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Aging and long term-care: the reality of two countries in Europe- Portugal and Denmark

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Abstract. The current context of long-term care for the elderly with dependence is of particular interest in terms of population aging and health policies. The present study aims to characterize the reality of the elderly with dependence in the Portuguese and Danish context in relation to their sociodemographic and health characteristics; compare the frequency of long-term care in the two countries; understand the possibility of the occurrence of long-term care by informal caregivers (ICS) who may or may not be part of the household of the elderly with dependence. A cross-sectional study was developed in Portugal and Denmark through the Survey of Health, Aging and Retirement in Europe (SHARE), in 2015. Descriptive statistics were used, with chi-square test and bivariate logistic analysis. The results demonstrate the reality of the population aging that occurred in Portugal and Denmark, as well as the differences and similarities between the two countries regarding the care provided by ICS. The context in which care is provided by caregivers depends on the country where it occurs. It is imperative to take a new look at informal long-term care in both countries, as well as thinking about health policies in the face of aging.

Keywords

1 Introduction

In Europe there is an aging population, with an increasing trend for the coming years, which is associated with the greater provision of long-term care for the elderly. Long-term care refers to activities performed for dependent elderly people unable to take care of themselves, fully and long-term, by CI, namely family and friends, as well as by formal caregivers, including professionals, in the home context of the elderly. elderly (1,2).

The Portuguese socio-demographic reality demonstrates the European trend of increasing the population's aging index, especially in recent years. (3). Aging is associated with a high rate of total dependence, especially with regard to dependence on

activities of daily living (ADL's) and instrumental activities of daily living (IADL's), with repercussions in the scope of long-term care (4).

The population aging index in Portugal, set in 2017 at 153.2%, reveals the growing trend of recent years (5,6). The Danish context, in turn, verifies the trend of the other European countries, with the aging rate fixed at 112.9% in 2017 and the elderly dependency rate fixed at 29.6% (7).

Recently, it has become evident that Portugal has the highest rate of informal long-term care in Europe with an inverse relation to the rate of coverage of formal care, whose reasons point to the scarcity of formal caregivers, to the deficient socio-economic resources of IC as well as for the cultural issue of family care (3,8).

In turn, long-term care in Denmark points to the provision of formal long-term care compared to informal care, justified by a better socioeconomic situation of the elderly and families, as well as the social and health policies instituted (8 –10).

In view of the above, it is important to understand the evident differences in the provision of long-term care in the two countries, as well as the size of them in relation to the demographic, socioeconomic and health characteristics of the elderly.

Thus, this study aims to:

1. Describe the reality of elderly people with dependency in Portugal and Denmark in relation to demographic characteristics, socioeconomic and health issues.
2. Compare the frequency of long-term care in the two countries provided by ICs, whether or not they belong to the household.
3. Understand the significance of sociodemographic, health and nationality factors for long-term care provided by ICs.

It is expected that the present study will identify differences and similarities between the two countries in the context of the provision of long-term care by ICs.

2 Material and Methods

2.1 Data Source

This study is cross-sectional, observational, and analytical. Data was obtained through the sixth wave of SHARE that occurred in 2015 (11,12). SHARE is the first longitudinal and transversal project carried out in Europe that collects data on health, socioeconomic status and social and family networks of people over 50 years old.

For the Portuguese sample, the target population was defined as all Portuguese-speaking residents, born until 1960, and their spouses / partners, regardless of their age. For data collection, an interview was conducted, based on the questionnaire developed by the SHARE team, via telephone to households, where the response rate was around 60%, with one with an expected proportion of 10% non-sampling units and conducting 2 interviews in about 50% of the households so that the total sample size is 2507 people.

For the Danish sample, the target population was defined as all residents who speak Danish and were born until 1960. The size of the total sample is 3373 people. As in

Portugal, data collection was carried out through interviews, according to the questionnaire, via telephone.

2.2 Study Sample

Considering the objectives and purpose of the present study and the definition of old proposal by the European Union, as the person over 65 years (13), defined the following criteria for inclusion in the study:

1. Age equal to or above 65 years.

For the classification of functional dependence, the following measurement instruments were used: Katz index to characterize the ADL's and the Lawton and Brody index to characterize the IADL's (14).

For the classification of academic qualifications, an International Standard Classification of Education ISCED-11 instrument was used (14).

Table 1 presents the variables under study in the statistical analysis to characterize the elderly and long-term care.

Table 1 – Variables	
Variables	Categories
Gender	Male; female
Age	65-69; 70-74; 75-79; 80-84; 85-89; >90
Marital Status	Married and living together with spouse; registered partnership; married; living separated from spouse, never married; divorced; widowed
Educational Level- ISCED 11	Level 1- primary education; Level 2-lower secondary education); Level 3-upper secondary education); Level 4-post-secondary non-tertiary education); Level 5 short-cycle tertiary education; Level 6-bachelor's or equivalent level; Level 7 master's or equivalent level.; Level 8- Doctoral or equivalent level
Household Area	A big city; the suburbs or outskirts of a big city; a large town; a small town; a rural area or village
Chronic Diseases	Less than two diseases, two or more diseases
Self-reported health status	Excellent; Very Good; Good; Reasonable; Bad
Limitation in activities of daily living (ADL'S)	Without more than one limitation
Limitation in instrumental activities of daily living (IADL's)	Without More than one limitation
Country	Portugal; Denmark
Informal Long-term care provided by informal caregivers residing inside household	Yes, No
Informal Long-term care provided by informal caregivers residing outside household	Yes, No

2.3 Statistical Analysis

For statistical analysis of the data, descriptive statistics were used to characterize the elderly with the variables expressed in table 1. The Chi-Square test, with Monte Carlo simulation and 99% significance level, was used to compare the frequency of care informal services provided by informal caregivers belonging to the household or external to the household, in both countries. Subsequently, binary logistic regression (using both enter and forward LR methods: likelihood ratio) was used to characterize the probability of long-term care provided by the informal caregiver who belongs to the household (Model 1), and by the informal caregiver outside the household (Model 2). Both models were tested and validated using the Hosmer and Lemeshow's test and the residue analysis. SPSS statistical software, version 25, was used for the statistical treatment of data.

3 Results

The results related to descriptive statistics are presented in table 2 according to the countries under study, namely for Portugal (n = 1013) and Denmark (n = 1878) stratified according to age and the categories of the variables under study. The results that best characterize each category are described in bold.

The data shows that the group of elderly people (men and women) in Portugal and Denmark are mostly aged between 65-69 years old, about 35.2% and 36% respectively.

Regarding marital status, in Portugal the elderly married and living with their spouse are mostly aged between 70-74 years (37.1%) and about 25% of widowed elderly are aged between 80-84 years. In Denmark, married elderly people are between 65-69 years old (46.2%) and widowed elderly people are between 80-84 years old (24.2%).

Regarding the level of education ISCED-11, in Portugal, the elderly with the basic education level 1st and 2nd cycles (44%) are between 65-69 years old and the elderly between 70-74 years old have the level of 3rd cycle basic education (42.9%). In Denmark, older people with secondary education are those aged 65-69 years (40.3%).

Elderly people aged 65-69 years, in Portugal, are those who most present two or more chronic diseases (34%). In Denmark, older people of the same age group (29%) are those who have more than 2 chronic diseases.

Regarding the presence of more than one limitations in the ADL's, it is the elderly aged between 65-69 years who most verify this condition both in Portugal (22.7%) and in Denmark (29%).

Regarding self-perceived health status in Portugal, elderly people aged between 65 and 69 years old perceive their health as reasonable (37.3%) or good 38%. In the case of Denmark, the elderly aged 65-69 years of age perceive their health as good (30.4%) and very good (36.7%).

Regarding the geographical area of residence, elderly people in Portugal are more frequent in large cities and rural areas. In the case of Denmark, the geographical areas where the elderly live most often refer to urban centers and small towns.

Regarding to the reception of informal care by ICs residing outside the household, the elderly aged 70-74 years, in Portugal, have a frequency of 23.6%, while in Denmark they are the elderly among 65 -69 years old who receive about 30.2% of care by ICs residing outside the household.

Regarding the reception of informal care by ICs residing inside their household, the elderly aged 70-74 years old have a frequency of 26.6%. In Denmark it is the elderly between 75-79 years of age who receive about 10.2% of care by IC that reside inside their household.

Table 3 analyzes the two countries comparatively in relation to long-term care provided by ICs, whether residing inside to the household or outside to it.

Table 3- Frequency (%) of long-term care provided by informal caregivers to elderly			
	Portugal (n;%)	Dinamarca (n;%)	<i>p</i> -valor*
Long-term care provided by informal caregivers residing inside household			
Yes	(179;50,6%)	(175; 49,4%)	<i>p</i> =0,001
No	(1328; 32,2%)	(2795; 67,8%)	
Long-term care provided by informal caregivers residing outsidehousehold			
Yes	(253; 11,8%)	(1898; 88,2%)	<i>p</i> =0,001
No	(1416; 43,7%)	(1825; 56,3%)	

A higher percentage of care provided by ICs residing outside household was observed in Denmark (88.2%) compared to Portugal ($p < 0.05$). Regarding the caregiving by ICs residing inside household, there was a higher percentage in Portugal (50.6%) compared to Denmark ($p < 0.05$).

Binary regression models were used to explain the probability of long-term care provided by ICs (Model 1- long-term care provided by the caregiver residing inside household and Model 2- long-term care provided by the caregiver residing outside household). The odds ratio and confidence interval values for the significant variables are shown in the table 4.

Model 1 presents gender, limitations on ADL's and IADL's, and country of residence as significant variables. As such, it was observed that elderly males are 1.9 times more likely to receive informal care by ICs residing inside their household. On the other

hand, the elderly without limitation in the ADL's are 81% less likely to receive informal care by the ICs residing inside their household

Table 4- Model 1 and 2 -results from logistic regression analyses		
Model 1- Availability of informal long term-care provided by IC's residing inside household		
Independent variables	Crudes odds Ratio (95% IC; p)	Forward LR model ^b , odds ratio (95% IC; p)
Gender		
Male	1,552 (1,111:2,167; 0,010)	1,905 (1,313:2,763; 0,000)
Female	-	-
Limitation in activities of daily living (ADL's)		
Without	0,189 (0,122:0,293; 0,000)	0,139 (0,087:0,221; 0,000)
More than one ^a	-	-
Limitation in instrumental activities of daily living (IADL's)		
Without	0,661 (0,425:1,029; 0,065)	0,277 (0,171:0,447; 0,000)
More than one ^a	-	-
Country		
Portugal ^a	-	-
Denmark	0,580 (0,411:0,817; 0,002)	0,697 (0,480:1,011; 0,057)
Model 2- Availability of informal long term-care provided by IC's residing outside household		
Independent variables	Crudes odds Ratio (95% IC; p)	Forward LR model, odds ratio (95% IC; p)
Age		
65-69 ^a	-	-
70-74	0,870 (0,690:1,098; 0,000)	0,847 (0,665:1,078; 0,177)
75-79	1,256 (0,976:1,616; 0,077)	1,122 (0,861:1,462; 0,394)
80-84	2,320 (1,781: 3,022; 0,000)	2,016 (1,523:2,669; 0,000)
85-89	2,830 (2,033:3,940; 0,000)	2,147 (1,511:3,049; 0,000)
>90	4,454 (2,843:6,976; 0,000)	2,783 (1,714:4,517; 0,000)
Gender		
Male	0,844 (0,745:0,956; 0,008)	0,657 (0,548:0,787; 0,000)
Female ^a	-	-
Chronic diseases		
Less than two ^a	-	-
More than two	1,270 (1,123:1,438; 0,000)	1,283 (1,062:1,550; 0,010)
Limitation in activities of daily living (ADL's)		
Without	-	-
More than one ^a	2,367 (1,997:2,806; 0,000)	2,922 (2,288:3,730; 0,000)
Country		
Portugal ^a	-	-
Denmark	3,075 (2,618:3,612; 0,000)	4,197 (3,342:5,270; 0,000)
a) Reference class.		
b) Modelo Forward LR, embodying all the variables under the analysis.		

On the other hand, elderly people without limitations in the ADL's are 81% less likely to receive informal care by the ICs residing inside their household, compared to the elderly with more than one limitation in the ADL's. Likewise, elderly people with no limitations in IADL's are 72.3% less likely to receive informal care by ICs residing inside their household than people with limitations in IADL's. Regarding the country

where the elderly live, it is observed that in Denmark the probability of receiving care by the ICs residing inside their household is 64.3% lower than in Portugal.

Model 2 presents age, gender, the presence of chronic diseases, limitations in the ADL's, as well as the country of residence of the elderly as the significant variables.

In this way, elderly people aged 85-89 years old are 2.1 times more likely to receive informal care by ICs residing outside their household than people aged 65-69 years old. This evidence fits equally in the elderly aged over 90 years who are 2.8 times more likely to receive informal care by ICs residing outside their household than the elderly aged 65-69 years. Regarding gender, elderly males are 34.3% less likely to be cared for by an IC outside their household than elderly females. In turn, the elderly with more than one limitation in the ADL's are 2.9 times more likely to have informal care provided by ICs outside their household than the elderly without limitations. Finally, elderly people living in Denmark are 4.9 times more likely to receive care from ICs outside their household than elderly people living in Portugal.

4 Results

The long-term care received by the elderly in Portugal by ICs inside their household, are most often provided to those aged 70-74 years (26.6%). In the case of Denmark, elderly people aged 75-79 years old have a higher frequency of informal care (22.2%) provided by ICs

Regarding long-term care, in Portugal, provided by ICs residing outside household, it appears that elderly people aged 70-74 years are more frequent (23.6%) of them, while in Denmark they are elderly people with age between 65-69 years who most often receive the same type of care (30.3%). The results are in line with previous studies and it is important to note that the majority of the elderly who participated in the present study are aged between 65-69 years old (15-17).

The evidence that over the course of aging is associated with an increase in the presence of chronic diseases and therefore with the establishment of the dependency process, a common situation in both countries, namely for the elderly aged 70-74 years (28.6% for Portugal and 25.8% for Denmark) allows reflection on how long-term care is planned, organized and implemented for the elderly in both countries (17).

In fact, the context of providing long-term care assumes considerable representativeness depending on the country, where it is provided (2,15,18).

The provision of long-term care by ICs belonging to the household, in the Portuguese context (51%) demonstrates the reality of a country with a high rate of aging and a high rate of dependence on the ADL's, coexisting with situations of chronic diseases where care they are mainly provided by family members who belong to the household (15,16,18). By analyzing the results obtained, it is possible to state that the frequency of long-term care provided by ICs residing outside the household occurs more frequently in the Danish context (88.2%) compared to the Portuguese context (11.8%). In Denmark, like other Nordic countries, although there is a high proportion of informal care, the fact that they are neither intensive or provided by ICs that are part of the

household, enhances the experience of the role of caregiver in a context of better well-being (19,20).

Elderly people aged 85-90 years and over 90 years old are more likely to receive long-term care by ICs residing outside the household. This finding is supported by other studies in that the advancement of the aging process is a factor that provides the need for care by other elements of the social network of the elderly, with greater significance for their children (2,18,19).

In the first model, the presence of limitations in the IADL's causes the possibility of receiving care by the ICs belonging to the elderly household, as in the face of the aging process in the approach to the end of life, the ability to deal with the components related to personal management and the social and financial resources of the elderly are diminished. This finding is supported by other studies that demonstrate the occurrence of worsening chronic disease, as a factor that increases dependency, and therefore, the possibility of informal care (2,20).

The gender of the elderly, in both models, influences the possibility of long-term care for ICs belonging to the household or outside to it. Although, the existing literature states that the possibility of receiving long-term care by ICs belonging to the household is similar in relation to the gender of the elderly with functional dependence in the ADL's and IADL's (18,20,21), the present study demonstrates the future need to investigate the factors that cause the present evidence.

Finally, the country where long-term care is provided by ICs that belong to the household, both models, demonstrate that in Denmark there is a greater possibility of providing informal care by ICs residing outside the household. The present fact may be related to the existing differences in Europe regarding political strategies and good social and health governance in relation to informal care (22,23). In the case of the countries of northern Europe, in which Denmark is included, there is mostly informal care provided in a non-intensive way, that is, the perspective of exercising the role of caregiver is seen as an enhancer of human relations and not both in knowing how to care in an instrumental way, that is, in providing care related to AVDS and AIVDS (6,24)

In general, the results of the present study are aligned with the existing literature, which demonstrates the internal and external validity of the same, and adds content to scientific knowledge, given the magnitude of the results obtained. However, it is important to note that results must be carefully interpreted, and therefore generalized in view of the characteristics of the samples. The fact that the results obtained reside in the collection of data through telephone interviews with self-report, can cause the results to be biased.

On the other hand, it is important to note that in the present study, variables such as the constitution of the household of elderly people with dependence, the policies implemented for long-term care in both countries, as well as the dimension of formal care, were not studied, so it is important to mention its importance in future research.

5 Conclusion

This study demonstrates the reality of providing long-term care in Portugal and Denmark. Aging in both countries is a similar sociodemographic reality, with a high percentage of elderly people with dependence. Even though the proportion of long-term care by ICs is similar in the two countries, it is evident that the way in which they are provided, residing inside household or outside it, is different. In fact, it is verified that in Denmark the occurrence of care provided by ICs residing outside the household assumes a greater possibility compared to Portugal.

Therefore, the present study demonstrates that it is important to scientifically analyze health and socioeconomic policies, in terms of aging and long-term care, especially when provided by ICs. In fact, there is a widespread aging of Europe, however, the policies implemented may be equitable perspectives for European citizens, respecting the cultural dimensions and the exercise of freedom of choice in informal care by caregivers and people with disabilities. dependency, safeguarding health promotion.

6 Ethics Consideration

The SHARE study is subject to continuous ethical review, from places 1 to 4 the study was reviewed and approved by the Ethics Committee of the University of Mannheim. The 4th wave of SHARE and the continuation of the project were reviewed and approved by the Ethics Council of the Max Planck Society (12). In the 6th wave of Share, in view of the use of blood samples, it was safeguarded from the ethical principles contained in the Helsinki declaration (11).

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