Fall Injury Episodes Among Noninstitutionalized Older Adults: United States, 2001–2003

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Abstract

Objective—This report presents national estimates of fall injury episodes for noninstitutionalized U.S. adults aged 65 years and over, by selected characteristics. Circumstances surrounding the fall injury and activity limitations and utilization of health care resulting from the fall injury are also presented.

Methods—Combined data from the 2001–2003 National Health Interview Surveys (NHIS), conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS), were analyzed to produce estimates for the U.S. civilian noninstitutionalized population. Data on nonfatal medically attended fall injuries occurring within the 3 months preceding the interview were obtained from an adult family member.

Results—The annualized rate of fall injury episodes for noninstitutionalized adults aged 65 years and over in 2001–2003 was 51 episodes per 1,000 population. Rates of fall injuries increased with age, and were higher for women compared with men. Non-Hispanic white older adults had higher rates of fall injuries compared with non-Hispanic black older adults. Older adults with certain chronic conditions and activity limitations had higher rates of fall injuries compared with older adults without these conditions. The most common cause of fall injuries among older adults was slipping, tripping, or stumbling, and most fall injuries occurred inside or around the outside of the home. Nearly 60 percent of older adults who experienced a fall injury visited an emergency room for treatment or advice. Nearly one-third of older adults experiencing a fall injury needed help with activities of daily living as a result, and over one-half of these persons expected to need this help for at least 6 months. A similar percentage experienced limitation in instrumental activities of daily living as a result of fall injuries.

Conclusion—Fall injuries remain very prevalent among older adults and result in high health care utilization and activity limitations. Rates of fall injuries vary by demographic and health characteristics of older noninstitutionalized adults.

Keywords: National Health Interview Survey • injury episodes • injury prevention • older adults

Introduction

Falls are the leading cause of nonfatal medically attended injuries in the United States (1). Injuries caused by falls are more prevalent among adults aged 65 years and over compared with younger persons, occurring in 2005 at a rate of 76 episodes per 1,000 population among persons aged 65 years and over and 36 episodes per 1,000 population among persons under age 65 (CDC unpublished data, 2005). Annually, one in three Americans over age 65 years experiences a fall, and many of these falls are recurrent (2,3). Falls are associated with numerous morbidities, decreased quality of life, and high health care costs (4–6). Physical injuries associated with falling include fractures, contusions, and lacerations. Hip and other lower extremity fractures can be especially debilitating for older adults (7–9). Studies have shown that injuries experienced as a result of falling may lead to a decrease in the ability to perform activities of daily living (10,11). Especially among older adults, falls increase disability, and those injured during a fall often do not return to their pre-fall level of physical functioning (12).

Aside from the physical injuries and limitations that often result from a fall, there are psychological consequences of experiencing a fall injury. Studies have shown that a fall injury may trigger the fear of additional falls (13,14). Such fears or the inability to recover pre-fall physical functions may lead to increased depressive symptoms, including fear of institutionalization (15). A study of adults aged 75 years and over found that those adults who fell at least once during the past 3 months had an increased risk of being admitted to a long-term care facility over a 1 year period (16). Ultimately, the fear of another fall may lead to decreases in quality of life, due to restricting usual activities in hopes of avoiding a fall.

There is considerable health care utilization resulting from fall injuries. In 2003, over 1.8 million older adults were treated in emergency departments for fall injuries, and over 421,000 were hospitalized (17). Among older adults, fall injuries were five times as likely to be the cause of hospitalization compared with injuries due to other causes (18). Due to this high usage of health care services, costs associated with fall injuries are very high for this age group. For example, among older adults, the total cost of fall injuries was $27.3 billion in 1994, and this cost is expected to increase to $43.8 billion by 2020 (5,19).

Increases in life expectancy during the past century have contributed to increases in the size of the older population, and this trend is expected to continue. According to the U.S. Census Bureau, by 2020, the population aged 65 years and over will reach 54.6 million, up from 35.0 million in 2000 (20). Because the prevalence of fall injuries is high among older adults, it is desirable to examine the demographic and health characteristics of those who have experienced a recent fall injury. It is also of interest to assess causes and consequences of the fall injury. This information will help target prevention strategies and identify health care utilization needs for older adults who may be at higher risks for fall injuries as well as identify possible adverse outcomes resulting from fall injuries.

This report presents national estimates of nonfatal medically attended fall injury episodes for noninstitutionalized adults aged 65 years and over based on data from the National Health Interview Survey (NHIS) for 2001–2003. The NHIS is one of the major data collection systems of the National Center for Health Statistics (NCHS) and is a continuous survey of a nationally representative sample of the U.S. civilian noninstitutionalized household population. NHIS microdata are released annually. In this report, estimates are presented by demographic characteristics, such as sex, age, race/ethnicity, poverty status, place of residence and region, as well as selected health characteristics including chronic conditions, activity limitations, and health behaviors. This report also presents descriptive statistics about the type of fall injury, activity during fall injury, location of the fall injury, and health care contacts and limitations experienced as a result of the fall injury.

Methods

Data source

The statistics shown in this report are based on data from the family and sample adult components of the 2001–2003 NHIS annual core questionnaires (21–23). As previously noted, the NHIS is a survey of a nationally representative sample of the civilian noninstitutionalized household population of the United States. Individuals residing in long-term care institutions or correctional facilities are excluded from the sample, as well as those on active duty in the Armed Services (although their civilian family members are included) and U.S. nationals living in foreign countries. Basic health and demographic information is collected in the family component for all members of the family. Adults present at the time of the interview are asked to respond for themselves. Proxy responses are accepted for the family component for adults not present at the time of the interview and for those who are physically or mentally incapable of responding for themselves. Additional information is collected from one randomly selected adult and child (the "sample adult" and "sample child") per family. The sample adult responds for himself or herself, and a knowledgeable adult in the family provides proxy responses for the sample child. In rare instances, when the sample adult is mentally or physically incapable of responding, proxy responses are accepted for this person.

Data on nonfatal medically attended injuries and poisonings (collectively referred to as "injuries") occurring in the previous 3-month period to any member of the family residing in the home at the time of the interview are obtained using the family component. Respondents are asked if during the past 3 months (or 91 days before the interview date) they or anyone in the family was injured or poisoned seriously enough that they got medical advice or treatment. The focus of the injury and poisoning section is on episodes. An episode is defined as a traumatic event in which the person was injured one or more times from an external cause. The *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD–9–CM) is used to define injuries and classify external causes of injury conditions (24). A person may record up to a total of 10 episodes and will be represented in the data file as many times as he or she had unique episodes. Each episode must have at least one condition classified according to the nature-of-injury codes 800–999 in the ICD–9–CM. Medically attended injuries are defined as those for which a health care professional was contacted either in person or by telephone for advice or treatment. Additional information available for each episode includes the cause of the injury, what the person was doing at the time of the injury, the place of occurrence, whether the person was hospitalized, where the injured person received medical advice or treatment, and whether the injury caused any limitation of activity. Information about how the injury happened, the body part injured, the type of injury, along with responses to questions about specific types of injuries, place of occurrence, and activity were used to assign ICD–9–CM diagnostic and external

cause codes for all injuries. More details on injury data in the NHIS since the latest survey redesign in 1997 can be found in *Injury and Poisoning Episodes and Conditions: National Health Interview Survey, 1997* (25).

Statistical analysis

Three years of data were combined to obtain sufficient sample sizes for subgroup analyses. Differences in injury questions on the NHIS prior to 2001 prevented analysis of earlier data for this study. The interviewed sample for 2001–2003 consisted of 111,014 households, which yielded 113,037 families and 286,294 persons (of which 31,875 were aged 65 years and over). For the combined years 2001–2003, the household response rate was 89.2%. The final response rate for the Sample Adult component was 74.1%. Procedures used in calculating response rates for combined NHIS data years are described in detail in Appendix I of the Survey Description of the NHIS data files (21–23). This report is based on 524 fall injury episodes among 31,875 adults aged 65 years and over (unweighted counts). Of those who fell, 93% of these older adults had only one fall injury episode reported during the 3-month recall period.

Data from the NHIS can be used to estimate the number and rate of fall injuries in the noninstitutionalized population. Because the recall period for injury episodes is 3 months, each 3-month estimate was multiplied by 4 to calculate estimates of the number of injury episodes occurring annually. Rates are calculated as the annual number of fall injury episodes per 1,000 population. However, it is not possible to estimate the number of *people* injured annually using the NHIS. Although the number of persons who were injured during the 3-month recall period is known, the same individuals may or may not have had comparable numbers of additional episodes over the rest of the year (25). Recent research suggests that when studying all injuries (or minor injuries), it may be preferable to base estimates on injuries occurring within 5 weeks before the interview rather than on all injuries occurring within the

3-month recall period used in the NHIS (26). Beginning with the 2004 NHIS, imputation is performed at NCHS for injury episode dates for which the respondent had not provided sufficient information to determine a month, day, and year of occurrence. Imputation was done so that for all episodes it would be possible to calculate a specific elapsed time in days between the date of the injury episode and the date the injury questions were asked. The availability of this information will allow for use of a five-week reference period (or any desired reference period less than or equal to the three-month recall period).

Point estimates and estimates of their variances were calculated using SUDAAN, a software package that is designed to account for a complex sample design such as that used by the NHIS. The Taylor series linearization method was selected for variance estimation (27). All estimates were calculated using NHIS weights that are based on census totals for sex, age, and race/ethnicity of the civilian noninstitutionalized population of the United States. Estimates based on variables from the family component (Tables 1 and 3–6) were weighted using the Person Record Weights, while estimates based on variables in the sample adult component (Table 2) were weighted using the Sample Adult Record Weights. Due to sampling variability, overall rates of fall injuries calculated using the two different sets of weights are slightly different. All estimates shown meet the NCHS standard of having less than or equal to 30% relative standard error.

Some estimates presented in this report were age adjusted using the 2000 projected U.S. population as the standard population (28,29). The SUDAAN procedures DESCRIPT and RATIO were used to produce age-adjusted estimates. Age adjustment was used to allow comparison of various sociodemographic subgroups that have different age structures. The estimates in this report that were age adjusted used the age groups 65–74 years, 75–84 years, and 85 years and over.

Estimates were compared using two-tailed significance tests at the 0.05 level. Terms such as ''greater than'' and ''less than'' indicate a statistically

significant difference. Terms such as ''similar'' or ''no difference'' indicate that the statistics being compared were not significantly different. Lack of comment regarding the difference between any two statistics does not mean that the difference was tested and found to be not significant.

Most statistics presented in this report can be replicated using NHIS public-use data files and accompanying documentation available for downloading from the NCHS website at http://www.cdc.gov/nchs/nhis.htm. Many of the references cited in this report are also available via the NCHS website at http://www.cdc.gov/nchs.

Results

Figure 1 shows rates of fall injury episodes for persons of all ages and shows that for adults, these rates increase considerably with age. Table 1 presents frequencies and rates of fall injury episodes by various characteristics. The annual crude rate of fall injury episodes for adults aged 65 years and over based on the 2001–2003 NHIS was 51 episodes per 1,000 population per year. Adults aged 85 years and over had the highest rates of fall injury episodes, and rates were similar among men and women. However, among adults aged 65–74 years and 75–84 years, the rate of fall injury episodes was higher in females than in males (65–74 years: 39 and 25 per 1,000 population, respectively; 75–84 years: 80 and 43 per 1,000 population, respectively). Among older adults, non-Hispanic whites had higher age-adjusted rates of fall injury episodes than non-Hispanic blacks (53 and 34 per 1,000 population, respectively). Fall injury episode rates for Hispanics (51 per 1,000 population), were similar to rates for non-Hispanic whites. Fall injury episode rates (age-adjusted) were lower for older adults who were married or living with a partner compared with their widowed, never married, divorced, or separated counterparts (40 and 66 per 1,000 population, respectively). Older adults who had fair or poor health status had higher rates (age-adjusted) of fall injury episodes compared with older adults with excellent or very good (78
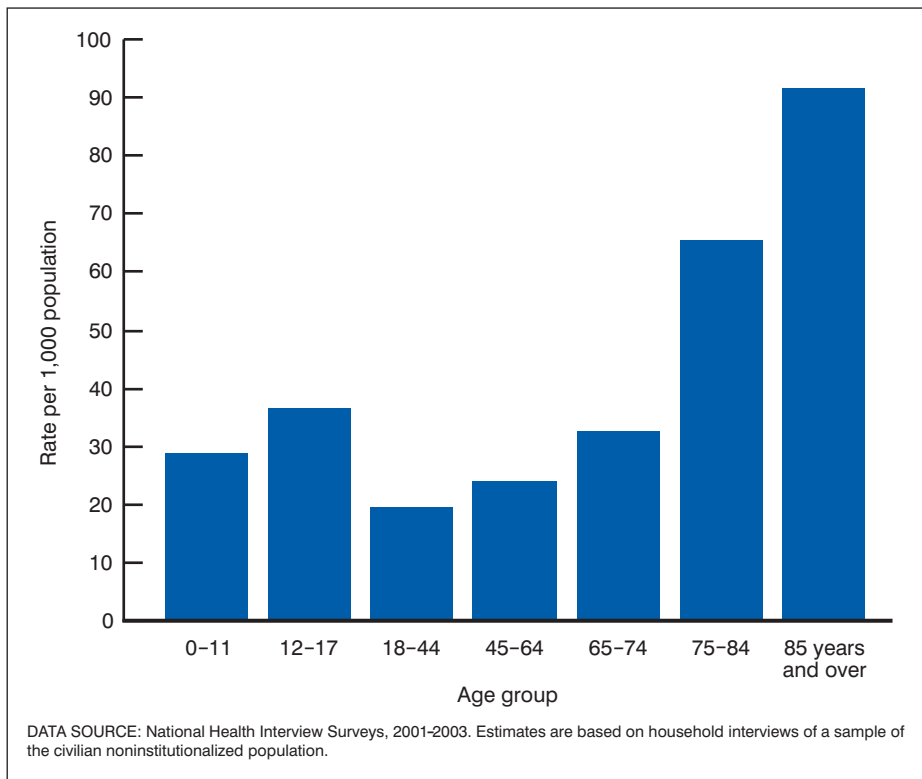
Figure 1. Annualized rates of fall injury episodes among persons of all ages, by age group: United States, 2001–2003

[1]"Other" includes the following categories: unspecified, driving or riding in a motor vehicle, working at a paid job, attending school, and being care for.

NOTE: Respondents could indicate participation in up to two activities per fall injury episode.

DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.
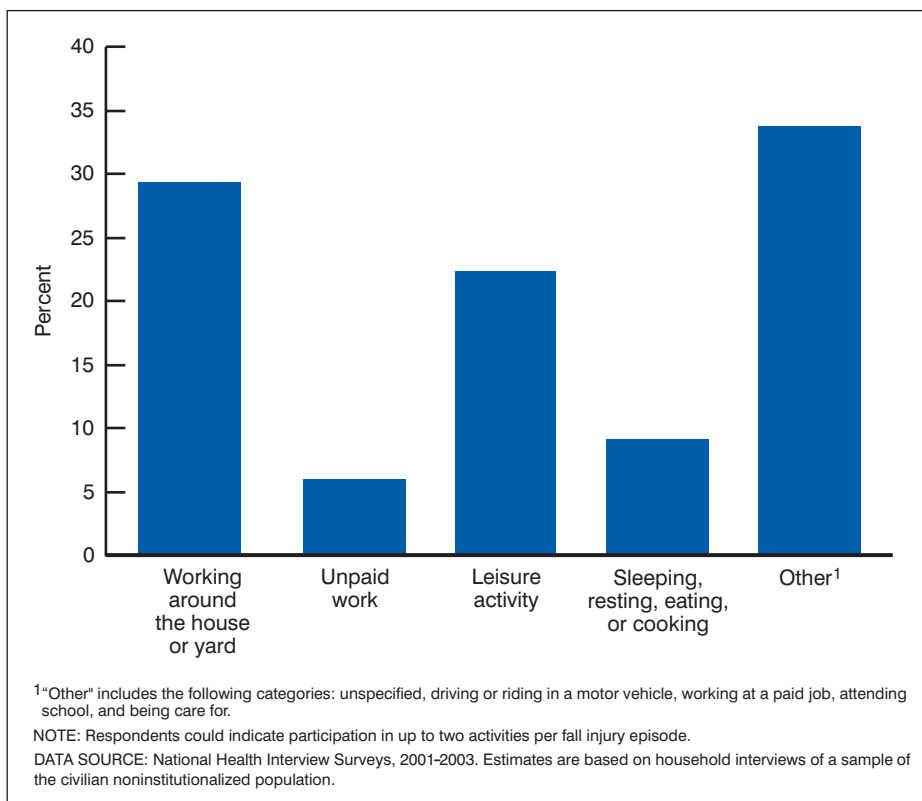
Figure 2. Percentages of fall injury episodes among adults aged 65 years and over, by activity when fall injury occurred: United States, 2001–2003

and 36 per 1,000 population, respectively) or good health status (46 per 1,000 population). There were no significant differences in fall injury episode rates by metropolitan statistical area status or region of residence.

Frequencies and age-adjusted rates of fall injury episodes are presented for selected health characteristics in Table 2. The rate of fall injury episodes was higher among adults aged 65 years and over with heart disease, stroke, cancer, diabetes, or vision problems compared with adults without these conditions. Fall injury episode rates for older adults did not vary significantly by obesity, alcohol consumption, hypertension, or asthma. Older adults who had great difficulty (responding ''very difficult to do'' or ''can't do at all'') walking one-quarter of a mile, standing for two hours, stooping, or climbing 10 steps without resting had significantly higher rates of fall injury episodes compared with adults who found those activities either not at all difficult, only a little difficult, or somewhat difficult. Fall injury episode rates for older adults whose health was better or the same compared to last year were lower compared with older adults whose health was worse compared to last year.

Circumstances surrounding fall injuries of older adults are shown in Tables 3–5 and Figure 2. The causes of fall injuries are presented in Table 3. Fifty-seven percent of the fall injury episodes occurred due to slipping, tripping, or stumbling. The next highest cause of fall injuries was loss of balance, dizziness, fainting, or a seizure (27%). The majority of fall injuries occurred at home (Table 4). Nearly three-quarters of the fall injury episodes occurred at home, either inside the house (50%) or around the outside of the house (24%). The remaining one-quarter of the fall injury episodes occurred in locations including streets, parking lots, residential institutions, public buildings, recreation areas, schools, industrial areas, etc. Over one-half of the fall injury episodes among older adults happened on the floor or level ground (Table 5). Sixteen percent of the fall injury episodes occurred on either stairs or an escalator, followed by curbs and furniture (8% for

both types). Twenty-nine percent of fall injury episodes occurred while the older adult was working around the house or yard, and over 20% of the episodes occurred while engaged in leisure activities (Figure 2). Smaller percentages of fall injury episodes occurred while doing unpaid work (6%) or activities such as sleeping, eating, resting, or cooking (9%).

Fall injuries among older adults resulted in activity limitations and varying levels of health care utilization (Table 6). Six percent of fall injury episodes among older adults resulted in a phone call to a doctor for treatment or advice. Nearly 40% of the episodes led to a doctor's office visit, while 8% led to an outpatient clinic visit, and 57% resulted in a visit to an emergency room. Thirty-two percent of fall injury episodes caused a need for help with activities of daily living, and for over one-half of these episodes, this help was expected to be needed for at least 6 months. The same percentage of fall injury episodes (32%) resulted in a need for help with instrumental activities of daily living, and almost three-quarters of these episodes were expected to require this help for at least 6 months.

Discussion

Based on this study, adults aged 65 years and over in the noninstitutionalized U.S. population experienced 51 fall injury episodes per 1,000 population per year or approximately 1.7 million fall injury episodes annually. Fall injury episode frequencies and rates based on the NHIS were somewhat lower than those obtained using another NCHS survey, the National Hospital Ambulatory Medical Care Survey (NHAMCS) (30). The NHAMCS includes only data on fall injuries that resulted in a visit to a hospital emergency department (ED). Differences in these estimates between the surveys could be explained by several factors. The NHIS is a household interview survey and the NHAMCS is based on provider medical records. The NHIS does not capture all fall injury episodes if the respondent does not recall them, a problem that may be more prevalent among older adults with memory

problems, leading to a possible underestimation of events (31). The populations for these surveys are also different. The NHIS fall injury data are not limited to ED visits, while the NHAMCS estimates are limited to ED visits only. In addition, the NHIS does not include institutionalized persons in its sample, while the NHAMCS includes both institutionalized and noninstitutionalized persons. A strength of the NHIS is that it captures additional fall injury episodes that result in medical attention other than emergency department visits. The NHIS, however, is not designed to cover injuries experienced by institutionalized persons. In 2002, 5% of the total U.S. population aged 65 years and over was institutionalized, but this number increases to 17% for adults aged 85 years and over (32). Consequently, fall injuries among the very old are less likely to be covered by the NHIS.

In making comparisons to other surveys, it is important to consider that use of a 5-week reference period may lead to more accurate reports of some types of injuries, including fall injuries. Research based on the 1997–1999 NHIS shows that injuries occurring during the 5 weeks preceding the interview were more likely to be reported than those occurring 6–13 weeks before the interview. These differences are seen more for less severe injuries such as contusions and superficial injuries compared with severe injuries such as fractures (26). Because fall injuries can be either minor or severe, it would be desirable to use the 5-week reference period when possible. Preliminary analyses of 2004–2005 NHIS data show that regardless of whether the 3-month recall period or 5-week reference period was used, overall fall injury episode rates for older adults increased compared with 2001–2003 rates.

Findings that older women are more likely to experience a fall injury than older men and that fall injuries increase with age among older adults were consistent with the NHAMCS and other studies (30,33–35). One explanation of the higher rates of fall injury episodes among older women is they experience a substantial loss of bone density following menopause, a factor that may

increase the likelihood of experiencing a fall (19). Our study found that non-Hispanic white older adults were more likely to experience a fall injury compared with non-Hispanic black adults. This finding was consistent with a study based on hospitalized Californians aged 20 years and over that indicated that whites were more likely to have experienced fall injuries compared with blacks and Hispanics (36). Based on our study, older adults who were either married or cohabiting had lower rates of fall injuries compared with adults who were divorced, separated, widowed, or who had never married. This finding is consistent with a similar finding from a Finnish study that found that unmarried marital status was a significant predictor of major injurious falls (37). The higher rate of fall injuries among older adults who are not married or not living with a partner may be related to the older adult engaging in physically demanding activities that exceed their abilities in order to maintain independence, but that increase their likelihood of falling (37).

Numerous studies have investigated the association between health characteristics and falls or fall injuries. A Proceedings based on two symposia on the prevention of falls summarizes the results of 52 studies that examined risk factors for falls and/or fall injuries from 1976–1994 (38), and more recent studies have examined health characteristics as well (37,39–50). Consistent with other studies that have found that declining self-reported health status is associated with falls (45,49,51), our study found that rates of fall injury episodes for older adults were higher among persons with fair or poor health status compared with good, very good, or excellent health status. Older adults with heart disease, stroke, cancer, diabetes, or vision problems were also more likely to experience a fall injury. Previous studies have found that heart disease (47), stroke (47), and vision problems (41,45) may be risk factors for falls or fall injuries. These chronic conditions may increase susceptibility to falls by way of altering sensory or motor systems. Medications taken to control these types of chronic conditions may also increase the likelihood of falls (42).

Persons with diabetes may have a higher prevalence of neuropathy or impaired gait or balance, which could lead to an increased risk for falls (50). Vision problems can increase the likelihood of a fall by decreasing the ability to detect obstacles and lessening stability (37). Older adults with selected severe mobility limitations also experienced higher rates of fall injury episodes compared with older adults with little or no difficulty with these activities. Although it cannot be determined whether or not these limitations occurred as a result of the fall injury or whether they were a factor in causing the injury, it is interesting to note that previous studies found limitations in walking (46) and stepping (40) to be risk factors of falls in the older population. Inconsistent with this analysis, several studies have found that low body mass index is associated with an increased risk of falls due to underweight persons being weak or having poor nutritional or health status (52–54). One reason for this result may be the omission of institutionalized older adults from the NHIS. These adults may be weaker or in poorer health than their noninstitutionalized counterparts. Other health characteristics were considered, but not included in the analysis due to sample size limitations.

Several circumstances surrounding fall injuries of older adults were investigated. Slipping, tripping, or stumbling was found to be the most common cause of fall injury among older adults, followed by loss of balance, dizziness, fainting, or seizure. The majority of fall injuries occurred inside or around the home, and over one-half of fall injuries occurred on the floor or level ground. Nearly 3 out of 10 fall injuries occurred while the older adult was working around the house or yard. The finding that home was the most common site of a fall injury was consistent with other studies of older adults (36,55–57). Different studies did not always categorize causes of falls, types of falls, and activities during which the fall occurred in exactly the same manner as our study, but these studies still found that slipping or tripping and loss of balance were common causes of fall injuries among

older adults (36,45,58). Other studies also found that the floor or level ground as well as stairs or steps were common types of falls, which was consistent with this study (36,59). Results from this study indicate that fall injuries result in various types of health care utilization and chronic activity limitations. A previous study found that among older adults with at least one activity limitation, older adults with fall injuries had a higher likelihood of needing help with bathing, dressing, using the bathroom, and eating compared with older adults not experiencing a fall (60).

A limitation of this study is that, because the NHIS is a cross-sectional survey, causality between various characteristics and fall injuries cannot be ascertained unless a question asks a respondent if it was the result of the injury. Additionally, despite combining data from multiple data years, sample sizes for older adults who experienced a fall injury are still relatively small and therefore constrained the analysis of some characteristics found to be associated with falls or fall injuries in other studies. As previously mentioned, length of the recall period could have led to underreporting of less severe injuries, and reluctance on the part of respondents to answer detailed questions about injuries could also result in underreporting of injuries.

Even with its limitations, this study is valuable in presenting nationally representative results of analyses based on older adults experiencing a fall injury. Combining 3 years of NHIS data provided reliable estimates of fall injury rates, and the wide variety of health topics on the NHIS allowed for identification of several characteristics that may contribute to the likelihood of experiencing a fall injury or result from experiencing a fall injury. In addition to these strengths, NHIS provides details surrounding the circumstance of fall injuries not often found in other large-scale surveys.

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Table 1. Annualized frequencies and age-adjusted annualized rates of fall injury episodes among adults aged 65 years and over, by selected characteristics: United States, 2001–2003

Characteristic	Number in thousands	Rate per 1,000 population (95% confidence interval)
Sex and age[1]		
Both sexes:		
65 years and over (age adjusted)	1,689	51.55 (45.82 57.27)
65 years and over (crude).	1,689	50.56 (44.89 56.24)
65–74 years.	585	32.70 (26.26 39.13)
75–84 years.	790	65.37 (55.68 75.07)
85 years and over	313	91.85 (68.32 115.39)
Male:		
65 years and over	524	39.65 (31.21 48.10)
65–74 years.	202	24.83 (16.84 32.81)
75–84 years.	211	43.35 (30.18 56.51)
85 years and over	110	92.13 (45.66 138.60)
Female:		
65 years and over	1,165	60.26 (51.75 68.77)
65–74 years.	383	39.28 (29.42 49.14)
75–84 years.	579	80.28 (65.86 94.69)
85 years and over	203	91.70 (64.92 118.48)
Hispanic or Latino origin and race[2]		
Hispanic or Latino.	99	51.05 (28.68 73.42)
Not Hispanic or Latino white, single race	1,458	53.48 (46.98 59.98)
Not Hispanic or Latino black or African American, single race.	92	34.06 (18.04 50.09)
Non-Hispanic, other	28	*29.92 (8.56 51.29)
Marital status		
Never married, divorced, separated, or widowed.	990	66.12 (56.29 75.96)
Married or cohabiting.	686	39.56 (32.33 46.79)
Poverty status[3]		
Poor	242	65.55 (43.26 87.83)
Near Poor	493	53.57 (39.87 67.26)
Not poor	954	48.53 (40.75 56.30)
Place of residence[4]		
Large MSA	708	51.00 (42.47 59.53)
Small MSA	603	52.41 (42.33 62.50)
Not in MSA.	377	50.96 (39.01 62.90)
Region		
Northeast	342	48.41 (35.41 61.40)
Midwest.	426	54.64 (43.28 65.99)
South	549	47.41 (38.52 56.30)
West.	371	59.63 (45.08 74.18)
Respondent-assessed health status[5]		
Excellent or very good.	448	36.40 (28.17 44.63)
Good	532	45.57 (36.35 54.80)
Fair or poor.	708	78.08 (65.39 90.78)

* Figure does not meet standard of reliability or precision.

[1]Estimates for age groups are not age adjusted.

[2]Persons of Hispanic or Latino origin may be of any race or combination of races. Similary, the category "not Hispanic or Latino" refers to all persons who are not of Hispanic or Latino origin, regardless of race.

[3]Poverty status is based on family income and family size using the U.S. Census Bureau's poverty thresholds for 2000, 2001, and 2002. "Poor" persons are defined as below the poverty threshold, "near poor" persons have incomes of 100% to less than 200% of the poverty threshold, and "not poor" persons have incomes that are 200% of the poverty threshold or greater. Missing family income data were imputed for 36% of older adults. See "Technical Notes" on income.

[4]MSA is metropolitan statistical area.

[5]Respondent-assessed health status is based on the question "Would you say [person's] health in general is excellent, very good, good, fair, or poor?"

NOTE: Unless otherwise noted, estimates are age adjusted using the projected 2000 U.S. population as the standard population and using three age groups: 65–74 years, 75–84 years, and 85 years and over.

DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.

Table 2. Annualized frequencies and age-adjusted annualized rates of fall injury episodes among adults aged 65 years and over, by health characteristics: United States, 2001–2003

Characteristic	Number in thousands	Rate per 1,000 population (95% confidence interval)
All fall injury episodes[1]	1,769	53.85 (45.41 62.29)
Heart disease[2]		
Yes	733	67.37 (49.75 84.99)
No	1,027	46.59 (37.34 55.84)
Hypertension[3]		
Yes	986	53.72 (42.92 64.52)
No	770	53.55 (39.92 67.18)
Stroke[4]		
Yes	289	92.98 (54.81 131.14)
No	1,472	50.13 (41.39 58.87)
Emphysema[5]		
Yes	183	*115.09 (36.87 193.31)
No	1,578	50.53 (42.56 58.50)
Asthma[5]		
Yes	199	75.26 (38.93 111.60)
No	1,554	51.59 (42.91 60.28)
Any cancer[6]		
Yes	490	72.06 (53.41 90.72)
No	1,279	49.15 (39.54 58.76)
Diabetes[7]		
Yes	443	94.58 (55.63 133.53)
No	1,320	48.39 (39.93 56.84)
Vision trouble[8]		
Yes	528	84.12 (60.40 107.84)
No	1,241	46.49 (38.07 54.90)
Difficulty walking a quarter of a mile		
Not at all difficult	647	35.12 (25.42 44.82)
Little or somewhat difficult	168	29.89 (15.91 43.87)
Very difficult or cannot do	770	108.02 (84.05 131.99)
Difficulty standing for two hours		
Not at all difficult	521	31.75 (21.88 41.63)
Little or somewhat difficult	230	38.22 (21.57 54.86)
Very difficult or cannot do	832	104.04 (81.75 126.33)
Difficulty stooping, bending, or kneeling		
Not at all difficult	491	30.32 (21.32 39.32)
Little or somewhat difficult	340	41.43 (26.37 56.50)
Very difficult or cannot do	861	112.66 (88.12 137.19)
Difficulty climbing ten steps without resting		
Not at all difficult	650	31.30 (23.31 39.29)
Little or somewhat difficult	255	49.77 (30.21 69.33)
Very difficult or cannot do	721	133.00 (102.04 163.95)
Body mass index[9]		
Underweight or healthy weight	721	52.23 (38.61 65.85)
Overweight	588	49.06 (36.15 61.97)
Obese	410	72.39 (49.74 95.03)
Leisure-time physical activity[10]		
Any regular	308	43.56 (25.29 61.83)
No regular	1,409	55.11 (45.42 64.81)
Alcohol consumption[11]		
Nondrinker	1,154	60.16 (48.41 71.91)
Current infrequent or light drinker	367	42.72 (28.48 56.97)
Current moderate or heavy drinker	202	46.75 (24.38 69.13)
Health status compared to last year[12]		
Better or the same	1,139	40.66 (33.11 48.22)
Worse	624	122.55 (89.06 156.04)

* Figure does not meet standard of reliability or precision.

[1]Estimates in this table are calculated using Sample Adult weights, while other tables in this report use Person weights. Due to sampling variability, overall rates of fall injuries calculated using the Sample Adult weights are slightly different than those calculated using the Person weights.

[2]Respondents were asked if they had ever been told by a doctor or other health professional that they had any of the following conditions: coronary heart disease, angina pectoris, heart attack, or any other heart condition or disease.

[3]Respondents were asked "Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?"

[4]Respondents were asked "Have you ever been told by a doctor or other health professional that you had a stroke?"

[5]Respondents were asked "Have you ever been told by a doctor or other health professional that you had asthma?"

[6]Respondents were asked "Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?"

[7]Respondents were asked if they had ever been told by a doctor or other health professional that they had diabetes (or sugar diabetes; female respondents were instructed to exclude pregnancy-related diabetes). Responses from persons who said they had "borderline" diabetes were treated as unknown with respect to diabetes.

[8]Respondents were asked "Do you have any trouble seeing, even when wearing glasses or contact lenses?"

[9]Body mass index (BMI) is calculated from information respondents supplied in response to questions in the survey regarding height and weight. For both men and women, underweight is indicated by a BMI under 18.5; healthy weight is indicated by a BMI greater than or equal to 18.5 and less than 25.0; overweight is indicated by a BMI greater than or equal to 25.0 and less than 30.0; obesity is indicated by a BMI greater than or equal to 30.0.

[10]Regular leisure-time physical activity is defined as engaging in light-moderate leisure-time physical activity for greater than or equal to 30 minutes at a frequency of greater than or equal to five times per week or engaging in vigorous leisure-time physical activity for greater than or equal to 20 minutes at a frequency greater than or equal to three times per week.

[11]Lifetime abstainers are defined as having had fewer than 12 drinks in their lifetime. A former drinker had at least 12 drinks in his or her lifetime or in any one year and had no drink in the past year. Current infrequent drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in one year, and 1–11 drinks in the past year. Current light drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in the past year, and less than or equal to three drinks per week in the past year. Current moderate drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in the past year, and (male) more than three drinks per week, up to 14 drinks per week, or (female) more than three drinks per week, up to seven drinks per week. Current heavier drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in the past year, and (male) over 14 drinks per week in the past year, or (female) over seven drinks per week in the past year (average consumption).

[12]Estimates are based on the question "Compared with 12 months ago, would you say your health is better, worse, or about the same?"

NOTE: Estimates are age adjusted using the projected 2000 U.S. population as the standard population and using three age groups: 65–74 years, 75–84 years, and 85 years and over.

DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.

Table 3. Annualized frequencies and percentages of fall injury episodes among adults aged 65 years and over, by cause of fall: United States, 2001–2003

Characteristic	Number in thousands	Percent of all fall episodes (95% confidence interval)
All fall injury episodes	1,689	100.0
Cause of fall		
Slipping, tripping, or stumbling.	948	57.0 (51.5 62.5)
Loss of balance, dizziness, fainting, seizure	444	26.7 (21.6 31.7)
Other[1]	272	16.4 (12.1 20.7)

[1]"Other" includes the following categories: collision with, pushing, or shoving by another person; jumping or diving; and something else.

DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.

Table 4. Annualized frequencies and percentages of fall injury episodes among adults aged 65 years and over, by where fall occurred: United States, 2001–2003

	Number in thousands	Percent of all fall episodes (95% confidence interval)
All fall injury episodes	1,689	
Places mentioned where falls occurred[1]		
Inside the house	837	49.9 (44.7 55.1)
Outside the house	400	23.9 (19.4 28.4)
Street, highway, or parking lot	110	6.5 (3.6 9.5)
Residential institution, health care facility, or other public building	172	10.3 (7.2 13.4)
Other[2]	169	10.1 (7.2 13.0)

[1]Respondents could indicate up to two places where the fall occurred per fall injury episode, therefore, the total percentage may be greater than 100%.
[2]"Other" includes the following categories: sport facility, athletic field, or playground; park or recreation area; river, lake, stream, or ocean; farm; industrial or construction area; trade or service area; school; child care center or preschool; and other unspecified responses.

DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.

Table 5. Annualized frequencies and percentages of fall injury episodes among adults aged 65 years and over, by type of fall: United States, 2001–2003

	Number in thousands	Percent of all fall episodes (95% confidence interval)
All fall injury episodes	1,689	
Types of falls mentioned[1]		
Stairs, steps, or escalator	260	15.5 (11.7 19.4)
Floor or level ground	913	54.6 (49.3 59.8)
Curb, including sidewalk	136	8.1 (5.0 11.3)
Chair, bed, sofa, or other furniture	126	7.5 (4.6 10.5)
Other (specified)[2]	137	8.2 (5.3 11.1)
Other (not specified).	156	9.3 (6.3 12.3)

[1]Respondents could indicate up to two types of falls per fall injury episdode, therefore, the total percentage may be greater than 100%.
[2]"Other (specified)" includes the following categories: ladder or scaffolding; playground equipment; building or other structure; bathtub, shower, toilet, or commode; and hole or other opening.
DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.

Table 6. Annualized frequencies and percentages of fall injury episodes among adults aged 65 years and over, by consequences of fall injury: United States, 2001–2003

Consequence[1] of fall injury	Number in thousands	Percent of all fall episodes (95% confidence interval)	
Phone call to doctor for treatment or advice	103	6.2 (3.8	8.6)
Visit to doctor's office for treatment or advice.	632	38.0 (32.7	43.3)
Visit to clinic or outpatient department for treatment or advice	129	7.8 (5.1	10.4)
Visit to emergency room for treatment or advice.	950	57.2 (52.2	62.1)
Overnight visit to hospital for treatment or advice	250	15.0 (11.1	18.9)
Need help with activities of daily living as result of fall injury	532	31.8 (26.6	37.0)
Expect to need help with activities of daily living for at least six months[2]	278	58.5 (48.5	68.5)
Need help with instrumental activities of daily living as result of fall injury	538	32.3 (27.2	37.4)
Expect to need help with instrumental activities of daily living for at least 6 months[3] . . .	341	73.3 (64.2	82.3)

[1]Consequences of fall injuries were asked in separate questions and are therefore not mutually exclusive.

[2]The universe for these estimates is noninstitutionalized adults aged 65 years and over who needed help with activities of daily living as a result of the fall injury.

[3]The universe for these estimates is noninstitutionalized adults aged 65 years and over who needed help with instrumental activities of daily living as a result of the fall injury.

DATA SOURCE: National Health Interview Surveys, 2001–2003. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population.

Technical Notes

Sample design

The National Health Interview Survey (NHIS) is a cross-sectional household interview survey of the U.S. civilian noninstitutionalized population. Data are collected continuously throughout the year in all 50 states and the District of Columbia. NHIS uses a multistage, clustered sample design to produce national estimates for a variety of health indicators. Information on basic health topics is collected for all household members, if necessary, by proxy from one adult family member. Additional information is collected for one randomly selected adult and one randomly selected child in each family. Self-response is required for the Sample Adult questionnaire except in rare cases where sample adults are physically or mentally incapable of responding for themselves.

Response rates

The household response rate for NHIS data years 2001–2003 was 89.2%. The final response rate for the Sample Adult component of NHIS was 74.1%. NHIS interviews were completed with 31,875 adults aged 65 years and over completing the Family Core and 17,771 adults aged 65 years and over completing the Sample Adult questionnaires. Procedures used in calculating response rates for combined data years are described in detail in Appendix I of the Survey Description Document of the NHIS data files (21–23).

Item nonresponse

Item nonresponse for each of the sociodemographic indicators shown in this report was about 1% or less, with the exception of questions related to family income. Because item non-response for family income (used to generate estimates for poverty status) was considerably higher than non-response for other indicators, starting with 2004, family income data for NHIS data was imputed with five sets of imputed values created to allow for the assessment of variability caused by imputation. Family income was missing for about 30% of persons in 2001–2003. Detailed descriptions of the multiple imputation procedure, as well as data files for 1997 and beyond are available from: www.cdc.gov/nchs/nhis.htm, via the Imputed Income Files link under that year. Item nonresponse for health behavior, heath care, conditions, and other health-related items were less than 3%. The denominators for estimates shown in Tables 1–6 exclude persons for whom the relevant information was not reported.

Age adjustment

Data shown in this report were age adjusted using the projected 2000 U.S. population (provided by the U.S. Census Bureau) as the standard population (28,29). Age adjustment was used to allow comparison among various population subgroups that have different age structures. This is particularly important for demographic character-istics such as race and ethnicity, education, and marital status. It is also helpful for other characteristics. The following age groups were used for age adjustment: 65–74 years, 75–84 years, and 85 years and over (Table I). Estimates were calculated using software for statistical analysis of correlated data (SUDAAN) (27). The SUDAAN procedures RATIO and DESCRIPT were used to produce age-adjusted percentages and rates and their variances.

Table I. Age distribution used in age adjusting data shown in Tables 1 and 2: Projected 2000 U.S. population

Age	Population (in thousands)
65 years and over	34,710
65–74 years	18,136
75–84 years	12,315
85 years and over	4,259

Tests of significance

Statistical tests performed to assess significance of differences in the estimates were two-tailed with no adjustments for multiple comparisons. The test statistic used to determine statistical significance of differences between two percentages or rates was

$$Z = \frac{|X_a - X_b|}{\sqrt{S_a{}^2 + S_b{}^2}}$$

where X_a and X_b are the two percentages or rates being compared, and S_a and S_b are the SUDAAN-calculated standard errors of those percentages or rates. The critical value used for two-sided tests at the 0.05 level of significance was 1.96.

Relative standard error

All estimates shown meet the NCHS standard of having less than or equal to 30% relative standard error. The relative standard errors are calculated as follows:

Relative standard error (as a percentage) = (SE/Est) 100,

where SE is the standard error of the estimate, and Est is the estimate.

Definition of terms

Socioemographic terms

Age—The age recorded for each person is the age at the last birthday.

Hispanic or Latino origin and race—Hispanic or Latino origin and race are combined into a single measure in this report. Anyone with any Hispanic or Latino origin (including persons of Mexican, Puerto Rican, Cuban, Central and South American, or Spanish origins) were classified as Hispanic. The race categories were limited to the two largest single race groups due to issues of statistical reliability with the smaller groups. Data for single race persons other than non-Hispanic black and non-Hispanic white, and for multiple race persons, though not shown separately, are included in the analysis for all other variables.

Marital status—For adults identified in the initial household roster as spouses or domestic partners, marital status is automatically recorded and subsequently verified by the interviewer. For all others, respondents were asked to choose one of six marital status categories, displayed on a flash card, that they felt best descried their current

marital status (married, widowed, separated, divorced, never married, or living with a partner). Persons who were living with a partner were considered members of the same family. The marital status ''married'' may include common law unions.

Place of residence—Place of residence is classified as inside a metropolitan statistical area (MSA) or outside an MSA. Generally, an MSA consists of a county or group of counties containing at least one city or twin cities with a population of 50,000 or more, plus adjacent counties that are metropolitan in character and are economically and socially integrated with the central city. In New England, towns and cities rather than counties are the units used in defining MSAs. The number of adjacent counties included in an MSA is not limited, and boundaries may cross state lines. The metropolitan populations in this report are based on MSAs as defined in the 1990 census. In the tables for this report, place of residence is based on a variable in the 2003 Person data file indicating MSA size. This variable is collapsed into three categories: MSAs with a population of 1,000,000 or more, MSAs with a population of less than 1,000,000, and non-MSA areas.

Poverty status—Poverty status is based on family income and family size using the U.S. Census Bureau's poverty thresholds. ''Poor'' persons are defined as below the poverty threshold. ''Near Poor'' persons have incomes of 100% to less than 200% of the poverty threshold. ''Not Poor'' persons have incomes that are 200% of the poverty threshold or greater.

Region—In the geographic classification of the U.S. population, states are grouped into the four regions used by the U.S. Census Bureau:

Region	States included
Northeast	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania;
Midwest	Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, and Nebraska;
South	Delaware, Maryland, District of Columbia, West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Oklahoma, Arkansas, and Texas;
West	Washington, Oregon, California, Nevada, New Mexico, Arizona, Idaho, Utah, Colorado, Montana, Wyoming, Alaska, and Hawaii.

Terms related to health characteristics and outcomes

Conditions—Condition is a general term that includes any specific illness (physical or mental) or injury. From 1978 through 1996, six chronic condition lists were used in the NHIS. Those six lists covered 133 conditions. The 1997 (and beyond) NHIS chronic condition data cover a substantially reduced number of conditions. Included in this report were the following conditions: heart disease, hypertension, stroke, asthma, cancer, diabetes, and vision trouble. All data in the Sample Adult component are self-reported, and most questions ask whether a condition was diagnosed by a doctor or a health professional. The reference periods for the conditions vary. There are four basic reference periods: ever, past 12 months, past 30 days, and currently.

Respondent-assessed health status—Respondent-assessed health status was based on the question, ''Would you say your health, in general, was excellent, very good, good, fair, or poor?'' Information was obtained from all respondents, with proxy responses allowed for adults not taking part in the interview.

Difficulty in physical functioning —Refers to the degree of difficulty respondents experienced performing various physical activities without the assistance of another person and without using special equipment. Included in this report were the following activities: walking a quarter of a mile (or three city blocks); standing for two hours; stooping, bending or kneeling; and climbing 10 steps without resting. Response categories include ''not at all difficult,'' ''only a little difficult,'' ''somewhat difficult,'' ''very difficult,'' can't do at all,'' or ''do not do this activity.'' Those who responded ''do not do this activity'' were not included in the tables.

Terms related to health behavior

Alcohol consumption— Refers to the respondent's alcohol drinking status at the time of interview. There are six alcohol consumption categories. Lifetime abstainers are defined as having had fewer than 12 drinks in his or her lifetime. A former drinker had at least 12 drinks in their lifetime or in any one year and had no drink in the past year. Current infrequent drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in one year, and 1–11 drinks in the past year. Current light drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in the past year, and less than or equal to three drinks per week in the past year. Current moderate drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in the past year, and (male) more than three drinks per week up to 14 drinks per week or (female) more than three drinks per week up to seven drinks per week. Current heavier drinkers are defined as having had at least 12 drinks in their lifetime, at least 12 drinks in the past year, and (male) over 14 drinks per week in the past year or (female) over seven drinks per week in the past year (average consumption).

Body mass index—Body mass index (BMI) is calculated from the sample adult's responses to survey questions regarding height and weight. BMI is weight (in kg)/[height (in m)]^2. For both sexes, the category ''underweight'' is defined as a BMI less than 18.5. Healthy weight is defined as a BMI greater than or equal to 18.5 and less than 25.0. Overweight is defined as a BMI greater than or equal to 25.0 and less than 30.0. Obese is defined as a BMI greater than or equal to 30.0.

Leisure-time physical activity—All questions related to leisure-time physical activity are phrased in terms of current behavior and lack a specific prior reference period. Respondents are told that they are being asked only about leisure-time physical activities. Regular activity refers to leisure-time activity engaged in for a minimum specified duration and a minimum specified frequency.

Any regular activity—Is either regular light-moderate, regular vigorous, or both. It does not include other combinations of activity levels (e.g., vigorous activity twice a week combined with light-moderate activity three times a week). The number of individuals with such combinations of activity is small.

Regular light-moderate activity—Is light-moderate activity that occurs five or more times per week for at least 30 minutes each time. *Regular vigorous activity*—Is vigorous activity that occurs three or more times per week for at least 20 minutes each time.

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