

**Falls Among
Utah Seniors:
1999-2004
*Prevalence, Impact
and Prevention***



Utah Department of Health
Division of Community and Family Health Services
Bureau of Health Promotion
Violence and Injury Prevention Program
P.O. Box 142106
Salt Lake City, Utah 84114-2106
Phone: (801) 538-6141
Web site: <http://health.utah.gov/vipp>
E-mail: vipp@utah.gov



Prepared by Albert Wang, M.P.H., Karen Nellist, M.P.H., Cyndi Bemis, and Trisha Keller, M.P.H., R. N., with special thanks to Michael Friedrichs, M.S. for his epidemiological consultation and to Amy Bowler for her assistance with layout and design.

This report was funded in part by the Centers for Disease Control and Prevention (CDC) through the Utah Traumatic Brain Injury Surveillance Project, Cooperative Agreement #U17/CCU814044-06 and the Utah Preventive Health and Health Services Block Grant, DUNS 95-934-7972. The contents of this report are solely the responsibility of the authors and do not represent the opinions of the CDC. This report may be reproduced and distributed without written permission.

Suggested citation: Violence and Injury Prevention Program. Falls Among Utah Seniors: 1999-2004: Prevalence, Impact and Prevention. Salt Lake City, UT: Utah Department of Health, 2007.

Published May 2007

Table of Contents

Executive Summary	2
Introduction.....	3
2003 Fall Prevalence for Seniors	4
Figure 1. Percent of Seniors Aged 65+ Who Reported Falling in the Past Three Months by Age Group, Utah and US 2003	4
Figure 2. Percent of Seniors Aged 65+ Who Reported Falling in the Past Three Months and Who Were Examined by a Doctor or Injured in the Fall, by Sex, Utah 2003	5
Figure 3. Selected Measures of Senior Health Status by Fallen or Not Fallen in the Past Three Months, Utah 2003	5
Emergency Department Visits Due to Falls, 1999-2004	6
Figure 4. All Senior Fall-related Emergency Department Visits, Rates by Age Group and Year, Utah 1999-2004.....	6
Figure 5. All Senior Fall-related Emergency Department Visits, Rates by Sex and Age Group, Utah 1999- 2004.....	6
Figure 6. Treat-and-Release Senior Fall-related Emergency Department Visits, Rates by Sex and Age Group, Utah 1999-2004	7
Figure 7. Treat-and-Release Senior Fall-related Emergency Department Visits, Average Charge by Sex and Year, Utah 1999-2004	7
Hospitalizations Due to Falls, 1999-2004	8
Figure 8. Senior Fall-related Hospitalization Rates by Age Group and Year, Utah 1999-2004.....	8
Figure 9. Senior Fall-related Hospitalization Rates by Age Group and Sex, Utah 1999-2004.....	8
Figure 10. Senior Fall-related Average Hospital Charge by Sex and Age Group, Utah 1999-2004.....	9
Figure 11. Senior Fall-related Average Hospital Charge by Sex and Year, Utah 1999-2004	9
Fatal Fall Injury Trends, 1999-2004.....	10
Figure 12. Senior Fall-related Deaths by Age Group and Year, Utah 1999-2004	10
Figure 13. Senior Fall-related Deaths by Age Group and Sex, Utah 1999-2004	10
2005 Safety and Health Survey	11
Figure 14. Mean Age of Seniors by Sex and Facility, Utah 2005.....	11
Figure 15. Senior Survey Respondent Place of Residence, Utah 2005	11
Figure 16. Number of Days of Physical Activity Reported by Seniors with a Duration of at Least 30 Minutes Per Week , Utah 2005	11
Figure 17. Reported Senior Fall-related Hospitalizations During Past Year, Utah 2005.....	12
Figure 18. Reported Senior Fall-related Emergency Department Use During Past Year, Utah 2005	12
How Does Utah Compare to the Nation?	13
Recommendations	14
References	15
Appendix	16
Resources	17

Executive Summary

Fall injuries are a major public health problem. They represent an increasingly large burden to individuals and families, society, and the health care system. Unintentional injuries pose a significant threat to the health and well-being of Utah seniors (aged 65 and older). Falls are the leading cause of unintentional injury among older adults in Utah. Most injuries are caused by falls on the same level, for example trips or slips while walking.

In Utah, from 1999 to 2004, senior fall-related injuries accounted for 412 deaths, 15,895 hospitalizations and 53,591 emergency department (ED) visits. For every one fall-related death, there are 39 hospitalizations, 130 ED visits and an unknown number of visits to other health care settings, (clinics, Doctor's office, etc.)

In Utah, total charges for senior ED visits for fall-related injuries doubled from 1999-2004; from \$3.5 million in 1999 to \$7.1 million in 2004. Fall-related hospitalization charges increased from \$28.8 million to \$47.4 million during the same time period.

A 2003 Behavioral Risk Factor Surveillance System (BRFSS) survey of Utah seniors aged 65 and older found that 14.5 percent (or 29,000 Utah seniors) had reported falling in the previous three months, which was similar to the national rate of 13.4 percent. Of those who reported falling, women were more likely to seek treatment and to

report that the fall curtailed their usual activities for at least a day.

A review of Utah data for 1999-2004 shows females seeking emergency department treatment at a higher rate than males. Females were also two to three times more likely to be hospitalized for a fall injury. However, it was statistically significant that males were more likely to die from their injuries. Further research is needed to understand the differences in fall-related morbidity and mortality between males and females.

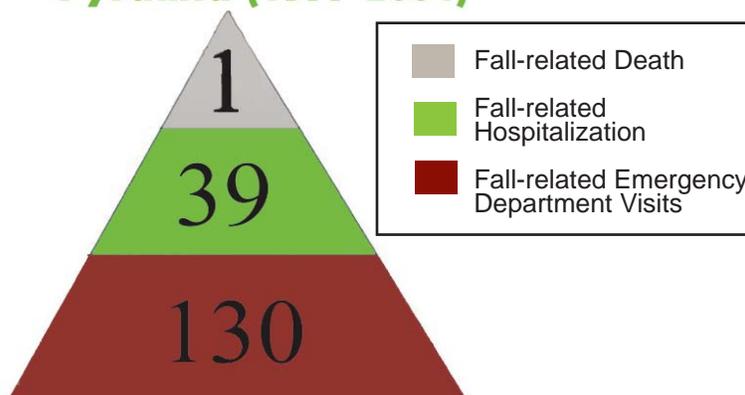
During this period, seniors aged 85 and older were at least twice as likely as seniors aged 65 to 84 to be hospitalized with a fall injury. More than half of all seniors 65 and older, admitted to the hospital due to a fall, had suffered a hip fracture.

It is recommended that seniors:

- 1) work with family members and health care providers to assess their medical risks for falling;
- 2) check in the home and correct the hazards likely to cause falls, for example tripping hazards (loose rugs or electrical cords), poor lighting, etc.
- 3) be very selective when choosing footwear and choose flat shoes with sturdy, non-slip soles, and good ankle support.

As the Utah population ages, the incidence of fall-related injuries and the costs to treat them will continue to climb and add to the state's health care burden. Fall prevention efforts need to increase.

Utah Fall-related Injury Pyramid (1999-2004)



Introduction

Falls are a serious public health problem among seniors (aged 65 and older). They are the most common cause of nonfatal injuries and hospital admissions for trauma among older adults in the United States. More than one-third of seniors fall each year.^{1,2} Most fall injuries are caused by falls on the same level (not from falling down stairs) or from a standing height—for example, by tripping while walking.³ Falls are the leading cause of injury-related hospitalization among Utah adults aged 65 and older.

Seniors are more prone to falling as their sight, hearing, muscle strength, coordination, and reflexes deteriorate as they age. Balance can be affected by diabetes and heart disease, or by problems with the nervous and circulatory systems or the thyroid gland. Additionally, certain medications can cause dizziness, making a person more likely to lose his or her balance and fall.⁴

The National Center for Injury Prevention and Control (NCIPC) reports that, in 2003, more than 1.8 million adults aged 65 and older were treated in emergency departments for fall-related injuries and more than 412,000 (22.8 percent) were hospitalized.⁵ That same year, 9,127 Utah seniors were treated in emergency departments due to falls and 2,674 (29.3 percent) were hospitalized.⁶

Fractures due to osteoporosis and other bone diseases are common, costly, and often become a chronic burden on individuals and society. They affect more than 10 million individuals and contribute to approximately 1.5 million fractures annually.^{7,8} When bones are fragile, even a

minor fall can cause one or more fractures.⁴ Hip fractures are a common health problem among elderly men and women who fall and are associated with increased risk of mortality. The death rate is 2.8 to 4 times greater among hip fracture patients during the first three months post-fracture^{9,10} and nearly one in five hip fracture patients are discharged to nursing homes.^{11,12} Preliminary data from the 2006 Utah Behavioral Risk Factor Surveillance System (BRFSS) survey indicate that 10.6 percent of females and 2.2 percent of males aged 65 and older have been told by a health professional that they have osteoporosis.¹³ In the absence of interventions, it is estimated that in 2020, one in two Americans over the age of 50 will have, or will be at high risk for, osteoporosis.¹²

This report describes the incidence of falls among seniors both nationally and in Utah. Seniors were divided into three age groups: 65 to 74 years, 75 to 84 years, and 85+ years. The report describes senior falls in Utah using surveillance data ([BRFSS], Utah and US), emergency department data (Utah Emergency Department Encounter Database), hospital discharge data (Utah Hospital Discharge Database), mortality data (Utah death certificates), and data from a one-time survey of older adults participating at senior citizen centers and/or residing in assisted living centers in Utah.

Data for this report are expressed with 95 percent confidence intervals (CI), which indicate 95 percent confidence that the “true” rate lies within the two designated confidence bounds.

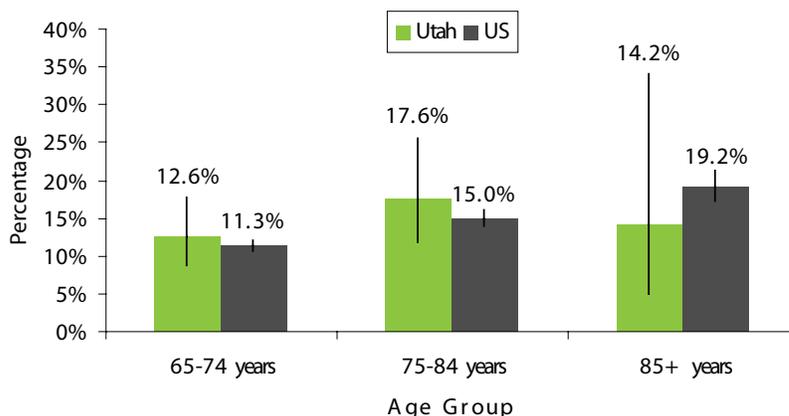
2003 Fall Prevalence for Seniors

The Utah 2003 BRFSS included questions relating to falls. The data from the survey showed that more than 29,000 Utah seniors (14.5 percent) aged 65 and older reported a fall in the past three months. This rate was comparable to the national rate of 13.4 percent for the same time period. The rates were similar for males and females, and across all senior age groups (65 to 74 years, 75 to 84 years, and 85+ years), both nationally and in Utah (Figure 1).

There were no significant differences in fall prevalence by income, education level, ethnicity, weight category (ideal weight, overweight, or obese), or geographic location within the state. This was most likely due to insufficient sample sizes to detect any differences.

Slightly more than one percent of seniors who reported falling in the past three months (n=319) also reported binge drinking, which was defined as consuming five or more alcoholic drinks at one occasion. Similarly, 1.1 percent of seniors who reported falling in the past three months reported chronic drinking (more than 60 drinks in 30 days for men or more than 30 drinks in 30 days for women). However, there was no evidence that seniors who engaged in binge drinking or seniors who were categorized as chronic drinkers suffered higher rates of falls in the prior three months than non-drinkers.

Figure 1. Percent of Seniors Aged 65+ Who Reported Falling in the Past Three Months by Age Group, Utah and US 2003

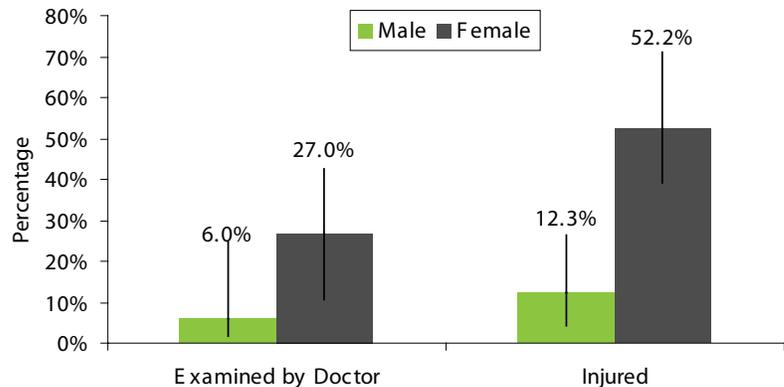


Source: BRFSS, Utah and US 2003

Injuries Due to Falls

In Utah, fewer than one in five seniors who fell chose to be examined by a doctor. Of the seniors who reported having fallen in the past three months, women were more than four times as likely to report being injured (52.2 percent for females and 12.3 percent for males) and almost five times more likely to report seeing a doctor (27.0 percent for females and 6.0 percent for males) (Figure 2). Overall, 33.6 percent of seniors who fell reported being injured seriously enough to limit their regular activities for at least a day and 17.5 percent reported being examined by a doctor because of the fall.

Figure 2. Percent of Seniors Aged 65+ Who Reported Falling in the Past Three Months and Who Were Examined by a Doctor or Injured in the Fall, by Sex, Utah 2003

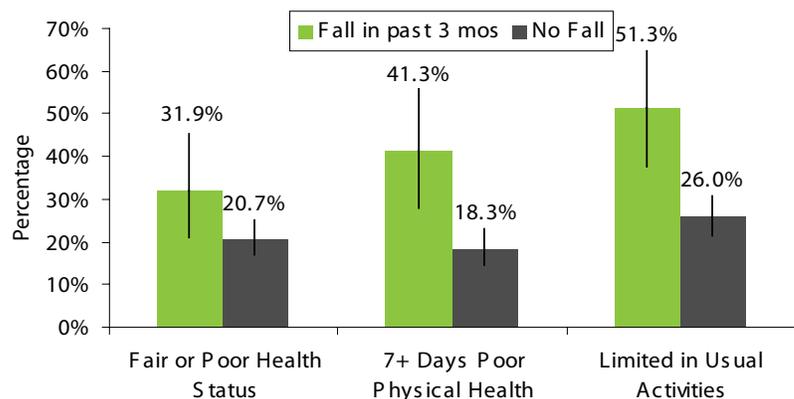


Source: BRFSS, Utah 2003

Quality of Life

Adults aged 65 and older who reported falling in the past three months reported poorer health status than those who did not fall. Fair or poor health was reported by 31.9 percent of those who had fallen in the past three months. In addition, 41.3 percent reported poor physical health for seven or more of the past 30 days. When asked if the respondent's usual activities were limited in any way because of physical, mental, or emotional problems, more than half (51.3 percent) of those who reported falling within the past three months reported limiting their activities compared with 26.0 percent of those who did not fall (Figure 3).

Figure 3. Selected Measures of Senior Health Status by Fallen or Not Fallen in the Past Three Months, Utah 2003

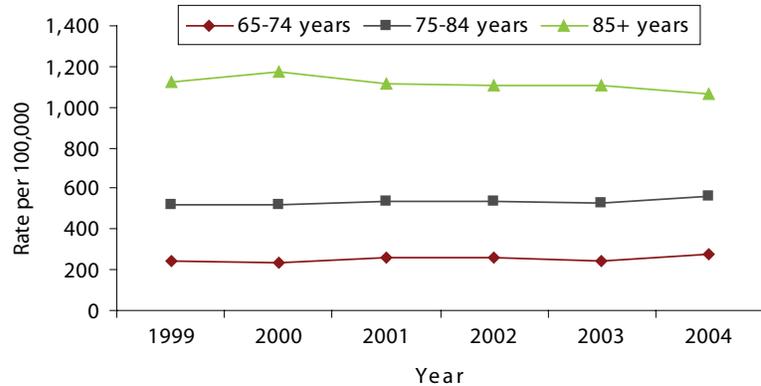


Source: BRFSS, Utah 2003

Emergency Department Visits Due to Falls, 1999-2004

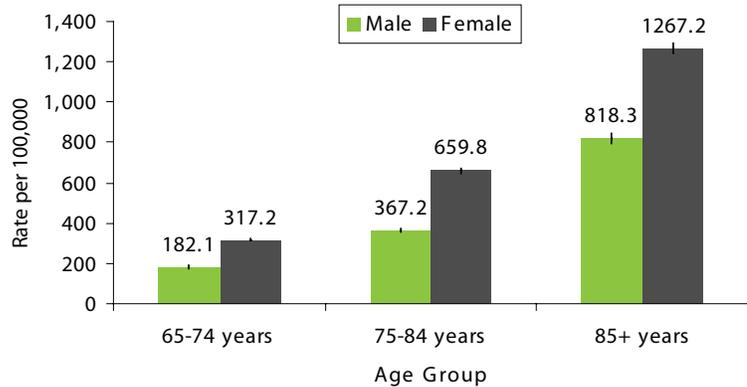
From 1999-2004, the overall rate of emergency department (ED) visits for seniors aged 65 and older was 454 per 100,000 population. The rate for seniors aged 85+ years was higher than for those aged 65-74 years and 75-84 years (Figure 4). Females had more visits for fall injuries than males in each age group (Figure 5) and were more than twice as likely to be admitted to the hospital. Approximately 24% of the 53,591 fall-related ED visits resulted in hospitalization.

Figure 4. All Senior Fall-related Emergency Department Visits, Rates by Age Group and Year, Utah 1999-2004 (n=53,591)



Source: Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, UDOH

Figure 5. All Senior Fall-related Emergency Department Visits, Rates by Sex and Age Group, Utah 1999-2004 (n=53,591)

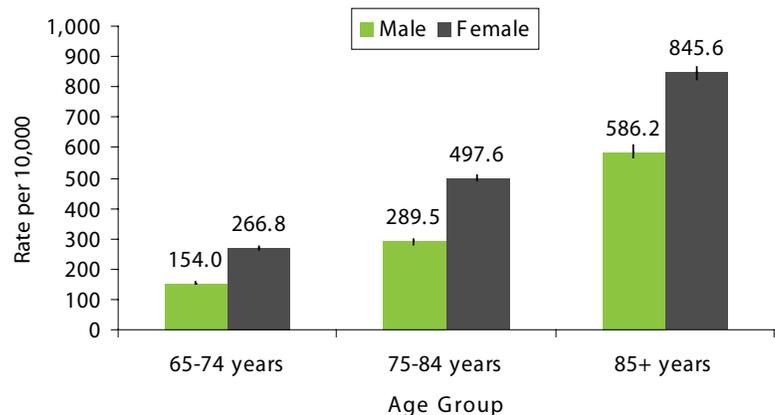


Source: Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, UDOH

ED Visits for Seniors Treated and Released

Between 1999-2004, there were 40,876 ED visits for fall-related injuries by seniors who were treated and released. Seniors aged 85+ years had a rate of ED visits of 756 per 100,000 which was a statistically higher ($p < 0.05$) compared to the other age groups. The seniors aged 85+ year were more than twice as likely as those aged 65-84 years to visit an ED for a fall-related injury. Additionally, females were more likely to visit the ED compared to males across all age groups (Figure 6). Despite the differences between males and females, there was no statistical difference in the cost for ED care by sex.

Figure 6. Treat-and-Release Senior Fall-related Emergency Department Visits, Rates by Sex and Age Group, Utah 1999-2004 (n=40,876)



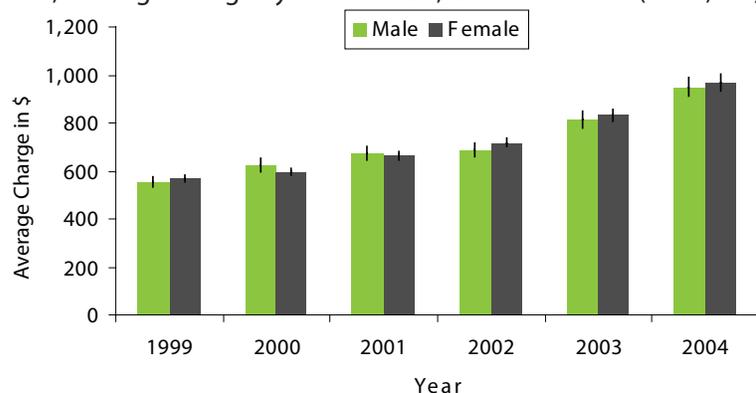
Source: Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, UDOH

Cost of ED Visits for Seniors Treated and Released

There was a 71% increase in the average charge (from \$563 to \$962) for ED care from 1999 to 2004 (Figure 7). This jump is significantly higher ($p < 0.05$) than the increase in average charges for ED encounters for non-fall-related senior injuries, which rose 54% over the same period (from \$440 to \$678).

The total charge for senior ED visits for fall injuries (excluding those that were hospitalized) more than doubled from 1999 to 2004 (from \$3.5 million in 1999 to \$7.1 million in 2004).⁶ The rising costs of all medical care and aging of the population contributed to this trend. The 2004 ED cost of fall-related injuries was 3.7 times higher than the cost (\$1.9 million) for treating all non-fall-related injuries.

Figure 7. Treat-and-Release Senior Fall-related Emergency Department Visits, Average Charge by Sex and Year, Utah 1999-2004 (n=40,876)



Source: Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, UDOH

Hospitalizations Due to Falls, 1999-2004

Hospitalizations included any instance a senior was admitted to a hospital due to a fall, regardless of how or where they were admitted. For the years 1999-2004, there were 15,895 senior fall-related hospitalizations.

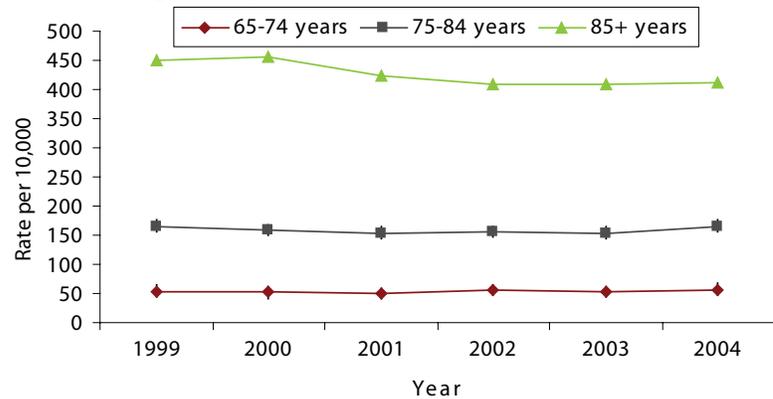
Trends

Seniors aged 65-74 years had the lowest rates of fall-related hospitalization while seniors 85 and older had the highest rates (Figure 8). The rate for females was higher across all age groups, with the largest difference seen in the 85 and older age group (494.7 per 10,000 for females and 291.4 per 10,000 for males) (Figure 9).

Analysis of 1999-2004 Utah hospital discharge data shows that more than half (53.5 percent or 5,908 persons) of persons 65 years and older, who were admitted to a hospital because of a fall, had a hip fracture (ICD-9 primary diagnosis codes 808 or 820). The percentages were comparable between males at 1,619 cases (50.6 percent) and females at 4,289 cases (54.6 percent).

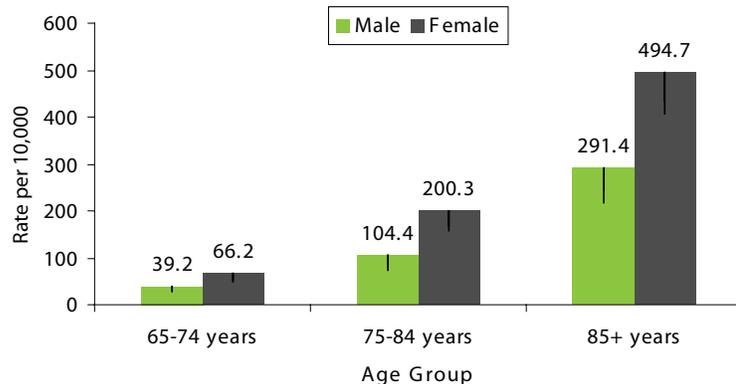
The average length of stay for seniors hospitalized for a fall was 5.0 days (4.9 days for females and 5.4 days for males). There was no difference in the average length of hospital stay by sex for seniors aged 65 to 74 years; however, there were differences for those aged 75 and older, with females experiencing shorter stays compared to males. This difference was largest and statistically significant ($p < 0.05$) for the 85 and older age group (4.9 days for females and 5.3 days for males).

Figure 8. Senior Fall-related Hospitalization Rates by Age Group and Year, Utah 1999-2004 (n=15,895)



Source: Utah Inpatient Hospital Discharge Data, Office of Health Statistics, UDOH

Figure 9. Senior Fall-related Hospitalization Rates by Age Group and Sex, Utah 1999-2004 (n=15,895)



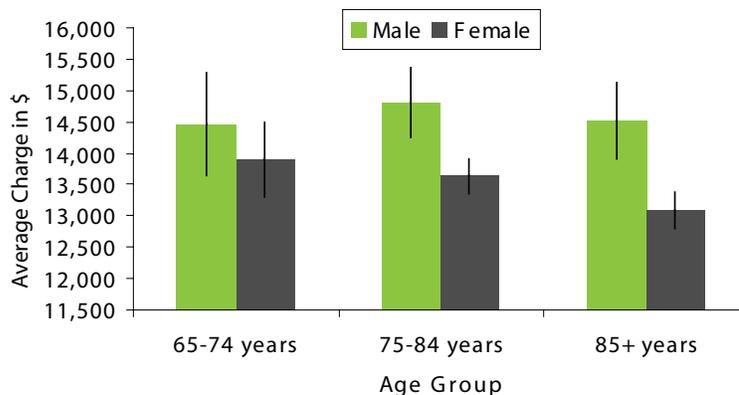
Source: Utah Inpatient Hospital Discharge Data, Office of Health Statistics, UDOH

The average hospital charge across age groups was similar (ranging from \$13,415 to \$14,088 for seniors aged 65+), however charges were higher for males than females particularly in the older age groups (75 years and older) (Figure 10). The average charge for males 85 and older was \$14,510 compared to \$13,092 for females (Figure 10). The longer hospital stays for males in this age group could explain the difference.

The overall average hospital charge for fall injuries has increased significantly over time. In 1999, the average charge for seniors admitted due to a fall was \$11,626. In 2004, that had risen to \$16,675, a 43.4 percent increase in five years, with males incurring significantly higher costs than females (Figure 11). These results suggest that, even though females have a higher risk of fall-related hospitalization, males could have more serious fall injuries that result in longer lengths-of-stay and higher average charges.

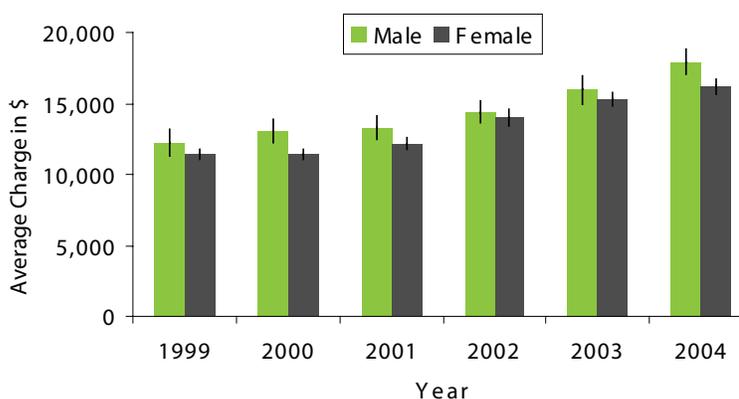
Total costs for fall related hospitalizations for seniors rose from \$28.8 million in 1999 to \$47.4 million in 2004, a 65% increase. While non-fall related senior injury hospitalizations rose 45% over the same time period.

Figure 10. Senior Fall-related Average Hospital Charge by Sex and Age Group, Utah 1999-2004 (n=15,895)



Source: Utah Inpatient Hospital Discharge Data, Office of Health Statistics, UDOH

Figure 11. Senior Fall-related Average Hospital Charge by Sex and Year, Utah 1999-2004 (n=15,895)



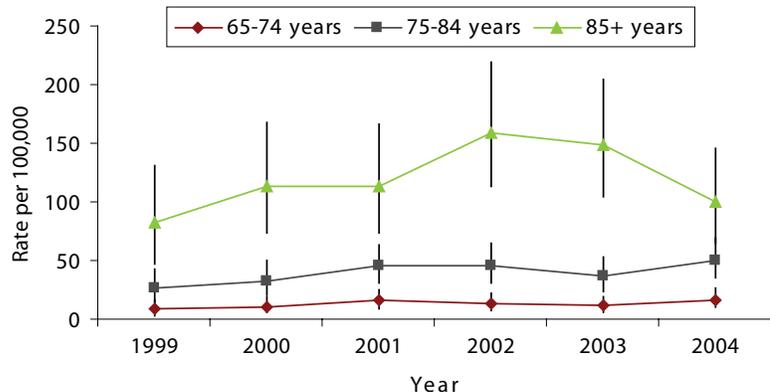
Source: Utah Inpatient Hospital Discharge Data, Office of Health Statistics, UDOH

Fatal Fall Injury Trends, 1999-2004

From 1999 to 2004, 412 Utah seniors (35 per 100,000 population) died from fall injuries, making falls the leading cause of injury-related death among seniors. Seniors aged 85 years and older had a statistically higher ($p < 0.05$) risk of fall-related death than those aged 65 to 84 years (Figure 12).

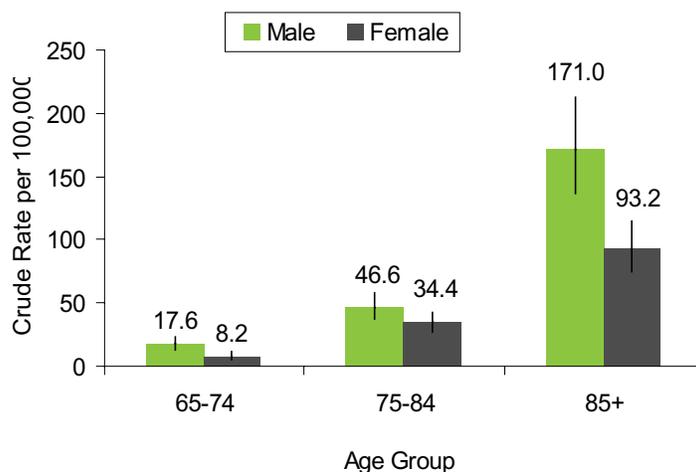
Senior males in all age groups had a statistically higher ($p < 0.05$) risk of fall-related death compared to senior females (Figure 13).

Figure 12. Senior Fall-related Deaths by Age Group and Year, Utah 1999-2004 (n=412)



Source: Utah Death Certificate Database, Office of Vital Records and Statistics, UDOH

Figure 13. Senior Fall-related Deaths by Age Group and Sex, Utah 1999-2004 (n=412)



Source: Utah Death Certificate Database, Office of Vital Records and Statistics, UDOH

2005 Safety and Health Survey

Demographics

The survey was conducted at senior citizen centers (SCC) and assisted living centers (ALC) across Utah. Of the 2,513 respondents, 30.3 percent were male and 69.7 percent were female. A total of 78.8 percent of respondents attended SCCs and 21.2 percent resided in ALCs.

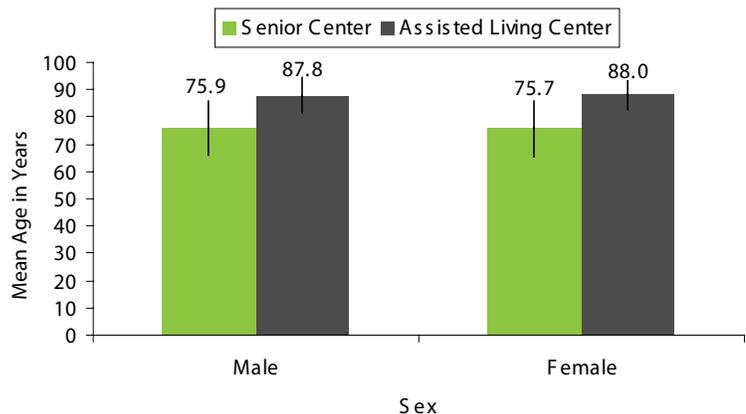
The overall age range of respondents was comparable; however, ALC residents were significantly older than SCC visitors. The average age of male SCC visitors was 75.9 years, and the average age of male residents of ALCs was 87.8 years. The average age of female SCC clients was 75.7 years, compared to an average age of 88.0 years for female ALC residents (Figure 14).

When asked about place of residence, 73.0 percent of respondents lived in their own home, 16.0 percent lived in an ALC, 6.0 percent lived at a friend's or relative's home, and 5.0 percent lived elsewhere (Figure 15). Some respondents lived at an ALC but completed a survey while visiting a senior citizen center.

Physical Activity Among Seniors*

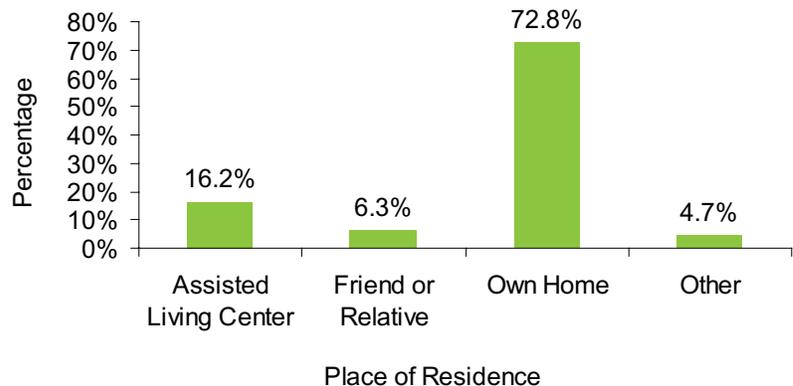
Most seniors who attended SCCs reported exercising two to three days per week for at least 30 minutes per day (31.7 percent of males, 34.0 percent of females). Overall, males reported exercising more frequently than females, with 41.7 percent exercising four or more days per week, compared to 34.1 percent of females (Figure 16).

Figure 14. Mean Age of Seniors by Sex and Facility, Utah 2005 (n=2,513)



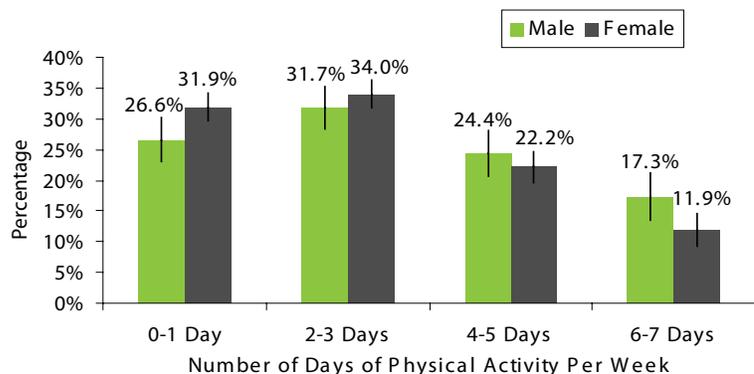
Source: Safety and Health Survey, UDOH

Figure 15. Senior Survey Respondent Place of Residence, Utah 2005 (n=2,513)



Source: Safety and Health Survey, UDOH

Figure 16. Number of Days of Physical Activity Reported by Seniors with a Duration of at Least 30 Minutes Per Week*, Utah 2005 (n=1,818)



*Includes senior citizen center data only since data from assisted living centers were incomplete
Source: Safety and Health Survey, UDOH



Walker/Cane Use Among Seniors*

More than 70 percent of respondents, who attended senior centers, reported they “never” used a walker or cane for mobility assistance and nearly 10 percent reported using a walker or cane “very often.” Respondents who reported using a walker or cane “very often” or “fairly often” also reported falling two or more times in the past six months at a statistically higher rate than (67.1 percent versus 31.2 percent) those who reported using a walker or cane “never,” “seldom,” or “occasionally” ($p=0.0019$).

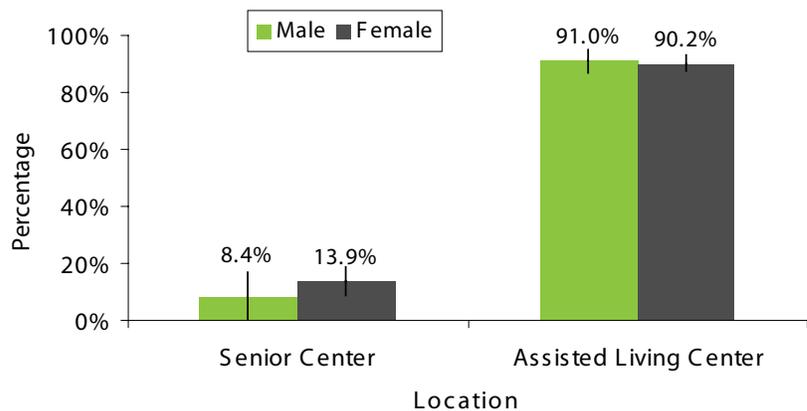
Senior Footwear

Of the senior respondents, 45 percent of ALC residents reported wearing slippers most of the time and 40 percent reported wearing either one- or two-inch heels. Of senior center visitors, 23 percent reported wearing slippers most of the time and 23 percent said they wear one-inch heels most of the time.

Hospitalization and Emergency Department Use Due to Falls

The survey showed that fall-related hospitalizations and emergency department use during the past year were higher for Utahns residing in ALCs than for SCC clients (Figures 17 and 18). The results are not unexpected, as the average age of seniors at ALCs is higher than for those attending SCCs. Males and females had similar rates of hospitalization and emergency department use regardless of survey location.

Figure 17. Reported Senior Fall-related Hospitalizations During Past Year, Utah 2005 (n=637)



Source: Safety and Health Survey, UDOH

Figure 18. Reported Senior Fall-related Emergency Department Use During Past Year, Utah 2005 (n=709)



Source: Safety and Health Survey, UDOH

*Data presented represent only SCC responses since data from ALCs were incomplete.

How Does Utah Compare to the Nation?

Hospitalization and Emergency Department Use Due to Falls

A 1996 study by the National Center for Injury Prevention and Control (NCIPC) referenced by Rizzo et.al. found that the average health care cost of a fall injury for Americans aged 72 and older was \$19,440. The charges are broken down as follows: hospital \$11,042, nursing home \$5,324, home health \$2,820, and emergency room \$253.¹⁴ A Utah study done three years later (1999) showed the average total fall related hospitalization cost for a person aged 75 and older was \$10,978.⁶ The average emergency department cost of fall treatment for seniors aged 75 and older was \$554.⁶ While Utah's average cost of hospitalization is slightly lower than the national average, the state's average cost of emergency care for falls is more than twice the national average. This is likely due in part to the three-year difference between the national and Utah studies and the slightly older Utah age group studied.

The NCIPC report mentions that, nationally, fall-related hospitalization stays for seniors are nearly twice as long as stays for non-fall-related injuries.¹⁴ In Utah, total length of stay for fall-related hospitalizations from 1999 to 2004 was more than four times that of hospitalizations for other injuries (80,015 fall-related days, 18,948 non-fall days).

Death Due to Falls

The United States rates for fall-related deaths in seniors, age 65 and older, have increased during 1999 to 2003. They increased from a 1999 rate of 33.3 per 100,000 (crude rates) for males and 26.7 per 100,000 for females up to 42.3 per 100,000 for males and 35.7 per 100,000 for females in 2003. This was a 27.1% increase in fall-related death rates for senior males, and a 33.8% increase for senior females.

In Utah, the fall-related death rates have also increased for the same age group and time period. In 1999, fall-related deaths were at 19.8 per 100,000 (crude rates) for males and 25.2 per 100,000 for females. In 2003, they had risen to 46.4 per 100,000 for males and 29.3 per 100,000 for females. This shows a 134.1% increase in fall death rates for Utah male seniors while Utah female seniors only increased 16.0% .

Compared to the US data, the results suggest that the problem is more serious among Utah males.

Recommendations

As adults age, they spend more of their time at home. As such, one-half to two-thirds of all older adult falls happen in or around the home. The majority of home falls occur on the same level; for example, tripping or slipping. Many seniors can also suffer serious injuries by slipping in a tub or shower, or when falling from a bed or toilet.

Physical changes that occur as people age also put seniors at risk of fall injury. Even a senior's choice of footwear can play a role in falls. Wearing high heels, slippers, and socks without shoes all increase the risk of falling.

Focusing on the following three recommendations are critical, as seniors are living longer than ever before. By taking prevention measures, older adults who hope to spend their golden years in their own homes will increase their likelihood of doing so.

Recommendation 1. Seniors should work with family members and health care providers to assess their medical risks for falling, including:

- Have an annual physical exam
- Have an annual eye exam
- Review medications for possible side effects and interactions
- Be screened for osteoporosis
- If recommended by a doctor, take medications to strengthen bones
- If recommended by a doctor, begin a strengthening/exercise program. Many geriatric specialists recommend tai chi, a martial art found to be especially useful in reducing fall risk.¹⁵

Recommendation 2. All seniors and those who care for them should check the home for the following hazards and correct problems as necessary.

- Unstable furniture
- Loose throw rugs
- Slippery bathroom surfaces
- Loose or missing stair railings
- Poor lighting
- Clutter
- Electrical cords in walkways
- Lack of grab bars near toilets and in tubs/showers

Recommendation 3. Seniors should be very selective when choosing footwear.

- Flat shoes with sturdy, non-slip soles and good ankle support are best
- Slippers are too unstable and should not be worn
- Wearing socks without shoes is dangerous, especially on wood, tile, or other smooth surfaces
- Avoid shoes with heels
- Replace old or poorly-fitting shoes

References

1. Hornbrook, M.C., Stevens, V.J., Wingfield, D.J., Hollis, J.F., Greenlick, M.R., and Ory, M.G. (1994) Preventing falls among community-dwelling older persons: results from a randomized trial. *The Gerontologist*. 34(1): 16-23.
2. Hausdroff, J.M., Rios, D.A., and Edelder, H.K. (2001) Gait variability and fall risk in community-living older adults: a 1-year prospective study. *Archives of Physical Medicine and Rehabilitation*. 82(8): 1050-6.
3. Ellis, A.A., and Trent, R.B. (2001) Do the risk and consequences of hospitalizations fall injuries among older adults in California vary by type of fall? *Journal of Gerontology: Medical Sciences*. 56A(11):M686-92.
4. National Institute on Aging, U.S. National Institutes of Health. (reprinted 2006) Age page: falls and fractures. Retrieved on July 27, 2006 from <http://www.nlm.nih.gov/medlineplus/falls.html>.
5. Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS)[Online].(2005) National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (producer). Available from url: www.cdc.gov/ncipc/wisqars. Retrieved on August 7, 2005.
6. The Utah Emergency Department Encounter Database or the Utah Inpatient Hospital Discharge Database, from Utah Department of Health, Center for Health Data, Indicator-Based Information System for Public Health website: <http://ibis.health.utah.gov/>. Retrieved on June 12, 2006.
7. Riggs, B.L., and Melton, L.J. 3rd. (1995) The worldwide problem of osteoporosis: insights afforded by epidemiology. *Bone*. Nov;17(5Suppl.):505S-511S.
8. Chrischilles, E. A., Butler, C. D., Davis, C. S., and Wallace, R. B. (1991) A model of lifetime osteoporosis impact. *Arch Intern Med*. Oct;151(10):206-32.
9. Liebson, C.L., Tosteson, A. N., Gabriel, S. E., Ransom, J.E., and Melton, L.J.(2002) Mortality, disability, and nursing home use for persons with and without hip fracture: a population-based study. *J Am Geriatr Soc*. Oct;14(2):70-75.
10. Richmond, J., Aharonoff, G. B., Zuckerman, J.D., and Koval, K.J.(2003) Mortality risk after hip fracture. *J Orthop Trauma*. Sept;17(8Suppl): S2-5.
11. U.S. Department of Health and Human Services. *Bone Health and Osteoporosis: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Office of the Surgeon General, 2004.
12. Salkeld, G., Cameron, I.D., Cumming, R. G., Easter, S., Seymour, J., Kurrle, S.E., and Quine, S. (2000) Quality of life related to fear of falling and hip fracture in older women: a time trade off study. *BMJ*. Feb 5;320(7231):341-6.
13. Preliminary data from the Utah Behavioral Factor Surveillance Survey (2006) Utah Department of Health, Salt Lake City, Utah.
14. Rizzo, J.A., Friedkin, R., Williams, C.S., Nabors, J., Acampora, D., and Tinetti, M.E.(1998) Health care utilization and costs in a Medicare population by fall status. *Med Care*. Aug;36(8):1174-88.
15. The Mayo Clinic Web site, available at URL <http://www.mayoclinic.com/health/fall-prevention/HQ00657>, accessed August 10, 2006.

Appendix

Data Sources and Methods

Utah Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS is a state-based survey that collects uniform, state-specific data on preventive health practices and risk behaviors that are linked to injuries, chronic diseases, and preventable infectious diseases in the adult population. The BRFSS is the largest telephone health survey in the U.S., collecting data from more than 350,000 adults every three years.

In 2003, the Utah BRFSS included three questions on falls:

1. "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, have you had a fall?"
2. "Were you injured? By injured, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor."
3. "Were you examined by a doctor or other health care provider because of the fall?"

Utah Emergency Department Encounter Database (EDED) and Utah Inpatient Hospital Discharge Database (HDDDB)

The EDED contains consolidated information on complete billing, medical codes, personal characteristics describing a patient, services received, and charges billed for each patient emergency department (ED) encounter. The Bureau of Emergency Medical Services/Office of Health Care Statistics receives quarterly emergency department encounter data from hospitals. The data are converted into a standardized format and are validated through a process of automated editing and report verification. Each record is subjected to a series of edit checks for accuracy, consistency, completeness, and conformity with the definitions specified in the Utah Hospital Emergency Patient Encounter Data Submittal Manual. Records failing the edit check are returned to the data supplier for correction.

The HDDDB contains consolidated information for complete billing, medical codes, and personal characteristics describing a patient, the services received, and charges billed for each inpatient hospital stay. The Office of Health Care Statistics (OHCS) receives quarterly discharge data from hospitals. The data are converted into a standardized format and validated using automated editing and report verification. Each record is subjected to a series of edits to check for accuracy, consistency, completeness, and conformity with the definitions specified in the Data Submittal Manual. Records failing the edit check are returned to the data supplier for correction.

Since the data source is billing forms, all visits or encounters have a diagnosis code. There is some difference of opinion regarding whether some providers emphasize diagnosis codes that yield higher reimbursements. The hospital and ED data are considered "Administrative Data" because they were created for use in billing and remittance of payment. As such, they were not constructed for public health surveillance purposes, and are weak in areas such as external cause of injury and race or ethnicity. In general, they are extremely valuable and reasonably complete and valid.

Utah Death Certificate Database

Utah requires that death certificates be filed by funeral directors. Funeral directors obtain demographic information from an informant, a close family member of the deceased. The cause of death is certified by the deceased physician or the physician who attended the death. Accidental and suspicious deaths are certified by the Medical Examiner. Death certificate data are assessed for completeness and consistency. The Office of Vital Records and Statistics (OVRs) conducts annual training for funeral directors and local registrars. When death certificates are received, the cause of death literals are computer-entered by personnel at the OVRs. The data are then shipped to the National Center for Health Statistics (NCHS), where the data are machine-coded into ICD-10 codes. NCHS returns the ICD-10 codes to OVRs and the records are updated.

ICD Codes Used in the Analysis

- *ICD-9 (hospitalizations)
- *E880-E886 Accidental falls
- *E888 Other and unspecified falls
- *E957 Suicide and self-inflicted injuries by jumping from a high place
- *E968.1 Assault by other and unspecified means, pushing from a high place
- *E987 Falling from a high place, undetermined whether accidentally or purposely inflicted
- *ICD-10 (fatalities)
- *W00-W19 Falls
- *X80 Intentional self-harm by jumping from a high place
- *Y01 Assault by pushing from a high place
- *Y30 Falling, jumping or pushed from a high place, undetermined intent

2005 Safety and Health Survey Database

The 2005 Safety and Health Survey was administered to a convenience sample taken from a list of senior citizen centers provided by the Division of Aging and Adult Services and assisted living centers provided by the Bureau of Health Care Facilities Licensing. This list included 108 senior centers and 94 assisted living centers.

Study coordinators requested voluntary participation from each center director. A total of 94 senior centers and 55 assisted living centers agreed to participate and 3,500 surveys were distributed.

Additionally, the Utah Department of Health Violence and Injury Prevention Program provided participants with safety brochures and items such as night lights and slip-resistant rug pads.

To achieve a 75 percent response rate, coordinators performed extensive follow-up, contacting centers that did not return surveys in a timely fashion and including self-addressed, stamped envelopes for return mailing of completed surveys.

Data were obtained from 2,645 completed surveys and were entered into a delimited text file.

Resources

Utah Department of Human Services
Division of Aging Services
120 North 200 West, Room 325
Salt Lake City, UT 84103
(801) 538-3910
www.dhs.utah.gov

Brain Injury Association of Utah
1800 South West Temple, Suite 203
Salt Lake City, UT 84115
(801) 484-2240
www.biau.org

National Center for Injury Prevention and Control
Mailstop K65
4770 Buford Highway, NE
Atlanta, GA 30341-3724
(770) 488-1506
www.cdc.gov/ncipc/

National Institute on Aging
Building 31, Room 5C27
31 Center Drive, MSC 2292
Bethesda, MD 20892
(301) 496-1752
www.grc.nia.nih.gov

National Resource Center for Safe Aging
San Diego State University
6505 Alvarado Road, Suite 211
San Diego, CA 92120
(619) 594-0986
www.safeaging.org

Utah Department of Health
Violence and Injury Prevention Program
P.O. Box 142106
Salt Lake City, UT 84104-2106
(801) 538-6141
www.health.utah.gov/vipp/