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Heat Illness and Death Among Workers — United States, 2012–2013

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Exposure to heat and hot environments puts workers at risk for heat stress, which can result in heat illnesses and death. This report describes findings from a review of 2012–2013 Occupational Safety and Health Administration (OSHA) federal enforcement cases (i.e., inspections) resulting in citations under paragraph 5(a)(1), the "general duty clause" of the Occupational Safety and Health Act of 1970. That clause requires that each employer "furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees" (*1*). Because OSHA has not issued a heat standard, it must use 5(a)(1) citations in cases of heat illness or death to enforce employers' obligations to provide a safe and healthy workplace. During the 2-year period reviewed, 20 cases of heat illness or death were cited for federal enforcement under paragraph 5(a)(1) among 18 private employers and two federal agencies. In 13 cases, a worker died from heat exposure, and in seven cases, two or more employees experienced symptoms of heat illness. Most of the affected employees worked outdoors, and all performed heavy or moderate work, as defined by the American Conference of Governmental Industrial Hygienists (*2*). Nine of the deaths occurred in the first 3 days of working on the job, four of them occurring on the worker's first day. Heat illness prevention programs at these workplaces were found to be incomplete or absent, and no provision was made for the acclimatization of new workers. Acclimatization is the result of beneficial physiologic adaptations (e.g., increased sweating efficiency and stabilization of circulation) that occur after gradually increased exposure to heat or a hot environment (*3*). Whenever a potential exists for workers to be exposed to heat or hot environments, employers should implement heat illness prevention programs (including acclimatization requirements) at their workplaces.

To understand the effectiveness of existing heat illness prevention campaigns and tools, OSHA convened the Heat Illness Workgroup* to conduct a systematic review of cases of occupational heat illness or death cited for federal enforcement under paragraph 5(a)(1) during 2012–2013. Cases were identified by OSHA's Directorate of Enforcement Programs. For all cases reviewed, the workgroup established a list of program elements it considered important based on published literature and members' professional experience (Table). These included information on local weather conditions, work processes and workload, employer heat illness prevention program elements, health outcomes, numbers of persons affected, and individual risk factors. When needed, OSHA Compliance Safety and Health Officers were consulted for case clarification.

*The Heat Illness Workgroup was created in 2014 after an informal internal review of OSHA's Heat Illness Campaign and consisted of representatives from the various offices (all listed as coauthors in this report) involved in campaign materials development. The group invited a representative from CDC's National Institute for Occupational Safety and Health when they became aware of the CDC/NIOSH document revision, *Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments* that was underway.

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During 2012–2013, a total of 20 cases were cited for federal enforcement under paragraph 5(a)(1). Thirteen cases involved a worker death attributed to heat exposure, and seven involved two or more workers with symptoms of heat illness. Thirteen worksites were outdoors. In eight cases, workers performed heavy work, and in 12 cases they performed moderate work per American Conference of Governmental Industrial Hygienists workload definitions (*2*). Seven cases occurred in indoor facilities with a local heat source, such as laundry equipment or combustion engines. The cases occurred in various workplaces, including two in solid waste collection, two in mail delivery, nine in outdoor worksites (e.g., ship repair, landscaping, roofing, and oil servicing), two in laundries, and five in indoor worksites with machinery or other heat sources. All heat illnesses and deaths occurred on days with a heat index in the range of 84.0°F–105.7°F (29.0°C–41.0°C), although those working in direct sunlight might have experienced a heat index that was up to 15.0°F (8.3°C) higher than reported (*3*).

Thirteen employers had not incorporated an approach to identifying heat illness risk (e.g., heat index), as described by the National Oceanic and Atmospheric Administration, into their heat illness prevention program (*4*). None of the employer heat illness prevention programs were complete. Twelve had no program at all, seven provided inadequate water management, and 13 failed to provide shaded rest areas. Only one of the employers used work-rest cycles (i.e., scheduled periods of rest between periods of work based on temperature, humidity, and the intensity of the work activity), and none had an acclimatization program (Table). Four of the 13 deaths occurred on the first day at work in a new job or after returning from time away from the job, three on the second day, and two on the third day; four deaths occurred among long-time employees. In the cases that involved heat illness but not a death, the number of days on the job did not appear to contribute to any of the heat-related incidents.

Discussion

Heat-related deaths often occur in occupations in which workers are performing tasks in hot environments, causing them to build metabolic heat faster than their bodies can release heat and cool down. In North Carolina, during 2008–2010, work-related heat illnesses resulting in emergency department visits were more common than work-related emergency department visits with any other cause among persons aged 19–45 years (*5*). In Maricopa County, Arizona, during 2002–2009, outdoor work in construction and agriculture accounted for 35% of heat-related deaths in men (*6*). A total of 68 crop production worker deaths were reported in the United States during 1992–2006, resulting in an annual average death rate of 0.39 deaths per 100,000 crop workers (*7*). Particularly in agriculture, estimates of heat illness cases are likely to be undercounts because some surveys exclude workers on small farms (*8*).

Although OSHA's Heat Illness Prevention Campaign's core message "Water. Rest. Shade." has been widely disseminated and reflects many similar public health messages (*9*), this review

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TABLE. Summary of heat illness and fatality cases cited by the Occupational Safety and Health Administration (OSHA)* — United States, 2012–2013

Case no.	Age (yrs)	Fatality	Type of employment	Temperature (heat index) at time of incident	Time employed	Overall employer program present	Employer provided water and supported use	Employer provided rest opportunities	Employer provided cool or shaded area	Work-rest cycle	Acclimatization program	Local uncontrolled heat source (indoor)	Clothing contribution
1	47	Yes	Waste collection	91.0°F, 32.8°C (93.8°F, 34.3°C)	1 day	No	No	Only on scheduled breaks	No	No	No	None	Wearing two flannel shirts
2	Unknown (multiple workers)	No	HVAC systems manufacturing	98.6°F, 37.0°C (105.5°F, 40.8°C)	Unknown	No	No	Limited breaks	No	No	No	Plant machinery, inoperable A/C	Unknown
3	47	Yes	Asphalt paving	97.0°F, 36.1°C (99.9°F, 37.7°C)	3 days	No	Yes	Scheduled and water breaks	No	No	No	Asphalt paver machine, hot asphalt	Unknown
4	39	Yes	Synthetic turf installation	91.9°F, 33.3°C (92.5°F, 33.6°C)	2 days	Yes	Yes	Scheduled breaks	No	No	No	Synthetic turf material	Unknown
5	Unknown	No	Commercial laundry	93.9°F, 34.4°C (102.1°F, 38.4°C)	Unknown	No	Yes	Scheduled breaks	Yes	Yes†	No	Irons, washers, dryers, no A/C or fans	Unknown
6	55	Yes	Mail delivery	102.0°F, 38.9°C (104.6°F, 40.3°C)	2 days	Yes	No	No	No§	No	No	None	Unknown
7	3 workers: 53; mid-30's; 31	No	Oil field servicing	96.1°F, 35.6°C (102.0°F, 38.8°C)	Unknown	Yes	No	Minimal breaks	No	No	No	Rig engine and black steel pipe	Unknown
8	60	Yes	Roofing	82.9°F, 28.3°C (84.0°F, 28.9°C)	1 day	No	Yes	Scheduled breaks	Yes	No	No	Reflective roof surface	Wearing black clothing
9	Unknown (multiple workers)	No	Laundry	92°F, 33.3°C (100.0°F, 37.8°C)	Unknown	No	No	Scheduled breaks	No	No	No	Irons, washers, dryers, no A/C	Unknown
10	30	Yes	Oil and gas drilling	101.0°F, 38.3°C (101.7°F, 38.7°C)	2 days	No	Yes	Scheduled breaks	Yes	No	No	None	Unknown
11	31	Yes	Waste collection	91.0°F, 32.8°C (97.0°F, 36.1°C)	3 days	No	Yes	Minimal breaks	No	No	No	None	Unknown
12	36	Yes	Laying pipe	84.0°F, 28.9°C (88.0°F, 31.1°C)	1 day	Yes	Yes	Scheduled breaks	Yes	No	No	None	Unknown
13	Unknown (multiple workers)	No	Printing services	93.9°F, 34.4°C (98.6°F, 37.0°C)	Unknown	No	No	Limited breaks	No	No	No	Machinery	Unknown
14	59	Yes	Ship repair	87.1°F, 30.6°C (94.5°F, 34.7°C)	1 day	No	No	Breaks as needed	No	No	No	None	Unknown
15	45	Yes	Mail delivery	93.9°F, 34.4°C (98.6°F, 37.0°C)	>1 year	Yes	Yes	No	No	No	No	None	Unknown
16	20's (2 workers); 35 (1 worker)	No	Roofing	97.0°F, 36.1°C (105.5°F, 40.8°C)	2 weeks (1 worker); 2–3 days (2 workers)	No	Yes	Scheduled breaks	Yes	No	No	Hot tar pots	Unknown
17	Unknown (2 workers)	No	Military post exchange	90.0°F, 32.2°C (97.9°F, 36.6°C)	>1 year	Yes	Yes	No	No	No	No	Not functional A/C, metal trailer, asphalt parking lot	Unknown
18	64	Yes	Waste handling and recycling	93.9°F, 34.4°C (100.8°F, 38.2°C)	1 year	Yes	Yes	One 45-minute break in 12-hour shift	No	No	No	Radiant heat from motors, aluminum walls	Unknown
19	68	Yes	Sauna	82.4°F, 28.0°C (82.9°F, 28.3°C)	Unknown	No	Yes	Scheduled breaks	Yes	No	No	Sauna temperature 200.0–250.0°F; (93.3–121.1°C) radiant heat from stone walls	Shirt, sweatshirt and sweat pants
20	64	Yes	Park	113.0°F, 45.0°C (105.7°F, 40.9°C)¶	>1 year	Yes	Yes	Breaks as needed	Yes	No	No	None	Unknown

Sources: OSHA's Directorate of Enforcement Programs database for heat case inspections. OSHA Compliance Safety and Health Officers' inspection records. Investigators' interviews with Compliance Safety and Health Officers about the inspections.

Abbreviations: HVAC = heating, ventilation, and air conditioning; A/C = air conditioning.

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† 75% laundry sorting and 25% rest.

§ A/C unavailable in mail delivery vehicles.

¶ Humidity was very low (7%), making the heat index lower than the temperature.

What is already known on this topic?

Exposure to heat and hot environments puts workers at risk for heat stress, which can result in heat illness and death. Guidance for prevention exists, but heat illness prevention programs are not formally implemented by most employers.

What is added by this report?

A review of 2012–2013 Occupational Safety and Health Administration federal enforcement cases (i.e., inspections) resulting in citations under paragraph 5(a)(1), the "general duty clause" of the Occupational Safety and Health Act of 1970, indicated a total of 20 cases involving heat illness and death among workers (13 cases of worker deaths and seven cases in which two or more employees experienced symptoms of heat illness). Most of the affected workers were outdoors and performing heavy or moderate work. In addition, most deaths occurred in the first 3 days of working, with four of them occurring on the worker's first day. Many employers had no heat illness prevention program. Among those with such programs, many lacked basic program elements, such as water management, shaded rest areas, work-rest cycles, and acclimatization protocols. Employers' failure to support acclimatization appears to be the most common deficiency and the factor most clearly associated with death.

What are the implications for public health practice?

Heat illness prevention recommendations include the provision of water and rest breaks in a shaded, cool area to employees. Guidance from regulatory and public/occupational health agencies should include acclimatization of workers as an essential element of employer heat illness prevention programs.

shows that some employers have not developed complete heat illness prevention programs. Strikingly, in the cases reviewed, the failure to support acclimatization appears to be the most common deficiency and the factor most clearly associated with death. Employers need to provide time to acclimatize for workers absent from the job for more than a few days, new employees, and those working outdoors during an extreme heat event or heat wave. Employers must ensure that all workers acclimatize to hot environments by gradually increasing duration of work in the hot environment. In addition, health care providers should be aware of the loss of acclimatization in their patients who have been out of work for a week or more and counsel them that they will need time to regain acclimatization once they return to their job. New workers and all workers returning from an absence of more than a week should begin with 20% of the usual duration of work in the hot environment on the first day, increasing incrementally by no more than 20% each subsequent day (*3*). During a rapid change leading to excessively hot weather or conditions such as a heat wave, even experienced workers should begin on the first day of work in excessive heat with 50% of the usual duration of work, 60% on the second day, 80% on the third, and 100% on the fourth day (*9*). Full acclimatization might take up to 14 days or longer to attain, depending on individual or environmental factors.

Employers should be aware of the importance of all elements, including acclimatization, in their heat illness prevention programs. They should be diligent about 1) designating a person to develop, implement, and manage the program, 2) monitoring the temperature (e.g., heat index and wet bulb globe temperature[†]) of their worksite, 3) providing water and rest breaks in a shaded, cool area, 4) acclimatizing workers by gradually increasing the exposure to heat or a hot environment, 5) modifying work schedules as necessary to reduce workers' exposure to heat, 6) training workers on the signs and symptoms of heat illness, 7) monitoring workers for signs of heat stress, and 8) planning for emergencies and response. Guidance provided by CDC's National Institute for Occupational Safety and Health includes information on acclimatization, work-rest schedules, adequate hydration, indices for monitoring environmental heat stress (including wet bulb globe temperature), and other recommendations that can be used for developing a heat illness prevention program (*9,10*).

The findings in this report are subject to at least three limitations. First, information collected retrospectively might fail to identify important elements such as individual prior acclimatization that might have been missed by OSHA Compliance Safety and Health Officers. Second, information from weather websites regarding past weather conditions relatively close to the worksite under consideration might not accurately represent conditions at the worksite itself (especially because at least one of the weather stations was more than 100 miles from the worksite) and thus might fail to identify the actual impact of weather. Finally, OSHA Compliance Safety and Health Officers performing workplace inspections might have missed program elements identified by the Heat Illness Workgroup because these elements were not part of routine information collection.

Additional information and resources regarding heat stress are available from CDC at http://www.cdc.gov/niosh/topics/heatstress and from OSHA at https://www.osha.gov/SLTC/heatillness/edresources.html.

[†] Wet bulb globe temperature is the measure of heat stress in direct sunlight that takes into account temperature, humidity, wind speed, sun angle, and cloud cover. This differs from the heat index, which takes into account temperature and humidity and is calculated for shady areas. Additional information available at http://www.srh.noaa.gov/tsa/?n=wbgt.

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Relationship of Income and Health Care Coverage to Receipt of Recommended Clinical Preventive Services by Adults — United States, 2011–2012

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Each year in the United States, an estimated 100,000 deaths could be prevented if persons received recommended clinical preventive care (*1*). The Affordable Care Act has reduced cost as a barrier to care by expanding access to insurance and requiring many health plans to cover certain recommended preventive services without copayments or deductibles. To establish a baseline for the receipt of these services and to begin monitoring the effects of the law, CDC analyzed responses from persons aged ≥18 years in the National Health Interview Survey (NHIS) for the years 2011 and 2012 combined. This report summarizes the findings for six services covered by the Affordable Care Act. Among the six services examined, three were received by less than half of the persons for whom they were recommended (testing for human immunodeficiency virus [HIV] and vaccination for influenza and zoster [shingles]). Having health insurance or a higher income was associated with higher rates of receiving these preventive services, affirming findings of previous studies (*2*). Securing health insurance coverage might be an important way to increase receipt of clinical preventive services, but insurance coverage is not all that is needed to ensure that everyone is offered and uses clinical services proven to prevent disease. Greater awareness of Affordable Care Act provisions among public health professionals, partners, health care providers, and patients might help increase the receipt of recommended services (*3*).

The analysis focused on responses to questions about the receipt of six clinical preventive services recommended by the U.S. Preventive Services Task Force (USPSTF) or the Advisory Committee for Immunization Practices (ACIP). The six preventive services are among dozens of services for adults covered without copayments or deductibles under certain health plans according to the Affordable Care Act,* and were selected for this analysis because the recommendations closely fit NHIS survey questions. The six were as follows: HIV testing, smoking cessation discussion, influenza vaccination, pneumococcal vaccination, tetanus vaccination, and zoster (shingles) vaccination. However, the recommendations and NHIS questions are not a perfect match. For example, cessation intervention is recommended for all forms of tobacco use, but respondents were only asked about receiving smoking cessation interventions. The fit between the NHIS questions and the recommendations varied among the six preventive services (Table 1).

NHIS is administered by in-person interviews to a nationally representative sample of the noninstitutionalized, U.S. civilian population. For this analysis, NHIS data from the sample adult core questionnaire in 2011 and 2012 were combined to increase sample sizes and improve reliability of estimates. In each household identified, one adult (aged ≥18 years) from each family was randomly selected to complete the questionnaire.† NHIS 2011 and 2012 adult core samples included 33,014 and 34,525 respondents, respectively, and the overall response rates were 66.3% and 61.2%.

Participants were asked whether they had health insurance at the time of the interview. They were considered uninsured if they reported currently not having private health insurance, Medicare, Medicaid, Children's Health Insurance Program, a state-sponsored or other government-sponsored health plan, or a military plan. Respondents also were defined as uninsured if they had only a private plan that paid for one type of service (e.g., injury or dental care) or had only Indian Health Service coverage.§ Multiple imputations were performed on family income to account for missing responses to income questions.¶ NHIS data were adjusted for nonresponse and weighted to provide national estimates of insurance status and receipt of preventive care; 95% confidence intervals were calculated, taking into account the survey's multistage probability sample design. Generalized linear modeling and the t-test were used to calculate prevalence ratios and statistical significances of differences in preventive services receipt between 1) persons who were insured and those who were uninsured, 2) those with current family incomes >200% of the federal poverty level (FPL) ($46,100 for a family of four in 2012**) and those

* For adults, the Affordable Care Act recognizes USPSTF (http://www.uspreventiveservicestaskforce.org) and ACIP (http://www.cdc.gov/vaccines/acip) as organizations whose clinical preventive service recommendations receive coverage without copayments and deductibles for certain health plans.

† Additional information available at http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm.

§ Consistent with other population surveys conducted by U.S. federal agencies, CDC does not regard Indian Health Service coverage as health insurance for the purpose of identifying uninsured populations.

¶ Additional information available at http://www.cdc.gov/nchs/nhis/2011imputedincome.htm and http://www.cdc.gov/nchs/nhis/2012imputedincome.htm.

** Additional information available at http://aspe.hhs.gov/poverty/12poverty.shtml and http://www.census.gov/hhes/www/poverty/about/overview/measure.html.

TABLE 1. Comparison of recommendations from the United States Preventive Services Task Force (USPSTF) and the Advisory Committee on Immunization Practices (ACIP) with questions regarding six recommended clinical preventive services in the National Health Interview Survey (NHIS) — United States, 2011–2012

Clinical preventive service (age group)	Recommendation	Question to NHIS participants	Key distinctions for this analysis of use of recommended services
HIV test (age 18–65 years)	HIV infection screening is recommended for persons aged 15–65 years. Screening is recommended for other age groups at increased risk. Recommended screening interval for the general population is not specified.*	To adults aged ≥18 years: "Except for tests you may have had as part of blood donations, have you ever been tested for HIV?"†	NHIS asks this question to those aged ≥18 years. Those aged 15–17 years are not included in the analysis.
Smoking cessation discussion (age ≥18 years)	Tobacco cessation interventions are recommended for those who use tobacco products. A recommended screening interval for the general population is not specified.*	To adults aged ≥18 years who currently smoke cigarettes every day or some days: "During the past 12 months, has a doctor or other health professional talked to you about your smoking?"	Adults who use tobacco only in forms other than cigarettes are not included in the analysis.
Influenza vaccination (age ≥18 years)	Annual vaccination against influenza is recommended for all persons aged ≥6 months.§	To adults aged ≥18 years: "During the past 12 months, have you had a flu shot?" and "During the past 12 months, have you had a flu vaccine sprayed in your nose by a doctor or other health professional?" A "yes" response to either question is coded as vaccination received.	This analysis focuses on adults aged ≥18 years.
Pneumococcal vaccination (age ≥65 years)	Pneumococcal vaccination is recommended for all persons aged ≥65 years and for persons with certain other risk factors aged <65 years.§	"Have you ever had a pneumonia shot?"†	This analysis focuses on those aged ≥65 years.
Tetanus vaccination (age ≥19 years)	Vaccination with Td booster (or 1-time dose of Tdap) for all adults aged ≥19 years.§	To adults aged ≥18 years: "Have you received a tetanus shot in the past 10 years?"	This analysis focuses on those aged ≥19 years for consistency with the recommendation for adults.
Zoster (shingles) vaccination (age ≥60 years)	Zoster vaccination is recommended for adults aged ≥60 years.§	To adults aged ≥50 years: "Have you ever had the zoster or shingles vaccine, also called Zostavax?"†	This analysis focuses on those aged ≥60 years for consistency with the recommendation for adults.

Abbreviations: HIV = human immunodeficiency virus; Td = tetanus and diphtheria; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis.
* **Source:** USPSTF.
† At any age.
§ **Source:** ACIP.

with incomes ≤200% of the FPL, and 3) those with any private health insurance and those with only public coverage.

For the six services examined, prevalence of receipt of service was as follows: zoster vaccination, 17.9%; influenza vaccination, 39.4%; HIV testing, 41.7%; smoking cessation discussion, 52.0%; pneumococcal vaccination, 61.4%; and tetanus vaccination, 62.0% (Table 2). A higher percentage of adults with health insurance received five of six recommended clinical preventive services (all but HIV testing) compared with those who were uninsured (Table 2). Among those five services, the service receipt prevalence ratio for those with insurance compared with those without insurance ranged from 1.2 for tetanus vaccination to 3.4 for pneumococcal vaccination (Table 2). However, service receipt for persons with health insurance was <50% for three of six recommended clinical preventive services.

Persons with family incomes >200% of the FPL received five of six recommended clinical preventive services at a statistically significant higher prevalence compared with those with incomes below that threshold (Table 3). Among those five services, the service receipt prevalence ratio for those with family incomes >200% of the FPL compared with those with incomes ≤200% of the FPL ranged from 1.1 for pneumococcal vaccination to 1.9 for zoster vaccination (Table 3).

Persons with private health insurance received three of six recommended clinical preventive services at a higher prevalence, and three of six at a lower prevalence, compared with those with only public insurance (Table 4).

Discussion

The findings in this report indicate that during 2011–2012, large portions of the adult population were not receiving recommended preventive care, those with insurance were more likely to receive recommended preventive services than those without coverage, and those with higher income were more likely to receive recommended care. This supports previously published studies, including one that found prevalence ratios in the range of 1–3 for those with insurance receiving

TABLE 2. Percentage of adults in the recommended populations who received six clinical preventive services, by health insurance status — National Health Interview Survey, United States, 2011–2012

Clinical preventive service (age group)	Insured receiving service			Uninsured receiving service			Prevalence ratio, insured/ uninsured*	(95% CI)	Total receiving service	
	No.	%	(95% CI)	No.	%	(95% CI)			%	(95% CI)
HIV test (ever) (age 18–65 years)	40,823	41.5	(40.7–42.2)	11,641	43.1	(41.9–44.3)	1.0†	(0.9–1.0)	**41.7**	**(41.1–42.4)**
Smoking cessation discussion (within 12 mos) (age ≥18 years)	8,935	59.1	(58.0–60.3)	3,497	32.7	(31.1–34.4)	1.8§	(1.7–1.9)	**52.0**	**(51.0–53.0)**
Influenza vaccination (within 12 mos) (age ≥18 years)	54,217	44.2	(43.6–44.7)	11,888	14.7	(13.9–15.4)	3.0§	(2.9–3.2)	**39.4**	**(38.9–40.0)**
Pneumococcal vaccination (ever) (age ≥65 years)	13,585	61.7	(60.6–62.7)	113	18.1	(9.1–27.0)	3.4§	(2.1–5.6)	**61.4**	**(60.3–62.4)**
Tetanus vaccination (within 10 years) (age ≥19 years)	51,872	63.7	(63.0–64.3)	11,431	53.7	(52.6–54.8)	1.2§	(1.2–1.2)	**62.0**	**(61.5–62.6)**
Zoster vaccination (ever) (age ≥60 years)	18,297	18.4	(17.6–19.2)	868	6.3	(4.2–8.4)	2.9§	(2.1–4.1)	**17.9**	**(17.1–18.7)**

Abbreviations: CI = confidence interval; HIV = human immunodeficiency virus.
* Generalized linear modeling was used to identify statistical significance of differences between insured and uninsured persons receiving service.
† p<0.015.
§ p<0.001.

TABLE 3. Percentage of adults in the recommended populations who received six clinical preventive services, by family income level — National Health Interview Survey, United States, 2011–2012

Clinical preventive service (age group)	Income >200% FPL receiving service			Income ≤200% FPL receiving service			Prevalence ratio, higher income/ lower income*	(95% CI)
	No.	%	(95% CI)	No.	%	(95% CI)		
HIV test (ever) (age 18–65 years)	31,948	40.2	(39.4–40.9)	25,815	44.6	(43.5–45.7)	0.9†	(0.9–0.9)
Smoking cessation discussion (within 12 mos) (age ≥18 years)	6,068	53.5	(52.2–54.8)	6,404	50.4	(48.9–51.9)	1.1§	(1.0–1.1)
Influenza vaccination (within 12 mos) (age ≥18 years)	40,110	42.8	(42.2–43.4)	26,201	33.4	(32.6–34.3)	1.3†	(1.3–1.3)
Pneumococcal vaccination (ever) (age ≥65 years)	8,268	64.4	(63.1–65.6)	5,449	56.2	(54.5–57.9)	1.1†	(1.1–1.2)
Tetanus vaccination (within 10 years) (age ≥19 years)	38,893	65.0	(64.4–65.7)	24,840	56.6	(55.7–57.5)	1.1†	(1.1–1.2)
Zoster vaccination (ever) (age ≥60 years)	12,025	21.4	(20.4–22.4)	7,177	11.3	(10.3–12.3)	1.9†	(1.7–2.1)

Abbreviations: CI = confidence interval; HIV = human immunodeficiency virus; FPL = federal poverty level.
* Generalized linear modeling was used to identify statistical significance of differences betweeen persons at higher income level and lower income level receiving service.
† p<0.001.
§ p<0.005.

recommended preventive services compared with those without coverage (*2*). However, even among persons with insurance and higher income, in this analysis, receipt of recommended preventive services was suboptimal.

This report could serve as a baseline for tracking the effects of the Affordable Care Act on the receipt of six preventive services. Although the law began to require certain plans to cover clinical preventive services in September 2010, the data from 2011–2012 provide a feasible baseline for measuring the law's effects because 1) a high number of persons remained uninsured during 2011–2012, 2) there was little awareness of the preventive care provisions of the new law, and 3) many plans in existence before enactment of the Affordable Care Act were not subject to the preventive services provisions (*4*–*6*).

The findings in this report are subject to at least four limitations. First, this was a cross-sectional study, and associations between receipt of a service and other factors do not imply a causal relationship. Second, insurance coverage and income level are just two of many factors that might be associated with service receipt rates. This analysis does not include possible confounders such as education, health status, or other factors. Third, receipt of preventive services was self-reported and might be subject to recall bias. Finally, inferences from these results are limited by differences in time between when the questions were asked and when the services were received. For

TABLE 4. Percentage of adults in the recommended populations who received six clinical preventive services, by source of health insurance coverage — National Health Interview Survey, United States, 2011–2012

Clinical preventive service (age group)	Private insurance receiving service			Only public insurance receiving service			Prevalence ratio, private/ public*	(95% CI)
	No.	%	(95% CI)	No.	%	(95% CI)		
HIV test (ever) (age 18–65 years)	31,605	38.6	(37.8–39.3)	9,218	53.0	(51.6–54.3)	0.7†	(0.7–0.8)
Smoking cessation discussion (within 12 mos) (age ≥18 years)	5,399	55.3	(53.9–56.8)	3,535	65.8	(64.0–67.5)	0.8§	(0.8–0.9)
Influenza vaccination (within 12 mos) (age ≥18 years)	38,470	42.4	(41.8–43.1)	15,738	48.9	(47.9–49.9)	0.9§	(0.8–0.9)
Pneumococcal vaccination (ever) (age ≥65 years)	6,807	66.1	(64.8–67.4)	6,769	56.9	(55.3–58.4)	1.2§	(1.1–1.2)
Tetanus vaccination (within 10 years) (age ≥19 years)	36,917	65.7	(65.1–66.4)	14,946	57.9	(56.9–58.9)	1.1§	(1.1–1.2)
Zoster vaccination (ever) (age ≥60 years)	10,305	20.4	(19.4–21.4)	7,984	15.7	(14.6–16.7)	1.3§	(1.2–1.4)

Abbreviations: CI = confidence interval; HIV = human immunodeficiency virus.
* Generalized linear modeling was used to identify statistical significance of differences between persons with private insurance and only public insurance.
† $p<0.05$.
§ $p<0.001$.

What is already known on this topic?

Rates of receipt of some clinical preventive services by adults are low, but higher for persons with insurance coverage or higher incomes. The Affordable Care Act's expansions of health insurance access and coverage requirements for clinical preventive services were developed to increase access to health services to improve the health of the population.

What is added by this report?

Analysis of combined adult responses to the National Health Interview Survey in 2011 and 2012 indicated that persons with health insurance were more likely to have received five of six recommended preventive services than persons without insurance. However, regardless of insurance status, receipt was below 50% for three services and ranged from 17.9% for zoster vaccination to 62.0% for tetanus vaccination.

What are the implications for public health practice?

Increased insurance coverage might lead to a substantial increase in receipt of preventive care and improvements in population health. However, low rates of service receipt even among those with insurance suggest that additional efforts beyond insurance coverage expansion might be needed to increase offering and use of services.

example, NHIS identifies whether the respondent is insured at the time of interview; however, depending on the service, NHIS asks whether the respondent received preventive care in the last 12 months, last 10 years, or ever during their lifetime. Currently uninsured respondents might have received preventive care during a time when they had insurance, or vice versa. In addition, NHIS is limited to noninstitutionalized civilians, excluding certain populations (e.g., the institutionalized and the military) that might be especially likely to receive recommended preventive services.

All new private health plans, alternative benefit plans for the newly Medicaid eligible, and Medicare now provide coverage without copayments or deductibles for recommended clinical preventive services. By expanding access to insurance and requiring many plans to cover recommended clinical preventive services, the Affordable Care Act is expected to reduce barriers to receipt of recommended preventive care. The number of uninsured persons aged <65 years is expected to drop from 55 million in 2013 to 30 million in 2017 (*7*).

Lack of insurance, however, is not the only barrier to receiving services; a number of other factors likely will continue to inhibit receipt of preventive care. First, many persons are currently insured under "grandfathered" health plans not required to provide coverage without copayments or deductibles for all recommended preventive services (*8*). Second, other barriers, such as transportation costs and lack of a regular physician, might inhibit receipt of recommended preventive care. Finally, even after the Affordable Care Act is implemented fully, millions of persons are expected to remain uninsured (*7*). To date, about half of the 50 states have not yet implemented the law's expansion of Medicaid, leaving an estimated 40% of their adult residents who have been uninsured in the last 2 years without access to affordable care (*9*). Studies have indicated that 60%–74% of children who are eligible for Medicaid are uninsured, in part as a result of failure to renew enrollment in Medicaid (*10*). Efforts to increase enrollment and coverage retention could help these populations maintain continuous coverage, thereby increasing receipt of preventive services and reducing avoidable complications from illness, long-term health care costs, and premature deaths (*10*).

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Vital Signs: Fruit and Vegetable Intake Among Children — United States, 2003–2010

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Abstract

Background: Eating more fruits and vegetables adds underconsumed nutrients to diets, reduces the risks for leading causes of illness and death, and helps manage body weight. This report describes trends in the contributions of fruits and vegetables to the diets of children aged 2–18 years.

Methods: CDC analyzed 1 day of 24-hour dietary recalls from the National Health and Nutrition Examination Surveys from 2003 to 2010 to estimate trends in children's fruit and vegetable intake in cup-equivalents per 1,000 calories (CEPC) and trends by sex, age, race/ethnicity, family income to poverty ratio, and obesity status. Total fruit includes whole fruit (all fruit excluding juice) and fruit juice (from 100% juice, foods, and other beverages). Total vegetables include those encouraged in the *Dietary Guidelines for Americans, 2010* (i.e., dark green, orange, and red vegetables and legumes), white potatoes, and all other vegetables.

Results: Total fruit intake among children increased from 0.55 CEPC in 2003–2004 to 0.62 in 2009–2010 because of significant increases in whole fruit intake (0.24 to 0.40 CEPC). Over this period, fruit juice intake significantly decreased (0.31 to 0.22 CEPC). Total vegetable intake did not change (0.54 to 0.53 CEPC). No socio-demographic group met the *Healthy People 2020* target of 1.1 CEPC vegetables, and only children aged 2–5 years met the target of 0.9 CEPC fruits.

Conclusions: Children's total fruit intake increased because of increases in whole fruit consumption, but total vegetable intake remained unchanged.

Implications for Public Health Practice: Increased attention to the policies and food environments in multiple settings, including schools, early care and education, and homes might help continue the progress in fruit intake and improve vegetable intake.

Introduction

Dietary Guidelines for Americans, 2010, recommends that Americans aged ≥2 years eat more fruits and vegetables to add important nutrients that are underconsumed, reduce the risk of heart disease, stroke, and some cancers, and help manage weight (*1*). Most U.S. residents, including children, consume too few fruits and vegetables. In 2007–2010, 60% of children aged 1–18 years did not meet U.S. Department of Agriculture Food Patterns fruit intake recommendations, and 93% did not meet vegetable recommendations (*2*). Because of the benefits of eating fruits and vegetables and because childhood dietary patterns are associated with food patterns later in life (*3*), encouraging children to eat more fruits and vegetables is a public health priority.

Healthy People 2020 (HP2020) objectives NWS-14 and NWS-15 call for increases in the contribution of fruits to U.S. residents' diets from 0.5 cup-equivalents per 1,000 calories (CEPC) in 2001–2004 to a 2020 target of 0.9 CEPC and of vegetables from 0.8 CEPC to a 2020 target of 1.1 CEPC.* One cup-equivalent is approximately one small apple, 1 cup of applesauce, 1 cup of 100% juice, or 12 baby carrots.† The Dietary Guidelines emphasizes that the majority of fruit consumed be whole fruit, rather than juice; when juice is consumed, it should be 100% juice (*1*). The Dietary Guidelines also recommends eating a variety of vegetables, especially dark green, orange, and red vegetables (e.g., broccoli and spinach, carrots and pumpkin, and tomatoes and red peppers, respectively) and legumes.

* Additional information available at http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=29.

† Additional information available at http://myplate.gov/printpages/myplatefoodgroups/fruits/food-groups.fruits-counts.pdf and http://myplate.gov/printpages/myplatefoodgroups/vegetables/food-groups.vegetables-counts.pdf.

In spite of some recent evidence of increases in children's fruit intake (*4*), trends by fruit and vegetable subgroups have not been reported. This report describes trends in the contribution of fruits and vegetables to children's diets from 2003–2004 to 2009–2010, overall and by demographic characteristics, using 1 day of 24-hour dietary recall data from the What We Eat in America component of the National Health and Nutrition Examination Survey (NHANES).

Methods

NHANES is a nationally representative, multistage survey of the noninstitutionalized U.S. civilian population.[§] CDC analyzed data for children aged 2–18 years to include preschool and school-aged populations. Consistent with HP2020 methods, CDC used data for children starting at age 2 years. Across the four NHANES survey cycles (2003–2004, 2005–2006, 2007–2008, and 2009–2010) the response rates for persons aged 1–19 years were 81%–90%. A total of 14,865 children aged 2–18 years participated in these four cycles. Trained interviewers collected 24-hour dietary recalls using the U.S. Department of Agriculture (USDA) automated multiple-pass method[¶] by proxy for those aged 1–5 years, with proxy assistance for those aged 6–11 years, and directly from participants aged ≥12 years. After excluding those with incomplete data, the final analytic sample was 12,459 participants. All reported single and multi-ingredient foods and beverages were separated into their components and assigned cup-equivalents of fruits and vegetables according to standard recipes using the USDA's MyPyramid and Food Patterns Equivalents databases corresponding with each NHANES survey cycle.[**] Total fruit included whole fruit (all forms of fruit, excluding juice) and fruit juice (100% fruit juice plus the 100% fruit juice component of foods and other beverages). Total vegetables included those which the Dietary Guidelines encourages persons to consume (dark green, orange, and red vegetables and legumes), white potatoes, and all other vegetables. Intakes in CEPC of total fruit, total vegetables, and each subgroup were estimated by summing the cup-equivalents consumed from each food and beverage, dividing by caloric intake, and multiplying by 1,000. Mean intake for each survey cycle was age-standardized to the 2000 U.S. population and calculated overall and by sex, age group (2–5, 6–11, and 12–18 years), race/ethnicity (Mexican American, non-Hispanic black, or non-Hispanic white), family income to poverty ratio (<130%, 130% to <349%, and ≥349%), and obesity status (age-specific and sex-specific body mass index ≥95th percentile using the 2000 CDC growth charts[††]). For family income to poverty ratio, poverty was defined according to federal poverty guidelines.[§§] To examine trends in fruit and vegetable intake, average annual change in CEPC per year was calculated using linear regression and was reported as a percent by dividing the annual change by mean intake in 2003–2004. T-tests were used to examine differences in fruit and vegetable subgroups by socio-demographic characteristics in 2009–2010. A p-value of <0.05 was considered statistically significant.

Results

Total fruit intake among children significantly increased 0.015 CEPC or 3% of the 2003–2004 baseline amount, per year (0.55 CEPC in 2003–2004 to 0.62 in 2009–2010) (Figure 1). Whole fruit intake significantly increased 0.029 CEPC or 12% per year (0.24 to 0.40 CEPC); fruit juice intake significantly decreased 0.014 CEPC or 5% per year (0.31 to 0.22 CEPC). Total fruit intake increased significantly among males, children aged 6–11 years, children from families with incomes in the 130% to <349% poverty threshold, and obese children (Table 1). Whole fruit intake increased significantly among all socio-demographic groups.

Total vegetable and vegetable subgroup intake in CEPC did not change over time (Figure 2). White potatoes accounted for an average of 30% of total vegetable intake over the study period (0.15–0.17 CEPC) (Figure 2) and were consumed mainly as less healthy forms of potatoes (e.g., fried potatoes and potato chips) (0.09–0.11 CEPC over the study period). Trends in total vegetable intake in CEPC were similar across socio-demographic groups, except for slight but significant decreases among Mexican Americans (driven by a significant decrease in Dietary Guidelines-encouraged vegetables) and non-Hispanic black children (driven by a significant decrease in other vegetables) (Table 2).

Disparities in total fruit intake existed by age in 2009–2010. Children aged 2–5 years consumed significantly more fruit in CEPC than older children (p<0.01 for differences) (Table 1). Females consumed more total vegetables in CEPC than males, and children aged 12–18 years consumed more vegetables in CEPC than younger children (p<0.05 for differences). Mexican American children consumed more vegetables in CEPC than non-Hispanic black children (p=0.01). No socio-demographic group met the HP2020 total vegetable target and only children aged 2–5 years met the total fruit target.

§ Additional information available at http://www.cdc.gov/nchs/nhanes.htm.

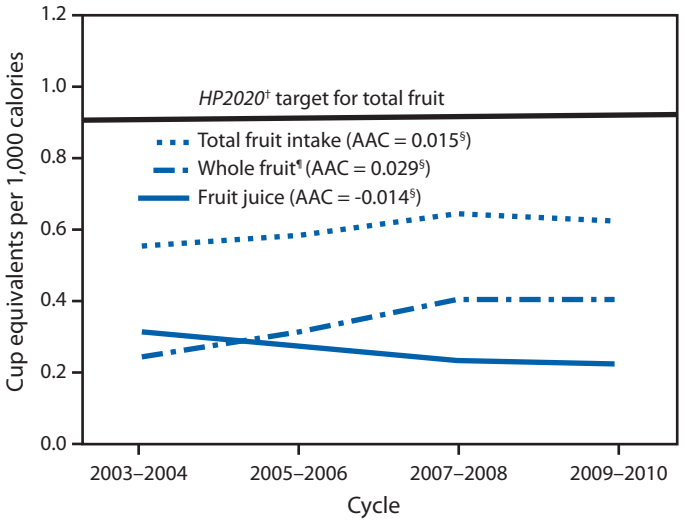
¶ Additional information available at http://www.ars.usda.gov/Services/docs.htm?docid=7710.

** Additional information available at http://www.ars.usda.gov/services/docs.htm?docid=23868 and http://www.cnpp.usda.gov/publications/mped/cnpp-mpedaddendumdocumentation.pdf.

†† Available at http://www.cdc.gov/nchs/data/series/sr_11/sr11_246.pdf.

§§ Additional information available at http://aspe.hhs.gov/poverty/13poverty.cfm.

FIGURE 1. Mean daily intake of fruit in cup-equivalents per 1,000 calories among children aged 2–18 years — National Health and Nutrition Examination Survey, United States, 2003 to 2010*



Abbreviations: AAC = average annual change; HP2020 = *Healthy People 2020*.
* Estimates age adjusted to the 2000 U.S. population.
† Additional information available at http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=29.
§ Average annual change from 2003 to 2010 calculated using linear regression statistically different from zero at alpha = 0.05.
¶ Whole fruit includes all forms of fruit, excluding juice.

Discussion

From 2003–2004 to 2009–2010, children's total fruit intake per 1,000 calories increased an average of 3% per year, or a total of 13% between the two periods. Whole fruit increased an average of 12% per year, or 67% over the period, while fruit juice decreased an average of 5% per year, or 29% over the same period. Total vegetable intake per 1,000 calories remained unchanged. Children aged 2–5 years consumed 0.51 CEPC (about one half of a small apple for every 1,000 calories eaten) more total fruit than children aged 12–18 years. No sociodemographic group met the HP2020 total vegetable target and only children aged 2–5 years met the total fruit target. Increases in whole fruit intake and decreases in fruit juice intake are both encouraging patterns. The Dietary Guidelines and the American Academy of Pediatrics emphasize that most fruit should be consumed as whole fruit, rather than juice (*1,5*). Although 100% juice can be part of a healthy diet, it might be easy to over consume (*5*), and it lacks the fiber of whole fruit (*1,5*).

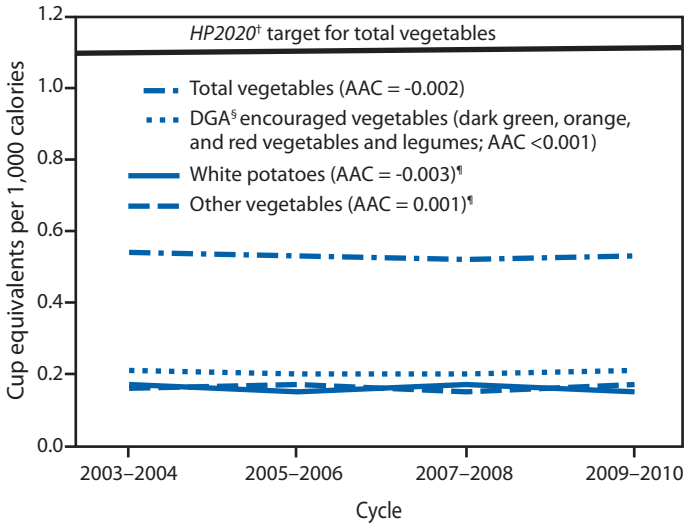
Children's fruit and vegetable consumption might be influenced by taste preferences, repeated exposures to fruits and vegetables, social experiences, and availability (*6*). Although specific reasons for the increase in fruit intake among children are unknown, a number of policies and programs implemented over the last several years might have contributed. For example, the addition of

TABLE 1. Mean intake of total fruit in cup-equivalents per 1,000 calories among children aged 2–18 years, by sex, age, race/ethnicity, family income to poverty ratio, and obesity status — National Health and Nutrition Examination Survey, United States, 2003 to 2010*

Characteristic	2003–2004			2009–2010			p-value†	Annual change§
	No. surveyed	Mean intake	(95% CI)	No. surveyed	Mean intake	(95% CI)		
All children	**3,348**	**0.55**	**(0.49–0.61)**	**2,830**	**0.62**	**(0.56–0.68)**	**0.032**	**0.015**
Sex								
Male	1,663	0.52	(0.44–0.60)	1,475	0.60	(0.53–0.68)	0.021	0.019
Female	1,685	0.59	(0.52–0.66)	1,355	0.64	(0.58–0.71)	0.249	0.010
Age group (yrs)								
2–5	706	0.89	(0.76–1.01)	774	0.97	(0.86–1.07)	0.203	0.016
6–11	861	0.51	(0.42–0.60)	1,058	0.61	(0.55–0.67)	0.015	0.020
12–18	1,781	0.43	(0.36–0.50)	998	0.46	(0.38–0.54)	0.407	0.007
Race/ethnicity¶								
Mexican American	1,005	0.66	(0.57–0.75)	765	0.72	(0.59–0.85)	0.406	0.011
Black, non-Hispanic	1,145	0.55	(0.47–0.62)	566	0.62	(0.53–0.71)	0.170	0.012
White, non-Hispanic	930	0.52	(0.44–0.59)	988	0.59	(0.50–0.67)	0.108	0.015
Income to poverty ratio								
<130%	1,505	0.56	(0.47–0.65)	1,332	0.59	(0.53–0.66)	0.485	0.006
130% to <349%	1,196	0.49	(0.43–0.55)	949	0.63	(0.52–0.73)	0.013	0.025
≥349%	647	0.65	(0.57–0.74)	549	0.65	(0.58–0.72)	0.252	0.011
Obesity status								
Obese**	625	0.45	(0.36–0.53)	523	0.61	(0.54–0.67)	0.002	0.030
Not obese	2,723	0.57	(0.51–0.64)	2,307	0.62	(0.56–0.68)	0.094	0.012

Abbreviation: CI = confidence interval.
* Estimates age adjusted to the 2000 U.S. population.
† p-value for average annual change from 2003 to 2010 estimated using linear regression.
§ Average annual change from 2003 to 2010 in cup-equivalents per 1,000 calories calculated using linear regression.
¶ Other racial/ethnic groups not shown; all racial/ethnic groups included in reported values for the total population and values shown by sex, age groups, family income to poverty ratio, and obesity status.
** Body mass index ≥95th percentile using 2000 CDC growth chart.

FIGURE 2. Mean daily intake of vegetables in cup-equivalents per 1,000 calories among children aged 2–18 years — National Health and Nutrition Examination Survey, United States, 2003 to 2010*



Abbreviations: AAC = average annual change; DGA = Dietary Guidelines for Americans, 2010; HP2020 = *Healthy People 2020*.
* Estimates age adjusted to the 2000 U.S. population.
† Additional information available at http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=29.
§ Available at http://www.health.gov/dietaryguidelines.
¶ Estimates for white potatoes and other vegetables overlap across the study period (0.15–0.17 cup-equivalents per 1,000 calories).

a voucher for fruits and vegetables worth $6–$10 to the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in 2009 might have contributed to increased intake in the last survey cycle (*7,8*). The federal Fresh Fruit and Vegetable Program, which provides free fruits and vegetables to eligible elementary schools, expanded from a few states in 2002 to all 50 states in 2008 (*9*). The program increased fruit and vegetable consumption among program participants by about one third of a cup per day, mainly as fruit (*9*). The Child Nutrition and WIC Reauthorization Act of 2004 required school districts to adopt school wellness policies that included goals for nutrition standards and nutrition education by 2006.¶¶ Multiple states also adopted various policies to improve the food environment within early care and education settings and schools, which might have resulted in increased healthy offerings in these settings (*10–12*). Although all of those policies and programs encouraged higher intake of fruits and vegetables, vegetable intake did not increase. Evidence suggests that children have a stronger preference for fruits than vegetables, and that it might be easier to increase consumption of fruits than vegetables (*6*).

Continued efforts are needed to increase children's fruit and vegetable consumption. Expert bodies have identified parents,

¶¶ Child Nutrition and WIC Reauthorization Act of 2004. 118 Stat. 729, Sect. 101–502, 108th Congress, 2004.

TABLE 2. Mean intake of total vegetables in cup-equivalents per 1,000 calories among children aged 2–18 years, by sex, age, race/ethnicity, family income to poverty ratio, and obesity status — National Health and Nutrition Examination Survey, United States, 2003 to 2010*

Characteristic	2003–2004			2009–2010			p-value†	Annual change§
	No. surveyed	Mean intake	(95% CI)	No. surveyed	Mean intake	(95% CI)		
All children	**3,348**	**0.54**	**(0.50–0.57)**	**2,830**	**0.53**	**(0.49–0.58)**	**0.650**	**-0.002**
Sex								
Male	1,663	0.52	(0.48–0.55)	1,475	0.48	(0.45–0.51)	0.160	-0.005
Female	1,685	0.56	(0.51–0.60)	1,355	0.58	(0.50–0.66)	0.865	0.001
Age group (yrs)								
2-5	706	0.49	(0.45–0.54)	774	0.48	(0.44–0.52)	0.524	-0.003
6-11	861	0.55	(0.49–0.61)	1,058	0.48	(0.42–0.54)	0.080	-0.011
12-18	1,781	0.55	(0.51–0.58)	998	0.60	(0.51–0.68)	0.279	0.007
Race/ethnicity¶								
Mexican American	1,005	0.61	(0.57–0.65)	765	0.56	(0.52–0.60)	0.041	-0.008
Black, non-Hispanic	1,145	0.54	(0.51–0.57)	566	0.48	(0.43–0.53)	0.047	-0.009
White, non-Hispanic	930	0.51	(0.47–0.56)	988	0.54	(0.47–0.61)	0.572	0.003
Income to poverty ratio								
<130%	1,505	0.56	(0.53–0.60)	1,332	0.53	(0.48–0.58)	0.460	-0.004
130% to <349%	1,196	0.56	(0.51–0.61)	949	0.53	(0.42–0.64)	0.400	-0.007
≥349%	647	0.47	(0.41–0.52)	549	0.53	(0.47–0.59)	0.300	0.006
Obesity status								
Obese**	625	0.56	(0.49–0.63)	523	0.52	(0.48–0.57)	0.316	-0.006
Not obese	2,723	0.53	(0.49–0.57)	2,307	0.54	(0.48–0.59)	0.828	-0.001

Abbreviation: CI= confidence interval.
* Estimates age adjusted to the 2000 U.S. population.
† p-value for average annual change from 2003 to 2010 estimated using linear regression.
§ Average annual change from 2003 to 2010 in cup-equivalents per 1,000 calories calculated using linear regression.
¶ Other racial/ethnic groups not shown; all racial/ethnic groups included in reported values for the total population and values shown by sex, age groups, family income to poverty ratio, and obesity status.
** Body mass index ≥ 95th percentile using 2000 CDC growth chart.

Key Points

- Eating fruits and vegetables adds important nutrients, helps control weight, and reduces the risks for many serious illnesses.
- Whole fruit intake among children aged 2–18 years increased by 12% of the 2003–2004 baseline amount per year from 2003 to 2010. Fruit juice intake significantly decreased.
- Vegetable intake among children did not change from 2003 to 2010.
- Most children still consume too few fruits and vegetables, in spite of progress. About 60% of children consume fewer fruits than recommended, and 93% of children consume fewer vegetables than recommended.
- Schools and early care and education providers can help continue progress on fruit intake and improve vegetable intake by: 1) meeting or exceeding current nutrition standards for meals and snacks, 2) serving fruits and vegetables whenever food is offered, 3) training staff members to make fruits and vegetables more appealing and ready to eat, and 4) providing nutrition education and hands-on learning opportunities such as growing and preparing fruits and vegetables.
- Additional information is available at http://www.cdc.gov/vitalsigns.

schools, early care and education providers, community and business leaders, and state and local officials as stakeholders who might affect the nutrition environments of children. (*1,13,14*) Among these, schools and early care and education are important settings (*13,14*) because approximately 60 million children (*15,16*) are exposed to the food and education provided in these settings. In addition, two recent studies showed that implementing policies about foods offered in schools improved children's fruit and vegetable consumption (*17,18*). Furthermore, federal policies and programs can be used to encourage fruit and vegetable consumption in these settings. For example, the Healthy Hunger-Free Kids Act, 2010*** increased the amount and variety of fruits and vegetables served in the National School Lunch and School Breakfast Programs,††† required USDA to establish nutrition standards for all foods sold during the school day, and required that foods offered in early care and education settings through the Child and Adult Care Food Program align with the Dietary Guidelines.§§§ CDC funds state health departments to improve healthy eating at schools and early care and education settings through the State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity, and Associated Risk Factors and Promote School Health.¶¶¶ At least two *Let's Move!***** initiatives support the improvement of children's dietary quality, including *Let's Move! Child Care* and *Let's Move! Salad Bars to Schools*.

School districts, schools, and early care and education providers can help increase children's fruit and vegetable consumption by implementing nutrition standards that meet or exceed federal regulations for meals and snacks (*19–22*). They can bolster these nutrition standards in a number of ways. For example, schools, school districts, and early care and education providers can make fruits and vegetables available whenever food is offered (*19*), increase the visibility and appeal of fruits and vegetables in cafeterias (*19*), and ensure that staff members are trained to implement nutrition standards and model healthy behaviors (*19,20*). They can also provide nutrition education as a part of classroom activities (*13,19–21*) and within comprehensive health education (*19*) and offer hands-on learning opportunities (*13,19,21,22*) that might include food preparation, gardening, and farm-to-school and preschool programs (*19*).

The findings in this report are subject to at least five limitations. First, the 24-hour dietary recalls are reported by either parents or children and are subject to recall and social-desirability biases (*23,24*). Second, estimating fruit and vegetable intake relies on the MyPyramid and Food Patterns Equivalents databases, which disaggregate foods and beverages into cup-equivalents according to standard recipes. Incongruence between recipes and actual foods consumed might introduce measurement error. Trends were estimated from four NHANES cycles from 2003–2004 to 2009–2010. The most recent data available were for 2009–2010. Earlier data were not used because total fruit was not disaggregated into whole fruit and fruit juice in the USDA databases before 2003–2004. Finally, the response rates in NHANES were 81%–90% for persons aged 1–19 years across the study years; lower response rates can result in nonresponse bias. However, NHANES data are weighted to adjust for nonresponse to minimize bias.

Children's total fruit intake per 1,000 calories increased as a result of increases in whole fruit, but remained well short of

*** Additional information available at http://www.fns.usda.gov/cnd/governance/legislation/cnr_2010.htm.

††† Additional information available at http://www.ecfr.gov/cgi-bin/text-idx?SID=6e619efd3476fc185e85495e42f62127&node=7:4.1.1.1.1.3.1.2&rgn=div8 for the National School Lunch Program and http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=7:4.1.1.1.3#7:4.1.1.1.3.0.1.8 for the National School Breakfast Program.

§§§ Richard B. Russell National School Lunch Act. P.L. 113-75, Sect. 9 [1758] Nutritional and other program requirements; Sect. 17 [1766] Child and adult care food program.

¶¶¶ Additional information available at http://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm.

**** Additional information available at http://www.letsmove.gov.

national goals. Total vegetable intake per 1,000 calories remains low and unchanged, and about one third of vegetable intake was white potatoes, mainly eaten fried or as potato chips. Increased attention to the policies and food environments where children live, learn, and play, as well as increased opportunities for children to learn about fruits and vegetables, might help continue progress on fruit intake and improve vegetable intake.

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Announcement

Updates to CDC's Disability and Health Data System

CDC's Division of Human Development and Disability has recently updated its Disability and Health Data System (DHDS), a web-based data tool (available at http://dhds.cdc.gov) providing state-level data on the health of adults with disabilities in the United States.

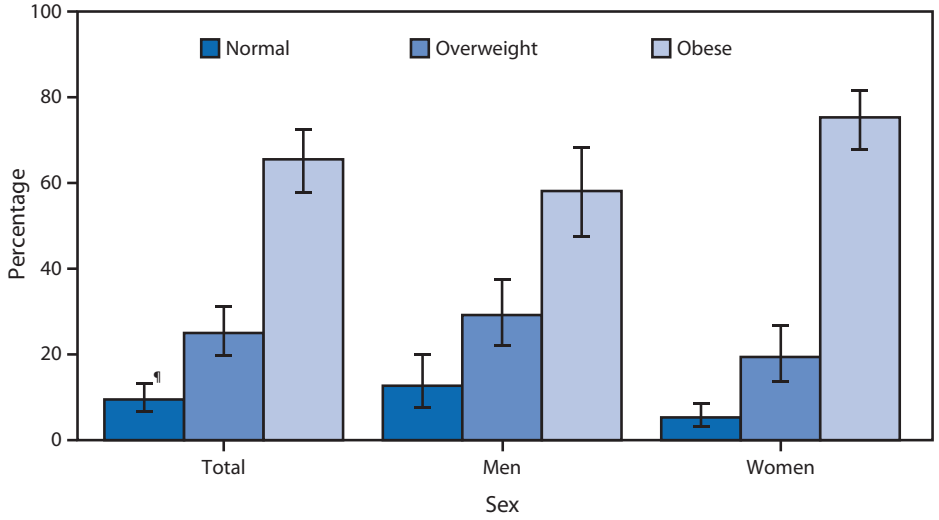
Users can now view data in dual area profiles in addition to maps, data tables, and state profiles. Dual area profiles allow users to compare several pieces of health information for two geographic areas displayed side by side. In addition, 2012 Behavioral Risk Factor Surveillance System (BRFSS) data have been added to DHDS and are populated in maps, data tables, state profiles, and dual area profiles. Finally, interactive maps for mobile devices have been added so that users can view maps on a smartphone, tablet, and all web browsers except Internet Explorer 8 or earlier.

DHDS is intended to raise awareness of health disparities experienced by adults with disabilities in order to inform program and policy initiatives aimed at improving the health of adults with disabilities. Recent data on the health of adults with disabilities in specific states and health program areas are available through DHDS at http://dhds.cdc.gov. Questions regarding DHDS should be sent to dhds@cdc.gov.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage Distribution of Weight Status* Among Adults Aged ≥20 Years with Diabetes,† by Sex — National Health and Nutrition Examination Survey, United States, 2009–2012§



* Weight status is based on body mass index cutoff values for adults (kg/m^2): normal weight (18.5–24.9), overweight (25.0–29.9), and obese (≥30.0).
† Diabetes is defined as a fasting plasma blood glucose ≥126 mg/dL, a hemoglobin A1c ≥6.5%, or a self-reported physician diagnosis of diabetes.
§ Estimates are age-adjusted to year 2000 U.S. Census standard population using age groups 20–39 years, 40–59 years, and ≥60 years.
¶ 95% confidence interval.

During 2009–2012, an estimated 65.5% of adults with diabetes were obese, 25.0% were overweight, and 9.5% were normal weight. The prevalence of obesity among women with diabetes (75.3%) was higher than the prevalence of obesity among men with diabetes (58.1%).

Source: CDC. National Health and Nutrition Examination Survey Data. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2009–2012. Available at http://www.cdc.gov/nchs/nhanes.htm.

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Data presented by the Notifiable Disease Data Team and 122 Cities Mortality Data Team in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. Address all inquiries about the *MMWR* Series, including material to be considered for publication, to Editor, *MMWR* Series, Mailstop E-90, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30329-4027 or to *mmwrq@cdc.gov.*

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