

# Functional disability indicators and associated factors in the elderly: a population-based study in Bagé, Rio Grande do Sul, Brazil

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## Abstract

**Objective:** to estimate the prevalence of functional disability in basic and instrumental daily activities and associated factors in elderly who live in the urban area of Bagé-RS, Brazil. **Methods:** this is a population-based cross-sectional study, conducted in 2008; functional disability was defined by basic and instrumental daily activities, using Katz index and Lawton and Brody scale; Poisson regression was used for crude and adjusted analyses. **Results:** 1,593 elderly individuals were investigated; the prevalence of disability for basic activities was of 10.6% (95%CI: 9.1;12.1) and of 34.2% (95%CI: 31.9;36.6) for instrumental activities; both disabilities were statistically associated to the increment of age, low education level, alcohol consumption, history of cerebrovascular diseases, cognitive impairment, hospitalization and home care. **Conclusion:** a high proportion of elderly presented functional disability; the outcomes were associated to the following variables: demographic, socioeconomic, behavioral, health status and use of health services.

**Keywords:** Aged; Disabled Persons; Activities of Daily Living; Cross-Sectional Studies.

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## Introduction

Longevity is one of the greatest achievements of the world population, although it happens differently in each nation and socioeconomic context.<sup>1</sup> In high-income countries, the increase in the proportion of older people in the population occurred gradually, following improvements in general living conditions. On the other hand, in low and middle-income countries, this increase has been occurring at an accelerated rate, posing a challenge for current social and health policies.<sup>2</sup>

The increase of noncommunicable diseases (NCDs) in a greater longevity scenario due to a better health status is one of the main implications entailed in the aging process, consequently changing the epidemiological profile. The growing number of elderly with functional disability is one of the consequences of such change, complicating their adaptation in a social environment and resulting in greater physical and mental vulnerability.<sup>3</sup>

*The loss of functional ability carries implications for the elderly, their families and the community. In addition to increasing the risk of death, it enhances the chances of hospitalization and expenditures.*

Functional disability is the difficulty of performing daily activities in any area of one's life due to a health problem.<sup>4</sup> Functional disability is associated with multidimensional factors and may be evaluated according to two domains: basic activities of daily living (ADLs), that is, tasks related to self-care, such as feeding and bathing; and instrumental activities of daily living (IADLs), which are related to an individual's independence in society, such as shopping and using means of transport.<sup>5</sup>

In Brazil, the prevalence of disability among the elderly may vary from 6.9 to 47%, depending on population, considered age group and the assessment tools used.<sup>6-9</sup> A study supported by the data from the National Household Sample Survey of 2003 shows that the main factors associated with disability in the elderly are female, older age, presence of chronic diseases, bad self-rated health, low income and low level of education.<sup>6</sup>

The loss of functional ability carries implications for the elderly, their families and the community. In addition to increasing the risk of death, it enhances

the chances of hospitalization and expenditures for the Brazilian National Health System. Therefore, assessing the functional disability in the elderly and its associated factors is essential to elect appropriate interventions in order to help improving quality of life and (re)organizing strategies focused on individuals and population.<sup>10</sup>

The aim of this study was to estimate the prevalence of the associated factors to functional disability in Basic ADLs and IADLs in elderly who live in the municipality of Bagé, Rio Grande do Sul state, Brazil.

## Methods

This is a population-based cross-sectional study, with data collected from July to November 2008 in the urban area covering primary health care services in Bagé-RS, in a sample of elderly people – individuals aged 60 or over. In 2008, Bagé had about 122,461 inhabitants, of which 14,792 (12%) were elderly, mostly residents in the urban area: 82%.

The sample size was calculated for a larger study to evaluate the occurrence of home care according to the primary health care model.<sup>16</sup> Considering 10% of losses and refusals and a 1.3 design effect, the study had 80% of efficiency to detect 1.5 relative risks and exposures affecting at least 4% of the population.

The data collection of the larger study respected the 20 Primary Health Care Units (PHU) that existed in the city at that time: 15 Family Health Strategy (FHS) units and 5 traditional PHUs. FHS covered 51% of the urban population, while the traditional model covered 49%. Hence, the study population corresponded to the total elderly urban population of the municipality.

For the sample location, PHUs were divided into micro areas with numerical identification for each block, and the starting point of the data collection and each one of the blocks was picked up randomly. To ensure that all households had the same probability of compounding the study sample, the selection system of one home from a group of five was used. All residents aged 60 or over living in the selected households were asked to participate. The surveys not done after three attempted visits in different days and times were considered losses, and the cases in which the elderly declined to participate were considered refusals.

Hence, elderly – 60 years old or over – who lived in private households in the urban area of Bagé-RS at the reference date of the survey were included in

the study. Individuals that were traveling, deprived of their liberty due to a court order or living in long-stay institutions at the time of the survey were excluded. The questionnaire was given to the primary caregiver when the older person was not physically or mentally able to answer it.

The dependent variable 'functional disability' was operationalized to characterize independently the domains of basic and instrumental activities of daily living. Katz index was used to characterize Basic ADLs (bathing, dressing, eating, toileting and making bed-wheelchair transfers),<sup>11</sup> whereas Lawton and Brody scale was used to characterize IADLs (using the phone, going to distant places, shopping, preparing meals, doing household chores, managing money, taking drugs, and handling small objects).<sup>12</sup> These two tools were selected due to their extensive use in previous surveys<sup>13,14</sup> on functional disability in the elderly, in addition to being validated and recognized by the Ministry of Health.<sup>15</sup>

Three response options were offered for each activity evaluated in each domain: do not receive assistance, receive partial assistance or receive total assistance. Functional disability was defined by the need for partial or total assistance for at least one basic activity and at least one instrumental activity of daily living.

The independent variables included were:

- Sex (female; male);
- Age (in years: 60 to 64; 65 to 69; 70 to 74; 75 or over);
- Living alone (yes; no);
- Self-reported ethnicity/skin color (white; black; brown, indigenous, and Asian);
- Marital status (married or with companion; widowed; single or separated);
- Schooling (in completed years: without formal education; 1-7; 8 or over);
- Economic classification, according to the Brazilian Association of Research Companies – BARC (A/B; C; D/E);
- Tobacco use (former smoker; smoker; never smoked);
- Alcohol consumption in the last 30 days (yes; no);
- Sedentary behavior – watching TV more than 3 hours a day (yes; no);
- Self-rated health (excellent/good, average, poor/very poor);
- Feeling about life (satisfied; dissatisfied);
- Is your health better, equal or worse than other people of your age?;
- History of falls in the last year (yes; no);

- History of fracture in the last year (yes; no);
- Medical diagnosis of systemic hypertension (yes; no);
- Diagnosis of diabetes mellitus (yes, no);
- Medical diagnosis of cerebrovascular accident (yes; no);
- Medical diagnosis of heart disease (yes; no);
- Medical diagnosis of rheumatism, arthritis or osteoarthritis (yes; no);
- Medical diagnosis of cancer (yes; no);
- Cognitive impairment (Mini-Mental State Examination: up to 22/23) (yes; no);
- Use of urgency/emergency services in the last 3 months (yes; no);
- Home care in the last 3 months (yes; no);
- Hospitalization in the last 12 months (yes; no).

Stata® software, version 12.1, performed the analyses. Independent analyzes were performed to characterize functional disability in Basic ADLs and IADLs, and there was not a variable that combined both domains. Descriptive statistics were used to calculate the prevalence and respective 95% confidence intervals (95%CI). In the crude analysis, chi-square tests were used for heterogeneity or linear trend. The adjusted analysis helped to evaluate the association of each field of disability with independent variables, controlling possible confounding factors. The exposure variables were organized according to the following hierarchical model: 1<sup>st</sup> level - Demographic and socioeconomic characteristics 2<sup>nd</sup> level - Behavioral characteristics 3<sup>rd</sup> level - Health status and morbidity 4<sup>th</sup> level - Use of health services

Backwards selection was applied by hierarchical levels. Poisson regression with robust adjustment of variance was used. The prevalence ratios and their 95%CI were calculated and measured, and the p-values of the Wald test for heterogeneity and linear trend were measured. Associations with a <0.05 p-value were considered statistically significant.

The research protocol was approved by the Ethics Research Committee of the Medical School of the Federal University of Pelotas: Report No. 15/08. Ethical principles were respected, as the participants signed the Free Informed Term of Consent and were guaranteed to have absolute anonymity.

## Results

The analyses included the 1,593 elderly surveyed; losses represented 4.0% (n=76) and refusals

represented 3.0% (n=44). The sample consisted predominantly of women (63.0%), individuals aged 70 or over (51.4%) and white persons (78.6%); 51.2% of the sample corresponded to elderly who were married or living with a partner, 33.8% were widowers and 17.5% lived alone. Most of the participants (54.6%) reported having 1-7 years of schooling, and 23.6% had no schooling; 38.4% belonged to class C and 34.0% to class D/E. Regarding behavioral variables, 39.6% of the elderly reported having stopped smoking, 15.3% were smokers, 16% had consumed alcohol in the last 30 days, and 59.3% admitted to watch TV more than 3 hours per day. As for the self-rated health, 34.1% of the elderly classified their health as average, 94.3% said they were satisfied with life, and 44.6% of the participants considered their health equal to other people's health in general.

With regard to diseases, 4.0% of the elderly reported having suffered some type of fracture, and 28.0% of them had a fall in the last year. More than half of the participants (55.3%) had medical diagnosis of systemic hypertension, 15.1% had diabetes mellitus and 27.2% had rheumatism, arthritis or osteoarthritis. Amongst the older people surveyed, 9.8% reported having suffered a cerebrovascular accident, 29.6% had a heart disease, 4.9% were diagnosed with cancer, and 34.1% had cognitive impairment. Finally, with respect to the use of

health services, 17.7% of the participants said to have been hospitalized in the last 12 months, 12.8% used an emergency medical service, 54.5% had a doctor's appointment, and 6.8% said they had received some form of home care in the three months preceding the interview.

The prevalence of disability in Basic ADLs was 10.6% (95%CI: 9.1; 12.1), and 34.2% in IADLs (95%CI: 31.9, 36.6). Table 1 describes the dependence in each basic and instrumental activity of daily living. Feeding (96.5%) was the most independent activity among the basic activities, followed by making bed-wheelchair transfers (94.8%). The need for partial assistance in bathing was reported by 3.9% of the elderly, and 3.7% of them needed partial assistance in making bed-wheelchair transfers. Regarding the need for total assistance, dressing (7.0%) and bathing (5.5%) were the greater dependences. As for the instrumental activities, the elderly reported having greater independence to handle small objects (86.7%) and take drugs (86.6%), while 11.6% reported needing partial assistance in cleaning the house and 9.7% in shopping. Using the telephone (11.0%) and shopping (10.3%) were the activities which required total assistance more frequently.

Tables 2 and 3 show the crude and adjusted analyses of functional disability in basic and instrumental activities, according to independent variables. The

**Table 1 – Descriptive analysis of functional dependence in every basic activity of daily living (ADL) and instrumental activity of daily living (IADL) among the elderly (n=1,593) in Bagé, Rio Grande do Sul, 2008**

Activities	Independent		Needs partial assistance		Needs total assistance	
	n	%	n	%	n	%
<b>ADL</b>						
Bathing	1,442	90.5	63	4.0	88	5.5
Dressing	1,451	91.0	31	2.0	111	7.0
Toileting	1,502	94.3	49	3.0	42	2.7
Transfers bed-wheelchair	1,511	94.8	59	3.8	23	1.4
Feeding	1,537	96.5	30	1.9	26	1.6
<b>IADL</b>						
Using the telephone	1,323	83.0	94	6.0	176	11.0
Moving to distant places	1,303	81.8	137	8.6	153	9.6
Shopping	1,275	80.0	154	9.7	164	10.3
Preparing meals	1,317	82.7	130	8.1	146	9.2
Housekeeping	1,253	78.6	185	11.6	155	9.8
Handling small objects	1,381	86.7	80	5.0	132	8.3
Taking medicine	1,377	86.8	113	7.1	95	6.1
Managing financial matters	1,346	84.5	125	7.9	122	7.6

factors that remained associated with functional disability in basic activities in the adjusted analysis were: elderly aged 75 or over (PR=3.55 – 95%CI: 2.23; 5.66), compared with the elderly aged 60 to 64; and elderly who were widowers (PR=1.52 – 95%CI: 1.12; 2.06) compared with those who were married or with a companion. The association with schooling

showed a linear trend, with a higher prevalence of disability for Basic ADLs among elderly with a low level of education. Older people who had not consumed alcohol in the last 30 days had a higher prevalence of disability for Basic ADLs (PR=3.06 – 95%CI: 1.37; 6.83). Elderly who were satisfied with life had lower prevalence of disability for Basic ADLs (PR=0.51 –

**Table 2 – Crude and adjusted analysis of the association between independent variables and disability for basic activities of daily living (ADL) among the elderly (n=1,593) in Bagé-RS, 2008**

Variable	%	Crude analysis ADL	Adjusted analysis ADL
		p-value <sup>a</sup> PR <sup>c</sup> (95% CI <sup>d</sup> )	p-value <sup>b</sup> PR <sup>c</sup> (95% CI <sup>d</sup> )
<b>1<sup>st</sup> level: Sociodemographic</b>			
<b>Age (in years)</b>		<0.001	<0.001
60-64	5.2	1	1
65-69	4.0	0.76 (0.39; 1.45)	0.71 (0.37; 1.37)
70-74	6.5	1.24 (0.69; 2.23)	1.16 (0.64; 2.11)
≥75	22.5	4.29 (2.74; 6.71)	3.55 (2.23; 5.66)
<b>Marital status</b>		<0.001	0.018
Married or with companion	8.0	1	1
Single/Separated	8.4	1.03 (0.64; 1.67)	1.52 (0.95; 2.44)
Widower	15.4	1.90 (1.40; 2.58)	1.52 (1.12; 2.06)
<b>Schooling (in years)</b>		<0.001	0.021
≥8	5.2	1	1
1-7	10.1	1.92 (1.77; 3.15)	1.71 (1.05; 2.77)
None	16.9	3.21 (1.94; 5.32)	2.04 (1.23; 3.38)
<b>2<sup>nd</sup> level: Behavioral</b>			
<b>Alcohol consumption</b>		<0.001	0.006
No	2.3	1	1
Yes	12.0	5.09 (2.27; 11.38)	3.06 (1.37; 6.83)
<b>3<sup>rd</sup> level: Health status and morbidity</b>			
<b>Cerebrovascular accident</b>		<0.001	<0.001
No	7.4	1	1
Yes	39.4	5.29 (4.06; 6.91)	2.72 (1.91; 3.87)
<b>Cognitive impairment</b>		<0.001	<0.001
No	2.6	1	1
Yes	18.0	6.91 (4.53; 10.5)	3.99 (2.50; 6.37)
<b>4<sup>th</sup> level: Use of health services</b>			
<b>Hospitalization in the last 12 months</b>		<0.001	0,001
No	8.1	1	1
Yes	21.9	2.69 (2.02; 3.58)	1.73 (1.26; 2.40)
<b>Home care in the last three months</b>		<0.001	<0.001
No	7.9	1	1
Yes	46.7	5.87 (4.50; 7.65)	2.50 (1.62; 3.86)

a) p-value calculated with Wald test for heterogeneity

b) p-value calculated with Wald test for linear trend

c) PR: prevalence ratio

d) 95% CI: 95% confidence interval

Note: Adjusted for 1st level – Sociodemographic characteristics –, 2nd level – Behavioral characteristics –, 3rd level – Health status and morbidity –, and 4th level – Use of health services. The variables sex; living alone; ethnicity/skin color; economic classification; tobacco use; sedentary behaviour; feeling about life; health conditions compared to other people; falls; fractures; systemic hypertension; diabetes mellitus; heart disease; rheumatism, arthritis or osteoarthritis; cancer; use of urgency/emergency services; and medical appointment were not described in the tables because they did not present statistically significant association with the outcome.

**Table 3 – Crude and adjusted analysis of the association between independent variables and disability for instrumental activities of daily living (IADL) among the elderly (n=1,593) in Bagé-RS, 2008**

Variable	%	Crude analysis	Adjusted analysis
		BADL	BADL
		p-value <sup>a</sup> PR <sup>c</sup> (95% CI <sup>d</sup> )	p-value <sup>b</sup> PR <sup>c</sup> (95% CI <sup>d</sup> )
<b>1<sup>st</sup> level: Sociodemographic</b>			
<b>Age (in years)</b>		<0.001	<0.001
60-64	20.7	1	1
65-69	23.7	1.14 (0.87; 1.48)	1.09 (0.84; 1.42)
70-74	30.1	1.45 (1.12; 1.87)	1.39 (1.08; 1.79)
≥75	55.6	2.68 (2.18; 3.29)	2.41 (1.94; 2.98)
<b>Ethnicity/skin color</b>		0.006	0.003
White	31.9	1	1
Black	42.4	1.32 (1.07; 1.63)	1.12 (0.91; 1.38)
Brown/Indigenous/Asian	42.7	1.33 (1.11; 1.60)	1.32 (1.12; 1.56)
<b>Schooling (in years)</b>		<0.001	<0.001
≥8	20.7	1	1
1-7	33.1	1.59 (1.27; 2.00)	1.45 (1.16; 1.81)
None	49.1	2.36 (1.87; 2.98)	1.75 (1.39; 2.20)
<b>2<sup>nd</sup> level: Behavioral</b>			
<b>Tobacco use</b>		0.029	0.018
No, never smoked	34.2	1	1
Yes, smokes	27.1	0.79 (0.63; 0.99)	1.10 (0.88; 1.38)
Smoked in the past, but stopped	37.0	1.08 (0.93; 1.25)	1.22 (1.06; 1.40)
<b>Alcohol consumption</b>		<0.001	0.022
No	21.3	1	1
Yes	36.7	1.71 (1.34; 2.20)	1.33 (1.04; 1.70)
<b>3<sup>rd</sup> level: Health status and morbidity</b>			
<b>Self-assessment on health</b>		<0.001	0.250
Excellent/Good	24.3	1	1
Average	42.5	1.74 (1.50; 2.03)	1.50 (1.29; 1.75)
Poor/Very poor	51.3	2.11 (1.70; 2.62)	1.45 (1.13; 1.86)
<b>Morbidity</b>			
<b>Diabetes</b>		<0.001	0.001
No	32.3	1	1
Yes	44.5	1.37 (1.17; 1.61)	1.33 (1.12; 1.58)
<b>Cerebrovascular accident</b>		<0.001	<0.001
No	30.9	1	1
Yes	64.1	2.06 (1.79; 2.38)	1.42 (1.19; 1.69)
<b>Cognitive impairment</b>		<0.001	<0.001
No	22.7	1	1
Yes	49.0	2.15 (1.86; 2.49)	1.41 (1.20; 1.66)
<b>4<sup>th</sup> level: Use of health services</b>			
<b>Hospitalization in the last 12 months</b>		<0.001	0,001
No	30.4	1	1
Yes	51.7	1.69 (1.47; 1.95)	1.30 (1.11; 1.51)
<b>Home care in the last three months</b>		<0.001	<0.001
No	30.6	1	1
Yes	83.4	2.72 (2.43; 3.05)	1.61 (1.34; 1.94)

a) p-value calculated with Wald test for heterogeneity

b) p-value calculated by Wald test for linear trend

c) PR: prevalence ratio

d) 95% CI: 95% confidence interval

Note: Adjusted for 1st level – Sociodemographic characteristics –, 2nd level – Behavioral characteristics –, 3rd level – Health status and morbidity –, and 4th level – Use of health services. The variables sex; living alone; ethnicity/skin color; economic classification; tobacco use; sedentary behaviour; feeling about life; health conditions compared to other people; falls; fractures; systemic hypertension; diabetes mellitus; heart disease; rheumatism, arthritis or osteoarthritis; cancer; use of urgency/emergency services; and medical appointment were not described in the tables because they did not present statistically significant association with the outcome.

95%CI: 0.33; 0.78). The prevalence of disability in basic activities was higher among individuals diagnosed with cerebrovascular accident (PR=2.72 – 95%CI: 1.91; 3.87), and with positive screening for cognitive impairment (PR = 3.99 – 95%CI: 2.50; 6.37). Hospitalization in the last 12 months (RP=1.73 – 95%CI: 1.26; 2.40) and home care in the last 3 months (RP=2.50 – 95%CI: 1.62; 3.86) were associated with higher incidence of disability for Basic ADLs (Table 2).

A similar behavior was observed in disability for IADLs – saving the variables 'marital status', 'feeling about life' and 'health status' – when comparing those who had a statistically significant association with disability for IADLs to those who had not. On the other hand, some variables were associated with disability for IADLs and not with Basic ADLs. Brown/indigenous/Asian elderly had a higher prevalence of disability for IADLs (RP=1.32 95%CI: 1.12; 1.56) than those who identified themselves as white. Former smokers had a higher prevalence of IADLs (PR=1.22 – 95%CI: 1.06; 1.40) than current smokers, and elderly with diabetes had a higher incidence of IADLs (PR=1.33 – 95%CI: 1.12; 1.58). Living alone was statistically associated with a lower incidence of Basic ADLs and IADLs (Table 3).

## Discussion

The survey results reinforce the multidimensional condition of functional disability, which is associated with demographic, socioeconomic, and behavioral characteristics, health status and use of health services by the elderly. Most of the elderly surveyed were considered independent to perform basic and instrumental activities of daily living. However, a significant proportion had difficulty or inability to perform some activities, especially instrumental ones.

We believe that the presence of greater limitations on the execution of instrumental activities occur due to the impact of low levels of motor, sensory and cognitive impairment on such functions. On the other hand, performing basic activities require less integrity of such systems, which is why failure to perform them is usually linked to major limitations.<sup>14</sup>

Similarly to this study, a research that investigated the elderly in Pelotas municipality between 2007 and 2008 found higher prevalences of functional disability in 'bathing', 'dressing', and 'shopping'.<sup>17</sup> Evidence suggests that the difficulties in carrying out basic or

instrumental activities result from the physiological aging process, which affects cognitive (attention deficit, reasoning and memory), motor (decreased physical strength, mobility and balance limitations), and sensitive functions (impaired vision, touch, proprioception, hearing, taste, and smell).<sup>14</sup>

In this context, possible strategies to minimize the dependence of the elderly and extend their functionality become more relevant, by reducing architectural barriers, improving the lighting and arrangement of furniture in the house, and using adaptive equipment such as orthoses (canes, crutches, walker, wheelchair, hearing aid and glasses).<sup>14</sup>

According to this study, elderly aged 75 or over were more prone to functional disability in basic and instrumental activities, as found in national<sup>18,6</sup> and international surveys.<sup>19,20</sup> The functional decline affects 6% of biological functions in the elderly aged between 60 and 64, reaching about 50% of the physiological capacity after age 75.<sup>20</sup>

With regard to ethnicity/skin color, brown/indigenous/Asian elderly showed 32% more functional disability in instrumental activities compared to white elderly. With reference to schooling, the shorter the time of schooling, the greater the association with functional disability, both in basic and instrumental activities, coinciding with findings of studies conducted in the country.<sup>7,8</sup> Such associations may be related to the socioeconomic status of those elderly, given that, in Brazil, ethnicity/skin color and schooling are directly related to socioeconomic status and, consequently, to living, housing, and work conditions, food safety, leisure, and lifestyle.<sup>7,8</sup>

Elderly widowers have a higher prevalence of functional disability in basic activities, according to the results of a population-based study, in the Southeast region of Brazil, on the negative impact of the loss of a partner on the daily lives of older people.<sup>21</sup> Furthermore, the authors presented evidence of loosen emotional ties and support network, and the resulting damage to one's health, with negative consequences for their functional ability.<sup>21</sup>

As observed in other studies,<sup>21,9</sup> living alone was associated with lower prevalence of functional disability in basic and instrumental activities. This condition shows greater independence and autonomy of the elderly in the performance of daily activities, probably because they still have physical and cognitive conditions for doing such activities.<sup>22</sup> This outcome may present reverse causation, as the elderly who live alone may

be precisely those who have less difficulty with Basic ADLs and IADLs.

Concerning behavioral characteristics, elderly former smokers have 22% more chances of having functional disability in instrumental activities than those who have never smoked. One hypothesis for this association is that smoking cessation is usually motivated by the worsening of one's health status, which can lead to a functional decline.<sup>23</sup> The elderly who did not consume alcohol presented more disability in basic and instrumental functions. Alcohol, a depressant drug of the central nervous system, affects different brain functions, such as cognition, psychomotor coordination, visuospatial ability and perceptual motor skills, and can change one's health status and reduce functional ability.<sup>24</sup> Although this is a cross-sectional study, such association may be biased by reverse causation, as disabilities might influence the decline in alcohol consumption.

Studies report that a poor self-rated health is associated with a greater risk of morbidity and mortality, while a good health status predicts a healthy aging.<sup>3,7,21</sup> Pessimistic self-rated health usually stem from morbidity and limitations on the performance of daily activities. In this study, however, that was not associated with increased functional disability, that is, feeling satisfied with life was associated with a lower incidence of disability in basic activities.

Among the investigated diseases, the findings showed that having diabetes mellitus increases by 33% the risk of disability in instrumental activities. Having a history of cerebrovascular accident and/or a cognitive impairment was also significantly associated with functional disability in both domains.

Diabetes can trigger various complications, such as vascular disorders, vision loss, renal failure, and cerebrovascular accident, leading to cognitive decline, amputations, physical disability, falls and fractures and threatening the individual's independence.<sup>25</sup> Cerebrovascular accident, in turn, is one of the most limiting diseases: in a short period of time, its consequences can drastically reduce the independence of older people.<sup>3</sup> Cognitive impairment implies disturbance in the orientation in space and time, and difficulty with attention and memory, limiting social and intellectual activities of the elderly and restricting their functionality.<sup>26</sup>

Similarly to diabetes and cerebrovascular accidents, hypertension is a disease that compromises the

circulatory system and has high mortality rates.<sup>27</sup> Although systemic hypertension is quite prevalent (55.3%) among the elderly surveyed, no association between this disease and functional disability in any of the investigated domains was found. Similarly to what occurs in Brazil, investments in public policies related to the treatment of hypertensive patients, which ensure conditions for early diagnosis, give easy access to drug treatment, and encourage healthier lifestyles, reduce the negative consequences of the disease for the health and retard the loss of functionality.<sup>27</sup>

Just as previous findings,<sup>28</sup> the results of this research indicate that elderly hospitalized at least once in the last year presented a probability about 70% higher of having disability in basic activities, and 30% higher in instrumental activities. Likewise, having received home care in the last three months was strongly associated with functional disability in both domains investigated. The literature indicates hospitalization causes losses in vital capabilities and the use of home care is associated with limited mobility to the health service.<sup>28</sup>

The use of health services is an important sign of one's poor health status. In this context, research shows that, in Brazil, the prevalence of annual hospitalization in public hospitals increases according to the age of older people, as it happens with 8.3% of the 60-69 age group, 10% of the 70-79 age group, and 11.9% of 80 years or over age group. This finding suggests that aging is accompanied by a decline in the health and functional ability of the elderly, causing a higher demand for health services.<sup>29</sup>

The results of this study allowed us to know the proportion of elderly individuals with impaired functional ability in basic and instrumental activities and associated factors. Amidst the investigated variables, we emphasize the importance of investing in health promotion actions which are related to behavioral characteristics, of health status and use of health services. These are subject to change and affect directly the functional ability of the elderly. The data presented can also be used by research initiatives on functional ability, in daily clinical practice of health professionals, and they allow to estimate the demand for support needed and the response in providing home care. This type of care may include targeted and timely interventions through actions that promote a healthy aging, independence, autonomy, quality of life and



reduction in mortality among the elderly. Furthermore, these measures will be noticeable in the reduction of the costs of health services.

Finally, carrying out impact studies to better understand the disability process in the elderly is necessary, for they will allow the development of strategies to reduce damages even more effectively.

### Authors' contributions

Nunes JD contributed to the conception and design of the study, analysis and interpretation of results, drafting and critical proofreading of the content of

the manuscript. Saes MO and Nunes BP contributed to the analysis and interpretation of data, drafting, and critical proofreading of the content of the manuscript. Siqueira FCV, Soares DC and Fassa MEG contributed to the study design, data interpretation and critical proofreading of the content of the manuscript. Thumé E and Facchini LA contributed to the conception and design of the study, as well as the drafting and critical proofreading of the content of the manuscript. All authors have approved the final version of the manuscript and declared to be responsible for all aspects of this study, ensuring its accuracy and integrity.

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