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Self-Reported Falls and Fall-Related Injuries Among Persons Aged ≥ 65 Years --- United States, 2006

Each year, an estimated one third of older adults fall, and the likelihood of falling increases substantially with advancing age. In 2005, a total of 15,802 persons aged ≥ 65 years died as a result of injuries from falls ([1](#)). However, the number of older adults who fall and are not injured or who sustain minor or moderate injuries and seek treatment in clinics or physician offices is unknown. To estimate the percentage of older adults who fell during the preceding 3 months, CDC analyzed data from the 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey. This report summarizes the results of that analysis, which indicated that approximately 5.8 million persons aged ≥ 65 years, or 15.9% of all U.S. adults in that age group, fell at least once during the preceding 3 months, and 1.8 million (31.3%) of those who fell sustained an injury that resulted in a doctor visit or restricted activity for at least 1 day. The percentages of women and men who fell during the preceding 3 months were similar (16.4% versus 15.2%, respectively), but women reported significantly more fall-related injuries than men (35.7% versus 24.6%, respectively). The effect these injuries have on the quality of life of older adults and on the U.S. health-care system reinforces the need for broader use of scientifically proven fall-prevention interventions.

BRFSS surveys are conducted in all 50 states, the District of Columbia (DC), and selected U.S. territories (Puerto Rico, the U.S. Virgin Islands, and Guam) ([2](#)). BRFSS uses a multistage sampling design based on random-digit--dialing methods to select a representative sample of the noninstitutionalized, civilian population aged ≥ 18 years in each state or territory. Details on the design, random sampling procedures, and reliability and validity of measures used in BRFSS have been described previously ([3,4](#)). In 2006, the median response rate among states, based on Council of American Survey Research Organizations (CASRO) guidelines, was 51.4% (range: 35.1%--66.0%). Data were weighted to account for probability of selection and to match the age-, race/ethnicity-, and sex-specific populations from annually adjusted intercensal estimates. Statistical significance was determined by nonoverlap of 95% confidence intervals. Estimates were considered unstable if the unweighted sample size for the subgroup was less than 50. In 2006, interviews with 92,808 persons aged ≥ 65 years were completed. Data from all 50 states, DC, Puerto Rico, and the U.S. Virgin Islands are included in this report.

Two questions about falls were included in the 2006 survey. The first was, "The next question asks about a recent fall. By a fall, we mean when a person unintentionally comes to rest on the ground or

another lower level. In the past 3 months, how many times have you fallen?" Those who reported a fall were asked a second question, "How many of these falls caused an injury? By an injury, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor." In response to the first question, the number of reported falls ranged from 0 to 76; the mean number of falls among those who fell was 1.9; median = 1.0. Of respondents who said they had fallen, 23.1% reported falling three times or more. Overall, 15.9% of respondents reported one or more falls ([Table 1](#)). The number of reported falls that resulted in injury ranged from 0 to 50. Among those who fell and were injured, the mean number of injurious falls was 1.4; median = 1.0. Overall, 31.3% of respondents who reported falling also reported a fall-related injury.

The percentages of men and women who reported falling during the preceding 3 months were similar (15.2% and 16.4%, respectively) ([Table 2](#)), but women reported more fall-related injuries than men (35.7% versus 24.6%). By race/ethnicity, American Indians/Alaska Natives reported the greatest percentage of falls (27.8%); Hispanics reported the greatest percentage of falls with injuries (41.0%). The percentages of persons aged 65--69 years and 70--74 years who reported falling during the preceding 3 months were similar (13.4% versus 14.0%) but increased significantly for persons aged 75--79 years (15.7%) and ≥ 80 years (20.8%). Although the percentage of persons reporting falls increased with age, the percentage of persons reporting fall-related injuries was nearly identical for each age group (range: 29.9%--32.1%).

Reports of falls ranged from 12.8% among respondents in Hawaii to 20.1% among those in Vermont, but no geographic patterns were apparent. The 50 states and DC were ranked according to their age-adjusted fall mortality rates for 2003--2004. Of the seven states at or above the 90th percentile nationally (Arizona, Minnesota, New Mexico, Rhode Island, South Dakota, Vermont, and Wisconsin) ([1](#)), only Vermont (first) and New Mexico (seventh) also were among the 10 states with the greatest proportion of reported falls; only Rhode Island (first) and Arizona (seventh) appeared among the 10 states with the greatest proportion of fall-related injuries. The percentage of respondents who fell and were injured ranged from 23.7% (Nebraska) to 48.0% (Rhode Island).

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Editorial Note:

Falls are the leading cause of fatal and nonfatal injuries for persons aged ≥ 65 years ([1](#)). National estimates for rates of fatal falls and fall-related injuries treated in emergency departments have been published previously ([1](#)); however, this report presents the first national estimates of the number and proportion of persons experiencing fall-related injuries associated with either restricted activity or doctor visits. The results in this study suggest that in 2006, approximately 1.8 million persons aged ≥ 65 years (nearly 5% of all persons in that age group) sustained some type of recent fall-related injury. Even when those injuries are minor, they can seriously affect older adults' quality of life by inducing a fear of falling, which can lead to self-imposed activity restrictions, social isolation, and depression ([5](#)). In addition, fall-related medical treatment places a burden on U.S. health-care services. In 2000, direct medical costs for fall-related injuries totaled approximately \$19 billion ([6](#)). A recent study determined that 31.8% of older adults who sustained a fall-related injury required help with activities of daily living as a result, and among them, 58.5% were expected to require help for at least 6 months ([7](#)).

Few studies of falls have used a 3-month time frame, so comparison with other studies is challenging. A

recent analysis of data from the National Health Interview Survey (NHIS) presented the number and rate of medically attended falls reported during the preceding 3 months. However, the NHIS design did not permit calculation of the number of persons injured (7).

Among persons aged ≥ 65 years, other studies have reported that women fall more frequently and are treated for fall-related injuries, especially fractures, more often than men (8). Similarly, the analysis of BRFSS data indicated that a greater proportion of women than men reported fall-related injuries, but it did not find a significant difference between the proportion of women and men that experienced falls. The reasons for the differences in results between these studies are uncertain. Women might be less likely than men to report a noninjurious fall, or more likely than men to restrict their activities or seek medical attention after a fall.

The BRFSS definition of a fall-related injury does not specify severity; an injury could be as minor as a small bruise or as severe as a broken hip. This broad definition could have obscured age-related differences if, for example, persons aged 65--69 years sustained less severe injuries and persons aged ≥ 80 years experienced more severe injuries.

The findings in this report are subject to at least five limitations. First, BRFSS is a telephone-based survey and excludes households without landline telephones, so the results might be subject to selection bias. Second, data are self-reported and subject to recall bias; therefore, prevalence estimates of falls might be underestimated. Third, BRFSS does not include institutionalized persons, thereby excluding persons in long-term--care facilities, who are most at risk for falls. Fourth, the broad definition of injury might have led participants to report minor falls as injurious, resulting in an estimate of fall-related injuries that is higher than in other similar studies. Finally, the low response rate and possible response bias might have affected the representativeness of these data.

Falls and fall-related injuries seriously affect older adults' quality of life and present a substantial burden to the U.S. health-care system. Modifiable fall risk factors include muscle weakness, gait and balance problems, poor vision, use of psychoactive medications, and home hazards (8). Falls among older adults can be reduced through evidence-based fall-prevention programs that address these modifiable risk factors. Most effective interventions focus on exercise, alone or as part of a multifaceted approach that includes medication management, vision correction, and home modifications (8). One example of an effective fall-prevention program is "Moving for Better Balance," a Tai Chi program based on a randomized controlled trial conducted at the Oregon Research Institute, which reduced the frequency of falls by 55% (9). The program is conducted in senior centers in Oregon; participants learn eight body-movement exercises during 1-hour classes offered twice weekly for 12 weeks. This program and 13 other proven fall-prevention strategies are described in a new publication, *Preventing Falls: What Works. A Compendium of Effective Community-Based Interventions from Around the World*. The companion publication, *Preventing Falls: How to Develop Community-Based Fall Prevention Programs for Older Adults*, offers guidelines to help organizations develop fall-prevention programs. These publications and other fall-related educational materials are available at <http://www.cdc.gov/ncipc/duip/fallsmaterial.htm>.

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Table 1

TABLE 1. Percentage and estimated number of self-reported falls* and fall-related injuries† during the preceding 3 months among persons aged ≥65 years, by state‡ — Behavioral Risk Factor Surveillance System, United States, 2006

State§	At least one self-reported fall during preceding 3 months			Among those who fell, those who were injured at least once		
	%	(95% CI)¶	No. (estimated)**	%	(95% CI)	No. (estimated)**
Overall	15.9	(15.4–16.4)	5,828,731	31.3	(29.7–32.8)	1,812,315
Alabama	17.4	(14.7–20.6)	103,772	40.0	(31.3–49.3)	41,241
Alaska	19.6	(13.5–27.6)	8,654	24.2††	—	2,097††
Arizona	13.9	(11.1–17.3)	104,105	36.8	(25.0–50.5)	38,298
Arkansas	16.4	(14.5–18.5)	63,752	26.8	(21.5–33.0)	17,116
California	17.7	(15.0–20.7)	649,771	33.8	(25.5–43.2)	219,493
Colorado	16.6	(14.5–19.0)	75,760	28.9	(22.9–35.8)	21,723
Connecticut	13.6	(12.0–15.4)	64,083	28.6	(23.1–34.9)	18,347
Delaware	14.8	(12.1–17.9)	16,637	39.1	(29.0–50.2)	6,502
District of Columbia	14.5	(11.9–17.5)	9,400	28.4††	—	2,672††
Florida	13.6	(12.1–15.1)	406,745	34.7	(29.4–40.4)	140,319
Georgia	17.5	(15.3–19.8)	152,546	35.3	(28.7–42.6)	53,613
Hawaii	12.8	(10.8–15.1)	22,172	28.2	(20.9–36.8)	6,231
Idaho	19.5	(17.1–22.3)	31,347	34.8	(27.8–42.4)	10,851
Illinois	14.8	(12.6–17.3)	228,551	31.5	(23.8–40.5)	71,851
Indiana	15.6	(13.7–17.7)	120,338	33.0	(26.9–39.6)	39,105
Iowa	14.4	(12.5–16.5)	60,738	27.0	(21.1–34.0)	16,340
Kansas	17.4	(15.8–19.2)	61,809	30.2	(25.5–35.3)	18,548
Kentucky	17.6	(15.3–20.2)	84,252	30.8	(24.3–38.1)	25,375
Louisiana	16.1	(14.1–18.3)	84,210	28.9	(23.1–35.6)	24,070
Maine	16.9	(14.3–19.8)	32,300	23.0††	—	7,373††
Maryland	15.7	(13.8–17.9)	99,842	27.8	(22.1–34.3)	27,472
Massachusetts	16.6	(14.9–18.6)	139,314	29.3	(24.3–34.9)	40,590
Michigan	15.9	(13.9–18.0)	199,553	29.4	(23.5–36.2)	58,741
Minnesota	15.5	(13.4–18.0)	97,794	31.5	(24.6–39.2)	30,762
Mississippi	18.4	(16.4–20.7)	65,852	34.2	(28.2–40.6)	22,342
Missouri	16.2	(13.6–19.3)	125,146	30.8	(23.6–39.0)	38,502
Montana	18.0	(15.9–20.4)	22,909	27.2	(21.5–33.8)	6,232
Nebraska	15.0	(13.3–16.9)	34,589	23.7	(18.7–29.6)	8,183
Nevada	15.1	(12.1–18.7)	41,465	36.9††	—	15,291††
New Hampshire	16.5	(14.3–18.9)	26,200	33.1	(26.2–40.8)	8,680
New Jersey	13.1	(11.9–14.5)	145,105	30.0	(25.5–35.0)	43,163
New Mexico	18.4	(16.1–20.9)	42,491	30.7	(24.4–37.7)	12,885
New York	15.2	(13.2–17.3)	366,860	27.0	(21.2–33.8)	98,348
North Carolina	16.7	(15.4–18.1)	177,518	34.0	(29.8–38.4)	59,953
North Dakota	16.4	(14.1–18.9)	15,007	29.8	(23.0–37.6)	4,466
Ohio	14.3	(11.6–17.6)	214,596	31.6	(22.0–43.1)	67,448
Oklahoma	16.0	(14.3–17.9)	74,965	30.1	(24.7–36.1)	22,474
Oregon	15.3	(13.3–17.6)	71,255	28.7	(22.6–35.7)	20,466
Pennsylvania	15.7	(13.7–17.8)	291,355	26.7	(20.9–33.3)	77,622
Rhode Island	16.5	(14.3–19.0)	24,877	48.0	(40.5–55.7)	11,899
South Carolina	14.2	(12.6–16.0)	76,214	39.6	(33.6–46.0)	30,040
South Dakota	16.1	(14.2–18.0)	17,602	29.1	(23.5–35.4)	5,100
Tennessee	15.0	(12.4–18.0)	111,181	28.8††	—	30,642††
Texas	17.9	(15.3–20.8)	401,689	28.5	(21.6–36.7)	113,820
Utah	18.8	(15.9–22.1)	39,967	27.5	(20.5–35.9)	10,924
Vermont	20.1	(18.1–22.2)	16,600	28.7	(23.7–34.3)	4,738
Virginia	14.4	(12.1–17.0)	122,966	28.2	(21.1–36.6)	34,400
Washington	18.3	(17.1–19.5)	132,251	32.0	(28.6–35.6)	42,218
West Virginia	16.6	(14.3–19.3)	46,979	35.7	(28.4–43.7)	16,654
Wisconsin	15.0	(12.6–17.6)	106,861	27.4††	—	29,290††
Wyoming	18.0	(15.8–20.5)	11,361	33.8	(27.3–40.9)	3,816
Puerto Rico	18.6	(16.3–21.0)	86,640	39.0	(32.3–46.2)	33,573
U.S. Virgin Islands	14.8	(11.4–19.0)	1,284	33.9††	—	435††

* Based on a response indicating one or more falls in answer to the following: "The next question asks about a recent fall. By a fall, we mean when a person unintentionally comes to rest on the ground or another lower level. In the past 3 months, how many times have you fallen?"

† Based on a response indicating one or more injuries among those persons who reported falls in answer to the following: "How many of these falls caused an injury? By an injury, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor."

‡ Includes the 50 states, District of Columbia, Puerto Rico, and U.S. Virgin Islands.

§ Confidence interval.

** Estimates are weighted to account for probability of selection to match age-, race/ethnicity-, and sex-specific populations from annually adjusted intercensal estimates.

†† Estimate might be unstable (n<50).

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Table 2

TABLE 2. Percentage and estimated number of self-reported falls* and fall-related injuries† during the preceding 3 months among persons aged ≥65 years, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2006

Characteristic	At least one self-reported fall during preceding 3 months			Among those who fell, those who were injured at least once		
	%	(95% CI) [§]	No. (estimated) [¶]	%	(95% CI)	No. (estimated) [¶]
Overall	15.9	(15.4–16.4)	5,828,731	31.3	(29.7–32.8)	1,812,315
Sex						
Women	16.4	(15.8–17.0)	3,496,036	35.7	(33.7–37.9)	1,241,684
Men	15.2	(14.4–16.0)	2,332,696	24.6	(22.5–26.8)	570,631
Race/Ethnicity**						
American Indian/Alaska Native	27.8	(19.1–38.5)	72,398	34.3	(18.2–55.0)	24,803
Asian/Hawaiian/Pacific Islander	13.0	(8.3–19.7)	72,330	25.7 ^{††}	—	18,449 ^{††}
Black	13.0	(11.4–14.8)	346,155	32.8	(26.2–40.1)	111,527
Hispanic	17.4	(14.5–20.8)	457,096	41.0	(30.9–51.8)	185,595
Other/Multiple race	18.8	(15.5–22.6)	149,891	28.9	(21.5–37.8)	43,217
White	15.8	(15.4–16.3)	4,643,692	30.3	(28.9–31.7)	1,400,498
Age group (yrs)						
65–69	13.4	(12.7–14.2)	1,419,074	29.9	(27.4–32.6)	421,955
70–74	14.0	(13.2–14.9)	1,196,065	31.8	(28.5–35.3)	378,685
75–79	15.7	(14.7–16.8)	1,372,992	31.0	(27.8–34.4)	423,300
≥80	20.8	(19.7–21.9)	1,840,600	32.1	(29.1–35.3)	588,376
Marital status						
Married	14.2	(13.5–14.8)	2,951,196	28.4	(26.4–30.6)	836,610
Single ^{§§}	18.1	(17.4–18.9)	2,858,244	34.0	(31.7–36.3)	963,822
General health (self-reported)						
Excellent	9.7	(8.7–10.9)	416,543	29.3	(23.9–35.3)	121,814
Very good	11.7	(11.0–12.4)	1,101,974	23.8	(21.3–26.5)	261,020
Good	14.4	(13.7–15.2)	1,771,034	28.1	(25.7–30.7)	495,184
Fair	19.8	(18.7–20.9)	1,438,467	35.9	(32.8–39.1)	514,058
Poor	32.5	(30.1–35.0)	1,056,012	39.1	(34.3–44.1)	409,705

* Based on a response indicating one or more falls in answer to the following: "The next question asks about a recent fall. By a fall, we mean when a person unintentionally comes to rest on the ground or another lower level. In the past 3 months, how many times have you fallen?"

† Based on a response indicating one or more injuries among those persons who reported one or more falls in answer to the following: "How many of these falls caused an injury? By an injury, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor."

§ Confidence interval.

¶ Estimates are weighted to account for probability of selection to match age-, race/ethnicity-, and sex-specific populations from annually adjusted intercensal estimates.

** Hispanics are only included in the Hispanic category.

†† Estimate might be unstable (n<50).

§§ Includes widowed, divorced, separated, and never married.

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