

Neurodegenerative Diseases

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Research Article
Epidemiological impact of neurodegenerative diseases in the rural Spanish-Portuguese cross-border region

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Short Title: Neurodegenerative diseases epidemiology in the Spanish-Portuguese border region.

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Abstract

Introduction: Epidemiological data indicate that neurodegenerative diseases show a high prevalence with a progressive increasing trend, especially in aging populations, as is the case in rural areas. The objective of this study was to assess the quantitative impact of neurodegenerative diseases in rural areas of the Spanish-Portuguese border region and to describe the epidemiological profile of the most prevalent disorders in one of the most depopulated and aged regions of Europe.

Methods: A cross-sectional descriptive study was designed to estimate the prevalence of subjects diagnosed with the most common neurodegenerative disorders: dementia (Alzheimer's disease & other dementias), Parkinson's disease & Parkinsonism and Multiple sclerosis in the Spanish-Portuguese cross-border border region in 2020. It includes Bragança and Guarda Districts (Portugal), and Salamanca (Castilla y León, Spain).

Results: Neurodegenerative diseases accounted for 1.85% in the Spanish-Portuguese cross-border region in 2020; a total of 5,819 records: 987 (prevalence, 2.51%) were reported in Salamanca (Spain); 2,332 (prevalence, 1.87%) in Bragança; and 2,500 (prevalence, 1.66%) in Guarda. Female population suffered from them in higher proportion (2.35% vs. 1.32%). Dementia represented 1.19% (3,744), Parkinson's disease & Parkinsonism 0.58% (1,823) and Multiple sclerosis 0.08% (252). These disorders impacted older age groups. In the rural border region of Spain, 1 out of 4 cases were institutionalized.

Conclusion: The findings reveal the health impact of neurodegenerative diseases in the Spanish-Portuguese cross-border region. The epidemiological data emphasizes the region's circumstances and highlights research priorities. Intervention strategies must be implemented in the region to ensure quality healthcare in rural areas.

Introduction

Neurodegenerative diseases (hereinafter referred to as “NDDs”) impose substantial medical and public health burdens on populations throughout the world. They are one of the main causes of mortality, disability, and dependence globally [1,2] and have become a global health problem due to the physical and emotional impact they have on sufferers and their families, as well as the negative side effects, both on their life expectancy and quality of life, and on their personal, social, and professional development [3]. NDDs are a heterogeneous group of disorders characterized by progressive degeneration of neurons, especially in central nervous system, including highly prevalent Alzheimer’s disease (hereinafter referred to as “AD”), Parkinson’s disease (hereinafter referred to as “PD”), and multiple sclerosis (hereinafter referred to as “MS”) [4-6].

Evidence from epidemiological data indicates that neurodegenerative diseases show a high prevalence with a progressive growing trend, especially in aging populations, as is the case in rural areas. The worldwide prevalence of NDD is estimated at 1.03% and 1.61% in Europe [7]. The prevalence of NDDs in Spain reaches 2.08% of the population, representing a total of 988,000 people affected [7]; 22% of these people with NDDs live in rural areas [7], regions characterized by a strong aging and depopulation process [8]. More than 55 million people worldwide (8.1 % of women and 5.4% of men over 65 years) suffer from dementia in 2020, most suffering from AD, and there are around 10 million new cases each year [6,9]. The number of individuals with dementia is expected to double by 2050 due to population aging [10]. *Alzheimer Europe* estimated the prevalence of dementia in Europe at 1.57% in 2018; but the expected significant increase in the number of people over 70 and, in particular, people over 85, this percentage will rise to 1.80% in 2025 and 3.00% in 2050. In Spain, 852,741 (1.83%) people suffered from dementia in 2018, rising to 992,000 (2.13%) in 2025, and more than 1.7 million (3.99%) in 2050; data ranging between 5% and 14.9% for those over 65 years, and between 6.6% and 17.2% for those over 70 years depending on the geographical area of the study [7]. Similarly, people with dementia in Portugal will represent 2.29% in 2025, and 3.82% (346,905) in 2050 versus 1.88% (193,516) in 2018 [11]. In Europe, prevalence and incidence rates for PD are estimated at approximately 108-257/100,000 and 11-19/100,000 per year, respectively [12]. The study conducted by Ferreira et al. (2017) points to an adjusted prevalence for the resident population aged ≥50 years of 0.24%, estimating a total number of cases of 180/100,000 inhabitants [13]. In Spain, it affects around 120,000-150,000 individuals (up to 2% in people over 65 years of age and 4% in >80 years old), and its prevalence is estimated to increase in the future [14,15]. An estimated 2.8 million people worldwide suffer from MS. The 2020 global prevalence is 35.9/100,000 population [16,17]. MS prevalence in the European region in 2020 is estimated at 142.8/100,000

population [16]. The Multiple Sclerosis International Federation estimates that there are 5,787 individuals with MS in Portugal, 56.2/100,000 inhabitants; in Spain, it is estimated at 100/100,000 inhabitants [18]. Females are twice as likely to live with MS as males [16].

The progressive ageing of the population is an unquestionable fact associated with this group of diseases, and this entails an increasing social and economic burden. NDDs will become a major challenge for Public Health and Social-Health Care in future years due to demographic changes worldwide. An updated knowledge/understanding of the prevalence of NDDs in rural Spanish-Portuguese border region and their demographic and geographic characteristics is in great demand. These regions share almost one hundred kilometers of the Douro River, which demarcates their border, and they also share demographic trends: their predominantly rural character and a regressive demographic dynamic, with population loss and ageing. This border region is the most aged area in Europe. The Spanish-Portuguese cross-border has a leading position in terms of the life expectancy of its population. Salamanca is Spain's province with the highest life expectancy (84.74 years; female 87.88 versus male 81.67) [19]. In Beiras e Serra da Estrela (includes the Guarda region) the life expectancy is 80.32 years and life expectancy in Terras de Trás-os-Montes is 80.68 years [20]. Population density is very low, showing high depopulation (15.37 inhabitants/km² in Salamanca, 33.40 inhabitants/km² in Beiras e Serra da Estrela, and 18.85 inhabitants/km² in Bragança) and large population dispersion.

Therefore, we **proposed** quantifying the current scope of NDDs in the rural areas of the Spain-Portugal border and describing the Spanish and Portuguese epidemiological profiles in one of Europe's most depopulated and aged regions.

Materials and Methods

Study design and settings

A cross-sectional descriptive study was conducted in 2020 to estimate the prevalence of more frequent NDDs in the rural areas of the north-central Spanish-Portuguese border region. It includes part of Castilla y León (Salamanca, Spain) and Bragança and Guarda (Portugal).

Study population and Sample

Spain and Portugal use different systems to collect, process and classify diseases. Therefore, we agreed on how to collect data homogeneously. Thus, we defined the following inclusion criteria: i) subjects with *International Classification of Diseases, ICD-9-CM* diagnostic codes: 331 (Alzheimer's disease and other dementias), 332 (Parkinson's disease), and 340 (Multiple Sclerosis); or *ICD-10* diagnostic codes: G20 (Parkinson's disease), G21 (Parkinsonism), G30 (Alzheimer's disease), G31

(other dementias) and G35 (Multiple Sclerosis), residing in the rural cross-border area of Salamanca (Castilla y León, Spain); and ii) subjects with *Classificação Internacional de Cuidados de Saúde Primários - 2ª Edição* = *International Classification of Primary Care (ICPC-2)* diagnostic codes: P70 (Dementia), N 86 (Multiple Sclerosis) and N 87 (Parkinsonism), residing in Bragança and Guarda (Portugal). The data presented in this study are related to active diagnoses, according to ICPC-2. Thus, we defined three diagnostic groups: “AD & other dementias”, “PD & Parkinsonism”, and “MS”.

Study participants were recruited from: i) Ten Basic Health Areas of the cross-border rural area of the province of Salamanca, providing coverage for a total population of 39,354 inhabitants (20,147 males and 19,207 females), from Regional Health Management (RHM) of Castilla y León, Spain [21]; ii) in Guarda, Portugal, the participants were recruited in the area covered by the Local Health Unit of Guarda, which includes 14 Functional Units in Primary Health Care, with a population of 150,328 users, 71,687 men and 78,641 women [22]; and iii) in Bragança District, Portugal, the total resident population was 124,571 (58,976 men; 65,595 women) [23].

A total of 5,819 residents had a registered NDD in the Spanish-Portuguese cross-border region in 2020; 987 were collected in the Spanish cross-border area, 2,500 in Guarda, and 2,332 in Bragança (both Portuguese cross-border regions).

Data collection

In the Spanish region, subjects were recorded from the *Electronic Clinical Record* of Primary Care (MEDORA) by the Regional Health Management of Castilla y León during June-July 2020. In the Portuguese region, data were collected from the *Sistema de Informacao das Administracoes Regionais de Saude (SIARS)* with updates for December 2020 in Guarda, and the data provided in Bragança are from 2019. Variables collected were age, sex, diagnostic codes, geographic sanitary areas (Basic Health Zones), institutionalized care and evolution time (in years) from the date of diagnosis. All recruited participants were stratified into three diagnostic groups for data analysis: “AD & other dementias”, “PD & Parkinsonism”, and “MS”.

Data analyses

The data files were provided in Excel and exported to SPSS software (version 26.0) for statistical data exploitation. The descriptive analysis includes numbers (n), percentages (%), mean or median, and standard deviation (SD) or interquartile range (IQR = $Q_3 - Q_1$). Prevalence expresses the total number of events, or count, divided by the total population of the selected geographic area and multiplied by a constant (100). In the bivariate analysis, a Chi-square (χ^2) test was used to compare the association between categorical variables. The measured outcome was expressed as the odds ratio (OR) and the

95% CI for OR. Continuous variables were compared with Student's t-test or Mann-Whitney test for two groups, depending on their normal or non-normal distribution. ANOVA allowed us to analyze the influence of independent nominal variables on a continuous dependent variable; thus, one-way ANOVA was used to compare the age means in the three diagnostic groups. All comparisons were considered statistically significant at a $P < 0.05$ level.

Results

Prevalence

A total of 5,819 residents had a recorded NND in the Spanish-Portuguese cross-border region in 2020; it represents an overall prevalence of 1.85%, higher in women (2.35%) versus men (1.32%). The prevalence was higher in the rural cross-border region of Spain (2.51%), with 987 cases reported. In the Portugal cross-border region, 2,332 cases (prevalence, 1.87%) were reported in the Bragança region and 2,500 (prevalence, 1.66%) in the Guarda region. In all three regions, the prevalence in females was almost double that of males (shown in **Table 1**). Most of the cases were in individuals over 70 years of age (5,066/5,819; 87%). Thus, NDD prevalence in the population over 70 years of age increased to 6.53% (5,066 cases), higher in women (7.57%) versus men (5.08%). This age group of the population reached the highest prevalence in the rural Spanish region of Salamanca (7.31%), with women (8.65%) versus men (5.70%), while the Guarda region had the lowest prevalence (5.88%), women (6.77%) versus men (4.58%).

According to diagnostic groups, AD & other dementias attained an overall prevalence of 1.19% (3,744 cases), PD & Parkinsonism 0.58% (1,823 cases) and MS 0.08% (252 cases). **Figure 1** shows a map of the area with data obtained in the three cross-border regions. We found that AD & other dementias prevalence (1.47% in Salamanca, 1.28% in Bragança, and 1.04% in Guarda, $P < 0.001$) and PD & Parkinsonism prevalence (0.95% in Salamanca versus 0.53% in Guarda and Bragança districts, $P < 0.001$) were higher in the rural Spanish border area, while MS prevalence was similar in the three border regions (0.06 in Bragança; 0.09% in Guarda and Salamanca). AD & other dementias and PD & parkinsonism prevalence increased significantly with age (70+ years old), 4.55% and 2.72%, respectively, in the Spanish cross-border region. In contrast, MS prevalence (0.03%) declined in the older population, as would be expected.

Significant differences were observed in the morbidity pattern according to gender (shown in **Fig. 2**). All diagnoses were more prevalent in the female population of the three cross-border regions, although the prevalences observed in males and females were significantly different between regions for each of the diagnostic groups ($P < 0.001$). We note one exception to this trend, PD &

Parkinsonism prevalence (0.88%) was slightly higher than AD & other dementia prevalence (0.85%) in the rural male population of the Spanish border.

Epidemiological profiles

We provide epidemiological profiles of neurological disorders in the three Spanish-Portuguese cross-border regions. Main data are summarized in **Table 2**. The rural female population of the Spanish-Portuguese cross-border region suffered from NDDs in a higher proportion. These disorders impacted older age groups. The mean age was slightly higher in the Salamanca region, 82 yrs. (sample range, 27 to 109 years old) versus 79 yrs. (sample range, 19 to 111 years old), in the Guarda region. Mean age and evolution time differed significantly in each diagnostic group ($P < 0.001$). AD & other dementias represented the most frequent diagnosis; however, the proportion of dementia on the Portuguese border was higher than on the Spanish border (68.4% and 62.8% versus 58.7%). While the proportion of PD & Parkinsonism was higher in the Spanish border (37.7% versus 31.7% and 28.3%). In the rural Spanish cross-border region, the 579 cases of dementia included the diagnoses: AD (307 cases), mild cognitive impairment (MCI) (145 cases), senile dementia (94 cases), vascular dementia (29 cases), alcoholic dementia (3 cases) and spongiform encephalopathy (1 case). In addition, there were 234 (23.7%) institutionalized persons in the Spanish cross-border region, accounting for 1 in 4; significant differences were observed according to gender, 175 women (175/626; 28%) versus 59 men (59/361; 16.3%), twice as many females as males institutionalized (OR = 2.0; 95% CI, 1.4-2.7; $P < 0.001$). The proportion of institutionalized persons increases with age. Thus, of the 11 persons over 100 years of age, 7 (63.6%) are institutionalized; of the 179 persons between 90 and 99 years of age, 78 (43.6%) are institutionalized; and of the 466 persons between 80 and 89 years of age, 101 (21.7%) are institutionalized. The proportion of institutionalized persons was higher among patients with AD & other dementias (26.4%) compared to 21% in PD & Parkinsonism and 8.3% in MS.

Discussion

NDDs are a new challenge that all healthcare professionals must face due to the ageing of the population and the increase in life expectancy. This research identified NDDs as an important public health problem in the Spanish-Portuguese cross-border region, with a prevalence of 1.85%, which was higher than the prevalence of these disorders in Europe (1.61%) or in the world (1.03%) [7]; however, the impact is significantly different in the three border regions, with the Spanish border being the most affected (2.51% vs 1.87% and 1.66%, Bragança and Guarda respectively). The prevalence of these diseases increases with age; thus, the number of cases is expected to increase for the foreseeable future as life spans in these countries continue to increase [19,20]. Spain and

Portugal's border area is one of the most aged areas of the European Union, in relation to the low birth rate and the burden of the population over 65 years of age (the proportion of elderly people in the Spanish border provinces is 22.7%, and 27.2% in the Portuguese regions) [24]. Salamanca region's ageing rate is one of the highest in Spain, standing at 219.96% in 2021 (220 people over 64 years of age for every 100 under 16) [25]. Population projections for 2030 indicate that this region has the most negative demographic outlook for the European Union. NDD prevalence in women was higher than in men in the three cross-border regions. We analyzed the demographic differences by sex to interpret this data. Thus, in Spanish border municipalities, there are more men than women; Salamanca is the province with the most male-dominated municipalities (percentage of municipalities in the province of Salamanca with more men than women, 83.7%). However, there is no Portuguese border municipality with more men than women [24]. This data confirms a process of masculinization in Spanish rural society. However, after 75 years of age, there are more women than men due to the higher life expectancy of women [26]. The ageing index in Portugal for the year 2019 was 163.2 (INE, 2020), a value that the region of Bragança almost doubles (315.7) [27]. Combined with greater female longevity, it will explain the higher prevalence of neurodegenerative diseases in the elderly population, which is mostly female.

AD and PD are the most common late-life neurodegenerative disorders. Large population-based studies have established that AD is the most common form of dementia. PD has been considered the second most common degenerative disease [28].

Despite the fact that ageing characterizes the rural Spanish-Portuguese cross-border region, the prevalence of dementia -is global (1.19%) and for each of the three regions (1.47% in Salamanca; 1.28% in Bragança; 1.04% in Guarda)- were lower than those of their respective countries (1.83% in Spain; 1.88% in Portugal) and the European average (1.57%) in 2018 [11]. Dementia is more prevalent at older ages [7], the percentage of dementia increased to 4.55% in the 70+ population living in the rural cross-border area of Salamanca. Thus, although getting older is the main risk factor for dementia, evidence shows that other factors can help reduce your own risks, such as eating healthily, keeping active, exercising your mind and pollution-free air [29,30]. Our findings are consistent with previous studies. According to the OECD, Portugal has a high prevalence of dementia, making it the fourth country with the most cases per thousand inhabitants, with an estimated 19.9 cases per thousand inhabitants, with age being the main risk factor [31]. In a population from northwestern Spain [32], prevalence rates were lower than those reported for neighbouring countries, with a low prevalence of vascular dementia and a high proportion of AD among all dementia cases (307 cases of AD vs 29 cases of vascular dementia in rural Spanish border region).

Women are more likely than men to develop dementia. Our findings follow the same trend (2.12%, 1.73% and 1.4% in women vs 0.85%, 0.78% and 0.65% in men, Salamanca, Bragança and Guarda, respectively). Age is the greatest risk factor, and women tend to outlive men, which may partly explain why more women are diagnosed with it [33-35].

Worryingly, the global prevalence of PD is increasing over time and is expected to double within the next 20 years (up to 2% in people over 60 and 6% in people over 80 years). The prevalence of PD & Parkinsonism in the Spanish-Portuguese cross-border region (0.58%) was higher compared to their respective countries [7,13-15], being higher in the Spanish border region (0.95% in Spain vs 0.53% in Portugal). There is a predominance of females, and it increases with age, in line with studies in neighbouring regions [36]. In the rural Spanish border region, prevalence increased to 2.72% in the population over 70 years of age and doubled in the male population (0.88% vs 0.49% and 0.46% in Bragança and Guarda, respectively), approaching the female population (1.01%); it was even higher than dementia (0.85%).

Multiple prevalence studies conducted in Spain reveal a steady increase in the crude prevalence of MS over time, Spain seems to have become a country with a high prevalence of MS [37].

Epidemiological data regarding MS in Portugal are scarce. A 2020 study reports a higher point prevalence of MS than had been previously described in Portugal, but still far from the higher values recently reported in other Southern European countries [38]. The prevalence of MS in the Spanish-Portuguese cross-border region (0.08%) was similar to that of their respective countries and European neighbors^{7,18}, and women were twice as likely to have MS as men (0.12% vs 0.06%). Experts have a few theories that might explain the sex differences in MS rates [39].

Society is ageing, which leads to a greater presence of chronic illnesses, dependency, and personal care for those who suffer from them. Recent studies suggest that progressive worsening of symptoms, decreasing functional status, experience of multiple losses as the disease worsens, increasing disability and changes in social roles may pose difficulties in the physical and psychological management of these patients [40]. The outbreak of the COVID pandemic has revealed some shortcomings affecting health and social services, which are exacerbated in rural areas. The Spanish-Portuguese cross-border area is one of the European regions most affected by ageing, depopulation, and masculinization of the rural environment. This is compounded by poor accessibility, both physical (transport and communications) and telematic (internet) and access to social services. The family is one of the main support services providers for the person with NDD [41,42]. Achieving comprehensive social and health care in rural areas requires adequate coordination and planning of health and social services.

Strength and Limitations

Results from this study should be interpreted considering some limitations and relevant strengths. We examined a regionally-based population study by including diverse community data sources to suggest clear information about the current burden of NDDS. Data collection was not possible in all regions. Some variables could not be collected in the Portuguese regions due to the information organisation of the health institutions that do not have the data in question. Thus, it was not possible to calculate the mean age in the region of Bragança because the aggregated data available from the Information System of the Regional Health Administration only appear by age group. An obvious strength is that this study is the first of its type in the Spanish-Portuguese cross-border region on neurodegenerative disorders. The epidemiological data emphasizes the region's circumstances and highlights research priorities. The area is characterized by a strong border character, which makes participation between the two territories effective and gives the area a character of cooperation, mutual aid, and rural development with a transnational and modern style. We are confident it will draw the attention of policymakers to intervention strategies in the region.

Conclusions

This research identified NDDs as an important public health problem in the Spanish-Portuguese cross-border region. Due to the scarcity of epidemiological data on NDDs in this region, these findings provide an updated insight into the epidemiology of NDDs in Spain and Portugal and their associated rates and ratios, which may facilitate policymakers and health professionals to mitigate the related health issues and to implement social and health programs in this area. We recommend the provision of quality healthcare in rural settings to improve early diagnosis and care for affected individuals.

Statement of Ethics

Study approval statement: This study protocol was reviewed and approved by the Bioethics Committee of the University of Salamanca, approval number [Protocol No. 2019/238], in Spanish Region; in Portugal Region, the study protocol was reviewed and approved by the Ethics Committee for Health of the Local Health Unit of Guarda, approval number [Protocol No. 7/2019]. All procedures comply with the 1964 Declaration of Helsinki principles and its amendments.

Consent to participate statement: This descriptive cross-sectional study did not include primary data directly from the population/sample. This study collected secondary data from official government sources. No data is provided to identify or locate the patient.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

MAS conceptualized and supervised the paper. MAS, EM, MP and AF designed and coordinated the epidemiological study in the different regions. MAMD, RNPM, EM, MP, AC, CPM and AM collected the data. MAS, EM, MP and AM analyzed the data and interpreted the results. MAS drafted the first version of the manuscript. EM, MP, TP, HP and JS, provided a critical review of the manuscript All authors have read and approved the final version of the manuscripts.

Data Availability Statement

Data is not publicly available due to ethical reasons. Further enquiries can be directed to the corresponding author.

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Figure Legends

Fig. 1. Geographic distribution of cases and prevalence (per 100 inhabitants) by diagnostic groups in the Spanish-Portuguese border region.

Fig. 2. Gender distribution of cases and prevalence (per 100).

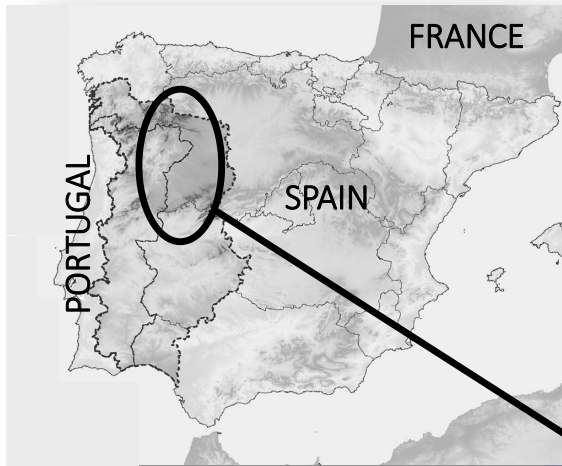
Table 1. Prevalence of neurodegenerative diseases in the Spanish-Portuguese cross-border.

	Salamanca, Spain			Guarda, Portugal			Bragança, Portugal			Spanish-Portuguese cross-border region		
	Population No.	Sample No.	Prevalence (per 100)	Population No.	Sample No.	Prevalence (per 100)	Population No.	Sample No.	Prevalence (per 100)	Population No.	Sample No.	Prevalence (per 100)
Total	39,354	987	2.51	150,328	2,500	1.66	124,571	2,332	1.87	314,253	5,819	1.85
Female	19,207	626	3.26	78,641	1,659	2.11	65,595	1,550	2.36	163,443	3,835	2.35
Male	20,147	361	1.79	71,687	841	1.17	58,976	782	1.33	150,810	1,984	1.32
>70 y.o.	12,310	900	7.31	35,877	2,109	5.88	29,425	2,057	6.99	77,612	5,066	6.53
Female	6,714	581	8.65	21,231	1,438	6.77	17,146	1,394	8.13	45,091	3,413	7.57
Male	5,596	319	5.70	14,646	671	4.58	12,279	663	5.40	32,521	1,653	5.08
Life expectancy (yrs.)*	84.74			80.32			80.68					

*Data source: <https://www.ine.es/>.

Table 2. Epidemiological profiles.

	Spanish		Portuguese	
	Border Region		Border Region	
	Salamanca	Guarda	Bragança	
NDDs				
No. cases and proportion, N (%)	987 (100 %)	2500 (100 %)	2332 (100 %)	
Prevalence, per 100 inhabitants	2.51	1.66	1.87	
Female/male ratio	626/361 = 1.79	1659/841 = 1.97	1550/782 = 1.98	
Age (yrs.), mean (\pm SD)	82 (\pm 10.2)	79 (\pm 12.0)	-	
<i>median (IQR)</i>	84 (88 – 77)	82 (87 – 75)	-	
<i>range, min. to max. value</i>	27 to 109	19 to 111	-	
Evolution time (yrs.), mean (\pm SD)	5.1 (\pm 3.8)	-	-	
Institutionalized individuals, n (%)	234 (23.7 %)	-	-	
AD & other dementias				
No. cases and proportion, n_1 (n_1/N)	579 (58.7 %)	1570 (62.8 %)	1595 (68.4 %)	
Prevalence, per 100 inhabitants	1.47	1.04	1.28	
Female/male ratio	407/172 = 2.37	1102/468 = 2.35	1137/458 = 2.48	
Age (yrs.), mean (\pm SD)	84 (\pm 8.1)	82 (\pm 9.1)	-	
<i>median (IQR)</i>	85 (90 – 79)	83 (88 – 78)	-	
<i>range, min. to max. value</i>	32 to 109	29 to 111	-	
Evolution time (yrs.), mean (\pm SD)	4.5 (\pm 3.3)	-	-	
Institutionalized individuals, n (%)	153 (26.4 %)	-	-	
PD & Parkinsonism				
No. cases and proportion, n_2 (n_2/N)	372 (37.7 %)	792 (31.7 %)	659 (28.3 %)	
Prevalence, per 100 inhabitants	0.95	0.53	0.53	
Female/male ratio	195/177 = 1.10	464/328 = 1.41	367/292 = 1.26	
Age (yrs.), mean (\pm SD)	81 (\pm 8.4)	78 (\pm 10.0)	-	
<i>median (IQR)</i>	82 (86 – 75)	80 (85 – 73)	-	
<i>range, min. to max. value</i>	41 to 99	39 to 104	-	
Evolution time (yrs.), mean (\pm SD)	5.7 (\pm 3.9)	-	-	
Institutionalized individuals, n (%)	78 (21.0 %)	-	-	
MS				
No. cases and proportion, n_3 (n_3/N)	36 (3.6 %)	138 (5.5 %)	78 (3.3 %)	
Prevalence, per 100 inhabitants	0.09	0.09	0.06	
Female/male ratio	24/12 = 2	93/45 = 2.1	46/32 = 1.4	
Age (yrs.), mean (\pm SD)	54 (\pm 13.5)	51 (\pm 14.8)	-	
<i>median (IQR)</i>	54 (62 – 44)	53 (61 – 41)	-	
<i>range, min. to max. value</i>	27 to 95	19 to 83	-	
Evolution time (yrs.), mean (\pm SD)	9.3 (\pm 6.8)	-	-	
Institutionalized individuals, n (%)	3 (8.3 %)	-	-	



Spanish-Portuguese cross-border region

