

# Relationship between self-reporting of visual impairment and falls in older adults participating in the 2015 SABE Colombia Survey

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## ABSTRACT

**Objective:** To examine the link between self-reported visual impairment and falls among older adults using data from Colombia's Health, Well-being and Aging Survey (2015).

**Materials and Methods:** A cross-sectional analysis of the SABE Colombia 2015 survey was conducted. The dependent variable was falls in the past year; independent variables included self-reported visual impairment, sociodemographic factors, environment, personal factors, and health conditions. A bivariate analysis was followed by a logistic regression to calculate ORs ( $p < 0.05$ ).

**Results:** Half of the participants reported visual impairment, and a third experienced falls in the past year, with over half falling multiple times. The average age was 69.6 years, predominantly women, living in urban areas, and most were dependent on daily activities. Common conditions included hypertension, dyslipidemia, and joint issues. Architectural hazards like stairs without railings, poor lighting, and obstacles were common. Multivariate analysis showed that outdoor lighting, railings, and leaving home were associated with fewer falls. Factors significantly increasing fall risk included uneven home entrances, furniture obstacles, dependence on daily activities, certain health conditions, and fear of falling.

**Conclusion:** Adequate lighting, railings, and unobstructed spaces were associated with a lower fall risk, while obstacles, functional dependence, and mobility-impairing conditions increased it among those with visual impairments.

**Keywords:** Older adult, visual impairment, falls

## INTRODUCTION

The population of older adults (MA) is on the rise and faster than expected. In Colombia, for example, the proportion of people aged 60 or over went from 9% in 2005 to 13% in 2018. Projections indicate that the number of older adults in the country and the world will continue to increase, as well as an increase in life expectancy at birth of the Colombian population by 2040. This population group is characterized by its heterogeneity and therefore, they have different needs from those of the rest of the population, including a greater demand for the use of health services. (1) (2) (1) (3)

Aging leads to physiological changes in all body systems, associated with the burden of disease and deficits in functionality, which makes MAs susceptible to adverse health outcomes more frequently and noticeably than the younger population. Vision is one of the functions that deteriorates the most during the aging process, thus becoming one of the most prevalent chronic conditions among older adults in all latitudes of the planet. According to data from global prevalence studies, by 2015, 405,100,000 people in 98 countries on 5 continents had mild, moderate or severe visual impairment, and of these, 77% corresponded to people over 50 years of age. (4) (5)

In this global panorama, Colombia is no exception. In the Health, Well-being and Aging survey, SABE Colombia 2015, visual impairment was the chronic condition most frequently reported by participants, with a prevalence of 88.9%. Visual impairment negatively impacts quality of life, the relationship with others and with the environment, is associated with social isolation and can even facilitate the appearance of affective disorders such as depression, in addition to being a cause of disability. (6) (7)

Vision is critical to maintaining balance, gait, and mobility, and its impairment is an independent risk factor for falling. Falls are more frequent among MAs, have a high frequency that increases with age (28% to 35% of  $\geq 65$  years old and 32% to 42% of those  $> 70$  years old fall every year), they have consequences in the physical domain, which can be from mild (soft tissue trauma) to severe (hip fracture, fracture of the upper limbs and cranioencephalic trauma), generate a greater need for consultation to the emergency room, hospitalization requirements, prolonged hospital stays, institutionalization, social isolation, restriction of mobility, increase in health costs and higher mortality rates, which is why they have been considered by the World Health Organization (WHO) as an important public health problem. In the 2015 SABE Colombia survey, one in three people reported falling and more than half reported having fallen more than once in the last year, an event that was more frequent with age and in women, therefore, the objective of this study was to analyze the relationship between self-reported visual impairment and the presence of falls among older adults participating in the SABE Colombia Survey in 2015.

## MATERIALS AND METHODS

### Study design and data collection

This is a secondary data analysis, observational, cross-sectional study for analytical purposes, which uses information from the National Survey of Health, Aging and Old Age, SABE Colombia 2015.

The SABE Colombia Survey is a representative study for the population of adults over 60 years of age, based on the guidelines of the National System of Population Health Studies and Surveys of the Ministry of Health. It collected information from 23694 older adults, residents in the community, in 246 municipalities of Colombia, with disaggregation of the national and regional levels and in 4 large cities of the country in Bogotá, Cali, Medellín and Barranquilla. Thanks to this, the survey managed to have regional representativeness, urban-rural stratification of the sample and self-representation of 4 large cities in the country. It was executed between 2014 and 2015, by groups from the Universidad del Valle and the University of Caldas and the support of the National Consulting Center. This study was carried out in the homes of older adults, using a predetermined questionnaire, by face-to-face interview. The details of the methodology of the SABE Colombia 2015 Survey can be found in the publication of the Ministry of Health and Social Protection "Health, Welfare and Aging in Colombia – Situation of the Elderly".

### Study variables

**Dependent:** The dependent variable in this study was drop, defined as the report of at least one drop in the year prior to the time of the interview

**Covariates:** The independent variables were divided into self-report of visual impairment and the sociodemographic determinants, physical and social environment, personal factors and health conditions, were defined as follows:

- a. Self-report of visual impairment was evaluated through the question: What would you say your vision is like, far or near, regardless of whether you wear glasses?, visual impairment was taken as all those who stated that their vision was regular, bad or very bad.
- b. Sociodemographic determinants: age in years completed at the time of the interview, sex, area of origin according to location within each municipality (municipal seat, population center or dispersed rural), affiliation to the social security system in health -SSSS- (subsidized, contributory, exceptional, special, non-affiliated) and the highest level of education achieved by the elderly (none, preschool, primary, secondary, technical or technological, university or postgraduate).
- c. Determinants of the physical and social environment: perceived risks at the entrance to the home (lack of ramps, lack of lighting, stairs without railings or handrails and unevenness), inside the home (presence of obstacles, poor lighting, damaged or uneven steps, smooth floor in the shower, absence of supports in the shower or toilet).
- d. Characteristics of falls: place of occurrence of the fall (at home, on the street or others), number of falls in the last year, inability to perform any activity due to a fall (walking inside the house, doing work in the house, activities outside the house or none), requirement for attention by health personnel for the fall, presence of fear of falling and its intensity (a lot, regular, little or none), limitation of activities for fear of falling.
- e. Determinants of personal factors: functionality in basic activities of daily living (BADL) according to the Barthel Index and categorized by degree of dependence (less than 20 points total dependence, 20 to 35 points severe dependence, 40 to 55 points moderate dependence, 60 to 95 points low dependence or 100 points independent). Functionality in instrumental activities of daily living (IADL) according to the modified Lawton Scale, categorized as dependent (requires help or is incapable) or independent (does not require any type of assistance) to perform any of the following activities: money management, daily shopping, food preparation, use of public transport, use of the telephone and taking medication.

-Level of living space, depending on how far the person moves and the trips they made in the last month: Level 0 (confined to the room), Level 1 (other rooms of the house different from where they sleep), Level 2 (outside their house but only up to the entrance of the house, includes, terrace, front garden, patio, hallway of your apartment), Level 3 (moves in places in your own neighborhood other than your garden or apartment building); Level 4 (sites outside your neighborhood but only within the city), Level 5 (sites outside your city).

- f. Determinants of health conditions: All by self-report through the following questions : Has a doctor or nurse ever told you that you have...? arterial hypertension (HTN), joint disease (arthritis, osteoarthritis or rheumatism), diabetes, heart and/or cerebrovascular disease, osteoporosis.

### Statistical analysis

Descriptive statistics were used to analyze key characteristics of the 6 types of variables listed above. As measures of central tendency, the median or mean were used for the numerical variables depending on the symmetry of their distribution, and percentages or frequencies for the categorical variables. The dispersion of the data in the numerical variables was reported with standard deviation, variance, and minimum and maximum values. The association between categorical variables was explored with Fisher's exact test or Chi-square test, with a confidence level established at  $p < 0.05$ . To examine the degree of relationship between the numerical variables, Pearson's Correlation Coefficient was used. A multivariate logistic regression analysis was performed to identify the variables with the greatest impact on the dependent variable and to calculate the ORs. The respective assumptions of normality were validated by means of the Shapiro Wilk or Kolmogorov Smirnov test, the homogeneity of variance with the Levene test and independence with the Chi-square test; for the comparison of categorical variables, the Z-test for proportions was used. Statistical calculations were performed using version 3.5.2 and SPSS 25.

### RESULTS

In the SABE Colombia 2015 Survey, 23694 older adults participated, of which 12439 (52.5%) reported some degree of visual impairment. Table 1 shows the sociodemographic characteristics of the people who reported visual impairment, stratified according to the presence or absence of falls in the previous year.

Although most of the people who reported visual impairment were independent in ABVD and IADL, those who reported falls had mild or moderate functional dependence more frequently ( $p = 0.000$ ). There were no statistically significant differences in the maximum level of living space achieved between the groups ( $p = 0.687$ ).

**Table 1.** Sociodemographic characteristics of people with self-reported visual impairment stratified according to whether or not they had falls during the previous year

Variable	Rank	Falls in the last year		
		Yes n= 3980	No n=8459	p
<b>Age</b>	Media	69,6 DE $\pm$ 7,4	69.18 $\pm$ 7,1	<b>0.000</b>
	60-69	56,43%	58,1%	0,084
	70-79	31,56%	32,2%	0,471
	80-89	10,96%	9,0%	0,001
	Over 90	1,05%	0,7%	0,030
<b>Sex</b>				<b>0.001</b>
	Man	34,45%	46.4%	0,000
	Woman	65,55%	53.6%	0,000
<b>Origin</b>				<b>0.002</b>
	Municipal Seat	74,0%	71,3%	0,002
	Rural	26,0%	28,7%	0,002
<b>Assurance</b>				<b>0.800</b>
	Contribution	37,44%	37,3%	0,889
	Subsidized	59,17%	59,1%	0,922
	Other	3,39%	3,6%	0,533
<b>Educational level</b>				<b>0.189</b>
	None	15,15%	16,4%	0,067

	Primary	62,24%	62,2%	0,953
	High school	16,66%	15,4%	0,087
	Higher (Technical, technological, university or postgraduate)	5,79%	5,7%	0,869
	NS/NR	0,16%	0,2%	0,521
<b>Socioeconomic status</b>				<b>0.067</b>
	1	41.88%	42,6%	0,472
	2	39.22%	40,2%	0,298
	3	16%	14,9%	0,097
	4 a 6	2.9%	2.4%	0,076
<b>Monthly income level</b>				<b>0.134</b>
	Less than one SMLV	69,4%	66,9%	0,009
	1 SMLV	16,0%	16,8%	0,325
	More than 1 SMLV to 2 SMLV	9,0%	9,7%	0,284
	More than 2 SMLVs	3,8%	4,8%	0,024
	No know what the node answers	1.8%	1.8%	0.698

Recurrent falls (2 or more falls in the last year) were reported in 54.64% of people, with an average of 2.7 SD  $\pm$  6.1 falls per year. The house was the place where they fell the most. Most did not have disability as a result of a fall and 68% did not need health care.

Although the morbidity profile was similar between those who fell and those who did not, those who reported falls had a proportionally higher burden of disease ( $p = 0.000$ ) (Table 2).

No significant differences were found in the architectural risks at the entrance of the homes of those who fell and did not (Table 3), contrary to what happened inside the homes, where the risks reported by the patients who fell, which showed significant differences were: smooth floors in the shower or bathroom, light closer to the bed difficult to reach, dark bed-to-bathroom corridors, damaged lights on the stairwell or corridors, need to walk among furniture, and required support when entering or exiting the shower, or when standing up from the toilet or toilet (Table 4).

The majority (83.45%) of people with visual impairment reported fear of falling. Those who fell were very afraid of falling ( $p = 0.000$ ) and had more limitation of their activities because of this fear of falling ( $p = 0.000$ ). Table 5.

### Multivariate analysis by logistic regression

In the logistic regression analysis, among people with self-reported visual impairment, neither age nor being female had a statistically significant association with a greater chance of falling.

The factors of living conditions associated with the lower chance of falling were: coming from rural areas (OR 0.60, 95% CI: 0.51 to 0.72;  $p = 0.000$ ); living in socioeconomic strata 2 and 3 (OR 0.71, 95% CI: 0.62 to 0.83;  $p = 0.000$ ) and OR 0.70 (95% CI, 0.57 to 0.86;  $p = 0.000$ ). Reach a primary or secondary level of schooling, belong to the subsidized health regime and have a monthly income of 1 SMMLV.

The risks at the entrance of the dwellings associated with a lower chance of falling were: adequate exterior lighting (OR 0.70, 95% CI: 0.61 to 0.81;  $p = 0.000$ ), having ramps (OR 0.82, 95% CI, 0.68 to 0.99;  $p = 0.037$ ), and guardrails and handrails on stairs (OR 0.86, 95% CI, 0.74 to 0.99;  $p = 0.040$ ); while having unevenness or discontinuous surfaces at the entrance was associated with a 15% higher risk of falling OR 1.15 (95% CI, 1.01 to 1.32;  $p = 0.048$ ).

In people with visual impairment, the perceived risks inside the home did not show a significant association with falls; although there was a tendency for risk in walking between furniture, obstacles such as cables or ropes, having smooth floors or requiring supports for the shower or toilet.

Mild or moderate dependence on ABVD was associated with 38% and 61% more chance of falling, OR 1.38 (95% CI, 1.10 to 1.72;  $p = 0.006$ ) and OR 1.61 (95% CI, 1.26 to 2.05;  $p = 0.000$ ), respectively. However, having dependence on IADL did not show a significant association.

Some health conditions were associated in different proportions with falls as follows: 58% with cerebral thrombosis OR 1.58 (95% CI 1.18 to 2.12;  $p = 0.002$ ), 29% with joint alterations OR 1.29 (95% CI 1.12 to 1.49;  $p = 0.000$ ),

30% with elevated cholesterol OR 1.30 (95% CI 1.09 to 1.51;  $p = 0.01$ ) and 26% with osteoporosis OR 1.26 (95% CI 1.06 to 1.51;  $p = 0.03$ ).

Being able to move around in the neighborhood and not having a restriction to go out in the city or beyond, behaved as protective factors when compared to more restricted living space levels with OR 0.70 (95% CI, 0.54 to 0.91;  $p = 0.009$ ) and OR 0.77 (95% CI, 0.63 to 0.93;  $p = 0.007$ ), respectively.

A high fear of falling was associated with a 40% greater chance of falling OR 1.40 (95% CI, 1.17 to 1.66;  $p = 0.000$ ). Other levels of fear were not associated with increased risk of falling.

**Table 2.** Living and health conditions of people who self-reported stratified visual impairment according to whether or not they had falls during the previous year

Variable	Rank	Falls in the last year		
		Yes n= 3980	No n= 8459	p
<b>Dependence on ABVD</b>				<b>0.000</b>
	Total/severe dependence	0,7%	0.4%	0.082
	Moderate dependence	12,44%	6.0%	0.000
	Mild dependence	12,26%	7.8%	0.000
	Independence	74,62%	85.7%	0.000
<b>Dependence on IADL</b>				<b>0.000</b>
	Independent	59%	65,7%	0.000
	Dependent	41%	34,3%	0.000
<b>Living Space Level</b>				<b>0.687</b>
	Homebound	10,6%	10,2%	0,467
	Neighborhood	12,6%	12,8%	0,818
	City and Out of City	76,8%	77,1%	0,732
<b>Health conditions*</b>				
	Hypertension	59,07%	52.1%	0.000
	High blood sugar	20,63%	16.2%	0.000
	Heart problems	17,41%	12.9%	0.000
	Stroke or cerebral thrombosis	5,70%	3.1%	0.000
	Osteoarthritis or rheumatism	36,91%	25.8%	0.000
	Osteoporosis	16,88%	10.7%	0.000
	High cholesterol	55,05%	46.9%	0.000
	High Triglycerides	43,04%	36.9%	0.000

ABVD: Basic Activities of Daily Living; IADL: Instrumental Activities of Daily Living

\* The name of the item corresponds to how the pathology was investigated in the SABE Colombia 2015 survey

## DISCUSSION

Self-report of visual impairment was reported in half of the participants of the SABE Colombia 2015 survey, higher than the prevalence of 6% and 8.6% found in other population-based studies (6) (9). Likewise, one in three people with a report of visual impairment presented falls in the previous year, lower than the prevalence of 46.7% reported by the Behavioral Risk Factor Surveillance System in the United States in 2014, but higher than the 25% found in a study in Spain (Lleida Frailty Survey).(5) (10) (11)

**Table 3.** Perceived risks at the entrance of the home by people who self-reported stratified visual impairment according to whether or not they had falls during the previous year

Perceived risks at the entrance of the home	Falls in the last year		p
	Yes	No	
Presence of Ramps	86,98%	87.3	0.584
Lifts suitable for your mobility	98,54%	98.6%	0.872
Outdoor lighting	33,17%	31.6%	0.077
Lighting at the main entrance	31,06%	31%	0.934
Stairs without railings or handrails	85,68%	85.6%	0.913

Unevenness or discontinuous surfaces at the entrance of the house	42,19%	41.6%	0.572
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**Table 4.** Perceived risks inside the home by people who self-reported stratified visual impairment according to whether or not they had falls during the previous year

Perceived risks inside the home	Falls in the last year		p
	Yes	No	
When he crosses a room in his house he has to walk among the furniture	13,37%	11.6%	0.005
You have to walk between wires and ropes such as lamps, telephones, or extension cords	2,86%	2.6%	0.337
Has mats that slip on the floor	2,36%	2.4%	1.000
There are broken or uneven steps	11,25%	10.7%	0.434
Damaged lights are in the stairwell or corridor of your house	7,11%	5.9%	0.026
The staircase has handrails or railings	74,47%	75.1%	0.565
Cookware is stored in cabinets or furniture that are too high	5,69%	5.6%	0.801
The floor of the bathroom or shower is smooth	36,30%	33.8%	0.008
Needs some support when you get in or out of the shower	13,81%	7.6%	0.000
Needs some support when you are going to get off the toilet or toilet	11,82%	6.5%	0.000
Light closer to the bed is hard to reach	29,69%	27.6%	0.015
The hallway from her bed to the bathroom is dark	28,37%	26.3%	0.016

In our study, women and older women fell more frequently, although in the logistic regression analysis they were not identified as independent risk factors for falling. Previous studies in the United States, Spain, and Brazil (9, ) showed similar results. Among the factors related to age are changes in the musculoskeletal system, sensory, cognitive, proprioception alterations, the presence of more comorbidity and polypharmacy Regarding gender, it has not been completely elucidated or consistent why women are more at risk of falling, it is considered that the changes associated with menopause and its greater effect on bone and muscle health could explain it on the other hand, It has been seen that women tend to have less muscle-strengthening physical activity throughout life.(11) (12) (3,13) (14), (8)

**Table 5.** Fear of falling among those who reported stratified visual impairment based on whether or not they had falls during the previous year

Fear of falling				
Variable	Rank	Falls in the last year		p
		Yes n= 3964	No n= 8431	
Report of fear of falling				0.000
	A lot	71,85%	55.27%	0.000
	Regular	11,58%	14.20%	0.000
	Little	6,94%	10.73%	0.000
	None	9,64%	19.80%	0.000
Limitation of activities for fear of falling		n= 3312	n= 6740	
				0.000
	Yes	51.37%	41.5%	0.000
	No	48.63%	58.5%	0.000

**Table 6.** Logistic regression analysis of the author's association, reporting of visual impairment and falls

Variable	Rank	OR	IC 95%		p
Age (years)	70 a 79	0,90	0,78	1,03	0,117
	80 a 89	0,86	0,69	1,06	0,161
	≥ 90	0,81	0,42	1,53	0,513

Sex	Woman	1,06	0,92	1,21	0,434
Educational level (Reference: none)	Primary	0,71	0,60	0,85	0,000
	High school	0,77	0,62	0,96	0,023
	Upper	0,87	0,63	1,19	0,370
Location	Rural	0,60	0,51	0,72	0,000
Assurance (Reference: contributory)	None	1,04	0,65	1,67	0,863
	Subsidized	0,80	0,69	0,93	0,003
	Other	0,89	0,55	1,46	0,646
Monthly Income (SMMLV) Reference: less than 1 SMMLV	1 SMMLV	0,80	0,67	0,95	0,011
	1 a 2 SMMLV	0,86	0,69	1,08	0,187
	More than 2 SMMLV	0,75	0,55	1,04	0,084
Socioeconomic status (reference stratum 1)	Stratum 2	0,71	0,62	0,83	0,000
	Stratum 3	0,70	0,57	0,86	0,000
	Stratum 4, 5 and 6	1,06	0,74	1,50	0,760
Perceived risks at the entrance of the home	Unevenness or discontinuous surfaces at the entrance of the house	1,15	1,01	1,32	0,048
	Ramps	0,82	0,68	0,99	0,037
	Outdoor lighting	0,70	0,61	0,81	0,000
	Railings and handrails on stairs	0,86	0,74	0,99	0,040
Perceived risks inside the home	When he crosses a room in his house he has to walk among the furniture	1,22	1,00	1,48	0,05
ABVD	Total/severe dependence	1,50	0,56	4,03	0,422
	Moderate dependence	1,61	1,26	2,05	0,000
	Mild dependence	1,38	1,10	1,72	0,006
AIVD	Dependent	1,12	0,97	1,29	0,123
Health Conditions	Trombosis cerebral	1,58	1,18	2,12	0,002
	arthritis, osteoarthritis or rheumatism	1,29	1,12	1,49	0,000
	osteoporosis	1,26	1,06	1,51	0,010
	High cholesterol	1,30	1,09	1,54	0,003
Reference living space (confined to home)	Neighborhood	0,70	0,54	0,91	0,009
	City and Out of City	0,77	0,63	0,93	0,007
Fear of falling reference (none)	Little	0,92	0,72	1,19	0,535
	Regular	0,97	0,78	1,22	0,800
	A lot	1,40	1,17	1,66	0,000

SMMLV: Current legal minimum monthly wage; ABVD: Basic Activities of Daily Living; IADL: Instrumental Activities of Daily Living

In this study, coming from rural areas was associated with a 40% lower chance of falling. A study conducted in China found that employment in agricultural activities that require a high level of physical activity for long periods of time could explain this trend (15). (16)(15)

As for the economic determinants, living in strata 2 and 3, achieving primary and secondary schooling, and belonging to the subsidized health regime was related to less opportunity to fall. Other studies have shown results similar to ours MPAs with lower incomes are exposed throughout life to worse nutritional conditions, poor access to health services, less possibility of controlling chronic health conditions, and less education. A low level of education is associated with a higher risk of cognitive impairment, which is also related to a higher risk of falling. Studies are required to evaluate the association between the possibility of falling and these sociodemographic conditions that are so particular to each country and even to each region within the same national territory. (9) (17). (17)

In this study, more than half of those who reported some degree of visual impairment (54.64%) had 2 or more falls during the last year, with an average of 2.7 SD  $\pm$  6.1 falls. This figure is much higher than that found in the study by Ehrlich et al. where the prevalence of recurrent falls among those who reported visual impairment was 20%, although similar to that found in the general analysis of the SABE Colombia 2015 Survey. The falls occurred mainly in the house, followed by those that occurred in the street. The majority, 76.48%, did not report having been disabled as a result of a fall and 68% did not need health care for this reason. (9) (6)

According to what is established in the literature, the participants of this study perceived as risks, some environmental factors at the entrance and inside the homes: smooth and/or irregular or uneven floors, presence of carpets, cables or other types of obstacles on the floor, poorly arranged furniture, as well as the absence of handrails on the stairs, lack of adequate lighting in the different spaces of the house, or not having supports in the toilets or showers, among others. In the logistic regression analysis, having adequate lighting on the outside of the house, ramps and handrails on exterior stairs was associated with less opportunity to fall. On the contrary, the presence of unevenness at the entrance of the home was associated with a 15% higher risk of falls. The other architectural risks reported, although they did not show a significant association with drops in logistic regression, did show a tendency to behave as risk factors. These findings indicate the need for government entities to implement construction standards that guarantee minimum safety conditions in the homes of the PAMs, as well as establish the imperative need to generate educational strategies for the general community so that, in each home, as far as possible, basic structural changes are made that impact on these risk factors. (13)

Several studies have shown an association between functionality in basic and instrumental activities of daily living, including the 2015 study by Lavedán et al. in Lleida, Spain, which showed how disability in basic activities of daily living behaves as an independent factor for falling, not being the same if the disability is in instrumental activities. Orces in a study carried out in Ecuador, found that having limitation in activities of daily living was associated with a 103% greater chance of falling. Similarly, in this study, having mild or moderate dependence on ABVD was associated with 38% and 61% more chance of falling, with no association found between disability in IADL and falls. In this section, it could be inferred that those with severe or total dependence, possibly have less mobility, are more confined to bed and, in this way, fall less than those who are more active. (11) (18)

In this study, those who reported visual impairment and falls had more comorbidity than those who reported visual impairment but did not fall. This same trend had already been observed in the research of Ehrlich et al. and Hong et al. . Studies have shown that cardiovascular alterations such as cardiac arrhythmias or syncope, neurological alterations such as cerebrovascular events or sequelae of these, or pathologies of the musculoskeletal system such as arthritis or osteoarthritis, are risk factors for falls. In this study, self-reported health conditions that compromised the locomotor system were those that showed the greatest association with falls, in order of frequency, cerebral thrombosis, joint alterations and osteoporosis, 61.2%, 31.4% and 23% respectively, results in accordance with reports in the literature, such as Lamoureaux et al., who in 2010 found an association between a history of stroke and falls. Smith et al. in Brazil, found hypertension as an independent risk for falls that, although in this study did not have a statistically significant association, it was the most prevalent chronic condition. (9) (19) (13) (20) (12)

The prevalence of fear of falling among those who manifested visual impairment was 83.45%, being more frequent and severe among those who fell previously. This prevalence is much higher than that shown by previous research, ranging from 25% among those who do not have visual impairment, to 48% among those who do; although it agrees with the findings of a systematic review where the prevalence was between 3% and 85%, reflecting the differences in terms of the definition of fear of falling and the various tools for its measurement. Likewise, 51% of those who reported some degree of fear of falling and who had suffered a fall, expressed limitations in their activities of daily living due to this fear. In the logistic regression analysis, reporting a lot of fear of falling was associated with a 40% higher risk of falling than those who did not have a fear of falling, thus confirming the findings of the literature that give fear of falling the characteristic of an independent risk factor for falling. (9) (21)

The SABE Colombia 2015 Survey is the first nationwide study to evaluate the characteristics of PAM in several regions of the country. It has several limitations. First, this is a cross-sectional secondary data analysis study that used information from the 2015 SABE Colombia Survey, which does not allow us to infer causality. On the other hand, there was no objective measurement of visual impairment, falls, nor was there a review of the medical history to evaluate comorbidity, these data were obtained by author report, which can generate memory biases in the interviewees. Data such as the use of antihypertensive and psychotropic medications, use of external gait devices, as well as data on cognitive impairment or depression, which could be related to an increased risk of falls, were not included in the analysis.

## CONCLUSIONS

More than half of the older adults participating in the 2015 SABE Colombia Survey self-reported some degree of visual impairment, a much higher proportion than those reported in other studies.

Approximately one-third of those who reported visual impairment had at least one fall, and of those, more than half were recurrent fallers.

The falls occurred mostly at home and it was found that the presence of unevenness at the entrance of the house and having to walk among the furniture, behaved as risk factors associated with falling

living in a rural area and having adequate lighting at the entrance of the house behaved as protective factors for falling, while having mild or moderate dependence on ABVD and being dependent on IADL, having presented cerebral thrombosis, arthritis or osteoarthritis or osteoporosis behaved as risk factors for falling.

In this study, fear of falling showed a very high prevalence among those who reported visual impairment.

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