



# Health-Related Quality of Life and Associated Factors: Regional Differences Among Oldest-Old in Brazil

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## Abstract

**Purpose:** The aim of this research was to investigate the extent to which socioeconomic and regional differences in Brazil may influence the quality of life. To this end, we examined factors associated with health-related quality of life in two populations of oldest-old people, aged 80 and over: one from the Northeast of Brazil and the other from the Southeast.

**Methods:** 417 participants aged 80 and over were interviewed face-to-face, 179 from Brejo dos Santos, one of the poorest regions in the Northeast; and 238 from São Paulo, one of the largest urban metropolises in Southeast Brazil. Data, which included socioeconomic and demographic factors, health status, and health-related quality of life, were collected using a structured questionnaire. The dependent variable was determined by the completion rate of the 12-item Short Form Survey and analyzed using multiple logistic regression.

**Results:** Although the population of São Paulo had four times as many long-lived women than men, had better literacy levels, used more medications, and presented a greater prevalence of symptoms suggestive of depression in comparison to the Northeast's population, no difference was observed in the proportion of good physical components among the two populations, 54.3% in Brejo dos Santos' oldest-old and 50.4% in São Paulo's ( $P = .6272$ ). Quality and quantity of sleep were factors that most affected the health-related quality of life among the oldest-old of Northeast.

**Conclusion:** Factors associated with health-related quality of life were different among the oldest-old people of the two locations, thereby corroborating the heterogeneous nature of the longevous population.

## Keywords

quality of life, aged 80 and over, longevity, emerging countries

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**What do We Already Know About This Topic?**

Health-related quality of life (HRQoL) is a strong predictor of mortality and is strongly influenced by social determinants such as income and education; for this reason, HRQoL is an important parameter to be used in health services and to be considered in public policy planning.

**How Does Your Research Contribute to the Field?**

The results of this study point to the need for those planning health policies and actions to take proper account of regional particularities. In São Paulo, the ratio of women to men (W:M) was 4:1 while, in Brejo dos Santos, the W:M ratio was 1:1. The quality and quantity of sleep were among the factors that most impacted HRQoL among the oldest in Brejo dos Santos.

**What Are Your Research's Implications Towards Theory, Practice, or Policy?**

In continent-sized countries, such as Brazil, future studies should explore in greater depth how regional and cultural differences impact HRQoL, multimorbidity, and mortality in longevous populations as these differences may be exacerbated by the sheer size of the country.

**Introduction**

In Brazil, like other developing countries, the population of people aged 80 and over has been rapidly growing in number<sup>1-3</sup>. In 2020, it was estimated that longevous people represented 2% of the Brazilian population, or 4,441,000 individuals, with 1.62 women for each man<sup>4</sup>. In continent-sized countries, socioeconomic differences and regional inequalities<sup>3</sup>, like other developing countries<sup>5,6</sup>, might influence the health-related quality of life of the oldest-old population but be made more stark by the size of the country. The Brazilian Northeast, for example, has one of the lowest human development indexes (HDI: .663) and urbanization in the country<sup>7</sup>. Moreover, this region has some socio-cultural traditions, such as a high frequency of consanguineous marriages, which might affect life expectancy at birth, fecundity, and mortality<sup>8-10</sup>. Studies addressing how economic and regional inequalities can influence health-related quality of life may favor gerontological care aimed at preventing disability and mortality in the oldest-old age group.

Health-related quality of life (HRQoL) describes how physical dysfunction, pain, and distress may result in limitations of people's everyday activities and psychological well-being. A lower level of HRQoL was associated with aging<sup>11</sup>. HRQoL is a strong predictor of mortality and is strongly influenced by social determinants such as income and education<sup>12,13</sup>; for this reason, HRQoL is an important parameter to be used in health services and to be considered in public policy planning. In Brazil, the less developed areas of the country, such as the Northeast, comprise most of the country's illiterate and poor population<sup>14</sup>. Therefore, these inequalities may impact the HRQoL of the oldest-old population and should be better understood.

In the literature, a few cross-sectional studies addressed factors associated with HRQoL among the oldest-old. The incidence of two or more chronic diseases (multimorbidity) can impair the HRQoL and increase the risk of death<sup>15,16</sup>. In

Spanish octogenarians, a poorer HRQoL was associated with gender (being a woman), frailty and heart failure<sup>17,18</sup>, while an increased use of medication and number of chronic illnesses has been noted among Italian nonagenarians<sup>19</sup>. Studies conducted in Spain<sup>17</sup>, Canada,<sup>20,21</sup> and Brazil<sup>18,22</sup> pointed out that frailty was associated with worse HRQoL.

Among the oldest, the physical component summary of HRQoL was positively associated with Basic Activities of Daily Living (BADL) and Instrumental Activities of of Daily Living (IADL), cognitive functioning, conscientiousness, and life satisfaction, and was negatively associated with comorbidity<sup>11</sup>. A meta-analysis carried out with studies conducted in oldest-old people in Iran observed that the average for HRQoL was lower when compared to other, more economically developed countries<sup>6</sup>. In the Catalonia region of Spain, favorable social, economic and educational conditions were related to better living conditions and consequently better scores for HRQoL in physical and mental aspects<sup>5</sup>.

In Brazil, aging with dignity is considered a fundamental human right, protected and promoted under the principles of the 1988 Constitution<sup>3</sup>. In 1994, actions to be implemented by governments to ensure seniors' social rights, autonomy, integration, and effective participation in society were stated in the National Policy for the Elderly<sup>3</sup>. It determines, for example, a noncontributory lifelong pension of one minimum wage per month (R\$1,2012.00 or about US\$ 300) paid to people 65 years and older<sup>23</sup>. Despite the improvement in public policies and access to health services for the older people, family is generally their main source of social support<sup>24</sup> and it is therefore important to promote public policies that can provide ways to support families that are caring for older adults<sup>18,22</sup>.

The Brazilian socio-cultural and economic regional differences may influence the prevalence of multi-morbidities in people aged 80 and over. Here we look at how the

socioeconomic, demographic, and health status differences might influence HRQoL among the oldest-old people in a rural, poor and consanguineous population of Brejo dos Santos, in the Northeastern, and in the largest urban center of the country, the population from São Paulo in the Southeast of Brazil.

## Methods

### Study Design, Settings, and Participants

This was a quantitative cross-sectional study conducted with oldest-old aged 80 and over from two different cities in socioeconomic, demographic, and cultural terms: São Paulo (SABE-SP), one of the largest urban centers in Latin America and, Brejo dos Santos (SABE-PB), a city located in the Northeast hinterland, where several previous studies have been conducted regarding the quality of data collected by health workers<sup>25</sup>, consanguinity and genetic diseases<sup>26–28</sup>. All information was collected in the senior's homes through the Health, Well-being and Aging (*Saúde, Bem-estar e Envelhecimento - SABE*) survey questionnaire<sup>29,30</sup> which was administered by trained interviewers.

In São Paulo, oldest-old were selected through a representative probabilistic sample of the urban city population and a detailed description of the study design and sampling process was previously published<sup>29,30</sup>. Here, the sample refers to the 2015 cohort<sup>31</sup>, whose seniors, totaling 238 persons aged 80 or more, were interviewed in the first semester of 2016.

In Brejo dos Santos, all 188 residents aged 80 or over were recruited and, of these, 179 were interviewed in their homes in the first half of 2017. Inclusion criteria were men and women, 80 years old and over, and residents of the town. Losses occurred from refusals, migration to another city, and other reasons (4.9%).

### HRQoL Measurements

HRQoL was measured using Short Form 12 (SF-12) which results in two scales: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). The SF-12 contains 12 items that were combined, scored, and weighted to create two scales that provide glimpses into mental and physical functioning and overall HRQoL. Scores range from 0, indicating the lowest HRQoL, to 100, the highest HRQoL. In this analysis, we used SF-12 tertiles, a statistical procedure adopted due to the nonparametric distribution of this variable<sup>31</sup>. The cut-off point for the dichotomization of the dependent variable was calculated from the averages of each HRQoL component, which for Brejo dos Santos was 39.94 for PCS and 50.20 for MCS. Among the seniors in São Paulo, the average for PCS was 40.30, and for MCS 50.98. Thus, the seniors were classified as follows: good or bad PCS and good or bad MCS.

### Exposure Variables

The socioeconomic-demographic factors verified were as follows: gender (male/female), ethnicity referred (white/non-white), age group (80–89/90 or more), literate (yes/no), and importance of religion for the oldest-old (important/not important); self-assessment of the oldest-old on their income (sufficient/insufficient).

Health status was verified by cognitive state (adequate/suggestive of impairment), subjective well-being (better/worse), self-assessment of sleep (good/regular/bad), self-assessment of hearing (good/regular/bad), self-assessment of vision (good/regular/bad), the occurrence of fall in the last 12 months (yes/no), self-assessment of current health in relation to that of a year ago (better/equal/worse), number of self-reported diseases (none/one/two or more), number of medication used (none/one to four/five or more), and symptoms suggestive of depression (yes/no).

Regarding cognitive states such as orientation, memory, language, and attention, the abridged version of the Mini-Mental State Examination (MMSE) was used. The maximum score is 19 and the classification occurred as follows: adequate cognitive status (13 points or more) and suggestive of cognitive impairment (12 points or less)<sup>32</sup>.

Subjective well-being was measured using the WHO Well-being Index, whose raw scores range from 0 to 25. Those oldest-old persons who scored 13 points or more were rated with the best well-being and those with 12 points or less were rated as having poor well-being<sup>33</sup>.

Symptoms suggestive of depression were analyzed using the Geriatric Depression Scale (GDS-15), a reliable instrument to perform screening for depression in the oldest-old. Our participants were classified as oldest-old with symptoms suggestive of depression (6 points or more) and without symptoms of depression (5 points or less)<sup>34</sup>.

### Statistical Analysis

Data were tabulated in Epidata 3.1 double-entry program. Afterward, the “R” statistical software was used to analyze the data. Initially, data were described using absolute and relative frequencies. Cronbach's alpha coefficients were calculated to verify the reliability of the HRQoL instruments [.963 for the study in Brejo dos Santos and .966 for that in São Paulo]. The association between HRQoL (PCS and MCS) and exposure variables (socioeconomic-demographic factors and health status) was analyzed with multiple logistic regression.

An initial model of multiple logistic regression was used to verify this association, and variables that presented  $p \leq 0.20$  in the initial model were included in the final multiple logistic regression model, based on 95% confidence intervals (CIs) and prevalence ratios (PR) for each model. Correlations with  $P$ -value  $\leq 0.05$  were considered statistically significant.

### Ethical Considerations

Both studies respected the ethical aspects involving research with human beings in accordance with the principles of Resolution 466/12 of the Brazilian National Health Council. The study conducted in Brejo dos Santos, Paraíba, was approved by the Ethics Committee for Research on Human of Universidade Estadual da Paraíba (CAAE: 67426017.6.0000.5187) and the study conducted in São Paulo was approved by the Ethics Research Committee of Universidade de São Paulo. All participants were informed about study aims and agreed to participate in the survey.

### Results

After the interviews, 245 seniors completed in full the instrument to measure HRQoL, of whom 116 were from Brejo dos Santos with an average age of 84.68 years ( $\pm 4.94$ ) and 129 from São Paulo with an average age of 85.67 years ( $\pm 4.24$ ). [Table 1](#) presents the distribution of the seniors according to socioeconomic-demographic factors and health status. In São Paulo, the ratio of women to men (W:M) was 4:1 while, in Brejo dos Santos, the W:M ratio was 1:1. In São Paulo, Southeast of Brazil, the oldest-old people showed better levels of literacy, used more medication, and had a higher prevalence of symptoms suggestive of depression when compared to the Northeast population.

Regarding HRQoL scores, a good PCS was observed in 54.3% of seniors living in Brejo dos Santos and 50.4% of those living in São Paulo; in relation to the proportion of good MCS, the values were 55.2% and 43.4%, respectively ([Table 1](#)). The mean score for the PCS was 39.94 ( $\pm 10.81$ ) among longevous in Brejo dos Santos and 40.31 ( $\pm 12.28$ ) among those in São Paulo, while for the MCS, the mean score was 50.18 ( $\pm 7.80$ ) in Brejo dos Santos and 46.41 ( $\pm 10.65$ ) in São Paulo.

[Table 2](#) presents the final multiple logistic regression model of the association between poor PCS and socioeconomic-demographic factors and health status for each population independently. In Brejo dos Santos, there was a statistically significant relationship between poor PCS and being female, being aged 90 or older, having fallen in the last year, and self-assessing sleep as regular. Among the longevous living in São Paulo, the bad PCS was associated with those who had a cognitive state suggestive of impairment and had self-assessment of vision as bad.

The final multiple logistic regression model regarding the association between poor MCS and exposure variables is illustrated in [Table 3](#). In Brejo dos Santos, a statistically significant association was observed between poor MCS and not considering religion as important, worse subjective well-being, cognitive state suggestive of impairment, self-assessment of sleep as regular or bad, and using five medications or more. In São Paulo, there was no statistically significant association between poor MCS and socioeconomic and demographic

factors and health status, for this reason, the data of SABE-SP were not shown in [Table 3](#).

### Discussion

Most of the oldest-old people who participated in our study presented good HRQoL. Despite their socioeconomic and demographic differences, both populations had a similar proportion of poor PCS. Among the long-lived seniors, aged 80 or older, self-perception of quality of life seems to be more homogenous than in other age groups which could explain this finding; however, they showed heterogeneity in relation to the associated factors with HRQoL. In Brejo dos Santos, poor PCS was associated with gender, age group, self-assessment of sleep, and occurrence of fall in the last 12 months, while, in São Paulo, poor PCS was associated with cognitive state and self-assessment of vision.

In this study, men and women aged 80 and over in Brejo dos Santos are practically equal in number. In contrast, in São Paulo, there are four women for each man. Poor PCS and being female were associated in the Brejo dos Santos, which may indicate a correlation with the domestic roles fulfilled by women compared to those fulfilled by men. Given that women are more affected by chronic diseases and have greater fragility that might impact HRQoL<sup>35,36</sup> and this is so internationally, the relative scarcity of oldest-old men in São Paulo is a factor to consider in seeking to explain the difference between the two cities. This implies strongly that the planning of health actions for the longevous population should consider these differences in relation to the proportion of individuals per sex.

Brejo dos Santos is located in the Northeast hinterland, a region that has high temperatures throughout the year, and because it is a rural region, most of the seniors 80 years old and over are farmers and have the habit of waking up early. Such behaviors may explain sleep disorders and the observed association with poor PCS and poor MCS, which corroborates findings in the literature<sup>37,38</sup>.

Changes in the quantity and quality of sleep tend to result in a decreased cognitive state, fatigue, and decreased vigilance<sup>39</sup>. Hence, there is the tendency of changes in sleep patterns to result in psychological exhaustion and a feeling of mental fatigue which, in turn, may impair socialization, subjective well-being and quality of life. In Korea, old women who kept a sleep duration longer than 8 hours per night were related to better scores for HRQoL than those with less sleep hours<sup>40</sup>.

Mental fatigue and psychological exhaustion tend to make those affected less wary and more accident-prone. Hence, the observed association in Brejo dos Santos between the occurrence of falls in the last 12 months, and poor PCS may be related to sleep quality<sup>41</sup>. In turn, injuries and trauma caused by falls result in deterioration of the person's physical function and, consequently, of their HRQoL<sup>42</sup>. In addition, the pain and discomfort caused by falls are likely to have an impact on sleep quality which brings the vicious circle full cycle.

**Table 1.** Distribution of the oldest-old according to socioeconomic, demographic and health status characteristics.

Variables	SABE-PB		SABE-SP	
	TOTAL		TOTAL	
	n	%	n	%
Gender				
Female	57	49.1	104	80.6
Male	59	50.9	25	19.4
Ethnicity				
White	59	50.9	75	58.1
Not white	54	46.5	54	41.9
Did not answer	3	2.6	-	-
Age group				
80–89 years	96	82.8	104	80.6
90 and over	20	17.2	25	19.4
Literate				
Yes	47	40.5	100	77.5
No	69	59.5	26	20.2
Did not answer	-	-	3	2.3
Importance of religion to the elderly				
Important	106	91.4	109	84.5
Not important	9	7.8	16	12.4
Did not answer	1	0.8	4	3.1
Self-assessment of income				
Sufficient	75	64.7	81	62.8
Insufficient	41	35.3	46	35.7
Did not answer	-	-	2	1.5
Cognitive states				
Adequate	50	43.1	94	72.9
Suggestive of impairment	64	55.2	30	23.3
Did not answer	2	1.7	5	3.8
Subjective well-being				
Best	86	74.1	88	68.2
Worst	27	23.3	37	28.7
Did not answer	3	2.6	4	3.1
Sleep self-assessment				
Good	56	48.2	74	57.5
Average	30	25.9	34	26.4
Bad	19	16.4	19	14.6
Did not answer	11	9.5	2	1.5
Self-assessment of hearing				
Good	45	38.8	50	38.8
Average	32	27.6	51	39.5
Bad	28	24.1	24	18.6
Did not answer	11	9.5	4	3.1
Self-assessment of vision				
Good	38	32.7	47	36.4
Average	37	31.9	54	41.9
Bad	30	25.9	27	20.9
Did not answer	11	9.5	1	0.8
Fall occurrence in the last 12 months				
Yes	31	26.8	52	40.3
No	84	72.4	77	59.7

(continued)

**Table 1.** (continued)

Variables	SABE-PB		SABE-SP	
	TOTAL		TOTAL	
	n	%	n	%
Did not answer	1	0.8	-	-
Self-assessment of current health compared to that of a year ago				
Better	19	16.4	16	12.4
Average	60	51.7	64	49.6
Worse	36	31.1	49	38.0
Did not answer	1	0.8	-	-
Number of self-reported diseases				
None	27	23.2	11	8.5
One	46	39.6	17	13.2
Two or more	43	37.2	42	32.6
Did not answer	-	-	59	45.7
Number of medication use				
None	14	12.1	6	4.7
One to four	60	51.7	44	34.1
Five or more	34	29.3	79	61.2
Did not answer	8	6.9	-	-
Depressive symptoms				
Yes	34	29.3	90	69.8
No	39	33.5	9	7.0
Did not answer	43	37.2	30	23.2
TOTAL	116	100	129	100

Note. Data was collected in Brejo dos Santos, in the state of Paraíba, Brazil (SABE-PB) and in São Paulo, capital (SABE-SP) in 2017 and 2016, respectively. SABE is abbreviation for the research project name in Portuguese (*Saúde, Bem-Estar e Envelhecimento or Health, Well-being, and Aging*).

In Spain, engaging in activities that stimulate cognitive status or promote social activities such as social groups were related to better HRQoL<sup>43</sup>. In our study, cognitive state suggestive of impairment was associated with poor PCS among seniors in São Paulo and with poor MCS in Brejo dos Santos. Cognitive loss leads to greater dependence and reduced autonomy, and this impairs HRQoL among seniors<sup>44–46</sup>. In fact, the loss of cognition weakens social and family relations and communication with the environment in which the seniors live and relate, and this has a negative impact on the MCS<sup>47</sup>. In Brazil, the proportion of seniors living with children or relatives, which is considered an indicator of physical, mental, financial, or social fragility, had a significant drop, especially among women; and the proportion of older women as family providers has increased in the last years<sup>3</sup>. Religious belief, observation, and practice influence HRQoL positively<sup>48</sup>, acting at a cognitive and affective level that can influence the perception of the world and resulting in better satisfaction with life<sup>49</sup>. Therefore, these facts may justify the association among the oldest-old living in Brejo dos Santos between considering religion as unimportant and poor MCS.

**Table 2.** Multiple logistic regression results showing significant association between bad PCS and the exposure variables for each oldest-old population.

Bad PCS		
Variables	SABE-PB (Brejo dos Santos)	
	PR	95% CI
Gender		
Female	1.68	1.02-2.78
Male	1	—
Age group		
80–89 years	1	—
90 years and over	1.79	1.20-2.67
Sleep self-assessment		
Good	1	—
Average	1.91	1.34-2.71
Bad	1.43	0.85-2.39
Fall occurrence in the last 12 months		
Yes	1.59	1.07-2.37
No	1	—
SABE-SP (São Paulo)		
Variables	PR	95% CI
Cognitive state		
Adequate	1	—
Suggestive of cognitive impairment	1.76	1.24-2.48
Auto evaluation of vision		
Good	1	—
Average	1.25	0.86-1.83
Bad	1.55	1.06-2.26

Note. Data was collected in Brejo dos Santos, in the state of Paraíba, Brazil (SABE-PB) and in São Paulo, capital (SABE-SP) in 2017 and 2016, respectively. PCS = Physical Component Summary; SABE (*Saúde, Bem-Estar e Envelhecimento*) = Health, Well-being, and Aging project; 95% CI = 95% confidence interval; PR = Prevalence rate.

Worse subjective well-being was associated with poor MCS among the oldest-old in Brejo dos Santos. In order to understand how to improve the quality of life of the population, it is necessary to include measures that improve the subjective well-being of individuals, these measures being as important as the economic indices<sup>50</sup>. In Taiwan, well-being levels and depressive symptoms were associated with HRQoL<sup>51</sup>, so it is worth noting that subjective well-being is a protective factor for health, and can reduce the occurrence of chronic diseases, in addition to promoting longevity<sup>50</sup>.

In this study, among the oldest-old of São Paulo, no variable studied presented an association with poor MCS. In Brejo dos Santos, just as discussed in the literature<sup>46,52,53</sup>, polypharmacy was associated with poor MCS. Insomnia, anxiety, and confused states result in emotional and social changes in the seniors, increasing the consumption of

**Table 3.** Multiple logistic regression results showing significant association between bad MCS and exposure variables for oldest-old population of Brejo dos Santos, Brazil (SABE-PB).

Bad MCS		
Variables	SABE-PB	
	PR	95% IC
Religion importance to the seniors.		
Important	1	-
Not important	0.29	0.09-0.92
Cognitive state		
Adequate	1	-
Suggestive of impairment	2.11	1.35-0.31*
Subjective well-being		
Best	1	-
Worst	1.94	1.29-2.92
Sleep self-assessment		
Good	1	-
Average	1.65	1.07-2.54
Bad	1.79	1.14-2.82
Number of medication used by seniors		
None	1	-
One to four	1.82	0.99-3.36
Five or more	2.80	1.61-4.85

Note. Data was collected in Brejo dos Santos, in the state of Paraíba, Brazil (SABE-PB) and in São Paulo, capital (SABE-SP) in 2017 and 2016, respectively. MCS = Mental Component Summary; SABE (*Saúde, Bem-Estar e Envelhecimento*) = Health, Well-being and Aging project; 95% CI = 95% confidence interval; PR = Prevalence rate.

medication and weakening their social relationship with their environment<sup>46,52,53</sup>.

The results of this study point to the need for those planning health policies and actions to take proper account of regional particularities. In São Paulo, there were proportionately four times as many longevous women than man; on the other hand, in Brejo dos Santos, the quality and quantity of sleep were among the factors that most impacted HRQoL among the oldest. In continent-sized countries, such as Brazil, future studies should explore in greater depth how regional and cultural differences impact HRQoL, multimorbidity, and mortality in oldest-old populations as these differences may be exacerbated by the sheer size of the country.

In practical terms, the importance of periodic assessments of the health status of longevous elderly is observed, as these prioritize the quality of sleep and vision, the occurrence of falls, cognitive status, well-being, and use of medication. These periodic assessments allow early diagnosis and interventions in order to enable a better health-related quality of life for these seniors, thereby benefiting, in addition to the seniors, their families, society, and the health system. Research results like these enable health managers to better plan and manage financial resources and personnel, which are

clearly important aspects in health care. In this context, the importance of studies that assess the health situation of longevous elderly in different locations, whether cities, states, or countries, is confirmed.

Thus, it is suggested that the actors involved with the care of the oldest-old carry out a continuous monitoring of the environment in which the seniors live, in order to identify aspects in the home and surrounding areas that increase the risk of falls; that they monitor the correct use of medication, considering the prescription, posology, frequency, and validity; that they be alert to situations that express sleep disorders or cognitive decline such as excessive daytime sleepiness, memory loss, lack of attention when performing activities, impairment in reasoning or language.

The limitation of this study was the cross-sectional design which allows identifying factors that might be associated with outcome variables; however, the causality cannot be inferred. The results are also potentially affected by an omitted variable bias (OV) and the methodology choice of dichotomizing the variables to perform the multiple logistic regression. The comparison of the two groups is potentially affected by many variables not included in the analysis, some of them not observable at all. These limitations, however, do not compromise the findings of the study, which is one of the first papers in the literature that compares oldest-old people who have had different living conditions. To better understand the causal relationship between variables, future studies with a longitudinal or control-case design are recommended.

## Conclusion

Poor PCS of HRQoL was associated with gender, age group, sleep self-assessment, and falls in the last 12 months among the oldest-old in Brejo dos Santos, a rural and poor city in the Northeastern of Brazil; among the seniors in São Paulo, an urban metropolis, there was the association with the importance of religion for the seniors, cognitive state, number of medications used, and subjective well-being. Regarding the poor MCS of HRQoL, there was a statistically significant association between cognitive state and self-assessment of vision in Brejo dos Santos; in São Paulo, there was no significant association.

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## Authors' contributions

JLGSF, TNM, YAOD and SS: study conception, study design, acquisition of data, analysis and interpretation of data, and drafting the manuscript. ROA and JLFS: analysis and interpretation of data. JCLN, JBM, JMMS, RFMS: acquisition of data. MS and MZ: revision of the manuscript. All authors read and approved the final manuscript.

## Declaration of Conflicting Interests

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## Ethics Approval

This research was approved by the Research Ethics Committee of Paraíba State University (UEPB) under protocol CAAE: 67426017.6.0000.5187 and University of São Paulo (<http://www.fsp.usp.br/sabe/>), being in accordance with the principles of Resolution 466/12 of the Brazilian National Health Council.

## Informed Consent

All participants or their guardians received verbal and written explanations regarding the study procedures, and when they agreed, they signed the informed consent form and institutional declaration of approval. The results were presented to the participants after the conclusion of the study.

## Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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