

# Income inequality and functional capacity of the elderly in a city in Southeastern Brazil

## *Desigualdades de renda e capacidade funcional de idosos em município do Sudeste brasileiro*

Marylane Viana Veloso<sup>I</sup> , Neuciani Ferreira da Silva Sousa<sup>II</sup> ,  
Lhais de Paula Barbosa Medina<sup>III</sup> , Marilisa Berti de Azevedo Barros<sup>III</sup> 

**ABSTRACT:** *Objective:* Estimate the magnitude of the income inequality in the prevalence of functional dependency for basic and instrumental activities of daily life (BADLs, IADLs) and the abandonment of advanced activities (AADLs). *Methods:* This was a cross-sectional, population-based study, developed using sample data of 986 elderly people from a health survey carried out in the municipality of Campinas, São Paulo, in 2014/15. The prevalence of functional dependency in BADLs and IADLs and of abandonment of the AADLs was estimated according to monthly family income *per capita*. A multiple regression Poisson analysis was developed to estimate the prevalence ratio (PR) adjusted by gender and age. *Results:* There was no significant association between income and functional dependency for BADLs. Of the seven IADLs analyzed, five presented a higher prevalence of dependency in the lower-income stratum, with special highlight to using the phone (PR = 3.50), controlling medication usage (PR = 2.44), and use of transportation (PR = 2.35). The abandonment of AADLs was higher among low-income elderly people in all activities analyzed, with the greatest inequalities observed in making contact by letter, phone and e-mail (PR = 3.76), using the Internet (PR = 3.34), driving vehicles (PR = 2.85) and visiting family (PR = 2.77). *Conclusions:* The broad inequality detected among income stratum regarding the functional capability for the IADLs and abandonment of the AADLs emphasize the importance of fully implementing and maintaining the policies and programs directed toward the social protection of elderly adults. The focus should be on the most socially vulnerable segments, with the aim of achieving a population that is more equal, active, independent, and involved in participatory ageing.

**Keywords:** the Elderly. Health surveys. Health status disparities. Activities of daily living.

<sup>I</sup>Department of Health of the State of Piauí – Teresina (PI), Brazil.

<sup>II</sup>Institute of Collective Health, Universidade Federal de Mato Grosso – Cuiabá (MT), Brazil.

<sup>III</sup>Department of Collective Health, School of Medical Sciences, Universidade Estadual de Campinas – Campinas (SP), Brazil.

**Corresponding author:** Marylane Viana Veloso. Rua Luiz Pires de Lima, 3.770, CEP: 64047-020, São João, Teresina (PI), Brazil. E-mail: marylanewiana@gmail.com

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**RESUMO:** *Objetivo:* Estimar a magnitude das desigualdades de renda nas prevalências de dependência funcional em atividades básicas e instrumentais da vida diária (ABVDs e AIVDs, respectivamente) e no abandono de atividades avançadas (AAVDs). *Métodos:* Estudo transversal, de base populacional, desenvolvido com dados de amostra de 986 idosos de inquérito de saúde realizado no município de Campinas, São Paulo, em 2014/15. Foram estimadas as prevalências de dependência funcional em ABVDs e AIVDs e de abandono das AAVDs segundo a renda familiar mensal *per capita*, bem como desenvolvidas análises de regressão múltipla de Poisson para estimar razões de prevalência (RPs) ajustadas por sexo e idade. *Resultados:* Não houve associação significativa entre renda e dependência funcional em ABVDs. Das sete AIVDs analisadas, cinco apresentaram maior prevalência de dependência no estrato de menor renda, com destaque para o uso de telefone (RP = 3,50), o controle do uso de remédios (RP = 2,40) e o uso de transporte (RP = 2,35). O abandono de AAVDs foi maior entre os idosos de menor renda em todas as atividades analisadas, com maiores desigualdades observadas no contato por carta, telefone e *e-mail* (RP = 3,76), no uso de internet (RP = 3,34), em dirigir veículos (RP = 2,85) e na visita a familiares (RP = 2,77). *Conclusão:* As amplas desigualdades detectadas entre estratos de renda quanto à capacidade funcional nas AIVDs e no abandono das AAVDs ressaltam a importância da plena implementação e manutenção de políticas e programas voltados à proteção social de idosos, focando, em especial, os segmentos socialmente mais vulneráveis, na perspectiva de se atingir um patamar populacional mais equânime de um envelhecimento ativo, participativo e independente.

**Palavras-chave:** Idoso. Inquéritos de saúde. Disparidades nos níveis de saúde. Atividades cotidianas.

## INTRODUCTION

Relevant scientific, technological and social advancements of the 20th century<sup>1</sup> have contributed to the rapid aging of the population, especially in the least developed regions of the world<sup>1</sup>. Demographic projections indicate that, in 2050, two billion (21%) individuals around the world population will reach 60 years old or older, and among them, 425 million will be 80 years old<sup>2</sup>. In Brazil, it is estimated that, in 2050, almost a third of the population will be elderly (29.3%) and 6.7% will be 80 years old or older<sup>3</sup>.

Given this scenario, it is essential to achieve better health and quality of life for the elderly, in order to preserve their autonomy as much as possible. This goal represents a serious challenge for health services, governments and social organizations<sup>4</sup>. Preserving and stimulating functional capacity to perform daily activities is essential for active aging, as advocated by the World Health Organization (WHO) and national policies<sup>4,5</sup>.

Functional capacity is an important indicator of health in aging, as it reveals how independent the elderly population is in order to be able to carry out activities of different degrees of complexity, usually classified as basic (BADLs), instrumental (IADLs) and advanced activities of daily living (AADLs)<sup>6</sup>. The inability to perform them, which is associated with the presence of chronic diseases<sup>7</sup>, old age<sup>8</sup> and cognitive declines<sup>9</sup>, indicates dependence on care by third parties<sup>10</sup> and the risk of frequent hospitalizations<sup>8</sup>.

Research has shown significant associations between functional capacity and different indicators of socioeconomic status,<sup>10-12</sup> analyzing BADLs<sup>13-15</sup> or IADLs<sup>7,16</sup>. Family income *per*

*capita* (FIPC), as an indicator of socioeconomic level, is justified by its importance in social reproduction in Brazil. Given the absence or insufficiency of social support, such as quality education, adequate provision of health services, transportation, leisure and decent housing conditions, income assumes a primary role as an indicator of spending and purchasing power of goods and services that are considered to be important for having a satisfactory life<sup>17</sup>.

In countries like Brazil, where profound socioeconomic inequalities prevail, it is essential to know and monitor the role of income in preserving active and healthy aging. It is also important to assess the magnitude of possible disparities considering daily activities of different degrees of complexity, as well as the specific activities most affected by income differences. This analysis is based on the principle that dependence on each activity generates different impacts on the life of the elderly and on the demand for care. Several authors have analyzed specific activities<sup>8,12,13,18</sup>, but there is a lack of Brazilian studies on social inequalities and dependency on these activities.

As such, this study aimed to estimate the magnitude of income inequalities in the prevalence of functional dependence in BADL and IADL, as well as in the abandonment of AADL, among elderly people living in a municipality in southeastern Brazil.

## METHODS

This is a cross-sectional, population-based study, developed with data from the Health Survey in the Municipality of Campinas (ISACamp), conducted in 2014 and 2015. The survey population consisted of individuals aged 10 years or over, living in private households in the urban area of the municipality. The sampling process was stratified by clusters in two stages. In the first stage, 70 census tracts were drawn and in the second stage, households were selected.

The sample size was defined to guarantee estimates of a 0.50 proportion, with a 95% confidence interval (95%CI), and an error of 4 to 5 percentage points, considering the design effect of 2. Of the three age groups (adolescents, adults and the elderly) that comprised the sample domains of the survey, only the elderly were analyzed in this study. A sample size of one thousand elderly people was defined, with 2,853 households being randomly selected to interview. A non-response rate of 20% was considered based on previous surveys. These households were drawn in the 70 census sectors previously sampled, generating a representative sample of the elderly population in the municipality. In each household, all residents of the age group for which the address had been drawn were interviewed. The option of not randomly selecting individuals in each household is due to the fact that this type of design is similar in terms of accuracy and has a lower cost in relation to the drawing of one person per household<sup>19</sup>.

The ISACamp 2014/2015 questionnaire was structured into 13 thematic blocks and applied by trained and supervised interviewers, using tablets given directly to the selected individual. In the case of elderly people with difficulties in answering the questionnaire, the information was provided by a family member or caregiver.

Regarding the study variables, functional dependence referred to the need for partial or total help in performing BADLs and IADLs. The BADLs included: bathing; getting dressed; using the toilet; lying down/getting up, and eating<sup>20</sup>. The IADLs analyzed were: using the phone; using transportation; shopping; preparing their own meal; performing household chores; controlling their use of medications, and taking care of their finances<sup>21</sup>. The prevalence of dependence on IADLs was estimated in relation to those who used to do the activity.

The study also analyzed the abandonment of AADLs, that is, the report of having stopped doing them. The AADLs considered were: performing voluntary work; writing people letters, sending *e-mails* or calling people on the telephone; receiving and visiting friends and family; participating in cultural or social activities; using the internet; taking short or long trips, and driving a car<sup>22,23</sup>. The prevalences of those who abandoned the AADLs were estimated in relation to those who, previously, had done the activity.

The main independent variable analyzed was monthly family income in minimum wages *per capita* (which in 2014 corresponded to R\$ 724), obtained by adding the income of the family members, divided by the number of residents of the household. For this income, three categories were developed: less than 1 minimum wage, between 1 and 2 minimum wages, more than 2 minimum wages.

The other independent variables used to characterize the study population were:

- Sex: male and female;
- Age group in years: 60 to 69, 70 to 79 and 80 and older;
- Education in years of schooling: 0 to 3; 4 to 8; 9 years or more;
- Race/color: white, not white (dark-skinned black, light-skinned black, indigenous, yellow);
- Having household equipment: filter, television, refrigerator, freezer, washing machine, microwave, VCR/DVD player, dishwasher, air conditioning, vacuum cleaner, landline and cell phone, camera/digital camera, computer, laptop/tablet, motorcycle, bicycle and car;
- Paid work: yes/no;
- Having private health insurance: yes/no;
- Chronic diseases: hypertension, diabetes, angina, myocardial infarction, arrhythmia, cancer, osteoporosis, arthrosis/rheumatism, rheumatism, asthma or asthmatic bronchitis, emphysema/chronic lung disease, work-related musculoskeletal disease/repetitive strain injury, varicose veins in the legs, stroke, diseases in the spine;
- Self-rated health: good/very good and regular/bad/very bad.

The prevalence and prevalence ratios (PRs) of dependence on each BADL and each IADL were estimated, as well as abandonment of each AADL, according to income strata. The prevalence of dependency in at least one BADL and in at least one IADL was also estimated, as well as having abandoned at least one AALD. To determine the associations, Pearson's  $\chi^2$  test was used, with a Rao-Scott adjustment, considering those with  $p < 0.05$  to be statistically significant. And to estimate the PRs adjusted for sex and age, Poisson multiple regression was used.

Because it is a complex sample, the data were analyzed using the command *svy* from the statistical software Stata, version 14.0 (Stata Corp., College Station, United States), which allows for the consideration of the sample weights, post-stratification weights and design by clusters.

ISACamp was approved by the Research Ethics Committee of the School of Medical Sciences of the Universidade Estadual de Campinas under opinion n° 3,734,746, of November 29, 2019 (*Plataforma Brasil*, Presentation Certificate for Ethical Appreciation - *Certificado de Apresentação para Apreciação Ética* - CAAE no. 24785519.0. 0000.5404).

## RESULTS

In the 2,853 households chosen to interview the elderly, there was 6.8% refusals and other losses. Among the 1,168 elderly people located in the selected households, there were 15.5% losses, subdivided into 14% refusals and 1.5% for other reasons. The final sample consisted of 986 elderly people and 57 (5.7%) of them completed the questionnaire with the help of a family member or caregiver. The study population consisted of 57.7% women and 56.8% individuals aged 60 to 69 years.

Significant sociodemographic inequalities differentiated the elderly from the three income strata analyzed. While 51% of the elderly in the FIPC segment below a minimum wage had less than four years of schooling, this percentage declined to 11.3% in the upper income stratum. In this stratum, 49.2% of the elderly had nine or more years of study, while only 10.2% of the lower income segment reached this level of education. In the upper income stratum, 80% of the elderly were white, 76.1% had 11 or more pieces of equipment at home, 61.5% had access to a computer and 75.7% had a private health plan, lowering these percentages, respectively, to 62.8, 32.4, 40, and 23% in the lower income stratum (Table 1).

The percentage of elderly people with self-rated health as fair to very poor increased with decreasing income, reaching 43.8% of the elderly in the poorest segment. The prevalence of dependence on some IADL and abandonment of some AADL also increased significantly with declining income (Table 1).

Regarding functional dependence for BADL (Table 2), there were no significant differences for the performance of any of the activities in the comparisons between the income categories. In relation to functional dependence in IADLs, the prevalence of dependent elderly people was higher among those belonging to the lower income segment, compared to those with higher income, in five activities. The greatest inequalities detected were in: using the telephone (PR = 3.50), using transportation (PR = 2.35) and controlling their use of medications (PR = 2.40). A gradient was observed with an increase in the percentages of dependence accompanying the reduction in income.

In Table 3, it is observed that the prevalence of abandonment of all analyzed AADLs was significantly higher in the elderly with lower income. The biggest differences

Table 1. Distribution of the elderly according to the family income categories per capita (in minimum wages) and sociodemographic and health variables. Campinas, São Paulo, Brazil, 2014–15.

Variables	%	Family income per capita*			p-value
		> 2 n = 332	1 to 2 n = 366	< 1 n = 280	
<b>Sex</b>					
Male	42.3	43.4	45.0	37.3	0.0785
Female	57.7	56.6	55.0	62.7	
<b>Age group (years)</b>					
60–69	56.8	63.7	54.2	51.3	0.0621
70–79	27.8	21.7	30.9	31.7	
80 e +	15.4	14.6	14.9	17.0	
<b>Schooling (years)</b>					
9 +	26.3	49.2	15.7	10.2	< 0.0001
4 to 8	41.7	39.5	46.2	38.8	
0 to 3	32.0	11.3	38.1	51.0	
<b>Race/color</b>					
White	71.2	80.0	68.9	62.8	0.0016
Non-white	28.8	20.0	31.1	37.2	
<b>No. of household appliances</b>					
1 to 10	52.5	23.9	69.3	67.6	< 0.0001
11 and +	47.5	76.1	30.7	32.4	
Has access to computer	44.7	61.5	31.5	40.0	< 0.0001
Does paid work	22.1	24.9	20.8	20.2	0.4124
Has a private health plan	46.9	75.7	36.5	23.0	< 0.0001
<b>No. of diseases</b>					
None	12.1	11.9	13.3	10.7	0.7202
1 to 2	33.9	35.8	33.7	31.5	
3 and more	54.0	52.3	53.0	57.8	
Self-rated health: fair/poor/very poor	34.2	26.4	34.8	43.8	0.0008
Dependence for at least 1 BADL	8.4	5.9	9.0	10.8	0.0894
Dependence for at least 1 IADL	42.9	34.7	44.8	51.6	0.0067
Abandonment for at least 1 AADL	58.7	52.1	57.2	69.3	0.0009

\*In minimum wages; BADL: basic activities of daily living; IADL: instrumental activities of daily living; AAVD: advanced activities of daily living.

found between the extreme strata of income were in making contact through letters, email or over the telephone (PR = 3.76), using the internet (PR = 3.34), driving vehicles (PR = 2.85) and visiting family and friends (PR = 2.77). There was an increase in the percentage of those who abandoned the AADLs following the reduction in income from the strata.

## DISCUSSION

Important demographic, socioeconomic and access to private health care inequalities were observed among the income strata of the elderly population studied. This research revealed the existence of significant income inequalities in the prevalence of dependence

Table 2. Prevalence (in %) and prevalence ratio (PR) of functional dependence for basic and instrumental activities of daily living according to the family income categories *per capita* (in minimum wages) of the elderly. Campinas, São Paulo, Brazil, 2014–15.

Activities	Family income <i>per capita</i> *			RP * (95%CI)**	
	> 2 (1)	1 a 2 (2)	< 1 (3)	(2/1)	(3/1)
Basic activities					
Bathing	5.1	6.5	8.3	1.16 (0.66 – 2.06)	1.38 (0.73 – 2.58)
Getting dressed	4.8	8.1	6.9	1.49 (0.79 – 2.80)	1.20 (0.64 – 2.22)
Using the bathroom	3.0	4.0	4.8	1.20 (0.55 – 2.64)	1.35 (0.66 – 2.79)
Lying down and getting up	3.5	4.4	5.9	1.18 (0.53 – 2.64)	1.44 (0.61 – 3.37)
Feeding oneself	2.5	3.5	4.7	1.33 (0.57 – 3.09)	1.68 (0.63 – 4.46)
Dependency for 1 or more	5.9	9.0	10.8	1.38 (0.80 – 2.38)	1.57 (0.91 – 2.70)
Instrumental activities					
Using the phone	4.7	10.3	18.4	2.13 (1.21 – 3.75)	3.50 (1.80 – 6.81)
Using transportation	9.7	20.7	26.5	1.98 (1.21 – 3.22)	2.35 (1.50 – 3.67)
Going shopping	20.0	26.0	36.6	1.22 (0.88 – 1.70)	1.59 (1.21 – 2.07)
Preparing meals	6.1	7.0	10.2	1.04 (0.61 – 1.76)	1.41 (0.87 – 2.29)
Doing household chores	23.5	26.4	24.3	1.08 (0.80 – 1.48)	0.90 (0.68 – 1.20)
Taking medications	6.6	11.7	18.2	1.64 (1.01 – 2.66)	2.40 (1.39–4.15)
Taking care of finances	18.2	25.9	31.5	1.37 (1.05 – 1.79)	1.56 (1.15 – 2.10)
Dependency for 1 or more	34.7	44.8	51.6	1.25 (0.96 – 1.62)	1.34 (1.11 – 1.63)

\*In minimum wages; \*\*adjusted for age and sex; 95%CI: 95% confidence interval.

for five IADLs and in the prevalence of abandonment for all studied AADLs. It became evident that the level of inequality differs between activities and that disparities tend to be more present and of greater magnitude in AADLs compared to IADLs. In this study, no statistically significant differences were detected between the prevalence of dependence on BADLs according to income level.

The prevalence of dependence in at least one of the five basic activities analyzed in this study was 8.4% in the elderly aged 60 years old or older. This prevalence is higher than that observed in a study carried out in Singapore (6.6%)<sup>24</sup> and similar to that found in research carried out in Ireland (8%)<sup>25</sup>. But a study carried out in New York, with individuals aged 65 and over, found that 28% of them had lacked an ability in at least one BADL<sup>23</sup>. In Brazil, data from the National Health Survey (*Pesquisa Nacional de Saúde - PNS*) indicated the presence of these disabilities in 16% of the elderly population aged 60 years old or older<sup>13</sup>. Even higher prevalence rates were observed in other Brazilian studies: 36.1% in the research by Farias-Antúnez et al.<sup>16</sup> and 26.8% in the study by Del Duca et al.<sup>26</sup>. Some studies include the presence of urinary or fecal incontinence among the studied BADLs, regardless of whether the condition caused functional dependence or not<sup>8,16,26</sup>. Other studies have included the prevalence of elderly people who have some difficulty in carrying out the activity, even if they do not need the help of others<sup>13,14</sup>. These two conditions tend to raise the prevalence values. In the present study, urinary/fecal incontinence was not included and only elderly people who needed some help, whether partial or complete help, were considered dependent for BADLs. Thus, the differences in prevalence between studies depend on the list of investigated

Table 3. Prevalence (in %) and prevalence ratio of the elderly who stopped doing advanced activities according to the categories of family income *per capita* (in minimum wages). Campinas/SP, Brazil, 2014–2015.

Variables	Family income <i>per capita</i> *			PR* (95%CI)**	
	> 2 (1)	1 a 2 (2)	< 1 (3)	(2/1)	(3/1)
Volunteering	33.4	44.1	48.6	1.29 (0.93 – 1.78)	1.47 (1.04 – 2.07)
Contacting people by letter, <i>email</i> or phone	4.0	9.7	16.4	2.29 (1.13 – 4.60)	3.76 (1.78 – 7.92)
Visiting family or friends	4.4	9.7	12.7	2.13 (0.95 – 4.78)	2.77 (1.24 – 6.17)
Participating in social activities	32.9	40.7	54.9	1.21 (0.93 – 1.59)	1.63 (1.20 – 2.23)
Using the internet	8.3	9.7	28.5	1.16 (0.36 – 3.68)	3.34 (1.43 – 7.79)
Traveling	21.0	26.5	38.0	1.21 (0.89 – 1.63)	1.67 (1.22 – 2.29)
Driving vehicles	19.7	35.1	57.9	1.82 (1.26 – 2.63)	2.85 (1.92 – 4.25)
Stopped doing 1 or more	52.1	57.2	69.3	1.07 (0.95 – 1.21)	1.28 (1.11 – 1.49)

\*In minimum wages; \*\*adjusted for age and sex; 95%CI: 95% confidence interval.



activities, the age group analyzed and differences in other methodological aspects, in addition to differences in the health conditions of the target populations.

In this study, no association was found between dependence for BADLs and family income. A similar result was observed in a study carried out in the Netherlands, using different levels of education<sup>8</sup>, and in a study carried out in Pelotas, which found no inequality in the prevalence of BADL dependency between income or schooling levels<sup>26</sup>. However, many studies have detected socioeconomic inequalities in the prevalence of dependence for BADLs<sup>13,16</sup>. Differences in the instruments used for the evaluation of BADLs, with regard to the statistical power of the studies and the socioeconomic indicators employed, may account, in part, for the detection or not of socioeconomic inequalities. Because the prevalence for BADL dependence is low, the detection of significant differences requires larger sample sizes. The survival bias cannot be ruled out either, considering that individuals of lower socioeconomic levels tend to have higher premature mortality.

Regarding IADLs, this study found that 42.9% of the elderly were dependent for at least one of the activities analyzed. This prevalence is similar to that found in Lafaiete Coutinho, Bahia (41%)<sup>27</sup>, and in research with elderly people in rural areas of Pelotas (45.4%)<sup>28</sup>, but it is lower than that found in Spain in people aged 65 or over (53.5%)<sup>25</sup>. Nevertheless, this prevalence is higher than that found in other studies<sup>16,29</sup>.

In this study, inequalities were detected between income strata regarding dependence for five IADLs. The inequalities varied, with the stratum of the worst income having a prevalence of dependence between 1.56 and 3.5 times higher than that of the highest income, depending on the IADL considered. Similar to the present study, some studies also detected social inequalities in the prevalence of being dependent for at least one IADL, however, this was found when using educational level<sup>15,30</sup> as an indicator of social inequality. But other studies have found no association between socioeconomic status indicators and disability for IADL<sup>26,31</sup>.

Some studies have analyzed the prevalence of dependence for specific tasks of IADLs. In a study carried out in Goiânia, disability varied from 12.4% for taking medications to 30.5% for using the telephone<sup>30</sup>. Research carried out in Pelotas demonstrated that 11.8% of the elderly were incapable of handling money and 17.6% were incapable of using transport<sup>26</sup>.

However, no studies have been found that have assessed socioeconomic inequality in the prevalence of dependence for specific IADLs. The results of this research revealed that no significant inequalities were found between income strata, only for domestic tasks and the preparation of meals. The greatest inequalities were detected in activities that reduce social participation or that have more direct health implications. For example, inequalities when using the telephone imply limitations to social connection and additionally with regard to health care, in the event of a need to call for help in an emergency situation. Dependence for the use of public transport can reduce mobility and increase demand for family members or caregivers. The inability to control medication usage and, especially, the need for more complex medical home care, become important problems for public health due to the costs and risks they represent.

The marked inequalities detected in dependence for IADLs and the fact that they differ according to the activity considered, point to the need for further studies to assess and

monitor social disparities in specific IADLs, so that they can be considered in policies and programs to promote elderly health.

During the aging process, people gradually lose functional capacity, generating cognitive, functional and sensory impairments. To start, the AADLs become compromised and, then the IADLs and BADLs, making a portion of the elderly dependent on continuous assistance<sup>32</sup>. In a systematic review developed with 31 articles, most studies agree that the inability to perform AADLs implies increased risks of worsening cognitive status, depression and mortality<sup>33</sup>. The inability to perform advanced activities is associated with demographic, behavioral and health conditions<sup>34</sup>.

It was found that the inability to perform seven of the analyzed AAVDs had significantly higher prevalences in the lower income stratum. Abandoning contact with friends and family by letter, e-mail or telephone was 2.8 and 3.8 times, respectively, more prevalent in the poorest strata. Abandoning internet usage was 3.3 times higher in the elderly from the poorest strata, a result that differs from that observed in a study carried out in Florianópolis, Santa Catarina, in which no difference was detected in the abandoning of internet use between schooling levels or income<sup>35</sup>. Research carried out in four Brazilian locations evaluated the abandonment of thirteen AADLs and identified that the highest percentages were in paid work, long trips and participation in social events<sup>36</sup>. However, abandonment was not assessed according to socioeconomic level. A study that analyzed the frequency and diversity of contact (with family and friends) in the elderly in the city of São Paulo found that, in men, the poorest quartile had higher chances of low frequency (OR = 2.54; 95%CI % 1.36 - 4.73) and a low diversity of contacts (OR = 4.97; 95%CI 2.54 - 9.69) compared to the richest (3<sup>rd</sup> and 4<sup>th</sup> income quartiles), but in women, this association was not observed<sup>37</sup>.

The significant income inequalities detected, both in the functional dependence of the elderly for IADLs and in the abandonment of AADLs, underscore the importance of guaranteeing that Brazilian elderly people, especially to the most vulnerable social segments, have access to existing social protection programs and benefits. It also stresses the need to maintain these programs<sup>38</sup>. The Organic Law on Social Assistance<sup>39</sup>, in turn, guarantees the minimum income necessary for the survival of the elderly and their families, an aid that provides better living conditions. Furthermore, it can repair part of the social losses experienced in earlier stages of life. These factors are relevant to prevent and reduce disability and functional dependence<sup>40</sup>.

In addition, health promotion, disease prevention and quality care coverage policies are essential to reduce the effect of socioeconomic inequality on the functional capacity of the rapidly aging population<sup>40</sup>. However, studies point to setbacks in the coverage and universalization of health services, in addition to the lack of coordination and financing of specific actions that should be available to the elderly<sup>41,42</sup>. The implementation of actions and policies to protect the health of the elderly is especially important in periods of increased income concentration<sup>43,44</sup> and economic and political crises that tend to increase social and health inequalities<sup>42</sup>.

One of the limitations of this study, due to its cross-sectional design, is the impossibility of establishing cause and effect relationships. Thus, it was not possible to exclude the occurrence of reduced income caused by the appearance of functional disabilities<sup>13</sup>. But this effect

would be more present in the lack of ability regarding BADLs in which, in this study, there were no differences according to the income category. Comparisons with results from other studies are hampered by the use of different indicators and analysis strategies. It is also necessary to consider the sample losses that occurred. The percentage of losses was lower than expected in the sample planning (20%), and a bias that could result from differential loss would have been, to a large extent, controlled by the post-stratification used in the analyzes of this study. The sample size also limited the statistical power of the study in identifying PRs  $< 1.7$  as statistically significant when the prevalence of disabilities was less than 20%.

The study showed that the income level of the elderly is associated with ethnic, educational, living conditions and functional dependence for IADLs and abandonment of AADLs. It also made it possible to assess social inequality in a more comprehensive profile of functional capacity by analyzing three levels of activities (BADL, IADL and AADL), which has not been done by many studies<sup>8,26,37</sup>. Furthermore, it allowed for the measurement of socioeconomic inequalities in specific activities of daily living, which has not yet been done. Considering the contemporary increase in income concentration indices<sup>41</sup>, socioeconomic inequalities, and poverty, the already observed harmful effects of economic austerity policies,<sup>45</sup> and the losses produced by social pension reform modalities<sup>46</sup>, there is a need to monitor the magnitude of social inequalities in health and the functional capacity of the elderly.

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