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World TB Day — March 24, 2013

Each year, World TB Day is observed on March 24. This annual event commemorates the date in 1882 when German bacteriologist Robert Koch announced his discovery of *Mycobacterium tuberculosis*, the bacillus that causes tuberculosis (TB). World TB Day provides an opportunity to raise awareness about TB-related problems and solutions, and to support worldwide TB control efforts. For the second year, CDC joins the global Stop TB Partnership in adopting the World TB Day slogan, "Stop TB in My Lifetime."

In 2012, a total of 9,951 new TB cases were reported in the United States, for a rate of 3.2 cases per 100,000 (*1*). This is the first time the number of TB cases has dropped below 10,000 since standardized national reporting began in 1953. Despite this milestone, a number of challenges remain that slow progress toward the goal of TB elimination in the United States. TB still persists in specific populations; foreign-born persons, racial/ethnic minorities, and homeless persons continue to be affected disproportionately (*2*).

CDC is committed to a world free of TB. Initiatives to improve awareness, testing, and treatment of latent TB infection and TB disease among high-risk groups are critical to reach the goal of TB elimination in the United States. Additional information about World TB Day and CDC's TB elimination activities is available at http://www.cdc.gov/tb/events/worldtbday.

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1. CDC. Trends in tuberculosis—United States, 2012. MMWR 2013;62:201–5.
2. CDC. Notes from the field: tuberculosis cluster associated with homelessness—Duval County, Florida, 2004–2012. MMWR 2012; 61:539–40.

Trends in Tuberculosis — United States, 2012

In 2012, a total of 9,951 new tuberculosis (TB) cases were reported in the United States, an incidence of 3.2 cases per 100,000 population. This represents a decrease of 6.1% from the incidence reported in 2011 and is the 20th consecutive year of declining rates. Of the 3,143 counties in the United States, 1,388 (44.2%) did not report a new TB case during 2010–2012. This report summarizes provisional TB surveillance data reported to CDC's National Tuberculosis Surveillance System in 2012. The TB rate in foreign-born persons in the United States was 11.5 times as high as in U.S.-born persons. In comparison with non-Hispanic whites, TB rates among non-Hispanic Asians, Hispanics, and non-Hispanic blacks were 25.0, 6.6, and 7.3 times as high, respectively. Although the number of cases dropped below 10,000 for the first time since standardized national reporting of TB began in 1953, a number of challenges remain that slow progress toward the goal of TB elimination in the United States. Initiatives to increase TB awareness and testing and treatment of latent infection and disease will be critical to TB elimination efforts, especially among foreign-born populations, racial/ethnic minorities, and other groups that are disproportionately affected.

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U.S. Department of Health and Human Services
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Health departments in the 50 states and the District of Columbia electronically report to CDC verified TB cases that meet the CDC and Council of State and Territorial Epidemiologists surveillance case definition.* Reports include the patient's county of residence, self-identified race and ethnicity (i.e., Hispanic or non-Hispanic), human immunodeficiency virus (HIV) status, drug-susceptibility test results, country of origin, and information on excessive alcohol use, homelessness, and detention at a correctional facility. CDC calculates national and state TB rates overall and by racial/ethnic group, using U.S. Census Bureau population estimates (*1*). The Current Population Survey provides the population denominators used to calculate TB rates and percentage changes according to national origin.† For TB surveillance, a U.S.-born person is defined as a person born in the United States or its associated jurisdictions,§ or a person born in a foreign country but having at least one U.S.-citizen parent. In 2012, the country of birth was unknown for 0.4% of patients and race/ethnicity was unknown for 0.9%. In this report, persons of Hispanic ethnicity might be of any race; non-Hispanic persons are categorized as Asian, black, white, American Indian/Alaska Native, Native Hawaiian or other Pacific Islander, or of multiple races.

* Available at http://wwwn.cdc.gov/nndss/script/casedef.aspx?condyrid=876&datepub=1/1/2009%2012:00:00%20am.

† Additional information available at http://dataferrett.census.gov.

§ Includes Guam, the Commonwealth of Northern Mariana Islands, America Samoa, the Federated States of Micronesia, Palau, and the Republic of the Marshall Islands.

In 2012, a total of 9,951 new tuberculosis (TB) cases were reported in the United States. The incidence of 3.2 cases per 100,000 population was a decrease of 6.1% from the incidence reported in 2011 (Table) and is the 20th consecutive year of declining rates. Although reported TB cases and rates decreased from 2011 for foreign-born and U.S.-born persons and among all racial/ethnic groups, foreign-born persons and racial/ethnic minorities continued to be disproportionately affected by TB in the United States. The TB rate among foreign-born persons in the United States in 2012 was 11.5 times higher than among U.S.-born persons. The TB rates among Asians, Hispanics, and blacks were 25.0, 6.6, and 7.3 times as high as whites, respectively. Among U.S.-born persons, the greatest disparity in TB rates was between blacks and whites; the rate among blacks was 5.8 times as high as that of whites.

Individual state TB rates per 100,000 population varied widely, from 0.4 in West Virginia to 9.0 in Alaska (median: 2.3). Rates in 2012 were lower than in 2011 in 33 states and the District of Columbia and higher in 17 states. Four states (California, Texas, New York, and Florida) each reported more than 500 cases for 2012, as they have since 2008. Combined, these four states accounted for 4,967 TB cases, representing half (49.9%) of all TB cases reported in 2012. Among the 441 counties in these four states, 136 (30.8%) did not report a new TB case during 2010–2012. Among the 2,702 counties in the states reporting fewer than 500 cases, 1,253 (46.4%) counties did not report a TB case during 2010–2012 (Figure 1).

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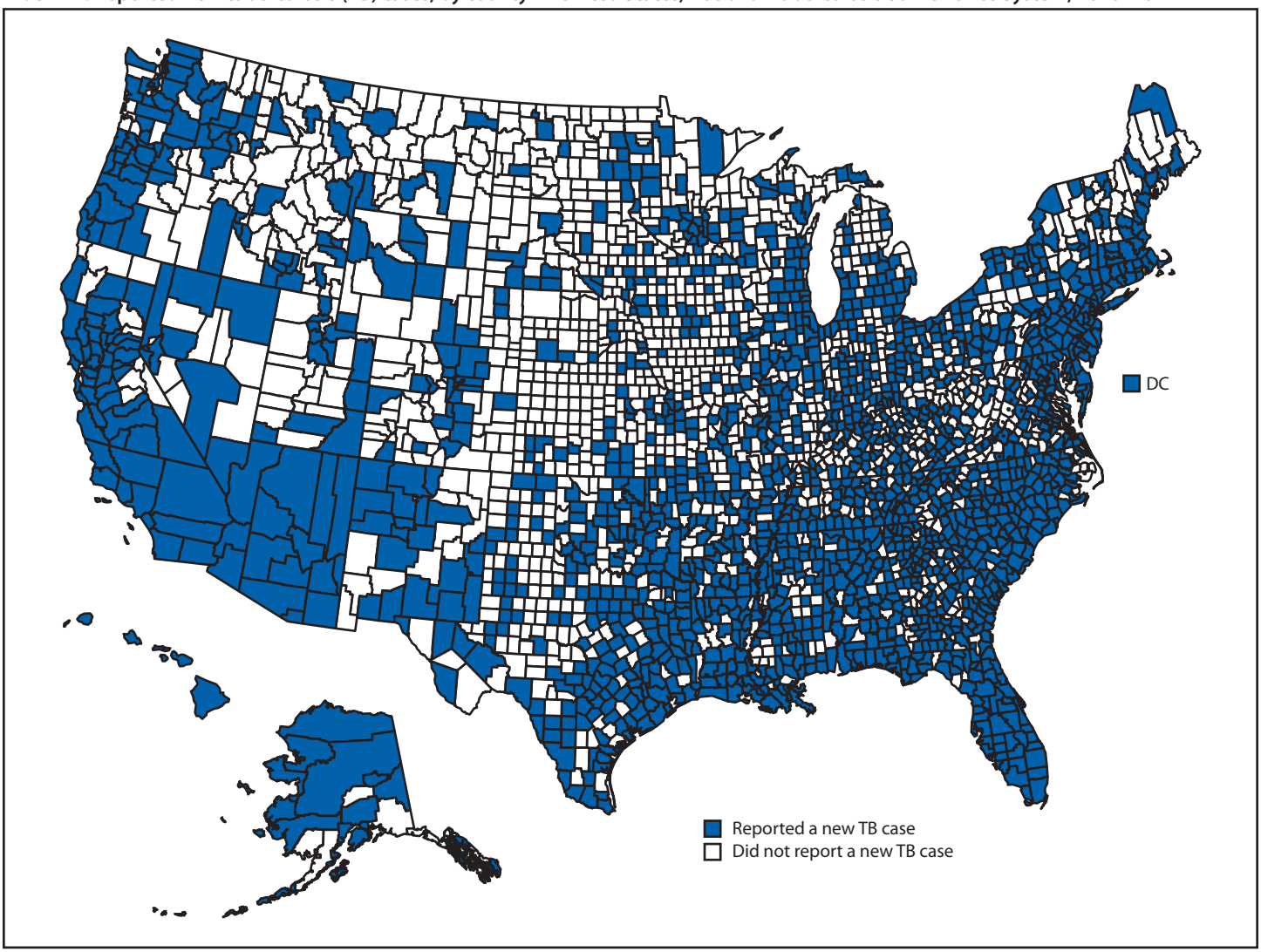
TABLE. Number and rate* of tuberculosis cases and percentage change, by race/ethnicity — United States, National Tuberculosis Surveillance System, 2011–2012†

	2011		2012		% change 2011–2012		U.S. population	
Race/Ethnicity	No.	Rate	No.	Rate	No.	Rate	2011	2012
Asian	3,156	21.0	3,043	19.8	-3.6	-5.6	15,063,596	15,382,833
Black	2,379	6.2	2,222	5.7	-6.6	-7.4	38,337,168	38,664,702
White	1,650	0.8	1,566	0.8	-5.1	-5.2	197,510,927	197,638,915
Other§	248	2.9	240	2.7	-3.2	-5.7	8,634,949	8,859,335
Hispanic	2,999	5.8	2,793	5.2	-6.9	-9.1	52,045,277	53,305,237
Unknown	92	—	87	—				
Total	**10,524**	**3.4**	**9,951**	**3.2**	**-5.4**	**-6.1**	**311,591,917**	**313,851,022**

* Per 100,000 population.
† Data as of February 22, 2013. Data for 2012 are provisional.
§ Includes American Indian/Alaska Native (2011: n = 128, rate = 5.6 per 100,000 population; 2012: n = 139, rate = 6.0), Native Hawaiian or other Pacific Islander (2011: n = 82, rate = 16.1; 2012: n = 67, rate = 12.9), and multiple race (2011: n = 38, rate = 0.7; 2012: n = 34, rate = 0.6).

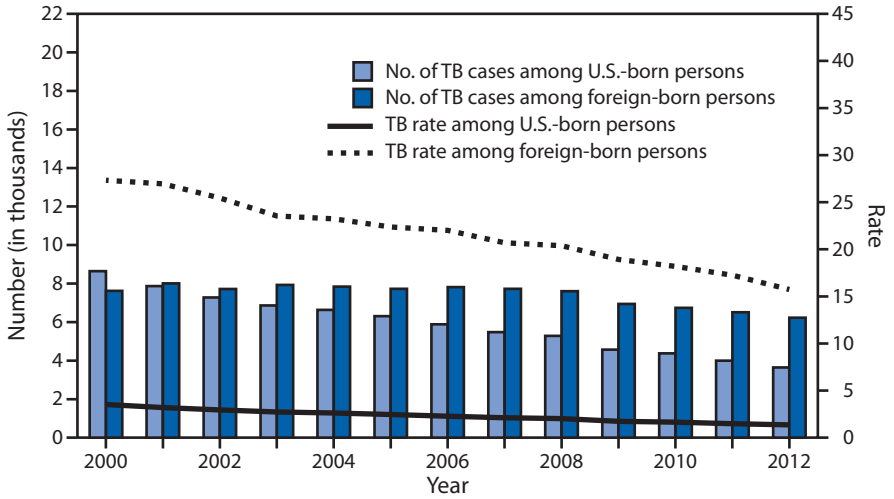
FIGURE 1. Reported new tuberculosis (TB) cases, by county — United States, National Tuberculosis Surveillance System, 2010–2012†



† Data are current as of March 6, 2013. Data for 2012 are provisional.

Among U.S.-born persons, the number and rate of TB cases decreased in 2012. The 3,666 TB cases reported among U.S.-born persons (37.0% of all cases with known national origin) represented an 8.2% decline compared with 2011 and a 57.6% decline compared with 2000 (Figure 2). The rate of 1.4 per 100,000 population among U.S.-born persons represents a 8.7% decline since 2011 and a 61.4% decline since 2000.

FIGURE 2. Number and rate* of tuberculosis (TB) cases among U.S.-born and foreign-born persons, by year reported — United States, National Tuberculosis Surveillance System, 2000–2012†



* Per 100,000 population.
† Data current as of February 15, 2013. Data for 2012 are provisional.

Among foreign-born persons in the United States, the number and rate of TB cases also decreased in 2012. A total of 6,243 TB cases were reported among foreign-born persons (63.0% of all cases in persons with known national origin), a 4.1% decline since 2011 and an 18.1% decline since 2000. The 15.8 cases per 100,000 population TB rate among foreign-born persons represents an 8.6% decline since 2011 and 42.3% decline since 2000. In 2012, 54.6% of foreign-born persons with TB and known country of birth originated from five countries: 1,303 (20.9%) from Mexico, 768 (12.3%) from the Philippines, 529 (8.5%) from India, 450 (7.2%) from Vietnam, and 351 (5.6%) from China.

Asians had the highest TB case rate among all racial/ethnic groups, which was 25.0 times higher than that of whites (Table). From 2011 to 2012, TB rates per 100,000 population decreased most for Hispanics (9.1%), followed by blacks (7.4%), Asians (5.6%), and whites (5.2%). Among persons in the United States with TB and known national origin, 95.7% of Asians, 75.0% of Hispanics, 39.7% of blacks, and 19.1% of whites were foreign-born. Among U.S.-born persons with TB, blacks were the racial/ethnic group most affected (36.7%). The TB rate among U.S.-born blacks was 5.8 times greater than for U.S.-born whites, the largest disparity among U.S.-born persons.

In 2012, HIV status was known for >80% of TB cases reported. Among those with a known result, 7.7% were reported as HIV-positive.

Among persons aged ≥15 years with TB and known housing status, 5.6% reported being homeless within the past year. Among persons aged ≥15 years, 12.1% reported excessive alcohol use within the past year. Among persons aged ≥15 years and known status, 4.2% were confined to a correctional facility (i.e., prison, jail, or juvenile correctional facility) at the time of TB diagnosis.

A total of 127 cases of multidrug-resistant TB (MDR TB)¶ were reported in 2011, the most recent year for which complete drug-susceptibility results are available. Drug-susceptibility test results for isoniazid and rifampin were reported for 97.0% and 96.8% of culture-confirmed TB cases in 2010 and 2011, respectively. Among these cases, the percentage of MDR TB for 2011 (1.6% [127 of 7,817 cases]) was greater than the percentage for 2010 (1.3% [109 of 8,241 cases]). The percentage of MDR TB cases among persons without a previous history of TB was 1.3% in 2011. For persons with a previous history of TB, the percentage with MDR TB was 8.2% in 2011. Foreign-born persons accounted for 109 (85.8%) of the 127 MDR TB cases in 2011. One case of extensively drug-resistant TB** has been reported for 2012.

Reported by

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Editorial Note

Since the resurgence of TB in the late 1980s and early 1990s, when TB cases increased substantially, the United States has experienced 20 consecutive years of declines in TB cases and rates. If TB rates had remained constant at their 1993 level, more than 200,000 additional TB cases would have occurred in the United States during 1993–2012 (Michael P. Chen, PhD, CDC,

¶ Defined by the World Health Organization as a case of TB in a person with a *Mycobacterium tuberculosis* isolate resistant to at least isoniazid and rifampin. Additional information available at http://whqlibdoc.who.int/publications/2010/9789241599191_eng.pdf.

** Defined by the World Health Organization as a case of TB in a person with an *M. tuberculosis* isolate with resistance to at least isoniazid and rifampin among first-line anti-TB drugs, resistance to any fluoroquinolone (e.g., ciprofloaxacin or ofloxacin), and resistance to at least one second-line injectable drug (e.g., amikacin, capreomycin, or kanamycin). Additional information available at http://whqlibdoc.who.int/publications/2010/9789241599191_eng.pdf.

personal communication, 2013).[††] Instead, substantial federal, state, and local resources have been mobilized to strengthen TB control efforts.[§§] Most areas of the country report fewer cases of TB, and no TB cases have been reported for the past 3 years in 44.2% of counties. However, TB cases among foreign-born persons, persons infected with HIV, homeless persons, those who are incarcerated, and those who report excessive alcohol use are significant challenges that impede progress toward TB elimination. Drug-resistant TB also is a global public health issue that has the potential to affect a greater proportion of U.S. TB cases (*2*).

Geographically, the distribution of TB cases is heterogeneous. Although all states and the District of Columbia reported cases of TB in their jurisdictions, four states (California, Texas, New York, and Florida) reported half of all TB cases in the United States. These four states have less than one third of the U.S. population. Rates of TB were highest in Alaska (9.0 per 100,000 population) and Hawaii (8.4 per 100,000), which combined have <1% of the U.S. population. Additionally, 17 states had higher rates of TB in 2012 than in 2011. At the state level, the distribution of TB by county also is heterogeneous.

TB persists in specific populations. In 2012, foreign-born persons and racial/ethnic minorities continued to be affected disproportionately. Although the numbers and rates of TB among foreign-born persons in the United States decreased, they did so at a lower rate than for U.S.-born persons. Asians continued to be the racial/ethnic group most represented among new TB cases. Initiatives that promote further TB awareness, testing, and treatment of latent infection and TB disease among foreign-born persons and racial/ethnic minorities will be critical for future TB elimination efforts.

Homeless persons also are a population at high risk for TB (*3*). Persons who are homeless might have factors that favor TB transmission, such as excessive alcohol use, substance abuse, malnutrition, and crowded living situations, as reported in recent outbreaks in the United States (*4,5*). Vigilance for TB among homeless persons will be crucial for maintaining progress toward TB elimination among the U.S.-born population.

The findings in this report are subject to at least two limitations. First, this analysis is limited to reporting provisional TB cases and case rates for 2012. Second, case rates are calculated from estimates, not counts, of population denominators from 2012. Final TB case rates based on updated denominators will be presented in CDC's annual TB surveillance report later this year.

[††] The unpublished analysis estimated the number of additional TB cases during 1993–2012 by two methods. The first method assumes the TB rate did not change from 1993 (a rate of 9.7 TB cases per 100,000), multiplies that rate by the annual estimated U.S. population to calculate the expected annual number of TB cases during 1993–2012, and sums the differences between the actual number of TB cases reported from the expected annually. The second method estimated the number of additional TB cases from two segmented log-linear models that assume the TB rate remained unchanged from 1993 and sums the differences between the actual number of TB cases reported from the expected cases as predicted by the models for each year. Both methods yielded >200,000 additional TB cases.

[§§] Based on justification of estimates for Congressional Appropriations Committees for multiple years. Available at http://www.cdc.gov/fmo/topic/budget%20Information/index.html.

What is already known on this topic?

As tuberculosis (TB) has declined in the United States since 1993, an increasing proportion of cases have been among foreign-born persons. Among U.S.-born persons with TB, racial and ethnic minorities are affected disproportionately.

What is added by this report?

In 2012, the number of TB cases reported in the United States was 9,951, the lowest number since standardized national reporting of TB began in 1953. The incidence decreased to 3.2 cases per 100,000 population from 3.4 in 2011, the 20th consecutive annual decrease. Most cases were among foreign-born persons, in whom the incidence was 11.5 times higher than among U.S.-born persons. Rates also varied by race/ethnicity, with rates 25.0, 6.6, and 7.3 times as high in non-Hispanic Asians, Hispanics, and non-Hispanic blacks as in non-Hispanic whites, respectively.

What are the implications for public health practice?

Continued vigilance and surveillance of TB is needed to reach CDC's TB elimination goal of <1 case per 1 million persons. Initiatives to improve awareness, testing, and treatment of TB disease and latent TB infection in foreign-born and minority populations are likely to be the most efficient way to facilitate progress toward the elimination of TB in the United States.

Despite the decline in TB cases and rates from the previous year, the rate of 3.2 TB cases per 100,000 persons in 2012 exceeds CDC's TB elimination goal for 2010 of <1 case per 1 million population (*6*). Although continued progress toward achieving TB elimination in the United States occurred in 2012, TB persists in some geographic regions and among foreign-born persons and racial/ethnic minorities. Counties that reported no TB cases in 2010–2012 still require TB prevention and control activities because TB can cross borders. Ongoing surveillance will be essential to shape targeted TB prevention strategies in the effort to sustain success toward TB elimination in the United States.

Acknowledgments

State and local TB control officials.

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Tuberculosis Control Activities Before and After Hurricane Sandy — Northeast and Mid-Atlantic States, 2012

On October 29, 2012, Hurricane Sandy struck the U.S. northeast and mid-Atlantic seaboard; the effects of the storm extended to southeastern and midwestern states and to eastern Canada. At the time, 1,899 residents in the most affected areas were undergoing treatment for tuberculosis (TB) disease or infection. To ascertain the operational abilities of state and local TB programs during and after the storm and to determine whether lessons learned from a previous hurricane were effective in ensuring continuity of TB patient care, CDC interviewed staff members at all of the affected state and city TB control programs, including those in areas with power outages and flooded streets, tunnels, and subway lines. The interviews determined that continuity of care for TB patients in programs affected by Hurricane Sandy was better preserved than it had been during and after Hurricane Katrina in August 2005. This improvement might be attributed to 1) preparedness measures learned from Hurricane Katrina (e.g., preparing line lists of patients, providing patients with as-needed medications, and making back-up copies of patient records in advance of the storm) and 2) less widespread displacement of persons after Hurricane Sandy than occurred after Hurricane Katrina. Maintaining readiness among clinicians and TB control programs to respond to natural disasters remains essential to protecting public health and preserving TB patients' continuity of care.

TB Programs Most Affected

Hurricane Sandy traveled along the Atlantic coast, affecting 24 states from Florida to Maine and west to West Virginia, Michigan, and Wisconsin. Coming ashore near Atlantic City, New Jersey, Hurricane Sandy caused particularly severe damage in New Jersey and New York. Overall, the 15 most affected TB control programs were in the mid-Atlantic (Delaware, District of Columbia, Maryland, North Carolina, Pennsylvania, Virginia, and the cities of Baltimore and Philadelphia) and northeast (Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and New York City).

By 1 week after Hurricane Sandy made landfall, all TB control programs had resumed normal patient-care operations. At least 10 of the 15 programs had been closed for 2 days (including those serving New Jersey, New York state, and New York City), either because of preparations in anticipation of the storm or because of the direct effects of the storm. None reported any significant damage to TB program infrastructure or equipment. Immediately after the storm, all TB program employees were accounted for; unlike the experience after Hurricane Katrina (*1*), there was no loss or gain of TB patients as a result of Hurricane Sandy. At least two programs reported giving their patients medications in advance of the storm for self-administered therapy (SAT), including medications that would otherwise have been administered using directly observed therapy (DOT). Reportedly, all patients who were placed on SAT were returned to DOT within a week after the storm had passed.

After the storm, program consultants from CDC's Division of Tuberculosis Elimination (DTBE) assessed the affected programs and determined that no special assistance from DTBE was needed. Similar to what was done in the aftermath of Hurricane Katrina, DTBE activated the DTBE help desk on November 2, 2012, to facilitate Hurricane Sandy–related communications among TB controllers and nurse consultants throughout the country. However, unlike the extensive and sophisticated chain of communications after Hurricane Katrina, no calls were received by the help desk before it was deactivated on November 15.

Overall, in the 15 most affected TB control jurisdictions (11 states, three cities, and the District of Columbia), a total of 1,899 patients (including those with verified cases of active disease, suspected disease, and those treated for latent TB infection [LTBI]) were being treated by the TB programs just before Hurricane Sandy struck. By November 12, 2012, all active disease TB patients from the affected areas had been located and, if still indicated, had resumed TB treatment on DOT; all patients treated for LTBI also were accounted for. One patient (an LTBI patient from New Jersey) initially was thought to be lost to follow-up. However, it was subsequently confirmed that this patient had completed her course of treatment on SAT. Therefore, all 1,899 patients under treatment before the storm remained under treatment afterward.

New York City

During and after Hurricane Sandy, New York City Department of Health and Mental Hygiene (DOHMH) TB clinics remained open with only minimal reduction in service; hours were reduced on the afternoon that the storm arrived, and one clinic in Staten Island was closed for 1 day after the storm because no patients were scheduled for appointments that day. Initially, there were difficulties with testing specimens for TB because the public health laboratory was operating for several days on back-up generator power and

What is already known on this topic?

State and local tuberculosis (TB) control programs plan for emergencies with the potential to result in mass displacement of patients and disruptions in access to diagnostic services.

What is added by this report?

The lessons learned from the experience of Hurricane Katrina in 2005 were applied successfully in maintaining preparedness and TB control activities for persons undergoing TB treatment after Hurricane Sandy. All of the 1,899 patients undergoing treatment in the 15 TB control program areas most affected were fully accounted for; unlike Hurricane Katrina, there was no loss or gain in the number of TB patients within programs as a result of Hurricane Sandy.

What are the implications for public health practice?

To address issues of natural disasters in an efficient, effective manner, TB control programs need to continue to conduct systematic planning that will enable timely response.

had limited Internet connectivity, and because many hospital, commercial, and reference laboratories were not functional as a result of storm-related complications. The New York State Department of Health Laboratory provided short-term backup for transport and processing of some TB specimens.

Because of flooding and loss of power, Bellevue Hospital had to evacuate all of its patients, and the New York City TB program immediately had to find another secure hospital ward for six TB patients in Bellevue's detention unit. All six were safely transferred to Lincoln Hospital in the Bronx. Two of the patients were considered infectious; they were transferred to negative-pressure isolation rooms. Within a week of their transfer to the new facility, a physician from DOHMH went to Lincoln Hospital to visit the patients and to consult with the physicians involved in their care. Each patient was assigned a DOHMH staff worker for case management. An outpatient TB clinic also was affected by closure of Bellevue Hospital.

Within a week, DOHMH had contacted 26 of the 27 patients who previously had been receiving antituberculosis medications through the DOT program at Bellevue Hospital. As patients began running out of medications, all contacted patients were given appointments at DOHMH clinics. By November 16, a total of 24 of 27 patients had been evaluated at DOHMH clinics and continued with DOT, either at a DOHMH clinic, through the DOHMH field staff, or through DOT field staff members from Bellevue Hospital. During the approximately 1 month that Bellevue Hospital remained closed, four patients were discharged as having completed therapy. Four patients decided to continue treatment at DOHMH clinics, and the remaining 16 patients returned to Bellevue Hospital for further evaluation and treatment.

New Jersey

After Hurricane Sandy struck, the state motor pool in Newark initially had no fuel; however, all vehicles including those used by the TB program were accounted for, and none were damaged. The Global Tuberculosis Institute at the University of Medicine and Dentistry of New Jersey (UMDNJ) in Newark and the Waymon C. Lattimore Practice that administers ambulatory-care services at University Hospital at UMDNJ reopened on November 5, 2012. Immediately after the storm, communication with the coastal areas in New Jersey was limited because phone lines and cell towers had been damaged or destroyed by the storm. Also, access to affected areas was restricted to those who could show proof of residency or property ownership.

Twelve active TB patients lived in the most severely affected areas of New Jersey, and these patients had been given their TB medications before the storm to conduct SAT. Two counties that did not provide TB medications to patients before the storm subsequently added the number of days that therapy had been missed to the end of the patients' course of therapy.

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Editorial Note

Ensuring appropriate diagnosis, treatment, and prevention of TB is the responsibility of the National TB Control Program and of TB control programs in public health departments across the United States. This report describes the challenges faced by TB programs in affected jurisdictions when Hurricane Sandy disrupted normal operations. Standard treatment and cure of TB disease requires a multidrug regimen administered under DOT for at least 6 months (*2*). Recommended treatment for LTBI can be for 3 months using a new 12-dose regimen (*3*) or ≤9 months using older daily regimens (*4*). Despite the challenges, health department workers helped ensure continuity of treatment for TB disease or infection for the 1,899 patients in the 15 most affected TB control jurisdictions. Unlike the situation after Hurricane Katrina struck the U.S. Gulf Coast in 2005, causing displacement of 62 (48%) of the 130 New Orleans–area patients (*1*), none of the affected areas reported displacement of any TB patients after Hurricane Sandy.

In preparation for Hurricane Sandy, the TB programs in New York City, New York state, and New Jersey implemented measures in advance of the storm to ensure continuity of care, including 1) preparing line lists of patients who might be affected, 2) providing patients with medications to self-administer in the event DOT was interrupted, 3) providing patients with a list of phone numbers to reestablish contact with the health department if they were displaced and obtaining contact information for patients' relatives and friends in other parts of the country, 4) making back-up copies of patient records for potential sharing with new jurisdictions, and 5) moving essential TB treatment supplies to safer areas. These activities reflected lessons that had been learned from the disruptions in patient care after the landfall of Hurricane Katrina in 2005 (*1*).

During an initial disaster response, the most urgent public health priorities are providing safe and adequate shelter, water, food, and sanitation. Also important are interventions to minimize potential spread of communicable diseases, including TB, because displaced persons congregate in shelters and resettle in new communities. A lesson learned from both Hurricane Katrina and Hurricane Sandy was that all TB control programs should consider planning for emergencies that might result in mass displacement of patients or in disruptions in access to laboratory or other diagnostic services, and in supply of medications.

Acknowledgments

Staff members of the 15 state and local health departments most affected by Hurricane Sandy.

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Awareness of Prediabetes — United States, 2005–2010

In 2010, approximately one in three U.S. adults aged ≥20 years (an estimated 79 million persons) had prediabetes, a condition in which blood glucose or hemoglobin A1c (A1c) levels are higher than normal but not high enough to be classified as diabetes (*1*). Persons with prediabetes are at high risk for developing type 2 diabetes, which accounts for 90%–95% of all cases of diabetes. Each year, 11% of persons with prediabetes who do not lose weight and do not engage in moderate physical activity will progress to type 2 diabetes during the average 3 years of follow-up (*2*). Evidence-based lifestyle programs that encourage dietary changes, moderate-intensity physical activity, and modest weight loss can delay or prevent type 2 diabetes in persons with prediabetes (*2*). Identifying persons with prediabetes and informing them about their increased risk for type 2 diabetes are first steps in encouraging persons with prediabetes to make healthy lifestyle changes. However, during 2005–2006, only approximately 7% of persons with prediabetes were aware that they had prediabetes (*3*). To examine recent changes in awareness of prediabetes and factors associated with awareness among adults aged ≥20 years, CDC analyzed data from the National Health and Nutrition Examination Survey (NHANES). This report describes the results of that analysis, which indicated that, during 2009–2010, approximately 11% of those with prediabetes were aware of their condition. Furthermore, during 2005–2010, estimated awareness of prediabetes was <14% across all population subgroups, different levels of health-care access or use, and other factors. In the United States, persons with prediabetes, including those with regular access to health care, might benefit from efforts aimed at making them aware that they are at risk for developing type 2 diabetes and that they can reduce that risk by making modest lifestyle changes. Efforts are needed to increase awareness.

NHANES is an ongoing, stratified, multistage probability sample of the noninstitutionalized U.S. civilian population. It includes personal interviews, medical examinations, and laboratory measurements (*4*). This analysis was conducted using data from three sampling cycles of NHANES, with examination response rates of approximately 77% for 2005–2006, 75% for 2007–2008, and 77% for 2009–2010 (*4*). Of 6,938 nonpregnant participants aged ≥20 years assigned to a morning fasting session, 6,771 had valid values for both fasting plasma glucose (FPG) and A1c tests. After excluding those with self-reported diabetes (n = 834) and those with undiagnosed diabetes (FPG ≥126 mg/dL or A1c ≥6.5%) (n = 310), a total of 2,603 participants with prediabetes (FPG 100–125 mg/dL or A1c 5.7%–6.4%) were identified. Adult participants were classified as being aware of their prediabetes if they 1) answered "yes" to the question, "Have you ever been told by a doctor that you have prediabetes, borderline diabetes, impaired fasting glucose, impaired glucose tolerance, or that your blood sugar is higher than normal but not high enough to be called diabetes or sugar diabetes?" or 2) reported having prediabetes when asked whether they had diabetes. The prevalence of prediabetes awareness was compared across selected sociodemographic characteristics, health-care access or use characteristics, and other factors. Sociodemographic characteristics included age group, race/ethnicity, sex, education level, and poverty-to-income ratio (PIR).* Health-care access or use characteristics included having any health insurance or other health-care coverage at time of interview, number of doctor visits in the past year, and having a usual source of care (defined as those reporting having a place they usually go to for care that was a doctor's office or clinic as opposed to no place or a hospital outpatient or emergency department). Other characteristics examined included family history of diabetes, reported current use of medication for hypertension or hypercholesterolemia, and body mass index (BMI) obtained from measured height and weight and classified as normal weight (BMI <25.0 kg/m^2), overweight (BMI 25.0–29.9 kg/m^2), and obese (BMI ≥30.0 kg/m^2). Analyses were performed with sampling weights, which account for the complex sampling design. Age-adjusted estimates were calculated by the direct method using the 2000 U.S. standard population. T-tests were used to examine the differences between subgroups.

During 2005–2010, the percentage of persons aged ≥20 years with prediabetes who were aware of their prediabetes remained low but was slightly higher during 2009–2010 (11.1%) than during 2005–2006 (7.7%, p=0.04) (Table). During 2005–2010, the prevalence of prediabetes awareness was lower among persons aged 20–44 years (5.1%) compared with persons aged 45–64 years (10.0%) and those aged ≥65 years (11.9%; both p<0.002) (Table). Age-adjusted prevalence of prediabetes awareness was lower among persons with less than a high school education (4.9%) compared with those with greater than a high school education (8.7%, p=0.003). It was higher among those overweight (7.9%) and those obese (9.9%) compared with among those of normal weight (4.3%, p=0.045 and p=0.004 respectively). Also, it was higher among those with a family history of diabetes compared with those without (10.4% versus 6.2%, p=0.001), among those reporting taking either

* PIR is the household income as a percentage of the poverty threshold income after accounting for inflation and family size and is classified as poor (<100%), low income (100%–199%), middle income (200%–399%), and high income (≥400%).

TABLE. Crude and age-adjusted prevalence of prediabetes awareness* among adults aged ≥20 years with prediabetes† — National Health and Nutrition Examination Survey, United States, 2005–2010

Characteristic	No. with prediabetes§	Crude¶		Age-adjusted**	
		%	(95% CI)	%	(95% CI)
Total (2005–2010)	**2,603**	**8.9**	**(7.7–10.2)**	**7.8**	**(6.6–9.3)**
2005–2006	626	7.7	(5.8–10.1)	6.5	(4.7–9.0)
2007–2008	957	7.7	(6.0–9.9)	6.6	(4.9–8.8)
2009–2010	1,020	11.1	(9.0–13.6)	10.1	(7.8–13.0)
Age group (yrs)					
20–44	759	5.1	(3.3–7.9)	NA	—
45–64	1,040	10.0	(8.3–12.0)	NA	—
≥65	804	11.9	(9.3–15.0)	NA	—
Race/Ethnicity					
White, non-Hispanic	1,293	9.1	(7.6–10.8)	7.6	(6.0–9.4)
Black, non-Hispanic	489	8.3	(5.8–11.7)	7.9	(5.4–11.4)
Mexican American	475	5.6	(3.8–8.0)	7.0	(5.0–9.7)
Other††	346	11.2	(7.1–17.1)	11.0	(7.2–16.3)
Sex					
Men	1,423	7.6	(6.0–9.4)	6.6	(5.2–8.3)
Women	1,180	10.6	(8.4–13.2)	9.9	(7.3–13.2)
Education					
<High school	800	6.0	(4.4–8.2)	4.9	(3.6–6.7)
High school	653	8.6	(6.2–11.8)	8.3	(5.6–12.2)
>High school	1,144	10.3	(8.6–12.1)	8.7	(7.2–10.6)
Poverty-to-income ratio					
Poverty (<100%)	697	8.5	(6.0–11.8)	8.2	(5.7–11.8)
Low income (100%–199%)	670	7.6	(5.4–10.5)	6.5	(4.7–9.0)
Middle income (200%–399%)	628	7.9	(5.8–10.8)	6.8	(4.7–9.6)
High income (≥400%)	608	10.8	(8.4–13.7)	9.2	(6.7–12.4)
Body mass index (kg/m^2)					
Normal (<25.0)	583	4.8	(3.0–7.5)	4.3	(2.3–7.9)
Overweight (25.0–29.9)	932	9.4	(7.4–12.1)	7.9	(5.8–10.7)
Obese (≥30.0)	1,053	10.8	(8.7–13.3)	9.9	(7.8–12.3)
Family history of diabetes					
Yes	1,013	11.6	(9.5–14.1)	10.4	(8.3–13.0)
No	1,533	7.2	(5.8–8.8)	6.2	(4.8–7.9)
Medication for hypertension/ hypercholesterolemia					
Yes	1,032	13.4	(11.3–15.9)	13.9	(9.2–20.5)
No	1,571	6.0	(4.8–7.5)	6.1	(4.8–7.7)
Health coverage status§§					
Covered	1,995	9.7	(8.3–11.4)	8.4	(6.8–10.3)
Not covered	605	5.5	(3.4–8.7)	4.7	(3.0–7.3)
No. of doctor visits in the past year					
<2	888	5.1	(3.7–6.9)	5.4	(3.8–7.6)
2–3	714	9.5	(7.2–12.5)	9.0	(6.5–12.3)
≥4	1,001	11.7	(9.8–14.0)	10.5	(7.9–13.7)
Usual source for care¶¶					
Clinic or doctor's office	2,062	9.9	(8.5–11.6)	8.9	(7.2–11.0)
Other or none	541	4.2	(2.5–6.9)	4.4	(2.6–7.3)

Abbreviations: CI = confidence interval; NA = not applicable.

* Prediabetes awareness defined as adult respondents with prediabetes who 1) answered "yes" to the question, "Have you ever been told by a doctor that you have prediabetes, borderline diabetes, impaired fasting glucose, impaired glucose tolerance, or that your blood sugar is higher than normal but not high enough to be called diabetes or sugar diabetes?," or 2) volunteered having prediabetes when asked whether they had diabetes.

† Prediabetes defined through laboratory testing (fasting plasma glucose 100–125 mg/dL or hemoglobin A1c 5.7%–6.4%).

§ Total sample size for each category is not the same because of item nonresponse.

¶ Chi-square test of association. All variables, except sex and poverty-income ratio, were significantly associated with prediabetes awareness at p-value <0.05.

** Standardized to the age distribution of the 2000 U.S. Census population. A t-test was used to test differences between subgroups.

†† Includes other Hispanic, multiracial, and others.

§§ Covered included those who answered "yes" to the following questions: "Are you covered by health insurance or some other kind of health-care plan?" and "Do you have Medicare?" (for those aged ≥65 years only).

¶¶ Includes participants who reported having a place they usually go to for care and that this place is a doctor's office or clinic and those who reported not having a usual source of care or whose usual source of care was hospital outpatient or emergency department.

What is already known on this topic?

Although an estimated one third of U.S. adults aged ≥20 years have prediabetes, during 2005–2006, only about 7% of them were aware that they had prediabetes. Evidence-based lifestyle-change programs that encourage dietary changes, moderate-intensity physical activity, problem-solving skills, and modest weight loss can delay or prevent type 2 diabetes among those with prediabetes. Interventions to promote identification and improved awareness of prediabetes are key first steps to implementing such programs for persons at high risk for type 2 diabetes.

What is added by this report?

The proportion of U.S. adults with prediabetes aged ≥20 years who were aware that they had prediabetes remained low, with only 11% reporting during 2009–2010 that they had prediabetes. Further, awareness of prediabetes was low (<14%) regardless of educational level, income level, coverage by health insurance or other kind of health-care plan, or health-care use.

What are the implications for public health practice?

Persons with prediabetes, including persons with regular access to health care, might benefit from efforts aimed at making them aware that they are at risk for developing type 2 diabetes and that they can reduce their risk by making modest lifestyle changes.

hypertension or hypercholesterolemia medication compared with those not taking such medication (13.9% versus 6.1%, p=0.01), among those with health insurance or other coverage at time of interview compared with those without (8.4% versus 4.7%, p=0.008), and in those reporting a usual source of care that was either a clinic or doctor's office (8.9%) compared with those without a usual source of care or those who received care in a hospital outpatient or emergency department (4.4%, p=0.01). Compared with those having fewer than two doctor visits in the past 12 months (5.4%), persons visiting doctors more than once were more likely to be aware of their prediabetes (9.0% for those having two or three visits, p=0.048, and 10.5% for those having four or more visits, p=0.008). No statistically significant association was observed between prediabetes awareness and sex, race/ethnicity, or PIR group.

Reported by

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Editorial Note

This report indicates that the proportion of U.S. adults with prediabetes who report being told they have prediabetes remained low, with only 11.1% reporting during 2009–2010 that they have prediabetes. It also indicates awareness of prediabetes was low (<14%) across all population subgroups and different levels of health-care access or use and other factors. Thus, interventions to promote identification and increased awareness of those with prediabetes are needed to encourage adoption of type 2 diabetes prevention strategies, particularly among groups known to be at high risk for type 2 diabetes.

Risk factors for prediabetes and type 2 diabetes include being aged ≥45 years; being overweight or obese; having a family history of diabetes; being of African American, Hispanic/Latino, American Indian, Asian American, or Pacific Islander race/ethnicity; having given birth to a baby weighing ≥9 pounds (4,082 g) or having a history of gestational diabetes; and being physically active <3 times a week (*5–7*). The American Diabetes Association has recommended that testing for prediabetes and diabetes be considered for adults with risk factors (*7*). Persons unaware of their risk should discuss their risk with their health-care provider and can take an online quiz to assess their risk for prediabetes.[†]

Evidence-based lifestyle programs aimed at increasing physical activity, improving diet, and achieving moderate weight loss (i.e., approximately 7% of total body weight) among those with prediabetes and BMI ≥24.0 kg/m^2 can prevent or delay type 2 diabetes (*2*). The CDC-led National Diabetes Prevention Program,[§] a public-private partnership of community organizations, private insurers, employers, health-care organizations, and government agencies, supports the nationwide implementation of evidence-based, lifestyle-change programs in the community that promote modest weight loss, good nutritional practices, increased physical activity, and problem-solving skills among persons at high risk for developing type 2 diabetes. Also, the National Diabetes Education Program,[¶] a partnership of the National Institutes of Health and CDC, provides resources to reduce the risk for type 2 diabetes, including resources such as "Small Steps. Big Rewards. Your Game Plan to Prevent Type 2 Diabetes" and "Just One Step," which provide helpful tips in making lifestyle changes.

The findings in this report are subject to at least five limitations. First, NHANES participants with impaired glucose tolerance (based on 2-hour oral glucose tolerance test values of 140–199 mg/dL) were not included in the definition of prediabetes; had they been included, the overall estimate of awareness during 2009–2010 would have been 10.0% rather than 11.1%. Second, data on prediabetes awareness and most other characteristics were self-reported and might be subject to recall bias. Third, because NHANES surveys only

[†] Available at http://www.cdc.gov/diabetes/prevention/prediabetes.htm.
[§] Additional information available at http://www.cdc.gov/diabetes/prevention.
[¶] Additional information available at http://www.yourdiabetesinfo.org.

the noninstitutionalized U.S. civilian population, military personnel and persons residing in nursing homes and other institutions are not included. Fourth, the NHANES examination response rates were approximately 75%; the actual level of awareness might be higher or lower if nonparticipants differed systematically from participants. Finally, results of the laboratory tests that were used to define prediabetes vary within persons across time, blood specimen, and laboratory analysis. However, on average, the single pair of test results obtained for a participant in this study would be expected to approximate the mean values for similar persons in the U.S. population. Compared with FPG, A1c has less within-person variability (*8*).

Although diabetes prevalence is increasing in the United States (*9*), type 2 diabetes can be prevented or delayed among those who are at high risk by modest weight loss, good nutritional practices, and increased physical activity. Because the vast majority of persons with prediabetes are unaware of their condition, identification and improved awareness of prediabetes are critical first steps to encourage those with prediabetes to make healthy lifestyle changes or to enroll in evidence-based, lifestyle-change programs aimed at preventing type 2 diabetes.

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Notes from the Field

Multistate Outbreak of *Salmonella* Infantis, Newport, and Lille Infections Linked to Live Poultry from a Single Mail-Order Hatchery in Ohio — March–September, 2012

In early 2012, three clusters of human *Salmonella* infections were identified through PulseNet, a national network of public health and food regulatory agency laboratories coordinated by CDC that subtypes disease-causing organisms. Initial investigations indicated many of the ill persons in these three clusters had contact with live poultry (e.g., chicks and ducklings) from a single mail-order hatchery; therefore, the three investigations were merged. During March 1–September 24, 2012, a total of 195 persons infected with the outbreak strains of *Salmonella* serotypes Infantis, Newport, and Lille were reported from 27 states.

Among persons infected, 64 (33%) of 194 were aged ≤10 years; the age of one infected person was unknown. Seventy-nine (79%) of 100 ill persons who were interviewed reported contact with live poultry in the week before illness. Among 39 ill persons who purchased live poultry from the mail-order hatchery and who provided a reason for their purchase, all reported purchasing live poultry for backyard flocks to produce eggs or meat, or to keep as pets. Birds were purchased from multiple feed stores or directly from hatcheries. The median period from acquiring poultry and illness onset was 19 days (range: 3–90 days). Forty-seven (87%) of 54 ill persons with available purchase information reported buying chicks or ducklings sourced from a single mail-order hatchery in Ohio.

The mail-order hatchery is a participant in the U.S. Department of Agriculture's National Poultry Improvement Plan (USDA-NPIP). This program is intended to eliminate certain strains of *Salmonella* that cause illness in poultry-breeding flocks and hatcheries. However, the program does not certify that these poultry are free from other strains of *Salmonella* that might cause illness in humans. Recently, the same mail-order hatchery has been linked to other human *Salmonella* infections outbreaks (*1,2*).

This outbreak investigation identified the largest number of human illnesses ever linked to contact with live poultry during a single outbreak, and it underscores the ongoing risk for human salmonellosis linked to backyard flocks. Preventing live poultry–associated salmonellosis requires an integrated approach involving mail-order hatcheries, agricultural feed stores, and consumers. Mail-order hatcheries should comply with management and sanitation practices outlined by USDA-NPIP and avoid the shipment of day-old chicks through their hatchery from another hatchery (e.g., trans-shipping). Feed stores should use physical barriers (e.g., a wall or fence) between customers and poultry displays to prevent direct contact with poultry (*3*). Educational materials warning customers and advising them on how to reduce the risk for *Salmonella* infection from live poultry should be distributed with all live poultry purchases (*4*).

Reported by

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Announcements

Diabetes Alert Day — March 26, 2013

March 26 is Diabetes Alert Day, which is dedicated to raising awareness about type 2 diabetes, its risk factors, and its prevention. Type 2 diabetes, which can be prevented or delayed through lifestyle changes such as losing weight and increasing physical activity, accounts for 90%–95% of all diabetes cases in the United States (*1*).

Information about type 2 diabetes and ways to prevent it is available from numerous sources.The Prediabetes Risk Test (http://www.cdc.gov/diabetes/prevention/prediabetes.htm) is a helpful resource that uses answers to a few simple questions about weight, age, family history, and other risk factors to indicate a person's risk for developing type 2 diabetes.

The CDC-led National Diabetes Prevention Program (http://www.cdc.gov/diabetes/prevention/index.htm) is working with partners in communities across the United States to establish effective lifestyle change programs for persons at high risk for type 2 diabetes. Lifestyle change programs are listed by state at http://www.cdc.gov/diabetes/prevention/recognition/registry.htm#program. The Just One Step tool (http://ndep.nih.gov/resources/diabetes-healthsense/just-one-step.aspx), created by the National Diabetes Education Program, a joint program of the CDC and the National Institutes of Health, provides helpful tips for making lifestyle changes.

CDC's Diabetes Interactive Atlases (http://www.cdc.gov/diabetes/atlas) provide data on trends in diagnosed diabetes (both prevalence and incidence), obesity, and leisure-time physical inactivity in the United States. Additional information about diabetes control and prevention is available at http://www.cdc.gov/diabetes.

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World Water Day — March 22, 2013

World Water Day, sponsored by the United Nations (UN), is observed every year on March 22. This year, World Water Day focuses on water cooperation.

Since 1990, the number of persons able to access improved drinking water and sanitation resources has increased by nearly 2 billion and 1.8 billion, respectively (*1*). Despite these gains, hundreds of millions still lack access to these essential resources (*1*).

In December 2010, the UN General Assembly declared 2013 as the International Year of Water Cooperation. This observance aims to promote water cooperation across different types of organizations and governments and across different disciplines. Water cooperation is a foundation for peace and sustainable development because 1) it is key to poverty eradication, social equity, and gender equality; 2) it creates economic benefits from more efficient and sustainable uses of water resources; 3) it is crucial to preserving water resources and protecting the environment; and 4) it builds peace through partnerships on such a practical and vital issue.

Additional information about World Water Day and ideas on how to get involved are available via the UN World Water Day website at http://www.unwater.org/worldwaterday. Information on CDC's efforts to ensure global access to improved water, sanitation, and hygiene resources is available at http://www.cdc.gov/healthywater/global.

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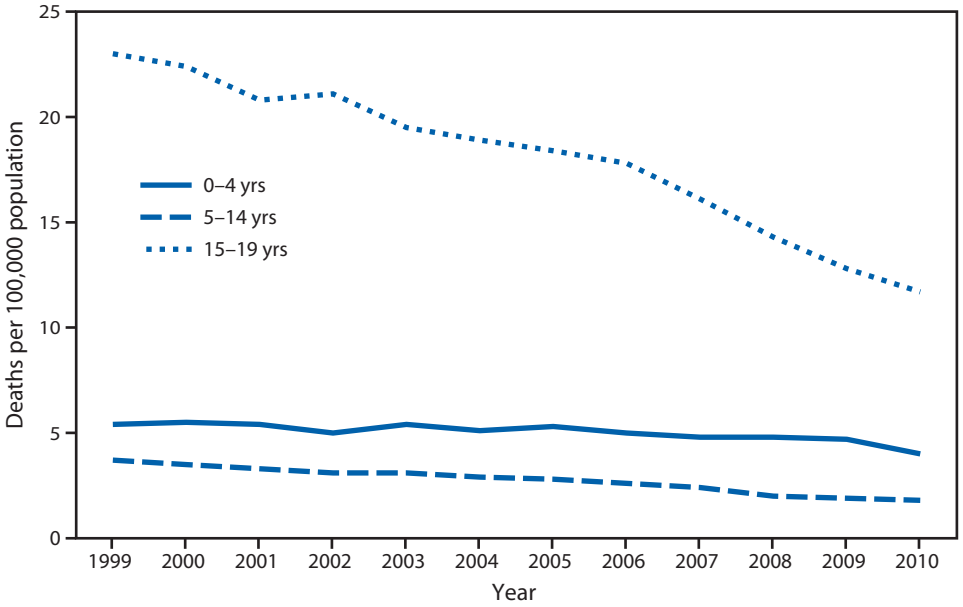
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Rate of Traumatic Brain Injury (TBI)–Related Deaths*† Among Persons Aged 0–19 Years, by Age Group — National Vital Statistics System, United States, 1999–2010



* Per 100,000 population. Rates are revised by using populations enumerated as of April 1 for 2000 and 2010, and intercensal estimates as of July 1 for all other years, and therefore might differ from rates previously published.

† Based on *International Classification of Diseases, 10th Revision* codes S01.0–S01.9 (open wound of the head); S02.0, S02.1, S02.3, and S02.7–S02.9 (fracture of the skull and facial bones); S04.0 (injury to optic nerve and pathways); S06.0–S06.9 (intracranial injury); S07.0, S07.1, S07.8, and S07.9 (crushing injury of head); S09.7–S09.9 (other unspecified injuries of head); T01.0 (open wounds involving head with neck); T02.0 (fractures involving head with neck); T04.0 (crushing injuries involving head with neck); T06.0 (injuries of brain and cranial nerves with injuries of nerves and spinal cord at neck level); and T90.1, T90.2, T90.4, T90.5, T90.8, and T90.9 (sequelae of injuries of head).

From 1999 to 2010, the rate of TBI-related deaths among youths aged 15–19 years decreased by nearly half, from 23.0 per 100,000 in 1999 to 11.7 in 2010. Rates also decreased for children aged 0–4 years, from 5.4 per 100,000 in 1999 to 4.0 in 2010, and for children and teens aged 5–14 years, from 3.7 per 100,000 in 1999 to 1.8 in 2010.

Source: National Vital Statistics System mortality data. Available at http://www.cdc.gov/nchs/deaths.htm.

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