







## Factors associated with the social, individual and programmatic vulnerability of older adults living at home

Fatores associados à vulnerabilidade social, individual e programática de idosos que vivem no domicílio

Factores asociados con la vulnerabilidad social, individual y programática de personas mayores que viven en domicilio

### How to cite this article:

Bolina AF, Rodrigues RAP, Tavares DMS, Haas VJ. Factors associated with the social, individual and programmatic vulnerability of older adults living at home. Rev Esc Enferm USP. 2019;53:e03429. DOI: <http://dx.doi.org/10.1590/S1980-220X2017050103429>

-  Alisson Fernandes Bolina<sup>1</sup>  
 Rosalina Aparecida Partezani Rodrigues<sup>2</sup>  
 Darlene Mara dos Santos Tavares<sup>3</sup>  
 Vanderlei José Haas<sup>3</sup>

<sup>1</sup> Universidade de Brasília, Brasília, DF, Brazil.

<sup>2</sup> Universidade de São Paulo, Escola de Enfermagem de Ribeirão Preto, Ribeirão Preto, SP, Brazil.

<sup>3</sup> Universidade Federal do Triângulo Mineiro, Uberaba, MG, Brazil.

### ABSTRACT

**Objective:** To verify the occurrence and factors associated to social, individual and programmatic vulnerability among older adults. **Method:** A household and cross-sectional survey conducted with 701 community-dwelling older adults. For evaluation of the individual component, we used the frailty phenotype; for the social component, the social vulnerability index was implemented; and for the programmatic component, the Index of access and use of health services. Descriptive and bivariate statistical analyzes and multinomial logistic regression were also carried out ( $p \leq 0.05$ ). **Results:** It was verified that 15.7% of the older adults lived in areas of high social vulnerability, 31.8% were physically frail and had a moderate programmatic vulnerability score. Older people of a lower age, having lower education and income levels were more likely to live in areas of high or very high social vulnerability. The female gender and the high age groups increased the chances of the frailty condition. It was also observed that the older adults in the 70-80-year age group and having lower education were more likely to have medium programmatic vulnerability. **Conclusion:** The importance of primary care professionals to consider the multidimensional aspect of vulnerability in identifying older adults who need to be prioritized in health care is evidenced.

### DESCRIPTORS

Aged; Social Vulnerability; Health Vulnerability; Geriatric Nursing; Primary Care Nursing.

### Corresponding author:

Alisson Fernandes Bolina  
Universidade de Brasília, Faculdade Ciências da Saúde  
Asa Norte  
CEP 70910900 – Brasília, DF, Brazil  
[alissombolina@yahoo.com.br](mailto:alissombolina@yahoo.com.br)

Received: 01/09/2018  
Approved: 09/13/2018

## INTRODUCTION

The term vulnerability is used in public health to designate the susceptibilities of people or communities to health problems and damage<sup>(1)</sup>. Specifically in gerontological literature, there is evidence of the relationship between vulnerability and age group, emphasizing that the outcome tends to increase with age<sup>(2)</sup>.

Due to the importance of the multidimensional aspect in the gerontology field, the concept of vulnerability is formed in three interdependent dimensions, namely the individual, the social and the programmatic<sup>(1)</sup>, and provides the foundation for the present study. In this model, individual vulnerability is characterized by biological, behavioral and affective aspects that increase susceptibility to adverse health outcomes. The social component is related to the interference of the socioeconomic and cultural contexts. However, the programmatic component refers to the way in which the policies, the programs and the health services influence the problem in question.

Under such definitions, it is known that biological decline caused by the aging process associated with unfavorable social conditions and life habits may predispose older adults to biological, socioeconomic and psychosocial vulnerability. In turn, the occurrence of vulnerability can cause adverse health outcomes in older adults<sup>(3)</sup> and consequently impact their quality of life.

Despite the multidimensional conception of vulnerability in older adults, studies have focused on associating physical frailty with adverse health conditions<sup>(4-5)</sup>. The conception of vulnerability in this study integrates the social and contextual aspects to which older adults are exposed to in the course of aging, together with their physical frailty<sup>(6)</sup>.

It is worth considering that the most accepted definition of physical frailty is possibly related in terms of biophysiological vulnerability to the development of health problems<sup>(7)</sup>, which is a concept adopted in the present study to evaluate the individual component. Taking into account that the study of vulnerability and the social and programmatic components are part of the adopted concept<sup>(1)</sup>, the first was considered in this study as adverse environmental and social conditions that spatially determine health risk situations<sup>(8)</sup>, while the second as the access and use of health resources by older adults<sup>(1)</sup>.

It is believed that the concept of vulnerability in light of the theoretical approach adopted in this study<sup>(1)</sup> would provide support for understanding the health phenomenon from a broader perspective, and not only hold the individual and their aging process responsible for their health status<sup>(8)</sup>. However, the scientific literature on publications on this subject is still scarce. In a review of the literature in the PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Latin American and Caribbean Literature in Health Sciences (LILACS) databases, there were no population-based studies until the present which had evaluated the three components of vulnerability in older adults and the associated factors.

Therefore, by broadening the understanding of vulnerability in older adults, health professionals can apply this knowledge in clinical practice, proposing interventions in the individual, social and programmatic care of this population. It is hoped that the results of this study may subsidize municipal managers in designing health actions to ensure social justice.

The objective of this study was to verify the occurrence of social, individual and programmatic vulnerability of older adults and the socioeconomic factors associated to each of these components.

## METHOD

This is a population-based, quantitative, observational and cross-sectional study conducted in the city of Uberaba, located in the state of Minas Gerais, Brazil.

The population was composed of older adults living in the urban area of the municipality. The multi-stage conglomerate sampling technique was used for defining the sample. First, the sample size was calculated using the prevalence of functional disability in the Instrumental Activities of Daily Living of 28.8%, which was based on other studies developed with older adults in the community, with an accuracy of 1.5% and 95% confidence interval for a finite population estimated at 36,703 older adults. Thus, a minimum sample size of 673 older adults was reached. Given the possibility of 20% sample loss, the maximum number of attempts was 808 older adults.

In the first stage, the participants were selected by an arbitrary draw using systematic sampling of half the quantity of the census tracts of the municipality. There are 409 urban census tracts in Uberaba, of which 204 were chosen. In order to obtain the Sampling Interval (SI), the total number of sectors was divided by those drawn, resulting in a SI = 2. Therefore, the first sector and the following sectors were randomly selected according to the SI. It should be noted that the sector listing followed an increasing numerical order for the purposes of the draw.

In the second stage, we defined the number of older adults interviewed based on the sample calculation (808) divided by the number of census tracts drawn (204), so that a similar number was obtained for each census sector. Thus, the number of households/older adults was approximately four older adults per census tract.

Data were collected at only one moment at the older adults' residences, from January to April 2014. The inclusion criteria for this study were: 60 years of age or older, did not present cognitive decline and reside in the urban area of the municipality of Uberaba.

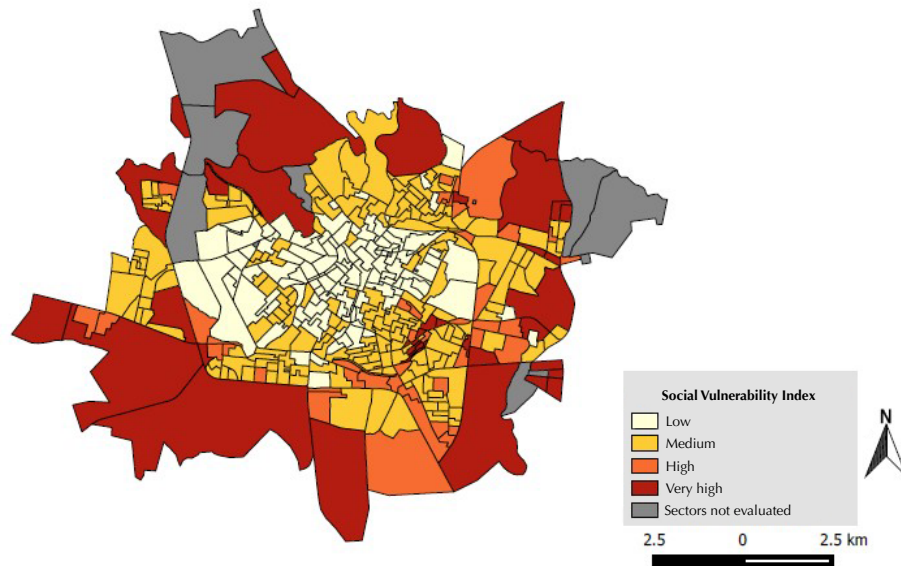
The loss of sample was due to: census tracts without older adults (n = 32 older adults), sectors without houses (n = 36 older adults) and sectors that did not reach the number of older adults (n = 19 older adults). Older adults who did not complete the frailty phenotype tests (n = 24 older adults) and those who did not identify the geographical coordinates (n = 4) were excluded. Thus, 701 eligible older adults participated in the study.

Before starting the interview, the cognitive evaluation of the older adults was conducted via application of the Mini-Mental State Examination (MMSE), translated and validated in Brazil<sup>(9)</sup>. The scale generates scores that vary from 0 to 30 points, and the education level of the interviewee is contemplated for the cut-off point of cognitive decline, namely: 13 points for illiterate subjects, 18 points or less for those with schooling from 1 to 11 years, and 26 points for schooling over 11 years. It should be pointed out that the older adults with an indication of cognitive decline did not participate in the final study sample, so other households were sequentially visited until the number of older adults in the respective census section met the required sample size.

For characterizing the socioeconomic variables, we used the instrument elaborated by the Collective Health Research Group/Universidade Federal do Triângulo Mineiro. The variables considered were: gender (male and female); age group, years of age (60–70, 70–80 and 80 and over); marital status (with and without companion);

education, years of schooling (no schooling, 1–4, 4–9, 9 and more); home arrangement (alone and accompanied); and monthly individual income in minimum wages (<1, 1, 1–3, 4 or more).

A Social Vulnerability Index was constructed for the municipality of the present study to evaluate the social component of the vulnerability, using the methodological and operational aspects of the Health Vulnerability Index (HVI) prepared by the Municipal Health Department of the city of Belo Horizonte-MG. The HVI conceptualizes eight indicators divided into two dimensions (sanitation and sociodemographics), selected from their discriminatory power of spatial inequalities<sup>(10)</sup>. The Index classifies the census tracts according to levels of social vulnerability, and is divided into four levels (medium risk, low risk, high risk and very high risk), as shown in Figure 1 below. The older adults were evaluated according to the vulnerability level of the sector in which they reside, and the variable recategorized in low, medium and high/very high social vulnerability.



**Figure 1** – Spatial distribution of the census tracts of the municipality of Uberaba-MG, according to the HVI.

Individual vulnerability was assessed by five criteria of the frailty phenotype, namely: unintentional weight loss, decreased muscle strength, slow walking speed, low physical activity level and self-reported exhaustion and/or fatigue<sup>(6)</sup>, as described in a previous study<sup>(11)</sup>. Based on this evaluation, older adults who presented three or more of these criteria were considered frail, one or two as pre-frail and all negative tests as not frail<sup>(6)</sup>.

The programmatic component was analyzed through indicators of access and use of health services, entitled Programmatic Vulnerability Index. Thirty-two (32) variables which contemplate these aspects were used to evaluate access and utilization of health services, based on two sections of

the questionnaire of the National Household Sample Survey (PNAD – *Pesquisa Nacional por Amostra de Domicílios*)<sup>(12)</sup>. The Programmatic Vulnerability Index was then constructed from these variables.

Individual response weights were initially assigned to each response category, which together made up the overall score. This was submitted to the adhesion test to normal distribution, but the test indicated no adhesion even using logarithmic transformations. We chose to use the principal component analysis technique<sup>(13)</sup> to extract the best set of questions which could retain the most compact representation from the linear combination between them in order of estimation, taking care to not leave aside relevant

information. The first 10 major components retained approximately 78% of the variance (eigenvalues > 1.0). It should be noted that the variable with the highest load was selected for each component, which was then included in calculating the programmatic vulnerability score. Therefore, the index representative of programmatic vulnerability resulted in multiplying the loads by the value of the selected variables.

The programmatic vulnerability score was obtained in this analysis, and the lowest values represented greater vulnerability in this component. The generated score was subsequently classified into three categories, using the cut-off points corresponding to the distribution tertiles (low, medium and high) vulnerability in this component.

The data collected were inserted into spreadsheets in the Excel® program by two people using double entry to identify potential inconsistencies from the data entry. When these were evidenced, the original interview was checked and the fields corrected if necessary. The database was subsequently transferred to SPSS 22.0 for the purposes of its analysis.

Descriptive analysis was performed by means of absolute and percentage frequencies for the categorical variables, and by mean and standard deviation for numerical variables. We used the preliminary bivariate analysis (chi-square test) with the criterion for inclusion in the multiple regression model of  $p < 0.1$  to verify the factors associated with vulnerability components (dependent variable). It should be noted that vulnerability components were categorized as: individual (frail, pre-frail and not frail), social (low, medium and high/very high) and programmatic (low, medium and high). The independent variables were: gender (male and female); age group, years of age (60–70, 70–80, and 80 and over); marital status (with and without companion); education, years of schooling (no schooling, 1–4, 4–9, 9 or more); home arrangement (alone and accompanied); and monthly individual income in minimum wages (<1, 1, 1–3, 4 or more). Thus, the independent variables that met the criterion adopted in the preliminary bivariate analysis were inserted into the multinomial logistic regression model, adopting a significance level of 5% ( $p \leq 0.05$ ). The reference category in these analyzes was the stratum of the best vulnerability condition for each of the components (not frail/low social vulnerability/low programmatic vulnerability).

The larger project on which this research is based is entitled “Dependence for activities of daily living, frailty and use of health services among the older adults in the Triângulo Mineiro”, was approved by the Research Ethics Committee of UFTM, under the opinion no. 493.211, and is in accordance with that recommended by Ordinance No. 466/2012 of the National Health Council, which regulates the guidelines and norms of research with human beings in its various aspects. The research presented herein was submitted and approved by the Ethics Committee of the Ribeirão Preto School of Nursing, Universidade de São Paulo, under the opinion no. 342/2016. It is noteworthy that the interviews only occurred after consent was given by the study participant regarding the research objectives and the signing of the Informed Consent Form.

## RESULTS

Of the 701 elderly, the majority were female ( $n = 468$ , 66.8%), in the age group of 60–70 years old ( $n = 302$ , 43.1%), without companion ( $n = 406$ ; 57.9%), living with companion ( $n = 552$ , 78.7%), with 4–9 years of schooling ( $n = 303$ , 43.2%) and with one minimum wage of income ( $n = 317$ , 45.2%).

The occurrence of high/very high social vulnerability was 15.7%, and that of frailty reached 16.0%. It was also identified that the average programmatic vulnerability score of the older adult corresponded to 1.90 ( $\pm 0.61$ ), which represents moderate access and use of the health service, taking into account the distribution tertiles of the scores (between 1.76 and 2.09) (Table 1).

**Table 1** – Distribution of the older adults according to social, individual and programmatic vulnerability – Uberaba, MG, 2014.

Components of vulnerability	Total	
	n / mean	% ( $\pm$ sd)
<b>Social vulnerability</b>		
Low	214	30.5%
Medium	377	53.8%
High/very high	110	15.7%
<b>Individual vulnerability</b>		
Not frail	223	31.8%
Pre-frail	366	52.2%
Frail	112	16.0%
<b>Programmatic vulnerability</b>	1.90	$\pm 0.61$

In the bivariate analysis of the social component of vulnerability, the variables included in the multiple regression model considering the adopted criterion ( $p < 0.1$ ) were: age group ( $p = 0.030$ ), education level ( $p < 0.001$ ) and individual income ( $p < 0.001$ ). Regarding physical frailty, the following variables were: gender ( $p = 0.001$ ), age group ( $p < 0.001$ ), marital status ( $p = 0.004$ ), education level ( $p < 0.001$ ) and individual income ( $p = 0.005$ ); while the programmatic components were: age group ( $p = 0.012$ ), marital status ( $p = 0.046$ ), education ( $p < 0.001$ ) and monthly income ( $p = 0.035$ ).

Table 2 presents the multinomial logistic regression model for the factors associated with social vulnerability. They were consolidated as associated factors that increase the chances of residing in high/very high vulnerability in this component in relation to the respective reference variable: age groups of 60–70 years (OR = 2.58, CI = 2.58, 1.27–5.26) and 70–80 years (OR = 2.06, CI = 1.04–4.10); no education (OR = 12.93; CI = 3.80–44.8) and 1–4 years of studying (OR = 7.12; CI = 2.20–23.10); and monthly income < 1 minimum wage (OR = 19.66, CI = 2.26–170.67), 1 salary (OR = 13.95, CI = 1.76–110.40) and 1–3 salaries (OR = 10.22, CI = 1.29–80.60). For the condition of medium social vulnerability, the associated factors were: age groups of 60–70 years (OR = 2.14; CI = 1.33–3.43); no education (OR = 4.65, CI = 2.25–9.57), 1–4 years of schooling (OR = 2.94, CI = 1.56–5.54) and 4–9 years or more (OR = 1.77, CI = 1.02–3.07); and monthly income of 1 salary (OR = 1.92, CI = 1.03–3.56).

Regarding the factors associated with the individual component, those that were associated with the greatest odds for the frailty condition in relation to the respective reference variable were: female gender (OR = 2.03, CI = 1.15-3.60) and age groups of 70-80 years (OR = 2.10, CI = 1.17-3.79) and 80 years or older (OR = 5.88, CI = 3.05-11.33) (Table 3).

Regarding programmatic vulnerability, 70-80 year olds presented higher odds for the medium vulnerability condition in this aspect (OR = 1.62; CI = 1.05-2.49). It is worth noting that having 9 or more years of schooling was a protection variable for the condition of moderate programmatic vulnerability in comparison to not having any education (OR = 0.38, CI = 0.17-0.84) (Table 4).

**Table 2** – Multinomial logistic regression model for the socioeconomic and demographic variables associated with the social vulnerability of the older adults – Uberaba, MG, 2014.

	Social Vulnerability					
	OR	Mean CI 95%	p*	OR	High/very high CI 95%	p*
<b>Age group</b>						
60-70 years	2.14	1.33-3.43	<b>0.002</b>	2.58	1.27-5.26	<b>0.009</b>
70-80 years	1.27	0.79-2.03	0.322	2.06	1.04-4.10	<b>0.039</b>
80 years or older		1			1	
<b>Education</b>						
No education	4.65	2.25-9.57	<b>&lt;0.001</b>	12.93	3.80-44.8	<b>&lt;0.001</b>
1-4 year(s)	2.94	1.56-5.54	<b>0.001</b>	7.12	2.20-23.10	<b>0.001</b>
4-9 years	1.77	1.02-3.07	<b>0.042</b>	2.24	0.71-6.99	0.166
9 or more years		1			1	
<b>Income*</b>						
< 1 salary	2.11	0.95-4.67	0.065	19.66	2.26-170.67	<b>0.007</b>
1 salary	1.92	1.03-3.56	<b>0.039</b>	13.95	1.76-110.40	<b>0.013</b>
1-3 salaries	1.35	0.74-2.46	0.323	10.22	1.29-80.60	<b>0.027</b>
4 or more salaries		1			1	

Reference category: low social vulnerability; OR: odds ratio; CI: Confidence interval; \* $p < 0.05$ .

**Table 3** – Multinomial logistic regression model for socioeconomic and demographic variables associated with individual vulnerability of older adults – Uberaba, MG, 2014.

	Individual vulnerability					
	Pre-frail			Frail		
	OR	CI 95%	p*	OR	CI 95%	p*
<b>Gender</b>						
Male		1			1	
Female	1.30	0.88-1.19	0.187	2.03	1.15-3.60	<b>0.015</b>
<b>Age group</b>						
60-70 years		1			1	
70-80 years	1.38	0.94-2.02	0.098	2.104	1.17-3.79	<b>0.013</b>
80 years or older	1.65	0.99-2.75	0.054	5.88	3.05-11.33	<b>&lt;0.001</b>
<b>Relationship status</b>						
With companion		1			1	
No companion	0.78	0.54-1.13	0.190	0.915	0.534-1.570	0.748
<b>Education</b>						
No education		1			1	
1-4 year(s)	0.96	0.55-1.68	0.887	0.83	0.41-1.70	0.408
4-9 years	0.67	0.41-1.11	0.118	0.57	0.30-1.11	0.980
9 or more years	0.94	0.47-1.88	0.857	0.65	0.23-1.80	0.619

continues...

...continuation

	Individual vulnerability					
	Pre-frail			Frail		
	OR	CI 95%	p*	OR	CI 95%	p*
<b>Income*</b>						
< 1 salary		1			1	
1 salary	0.806	0.44-1.46	0.477	2.24	0.82-6.17	2.24
1-3 salaries	0.737	0.40-1.37	0.335	1.04	0.35-3.05	1.04
4 or more salaries	0.383	0.17-0.86	0.477	0.96	0.25-3.61	0.96

Reference category: Not frail; OR: odds ratio; CI: Confidence interval; \*p&lt;0.05.

**Table 4** – Multinomial logistic regression model for the socioeconomic and demographic variables associated with the programmatic vulnerability of older adults – Uberaba, MG, 2014.

	Programmatic vulnerability					
	Mean			High		
	OR	CI 95%	p*	OR	CI 95%	p*
<b>Age group</b>						
60-70 years		1			1	
70-80 years	1.62	1.05-2.49	<b>0.028</b>	1.05	0.96-1.60	0.802
80 years or older	1.64	0.95-2.83	0.074	1.62	0.97-2.70	0.063
<b>Relationship status</b>						
With companion		1			1	
No companion	0.69	0.47-1.03	0.074	0.83	0.57-1.21	0.28
<b>Education</b>						
No education		1			1	
1-4 year(s)	1.17	0.66-2.10	0.592	1.08	0.60-1.94	0.796
4-9 years	0.83	0.49-1.40	0.481	0.94	0.56-1.59	0.21
9 or more years	0.38	0.17-0.84	<b>0.017</b>	0.49	0.24-1.01	0.052
<b>Income*</b>						
< 1 salary		1			1	
1 salary	0.89	0.46-1.74	0.742	0.90	0.47-1.70	0.741
1-3 salaries	0.32	0.27-1.05	0.070	0.64	0.34-1.23	0.183
4 or more salaries	0.68	0.24-1.71	0.417	0.95	0.41-2.20	0.896

Reference category: low programmatic vulnerability; OR: odds ratio; CI: Confidence interval; \*p&lt;0.05.

## DISCUSSION

This study evaluated the occurrence of vulnerability in a representative sample of older adults living in the household and associated socioeconomic factors. With regards to the social component, it was found that 53.8% and 15.7% of the older adults lived in areas of medium and high/very high vulnerability, respectively. The analysis of this data is also evident in Canada, however with lower percentages in the study of a representative cohort of 5,703 older adults living in the community, in which 41.3% and 12.5% presented moderate and high social vulnerability, respectively<sup>(14)</sup>. Nevertheless, national data are in line with the present study and demonstrate that social inequality in the country is still very expressive<sup>(15)</sup>.

The social vulnerability of older adults results from several circumstances that are exposed in daily life<sup>(16)</sup>, and

related to sociodemographic characteristics (among other factors). In the present study, the age groups, 60-70 years ( $p = 0.009$ ) and 70-80 years ( $p = 0.039$ ), were associated with higher chances of living in areas of high/very high social vulnerability. In contrast, an international study which employed the Social Vulnerability Index found that older age remained associated with increased social vulnerability<sup>(14)</sup>. It is believed that this discrepancy stems from the use of different definitions, since the researchers evaluated the social construct school the accumulation of sociodemographic and economic deficit.

Also with regard to the factors associated with high/very high social vulnerability, this condition was identified with the lowest level of education (no education and only 1-4 years of schooling) and low income (< 1 minimum wage, 1 salary and 1-3 salaries). A similar result was shown in a

survey of older adults in Canada<sup>(14)</sup>. Due to the low education level associated with minimum income, older adults make up a population stratum vulnerable to poverty<sup>(16-17)</sup>.

Therefore, social vulnerability is an aggravating factor in old age, since the precarious social security payments paid to older adults are insufficient to meet their demands, and often families also need their financial resources to supplement the family's income. In addition, most Brazilian older adults only have a few years of education because of the difficulty to access school<sup>(16-17)</sup>, which may be an obstacle in searching for information about healthcare.

All of these records about the social vulnerability of older adults bring with them some implications that point to the need to provide basic social services to this group in order to increase social skills and minimize vulnerability<sup>(17)</sup> in the course of the aging process.

It is important to emphasize that the aging process may lead to greater predisposition to develop physical frailty<sup>(11)</sup>. There was an expressive percentage of physical frailty in the present study, with 16.0% of older adults being frail, and more than half (52.2%) were pre-frail. In a systematic review protocol with 19 studies evaluating Frailty syndrome with different measurement instruments<sup>(18)</sup>, the authors identified that the prevalence of frailty ranged from 6.7% to 44%, considering the study method, concepts and even cultural and regional disparity in the frailty process.

The frailty process is understood as the reduction of reserves and resistance to stressors due to cumulative declines in several systems, which cause greater susceptibility to adverse outcomes<sup>(19)</sup>. Some scholars consider aging itself a condition of vulnerability<sup>(11)</sup>.

It is important to consider that even though there is a relationship with age, physical frailty is considered a specific syndrome<sup>(19)</sup>. These statements are in line with the results obtained in the present study, since the higher age groups (70-79 years and 80 years or older) increased the chances of presenting frailty condition. Similarly, surveys with community older adults in Brazil and in the world using the frailty phenotype<sup>(11)</sup> also found this association<sup>(20-21)</sup>.

For these reasons, researchers have sought to understand the social determinants of physical frailty over the course of age, as demonstrated in a systematic review of the literature<sup>(22)</sup>. In this study, the authors evidenced a significant number of longitudinal studies that measured socioeconomic and demographic factors as predictors of frailty, classifying the most frequent variables as age, gender and education<sup>(22)</sup>.

In analyzing other socio-demographic variables related to physical frailty in this study, it was possible to verify an association with female gender, which coincides with the results of a national study carried out with community-dwelling older adults<sup>(23)</sup>. Female gender is possibly more intrinsic risk to physical frailty caused by hormonal changes and loss of strength and muscular mass, in addition to greater vulnerability to extrinsic sarcopenia factors<sup>(7)</sup>.

The greater frailty of women and oldest older adults evidenced in this study indicates the need for an intervention plan for frail individuals, which contemplates the specificities between the genders. For older adults who do not have this

condition, it is suggested that health professionals screen all 70-year-olds or older<sup>(19)</sup> in order to enable early diagnosis, and therefore make treatment more effective.

With regard to programmatic vulnerability, it was observed that the older adults had a mean score of 1.90 ( $\pm$  0.61), which represents moderate access and use of health services. Based on these findings, research in Brazil has verified social inequality in the accessibility and use of health services by older adults<sup>(15)</sup>. In Africa, only 51.7% of the older adults reported easy use of public health services; however, older people used less services<sup>(24)</sup>.

The low accessibility of older adults to health services is a worrying issue, since these individuals may present a greater need for healthcare due to diseases, disabilities and physical and cognitive deficits related to aging<sup>(3)</sup>.

In qualifying the factors associated with programmatic vulnerability, the present study verified that the older adults in the 70-80-year age group were more likely to present moderate vulnerability in this component. This finding partly corroborates a survey carried out in Campinas, São Paulo state, in which there was a lower frequency of health services use in older adults from 65 to 69 years old and by those aged 80 years or older<sup>(3)</sup>. These authors believe that the lower use of health services by the younger older adults results from better health status, while older people resort less to these services because of lack of instrumental support and because of the poverty situation; however, the present study did not verify an association between programmatic vulnerability and income.

Another variable that was associated with moderate programmatic vulnerability was education. Low access to information on health treatment and recovery measures contributes to programmatic vulnerability in older adults<sup>(16)</sup>. Due to the aging of the population, healthcare directed to older adults needs to be structured in order to generate social responses to the new demands of this population. However, the current care model in Brazil favors fragmented and disarticulated actions, focusing on the individual aspect<sup>(25)</sup>.

Given this situation, the older adult population becomes one of the disadvantaged by virtue of their greater susceptibility and consequently greater need to use health resources. It is believed that it is only possible to transform the organization of the health service and improve care for older adults through innovative practices that transcend the limits of biological aspects<sup>(26)</sup>.

It is in this context of discussion that vulnerability, as a multidimensional construct, demonstrates significant advances in both the theoretical perspective and in the contribution to health practices<sup>(27)</sup>. Understanding the individual, social and programmatic vulnerability of older adults as a multidimensional construct allows to evaluate this population in a comprehensive way within their context. Thus, expanding this articulation with the human being who is in the aging process enables a more in-depth study of their process of senescence and senility.

Under this view, it will be the nursing's responsibility to incorporate this knowledge into clinical practice by proposing a comprehensive care plan which is articulated to the

interdisciplinary team, and which includes the social and programmatic aspects associated with individual vulnerability. The interdisciplinary team can then use recommended tools for primary care to operationalize this comprehensive care, such as the unique therapeutic project. This proposal is based on the concept of extended clinical practice, and aims at proposing therapeutic behaviors articulated with the interdisciplinary team through meetings, in which all opinions, including those of the user and their family are essential to understand the Subject in their singularity<sup>(28)</sup>. Therefore, primary health care professionals, including nurses, can identify the multiple conditions of vulnerability in identifying older adults that need to be prioritized in health care.

It is worth considering that this study presents a limitation related to the cross-sectional design, which makes the causal relationship of the events studied unfeasible, as well as the use of a synthetic indicator of social vulnerability which does not permit identifying this aspect at the individual level due to the homogeneity within the census tract. Cohort-type studies, preferably multicenter, which take into account individual measures of social vulnerability can contribute to planning care policies for this population, especially those most vulnerable.

## CONCLUSION

In this study, it was verified that 15.7% of older adults lived in areas of high social vulnerability, 31.8% were physically frail and had moderate programmatic vulnerability score. The older adults with lower age groups, with no schooling and 1 to 4 years of education and with lower monthly income were more likely to live in areas of high/very high social vulnerability. Regarding the individual component, the variables of female gender and high age groups increased the chances of the older adult to present frailty. It was also observed that older adults of 70 | 80 years old and lower education were more likely to have medium programmatic vulnerability.

The results of this study suggest that older adults living in the household were subject to different conditions of vulnerability from an individual, social and programmatic perspective. It is inferred that socioeconomic variables may contribute to the occurrence of vulnerability conditions in older adults. Thus, primary healthcare professionals, including nurses, can identify these aspects in identifying vulnerable groups that need to be prioritized in healthcare.

## RESUMO

**Objetivo:** Verificar a ocorrência e os fatores associados à vulnerabilidade social, individual e programática entre idosos. **Método:** Inquérito domiciliar e transversal conduzido com 701 idosos comunitários. Para a avaliação do componente individual, recorreu-se ao fenótipo de fragilidade; do social, ao Índice de Vulnerabilidade Social; e do programático, ao Índice de acesso e utilização do serviço de saúde. Realizaram-se análises estatísticas descritiva e bivariada e regressão logística multinomial ( $p \leq 0,05$ ). **Resultados:** Constatou-se que 15,7% dos idosos residiam em áreas de elevada vulnerabilidade social, 31,8% eram frágeis fisicamente e escore moderado de vulnerabilidade programática. Os idosos com menores faixas etárias, escolaridade e renda apresentaram maiores chances de residir em áreas de elevada ou muito elevada vulnerabilidade social. O sexo feminino e as elevadas faixas etárias aumentaram as chances da condição fragilidade. Também se observou que idosos com 70 | 80 anos e menor escolaridade tiveram maiores chances de possuir média vulnerabilidade programática. **Conclusão:** Evidencia-se a importância de os profissionais da atenção primária considerar o aspecto multidimensional da vulnerabilidade na identificação de idosos que precisam ser priorizados nos cuidados à saúde.

## DESCRITORES

Idoso; Vulnerabilidade Social; Vulnerabilidade em Saúde; Enfermagem Geriátrica; Enfermagem de Atenção Primária.

## RESUMEN

**Objetivo:** Verificar la ocurrencia y los factores asociados con la vulnerabilidad social, individual y programática entre personas mayores. **Método:** Encuesta domiciliar y transversal conducida con 701 personas mayores comunitarias. Para la evaluación del componente individual, se recurrió al fenotipo de la fragilidad; del social al Índice de Vulnerabilidad Social; y del programático al Índice de acceso y utilización del servicio sanitario. Se realizaron análisis estadísticos descriptivo y bivariado y regresión logística multinomial ( $p \leq 0,05$ ). **Resultados:** Se constató que el 15,7% de los ancianos residían en áreas de elevada vulnerabilidad social, el 31,8% eran frágiles físicamente y con puntaje moderado de vulnerabilidad programática. Los ancianos con menores rangos de edad, escolaridad e ingresos presentaron mayores probabilidades de residir en áreas de elevada o muy elevada vulnerabilidad social. El sexo femenino y los elevados rangos de edad aumentaron las probabilidades de la condición fragilidad. También se notó que los ancianos de 70 | 80 años y menor escolaridad presentaron mayores probabilidades de tener una vulnerabilidad programática media. **Conclusión:** Se evidencia la importancia de que los profesionales de la atención primaria consideren el aspecto multidimensional de la vulnerabilidad en la identificación de las personas mayores que necesitan priorizarse en los cuidados sanitarios.

## DESCRIPTORES

Anciano; Vulnerabilidad Social; Vulnerabilidad en Salud; Enfermería Geriátrica; Enfermería de Atención Primaria.

## REFERENCES

1. Ayres JRC, Paiva V, França Junior I. From natural history of disease to vulnerability: changing concepts and practices in contemporary public health. In: Parker P, Sommer M, editors. Routledge handbook in global public health. New York: Taylor & Francis; 2011, p. 98-107.
2. Beales D, Tulloch AJ. Community care of vulnerable older people: cause for concern. Br J Gen Pract. 2013;63(615):549-50. DOI: 10.3399/bjgp13X673892
3. Rodrigues NO, Neri AL. Vulnerabilidade social, individual e programática em idosos da comunidade: dados do estudo FIBRA, Campinas, SP, Brasil. Cien Saúde Coletiva. 2012;17(8):2129-39. DOI: <http://dx.doi.org/10.1590/S1413-81232012000800023>
4. Gobbens RJJ, Luijckx KG, Van Assen MALM. Explaining quality of life of older people in the Netherlands using a multidimensional assessment of frailty. Qual Life Res. 2013;22(8):2051-61. DOI: 10.1007/s11136-012-0341-1



5. Gobbens RJJ, Van Assen MALM, Luijkx KG, Schols JMGA. The predictive validity of the Tilburg Frailty Indicator: disability, health care utilization, and quality of life in a population at risk. *Gerontologist*. 2012;52(5):619-31. DOI: 10.1093/geron/gnr135
6. Brocklehurst H, Laurenson M. A concept analysis examining the vulnerability of older people. *Br J Nurs*. 2008;17(21):1354-7. DOI: 10.12968/bjon.2008.17.21.31738
7. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol*. 2001;56(3):146-56.
8. Silva HS, Lima AMM, Galhardoni R. Envelhecimento bem-sucedido e vulnerabilidade em saúde: aproximações e perspectivas. *Interface (Botucatu)*. 2010;14(35):867-77. DOI: <http://dx.doi.org/10.1590/S1414-32832010005000034>
9. Bertolucci PHF, Brucki SMD, Campacci SR, Juliano Y. O mini-exame do estado mental em uma população geral. Impacto da escolaridade. *Arq Neuropsiquiatr*. 1994;52(1):1-7. DOI: <http://dx.doi.org/10.1590/S0004-282X1994000100001>
10. Belo Horizonte. Secretaria Municipal de Saúde. Índice de vulnerabilidade da saúde 2012 [Internet]. Belo Horizonte; 2013 [citado 2014 ago. 15]. Disponível em: <http://portalpbh.pbh.gov.br/pbh/ecp/files.do?evento=download&urlArqPlc=ivsauderisco2012.pdf>
11. Tavares DMS, Colamego CG, Pegorari MG, Ferreira PCS, Dias FA, Bolina AF. Cardiovascular risk factors associated with frailty syndrome among hospitalized elderly people: a cross-sectional study. *Sao Paulo Med J*. 2016;134(5):393-9. DOI: <http://dx.doi.org/10.1590/1516-3180.2016.0028010616>
12. Instituto Brasileiro de Geografia e Estatística (IBGE). Pesquisa Nacional por Amostra de Domicílios – PNAD. Rio de Janeiro: IBGE; 2016.
13. Jolliffe IT. Principal component analysis. New York: Springer; 2002.
14. Andrew MK, Mitnitski A, Kirkland SA, Rockwood K, et al. The impact of social vulnerability on the survival of the fittest older adults. *Age Ageing*. 2012;41(2):161-5. DOI: 10.1093/ageing/afr176
15. Lima-Costa MF, Facchini LA, Matos DL, Macinko J. Mudanças em dez anos das desigualdades sociais em saúde dos idosos brasileiros (1998-2008). *Rev Saúde Pública*. 2012; 46 Supl. 1:100-7. DOI: <http://dx.doi.org/10.1590/S0034-89102012005000059>
16. Rocha L, Budó MLD, Beuter M, Silva RM, Tavares JP, et al. Vulnerabilidade de idosos às quedas seguidas de fratura de quadril. *Esc Anna Nery*. 2012;14(4):690-6. DOI: <http://dx.doi.org/10.1590/S1414-81452010000400006>
17. Geib LTC. Determinantes sociais da saúde do idoso. *Ciênc Saúde Coletiva*. 2012;17(1):123-33. DOI: <http://dx.doi.org/10.1590/S1413-81232012000100015>
18. Fhon JRS, Rodrigues RAP, Neira WF, Huayta VM, Robazzi ML. Falls and its association with the frailty syndrome in the elderly: systematic review with meta-analysis. *Rev Esc Enferm USP*. 2016;50(6):1003-10. DOI: 10.1590/S0080-623420160000700018
19. Morley JE, Vellas B, Van Kan GA, Anker SD, Bauer JM, Bernabei R, et al. Frailty consensus: a call to action. *J Am Med Dir Assoc*. 2013;14(6):392-7. DOI: 10.1016/j.jamda.2013.03.022
20. Pegorari MS, Tavares DMS. Fatores associados à síndrome de fragilidade em idosos residentes em área urbana. *Rev Latino Am Enfermagem*. 2014;22(5):874-82. DOI: <http://dx.doi.org/10.1590/0104-1169.0213.2493>
21. Armstrong JJ, Mitnitski A, Andrew MK, Launer LJ, White LR, Rockwood K, et al. Cumulative impact of health deficits, social vulnerabilities, and protective factors on cognitive dynamics in late life: a multistate modeling approach. *Alzheimers Res Ther*. 2015;7(1):38. DOI: 10.1186/s13195-015-0120-7
22. Feng Z, Lugtenberg M, Franse C, Fang X, Hu S, Jin C, et al. Risk factors and protective factors associated with incident or increase of frailty among community-dwelling older adults: A systematic review of longitudinal studies. *PLoS One*. 2017;12(6):e0178383. DOI: <https://doi.org/10.1371/journal.pone.0178383>
23. Rodrigues RAP, Fhon JRS, Huayta VMR, Neira WLF, Pontes MLF, Silva AO, et al. Frailty syndrome and anthropometric measurements in the elderly living at home. *J Aging Res Clin Pract*. 2017;6:133-8.
24. Awoke MA, Negin J, Moller J, Farell P, Yawson AE, Biritwum RB, et al. Predictors of public and private healthcare utilization and associated health system responsiveness among older adults in Ghana. *Glob Health Action*. 2017;10(1):1-10. DOI: 10.1080/16549716.2017.1301723
25. Mendes EV. O cuidado das condições crônicas na atenção primária à saúde: o imperativo da consolidação da estratégia da saúde da família. Brasília: Organização Pan-Americana da Saúde; 2012.
26. Veras R. Linha de cuidado para o idoso: detalhando o modelo. *Rev Bras Geriatr Gerontol*. 2016;19(6):887-903. DOI: <http://dx.doi.org/10.1590/1981-22562016019.160205>
27. Oviedo RAM, Czeresnia D. O conceito de vulnerabilidade e seu caráter biossocial. *Interface (Botucatu)*. 2015;19(53):237-49. DOI: 10.1590/1807-57622014.0436
28. Brasil. Ministério da Saúde; Secretaria de Atenção à Saúde, Núcleo Técnico da Política Nacional de Humanização. Clínica ampliada, equipe de referência e projeto terapêutico singular. Brasília: MS; 2008.

### Financial support

Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP). Process no. 2015/04425-01.

Fundação de Amparo à Pesquisa de Minas Gerais (FAPEMIG) Process APQ-02035-14.



This is an open-access article distributed under the terms of the Creative Commons Attribution License.