Negative self-rated health in the elderly in cities with different levels of economic well-being: data from FIBRA

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Abstract *This comparative, cross-sectional study analyzed negative self-rated health in elderly people, according to sociodemographic and health variables, use of public or private health services, functional performance, frailty and depressive symptoms. The participants lived in Belém (n = 571) and Campinas (n = 676), cities with different socioeconomic conditions, and the research formed part of a multicentric study on frailty (Fibra Study, Unicamp). Multivariate regression analysis showed that in both cities, negative self-rated health was associated with low education, three or more chronic diseases and sight deficiencies. In Belem, additional observations included associations with fatigue, three or more signs and symptoms and use of public health services; in Campinas, negative self-rated health was also associated with depressive symptoms. The associations suggest that poor health in old age is the result of an accumulation of deficits for lack of socioeconomic resources throughout life and that deficits are not sufficiently compensated for health services in old age.*
Key words *Aging, Self-rated health, Chronic diseases, Health services, Socioeconomic factors*

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Introduction

The population aging process underway in Brazil has been accompanied by increased prevalence of chronic diseases, use of medications and hospitalizations in the elderly[1]. Such occurrences are exacerbated by disability, which is characterized as the inability or difficulty to perform tasks that are part of everyday life, and which are indispensable for independent living in the community[2]. Disability, chronic diseases, falls, hospitalizations and mortality are seen as risks associated with the clinical syndrome of frailty, marked by fatigue, unintentional weight loss, physical inactivity, low grip strength and slow walking speed, as described by Fried et al.[3].

Lower levels of education and lifelong poverty can give rise to adverse and cumulative effects to health, nutritional habits, self-care and adherence to health treatments. The continuity of these conditions into old age particular affects quality of life in the health of the elderly[4]. Poverty and low access to health services have been described as variables associated with frailty[3,5].

The subjective health assessment has been associated with the decline of functional autonomy[6], disability and chronic diseases[7] among the elderly. Self-rated health is global and evaluative, involving answers that are characterized as a personal judgment about the quality of physical and mental health, based on individual and social criteria[8]. Since it has an effect on overall sense of well-being, self-treatment and adherence to health treatment[9], health assessments are recommended by the World Health Organization (WHO) as an important indicator of population health.

Self-rated health was used in Brazil as an outcome variable for the first time in Bambuí Project[10]. The results of this pioneering study showed a multidimensional structure of self-rated health in the elderly, which comprises socioeconomic status, social support, physical health, depressive symptoms, and access to and use of health services.

Survey data conducted in Brazil and overseas suggest that age, sex, material well-being and level of education are relevant dimensions of self-assessment of health status[11-13]. The negative self-perception of health in the elderly is associated with chronic diseases, disability, vision and hearing deficiencies, the inability to leave home alone or to carry out exercise, as well as psychosocial factors[6,14,15]. The negative health assessments do not refer exclusively to feelings of physical pain and discomfort, but also to the social and psychological consequences of diseases[16].

There is no Brazilian data on health self-assessment in the elderly living in cities with different socio-economic levels, considering other health indicators and sociodemographic variables. Knowledge about the correlates of self-rated health can guide policies and programs to improve healthcare for the elderly.

The objectives established for this study were: a) to compare the profile of the elderly, 65 years or more, living in Belém (Pará State) and Campinas (Sao Paulo State), taking into consideration self-assessed health, sociodemographic variables and other health indicators, including access to and use of health services b) in each city, to examine the associations between negative self-rated health, socio-demographic variables and other health variables.

Methods

The research was based on an electronic database from the study 'Frailty of the Brazilian Elderly' (FIBRA Study, University of Campinas, 2008-2009), from the multicenter and cross-sectional project , which aimed to investigate the relationship between frailty indicators[3] and associated socio-demographic, biological and psychosocial variables, in the urban elderly aged 65 and over. The FIBRA study involves seven Brazilian cities chosen by convenience and selected from probabilistic samples of urban census tracts (93 in Belém and 90 in Campinas), corresponding to the ratio of the number of older adults to the number of urban census tracts[17]. The cities had more than one million inhabitants, at the time of data collection. The former had a Gross Domestic Product (GDP) per capita of BRL 9,793 and the second, a GDP per capita of BRL 29,731[18], data used to affirm that they are cities whose populations experience different economic conditions. The recruitment was carried out in respondents' homes by trained recruiters following a pre-planned sequence in each census tract, and eligibility criteria were as follows: aged 65 years or older, being a permanent resident in the city of domicile and the respective census tract, absence of severe cognition, communication, sensory and mobility impairments. The exclusion criteria used in recruitment were the same as those adopted by Fried et al.[3]: a) occurrence of memory problems, attention difficulties, spatial and temporal orientation or communication

problems suggestive of dementia, or the mention of diagnosis made by a physician, or by a family member; b) being temporary or permanently bedridden; c) those afflicted with serious consequences of a stroke, with localized loss of strength and/or aphasia; d) Parkinson's Disease with serious loss of mobility, speech or affection; e) serious loss of sight or hearing, which could be a serious obstacle to communication; f) those who are terminally ill.

The data was collected in one single session, lasting between 40 and 120 minutes, in the community setting with address, time and date agreed with the elderly at the moment of recruitment for the survey. The session was divided into two parts. The first included measures of sociodemographic, anthropometric, clinical, frailty and dementia screening. In this case, the evaluation used the Mini-Mental State Examination (MMSE), whose cutoff for presence of cognitive impairment is schooling suggested by Brucki et al.[19] and recommended by the Brazilian Academy of Neurology, less one standard deviation (17 for illiterates, 22 points for 1 to 4 years of schooling; 24 points for 5 to 8 years of schooling and 26 points for 9 or more years of schooling). The sample of 721 older adults in Belem and 900 in Campinas were excluded those who scored below the cutoff point. The elderly included in the MMSE score (571 in Belém and 689 in Campinas) participated in the second part of measures (all self-report) on physical health conditions, functionality, depressive symptoms and life satisfaction, all of which are of interest to the study. All participants signed an informed consent form that had received approval from the Ethics Committee of the Faculty of Medical Sciences at the State University of Campinas (UNICAMP). For this study an addendum to the FIBRA study was approved.

Variables and measures

1. **Self-assessment of health**. Taken as a dependent variable, this was investigated by means of the question: " In general, how would you rate your current health status?, with the following response options: very good (5), good (4) regular (3) bad (2) and very bad (1). In data analysis, very good and good health were combined into the positive self-rated health class, and fair, bad and very bad health were combined into the negative self-rated health class.

2. **Sociodemographic variables** were evaluated as: a) sex (male or female); b) age in years,

which was divided into four groups (65-69, 70-74, 75-79, and > 80 years); c) family income [(relating to wages, pensions, retirement benefits, social benefits, rent and interest received monthly by family members and grouped according as a multiple of the Brazilian minimum wage (MW) per month at the time of data survey as follows into corresponding (≤ 1; 1.1 to 3, 3.1 to 5;> 5 MW)]; d) head of family (yes or no) and; e) education ("until which year of study did you go to school?", the value was noted and was later used to establish the categories: never went to school, and 1-4 years, 5-8 years and ≥ 9 years of schooling), corresponding to the levels of the Brazilian formal education; f) Even within the sociodemographic variables the elderly person was asked if they carried out some form of paid work (yes or no).

3. **Access to and use of health services**. Access to health services was investigated through responses to the following question: when you need medical care, what kind of health care demand do you most often use? Public health or the Brazilian Unified Health System, SUS (health centers, clinics); clinics, offices and hospitals linked to religious organizations or private health plans; clinics and private hospitals paid directly by the patient? The first alternative was considered as predominantly using public services and the other two as private services. The use of health services has two indicators: a) Higher number of inpatient nights in hospital in the year preceding the survey, with answers attributed as none, 1 or 2 or more; b) number of medical visits in the last year, grouped as none, 1, 2 and 3 or more.

4. **Physical Health.** This was based on the elderly individual's answers to the items corresponding to: a) number of chronic diseases diagnosed by a physician in the last year, from heart disease, hypertension, cerebrovascular accident / ischemia / stroke; diabetes mellitus, cancer, arthritis or rheumatism, lung diseases, depression and osteoporosis, with answers yes or no. Response variables of 1 or 2 and 3 or more were created; b) Signs and symptoms in the 12 months preceding the survey, which included urinary incontinence, fecal incontinence, memory problems, unintentional weight loss, fractures, chewing and swallowing and sleep problems, assessed by questions with answers yes or no. Affirmative responses were counted and assigned to the tracks none, 1 or 2 and 3 or more; c) We evaluated sight indicators (seeing well without glasses; seeing well with glasses; and not seeing well without glasses) and hearing (hearing well;

hearing badly and using a hearing aid; and hearing badly and no hearing aid), all with possible answers yes or no; d) To measure the nutritional status Body Mass Index (BMI) in kg /m^2 was considered and obtained using the formula: BMI = weight (kg) ÷ height (m)^2 .The resulting data were classified based on recommendations established by the Pan American Health Organization (PAHO): BMI less than 23 = underweight; BMI between 23 and 27.99 = normal weight; BMI between 28 and 29.99 = overweight; and BMI above 30 = obesity[20]; e) For the cardiovascular risk measure the waist ratio/ hip ratio (WHR) was considered. As classical protocols, measurement of waist circumference is made at the midpoint between the lower border of the last rib and the iliac crest. The hip circumference is measured considering the point of maximum volume of the glutes[21]. The measurements were performed with stretch resistant tape, with millimeter measures and measuring 150 cm. The criteria for the classification of WHR were proposed by Lohman et al[22]. For women, WHR = 0.80 to 0.85 (low risk); WHR = 0.86 to 0.90 (moderate risk) and WHR> 0.90 (high risk). For men, WHR = 0.90-0.95 (low risk); WHR = 0.96 to 1.0 (moderate risk) and WHR> 1.0 (high risk).

5. **Fragility.** This was operationalized by means of a five criteria model constructed by Fried et al.[3]: a) unintentional weight loss was indicated by 4.5kg or 5% of body weight in the previous year; b) fatigue was considered for the answers 'always' or 'almost always' of two items taken from the CES-D[23], about the perceived lack of energy to start or take care of daily activities; c) physical inactivity was indicated by a weekly caloric expenditure rate in exercise and housework less than the value of the 1st quintile of the distribution. Types, the weekly frequency and duration of daily exercise and domestic activities of low, moderate and high intensity that the elderly performed were evaluated using an adapted Brazilian version of the Minnesota Leisure Activities Questionnaire[24]. The results were interpreted according to the parameters established by Ainsworth et al.[25]; d) The handgrip measured in kilograms force (kg f) was obtained with a hydraulic dynamometer, Jamar model (Lafayette Instruments®, Lafayette, Indiana, USA), using the elderly's dominant hand and placed in the dominant hand in three consecutive attempts, with a one minute resting interval. Low grip strength was defined by the lowest quintile in the sample, values of each city adjusted for gender and height[3]; e) The gait speed test involved three consecutive measurements of the time (in seconds) which the individual took to walk 4.6 meters on a flat surface, on a straight line and usual speed, with the use of canes or walkers if needed. In each sample, the time values in seconds above the 80th percentile were considered as run time indicators, adjusted for gender and height[3,26]. According to Fried et al.[3], the elderly who score points in any three of the five indicators must be considered as weak; those who score in 1 or 2 as pre-fragile; and those that score in none as non-fragile and robust.

6. **Independence to perform instrumental activities of daily living (IADL).** The elderly were asked about how much help (total, partial or none) they needed to perform the following IADL: a telephone call, using transport, shopping, cooking, housework, medication use and money management[27]. The categories partial or total aid were grouped into one, called dependency. "None" were considered independent. Responses to each item given to each of the three possibilities were counted. The answers 'partial relief' and 'total' have been grouped in the dependent category.

7. **Depressive symptoms.** These were evaluated using the Geriatric Depression Scale with 15 dichotomous items (GDS-15)[28] and a cut-off score> 6, a depression screening tool for elderly that evaluates emotional states.

Data analysis

In the statistical analysis we used the computer program SAS System for Windows (Statistical Analysis System), version 9.2, SAS Institute Inc., 2002-2008, Cary, NC, USA. Samples from the two cities were compared with respect to the frequency with which the elderly rated their health positively (as good and very good) or negatively (as fair, bad and very bad), taking into account the sociodemographic and health indicators. The test used to make comparisons between the distributions of ordinal variables of the two cities was the Mann Whitney test. To compare the frequencies of categorical variables observed in the two cities, we adopted the chi-square test. Nonparametric tests were determined by the nature of the distributions, which did not tend to normalcy. The choice of non-parametric tests was determined by the nature of the distributions, which did not tend to normalcy. Analysis of univariate and multivariate logistics with forward stepwise selection criterion variables were used to estimate the magnitude of associations be-

tween the independent variables and the negative health self-assessment in Belém and in Campinas. Statistical significance was set at p ≥ 0.05 for all the analyses.

Results

A significantly higher percentage of elderly people in Campinas rated their health positively compared with those in Belém, where we found a higher frequency of negative self-rated health. In both cities, 69% of the sample were women and 69% of participants were aged between 65 and 74. In Belém, we observed a significantly greater percentage of older adults with average family incomes below the minimum wage and 3 times the minimum wage compared with Campinas, where the frequency of participants with a family income of between 3.1 and five times the minimum wage was significantly higher. Campinas surpassed Belém as the percentage of older adults with 1-4 years of schooling, but Belém surpassed Campinas in terms of those with 5-8 years of schooling.

Compared to Campinas, Belém had a significantly higher percentage of older adults who used public health care more often, and in Campinas there was a higher frequency of older adults who used private health care. The elderly of Belém self-reported more medical visits in the 12 months preceding the survey than those in Campinas. But the statistically significant differences between the two cities that were observed were the number of chronic diseases diagnosed by doctors and the number of signs and symptoms in the year preceding the interview.

In Belém, the percentage of older adults with underweight and lower cardiovascular risk exceeded those in Campinas, where there was a significantly higher percentage of elderly with overweight and obesity and with a high cardiovascular risk. In Belém there were more elderly that reported hearing well, but more elderly in Campinas reported good eyesight. The older adults of Belém reported seeing better without glasses compared with those from Campinas, but there were older adults from Belém who reported bad hearing and no hearing aid. Compared to Campinas, Belém had a significantly higher percentage of elderly who reported needing assistance in IADL performance.

In Campinas a significantly higher percentage of older adults were found to describe themselves as totally independent. The samples of the two cities were not statistically different in terms of the prevalence of frailty based on Fried et al[3].'s criteria, with the exception of the physical inactivity variable, for which the elderly of Belém surpassed those of Campinas. Table 1 presents a comparison of the percentage of participants in the two cities (around 21.5%) with cutoff points for depressive symptoms (Table 1).

In Belém there was a statistically higher percentage of the elderly who evaluated their health negatively among the following groups: those who earned less than three times the minimum wage, those with 1-8 years of schooling, those who worked, those who used public health care services and those who reported three or more medical visits in the previous year; those who had three or more diseases and 3 or more signs and symptoms; those who reported not seeing well with glasses, those who could not see well without glasses, those that reported bad hearing and no hearing aid, those who perceived fatigue, with lower handgrip, lower mean gait speed, physical inactivity and those above cutoff points in EDG. Also in Belém, among those who evaluated their health positively were older adults with income exceeding 5 MW, those with nine or more years of schooling, those working, who used private health care, who reported only one medical visit in the previous year. This group had fewer chronic diseases and fewer signs and symptoms (none to 2); they reported seeing well and hearing well without the aid of instruments; they were physically active and scored above the cut-off point for depressive symptoms.

In Campinas, among those who had negative self-rated health, there were significantly more older adults who earned between 1.1 and 3 times the minimum wage, had little education, used public health care, had made more than three medical visits in the previous year, had three or more diseases and three or more signs and symptoms, reported not seeing well with glasses, needed assistance in IADL performance, perceived fatigue, had a lower mean gait speed, were physically inactive and scored above 6 in the EDG (Table 2).

In Belém the elderly who evaluated their health negatively were found to have lower family incomes, make more medical visits in the previous year, more nights in hospital, more chronic diseases, more signs and symptoms and more depressive symptoms than those who evaluated their health positively. The exception was for the variable IMC, in which the elderly of Campinas with positive self-rated health had a significantly

Table 1. Comparison between the frequencies of the elderly of Belém and Campinas, in sociodemographic and health variables. FIBRA Unicamp Study, 2008-2009.

Variables	Belém		Campinas		p*
	n	%	n	%	
Sex					
Male	175	30,65	212	31,36	
Female	396	69,35	464	68,64	= 0.786
Age (years)					
65-69	222	38,88	247	36,54	
70-79	167	29,25	225	33,28	
75-70	115	20,14	134	19,82	
80 and older	67	11,73	70	10,36	=0.456
Family income (MW)					
≤ 1,0	69	_14,97_	39	6,59	
1,1 a 3,0	233	_50,54_	232	39,19	
3,1 a 5,0	80	17,35	162	_27,36_	
>5,0	79	17,14	159	_26,86_	**≤ 0.001**
Head of family					
Yes	359	62,87	391	57,93	
No	212	37,13	284	42,07	=0.076
Education (years)					
Never went to school	103	18,04	127	18,79	
1 a 4	230	40,28	360	_53,25_	
5 a 8	141	_24,69_	91	13,46	
9 or more	97	16,99	98	14,50	**≤ 0.001**
Paid work					
Yes	86	15,33	93	13,80	
No	475	84,67	581	86,20	=0.447
Health care more often					
Public service	411	_74,32_	312	48,00	
Private service	142	25,28	338	_52,00_	**≤ 0.001**
Number of medical visits /year					
None	36	6,50	36	5,63	
1	48	8,66	87	_13,59_	
2	64	11,55	111	_17,34_	
≥ 3	406	_73,29_	406	63,44	**≤ 0.001**
Number of inpatient nights in hospital/year					
None	497	88,12	582	87,65	
1	15	2,66	17	2,56	
≥ 2	52	9,22	65	9,79	=0.940
Number of diseases					
None	71	12,43	75	11,09	
1-2	292	51,14	309	45,71	
≥ 3	208	36,43	292	43,20	=0.052
Number of Signs and symptoms					
None	86	15,06	81	11,98	
1-2	272	47,64	327	48,37	
≥ 3	213	37,30	268	39,64	=0.264

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higher score than those with negative self-rated health. For the other variables, the results were similar to those of the elderly of Belém (Table 3).

In the univariate logistic regression analysis, we investigated associations between negative self-rated health and independent vari-

Table 1. continuation

Variables	Belém		Campinas		p*
	n	%	n	%	
Nutritional status					
Underweight	124	_22,30_	100	14,81	
Normal weight	232	41,73	288	42,67	
Overweight	200	35,97	287	_42,52_	≤ **0.002**
Cardiovascular risk					
Low	240	_43,17_	241	35,70	
Moderate	170	30,58	192	28,44	
High	146	26,26	242	_35,85_	≤ **0.001**
Vision					
Seeing well without glasses	282	49,65	380	_56,80_	
Seeing well with glasses	219	38,56	251	37,52	
Not seeing well without glasses	67	_11,80_	38	5,68	≤ **0.001**
Hearing					
Hearing well without hearing aid	451	_79,40_	486	72,86	
Hearing badly with hearing aid	10	1,76	26	3,90	
Hearing badly without hearing aid	107	18,84	155	_23,24_	≤ **0.009**
IADL Performance					
Dependent	270	_47,54_	179	26,64	
Independent	298	52,46	493	_73,36_	≤ **0.001**
Fatigue					
Yes	95	17,56	116	17,31	
No	446	82,44	554	82,69	=0.910
Low grip strength					
Yes	100	17,76	112	16,69	
No	463	82,24	559	83,31	=0.620
Low gait speed					
Yes	105	18,72	107	15,88	
No	456	81,28	567	84,12	=0.187
Physical inactivity					
Yes	361	_63,22_	383	56,66	
No	210	36,78	293	_43,34_	=0.019
Depressive symptoms					
≥ 6	133	23,33	132	19,67	
< 5	437	76,67	539	80,33	=0.117

* Chi-square test.

ables, showing that in Belém, the most robust associations were one night in a hospital, three or more signs and symptoms, a score above 6 on the EDG, not seeing well without glasses, fatigue and bad hearing and no hearing aid. In Campinas, the strongest associations were with: 3 or more chronic diseases, 3 or more signs and symptoms, a score above 6 on the EDG, having a family income below the minimum wage, 5-8 years of schooling, lower handgrip and having 1 or 2 chronic diseases (Table 4).

A multivariate analysis applied to the Belém data found associations between negative self-rated health and fatigue, lack of compensation for sight deficiencies, three or more signs and symptoms, 1 or 2 diseases, not seeing well with glasses, 5-8 years education and use of public health care. In Campinas multiple associations were observed between negative self-rated health and a higher number of diseases, depressive symptoms ≥ 6, bad vision wearing glasses and less education (Table 5).

Discussion

The same percentages of elderly women and men from the two cities in the study complied with one of the prerequisites for inclusion. In Belém

Table 2. Distribution of frequencies of the elderly of Belém and Campinas with positive and negative self-rated health, according to sociodemographic variables and other health variables. FIBRA Unicamp Study, 2008-2009.

Variables	Belém					Campinas				
	Negative		Positive			Negative		Positive		
	n	%	n	%	p*	n	%	n	%	p*
Sex										
Male	94	28,23	81	34,03		83	29,86	129	32,41	
Female	239	71,77	157	65,97	=0,138	195	70,14	269	67,59	=0,481
Age (years)										
65-69	134	40,24	88	36,97		101	36,33	146	36,68	
70-79	101	30,33	66	27,73		101	36,33	124	31,16	
75-70	60	18,02	55	23,11		51	18,35	83	20,85	
80 and older	38	11,41	29	12,18	=0,465	25	8,99	45	11,31	=0,442
Family income (MW)										
≤ 1,0	43	_16,29_	26	13,20		21	8,61	18	5,17	
1,1 a 3,0	152	_57,58_	81	41,12		110	_45,08_	122	35,06	
3,1 a 5,0	41	15,53	39	_19,80_		69	28,08	93	26,72	
> 5,0	28	10,61	51	_25,89_	=<**0.001**	44	18,03	115	_33,05_	=<**0.001**
Head of family										
Yes	203	60,96	156	65,55		160	57,76	231	58,04	
No	130	39,04	82	34,45	=0,264	117	42,24	167	41,96	=0,943
Education (years)										
Never went to school	63	18,92	40	16,81		62	_22,30_	65	16,33	
1 a 4	148	_44,44_	82	34,45		160	_57,55_	200	50,25	
5 a 8	92	27,63	49	20,59		38	13,67	53	13,32	
9 or more	30	9,01	67	_28,15_	=<**0.001**	18	6,47	80	_20,10_	=<**0.001**
Paid work										
Yes	39	11,89	47	_20,17_		33	11,96	60	15,08	
No	289	88,11	186	79,83	=<**0.007**	243	88,04	338	84,92	=0,248
Health care more often										
Public service	264	_82,24_	147	63,36		144	_53,73_	168	43,98	
Private service	57	17,76	85	_36,64_	=<**0.001**	124	46,27	214	_56,02_	=0,014
Number of medical visits /year										
None	18	5,57	18	7,78		11	4,12	25	6,70	
1	18	5,57	30	_12,99_		29	10,86	58	15,55	
2	35	10,84	29	12,55		32	11,99	79	_21,18_	
≥ 3	252	_78,02_	154	66,67	=**0.007**	195	_73,03_	211	56,57	=<**0.001**
Number of inpatient nights in hospital/year#										
None	284	86,32	213	90,64		233	84,42	349	89,95	
1	13	3,95	2	0,85		10	3,62	7	1,80	
≥ 2	32	9,73	20	8,51	=0,065	33	11,96	32	8,25	=0,086
Number of diseases #										
None	31	9,31	40	_16,81_		10	3,60	65	_16,33_	
1-2	162	_48,65_	130	_54,62_		102	36,69	207	_52,01_	
≥ 3	140	42,04	68	28,57	=<**0.001**	166	_59,71_	126	31,66	=<**0.001**
Number of Signs and symptoms#										
None	34	10,21	52	_21,85_		15	5,40	66	_16,58_	
1-2	140	42,04	132	_55,46_		111	39,93	216	_54,27_	
≥ 3	159	_47,75_	54	22,69	=<**0.001**	152	_54,68_	116	29,15	=<**0.001**

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and Campinas, the number of women from each age range in the sample matched the estimated numbers required for the planned sample, as was the case for the four age ranges for men in Campinas. In Belém, the number of men examined was slightly less than those anticipated for

Table 2. continuation

Variables	Belém					Campinas				
	Negative		Positive			Negative		Positive		
	n	%	n	%	p*	n	%	n	%	p*
Nutritional status										
Underweight	74	23,05	50	21,28		35	12,64	65	16,33	
Normal weight	133	41,43	99	42,13		110	39,71	178	44,72	
Overweight	114	35,51	86	36,60	=0,882	132	47,65	155	38,94	=0,068
Cardiovascular risk										
Low	132	40,87	108	46,35		94	33,94	147	36,93	
Moderate	104	32,20	66	28,33		71	25,63	121	30,40	
High	87	26,93	59	25,32	=0,419	112	40,43	130	32,66	=0,107
Vision										
Seeing well without glasses	126	38,07	156	_65,82_		130	47,10	250	63,61	
Seeing well with glasses	154	_46,53_	65	27,43		132	_47,83_	119	30,28	
Not seeing well without glasses	51	_15,41_	16	6,75	=**<0.001**	14	5,07	24	6,11	=**<0.001**
Hearing										
Hearing well without hearing aid	250	75,30	201	_85,17_		193	70,44	293	74,55	
Hearing badly with hearing aid	5	1,51	5	2,12		7	2,55	19	4,83	
Hearing badly without hearing aid	77	_23,19_	30	12,71	=**0.007**	74	27,01	81	20,61	=0,068
IADL Performance										
Dependent	166	50,15	104	43,88		89	_32,36_	90	22,67	
Independent	165	49,85	133	56,12	=0,140	186	67,64	307	_77,33_	=**0,005**
Fatigue										
Yes	241	76,75	205	_90,31_		209	75,72	345	_87,56_	
No	73	_23,25_	22	9,69	=**<0.001**	67	_24,28_	49	12,44	=**<0.001**
Low grip strength										
Yes	269	81,76	194	82,91		222	80,14	337	85,53	
No	60	18,24	40	17,09	=0,727	55	19,86	57	14,47	=0,065
Low gait speed										
Yes	267	81,16	189	81,47		220	79,71	347	_87,19_	
No	62	18,84	43	18,53	=0,926	56	_20,29_	51	12,81	=**0,009**
Physical inactivity										
Yes	226	_67,87_	135	56,72		177	_63,67_	206	51,76	
No	107	32,13	103	_43,28_	=**0.007**	101	36,33	192	_48,24_	=**0,002**
Depressive symptoms										
≥ 6	227	68,37	210	_88,24_		186	67,88	353	_88,92_	
< 5	105	_31,63_	28	11,76	=**<0.001**	88	_32,12_	44	11,08	=**<0.001**

In the 12 months preceding the interview. * Chi-square test.

the age ranges of 65 to 69 and 80 and above, while the number in the 70 to 74 age range was slightly more than estimated[18]. A predominance of women in study samples of the elderly is a well-known occurrence, and is attributed not only to their greater longevity, but to their greater availability for participating in studies, for reasons related to gender. The most common explanation for the reduced participation of men is also associated with gender and is mainly attributed to a lack of motivation and of valuing information about health, along with less availability on account of

work or leisure commitments during periods in which data collection is normally carried out[29].

The majority of elderly people in this study reported living with a family income that was below the minimum wage. Per capita family income is an indicator of social capital which is associated with access to essential goods, particularly in situations in which there is an absence of or shortcomings in social policies that guarantee accommodation, transport and healthcare of an adequate quality[30]. In addition, those elderly with lower incomes are also the ones who seek health

Table 3. Elderly of Belém and Campinas showing values for the distributions of ordinal variables on self-rated health. FIBRA Unicamp Study, 2008-2009.

	Belém				Campinas			
	n	Mean	sd	p***	n	Mean	sd	p***
Negative*								
Age (years)	333	72,14	5,60	=0,352	278	71,99	5,06	=0,540
Family Income (MW)	264	3,11	4,85	**<0,001**	244	*4,02*	5,15	**<0,001**
Education (years)	333	*4,11*	3,36	**<0,001**	278	3,78	3,19	**<0,001**
No medical visits/year	323	*6,05*	4,62	=0,006	267	5,15	4,67	**<0,001**
No inpatient nights in hospital	329	1,28	6,11	=0,125	276	0,70	2,61	=0,041
No chronic diseases/year	333	2,37	1,45	**<0,001**	278	*2,94*	1,48	**<0,001**
No signs and symptoms/year	333	2,45	1,50	**<0,001**	278	*2,74*	1,49	**<0,001**
BMI	321	26,76	5,31	=0,551	277	*28,33*	5,11	=0,003
Cardiovascular risk	323	0,89	0,08	=0,987	277	0,91	0,08	=0,115
Independence to AIVD	331	5,73	1,61	=0,032	275	*6,35*	1,21	=0,006
Score EDG	332	4,49	2,98	**<0,001**	274	*4,69*	3,14	**<0,001**
Positive**								
Age (years)	238	72,60	5,77	=0,352	398	72,35	5,48	=0,540
Family income (SM)	197	4,67	4,80	**<0,001**	348	*5,23*	5,34	**<0,001**
Education (years)	238	*5,61*	4,48	**<0,001**	397	5,32	4,50	**<0,001**
Nº medical visits/year	231	*5,29*	4,90	=0,006	373	3,81	4,25	**<0,001**
Nº inpatient nights in hospital	235	1,02	6,41	=0,125	388	0,86	6,58	=0,041
Nº chronic diseases/year	238	1,84	1,35	**<0,001**	398	*1,89*	1,31	**<0,001**
Nº signs and symptoms/year	238	1,64	1,37	**<0,001**	398	*1,85*	1,38	**<0,001**
BMI	235	27,00	5,74	=0,551	398	27,22	4,67	=0,003
Cardiovascular risk	233	0,89	0,08	=0,987	398	0,90	0,09	=0,115
Independence to AIVD	237	6,05	1,38	=0,032	397	*6,57*	0,92	=0,006
Score EDG	238	*2,86*	2,27	**<0,001**	397	2,73	2,26	**<0,001**

* Regular/bad/very bad. ** Good/ Very good. *** Mann Whitney test to compare two independent samples.

services less, who have lower treatment adherence and have less access to medication, when compared with those in a better social condition.

Data about the percentage of elderly who are heads of family and who work match those found in national trends[31], showing that the elderly make an important economic contribution to the respective families and communities[32].

The sample composition of each one of the two cities proves to be different in terms of income: in Belém, the family income of 65.5% of the elderly varies between less than one and three times the minimum wage, compared with 45.8% for the same group in Campinas. In Belém, 34.4% of the elderly had a family income of more than three times the minimum wage compared with 54.2% of the same group in Campinas. These data are reflected in the greater average income of those from the Campinas sample, which leads one to assume that the structural conditions offered by society contributed considerably to the quality of life of its citizens. In this way, the elder-

ly from Campinas had more access to the cooperative system of medical care (health insurance plans), compared with those from Belém. The latter reported predominantly using public services, mainly the Unified Health System (SUS). It is likely that these differences are due to the employment conditions that are available during the lives of the elderly in the two cities. There is a largely unequal geographic distribution of clients of private health insurance plans in Brazil, which reflects their greater distribution and expansion in the most economically developed regions of the country[33].

Campinas is an industrialized city with more consolidated work conditions, and offers greater access to cooperative and private health systems among workers and retirees compared with Belém, where informal work relations for workers and elderly retirees are more common. The demand for the health services is fairly unequal among people from different income brackets, with greater advantages for those from more

Table 4. Results of univariate analysis of the associations between negative self-rated health, socio-demographic variables and other health variables, in Belém and Campinas. FIBRA Unicamp Study, 2008-2009.

Variables	Belém[*]			Campinas[**]		
	OR	IC 95% O.R.	p	OR	IC 95% O.R.	p
Sex						
Male (ref.)	1.00	---	---	1.00	---	---
Female	1.31	0.92 – 1.88	0.138	1.13	0.81 – 1.57	0.481
Age						
65-69 years (ref.)	1.00	---	---	1.00	---	---
70-74 years	1.01	0.67 – 1.52	0.981	1.18	0.82 – 1.70	0.381
75-79 years	0.72	0.46 – 1.13	0.150	0.89	0.58 – 1.37	0.590
≥80 years	0.86	0.50 – 1.50	0.595	0.80	0.46 – 1.39	0.435
Family income						
> 5.0 MW (ref.)	1.00	---	---	1.00	---	---
3.1 MW – 5.0 MW	1.92	1.01 – 3.62	**0.045**	1.94	1.22 – 3.09	**0.005**
1.1 MW – 3.0 MW	3.42	2.00 – 5.83	<**0.001**	2.36	1.53 – 3.63	<**0.001**
≤ 1.0 MW	3.01	1.54 – 5.89	**0.001**	3.05	1.49 – 6.26	**0.002**
Head of family						
No (ref.)	1.00	---	---	1.00	---	---
Yes	0.82	0.58 – 1.16	0.264	0.99	0.73 – 1.35	0.943
Education (years)						
9 or more (ref.)	1.00	---	---	1.00	---	---
5 a 8	4.19	2.41 – 7.29	<**0.001**	3.19	1.65 – 6.16	<**0.001**
1 a 4	4.03	2.43 – 6.70	<**0.001**	3.56	2.05 – 6.17	<**0.001**
Never went to school	3.52	1.96 – 6.32	<**0.001**	4.24	2.28 – 7.87	<**0.001**
Paid work						
No (ref.)	1.00	---	---	1.00	---	---
Yes	1.87	1.18 – 2.97	**0.008**	0.77	0.49 – 1.21	0.249
Health care more often						
Private service (ref.)	1.00	---	---	1.00	---	---
Public service	2.68	1.81 – 3.96	<0.001	1.48	1.08 – 2.03	**0.015**
Nº medical visits/last year						
0 (ref.)	1.00	---	---	1.00	---	---
1	1.01	0.67 – 1.52	0.981	1.14	0.49 – 2.63	0.765
2	0.72	0.46 – 1.13	0.150	0.92	0.41 – 2.09	0.844
≥ 3	0.86	0.50 – 1.50	0.595	2.10	1.01 – 4.38	**0.048**
Nº inpatient nights in hospital/ last year						
0 (ref.)	1.00	---	---	1.00	---	---
1	4.87	1.09 – 21.81	**0.038**	2.14	0.80 – 5.70	0.128
≥2	1.20	0.67 – 2.16	0.542	1.55	0.92 – 2.58	0.097
Nº chronic diseases/ last year						
0 (ref.)	1.00	---	---	1.00	---	---
1-2	1.61	0.95 – 2.71	0.075	3.20	1.58 – 6.49	**0.001**
≥3	2.66	1.53 – 4.61	<**0.001**	8.56	4.23 – 17.32	<**0.001**
Nº signs and symptoms/ last year						
0 (ref.)	1.00	---	---	1.00	---	---
1-2	1.62	0.99 – 2.66	0.055	2.26	1.23 – 4.14	**0.008**
≥3	4.50	2.65 – 7.66	<**0.001**	5.77	3.13 – 10.62	<**0.001**

it continues

privileged classes[34]. These inequalities will be minimized depending on the availability and organization of public sector services, human resources and equipment in each region[33].

Table 4. continuation

Variables	Belém[*]			Campinas[**]		
	OR	95% CI	p	OR	95% CI	p
Nutritional status						
Underweight (ref.)	1.00	---	---	1.00	---	---
Normal weight	0.91	0.58 – 1.41	0.669	1.15	0.71 – 1.85	0.570
Overweight/obesity	0.90	0.57 – 1.41	0.635	1.58	0.99 – 2.54	0.057
Cardiovascular risk						
Low (ref.)	1.00	---	---	1.00	---	---
Moderate	1.29	0.86 – 1.92	0.213	0.92	0.62 – 1.36	0.667
High	1.21	0.80 – 1.83	**0.378**	1.35	0.94 – 1.93	0.106
Vision						
Seeing well (ref.)	1.00	---	---	1.00	---	---
Not seeing well with glasses	2.93	2.02 – 4.26	**<0.001**	2.13	1.54 – 2.96	<0.001
Not seeing well without glasses	3.95	2.15 – 7.25	**<0.001**	1.12	0.56 – 2.24	0.745
Hearing						
Hearing well (ref.)	1.00	---	---	1.00	---	---
Hearing badly with hearing aid	0.80	0.23 – 2.82	0.733	0.56	0.23 – 1.36	0.199
Hearing badly and no hearing aid	2.06	1.30 – 3.27	**0.002**	1.39	0.96 – 2.00	0.078
IADL Performance						
Independent (ref.)	1.00	---	---	1.00	---	---
Dependent	1.29	0.92 – 1.80	0.140	1.63	1.16 – 2.31	**0.005**
Fatigue						
No (ref.)	1.00	---	---	1.00	----	---
Yes	1.08	0.70 – 1.68	0.728	2.26	1.59 – 3.39	**<0,001**
Low grip strength						
No (ref.)	1.00	---	---	1.00	---	---
Yes	1.02	0.66 – 1.57	0.926	1.47	0.98 – 2.20	0.066
Low gait speed						
No (ref.)	1.00	---	---	1.00	---	---
Yes	1.61	1.14 – 2.27	**0.007**	1.73	1.14 – 2.62	**0.010**
Physical inactivity						
No (ref.)	1.00	---	---	1.00	---	---
Yes	3.47	2.20 – 5.48	**<0.001**	1.63	1.19 – 2.24	**0.002**
Depressive symptoms						
< 6 (ref.)	1.00	---	---	1.00	---	---
> 6	1.08	0.70 – 1.68	0.728	3.80	2.54 – 5.68	**<0.001**

[*] Belém: OR (Odds Ratio) = Odds ratio for negative self-rated health; (n=238 positive e n=333 negative). 95% CI = 95% confidence interval. Ref.: reference level. [**] Campinas: OR (Odds Ratio) = Odds ratio for negative self-rated health; (n=398 positive e n=278 negative). 95% CI = 95% confidence interval. Ref.: reference level.

With regard to elderly people with between 1 and 4 years of schooling, the data for the two cities show different profiles. Given that Campinas has better development conditions, it was to be expected that the city would have a greater frequency of elderly in this group. For the same reasons, it was to be expected that Belém would have more elderly people with no formal schooling when compared with Campinas, however this did not prove to be the case. In addition, in Belem there was a greater percentage of elderly people with more than five years of schooling, compared with in Campinas. This data may be due to procedural errors, but may also indicate that among the elderly, alignment between level of income and level of schooling may be less likely than among adults. In addition, it is not only the individual's socioeconomic condition that affects his or her health status, but also macroeconomic conditions relating to the context in which that individual resides. In societies that are unequal, one finds less public provision of resources that are important for social well-being and as a result for levels of health[33].

Table 5. Results of the multivariate analysis for the association between negative self-rated health, socio-demographic variables and other health variables in Belém* and Campinas**. FIBRA Unicamp Study, 2008-**2009.**

Variables	Belém*			Campinas**		
	OR	95% CI	p	OR	95% CI	p
Vision						
Seeing well (ref)	1,00	---	---	1,00	---	---
Not seeing well with glasses	2,97	1,78 – 4,97	**<0,001**	1,87	1,25 – 2,79	**0,002**
Not seeing well without glasses	3,63	1,48 – 8,89	**0,005**	0,56	0,21 – 1,49	0,249
Fatigue						
No (ref.)	1,0	---		---	---	---
Yes	4,08	1,87 – 8,92	**<0,001**	---	---	---
Health care more often/ last year						
Private service (ref.)	1.00	---	---	---	---	---
Public service	2.45	1.42 – 4.24	**0.001**	---	---	---
Nº signs and symptoms/ last year						
0 (ref.)	1,00	---	---	---	---	---
1-2	1,78	0,92 – 3,45	0,089	---	---	---
≥ 3	3,40	1,63 – 7,09	**0,001**	---	---	---
Nº chronic diseases/ last year						
0 (ref.)	1,00	---	---	---	---	---
1-2	3,07	1,41 – 6,65	**0,005**	2,36	1.07 – 5.21	**0,033**
≥ 3	2,90	1,29 – 6,49	**0,010**	5,55	2.53 – 12.18	**<0,001**
Education (years)						
9 or more (ref.)	1.00	---	---	1.00	---	---
5 a 8	2.93	1.39 – 6.20	**0.005**	2.65	1.20 – 5.84	**0.016**
1 a 4	1.90	0.93 – 3.87	0.078	3.43	1.76 – 6.72	**<0.001**
Never went to school	1.71	0.75 – 3.91	0.205	3.73	1.70 – 8.18	**0.00**
Depressive symptoms						
< 6 (ref.)	---	---	---	1.00	---	---
> 6	---	---	---	2.61	1.56 – 4.36	**<0.001**

*Belém: OR (Odds Ratio) = Odds ratio for negative self-rated health; (n=163 positive e n=211 negative). 95% CI= 95% confidence interval. Ref.: reference level. ** Campinas: OR (Odds Ratio) = Odds ratio for negative self-rated health; (n=300 positive e n=217 negative). 95% CI= 95% confidence interval. Ref.: reference level.

The elderly from Belém showed worse indicators compared with those from Campinas with regard to the number of illnesses, number of signs and symptoms, Independence for instrumental activities of daily living (IADL) and depressive symptoms. However, in Campinas there were more elderly people with overweight and obesity and more with a greater risk of cardiovascular disease. When one refers to the medical consultation and hospitalizations of both samples, one finds that the elderly from Belém reported going to the doctor more often than their counterparts in Campinas, and that the samples showed no differences in terms of the number of hospitalizations in the previous year.

The literature recognizes the relationship between hospitalizations, consultations, chronic diseases and negative self-evaluation of health[7,14,34,35]. However, it is difficult to come up with a plausible explanation for the results found in this research, unless one speculates about the data showing multiple associations between negative self-evaluation of health, number of chronic diseases, fatigue, depressive symptoms and the type of health service most often used. What one can observe in these data is that illnesses and depressive symptoms have a greater weight when it comes to the opinion of the elderly from Campinas, compared with those from Belém. Among these variables, fatigue has a greater weight than depressive symptoms among the elderly from Campinas. Furthermore, the two types of services used showed covariations with negative self-evaluation of health among the Belém elderly, but not among those from Campinas. Could it be that the elderly from Belém have access to

health services of a poorer quality compared with those from Campinas? If this was the case, this reality is not reflected in the opinions of the elderly from Belém about their own health status, when taking into consideration schooling levels. In this city, only having 5 to 8 years of schooling (compared with having 9 or more) is associated with negative self-evaluation of health. These details about the data should be compared with data from national and international studies that show self-evaluation of health to be strongly influenced by levels of schooling among the elderly[11-13]. Moreover, one finds that the level of education is the main cause for social inequalities in health because it reflects the human capital of people (i.e. cognitive and non-cognitive abilities that might control or influence an individual's life, providing him or her with the necessary resources, that go beyond financial limitations)[36].

To suffer the effects of sight deficiency that is not treated is something that occurs more commonly in less favourable socioeconomic and health contexts, compared with in more developed environments. In this research, this occurrence affected the negative self-evaluation of health of the elderly from the two cities, but was more pronounced among those from Belem. This may therefore be considered a call for committing greater attention to shortcomings in the social protection system and healthcare provision for the elderly population. In the multivariate model, this study did not find an association between negative self-evaluated health and hearing deficiencies, despite the fact that the literature points to a relationship between these two conditions[37]. It may be important to call attention to the fact that this association appeared in the univariate analysis in the city of Belém, reinforcing the idea that this may be an alarm call for the health systems.

The results support the notion that self-perception of health is multidimensional and re-flects, globally, the opinion of the elderly about themselves and about questions that include biological, psychological and sociohistorical elements of their experience. It reflects judgements not only at the moment that they are made, but during an individual's entire life, and includes mechanisms for social comparison, motives and expectations. This current study addressed the dependent variable, but one should not forget the mediating role of the self-evaluation of health variable, which is found between the influence a number of variables including those for economic, health, functionality, self-care, belief in capacity and subjective well-being. The evaluation of health during aging does not only relate to the domains of the individual and of the private, but also to those relating to resources and social opportunities, which means that it should be included in the political and social policy spheres[38].

The definition of a transversal cut limits the possibility of drawing conclusions about the presence of risks for specific deductions, or even about cause and effect relationships. Part of the data is not easily found in the literature and could serve as a reference for future studies. However, as a study that addresses methods at a specific moment, the majority of data produced during this work replicates those of other Brazilian and foreign authors. Others lack a deepening and refining of the methods, the sample and the delineation. Nevertheless, this work represents an attempt to compare samples drawn from regions of Brazil that have different structural conditions, even though each one of these regions reproduces the conditions of poverty and social inequality that are the distinct mark of aging in this country. The results point to the need to give more attention to less favored socioeconomic segments of society, including the elderly and to reinforce the need for health strategies and activities that are developed with the aim of achieving a greater degree of equality in healthcare.

Collaborations

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