

# Prevalence of cognitive impairment and associated factors among the elderly in Bagé, Rio Grande do Sul, Brazil

## *Prevalência de déficit cognitivo e fatores associados entre idosos de Bagé, Rio Grande do Sul, Brasil*

### **Abstract**

It is estimated that until 2020 the elderly will represent 13% of the total Brazilian population, and there is increasing concern about healthy aging and low rates of cognitive impairment. This cross-sectional study aimed to identify the prevalence of cognitive impairment, using the Mini-Mental State Examination (MMSE) in a sample of 1,593 elderly aged 60 years old and more who were living in the community of the city of Bagé, Southern Brazil, in 2008. The Poisson regression model was used for estimating crude and adjusted prevalence ratios; their related 95% confidence intervals and p-values lower than 0.05 were considered statistically significant. The prevalence of cognitive impairment was of 34% and statistically associated with gender (female), age (older), schooling (less educated), lower economic classes, without retirement, with depression and functional limitation. The high magnitude with increased occurrence among poor and vulnerable groups contributes to the implementation of public policies in order to improve care, prevent diseases and promote the independence and autonomy of the elderly population.

**Keywords:** Health of the elderly. Cognition. Primary health care. Cross-sectional studies. Aging. Mental health.

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## Resumo

As estimativas para 2020 indicam que os idosos representarão 13% da população do Brasil e é crescente a preocupação com a manutenção da capacidade cognitiva desta população. O objetivo deste estudo foi identificar a prevalência e fatores associados ao déficit cognitivo em idosos residentes na área de abrangência dos serviços de atenção básica em saúde no município de Bagé, Rio Grande do Sul. O estudo epidemiológico de base populacional foi realizado em 2008. O Miniexame do Estado Mental (MEEM) foi aplicado, no domicílio, a 1.593 idosos. A análise dos fatores associados foi realizada através de regressão de Poisson a partir de um modelo hierárquico. Associações com valor  $p$  menor que 0,05 foram consideradas estatisticamente significativas. A prevalência de déficit cognitivo foi de 34,1%. Idosos do sexo feminino, indivíduos mais velhos, de cor da pele preta ou amarela/parda/indígena, com menor escolaridade, de classes sociais mais pobres, sem aposentadoria, com depressão e incapacidade para Atividades Instrumentais da Vida Diária (AIVD) tiveram maior probabilidade de apresentar déficit cognitivo ( $p < 0,05$ ). A elevada magnitude com possibilidade de ocorrência aumentada entre grupos mais pobres e vulneráveis contribui para a implementação de políticas públicas de modo a qualificar o atendimento, a prevenção de agravos e a promoção da independência e autonomia da população idosa.

**Palavras-chave:** Saúde do Idoso. Cognição. Atenção primária à saúde. Estudos Transversais. Envelhecimento. Saúde mental.

## Introduction

The population aging will require changes in the current Brazilian health system, especially because the increase of life expectancy in the country is not followed by the improvement in the general life conditions<sup>1-4</sup>. In order for the individual to remain independent and active while growing old, conditions of access to health services, social protection, leisure, practice of physical activities and education must be offered. In 2009, the elderly represented 11.3% of the Brazilian population, and the projections for 2020 indicate that about 30 million people will be 60 years old or older, representing 13.0% of the total population<sup>5</sup>. This can represent an increase in the number of people with morbidities, disabilities or with need to use health services<sup>6</sup>.

Facing population aging, dementia becomes an important health indicator among the elderly, with incidence rate of 13.8/1,000 inhabitants a year among the elderly living in the community<sup>7</sup>. Thus, it has become increasingly important for the Brazilian society, especially among the older age groups. A study conducted with 2,143 people aged 60 years old or more in São Paulo found a prevalence of cognitive deterioration of 6.9%, being 4.2% for people aged 60 to 74 years old and 17.7% for those aged 75 years old or more<sup>8</sup>.

Dementia syndromes are characterized by the presence of progressive cognitive impairment, especially memory loss and aphasia, apraxia, agnosia or disturbance in executive function<sup>9</sup>, which interferes with social and occupational activities<sup>10</sup>.

Cognitive impairment affects the quality of life of the elderly since it leads to the loss of their autonomy and independency. Besides, it requires a permanent caretaker and assistance from elderly care services, family and caretaker, with the objective of keeping the individual at home. Studies identifying elderly people with cognitive impairment are not common. Therefore, this study aimed at knowing the prevalence and associated factors of cognitive impairment in the elderly population living in the area assisted by the health services in the city of Bagé, Rio Grande do Sul.

## Methods

A population-based epidemiological study with cross-sectional design in which elderly people aged 60 years old or more were interviewed, living in private households in the area assisted by the Primary Health Care of the urban zone of the city of Bagé, Rio Grande do Sul, from July to November 2008.

Data were collected by questionnaires structured with pre-codified questions. For cognitive assessment, the Mini-Mental State Examination (MMSE) was used, which is comprised of several questions grouped into categories to assess specific cognitive functions: temporal orientation (5 points), spatial orientation (5 points), immediate memory (3 points), calculation (5 points), evoking memory (3 points), naming (2 points), repetition (1 point), command (3 points), reading (1 point), sentence (1 point), drawing (1 point), accounting for 30 points<sup>11</sup>. In order to define the presence of cognitive impairment, the cut-off point used in the analysis was 22/23, with sensitivity = 75.6% and specificity = 71.1%<sup>12</sup>.

The used independent demographic and socioeconomic variables were: gender (male/female), age in years (60 - 64/65 - 69/70 - 74/75 - 79/80 or older), self-reported skin color (white/ black/ yellow/mixed and indigenous), marital status (married or with a partner/single, separated, widow), schooling in full years (no schooling/1 to 3/ 4 to 7/ 8 or more), economic class (A and B/C/D and E), according to the Brazil Criteria of Economic Classification, of the National Association of Research Companies (ANEP), retirement (no/yes), health insurance (no/yes).

The independent variables of health status were depression, cardiovascular condition (hypertension and/or stroke and/or heart problems) and instrumental daily life activities (IDLA). The Geriatric Depression Scale was used to assess the presence of depression symptoms, and the results were dichotomized (present: score from 0 to 5/absent: score  $\geq$  6)<sup>13</sup>. In order to establish functional inability for IDLA, the Lawton and Brody scale was used<sup>14</sup>. The elderly who reported needing help for at least one of the activities were considered with inability.

The adjusted analysis was performed with the objective of controlling possible confusion factors in relation to the variables of the same level and those of the prior level. The Poisson regression model<sup>15</sup> was used, with robust variance estimation, maintaining variables with p value lower than 0.20 in the model. Associations with p value lower than 0.05 were considered to be statistically significant. Data analysis was conducted with the software Stata, version 12.0 (Stata Corp, College Station, Texas, USA).

A schematic conceptual model was used to determine the factors associated with the outcome. The variables of both levels were included simultaneously, with a level by level backward selection. Level 1 included demographic and socioeconomic variables (gender, age, skin color, marital status, schooling, ANEP, retirement and health insurance). The second level was composed of health condition variables (depression, cardiovascular problems and IDLA).

The project was approved by the OF. 015/08 at the Ethics Committee of the Medical School of UFPel. The ethical principles were insured by the informed consent of the interviewers, the assurance of the right to not participate in the research and the anonymity of the subjects. The precepts of Resolution n. 196/96, which regards the ethical aspects of research involving human beings, were respected.

## Results

In the study, 1,593 elderly people were interviewed, out of which 1,514 answered the MMSE questions, representing 5.0% of losses.

The female gender represented most of the sample (62.8%). Elderly people aged from 60 to 64 years old represented 25.1% of the total, and those aged 80 years old or more, 16.8% of the sample. The white skin color was prevalent (78.6%). Schooling strata presented similar distribution, and 23.7% of the elderly had no schooling and 21.8% had 8 years or more of schooling. The economic class with higher percentage was class C

(38.9%). Practically half of the elderly (51.3%) was composed of married participants or with partners. Retired people represented 71.7% of the total, and 35.4% were covered by a health insurance. In relation to health problems, 14.9% presented with depression, 64.4% had some cardiovascular problem, and 34.2% presented inability for IDLA. From all of the elderly participants, 34.1% (95%CI 31.7 – 36.5) presented positive tracking for cognitive impairment (Table 1).

In crude analysis, the possibility of presenting with cognitive impairment ( $p < 0.05$ ) was higher among female elderly individuals, older people, with black or yellow skin, mixed or indigenous, without a partner, with lower schooling, from poorer social classes, with no health insurance, with depression, cardiovascular problem and inability for IDLA. The retirement variable was not statistically associated with the outcome, both in the crude and the adjusted analyses (Table 2).

**Table 1** - Sample description according to sociodemographic and health conditions. Bagé, Rio Grande do Sul, 2008.

**Tabela 1** - Descrição da amostra de acordo com as características sociodemográficas e condições de saúde. Bagé, Rio Grande do Sul, 2008.

Variables	n = 1593	%
Gender		
Male	593	37.2
Female	1.000	62.8
Age (full years)		
60 – 64	400	25.1
65 – 69	374	23.5
70 – 74	322	20.2
75 – 79	229	14.4
≥ 80	268	16.8
Skin color (self-reported)		
White	1.252	78.6
Black	139	8.7
Yellow/Mixed/Indigenous	202	12.7
Marital status		
Married or with a partnet	816	51.3
Single, separated, widow(er)	776	48.7
Schooling (full years)		
No schooling	372	23.7
1 – 3	384	24.4
4 – 7	474	30.1
≥ 8	342	21.8
Economic class (ANEP)		
A/B	429	27.1
C	615	38.9
D/E	537	34.0
Retirement		
No	451	28.3
Yes	1.142	71.7
Health insurance		
No	1.025	64.6
Yes	561	35.4
Presence of health issues		
Depression*	225	14.9
Cardiovascular problem	1.026	64.4
Instrumental inability of daily life (AIVD)	518	32.7
Cognitive impairment	516	34.1

\*Variable with higher number of losses n = 1,512

\*Variável com maior número de perdas n = 1.512

In the adjusted analysis, the variables marital status, health insurance and cardiovascular problem lost their association with the outcome. Nonetheless, it was observed that female elderly people had 21% more chances of presenting with cognitive impairment. The

increment of age showed the linear increase in cognitive impairment, therefore, elderly people aged 80 years old or more had 2.45 times more occurrences of the outcome. Individuals with black skin or those with yellow skin, mixed and indigenous participants,

**Table 2** - Crude and adjusted analysis between cognitive impairment by sociodemographic and health conditions. Bagé, Rio Grande do Sul, 2008.

**Tabela 2** - Análise bruta e ajustada entre déficit cognitivo e variáveis sociodemográficas e de condições de saúde. Bagé, Rio Grande do Sul, 2008.

Variables	Crude analysis			Adjusted analysis	
	%	PR (95%CI)	p-value*	PR (95%CI)	p-value*
Level 1					
Gender			< 0.001		0.011
Male	27.6	1		1	
Female	37.9	1.38 (1.18 – 1.61)		1.21 (1.04 – 1.40)	
Age (full years)			< 0.001**		< 0.001**
60 – 64	18.2	1		1	
65 – 69	25.9	1.42 (1.08 – 1.87)		1.32 (1.02 – 1.71)	
70 – 74	35.8	1.97 (1.52 – 2.55)		1.66 (1.30 – 2.13)	
75 – 79	44.3	2.43 (1.88 – 3.15)		1.85 (1.43 – 2.40)	
≥ 80	62.3	3.42 (2.71 – 4.32)		2.45 (1.93 – 3.12)	
Skin color (self-reported)			< 0.001		0.002
White	30.0	1		1	
Black	53.5	1.79 (1.49 – 2.14)		1.29 (1.08 – 1.53)	
Yellow/Mixed/Indigenous	46.6	1.56 (1.31 – 1.85)		1.23 (1.06 – 1.44)	
Marital status			< 0.001		0.433
Married or with a partnet	26.4	1		1	
Single, separated, widow(er)	42.5	1.61 (1.39 – 1.86)		1.06 (0.92 – 1.22)	
Schooling (full years)			< 0.001**		< 0.001**
No schooling	71.0	11.05 (7.27 – 16.81)		5.78 (3.65 – 9.14)	
1 – 3	36.4	5.67 (3.67 – 8.77)		3.67 (2.32 – 5.80)	
4 – 7	22.9	3.57 (2.28 – 5.58)		2.63 (1.67 – 4.16)	
≥ 8	6.4	1		1	
Economic class (ANEP)			< 0.001**		< 0.001**
A/B	12.1	1		1	
C	31.1	2.56 (1.92 – 3.42)		1.44 (1.10 – 1.89)	
D/E	54.6	4.50 (3.42 – 5.92)		1.75 (1.32 – 2.32)	
Retirement			0.034		0.034
No	38.1	1		1	
Yes	32.5	0.85 (0.74 – 0.99)		0.86 (0.75 – 0.99)	
Health insurance			< 0.001		0.066
No	40.2	1		1	
Yes	22.7	0.56 (0.47 – 0.67)		0.86 (0.73 – 1.01)	
Level 2					
Depression			< 0.001		0.001
No	30.7	1		1	
Yes	51.6	1.68 (1.44 – 1.96)		1.27 (1.10 – 1.46)	
Cardiovascular problem			0.014		0.685
No	30.0	1		1	
Yes	36.4	1.21 (1.04 – 1.41)		1.03 (0.90 – 1.18)	
Instrumental inability of daily life (AIVD)			< 0.001		< 0.001
No inability	25.5	1		1	
With inability	54.2	2.13 (1.86 – 2.43)		1.32 (1.15 – 1.52)	

\*Wald test for heterogeneity; \*\*Wald test of linear tendency.

\*Teste de Wald de heterogeneidade; \*\*Teste de Wald de tendência linear.

presented 1.29 and 1.23 times more impairment when compared to white individuals. Those with no schooling presented 5.78 times more occurrences of cognitive impairment when compared to those with eight schooling years or more, and this association presented inverse linear tendency. Elderly people from the class C had more chances of cognitive impairment (PR = 1.44) when compared to those in class A. This probability increased for individuals in classes D/E (PR = 1.75). Finally, elderly people with depression and inability for IDLA presented approximately 30% more occurrence of cognitive impairment.

## Discussion

The prevalence of cognitive impairment was similar to that of other studies conducted in Brazil. Among the elderly participating in the Municipal Program of Seniors in Viçosa, Minas Gerais, the prevalence of cognitive impairment was of 36.5%<sup>16</sup>. A study conducted with hypertensive elderly assisted in a geriatric outpatient clinic associated with Universidade Federal do Rio de Janeiro found a 32.2% prevalence<sup>17</sup>. Other studies bring more diverging prevalence. In Belo Horizonte, the prevalence of cognitive impairment among elderly restricted to the household was of 22.8%<sup>18</sup>. In a population-based cross-sectional study conducted in Florianópolis, the prevalence found was of 46.8%<sup>19</sup>.

In the comparison of the results of the studies about cognitive assessment with MMSE, it is important to consider the analyzed population, the used cutoff points and the type of version of the instrument. In the SABE project, conducted in the city of São Paulo, the cognitive assessment used a reduced version of MMSE, validated in Brazil from the modified and validated version of Chile<sup>20</sup>. This reduced version established the cutoff point 12/13, and cognitive deterioration was indicated by 12 points or less<sup>21</sup>. The application of higher cutoff points allows to increase the sensitivity of the scale in order to detect more cases, considering that the MMSE is an instrument used to track cognitive impairment<sup>22</sup>.

The female gender presented more prevalence of cognitive deficit, as already described in other studies<sup>16,23,24</sup>. The higher life expectancy for women in Brazil contributes to this reality. In 2010, life expectancy for men was 69.7 years old, while among women the age was 77.3 years old<sup>25</sup>. Besides, as this study showed more frequent cognitive impairment among the older age groups, other authors already observed that this prevalence increases with age<sup>21,24,26</sup>.

The black skin color showed more prevalence of cognitive impairment. No studies were found to prove such relationship. However, a factor that contributes for the highest prevalence among black-skinned individuals is schooling. Among the elderly, in 2010 half of the population had less than four schooling years<sup>5</sup>.

The prevalence by schooling confirms that the higher the schooling of the individuals, the better their performance in the MMSE<sup>27</sup>. Among the elderly of a reference center of elderly care, the mean score at MMSE was also higher according to more schooling years<sup>28</sup>, as well as among the elderly of a population-based study conducted in Minas Gerais<sup>29</sup>.

With regard to economic classes, the probability of cognitive impairment increases with lower classes. Another study that assessed the economic level by per capita income demonstrated that the prevalence of cognitive impairment is higher among those receiving 0.6 to 1 minimum wage<sup>30</sup>. Therefore, individuals in a less favorable economic situation present more risks of cognitive impairment.

As to health insurance, a lower probability was found for impairment when the elderly people were covered by a health insurance in the crude analysis. After the adjustment, the association did not continue to present a bordering p value. Nonetheless, the possible protection of this socioeconomic indicator shows concerning health inequities, once, in Brazil, in 2008, 70.3% of the individuals aged 65 years old or more depended on the assistance of public health services<sup>31</sup>.

Depression among the elderly increased the risk for cognitive impairment. It has been observed that elderly with cognitive impairment are more depressed, in a chance ratio

of 1.81 in relation to those without cognitive impairment<sup>32</sup>. Another study concluded that elderly diagnosed with depression present with important cognitive and functional changes<sup>33</sup>.

Even though cardiovascular problems are considered as strong factors associated with dementia and Alzheimer's disease<sup>34</sup>, this relationship with cognitive impairment is not clear yet. A study with 99 elderly people with cognitive impairment did not find a significant association among those aged between 65 and 79 years old; however, among older people, there was a major inverse association<sup>17</sup>. Among the elderly of a community in a city of the State of São Paulo, the association was not found either<sup>35</sup>.

Elderly people with dependency for IDLA had more chances of presenting with cognitive impairment. A study conducted in a city of Bahia, with 222 women, concluded that elderly women with damaged cognitive function had 4.4 more chances for inabilities in IDLA in relation to those who did not have cognitive damage, even when controlled for the performance of physical and leisure activities in the past<sup>36</sup>. Another study conducted with elderly people assisted by teams of the Family Health Strategy in Goiânia observed that one of the statistically significant associated factors for dependency in IDLA was cognitive impairment (PR = 1.76)<sup>37</sup>.

The MMSE is universally used to track cognitive impairment; however, it has a serious educational bias. After being applied in low schooling populations, results can overestimate the prevalence of the problem. On the other hand, among high schooling populations, the test may not detect the deficit.

The used design does not allow the conduction of a causal inference in some associations,

for instance, cognitive impairment with IDLA and cardiovascular problems. Nonetheless, the representativeness of the target-population of the study, the use of a validated instrument to measure the outcome and the reduction of biases due to the used methodological criteria are strengths that ratify the found results.

## Conclusion

The factors associated with cognitive impairment were female gender, older age group, black skin and yellow/mixed/indigenous, low schooling, lower economic class, without retirement, presence of depression and IDLA. This profile is related to elderly people who should be more frequently assessed for cognitive impairment.

The strong influence of schooling in cognitive impairment shows health inequities that should be minimized with more political and financial incentives to increase the permanence of individuals in school, and, consequently, increasing the years of study.

Aging is a natural process in which progressive functional limitations are expected. To identify when these limitations result from pathologies is important to assess the health of the elderly person. In this sense, the study demonstrates to the health teams that the Mini-Mental State Examination is a potential instrument to detect cognitive impairment among the elderly, besides being easy to apply. Therefore, it enables to quality the assistance and to implement care to the elderly in the area approached by the basic care services, which will reflect on prevention and promotion of independency and autonomy of the subjects.

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