

# Unintentional domestic injuries among elderly in rural areas of Mandya: A community-based cross-sectional study in Southern Karnataka

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## ABSTRACT

**Background:** As the proportion of elderly in the population increases, they also become vulnerable to various types of intentional or unintentional injuries. Domestic accidents including falls among the elderly have been identified as a leading cause of injury-related morbidity and mortality in India and elsewhere. **Aim:** This study aims to assess the burden and pattern of domestic accidents in a rural part of Southern India. **Methods and Setting:** A community-based cross-sectional study among the elderly ( $\geq 60$  years) was carried out in rural areas of Southern Karnataka. A semi-structured interview schedule was used to get the information on domestic accidents. Inferential statistical tests like the Chi-square test and logistic regression analysis were used. **Results:** A total of 500 persons aged  $\geq 60$  years with a mean age of  $69.09 \pm 7.42$  years (Range 60–92 years) were included. One-third of the subjects have had an incidence of domestic accidents in the past 1 year contributing to a 35% prevalence of domestic accidents. A higher prevalence of domestic accidents was seen in those subjects who were ill (47.9%). Overall prevalence of falls was 21.4% ( $P = 0.007$ ). One-fifth of the subjects with domestic accidents had a residual illness. **Conclusion and Contribution:** One-third of our subjects gave a history of one or the other form of domestic accidents in the previous 1 year. Our study highlights the problem of unintentional domestic injuries among the most vulnerable group of the elderly and calls for a continuous assessment of the burden and nature of injuries.

**Keywords:** Domestic injuries, falls among elderly, unintentional injuries

## Introduction

Population aging is a global phenomenon that is both inevitable and predictable. It will change society at many levels and in complex ways, creating both challenges and opportunities. In 2020, the global population aged 60 years and over is just over 1 billion people, representing 13.5% of the world's

population of 7.8 billion. That number is 2.5 times greater than in 1980 (382 million) and is projected to reach nearly 2.1 billion by 2050.<sup>[1-4]</sup>

As the proportion of elderly in the population increases, they also become vulnerable to various types of injuries, be it intentional or unintentional.<sup>[1,5,6]</sup> According to the World Health Organization's Global Burden of Disease Study estimates, unintentional injuries accounted for more than 3.1 million deaths in 2019. The major unintentional injury-related causes of disability-adjusted life-years lost annually include road traffic injuries and falls. Of all unintentional injury deaths, 43% occurred at home, 17% at health facilities, and 35% at other places.<sup>[7-9]</sup>

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“Domestic accidents” (accident that takes place at home or in their immediate surroundings and more generally, all accidents not connected with traffic, vehicles, or sport) contribute to a major part of overall unintentional injuries. And also, falls are the predominant cause of admission to hospital for both children and older people.<sup>[10-14]</sup> The problem is graver in developing countries, particularly in rural areas, shantytowns, or informal dwellings. Domestic accidents including falls have been identified as a leading cause of injury-related morbidity and mortality in India.

But dimensions and nature of the problem of unintentional home (domestic) injuries are difficult to establish due to lack of valid and representative data. With a steady increase in life expectancy that is seen in recent years in our country, a comprehensive approach of finding the true issues and ways of addressing those among the elderly is of paramount importance. The primary care physicians being the usual first point of contact for patients after any of the accident that may happen in and around their home, will be immensely benefited in planning the appropriate treatment option that will improve the overall quality of life of the patients thus affected. Hence, this study was carried out among elderly in a rural area, where many of the occasions the true quantification of unintentional injuries or otherwise called as domestic accidents is rarely done.

## Materials and Methodology

### Study design

A community-based observational study with cross-sectional design.

### Study subjects

Persons aged 60 years and above in the study area.

### Study period

The study was carried out for a period of 3 months, i.e., March, April, and May 2022.

### Study area

The study was carried out in rural areas of Nagamangala, Mandya, (Southern Karnataka, India) with a population of 169000 (rural) as on March 31, 2022.

### Sample size

Assuming the prevalence of domestic injuries (accidents) in the age group of  $\geq 60$  years as 20%<sup>[15]</sup> with an allowable error of 20% and at a level of significance of 95%, in the standard formula for calculating the sample size:  $N = 4PQ/L^2$  (where N is the sample size to be taken, P is the prevalence of domestic accident, here 20%, Q = 1-prevalence, L = standard error), a sample size of 500 was obtained (with the inclusion of 10% non-response rate).

### Exclusion criteria

1. Those unwilling to be a part of the study.

2. Subjects whose general health condition did not allow them to communicate.
3. Subjects who could not be contacted on three consecutive visits

**Study tool:** A pre-designed, pretested, and semi-structured interview schedule with a “Domestic accident” questionnaire

## Methodology

Health center wise list of persons aged  $\geq 60$  years, prepared with the help of field health workers found a total of 18000 elders in the area. A simple random sampling method using the lottery technique was used in selecting the sample of 500 persons aged  $\geq 60$  years and was contacted and interviewed using the study tool to find the information on domestic accidents (in the past 1 year) and their determinants. Prior Ethics Committee approval was taken (AIMS/IEC/017/2022).

A house-to-house visit was done and written informed consent was obtained from all the participants by explaining the purpose of the study. If a subject could not be interviewed for any reason, an eligible subject from a neighboring house was included to meet the final sample size.

### Data analysis

Collected data were entered in the Microsoft Excel spreadsheet, coded appropriately, and cleaned for any possible error. Epi-info software was used for analysis. Categorical data were presented as percentages (%). Pearson’s Chi-square test was used to evaluate differences between groups for categorized variables.

Conditional logistic regression analysis (adjusted odds ratio with 95% Confidence Interval) was done to evaluate factors significantly associated with the incidence of domestic accidents. All tests were performed at a 5% level of significance; thus, an association was significant if the P value was  $< 0.05$ .

## Results

Our study included a total of 500 persons aged  $\geq 60$  years with a mean age of  $69.09 \pm 7.42$  years (Range 60–92 years). More than half (53.6%) of the subjects were males and the majority (81.8%) were in the age group of 60–75 years, 15.6% were 76–85 years and the remaining 2.6% were beyond 85 years. Majority (77.4%) were married, 55.4% elderly were illiterate. Forty-four percent of them were not involved in any occupation. Majority (53%) of the subjects belonged to lower middle class as per Udai Pareek’s scale of socio-economic status. Nearly 2/3<sup>rd</sup> of the subjects (316) belonged to joint family. About 10% of them were living single and 17.8% of subjects were not getting pension (from any source). Sixty-one (12.2%) subjects were fully independent, while 335 (67%) elderly were partially dependent and remaining 104 (20.8%) were fully dependent on their family members or close relatives for their daily expenses.

### Health status and activities of daily living

Nearly 1/2 of the subjects[238] reported “presently ill” while the rest 262 did not complain of any illness at the time of interview.

Majority (452) of the subjects had normal activities of daily living (ADL). Only 9 elderly subjects had severely impaired ADL [Table 1].

### Domestic accidents

One-third of the subjects (175) have had an incidence of domestic accidents in the past 1 year contributing to a 35% prevalence of domestic accidents [Table 2]. This corresponds to a domestic accident incidence rate of 350 per 1000 person years. The prevalence was higher among females (40.5%) compared to males (30.2%) and was found to be statistically significant with P value of 0.016. Nearly half (79) of the subjects with domestic accidents, had two or more events of domestic accidents in the past 1 year.

Majority (34.3%) of the study subjects reported ‘loss of equilibrium’ as the reason for a domestic accident [Figure 1]. A higher prevalence of domestic accidents was seen in those subjects who were ill (47.9%) compared to 23.3% in those who were not ill and this difference was significant statistically ( $P < 0.001$ ).

The most common form of domestic accident being falls in 93 (53.1%) subjects, out of the total 175 [Figure 2]. In 57.7% of the subjects, there was no one for the immediate assistance following a domestic accident but in remaining, immediate help was provided by victim’s son (25.1%), neighbor (12%), and other family members (5.2%). There was no statistically significant difference in the incidence of domestic accidents based on their type of residence (pucca, kuccha, or mixed house). Nearly 1/3<sup>rd</sup> of the subjects, who belonged to middle class have had experienced domestic accidents as compared

to 31.7% in those who belonged to lower middle class and 50% in those of lower class. This was found to be statistically significant ( $P = 0.024$ ).

Overall prevalence of falls was 21.4% (107) (16.8% in males and 26.7% in females, statistically significant with  $P = 0.007$ , Figure 3). Out of the total, 72% of falls had occurred inside the home and the remaining 28.0% were outside the home ( $P = 0.004$ ). Among the reason for falls in the study subjects, most common reason being ‘slipped’ in 67.3%, followed by ‘loss of balance’ (23.4%) and ‘tripped’ (9.3%) ( $P$ -value 0.029).

Majority (50%) of the falls had occurred in the courtyard, followed by the bathroom (20%), living room (16%), kitchen (11%), and the remaining in the immediate vicinity of the house (within 20

**Table 1: Distribution of study subjects by their ADL\***

ADL	Male	Female	Total
Normal	244	208	452 [90.4]
Moderately impaired	22	17	39 [7.8]
Severely impaired	2	7	9 [1.8]
Total	268	232	500 [100.0]

$P=0.156$

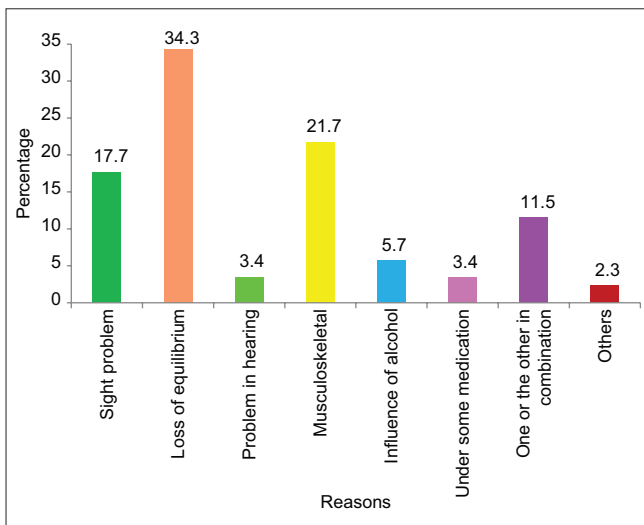
(The values in parentheses indicate percentage). \*Katz ADL index

**Table 2: Prevalence of unintentional domestic accidents among study subjects in the past 12 months**

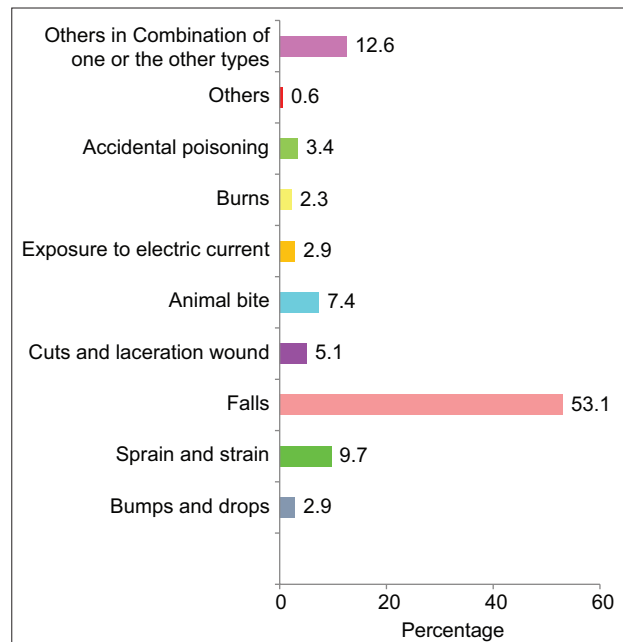
Domestic Accidents	Male	Female	Total
Yes	81 (30.2)	94 (40.5)	175 (35.0)
No	187 (69.8)	138 (59.5)	325 (65.0)
Total	268 (100.0)	232 (100.0)	500 (100.0)

$\chi^2=5.791, P=0.016^*$

(The values in parentheses indicate percentage). \*Statistically significant



**Figure 1:** Reasons attributed by the study subjects with domestic accidents (n = 175)



**Figure 2:** Types of domestic accidents among study subjects (n = 175)

meters) Figure 4. Nearly half (49) of the subjects had fractures following a fall.

Only 92 (52.5%) subjects who had experienced domestic accidents had sought healthcare facility for treatment. [Table 3]. Only 37 (21.1%) subjects with domestic accidents had presence of one or the other types of residual illness (statistically significant difference seen among males and females). Splint being the most common form of remedy among 49 (28%) subjects followed by bandage (12%) and pain killer (2.2%) following a domestic accident.

A stepwise logistic regression, applied to predict the prevalence of domestic accidents, found elderly females had 1.6 times more odds of having a domestic accident compared to males. And subjects aged 86 years and above were 2 times more prone to domestic accidents. In the type of family, being single was also a risk factor. Laborers were 2 times more prone to domestic accidents. Subjects who had an illness of any kind were 3 times more prone to domestic accidents. The significant difference in domestic accident prevalence was also seen among the different socio-economic status of subjects with the odd's ratio of 0.464 and 0.484 for lower middle and middle class, respectively [Table 4].

### Discussion

A total of 500 elderly subjects with a mean age group of 69.09 ± 7.42 years (Range 60–92 years) were included with 53.6% of the subjects being males and the majority (81.8%) in the age group of 60–75 years. Most were married, >50% were illiterate and 53% of the subjects belonged to the lower middle class as per Udai Pareek's scale of socio-economic status. Nearly 2/3<sup>rd</sup> of the subjects belonged to joint family. Eight percent of subjects were not getting pensions. Two third of the (67%) elderly were partially dependent and 20.8% were fully dependent on their family members or close relatives for their daily expenses. Half of the subjects were ill at the time of the study. In 10% of the subjects their activities of daily living was impaired (Katz ADL index).

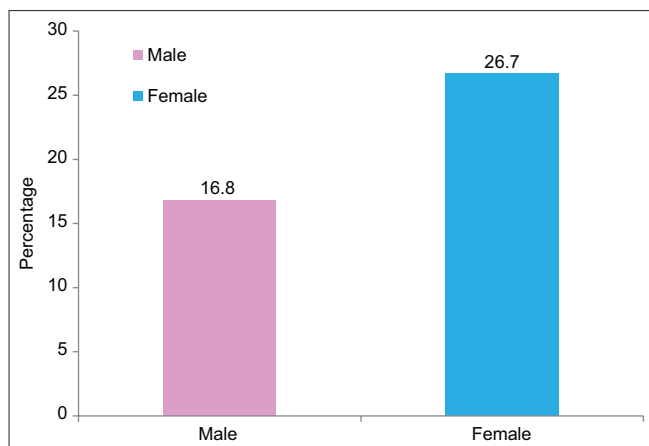


Figure 3: Prevalence of falls among study subjects

One-third (35%) of the subjects have had an incidence of domestic accidents in the past 1 year, with significantly higher incidence (1.6 times) among females. The risk of accidents was 2 times higher among those aged 86 years and above. Among those with domestic accidents, 35% reported “loss of equilibrium” as the main reason for the accidents. Falls (53%) were the most common domestic accident reported, with an overall prevalence of >20%. Only 53% of those with domestic accidents had sought medical treatment.

Table 3: Health care seeking behavior among subjects with domestic accidents

Health care seeking behavior	Gender		Total
	Male	Female	
Yes	34	58	92 (52.5%)
No	47	36	83 (47.5%)
Total	81	94	175

P=0.009\*

(The values in parentheses indicate percentage). \*Statistically significant

Table 4: Association of independent variables with domestic accidents (Logistic regression analysis)

Variables	aOR	Confidence interval	P
Gender (Male)	Reference		
Gender (Female)	1.631	1.028-2.587	0.038*
Age (60-75 years)	Reference		0.261
Age (≥86 years)	1.993	0.593-6.696	0.265
Marital status (Married)	Reference		0.974
Marital status (divorced/separated)	1.336	0.410-4.355	0.630
Education (graduation) <sup>#</sup>	Reference		0.024*
Illiterate <sup>#</sup>	0.307	0.097-0.966	0.043*
Family type (Nuclear)	Reference		0.771
Family type (Single)	1.600	0.754-3.397	0.221
No occupation <sup>#</sup>	Reference		0.293
Occupation (laborer) <sup>#</sup>	2.156	1.072-4.338	0.031*
Presently not ill	Reference		
Presently ill	3.237	2.096-5.001	<0.001*
Socio-economic status (Lower class) <sup>#</sup>	Reference		0.051
Socio-economic status 2 (Lower middle) <sup>#</sup>	0.464	0.284-0.759	0.002*
Socio-economic status 3 (Middle class) <sup>#</sup>	0.484	0.279-0.838	0.010*

(aOR=adjusted odds ratio). <sup>#</sup>Udai Pareek's scale, \*Statistically significant

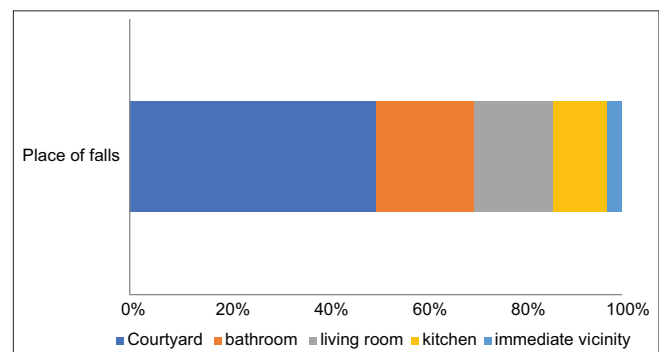


Figure 4: Place of falls among study subjects



In our study, majority of elderly subjects were dependent on their family members financially. Similar findings were found in the National Sample Survey of India by Ranjan *et al.*, with 47% of the elderly financially dependent; 30.1% independent, and 22.9% partially dependent on their family members.<sup>[16]</sup> In a study by Sumati Kulkarni *et al.* supported by UNFPA in seven states of India, >50% of elders were fully dependent financially on others.<sup>[17]</sup> Poor access to job opportunities in the rural area in our study might be one of the reasons for much higher dependence on elderly.

Majority (90.4%) of the subjects in our study had normal ADL. In a study done by Usha *et al.* in Uttarakhand, 72.% of elderly participants were fully independent and 28% were dependent on others for their daily activities.<sup>[18]</sup> These findings are similar to our study. However, in a study by Chakraborty *et al.*, in rural West Bengal, 18.8% of respondents were active; 45.6% of respondents were mildly disabled; 35.6% of respondents were severely disabled.<sup>[19]</sup> These differences in ADL status might be because of the different ADL assessment scales used in their study as well as the geographically related differences in elderly care and support.

One-third (1/3<sup>rd</sup>) of our study subjects had an incidence of the domestic accident in the past 1 year (with a significantly higher prevalence among females and those aged >85 years). Recurrent incidence was seen in more than half of the subjects with domestic accidents. The most common form of domestic accident being falls in 53.1% of subjects. Overall incidence of falls in the previous 1-year history was 21.4%. Higher odds of having a domestic injury were seen among females, those working as laborers and those who were ill. Nearly half of the subjects (45.8%) in our study had a fracture following a fall. In a study done by Karavadi *et al.* in Bengaluru, 36.4% of the elderly in old age homes had a history of falls (40.9% in females and 29.5% in males) in the previous 1 year and 6.4% of them had experienced recurrent falls. And, fall risk was higher among those with comorbidities.<sup>[20]</sup>

In a study by Kumar *et al.* in urban slums of Chennai, 1/3<sup>rd</sup> of the subjects had a history of fall and the fall rate difference was significant with gender. About 41.5% of elder persons with multiple comorbidities had history of fall.<sup>[21]</sup> Falls are the most common form of domestic injuries in many studies, and also women are affected the most.<sup>[22,23]</sup> So, be it a rural or urban locality on an average 1/3<sup>rd</sup> of the elderly were prone to domestic accidents as shown in many studies listed above.

In a study done among the elderly by Patil *et al.* in North Bangalore, 29.8% had fallen in the previous 6 months of the study, and females (31.3%) had a higher rate of falls compared to males (27.02%). And also, a significantly higher rate of fall rate was seen among those aged 76–85 years (65.7%) compared to 60–75 years (26.3%) and >85 years (20%).<sup>[24]</sup> Mane *et al.*, in the urban area of Karnataka, found 36.8% of the subjects had experienced at least one fall in the previous 6 months. And, 10.4% of them

had sustained a fracture after that.<sup>[25]</sup> In a study by Marmamula *et al.* in Telangana, 29% of the participants reported a history of fall in the previous 1 year.<sup>[26]</sup> These findings in various parts of Karnataka and Telangana are in coherence with the findings from our study. In a study by Dhar *et al.* in Uttarakhand, 42% of the elderly subjects had a history of fear of fall and it was more among females compared to males.<sup>[23]</sup> This study had a slight high prevalence of a history of fear of falls, as it is done in a tertiary healthcare hospital to which much of the times diseased individuals will be attending the outpatient departments. A systematic review by Biswas *et al.*, which included 22 studies, found the similar fall incidence and risk among the elderly in India.<sup>[27]</sup>

Majority (34.3%) of our study subjects reported 'loss of equilibrium' as the reason for a domestic accident. In a study done by Joseph *et al.*, in Tamil Nadu, 2/3<sup>rd</sup> of the subjects had experienced subjective premonitory feelings before fall, 42% felt the weakness of limbs, 16% giddiness.<sup>[28]</sup> In our study, those who were ill had a significantly higher rate of domestic accidents. These findings are similar to studies done by Karavadi *et al.* and Kumar *et al.*<sup>[20,21]</sup>

In our study, 52.5% of subjects who had experienced domestic accidents had sought healthcare facility for treatment. Only 21.1% of subjects with domestic accidents had a residual illness. Joseph *et al.*, in Tamil Nadu, found 84.3% of those with falls history had availed medical attention. And, among those who had fallen, 1/3<sup>rd</sup> had restricted activity and 21.3% were bedridden.<sup>[28]</sup> Many of the other studies too found similar findings related to falls among the elderly as shown in systematic reviews done by Joseph *et al.*, and Kaur *et al.*, including many community-based and institution-based studies on the elderly in India.<sup>[29,30]</sup> Immediate comprehensive medical attention following an accident, be it domestic or any other type, depends mainly on the availability of the quality healthcare services nearby as well as the ability of the centers in dealing with complicated cases as well.

## Conclusion

One-third of our subjects gave a history of one or the other form of domestic accidents in the previous 1 year. Most common unintentional domestic injury was falls and women were affected the most. Higher rate of domestic injuries was seen in those who were ill and beyond 70 years of age. Much of the elderly also had a residual illness following a fall. Immediate assistance and access to health care following an injury was a major issue in our study area. Our study highlights the problem of unintentional domestic injuries among the most vulnerable group of elderly and calls for a continuous assessment of the burden and nature of injuries which will help primary care physicians as well as policymakers for a comprehensive corrective action to reduce and prevent the burden.

## Limitations of the study

Nearly 1/10<sup>th</sup> of the people in India are elderly. Being considered as the vulnerable group for a wide variety of illnesses, because of

the environmental exposure or other sources, be it communicable or non-communicable diseases, creates lot many challenges in many complex ways. As our study included only a subset of elderly group in the study area, the generalizability and planning and implementation of the preventive and promotive approaches related to domestic accidents might be a little difficult. And also, the objective assessment of the domestic accidents among elderly was not included in the study. Thus, larger studies with multicentric representation including subjective as well as objective assessment, at regular intervals will provide the valuable information of the problems in elderly and thus will benefit the policymakers and practitioners at the local level to take corrective comprehensive action.

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### Conflicts of interest

There are no conflicts of interest.

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