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Population Ageing, Dependency and Healthcare Services Utilisation*

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ABSTRACT

The increase in the percentage of the elderly (the population 65 years or older) in developed countries is a cause for concern about the levels of health care services expenditures and the widening of long-term care services in these countries. The current debate includes the issue of establishing a system of protection for dependence as a new modality of social protection. The objective of this paper is to analyse the evolution of the degree of dependence in the Spanish population over 65 years during the period between 1997 and 2003, and to estimate the impact of dependence on health status and health care utilisation for the same period. An increasing trend of dependence prevalence as well as of the consumption of health care services has been found. A statistical association between the degree of dependence and the variables of health status, drug consumption and in-patient services has been observed. But this association is not significant in the case of medical consultations. The low degree of association between dependence and out-patient health care services strengthens the hypothesis that the elderly population presents specific necessities, oriented to assistance of dependence needs rather than ambulatory health care services.

Keywords: Ageing; Dependency; Health Care Services.

Envejecimiento de la población, dependencia y utilización de servicios sanitarios

RESUMEN

El aumento de la proporción de mayores de 65 en la población de los países desarrollados viene siendo motivo de preocupación debido al crecimiento del gasto sanitario y a la expansión de los servicios de cuidados de larga duración observados en estos países. El debate actual aborda la problemática vinculada al establecimiento de un sistema de protección a la dependencia como una nueva modalidad de protección social. El objetivo de este trabajo es analizar la evolución del grado de dependencia en la población española mayor de 65 años en el período 1997-2003, así como estimar su relación con el estado de salud y con la utilización de servicios sanitarios durante el mismo período. Se ha identificado una tendencia creciente tanto de la prevalencia de dependencia como del uso de recursos sanitarios. Además, se observa una relación estadísticamente significativa entre el grado de dependencia y las variables estado de salud, consumo de fármacos y uso de servicios de hospitalización, pero no con los servicios de atención primaria. El bajo grado de asociación entre la dependencia y la utilización de servicios sanitarios ambulatorios refuerza la hipótesis de que la población mayor presenta necesidades específicas, diferentes de las del resto de población, orientadas a la asistencia de la dependencia más que a los servicios sanitarios ambulatorios.

Palabras claves: Envejecimiento; dependencia; servicios sanitarios.

Clasificación JEL: I10, I30.

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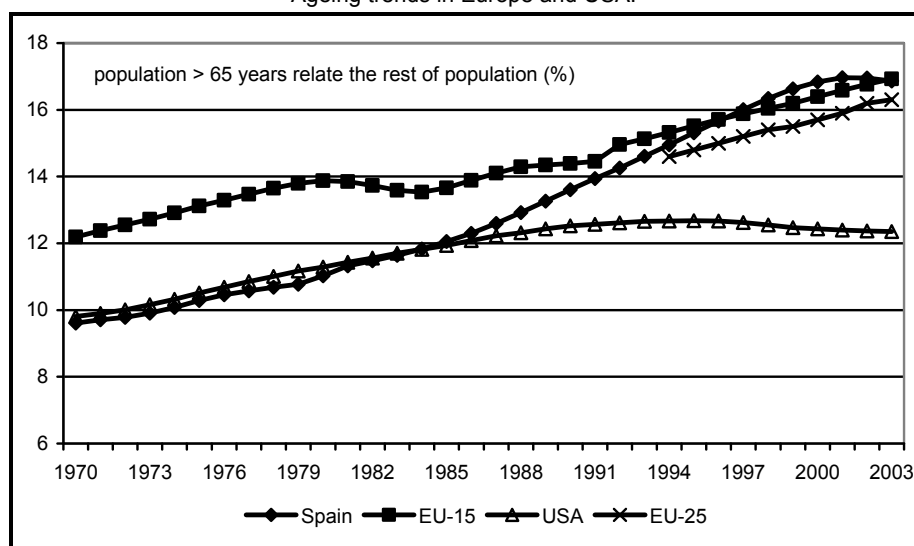
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1. INTRODUCTION

In the last decades, age structure of developed countries' population has undergone dramatic changes due to low fertility and mortality rates and continuous increases in life expectancy which together have lead to a small natural population growth and a progressive ageing, with an increase in the number of persons aged 65 years and over compared with the rest of population (Figure 1).

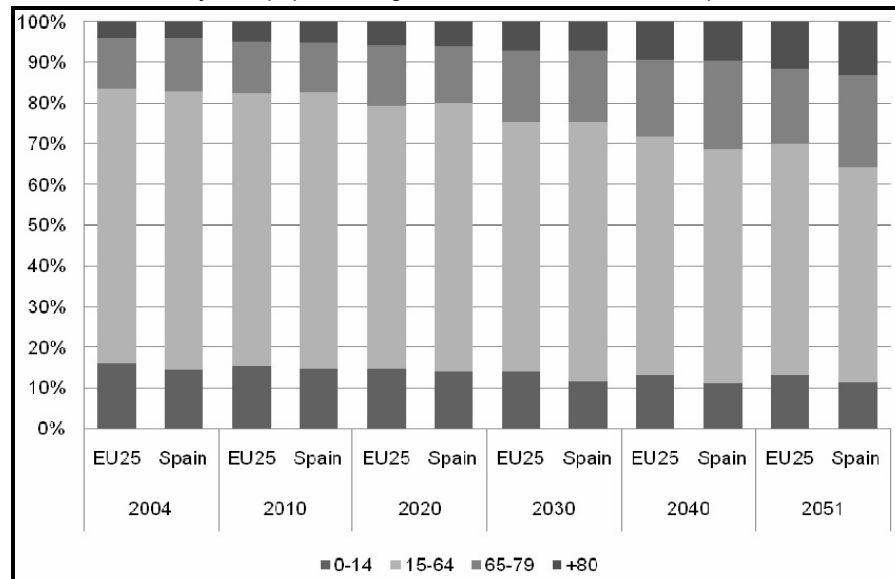
FIGURE 1
Ageing trends in Europe and USA.



Source: OCDE Health Data 2005, INE and Eurostat. Own elaboration.

Furthermore, the number of persons aged 80 and over is increasing regarding the number of persons aged between 65 and 79 years, making an internal ageing of elderly population happen ("ageing of ageing"). This trend is expected to increase in the near future both in Europe and Spain (Figure 2). In the case of Spain, currently a "demographic truce" is taking place, until about the year 2020, due to the delay of the "baby-boom" phenomena in our country.

FIGURE 2
Projected population age structure in the EU-25 and Spain.



Source: Eurostat. Own elaboration.

The described demographic pattern, shared by the majority of developed countries, is one of the main challenges for European economies in next years. In order to analyse its consequences on the current social and economic models, a number of studies have been carried out.

These studies have analyzed the effects of ageing population on economic growth, through the labour market and employment, the financial markets and the families and public economy (Hernández and Ortega, 2002). In the current scenario with a growing public expenditures in developed countries during last years, debate has been focused in the consequences of ageing on the financial sustainability of public pension system (Herce, 2004; OCDE, 2000, 2005), health care systems (Casado, 2000, Ahn et al, 2003, Fuchs, 1999) and more recently on the long-term care (LTC) services (Manton, 1997; Rodríguez, 1999; Casado and López, 2001; Puga, 2002; OCDE, 2005, 2006; European Union, 2004, 2006; Wanless, 2006).

International evidence shows a relationship between ageing and health care expenditure (Casado and López, 2001) and between ageing and dependence, with a higher prevalence of disability in older person. The higher probability of bearing chronic diseases at older ages together with the natural process of senescence, provoke an increase of the percentage of persons with limited functional abilities as age of population cohorts increase (Manton et al, 1997; Casado and López, 2001).

Concern about the association between age and health care expenditure has generated profuse literature in last decades about the necessity of contain the grow-

ing costs in health care services. In return, concern about costs of disability is relatively recent and its leit motiv is different from the former. Up to now, dependency has been considered as individual and private problem that must be dealt with by the families. Dependent persons themselves and their families have currently to bear the majority of the long term care (LTC) costs whether through informal carers or contracted professionals, in the domestic environment or in care homes. Historically in most countries, public funding for LTC¹ has been relatively reduced in comparison with other related social services as health care and pensions. Total expenditure on LTC in OECD countries ranges from around 0.2% to 3% of gross domestic product (GDP), although most countries spend less than 1.5% of GDP (OECD, 2005).

So the issue is, on one hand, if public sector should increase its effort in public programs of assistance to disability, and on the other hand, the interface with other near social programs, as the health care system. LTC policies face numerous challenges which sometimes overlap with other health and social services, as well as with informal care provided at home by family and friends. Problems in coordinating acute health care, rehabilitation and LTC, can lead to unsatisfactory outcomes for patients at the same time that they can also provoke an inefficient use of both healthcare and LTC resources.

Most OECD countries have decided recently to extend the public provision of LTC, focusing their concern in the identification of individuals with access to these services (patterns of need for social care), the funding source (who pays these services?), the public-private mix of funding for LTC services, the coordination with informal care, the impact on labour market, etc (IMSERSO, 2004; European Union, 2004; OCDE, 2005; Wanless, 2006). In Spain, in accordance to the model of Scandinavian countries, a National Dependence System (NDS) with broad coverage and universal access has been created and regulated by a Dependency Law, which entered into force at the beginning of 2007. These circumstances lead us to establish the functional scope of our work in the patterns of need for social care.

The objective of this paper is twofold. Firstly to estimate the number of persons aged 65 years and over with disability in Spain, their degree of disability and the evolution of this pattern between 1997 and 2003. Secondly, the relationship between the degree of disability and both, health status and consumption of health care services, is analysed for the same time period.

To achieve these objectives, the paper is structured as follows. In the next section, the relationship between demographic ageing and health care and LTC expenditures of elderly is analysed. In epigraph 3, an operational definition of dependence is suggested, which let estimate the prevalence of dependence in Spain distinguishing several level of dependency. In epigraph 4, we analyse the evolution of the dependence structure in the period 1997-2003, as well as the relationship

¹ Although there is no internationally accepted definition of long-term care, it usually means care for elderly, handicapped and psychiatric patients lasting or expected to last at least 6 months, and requiring a high (daily) intensity.

with other variables (demographic, health care services consumption and perceived health status). Finally, considering previous international lessons, the main conclusions of the analysis carried out are displayed.

2. COSTS IN HEALTH CARE AND LONG-TERM CARE IN AN AGEING SOCIETY, ARE THEY NECESSARILY INCREASING?

It is well known the higher prevalence of disability in older person than in the rest of population (IMSERO, 2004; Wanless, 2006). Nevertheless, derive a public expenditure growth in health care and in LTC services simply from a growing number of elderly can be so simplistic.

The OECD distinguishes six factors that influence healthcare expenditure (European Union, 2004) among of them demography plays an important role, but no more than others (Cano, 2006). Recent health economic literature points that demography factors are not the main health care expenditure drivers.

Regarding the LTC, demography trends forecast a growing number of dependents as a direct consequence of ageing population, but we must consider several shadings. First, demographic projections are based on assumptions about several variables (natality, mortality, morbidity, etc.) which are based on past trends. So, while aging is a certain fact, the pattern according to which this process will occur is uncertain. Thus it is not possible to say that an increase in the number of person aged 65 and over in the future will involve an aligned increase of the number of dependent elderly, which will depend on the evolution of functional disability prevalence in the future.

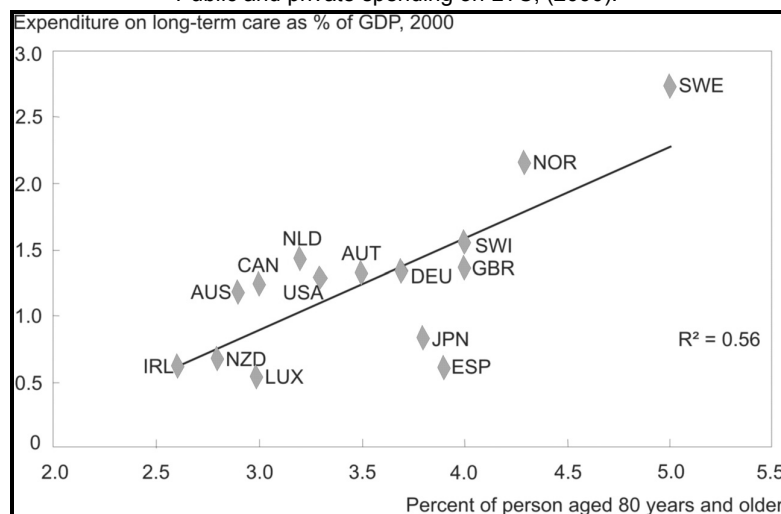
The consequences of largest life expectancy on the quality of life of older people have been exposed in two contradictories theories:

The first, the so called “compression of morbidity” (Fries, 1980) stipulates that medical progress and healthy lifestyles cause not only a fall in mortality rates, but also that chronic diseases and functional disabilities, are subjected to a “compression” process (this is, disabilities will appear in periods more and more short before death). In accordance with this theory, prevalence rates of functional disabilities will decrease in the future, at the same time that mortality rates.

The second theory, known as the “expansion of morbidity” (Kramer, 1980) states a reduction of the risk of disease as a consequence of changes in lifestyle, but maintains that these changes do not modify the occurrence nor the progression of the majority of degenerative illness associated with elderly. Regarding to medical treatments, this theory advocates that the main effect of them is to extend the life expectancy of persons with illness and functional disabilities, without appreciable health gains. In accordance with this theory, the consequences to reduce the mortality rates will be an extension of time during chronic diseases and functional disabilities can be shown. As a result, disability prevalence rates will evolve in opposite sense to mortality rates.

Nevertheless, the weak correlation between LTC and age suggest that non demographic factors play an important role in explaining LTC costs. As Figure 2.1 shows, countries with similar expenditure levels (i.e. Ireland and Spain) may face rather different challenges. Therefore countries with significantly different population shares of oldest persons often have similar spending levels, which are mainly due to differences in programmes design, such as public-private mix of funding and, more generally, differences in the division of labour between formal and informal (unpaid) care-giving. The large variations in the public coverage of long-term care costs among the OECD countries reflect variations in choice among countries in the way in which LTC is financed and provided. And even in countries with relatively comprehensive coverage, expenditure on long-term care is currently only around 10 to 20% of total spending on health and long-term care together. Up to the moment, there is no evidence that LTC expenditure has grown faster than expenditure on acute health care after the initial introduction of long-term care programmes. High private cost-sharing and informal care provision have helped to contain the expenditure in the past (OCDE, 2005).

FIGURE 3
Public and private spending on LTC, (2000).



Source: OECD (2005)

3. DEPENDENCY ASSESSMENT

Concern about demographic aging effects has stimulated in last years substantial efforts among the analytic community focused on cross-national comparisons. A number of countries have developed national representative surveys which contains data about disabilities (Waidmann and Manton, 1998). Most of these are cross-section

surveys, collecting data about individuals in one cut but not over time. These types of surveys present methodological limitations in order to make dynamic calculations on disability prevalence. Nevertheless, in the bulk of cases, such surveys have been repeatedly done, making possible to analyse the dynamic of dependence prevalence over time. In the United States longitudinal surveys of chronic disability have been conducted, standing out the National Long-Term Care Survey (NLTCS) with surveys done in 1982, 1984, 1989 and 1994. This survey makes a surveillance of individuals over time, replenishing samples by age group. In 2004 a new longitudinal cross national database of micro data on health, socioeconomic status and social family networks of some 22.000 continental European individual over the age of 50 started. That is the “Survey of health, ageing and retirement in Europe” (SHARE²), in which eleven European countries have contributed micro data to the first wave in 2004.

In Spain, several national representative surveys collect data about disabilities. Some of them were designed for a general assessment of the health status of individuals (health, life conditions) as the Spanish National Health Survey (S-NHS) completed in several years³, the Disability Deficiency and Health Status Survey (1999) and Life Conditions in Elderly (2004). Other surveys designed specifically for the study of elderly are the Informal Care of Elderly Survey (done 1993, 1994 and 2004) and the Elderly Loneliness Survey (1998).

In general, the studies carried out to analyse the dependence in elderly have had as main objective estimate how many elderly presented problems of dependence and the intensity of those problems. Additionally, sometimes, the socio-demographic profile of dependents was analysed in comparison with no dependent.

A first step before assessing dependence is to precisely define this concept. The word dependence has a lot of senses (demographic, economic, psychological, social and politics) depending on the analysed relations. In social sense, the Council of Europe (1998) defined dependence as “*a state in which persons, by reason of lack or loss of physical, psychological or intellectual autonomy, require significant assistance or help in carrying out their usual day-to-day activities*”. Considering that, analytic community usually distinguishes between two main groups of activities:

- Activities of daily living (ADL⁴): activities related to personal care. This group includes bathing or showering, dressing, getting in or out of bed, seating, using the toilet, and eating.
- Instrumental activities of daily living (IADL): this group includes activities which purpose is to maintain the environment of individuals. Preparing meals, managing money, shopping for groceries or personal items, executing light or heavy housework, or using a telephone are included in this group.

² www.share-project.org.

³ 1987, 1993, 1995, 1997, 2001, 2003.

⁴ Many authors call them Basic Activities of Daily Living (BADL).

Thus, an ageing dependent is a person aged 65 and over who requires help to carrying out one or more of this ADL or IADL, or who can not carry out them.

Since, it is not the same to be limited to eat or wake up than to be limited in handling of money matters, a second step is to assess the degree of disability or dependence of the dependent individuals. Three types of methodological approaches have been proposed (Casado and López, 2001):

- [A] *Classify individuals according to the number and nature of activities in which they are limited.* In general, differences between individuals with problems in IADL and in ADL are established. From bottom to upper dependency degree, the first group includes individuals with problems only in several IADL; following groups include individuals limited in some ADL, classified in several levels depending on the total number of ADL in which they have problems. The range of dependence categories and the number of them is different among various studies (Manton et al, 1997; Rodríguez, 1999; Casado and López, 2001; Puga, 2002; Wanless, 2006), showing the “*ad hoc*” character that underlies in their methodologies.
- [B] *Functional scales:* these scales resume the level of dependence in only one variable (index) which gives us a synthetic measure of dependence level (Barthel, Katz or Lawton Indexes). The various scales that exist try to get not only a dependence measure, but a package of categories to classify the dependent persons.
- [C] *Multivariate analysis techniques:* by means these techniques is possible to obtain different dependence categories without a priori assumptions, being the data themselves which define each category (Béland and Zunzunegui, 1995).

The economic assessment of LTC services is minus frequent in the literature. Some proposals link functional disabilities in elderly and time of services needed (usually measured in hours), assigning a tariff per hour. In Spain, from many data sources, different schemes have been described (Table 1):

TABLE 1
Spanish proposals for economic assessment of LTC services.

Degree Dependency	Hours/ week	Cost/ hour	Total/ month
Home Care Service (Basque Country)			
Large dependence	8.75	9.62	336.70
Severe	8.33	9.62	320.54
Considerable	6.21	9.62	238.96
Mild	4.68	9.62	180.09
German scheme adapted to Spain			
Large dependence	35	7.21	1,081.50*
Severe	21	7.21	648.90*
Considerable	10.5	7.21	324.45*
* Counting 30 days			

Source: Rodríguez (1999).

Without assessing the cost of LTC activities, Rodríguez (1999), according to the daily help required, sets up 4 levels of dependence: Large dependence (between 5 to 24 hours daily), Severe Dependence (from 3 to 5 hours/day), Considerable Dependence (1.5 to 3 hours/day) and Mild Dependence (help ever a week). In turn, Puga (2002) from the Informal Care Survey (1994) relates the number of hours of care required by elderly with the functional limitations of ancients. She concludes that persons who need care weekly or less, in average have problems in one ADL and three IADL; persons who need daily care, but no more than hours a day, have problems in 2 ADL and 4 IADL; and finally persons who need care during 3 or more hours a day are, in average, limited for 4 ADL and 5 IADL.

In relation to the final cost of the Spanish system of dependency, Julia Montserrat (2006) rightly points out there is no single model, or a single cost. There are different models and within each of them there are different scenarios costs. The model varies depending on the benefits included in the catalogue of services offered by the law. Different scenarios will arise from different assumptions about the demand for benefits, depending on levels of dependency and the combination of different types of existing benefits. Based on a model developed previously (Montserrat, 2005), the author estimates that in 2015 the Spanish system of dependency will benefit 701,968 over 65 who receive home care services both formal and informal, 182,662 will receive day care centers, 73,031 may obtain temporary stays in residences, and 135,162 severe and very serious dependents will have place in residences. The annual cost estimated in this study for the year 2015 amounts to 11.562,86 million Euros, 25% higher than the official estimates.

Most empirical works have classified individuals in dependence degrees based on the differentiation between ADL and IADL, but they show a high heterogeneity among activities included in each group, as well as in the criteria to establish the threshold for each dependence degree. This heterogeneity could be due to the di-

versity of data sources and to the discretionary criteria of analysts to make these decisions. The utilisation of divergent criteria in a variety of analyses has important consequences on the obtained dependence rates. Actually, international evidence is controversial, some results showing a decreased trend of disability rates (Manton et al, 1997; Weidmann and Manton, 1998) but other showing different trends, concretely no changes (Jacobzone et al, 1999) or increasing trend in disability rates (Puga, 2002; Jagger, 2006). Table 2 resumes some of the main results.

TABLE 2
International and Spanish evidence about trends in dependence prevalence.

Author (year)	Data Source	Main Results
International		
Manton et al (1997)	USA - NLTCS	Falling prevalence rates 1982-1994
Jacobzone <i>et al</i> (1999)	9 OCDE's countries surveys	3 trends: Significant falling prevalence: Germany, Japan, France, USA, Sweden Little falling prevalence: Australia, United Kingdom Absence of clear trend: Canada, The Netherlands
Wen (2003)	USA National Health Interview Survey (NHIS), Australian Bureau of Statistics (ABS)	Falling rates in USA and mixed-increasing in Australia
Jagger <i>et al</i> (2006)	MRC Cognitive Function and ageing study (UK)	Increasing trend in UK Falling trend in Spain and US
Spain		
Casado (2006)	NHS 1993, 2001.	Falling prevalence 1993-2003
Puga (2002)	NHS 1993, 1997 CIS 1993, 1998	Increasing prevalence 1993-1998

Source: Author's elaboration from original referenced work.

A large number of studies have reported a decline in disability prevalence among older population in some developed countries (Waidmann and Manton 1998; Jacobzone et al. 1999; Schoeni et al. 2001). In the United States, an analysis of the National Long Term Care Surveys (NLTCS) data shows that declination in disability prevalence, observed from 1982 to 1989, in the elderly population, continued to 1994 (Manton et al, 1997). Furthermore, several surveys have been used to estimate disability trends, emerging a growing body of evidence which points toward declines in disability rates among the elderly. Some studies show smaller declines than others, but in a variety of disability research employing different surveys and analytic methods, no maintained increase in disability rates has been

observed. Even several studies based on survey data, which previously have shown either increasing or undefined tendencies of disability over time, now opposite show statistically significant declines in elderly disability rates (Waidmann and Manton, 1998).

In other respect, a variety of trends were reported across the OECD countries (Jacobzone et al. 1999). Besides the United States, clear declining disability prevalence was reported for Germany, France and Japan. Moderate declining disability was reported for Sweden. Mixed patterns of prevalence were reported for Canada, with a clear decline for people aged 65–74, but an increase in most age groups over 75. No consistent decline in disability prevalence was reported in the United Kingdom and the Netherlands. In Australia, the latest population survey data indicated no decrease and even a possible increase in disability prevalence among people aged 75 or older (Wen, 2003).

Whatever the case, the estimates of prevalence indicate that the decline occurring during the period has been observed just for people who only need help with routine care activities, such as household chores, doing necessary business, shopping, and getting around. There was no change in the prevalence in this period for people with a more severe disability, i.e. those who need help with personal care activities. It may be useful to look at some differences in the operational definition of disability and survey design between countries to examine its possible impact on reported trends about disability prevalence. Has disability fallen over time? Answering this question is not easy because consistent cross-country data on disability rates simply do not exist. Disability is usually measured through the inability of performing one or more Activities of Daily Living (ADL). Evidence for some OECD countries suggests that the share of the severely disabled has fallen over time, while no conclusion could be reached concerning the evolution of moderate disability. Studies on the United States, where more data are available, show that disability rates may have declined somewhat among the oldest but have increased among younger age groups, a phenomenon that is often linked to obesity trends (Rand Research Bulletin, 2004).

In United Kingdom, the Wanless' Review projects that the number of people with impairment and dependency will increase significantly over the next 20 years. Other studies have suggested that even in relatively optimistic scenarios there will be a relative expansion of morbidity in this country. In particular, in all the considered scenarios both the number and the proportion of those 65 and over who are disabled will increase in the future, although in a moderate way (Jagger, 2006). In Sweden published researches suggest the same trend. On the other hand, in the United States, Spain, France, Belgium, Taiwan, Italy, Netherlands and Switzerland research tentatively suggests falls in the rate of disability (Jagger et al, 2006; Waidmann and Manton, 1998). Countries where no substantial decline is apparent do not show consistent evidence that disability rates are rising, and include United Kingdom (in contrast with results above of Jagger, 2006), Australia and Canada (Waidmann and Manton, 1998).

4. METHODOLOGY

Dependence issue can be studied from various approaches. Recent published works include among their topics the following: origins and development of social care, patterns of need for social care, the current system performing (services, standards, processes and outcomes), the social care funding system (main drivers of expenditure, comparison of funding models, public and private options), workforce, informal care, and the new influences on care (tele-care and related technology, housing and extra care housing, dementia care, prevention, intermediate care and rehabilitation). The functional scope of this work is focused in patterns of need for social care.

This is a retrospective and cross-section study, which scope is the whole Spanish territory during the period 1997-2003. The source of data is the Spanish National Health Survey (S-NHS), done by the Health Care and Consumption Ministry and the National Statistics Institute (NSI). Individual data for years 1997, 2001 and 2003 have been used. The S-NHS is a national representative survey which includes data for all age persons, and it contains so useful information for decision-making and health policy assessment. The S-NHS clusters data in four dimensions: perceived health status, life style, health care and prevention services consumption, and socio-demographic and personal characteristics. The dimension health status includes data about difficulties in performing daily activities in people aged 65 and over. This survey has been done repeatedly from 1987, providing a longitudinal data up to 2003.

4.1. Case definition and procedure

In this work, it will be classified as a *dependent aged* the persons of 65 years and over in a dependent state. Dependence state is considered from the revealed inability to achieve the 27 daily activities (self-care/sufficient) collected in the S-NHS for individuals of 65 years and over. In accordance with the classification proposed by Puga (2002), self-care variables have been separated into ADL and IADL (Table 3). This categorization, widely used at international level, is based on the classification of functional abilities used by the most frequent indexes (Katz Index, Barthel Index and Lawton Index).

TABLE 3
Self-care activities in the Spanish National Health Survey.

Activity	Type
1. Feeding oneself (cutting up food yourself)	ADL ⁱ
2. Dressing and undressing oneself	
3. Grooming (combing, shaving, etc.) oneself	
4. Walking (with or without walking stick, crutches or walker)	
5. Getting in and out of bed	
6. Washing face and upper body (from waist up)	
7. Washing (bath or shower) oneself	
8. Climbing ten steps	
9. Staying alone during the night	
10. Use the telephone (look for the phone umber and dial)	IADL ⁱⁱ
11. Buy food, clothes, etc.	
12. Take public transport: bus, taxi, underground/subway, etc.	
13. Prepare one's own breakfast	
14. Prepare one's own meal	
15. Take one's own medicines (remember dosage and time)	
16. Manage one's own money (pay receipts, banking, sign cheques)	
17. Cut a slide of bread	
18. Wash up the dishes	
19. Make bed	
20. Change the sheets of the bed	
21. Hand wash light clothes	
22. Machine wash clothes	
23. Mop the floor	
24. Crouch down to clean spots and floor	
25. Cut toenails oneself	Others ⁱⁱⁱ
26. Sew a button	
27. Continue walking one hour	
ⁱ Katz and Barthel Indexes ⁱⁱ Lawton Index ⁱⁱⁱ Activities not included in disability assessment because they affect a broad share of elderly, which have not any other problems, having these conditions a weak discrimination capability in this group of aged population	

Source: Puga (2002).

From the previous classification which distinguishes among ADL and IADL, we rank several degrees of dependence, regarding the type (ADL or IADL) and the number of activities in which each person has disability or inability (Table 4).

TABLE 4
Dependence degrees.

Dependence Degree	Activities	Required Help
Not dependent	Without inability in any IADL	No
Mild	< 5 IADL and none of ADL Inability only for <i>stay alone during the night</i>	< 1 time a week
Moderate	1-2 ADL and/or > 5 IADL	1-2 times a week
Severe	3 or more ADL	3 + times a week

Source: Puga (2002).

4.2. Variables

- a) Degree of dependence: we will consider two scales of dependence. The first one distinguishes four degrees depending on number of ADL and/or IADL limitations (Table 4.2) (Puga, 2002). Furthermore, in order to obtain a higher international comparability, we have applied the classification proposed by Wanless et al. (2006) in the United Kingdom, which establishes five dependence groups (no dependent, dependence in 1 IADL, dependence in 1 IADL and difficulty in 1 ADL, dependence in 1 ADL, and dependence in 2 or more ADL).
- b) Socio-demographic variables
 - Age: we distinguish two age groups, those of 65-79 years and 80 years and over.
 - Civil status: married, single, other cases (separate, divorced, widow, etc.).
- c) Revealed health status: variable with 3 dimensions: good/very good, regular/medium, bad/very bad.
- d) Health care services utilization. We analyse three variables about health care services consumption:
 - Hospital resources: number of times that a person has been hospitalized during the last 12 months before the survey
 - Ambulatory care: number of consultations to a physician during the last two weeks previous to the survey
 - Drugs consumption: drugs prescribed during the last two weeks previous to the survey

4.3. Analysis

- a) Assessing sample representativeness: Since we are analysing the dependence phenomena from individual data of the S-NHS, it has a crucial importance to make sure about how representative of total Spanish population is the sample used in the survey. Concretely, our concern was regarding the sufficient representation of some specific age groups in the sample. We checked the representation of age groups of 65 years and over by means of a Chi-square test, comparing the Spanish population pyramid with that of the sample used in the S-NHS.
- b) Descriptive/univariate analysis: Based on the variables included a descriptive analysis about the target population is carried out. Furthermore, the evolution of these variables in the considered period of time is analysed.
- c) Bivariate analysis: Since we want to identify distinctive characteristics of the dependent elderly, for each included variable we carry out a differences analysis among subjects according to the degree of dependence.
- d) Multivariate analysis: finally, to verify possible relationships among the degree of dependence and the rest of variables, we perform a multivariate analysis by means of a nominal regression, where the dependent variable is the degree of dependence and the independent variables are the rest of included variables (age, sex, civil status, health care resources consumption, and perceived health status).

5. RESULTS

The results of the chi-square test inform about the goodness of fit of Spanish population distribution and the population represented by the S-NHS. In this case, results lead us to refuse the null hypothesis which assumes they have similar distributions. Nevertheless, after comparing the relative weight of each population age group, we observe that all age groups over 65 years are sufficiently represented in the sample of the S-NHS. This fact eliminates the risk to base our conclusions in underrepresented age groups. Information on population and age distribution has been derived from census data supplied by the National Statistical Institute (INE). Population censuses existing correspond to the years 1991 and 2001, thus providing the data only for one year of study. Regarding data on the distribution of population in different age groups for years 1997 and 2003, we used the inter-census population estimates made by the INE from censuses of 1991 and 2001 respectively.

Spanish population of 65 years and over collected in the S-NHS in 1997, 2001 and 2003 is mainly female, and a growing percentage of women over time can be observed. Concretely, in 1997 and 2001 the 57-58% of surveyed people was women, in 2003 this percentage grows up to almost 63%.

We can also observe an ageing of this population group, with an increase of average age and the percentage of most ancient (older than 80 years) respect the total number of older aged 65 and over.

Regarding the civil status, it is also possible to appreciate an increase in the percentage of widows of about 8 points (from 31% in 1997 to 39% in 2003). The population's level of studies changes as well over time, diminishing the percentage of those with intermediate studies and increasing those with primary and high studies.

The perceived health status also shows a trend to deterioration in the period of study, with an increase in the number of persons that perceive themselves as having a bad or very bad health status, and a reduction of those who perceive their health as good or very good. The number of individuals declaring a regular health status maintains stable over time.

Finally, an increase in the consumption of hospital services and drugs is observed in the population of 65 years and over. Medical consultations increased notably between 1997 and 2001, and then diminish in 2003, although remaining higher than at the beginning of the studied period (Table 5).

TABLE 5

Characteristics of population of 65 years and over collected in the Spanish National Health Survey (1997, 2001 and 2003).

Variables		1997	2001	2003
N	(population ≥ 65 years)	1,072	4,226	6,133
Sex	- Male	41.79	42.59	37.56
	- Female	58.21	57.41	62.44
Age	Average	72.91	73.24	74.70
	SD	(6.09)	(6.46)	(6.78)
Age (%)	- 65-79 years	83.97	84.24	76.62
	- 80 years and over	16.03	15.76	23.38
Civil Status	- Single	6.34	5.68	10.26
	- Married	62.69	63.51	50.09
	- Others	30.97	30.81	39.65
Level of studies	- Primary/no studies	83.93	81.60	86.31
	- Medium	10.59	13.44	7.75
	- High	5.47	4.96	5.94
Perceived health	- Bad/very bad	18.21	16.01	19.34
	- Regular	39.68	41.16	40.68
	- Good/very good	42.11	42.82	39.98
Consultations	Average	0.51	1.70	1.24
Hospitalizations	Average	0.15	0.14	1.36
Drugs	- No consumption	26.47	22.38	16.62
	- Between 1 and 3	64.86	67.48	65.24
	- Between 4 and 6	8.01	9.12	16.35
	- More than 6	0.65	1.02	1.79

*SD: Standard Deviation.

Source: Own elaboration from S-NHS data.

On the other hand, both the prevalence and the degree of dependence have risen in the period of study. In 1997 and 2001, 73.6% and 72% respectively of population of 65 years and over were not dependent, in 2003 this percentage diminished up to less than 69%. By dependence degrees, considering Puga's (2002) definition, the percentage of persons who present moderate and especially severe dependence degree increases in 2003 regarding previous periods. Wanless' (2006) classification shows the same trend (Table 6).

TABLE 6
Prevalence of dependence 1997-2003.

Variables		1997	2001	2003	Var.
N	(population ≥ 65 years)	1,072	4,226	6,133	4,721
Puga's Dependence (%)	- No dependent	73.63	72.09	68.84	-0.065
	- Mild dependence	11.37	11.08	11.56	0.017
	- Moderate dependence	9.23	11.82	11.54	0.250
	- Severe dependence	5.78	5.01	8.05	0.393
Wanless' Dependence (%)	- No dependent	73.63	72.09	68.84	-0.065
	- Group 1	11.18	11.77	12.13	0.085
	- Group 2	10.81	10.66	9.44	-0.127
	- Group 3	2.52	3.21	4.76	0.889
	- Group 4	1.86	2.27	4.83	1.597

Source: Own elaboration from S-NHS data.

Comparing no dependent elderly groups with those dependent, many particular characteristics can be discerned (Table 7).

The percentage of women is clearly higher in dependent than in no dependent groups, and it increases as the pace of dependency does. The highest percentage of women (70%) is located in the group of severe dependence. Age also rises alongside dependence, almost 55% of severe dependent are people aged 80 and over.

The percentage of single and married persons diminishes with the degree of dependence, while the "others" group, which includes widows, increases progressively. In the no dependent group, we can find the highest percentage of persons with high level studies. The population with primary or medium level studies shows percentages quite similar in all groups, without significant differences between dependent and no dependent.

The health status variable changes significantly among the various degrees of dependence. The proportions of bad and good perceived health are almost the inverse between the groups of no dependent and in those with a severe dependence

degree. On one hand, 10% of non dependent people perceive their health status as bad or very bad and 51% as good or very good. On the other hand, 57% of people with a severe degree of dependence perceive themselves having a bad or very bad health status, while only the 10% declare a good or very good health status.

A high association between the degree of dependence and health care resources consumption is observed. This relation is especially strong in hospital (inpatient) and drugs consumption, and more moderate in ambulatory care (consultations), where differences between no dependents and dependents of different degrees are very light (not significant).

TABLE 7
Comparison among variables by degree of dependence.

Variable		No Dependent	Dependent (Puga, 2002)		
			Mild	Moderate	Severe
N (population ≥ 65 years) = 11,437		8,062	1,300	1,307	768
Sex	- Male	43.49	31.92	31.60	29.04
	- Female	56.51	68.08	68.40	70.96
Age (%)	- 65-79 years	87.39	70.92	64.80	45.57
	- 80 years and over	12.61	29.08	35.20	54.43
Civil Status	- Single	31.89	25.40	25.63	19.27
	- Married	37.10	30.18	28.39	30.08
	- Others	31.02	44.42	45.98	50.65
Education Level	- Primary/no studies	36.46	38.78	37.08	31.46
	- Medium	56.04	57.22	57.79	64.49
	- High	7.49	4.00	5.13	4.05
Perceived health	- Bad/very bad	10.16	24.33	37.38	56.79
	- Regular	39.04	49.81	46.58	33.68
	- Good/very good	50.80	25.87	16.04	9.53
Consultations	Average	0.55	0.65	0.70	0.78
Hospitalizations	Average	0.19	0.27	0.36	0.51
Drugs	- No	23.73	13.08	8.88	6.64
	- Between 1 and 3	67.42	67.46	61.74	56.38
	- Between 4 and 6	8.42	17.38	25.55	30.73
	- More than 6	0.43	2.08	3.83	6.25

Source: Own elaboration from S-NHS data.

The following table summarizes the multivariate analysis carried out. The variables hospitalization, drugs consumption, and age are positively related with the degree of dependence, so as degree of dependence increases those variables increase as well. Regarding health status variable feeling bad or regular increases the de-

gree of dependence. Another remarkable fact is that being male diminishes the probability of high dependence in comparison with females. The rest of variables show not significant relationship in the model. Coefficients (B) and p values are shown in Table 8.

We have developed a second model considering exclusively those of 80 years and over. In this model the variables hospitalization and age increases their relevance in comparison with the former model for the whole population of 65 years and over, in the same way their positive impact increases when dependence degree go greater. However, the variables “drugs consumption” and “perceived health status” reduce their importance, and the variable “sex” becomes non significant. Finally, the variable “civil status” enters as a significant variable in mild and moderate degrees. For this older group, singleness diminishes the probability of dependence in comparison with married or others (Table 9).

We have to be cautious in the interpretation of the estimated coefficients in the logistic regression. Such coefficients must be understood as indicators of the correlation or association degree among dependence and the rest of variables, without considering those as determinants factors of dependence. Even in some cases we can find a twofold direction in the relationship, as occurs with the relation between dependence and health status. In addition, some variables used as explicative of the degree of dependence in the model are highly correlated among them, as it is the case of age and perceived health status.

In short, in this work we do not try to establish an explicative model of the degree of dependence in Spanish population, but enlarge our knowledge about the sign and strength of the relationship among any characteristics of the population and the dependence degree. The potential to estimate the demand of social care depends on the perception about such relationships, and on the efficacy of health and economic policies for modifying its intensity.

We evaluated the goodness of our fits by means of Pearson’s Chi-square test. This statistical test studies global significance of the model (taking into account all the variables involved in the study). As significant (p-value <0.05), we can say that, in all cases, the goodness of fit is adequate and that the models are valid to describe the behaviour of our dependent variables (Annexes 1 and 2).

We have also applied the same test for the various effects/variables of the models. The Chi-square statistic compares the -2 log likelihood difference between the final model and the reduced model. In this case the reduced model was form omitting an effect/variable of the final model. The null hypothesis is that all parameters of that effect/variable are equal to 0. Performed tests show that the variables representing the number of medical consultations, marital status, and educational level are not significant in the group of people aged 65 years or older or in the persons of 80 or more years. This indicates that these variables are not relevant to our study.

TABLE 8
Logistic Regression. Individuals of 65 years and over.

Degree of dependence	Variables		1997		2001		2003	
			B	Sig.	B	Sig.	B	Sig.
Mild	Intersection		-8.450	0.000	-8.432	0.000	-8.111	0.000
	Hospitalizations		-0.022	0.780	-0.026	0.751	-0.066	0.464
	Medical Consultations		0.005	0.296	0.006	0.280	0.006	0.281
	Drugs Consumption		0.172	0.000	0.173	0.000	0.167	0.000
	Age		0.079	0.000	0.079	0.000	0.078	0.000
	Health Status	Good	1.132	0.000	1.128	0.000	1.121	0.000
		Regular	0.538	0.000	0.535	0.000	0.530	0.000
		Bad	0.000	—	0.000	—	0.000	—
	Sex	Male	-0.243	0.022	-0.244	0.021	-0.240	0.024
		Female	0.000	—	0.000	—	0.000	—
	Civil Status	Single	-0.186	0.131	-0.159	0.202	-0.159	0.186
		Married	-0.146	0.322	-0.194	0.198	-0.193	0.171
		Others	0.000	—	0.000	—	0.000	—
Moderate	Level of Studies	Primary	0.226	0.358	0.230	0.350	0.254	0.303
		Medium	0.408	0.117	0.408	0.117	0.355	0.181
		High	0.000	—	0.000	—	0.000	—
	Intersection		-11.357	0.000	-11.075	0.000	-10.691	0.000
	Hospitalizations		0.131	0.047	0.155	0.017	0.093	0.182
	Medical Consultations		0.001	0.813	0.002	0.791	0.002	0.754
	Drugs Consumption		0.274	0.000	0.281	0.000	0.271	0.000
	Age		0.106	0.000	0.107	0.000	0.106	0.000
	Health Status	Good	1.840	0.000	1.846	0.000	1.822	0.000
		Regular	0.888	0.000	0.891	0.000	0.878	0.000
		Bad	0.000	—	0.000	—	0.000	—
	Sex	Male	-0.340	0.003	-0.349	0.002	-0.337	0.003
		Female	0.000	—	0.000	—	0.000	—
	Civil Status	Single	-0.171	0.188	-0.143	0.279	-0.080	0.533
		Married	0.062	0.678	0.011	0.946	-0.077	0.596
		Others	0.000	—	0.000	—	0.000	—
	Level of Studies	Primary	0.165	0.514	0.122	0.628	0.192	0.450
		Medium	0.078	0.771	0.153	0.567	0.020	0.942
		High	0.000	—	0.000	—	0.000	—

TABLE 8 (continuación)
Logistic Regression. Individuals of 65 years and over.

Degree of dependence	Variables		1997		2001		2003	
			B	Sig.	B	Sig.	B	Sig.
Severe	Intersection		-20.500	0.000	-20.466	0.000	-19.500	0.000
	Hospitalizations		0.283	0.000	0.281	0.000	0.211	0.009
	Medical Consultations		0.008	0.354	0.009	0.300	0.009	0.316
	Drugs Consumption		0.337	0.000	0.338	0.000	0.319	0.000
	Age		0.198	0.000	0.198	0.000	0.196	0.000
	Health Status	Good	2.639	0.000	2.617	0.000	2.591	0.000
		Regular	1.063	0.000	1.054	0.000	1.031	0.000
		Bad	0.000	—	0.000	—	0.000	—
	Sex	Male	-0.610	0.000	-0.606	0.000	-0.586	0.001
		Female	0.000	—	0.000	—	0.000	—
	Civil Status	Single	-0.258	0.207	-0.133	0.526	-0.145	0.472
		Married	0.405	0.049	0.257	0.221	0.262	0.195
		Others	0.000	—	0.000	—	0.000	—
	Level of Studies	Primary	0.850	0.069	0.874	0.061	1.093	0.023
		Medium	0.650	0.172	0.592	0.215	0.384	0.432
		High	0.000	—	0.000	—	0.000	—

Source: Own elaboration from S-NHS data.

TABLE 9
Logistic Regression. Individuals of 80 years and over.

Degree of dependence	Variables		1997		2001		2003	
			B	Sig.	B	Sig.	B	Sig.
Mild	Intersection		-9.075	0.001	-9.206	0.001	-10.326	0.000
	Hospitalizations		0.186	0.392	0.187	0.416	0.410	0.102
	Medical Consultations		-0.023	0.464	-0.023	0.456	-0.021	0.452
	Drugs Consumption		0.169	0.030	0.165	0.034	0.179	0.022
	Age		0.086	0.009	0.085	0.010	0.088	0.008
	Health Status	Good	0.876	0.011	0.885	0.010	0.924	0.008
		Regular	0.308	0.212	0.300	0.223	0.323	0.191
		Bad	0.000	—	0.000	—	0.000	—
	Sex	Male	0.129	0.573	0.134	0.559	0.089	0.700
		Female	0.000	—	0.000	—	0.000	—
	Civil Status	Single	-0.613	0.022	-0.686	0.011	-0.747	0.005
		Married	-0.597	0.067	-0.480	0.140	-0.478	0.126
		Others	0.000	—	0.000	—	0.000	—

TABLE 9 (continuación)
Logistic Regression. Individuals of 80 years and over.

Degree of dependence	Variables		1997		2001		2003	
Mild	Level of Studies	Primary	0.799	0.121	0.802	0.121	0.701	0.175
		Medium	0.842	0.125	0.811	0.141	1.096	0.052
		High	0.000	—	0.000	—	0.000	—
Moderate	Intersection		-13.903	0.000	-13.344	0.000	-13.724	0.000
	Hospitalizations		0.372	0.060	0.478	0.018	0.470	0.045
	Medical Consultations		-0.001	0.940	-0.001	0.950	0.000	0.977
	Drugs Consumption		0.256	0.000	0.263	0.000	0.262	0.000
	Age		0.133	0.000	0.135	0.000	0.135	0.000
	Health Status	Good	1.583	0.000	1.608	0.000	1.592	0.000
		Regular	0.376	0.141	0.394	0.122	0.393	0.123
		Bad	0.000	—	0.000	—	0.000	—
	Sex	Male	-0.156	0.492	-0.184	0.417	-0.173	0.447
		Female	0.000	—	0.000	—	0.000	—
	Civil Status	Single	-0.591	0.025	-0.620	0.021	-0.508	0.052
		Married	0.048	0.874	0.050	0.868	-0.094	0.748
		Others	0.000	—	0.000	—	0.000	—
Severe	Level of Studies	Primary	0.641	0.167	0.540	0.241	0.609	0.190
		Medium	0.249	0.616	0.463	0.351	0.354	0.495
		High	0.000	—	0.000	—	0.000	—
	Intersection		-28.395	0.000	-28.795	0.000	-28.562	0.000
	Hospitalizations		0.634	0.003	0.646	0.003	0.684	0.006
	Medical Consultations		0.011	0.392	0.011	0.392	0.011	0.412
	Drugs Consumption		0.289	0.000	0.287	0.001	0.289	0.000
	Age		0.285	0.000	0.285	0.000	0.285	0.000
	Health Status	Good	2.878	0.000	2.878	0.000	2.883	0.000
		Regular	1.152	0.002	1.141	0.002	1.135	0.002
		Bad	0.000	—	0.000	—	0.000	—
	Sex	Male	-0.850	0.004	-0.839	0.004	-0.837	0.004
		Female	0.000	—	0.000	—	0.000	—
	Civil Status	Single	-0.549	0.113	-0.518	0.139	-0.584	0.087
		Married	0.129	0.723	0.122	0.738	0.137	0.701
		Others	0.000	—	0.000	—	0.000	—
	Level of Studies	Primary	1.814	0.029	1.966	0.019	2.023	0.019
		Medium	1.326	0.117	1.269	0.136	1.265	0.146
		High	0.000	—	0.000	—	0.000	—

Source: Own elaboration from S-NHS data.

6. DISCUSSION

Expenditure on health and long-term care is a first-order policy issue. Between now and 2050, in the absence of policy action to break with past trends in this area, public expenditure on health and long-term care could almost duplicate its share of GDP in most OECD countries. Even with containment measures, public expenditure on health and long-term care could rise from the current average level of 6-7 % of GDP to around 10% by 2050. Despite the relevance of magnitudes involved, policy discussion in many countries has focused less on health and long-term care spending than on pension and transfer expenditure. There can be many reasons for that, mainly related with that pension expenditure is analytically more easily manageable than is the case for health and long-term care.

In general, in spite of their relationship, expenditures on long-term care and on health care (both preventive and acute) are considered separately, and there are great differences across countries. Non-demographic factors (including effects from technology and relative prices) play an important role in upwards pressure on long-term care expenditures, and indeed are the most important driver of the increase in health-care expenditure.

Spanish population is one of the most rapidly ageing in the world, so it is of primordial importance to analyse the challenges that this country may face in the near future in terms of patterns of need for social care.

Regarding the dependence prevalence, the more recent data (S-NHS, 2003) show that a 31.16% of Spanish population of 65 years and over are dependent⁵. This percentage is higher than the obtained for previous years of 26.37% (S-NHS, 1997) and 27.91% (S-NHS, 2001), showing an increasing trend of dependence prevalence among old Spanish population. Analysing the evolution by dependence degrees, severe and moderate dependence show the highest increases. Nevertheless, we must take into account that the National Health Survey does not include those people who are in nursing homes, so presumably underestimates the prevalence of severe dependents. Regarding the relationship between dependence and sex, there are more females than males in the dependents group, and most dependents are widow. The degree of dependence rises with age, being the prevalence higher in the group of 80 and more years than in the rest. Finally, there is a high relationship between health status and dependence, and between health care resources consumption and dependence, especially in the case of hospitalization and drugs. So the profile of the Spanish aged dependent is a woman of 80 years or over, widow, with bad perceived health status and highly consumer of health care resources, in particular hospitalizations and drugs. These results are coincident with previous analysis carried out about the determinant factors of dependence, showing that age and health status are the better predictive factors of dependence in Spanish population (Puga, 2002).

⁵ After checking the representativeness of all age groups in the S-NHS, we can extrapolate the obtained results to all ageing population.

International evidence about prevalence trends in past years is sometimes contradictory. Despite the increasing interest on the dependence analysis in Spain, few longitudinal analyses have been carried out, and with controversial results. Firstly, Puga (2002) concludes that, regardless the survey used in the analysis, either the S-NHS or the Informal Care of Elderly Survey for the years 1993 and 1999, the prevalence of dependence in past years has been increasing. Secondly Casado (2006), using the S-NHS of the years 1993 and 2001 indicates a significant diminution of more than 2 percentage points in the rate of dependent elderly. Probably these differences are due to the use of several types of indicators involving multiple definitions of disability, so in order to obtain the necessary consensus further analysis are necessary.

Projections about the future trends of dependence rates are also so controversial, with a variety of scenarios considered about evolution of mortality, morbidity and disability, which determine different dependence rates in the future. Although international experience is mixed, Puga (2002) concludes that, if the more probable scenario occurs, an increase in both total number and percentage of disability elderly will take place in Spain, reaching “pandemic” dimensions. The Spanish White Book of Dependency also forecasts an increase of dependent people in the next twenty years.

Regarding predicting factors of dependence, there are more females than males in the dependents group, and most dependents are widow. Also the degree of dependence rises with age, being the prevalence higher in the group of 80 and more years than in the rest. Finally, there is a high relationship between health status and dependence, and between health care resources consumption and dependence, especially in the case of hospitalization and drugs. So the profile of the Spanish aged dependent is a woman of 80 years or over, widow, with bad perceived health status and highly consumer of health care resources, in particular hospitalizations and drugs. These results are coincident with previous analysis carried out about the determinant factors of dependence, showing that age and health status are the better predictive factors of dependence in Spanish population (Puga, 2002).

In any of the previous context, an ageing population carries increasing pressures on social and care systems and wide ranging reforms are needed to offer a comprehensive response integrating the life course dimension. For countries moving towards comprehensive long-term care services system, there are several lessons from the reform experiences analysed by the OCDE. First, universal systems with population-wide access to long-term care can prevent catastrophically high personal costs for people who become dependent. In these cases, the global need for social assistance programmes and the previous gap between public and private funding has been greatly reduced. However, such systems require costly contributions and extend benefits to those who could finance their own care (OCDE, 2005).

In accordance with Braña (2004) the key issue is whether the foreseeable situation of the Spanish population, aged and with a larger number of dependent, will mean higher costs for health and social systems. In the case of spending on social

services the explanation is purely political and it will depend on the determination of the authorities on the family. With regard to health spending, following the model of Cutler and Sheiner (1998), Braña stresses the importance of considering three factors, the medical (use intensity and medical technology), the epidemiological (health status) and the demographic (ageing). Like Braña, we also expect an increase of the Spanish healthcare spending dedicated to dependent persons because of the larger number of dependent people and of the medical factor.

For the Spanish's case, several questions have to be solved while implanting the planned National Dependence Service (NDS). Spanish Act 39/2006 for the Promotion of Personal Autonomy and Care for Dependent Persons regulates the basic conditions for the promotion of personal autonomy and care for dependent persons, and creates the System for Autonomy and Care for Dependency (SACD). Concretely, a single standard scale for the evaluation of each individual for estimate his/her needs must be established. Needs of care will be calculated in accordance with the level of dependence of each individual. There will be three grades of dependence (Grade I or Moderate, Grade II or Severe and Grade III or Extreme Dependence) which will be evaluated according to the terms provided in the Royal Decree 727/2007 passed to this purpose. Before doing that, it is impossible to estimate a global amount of resources needed for an adequate mix public-private financial support of the NDS. Publications related to the Spanish population over 65 years reflect a high variability in their disability and dependency estimates (Palacios and Abellán, 2007).

In particular, disability in later life arises as a result of coronary heart disease and stroke, sensory problems (vision and hearing), arthritis, incontinence, dementia and depression, so trends in these diseases and conditions can be used to estimate future numbers of people with social care needs. The prevalence of all these diseases is rising exponentially in our societies, and medical advances regarding these pathologies are more focused in recuperative targets (enlarge life) than in preventive and rehabilitation activities (improve quantity and quality of life without disability). All these circumstances and the results obtained previously for Spanish population do not lead us to support the "compression of morbidity theory".

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ANNEX 1

Individuals of 65 years and over (Table 8).

TABLE 10
Goodness of fit.

Year	Model	-2 log likelihood	Chi-square	Degrees of freedom	Sig.
1997	Intersection	7609.604			
	Final	6304.064	1305.539	36	.000
2001	Intersection	7610.415			
	Final	6305.991	1304.424	36	.000
2003	Intersection	7504.312			
	Final	6193.285	1311.027	36	.000

TABLE 11
Effects Chi-square test.

Year	Effect	-2 log likelihood of reduced model	Chi-square	Degrees of freedom	Sig.
1997	Intersection	6304.064 ^(a)	.000	0	.
	Hospitalisations	6319.762	15.698	3	.001
	Medical Consultation	6305.588	1.523	3	.677
	Drug Consumption	6406.097	102.032	3	.000
	Age	6693.993	389.928	3	.000
	Health Status	6565.391	261.326	6	.000
	Sex	6324.000	19.936	3	.000
	Civil Status	6316.042	11.977	6	.062
	Level of Studies	6312.433	8.368	6	.212
2001	Intersection	6305.991 ^(a)	.000	0	.
	Hospitalisations	6322.035	16.044	3	.001
	Medical Consultation	6307.721	1.730	3	.630
	Drug Consumption	6411.620	105.629	3	.000
	Age	6696.633	390.643	3	.000
	Health Status	6565.310	259.320	6	.000
	Sex	6326.175	20.184	3	.000
	Civil Status	6312.277	6.286	6	.392
	Level of Studies	6314.839	8.848	6	.182
2003	Intersection	6193.285 ^(a)	.000	0	.
	Hospitalisations	6202.470	9.185	3	.027
	Medical Consultation	6194.958	1.673	3	.643
	Drug Consumption	6287.702	94.418	3	.000
	Age	6572.787	379.502	3	.000
	Health Status	6446.202	252.917	6	.000
	Sex	6212.166	18.881	3	.000
	Civil Status	6200.080	6.795	6	.340
	Level of Studies	6206.379	13.094	6	.042

^(a) This reduced model is equivalent to the final model since the omission of the effect/variable does not increase the degrees of freedom.

ANNEX 2

Individuals of 80 years and over (Table 9)

TABLE 12
Goodness of fit.

Year	Model	-2 log likelihood	Chi-square	Degrees of freedom	Sig.
1997	Intersection	1877.719			
	Final	1593.453	284.266	36	.000
2001	Intersection	1877.719			
	Final	1595.990	281.729	36	.000
2003	Intersection	1856.243			
	Final	1575.219	281.023	36	.000

TABLE 13
Effects Chi-square test.

Year	Effect	-2 log likelihood of reduced model	Chi-square	Degrees of freedom	Sig.
1997	Intersection	1593.453 ^(a)	.000	0	.
	Hospitalisations	1603.302	9.849	3	.020
	Medical Consultation	1595.536	2.083	3	.555
	Drug Consumption	1610.906	17.454	3	.001
	Age	1663.085	69.632	3	.000
	Health Status	1657.858	64.405	6	.000
	Sex	1604.477	11.025	3	.012
	Civil Status	1606.169	12.716	6	.048
	Level of Studies	1604.044	10.591	6	.102
2001	Intersection	1595.990 ^(a)	.000	0	.
	Hospitalisations	1606.310	10.319	3	.016
	Medical Consultation	1598.127	2.137	3	.544
	Drug Consumption	1613.801	17.810	3	.000
	Age	1665.915	69.924	3	.000
	Health Status	1660.605	64.615	6	.000
	Sex	1606.785	10.794	3	.013
	Civil Status	1608.162	12.172	6	.058
	Level of Studies	1607.443	11.452	6	.075
2003	Intersection	1575.219 ^(a)	.000	0	.
	Hospitalisations	1583.690	8.471	3	.037
	Medical Consultation	1577.220	2.001	3	.572
	Drug Consumption	1593.025	17.806	3	.000
	Age	1644.837	69.618	3	.000
	Health Status	1639.409	64.189	6	.000
	Sex	1585.316	10.097	3	.018
	Civil Status	1587.212	11.992	6	.062
	Level of Studies	1588.096	12.877	6	.045

^(a) This reduced model is equivalent to the final model since the omission of the effect/variable does not increase the degrees of freedom.