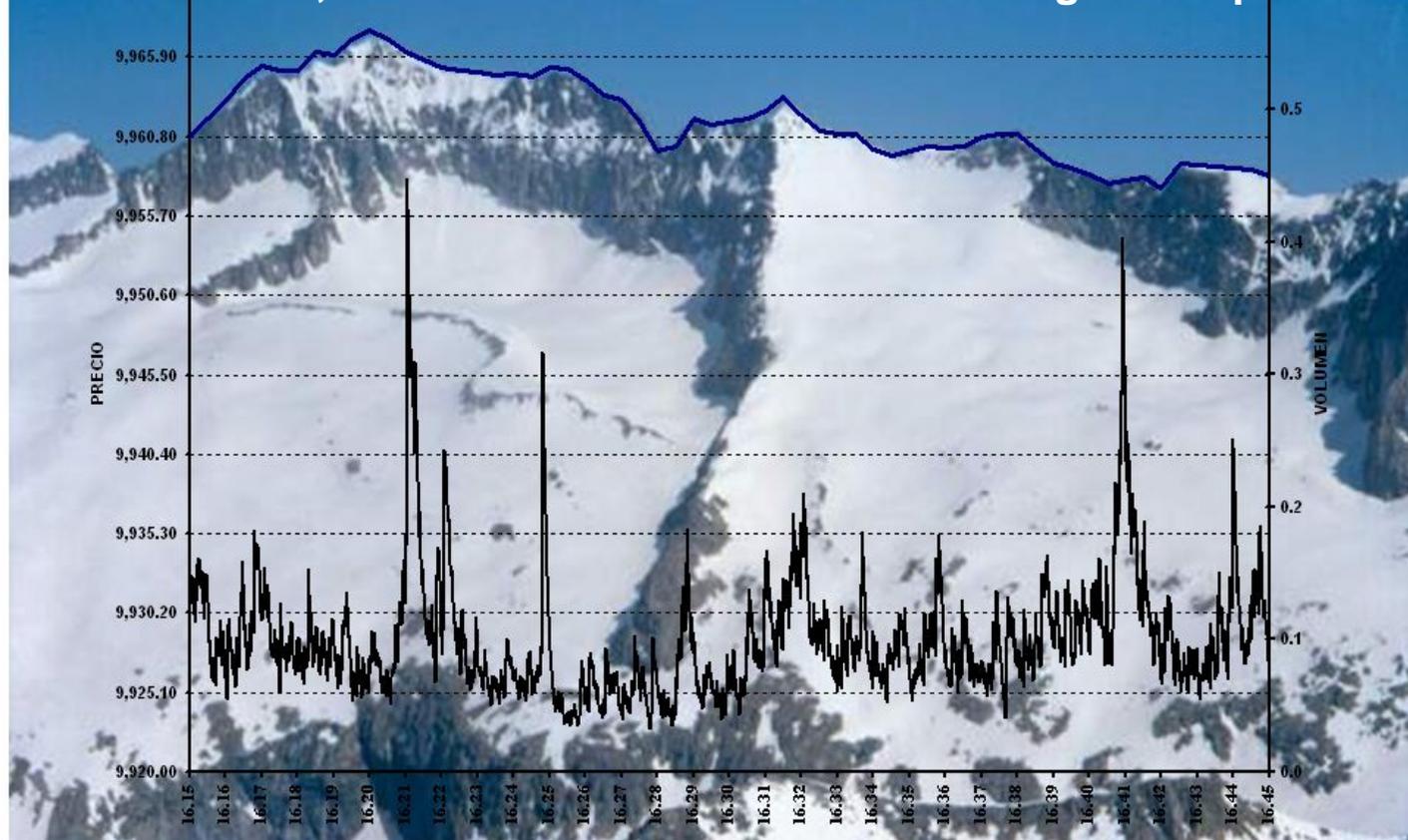


Economics, Finance and Mathematics from a high standpoint



Estimating Total Informal Care Costs in Spain. Can Formal Care Reduce It?

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Edita:

Departamento de Análisis Económico y Finanzas de la UCLM

Teléfono: 34 967 599 200. Extensión 2143

<http://www.uclm.es/dep/daef/>

Depósito Legal: AB-351-2009

ISSN: 1989-4856

Estimating total informal care costs in Spain. Can formal care reduce it?

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Conflicts of interest: None of the authors has a conflict of interests in this research.

Short title: Informal and formal care: cost and relationship

Number of figures and tables: 2 figures and 4 tables.

Abstract

This paper estimates the cost of informal care in Spain analyzing their evolution in the last decade. Furthermore, the linkage between informal and formal care, with which it could be replaced, is determined.

We find that in Spain 3.8 million people are dependent, approximately 40% receive informal care and more than 10% make use of some formal services. Estimation results indicate that the annual costs of informal care are between €22 and 33 thousand million representing approximately 8% of the Spanish GDP. Furthermore, this study sheds light on the fact that the use of appropriate formal services can reduce the need of informal care to 60%. However, the main problem is formal services heterogeneity of each Spanish region. Therefore, more studies are needed to assess the Spanish portfolio of formal services and find which are appropriate for each individual so that costs be reduced.

Key words: dependency, formal care, informal care, costs.

JEL Codes: C21, I10, I15, I31, J11, J13

Introduction

Current population ageing is unprecedented and without parallel in human history. It is also associated with an increase in the dependency ratio (Harwood et al., 2004). At world level the older population will grow from 12% in 2010 to 25% in 2025. In the case of Spain, which has one of the oldest populations in the world, the percentage will increase from 25% to 59%.

Many definitions exist for dependency but one of the simplest is found in the twenty-second edition of the RAE Dictionary of the Spanish Language which defines it as the situation in which a person cannot fend for him or herself. When a person is recognized as care dependent, moral obligation and social solidarity obliges society to provide that person with care or support so they can carry out the activities they can no longer do by themselves. These activities, which are common to all cultures and ages and are related to personal maintenance and survival, are known as activities of daily living (ADL). They were first defined in 1945 (Deaver and Brown, 1945) and the concept continued to evolve until the 1990's when they were classified in two major groups: basic activities of daily living (BADL) and instrumental activities of daily living (IADL) (Romero-Ayuso, 2007).

In Spain elderly people who are unable to carry out one, or several, of the BADL or IADL have two options: to go into a supervised institution or care center, where their needs are tended to by qualified staff, meaning formal care, or they can stay at home and receive the help of professionals (formal caregivers and/or formal services) or family members and friends (informal caregivers). According to figures from the Spanish National Institute of Statistics there are 3.8 million dependent persons and 77.5% of dependent elderly people only receive informal support (Rogero- García, 2009). Furthermore, in southern Europe, living at home for as long as possible is the most popular option (Nolan and Philp, 1999).

It is also necessary to note that the elderly represent the largest percentage of dependent persons (Alegre et al., 2005). There is therefore little possibility of their recovery, meaning that the need for care and its associated cost will continue for the rest of their lives.

The importance of analyzing the social costs of informal care is therefore clearly understandable. As well as evaluating these costs, it is fundamental to establish if the formal services received by the dependent replace or reduce the time dedicated to informal care.

There also exists a defined group of highly prevalent diseases, whose sufferers require special attention since their care needs and associated costs are very specific. Included among these illnesses are dementia, mental illness and Parkinson's disease.

The aims of this study are to analyze the evolution of dependency, estimate the costs of its associated informal care and to show the relationship between informal care and the formal services which could replace them. In the future, elderly necessities will change. They will need formal services and private services related to wellbeing and health will be more important. The study is organized as follows: the second section defines the sample used, the variables included and the methods employed, the third section describes the principal results obtained and the last section analyses them and indicates some implications for practitioners and policy makers.

Methods

Data Collection

A nationally representative sample of 7,524 individuals was used to develop an observational, transversal study. Data was obtained from the 2008 survey on disability, personal autonomy and dependency situations (EDAD). It is the most recent macro-survey on dependence conducted through a collaboration agreement between the Spanish National Institute of Statistics (INE), the State Department for Social Services, Family and Disability Support (via the Office of Coordination of Sectorial Policies for the Disabled and the Institute for Older People and Social Services IMSERSO) and the ONCE Foundation (the Spanish Organization for the Blind). The aim of the survey is to obtain the most relevant information possible on the situation of dependent persons. It is adapted to current social situations and is guided by the philosophy of the International Classification of Functioning, Disability and Health published by the World Health Organization (<http://www.who.int/classifications/en>).

The survey is subdivided in two parts. One part is aimed at people who live at home and the other at those in institutions. The data in this study are derived from the first part, which was conducted between November 2007 and February 2008.

Measures

To accomplish the first aim of this study, analyze the evolution of dependency, with the survey micro data we calculate the total number of dependent persons, the number of dependent persons that received care from principal caregiver, the number of dependent persons suffering from highly prevalent diseases such as: dementia, Parkinson's disease, multiple sclerosis, stroke, mental illness, ischemic cardiopathy, rheumatoid arthritis, muscular dystrophy, cerebral palsy, traumatic/acquired brain injury and the categorized weekly hours of informal care. The selection of these variables not only permits to obtain relevant information about the dependency in Spain, furthermore we can analyze and compare our results with

findings previously publicized. Oliva et al. (2009) used Survey on Disabilities, Impairments and Health Status (whose Spanish acronym is EDDES) to present information about dependency in Spain for 2002 year. The survey that we used is an upgrade of the EDDES survey, reason why we can obtain the same variables by employing a similar methodology and analyze the evolution of the dependency. Evolution of the dependency is important to determine what services are necessary.

To achieve the second objective of the study, consisting of economically evaluate all the time devoted to informal care in Spain, we have to take two major steps. First, we must estimate the time devoted to informal care and then try to give an economic value or cost.

For the first step, the EDAD survey contains two questions. One indicates the mean number of weekdays which an informal caregiver dedicates to the dependent person and the other measures the mean time dedicated per day. The annual time dedicated is estimated using these two questions. It must be taken into account that the individuals who answered zero to the number of hours of daily care (0.13%) were eliminated from the sample.

According to the literature the number of self-reported hours of care is over-estimated and a widely accepted solution is to recodify to 16 the hours of daily informal care for those individuals reporting a larger number (Ernst and Hay, 1994; Langa et al., 2001; Penrod et al., 1998). Since, it's possible that the time dedicated to care in the case of highly dependent persons may be greater than 16 hours, we decided to employ this cut-off to produce two cost scenarios that allow us to obtain a reasonable interval in which to place the real cost of informal care in Spain. The recodification for the generation of the minimum time scenario affects the sample by 33.3%.

The second step is the evaluation of the cost of the time dedicated to informal care. There are several methods to make this economic evaluation, Van den Berg and Spauwen (2006) presents a review. The opportunity cost method is the most common in economic health

evaluations (Glick et al., 2007). The opportunity cost of the time dedicated to informal care is estimated using the mean wage per hour paid to workers with similar characteristics to caregivers. When the person involved is giving up a remunerated job in order to provide the care, the salary foregone is considered the opportunity cost. The problem is that not all informal caregivers sacrifice a job and informal caregivers are also a highly heterogeneous group regarding socio-demographic characteristics (sex, age, education level, etc). Therefore the greatest difficulty lies in assigning a salary to caregivers who are not giving up remunerated activity in order to look after people in need of care.

Since the information contained in the EDAD survey is limited, it is not viable to apply the opportunity cost method. Therefore, the replacement cost method has been considered the next more appropriate and a valid method too (McDaid, 2001). This method consists in evaluating the time dedicated to care using the market price for a nearby replacement service. For this study we used the gross wage per hour of home help professionals taken from the 2002 collective bargaining agreement for the sector and updated to 2008 at an annual rate of 2%.

Once we obtain the annual time dedicated to informal care and the estimated price per hour of informal care is easy to estimate the social cost of informal care in Spain, the mean cost per person, and, to offer a more descriptive and detailed economic cost evaluation, we present results of social cost of informal care for the higher prevalence diseases.

Finally in order to answer to the third objective of the study, the relationship between informal and formal care, we consider that the linkage have to be linear and negative so that higher number of hours of formal care would cause a fewer hours of informal care. Instead of this relationship is not straightforward. Literature provides mixed results (e.g. Christianson, 1988; Langa et al., 2001; Ettner, 1994) that may be due to unobserved characteristics that affect both formal and informal care such as health characteristics, personal preference or

level of disability of the person. Thus is critical to consider some factors that could affect the time devoted to informal care and to provision of formal care to avoid bias and to uncover the real nature of the relation.

For example, the more dependent people receive a major intensity of informal care and have more likely to use formal services, as well as older dependents. It is also a key factor the dependent sex because when a man becomes widowed he will more likely to increase the help received than a woman. Geographical residence of dependent person is important too. If the dependent lives in a small town is more probably that their sons and daughter lives in other town and meanwhile the possibility of offering a greater amount of informal care is less. In a country like Spain, autonomous region of residence is important factor due to different territorial dispersion such as different aids implemented derived of inequitable policies that can be cause of large disparities among regions. Other issue is if the caregiver lives with the dependent. In such case is easier that the principal caregiver offers much hours of informal care. Furthermore, it is appropriate to consider whether the dependent receive state economic benefit. This fact can affect the decision of use formal service. Finally, must be considered the income of the dependent and the caregiver or the education level as a proxy.

To model the complexity of these relationships and to answer our main question the next OLS model was conducted:

$$y_i = \beta + \gamma x_i + \delta_j z_{ij} + u_i \quad (1)$$

Where y_i is the quantity of time devoted to informal care, β is the constant, x_i and z_{ij} are covariates, γ and δ_j are coefficients and u_i is the error term. The subscript i represent the individual and the j a set of adjustment factors. The covariate x_i is the observed quantity of formal care received by the dependent and z_{ij} is a vector of all factors that can influence in the relationship between informal and formal care.

The dependent variable y_i was transformed by neperian logarithm. The covariate x could not be obtained from the survey data so other covariates, proxy of intensity of formal care, may be define. Furthermore, the literature show an endogeneity problem in a model explaining formal care with informal care due to the decision of offer informal care and use formal services are simultaneously determined (e.g. Van Houtven and Norton, 2004; Bonsang, 2009). In this paper, the endogeneity problem is not cause for concern for two main reasons. First, the data correspond to dependents who receive informal care so that from the beginning every dependent person receives a greater or lesser extent and also is the dependent variable in the model. Secondly, as mentioned in the introduction, there is an extended tradition of informal care in Spain and formal services are developing only in recent years. Due to the country characteristics are common that all dependent persons first receive informal care and later will decide to use none, one or more formal services. In conclusion, the particular characteristics of the sample and field of study allow ruling out endogeneity in the relationship.

Once discussed the possible endogeneity problem there is to define a proxy for the intensity of formal care. To perform this task the survey data contain information on a group of fourteen formal services. A preliminary analysis showed that not more than five services been used at the same time and also existed a set of services that were the most commonly used. Furthermore, to the interest of the analyses is important that the formal services selected represent the intensity of care and can be a possible replacement of informal care, so the research team in conjunction with external consultants (dependent workers in general) selected tele-assistance, programmed home care, social home care, day centers and cultural, recreational, leisure and free time activities. These services were used to create a set of dummies for the number of formal services received by each dependent person as proxy of the intensity of formal care.

Covariates z_j was formed by the following factors: the dependent characteristics of sex, university studies, size of town, whether other people lived with the informal caregiver, whether the dependent person had received benefits in the last 12 months and the autonomous region in which they lived. We further obtained a dummy on whether the informal caregiver had a university education or not.

And finally, as we mentioned above, it is important to include a subset that represents the level of dependence on each subject. Accordingly to Moya et al. (2009) the level of dependency can be evaluated through the activities of daily living without have to evaluate other more complex variables such as the large list of diseases diagnosis, aids for movement or the level of cognitive impairments between others, so to perform this task two covariates were generated. One was employed to evaluate the level of dependency in basic activities of daily living by adding a unit for every activity from the following list in which the person was dependent for care: personal grooming, feeding, getting dressed and undressed, toileting, movement outside the home and movement in the home and body mobility. Another covariate was used for the instrumental activities of daily living by adding a unit for every activity in which the person was dependent: housework, preparing meals, shopping, handling transportation, using the telephone, maintaining relationships and managing medication.

After develop an analyses the model proposed, a sensitivity analysis was conducted to test the robustness of the model coefficients. For this task, two analyzes were performed, both represented by the equation 1 described above but with some differences. The first included only those dependent persons who received a number of hours of informal care included in the first quartile of the distribution of hours of informal care. The second to those individuals whose number of hours received were included in the fourth quartile.

Findings

The results of the national dependency prevalence rate are shown in Table 1. There was a slight decrease in the dependency rate of the disabled in comparison with the figure estimated by Oliva and Osuna-Guerrero (2009) for the year 2002 and a slight increase in the percentage of dependent persons that were receiving care from main informal caregiver.

With regard to distribution by the diseases suffered by dependent persons and dependent persons with main informal caregiver (dependents who receive informal care), Figure 1 shows that, with the exception of mental illness and multiple sclerosis, the prevalence rate of diseases increased between 2002 and 2008 and it is worth noted that in the case of some diseases, such as dementia, the prevalence doubled.

Figure 2 presents the distribution of hours of informal care for dependent persons and for the principal diseases studied, for the years 2002 and 2008. We can observe that both for all dependent persons and for persons suffering some disease high intensity informal care (more than 60 hours per week) is the group with a higher rate and also increases between 2002 and 2008.

Table 2 shows the estimation of annual time costs dedicated to informal care both for all dependents persons and for persons suffering from each one of the diseases included. To ascertain an approximate annual cost of informal care per disease the number of sufferers and the mean annual hours per illness and person are included. The results reveal that the annual cost of informal care in Spain is somewhere between 22 and 33 thousand million Euros, depending on the scenario.

Table 3 presents a descriptive analysis of the variables included in the model proposed for analyzing the linkage between informal and formal care. The weighting factor included in the survey was used in all the calculations which allowed estimations at national level to be obtained. The mean amount of hours of informal care was between 4469.1 (SD 3441.28) and 3000.08 (SD 1949.02) depending on the scenario. The indices of dependency are situated a

little over the mean score which indicates that Spain's dependent population living at home is not dependent to an extreme degree. Regarding the mean age, the dependent are older people, 71.8 years old (SD 19.56) and 17.2 percent receive at least one formal service. A greater number of dependent persons are female and generally neither the dependent person nor the caregiver has university qualifications. A large percentage (79.7%) of the care dependent received care from someone living at home and the Spanish region with the largest number of care dependent is Andalusia.

Table 4 presents the OLS regression model. It can be observed that receiving formal services reduces the number of informal care hours between 15.2% when only one of the possible replacement formal services is received, and 61.6% when 4 or 5 are received. It must be taken into account that these results are obtained after adjusting the particular characteristics of each individual described in table 3. It must also be noted that if the caregiver has a university education, the number of informal care hours is reduced by 49.5%.

Finally, table 5 presents the OLS models for the sub-samples of dependent persons that received less hours of informal care, individuals in the first quartile of informal care hour distribution, and for dependent persons that received the higher number of hours of informal care, individuals in the fourth quartile of distribution. The results show that while the coefficients for the number of formal services of individuals in the first quartile remain relatively stable, drastically change for those in the fourth quartile. The overall effect of the increase in formal care is the reduction of informal care and therefore formal services substitute for informal care. Instead of this fact, the sensitivity analysis shows that formal services are complementary of informal care when the latter is offered at a very high intensity.

Discussion

This study analyses the 2008 EDAD survey in order to establish the evolution of dependency and, on one hand the social cost of informal care in Spain and the social cost of the time dedicated to the informal care of sufferers of highly prevalent diseases, and on the other hand the relationship between informal and formal care.

The analysis shows that between 2002 and 2008 the prevalence of some diseases doubled. This could be due to population ageing, since some illnesses, such as dementia, are closely related to old age. Population ageing could also explain the increase in people receiving high intensity weekly informal care (more than 60 hours). This information is may be relevant for policy-makers.

Furthermore, the results show that if we disregard the other costs of informal care such as the physical and psychological wear and tear of the caregiver, the illnesses and the informal caregiver's absence without leave from work (Bamford et al., 1998; Ho et al, 2009), the social cost of the time dedicated to informal care represents a high percentage of GDP. The use of substitution services, such as formal care would noticeably reduce this percentage as well as generating employment in the sector and reducing other costs derived from carrying out informal care. This result are in accordance with findings of Bolin et al. (2008) and Bonsang (2011) among others.

The informal care costs estimated in this study are in keeping with the figures published for 2002 by Oliva and Osuna Guerrero (2009) since, although the minimum cost scenario indicated is in the range of the maximum cost of the mentioned work, it must be considered that the differences can be attributed to the rise in population ageing and, consequently, the rise in the dependency rate in Spain between 2002 and 2008.

Regarding the social cost of informal care per disease, year and person, it is worth mentioning that the most disabling diseases are those with the highest cost/person ratio. For example, in

scenario 1, dementia represents a care cost per year of 15,275.86 € and cerebral palsy 14,659.15 per person per year.

The statistics derived from the factors used to achieve the third aim of this study, which is to evaluate the relationship between informal and formal care, are as expected. For example, there are a larger number of dependent women, the education level is low and the caregiver does not have a university education. As a result of the Personal Autonomy and Care for Dependent Persons Act (39/2006) of 14 December, a framework was created in 2006 within which companies and institutions in the socio sanitary field can work towards the design and/or evaluation of their respective service portfolios. The act includes regulations on the payments related to the providing of services when formal services are not available and/or financial benefits for care in the family and personal assistance. Our figures show that, as of the date of the data collection for the 2008 EDAD survey, the services related above all to the replacement or reduction of informal care time had not been greatly developed. Only 11% of dependent persons had received these services in the previous twelve months and these kinds of services will be necessary in the future.

The analysis also illustrates the geographical distribution of dependent care, with a large percentage of dependent persons living in towns with fewer than 10,000 inhabitants. This indicates that, at present, population ageing affects, above all, rural centers of population, where, due to the physical demands of a lifetime of a certain type of work, there is a greater number of dependent persons.

The regression analysis explains 27.2% of the variability in informal care hours provided by the caregivers of dependent persons. This study shows that if the variables representing the heterogeneity of the individuals in the sample and their dependency level are adjusted, formal care substitutes informal care and reduces its intensity. As mentioned above, the literature provides a studies which confirms this finding, although another recent study indicates that

care giving is reinforced by formal care in certain special cases such as when the person receiving care is very elderly, is an individual with multiple dependencies, when a large number of informal care hours are provided or in the case of mental illnesses and/or dementia (Jiménez Martín and Vilaplana, 2008). Our findings support this evidence through the sensitivity analyses and, furthermore, there is to consider that in order to analyze the effect of replacement or complementation between formal services and informal care, it is important to evaluate only those services which can really be replaced, as has been done in this study.

A European study has found that caregivers with a higher level of education tend to be more responsible with the elderly while those with a lower level tend to provide a larger number of informal care hours (Farfan-Portet et al., 2007). This study shows that if either the dependent person or the caregiver has a university education the number of informal care hours is reduced. If the dependent person has a university education the reduction is approximately 3.5% and if it is the caregiver the reduction is 49.5%. Certain limitations must be taken into account when considering the results of this study.

Different methods may be used to evaluate the time dedicated to informal care, such as the cost opportunity method, the proxy good method, contingent or cost replacement evaluation (Mcdaid, 2001; Koopmanschap et al., 2008; Van Den Berg et al., 2004). All these methods have advantages and disadvantages but owing to the nature of our data approximation by means of cost replacement was used since using this technique it is possible to compare the cost-effectiveness of informal care with other replacements such as institutionalization (Chappell et al., 2004). The costs were also estimated by means of two scenarios to provide the reader with a framework of reasonable costs.

Another limitation is the lack of information on the intensity of formal care and it is reasonable to believe that the scale of the effect has not been appropriately evaluated, making it necessary for estimates to be cautious. Future studies need to clarify this issue.

In short, in order to strengthen the fourth pillar of the welfare state, it is vital to consider and evaluate the feasibility of social and economic policies. Studies such as this one supply the information and tools needed for politicians and administrators to evaluate the most cost-effective policies. The results of this study provide useful information for the shaping of dependent care policies. Relationship between informal and formal care services is economically and socially useful to health care managers and governments in general, since population ageing and dependency ratios are increasing. Population is going to need new services related to care and wellbeing and cooperation between public and private sector will be necessary.

Table 1

Percentage of dependent persons and dependent persons receiving informal care for 2002 and 2008.

		Differences
% of the national total in 2002	8.46	
% of the national total in 2008	8.21	-0.26
% receiving informal care in 2002	3.09	
% receiving informal care in 2008	3.17	0.09

Notes: For 2002 the estimate of Oliva J et al. 2009¹ was employed.

Calculation of percentages based on the population of Spain in 2002 (41,837,894 people)

Calculation of percentages based on the population of Spain in 2008 (46,157,822 people)

Population increased between 2002 and 2008 in 4,319.928 (10.3%).

Figure 1

Descriptive of percentage of dependence persons and dependence persons receiving informal care for disease and for 2002 and 2008 years.

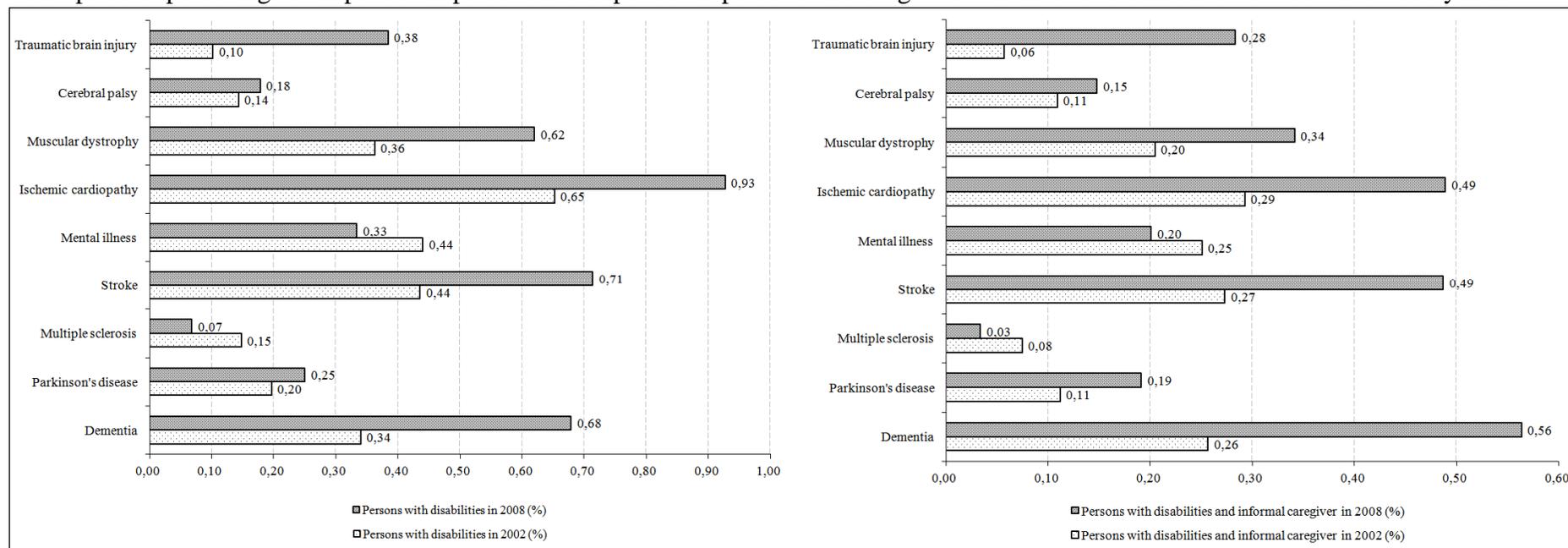


Figure 2
Distribution of informal care hours per week for 2002 and 2008.

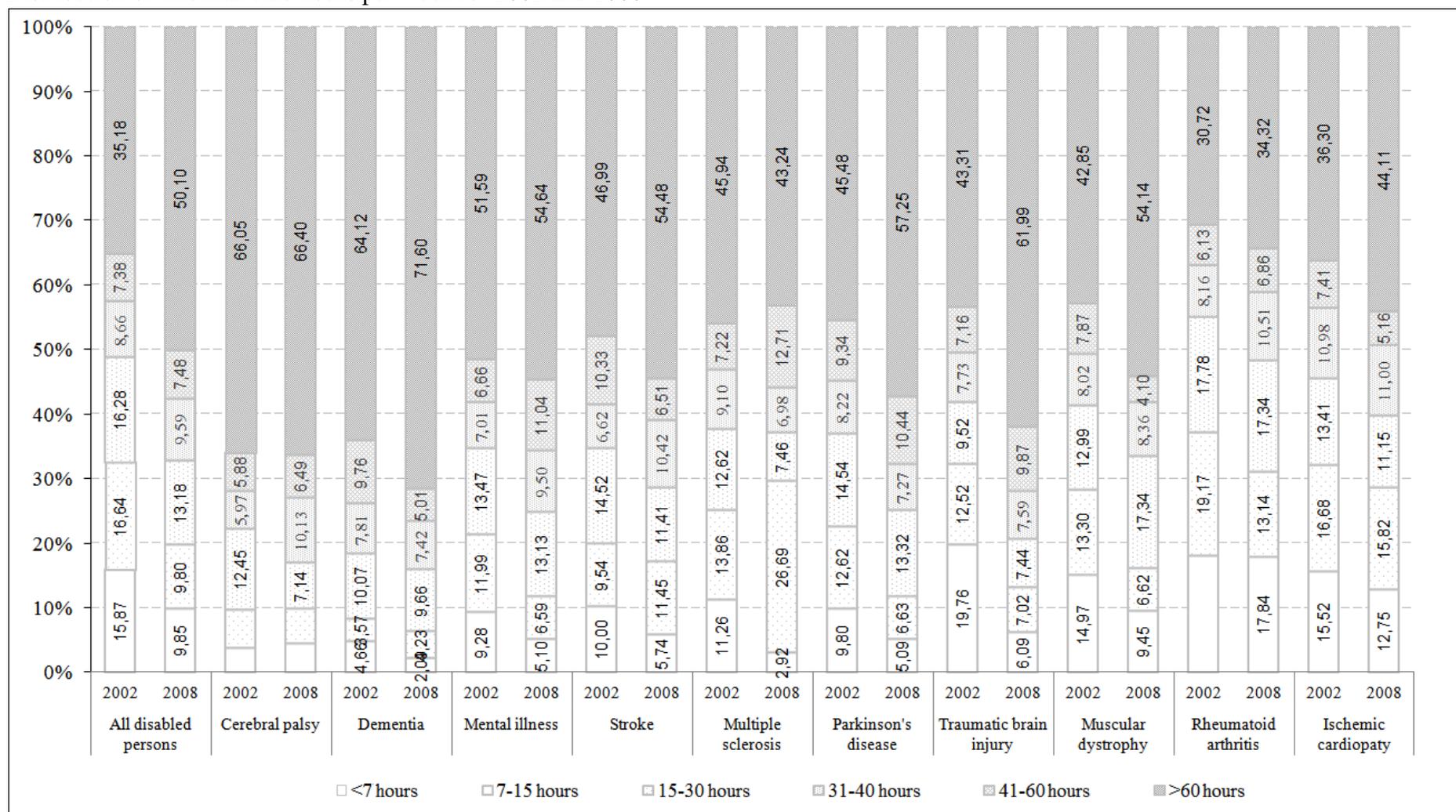


Table 2

Estimate of the cost of informal care hours per year.

	Number of dependent persons	Scenario 1		Scenario 2	
		Cost (M€) ^a	Mean of cost per person (€) ^b	Cost ^a	Mean of cost per person (€) ^b
All dependent persons ^c	1,200,804	32,631.4	27,174.62	21,905.3	18,242.19
Dementia	82,686	1,263,1	15,275,86	1,942,1	23,487.65
Parkinson's disease	20,741	229,6	11,069,86	343,3	16,551.75
Multiple sclerosis	2,986	18,2	6,095,11	27,5	9,209.64
Stroke	58,215	492,0	8,451,43	744,3	12,785,36
Mental illness	87,436	842,8	9,639,05	1,233,2	14,104.03
Ischemic cardiopathy	98,850	487,0	4,926,65	721,3	7,296.91
Rheumatoid arthritis	1,128,817	4,372,0	3,873,08	6,295,60	5,577.16
Muscular dystrophy	48,327	323,2	6,687,77	495,4	10,250.99
Cerebral palsy	22,532	330,3	14,659,15	493,2	21,888.86
Traumatic brain injury	40,917	457,1	11,171,39	685,4	16,750.98

Notes: EDAD 2008. Scenario 1: Total hours calculated without limitations; Scenario 2: Total hours per year limited to 16 hours per day leaving 8 hours for sleep; ^a Units: millions of Euros in care hours per year; ^b (Cost x 106)/n; ^c Refers to persons with disability and informal caregiver who report hours. Mean cost per person.

Price per hour in 2002 updated by 2% per year until 2008; the cost and number of persons with disease refers to that disease only (without co morbidity).

Table 3

Descriptive statistics of dependent persons that receive informal care.

	Mean	SD
Informal care (number of hours per year)	4469.1	3441.28
Informal care (number of hours per year limited to 16 per day)	3000.08	1949.02
Neperian logarithm of informal care	3.97	1.11
Index of dependency in basic activities of daily living	4.54	2.33
Index of dependency in instrumental activities of daily living	4.29	1.78
Age of dependent	71.80	19.56
	Number of persons	%
Number of formal services		
1	165.184	13.8
2	35.377	2.9
3	4.481	0.4
4-5	1.154	0.1
Sex of dependent (female)	793.013	66.0
The dependent has a university education	37.107	3.1
The caregiver has a university education	16.532	1.4
Town with less than 10.000 inhabitants	331.954	27.6
Personal care is provided by someone living in the home	957.313	79.7
The dependent has received benefit in the previous 12 months	131.652	11.0
Autonomous region of residence		
Andalusia	233.527	19.4
Aragon	38.187	3.2
Asturias	38.435	3.20
Balearic Islands	21.3	1.8
Canary Islands	39.545	3.3
Cantabria	16.1	1.3
Castilla-Leon	82.013	6.8
Castilla-La Mancha	64.448	5.4
Catalonia	141.98	11.8
Valencia	161.576	13.5
Extremadura	31.806	2.60
Galicia	122.942	10.2
Madrid	87.488	7.3
Murcia	42.183	3.5
Navarre	15.577	1.3
Basque Country	51.86	4.3
La Rioja	7.279	0.6
Ceuta and Melilla	4.56	0.4
Number of observations	1,200,804	

Notes: EDAD 2008. SD denotes standard deviation.

Table 4

OLS model for informal care intensity.

Dependent variable	Informal care
Intercept	2.777 ^{***} (0.005)
Number of formal services received	
1	-0.152 ^{***} (0.002)
2	-0.210 ^{***} (0.005)
3	-0.567 ^{***} (0.014)
4-5	-0.616 ^{***} (0.027)
Index of dependency in basic activities of daily living	0.085 ^{***} (0.000)
Index of dependency in instrumental activities of daily living	0.172 ^{***} (0.001)
Sex of dependent (female)	-0.124 ^{***} (0.002)
Age of dependent	0.001 ^{***} (0.000)
University education of the dependent	-0.035 ^{***} (0.005)
University education of the caregiver	-0.495 ^{***} (0.007)
Residence of dependent in town with less than 10.000 inhabitants	-0.057 ^{***} (0.002)
Personal care is provided by someone living in the home	0.492 ^{***} (0.002)
The dependent has received benefit in the previous 12 months	-0.024 ^{***} (0.003)
Autonomous region of residence	
Aragon	-0.362 ^{***} (0.005)
Asturias	-0.515 ^{***} (0.005)
Balearic Islands	-0.247 ^{***} (0.006)
Canary Islands	-0.001 (0.005)
Cantabria	-0.003 (0.007)
Castilla-Leon	-0.380 ^{***} (0.004)
Castilla-La Mancha	-0.179 ^{***} (0.004)
Catalonia	-0.105 ^{***} (0.003)
Valencia	-0.039 ^{***} (0.003)
Extremadura	0.129 ^{***} (0.005)
Galicia	-0.450 ^{***} (0.003)
Madrid	0.051 ^{***} (0.004)
Murcia	-0.042 ^{***} (0.005)
Navarre	-0.110 ^{***} (0.007)
Basque Country	-0.436 ^{***} (0.004)
La Rioja	-0.110 ^{***} (0.011)
Ceuta and Melilla	0.084 ^{***} (0.013)
Adjusted R ²	0.272
Number of observations	1,200,804

Notes: EDAD 2008. Sample includes all individuals that receive informal care. Andalusia was excluded due to colinearity. Asterisks (*), (**), (***) means that the coefficient estimate is significantly different from zero at the 10%, 5% and 1% level, respectively. Standard errors are in parentheses.

Table 5

OLS models for the first and fourth quartile of the informal care intensity distribution

Dependent variable	First quartile of informal care distribution	Fourth quartile of informal care distribution
Intercept	2.187 ^{***} (0,010)	3.685 ^{***} (0,006)
Number of formal services received		
1	-0,068 ^{***} (0,005)	0,068 ^{***} (0,003)
2	-0,193 ^{***} (0,009)	0,137 ^{***} (0,007)
3	-0,657 ^{***} (0,028)	0,316 ^{***} (0,020)
4-5 (no individuals with this number of services)	-	-
Index of dependency in basic activities of daily living	0,074 ^{***} (0,001)	0,021 ^{***} (0,001)
Index of dependency in instrumental activities of daily living	0,208 ^{***} (0,001)	0,033 ^{***} (0,001)
Sex of dependent (female)	-0,093 ^{***} (0,004)	-0,057 ^{***} (0,002)
Age of dependent	-0,001 ^{***} (0,000)	0,001 ^{***} (0,000)
University education of the dependent	-0,083 ^{***} (0,011)	-0,020 ^{***} (0,007)
University education of the caregiver	-0,041 ^{***} (0,012)	-0,198 ^{***} (0,010)
Residence of dependent in town with less than 10.000 inhabitants	-0,066 ^{***} (0,004)	-0,002 (0,003)
Personal care is provided by someone living in the home	0,577 ^{***} (0,004)	0,057 ^{***} (0,003)
The dependent has received benefit in the previous 12 months	-0,024 ^{***} (0,006)	0,114 ^{***} (0,000)
Autonomous region of residence		
Aragon	-0,452 ^{***} (0,010)	0,116 ^{***} (0,006)
Asturias	-0,513 ^{***} (0,009)	0,100 ^{***} (0,007)
Balearic Islands	-0,106 ^{***} (0,015)	0,074 ^{***} (0,007)
Canary Islands	0,206 ^{***} (0,010)	0,155 ^{***} (0,007)
Cantabria	0,125 ^{***} (0,015)	0,298 ^{***} (0,008)
Castilla-Leon	-0,552 ^{***} (0,007)	0,004 (0,005)
Castilla-La Mancha	-0,360 ^{***} (0,009)	-0,018 ^{***} (0,006)
Catalonia	-0,170 ^{***} (0,007)	-0,151 ^{***} (0,004)
Valencia	-0,323 ^{***} (0,007)	-0,083 ^{***} (0,004)
Extremadura	-0,103 ^{***} (0,013)	-0,102 ^{***} (0,009)
Galicia	-0,316 ^{***} (0,007)	-0,018 ^{***} (0,004)
Madrid	-0,022 ^{***} (0,008)	0,050 ^{***} (0,005)
Murcia	-0,092 ^{***} (0,011)	0,041 ^{***} (0,005)
Navarre	-0,380 ^{***} (0,016)	0,135 ^{***} (0,011)
Basque Country	-0,360 ^{***} (0,009)	-0,044 ^{***} (0,006)
La Rioja	-0,051 ^{**} (0,024)	-0,067 ^{***} (0,017)
Ceuta and Melilla	0,329 ^{***} (0,025)	0,067 ^{***} (0,019)
Adjusted R ²	0,306	0,123
Number of observations	304,546	136,825

Notes: EDAD 2008. Asterisks (*), (**), (***) means that the coefficient estimate is significantly different from zero at the 10%, 5% and 1% level, respectively. Standard errors are in parentheses.

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