Factors associated with worsening of self-rated health in older people: a longitudinal study

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Abstract

Objective: to identify factors associated with worsening self-perception of health in community-dwelling older people over time. *Method*: This is a prospective and analytical longitudinal study. At baseline, data collection took place at home, based on random sampling by clusters. The second data collection was performed after an average period of 42 months. Sociodemographic variables related to health and use of health services were analyzed. Self-perception of health was investigated by the question: "How would you classify your health status?". The results of the health classification of each older person were compared between the two moments of the study (first wave and baseline) defining the dependent variable. Adjusted prevalence ratios were obtained by multiple *Poisson* regression analysis with robust variance. *Results*: 394 older people participated in the two stages of the study, 21.1% worsened their self-perception of health, 26.7% improved and 52.2% showed no change. The variables that remained statistically associated with the transition to a worse self-rated health assessment were: asthma, systemic arterial hypertension and frailty. *Conclusion*: self-perception of health is characterized by a transition between levels of self-rated health. Chronic diseases and frailty showed a longitudinal association with worsening of self-rated health.

Keywords: Self-Conception. Elderly. Risk Factors. Health Status. Longitudinal Studies.

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INTRODUCTION

The Brazilian population aging is recent and occurs in an accentuated way[1]. This demographic phenomenon has important epidemiological implications for the country, as older people require permanent health care and, consequently, an increasing demand for health services[2].

This reality represents an important challenge for the structuring of the care network that needs to be organized in order to adequately welcome this public. Therefore, some lines of care must be adopted in order to assist in the organization of these services and for this it is essential to know the health conditions of the older population. The assessment of the older person's self-perception of health status is a relevant construct to analyze health conditions[3]. It is a qualitative indicator of the perception of one's own health, which can be applied to population groups in an effective, immediate and low-cost manner[3,4]. It encompasses physical, cognitive and emotional components, as well as aspects related to well-being and satisfaction with one's own life[5,6], capable of consistently predicting morbidity and mortality and the decline in functional capacity[3,7]. Inadequate lifestyle[6] including smoking, physical inactivity and obesity, presence of chronic diseases[6,8] such as hypertension, diabetes and asthma and aspects related to mental health[9] have been associated with negative self-perception of health in some cross-sectional studies[6,8,9]. Few studies carried out serial assessments of the population's self-perception of health over time, and in the case of these studies, the population was primarily composed of adults[10,11]. There is a need for more studies to investigate the factors that actually interfere, over time, in the self-perception of health of older people and, consequently, in a healthy longevity from a clinical and emotional point of view.

Investigating these factors is recommended, in view of the possibility of developing actions for their control and thus positively impacting a more functional and fruitful longevity with better health self-assessment.

The need to study changes in health states has already been signaled[3] and may represent relevant tools for public health guidelines[3]. This reiterates the relevance of the present investigation, which aims to identify changes in the self-perception of health over time, in addition to the health conditions that lead to a worsening of the older person's self-perception of health. It will be relevant for the elaboration of proposals that can prevent its progression and possible consequences. Therefore, this study aimed to identify factors associated with worsening self-perception of health in community-dwelling older people over time.

METHOD

This is a population-based and household-based study, with a longitudinal, prospective and analytical design, with non-institutionalized older people living in the urban area of Montes Claros, a medium-sized municipality in the north of Minas Gerais, located in the Southeast of Brazil. The municipality represents the main regional urban center and has a population of approximately 400 thousand inhabitants. The planning and execution of the study was guided by the *Equator* guidelines, through the instrument *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE).

To define the sample size in the first phase of collection (baseline), the older people population contingent of 30,790 residents in the urban region was used, according to data from the Brazilian Institute of Geography and Statistics (IBGE). Sampling was defined in order to estimate the prevalence of each health outcome explored in the epidemiological survey. For the total number of older people allocated to the study at baseline, the following parameters were applied: 95% confidence level, 50% conservative prevalence for unknown outcomes and 5% sampling error. For sample planning, cluster sampling was adopted and therefore it was necessary to multiply the sample number identified by a correction factor and design effect (*deff*) of 1.5%. In order to mitigate possible losses and ensure the adequacy of the sample size, 15% was added to the final sample number. The sample size calculation defined 656 older people as the minimum number of people for the study[12].

The inclusion criteria adopted were: being 60 years of age or older, residing in the allocated

household and accepting to participate in the study. The residence of all older people interviewed in the base year (May and July 2013) was considered eligible for the new interview in the first wave of the study (between November 2016 and February 2017). People over 60 years of age who had not participated in the first data collection were excluded. All selected households were visited up to three times on different days and times. After that, older people who were not available for participation, even by appointment, were defined as losses. Other losses were: older people who changed residence and those who had died, in addition to older people whose caregivers/family members refused to participate in the study. Older people who changed their address were not contacted, as there was no information about their current address.

Baseline data collection was performed by interviewers who were trained and underwent a calibration process (Kappa 0.8). The calibration process consisted of training the interviewers who were undergraduate students in nursing and medicine. After the training, the data collection instruments were applied repeatedly to the same interviewees over a few weeks. The results of these interviews were compared in order to verify the agreement between the interviewers. The results of the calibration step were not included in the study data as they were part of the pilot study with the aim of improving the collection instruments and training the interviewers. The interviews took place from May to July 2013. As a data collection protocol, the interviewers started from a pre-stipulated point in each selected census sector. The households were visited alternately, when an older person was found, they were invited to participate in the study. In case there was more than one older person, the oldest was invited to participate. If no older person was found in the household, the route was followed by the criterion of switching households.

In the base year, between May and July 2013, 685 older people (age ≥60 years) were investigated. The first wave (second collection phase) of the study took place between November 2016 and February 2017, in order to continue the investigation. In this second phase, all homes of older people who participated in the study in the base year were visited again for the second data collection. The data collection instruments are validated and have been previously used[3,12]. The questions in the questionnaire were answered with the help of family members or companions for the older people who were unable to answer, following the guidelines of the data collection instruments.

The dependent variable was the transition to a worse state of self-rated health. This variable was measured by the question: "How would you rate your health status?", whose possible answers were "very good", "good", "regular", "bad" or "very bad". The results of the health classification of each older person were compared between the two moments of the study (first wave and baseline), thus defining the dependent variable. The dependent variable responses were dichotomized into two levels: worsening and non-worsening of self-perception of health.

The data to compose the independent variables were extracted from the first wave of the study (second collection phase). The variables were grouped into sociodemographic, related to health and use of health services. They were dichotomized as follows: sociodemographic: sex (male or female); age group (up to 79 years or ≥80 years); marital status (with a partner, which was composed of married and in a stable union, or without a partner, composed of single, widowed and divorced people); family arrangement (lives alone or with other people); time of education (up to four years or more than four years of study); reading (knows how to read or does not know how to read); religious practice (yes or no); has own income (yes or no); monthly family income (≤ minimum wage or > than one minimum wage). Health-related: existence of reported chronic diseases (systemic arterial hypertension, diabetes mellitus, acquired heart diseases (acute myocardial infarction, heart failure secondary to other chronic diseases. Congenital heart diseases were not considered), osteoarticular disease, asthma, neoplasia, cerebrovascular accident; polypharmacy, defined as the use of five or more medications (yes or no); self-reported weight loss (yes or no); presence of caregiver (yes or no); fall in the last 12 months (yes or no) and the levels of frailty measured by the *Edmonton Frail Scale* (EFS)[13,14]. Use of health services: medical consultation in the last 12 months (yes or

no); hospitalization in the last 12 months (yes or no), the perception of difficulty in using the most sought after health service (yes or no) was also evaluated. The diseases assessed were identified through the report of the older person and/or caregivers or family members. It was not possible to measure how long the older person had had the disease due to the difficulty in finding medical records and also the fragility of memory for such information.

The EFS allows an assessment of frailty through nine domains, from 11 items with a score from zero to 17. The values of the scores determine that between zero and four there is no presence of frailty; five and six indicate an apparent vulnerability; seven and eight suggest mild frailty; nine and ten, moderate frailty; and 11 or more, severe frailty[13,14]. Older people with a score ≥7 were considered frail.

Descriptive analyzes were performed to organize the data, followed by bivariate analyzes aimed at identifying factors associated with the dependent variable (worsening of self-perception of health). For this purpose, the chi-square test was used. The magnitude of the associations was estimated from the prevalence ratios (PR). Using Poisson regression, with robust variance, the adjusted PRs were calculated. The variables eligible for the elaboration of the final model were those that, in the bivariate analysis, were more strongly associated with the worsening of self-perception of health, up to a significance level of 20% ($p<0.20$). To define the final model, a significance level of 0.05 ($p<0.05$) was adopted.

The research project that gave rise to this study was approved by the Research Ethics Committee through opinion number 1,629,395. All participants were instructed on the research, had the opportunity to ask questions and presented their consent. All signed the free and informed consent form.

RESULTS

Among the 685 older people evaluated in the base year, 92 refused to participate in the second phase of the study, 78 older people changed their residence and were not located, 67 older people had their homes visited three times on different days and times but were not found and 54 older people had died. Therefore, 394 older people participated in this study.

In relation to self-perception of health, 21.1% of the older people progressed to worsening of the indicator, 26.7% showed improvement and 52.2% showed no change (Table 1).

Tables 2 and 3 present the results of bivariate analyzes between the dependent variable (worsening of self-perception of health) and the characteristics of the older people. No sociodemographic variable was associated with worsening self-perception of health.

In the final model, the covariates that remained statistically associated with worsening of self-rated health, after multiple analysis, were: asthma, systemic arterial hypertension and frailty (Table 4).

Table 1. Transition between levels of self-perception of health in older people from baseline to the first wave of the study in Montes Claros, Minas Gerais, Brazil, 2013–2017.

Base line	First wave				
Self-perception levels	Very good	Good	Regular	Bad	Very bad
	n (%)	n (%)	n (%)	n (%)	n (%)
Very good	15 (3.8)	2 (13.3)	6 (40.0)	5 (33.3)	1 (6.7)	1 (6.7)
Good	145 (36.8)	7 (4.8)	91 (62.8)	44 (30.3)	2 (1.4)	1 (0.7)
Regular	180 (45.7)	3 (1.7)	54 (30.0)	102 (56.7)	17 (9.4)	4 (2.2)
Bad	48 (12.2)	0 (0.0)	9 (18.8)	26 (54.2)	11(22.9)	2 (4.2)
Very bad	6 (1.5)	0 (0.0)	1 (16.7)	5 (83.3)	0 (0.0)	0 (0.0)

* The percentages indicate the proportion of each level of self-rated health in relation to the baseline.

Table 2. Bivariate analysis between the worsening of self-perception of health and sociodemographic variables of community-dwelling older people followed up in the first wave of the study in Montes Claros, MG, Brazil, 2013–2017.

Independent Variable	Sample	Worsening of Self-Perception		
		No	Yes	
	n%	n	n	*p-value*
Sex				0.916
Male	131 (33.2)	103 (78.6)	28 (21.4)	
Female	263 (66.8)	208 (79.1)	55 (20.9)	
Age group (average 73.9 ±7.9)				0.911
Up to 79 years	302 (76.6)	238 (78.8)	64 (21.2)	
≥ 80 years	92 (23.4)	73 (79.3)	19 (20.7)	
Marital status				0.820
With partner	195 (49.5)	153 (78.5)	42 (21.5)	
Without partner	199 (50.5)	158 (79.4)	41 (20.6)	
Family arrangement				0.586
Lives alone	50 (12.7)	38 (76.0)	12 (24.0)	
Does not live alone	344 (87.3)	273 (79.4)	71 (20.6)	
Education (in years)				0.167
Up to 4	99 (25.1)	228 (77.3)	67 (22.7)	
> 4	295 (74.9)	83 (83.8)	16 (16.2)	
Reading				
Can read	300 (76.1)	238 (79.3)	62 (20.7)	0.728
Cannot read	94 (23.9)	73 (77.7)	21 (22.3)	
Religious practice				
Yes	381 (96.7)	300 (78.7)	81 (21.3)	0.609
No	13 (3.3)	11 (84.6)	2 (15.4)	
Own income				0.359
Yes	355 (90.1)	278 (78.3)	77(21.7)	
No	39 (9.9)	33 (84.6)	6(15.4)	
Monthly family income				0.885
Up to 1 minimum wage	102 (25.9)	80 (78.4)	22 (21.6)	
> 1 minimum wage	292 (74.1)	231 (79.1)	61 (20.9)	

Table 3. Bivariate analysis between the worsening of self-rated health and variables related to health and the use of health services by community-dwelling older people followed in the first wave of the study in Montes Claros, Minas Gerais, Brazil, 2013–2017.

Independent Variable	Sample	Worsening of Self-Perception		
		No	Yes	
	n (%)	n (%)	n (%)	*p-value*
Arterial hypertension				0.033
Yes	281 (71.3)	214 (76.2)	67 (23.8)	
No	113 (28.7)	97 (85.8)	16 (14.2)	

to be continued

Continuation of Table 3

Independent Variable	Sample	Worsening of Self-Perception		
		No	Yes	
	n (%)	n (%)	n (%)	*p-value*
Diabetes *Mellitus*				0.234
Yes	90 (22.8)	67 (74.4)	83 (21.1)	
No	304 (77.2)	244 (80.3)	60 (19.7)	
Heart disease				0.436
Yes	110 (27.9)	84 (76.4)	26 (23.6)	
No	284 (72.1)	227 (79.9)	57 (20.1)	
Osteoarticular Disease				0.431
Yes	189 (48.0)	146 (77.2)	43 (22.8)	
No	205 (52.0)	165 (80.5)	40 (19.5)	
Asthma				0.021
Yes	29 (7.4)	18 (62.1)	11 (37.9)	
No	365 (92.6)	293 (80.3)	72 (19.7)	
Neoplasia				
No	356 (90.4)	284 (79.8)	72 (20.2)	0.210
Yes	38 (9.6)	27 (71.1)	11 (28.9)	
Encephalic Vascular Accident				
No	365 (92.6)	288 (78.9)	77 (21.1)	0.959
Yes	29 (7.4)	23 (79.3)	6 (20.7)	
Polypharmacy				
No	287 (72.8)	234 (81.5)	53 (18.5)	0.038
Yes	107 (27.2)	77 (72.0)	30 (28.0)	
Self-reported weight loss				
No	335 (85)	267 (79.7)	68 (20.3)	0.373
Yes	59 (15)	44 (74.6)	15 (25.4)	
Presence of Caregiver				
Yes	348 (88.3)	276 (79.3)	72 (20.7)	0.614
No	46 (11.7)	35 (76.1)	11 (23.9)	
Fall in the last 12 months				
No	271 (68.8)	218 (80.4)	53 (19.6)	0.276
Yes	123 (31.2)	93 (75.6)	30 (24.4)	
Frailty				<0.001
Yes	111 (28.2)	100 (69.0)	45 (31.0)	
No	283 (71.8)	211 (84.7)	38 (15.3)	
Medical consultation in the last 12 months				
Yes	34 (8.6)	29 (85.3)	5 (14.7)	0.341
No	360 (91.4)	282 (78.3)	78 (21.7)	
Hospitalization in the last 12 months				0.080
Yes	57 (14.5)	40 (70.2)	17 (29.8)	
No	337 (85.5)	271 (80.4)	66 (19.6)	
Access Difficulty				0.140
Yes	130 (33.0)	97 (74.6)	33 (25.4)	
No	264 (67.0)	214 (81.1)	50 (18.9)	

Table 4. Factors associated with worsening of self-perception of health in community-dwelling older people in Montes Claros, Minas Gerais, Brazil, 2013–2017.

Independent Variable	PR *(adjusted)	**95% CI	p value
Frailty			< 0.001
Yes	1.147	1.063 - 1.236	
No	1		
Asthma			0.048
Yes	1.139	1.001 - 1.294	
No	1		
Arterial hypertension			0.049
Yes	1.020	1.001 - 1.130	
No	1		

*PR- Prevalence Ratio, ** 95%CI - Confidence Interval.

DISCUSSION

This study showed that there was variation between the different levels of self-perception of health of older people during the mean follow-up period (42 months). Chronic diseases and frailty showed a longitudinal association with the worsening of these levels of self-perception of health.

It is important to highlight that no significant differences were found for the main characteristics between the older people population followed up in the base year and the older people population considered as losses (57.5%) during the follow-up of this study. Therefore, it points to a non-differential loss[15].

The dynamic process of health self-perception of older people residing in the community, over time, was observed in this study. Just over half of the older people group maintained the pattern of the previous assessment, while about one-fifth showed worsening and approximately one-quarter showed improvement.

Factors associated with improved self-perception of health were not investigated in this study. This is due to the fact that variables such as diet, physical activity level, social support and autonomy were not considered, which according to the literature are capable of positively influencing self-perception of health[6,8].

The results of this study show a significant association between the worsening of self-perception of health status and frailty. Frail older people have physiological vulnerability to maintain or recover homeostasis after the occurrence of stressful events. This decompensation of homeostasis arises when acute physical, social or psychological events are capable of promoting an increase in deleterious effects on the different organic systems of frail older people. It is the decrease in energy reserves resulting from changes related to the aging process, composed of sarcopenia, neuroendocrine dysregulation and immune dysfunction[16-18]. Thus, the frailty syndrome with so many interferences in the functionality and autonomy of the older person is capable of negatively interfering over time in their health self-assessment.

The relationship between frailty in older people and negative self-perception of health has already been identified in cross-sectional studies[3,19,20]. However, no other study was found in the literature that evaluated the determinants of the worsening of self-perception of health in older people over time, which made it impossible to compare the results of the present study with other similar investigations.

A recent systematic review shows that frailty is highly prevalent in South American older people, with rates higher than those found in Europe and Asia[21]. These findings indicate the need for proposals capable of preventing the progression of both frailty and self-perception of health in older people towards negative health outcomes. This aspect is particularly important for health professionals who assist this

population. The Family Health Strategy teams should establish a closer relationship with these individuals, with the implementation of care protocols aimed at the necessary actions for healthy aging and quality of life, focusing on the promotion and prevention of the determinant aspects of frailty. This will bring benefits to the population with possible impacts on frailty and improvement in self-perception of health[2].

Worsening self-perception of health was also associated with asthma. Considered one of the main public health problems, asthma is a chronic obstructive inflammation of the bronchi with acute reversible exacerbations, caused by the increased reaction to various inhalational or food stimuli, causing constriction of the bronchial muscles, edema of its wall and hypersecretion of the mucous glands, leading to characteristic clinical picture: dyspnea, cough, wheezing[22].

Asthma has already been associated with negative self-perception of health among older people[19,20]. However, no other studies were found that showed a relationship between asthma and the worsening of self-perception over time. It is possible to establish a parallel between the possible severity of cases of the disease, which may even pose a risk of death[19] and its negative impacts on the worsening of self-perception of health. The clinical picture of asthma can vary from individual to individual, as well as in the same older person. There are times when the clinical picture may present exacerbated symptoms, requiring emergency care and hospitalization. Generally, older people with asthma also have other concomitant chronic non-communicable diseases that complicate and influence the treatment of asthma[19,20] and can also impact on the worsening of self-perception of health. Although there is no cure, there are treatments that greatly improve asthma symptoms and provide disease control[22,23]. Actions to prevent triggers related to asthma attacks should be part of the routine efforts of health professionals who accompany these older people in order to reduce the exacerbation of the disease and thus avoid worsening the indicator of worsening self-perception of health.

The worsening of self-perception of health was also associated with systemic arterial hypertension (SAH) in community-dwelling older people. Cross-sectional studies also identified this association[24,25]. Systemic arterial hypertension can negatively interfere in the self-perception of health in older people [26]. Hypertensive individuals are instructed to restrict certain foods, perform physical activity, and correctly use antihypertensive medications. Such changes in lifestyle can lead the older person to have a negative perception of their own health. Over time, the worsening of the condition of hypertension associated with the addition of medications can contribute to the worsening of the negative self-perception of health.

In this sense, health education is one of the main devices to enable and effect the health promotion of this population, as it strengthens the development of individual and collective responsibility for the prevention of diseases[26-28]. The establishment of partnerships between the Family Health Strategy teams and outdoor gym programs, multidisciplinary support teams, the older person and their caregivers is recommended for the development of health promotion actions and prevention of SAH complications. These are possibilities to develop lasting actions that generate in the older person the feeling of belonging to the health care group. Such actions are based on health literacy studies[29] and can favor prolonged adherence with very positive results also in the self-perception of health in the long term.

It is evident that the aspects found as determinants for a worsening of self-perception of health are associated with chronic diseases and frailty that can negatively impact the autonomy and independence of the older person. Old age with such limitations, in general, can interfere with the worsening of self-perception of health.

The present study has some limitations. The impossibility of evaluating the transitions in self-perception of health that occurred in time intervals shorter than the period elapsed between the baseline and the first wave of the study. It was also not possible to assess the factors associated with improved self-perception of health because variables that may be linked to a possible improvement were not investigated. In addition, some variables studied were self-reported. However, despite these limitations, this study has a random sample, with a significant

number of community-dwelling older people. In addition, this is an unprecedented study that shows what actually influences the worsening of the self-perception of health indicator. Also noteworthy is its potential for directing efforts that can improve self-perception of health among older people.

Understanding the factors that interfere with variations in self-perception of health is essential for the development of a care plan aimed at older people that seeks to intervene in the determinant aspects of self-perception over time. In the case of the older people in the municipality under study, efforts should be aimed at older people who have chronic diseases and those who have some level of frailty.

CONCLUSION

Self-perception of health was dynamic, with transition between levels of self-rated health during the follow-up period. Some health conditions were associated with worsening of self-perception of health in community-dwelling older people: chronic diseases and frailty. A significant portion of the older people showed improved self-perception of health. These results should be considered by health care teams in carrying out planned actions aimed at the health of the older person and aimed at improving the self-perception of health indicator.

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