Characteristics of Falls Among Older People — China, 2018

Zhiming Lu[1]; Pengpeng Ye[1]; Yuan Wang[1]; Leilei Duan[1]; Yuliang Er[1,#]

Summary

What is already known about this topic?

The incidence of falls among older people is 20.7% in China. Falls are the top cause for death from injuries in people aged 65 years and above, and mortality rates increase with age in China. There are few reports on the epidemiological characteristics of falls in older people nationwide in recent years.

What is added by this report?

This study found that among older people with falls reported in the National Injury Surveillance System (NISS) in 2018, there were more females than males. The peak time for falls was in the morning. Home was the most common site where falls occurred, and leisure activities and housework were the main activities when falls occurred. After falling, the lower limbs and head were most often injured with bruises and fractures. The degree of injury was mainly mild and moderate.

What are the implications for public health practice?

Data based on the NISS can be used as an additional data source for research on falls in China. This study identified priorities for the control and prevention of falls.

As defined by the World Health Organization (WHO), a fall is an event that results in a person inadvertently coming to rest on the ground, floor, or other lower level. Falls have become a serious public health problem worldwide (1). The study data were from the National Injury Surveillance System (NISS) in China, and descriptive analysis was applied on characteristics of falls among persons aged 60 years and above. In total, 100,551 cases of falls were collected from the NISS in China, including 41,821 males and 58,730 females. Falls most commonly occurred at home (55.97%), and leisure activities (30.27%) were the main activity category when falls occurred. The elderly should be treated as the targeted population for effective prevention of falls.

Globally, the number of deaths from falls was double in 2017 compared with 1990 (2). In 2017, there was an estimated 75,000 deaths attributed to falls among people over 70 years of age in China. Falls can result in limited mobility and disability — even death on older adults — which compromises health conditions and quality of life and causes large strains on medical resources (3–4). The data of this study were medical and health institution based and suggested the importance of prioritizing the prevention of falls in older adults for injury prevention and control through describing the characteristics of falls in the elderly in China.

The NISS was established in 2006 and covers 84 surveillance points (33 rural and 51 urban), including 252 medical and health institutions. Cases of falls were obtained from the outpatient or emergency departments of 252 medical and health institutions. The doctors and nurses in the outpatient or emergency departments filled in "national injury surveillance report cards" and sent those reports to the local CDCs regularly. The local CDCs were responsible for collecting, summarizing, and inputting information and regularly reporting the data to the National Center for Chronic and Noncommunicable Disease Control and Prevention of China CDC through administrative channels. Sampling methods, quality of data, and other detailed information of the NISS have been reported in published articles (5–6). Software SPSS (version 25.0, SPSS Inc, Chicago, IL, USA) was used for statistical analysis. The data utilization of the NISS had been reviewed and approved by the Ethical Review Committee of the National Center for Chronic and Noncommunicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention (ethical application grant number: 201502).

In total, 100,551 cases of falls among older persons aged 60 years and above were collected by the NISS in 2018, including 58,730 females and 41,821 males with a gender ratio of 1.40. The number of falls was evenly distributed in 12 months. Falls mainly occurred in the daytime (06:01–18:00), and the peak time was the morning (06:01–12:00). Home (55.97%), road/street (18.69%), and public residential institution (12.80%) were the sites where falls most often occurred. In different age groups, the top 3 sites of falls were

essentially the same, and the proportion of falls at home increased with age. Females (60.08%) had a higher proportion of falls at home than males (50.21%). The most common 3 activities when falls occurred were leisure activities (30.27%), housework (22.36%), and walking (20.20%). The activities when falls occurred differed based on age group. Higher proportions of falls occurred during housework for females (25.30%) than for males (18.23%). (Table 1)

In 2018, bruises (37.73%), fractures (34.34%), and sprains (14.94%) were the main natures of injury of falls in older persons aged 60–79 years, and the top 3 natures of injury of falls in older persons aged 80 years and above were fractures (41.62%), bruises (35.21%), and sharps injury, bites, and open wounds (8.74%). Higher proportions of fractures caused by falls were found in females (39.33%) than in males (27.34%). The most common body parts that falls affected were lower limbs (32.43%), head (21.48%), and torso (20.57%). The top 3 body parts that falls affected were lower limbs (31.95%), torso (21.08%), and head (19.44%) in older persons aged 60–69 years. Males (27.38%) had a higher proportion of head injuries caused by falls than females (17.27%).

About 60% of cases were mild in each age group, and moderate injury accounted for 34.66%. With an increase of age, the proportion of mild injury decreased, while severe injury increased. Overall, 70.49% of cases were discharged from the hospital after treatment, 24.64% required hospitalization, and 157 cases were fatal. The proportion of deaths increased with age.

DISCUSSION

This study showed the epidemiological characteristics of falls in older persons aged 60 years and above extracted from the NISS in China in 2018. As for cases of falls, there were more females than males. Home was the most common site where falls occurred. Older persons were more likely to suffer falls when they were engaged in leisure activities. These findings were consistent with previous research results in China (7). Previous studies showed that falls were the leading cause for the elderly to seek medical treatment for injuries in China. In total, 100,551 cases of falls among older persons were collected by the NISS in China in 2018, of which 34.34% resulted in fractures and 24.64% received hospitalization. The proportion of moderate and severe injuries was higher. These results indicated that falls were one of the major public problems for older people. Compared with

2014, there was an increasing tendency regarding the number of falls among the elderly aged 60 years and above (8). This may result from the increasing population of older persons caused by population aging in China and may be associated with a decreasing rate of underreporting for falls caused by improvements to the NISS (6).

In this study, falls mainly occurred in the daytime, and the peak time was between 06∶01–12∶00, which suggested that further attention should be paid to the epidemiological characteristics of falls and fall-related factors in the daytime, especially in the morning. Falls mainly occurred at home, and the proportion of falls at home increased with age, which may result from the poor action capacity and longer sedentary time at home caused by a decline of physiological function with increasing age. Behavioral factors were important risk factors for falls in older persons (1). The top three activities when falls occurred were leisure activities, housework, and walking. A study in Serbia showed that walking was most likely to cause falls (9), which is inconsistent with the results of this study. This may result from the different characteristics of physiology and behavior of people in different countries. Therefore, these activities should be taken into great consideration when implementing fall injury prevention and control programs. The potential risk of fall-related risk factors at home should be regularly identified and reduced to improve the safety of elderly people's daily lives.

These results suggested a higher proportion of fractures caused by falls, and this proportion increased with age. Females had a higher proportion of fractures than males probably due to postmenopausal women being more likely to develop osteoporosis caused by low estrogen levels (10), which increased the risk of fractures. It is important to strengthen the prevention and treatment of osteoporosis while preventing falls, especially paying attention to the prevention of osteoporosis in older women with histories of falls. It is essential to establish comprehensive prevention strategies when conducting intervention projects to prevent falls in older people.

The findings in this study were subject to some limitations. First, the data were collected in the form of report cards, and there may be recall bias for self-reported information. Second, the data of this study was extracted from the NISS, which only included outpatient and emergency department cases. Therefore, the number of falls was likely underestimated. Third, indicators, such as fall incidence at the community level, cannot be calculated from the NISS.

TABLE 1. The characteristics of falls among older people in China, 2018.

Item	Age (Years)			Sex		Total, N (%)
	60–69, N (%)	70–79, N (%)	80–, N (%)	Male, N (%)	Female, N (%)	
Sites						
Home	22,757 (45.28)	17,441 (61.20)	16,085 (73.79)	20,999 (50.21)	35,284 (60.08)	56,283 (55.97)
Road/street	11,743 (23.37)	4,764 (16.72)	2,281 (10.46)	8,481 (20.28)	10,307 (17.55)	18,788 (18.69)
Public residential institution	6,932 (13.79)	3,637 (12.76)	2,298 (10.54)	5,616 (13.43)	7,251 (12.35)	12,867 (12.80)
Farm/farmland	2,800 (5.57)	834 (2.93)	145 (0.67)	2,056 (4.92)	1,723 (2.93)	3,779 (3.76)
School and school-related areas	1,752 (3.49)	753 (2.64)	423 (1.94)	1,370 (3.28)	1,558 (2.65)	2,928 (2.91)
Industrial and construction area	1,656 (3.30)	138 (0.48)	64 (0.29)	1,522 (3.64)	336 (0.57)	1,858 (1.85)
Commercial and serve area	1,232 (2.45)	381 (1.34)	194 (0.89)	801 (1.92)	1,006 (1.71)	1,807 (1.80)
Sports and athletics area	671 (1.34)	269 (0.94)	112 (0.51)	512 (1.22)	540 (0.92)	1,052 (1.05)
Others	99 (0.20)	34 (0.12)	25 (0.11)	63 (0.15)	95 (0.16)	158 (0.16)
Unknown	612 (1.22)	249 (0.87)	170 (0.78)	401 (0.96)	630 (1.07)	1,031 (1.03)
Activities						
Leisure activities	14,111 (28.08)	8,669 (30.42)	7,653 (35.11)	12,868 (30.77)	17,565 (29.91)	30,433 (30.27)
Housework	12,444 (24.76)	6,661 (23.37)	3,377 (15.49)	7,622 (18.23)	14,860 (25.30)	22,482 (22.36)
Walking	9,055 (18.02)	6,225 (21.84)	5,027 (23.06)	8,207 (19.62)	12,100 (20.60)	20,307 (20.20)
Life activity	5,621 (11.19)	4,609 (16.17)	4,652 (21.34)	6,087 (14.55)	8,795 (14.98)	14,882 (14.80)
Work	4,569 (9.09)	796 (2.79)	185 (0.85)	3,648 (8.72)	1,902 (3.24)	5,550 (5.52)
Driving/riding vehicles	2,530 (5.03)	678 (2.38)	222 (1.02)	1,846 (4.41)	1,584 (2.70)	3,430 (3.41)
Sports activities	585 (1.16)	192 (0.67)	103 (0.47)	448 (1.07)	432 (0.74)	880 (0.88)
Education	94 (0.19)	38 (0.13)	21 (0.10)	74 (0.18)	79 (0.13)	153 (0.15)
Others	297 (0.59)	171 (0.60)	122 (0.56)	269 (0.64)	321 (0.55)	590 (0.59)
Unknown	948 (1.89)	461 (1.62)	435 (2.00)	752 (1.80)	1,092 (1.86)	1,844 (1.83)
Time						
00∶01–06∶00	2,356 (4.69)	1,476 (5.18)	1,467 (6.73)	2,234 (5.34)	3,065 (5.22)	5,299 (5.27)
06∶01–12∶00	22,047 (43.87)	12,602 (44.22)	8,839 (40.55)	17,985 (43.00)	25,503 (43.42)	43,488 (43.25)
12∶01–18∶00	16,975 (33.78)	9,605 (33.70)	7,757 (35.59)	14,323 (34.25)	20,014 (31.38)	34,337 (34.15)
18∶01–24∶00	8,876 (17.66)	4,817 (16.90)	3,734 (17.13)	7,279 (14.50)	10,148 (17.28)	17,427 (17.33)
Natures of injury						
Bruise	19.779 (39.36)	10,482 (36.78)	7,675 (35.21)	17,345 (41.47)	20,591 (35.06)	37,936 (37.73)
Fracture	15,076 (30.00)	10,382 (36.43)	9,072 (41.62)	11,434 (27.34)	23,096 (39.33)	34,530 (34.34)
Sprain	9,267 (18.44)	3,896 (13.67)	1,863 (8.55)	5,826 (13.93)	9,200 (15.66)	15,026 (14.94)
Sharps injury, bites and open wounds	3,500 (6.96)	2,022 (7.09)	1,904 (8.74)	4,211 (10.07)	3,215 (5.47)	7,426 (7.39)
Concussion/Cerebral contusion	1,821 (3.62)	1,262 (4.43)	980 (4.50)	2,252 (5.38)	1,811 (3.08)	4,063 (4.04)
Organ system injury	200 (0.40)	103 (0.36)	50 (0.23)	223 (0.53)	130 (0.22)	353 (0.35)
Burn	137 (0.27)	80 (0.28)	57 (0.26)	127 (0.30)	147 (0.25)	274 (0.27)
Others	384 (0.76)	220 (0.77)	144 (0.66)	328 (0.78)	420 (0.72)	748 (0.74)
Unknown	90 (0.18)	53 (0.19)	52 (0.24)	75 (0.18)	120 (0.20)	195 (0.19)
Body part injured						
Lower limbs	16,055 (31.95)	8,956 (31.42)	7,595 (34.84)	12,920 (30.89)	19,686 (33.52)	32,606 (32.43)
Head	9,769 (19.44)	6,201 (21.76)	5,625 (25.81)	11,451 (27.38)	10,144 (17.27)	21,595 (21.48)
Torso	10,594 (21.08)	6,006 (21.07)	4,088 (18.75)	8,181 (19.56)	12,507 (21.30)	20,688 (20.57)

TABLE 1. (Continued)

Item	Age (Years)			Sex		Total, N (%)
	60–69, N (%)	70–79, N (%)	80–, N (%)	Male, N (%)	Female, N (%)	
Upper limbs	1,0582 (21.06)	5,334 (18.72)	3,066 (14.07)	6,104 (14.60)	12,878 (21.93)	18,982 (18.88)
Multiple parts	2,555 (5.08)	1,604 (5.63)	1,154 (5.29)	2,461 (5.88)	2,852 (4.86)	5,313 (5.28)
Whole body	318 (0.63)	168 (0.59)	97 (0.45)	315 (0.75)	268 (0.46)	583 (0.58)
Others	296 (0.59)	186 (0.65)	140 (0.64)	308 (0.74)	314 (0.53)	622 (0.62)
Unknown	85 (0.17)	45 (0.16)	32 (0.15)	81 (0.19)	81 (0.14)	162 (0.16)
Severity						
Mild	33,637 (66.93)	17,091 (59.97)	11,739 (53.86)	26,984 (64.52)	35,483 (60.42)	62,467 (62.12)
Moderate	15,350 (30.54)	10,419 (36.56)	9,083 (41.67)	13,358 (31.94)	21,494 (36.60)	34,852 (34.66)
Severe	1,267 (2.52)	990 (3.47)	975 (4.47)	1,479 (3.54)	1,753 (2.98)	3,232 (3.21)
Disposition						
Discharged after treatment	38,139 (75.89)	19,297 (67.71)	13,443 (61.67)	29,665 (70.93)	41,214 (70.18)	70,879 (70.49)
Observed	956 (1.90)	783 (2.75)	705 (3.23)	1,110 (2.63)	1,344 (2.29)	2,444 (2.43)
Admitted	10,179 (20.26)	7,656 (26.86)	6,945 (31.86)	10,022 (23.96)	14,758 (25.13)	24,780 (24.64)
Transferred	642 (1,28)	533 (1.87)	479 (2.20)	731 (1.75)	923 (1.57)	1,654 (1.64)
Dead	68 (0.14)	45 (0.16)	44 (0.20)	87 (0.21)	70 (0.12)	157 (0.16)
Others	270 (0.54)	186 (0.65)	181 (0.83)	216 (0.52)	421 (0.72)	637 (0.63)
Total	50,254 (100.00)	18,500 (100.00)	21,797 (100.00)	41,821 (100.00)	58,730 (100.00)	100,551 (100.00)

In summary, the data from the NISS can be used as an additional data source for research on falls in China. Older people could be prioritized as a target population for fall prevention and control programs. Professional institutions should further improve the collection of fall information, establish a multidisciplinary and multidepartment team for fall prevention, and carry out more high-quality community intervention trials. The intervention measures and strategies with strong evidence should be prioritized in terms of the domestic and foreign guidelines on fall prevention from the aspects of exercise, environmental improvement, disease prevention and control, rational drug use, use of auxiliary tools, and behavioral adjustment.

Corresponding author: Yuliang Er, eryuliang@ncncd.chinacdc.cn.

1 National Center for Chronic and Noncommunicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

REFERENCES

1. World Health Organization. WHO global report on falls prevention in older age. Geneva (Switzerland): World Health Organization; 2008. https://apps.who.int/iris/handle/10665/43811.
2. James SL, Lucchesi LR, Bisignano C, Castle CD, Dingels ZV, Fox JT, et al. The global burden of falls: global, regional and national estimates of morbidity and mortality from the Global Burden of Disease Study 2017. Inj Prev 2020;26:i3 – 11. http://dx.doi.org/10.1136/injuryprev-2019-043286.
3. Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. J Am Geriatr Soc 2020;50(8):1329 – 35. http://dx.doi.org/10.1046/j.1532-5415.2002.50352.x.
4. Gill TM, Murphy TE, Gahbauer EA, Allore HG. Association of injurious falls with disability outcomes and nursing home admissions in community-living older persons. Am J Epidemiol 2013;178(3):418 – 25. http://dx.doi.org/10.1093/aje/kws554.
5. National Center for Chronic and Non-communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention. National injury surveillance dataset (2018). Beijing: People's Health Electronic Audio-visual Publishing House. 2018. (In Chinese).
6. Wang Y, Duan LL, Ji CR, Ye PP, Deng X, Er YL, et al. Evaluation of performance of national injury surveillance in China, 2006-2012. Chin J Epidemiol 2015;36(9):967 – 70. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2015.09.013. (In Chinese).
7. Er YL, Duan LL, Wang Y, Ji CR, Gao X, Deng X, et al. Analysis on data from Chinese National Injury Surveillance System, 2008-2013 on the characteristics of Falls. Chin J Epidemiol 2015;36(1):12 – 6. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2015.01.004. (In Chinese).
8. Er YL, Duan LL, Ye PP, Gao X, Wang Y, Deng X, et al. Analysis on the characteristics of unintentional injuries among the elderly from Chinese National Injury Surveillance System, 2014. Chin J Health Educ 2016;32(4):312 – 7. http://dx.doi.org/10.16168/j.cnki.issn.1002-9982.2016.04.005. (In Chinese).
9. Gazibara T, Kurtagic I, Kisic-Tepavcevic D, Nurkovic S, Kovacevic N, Gazibara T, et al. Falls, risk factors and fear of falling among persons older than 65 years of age. Psychogeriatrics 2017;17(4):215 – 23. http://dx.doi.org/10.1111/psyg.12217.
10. Anonymous. Consensus development conference: diagnosis, prophylaxis, and treatment of osteoporosis. Am J Med 1993;94(6):646 – 50. http://dx.doi.org/10.1016/0002-9343(93)90218-e.