25.6)
East North Central									
Illinois	5,961	1,279	(21.5)	1,253	(21.0)	283	(4.7)	279	(4.7)
Indiana	2,947	596	(20.2)	596	(20.2)	113	(3.8)	113	(3.8)
Michigan	4,306	596	(13.8)	595	(13.8)	108	(2.5)	108	(2.5)
Wisconsin	2,877	687	(23.9)	686	(23.8)	105	(3.7)	105	(3.7)
West North Central									
Iowa	1,594	856	(53.7)	856	(53.7)	202	(12.7)	202	(12.7)
Minnesota	2,819	598	(21.2)	598	(21.2)	107	(3.8)	107	(3.8)
Missouri	2,814	3,145	(111.8)	2,835	(100.8)	690	(24.5)	613	(21.8)
Nebraska	983	195	(19.8)	195	(19.8)	32	(3.3)	32	(3.3)
South Atlantic									
Florida	8,783	888	(10.1)	863	(9.8)	270	(3.1)	266	(3.0)
Georgia	4,368	898	(20.6)	897	(20.5)	237	(5.4)	237	(5.4)
Maryland	2,917	275	(9.4)	234	(8.0)	75	(2.6)	62	(2.1)
North Carolina	4,310	219	(5.1)	218	(5.1)	99	(2.3)	99	(2.3)
East South Central									
Alabama	2,012	928	(46.1)	548	(27.2)	433	(21.5)	299	(14.9)
Kentucky	1,892	478	(25.3)	468	(24.7)	94	(5.0)	92	(4.9)
West South Central									
Louisiana	1,965	380	(19.3)	380	(19.3)	92	(4.7)	92	(4.7)
Oklahoma	1,707	144	(8.4)	121	(7.1)	29	(1.7)	27	(1.6)
Mountain									
Arizona§§	2,804	178	(6.3)	178	(6.3)	20	(0.7)	20	(0.7)
Colorado	2,591	103	(4.0)	41	(1.6)	29	(1.1)	15	(0.6)
New Mexico	859	48	(5.6)	48	(5.6)	13	(1.5)	13	(1.5)
Wyoming	292	66	(22.6)	66	(22.6)	12	(4.1)	12	(4.1)
Pacific									
Alaska	340	123	(36.1)	62	(18.2)	8	(2.4)	6	(1.8)
California	17,003	1,825	(10.7)	1,790	(10.5)	192	(1.1)	191	(1.1)
Oregon	1,761	92	(5.2)	79	(4.5)	12	(0.7)	9	(0.5)
Washington	3,217	272	(8.5)	158	(4.9)	63	(2.0)	51	(1.6)

* An employed person aged ≥16 years at the time of blood collection. When an adult had multiple blood lead tests in a given year, only the highest blood lead level for that adult in that year was counted. Rate per 100,000 employed adults. Data from the Adult Blood Epidemiology and Surveillance (ABLES) Program, National Institute for Occupational Safety and Health (NIOSH/CDC). Denominators extracted from 2015 U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics (LAUS) program (http://www.bls.gov/lau/staadata.txt).

† A total of 30 states participated in the ABLES Program in 2013.

§ The numbers and rates of adults with BLLs ≥25 μg/dL are subsets of the numbers and rates of adults with BLLs ≥10 μg/dL.

¶ All cases reported by a state. These include cases among adult residents in the reporting state plus cases identified by the reporting state but who reside in another state.

** Adults residing in the reporting state.

†† 10–15 μg/dL BLL data were not available.

§§ Data from Arizona were available only for January to August 2013.

TABLE 2. Reported numbers of adults* with blood lead levels ≥25 *μg*/dL, by exposure source and area — state Adult Blood Lead Epidemiology and Surveillance programs, United States, 2013†

	Occupational§		Nonoccupational		Unknown		Total
Division/State	No.	(%)	No.	(%)	No.	(%)	No.
Total	**4,262**	**(77.6)**	**285**	**(5.2)**	**944**	**(17.2)**	**5,491**
New England							
Connecticut	37	(59.7)	23	(37.1)	2	(3.2)	**62**
Massachusetts	71	(56.3)	24	(19.0)	31	(24.6)	**126**
Vermont	3	(25.0)	4	(33.3)	5	(41.7)	**12**
Mid Atlantic							
New Jersey	105	(66.5)	—¶	(—)	53	(33.5)	**158**
New York	191	(64.7)	78	(26.4)	26	(8.8)	**295**
Pennsylvania	1,449	(94.5)	—	(—)	84	(5.5)	**1,533**
East North Central							
Illinois	177	(62.5)	14	(4.9)	92	(32.5)	**283**
Indiana	67	(59.3)	—	(—)	46	(40.7)	**113**
Michigan	70	(64.8)	28	(25.9)	10	(9.3)	**108**
Wisconsin	88	(83.8)	9	(8.6)	8	(7.6)	**105**
West North Central							
Iowa	200	(99.0)	2	(1.0)	—	(—)	**202**
Minnesota	92	(86.0)	3	(2.8)	12	(11.2)	**107**
Missouri	682	(98.8)	8	(1.2)	—	(—)	**690**
Nebraska	25	(78.1)	2	(6.3)	5	(15.6)	**32**
South Atlantic							
Florida	82	(30.4)	11	(4.1)	177	(65.6)	**270**
Georgia	100	(42.2)	—	(—)	137	(57.8)	**237**
Maryland	57	(76.0)	4	(5.3)	14	(18.7)	**75**
North Carolina	89	(89.9)	8	(8.1)	2	(2.0)	**99**
East South Central							
Alabama	353	(81.5)	—	(—)	80	(18.5)	**433**
Kentucky	—	(—)	—	(—)	94	(100.0)	**94**
West South Central							
Louisiana	78	(92.9)	5	(6.0)	1	(1.2)	**84**
Oklahoma	7	(24.1)	2	(6.9)	20	(69.0)	**29**
Mountain							
Arizona	12	(80.0)	3	(20.0)	–	(—)	**15**
Colorado	4	(13.8)	3	(10.3)	22	(75.9)	**29**
New Mexico	4	(30.8)	3	(23.1)	6	(46.2)	**13**
Wyoming	12	(100.0)	—	(—)	–	(—)	**12**
Pacific							
Alaska	5	(62.5)	—	(—)	3	(37.5)	**8**
California	146	(76.0)	45	(23.4)	1	(0.5)	**192**
Oregon	7	(58.3)	1	(8.3)	4	(33.3)	**12**
Washington	49	(77.8)	5	(7.9)	9	(14.3)	**63**

* An employed person aged ≥16 years at the time of blood collection. When an adult had multiple blood lead tests in a given year, only the highest blood lead level for that adult in that year was counted.

† Among the 30 reporting states, 29 states submitted data on exposure source in 2013. These data include adult residents in the state and residents of other states reported by the state ABLES programs.

§ Includes 23 cases coded with both occupational and nonoccupational exposure source.

¶ No cases were reported.

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Blood Lead Levels in Children Aged <5 Years — United States, 2007–2013

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Preface

This report provides data concerning childhood blood lead levels (BLLs) in the United States during 2007–2013. These data were collected and compiled from raw data extracts sent by state and local health departments to CDC's Childhood Blood Lead Surveillance (CBLS) system. These raw data extracts have been de-identified and coded into a format specifically for childhood lead reporting. The numbers of children aged <5 years reported to CDC for 2013 with newly confirmed BLLs ≥10 μg/dL are provided in tabular form by month (Table 1) and geographic location (Table 2). The incidence of BLLs ≥10 μg/dL is reported by age group for 2007–2013 (Table 3). The numbers of children aged <5 years with BLLs 5–9 μg/dL for 2013 are reported (Table 4). For the period 2007–2013, the numbers of children newly confirmed with BLLs ≥70 μg/dL are summarized (Figure 1) as well as the percentage of children with BLLs ≥5 μg/dL (Figure 2). This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, which encompasses various surveillance years but is being published in 2016 (*1*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases* (*2*).

Background

Permanent neurologic damage and behavioral disorders have been found to be associated with lead exposure at blood levels at or below 5 μg/dL (*3*–*6*). No safe BLLs in children have been identified (*7*). Studies examining children with high BLLs (≥70 μg/dL) have shown severe neurologic problems, including seizures, comas, and death (*8*). Children aged <5 years are at increased risk because their bodies are growing rapidly and they tend to put their hands or other objects, which might be contaminated with lead dust, into their mouths.

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In 1991, CDC recommended that BLLs ≥10 μg/dL in children should prompt public health action by the state or local health departments with follow-up testing (*9*). In 1995, the Council of State and Territorial Epidemiologists (CSTE), in collaboration with CDC, designated elevated BLLs as the first noninfectious condition to be added to the list of conditions designated as reportable at the national level (*10*).

In May 2012, the Advisory Committee on Childhood Lead Poisoning Prevention* (ACCLPP) recommended the use of a reference range for blood lead (*11*). ACCLPP recommended that the upper value of the reference range be based on the 97.5th percentile of the National Health and Nutritional Examination Survey† (NHANES). A generated BLL distribution in children aged 1–5 years (currently 5 μg/dL) is used by clinical and public health care providers to identify children with elevated BLLs (*11*).

In 2012, a total of 29 states and New York City identified and reported approximately 138,000 children aged <6 years with BLLs ≥5 μg/dL (*12*). Federal funding for reporting BLLs ended in 2012, and several states lost their statewide lead programs. By 2013, the number of children reported to CDC with BLLs ≥5 μg/dL had decreased, as had the number of states reporting data to CDC (*12*). For this report, CDC examined reported BLLs of children aged <5 years in three categories: children with BLLs ≥10 μg/dL, children with new reports of BLLs ≥10 μg/dL, and children with BLLs 5–9μg/dL.)

Data Sources

Results of blood lead tests for children from state and local health departments were sent to CDC's Healthy Homes and Lead Poisoning Prevention Program (HHLPPP). When federal funding was available, prior to 2013, states submitted data on a quarterly basis. After funding ended in 2012, a total of 27 states, the District of Columbia, and New York City continued

* ACCLPP advised and guided the Secretary and Assistant Secretary of the U.S. Department of Health and Human Services and the Director of CDC regarding new scientific knowledge and technical developments and their practical implications for childhood lead poisoning prevention efforts (http://www.cdc.gov/nceh/lead/acclpp/acclpp_main.htm).

† NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States (http://www.cdc.gov/nchs/nhanes.htm).

TABLE 1. Number and percentage of reported new cases of blood lead levels ≥10 μg/dL among children aged <5 years, by month — Childhood Blood Lead Surveillance System, United States, 2013*

Jan No. (%)	Feb No. (%)	Mar No. (%)	Apr No. (%)	May No. (%)	June No. (%)	July No. (%)	Aug No. (%)	Sept No. (%)	Oct No. (%)	Nov No. (%)	Dec No. (%)	Total No.
538 (6.5)	469 (5.7)	416 (5.1)	543 (6.6)	718 (8.7)	739 (9.0)	947 (11.5)	1,053 (12.8)	965 (11.7)	823 (10.0)	566 (6.0)	453 (5.5)	**8,230**

* A total of 29 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New Mexico, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, West Virginia, and Wisconsin).

TABLE 2. Reported number of newly identified cases of blood lead levels ≥10 μg/dL among children aged <5 years, by geographic region and state —Childhood Blood Lead Surveillance System, United States, 2013

Region/State	No.
	8,230
New England	**1,003**
Connecticut	264
Maine	—*
Massachusetts	472
New Hampshire	75
Rhode Island	163
Vermont	29
Mid-Atlantic	**2,472**
New Jersey	593
New York	—
New York City	639
Pennsylvania	1,240
Eastern North Central	**2,997**
Illinois	1094
Indiana	183
Michigan	335
Ohio	941
Wisconsin	444
Western North Central	**604**
Iowa	—
Kansas	—
Minnesota	126
Missouri	478
Nebraska	—
North Dakota	—
South Dakota	—
South Atlantic	**553**
Delaware	—
District of Columbia	27
Florida	—
Georgia	136
Maryland	268
North Carolina	95
South Carolina	—
Virginia	—
West Virginia	27

TABLE 2. (*Continued*) Reported number of newly identified cases of blood lead levels ≥10 μg/dL among children aged <5 years, by geographic region and state —Childhood Blood Lead Surveillance System, United States, 2013

Region/State	No.
Eastern South Central	**269**
Alabama	72
Kentucky	49
Mississippi	71
Tennessee	77
Western South Central	**241**
Arkansas	—
Louisiana	120
Oklahoma	121
Texas	—
Mountain	**83**
Arizona	69
Colorado	—
Idaho	—
Montana	—
Nevada	—
New Mexico	14
Utah	—
Wyoming	—
Pacific	**8**
Alaska	—
California	—
Hawaii	—
Oregon	8
Washington	—

* No data were reported for 2013.

to submit data to CDC in 2013 while 14 states that had lost funding for their childhood lead program could not provide data. Most of the states that continued to have childhood lead programs had sustainable funding through the state in which the health departments would verify the data collected for blood lead testing. The test results compiled and analyzed by state health departments and submitted to CDC comprise the CBLS database.

State and local childhood blood lead surveillance systems retain the results of blood lead tests of children reported to state health departments by private laboratories, as well as state and local government laboratories. The reporting criteria of BLLs from the laboratories to the state are set by each state and vary across jurisdictions. A set of core data variables have been established by CDC and participating states that should be collected for every child at the time of the blood lead test. These variables include identification and demographic information (e.g., date of birth, race, or ethnicity), laboratory information (e.g., venous or capillary blood test), date of blood lead test, address information such as city and zip code, and test result (*13*). Each child is assigned a unique identifier that corresponds to the de-identified and de-duplicated data sent to CDC. CDC checks each state-submitted record for correct formatting, coding and content. Records not meeting CDC

TABLE 3. Reported number of new cases and incidence rate per 100,000 children aged <5 years with blood lead levels ≥10 μg/dL, by age group — Childhood Blood Lead Surveillance System, United States, 2007–2013*

	<1 yr		1–4 yrs	
Year	No.	Rate	No.	Rate
2007†	2,055	47.75	18,398	110.72
2008§	1,852	43.00	15,251	90.41
2009¶	1,608	38.69	13,432	78.76
2010**	1,412	34.05	11,647	68.05
2011††	1,185	29.89	10,532	65.25
2012§§	860	21.81	9,369	58.31
2013¶¶	777	19.55	7,453	46.89

* Denominators are calculated as estimates of all children living in the United States from U.S. Census data.

† A total of 40 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin).

§ A total of 38 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin).

¶ A total of 38 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin).

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†† A total of 36 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin).

§§ A total of 30 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin).

¶¶ A total of 29 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New Mexico, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, West Virginia, and Wisconsin).

criteria are summarized in file processing reports that are sent to states for correction. Certain errors, if not corrected, prevent the record from being entered in CDC's CBLS database. For states with an error rate >10%, no data are loaded into CBLS, and the state must correct the problems before sending the records back to CDC.

TABLE 4. Number of children aged <5 years with blood lead levels 5–9 μg/dL, by sample type and age — Childhood Blood Lead Surveillance System, United States, 2013*

Age at time of blood lead test (yrs)	Capillary/Unknown (%)	Venous (%)
<1	3,960 (61.2)	2,510 (38.8)
1	14,035 (56.4)	10,866 (43.6)
2	11,999(57.2)	8,967 (42.8)
3	6,728 (57.2)	5,028 (42.8)
4	5,609 (56.0)	4,408 (44.0)
Total	**42,331 (57.1)**	**31,779 (42.9)**

* A total of 29 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New Mexico, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, West Virginia, and Wisconsin).

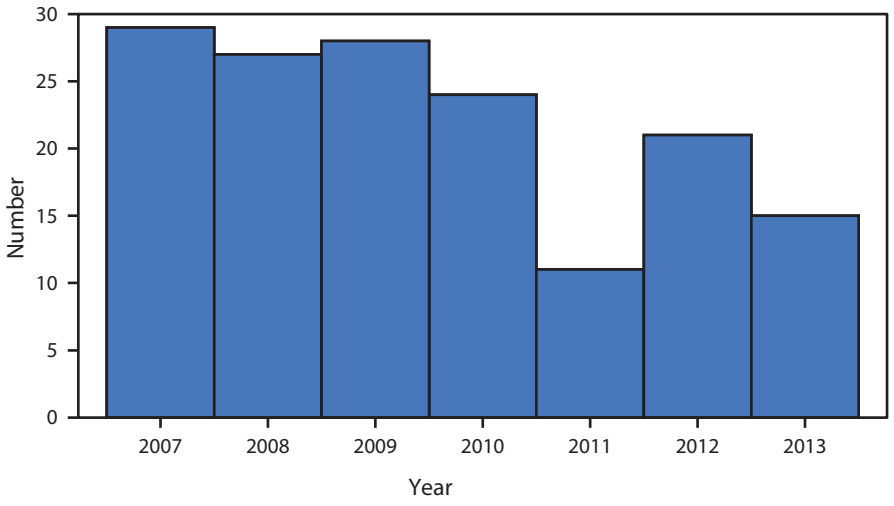
Interpreting Data

In this report, state surveillance data are presented for children aged <5 years who were tested for lead at least once during 2007–2013 and whose tests were reported to CDC. Having a confirmed BLL ≥10 μg/dL is defined as having one venous blood lead test ≥10 μg/dL or two capillary blood lead tests ≥10 μg/dL drawn within 12 weeks of each other (*14*). Incidence data rates are presented by the date of the confirmed blood lead test. Date are reported by the jurisdiction of the child's residence at the time of the confirmed blood lead test. State health departments check for duplicate laboratory reports for children and completeness of the laboratory report before sending the data to CDC. After data are sent, CDC also checks to ensure the completeness and accuracy of the data.

The data provided in this report are useful for analyzing childhood blood lead trends and determining relative morbidity numbers. However, reporting practices affect how these data are interpreted. Childhood blood lead reporting is likely incomplete, and completeness of the records might vary depending on state, laboratory, or BLL range (e.g., BLLs <10 μg/dL might not be required to be reported in some states). Independent of the actual incidence of disease, factors such as changes in the methods of surveillance or introduction of new diagnostic tests (e.g., use of a portable handheld analyzer) can cause changes in the reported blood lead levels.

In 2007, a total of 38 states, New York City, and the District of Columbia reported data to CDC. During 2007–2013, the number of states collecting and reporting childhood blood lead data to CDC fluctuated. Federal funding from CDC to state and local health departments ended in September 2012. For this reason, no states were required to report childhood blood lead data to CDC in 2013. Nevertheless, 29 jurisdictions (27 states, New York City, and the District of Columbia) did collect and report data to CDC. Although the varying number

FIGURE 1. Number of children aged <5 years with newly confirmed blood lead levels ≥70μgL — Childhood Blood Lead Surveillance System, United States, 2007–2013*



* For 2007, a total of 40 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin).

For 2008, a total of 39 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin).

For 2009, a total of 39 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin).

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For 2011, a total of 36 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin).

For 2012, a total of 30 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin).

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of states reporting data from year to year during 2007–2013 limits the extent to which trends can be analyzed, the data nonetheless can indicate BLLs in children for a particular year.

Methods for Identifying Childhood Blood Lead

Elevated blood lead levels has been a notifiable condition since 1995 (*9*). CDC asks state health departments to report all blood lead test data for children to HHLPPP, regardless of the BLL. Each state has its own laws and regulations regarding blood lead test reporting to the state health department. Of the 35 programs funded in 2014 by CDC, 33 required electronic reporting from the laboratory to the state health department.

Before ACCLPP's mid-2012 recommendation to use the 97.5 percentile from NHANES, currently 5 μg/dL, the "level of concern" was 10 μg/dL (*10*). For this report, elevated BLLs are defined as confirmed BLLs ≥10 μg/dL. Data on children with BLLs ≥5 μg/dL also are reported.

Publication Criteria

Reports of children aged <5 years with BLLs 5–9μg/dL and confirmed BLLs ≥10 μg/dL during 2007–2013.

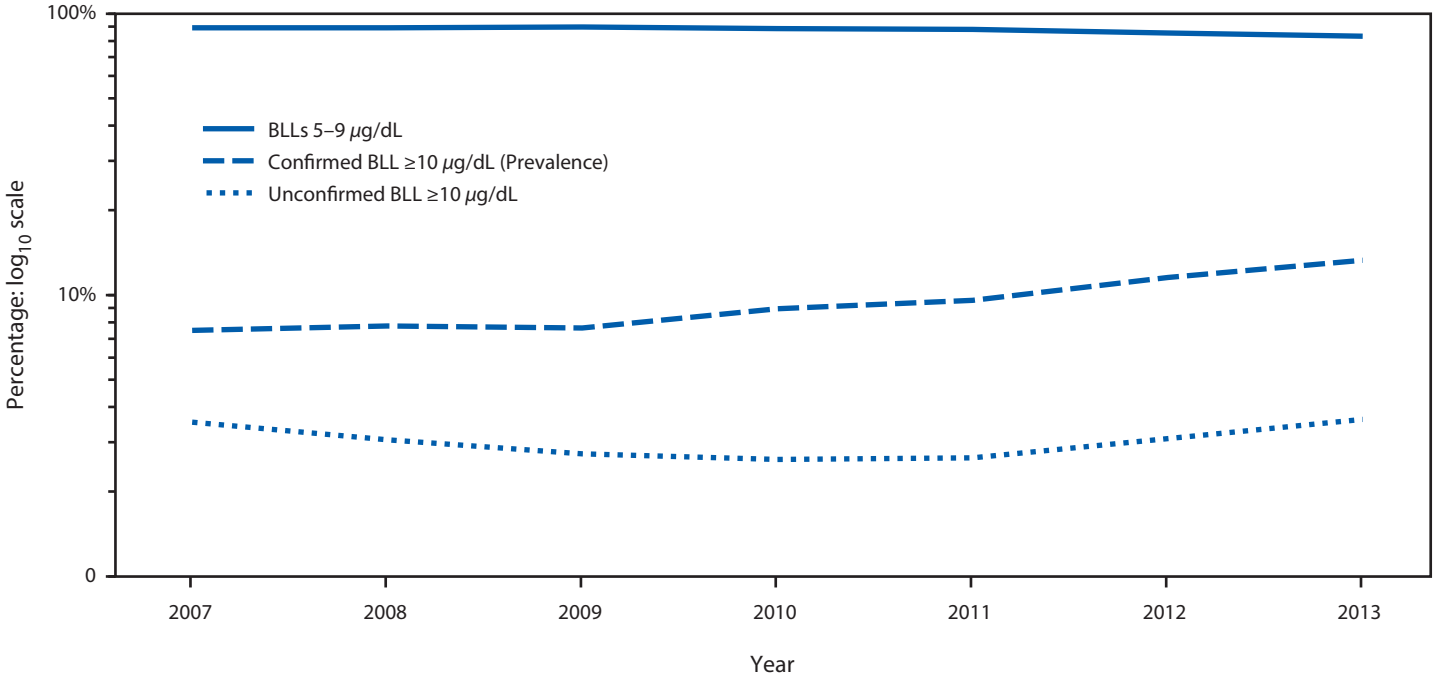
Highlights

Lead exposure in children can cause permanent neurologic damage (*3*). Behavioral disorders are associated with lead exposure even at detectable blood levels at or below 5 μg/dL (*3–6*). The most common highly concentrated source of lead for children in the United States is lead paint. When paint containing lead deteriorates into flakes, chips, or fine dust, it is easily inhaled or ingested by small children.

In 2011, the last full calendar year of federal funding from CDC, 34 states,[§] District of Columbia, and New York City submitted BLL data to CDC; however, by 2013, only

[§] States and jurisdictions reporting data included Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

FIGURE 2. Percentage of children aged <5 years with BLLs ≥5 μg/dL, by year and blood lead level — Childhood Blood Lead Surveillance System, United States, 2007–2013*



* For 2007, a total of 40 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Hampshire, New York, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin).

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For 2011, a total of 36 jurisdictions reported data to CDC (Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin).

For 2012, a total of 30 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin).

For 2013, a total of 29 jurisdictions reported data to CDC (Alabama, Arizona, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Hampshire, New Mexico, New York City, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, West Virginia, and Wisconsin).

27 states,¶ District of Columbia, and New York City submitted data (a 21% reduction in contributors). Although the decline in the number of health departments submitting data to CDC makes it difficult to assess trends over time, it is still possible to evaluate new cases in children with confirmed BLLs ≥10 μg/dL and cases in children with BLL 5–9 μg/dL from the states that continue to submit data to CDC.

In 2013, during the warmest weather months (July–September), 2,965 new cases were identified, more than in any other consecutive 3-month period (Table 1). In warm weather, windows that possibly are painted with lead-based paint are opened and closed, creating lead dust in the air and on the ground. Repainting and renovation activities also are more common in warm-weather months. Increased presence and activity of children in and around the home might lead to

¶ States and jurisdictions reporting data included Alabama, Arizona, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin.

children having more contact with contaminated dust, surfaces, and soil (*15*). This contact can lead to higher BLLs in the late summer and early fall.

The East North Central region reported the greatest number of new cases in 2013, with 2,997 children aged <5 years with confirmed BLLs ≥10 μg/dL reported to CDC, followed by the Mid-Atlantic region with 2,472 children (Table 2). These two regions (comprising eight state and local health departments that reported data) accounted for 67% of the new cases in the United States and almost 47% of the children aged <5 years tested and reported to CDC for 2013. The other seven geographic areas (comprising 21 state and local health departments that reported data to CDC for 2013) accounted for the remaining 33% of new cases and for 53% of the children aged <5 years tested and reported to CDC for 2013.

The number of new cases, defined as cases in children aged <5 years with a first-ever confirmed BLL ≥10 μg/dL, that were reported to CDC continued to decrease during 2007–2013 (Table 3). Although not all jurisdictions reported data to CDC, the denominator is the entire child population aged <1 year and aged 1–4 years from the U.S. Census across all years. Children aged 1–4 years continue to have a higher rate of confirmed BLLs ≥10 μg/dL than other children across all years, possibly because of increased hand-to-mouth activity and mobility for older children.

The numbers of newly confirmed children with BLLs ≥70 μg/dL during 2007–2013 are presented in graphic form (Figure 1). Changes in the number of jurisdictions reporting data to CDC over these 7 years make it difficult to discern any trend or clear pattern. One *Healthy People 2010* environmental health objective is eliminating BLLs ≥10 μg/dL (*16*). These children have BLLs at least seven times above the *Healthy People 2010* goal.

Prevalence data indicate that 74,110 children aged <5 years had a BLL 5–9μg/dL in 2013 (Table 4). Although a single capillary test is not a confirmatory test, in 2013, of the approximately 74,000 children aged <5 years who were tested and who were reported to CDC as having BLLs 5–9μg/dL, 31,779 (43%) had a confirmed 5–9 μg/dL by venous sample type. The mid-2012 change in the reference value and the loss of federal funding to state and local health departments from CDC made it difficult for most states to extend follow up testing for capillary tests 5–9μg/dL. Although venous blood lead samples have been the gold standard, one study has shown that capillary blood draws are suitable alternatives to venous blood draws when screening children aged <6 years to determine lead exposure and provide reasonable estimates at the population level (*17*).

During 2007–2013, a majority of the children aged <5 years with BLLs ≥5 μg/dL had BLLs 5–9 μg/dL (Figure 2). The percentage of children with confirmed BLLs ≥10 μg/dL increased from 7.5% to 13.3% during the same period. CDC, along with state and local health departments, continue efforts to reduce BLLs ≥5 μg/dL and confirmed BLLs ≥10 μg/dL through screening and primary prevention (*18*).

Effective surveillance requires state and local health departments to track a substantial number of children and their blood lead test results over time. More detailed annual summaries describing the number of children tested for lead by state, county, and BLL are published periodically by CDC. A summary of childhood lead exposure in 2014, the most recent year for which data are available, is provided at http://www.cdc.gov/nceh/lead.

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Surveillance for Silicosis — Michigan and New Jersey, 2003–2011

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Preface

CDC's National Institute for Occupational Safety and Health (NIOSH), state health departments, and other state entities maintain a state-based surveillance program of confirmed silicosis cases. Data on confirmed cases are collected and compiled by state entities and submitted to CDC. This report summarizes information for cases of silicosis that were reported to CDC for 2003–2011 by Michigan and New Jersey, the only states that continue to provide data voluntarily to NIOSH. The data for this report were final as of January 8, 2015. Data are presented in tabular form on the number and distribution of cases of silicosis by year (Table 1), duration of employment in occupations with potential exposure to dust containing respirable crystalline silica (Table 2), industry (Table 3), and occupation (Table 4). The number of cases by year is presented graphically (Figure). This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, which encompasses various surveillance years but is being published in 2016 (*1*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases* (*2*).

Background

Silicosis, a form of pneumoconiosis, is a progressive occupational lung disease caused by the inhalation, deposition, and retention of respirable dust containing crystalline silica. There is no effective specific treatment, and patients with silicosis can be offered only supportive care. Silicosis is preventable by using nonsilica substitution materials, effective dust control measures, and personal protective equipment.* Occupational exposure to respirable dust containing crystalline silica occurs in mining, quarrying, sandblasting, rock drilling, construction, pottery making, stone masonry, and tunneling operations (*3*). The Occupational Safety and Health Administration (OSHA) estimates that >2 million workers are currently exposed† to respirable crystalline silica in industries where exposure might occur, including 1.85 million workers in the construction industry and 320,000 workers in general industry and maritime workplaces (*4*,*5*). Typically a disease of long latency, silicosis usually is diagnosed through a chest radiograph after ≥10 years of exposure to respirable

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* General information concerning the hierarchy of hazard exposure controls is available at http://www.cdc.gov/niosh/engcontrols; information on control measures specific to crystalline silica is available at https://www.osha.gov/dsg/topics/silicacrystalline/control_measures_silica.html.

† National compliance standards for silica dust exposure (the Mine Safety and Health Administration [MSHA] and the Occupational Safety and Health Administration [OSHA]) use permissible exposure limits (PEL) based on the American Conference of Governmental Industrial Hygienists threshold limit value. These began to be applied in the early 1970s and included limits on exposure to silica through regulation of respirable mixed mine dust in underground coal mines using the MSHA's formula: (10 mg/m3)/(% quartz), and direct limits on exposure to crystalline silica as respirable quartz using the formulas: (10 mg/m3)/(%quartz + 2) for metal/nonmetal mining and general industry or (250 million particles per cubic foot)/(%quartz + 5) for the construction industry (currently for the construction industry, sampling, analysis, and calculations are the same as general industry, except an additional calculation to convert to millions of particles per cubic foot is conducted to determine overexposure according to OSHA's National Emphasis Program–Crystalline Silica at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=3790). For more information, see Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors; Final Rule, available at https://www.gpo.gov/fdsys/pkg/FR-2014-05-01/pdf/2014-09084.pdf, Criteria for a Recommended Standard: Occupational Exposure to Respirable Coal Mine Dust at http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf, Occupational Safety and Health Standards, Toxic and Hazardous Substances, 1910.1000, TABLE Z-3 Mineral Dusts at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9994, Safety and Health Regulations for Construction, Occupational Health and Environmental Controls, 1926.55 App A, Gases, vapors, fumes, dusts, and mists at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10629, and OSHA Frequently Asked Questions, Silica Advisor at https://www.osha.gov/dsg/etools/silica/faq/faq.html.

TABLE 1. Number and percentage* of silicosis cases, by year — Michigan and New Jersey, 2003–2011

	Michigan	New Jersey	Total
Year	No. (%)	No. (%)	No. (%)
2003	34 (16.8)	7 (7.8)	**41 (14.0)**
2004	28 (13.9)	16 (17.8)	**44 (15.1)**
2005	30 (14.9)	8 (8.9)	**38 (13.0)**
2006	19 (9.4)	10 (11.1)	**29 (9.9)**
2007	22 (10.9)	11 (12.2)	**33 (11.3)**
2008	23 (11.4)	16 (17.8)	**39 (13.4)**
2009	14 (6.9)	7 (7.8)	**21 (7.2)**
2010	21 (10.4)	8 (8.9)	**29 (9.9)**
2011	11 (5.4)	7 (7.8)	**18 (6.2)**
Total	**202 (100.0)**	**90 100.0**	**292 (100.0)**

Source: Sentinel surveillance data as of January 8, 2015.
* Percentages might not sum to 100% due to rounding.

TABLE 2. Number and percentage* of silicosis cases, by number of years of employment in jobs with potential exposure to silica — Michigan and New Jersey, 2003–2011

	Michigan	New Jersey	Total
No. yrs. employment	No. (%)	No. (%)	No. (%)
<10	20 (9.9)	8 (8.9)	**28 (9.6)**
10–19	19 (9.4)	17 (18.9)	**36 (12.3)**
20–29	54 (26.7)	10 (11.1)	**64 (21.9)**
30–39	57 (28.2)	10 (11.1)	**67 (22.9)**
≥40	25 (12.4)	9 (10.0)	**34 (11.6)**
Unknown	27 (13.4)	36 (40.0)	**63 (21.6)**
Total	**202 (100.0)**	**90 (100.0)**	**292 (100.0)**

Source: Sentinel surveillance data as of January 8, 2015.
* Percentages might not sum to 100% due to rounding.

TABLE 3. Number and percentage* of silicosis cases, by primary industry — Michigan and New Jersey, 2003–2011

	Michigan	New Jersey	Total
Industry (NAICS 2002)	No. (%)	No. (%)	No. (%)
Agriculture, forestry, fishing and hunting	**1 (0.5)**	**1 (1.1)**	**2 (0.7)**
Mining	**17 (8.4)**	**12 (13.3)**	**29 (9.9)**
Mining (except oil and gas) (212)	17 (8.4)	11 (12.2)	**28 (9.6)**
All other mining industries (213)	—† (—)	1 (1.1)	**1 (0.3)**
Construction	**34 (16.8)**	**23 (25.6)**	**57 (19.5)**
Specialty trade contractors (238)	32 (15.8)	15 (16.7)	**47 (16.1)**
Heavy and civil engineering construction (237)	2 (1.0)	5 (5.6)	**7 (2.4)**
All other construction industries (236)	— (—)	3 (3.3)	**3 (1.0)**
Manufacturing	**139 (68.8)**	**45 (50.0)**	**184 (63.0)**
Primary metal manufacturing (331)	106 (52.5)	3 (3.3)	**109 (37.3)**
Nonmetallic mineral product manufacturing (327)	10 (5.0)	28 (31.1)	**38 (13.0)**
Transportation equipment manufacturing (336)	13 (6.4)	2 (2.2)	**15 (5.1)**
Miscellaneous manufacturing (339)	4 (2.0)	3 (3.3)	**7 (2.4)**
Fabricated metal product manufacturing (332)	3 (1.5)	3 (3.3)	**6 (2.1)**
All other manufacturing industries (325, 333–335)	3 (1.5)	6 (6.7)	**9 (3.1)**
Wholesale trade	**1 (0.5)**	— (—)	**1 (0.3)**
Retail trade	**1 (0.5)**	— (—)	**1 (0.3)**
Transportation and warehousing	**2 (1.0)**	**2 (2.2)**	**4 (1.4)**
Professional, scientific, and technical services	— (—)	**1 (1.1)**	**1 (0.3)**
Administrative and support and waste management and remediation services	— (—)	**1 (1.1)**	**1 (0.3)**
Health care and social assistance	**1 (0.5)**	— (—)	**1 (0.3)**
Arts, entertainment, and recreation	— (—)	**1 (1.1)**	**1 (0.3)**
Other services (except public administration)	**4 (2.0)**	**3 (3.3)**	**7 (2.4)**
Repair and maintenance (811)	4 (2.0)	3 (3.3)	**7 (2.4)**
Public administration	**(0.5)**	— (—)	**1 (0.3)**
Unclassified	**1 (0.5)**	**1 (1.1)**	**2 (0.7)**
Total	**202 (100.0)**	**90 (100.0)**	**292 (100.0)**

Abbreviation: NAICS = North American Industry Classification System.
Source: Sentinel surveillance data as of January 8, 2015.
* Percentages might not sum to 100% due to rounding.
† Indicates no cases reported.

crystalline silica dust. Nodular silicosis also can develop within 5–10 years of exposure to higher concentrations of crystalline silica. A clinical continuum exists between the accelerated and the chronic forms of silicosis. Acute silicosis has a different pathophysiology than accelerated or chronic silicosis in that it might develop within weeks of initial exposure and is associated with exposures to extremely high concentrations† of crystalline silica. Respiratory impairment is severe, and the

TABLE 4. Number and percentage* of silicosis cases, by primary occupation — Michigan and New Jersey, 2003–2011

	Michigan	New Jersey	Total
Occupation (COC 2000)	**No. (%)**	**No. (%)**	**No. (%)**
Management (022)	—† (—)	**1 (1.1)**	**1 (0.3)**
Architecture and engineering (145, 150)	**1 (0.5)**	**2 (2.2)**	**3 (1.0)**
Healthcare practitioners and technical (313)	**1 (0.5)**	— (—)	**1 (0.3)**
Protective service (374)	**1 (0.5)**	— (—)	**1 (0.3)**
Building and grounds cleaning and maintenance	**5 (2.5)**	**2 (2.2)**	**7 (2.4)**
Janitors and building cleaners (422)	5 (2.5)	1 (1.1)	**6 (2.1)**
Grounds maintenance workers (425)	— (—)	1 (1.1)	**1 (0.3)**
Office and administrative support (561, 562, 570)	**3 1.5**	— (—)	**3 (1.0)**
Farming, forestry, and fishing (605)	— (—)	**1 (1.1)**	**1 (0.3)**
Construction and extraction	**50 (24.8)**	**32 (35.6)**	**82 (28.1)**
Construction laborers (626)	20 (9.9)	9 (10.0)	**29 (9.9)**
Brickmasons, blockmasons, and stonemasons (622)	11 (5.4)	2 (2.2)	**13 (4.5)**
Other extraction workers (694)	7 (3.5)	2 (2.2)	**9 (3.1)**
All other construction and extraction occupations (620–621, 623–625, 632, 635–636, 642, 644, 652–653, 660, 673, 682–684)	12 (5.9)	19 (21.1)	**31 (10.6)**
Installation, repair, and maintenance (712, 715, 722, 733–735, 762)	**7 (3.5)**	**8 (8.9)**	**15 (5.1)**
Production	**115 (56.9)**	**35 (38.9)**	**150 (51.4)**
Production workers, all other (896)	39 (19.3)	2 (2.2)	**41 (14.0)**
Molders and molding machine setters, operators, and tenders, metal and plastic (810)	27 (13.4)	1 (1.1)	**28 (9.6)**
Grinding, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic (800)	17 (8.4)	1 (1.1)	**18 (6.2)**
Metal furnace and kiln operators and tenders (804)	9 (4.5)	— (—)	**9 (3.1)**
Crushing, grinding, polishing, mixing, and blending workers (865)	4 (2.0)	5 (5.6)	**9 (3.1)**
First—line supervisors/managers of production and operating workers (770)	6 (3.0)	1 (1.1)	**7 (2.4)**
Molders, shapers, and casters, except metal and plastic (892)	— (—)	7 (7.8)	**7 (2.4)**
Inspectors, testers, sorters, samplers, and weighers (874)	3 (1.5)	3 (3.3)	**6 (2.1)**
Painting workers (881)	2 (1.0)	4 (4.4)	**6 (2.1)**
Miscellaneous assemblers and fabricators (775)	— (—)	5 (5.6)	**5 (1.7)**
All other production occupations (801, 803, 813–814, 822, 831, 875–876)	8 (4.0)	6 (6.7)	**14 (4.8)**
Transportation and material moving (913, 920, 961–963)	**4 (2.0)**	**8 (8.9)**	**12 (4.1)**
Unclassifiable	**15 (7.4)**	**1 (1.1)**	**16 (5.5)**
Total	**202 (100.0)**	**90 (100.0)**	**292 (100.0)**

Abbreviation: COC = Census Occupation Code by the U.S. Census Bureau.
Source: Sentinel surveillance data as of January 8, 2015.
* Percentages might not sum to 100% due to rounding.
† Indicates no cases reported.

disease is usually fatal within a year of diagnosis. In addition, occupational exposure to respirable crystalline silica puts workers at increased risk for other serious health conditions, including chronic obstructive lung disease, kidney and connective tissue disease, tuberculosis and other mycobacterial-related diseases, and lung cancer (*6*). In 1997, the International Agency for Research on Cancer (IARC) classified crystalline silica as carcinogenic to humans (*7*), and this classification was reconfirmed in 2012 (*8*).

During 1999–2013, a total of 2,065 decedents (age-adjusted death rate: 0.57 per 1 million persons aged ≥15 years) had silicosis listed as the cause of death on the death certificate.§

The annual number of silicosis deaths declined from 185 in 1999 to 111 in 2013 (*9,10*). Analysis of 1968–2005 data indicated that silicosis-attributable years of potential life lost before age 65 years decreased substantially during 1968–2005, but the decline slowed during the last 10 years of that period (*11*). However, the number of hospitalizations for which silicosis was listed as one of the discharge diagnoses did not decline during 1997–2011.¶ Cases of silicosis continue to occur despite the existence of legally enforceable exposure limits.† In 2014, silicosis with progressive massive fibrosis was observed in a male aged 37 years who worked for an engineered stone countertop company as a polisher, laminator, and fabricator (*12*). Silicosis in any of its clinical forms is consistently

§ Source: CDC, National Center for Health Statistics, Multiple Cause-of-Death data files, 1999–2013 on CDC WONDER Online Database, released 2015, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program (http://wonder.cdc.gov/mcd-icd10.html).

¶ Source: Agency for Healthcare Research and Quality. HCUPnet, an on-line query system for National Statistics on All Stays (http://hcupnet.ahrq.gov).

undercounted by the Survey of Occupational Injuries and Illnesses, an employer-based surveillance system maintained by the Bureau of Labor Statistics (*13*). An estimated 3,600–7,300 new cases of silicosis might be occurring each year (*13*). In 2008, the National Academy of Sciences recommended the continuation and expansion of surveillance efforts to prevent silicosis and other interstitial lung diseases (*14*).

Cases of silicosis are sentinel events that indicate the need for intervention (*15*). Silicosis was put under nationwide surveillance as part of the National Public Health Surveillance System in 1999** and became a nationally notifiable and standard condition in 2009.†† In 2010, the national surveillance case definition for silicosis was added to CDC's National Notifiable Diseases Surveillance System (NNDSS).§§

Since 2005, NIOSH has supported efforts by states to conduct surveillance for silicosis under the State-Based Occupational Health and Safety Surveillance cooperative agreement. Between 1987 and 2005, different cooperative agreements were in place, including the Sentinel Event Notification system for Occupational Risks (SENSOR). In 1987, some states initiated active silicosis surveillance under SENSOR and began providing data voluntarily to NIOSH (*16*,*17*). Since 1992, data summaries have been published in a series of reports.¶¶ The number of states*** that conduct silicosis surveillance varies by year based on funding support by NIOSH. Currently, Michigan and New Jersey are funded to continue to conduct sentinel case-based silicosis surveillance and interventions. These two states are the only states that continue to provide data voluntarily to NIOSH.

This report summarizes data for silicosis cases that met the surveillance case definition for a confirmed silicosis case for 2003–2011 as reported by Michigan and New Jersey. Data from state programs are updated annually and are available through the CDC's Work-Related Lung Disease Surveillance System (eWoRLD).†††

Data Sources

In 1987, some states initiated active silicosis surveillance under SENSOR and began providing data voluntarily to NIOSH (*16*,*17*). The number of states conducting silicosis surveillance varies by year.†† Two states, Michigan and New Jersey, continue to conduct sentinel case-based silicosis surveillance and interventions and provide data voluntarily to NIOSH.

Interpreting the Data

In this report, state surveillance data for confirmed silicosis cases are presented by the year of the reporting source, industry, occupation, and duration of employment in occupations with potential exposure to silica dust. The reporting source year is the year of a silicosis-related clinician report, hospital discharge, death, or year of a workers' compensation claim. If a case is ascertained from multiple data sources over multiple years, the year reported is the first year the case is ascertained from any data source.

Reporting practices affect how the data should be interpreted. Silicosis is frequently not recognized or reported by clinicians. Although multiple data sources are used, case ascertainment likely is incomplete. The data provided in this report are based on data from two states and might not be generalizable.

Methods for Identifying Silicosis

State sentinel silicosis surveillance programs identify suspected cases of silicosis through health care provider reports, hospital discharge or outpatient data, state death certificate data, and Workers' Compensation data. Other data sources include the identification by the index case of additional cases among co-workers at a work place, referrals from industrial hygienists conducting inspections at companies, employer screenings, and referrals from other state health departments.

In New Jersey, clinicians and hospitals are required to report cases of silicosis directly to the state health department. In Michigan, physicians, hospitals, clinics or employers are required to report cases of silicosis directly to the Michigan Department of Licensing and Regulatory Affairs or to the state's bona fide agent, Michigan State University.

Cases are confirmed using the surveillance case definition, which requires a history of occupational exposure to airborne silica dust and either or both: 1) a chest radiograph (or other

** Source: Council of State and Territorial Epidemiologists position statement ENV 4 (http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/1999-ENV-4.pdf).

†† Source: Council of State and Territorial Epidemiologists position statement 09-OH-01 (http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/09-OH-01.pdf).

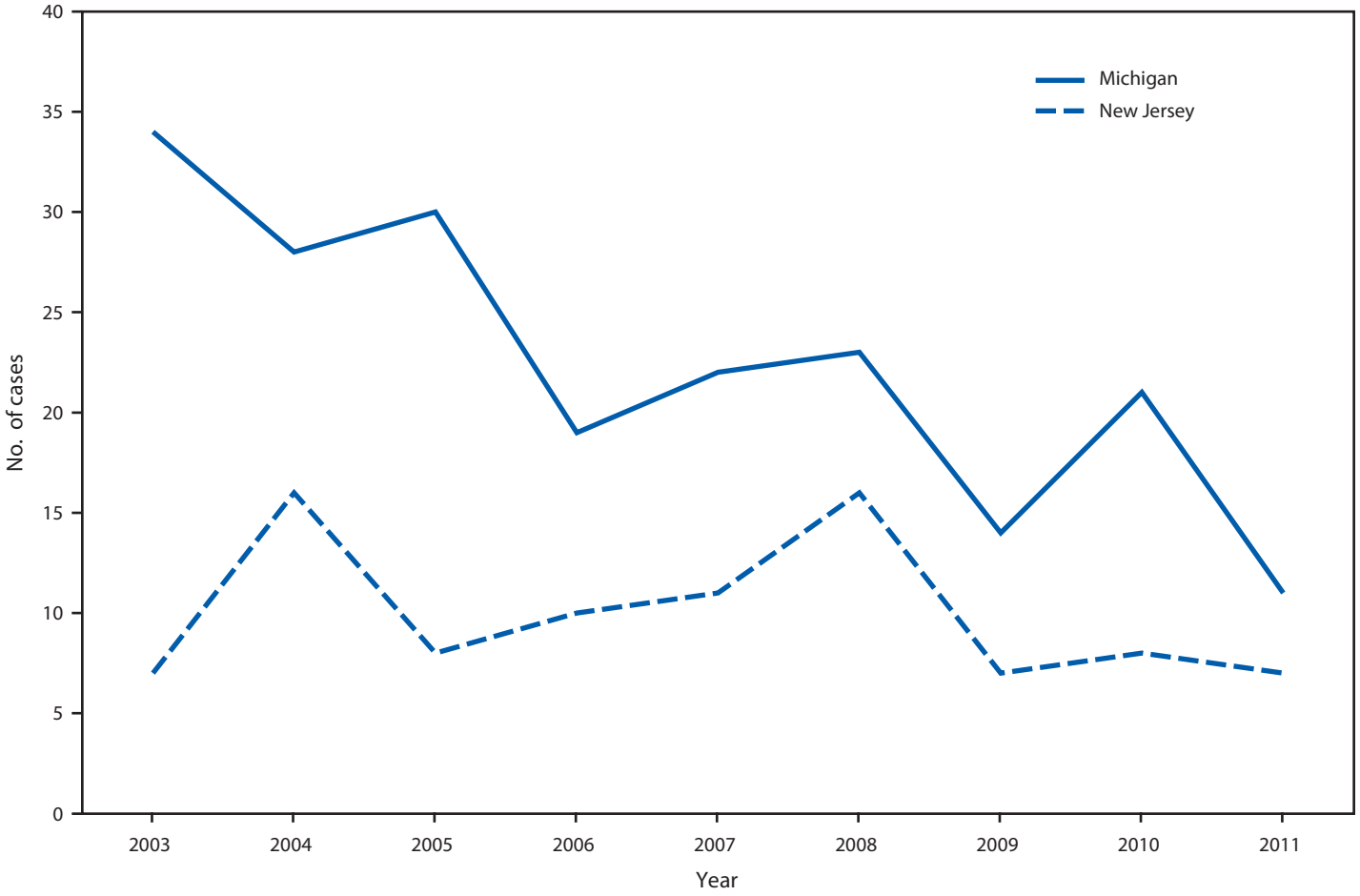
§§ Source: CDC. Silicosis 2010 case definition (https://wwwn.cdc.gov/nndss/conditions/silicosis/case-definition/2010).

¶¶ Work-Related Lung Disease (WoRLD) Surveillance Reports are available at http://www.cdc.gov/niosh/topics/surveillance/ords/NationalStatistics.html. The most recent data are available at http://wwwn.cdc.gov/eworld.

*** A list of states conducting silicosis surveillance is available in Table A-1 on page A-7 at http://www.cdc.gov/niosh/docs/2008-143/pdfs/2008-143.pdf.

††† State-based case data are available at http://wwwn.cdc.gov/eworld/Grouping/Silicosis/94#State-based Case Data.

FIGURE. Number* of silicosis cases by year — Michigan and New Jersey, 2003–2011



Source: Sentinel surveillance data as of January 8, 2015.
* N = 292 (Michigan: 202; New Jersey: 90).

radiographic image, such as computed tomography) showing abnormalities interpreted as consistent with silicosis; or 2) lung histopathology consistent with silicosis.[§§] Medical record review and follow-up interviews are conducted with the reported case or their surviving next-of-kin, using a standardized telephone-administered questionnaire.

Publication Criteria

De-identified confirmed cases of silicosis case data are reported voluntarily to NIOSH on an annual basis. All confirmed cases are published.

Highlights

Silicosis is a progressive and preventable occupational lung disease caused by the inhalation, deposition, and retention of respirable dust containing crystalline silica. As a sentinel event, a case of silicosis indicates a failure to prevent exposure to crystalline silica dust.

For the period 2003–2011, silicosis surveillance programs in Michigan and New Jersey identified and confirmed 292 cases; 28 (9.6%) had <10 years of potential exposure to silica dust. The manufacturing, construction, and mining industries accounted for 92% (n = 270) of the cases, with the greatest number of cases (184 [63%]) associated with manufacturing.

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Foodborne (1973–2013) and Waterborne (1971–2013) Disease Outbreaks — United States

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Preface

CDC collects data on foodborne and waterborne disease outbreaks reported by all U.S. states and territories through the Foodborne Disease Outbreak Surveillance System (FDOSS) (http://www.cdc.gov/foodsafety/fdoss/surveillance/index.html) and the Waterborne Disease and Outbreak Surveillance System (WBDOSS) http://www.cdc.gov/healthywater/surveillance), respectively. These two systems are the primary source of national data describing the number of reported outbreaks; outbreak-associated illnesses, hospitalizations, and deaths; etiologic agents; water source or implicated foods; settings of exposure; and other factors associated with recognized foodborne and waterborne disease outbreaks in the United States.

FDOSS and WBDOSS share an enhanced reporting platform, the National Outbreak Reporting System (NORS) (http://www.cdc.gov/nors). NORS also collects information on disease outbreaks with modes of transmission other than food and water, including person-to-person contact, animal contact, and environmental contamination.

This report summarizes data on foodborne disease outbreaks reported during 1973–2013 and waterborne disease outbreaks reported during 1971–2013; waterborne disease outbreak data for 2013 are preliminary. This report is a part of the *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks — United States*, which encompasses various surveillance years but is being published in 2016 (*1*). The *Summary of Notifiable Noninfectious Conditions and Disease Outbreaks* appears in the same volume of *MMWR* as the annual *Summary of Notifiable Infectious Diseases* (*2*).

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Background

Foodborne Disease Outbreak Surveillance

Foodborne diseases caused by known pathogens result in an estimated 9.4 million illnesses each year in the United States (*3*). Only a minority of foodborne illnesses, hospitalizations, and deaths occur as part of recognized outbreaks (*4*). However, information gathered from foodborne disease outbreak surveillance activities provide valuable insights into the agents that cause foodborne illness, types of implicated foods and ingredients, and settings in which transmission occurs.

Surveillance for foodborne disease outbreaks provides insight into the effectiveness of regulations and control measures, helps identify new and emerging pathogens, provides information regarding the food preparation and consumption settings in which outbreaks occur, informs prevention and control measures in the food industry by identifying points of contamination, and can be used to describe trends in outbreaks over time.

Foodborne disease outbreaks have been nationally notifiable since 2010; however, CDC has collected reports of foodborne disease outbreaks through FDOSS since 1973. Initially a paper-based system, FDOSS became web-based in 1998 and was transitioned to NORS in 2009.

Waterborne Disease Outbreak Surveillance

Despite advances in water management and sanitation, waterborne disease and outbreaks continue to occur in the United States. CDC collects data on waterborne disease outbreaks associated with drinking water, recreational water, and other water exposures through WBDOSS. Waterborne disease outbreaks have been nationally notifiable since 2010; however, reports of waterborne disease outbreaks have been collected by CDC since 1971. Initially utilizing a paper-based reporting process, the system transitioned to web-based reporting with the launch of NORS in 2009.

CDC uses waterborne disease outbreak surveillance data to identify the types of etiologic agents, settings, recreational water venues, and drinking water systems associated with waterborne disease outbreaks; inform regulations and public awareness activities to promote healthy swimming and safe drinking water; and establish public health priorities to improve prevention efforts, guidelines, and regulations at the local, state, territorial, and federal levels.

Data Sources

Foodborne Disease Outbreak Surveillance

State, local, and territorial health departments use a standard form (CDC form 52.13, http://www.cdc.gov/nors/pdf/NORS_CDC_5213.pdf) to report foodborne disease outbreaks to CDC. Data requested for each outbreak include reporting state; date of first illness onset; the number of illnesses, hospitalizations, and deaths; the etiology; the implicated food vehicle; the setting of food preparation and consumption; and contributing factors. Multistate outbreaks (i.e., those in which exposure to the implicated food occurred in more than one state) typically are reported to FDOSS by CDC.

Only reports meeting the definition of a foodborne disease outbreak, defined as the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food, are included in this summary. Outbreaks occurring on cruise ships that have both U.S. and international ports and those in which the food was eaten outside the United States, even if the illness occurred in the United States, are not reported to FDOSS.

Laboratory and clinical guidelines for confirming an etiology are specific to each bacterial, chemical/toxin, parasitic, and viral agent (http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming_diagnosis.html). Suspected etiologies are those that do not meet the confirmation guidelines. The cause of the outbreak is categorized as "multiple etiologies" if more than one etiologic agent is reported.

Waterborne Disease Outbreak Surveillance

State, local, and territorial health departments use a standard form (CDC form 52.12, http://www.cdc.gov/nors/forms.html) to report waterborne disease outbreaks to CDC. Data requested for each outbreak include reporting state; date of first illness onset; the number of illnesses, hospitalizations, and deaths; the etiology; the type of water exposure (e.g., recreational); the implicated venue or system, the setting of exposure; water quality indicators; and contributing factors.

Only reports meeting the definition of a waterborne disease outbreak, which is the occurrence of two or more cases of a similar illness resulting from exposure to a common water source, are included in this summary. WBDOSS includes reports of all types of illness outbreaks associated with water; this includes both gastrointestinal illness outbreaks and respiratory illness outbreaks (e.g., outbreaks of legionellosis, which causes a respiratory illness). Outbreaks occurring on cruise ships and those in which the water exposure occurred outside the United States or its territories, even if the illness occurred in the United States, are not included in WBDOSS.

Interpreting Data

Reported outbreaks represent only a small fraction of all foodborne and waterborne illnesses that occur each year and the outbreak data reported here are subject to limitations. Outbreaks caused by certain pathogens or vehicles might be more likely to be recognized, investigated, or reported. Some illnesses reported as sporadic (i.e., not outbreak-associated) are likely not recognized as being part of a reported outbreak or might be part of an undetected outbreak. In addition, all outbreak-related illnesses might not be identified during an investigation, smaller outbreaks might not come to the attention of public health authorities, and some outbreaks might not be investigated or reported to CDC.

Reporting practices for foodborne and waterborne disease outbreaks vary among states and territories, which might have differing definitions or interpretations of which events are reportable and unique laws related to disease outbreak reporting. Thus, variations in reporting rates by state or territory might reflect variations in levels of effort and funding for foodborne and waterborne disease outbreak investigation, rather than true differences in outbreak incidence rates by state. NORS maintains a dynamic database; this report includes data available on May 1, 2015, for foodborne disease outbreaks and May 4, 2015, for waterborne disease outbreaks; data published in this Summary might differ from those published earlier or later.

Methods for Identifying Foodborne and Waterborne Disease Outbreaks

CDC provides guidance for states and other jurisdictions for reporting foodborne and waterborne disease outbreaks (http://www.cdc.gov/nors/forms.html). As for all notifiable conditions, reporting to CDC is voluntary, and state and local laws, regulations, and practices vary. For example, CDC advises states to report outbreaks having cases occurring in the same household; however, state, local, or territorial

jurisdictions might determine that these outbreaks do not require investigation or might deem them nonreportable at the state or territorial level.

Publication Criteria

Foodborne disease outbreaks are defined as two or more cases of a similar illness resulting from ingestion of a common food. Waterborne disease outbreaks are defined as two or more cases of a similar illness linked epidemiologically by time and location to exposure to water or water-associated chemicals volatized into the air.

Highlights

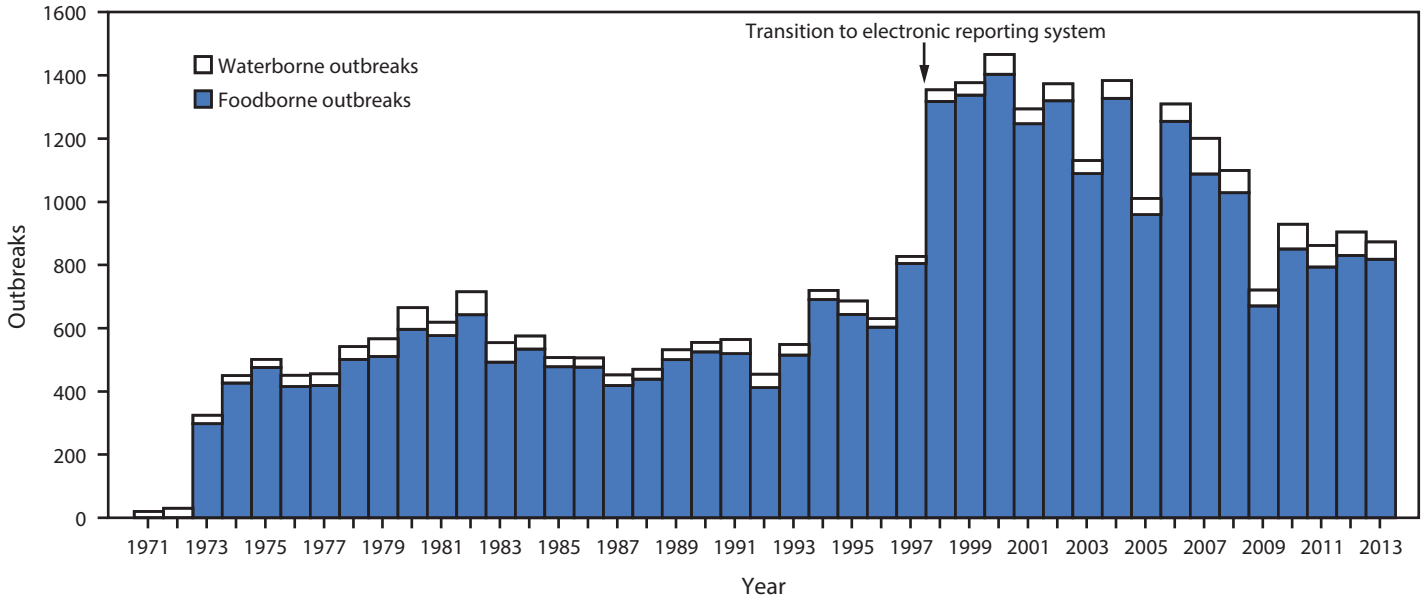
Foodborne Disease Outbreaks

During 1973–2013, CDC received reports of 30,251 foodborne disease outbreaks with 742,945 outbreak-associated illnesses from the 50 states, Puerto Rico, the District of Columbia, and freely associated states/territories. An average of 738 (range: 298–1,404) outbreaks were reported each year (Figure 1). The average annual number of foodborne disease outbreaks reported to CDC increased in 1998 in comparison to previous years, coinciding with the transition to an electronic reporting system, and decreased in 2009 in comparison to 1998–2008 coinciding with the transition to reporting through NORS. In 2013, a total of 792 single-state exposure outbreaks were reported with 11,786 illnesses by 47 states and Puerto Rico (Table) (Figure 2); an additional 26 multistate outbreaks (i.e., exposure to the implicated food occurred in more than one state) with 1,530 associated illnesses also were reported. CDC periodically publishes more detailed annual summaries describing the implicated foods, etiologic agents, settings, and points of contamination associated with foodborne disease outbreaks (http://www.cdc.gov/foodsafety/fdoss/data/annual-summaries/index.html).

Waterborne Disease Outbreaks

During 1971–2013, CDC received reports of 1,957 waterborne disease outbreaks with 642,782 outbreak-associated illnesses from 50 states and six freely associated states/territories. An average of 46 waterborne outbreaks was reported each year (Figure 1). In 2013, a total of 55 outbreaks causing at least 2,824 illnesses occurred in 21 states. No multistate outbreaks were reported; waterborne disease outbreak data for 2013 are preliminary (Table) (Figure 3). CDC periodically publishes more detailed summaries of waterborne disease outbreaks associated with recreational water and of waterborne disease outbreaks associated with drinking water (http://www.cdc.gov/healthywater/surveillance/surveillance-reports.html).

FIGURE 1. Number of foodborne and waterborne disease outbreaks reported by year, United States 1971–2013*



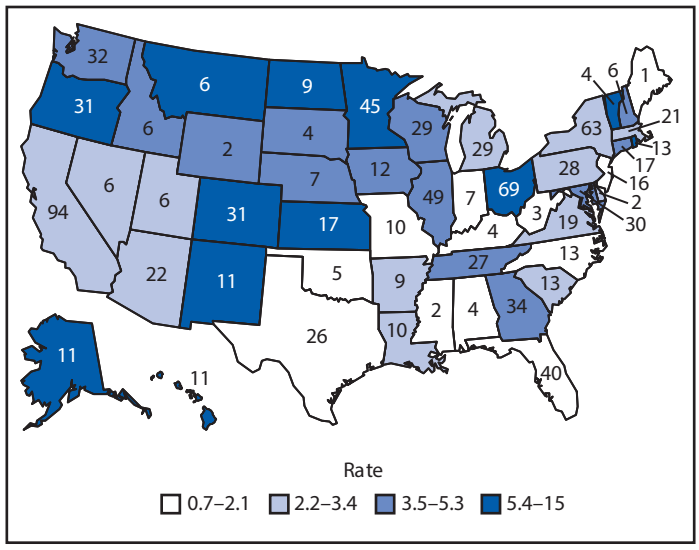
* Waterborne disease outbreak data for 2013 are preliminary. CDC partners with state agencies and the Environmental Protection Agency to review, summarize, and publish waterborne disease outbreak data separately from this report. CDC also reviews, summarizes, and publishes foodborne disease outbreak data separately from this report.

TABLE. Number of reported foodborne and waterborne disease outbreaks and outbreak-associated illnesses, by geographical division and area — United States, 2013*

Area	Foodborne		Waterborne		All	
	Outbreaks	Illnesses	Outbreaks	Illnesses	Outbreaks	Illnesses
United States	**818**	**13,316**	**55**	**2,824**	**873**	**16,140**
New England	**44**	**788**	**1**	**140**	**45**	**928**
Connecticut	13	248	—†	—	**13**	**248**
Maine§	—	—	—	—	—	—
Massachusetts	14	366	—	—	**14**	**366**
New Hampshire	4	70	—	—	**4**	**70**
Rhode Island	10	68	1	140	**11**	**208**
Vermont	3	36	—	—	**3**	**36**
Mid-Atlantic	**86**	**1,054**	**3**	**23**	**89**	**1,077**
New Jersey	10	72	—	—	**10**	**72**
New York	51	561	—	—	**51**	**561**
Pennsylvania	25	421	3	23	**28**	**444**
Eastern North Central	**158**	**2,165**	**17**	**2,139**	**175**	**4,304**
Illinois	39	714	5	1,445	**44**	**2,159**
Indiana	6	46	2	23	**8**	**69**
Michigan	27	350	1	597	**28**	**947**
Ohio	65	723	9	74	**74**	**797**
Wisconsin	21	332	—	—	**21**	**332**
Western North Central	**79**	**1,403**	**10**	**64**	**89**	**1,467**
Iowa	8	98	3	23	**11**	**121**
Kansas	14	356	—	—	**14**	**356**
Minnesota	35	604	7	41	**42**	**645**
Missouri	8	90	—	—	**8**	**90**
Nebraska	6	104	—	—	**6**	**104**
North Dakota	7	94	—	—	**7**	**94**
South Dakota	1	57	—	—	**1**	**57**

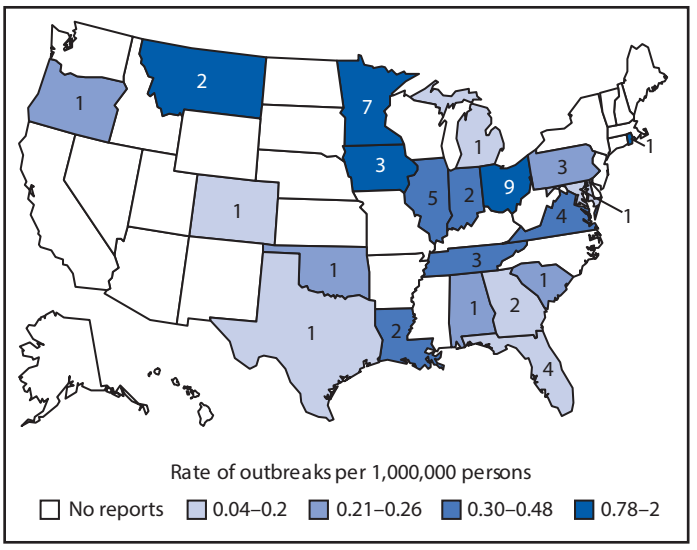
See table footnotes on page 83.

FIGURE 2. Rate* of reported foodborne disease outbreaks and number† of outbreaks, by state — Foodborne Disease Outbreak Surveillance System, United States, 2013



* Incidence of outbreaks per 1 million population based on the 2012 U.S census estimates. Cutpoints for outbreak rate categories determined by using quartiles.
† N = 818 (includes 26 multistate outbreaks assigned as an outbreak to each state involved).

FIGURE 3. Rate* of reported waterborne disease outbreaks and number† of outbreaks, by state — Waterborne Disease and Outbreak Surveillance System, United States, 2013



* Incidence of outbreaks per 1 million population based on the 2012 U.S census estimates. Cutpoints for outbreak rate categories determined by using quartiles.
† N = 55 (data are preliminary).

TABLE. (*Continued*) Number of reported foodborne and waterborne disease outbreaks and outbreak-associated illnesses, by geographical division and area — United States, 2013*

Area	Foodborne		Waterborne		All	
	Outbreaks	Illnesses	Outbreaks	Illnesses	Outbreaks	Illnesses
South Atlantic	**120**	**1,622**	**12**	**88**	**132**	**1,710**
Delaware§	—	—	—	—	—	—
District of Columbia§	—	—	—	—	—	—
Florida	36	323	4	25	**40**	**348**
Georgia	27	396	2	10	**29**	**406**
Maryland	23	228	1	14	**24**	**242**
North Carolina	10	239	—	—	**10**	**239**
South Carolina	11	182	1	5	**12**	**187**
Virginia	13	254	4	34	**17**	**288**
West Virginia§	—	—	—	—	—	—
Eastern South Central	**30**	**433**	**4**	**64**	**34**	**497**
Alabama	3	124	1	19	**4**	**143**
Kentucky	2	20	—	—	**2**	**20**
Mississippi	1	3	—	—	**1**	**3**
Tennessee	24	286	3	45	**27**	**331**
Western South Central	**35**	**765**	**4**	**164**	**39**	**929**
Arkansas	7	65	—	—	**7**	**65**
Louisiana	7	90	2	144	**9**	**234**
Oklahoma	5	238	1	17	**6**	**255**
Texas	16	372	1	3	**17**	**375**
Mountain	**67**	**1,427**	**3**	**23**	**70**	**1,450**
Arizona	18	438	—	—	**18**	**438**
Colorado	27	297	1	3	**28**	**300**
Idaho	4	19	—	—	**4**	**19**
Montana	5	62	2	20	**7**	**82**
Nevada	2	430	—	—	**2**	**430**
New Mexico	7	122	—	—	**7**	**122**
Utah	3	31	—	—	**3**	**31**
Wyoming	1	28	—	—	**1**	**28**
Pacific	**155**	**1,970**	**1**	**119**	**156**	**2,089**
Alaska	10	66	—	—	**10**	**66**
California	81	1,069	—	—	**81**	**1,069**
Hawaii	8	192	—	—	**8**	**192**
Oregon	28	368	1	119	**29**	**487**
Washington	28	333	—	—	**28**	**333**
Territories	**18**	**159**	**—**	**—**	**18**	**159**
Puerto Rico	18	159	—	—	**18**	**159**
Multistate	**26**	**1,530**	**—**	**—**	**26**	**1,530**

* Waterborne disease outbreak data for 2013 are preliminary. CDC partners with state and territorial agencies and the Environmental Protection Agency to review, summarize, and publish waterborne disease outbreak data separately from this report. CDC reviews, summarizes, and publishes foodborne disease outbreak data separately from this report.
† No data were reported for 2013.
§ No foodborne or waterborne disease outbreaks were reported for 2013.

References

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