

Original Paper

Analysis of Fall Incidence and Influencing Factors Among Home-Dwelling Elderly in China

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Abstract

Objective: To explore the current situation of falls among elderly people at home in Hechi City, Guangxi, China, and its influencing factors, so as to provide a basis for the formulation of targeted fall prevention intervention strategies. **Methods:** A convenience sampling method was used to conduct a questionnaire survey on 140 home-based elderly aged 60 or above in a community in Hechi City, Guangxi in 2025. Survey tools included a general information questionnaire and the Morse Fall Risk Assessment Scale. The χ^2 test was used to analyze the fall status and influencing factors among older adults. **Results:** The fall incidence rate within the past year was 22.9%. The rate of seeking medical attention after a fall was 28.1% (9/32). Chi-square test results indicated that chronic diseases, gait abnormalities, use of assistive devices, and insufficient self-awareness of fall risk were major risk factors for falls among the elderly (all $P < 0.05$). **Conclusion:** The high incidence of falls among home-dwelling older adults results from multiple interacting factors. Emphasis should be placed on enhancing self-assessment awareness, strengthening health education, improving home environments, and implementing multifactorial interventions to prevent and reduce falls.

Keywords

fall risk, community-dwelling older adults, fall cognition, prevention, influencing factors

1. Introduction

With the acceleration of global population aging, health issues among the elderly have become increasingly prominent. Falls, as a common accidental event among older adults, have emerged as a significant public health concern. Data from the World Health Organization (WHO) indicate that falls rank as the leading cause of accidental injury deaths among older adults worldwide (World Health Organization, n.d.). In China, according to the Seventh National Population Census, the proportion of

the population aged 60 and above reached 18.7%, reflecting a continuously deepening aging society (Office of the Seventh National Population Census Leading Group, State Council, n.d.). Falls among older adults can lead to severe physical injuries such as fractures and traumatic brain injuries, trigger psychological issues like anxiety and depression, and impose substantial family and socioeconomic burdens (Ambrose, Paul, & Hausdorff, 2013).

The home environment is a high-risk setting for falls among older adults. Compared to institutional care, older adults living at home face more complex and diverse fall risk factors, including physiological decline, chronic diseases, medication side effects, home safety hazards, and insufficient awareness of fall risks (Dengiz, Aytepe, Sirri et al., 2025). Existing research has primarily focused on fall prevention in medical or institutional settings, with insufficient systematic studies on fall risks and self-management factors among community-dwelling older adults, particularly those in specific regions. Therefore, this study aims to analyze the current fall situation among community-dwelling older adults in Hechi City through a cross-sectional survey and to explore its influencing factors in depth. This research seeks to provide scientific evidence for developing locally tailored, effective fall prevention interventions, which is crucial for reducing fall risks and improving the quality of life among older adults.

2. Subjects and Methods

2.1 Study Population

Convenience sampling was employed to select community-dwelling older adults aged ≥ 60 years residing in a residential community in Hechi City, Guangxi, from January to March 2025.

Inclusion Criteria: (1) Age ≥ 60 years; (2) Long-term home-dwelling elderly residents with local residency ≥ 6 months; (3) Clear consciousness, basic communication ability, comprehension of questionnaire content, and willingness to complete the survey; (4) Informed consent and voluntary participation.

Exclusion Criteria: (1) Individuals completely unable to perform activities of daily living independently; (2) Individuals with severe mental illness or cognitive impairment (e.g., moderate or higher dementia); (3) Individuals with severe complications or in acute disease exacerbation; (4) Individuals refusing participation or withdrawing mid-survey. Ultimately, 140 elderly individuals were included as valid research subjects.

2.2 Survey Tools

2.2.1 General Information Questionnaire

Designed by the researchers, including gender, age, educational attainment, living arrangements, chronic disease status, medication use, and self-rated health status.

2.2.2 Morse Fall Scale (MFS)

The Chinese version of the Morse Fall Scale was used to assess fall risk (Liu, Luo, Chai et al., 2024). This 6-item scale evaluates fall history, secondary diagnoses, walking aids, intravenous therapy, gait,

and mental status, with a total score range of 0–125 points. Based on internationally accepted standards and our hospital's clinical practice, risk levels were categorized as: low risk (0–24points), moderate risk (25–45points), and high risk (≥ 45 points). This scale demonstrated good reliability and validity in the study population, with a Cronbach's α coefficient of 0.81.

2.3 Statistical Methods

Data analysis was performed using SPSS Statistics, Version 26.0. Categorical data were described using frequencies (n) and percentages (%). The Chi-square test (χ^2 test) was employed to compare the differences in the incidence of falls among elderly populations with different characteristics. A two-sided test was used for all hypotheses, with the statistical significance level set at $\alpha=0.05$. A p-value of less than 0.05 was considered statistically significant.

3. Results

3.1 Demographic Characteristics of Participants

The study included 140 community-dwelling older adults. Among them, 63 (45%) were male and 77 (55%) were female; 70 (50%) were aged 60-70 years, 45 (32.1%) were 70-80 years, and 25 (17.9%) were 80 years or older; 84 (60%) resided in rural areas and 58 (40%) in urban areas; 65 (45%) were illiterate and 77 (55%) were not. A total of 119 participants (85%) had a spouse, while 21 (15%) did not. Other basic characteristics are presented in Table 1.

Table 1. Basic Information of Questionnaire Collection

Type	Category	Number	Percentage
Gender	Male	63	45%
	Female	77	55%
Age	60-70	70	50%
	70-80	45	31.11%
	≥ 80	25	18.89%
Educational Attainment	Illiterate	65	45%
	Non-illiterate	77	55%
Residence	Rural	84	60%
	Urban	58	40%
Spouse status	Yes	119	85%
	No	21	15%

3.2 Current Status of Falls Among Older Adults

Over the past year, 32 elderly individuals experienced falls, resulting in an annual fall incidence rate of 22.9%. Among them, 7 elderly individuals (21.9% of those who fell) experienced a fall within the past 3 months. Of the 32 individuals who fell, 9 required medical attention due to fall-related injuries, yielding a fall-related medical treatment rate of 28.1%. Elderly Falls and Medical Treatment Status

3.3 Fall Risk Assessment for Older Adults

Based on Morse Fall Risk Assessment scores, 20 individuals (14.3%) were classified as low risk (<25 points), 65 (46.4%) as moderate risk (25-45 points), and 55 (39.3%) as high risk (>45 points). This indicates that over 85% of community-dwelling older adults face moderate to high fall risk. The distribution of Morse Fall Risk Assessment scores is shown in Table 2.

Table 2. Frequency Distribution of Morse Fall Risk Assessment Scale Scores

Fall Risk Assessment Scale Score (Points)	Frequency	Frequency (%)	Cumulative Percentage (%)
10.0	7	5.00	5.00
15.0	13	9.29	14.29
25.0	21	15.00	29.29
30.0	22	15.71	45.00
35.0	10	7.14	52.14
40.0	3	2.14	54.29
45.0	9	6.43	60.71
50.0	14	10.00	70.71
55.0	10	7.14	77.86
65.0	10	7.14	85.00

70.0	4	2.86	87.86
80.0	5	3.57	91.43
85.0	2	1.43	92.86
95.0	5	3.57	96.43
100.0	3	2.14	98.57
110.0	2	1.43	100.00

3.4 Univariate Analysis of Factors Influencing Falls in Older Adults

Using the occurrence of falls within the past year as the dependent variable, χ^2 tests were conducted to analyze potential influencing factors. Results (Table 3) indicate that gender and age showed no statistically significant association with fall incidence ($P > 0.05$). However, educational attainment, presence of chronic diseases, living arrangements, gait status, and use of walking aids were significantly associated with fall incidence (all $P < 0.05$). The incidence of falls was relatively higher among illiterate and elementary school-educated elderly individuals ($\chi^2=11.100$, $P=0.004$). Elderly individuals with chronic diseases had a significantly higher incidence of falls than those without chronic diseases ($\chi^2=21.543$, $P=0.000$). The incidence of falls was lower among non-lonely elderly individuals than among those living alone ($\chi^2=7.933$, $P=0.005$). The incidence of falls was significantly higher among elderly individuals with a "frail" or "unbalanced" gait compared to those with a normal gait ($\chi^2=41.665$, $P=0.000$). Elderly individuals requiring the use of walking aids had a higher incidence of falls ($\chi^2=30.644$, $P=0.000$).

Table 3. Univariate Analysis of Elderly Falls

Variable	Variable	Falls in the past year (%)		Total	χ^2	P
		No	Yes			
Gender	Female	59 (55.14)	18 (54.55)	77 (55.00)	0.004	0.952
	Male	48 (44.86)	15 (45.45)	63 (45.00)		
Age	60-70	58 (54.21)	12 (36.36)	70 (50.00)	3.298	0.192
	70-80	32 (29.91)	13 (39.39)	45 (32.14)		
	80-90	17 (15.89)	8 (24.24)	25 (17.86)		

Level of Education	Junior high school and above	17 (15.89)	9 (27.27)	26 (18.57)	11.100	0.004
	Elementary School	47 (43.93)	4 (12.12)	51 (36.43)		
	Illiterate	43 (40.19)	20 (60.61)	63 (45.00)		
Chronic Disease Status	Yes	89 (83.18)	14 (42.42)	103 (73.57)	21.543	<0.001
	None	18 (16.82)	19 (57.58)	37 (26.43)		
Living Arrangement	Living alone	4 (3.74)	6 (18.18)	10(7.14)	7.933	0.005
	Non-single-person household	103 (96.26)	27 (81.82)	130 (92.86)		
Gait Status	Balance Disorder	1 (0.93)	5 (15.15)	6(4.29)	41.665	<0.001
	Normal	94 (87.85)	11 (33.33)	105 (75.00)		
	Frail	12 (11.21)	17 (51.52)	29(20.71)		
Walking Aids	No	102(95.33)	19 (57.58)	121(86.43)	30.644	<0.001
	Yes	5 (4.67)	14 (42.42)	19 (13.57)		

4. Discussion

4.1 High Prevalence of Fall Risk Among Community-Dwelling Older Adults

This study found that chronic diseases are strong predictors of fall risk in the elderly population. A variety of chronic diseases, such as degenerative arthritis, diabetic peripheral neuropathy, cardiovascular disease, and visual impairment, can directly or indirectly elevate the risk of falls through both physiologic and functional levels. At the physiological level, such diseases may cause pain, decreased joint mobility, reduced sensory input, hemodynamic instability, or impaired acquisition of visual information; at the functional level, they may significantly impair mobility, dynamic balance, reaction time, and environmental awareness and judgment, which together increase susceptibility to falls. In addition, multimorbidity is often accompanied by multiple medications, and the side effects of some medications in complex medication regimens, including postural hypotension, sedation, dizziness, and decreased muscle strength, may further impair postural control, resulting in a “disease-medication-function decline” superimposed effect that significantly increases fall susceptibility. This may further impair postural control, resulting in a “disease-drug-function decline” superimposed effect, which significantly increases the probability of falls (Milla, Marianne, Heidi et al., 2020). Therefore, it is important to include a thorough medication review in the assessment of fall risk in the elderly, examining the presence of medications and their interactions that may increase the risk of falls.

This study found that decreased gait stability and walking aid use, as directly observable and measurable indicators, were shown to be significant predictors of falls. These two indicators are essentially a concentration of core impairments such as lower limb muscle weakness, impaired balance and limited mobility (Kuo, Yen, Chen et al., 2022). Gait analysis reveals compensatory changes such as slowing of gait speed, shortening of stride length, widening of the base of the stride, and prolongation of the time spent in bipedal support, which are “cautious gait” strategies adopted by the body in order to maintain stability, but which in themselves reflect a lack of confidence in balance and an increased risk of falling. In addition, aids such as canes and walkers are designed to enhance stability and broaden the base of support, thereby reducing the risk of falls. However, the reality is often more complex. If aids are not properly configured (e.g., inappropriate height, mismatched type), are not individually adapted, or if the user is not adequately trained in their use, they may become new barriers rather than effective aids. Assistive devices themselves may also become a substantial fall risk, suggesting the need for a comprehensive assessment of the overall coordination of the “human-machine-environment” system in clinical practice.

The results of this study suggest that low educational level is a risk factor for falls in older adults. As a social determinant, the impact of low education is far-reaching and fundamental. It may indirectly increase fall risk by limiting health literacy. Older adults with lower levels of education may face more difficulty in accessing, understanding, evaluating, and applying health information related to falls prevention (e.g., the importance of balance training, recommendations for home environment modifications, and identification of medication side effects). This can affect the accuracy of their risk perception, and they may either overestimate their abilities and ignore potential hazards (e.g., engaging in high-risk activities with blind confidence) or have an excessive fear of falling that leads to severe limitations in range of motion, instead accelerating muscle atrophy and functional decline. In either case, it undermines their intention to adopt proactive and scientific risk-averse behaviors.

The results of this study identified solitary status as a risk factor for falls in older adults. When older adults experience precursor symptoms that may signal a fall (e.g., sudden dizziness, weakness due to postural hypotension) or have a non-fatal minor fall, the lack of people around makes it difficult to obtain timely assistance, making it possible for a minor event that could have been manageable to develop into dehydration, hypothermia, pressure ulcers, or even more serious secondary injuries. Even more important is its indirect psychosocial impact. Living alone is often closely associated with social isolation and loneliness, which in turn are strong risk factors for depression, anxiety, and decreased cognitive function. Depressed moods can directly lead to decreased energy and loss of interest, causing older adults to reduce their outings and daily activities (Petersen, König, & Hajek, n.d.). Together, these psychological states lead to a significant reduction in physical activity, which in turn leads to “disuse” changes - further muscle atrophy, accelerated deterioration of balance, and loss of bone density. This creates a vicious cycle of “psychosocial-physical functioning”: living alone/loneliness - psychological distress/reduced activity-decline in physical functioning -increased risk of falling- further

reduction in activity/exacerbation of social isolation due to fear of or actual falling. Therefore, fall interventions for elderly people living alone must not be limited to the physical level, but must incorporate social support, psychological care and promotion of social participation into comprehensive intervention programs.

Although age and gender have been identified as influencing factors for falls in some of the previous literature, this study did not find a statistically significant association between them and fall risk. This difference in results may be related to the characteristics of the source of the sample in this study, the relatively limited sample size, geographic and cultural factors, or confounding variables that were not fully measured, and it is recommended that future studies expand the sample size, carry out multicenter collaborations, and introduce finer-grained moderation and mediation analyses to clarify the pathways through which demographic variables play a role in the risk of falls. Therefore, our findings highlight the need for future research to expand the sample size and conduct multi-center collaborations to enroll more diverse and representative populations, thereby controlling for biases associated with specific sample sources.

4.2 Implications for Fall Prevention Practices

Based on these findings, preventing falls among homebound older adults requires a multidimensional, individualized comprehensive intervention strategy. For instance, community healthcare providers should conduct regular fall risk assessments for homebound seniors, particularly those with chronic conditions, gait abnormalities, mobility aid users, and individuals living alone. Additionally, for seniors with lower educational attainment, fall prevention knowledge should be disseminated through more intuitive, accessible methods (e.g., videos, diagrams, face-to-face explanations) to correct misconceptions and enhance self-management skills. Standardize medication use among the elderly and monitor for adverse effects of polypharmacy. Strengthen chronic disease management to mitigate functional decline caused by underlying conditions. Encourage and guide seniors in exercises that enhance muscle strength and improve balance (e.g., Tai Chi, balance training). Provide home safety assessments and modification recommendations, such as improving lighting, installing handrails, maintaining level and dry floors, and removing obstacles. Pay special attention to seniors living alone, promote neighborly assistance, and establish regular visitation mechanisms.

5. Conclusions

As this study was conducted among homebound elderly residents in a specific community in Hechi City, Guangxi, its value lies in providing actionable fall prevention strategies for families, communities, and healthcare institutions, particularly emphasizing the concept of “prevention-oriented, multidimensional intervention.” However, the relatively small sample size means the findings only represent the current situation of a portion of homebound elderly in this specific area and may not be applicable to all regions. The proposed strategies and research results are not yet comprehensive. Furthermore, genuinely improving fall prevention among homebound seniors requires sustained

intervention and further refinement. Future research on “Survey Analysis of Self-Management Practices and Influencing Factors in Fall Prevention Among Homebound Seniors” could explore additional avenues, such as the application of smart technologies or AI-based fall prediction systems, to broaden intervention coverage and benefit a wider elderly population. In summary, fall prevention for home-dwelling seniors is a systemic endeavor requiring sustained research investment and dynamic adjustments. Through scientific evaluation, multi-stakeholder collaboration, and technological innovation, we aim to build safer home-based care environments and ultimately achieve the goal of “healthy aging”. Future efforts should balance practical effectiveness with humanistic care, enabling seniors not only to reduce falls but also to enhance their overall quality of life.

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