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Factors in adult health-related quality of life: a population-based study

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Abstract *This study aimed to investigate factors associated with the physical health components (PHC) and mental health components (MHC) of health-related quality of life in adults. It is a population-based study, with household cluster sampling. The dependent variables were the PHC and MHC scores in the 12-Item Short-Form Health Survey (SF-12); the independent variables were social-demographic characteristics relating to health and behaviors. A multiple regression was made by the General Linear Model. Of the 841 interviewees, 31% had PHC adversely affected, and 37.2% had MHC adversely affected; 57% had adverse score in at least one domain. The average scores were 49.9 for the physical health component and 47.1 for the MHC. Higher scores on the PHC were associated with: being male (β = 1.94), having a car in the family (β = 0.89), having recently used dental services (β = 1.86), not having a chronic disease (β = 4.60), not using any medication (β = 2.09), not being a smoker (β = 2.04) and practicing physical activities (β = 1.73). Higher scores on the MHC were associated with not using medication (β = 1.91) and not being a smoker (β = 1.26). There is a need for further studies and policies aimed at maintaining and/or recovery of the physical and mental wellbeing of adults without specific diseases.*

Key words *Quality of life, Adult, Health profile, Population surveys*

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Introduction

The World Health Organization (WHO)[1] defines Quality of Life (QOL) as "the individual's perception of his own position in life in the context of the culture and value systems in which he lives and in relation to the related objectives, expectations, standards and concerns". Since this is a dynamic, wide-ranging, subjective and polysemic concept[2], various terms have been used in the literature to define QOL, such as well-being[3], degree to which people take advantage of the possibilities of their lives[4], perception of satisfaction with life[2]. The broad dimension of health and its relationship with various positive and negative aspects of life allow for various different forms of assessment, leading individuals with the same illnesses to manifest different levels of physical and/or emotional health and wellbeing. Based on these questions and on the multidimensional nature of QOL, the concept of Health-related Quality of Life (HRQOL), developed, and also a proliferation of instruments to measure it[3].

The instruments of HRQOL, created to transform subjective feelings into marks that were able to undergo measurement and objective analysis, have been used in the literature in recent years, although some are considered to be very extensive and/or complex for application and analysis. Commonly the instruments to measure HRQOL present questions divided into groups (also called domains or components), and aim to evaluate some specific aspects of limitation of health and wellbeing[4,5]. Among the instruments most used, we may highlight the *World Health Organization Quality of Life Assessment* (WHOQOL), the *Medical Outcomes Study 36-Item Short Form* (SF-36) and the *12-Item Short-Form Health Survey* (SF-12)[4]. The latter is internationally recognized and widely used in assessment of HRQOL in population studies, due to its being short, understandable, able to monitor outcomes in health in both general and specific populations[5], and having satisfactory psychometric properties[6]. It provides summary scores for the physical health component (PHC) and the mental health component (MHC) of the HRQOL.

Prior studies have evaluated the HRQOL in specific populations, normally institutionalized populations and/or populations with some chronic disease, including prostate cancer[7], advanced stage cancer[8], sickle cell anemia[9], liver disease[10], generalized chronic pain[11], people undergoing hemodialysis[12], and others. However, there is a great scarcity of studies on HRQOL conducted among adults of the population in general who do not have any specific pathology and are not institutionalized – although there is an increasing recognition of the importance of generating data related to health and HRQOL of this population stratum. Adults are the majority of the population, they demand health services, they have epidemiological particularities, and, because they are mostly workers, their conditions of health and wellbeing can have an important economic and social effect, both in the context of the family and in the economy of the country[13,14]. Also, adults have a decisive influence in the behavior of their dependents and, by this route, patterns of behavior and lifestyles adopted between adults[13], such as the consumption of tobacco or alcoholic drinks, and practice of physical activities, as well as influencing the level of potential for disease in the medium and long term, can have consequences for future generations.

In this context, this study investigated, using the SF-12, the PHC and MHC of the HRQOL, and its association with social-demographic characteristics, in relation to health and behaviors in a representative sample of adults of the community, that is to say, people who are not institutionalized and are not suffering from specific systemic conditions.

Methodology

This was an analytical cross-sectional study conducted on adults aged 35 to 44 in the municipality of Montes Claros, considered to be the principal city of the north of the Brazilian State of Minas Gerais – which, for this reason, has the characteristics of a regional capital, with a radius of influence that includes the whole of the north of the State of Minas Gerais and part of the south of Bahia. In 2013, the Brazilian Geography and Statistics Institute (IBGE) estimated its population at 385,898[15]. With an urbanization rate of approximately 90%, the municipality had 224 health establishments in 2009. Its Human Development Index (HDI) is 0.77, considered to be high in relation to the country. The industry and commerce of the municipality are important economic activities for the region[16].

Sampling: With the aim of obtaining good representation of the adults in the municipality, a complex, probabilistic sampling by clusters and with guarantee of proportionality of gender (54% female, as estimated for the population of the municipality by the IBGE[17]) was proposed.

The calculations showed the need to evaluate 762 adults, assuming a prevalence of events or illnesses at 50%, absolute error of 5.5%, confidence level of 95%, deff equal to 2.0, and non-reply rate of 20%. A prevalence of 50% was adopted to ensure power of inference for a larger number of outcomes, due to the multiplicity of outcomes as investigated in the umbrella project that gave rise to the present study. For the data collection, which was carried out in households, in the urban area, a probabilistic cluster sample was adopted in two stages, the first being the urban census sectors (Primary Sampling Unit – PSUs) and the second comprising the city blocks (Secondary Sampling Units – SSUs). In the rural areas, a choice was made in favor of a probabilistic cluster sample in a single stage, in which the PSUs comprised the rural areas. The PSUs were chosen by simple random selection. Of the 276 urban census sectors, 52 were chosen by lots, and from the 11 rural areas, two were chosen, as per the map of the municipality with the sectors as defined by the IBGE[17]. In the second stage between 1 and 11 city blocks were chosen by lot in each one of the 52 sectors, totaling 354. Non-residential city blocks (those constituted by squares, churches, industrial companies, barracks or prisons) were excluded. In the rural areas, all the households within a distance of up to 500 meters from an institution of reference were selected. All the households situated in the area selected were sequentially visited, and the adults (aged 35-44) were invited to participate. The option to confer proportionality by gender in the sample (maintaining the same proportion as estimated for the population of the municipality) sought to avoid over-estimation of the feminine gender, as had occurred in other household surveys[18]. More details on the sampling adopted can be found in a prior publication[19].

Data collection: The interviews were carried out in the households where adults in the chosen age bracket were found. These were duly informed about the survey and invited to participate. All those included in the study signed an informed consent form. Those households where, although they were in the street blocks chosen by lots, no residents were found after three attempts at contact on different days and shifts, were excluded. The interviews were carried out by trained interviewers and the data collected on palm top devices, using a software developed specifically for this survey, enabling simultaneous construction of the data bank.

Variables of the study: HRQOL was evaluated by the SF-12[5] in its version validated in Brazil by Camelier[4]. This is a more concise version of its predecessor, the SF-36[5], easier and faster to apply, and sensitive to evaluation of different levels of HRQOL, reliable, and with satisfactory internal consistency[6]. The instrument comprises 12 items that assess the dimensions: functional capacity, physical aspects, pain, general state of health, vitality, social aspects, emotional aspects and mental health, considering the perception of the individual in relation to the aspects of his/her life in the most recent four weeks. Each one of the 12 items has a group of possible answers distributed on a Likert-type scale, with the possibility, using an algorithm specific to the questionnaire, of calculating its two components: The Physical Component Summary (*Physical Component Summary* or PCS) and the mental component (*Mental Component Summary* or MCS). These scores are transformed into a scale of zero to 100, the higher values being correlated to better HRQOL[20]. The scores obtained for each one of the domains were considered as the dependent variables of this study.

The independent variables were grouped into three groups: *Social-demographic characteristics, characteristics in relation to health, and behavioral characteristics.*

Social-demographic characteristics: Gender, age, marital status, self-declared skin color, level of schooling, income, present work, residency and whether the family owns a car. The variable *gender* was maintained as collected. The variables age, number of years' schooling, income and ownership of a car, although collected in a discrete quantitative form, were grouped into categories.

Characteristics relating to health: Use of dental services in the last year, chronic disease, and daily use of medication, maintained as collected.

Behavioral characteristics: Use of tobacco (current smoking habit), consumption of alcoholic beverages (frequency of consumption of alcoholic drink) and practice of physical activity (frequency of physical activity). The variable relating to smoking was presented as collected. The other variables, although collected using a Likert scale, were regrouped into new categories.

Analyses conducted: The statistical software Predictive Analytics Software (PASW/SPSS)® version 18.0 for Windows®, was used. All the estimates were conducted obeying the need for correction for the effect of design, due to their being sourced from cluster samples. In this case, differ ent weightings were attributed to the sample elements to compensate the various probabilities of

inclusion, also taking into account the effect of the cluster and the non-response rates.

Initially, descriptive analyses were conducted of all the variables involved. Simple frequencies and corrected percentages were presented. Measures of central tendency (average) and variability (standard error), also corrected, were estimated for the description of the PHC and MHC assessed by the SF-12. Also, a lower limit of CI-95%[21] of the estimated average was adopted as cutoff point for PHC and MHC: individuals obtaining scores below the cutoff point, for each of the domains separately, were considered as negative perception of QOL for the domain in question. To estimate the general prevalence of negative perception of HRQOL, the individuals who presented adverse scores on the PHC or the MHC were used.

The association of the PHC and MHC (dependent variables), with the characteristics investigated, were verified using the Student's t-test and Anova Variance Analysis. The variables that presented a descriptive level (p-value) of 0.20 or less in the bivariate analyses were selected for the multivariable analysis. For this, the General Linear Model (GLM) was used, in which the PHC and the MHC were considered as dependent variables and the selected characteristics as independent variables. The final models were adjusted, maintaining only the variables associated with each domain (descriptive level 0.05 or lower).

Ethical implications: All the participants signed the informed consent form, as set out in Chapter IV of CNS Resolution 196/96. The collection of data qualifies in the Minimum Risk mode of surveys (CNS Resolution 196/96), and the data were obtained after approval of the protocol of the survey by the Institutional Research Ethics Committee.

Results

Of the 924 adults invited to take part in the survey because they lived in the clusters selected by lot, 841 accepted, representing a response rate of 91%. The average age was 39.5. A small predominance of the feminine gender was found. The majority said they were married or had a stable union, stated themselves to be of indigenous blood or negro or mixed-race, did not have an automobile, but had their own home. Level of schooling and per capita income were relatively low: 75% reported having up to 11 years' schooling and 70% per capita income up to R$ 300.00. Just over a quarter reported not having any formal employment. In the characteristics related to health and behavior, the majority stated they had not used dental services in the last year, did not have a chronic disease, did not take medications daily, did not use tobacco nor alcoholic beverages and never or rarely practiced physical activities (Table 1).

The average values, standard error and CI-95% obtained for the PHC and for the MHC were, respectively, 49.9 (SE 0.50; CI-95% 48.9-50.9) and 47.1 (SE 0.26; CI-95% 46.6-47.7). According to the cutoff points adopted (48.9 for PHC and 46.6 for MHC), 31% and 37.2% of the adults presented negative perception of HRQOL in relation to PHC and MHC, respectively. Of the total of the adults surveyed, 57% thus presented negative perception of HRQOL in at least one domain.

Table 1 compares the averages of PHC and MHC by social-demographic characteristics, and characteristics related to health, and behavior (by variate analysis). At the level of 0.20, the following variables presented associations with both domains of the HRQOL and were included in the multivariable analysis: currently in work, chronic disease, daily use of medication, use of tobacco and practice of physical activity. PHC was further associated with gender, age, level of schooling, income, family ownership of a car, use of dental services and consumption of alcoholic beverages, and there was also observed to be an association between MHC and marital status.

In the multivariable analysis (Table 2) the factors associated with higher PHC scores were: Being male ($\beta = 1.94$), family possession of a car ($\beta = 0.89$), having used dental services in the last year ($\beta = 1.86$), not having a chronic disease ($\beta = 4.60$), not using any medication daily ($\beta = 2.09$), not using tobacco ($\beta = 2.04$) and practicing physical activity ($\beta = 1.73$).

The variables associated with higher HRQOL scores in relation to MHC were: Not using medication daily ($\beta = 1.91$), and not using tobacco ($\beta = 1.26$) (Table 3). In a complementary way, Table 4 shows the distribution of adults investigated according to each question from the SF-12.

Table 1. Distribution of responses in adults (n = 841), Montes Claros, Minas Gerais, Brazil, with bivariate analysis of the Physical Health Component (PHC) and Mental Health Component (MHC) of the SF-12, by social-demographic characteristics and characteristics relating to health and behavior.

Characteristics	n	%†	PHC†			MHC†		
			Average†	Standard error†	p value	Average†	Standard error†	p value
Social-demographic characteristics								
Gender*					**<0.001**			0.981
Male	380	46.1	51.38	0.39		47.12	0.28	
Female	461	53.9	48.72	0.42		47.11	0.30	
Age*					**0.002**			0.402
34-39	434	52.6	50.80	0.41		47.29	0.29	
40-45	407	47.4	48.98	0.43		46.94	0.31	
Marital status*					0.823			**0.058**
Married/stable union	615	74.6	49.96	0.34		47.36	0.24	
Single/widowed	226	25.4	49.81	0.58		46.47	0.41	
Skin color – self-reported*					0.639			0.838
White/yellow	269	31.0	49.72	0.53		47.18	0.37	
Indigenous/negro/mixed-race	572	69.0	50.02	0.35		47.09	0.25	
Level of schooling**					**0.015**			0.664
More than 11 years' study	217	25.1	51.12	0.55		47.07	0.42	
5-11 years' study	510	60.6	49.78	0.38		47.03	0.26	
Up to 4 years' study	112	14.4	48.30	0.83		47.59	0.60	
Income**					**0.121**			0.718
Over R$ 300.00 per capita	251	30.0	50.83	0.53		47.31	0.36	
R$ 120.00 – R$ 300.00 per capita	385	46.4	49.46	0.45		46.93	0.32	
R$ 0.00 – R$ 120.00 per capita	174	23.6	49.56	0.63		46.98	0.46	
Work status*					**0.005**			**0.028**
In work	611	71.7	50.44	0.33		47.39	0.23	
Not working	225	28.3	48.57	0.63		46.35	0.47	
Place of residence*					0.289			0.405
Owned	667	81.0	49.76	0.33		47.03	0.24	
Rented / lent	174	19.0	50.53	0.64		47.45	0.43	
Car owned in the family*					**0.161**			0.552
Yes	266	30.6	50.53	0.49		47.29	0.36	
No	575	69.4	49.64	0.37		47.03	0.25	

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Discussion

This survey showed a high percentage of low HRQOL among adults, since more than half of the subjects investigated (57%) presented negative perception of HRQOL either in PHC or in MHC. Considering that this is a sample of adults in general of the community, not selected by reason of presenting any specific pathology, the result is a matter of concern. MHC had a higher occurrence of adverse values, and a lower average score, than PHC. Daily use of medication, and the habit of smoking, were associated with lower levels of HRQOL, both in PHC and in MHC. PHC was further associated with gender, family ownership of a car, use of dental services, chronic disease and practice of physical activity.

Average values obtained for PHC (49.9) and MHC (47.1) were similar to those found in a population-based study in the city of São Paulo, comparing 108 people suffering from Chronic Obstructive Pulmonary Disease – CPOD (PHC = 49.7; MHC = 50.4) and 670 controls (PHC = 51.9; MHC = 51.5), in which the average age of the sample investigated was 54[4]. Considering that this present survey was conducted on adults in general, not suffering from any specific disease, and that the average age was 39.5, a greater HRQOL would be expected for the adults of Montes Claros than for people suffering from COPD, but

Table 1. continuation

Características	n	%†	PHC†			MHC†		
			Average†	Standard error†	p value	Average†	Standard error†	p value
Characteristics related to health								
Has used dental services in the last year*								0.340
Yes	379	45.7	50.84	0.41	**0.005**	46.90	0.31	
No	462	54.3	49.17	0.42		47.30	0.28	
Chronic disease*								**0.040**
Absent	433	51.3	53.00	0.27	**<0.001**	47.54	0.22	
Present	403	48.7	46.70	0.49		46.68	0.35	
Daily use of medication*								**<0.001**
No	627	74.2	51.38	0.29	**<0.001**	47.60	0.20	
Yes	214	25.8	45.61	0.73		45.68	0.55	
Characteristics related to behavior								
Use of tobacco*								**0.017**
No	636	75.2	50.37	0.33	**0.008**	47.40	0.23	
Yes	204	24.8	48.55	0.66		46.25	0.48	
Alcohol consumption**								0.950
Never	486	58.5	50.23	0.37	**0.009**	47.11	0.26	
Occasional	79	9.3	50.18	1.19		47.18	0.73	
Frequent	274	32.2	47.13	0.50		46.94	0.39	
Practices physical activity**								**0.165**
Always/frequently	174	19.8	51.65	0.57	**0.003**	47.68	0.42	
Never/rarely	665	80.2	49.47	0.34		46.97	0.24	
PHC ref. cut-off point*								
Positive perception	576	69.0						
Negative perception	263	31.0						
PHC ref. cut-off point*								
Positive perception	517	62.8						
Negative perception	322	37.2						

† Estimates corrected for the effect of the sample design. * Student 't' Test. ** ANOVA.

this was not the case. At the same time, the average found for the PHC among adults of Montes Claros was higher than that found in people with prostate cancer (43.5)[7], individuals in hemodialysis (39.7)[12], and patients with advanced stages of cancer (37.1)[8], although it was lower than that found for individuals with generalized chronic pain (53.8)[11]. As for MHC, the average found for adults of Montes Claros was lower than that found for people with prostate cancer (52.1)[7] and people with generalized chronic pain (53.0)[11]; close to the level found for people undergoing hemodialysis (47.7)[12]; – and higher than the levels found for patients with advanced stage cancer (43.8)[8] and among patients with chronic liver diseases (43.01)[10]. Identification of higher average scores for PHC than MHC had already been found in previous studies using the SF-12[10,11,22].

Further, it is worth highlighting that to estimate the occurrence of negative perception of HRQOL, the lower limits of the CI-95% of the sample average obtained[21] (48.9 for PHC and 46.6 for MHC) were adopted as cutoff points for PHC and MHC. Some studies have adopted cutoff points of 50 for PHC and 42 for MHC[5,22]. However, the adoption of an arbitrary and single cutoff point for all the studies may possibly not be the best way of identifying individuals with adversely affected QOL, since their levels vary in different populations, with different age groups and different contexts. Thus, adoption of specific cutoff points for each study carried out was suggested, and adoption of the lower limit of the CI-95% appears to be appropriate for differentiating individuals with lower QOL taking into account the specific average levels of the population under study[21].

Table 2. Multivariable analysis of the Physical Health Component (PHC) of SF-12, by social-demographic characteristics, and characteristics relating to health and behavior – adults of Montes Claros, Minas Gerais State, Brazil; with estimated coefficients (β) by the General Linear Model (GLM) with their respective standard errors (SE).

	PHC†			
Parameters	**β**	**CI 95%**	**p value**	***Deff***
Intercept	46.25	44.11-48.40	< 0.001	1.94
Gender			-	-
Male	1.94	3.32-0.57	0.007	1.70
Female	Reference	-	-	-
Car owned in the family				
Yes	0.89	0.03-1.76	0.043	0.68
No	Reference	-	-	-
Use of dental services in the last year				
Yes	1.86	0.85-2.87	0.001	1.01
No	Reference	-	-	-
Chronic disease				
Absent	4.60	3.66-5.55	< 0.001	0.80
Present	Reference	-	-	-
Daily use of medication				
No	2.09	0.25-4.43	0.049	1.90
Yes	Reference	-	-	-
Use of tobacco				
No	2.04	0.31-3.76	0.022	0.62
Yes	Reference	-	-	-
Practice of physical activity				
Yes	1.73	0.82-2.63	<0.001	2.04
No	Reference	-	-	-

† Estimates corrected for the effect of the sample design. R2 = 18%.

Table 3. Multivariable analysis of the Mental Health Component (MHC) of SF-12 by social-demographic characteristics, and characteristics relating to health and behavior – adults of Montes Claros, Minas Gerais State, Brazil; with estimated coefficients (β) by the General Linear Model (GLM) with their respective standard errors (SE).

	CF†			
Parameters	**β**	**CI 95%**	**p value**	***Deff***
Intercept	44.77	43.18 - 46.36	< 0.001	1.41
Daily use of medication				
No	1.91	0.37 - 3.44	0.016	1.97
Yes	Reference	-	-	-
Use of tobacco				
Absent	1.26	0.42 - 2.09	0.004	0.69
Present	Reference	-	-	-

† Correction for design effect. R2 = 3%.

Prior studies found the influence of some of the social-demographic characteristics, and characteristics related to health and behavior, on HRQOL[4,22-26]. Higher levels of HRQOL in the PHC for male individuals had already been found in Brazilian literature[12,26,27] and international literature[11,25,28]. A prior study showed that women were more concerned with their state of

Table 4. Distribution (n and %) of responses by adults of Montes Claros, Brazil, in each question of the SF-12.

Item	Possible answers	n	%†
1. In general, how would you describe your health?	Excellent	74	8.8
	Very good	209	24.9
	Good	341	40.6
	Regular	184	21.9
	Bad	31	3.7
2. Difficulties in moderate activities such as moving a table, using a vacuum cleaner, playing ball, sweeping the house	Yes – great difficulty	42	5.0
	Yes – little difficulty	112	13.3
	No difficulty	685	81.6
3. Difficulty in going up several flights of stairs	Yes – great difficulty	31	3.7
	Yes – little difficulty	93	11.1
	No difficulty	715	85.2
4. Do you carry out less tasks than you would like?	Yes	170	20.3
	No	669	79.7
5. Do you feel difficulty in your work or in other activities?	Yes	172	20.5
	No	667	79.5
6. Do you do less than you would like to do, because of emotional problems?	Yes	150	17.9
	No	689	82.1
7. Have you worked, or done any of the activities, with less care than you usually do?	Yes	126	15.0
	No	713	85.0
8. During the last 4 weeks, how much has pain interfered with your normal work?	Not at all	546	65.1
	A little	122	14.5
	Moderately	70	8.3
	Quite a lot	82	9.8
	Extremely	19	2.3
9. How often do you feel calm and tranquil?	All the time	26	3.1
	Most of the time	125	14.9
	A good part of the time	100	11.9
	Some of the time	181	21.6
	A small part of the time	324	38.6
	Never	83	9.9
10. How often do you feel you have a lot of energy?	All the time	18	2.1
	Most of the time	89	10.6
	A good part of the time	77	9.2
	Some of the time	170	20.3
	A small part of the time	369	44.0
	Never	116	13.8
11. How often have you felt discouraged and depressed?	All the time	9	1.1
	Most of the time	31	3.7
	A good part of the time	64	7.6
	Some of the time	87	10.4
	A small part of the time	305	36.4
	Never	343	40.9
12. During the last 4 weeks, how often have your physical health or emotional problems interfered with your social activities?	All the time	16	1.9
	Most of the time	22	2.6
	A good part of the time	40	4.8
	Some of the time	45	5.4
	Never	716	85.3
Total		839	100

† Estimates corrected for the effect of the sample design.

health and seek more medical care than men[29] and, thus, may present a greater proportion of adversely-affected HRQOL[26] than men.

It was interesting to observe that although ownership of a car did not apparently have a direct relationship with HRQOL, it was shown to

be associated with PHC, increasing HRQOL in the PHC by 0.89 units in relation to people whose family did not have a car. Where families do not own cars, and are possibly dependent on public transport for daily travel, the problems of transport infrastructure and the quality of transport used could adversely affect peoples' mobility and their capacity to carry out routine travel. A study in São Paulo observed that mobility was directly related to citizens' QOL, and brought with it the possibility of people participating in the activities that they wanted to participate in[30].

Use of dental service in the last year was found to be associated with higher levels of HRQOL in the PHC. A prior study showed that the effects of oral disorders were associated with a negative perception of HRQOL, in the PHC and MHC of the SF-12[31]. Oral diseases can adversely affect HRQOL and operate restrictions on individuals' daily activities. The recent use of dental services can minimize such effects and give the sensation of "being up-to-date with oral health".

At the same time, absence of chronic diseases had a pronounced effect of increasing (by 4.6 units) the levels of HRQOL in the PHC. It is not surprising that this variable was the one that made the largest contribution in the multiple model of the PHC, since the SF-12 focuses on well-being related to conditions of health. A prior study held on a sample of 755 individuals of the general population of Porto Alegre, aged 20 to 64, using the SF-36, also showed less good HRQOL for those who had self-related chronic disease[26]. Also, studies of those suffering from some chronic disease also showed a significant increase in levels of HRQOL for the control subjects having no disease[4,10]. It has also been observed that the presence of co-morbidities significantly reduces HRQOL[7,25,28,32]. No association was found in this present investigation between reporting of chronic disease and MHC – which was a surprise. Perhaps, because of the characteristics of the population researched, relatively young adults, that were not suffering from specific diseases, most of them functionally independent and in work, the fact of reporting a chronic disease was not a sufficient factor to motivate an effect on the MHC of HRQOL.

The need for daily use of medication, on the other hand, was shown to be associated with HRQOL both in its PHC and MHC. The need for daily use of medication is, probably, due to the presence of chronic conditions, which is strongly associated with worse levels of HRQOL, as has been extremely widely shown in the literature[4,10,11,26,33,34]. Daily use of medication possibly carries with it the idea of a more serious disease, dependence and obligation, acting as a factor for anxiety and/or depression. A prior study showed that anxious or depressive individuals had, respectively, four and five times the risk of having lower MHC scores[11].

Adults that did not report a smoking habit presented a higher HRQOL both in the PHC and MHC, than those that smoke. A study with 60 patients who took part in a program to give up smoking, to evaluate HRQOL using the SF-36, found ex-smokers to have a significant improvement in PHC and MHC after the program of one year of abstinence[35]. In the present survey it was found that non-use of tobacco increased HRQOL by 2.04 units in the PHC and 1.26 units in the MHC, and this is compatible with the previous studies[36,37] which found that active smokers report a worse general state of health than non-smokers or ex-smokers. Once again, the question of daily dependency seems to be associated with the MHC of HRQOL. The smoker, as well as suffering from the dependency itself, suffers strong pressure from society, which often blames these individuals – rather than supporting them in a change to healthier behavior, in line with the principle of 'promotion of health' – giving rise to forms of social exclusion, prejudice, feelings of blame and fear, leaving them at the mercy of themselves and their addiction[38]. This shows the importance of programs for support in giving up the smoking habit for greater wellbeing and health of the population, based on 'health literacy', a relatively new concept in Health Promotion, used to describe the results of the activities of education and communication, focusing on giving people better access to health information and on individuals' capacity to use such information efficiently, providing the basis for empowerment[39].

The practice of physical activity, found in only 20% of the adults interviewed, was shown to be associated with better levels of HRQOL in the PHC. Other studies have already shown that regular practice of physical activity and greater physical aptitude are associated with lower rates of mortality and better HRQOL in populations of adults[40] and adolescents[22]. There are increasing numbers of data showing that exercise, and physical aptitude and activity are related to prevention and rehabilitation of diseases and QOL and wellbeing[40,41], and that these behaviors should be stimulated and that public policies should ensure that there are appropriate situations and envi-

ronments for such practices.

This study made a multiple regression through the general linear model, which is indicated for numerical dependent variables and offers the advantage of observing the magnitude of the impact on the dependent variable with alteration of one unit in the independent variable, which makes the analysis more sensitive. Generalized linear models were formulated as a way of unifying various statistical models, including linear, logistical and Poisson regression, under a single theoretical framework, making it possible to develop a general algorithm for the estimate of maximum verisimilitude in all these models[42]. A prior investigation, investigation, of adolescents[22], had adopted a general linear model in the analysis of data coming from the SF-12.

A limitation of this work relates to the fact that it is a cross-sectional study, which does not allow a temporal relationship to be established between QOL and the independent variables researched. As for the percentage of variance explained by the final models, it is found that this was modest (adjusted R^2 of 18% for PHC and 3% for MHC), largely because QOL represents a complex and multifactorial outcome, and it is probable that important explanatory variables have not been included in the analyses, indicating that only a partial comprehension can be achieved through epidemiological studies of this type. Unfortunately, most of the studies do not present the percentage of the variance that could be explained by the models obtained, making comparisons in this respect difficult.

The absolute error adopted in the calculation of the sample size was 5.5%, resulting in n = 762 individuals. If an absolute error of 5% were adopted in the sampling planning, keeping the other parameters fixed, the final sample calculated would be 819 individuals, lower than the one obtained in reality (n = 841). That is to say, the final sample ensured power of inference considering an absolute error of 5%. It should be further commented that this study is a sub-section of a larger project. The sampling calculation of the larger project was made for an estimate of a prevalence (50%, so as to ensure a larger sample and, consequently, a higher power of inference for the various outcomes investigated). However, the objective of the present investigation was not to estimate a prevalence, but averages, and the linear model was adopted to identify the factors that could contribute to higher average levels of QOL, both in its PHC and its MHC. Thus, if the calculation of the sample size were revised to attend specifically to the objectives of this present investigation, we would have an even lower error than the one indicated (5%). A simulation adopting the formula n = 50 + 8K (where k = the number of independent variables of the linear model)[43] showed that the size of the sample was well above the necessary size, ensuring a lower error and, consequently, a higher power of inference for the outcome investigated.

Further investigations are necessary to achieve increasingly good understanding about adult HRQOL and well-being, concomitantly including physical, social, cultural, and behavioral variables, such as health literacy, social capital, occurrence of psychic disorders, access to the health services, work satisfaction, composition of the family, religiosity and spirituality, all of which have so far been little studied in relation to QOL.

Conclusion

The high prevalence (57%) of adverse effect on HRQOL among adults of the community in general is a concern. It was found that being male, having a car in the family, having recently used dental services, not having a chronic disease, not using medication daily, not being a smoker, and practicing physical activities were related to higher levels in the PHC of the HRQOL. Also, not using daily medication, and not being a smoker, were associated with higher levels in the MHC of the HRQOL. The adult population, because of its social and economic importance, deserves greater attention from studies and an increase in policies designed to maintain and/or recover its physical and mental well-being.

Collaborations

DD Noronha trabalhou na concepção e na redação do manuscrito. DS Dias e MF Silveira trabalharam na concepção, nas análises e na revisão final. AMB De-Paula e AMEBL Martins trabalharam na pesquisa e revisão final do manuscrito. DS Haikal trabalhou na pesquisa, na concepção do trabalho, análises dos dados e redação do manuscrito.

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