Rev Saúde Pública 2011;45(6)

Maria do Desterro da Costa e Silva[I]

Helen Arruda Guimarães[I]

Euclides Maurício Trindade Filho[II]

Solange Andreoni[I]

Luiz Roberto Ramos[I]

Factors associated with functional loss in the elderly living in the city of Maceió, Northeastern Brazil

ABSTRACT

OBJECTIVE: To identify factors associated with functional loss in older adults living in the urban area.

METHODS: A cross-sectional study was carried out with a population-based sample of 319 elderly individuals from the municipality of Maceió (Northeastern Brazil), in 2009. To obtain the functional impairment data the Brazilian Older Americans Resources and Services Multidimensional Functional Assessment Questionnaire was used. A descriptive analysis, the chi-square test and a regression analysis for crude prevalence ratio were used, and the significance level that was adopted was $p < 0.05$.

RESULTS: The majority of participants were females (65.8%) and the mean age was 72 years (SD = 8.83). The prevalence of moderate/severe impairment was 45.5%, and the associated factors were being 75 years old or older, having up to four years of schooling, reporting two or more chronic diseases and being single.

CONCLUSIONS: The characteristics of the elderly with functional impairment reflect inequalities and potential impacts of this population segment on the health services.

DESCRIPTORS: Aged. Activities of Daily Living. Personal Autonomy. Frail Elderly Socioeconomic Factors. Cross-Sectional Studies.

INTRODUCTION

In the last decades the Brazilian population has been aging in an accelerated way and in unfavorable socioeconomic and cultural conditions. The demographic transformations that began in the last century show an increasingly aged population and the importance of insuring for the elderly not only a longer survival, but also a good quality of life.[21]

Assisting this population of millions of elderly individuals is a great challenge. It is necessary to establish health indicators that are capable of identifying elderly people with high risk of functional loss and to guide concentrated actions of health promotion and functional capacity maintenance. Such actions should have a practical meaning to primary care professionals, as well as an acceptable cost-benefit ratio to the managers of the few resources that are intended for the health area.[15]

Functional capacity can be defined as the elderly individuals' potential to decide and live their lives in an independent way in their daily routine. Functional

[I] Programa de Pós-Graduação em Saúde Coletiva. Escola Paulista de Medicina. Universidade Federal de São Paulo. São Paulo, SP, Brasil

[II] Universidade Estadual de Ciências da Saúde de Alagoas. Maceió, AL, Brasil

Correspondence:
Maria do Desterro da Costa e Silva
R. Jorge de Lima 113, 3º andar
Trapiche da Barra
57010-300 Maceió, AL, Brasil
E-mail: mdesterro@bol.com.br

Received: 11/26/2010
Approved: 7/4/2011

Article available from: www.scielo.br/rsp

capacity may be associated with the presence of diseases, deficiencies or medical problems, and it can be influenced by demographic, socioeconomic, cultural and psychosocial factors. [10,16]

The study of functional capacity is useful to assess the health status of the elderly, in light of the repercussions of the increase in life expectancy and the new perspectives concerning the daily routine of these individuals.[13] Its application is even more important in regions where sociodemographic modifications do not occur in a homogenous way, as is the case of the Northeastern region of Brazil.[a]

There are few studies in the Northeast region on this theme. The State of Alagoas presents the worst health indicators of the country and is marked by high social inequality.[a] Its capital city, Maceió, is the city that cares the least for the older citizens' health in the country, and the high indexes of elderly individuals with functional disability[a] can be attributed to the limited coverage of *Programa Saúde da Família* (PSF – Family Health Program).[b]

Within this perspective, the study attempted to identify factors associated with functional loss in the elderly.

METHODS

A cross-sectional study was carried out by means of a population-based inquiry with a probability sample of individuals aged 60 years or older, living in the urban zone of Maceió, in 2009.

The population of Maceió was of 896,965 inhabitants at the time the study was conducted, and 60,908 were elderly individuals. The city is divided into seven sanitary districts, which encompass 50 neighborhoods and 875 census tracts, two of which are rural.[a]

To calculate the sample size, a sampling error of 0.06% was considered, as well as a prevalence of functional disability of 0.5%, 95% of confidence level (95% CI), and alpha error of 0.05%. The calculated sample size was of 266 individuals. Adding 20% for losses and refusals, the minimum sample size that was necessary was 320 elderly individuals.

To obtain the sample, the city's heterogeneity in its different socioeconomic strata was taken into account. The sample was obtained by the cluster method, and the sampling stages were:

1) The seven sanitary districts were classified as "better", "intermediate" and "worse" socioeconomic level. A final organization was made based on a draw among the districts, through which the order of the districts to start the research was identified.

2) Each neighborhood received an alphabetical order and a number for the draw referring to the number of elderly individuals of each neighborhood. Neighborhoods with higher number of elderly people had higher odds of being part of the sample. Seven neighborhoods were drawn (one per district).

3) After the identification of the residential census tracts (excluding the two commercial sectors), the sectors of each neighborhood were drawn proportionately to the number of elderly people according to each sector, considering sample calculation and size of 0.5% plus 20% (for possible losses).

4) In each sector, all blocks were numbered, as well as their respective streets, avenues and villas. The process of selection of the households was started in a random way, clockwise. After going over a certain number of households (which was defined according to the total number of households of the sector), the interviews with the elderly were systematically performed by the researcher herself.

In case nobody in the household was aged 60 years or older, the interviewer went to the next household until an elderly person was identified, and then the systematic search was reinitiated. If the visited household had an elderly dweller who was absent at that moment, a new visit was scheduled. This was performed up to two times before the person was considered a loss. In case more than one elderly person lived in the household, all were interviewed. If the number of interviews forecast for the district was not reached, the researcher moved on to the next drawn sector.

To evaluate functional impairment, the functional scale Brazilian Older Americans Resources and Services Multidimensional Functional Assessment Questionnaire (BOMFAQ)[19] was used. This instrument was chosen due to its easy administration and its utilization in population-based inquiries.

BOMFAQ evaluates the difficulty reported in performing 15 daily activities, of which eight activities are classified as activities of daily living (ADL – lying in/getting out of bed, eating, grooming, walking on a level surface, bathing, dressing, going to the toilet in time and trimming toenails), and seven are considered instrumental activities of daily living (IADL – climbing a flight of stairs, taking medicines on time, walking near home, shopping, preparing meals, using public transport, and cleaning the house).

[a] Instituto Brasileiro de Geografia e Estatística. Pesquisa nacional por amostra de domicilio: indicadores sociodemográficos e de saúde no Brasil. Rio de Janeiro; 2009.
[b] Maceió. Relatório de gestão, coordenação de planejamento. Maceió: Secretaria Municipal de Saúde; 2008.

To each item there were two types of possible answers ("without difficulty", "with difficulty" [with help and without help]). From this, four categories were built according to the number of impaired tasks. However, when we analyzed the crude results, we decided to dichotomize this variable into: "without impairment / mild impairment" or "moderate impairment / severe impairment".

The risk factors that were analyzed were: socioeconomic (*per capita* income, considered the ratio between total income and the number of household dwellers; level of schooling, defined by the period of school attendance or the acquired learning level; demographic (sex, age, marital status, family composition); reported morbidities.

The descriptive analyses included calculations of proportions and respective 95%CI. In the crude analysis, the prevalence of functional impairment was calculated to each group of independent variables and the level of significance was tested using the chi-square and linear trend tests. The adjusted analysis was performed by Poisson regression[1] with calculation of adjusted prevalence ratios (PR), 95%CI and significance levels using the same test described above.

The study was approved by the Research Ethics Committee of Universidade Estadual de Ciências da Saúde de Alagoas, under the protocol number 863/08.

RESULTS

Of the 320 individuals eligible for the study, only one was considered a loss, due to a mistake in filling in the questionnaire. Of the 319 elderly individuals of the sample, 210 were women (65.8%) and 109 were men. The mean age was 72 years (SD = 8.83), ranging from 60 years to 105 years.

The prevalence of moderate/severe functional impairment was higher among women (51.4%) than among men (48.6%). Greater impairment was also observed in the older age groups: 56.9% among elderly individuals aged 75 to 79 years and 73.4% for those aged 80 years or older. The lower the level of schooling, the higher the proportion of elderly people with moderate/severe impairment: 50.0% among those who had up to four years of schooling and 56.4% among the illiterate. Moderate/severe functional impairment was higher among those who reported being single (65.4%), those who reported higher number of diseases (three or more diseases = 67.3%) and those who reported two (64.6%) (Table 1).

Even without statistical significance, a higher predominance of moderate/severe impairment was observed among the individuals who presented lower *per capita* income: 48.5% among those whose income was below one salary and 49.2% among the elderly who earned one to three salaries (p=0.083).

In the adjusted model (Table 2), all the variables were associated with moderate/severe functional impairment, except for family composition and *per capita* income. Sex was strongly associated with the occurrence of moderate/severe impairment, with odds approximately 1.40 times higher for women (PR 1.40; 95%CI:1.07;1.83) compared to men. Elderly people aged 75 years and older had odds approximately two times higher (PR 1.84; 95%CI:1.47;2.30). Elderly individuals with lower level of schooling (illiterate/ up to four years of schooling) presented odds approximately 1.81 times higher of having moderate/severe functional impairment compared to those with higher educational level. Only those who reported being single were associated with functional impairment (PR 1.68; 95%CI: 1.22;2.31). Presenting two or more diseases was also associated with odds of having moderate/severe impairment that were 1.74 times higher (PR 1.74; 95%CI: 1.37;2.20) compared to not having diseases.

DISCUSSION

In parallel to demographic change in a general way, the world has been watching an ambiguous situation: the desire of living more and the fear of disabilities, dependence. The functional capacity and autonomy of the elderly are important, because they are directly related to their quality of life. In the present study, 45.4% of the elderly presented impairment in the performance of at least four ADL. Data from the literature show that this profile has been a constant in the current studies, with prevalences similar to the ones observed in studies conducted with the Brazilian elderly population and among European and North American older citizens.[6,14,18]

The fact that the studied elderly individuals presented a higher percentage of functional impairment compared to other studies conducted in the Northeast region[3,7] is worrisome. This difference can be attributed to the place where the study was carried out, to the scales that were used, to the form of data collection and to the completion time. We highlight that the evaluated individuals live in the State that presents Brazil's most unfavorable socioeconomic parameters, as well as the worst health indicators.

Generic interventions in the disabilities are less fruitful that prevention actions, which focus specifically on disabling diseases. The focus on disabling diseases implies the need of a more comprehensive understanding of the factors that lead to the situation of disability.[5]

The factors that are more strongly associated with functional capacities are the presence of diseases, deficiencies or medical problems. However, it is observed

Table 1. Distribution of functional impairment and crude prevalence ratios according to the characteristics of the sample of elderly individuals. Maceió, Northeastern Brazil, 2009.

Variable	Without Impairment/Mild		Moderate/Severe Impairment		PR (95%CI)		p
	n	%	n	%			
Sex	174	54.5	145	45.5			0.00
Male	72	66.1	37	33.9	1	-	
Female	102	48.6	108	51.4	1.52	(1.13; 2.03)	0.00
Age group (years)							< 0.0001
60-64	46	61.3	29	38.7	1	-	
65-69	46	70.8	19	29.2	0.76	(0.47. 1.21)	0.24
70-74	43	67.2	21	32.8	0.85	(0.54; 1.33)	0.47
75-79	22	43.1	29	56.9	1.47	(1.01; 2.13)	0.04
80 or more	17	26.6	47	73.4	1.90	(1.38; 2.62)	0.0001
Level of schooling (years)							0.00
0	41	43.6	53	56.4	2.26	(1.28; 3.97)	0.00
≥ 4	71	50.0	71	50.0	2.00	(1.14; 3.51)	0.01
5-8	32	74.4	11	25.6	1.02	(0.49; 2.15)	0.95
9 or more	30	75.0	10	25.0	1		
Per capita income (minimum salaries)							0.08
<1	50	51.5	47	48.5	2.18	(1.05; 4.55)	0.03
1-3	90	50.8	87	49.2	2.21	(1.08; 4.55)	0.03
4-5	13	72.2	5	27.8	1.25	(0.45; 3.49)	0.66
6 or more	21	77.8	6	22.2	1	-	
Morbidities (number of diseases)							< 0.0001
None	46	76.7	14	23.3	1	-	
1	83	64.8	45	35.2	1.51	(0.90; 2.52)	0.11
2	29	35.4	53	64.6	2.77	(1.70; 4.50)	< 0.0001
3 or more	16	32.7	33	67.3	2.89	(1.75; 4.75)	< 0.0001
Marital status							0.03
Married	89	60.1	59	39.9	1	-	
Divorced/separated	14	58.3	10	41.7	1.05	(0.63; 1.75)	0.86
Widowed	62	51.2	59	48.8	1.22	(0.93; 1.60)	0.14
Single	9	34.6	17	65.4	1.64	(1.16; 2.31)	0.00
Family composition							0.55
Alone	18	52.9	16	47.1	1.15	(0.76; 1.74)	0.50
1st Generation	75	59.1	52	40.9	1	-	
2nd Generation	61	50.0	61	50.0	1.22	(0.93;1.61)	0.15
3rd Generation	20	55.6	16	44.4	1.09	(0.71; 1.65)	0.70

that the main underlying hypothesis is that functional capacity is also influenced by demographic, socioeconomic, cultural and psychosocial factors.[10]

The association between worse functional impairment and female sex found in this study confirms the findings of Nunes et al.[12] Women are the majority in groups of elderly people and although they have greater life expectancy, they present more limitations or greater functional capacity loss. To Murtagh,[11] the explanation to this difference lies in the higher prevalence of non-fatal conditions among women (osteoporosis and depression, for example) and in women's greater ability to report a higher number of health conditions in relation to men in the same age group. In Stockholm, Sweden, a cohort study with 1,424 elderly people pointed that the older women presented higher incidence of disability for ADL than men in the same age group.[19]

Age proved to be a factor that was strongly associated with functional impairment. In our study, the elderly aged 75 years or older had higher odds of having severe

Table 2. Adjusted model of the characteristics of the sample of elderly individuals associated with functional impairment. Maceió, Northeastern Brazil, 2009.

Variable	Degree of freedom	p	PR	95%CI
Female sex	1	0.01	1.40	(1.07;1.83)
75 years or older	1	<0.001	1.84	(1.47;2.30)
Level of schooling ≥ 4 years	1	0.00	1.81	(1.23;2.66)
Number of diseases ≥ 2	1	<0.001	1.74	(1.37;2.20)
Single	1	0.001	1.68	(1.22;2.31)

GL: grau de liberdade

impairment than the other age groups, corroborating the results found in other studies.[4,13]

In a study carried out in 13 districts of Portugal with 1,354 individuals aged 75 years or older, the researchers found a prevalence of functional disability that was lower than in the majority of the Brazilian studies, although the mean age of the members of the sample was higher. In addition, only 3.2% of the sample were considered dependent and 4.3% were considered almost dependent. In the autonomous group, men predominated, as well as more individuals belonging to the lowest age group.[17]

Elderly individuals with low level of schooling presented odds two times higher of having functional impairment. A similar result was observed by Rosa et al[16] in the municipality of São Paulo (Southeastern Brazil), in a study in which the elderly with low level of schooling (just reads and writes / illiterate) presented odds approximately five times higher of having moderate/severe dependence.

A Finnish longitudinal study followed 11,486 individuals aged between 65 and 84 years during ten years and showed that individuals with low level of schooling presented higher prevalence of difficulties in ADL.[20]

If we consider the elderly individuals of the population of Brazil as a whole, this cohort of today's older people comes from a time in which the access to education was precarious. Thus, the level of schooling of the studied elderly individuals, besides influencing their functional impairment, gives them lower chances of facing old age compared to the elderly population in general. It is the case, mainly, of the female population, as the social organization of the 20th century limited the access to education to a social elite, particularly men.[c]

The high number of illiterate individuals and people with low level of schooling strengthens the idea of an inefficient network of social services during life and is also revealed in other aspects, like housing, culture, income and, logically, in health. People with higher level of schooling are more concerned about health and have greater capacity for recovery, as well as healthier hygienic habits, when compared to the less favored ones.[8]

Considering the marital status, although the majority of the population reported being married or widowed, the marital status that presented influence on moderate/severe functional impairment was the single one, and the married elderly individuals presented lower odds of having functional impairment. Similar results were found by Maciel & Guerra[7] in a cross-sectional study, with a representative sample of 310 individuals. Among the biopsychosocial factors that influenced the functional decline of the elderly who resided in the urban zone, a significant association was observed with being single (OR=2.14).[7]

Although our results showed that being single is a factor that leads to functional impairment, the majority of those who stated being single (50%) lived with someone from the same generation, generally with relatives (siblings, sons/daughters, nephews/nieces). Besides, many had a stable union but stated being single, portraying a cultural question of the region, mainly among women, who consider as marital status only the civil and religious marriage. Many of them never had a stable marital relationship and were single mothers; others were never married and lived with relatives. The health profile of the Brazilian population in the context of epidemiological transition shows that chronic non-communicable diseases were responsible for 66.3% of the disease burden in Brazil.[3] Although the aging process is not necessarily related to diseases and disabilities, chronic-degenerative diseases are frequently found among the elderly. Thus, the tendency heads towards having an increasing number of elderly individuals who, although living more, present greater chronic conditions. The increase in the number of chronic diseases is directly related to greater functional disability.[3] In the present study, the higher the number of morbidities, the greater the association with functional impairment.

In 2006, a cross-sectional study (n = 254) was carried out in the municipality of São Leopoldo, Southern Brazil, which aimed to outline the epidemiological profile of the elderly who had health plans and verify functional capacity and associated factors. As the individuals presented a higher number of diseases, the prevalence of disability increased by approximately five times.[2] This was also shown in the present study, in which the higher number of morbidities is a factor of association with functional impairment, corroborating also the findings of Menéndez et al.[9]

[c] Berquó E. Envelhecimento populacional no Brasil e suas conseqüências. In: Pereira DM, organizador. Idoso: encargo ou patrimônio? O envelhecer em São Paulo. São Paulo: Secretaria Municipal de Saúde; 1992. p.51-9.

In the adjusted model, the PR of *per capita* income and family composition were not associated with moderate/severe impairment. However, their importance cannot be ignored; it is likely that in the case of the present study, which has a cross-sectional design, these factors are not able to reflect their impact on functional impairment in the final phase of life. The factors age, level of schooling, sex and marital status were associated in an independent way with moderate/severe impairment. It is possible that these factors portray better, mainly, the conditions throughout the life of these elderly individuals, conditions that seem to influence functional impairment in more advanced ages.

The present study had some limitations that should be considered: firstly, the questions about functional impairment covered mainly physical functioning, without utilizing any measure of cognitive incapacity or mental health. Thus, these factors are only reflecting whether they were severe enough to affect the areas of functioning surveyed in the research. Ideally, analyses of functional impairment distribution should include complementary data about known risk factors like smoking, alcohol consumption and practice of physical exercise. Additionally, more reliable information on the occurrence of chronic diseases would be useful to the understanding of the diseases that lead to functional impairment. Unfortunately, there are no behavioral data available, and the information on diseases are self-reported, which probably affects the accuracy of the data, in view of the low level of schooling of the elderly and the difficulties in accessing the health system in Maceió.

In view of the consistency of the associations found in the study, the variables that remained significant can be considered predictors of functional deficit, even though this is a cross-sectional study.

This study describes specifically the reality of elderly people from a capital city in the Northeast of Brazil. Further investigations are necessary for those living in other contexts, urban and rural. Furthermore, given the limitations of a cross-sectional design, longitudinal studies are recommended to test the hypotheses that we have raised, whose results may subsidize the development of programs and interventions in the field of elderly people's health.

The conditions of the elderly revealed here, their inequalities and potential impacts on the health services allow suggesting that the organization in a comprehensive way of elderly health care is an emerging priority in the capital city of the State of Alagoas.

REFERENCES

1. Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. *BCM Med Res Methodol.* 2003;(3):21. DOI: http://dx.doi.org/10.1186/1471-2288-3-21
2. Cardoso JH. Características epidemiológicas, capacidade funcional e fatores associados em idosos de um plano de saúde. *Cienc Saude Coletiva.* 2010;15(6):2871-8. DOI: http://dx.doi.org/10.1590/S1413-81232010000600024
3. Chaimowicz F. A saúde dos idosos brasileiros às vésperas do século 21: problemas, projeções e alternativas. *Rev Saude Publica.* 1997;31(2):184-200. DOI: http://dx.doi.org/10.1590/S0034-89101997000200014
4. Fiedler MM, Peres KG. Capacidade funcional e fatores associados em idosos no Sul do Brasil: um estudo de base populacional. *Cad Saude Publica.* 2008;24(2):409-15. DOI: http://dx.doi.org/10.1590/S0102-311X2008000200002
5. Guralnik JM, Lacroix AZ. Assessing physical function in older populations. In: Wallace RB, Woolson RF, editors. The epidemiologic study of the elderly. New York: Oxford University Press; 1992. p. 159-81.
6. Lollar DJ, Crews JE. Redefining the role of public health in disability. *Annu Rev Public Health.* 2003;24:195-208. DOI: http://dx.doi.org/10.1146/annurev.publhealth.24.100901.140844
7. Maciel ACC, Guerra RO. Influência dos fatores biopsicossociais sobre a capacidade funcional de idosos residentes no nordeste do Brasil. *Rev Bras Epidemiol.* 2007;10(2):178-89. DOI: http://dx.doi.org/10.1590/S1415-790X2007000200006
8. Maciel ACC, Guerra RO. Prevalência e Fatores associados ao déficit de equilíbrio em idosos. *Rev Bras Cienc Mov.* 2005;13(1):37-44.
9. Menéndez J, Guevara A, Arcia N, León-Díaz EM, Marín C, Alfonso JC. Enfermedades crónicas y limitación funcional en adultos mayores: estudio comparativo en siete ciudades de América Latina y el Caribe. *Rev Panam Salud Publica.* 2005;17(5/6):353-61. DOI: http://dx.doi.org/10.1590/S1020-49892005000500007
10. Mor V, Murphy J, Masterson-Alen S, Willey C, Razmpour A, Jackson ME, et al. Risk of functional decline among well elders. *J Clin Epidemiol.* 1989;42(9):895-904. DOI: http://dx.doi.org/10.1016/0895-4356(89)90103-0
11. Murtagh Kn, Hubert HB. Gender differences in physical disability among an elderly cohort. *Am J Public Health.* 2004;94(8):1406-11. DOI: http://dx.doi.org/10.2105/AJPH.94.8.1406
12. Nunes MC, Ribeiro RCL, Rosado LEFPL, Franceschini SC. Influência das características sociodemográficas e epidemiológicas na capacidade funcional de idosos residentes em Ubá, Minas Gerais. *Rev Bras Fisioter.* 2009;13(5);376-82. DOI: http://dx.doi.org/10.1590/S1413-35552009005000055
13. Parahyba MI, Simões CCS. A prevalência de incapacidade funcional em idosos no Brasil. *Cienc Saude Coletiva.* 2006;11(4):967-74. DOI: http://dx.doi.org/10.1590/S1413-81232006000400017
14. Ramos LR, Rosa TEC, Oliveira ZM, Medina MCG, Santos FRG. Perfil do idoso em área metropolitana na região sudeste do Brasil: resultado de inquérito domiciliar. *Rev Saude Publica.* 1993;27(2):87-94. DOI: http://dx.doi.org/10.1590/S0034-89101993000200003
15. Ramos LR. Fatores determinantes do envelhecimento saudável em idosos residentes em centro urbano: Projeto Epidoso, São Paulo. *Cad Saude Publica.* 2003;19(3):793-8. DOI: http://dx.doi.org/10.1590/S0102-311X2003000300010
16. Rosa TEC, Benício MHDA, Latorre MRDO, Ramos LR. Fatores determinantes da capacidade funcional entre idosos. *Rev Saude Publica.* 2003;37(1):40-8. DOI: http://dx.doi.org/10.1590/S0034-89102003000100008
17. Souza L, Galante H, Figueiredo D. Qualidade de vida e bem-estar dos idosos: um estudo exploratório na população portuguesa. *Rev Saude Publica.* 2003;37(3):364-71. DOI: http://dx.doi.org/10.1590/S0034-89102003000300016
18. Spilmann B. Changes in elderly disability rates and implications for health care utilization and costs. *Milbank Q.* 2004;82(1):157-94. DOI: http://dx.doi.org/10.1111/j.0887-378X.2004.00305.x
19. Strauss EV, Torres HA, Kareholt I, Winblad B, Fratiglioni L. Women are more disabled in basic activities of daily living than men only in very advanced ages: a study on disability, morbidity, and mortality from the Kungsholmen project. *J Clin Epidemiol.* 2003;56(7):669-77. DOI: http://dx.doi.org/10.1016/S0895-4356(03)00089-1
20. Sulander T, Tuija M, Sainio P, Rahkonen O, Nissinen A, Uutela A. Trends and educational disparaties in functional capacity among people aged 65-84 years. *Int J Epidemiol.* 2006;35(5):1255-61. DOI: http://dx.doi.org/10.1093/ije/dyl183
21. Vecchia RD, Ruiz T. Qualidade de vida na terceira idade: um conceito subjetivo. *Rev Saude Publica.* 2005;8(3):246-52. DOI: http://dx.doi.org/10.1590/S1415-790X2005000300006

Paper based on the Master's dissertation by Silva MDC submitted to Universidade Federal de São Paulo in 2010.
The authors declare that there are no conflicts of interests.