

## EPIDEMIOLOGICAL PROFILE OF FALLS OF THE SAME LEVEL DUE TO SLIPPING, TRIPPING OR FALSE STEPS AMONG ELDERLY PEOPLE IN PERNAMBUCA FROM 2008 TO 2022

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**Abstract:** The increased incidence of falls in the elderly, a complex and multifactorial phenomenon, is a significant public health concern due to the aging of society. The physiological process of aging contributes to a decrease in stability, with sarcopenia being a marked change that reduces muscle mass and compromises the ability to respond quickly to external stimuli. This makes older people more prone to falls during everyday activities. Understanding these changes is crucial to implementing effective prevention strategies and interventions, considering risk factors, such as reduced muscle strength, and promoting the quality of life of this population.

## INTRODUCTION

Falls in the elderly represent a significant concern in the context of public health, being a complex and multifactorial phenomenon that considerably affects the quality of life of this population. As society ages, the incidence of falls in the elderly has increased, requiring an in-depth understanding of the factors that contribute to this event.<sup>1</sup>

In addition to the physical challenges inherent to the aging process, environmental, medical and behavioral factors play crucial roles in the occurrence of falls. Prevention of these episodes therefore becomes a priority, involving strategies that range from health promotion and physical fitness to environmental adaptations and medical interventions.<sup>2</sup>

The physiological process of aging is marked by a series of changes in the body that can directly influence the predisposition to falls in the elderly. Several physiological systems are affected, contributing to reduced stability and increasing the risk of adverse events, such as falls. One of the most evident changes is the reduction in muscle mass, known as sarcopenia, which leads to a decrease in muscle strength and the ability to respond

quickly to external stimuli. This compromises the body's ability to maintain balance and respond efficiently to unexpected situations, predisposing older people to falls, especially during everyday activities.<sup>3</sup>

Furthermore, changes occur in the skeletal system, such as loss of bone density, making bones more fragile and susceptible to fractures in the event of a fall. The vestibular system, responsible for balance and perception of the body in space, also undergoes changes, affecting postural stability. Furthermore, the decrease in visual and hearing acuity, common in aging, can impact the perception of the environment, increasing the chances of trips and falls. The central nervous system also faces changes in the speed of information processing, which can influence the speed of motor responses to external stimuli.<sup>4-8</sup>

In addition to these physiological factors, chronic health conditions, use of medications and the presence of other comorbidities can contribute to the frailty of elderly people and increase the risk of falls.<sup>9-11</sup> In short, a detailed understanding of the physiological changes associated with aging is essential to develop specific prevention strategies and multidisciplinary approaches that aim to mitigate the risk of falls in this vulnerable population. Therefore, the objective of this work is to understand the epidemiological profile of elderly people hospitalized for falling on the same level due to slipping, tripping or false steps in the state of Pernambuco.

## METHODS

This is a quantitative descriptive ecological observational study, whose objective is to understand the epidemiological distribution of falls on the same level due to slipping, tripping or false steps (ICD 10 W1) in elderly people in Pernambuco. The data were collected by the DataSUS platform, through information obtained from the Notifiable Diseases

Information System (SINAN). Collection began from the Hospital Information System (SIH), using hospital morbidity data by place of hospitalization between January 2008 and December 2022.

The study population is made up of patients who were admitted to any hospital in Brazil, of both sexes, aged over 65 years. The indicators used were: sex, age, color/race, deaths, mortality rates and cost per hospitalization. The study was carried out in accordance with the principles of Resolution 466/2012 of the National Health Council of Brazil.

## RESULTS AND DISCUSSION

Between 2008 and 2022, 4,246 elderly people (individuals over 65 years old) were hospitalized in the state of Pernambuco due to falling from the same level due to slipping, tripping or false steps. Among the 121 municipalities in the state that had cases of hospitalization over the 15 years analyzed in this study, only 20 of them (Table 1) account for 90.9% of the state's cases, with Olinda, Paulista and Recife being those with the highest number of notifications, respectively. Furthermore, only these three municipalities are responsible for 56% of cases, with Olinda responsible for 25% of cases in the federative unit.

When analyzing the macro-regions, the metropolitan region is the one with the most accidents overall years with 88.6% of cases (Table 2). Furthermore, regarding the sex of the patients, there is a ratio of 3.6 women for every man affected. However, this proportion is not maintained in all macro-regions. In the São Francisco and Araripe Valley (VSFA) the ratio is 2.9:1.0, in the Wild region 2.1:1.0 and in the Hinterland 1:1.

City	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
<b>TOTAL</b>	<b>84</b>	<b>42</b>	<b>333</b>	<b>442</b>	<b>387</b>	<b>386</b>	<b>407</b>	<b>361</b>	<b>215</b>	<b>184</b>	<b>250</b>	<b>191</b>	<b>168</b>	<b>206</b>	<b>205</b>	<b>3861</b>
Olinda	1	2	97	129	104	94	111	98	64	63	85	57	40	54	63	1.062
Paulista	2	1	57	97	70	70	85	76	58	37	62	48	46	50	58	817
Recife	7	13	68	87	75	70	62	39	12	6	17	8	26	17	9	516
Abreu e lima	-	-	22	30	38	34	25	32	27	15	25	24	12	24	20	328
Igarassu	-	-	35	28	30	23	34	30	11	17	20	14	14	16	19	291
Goiana	-	-	15	16	16	25	17	19	9	18	16	15	11	13	13	203
Petrolina	41	16	16	7	9	8	7	12	7	4	3	1	1	-	-	132
Condado	-	-	3	3	3	7	4	5	6	3	10	3	2	8	6	63
Itambé	6	1	3	6	8	5	7	1	1	1	4	3	1	6	3	56
Itapissuma	-	-	5	6	3	6	4	3	4	6	1	4	5	-	2	49
Ilha de Itamaracá	-	-	3	8	8	3	5	3	4	3	1	5	2	1	2	48
Aracoiaba	-	-	2	6	3	2	5	3	1	4	2	3	4	6	2	43
Itaquitinga	2	-	-	3	4	6	5	3	-	5	-	3	1	1	4	37
Ouricuri	12	2	-	5	2	3	4	7	1	-	-	-	-	-	-	36
Jaboatão dos Guararapes	1	1	2	2	1	3	3	7	2	-	-	3	1	5	4	35
Santa maria da Boa Vista	5	2	2	3	3	7	9	2	-	-	-	-	-	1	-	34
Cabrobó	5	2	1	1	1	6	3	6	4	1	-	-	1	-	-	31
Aliança	-	-	1	1	4	7	3	5	1	-	2	-	1	4	-	29
Araripina	2	2	-	-	3	4	6	7	3	-	-	-	-	-	-	27
Dormentes	-	-	1	4	2	3	8	3	-	1	2	-	-	-	-	24

Table 1.0: List of the 20 municipalities with the highest number of elderly people hospitalized due to falling from the same level due to slipping, tripping or false steps in the state of Pernambuco.

Macrorregião de Saúde	White	Black	Brown	Yellow	Indian	Without information	Total
Total	337	66	1.920	226	6	1.691	4.246
Metropolitan	325	66	1.831	220	5	1.317	3.764
Vale do são Francisco e Araripe	1	-	42	-	-	358	401
Wild region	6	-	32	6	1	8	53
Hinterland	5	-	15	-	-	8	28

Table 3.0: Relationship of elderly people by race hospitalized for falling from the same level due to slipping, tripping or false steps in the health macro-regions of the state of Pernambuco.

Macroregion of health	65 to 69 years	70 to 74 years	75 to 79 years	80 years and over	Total
<b>TOTAL</b>	1.075,43	1.220,07	1.474,07	1.821,06	1.470,63
<b>Metropolitan</b>	1.064,96	1.198,57	1.523,54	1.874,06	1.488,36
<b>Vale do São Francisco e Araripe</b>	1.180,15	1.262,28	1.081,88	1.545,12	1.345,92
<b>Wild region</b>	975,69	2.485,41	1.175,51	1.202,63	1.292,56
<b>Hinterland</b>	1.412,78	2.400,88	630,7	856,36	1.210,40

Table 4

Health Macroregion	Male	Female	Total
Total	922	3.324	4.246
Metropolitana	788	2.976	3.764
Vale do são Francisco e Araripe	103	298	401
Wild region	17	36	53
Hinterland	14	14	28

Table 2.0: Relationship of elderly people by sex hospitalized for falling from the same level due to slipping, tripping or false steps in the health macro-regions in the state of Pernambuco.

In another study, when analyzing falls in general, a higher proportion of hospitalizations due to falls was noted among women, totaling 60.4% of the total number of hospitalizations. Specifically, women made up 50.3% of hospitalizations in the 60 to 69-year-old age group, 62.6% in the 70 to 79-year-old age group and 70.6% in the population aged 80 or over. Among individuals who declared their race, brown individuals were the most affected (75.1%), followed by whites (13.2%), yellow (8.8%), black (2.6%) and indigenous people (0.2%), respectively.<sup>12</sup>

Regarding deaths, the only macro-regions that declared fatalities were the Metropolitana and VSFA, with 58 and 2, respectively. The mortality rate of the Metropolitan Macroregion was 1.54, while that of the VSFA was 0.5. Furthermore, the mortality rate for men was 2.06, while that for women was 1.23, corroborating data from the WHO which states that mortality rates resulting from injuries caused by falls are higher among elderly men in the world. than among women in the same age group, for reasons that are not yet completely known.

Fatal fall rates increase significantly with age in both sexes, reaching the highest levels in groups aged 80 years and above (Table 4). Among men, fatal fall rates exceed those of women in all age groups, even with a lower overall incidence of falls. This disparity is

attributed to the fact that men, in the same age group, have a higher prevalence of comorbid conditions compared to women. This is also reflected in mortality after hip fractures, where, although the incidence of fractures is higher among women, the mortality rate associated with these fractures is higher among men. A study revealed that men report poorer general health and a greater number of underlying conditions than women, substantially magnifying the impact of hip fractures and, consequently, increasing the risk of mortality.

Age	65 to 69 years	70 to 74 years	75 to 79 years	80 years and over
Mortality rate	0,12	0,55	2,08	2,23

Table 3.0 Mortality rate by age group of elderly people hospitalized due to falling from the same level due to slipping, tripping or false steps in the health macro-regions of the state of Pernambuco.

The average number of days hospitalized was different between macro-regions. Patients hospitalized in the metropolitan macro-region had the highest average length of stay (7.3 days), followed by Hinterland (6.8 days), Wild region (5.3 days) and VSFA (3.3 days). There was also a small difference in relation to the age groups “65 to 69 years” (6.3 days), “70 to 74 years” (6 days), “75 to 79 years” (6.9 years) and “80 years or more” (7.6 days), but there was no difference between the sexes, therefore remaining 6.9 years. Interestingly, although other races had an average number of days spent in hospital between 6.8 and 7.8 years, indigenous people had an average of 50% less (3.5 days).

The average cost of hospitalization for these elderly people is R\$1,470.63. Although black people have the highest average number of days hospitalized (7.8 days), they have the second lowest cost among the races,



R\$ 1,242.75. The yellow population has the highest average cost of hospitalization (R\$ 1,681.33). It is also clear that the average cost per hospitalization varies depending on the age of the elderly person. The older the patient, the higher the hospitalization cost (Table 4).

In the Hospital Information System of the Unified Health System (SIH/SUS), 1,746,097 Hospital Admission Authorizations (AIHs) related to falls in elderly people in Brazil were registered during the period from 2000 to 2020, resulting in a total cost of R \$2,315,395,702.75 for the healthcare system. It is noteworthy that the age group between 60 and 69 years old had the highest proportion of hospitalizations due to falls in the elderly, totaling 37.7% of the total number of hospitalizations and corresponding to 30.3% of the global cost of these hospitalizations. In the age group of 70 to 79 years, despite a 5.5% lower number of hospitalizations (32.2%), the associated costs were higher, representing 32.8% of the total value. Hospitalizations of individuals aged 80 or over were responsible for 36.9% of the total cost of these hospitalizations.<sup>13</sup>

Regarding costs, R\$ 702,227,208.53 were allocated to hospitalizations for falls in the age group of 60 to 69 years old, with 54.3% of this amount going to male hospitalizations. For this age group, the average hospital stay was 6.2 days for males and 5.2 days for females. Furthermore, hospital mortality among men was more than double compared to women, registering 3.9% versus 1.6% between 2000 and 2007, and 3.7% versus 1.4% between 2008 and 2020.

In the age groups of 70 to 79 years and 80 years or more, hospital mortality was also higher for males. Among elderly people aged 70 to 79 years, hospital mortality for men

was 6.0% (2000-2007) and 11.4% (2008-2020), while for women it was 2.8% and 7.2%, respectively. Among elderly people aged 80 or over, hospital mortality for men was 9.1% (2000-2007) and 11.4% (2008-2020), compared to 5.6% and 7.2% for women, in the same periods. However, it is important to highlight that the majority of hospitalizations for falls in the entire elderly population, throughout both periods, were female.<sup>13</sup>

## CONCLUSION

The study reveals worrying data about hospitalizations of elderly people due to falls in the state of Pernambuco between 2008 and 2022. The significant concentration of cases in some municipalities, especially in the metropolitan region, highlights the need for specific prevention strategies. The disparity in incidence between sexes and age groups, associated with different mortality rates, highlights the complexity of the phenomenon. Furthermore, analysis of patients' socioeconomic and racial characteristics provides valuable insights for directing public health policies. The average cost of hospitalizations, which increases with age, points to the economic relevance of the problem. In short, there is an urgent need to develop preventive measures and adapted interventions to reduce the impact of falls in the elderly, promoting healthier and more sustainable aging.

## CONFLICT OF INTEREST

There is not any.

## FINANCING

The own author.

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