

## **Latin-American regional review on Falls in older people**

Dr. Pedro Paulo Marin

Centro de Geriatria y Gerontología UC, Chile  
(WHO Collaborative Centre)

### **Summary**

As the number of persons and the proportion of the total population who are older increase in Latin America, falls will become a major health burden. In the year 2000 the population of people aged 60 years or over in Latin America and the Caribbean was 41.3 million, and the estimated number of falls was 13.8 million. In Latin America, as in other parts of the world, falls are a major public health problem, in that they are associated with fractures, fear of falling, disability, extensive use of health services, institutionalization, and increased burden on family members. Women live longer than men in Latin America do (as elsewhere around the world), but older women in Latin America are more likely than men to be uninsured and to not have social security benefits. Women face a higher risk for falls and for hip fractures, so public health policies are needed to especially direct resources toward prevention of falls and osteoporosis among them.

Falls in the elderly population seems not to be a topic that clinicians or researchers from Latin-America are interested. There are very few papers published (30) and only from 6 countries of the Region. Most of the information available is clinical orientated and general reviews or with few subjects and not representative of the country. The best paper was published by Reyes-Ortiz CA, Al Snih S, Markides KS. in Rev Panam Salud Publica. 2005 that's includes a large population from SABE-PAHO and Mexicans-Americans. The prevalence levels of subjects who had multiple falls (two or more) that were found in five of the seven SABE cities (Bridgetown, Havana, Montevideo, Buenos Aires, and Sao Paulo) and in the H-EPESE ranged from 8.7% to 14.4%. These levels were similar to those of older populations in the developed countries of Canada, Finland, and the United States, where the prevalence of multiple falls among older people have been reported to be between 10% and 15%. Similarly, studies in Brazil found prevalence levels of multiple falls among older persons of 12% and 14%. Two of the SABE cities had higher prevalences of multiple falls: Mexico City (19.5%) and Santiago (20.3%).

### **Background/Introduction**

Falls are among the most common and serious health problems facing older Americans, causing considerable mortality, morbidity, and immobility. About three-fourths of deaths due to falls occur in the 13% of the population aged 65 years and older. Accidents are the fifth leading cause of death among older adults and falls account for two-thirds. Approximately one-third of community-dwelling elders fall each year, with 5% of falls resulting in fractures or

hospitalization. These rates are three times as high for elders residing in nursing homes and hospitals. Thus, the concern is not merely the high incidence of falls, but also the high susceptibility to injury among elders who fall. Falls are strong indicators of accelerating frailty, are the largest single cause of restricted activity days among older adults, and have wide ranging effects on the quality of life. Studies have shown falls and instability to be precipitating causes of nursing home admissions.

Falls and mobility problems are generally the result of multiple, diverse, and interacting etiologies. Unfortunately, many patients and doctors ignore falls if no injury has occurred, thereby missing important opportunities for potentially life-saving evaluation and treatment.

A fall is not a disease, rather regarded as a cause leading to serious outcomes. Falls, called unintentional injuries, can be coded in E880-886, E888 with International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM) codes. The term 'Fall-related injuries' is widely used to describe the outcomes (e.g. brain trauma, or hip fracture) of fall events.

## Methods

- **Search strategy and selection criteria**

We find 32 papers published from 6 countries of Latin-America. Results were obtain from PubMed, data base of LILACS [www.bireme.br](http://www.bireme.br), <http://www.who.int/search/es/>, and making enquiries to Directors of the Latin-American Region of the International Association of Gerontology (COMLAT-IAGG) and ALMA – Academy of Geriatric Professors from Latin-America.

## Results

**Epidemiology of falls in older population** from the literature we can summarize that Falls are a significant cause of death and disability and have a serious impact to the psychological and physical health of the elderly. Falls is a major cause of severe nonfatal injuries and common cause of hospital admissions (40%) for traumatic injuries among older adults. Falls are also the second leading cause of spinal cord and brain injury among older adults. Approximately 30 ~ 50 % of falls result in minor soft tissue injuries. Overall, 20~30% of those who fall suffer from moderate to severe injuries that limit mobility and independence, even the risk of death. The total direct cost of all fall injuries for people age 65 and older in 1994 was 20.2 billion, and it is projected to increase to 32.4 billion by 2020 in USA.

Falls are one of leading cause of deaths among people 65 years and older. Fall related deaths for men and women increase with advancing age. More than 60% of fall related death occurred to the persons aged 75 years or older. Men aged over 85 years (128.3 per 100,000) were almost ten times higher for men in 65-74 (11.5 per 100,000). Men showed consistently higher death rates than women. The highest rate of death due to falls is in white men aged 85 years and over, followed by white women aged 85 years and over ( 89.3 per 100,000).

For both men and women, death rates were higher for whites than for blacks. White men have the highest death rate (30 deaths per 100,000), followed

by white women (19 deaths per 100,000), black men (17 deaths per 100,000) and black women (10 deaths per 100,000) in 1998.

**Distribution of falls** in our Region was obtained from the analysis of the data collected in 2000–2001 for the Hispanic Established Populations for Epidemiologic Studies of the Elderly (H-EPESE) found a prevalence of falls in the preceding year of 32% in older Mexican-Americans in the southwestern part of the United States. That analysis also found that age, female gender, diabetes, arthritis, impairment in instrumental activities of daily living, and high depressive symptoms were significant independent predictors for one or more falls.

To estimate the prevalence of falls and the risk factors associated with falls among elders in Latin America and the Caribbean, and among Mexican-Americans living in the southwestern part of the United States, was employed a cross-sectional analysis of the H-EPESE and of data sets from a multicenter study called Health, Well-Being, and Aging in Latin America and the Caribbean (*Salud, Bienestar y Envejecimiento en América Latina y el Caribe*) (the "SABE project"). Mexican-Americans compose nearly 60% of the Hispanic population of the United States, and older Mexican-Americans are one of the fastest growing segments of older persons in the United States.

**Prevalence of fall in our region:**

	One fall	≥2 falls	Total %
Santiago	13.7	20.3	<b>34</b>
México	14	19.5	<b>33.5</b>
<u>Mex- USA</u>	17.7	13.1	<b><u>30.8</u></b>
Sao Paulo	16.8	12.2	<b>29</b>
Bs Aires	14.5	14	<b>28.5</b>
Montevideo	12.8	14.2	<b>27</b>
Havana	9.7	14.4	<b>24.1</b>
Bridgetown	12.9	8.7	<b>21.6</b>

UC Centro Geriatria, Chile - WHO  
Collaborative Center on Ageing

The bivariate comparison of fallers (one or more falls) and nonfallers. Fallers were significantly more likely to be older, be female, be ADL disabled, have lower cognitive scores, and report higher depressive symptoms, urinary incontinence,

hypertension, arthritis, diabetes mellitus, distant-vision problems, and hearing problems.

The results of the multiple logistic regression analyses. Significant independent risk factors for one or more falls were female gender (all surveys, odds ratio (OR) from 1.36 to 2.34), age (six surveys: Bridgetown, São Paulo, Santiago, Havana, Mexico City, and Montevideo; all have OR of 1.02), higher depressive symptoms (six settings: Bridgetown, São Paulo, Havana, Mexico City, Montevideo, and Mexican-Americans; OR from 1.02 to 1.10), any ADL limitation (five surveys: Bridgetown, Santiago, Havana, Montevideo, and Mexican-Americans; OR from 1.46 to 2.04), arthritis (three surveys: Bridgetown, Havana, and Montevideo; OR from 1.31 to 1.65), urinary incontinence (three surveys: Buenos Aires, Santiago, and Havana; OR from 1.39 to 1.96), diabetes (three surveys: Bridgetown, São Paulo, and Mexico City; OR from 1.33 to 1.49), and heart attack (two surveys: Santiago and Montevideo; OR 1.59 and 1.50, respectively). In contrast, a decreased risk for falls was found for heart attack (two surveys: Mexico City and the Mexican-Americans; OR 0.59 and 0.55, respectively), and higher cognitive function (two surveys: Havana and Mexico City; OR 0.95 and 0.94, respectively).

The occurrence of falls according to the number of risk factors. Risk factors included age  $\geq 80$  years, female gender, high depressive symptoms (GDS  $\geq 11$  or CES-D  $\geq 16$ ), diabetes mellitus, urinary incontinence, and any ADL impairment. A significant increase ( $P < 0.0001$ ) in the occurrence of falls was seen as the number of risk factors increased in all the surveys, when considering the categories of 0, 1, 2, and  $\geq 3$  risk factors.

General Results from this study: found that being older, being female, and having any functional impairments were significant independent correlates of falls in most of the survey sites. These findings are consistent with other studies, where age, female gender, and functional impairment were the main risk factors for falls among older people living in the community. A high level of depressive symptoms was an independent risk factor for falls in Bridgetown, Sao Paulo, Havana, Mexico City, and Montevideo, and in Mexican-Americans. These findings are similar to those reported from studies done in Italy, the Netherlands, and the United States. However, because we did not include antidepressive medication use in this analysis, we could not determine if the increased risk for falls is due to depression or to the effect of medications.

Diabetes was an independent risk factor for falls in Bridgetown, Sao Paulo, and Mexico City. In a few other studies, done in the United States, diabetes has been reported as a risk factor for falls. Arthritis was an independent risk factor for falls in Bridgetown, Havana, and Montevideo. This is similar to some previous studies done in the United States. Urinary incontinence was a risk factor for falls in Buenos Aires, Santiago, and Havana; these findings agree with previous reports on research done in and Japan and in the United States.

Other independent risk factors for falls that was found were heart attack in Chile and Uruguay, stroke in Buenos Aires, hypertension in Santiago, distant-vision problems in the H-EPESE Mexican-Americans, and cancer in Mexico City. We found previous reports for vision problems, stroke, and cancer but not for hypertension or heart attack. We found that that high cognitive status is a protective factor for falls in Havana and Mexico City. These results are consistent with previous reports from Brazil, Canada, and the United States that dementia and cognitive impairment are risk factors for falls in older people.

Was reported that arthritis (in Mexico City) and heart attack (in Mexico City and in the H-EPESE Mexican-Americans) were associated with a decreased risk for falls could have several possible explanations. One is the restricted activities in these subjects, and another is the use of cardiac medications that reduce symptoms that are associated with falls. In a study done in Canada the use of cardiac medications was associated with decreased risk for falls. The authors proposed that cardiac medications reduced fall-related symptoms such as dizziness secondary to decreased heart output. However, the SABE and H-EPESE studies collected no data on specific cardiac medications that we could have used to confirm this association between cardiac medications and decreased risk for falls.

Limitations of this study: The SABE and H-EPESE data on falls and comorbidities were self-reported. However, self-reports of falls and medical conditions have been used in many studies, and have been found to be accurate and reliable. Another limitation is our reliance on cross-sectional data, which precludes establishing causal relationships between certain variables and falls. Also, injury data related to falls and environmental barriers were not available in our analysis; this somewhat limits the meaningfulness of our results for these populations. Finally, the SABE survey does not represent the diversity of environments, localities, and elderly that exist in the selected countries. That is because the SABE data were collected in large cities, with the exception of Bridgetown, which has a much smaller population than do the other SABE cities.

Conclusions of the study: showed that the prevalence of falls is high in Latin America and the Caribbean and in Mexican-Americans in the southwestern United States. The risk for falls increases with age and may result from the accumulated effect of multiple conditions. A major implication of this study is that early detection of risk factors for falls may decrease the incidence of falls in these populations. Indeed, falls are associated with disability and medical conditions of high prevalence in Latin American and the Caribbean and in older Mexican-Americans, such as diabetes, arthritis, and depression—and all these conditions could be prevented, treated, or managed better.

**Consequences, Health service impacts and costs of falls in older people, Costs, Interventions/best practice of falls prevention, fall prevention policies & sustainability** only a few studies on this subject have been reported

from Latin America. For example, in a community-dwelling cohort study among people aged 65 and older in the city of Sao Paulo, Brazil, Perracini and Ramos found that 29% of subjects had fallen in the preceding year, and 12% had had recurrent falls. In a community cross-sectional study among women 60 years old or over in the city of Rio de Janeiro, Brazil, Rosenfeld et al. reported a total prevalence of 37% for falls in the previous year, and 14% for two or more falls.

Among older people, falls are associated with considerable mortality, hospitalization, institutionalization, hip fractures, fear of falling, and other consequences. For example, in Brazil during 1995, 41% of all deaths from falls occurred among people 60 or older. Similarly, in Jamaica, falls accounted for 41% of the trauma cases admitted to a rural hospital, and 26% of the trauma cases admitted to an urban hospital. In addition, 62.9% of elders in Colombia who had fallen developed a fear of falling, and 26% of them reported functional restrictions on instrumental and social activities of daily living due to that fear.

From the literature we can find:

- The risk of falling increases with age and is greater for women than for men.
- Two-thirds of those who experience a fall will fall again within six months.
- A decrease in bone density contributes to falls and resultant injuries.
- Failure to exercise regularly results in poor muscle tone, decreased strength, and loss of bone mass and flexibility.
  
- At least one-third of all falls in the elderly involve environmental hazards in the home
- In 2002, nearly 13,000 people ages 65 and older died from fall-related injuries (CDC 2004). More than 60% of people who die from falls are 75 and older
- Of those who fall, 20% to 30% suffer moderate to severe injuries such as hip fractures or head traumas that reduce mobility and independence, and increase the risk of premature death
  
- Among people ages 75 years and older, those who fall are four to five times more likely to be admitted to a long-term care facility for a year or longer
- Falls are a leading cause of traumatic brain injuries
- Among older adults, the majority of fractures are caused by falls
- Approximately 3% to 5% of older adult falls cause fractures Based on the 2000 census, this translates to 360,000 to 480,000 fall-related fractures each year.
- The most common fractures are of the vertebrae, hip, forearm, leg, ankle, pelvis, upper arm, and hand

- In 2000, direct medical costs total \$179 million dollars for fatal and \$19.3 billion dollars for nonfatal fall injuries

**Conclusions** A review of the recent literature reveals the following important findings:

- Studies have shown that among persons living in institutions, specific risk factors exist that significantly increase the likelihood of falling: leg weakness; gait and balance problems; impairment of daily living activities; impaired vision; impaired memory; taking multiple medications daily; taking certain classes of medications, including sedatives, some antihypertensive, and diuretics.
- Several studies have shown that the risk of falling increases dramatically as the number of risk factors increases. In one study, the predicted 1 year risk for falling ranged from 12 percent for persons with none of three risk factors (hip strength, balance, number of medications taken) to 100 percent for persons with all three risk factors.
- Older adults with lower extremity weakness have about a six-fold increase in fall risks, and persons with impaired gait or balance have a four- and five-fold increase, respectively.
- Detectable gait abnormalities affect 20–50 percent of people over age 65.5
- For patients who have suffered a fall, it has been shown that a systematic evaluation to identify the underlying cause of the fall, treatable risk factors, and a treatment plan can help discern treatable conditions, reduce or prevent recurrent falls, and improve general health outcomes.
- Programs to increase regular exercise and physical activity improve strength and balance, and have been shown to reduce the frequency of falls by 9–35 percent.

A convincing chain of indirect evidence supports the practice of regular inquiry into recent falls. This relatively low-cost methodology, in combination with an assessment of environmental risks, may help maintain an elderly patient's capacity for independent living.

### References from Latin-America studies.

1. Reyes-Ortiz CA, Al Snih S, Markides KS. Falls among elderly persons in Latin America and the Caribbean and among elderly Mexican-Americans. *Rev Panam Salud Publica*. 2005 May-Jun;17(5-6):362-9. PMID: 16053646 [PubMed - indexed for MEDLINE]
2. Reyes-Ortiz CA, Al Snih S, Loera J, Ray LA, Markides K . Risk factors for falling in older Mexican Americans. *Ethn Dis*. 2004 Summer;14(3):417-22. PMID: 15328944 [PubMed - indexed for MEDLINE]
3. Fabrício, Suzele Cristina Coelho; Rodrigues, Rosalina A. Partezani; Costa Junior, Moacyr Lobo da. Causas e conseqüências de quedas de idosos atendidos em hospital público / Falls among older adults seen at a São Paulo State public hospital: causes and consequences. *Rev. saúde pública*;38(1):93-99, fev. 2004.
4. Perracini, Monica Rodrigues; Ramos, Luiz Roberto. Fatores associados a quedas em uma coorte de idosos residentes na comunidade / Fall-related factors in a cohort of elderly community residents. *Rev. saúde pública*;36(6):709-716, 2002.
5. Perracini, Monica Rodrigues. Fatores associados à quedas em uma coorte de idosos residentes no município de São Paulo / Fall related factors in a cohort of elderly residents in São Paulo. São Paulo; s.n; 2000. 223 p.
6. Bodachne,Luiz. Instabilidade e quedas no idoso / Instability of posture in the elderly.*RBM rev. bras. med*;51(3):226-35, mar. 1994.
7. Gazzola, Juliana Maria; Muchale, Sabrina Michels; Perracini, Monica Rodrigues; Cordeiro, Renata Cereda; Ramos, Luiz Roberto. Caracterização funcional do equilíbrio de idosos em serviço de reabilitação gerontológica / Functional balance among elderly in a gerontological rehabilitation service. *Rev. fisioter. Univ. São Paulo*;11(1):1-14, jan.-jun. 2004.
8. Santos, Milena Lisboa Couto dos; Andrade, Marinúbia Chaves. Incidência de quedas relacionada aos fatores de riscos em idosos institucionalizados / Fall incidents related to risk factors in institutionalized elders. *Rev. baiana saúde pública*;29(1):57-68, 2005.
9. Rocha, Fábio Lopes; Cunha, Ulisses Gabriel de Vasconcelos. Aspectos psicológicos e psiquiátricos das quedas do idoso / Psychological and psychiatric aspects of falling in the elderly. *Arq. bras. med*;68(1):9-12, 1994.
10. Rozenfeld, Suely, Camacho, Luiz Antonio Bastos and Veras, Renato Peixoto Medication as a risk factor for falls in older women in Brazil. *Rev Panam Salud Publica*, June 2003, vol.13, no.6, p.369-375. ISSN 1020-4989
11. E\_Chaimowicz F, Ferreira Tde J, Miguel D. Use of psychoactive drugs and related falls among older people living in a community in Brazil. *Rev Saude Publica*. 2000 Dec;34(6):631-5. PMID: 11175609 [PubMed - indexed for MEDLINE]



12. Rodrigues, Rosalina Aparecida Partezani; Kusumota, Luciana; Fabricio, Suzele Cristina Coelho; Marques, Sueli; Corbacho, Angélica Cristina . Quedas com idosas na comunidade: estudo retrospectivo / Old-aged women falls in a municipal district: a retrospective survey .Mundo saúde (1995);25(4):420-424, 2001
13. Coutinho Ed Eda S, Silva SD. [Medication as a risk factor for falls resulting in severe fractures in the elderly]. *Cad Saude Publica*. 2002 Sep-Oct;18(5):1359-66. Portuguese. PMID: 12244369 [PubMed - indexed for MEDLINE]
14. Chaimowicz, Flávio; Ferreira, Teresinha de Jesus Xavier Martins; Miguel, Denise Freire Assumpção. Use of psychoactive drugs and falls among older people living in a community in Brazil. *Rev. saúde pública*;34(6):631-5, 2000.
15. Ferrer, M. L. P; Perracini, M. R; Ramos, L. R. Prevalencia de fatores ambientais associados a quedas em idosos residentes na comunidade em Sao Paulo. *Rev. bras. fisioter*; 8(2):149-154, 2004.
16. Aviña Valencia, Jorge; Azpiazu Lee, Jacaranda. El viejo.y la fractura de cadera / The elderly and the hip fracture. Review article. *Rev. mex. ortop. traumatol*;14(6):478-483, 2000.
17. Montero-Odasso, Manuel. Prevención de caídas en los ancianos / Prevention of falls in aged people Evidencia aten. primaria;4(1):18-22, 2001
18. Montero Odasso, Manuel. Caídas en el anciano: un gigante de la geriatría Falls in the elderly: a giant of geriatrics. *Nexo rev. Hosp. Ital. B.Aires*;19(3):75-81, 1999.
19. Delgado Gamero, Adalberto. Caidas en el anciano / Falls in old age. *Diagnóstico (Perú)*;27(1/2):18-22, 1991.
20. Gac H, Marin PP, Castro S, Hoyl T, Valenzuela E. [Falls in institutionalized elderly subjects. Features and geriatric assessment] *Rev Med Chil*. 2003 Aug;131(8):887-94. Spanish. PMID: 14558243 [PubMed - indexed for MEDLINE]
21. González C, Gisela, Marín L, Pedro Paulo, Pereira Z, Gloria. Características de las caídas en el adulto mayor que vive en la comunidad. *Rev. méd. Chile*, Set 2001, vol.129, no.9, p.1021-1030. ISSN 0034-9887
22. Cartier R., Luis. Caídas y alteraciones de la marcha en los adultos mayores. *Rev. méd. Chile*, Mar 2002, vol.130, no.3, p.332-337. ISSN 0034-9887
23. Marin PP, Gac H, Hoyl T, Carrasco M, Duery P, Cabezas M, Petersen K, Dussailant C, Valenzuela E. A comparative study of institutionalized nonagenarian and younger elderly women] *Rev Med Chil*. 2004 Jan;132(1):33-9. Spanish. PMID: 15379050 [PubMed - indexed for MEDLINE]
24. Marin PP, Carrasco M, Cabezas M, Gac H, Hoyl T, Duery P, Petersen K, Dussailant C. Biomedical impact of traveling for Chilean elderly] *Rev Med Chil*. 2004 May;132(5):573-8. Spanish. PMID: 15279143 [PubMed - indexed for MEDLINE]

25. Gonzalez G, Marin PP, Pereira G. [Characteristics of falls among free living elders] Rev Med Chil. 2001 Sep;129(9):1021-30. Spanish. PMID: 11725465 [PubMed - indexed for MEDLINE]
26. Marin PP, Kornfeld R, Escobar MC. Functional risk assessment of poor Chilean elders using an instrument validated in Canada] Rev Med Chil. 1998 Nov;126(11):1316-22. Spanish. PMID: 10349174 [PubMed - indexed for MEDLINE]
27. Marin PP, Valenzuela E, Saito NK, Castro S, Hoyl T. [Pilot experience with the use of an ambulatory geriatric assessment instrument] Rev Med Chil. 1996 Jun;124(6):701-6. Spanish. PMID: 9041727 [PubMed - indexed for MEDLINE]
28. Valdivia G, Giaconi J, Arteaga E, Pumarino H, Gajardo H, Villarroel L. [Hip fracture: a case-control study in the metropolitan region I] Rev Med Chil. 1996 Feb;124(2):189-97. Spanish. PMID: 9213887 [PubMed - indexed for MEDLINE]
29. Cornejo-Arias E, Medina-Lois E, Kaempffer-Ramirez AM, Hernandez-Araya E. Health status of the population 60 years of age and older in Santiago, Chile, 1993] Salud Publica Mex. 1995 Sep-Oct;37(5):417-23. Spanish. PMID: 8600557 [PubMed - indexed for MEDLINE]