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Factors associated with quality of life among the elderly in the community of the southern triangle macro-region, Minas Gerais, Brazil

Michelle Helena Pereira de Paiva [1]
Maycon Sousa Pegorari [2]
Janaína Santos Nascimento [3]
Álvaro da Silva Santos [1]

Abstract *This study sought to establish the socioeconomic and health factors associated with quality of life among the elderly in the community. An analytical study with a cross-sectional and quantitative approach was conducted in 2012 and 2013 with 3430 senior citizens in 24 municipalities in the Southern Triangle Macro-region of the State of Minas Gerais in Brazil. A structured questionnaire was used for socioeconomic and health variables, as well as the Katz scale, the World Health Organization Quality of Life-Bref (WHOQOL-BREF) and the World Health Organization Quality of Life Assessment for Older Adults (WHOQOL-OLD). Descriptive, bivariate statistical analysis was performed and a multiple linear regression model ($p < 0.05$) was created. Lower quality of life (QoL) scores were found in the environment and autonomy domains associated with advanced age, lack of schooling and income, a negative perception of health and functional disability. The salient key factor was negative health perception. The conclusion drawn was that socioeconomic and health factors were associated with the quality of life of the elderly, highlighting the lowest scores in the environmental domain and from the aspect of autonomy, a key influencing factor being negative health perception.*

Key words *Quality of life, Elderly, Health of the Elderly, Health status, Socioeconomic factors*

[1] Programa de Pós-Graduação em Atenção à Saúde, Universidade Federal do Triângulo Mineiro. R. Frei Paulino, 30, NS Abadia. 38025-180 Uberaba MG Brasil.
mhppaiva@gmail.com
[2] Curso de Fisioterapia, Universidade Federal do Amapá. Macapá AP Brasil.
[3] Departamento de Terapia Ocupacional, Universidade Federal do Rio de Janeiro. Rio de Janeiro RJ Brasil.

Introduction

Despite the increase in the number of elderly people being an achievement for mankind, this does not necessarily guarantee them the dignity to live well[1], in other words, quality of life (QoL) has not kept pace with the evolution that has taken place in terms of demographic and epidemiological profile.

In view of this, the greatest challenge has been to take care of a large population of old people, the majority of which have a low socioeconomic and educational level and a high prevalence of chronic and incapacitating diseases[2], which in turn has demanded greater investment in QoL research into old age.

QoL can be understood as being[3]:

"Individual perception of one's position in life, in the context of the culture and system of values in which a person lives, in relation to their goals, expectations, standards and interests. It is a wide-reaching concept, affected in complex ways by the physical health of the person, their psychological state, level of dependency, social relationships and relationships with the most important aspects within their environment."

Studies that aim to evaluate health, QoL, and associated factors are still insufficient in number[4] in order to be able to establish a sound body of knowledge, so managing to obtain a better understanding of the factors involved in QoL is a growing concern in Brazilian and international literature[5].

The studies reveal divergences with respect to factors associated with QoL among the elderly. In addition to this, regional and cultural differences can have an influence in the association between QoL and their potential factors[6]. One study has shown that the age bracket with the best QoL is from 60 to 69 years of age, and is reduced with each subsequent decade of life so that less than half of the elderly of eighty years old and over have a QoL that can be considered satisfactory[7]. Differently from another research study[8] which showed that QoL does not diminish with age when making a comparison between a young and very elderly group.

Other results indicate that elderly of the masculine sex enjoy a better QoL in all aspects, except for the aspect of intimacy. In addition to this, the highest QoL scores were associated with elderly married white people, who follow a religion, live with family, are not retired, do work that is remunerated and who have an income of between one and three minimum wages[7].

It is believed that investigations into QoL among the elderly are important for the future of health, principally, in the case of Brazil, where the population is ageing rapidly and which suffers from major inequality[4].

In addition to this, research such as this can help to gain a deeper and better understanding of the aspects related to ageing, as well as the planning and organization of health services, and the implementation of initiatives based on the populational context observed. Thus, this study has the object of verifying the socioeconomic and health factors associated with QoL among the elderly in the community.

Methods

This is an analytical study with a cross-sectional and quantitative approach, based on a population of 79,924 people of 60 and over[9], and is part of a research project entitled "Health Profile of the Elderly Population in Municipalities Covered by the Regional Health Superintendency - Uberaba/Minas Gerais". The region studied is located in the so-called Minas Gerais Triangle, in the state of Minas Gerais, in the Southeast of Brazil. For this study, elderly residents were analyzed in 24 municipalities, these being: Água Comprida, Araxá, Campo Florido, Campos Altos, Carneirinho, Comendador Gomes, Conceição das Alagoas, Conquista, Fronteira, Frutal, Ibiá, Itapagipe, Iturama, Limeira do Oeste, Pedrinópolis, Perdizes, Pirajuba, Planura, Pratinha, Sacramento, Tapira, Uberaba, União de Minas and Veríssimo. In total, the municipalities analyzed represent a territorial area of 33,594,041Km^2 with a human development index of 0.717[10].

To calculate the sample size, a reference was taken of the elderly population in each municipality[9] and the following parameters: sampling error of 0.05; reliability rate of 95% and their proportion of the population in each municipality (elderly population in the municipality divided by its total population). Thus, the calculation of the minimum sample resulted in a figure of 3,198 elderly people, being a simple random sampling process.

The criteria for inclusion were: agreement to take part in the study, the signing of a free and clear consent form; to have attained a minimum score in accordance with the level of schooling in the Mini-Mental State Examination[11] and be capable of walking, even with the aid of a stick or walking frame. The exclusion criteria were:

being dependent on a wheelchair, having serious hearing or vision problems, significantly increasing the difficulty of communication, and being confined to bed provisionally or definitively. This study counted on the participation of 3,430 elderly people.

The data were collected from the period from May 2012 to April to 2013, in public localities provided by the municipal authorities cited above, with the research being conducted by graduate and postgraduate students. The following were used: a structured questionnaire on socioeconomic and health variables, a Mini-Mental State Examination, the Katz scale and the *World Health Organization Quality of Life-Bref* (WHOQOL-BREF), *World Health Organization Quality of Life Assessment for Older Adults* (WHOQOL-OLD).

The Mini-Mental State Examination (MMSE) compiled by Folstein and McHugh in 1975 and translated by Bertolucci et al.[11], consists of questions that evaluate the following cognitive functions: concentration, language, praxis, orientation, memory and attention span[12]. These questions are grouped into seven categories, which are: orientation by time [of day] (5 points), orientation by place (5 points), recording of three words (3 points), attention [span] and calculation (5 points), recall of three words (3 points), language (8 points) and constructive visual capacity (1 point). The MMSE score can range from a minimum of 0 to a maximum total of 30 points[13]. The cut-off point for cognitive decline takes into account schooling level, with 13 points for those who are illiterate, 18 points or less for those with 1 to 11 years of schooling and 26 points for schooling of more than 11 years[11].

The structured questionnaire was compiled by researchers from this study [group], covering socioeconomic and demographic characteristics of the elderly being surveyed, such as: age, sex, marital status, schooling and household income, and questions regarding the health status of the elderly person in question, such as: self-assessment of health status, self-reported diseases (quantity and types of disease) and medication consumption (quantity and type of medication).

For assessment of functional capacity, the Daily Living Activity Independency Index (Katz index) was used, developed by Katz (1963) and adapted for Brazilian reality by Lino et al.[14]. This scale consists of six items that measure the performance of the person in terms of self-care activities[14]. An elderly person was considered to be independent when they had no difficulty in performing any of the basic activities of daily living (BADL) and dependent, when they had difficulty in performing one or more of these activities.

QoL of the elderly was evaluated using the WHOQOL-BREF and WHOQOL-OLD instruments. The WHOQOL-BREF was translated and validated in Brazil by Fleck et al.[15], and consists of 26 items, two of which relate to global QoL and health in general, and the other 24 organized into four domains (physical, psychological, environmental, and social relationships)[15]. The WHOQOL-OLD was validated for Brazil's elderly population by Chachamovich et al.[16] and consists of 24 items distributed among six aspects: functioning of senses; autonomy; past, present and future activities; social participation; death and dying and intimacy. This is a specific instrument for the evaluation of QoL in elderly people[16], and should be applied together with WHOQOL-BREF. In both these instruments, the domains and aspects consist of questions the scoring of which, on the *Likert* scale, vary from 1 to 5 according to degree of satisfaction. The final scores vary from 0 to 100 and calculated by a criterion, with the highest number corresponding to the best QoL.

An electronic spreadsheet was drawn up for the storage of data using the Microsoft Office 2007 Excel® program. The data collected were typed in by two people, with double-entry, with subsequent checking for the existence of inconsistencies. In the event of discrepancies, the researchers referred back to the original interview to carry out the pertinent corrections.

The database was imported into version 17.0 of the *Statistical Package for Social Sciences* (SPSS) program. Each domain of WHOQOL-BREF and WHOQOL-OLD was weighted in isolation with its respective criteria. The categories of variables were analyzed by absolute and percentage frequency and numerically using average and standard deviation. To verify the factors associated with QoL, a preliminary bivariate analysis procedure was carried out, using the *t*-student test for comparison between the average scores in the domains in WHOQOL-BREF and the aspects in WHOQOL-OLD with the category variables: sex, marital status, schooling, income and health perception. The Pearson Correlation Coefficient was used for the correlation between the scores in the domains in WHOQOL-BREF and the aspects in WHOQOL-OLD and the variables, age, number of medicaments and morbidity rates, and functional disability in terms of BADL (Basic Activities of Daily Living). The tests were considered significant when $p < 0.10$.

The variables of interest in accordance with the inclusion criteria established ($p < 0.10$) were introduced into the multi-variable regression model. The variables of age, number of self-reported morbidities, medications and functional incapacity for BADL were considered quantitatively. Factors associated with QoL were identified using a multi-variable analysis of the multiple linear regression model (enter method), considering a level of significance of 5% ($p < 0.05$). Minimum prerequisites necessary were included in the analysis of the residual aspects (normality, linearity and homoscedasticity) and multi-collinearity.

This work was approved by the Ethics Committee of the Minas Gerais Triangle Federal University. The interviews were conducted after consent and the signing of a Free and Informed Consent form.

Results

In the 24 municipalities that make up the Southern Triangle Macro Region, 3430 elderly people aged 60 years and over were interviewed. The majority of the elderly were between the ages of 60 and 69 (52.6% - n = 1805), of the feminine sex (61.5% - n = 2111), lived with a partner (56.2% - n = 1920) and had one to four years of schooling (54.2% - n = 1859). The majority of the elderly had white skin (60.1% - n = 2058) and the highest percentage received an income of one to three minimum wages (48.6% - n = 1658), Table 1. They showed a perception of regular health (39.2% - n = 1342), the presence of one to four morbidities (73.7% - n = 2527), use of one to four types of medication (79.3% - n = 2721) and independency in terms of BADL (Basic Activities of Daily Living) (85.2% - n = 2923), Table 2. A significant percentage of the elderly had high blood pressure (65.8% - n = 2256), followed by musculoskeletal diseases (35.8% - n = 1227), hyperlipidemia (30.9% - n = 1060), arthritis (30.5% - n = 1045), heart disease (24.5% - n = 839) and diabetes (19.9% - n = 682). The highest percentage use anti-hypertensives (64.7% - n = 2218), followed by analgesics (39.2% - n = 1346), diuretics (32.1% - n = 1102), anti-depressants (16.4% - n = 562) and hypoglycemic (14.5% - n = 497).

The social relationships domain and the aspect of death and dying show the highest average scores (73.54 and 72.36 respectively). The lowest average scores were observed in the environment

Table 1. Distribution of socioeconomic and demographic variables among the elderly. Southern Triangle Macro Region, Minas Gerais, Brazil, 2013.

Variables	n	(%)
Age bracket		
60 to 69	1805	52.6
70 to 79	1219	35.5
80 and over	406	11.8
Sex		
Masculine	1319	38.5
Feminine	2111	61.5
Marital status		
Living with partner	1920	56.2
Living without partner	1497	43.8
Schooling		
Illiterate	1036	30.2
1 to 4 years	1859	54.2
5 to 8 years	334	9.7
9 or more	201	5.9
Skin color		
White	2058	60.1
Black	459	13.4
Brown	834	24.4
Yellow	74	2.2
Income		
No income	51	1.5
Up to 1 minimum wage	549	16.1
1 one minimum wage	755	22.1
1 to 3 minimum wages	1658	48.6
4 to 7 minimum wages	342	10.0
7 wages and over	58	1.7

* Minimum wage refers to the period in Brazil (2012-2013): R$678.00.

Table 2. Distribution of clinical variables, functional capacity and morbidities among the elderly. Southern Triangle Macro Region, Minas Gerais, Brazil, 2013.

Variables	n	(%)
Health perception		
Very good	377	11.0
Good	1268	37.1
Regular	1342	39.2
Bad	435	12.7
Morbidities		
0	345	10.1
1 to 4	2527	73.7
5 or more	558	16.3
Use of medications		
0	507	14.8
1 to 4	2721	79.3
5 or more	202	5.9
Basic Activities of Daily Living		
Independent	2923	85.2
Dependent	507	14.8

domain and from the aspect of autonomy (62.00 and 66.82 respectively), Table 3.

With respect to the associated factors, the variables in the preliminary bivariate analysis were submitted to multi-variable analysis, in accordance with the inclusion criteria established ($p < 0.10$). Tables 4 and 5 show linear regression models for QoL scores for the domains of WHOQOL-BREF and the aspects of WHOQOL-OLD among the elderly. The minimum prerequisites considered were met, and the determination coefficients varied from 0.036 to 0.293. It can be verified that the salient factor which most contributed to the lowest scores in all the domains and aspects of QL was the negative perception of health.

All the variables studied show association with at least one domain or aspect. There was association between the feminine sex and the lowest QoL scores in the psychological domain and from the aspect of death and dying. The advanced age variable was associated with the lowest scores in the physical domain and from the aspects of functioning of the senses and autonomy; except for death and dying in which the highest QoL scores were observed. The absence of a partner (a) was associated with the lowest scores in the social relationship domain and in the aspect of intimacy. The absence of schooling was associated with low scores in the physical, psychological, environmental domains; and the aspects of functioning of the senses, autonomy and social participation. Absence of income was associated with low QoL scores in the physical, psychological, environmental domains and the aspect of intimacy. The highest number of self-reported morbidities is associated with low scores in the physical domain and the functioning of the senses, death and dying aspects. The highest number of self-reported morbidities is associated with low scores in the physical domain and the aspects for functioning of the senses and death and dying, while the highest number of medication cat-

Table 3. Distribution of QoL scores in the domains of WHOQOL-BREF and aspects of WHOQOL-OLD. Southern Triangle Macro Region, Minas Gerais, Brazil, 2013.

QoL scores	Average	Standard deviation
WHOQOL-BREF		
Physical	63.53	16.45
Psychological	67.41	14.76
Social relationships	73.54	14.10
Environmental	62.00	13.23
WHOQOL-OLD		
Functioning of senses	70.83	22.35
Autonomy	66.82	16.36
Past present and future activities	70.45	14.70
Social participation	68.12	14.82
Death and dying	72.36	25.03
Intimacy	69.65	19.11

Table 4. Multi-variable linear regression models for QoL scores in WHOQOL-BREF in relation to the variables studied. Southern Triangle Macro Region, Minas Gerais, Brazil, 2013.

Variables	WHOQOL-BREF							
	F $R^2 = 0.293$		P $R^2 = 0.178$		RS $R^2 = 0.042$		MA $R^2 = 0.127$	
	β*	p**	β*	p**	β*	p**	β*	p**
Age	-0.065	< **0.001**	-0.006	0.70	-	-	-	-
Sex	-0.017	0.26	-0.091	< **0.001**	-	-	-0.005	0.77
Marital status	0.011	0.46	-0.030	0.06	-0.058	< **0.001**	-0.008	0.64
Schooling	0.090	< **0.001**	0.094	< **0.001**	-	-	0.091	< **0.001**
Income	0.033	**0.02**	0.035	**0.02**	-	-	0.057	< **0.001**
Health perception	0.423	< **0.001**	0.340	< **0.001**	0.166	< **0.001**	0.304	< **0.001**
Medication	-0.061	< **0.001**	-0.022	0.23	-0.019	0.32	0.014	0.45
Morbidities	-0.099	< **0.001**	-0.027	0.12	-0.013	0.49	-0.015	0.41
Functional incapacity	-0.146	< **0.001**	-0.096	< **0.001**	-0.064	< **0.001**	-0.093	< **0.001**

R2= Coefficient of determination; * Standardized linear regression coefficients; F: Physical; P: Psychological; RS: Social Relationships; MA: Environmental; ** p< 0,05.

Table 5. Multi-variable linear regression models for QoL scores in WHOQOL-OLD in relation to the variables studied. Southern Triangle Macro Region, Minas Gerais, Brazil, 2013.

Variables	WHOQOL-BREF					
	FS $R^2 = 0.108$		A $R^2 = 0.087$		APPF $R^2 = 0.080$	
	β^*	p^{**}	β^*	p^{**}	β^*	p^{**}
Age	-0.101	< **0.001**	-0.059	< **0.001**	-0.022	0.18
Sex	-0.017	0.30	-0.008	0.63	-	-
Marital status	-	-	-	-	-	-
Schooling	0.074	< **0.001**	0.048	**0.004**	-	-
Income	0.041	**0.01**	-	-	-	-
Health perception	0.242	< **0.001**	0.209	< **0.001**	0.247	< **0.001**
Medication	-0.010	0.58	-0.009	0.64	-0.029	0.12
Morbidities	-0.040	**0.03**	-0.029	0.12	0.004	0.83
Functional incapacity	-0.087	< **0.001**	-0.137	< **0.001**	-0.091	< **0.001**

Variables	PS $R^2 = 0.104$		MM $R^2 = 0.036$		I $R^2 = 0.071$	
	β^*	p^{**}	β^*	p^{**}	β^*	p^{**}
Age	-0.024	0.15	0.059	< **0.001**	-0.008	0.64
Sex	-	-	-0.090	< **0.001**	0.021	0.24
Marital status	-	-	-	-	-0.192	< **0.001**
Schooling	0.035	**0.03**	-	-	0.024	0.16
Income	-	-	-	-	0.057	< **0.001**
Health perception	0.272	< **0.001**	0.081	< **0.001**	0.142	< **0.001**
Medication	-0.014	0.45	-0.038	0.05	-0.011	0.55
Morbidities	-0.018	0.34	-0.041	**0.03**	0.013	0.50
Functional incapacity	-0.113	< **0.001**	-0.065	< **0.001**	-0.059	< **0.001**

R^2 = Coefficient of determination; * Standardized linear regression coefficients; FS: Functioning of senses; A: Autonomy; APPF: Past, present and future activities; PS: Social participation; MM: Death and dying; I: Intimacy; ** $p < 0.05$.

egories is associated with the lowest scores in the physical domain, Tables 4 and 5.

Discussion

With regard to the QoL domains, the highest score was obtained for the social relationships domain and the lowest for the environment. Divergences in results were found in research with 2052 elderly people in Sete Lagoas – MG, where the highest score was in the psychological domain (80.30) and the lowest score in the physical domain (41.00)[4]. The lowest score in the environmental domain suggests that the elderly people in this study may encounter difficulties in adapting to the locality where they live. These aspects may lead to dependency, lack of autonomy and social isolation[17].

In addition to this, the lowest score in the environmental domain may have been influenced by the higher percentage of elderly people in this study that live on an income of 1 to 3 minimum wages (48.6%). This situation may compromise the ability to meet the needs of the elderly people and consequently increase the risk of falling sick and have negative repercussions on their QoL[18].

A study carried out in the town of Barra Bonita – SP obtained the lowest score from the aspect of autonomy, compared to the others, a result which is consistent with the results of this research[17]. This condition may be related to the difficulty that elderly people have in making their own decisions; acting with freedom and in accordance with their wishes[19]. Furthermore, in this study, this result may have been influenced by the lower score in the environmental domain. As a result of this, health professionals should plan,

organize and coordinate their health initiatives in areas other than those were the elderly people are living, and in a way that aims to encourage the elderly to make decisions and declare their preferences.

The highest score in the death and dying aspect indicates that the elderly people are facing their concerns, worries and fears about the end of their life, in an optimistic manner[20]. For the other elderly people, awareness of their own age and expectations of a shorter future leads to a closer relationship with the idea of death, accepting it as an inevitable occurrence[21].

In addition to the domains and aspects which are the most negatively impacted among the elderly, it becomes fundamental to get to know the factors associated with these, in view of the fact that they can affect their health[4]. Furthermore, they contribute to the creation of support policies and systematic initiatives in the health services.

As seen in this research, advancing age is associated with low QoL, corroborating with the data found in national[4,22] and international investigations[23]. Although ageing is not synonymous with diseases, with the increase in age, the elderly become more susceptible to the appearance of one or more diseases, principally those which are chronically degenerative[24]; as well as a progressive decline in functional capacity[22], which can in turn negatively impact the QoL of the elderly. Thus, health professionals should take a broad view of the elderly, and be attentive to possible demands with the advancing of age.

Research carried out among the elderly that live in Poland showed that a high QoL depends on a good education (OR = 2.31; $p < 0.05$) and an income that is sufficient to live on (OR = 1. 63; $p < 0.05$)[25], thus diverging from the findings in this research. It should be pointed out that social determinants, such as schooling and income, should be considered in the practices carried out by health professionals, so as to maintain a balance between health and interference in terms of well-being, functional independence, and the QoL of the elderly[18].

Negative health perception is associated with the lowest scores in all the domains and aspects. Research carried out in Curitiba – PR found that the perception of negative health can have an influence on the QoL of elderly people[26]. Another investigation conducted among elderly people living in Sete Lagoas – MG found, after adjustment for sociodemographic variables, that the perception of positive health was among the principal determining factors for a good QoL[4].

A study has also indicated that elderly people who assessed their health better and have reported that they have no diseases, have the highest average scores in the physical and environmental domains[27]. In addition to this, for those elderly people who have a negative health perception, sentiments related to death and dying are more present for those who evaluate their health as good or very good[27]. It is thus believed that there is a need for health professionals to evaluate health perception, and that interventions should be applied bearing in mind this health indicator.

Another association found was between old people without partners (a) and the lowest score in the intimacy aspect, corroborating with the result found in a study conducted amongst old people living in the South of Brazil[27]. The absence of a partner may result in difficulties in the ability of the elderly person to form other personal and intimate relationships, thus having a great impact on the intimacy aspect[15].

Inadequate social support and insufficient health services, to achieve the highest longevity associated with a satisfactory QoL is one of the greatest challenges relating to public policies, with an increase in the allocation of resources to meet socioeconomic and sanitary demands[28]. In addition to this, these aspects may contribute to a tendency towards functional disability or impose new limitations on the lifestyle of elderly people[18].

In light of this, it is necessary for health professionals to consider the network support structure of a given elderly person, particularly those who do not have a partner (a), adopting a systematic approach and a way of stimulating and strengthening interaction and affectionate contacts with their family and the community[18,29].

An association was observed between the higher number of medication categories, with the lowest scores in the physical domain. The multiple use of medication by the elderly can affect morbidity/mortality and their QoL. Adverse reactions to medications are associated with negative therapy outcomes and may influence the doctor-patient relationship, as confidence in the professional can be shaken; delaying treatment, limiting the autonomy of the elderly person and affecting QoL; Furthermore, in many cases the treatment of adverse reactions involves the prescription of new medications, increasing the risk of cascade iatrogenesis[30].

Of particular note is the use of various medications which can cause dependency on the intermediation of third parties or treatments, an

aspect of evaluated in the physical domain[15] due to the fact that the elderly person may experience difficulties with respect to telling the time, and the appropriate use of the medication.

The greater number of self-reported morbidities is associated with low scores in the physical domain and the aspects of functioning of the senses and death and dying. A study carried out among elderly people who live in the town of Jyväskylä, in Finland, showed that the increase in the number of morbidities had a negative influence on the QoL of the elderly[31]. In view of this, they need is seen for health professionals to be involved in the managing and control of risk factors; of morbidities and already existing complications.

Functional disability is associated with the lowest scores in all the domains and aspects, corroborating the findings of other investigations[22,24]. Functional capacity features in a broader sense than only maintaining the health of the elderly, also having the purpose of giving emphasis to a life of self-sufficiency and independence, even with the presence of one or more diseases[32,33].

Thus, functional capacity is a central aspect for the obtaining of a good QoL in old age[22] and the results of the evaluation should be considered for the drawing-up of strategies for the promotion of health among elderly people, and interventions for difficulties already present.

The study presents a number of limitations, such as cross-sectional delineation, which does not enable causality links to be established, having not evaluated the activities instrumental in daily life and chronic diseases and self-reported medications, which could lead to underestimation or overestimation of some of the information found. In addition to this, there is a shortage of studies using the WHOQOL-OLD.

The socioeconomic and health factors associated with QoL among the elderly, with particular emphasis on the lowest QL scores in the environmental domain associated with the absence of schooling and income, negative health perception and functional disability; and from the autonomy aspects, with greater age, absence of schooling, negative health perception and functional disability. The salient factor that exercises the greatest influence was negative health perception.

The results found here reinforce the necessity for the evaluation of QoL as a significant health indicator amongst the elderly, so that appropriate interventions can be planned based on factors which are having a negative impact on it.

Collaborations

MHP Paiva contributed to the design and writing of the article, revision critique and approval of the version to be published. MS Pegorari contributed to the concept, design, analysis and interpretation of the data, revision critique and approval of the version to be published. JS Nascimento contributed to the design, revision critique and approval of the version to be published. AS Santos contributed to the design, revision critique and approval of the version to be published.

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