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Measles Outbreak Associated with Adopted Children from China — Missouri, Minnesota, and Washington, July 2013

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On July 5, 2013, CDC was notified of two cases of laboratory-confirmed measles in recently adopted children from an orphanage in Henan Province, China. To find potentially exposed persons, CDC collaborated with state and local health departments, the children's adoption agency, and airlines that carried the adoptees. Two additional measles cases were identified, one in a family member of an adoptee and one in a third adopted child from China. To prevent further importation of measles, CDC worked with health officials in China, including "panel physicians" contracted by the U.S. Department of State to conduct the overseas medical examinations required for all immigrants and refugees bound for the United States. The following measures were recommended: 1) all adoptees examined at panel physician facilities should be screened for fever and rash illness, 2) measles immunity should be ensured among all adoptees from Henan Province who are scheduled for imminent departure to the United States, and 3) all children at the orphanage in Henan Province should be evaluated for measles. This report summarizes the results of the outbreak investigation and underscores the importance of timely routine vaccination for all international adoptees.

Investigation and Public Health Response

A boy and a girl, both aged 2 years and with cerebral palsy, were in the process of being adopted by families in the United States, but became ill in China before traveling to the United States. The boy (child A) developed rhinorrhea and cough on June 24. At the time of his immigration medical examination by a panel physician on June 29, the boy was found to have a rash on his neck. Because he was afebrile and had no other symptoms or signs, the rash was diagnosed as contact dermatitis. By the next day, the rash began on his head and spread to his trunk and extremities, and he developed a fever. The girl (child B) was noted to be febrile on June 29 during her immigration medical examination, but no other symptoms or signs were present. Two days later, the panel physician was told by her adoptive parents that the girl was afebrile and doing well. However, investigators later learned that on June 29 the girl had developed cough, fever, and conjunctivitis, and on July 1 she had developed a rash on her face and neck.

On July 4, both ill children traveled on different flights to the United States. They were hospitalized shortly after arrival in Washington and Missouri, respectively. Measles was confirmed in both children by positive immunoglobulin M (IgM) serology and polymerase chain reaction (PCR), and both were placed on isolation precautions. Neither child had documented measles vaccination, and their adoptive parents had executed

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affidavits, consistent with current policy, for exemption from the vaccine requirements for immigration until after their arrival in the United States.

State public health authorities notified CDC's Division of Global Migration and Quarantine (DGMQ) because both children were contagious* during travel. DGMQ, working with U.S. Customs and Border Protection, obtained passenger and crew manifests and contact information from the airlines to investigate potential exposure of persons on flights with the ill children. A total of 83 crew members and passengers (those seated in the same row, two rows in front of, and two rows behind the ill children; infants in arms seated anywhere on either plane; and crew members who served passengers in the same cabin as either ill child)† were identified as potentially exposed to measles. Contact information was available for 74 passengers and crew members from 20 states. Of the 29 passengers for whom follow-up data were available, two were found to be susceptible to measles, and one received postexposure immunoglobulin. No secondary measles cases associated with these flights were reported to CDC.

Local health officials conducted contact investigations with family members of the two ill adopted children, health-care personnel and other persons in health facilities where the children were treated, and two other U.S. families of recently adopted children who were in contact with the ill children in China. Contacts were interviewed about their travel history, presence of fever and rash, and measles immunity, either through documented vaccination or serologic tests. Contacts with no evidence of measles immunity were recommended to receive either postexposure vaccination with measles, mumps, and rubella (MMR) vaccine within 3 days of initial measles exposure or immunoglobulin administration within 6 days of initial measles exposure. Of 132 persons contacted, six were found to be susceptible to measles; three received postexposure immunoglobulin.

Two additional cases of measles were identified. Child C, aged 2 years in Minnesota, was adopted from China at the same time as child A and child B. Although child C was adopted from a different orphanage and traveled on different flights, he was exposed to the two infected children during the emigration process in China. Child C was asymptomatic and not contagious during travel. He arrived in the United States on July 4, developed a fever on July 10, rash on July 14, and tested IgM-positive for measles on July 16. This child also had cerebral palsy and no documentation of measles vaccination. The child's family members were fully immunized, and no secondary cases were reported.

A fourth case was identified in the adoptive mother, aged 39 years, of child B. Although she reported a history of vaccination against measles, she developed signs and symptoms compatible with modified measles. On July 14 (2 weeks after symptom onset in child B), she developed a rash on her face

* The contagious period for measles is considered to be from 4 days before to 4 days after the onset of rash.

† Additional information available at http://www.cdc.gov/quarantine/contact-investigation.html and http://www.cdc.gov/quarantine/air/managing-sick-travelers/commercial-aircraft/measles.html.

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and neck that lasted 4 days, but she had no fever, respiratory, or ocular symptoms. PCR and IgM tests performed on July 19 were positive for measles. An investigation of 19 contacts in this family revealed no additional cases.

Discussion

Although endemic measles was declared eliminated from the United States in 2000, sporadic outbreaks still occur as a result of importations from areas where measles is endemic (*1*). Recent reported outbreaks have been associated with international adoptions, including two outbreaks among adoptees from China in 2004 and 2006 (*2,3*). This report documents a cluster of imported measles cases among adoptees from China in July 2013.

China is the leading country of origin for internationally adopted children in the United States, contributing 30% (2,696) of foreign-born adoptions in 2012 (*4*). Through improved surveillance and enhanced nationwide vaccination campaigns using a 2-dose routine measles immunization schedule administered at 8 months and 18 months, with >90% measles vaccination coverage, cases of measles have significantly declined in China, from 2.8 per 100,000 in 2010 to 0.5 per 100,000 in 2012 (*5*). However, in the first months of 2013, the number of measles cases in China rose to an incidence of 2.7 per 100,000 (*6*).

Adoption of children from countries with high rates of vaccine-preventable diseases presents a challenge to the control of communicable diseases in the United States. Since 1996, the U.S. Department of State has required all persons seeking a U.S. immigrant visa to show proof of vaccination for certain vaccine-preventable diseases, including measles.[§] However, internationally adopted children aged ≤10 years are exempted from this requirement if the adopting parent(s) sign an affidavit indicating that the child will receive vaccination within 30 days of entry into the United States.[¶] A significant public health risk is posed before, during, and after travel to the United States when parents choose not to vaccinate their children before leaving the country of origin. Children who are malnourished or have concomitant conditions, which are common among foreign-born adoptees, are especially vulnerable to severe forms of vaccine-preventable diseases (*1*). Parents who choose to sign the affidavit should ensure that adoptees receive age-appropriate vaccines, as recommended by the Advisory Committee on Immunization Practices,[**] as soon as possible following entry into the United States.

[§] Illegal Immigration Reform and Immigrant Responsibility Act of 1996. Pub. L. No. 10-208, 110 Stat. 3009 (September 30, 1996).

[¶] The International Adoption Simplification Act of 2010. Pub. L. No. 111-287, 124 Stat. 3058 (November 30, 2010).

[**] Available at http://www.cdc.gov/vaccines/acip.

What is already known on this topic?

The United States eliminated domestic transmission of measles in 2000. Unvaccinated travelers to and from parts of the world where measles is still endemic continue to pose a risk for acquiring and transmitting the disease in the United States.

What is added by this report?

Two cases of measles were diagnosed in adopted children from China in July 2013, shortly after the children arrived in the United States. CDC collaborated with state and local health departments, the children's adoption agency, and the airlines on which the adoptees traveled to find potentially exposed persons. Two additional measles cases were identified, one in a family member of an adoptee and one in another adopted child recently arrived from China. None of the three children had been vaccinated against measles.

What are the implications for public health practice?

Foreign-born adopted children can be the source of imported measles. Efforts to ensure that adopted children receive safe and timely vaccination, as recommended by the World Health Organization and the country of origin, are critical to prevent similar outbreaks.

In this outbreak, all measles cases among adoptees were in unvaccinated children aged 2 years with cerebral palsy. Previous studies have shown that children with cerebral palsy are at risk for incomplete or delayed immunization, possibly as a result of the misconception that the MMR vaccine is associated with harmful neurologic side effects (*7,8*). Cerebral palsy is not a contraindication for MMR vaccination. Health-care providers should ensure that all children, including those with cerebral palsy, receive timely, age-appropriate routine immunizations, as recommended by the World Health Organization[††] and the country of origin, unless contraindicated by medical conditions (e.g., history of anaphylactic reaction to a vaccine component).

Two of the ill children reported in this cluster were symptomatic and contagious en route to the United States, potentially exposing their families, many travelers, and hospital patients and staff members to measles. Had they been identified as infectious with measles before travel and prevented from boarding, subsequent contact investigations by health officials and the substantial costs associated with control of the outbreak could have been avoided. More importantly, routine vaccinations according to recommended schedules likely would have averted this outbreak. Public health and adoption agencies should continue to promote appropriate vaccinations for adoptees and their adoptive families

[††] Available at http://www.who.int/immunization/policy/en.

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Diagnosis and Screening for Obesity-Related Conditions Among Children and Teens Receiving Medicaid — Maryland, 2005–2010

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The prevalence of obesity among children and adolescents in the United States tripled during 1980–2008 and plateaued during 2008–2010 (*1,2*). This rise in obesity was associated with a rise in chronic conditions previously observed mostly in adults, including hypertension, hypercholesterolemia, and type 2 diabetes (*3–6*). In 2007, the American Academy of Pediatrics published Expert Committee recommendations for universal screening for overweight and targeted laboratory screening for metabolic disorders among children and adolescents with a body mass index (BMI) at or above the 85th percentile based on age or presence of certain risk factors (*7*). To assess the prevalence of overweight and obesity among children and teens enrolled in Maryland Medicaid or the Maryland Children's Health Program (MCHP) and whether or not the children were being screened for obesity-related conditions according to the Expert Committee recommendations, investigators from the Maryland Department of Health and Mental Hygiene computed BMI percentiles for age and sex on a random sample of persons aged 2–19 years enrolled in Maryland Medicaid or MCHP whose height and weight were measured during a well-child visit. Encounter records were used to identify obesity-related conditions and screening laboratory tests received. This study found that 16.5% of participants were overweight (BMI in the 85th–94th percentiles) and 21.4% were obese (BMI at or above the 95th percentile). Obesity was highest among those aged 12–19 years (25.6%) and among Hispanics (28.1%). The diagnosis of obesity-related conditions increased significantly with increasing BMI, with 33.5% of obese participants diagnosed with asthma, 7.9% diagnosed with dyslipidemia, and 7.2% diagnosed with depression. Only 29.9% of overweight and 40.2% of obese participants received a lipid panel test. The results of this investigation were communicated to pediatric, public health, and managed-care leaders. Efforts to communicate the need to increase obesity screening and laboratory testing among this population should continue.

Approximately 383,000 children and teens aged 2–19 years received Medicaid/MCHP Healthy Kids services through the HealthChoice program each year during 2005–2010. From this population, the study sample was drawn by each year selecting at random from those who had managed-care organization encounters during that year. This process yielded approximately 1,600 charts per year that were reviewed by Medicaid Healthy Kids nurses to ensure the visit adhered to the Centers for Medicare and Medicaid Services' guidelines for early and periodic screening, diagnosis, and treatment (*8*). During these quality-assurance reviews, the nurses abstracted the child/teen's height, weight, and date of service, resulting in a final study population of 10,882 children and teens. All height and weight data had been directly measured by the health-care provider during the well-child visit. The data were combined with Medicaid/MCHP enrollment data to get each child/teen's sex, race/ethnicity, and date of birth needed for computing their exact age at the time of their visit. These data were then used to compute BMI percentile for age and sex using a computer program provided by CDC (*9*). Each child/teen's BMI percentile for age and sex was categorized into one of three groups: below the 85th percentile (classified as normal or underweight), in the 85th–94th percentiles (classified as overweight), or at or above the 95th percentile (classified as obese).

The data were linked to Medicaid/MCHP encounter data to gather information about obesity-related comorbidities and health-care provider screening (e.g., laboratory tests and family history). Each child/teen's visits going back 5 years (or to birth in the case of children aged <5 years) were searched for *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) codes to identify primary and secondary diagnoses of morbidities known to be associated with overweight and obesity.* These codes were also used to identify overweight and obesity-related screening, counseling, and family history–taking performed by the provider. Any screening laboratory tests performed that were related to overweight and obesity were identified through Current Procedural Terminology codes. Statistically significant differences ($p<0.05$) between groups were determined using Fisher's exact test and a two-sided Cochran-Armitage test for trend.

Of the 10,882 Healthy Kids study participants, 16.5% were classified as overweight (BMI in the 85th–94th percentiles), and 21.4% were classified as obese (BMI at or above the 95th percentile) (Table 1). The prevalence of obesity increased progressively, from 16.3% in children aged 2–5 years, to 23.1% among children aged 6–11 years, to 25.6% among children and teens aged 12–19 years. No significant difference was observed

* Obesity-related conditions included asthma, depression, dyslipidemia, sleep apnea, diabetes, hypertension, tibia vara, acanthosis nigricans, steatohepatitis, dysmetabolic syndrome, and hyperinsulinemia.

TABLE 1. Selected characteristics of children and teens aged 2–19 years participating in the Maryland Healthy Kids study (2005–2010), by body mass index (BMI) percentile

Characteristic	BMI below the 85th percentile			BMI in the 85th–94th percentiles			BMI at or above the 95th percentile			Total no.
	No.	%	(95% CI)	No.	%	(95% CI)	No.	%	(95% CI)	
Total	**6,769**	**62.2**	**(61.3–63.1)**	**1,790**	**16.5**	**(15.8–17.2)**	**2,323**	**21.4**	**(20.6–22.1)**	**10,882**
Age group (yrs)										
2–5	2,746	69.2	(67.8–70.7)	575	14.5	(13.4–15.6)	645	16.3	(15.1–17.5)	**3,966**
6–11	2,165	59.1	(57.5–60.7)	652	17.8	(16.6–19.1)	846	23.1	(21.7–24.5)	**3,663**
12–19	1,858	57.1	(55.4–58.8)	563	17.3	(16.0–18.7)	832	25.6	(24.1–27.1)	**3,253**
Sex										
Male	3,429	62.7	(61.4–64.0)	859	15.7	(14.8–16.7)	1,178	21.6	(20.5–22.7)	**5,466**
Female	3,340	61.7	(60.4–63.0)	931	17.2	(16.2–18.2)	1,145	21.1	(20.1–22.3)	**5,416**
Race/Ethnicity										
Black, non-Hispanic	3,832	62.8	(61.6–64.0)	1,000	16.4	(15.5–17.3)	1,271	20.8	(19.8–21.9)	**6,103**
White, non-Hispanic	1,865	63.2	(61.4–64.9)	468	15.9	(14.6–17.2)	620	21.0	(19.5–22.5)	**2,953**
Hispanic	595	52.4	(49.4–55.3)	222	19.5	(17.3–22.0)	319	28.1	(25.5–30.8)	**1,136**
Asian, non-Hispanic	201	69.3	(63.7–74.6)	47	16.2	(12.2–21.0)	42	14.5	(10.6–19.1)	**290**

Abbreviation: CI = confidence interval.

in obesity prevalence by sex. Hispanic participants had a significantly higher prevalence of obesity (28.1%) compared with their non-Hispanic white (21.0%), non-Hispanic black (20.8%), and non-Hispanic Asian (14.5%) counterparts. No significant change was observed in the prevalence of overweight and obesity during the period 2005–2010.

The rate of screening laboratory tests was lower than expected, based on the recommendations by the Expert Committee for children with elevated BMI (*7*). The Expert Committee recommends that all children and adolescents with a BMI at or above the 85th percentile for age and sex undergo lipid panel testing, beginning at age 10 years (or if they have other risk factors for comorbid conditions), but only 29.9% of study participants in the overweight category (in the 85th–94th percentiles) were tested, and only 40.2% of participants in the obese category were tested (Table 2). The Expert Committee also recommends that all children and adolescents with a BMI at or above the 95th percentile undergo a fasting glucose test beginning at age 10 years (or if they have other risk factors for comorbid conditions with a BMI in the 85th–94th percentiles); however, only 10.3% of obese study participants underwent this test.

The Expert Committee also recommends that clinicians assess for a family history of overweight and related complications (*7*). This study found that 1.5% of obese study participants had ICD-9-CM procedure codes for taking a family history of diabetes (Table 2). A similar number were coded for being screened for a family history of lipid disorders. A similar lack of coding occurred for indicating dietary or exercise counseling was provided to obese participants (≤2.0%). The records of few children and teens with a BMI in the 85th–94th percentiles included a diagnosis code of overweight (0.9%). The records of a higher percentage of children and teens with a BMI at or above the 95th percentile included a diagnosis code of obesity (22.3%); however, this is still below the number that met the criteria for obesity based on BMI percentile (*7*).

What is already known on this topic?

Expert Committee recommendations for the prevention, assessment, and treatment of childhood obesity were released in 2007 that update the 1998 guidelines published by the American Academy of Pediatrics. The recommendations included screening laboratory tests (lipid panel and fasting glucose) for children and adolescents with a body mass index (BMI) at or above the 85th percentile for age and sex, as well as dietary and physical activity assessment and screening for a family history of obesity risk factors.

What is added by this report?

Among Maryland Medicaid or Maryland Children's Health Program enrollees, the percentage of children and teens aged 2–19 years with a BMI at or above the 95th percentile is higher than in a nationally representative sample of the U.S. population. Despite recommendations for laboratory screening of children and adolescents with a BMI at or above the 85th percentile, the rates of lipid and fasting glucose screening among Maryland Medicaid or Maryland Children's Health Program enrollees were below what is recommended. Similarly, rates of documented dietary and exercise counseling also were below what is recommended.

What are the implications for public health practice?

Children who are overweight or obese should be appropriately identified and screened for complications, consistent with the Expert Committee recommendations. The increased obesity-related morbidity and low levels of diagnostic coding and laboratory screening identified in this study present a challenge to efforts to reduce and treat childhood obesity. Public health agencies can use this information as an opportunity to assess, understand, and reduce the barriers to implementation of the guidelines.

TABLE 2. Number and prevalence of children and teens aged 2–19 years participating in the Maryland Healthy Kids study (2005–2010) who were screened for or received a diagnosis of an obesity-related condition, by body mass index (BMI) percentile and selected characteristics

Characteristic	BMI below the 85th percentile		BMI in the 85th–94th percentiles		BMI at or above the 95th percentile		Total no.	p-value*
	No.	Prevalence (%)	No.	Prevalence (%)	No.	Prevalence (%)		
Total	**6,769**	**62.2**	**1,790**	**16.5**	**2,323**	**21.4**	**10,882**	
Diagnosed medical condition								
Asthma	1,825	27.0	535	29.9	779	33.5	**3,139**	<0.001
Depression	307	4.5	88	4.9	168	7.2	**563**	<0.001
Dyslipidemia	226	3.3	64	3.6	183	7.9	**473**	<0.001
Sleep apnea	98	1.5	33	1.8	77	3.3	**208**	<0.001
Diabetes	44	0.7	21	1.2	58	2.5	**123**	<0.001
Hypertension	43	0.6	13	0.7	61	2.6	**117**	<0.001
Tibia vara	48	0.7	20	1.1	27	1.2	**95**	0.027
Acanthosis nigricans	<6	—†	<6	—†	34	1.5	**40**	<0.001
Overweight	9	0.1	16	0.9	49	2.1	**74**	<0.001
Obesity	33	0.5	70	3.9	519	22.3	**622**	<0.001
Morbid obesity	<6	—†	<6	—†	62	2.7	**70**	<0.001
ED visit with primary or secondary diagnosis of obesity-related condition								
Yes	895	13.2	286	16.0	392	16.9	**1,573**	<0.001
Screening laboratory tests								
Lipid panel	1,674	24.7	535	29.9	934	40.2	**3,143**	<0.001
Metabolic panel	1,781	26.3	486	27.2	799	34.4	**3,066**	<0.001
Fasting glucose	195	2.9	83	4.6	238	10.3	**516**	<0.001
Screening for family history and counseling								
Family history of diabetes	52	0.8	17	1.0	34	1.5	**103**	0.004
Dietary counseling	21	0.3	5	0.3	47	2.0	**73**	<0.001
Exercise counseling	<6	—†	<6	—†	<6	—†	**<6**	0.010
Screening for lipid disorders	45	0.7	16	0.9	33	1.4	**94**	0.001

Abbreviation: ED = emergency department.
* Calculated using Cochran-Armitage test for trend.
† Percentages based on fewer than six persons are not shown.

Diagnoses of medical conditions associated with overweight and obesity were observed to increase significantly across the three BMI groups (Table 2). Asthma, depression, and dyslipidemia were the most common comorbid conditions diagnosed among obese study participants (33.5%, 7.2%, and 7.9%, respectively).

When the data were analyzed to identify emergency department (ED) visits with a primary or secondary diagnosis of an obesity-related complication, the prevalence of these ED visits increased significantly with increasing BMI (Table 2).

Discussion

This study demonstrates that the prevalence of obesity is higher among Maryland children receiving services through Medicaid/MCHP than in the general population of U.S. children and teens. The prevalence of obesity (21.4%) among the Maryland Healthy Kids study participants was significantly elevated compared with data from the National Health and Nutrition Examination Survey, which includes children and teens with all types of health insurance. In the United States, 16.9% of children and teens aged 2–19 years were categorized as obese during 2009–2010 (*2*). When stratified by race/ethnicity, the prevalence of obesity among non-Hispanic white Maryland Medicaid/MCHP children and teens was 21.0%, significantly higher than the national rate of 14.0%. Among Hispanic Maryland study participants, the prevalence of obesity was 28.1%, which was significantly higher than the national Hispanic prevalence of 21.2%. No significant difference was observed between the prevalence of obesity among non-Hispanic black children and teens in Maryland (20.8%) and the national prevalence of 24.3%.

This study also indicates these at-risk children and teens are not being adequately coded for overweight and obesity by their Medicaid/MCHP health-care providers and those with a BMI at or above the 85th percentile for age and sex are not receiving recommended screening laboratory tests for obesity-related conditions.

The findings in this study are subject to at least six limitations. First, although the height and weight of each study participant was directly measured by a clinician during a well-child visit, measurement errors or data recording errors might have

occurred, resulting in misclassification. Second, because the height and weight were abstracted from a single well-child visit, it is not possible to know when individual participants became overweight or obese or for how long they had been overweight. Third, bias might have resulted because some of the participants were followed for different periods because they were too young to have 5 years of encounter data or because they were enrolled inconsistently in Medicaid in Maryland. Fourth, health-care providers might have screened for overweight and obesity but neglected to record the diagnosis directly in the medical record, and therefore it would not have appeared in the Medicaid/MCHP encounter data used in this study. Fifth, health-care providers might have ordered laboratory tests, but patients might have neglected to follow through with the test. Finally, any screenings or tests performed >5 years before each participant's chart review were not included in this analysis.

The results of this investigation were presented to the medical directors of all Maryland Medicaid HealthChoice managed-care organizations, the health officers in each Maryland jurisdiction, and pediatricians to make them aware of the need to increase obesity screening and testing for obesity-related complications among this population.

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Rapid Hepatitis C Testing Among Persons at Increased Risk for Infection — Wisconsin, 2012–2013

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An estimated 3.2 million persons in the United States have chronic infection with hepatitis C virus (HCV) (*1*). Most new HCV transmissions occur among persons who inject drugs (*2*), often within the first few years of their injection drug use (*3*). During 2003–2012, reports of HCV infection increased from 15 to 54 cases per 100,000 among persons aged <30 years in Wisconsin, and 58% of persons in this age group with acute HCV infection reported injecting drugs (Wisconsin Division of Public Health, unpublished data, 2013). To increase detection of HCV infection, the Wisconsin Division of Public Health (WDPH) piloted a program during October 2012–October 2013 that offered rapid HCV testing to clients of four agencies providing outreach testing for HCV and human immunodeficiency virus infection, syringe exchange, counseling, and other harm reduction services to persons with drug dependence. During that period, 1,255 persons were tested using a rapid HCV test, and 246 (20%) of the results were positive. Most (72%) of the infections had not been reported to WDPH. A blood specimen for further testing was collected from 192 (78%) participants with positive HCV test results; among these participants, 183 were tested for HCV RNA using reverse transcription–polymerase chain reaction (RT-PCR), and these results were positive for 128 (70%) participants, indicating active infection. Use of the rapid HCV test detected previously unreported HCV infections and raised awareness of HCV. Persons identified with active HCV infection should be referred to medical care and counseled on ways to prevent HCV transmission to others.

A new cohort of young injection drug users acquiring HCV infection has been recognized nationwide, notably in suburban and rural areas (*4*). Most persons infected with HCV are unaware of their infection because it has few, if any, symptoms.* CDC and the United States Preventative Service Task Force recommend that persons who inject drugs receive HCV enzyme immunoassay (EIA) and nucleic acid testing to diagnose current HCV infections (*5,6*). Conventional EIA testing requires laboratory equipment, a trained phlebotomist, and long turnaround times to process. However, rapid point-of-care screening tests for HCV antibody using finger-stick capillary blood allow screening to be expanded outside of a clinical setting (*7,8*).

WDPH, in partnership with community organizations, supports outreach and overdose prevention services for persons with drug dependence. Four outreach agencies providing these services currently use rapid HIV testing technology and have staff members trained to collect blood specimens for PCR testing. Staff members at each agency were provided with OraQuick rapid HCV test kits (OraSure Technologies). Confirmatory tests using EIA and PCR were conducted at the Wisconsin State Laboratory of Hygiene.

Clients who used services from these agencies during October 2012–October 2013 were offered the OraQuick test and were interviewed to collect information regarding demographic characteristics and risk behaviors. Participants whose OraQuick test results were positive had blood specimens obtained by venipuncture and were asked to return to the outreach site for confirmatory test results. Reactive tests, and confirmatory results, when available, were reported to WDPH. Data from the Wisconsin Electronic Disease Surveillance System were analyzed to determine whether HCV infections detected during this pilot program had been reported previously to WDPH from a laboratory or local health department.

During the pilot program, rapid HCV tests were performed on blood specimens from the 1,255 participants, and results for 246 (20%) were positive. Most participants reported either that they had not been tested previously for HCV (53%) or they did not remember being tested for HCV (10%). Most (72%) of the infections detected during the pilot period were not recorded in the Wisconsin Electronic Disease Surveillance System, indicating they were newly detected HCV infections and not previously reported to WDPH.

Of the 1,255 persons who received rapid HCV tests, the median age was 28 years (range = 17–68 years), and 732 (59%) were male (Table). A total of 965 (78%) participants were non-Hispanic white, 81 (7%) were non-Hispanic black, 79 (6%) were non-Hispanic American Indian, and 18 (1%) were of other, mixed, or nonspecified race. A total of 97 (8%) were of Hispanic or Latino ethnicity. Compared with 2012 state data on HCV cases reported to WDPH, the 246 pilot program participants with HCV infection were younger (49% aged <30 years compared with 24%), more likely to be non-Hispanic white (78% compared with 63%), and less likely to be non-Hispanic black (5% compared with 13%) (Table).

The most common risk behavior or exposure reported by participants was injection drug use, reported by 1,033 (82%) of the 1,255 participants. A total of 868 (69%) reported injecting drugs

* Additional information available at http://www.cdc.gov/hepatitis/hcv/index.htm.

TABLE. Demographic characteristics of persons who received a rapid hepatitis C virus (HCV) test in a pilot program, compared with 2012 state surveillance data on HCV infection* — Wisconsin, October 2012–October 2013

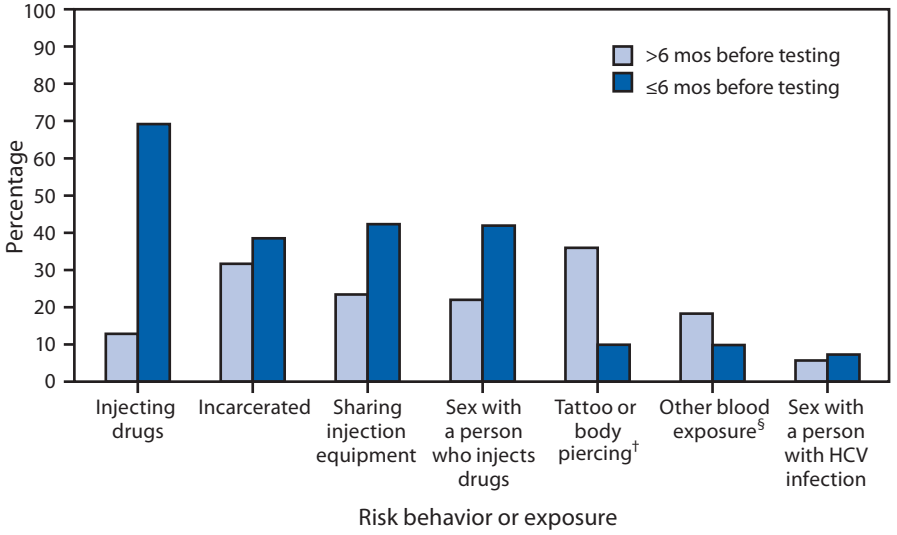
Characteristic	Received test (N = 1,255) No.	(%)	Positive test result (n = 246) No.	(%)	No. of cases reported by state in 2012 (N = 2,634) No.	(%)	p-value†
Sex (n = 1,231)							0.13
Male	732	(59)	136	(55)	1,585	(60)	
Female	499	(41)	110	(45)	1,049	(40)	
Age group (yrs) (n = 1,223)							<0.01
<30	698	(57)	120	(49)	636	(24)	
≥30	525	(43)	126	(51)	1,998	(76)	
Race/Ethnicity (n = 1,240)							
White, non-Hispanic	965	(78)	193	(78)	1,665	(63)	<0.01
Hispanic or Latino	97	(8)	23	(9)	138	(5)	<0.01
Black, non-Hispanic	81	(7)	12	(5)	346	(13)	<0.01
American Indian, non-Hispanic	79	(6)	16	(7)	63	(2)	0.02
Other§	18	(1)	2	(1)	59	(2)	0.17

* Available at http://www.dhs.wisconsin.gov/publications/p0/p00440-2012.pdf.
† p≤0.05 indicates statistically significant difference between pilot program results and 2012 Wisconsin HCV surveillance data.
§ Includes Asian, Hawaiian or Pacific Islander, mixed, and unspecified race. Race/ethnicity response was missing from 373 (14%) of the 2,634 Wisconsin surveillance records for 2012.

within 6 months of testing (Figure); among these participants, the average number of persons with whom they reported injecting drugs was 5.4 (range = zero to 100). Among the participants, 825 (66%) reported sharing drug injection equipment, and 531 (42%) reported sharing equipment within 6 months of testing.

A blood specimen for confirmatory testing was collected from 192 (78%) of the 246 participants with positive results from rapid HCV tests. The 54 participants without a blood specimen either refused venipuncture or agency staff members could not access a vein and referred them to a clinic for HCV diagnostic testing. Among participants with a blood specimen, 190 of the 192 were tested for HCV antibody using EIA, and 100% of the results were positive, indicating no false-positive results from the rapid HCV test. A total of 183 of the 192 were tested for HCV RNA using RT-PCR, and 128 (70%) had a positive result, indicating a high proportion of participants with active infection.

FIGURE. Percentage of participants (N = 1,255) reporting selected risk behaviors or exposures,* by period before rapid hepatitis C virus (HCV) testing during a pilot program — four outreach agencies, Wisconsin, 2012–2013



* Participants could report more than one risk behavior or exposure.
† From an unlicensed vendor.
§ For example, contact with blood during a fight.

Discussion

As a tool for enhanced surveillance in Wisconsin, use of the rapid HCV test facilitated screening at four agencies where predominantly young persons at increased risk for HCV infection receive outreach testing, syringe exchange, and other harm reduction services. Most persons who inject drugs acquire HCV infection during their first years of injecting, and sharing of injection equipment has been found to be the most important behavior associated with infection (*3*,*9*). The prevalence of HCV infection among program participants was 20%. Results of previous studies have demonstrated higher prevalence of HCV infection among persons who inject drugs in the United States (range = 35%–65%) (*9*). However, participants in this program were tested within agencies offering harm reduction services and, therefore, might exhibit safer injection practices or more preventive behaviors compared with other persons who inject drugs.

A majority (70%) of the HCV infections detected during this program were active, viremic infections. This finding, coupled

with self-reported behaviors of recent and continued sharing of injection equipment despite participation in a syringe exchange service, is concerning. These data suggest that prevention messages that emphasize the risk for HCV transmission during the sharing of any injection equipment (not only syringes) are highly important. All-oral therapeutic regimens with shorter duration and fewer adverse effects are now available to cure HCV infection and reduce the risk for transmission. Efforts to link persons with viremia to medical care are critical to limit the spread and impact of hepatitis C in Wisconsin.

Although use of the rapid HCV test provides a result at the point-of-visit, additional tests are needed to differentiate past infections from current infections. Therefore, HCV antibody surveillance strategies also should include the collection of blood specimens for RNA diagnostic testing. In the current program, venous blood specimens were obtained from 78% of participants with positive results from rapid HCV tests. The number of specimens collected to confirm current HCV infection might be increased, where practical, with additional training in venipuncture at each agency and enhancement of messages informing clients of the importance of HCV testing and knowledge of the test results.

The findings in this report are subject to at least three limitations. First, although rapid HCV tests were readily available, they were not accepted by all clients at the four agency sites, and data regarding rates of refusal of the rapid tests were not collected systematically. Second, efforts were made by each agency to refer clients with positive HCV test results to medical services; however, data regarding linkage to treatment of acute HCV infection were not collected systematically. Such data are essential to help determine where efforts to improve access to treatment might be needed. Finally, populations served by the four agencies might not be representative of the general Wisconsin population, which might account for all or part of the demographic differences between the HCV-positive population in Wisconsin and the persons with positive HCV test results in this pilot program.

During this pilot program, a rapid HCV test was used to increase HCV awareness and diagnose HCV infections within the context of supportive and accessible community public health programs. This partnership of state public health and community organizations can play an important role in efforts to decrease HCV infections among young persons who inject drugs. Recent evidence suggests that availability of HCV detection services in integrated care settings that combine substance abuse treatment and injection safety is most effective at reducing HCV infection among persons who inject drugs (*10*). The use of rapid HCV tests could be a powerful tool for screening, conveying prevention information, and initiating treatment in this population with a high prevalence of HCV infection.

What is already known on this topic?

Hepatitis C virus (HCV) infection is readily transmitted through injection drug use. A new cohort of young injection drug users acquiring HCV infection has been recognized nationwide, notably in suburban and rural areas.

What is added by this report?

Rapid HCV tests were used to test 1,255 persons at increased risk for HCV infection. Of these, 20% had positive HCV test results, and 72% of the infections had not been reported previously. Blood specimens for confirmatory testing were collected from 78% of the participants with positive test results, and 70% of those specimens tested positive for HCV RNA, indicating a high proportion of participants with active infection.

What are the implications for public health practice?

The use of rapid HCV tests could be a powerful tool for conducting HCV screening, conveying prevention information, and initiating treatment in a population with high prevalence of HCV infection.

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AIDS Resource Center of Wisconsin, Milwaukee; AIDS Network, Madison; Public Health Madison and Dane County; Sixteenth Street Community Health Center, Milwaukee; Wisconsin State Laboratory of Hygiene, Madison.

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Morbidity and Mortality Weekly Report

Vital Signs: Births to Teens Aged 15–17 Years — United States, 1991–2012

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On April 8, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Abstract

Background: Teens who give birth at age 15–17 years are at increased risk for adverse medical and social outcomes of teen pregnancy.

Methods: To examine trends in the rate and proportion of births to teens aged 15–19 years that were to teens aged 15–17 years, CDC analyzed 1991–2012 National Vital Statistics System data. National Survey of Family Growth (NSFG) data from 2006–2010 were used to examine sexual experience, contraceptive use, and receipt of prevention opportunities among female teens aged 15–17 years.

Results: During 1991–2012, the rate of births per 1,000 teens declined from 17.9 to 5.4 for teens aged 15 years, 36.9 to 12.9 for those aged 16 years, and 60.6 to 23.7 for those aged 17 years. In 2012, the birth rate per 1,000 teens aged 15–17 years was higher for Hispanics (25.5), non-Hispanic blacks (21.9), and American Indians/Alaska Natives (17.0) compared with non-Hispanic whites (8.4) and Asians/Pacific Islanders (4.1). The rate also varied by state, ranging from 6.2 per 1,000 teens aged 15–17 years in New Hampshire to 29.0 in the District of Columbia. In 2012, there were 86,423 births to teens aged 15–17 years, accounting for 28% of all births to teens aged 15–19 years. This percentage declined from 36% in 1991 to 28% in 2012 ($p<0.001$). NSFG data for 2006–2010 indicate that although 91% of female teens aged 15–17 years received formal sex education on birth control or how to say no to sex, 24% had not spoken with parents about either topic; among sexually experienced female teens, 83% reported no formal sex education before first sex. Among currently sexually active female teens (those who had sex within 3 months of the survey) aged 15–17 years, 58% used clinical birth control services in the past 12 months, and 92% used contraception at last sex; however, only 1% used the most effective reversible contraceptive methods.

Conclusions: Births to teens aged 15–17 years have declined but still account for approximately one quarter of births to teens aged 15–19 years.

Implications for public health practice: These data highlight opportunities to increase younger teens exposure to interventions that delay initiation of sex and provide contraceptive services for those who are sexually active; these strategies include support for evidence-based programs that reach youths before they initiate sex, resources for parents in talking to teens about sex and contraception, and access to reproductive health-care services.

Introduction

The U.S. teen birth rate has continued to decline, from 84.1 births per 1,000 teens aged 15–19 years in 1991 to an all-time low of 29.4 in 2012 (*1*). Despite this trend, approximately 305,000 infants were born to teens aged 15–19 years in 2012 (*1*), and the U.S. teen birth rate remains higher than in other developed countries (*2*). Of particular concern are births to younger teens (those aged 15–17 years), who are not yet legally recognized as adults and are at greatest risk for poor medical, social, and economic outcomes (*3*). Teens in this age group typically have not completed high school and are subject to state-based limitations on driving and obtaining employment (*4,5*). Previous research from the National Longitudinal Survey of Youth indicates that teens who gave birth before age 18 years were markedly less likely to earn a high school diploma or general equivalency degree compared with older teens who gave birth (*6*).

Given the demonstrated impact of early teen childbearing, CDC analyzed data from the natality files of the National Vital Statistics System to better understand patterns of childbearing among this age group, and from the National Survey of Family Growth (NSFG) to describe sexual experience, contraceptive use, and receipt of prevention opportunities among female teens aged 15–17 years.

Methods

U.S. natality files are compiled annually by CDC's National Center for Health Statistics and include demographic information, such as maternal age, race, and Hispanic ethnicity for all births in all 50 states and the District of Columbia. This report includes national data from 1991–2012 and state-specific data for 2012 (*7*).

NSFG is an in-person, household survey that uses a stratified, multistage probability sample of females and males aged 15–44 years to create nationally representative estimates of sexual behaviors, attitudes, and contraceptive use (*8*). The 2006–2010 sample was used for this analysis; data were restricted to never-married female teens aged 15–17 years. Respondents who reported ever having vaginal intercourse were considered sexually experienced. Respondents who had sex in the 3 months before the time of survey were considered currently sexually active.

Contraceptive use was categorized by level of effectiveness for pregnancy prevention based on the percentage of females who experience pregnancy during the first year of typical use (*9*). The most effective reversible methods (failure rate <1%) included hormonal implants and intrauterine devices (IUDs), classified as long-acting reversible contraceptives (LARCs); moderately effective methods (failure rate 6%–12%) included pill, patch, ring, or injectable contraception; and less effective methods (failure rate ≥18%) included condom, cervical cap, sponge, rhythm method, withdrawal, and responses marked as "other." No teens in this age group reported diaphragm use or surgical sterilization. Respondents who used more than one method were categorized according to the most effective method reported. Contraceptive use at last sex and use of clinical birth control services were evaluated among those at risk for pregnancy (i.e., those who were currently sexually active and excluding those who were sterile or were pregnant at the time of last sex). Receipt of clinical birth control services in the past 12 months included receiving counseling about birth control, a checkup or medical test related to birth control, or a method or prescription for birth control.

Self-reported formal sex education and parent communication about birth control and how to say no to sex were evaluated. Data on receipt of formal sex education before first sex also were analyzed.

Differences across racial/ethnic and age subgroups were assessed using chi-square tests without adjustment for multiple comparisons. Differences were considered statistically significant at $p<0.05$. All analyses were conducted using statistical software to account for the complex sample design of the NSFG.

Results

The rate of births per 1,000 teens aged 15–17 years declined 63%, from 38.6 in 1991 to 14.1 in 2012 (*1*). From 1991 to 2012, the rate of births per 1,000 teens declined from 17.9 to 5.4 for those aged 15 years, 36.9 to 12.9 for those aged 16 years, and 60.6 to 23.7 for those aged 17 years (Figure 1). The percentage decline was higher among teens aged 15 years (70%) compared with those aged 16 years (65%) and 17 years (61%).

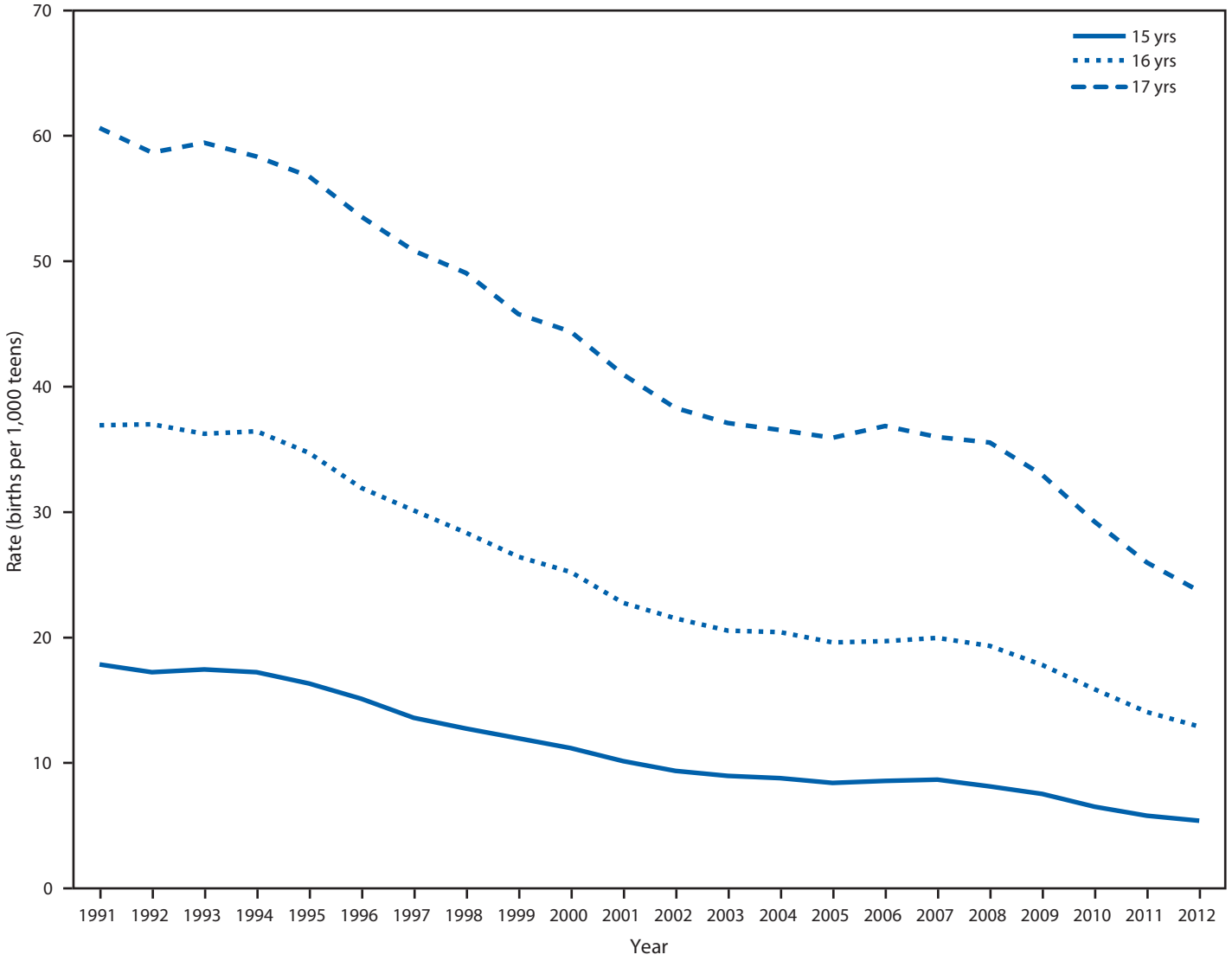
In 2012, the birth rate per 1,000 teens aged 15–17 years varied by race/ethnicity, with the highest rates among Hispanics (25.5), followed by non-Hispanic blacks (21.9), American Indians/Alaska Natives (17.0), non-Hispanic whites (8.4), and Asians/Pacific Islanders (4.1) (*1*). The rate of births to teens aged 15–17 years also varied widely by state (Figure 2), with the highest rate in the District of Columbia (29.0 per 1,000 teens aged 15–17) and the lowest rate in New Hampshire (6.2) (*1*).

In 2012, among 305,388 births to teens aged 15–19 years, 86,423 (28.3%) were births to teens aged 15–17 years. The percentage of births to teens aged 15–19 years that were to teens aged 15–17 years declined significantly during the observation period, from 36% in 1991 to 28% in 2012, representing a 22% decrease ($p<0.001$) (Figure 3).

During 2006–2010, among never-married female teens aged 15–17 years, 27.0% (95% confidence interval [CI] = 23.5%–30.7%) had ever had sex, including 14.6% (CI = 10.3%–20.2%) of those aged 15 years, 28.5% (CI = 22.9%–34.8%) of those aged 16 years, and 38.6% (CI = 33.0%–44.6%) of those aged 17 years. Additionally, 18.0% of teens aged 15–17 years were currently sexually active (CI = 15.2%–21.2%), including 8.0% (CI = 5.2%–12.1%) of those aged 15 years, 16.5% (CI = 13.0%–20.7%) of those aged 16 years, and 29.7% (CI = 24.2%–35.9%) of those aged 17 years. No significant differences by race/ethnicity were observed in the percentage of female teens aged 15–17 years who were sexually experienced or currently sexually active.

Among sexually experienced female teens aged 15–17 years, 22.7% (CI =16.7%–30.2%) used no contraceptive method at first sex; 62.0% (CI = 54.8%–68.7%) used a less effective method, and 15.3% (CI = 11.1%–20.8%) used a moderately or most effective method. Among those teens aged 15–17 years who were at risk for pregnancy at last sex, 40.4% (CI = 32.2%–49.1%) used a moderately or most effective method of birth control, 51.8% (CI = 43.3%–60.2%) used less effective methods, and 7.8% (CI = 4.5%–13.4%) used no method; 1.0% (CI = 0.3%–2.7%) used LARC methods at last sex. Additionally, 57.9% (CI = 49.8%–65.6%) of teens aged 15–17 years at risk for pregnancy received clinical birth control services in the past 12 months: 30.4%

FIGURE 1. Birth rates for teens aged 15–17 years, by age — United States, 1991–2012



Source: CDC's National Center for Health Statistics. National Vital Statistics System data.

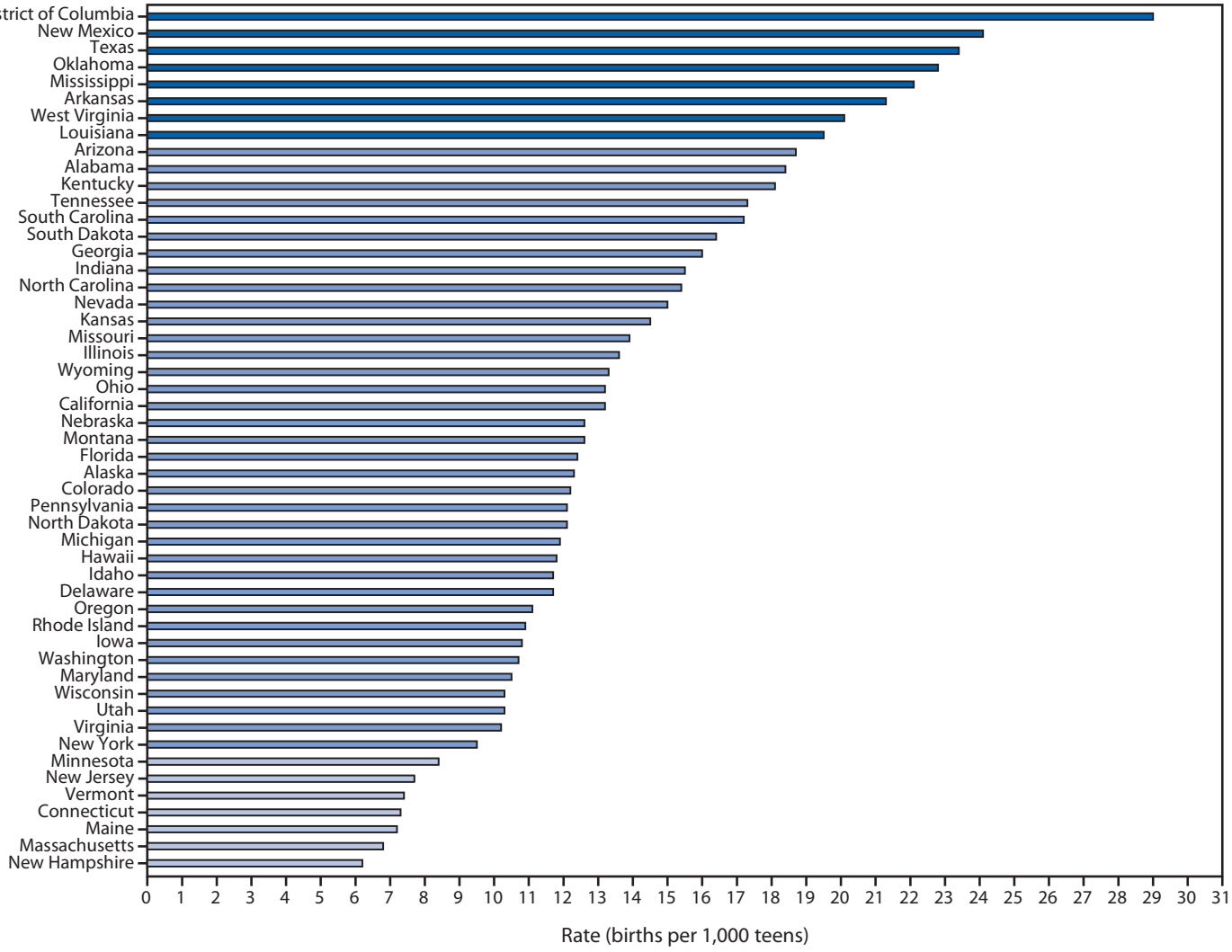
(CI = 23.8%–37.8%) received counseling about birth control, 35.2% (CI = 28.4%–42.7%) had a checkup or medical test related to birth control, and 51.7% (CI = 43.8%–59.4%) received a method or a prescription for birth control.

The vast majority of females aged 15–17 years received formal sex education on either birth control or how to say no to sex: 90.9% (CI = 88.1%–93.1%); fewer (61.3% [CI = 56.9%–65.4%]) received information on both topics (Figure 4). In contrast, only 44.0% (CI = 40.0%–48.2%) of female teens aged 15–17 years spoke with their parents about both topics, and 23.6% (CI = 20.7%–26.7%) did not speak with their parents about either topic. Of note, among sexually experienced female teens, 83.3% (CI = 77.2%–88.1%) did not receive formal sex education on these topics before first sex.

Conclusions and Comment

This report documents sharp declines in the birth rates for teens aged 15–17 years during 1991–2012; in parallel, the proportion of all births to teens aged 15–19 years that were to teens aged 15–17 years also has declined. However, approximately one in four births to a teen aged 15–19 years in 2012 was to a teen aged 15–17 years. There are substantial racial/ethnic disparities in births to younger teens with Hispanics, non-Hispanic blacks, and American Indians/Alaska Natives experiencing disproportionately higher rates (*1*). Prior research suggests that the overall risk for pregnancy declined 55% for teens aged 15–17 years during 1995–2002, with 23% of the change attributable to a decrease in sexual activity and 77% attributable to changes in contraceptive method use (*10*). Efforts to prevent pregnancy in this population should take a multifaceted approach, including the

FIGURE 2. Birth rates for teens aged 15–17 years, by reporting area — United States, 2012*



Source: CDC's National Center for Health Statistics. National Vital Statistics System data.

* The rates in reporting areas shaded medium blue are within 1 standard deviation (SD) of the mean. Rates in reporting areas shaded dark blue are >1 SD above the mean. Rates in reporting areas shaded light blue are >1 SD below the mean.

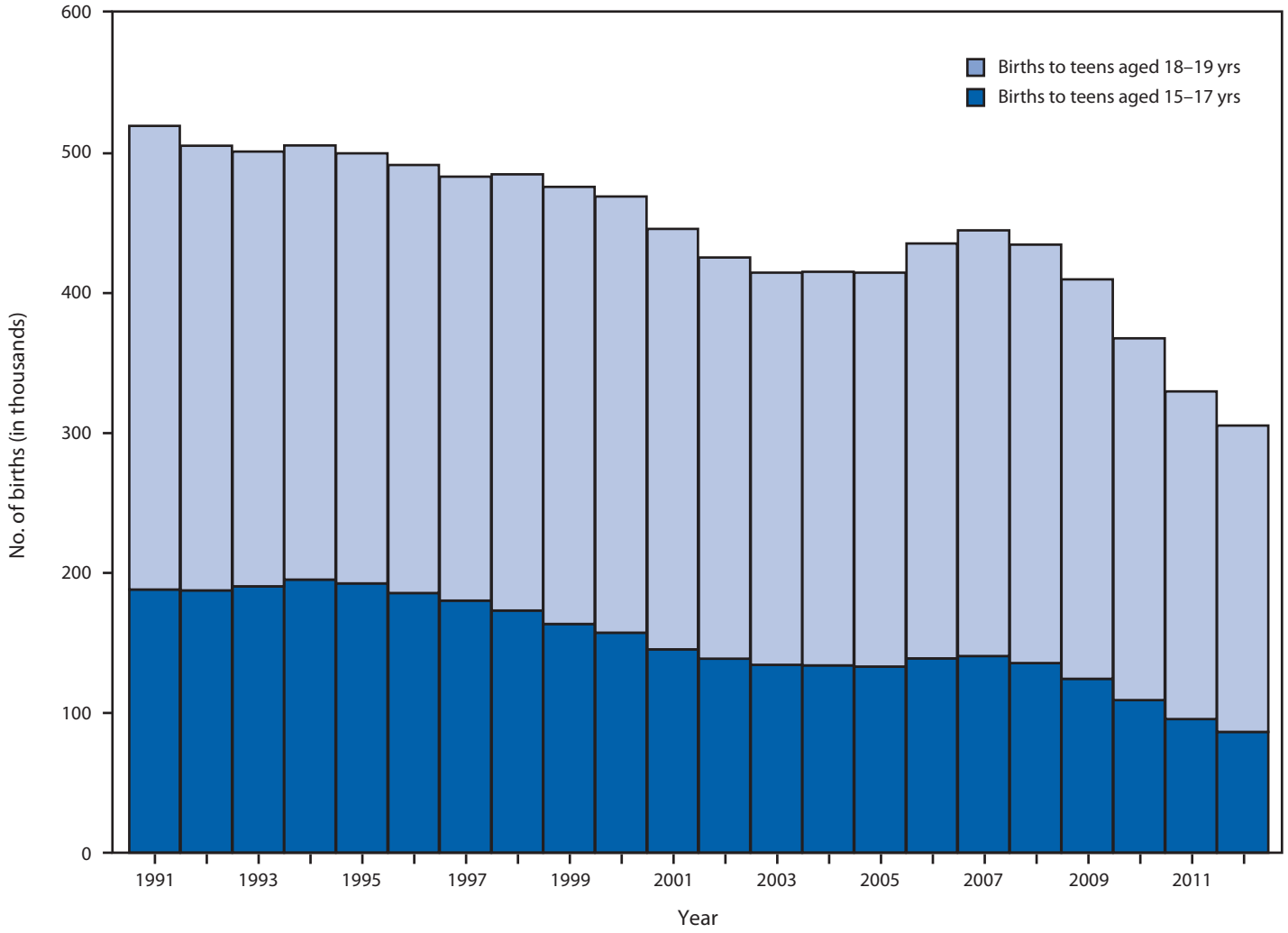
promotion of delayed sexual initiation and the use of more effective contraceptive methods.

Numerous evidence-based sexual health education programs have proven effective in delaying sexual initiation or increasing contraceptive use (*11*). This report suggests that although nearly all younger female teens received some form of sexual health education, only six in 10 reported that information on both birth control and how to say no to sex were covered. Of particular concern is that for most sexually experienced females aged 15–17 years, formal sex education did not precede their first sexual intercourse. This represents a missed opportunity to introduce medically accurate information on abstinence and effective contraceptive use.

Parents are a particularly strong influence on the sexual behavior of teens (*12*); however, almost a quarter of females aged 15–17 years have not spoken with their parents about how to say no to sex or about methods of birth control. In addition to providing information on normal sexual development, healthy relationships, abstinence, and prevention of pregnancy and sexually transmitted diseases, the quality of parent-child relationships and monitoring teen activities and behaviors are also important in helping a teenager make healthy decisions (*13,14*).

Although 92% of younger female teens used some form of contraception the last time they had sex, the majority of sexually active female teens aged 15–17 years relied on methods of contraception that are among the least effective during typical use, primarily condoms without simultaneous use of a more effective method. Consistent and correct condom use should be encouraged among sexually active teens to prevent sexually transmitted infections, including human immunodeficiency

FIGURE 3. Number of teen births* that were to teens aged 15–17 years compared with teens aged 18–19 years — United States, 1991–2012



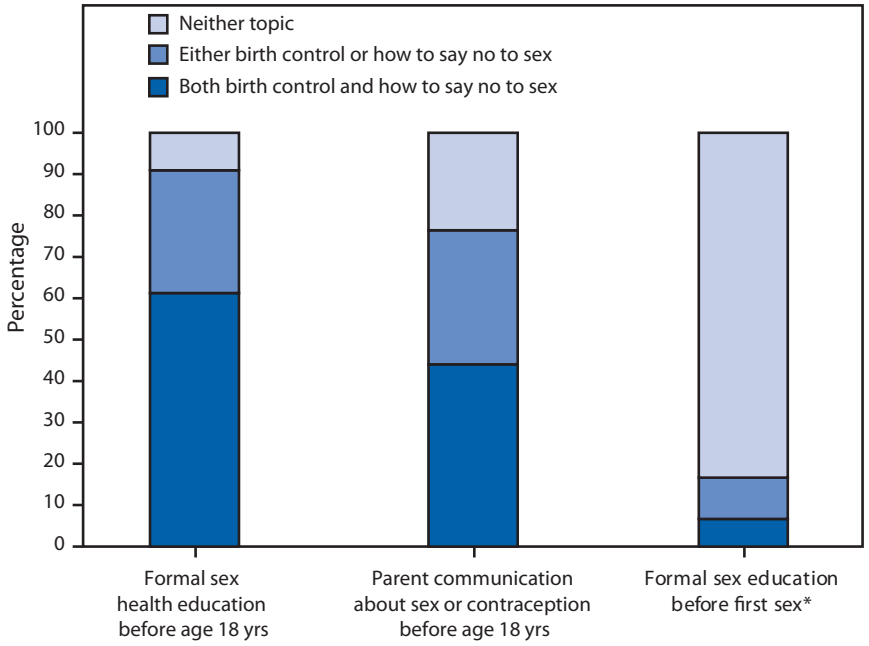
Source: CDC's National Center for Health Statistics. National Vital Statistics System data.
* Teen births are defined as births to teens aged 15-19 years.

virus infection. However, during typical use, condoms alone are not highly effective for pregnancy prevention.

Only 1% of sexually active females aged 15–17 years were using LARCs, which have the lowest failure rate among reversible methods of contraception and are safe for use for females of all ages, including teens (*15*). Previous research from the Contraceptive CHOICE Project, a study that increased use of the most effective birth control methods by providing enhanced contraceptive counseling and removing cost barriers, found that contraceptive failure rates were higher for teens who used the pill, patch, or ring; in contrast, rates of method failure and continuation for non–user dependent methods, such as LARCs, did not differ by age (*16*). In addition, this intervention demonstrated a reduction in unintended pregnancies and abortions among this age group compared with state and national estimates. However, teens face a number of barriers to LARC use, including cost, lack of health-care provider acceptance for these methods in teens, and lack of awareness of these methods among teens (*17*).

Use of more effective contraceptive methods by younger teens is limited, in part, because of the need to obtain these contraceptives from a health-care provider; the findings in this report suggest that slightly more than half of sexually active females aged 15–17 years received clinical birth control services in the past 12 months. Efforts that providers can take to increase use of these services by teens include ensuring that clinic services are youth-friendly and providing teen patients with confidential, respectful, and culturally competent services, with convenient office hours, and complete information about the most effective methods of contraception. Laws allowing minors to provide consent for health services and protecting their confidentiality vary by state. Improving confidentiality protections might

FIGURE 4. Percentage of never-married females aged 15–17 years who reported receipt of formal sex education and spoke with their parents about sex, by topic discussed — United States, 2006–2010



* Among teens who reported ever having vaginal sex.

Key Points

- Although the birth rate of teens aged 15–17 years declined 63% during the period 1991–2012, about one in four teen births occurred to younger teens (those aged 15–17 years) in 2012.
- About one in four females teens aged 15–17 years have ever had sex. Among those who have, about eight in 10 had not received any formal sex education before the first time they had sex.
- About nine in 10 sexually active younger teens used some form of contraception the last time they had sex. However, only 1% used one of the two most effective reversible methods (i.e., intrauterine devices or implants).
- Strategies to delay sexual initiation and increase the use of the most effective birth control methods include implementing evidence-based youth programs, helping parents talk to their teens about sex and contraception, and making sure that a sexually active younger teen can access reproductive health-care services.

decrease unintended births for teens (*18*); professional medical organizations have adopted policy statements that support the provision of confidential care to teens (*19*). States can consider expansion of eligibility for Medicaid coverage of family planning services to include teens aged <18 years.*

The findings in this report are subject to at least four limitations. First, only data on births were analyzed because more recent data on pregnancies (including miscarriages, stillbirths, and abortions) are not available. Second, births to teens aged <15 years, which also declined during this period, were not analyzed (*1*). Third, estimates of sexual activity, contraceptive use, and receipt of prevention opportunities are self-reported. Finally, it was not possible to assess the quality and quantity of formal sex education and parent communication about sex.

The findings in this report suggest that fewer young teens are giving birth, the majority of younger female teens are not yet sexually active, and the vast majority of those who are sexually active report use of some method of contraception. Teens need the necessary knowledge, skills, and encouragement to make healthy decisions and engage in healthy behaviors. Continued efforts to prevent teen childbearing among this group should include developmentally appropriate, evidence-based approaches to further delay sexual initiation and introduce the most effective methods of contraception for those who are sexually active.

* Additional information available at http://www.cdc.gov/stltpublichealth/psr/teenpregnancy/index.html.

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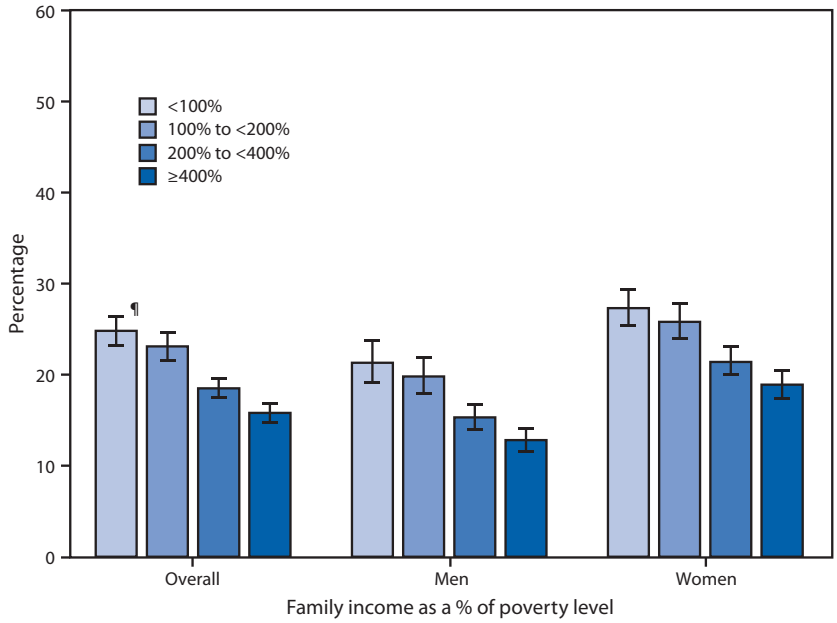
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Men and Women Who Regularly Had Insomnia or Trouble Sleeping,* by Family Income as a Percentage of Poverty Level† — National Health Interview Survey,§ United States, 2012



* Respondents were asked, "During the past 12 months, have you regularly had insomnia or trouble sleeping?"
† Poverty level was based on family income and family size, using U.S. Census Bureau poverty thresholds for 2011. Family income was imputed when information was missing, using multiple imputation methodology.
§ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. adult population.
¶ 95% confidence interval.

During 2012, the percentage of adults aged ≥18 years who reported that they regularly had insomnia or trouble sleeping during the past 12 months ranged from 15.8% for those with family incomes ≥400% of the poverty level to 24.8% for those with family incomes <100% of the poverty level. For both men and women, the percentage who regularly had insomnia or trouble sleeping decreased as family income increased. At every family income level, women were more likely than men to have had insomnia or trouble sleeping.

Source: National Health Interview Survey, 2012. Available at http://www.cdc.gov/nchs/nhis.htm.

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