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Abstract

Population aging in Spain drives a significant and increasing demand for Long-Term Care (LTC) services, fueled by the rising prevalence of cognitive impairment (CI). CI affects 18.5% of individuals aged 65 and older, a rate that sharply escalates to 45.3% in the 85+ cohort. This research utilizes pooled pre-COVID data from the Survey of Health, Aging and Retirement in Europe (SHARE), focusing on individuals 65+, to analyze how CI and physical limitations affect care utilization.

The results highlight pronounced socioeconomic vulnerability among the cognitively impaired, who possess significantly lower average wealth per capita. While both CI and physical limitations increase care usage, physical impairment emerges as a stronger determinant for overall care use (73% vs. 55% for CI only) and is a more influential factor in predicting nursing home residency (2% probability vs. 0.9% for CI). The financial burden is dominated by informal care, which accounts for 69.0% to 81.4% of the total cost of dementia. Policy analysis shows that fully replacing this informal care would exhaust the entire budget of the Spanish LTC system (SAAD), revealing structural constraints despite the 2007 Dependency Act.

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1. Introduction

Population ageing is giving rise to noticeable shifts in the needs of populations across several European countries, and this trend is expected to intensify in the coming decades. Although such rise in the needs of the population challenges the sustainability of Welfare States ageing itself is an indicator of success, largely driven by significant increases in life expectancy over the past century. In particular, the last 40 years have seen notable gains in life expectancy for those aged 65 and over. However, while this demographic shift is a testament to advances in healthcare quality and living standards, pension systems still need to adapt to changing ageing of the labor workforce, changes in mobility encompass rising demands on health and long-term care (LTC) systems, which require considerable resources to meet the needs of an older population.

Ageing effects. Age is a predisposing factor rather than a need factor for the demand of care services (de Meijer et al, 2013), and although it is far less important driver of healthcare expenditure (Zweifel et al., 1999; Seshamani and Gray, 2004; Carreras et al, 2018; Costa-Font and Vilaplana, 2020; Breyer and Lorenz, 2021; Zweifel, 2022) when it comes to LTC it is always relevant driver even when accounting for time to death (Karsson and Klohn, 2014; Hashimoto et al, 2010). Therefore, we expect that in the coming decades, in the demand for LTC services will grow significantly in Europe (European Comission, 2024). Among the driver of such LTC spending lies the growth of neurodegenerative diseases, especially those that cause cognitive impairment (Oficina de Ciencia y Tecnología, 2023).

The prevalence of dementia and neurodegenerative disorders. While accurately identifying the number of individuals affected by neurodegenerative diseases is challenging—largely due to under-diagnosis—it is estimated that between one and one and a half million people in Spain may

be living with a neurodegenerative condition, the majority of whom experience cognitive impairment. In Spain, the prevalence of dementia is a significant and growing concern, with estimates suggesting that between 734,000 and 937,000 individuals are affected by this condition. Dementia encompasses a range of neurodegenerative diseases that primarily affect cognitive function, leading to impairments in memory, reasoning, and the ability to carry out everyday activities. Alzheimer's disease is the most common form of dementia, but other types, such as vascular dementia and Lewy body dementia, also contribute to the overall impact.

The estimation of those affected is complex, mainly due to under-diagnosis and the fact that many people, especially in the early stages, may not seek medical attention or be diagnosed accurately. This underreporting can be attributed to various factors, including the stigma associated with cognitive decline, the gradual progression of symptoms, and sometimes, the assumption that memory loss is a natural part of ageing. As a result, the true number of individuals living with dementia may be higher than current estimates suggest.

Understanding the scale of the problem and the diverse needs of people with dementia will be crucial in ensuring a more responsive and sustainable care model in the future. Alzheimer's disease alone accounts for 60-80% of cases according to the so-called Comprehensive Plan for Alzheimer's. A recent Spanish study conducted on the population aged 65 and overestimated a prevalence rate of cognitive impairment of 18.5%. Prevalence rates vary depending on gender (women showed higher adjusted rates), education level, marital status and age (the prevalence was 45.3% in people aged 85 and older, Vega Alonso, 2018). In this regard, the Spanish Ministry of Health has developed two strategies in this field, namely the so-called “Strategy on

neurodegenerative disorders"[2] and the "Comprehensive plan for Alzheimer's and other dementias"[3].

The growing prevalence of dementia is placing increasing pressure on healthcare and social support systems, underscoring the urgent need for further adaptation to meet the demands of an ageing population. Among the main challenges it is possible to point out effective diagnosis, early intervention, and access to comprehensive care are essential to managing dementia effectively. However, to address these challenges, further collaboration between medical professionals, caregivers, and policymakers is required to raise awareness, enhance diagnostic tools, and ensure that resources are available for both individuals living with dementia and their families. A broad approach is required and includes the provision of psychological support, social integration, and creating dementia-friendly environments. Such efforts might involve modifying public spaces and homes to better accommodate those with cognitive impairments, as well as training caregivers and healthcare providers in specialized dementia care. By fostering a more inclusive and supportive environment, we can help individuals with dementia maintain a better quality of life and ease the burden on families and communities.

Costs of dementia. Cost of illness studies have estimated large social costs that compare to the costs of professional care (Kosaner et al, 2021; Wimo et al, 2023). A recent study (Gomez Maldonado et al, 2024) estimates that the average annual cost of care for patients with Alzheimer's

[2] Ministerio de Sanidad, Servicios Sociales e Igualdad. Estrategia en enfermedades neurodegenerativas del Sistema Nacional de Salud. https://www.sanidad.gob.es/organizacion/sns/planCalidadSNS/pdf/Est_Neurodegenerativas_APROBADA_C_INTERTERRITORIAL.pdf (2016)

[3] Ministerio de Sanidad, Consumo y Bienestar Social. *Plan integral de Alzheimer y otras demencias. 2019-2023*. https://www.sanidad.gob.es/profesionales/saludPublica/docs/Plan_Integral_Alhzeimer_Octubre_2019.pdf (2019).

disease (AD) in 2021 to range from €42,336 to €70,445, with the cost rising as cognitive impairment worsened—doubling from moderate to severe impairment. Among the total cost, healthcare expenses accounted for 5.2% to 8.6%. Formal long-term care (LTC) services, provided by professionals, represented between 7.7% and 12.8% of the overall cost. However, the cost of informal care, typically provided by family members or unpaid caregivers, was significantly higher, ranging from 69.0% to 81.4% of the total cost. These figures illustrate not only the considerable financial burden of dementia on healthcare systems but also the critical role played by informal caregivers. Indeed, the heavy reliance on unpaid care underscores the need for policy measures that support family caregivers, including financial assistance, respite services, and improved training to help them manage the demands of caregiving[4].

Mar et al. (2011) using data from patients with acquired brain damage (including stroke and traumatic brain injury), found that the cost of non-healthcare services increases significantly as functional impairment becomes more severe. For individuals with mild physical or cognitive impairment, the non-healthcare cost was €16,484, while for those with severe functional impairment, this cost rose to €44,550 (base year 2008). At mild levels of impairment, informal care (typically provided by family members or friends) plays a larger role in the total cost, reflecting the greater reliance on unpaid caregivers. However, as the degree of impairment increases, formal care (provided by professional services) becomes the dominant cost factor. This shift highlights the growing need for structured, professional support as individuals with acquired

[4] The differences between the total cost figures and the weight of the items are due to the shadow price applied to the valuation of the informal care time (home employee vs. home help service).

brain damage experience greater functional decline, further underscoring the financial strain on both families and healthcare systems.

Finally, Vilaplana-Prieto and Oliva-Moreno (2024) estimated the time spent on informal care for individuals with Alzheimer's disease (AD) living at home and its economic value, comparing data from 2021 with that from 2008. Despite the relatively short period between the two years, the study found that the number of people with AD living at home had increased by 43%, with a corresponding rise in the number of individuals receiving informal care. The authors find that while various factors may explain this significant increase, one key reason is the ageing of the Spanish population. Between 2008 and 2021, the population aged 65 and over grew by 24.2%, with the most notable increase occurring in those aged 85 and over, which rose by 74.4%.

The study also provides a monetary valuation of informal care using the Proxy Good method, which estimates the cost of replacing informal caregiving with formal home care services. The results indicate that fully replacing informal care with formal care would exhaust the entire budget of the *Sistema para la Autonomía y Atención a la Dependencia* (Spanish System for Autonomy and Care for Dependency). This highlights the enormous financial pressure that caregiving, particularly informal caregiving, places on families and the public welfare system, as well as the need for sustainable, long-term solutions to support both caregivers and the ageing population.

2. Policy environment

Although as most southern European countries, Spain is among the Western European countries with relatively low formal care provision as the family is still the main provider of long-term care

(OECD, 2005). However, after 2007, the Spanish government implemented a major reform known as the Promotion of Personal Autonomy and Care for Dependent Persons, which came into effect on January 1, 2007. This reform established the SAAD, with guiding principles that emphasized the universal and public nature of the right to receive benefits, equal access to benefits based on need, and the involvement of all public administrations, alongside the participation of private initiatives in the provision of services. SAAD represented a significant regulatory advancement in the field of social rights, offering a legal framework aimed at improving care for dependent persons.

However, the economic crisis that struck Spain in 2008 and lasted until 2014 significantly hindered the financing and full implementation of the new system. During these early years, the government faced considerable planning challenges and political disputes, which delayed the rollout of services and the promised population coverage. These delays led to long waiting lists, often referred to as the "dependency limbo," where individuals in need of care remained without adequate support for extended periods. In response to these delays, the system increasingly promoted cash benefits associated with informal care, rather than the development of professional, formal care services. As a result, despite the legislative progress made by SAAD, its practical impact was limited in the short term due to financial constraints, political gridlock, and the overwhelming reliance on informal care, which put additional strain on families and caregivers (Peña Longobardo et al, 2016).

Seventeen years after its implementation, the reform of Spain's long-term care (LTC) system has led to significant advancements in the provision of care for individuals with limitations in

autonomy. As of the end of 2024, nearly 1.5 million people are receiving some form of service or cash benefit through the SAAD. The catalogue of services available under the system includes those designed to prevent dependency and promote personal autonomy, such as telecare, home care, daycare and night centre services, and nursing homes. Each regional authority in Spain is responsible for establishing quality standards and accrediting professional services, ensuring that care is tailored to local needs. SAAD covers funding for a range of care options, including day and night care centres, residential care, and home care assistance.

The financing of SAAD comes from a combination of the Central Government, Regional Governments, and user co-payments. In the initial years following the approval of the SAAD, the financial burden largely fell on regional governments. However, in recent years, the Central Government has increased its financial contribution through substantial budget increases, which have helped to partially address the underfunding that plagued the system in its early years.

While the system has made notable strides in expanding services and improving coverage, challenges remain—particularly in terms of ensuring equitable access to services across all regions and maintaining the sustainability of the funding model. Nonetheless, SAAD represents a significant milestone in Spain's social welfare system, aiming to better support the growing number of individuals with dependency needs as the population continues to age (Jiménez-Martín and Viola, 2022). Therefore, the contribution of public funds may now slightly exceed 1% of GDP.

There is no public information on users' contributions to the SAAD, although a recent study estimated the percentage of co-payments for all benefits at 22% (Codorniu, 2024). Recent changes

in the government LTC strategies are trying to promote home care for dependent persons and reinforcing home care, telecare and day centres[5]. Likewise, the criteria for quality and minimum professional staffing of the centres and service providers, both public and private, have also been revised and improved[6]. In both plans, most emphasis is being placed in ensuring that people in need of care reside age in place for as long as possible alongside trying to improve the quality of the services provided, whether at home or in nursing homes.

Finally, it should be stressed that the SAAD is structured as a system of universal access mediated by the degree of need of the dependent person. To measure the degree of dependency and to establish an Individual Care Plan, a professional should apply the Dependency Assessment Scale, which establishes three degrees of dependency: Moderate (Degree I), Severe (Degree II), and Highly Dependency (Degree III). These degrees reflect the intensity of support needed for activities of daily living. Cognitive impairment is considered a relevant factor in the assessment of dependency, especially in activities involving decision-making, and the Scale is adapted for the assessment of people with health conditions that may affect their mental functions.

3. Data and Definitions

Sample: Our primary data source is the Survey of Health Aging and Retirement in Europe (SHARE). We use a pool of waves from 2004 to 2017, especially waves 1 (2004/05), 2 (2006/07),

[5] Ministerio de Derechos Sociales, Consumo y Agenda 2030. Estrategia estatal para un nuevo modelo de cuidados en la comunidad Un proceso de desinstitucionalización (2024-2030). Junio, 2024.
[6] Ministerio de Derechos Sociales y Agenda 2030. Acuerdo sobre Criterios comunes de acreditación y calidad de los centros y servicios del Sistema para la Autonomía y Atención a la Dependencia (SAAD) (22/06/2022). https://www.mdsocialesa2030.gob.es/derechos-sociales/servicios-sociales/acuerdos-criterios-comunes-saad.htm

4 (2010/11), 5 (2012/13), 6 (2014/15) and 7 (2016/17), all pre-COVID period. The SHARE sample consists of respondents aged 50 and older, but we focus on the individuals 65 +.

Cognitive Impairment: The threshold of a score of 6 and below as a measure of cognitive impairment builds on evidence from Crimmins et al. (2011) and Langa et al. (2017). We create a cognitive impairment indicator composed of four subtests/domains, namely:

- **10-Word Immediate Recall:** Presenting a list of 10 words and asking for immediate recall to test short-term memory/registration.
- **10-Word Delayed Recall:** Asking for recall of the same 10 words after a 5-minute (or similar) delay, assessing memory consolidation.
- **Serial 7s:** A task for attention and working memory, where the person subtracts 7 sequentially (e.g., 100-7, 93-7).
- **Date naming:** recall of the date to assess orientation.

The maximum total score for all correct answers is 29 points but, in our sample, the cognitive score ranges from 0 to 24. A score of 6 or lower on this indicator is used as a measure of cognitive impairment.

We also classify as cognitively impaired those individuals for whom a proxy respondent reported that the person was unable to complete the survey due to cognitive limitations. In sum, proxy status is identified using the corresponding survey question that asks whether the respondent is answering on behalf of someone else.

4. Results

4.1 The analysis of Cognitive Score and limitations

Cognitive Scores. The distribution of cognitive scores is shown in **Figure 1a**, where a score of 6 or below is used as a threshold for cognitive impairment. The dashed lines in the figure represent the quintiles of the distribution. As illustrated, a small percentage of respondents fall into the highest quintiles of the distribution. Furthermore, the second quintile starts at score 4 and goes up to score 6, representing 21.1% of the population aged 65 and over.

Figure 1b displays the distribution of cognitive scores for two age groups: those aged 65-84 and those 85 years old or older. A clear trend emerges, showing that older age is associated with lower cognitive scores. For the group aged 85 and older, 96,5% have a cognitive score of 12 or less, while for those aged 65-84, 76.5% of respondents achieve a score of 12 or less. This suggests a significant decline in cognitive performance as age increases, with the older group (85+) exhibiting notably lower scores on average.

Physical Limitations: The measure of physical limitations in our study is based on difficulties with activities of daily living (ADLs), which include tasks such as dressing, bathing, walking across the room, getting in and out of bed, and toileting. A physical limitation is defined as difficulty in performing two or more ADLs.

In **Figure 2a**, we present the distribution of ADL limitations in our SHARE sample. Figure 2b further breaks down ADL limitations for two distinct age groups: 65-84 and 85+. As shown, the majority of individuals report no physical limitations. However, this proportion decreases with age

(**Figure 2b**). For the younger group (65-84), approximately 85% have no physical limitations, while in the older group (85+), nearly 56% report no limitations.

For the 65-84 age group, around 8.3% of respondents experience physical limitations, defined as difficulty in two or more ADLs. This proportion rises dramatically in the 85+ age group, where 32.2% of respondents report difficulties with two or more ADLs. This indicates a substantial increase in the prevalence of physical limitations as individuals age, highlighting the increased challenges faced by the older population in performing essential daily tasks.

Care Utilization and Outcomes: In **Figure 3**, we display the percentage of the 65+ population using any type of long-term care, broken down by cognition quintile. We define three categories of care: any informal care at home, any formal care at home, and being in a nursing home. On average, 19% of the sample utilizes informal care at home, 15.5% use formal care at home, and a smaller fraction, 2.3%, reside in a nursing home.

Concerning nursing homes, we recognize that SHARE data does not allow us to have a complete picture of dependent persons in nursing homes. The available information allows us to know: (i) temporary stays; (ii) permanent stays, but only for persons who were interviewed in their homes in a previous SHARE wave but who have since transitioned to a nursing home in a subsequent wave. Having information about people who have transitioned to a nursing home allows us to identify, at least, their unmet nursing care needs. The percentage of people who have been unable to access a place in a nursing home due to cost (lack of availability) is 33.3% (50%) for people with cognitive impairment compared to 7.6% (5.2%) for people with physical impairment.

These figures provide insight into the distribution of long-term care usage across different levels of cognitive function. The data suggests that individuals with lower cognitive scores are more likely to use both informal and formal care, with those in the highest cognitive quintiles using these services less frequently.

4.2 The interaction between cognitive score and limitations

Table 1 illustrates the interaction between physical limitations and cognitive impairment. Around 80.5% of the sample reports no physical limitations, and 53.4% have neither cognitive nor physical impairments. However, nearly 12% of respondents have physical limitations (defined as difficulty with 2 or more ADLs), while approximately 9% experience both cognitive and physical impairments.

Table 2a compares these three groups based on sociodemographic characteristics. We distinguish between the no impairment group (0-1 ADLs and cognitive score of 7 or above); physical impairment only group (more than 2 ADLs and cognitive score of 7 or above); and cognitive impairment group (cognitive score of 6 or below). Key findings include:

- *Age differences*: The non-impaired group is, on average, 4 years younger (73 years old) than the physically impaired group (77 years old) and 6 years younger than the cognitively impaired group (79 years old).
- *Marital status and education*: The non-impaired group is more likely to be married and has significantly higher education levels. For example, they are 5% more likely to have

attended college than the physical impairment group and 8% more likely than the cognitive impairment group.

- *Income and wealth*: There are notable differences in income and wealth per capita across the groups. The average income per capita for the non-impaired group is €14,553, compared to €10,564 for the cognitively impaired group. The gap in wealth per capita is even larger. The cognitive impairment group has an average wealth per capita of €144,099, which is €60,807 less than the non-cognitively impaired group.

Table 2b examines care needs and care usage across these three groups, with score 6 being the threshold for cognitive impairment in Spain. We categorize the groups as no impairment (0-1 ADLs, score 7 or above); physical impairment only (more than 2 ADLs, score 7 or above); cognitive impairment (score below 7). The key findings include:

- Cognition scores: The average cognition score is significantly lower for the cognitively impaired group (3.43) compared to the physically impaired group (9.56) and the non-impaired group (11.32).
- ADL and IADL limitations: The physically impaired group has a higher number of limitations in both ADLs and IADLs than the cognitively impaired group, with the gap being particularly wide in ADL limitations.
- Care usage: Care usage increases with the level of impairment. 13% of the non-impaired group receives any form of care, 38% of the cognitively impaired group use care, and 71% of the physically impaired group receive some form of care.
- Nursing home use: Use of nursing homes is relatively low across all groups, with 3.5% of the physically impaired group and 2% of the cognitively impaired group residing in nursing homes. As expected, the group with no impairments has the lowest usage of nursing homes.

- Care hours: The physically impaired group uses more informal care hours (84 hours) compared to the cognitively impaired group (65 hours). Similarly, the physically impaired group also uses more formal home care hours (32 hours) than the cognitively impaired group (27 hours).

These findings suggest that while cognitive and physical impairments both lead to increased care needs, physical impairments are associated with higher levels of care usage, especially in terms of informal care and formal home care. The cognitively impaired group, while also in need of care, shows a lower level of formal care use and nursing home residency, possibly reflecting differences in the type of care required for cognitive versus physical limitations.

4.3 Examining Long-Term Care Use and Determinants

We begin by exploring the use of any care, followed by more specific types of care: formal home care, informal home care, and residence in a nursing home. To assess the factors associated with more intensive care, we also examine the number of hours of formal care received in the past month (conditional on receiving any formal care) and the number of hours of informal care received in the past month (conditional on receiving any informal care).

The regressions control for several variables, including whether the respondent has physical or cognitive impairment, age and age squared, marital status, gender, the interaction between marital status and gender, whether the respondent has children and the number of children, schooling level, and income and wealth.

Table 3 examines the probability of receiving any care using a linear probability model. Column 1 (no controls) shows that the likelihood of receiving care is higher among those with physical impairments. However, after controlling for age and age squared in Column 2, the probability of receiving care decreases for both groups, but the relative difference between those with physical impairments and those without remains unchanged. In Column 3, after adding additional covariates, the results show that being married decreases the probability of receiving care by 10%, while married women are significantly more likely to receive care, with a 5.5% higher probability compared to their male counterparts. The level of schooling also plays a significant role in care use. Individuals with primary education are 3.3% less likely to receive care than those with less than primary education. People with a college education or higher have a 0.3 % lower probability of receiving care, but this difference is not statistically significant. We now examine in more detail the use of formal home care, informal home care, and nursing home care, analyzing both the extensive margin (probability of using care) and intensive margin (number of hours of care received).

In **Tables 4a and 4b**, we focus on the use of formal home care. The probability of receiving formal care increases with both physical and cognitive impairments across all specifications. However, the probability decreases in absolute values as more covariates are added to the regression model. Married women are less likely to receive formal care, highlighting the importance of gender and marital status in care receipt. The level of schooling positively affects the likelihood of receiving formal care. Relative to individuals with less than primary education, those with high school and college education are significantly more likely to receive any paid care, with increases of 4.6%

and 5.1%, respectively. Conditional on receiving formal care, both cognitive impairment and physical impairment are strongly associated with receiving more care, with the effect being particularly strong for those with physical impairments. Finally, age shows an interesting pattern: while the probability of receiving formal care increases with age squared, the probability itself decreases with age.

Table 5 examines the use of informal home care. We find that the probability of receiving informal care is similarly higher for those with physical or cognitive impairments, but once again, the probability decreases as more covariates are added. Married women show a greater probability of receiving informal care, and the level of schooling negatively affects care receipt, suggesting that individuals with lower educational attainment are more reliant on informal care. The intensity of informal care (measured in hours) is also significantly higher for both physically impaired and cognitively impaired individuals compared to those with no impairments. The intensity of care is particularly high for individuals with physical impairments, reinforcing the importance of informal care for this group.

Finally, **Table 6** examines the probability of nursing home use. This analysis uses a smaller sample of SHARE data, so caution is needed when interpreting the results. Those with physical limitations are about 2% more likely to use nursing home care compared to those with cognitive impairment, who have a probability of 0.6%. This suggests that physical limitations might be a stronger determinant of nursing home use, although the relatively low probabilities for both groups indicate that nursing home care is not common in this sample.

4.4 Cost Estimation

In **Table 7**, we analyze the cost of care on both individual and aggregate level. The way to proceed for calculating is the same as in Costa-Font et al. (2025). The total cost per user amounts to €2,860 for 0-1 ADLs & Score 7+€, €11,113 for 2+ ADLs & Score 7+, and €83,507 for score 0 to 6 (all ADLs). Differentiating by type of service: the cost per user of formal care amounts to €906, €2,213, and €23,756 for the three groups mentioned, the cost per user of informal care amounts to €3,174, €7,747, and €83,153, and the cost per user in nursing homes represents €5,087, €12,418 and €133,287. Finally, the total cost of the system is 21,204 million euros, being informal care the most expensive program (11,643 million euros or 55% of all cost).

5. Conclusions

The increasing life expectancy in Spain has catalyzed a substantial rise in demand for Long-Term Care (LTC) services, driven primarily by neurodegenerative diseases. Cognitive impairment (CI) is highly prevalent, affecting **18.5%** of the population aged 65 and older, a rate that sharply increases to **45.3%** for individuals aged 85 and above. This demographic shift generates an immense economic burden. Cost of illness studies estimate that the average annual cost of care for patients with Alzheimer's Disease (AD) in 2021 ranged from €42,336 to €70,445. Critically, informal care provided by family members constitutes the vast majority of this financial liability, ranging from **69.0% to 81.4%** of the total care costs.

The main objective of this work was to analyse this escalating demand for Long-Term Care services in Spain, driven by population aging and the resultant rise in cognitive impairment caused

by neurodegenerative diseases. Our study specifically sought to characterize the needs of the older population (65+) and understand how the interaction between cognitive impairment and physical limitations affects care utilization and costs within the context of the Spanish SAAD. The empirical foundation of this analysis rests upon pooled, pre-COVID data spanning several years (2004–2017) from the **Survey of Health, Aging and Retirement in Europe (SHARE)**.

The results establish several crucial findings regarding dependency and care provision. Firstly, both cognitive and physical limitations show a steep positive correlation with age, with prevalence rates rising dramatically, particularly in the 85+ cohort. Furthermore, a significant socioeconomic gradient exists: the cognitively impaired population is characterized by demonstrably **lower average wealth** and lower educational attainment compared to non-impaired individuals. Regarding care dynamics, while both CI and physical impairment necessitate increased support, **physical limitations emerged as a stronger determinant** for total care utilization and intensity. Individuals with physical impairments receive a higher number of hours of both formal and informal home care than those with cognitive impairment. Additionally, physical limitations appear to be a stronger predictor for **nursing home residency** than cognitive impairment. Finally, cost estimations consistently highlight the severe economic burden of dependency, where **informal care provided by families accounts for most of the total cost per user**, underscoring the critical need for policy adaptation to support unpaid caregivers. Furthermore, analyses using the Proxy Good method suggest that fully replacing this informal care with formal home care services would require resources equivalent to the **entire budget** of the SAAD.

Key challenges for the future include improving early diagnosis, expanding access to formal care, and supporting informal caregivers through financial aid and training. As Spain's elderly

population continues to grow, a more inclusive, sustainable LTC model is essential to address the rising prevalence of cognitive impairment and its associated social and economic impact.

In terms of further LTC research it is also important to improve the quality of data available for the Spanish case. SHARE Spain, the currently available data source for older dependent people is not sufficiently specialized or large to facilitate an accurate understanding of the forces involved in physical and cognitive impairment analysis.

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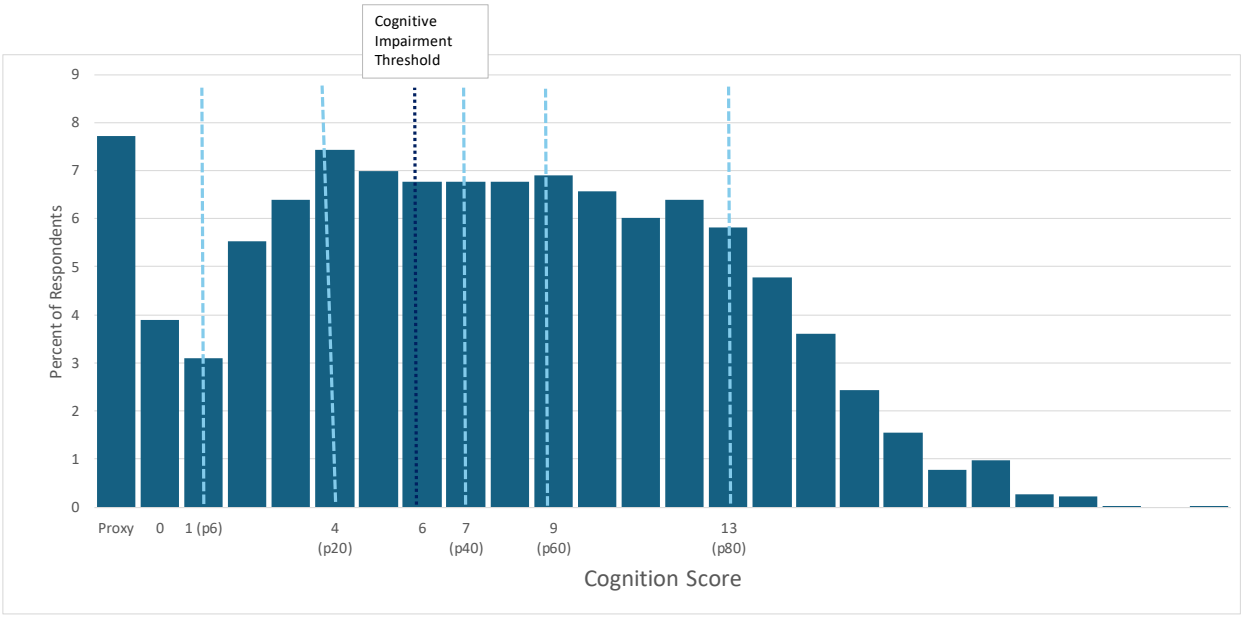
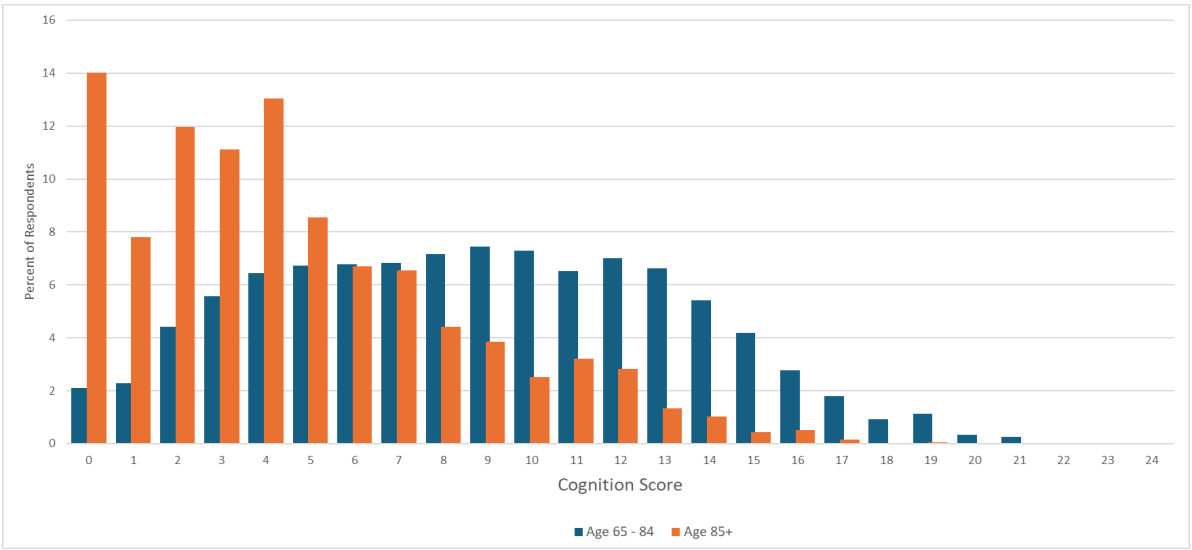
Tables and Figures

Figure 1a. Histogram of cognition scores (including proxies).



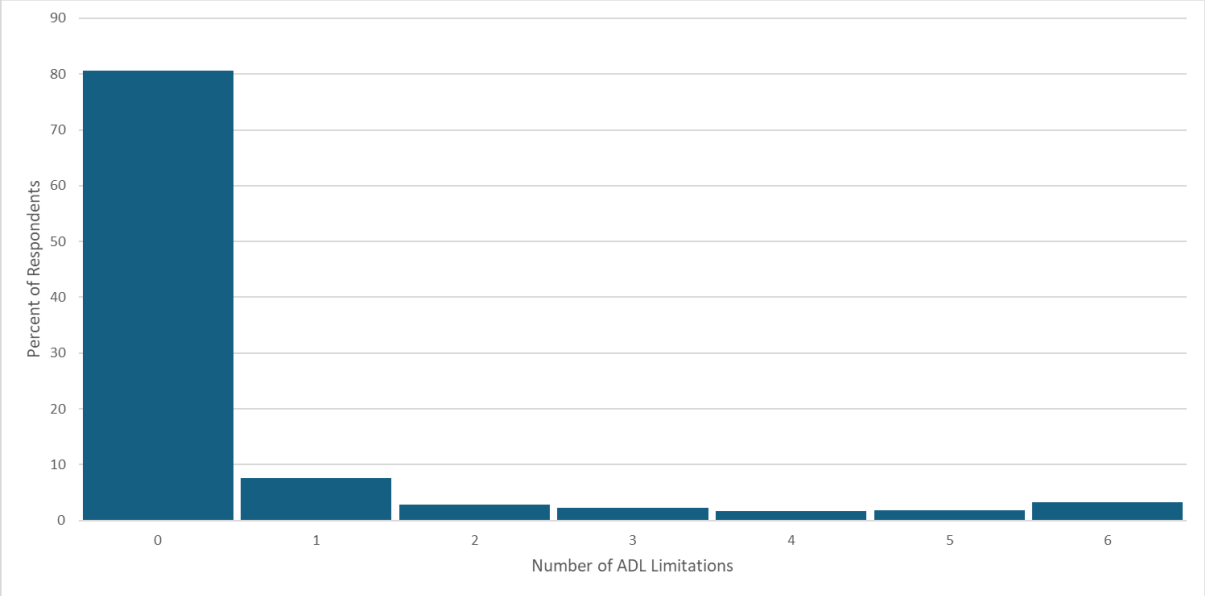
Source: SHARE (waves 1, 2, 4, 5, 6 y 7).

Figure 1b. Histogram of cognition scores by age categories



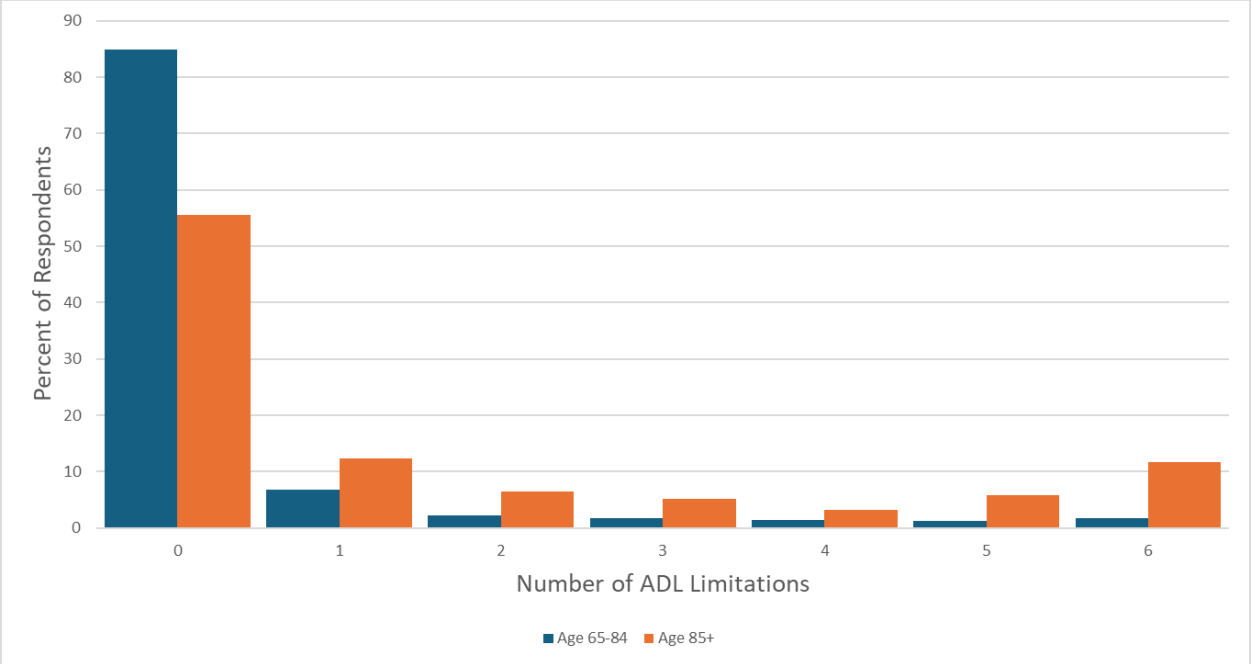
Source: SHARE (waves 1, 2, 4, 5, 6 y 7).

Figure 2a. Histogram of ADL limitations



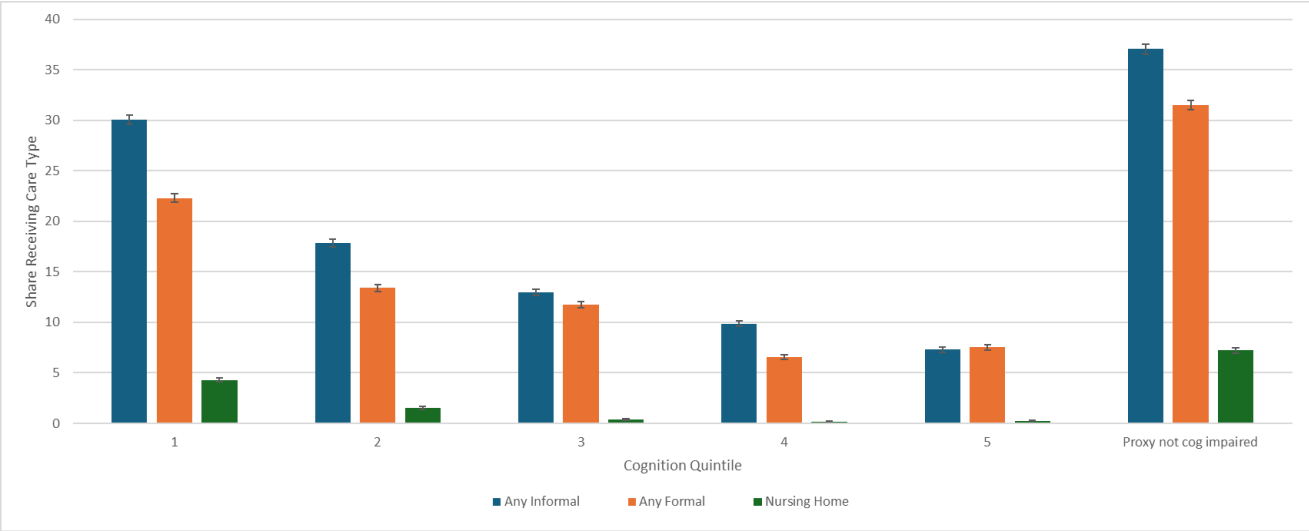
Source: SHARE (waves 1, 2, 4, 5, 6 y 7).

Figure 2b. Histogram of ADL limitations by age categories



Source: SHARE (waves 1, 2, 4, 5, 6 y 7).

Figure 3. Share Receiving Care Type by Cognition Quintile



Source: SHARE (waves 1, 2, 4, 5, 6 y 7).

Table 1: Joint distribution cognition score and ADL limitations

Limitations	Cognition score 0 - 6	Cognition Score 7+	Total
0 ADLs	27.06%	53.48%	80.54%
1 ADL	4.03%	3.53%	7.56%
2+ ADL	8.99%	2.91%	11.90%
Total	40.08%	59.92%	100.00%

Source: SHARE (waves 1, 2, 4, 5, 6 y 7). Proxy respondents identified as cognitively impairment are grouped with respondents who scored 0–6 on the cognitive assessment. Weighted percent.

Table 2a: Joint distribution cognition score and ADL limitations by sociodemographic characteristics

Means	0 - 1 ADLs & Score 7+	2+ ADLs & Score 7+	Score 0 - 6 (All ADLs)	Total
Age	73.323	77.739**	79.450**	75.877
	6.377	*7.819*	*7.456*	*7.488*
Female (0 or 1)	0.478	0.590**	0.628**	0.541
	0.500	*0.493*	*0.483*	*0.498*
Married (0 or 1)	0.796	0.652**	0.636**	0.728
	0.403	*0.477*	*0.481*	*0.445*
Any children (0 or 1)	0.647	0.628	0.674*	0.657
	0.478	*0.484*	*0.469*	*0.475*
Number of children	1.708	1.972*	1.991**	1.828
	1.661	*2.092*	*1.951*	*1.800*
Primary education (0 or 1)	0.630	0.541**	0.510**	0.580
	0.483	*0.499*	*0.500*	*0.494*
High school (0 or 1)	0.081	0.052*	0.017**	0.055
	0.273	*0.223*	*0.132*	*0.229*
College + (0 or 1)	0.100	0.052**	0.017**	0.065
	0.300	*0.223*	*0.128*	*0.247*
Work for pay (0 or 1)	0.034	0.028	0.008**	0.024
	0.182	*0.165*	*0.092*	*0.153*
Income per capita (mean)	14,553.69	12219.44*	10564.47**	12,904.11
	14,225.34	*8,504.54*	*10,475.13*	*12,875.45*
Income per capita (median)	11,821.63	10,384.59	9,333.59	10,630.26
Wealth per capita (mean)	204,906.80	145921.7*	144099.9**	179,141.50
	368,029.90	*203,644.20*	*317,886.60*	*346,622.50*
Wealth per capita (median)	116,294.30	91,972.63	97,711.21	116,486.30
N	5,936	288	4,094	10,318

Source: SHARE (waves 1, 2, 4, 5, 6 y 7). Notes: Standard errors are in parentheses. Standard errors are clustered at the respondent level. Stars correspond to the null hypothesis that the mean is different from the mean of 0 - 1 ADLs & Score 7+. *: Significant at the 95% confidence level **: Significant at the 99% confidence level.

Table 2b: Care needs and care usage across cognition score and ADL limitations

Means	0 - 1 ADLs & Score 7+	2+ ADLs & Score 7+	Score 0 - 6 (All ADLs)	Total
Limited score (out of 29)	11.318	9.565 **	3.439**	8.143
	3.108	*2.622*	*1.925*	*4.675*
Number of ADLs	0.048	3.635**	0.970**	0.514
	0.214	*1.466*	*1.801*	*1.361*
Number of IADLs	0.194	3.850**	1.821**	0.942
	0.670	*2.664*	*2.543*	*1.971*
Any care (0 or 1)	0.133	0.708**	0.379**	0.247
	0.340	*0.455*	*0.485*	*0.431*
Any Unpaid care (0 or 1)	0.080	0.538**	0.265**	0.167
	0.272	*0.499*	*0.442*	*0.373*
Any Paid care (0 or 1)	0.067	0.361**	0.193**	0.126
	0.251	*0.481*	*0.395*	*0.331*
Any Nursing home (0 or 1)	0.002	0.035**	0.020**	0.010
	0.043	*0.183*	*0.140*	*0.099*
Unpaid care hours per month (conditional on unpaid care)	42.158	83.950**	65.071**	60.412
	5.335	*17.314*	*25.902*	*24.801*
Paid care hours per month (conditional on paid care)	17.027	32.401**	27.194**	24.472
	3.279	*6.993*	*10.063*	*9.785*
NH LOS days per year (conditional on nursing home stay)	0.050	2.941**	0.356*	0.252
	1.766	*30.960*	*6.270*	*6.654*
N	5,936	288	4,094	10,318

Source: SHARE (waves 1, 2, 4, 5, 6 y 7). Notes: Standard errors are in parentheses. Standard errors are clustered at the respondent level. Stars correspond to the null hypothesis that the mean is different from the mean of 0 - 1 ADLs & Score 7+. *: Significant at the 95% confidence level **: Significant at the 99% confidence level.

Table 3: Probability of receiving any care

	(1) Any personal care	(2) Any personal care	(3) Any personal care
	R1	R2	R3
	b/se	b/se	b/se
2+ ADLs and Score 7+	0.575***	0.508***	0.494***
	(0.025)	(0.024)	(0.026)
Score 0 - 6	0.246***	0.154***	0.136***
	(0.008)	(0.009)	(0.01)
Age - 65		-0.065***	-0.063***
		(0.01)	(0.01)
(Age - 65) Squared		0.001***	0.000***
		(0.000)	(0.000)
Female			0.002
			(0.018)
Married			-0.098***
			(0.017)
Female * Married			0.055***
			(0.02)
Number of children			0.006*
			(0.003)
Any children			-0.005
			(0.013)
Income (Inverse Hyperbolic Sine)			0.000*
			(0.000)
Wealth (Inverse Hyperbolic Sine)			-0.000
			(0.000)
Primary education			-0.033***
			(0.009)
High school			0.000
			(0.02)
College or more			-0.003
			(0.019)
Constant	0.133***	2.101***	2.121***
	(0.005)	(0.371)	(0.392)
N	10318	10318	9234
F	631.458	532.774	139.925
p	0	0	0
r2	0.109	0.171	0.175

Source: SHARE (waves 1, 2, 4, 5, 6 y 7). Notes: Standard errors in parentheses. Standard errors are clustered at the respondent level="* p<0.05, ** p<0.01, *** p<0.001". Proxies who are identified as cognitively impaired are placed into groups "Score 0 - 6 Only" and "2+ ADLs and Score 0 - 6", depending on the number of ADL limitations.

Table 4a and 4b: Use of formal care on the extensive and intensive margin

	Extensive Margin: Any p*aid care*			Intensive Margin: *Hours paid care conditional on receiving any paid care*		
	R1	R2	R3	R4	R5	R6
	b/se	b/se	b/se	b/se	b/se	b/se
2+ ADLs and Score 7+	0.294***	0.242***	0.243***	15.374***	14.434***	14.793***
	(0.02)	(0.019)	(0.02)	(0.915)	(0.81)	(0.884)
Score 0 - 6	0.126***	0.055***	0.055***	10.167***	7.475***	7.629***
	(0.007)	(0.007)	(0.008)	(0.51)	(0.477)	(0.542)
Age - 65		-0.061***	-0.056***		-1.499***	-1.466***
		(0.008)	(0.008)		(0.486)	(0.521)
(Age - 65) Squared		0.000***	0.000***		0.013***	0.012***
		(0.000)	(0.000)		(0.003)	(0.003)
Female			0.027*			1.553*
			(0.014)			(0.835)
Married			-0.050***			2.348***
			(0.013)			(0.872)
Female * Married			0.026			-2.087**
			(0.016)			(1.025)
Number of children			-0.002			0.262
			(0.003)			(0.16)
Any children			-0.006			-1.310**
			(0.01)			(0.656)
Income (Inverse Hyperbolic Sine)			0.000**			-0.000
			(0.0000)			(0.0000)
Wealth (Inverse Hyperbolic Sine)			0.000**			-0.000
			(0.0000)			(0.0000)
Primary education			-0.003			0.390
			(0.007)			(0.476)
High school			0.046***			0.638
			(0.016)			(1.105)
College or more			0.051***			0.793
			(0.015)			(0.969)
Constant	0.067***	1.992***	1.837***	17.027***	56.483***	53.398**
	(0.004)	(0.295)	(0.312)	(0.416)	(19.594)	(20.991)
N	10,318	10,318	9,234	1,295	1,295	1,147
F	262	325	92	250	253	64
p	0	0	0	0	0	0
r2	0.048	0.112	0.123	0.279	0.439	0.444

Source: SHARE (waves 1, 2, 4, 5, 6 y 7) and EDAD (2020). Notes: Standard errors in parentheses. Standard errors are clustered at the respondent level="* p<0.05, ** p<0.01, *** p<0.001". Proxies who are identified as cognitively impaired are placed into groups "Score 0 - 6 Only" and "2+ ADLs and Score 0 - 6", depending on the number of ADL limitations.

Table 5a and 5b: Use of informal care on the extensive and intensive margin

	Extensive Margin: Any unpaid care			Intensive Margin: *Hours unpaid care conditional on receiving any unpaid care*		
	R1	R2	R3	R4	R5	R6
	b/se	b/se	b/se	b/se	b/se	b/se
2+ ADLs and Score 7+	0.46***	0.42***	0.41***	39.90***	39.98***	40.44***
	(0.02)	(0.02)	(0.02)	(3.77)	(3.7)	(3.99)
Score 0 - 6	0.18***	0.14***	0.12***	27.56***	26.75***	26.83***
	(0.01)	(0.01)	(0.01)	(2.61)	(2.7)	(3.02)
Age - 65		-0.03***	-0.03***		-10.90***	-10.98***
		(0.01)	(0.01)		(2.57)	(2.77)
(Age - 65) Squared		0.00***	0.00***		0.07***	0.07***
		(0.000)	(0.000)		(0.02)	(0.02)
Female			-0.000			7.16*
			(0.02)			(4.18)
Married			-0.04***			13.45***
			(0.02)			(4.39)
Female * Married			0.03*			-10.05**
			(0.02)			(5.04)
Number of children			0.01***			1.69**
			(0.000)			(0.71)
Any children			0			-9.42***
			(0.01)			(3.08)
Income (Inverse Hyperbolic Sine)			0			0
			(0.000)			(0.000)
Wealth (Inverse Hyperbolic Sine)			-0.00**			-0.000
			(0.000)			(0.000)
Primary school			-0.04***			3.33
			(0.01)			(2.22)
Some college			-0.03*			6.44
			(0.02)			(5.66)
College or more			-0.05***			1.81
			(0.02)			(5.61)
Constant	0.08***	0.90***	1.18***	42.92***	464.66***	453.88***
	(0.000)	(0.33)	(0.35)	(2.32)	(104.07)	(111.86)
N	10,318	10,318	9,234	516	516	448
F	488	311	82	72	45	14
p	0	0	0	0	0	0
r2	0.09	0.11	0.11	0.22	0.26	0.31

Source: SHARE (waves 1, 2, 4, 5, 6 y 7) and EDAD (2020). Notes: Standard errors in parentheses. Standard errors are clustered at the respondent level="* p<0.05, ** p<0.01, *** p<0.001". Proxies who are identified as cognitively impaired are placed into groups "Score 0 - 6 Only" and "2+ ADLs and Score 0 - 6", depending on the number of ADL limitations.

Table 6: Use of nursing home on the extensive margin

	(1) Reside in Nursing Home >= 100 days	(2) Reside in Nursing Home >= 100 days	(3) Reside in Nursing Home >= 100 days
	R1	R2	R3
	b/se	b/se	b/se
2+ ADLs and Score 7+	0.019***	0.017***	0.012***
	(0.004)	(0.004)	(0.004)
Score 0 - 6	0.006***	0.003**	0.002
	(0.001)	(0.001)	(0.002)
Age - 65		-0.002	-0.002
		(0.002)	(0.002)
(Age - 65) Squared		0	0
		(0.000)	(0.000)
Female			0.005
			(0.003)
Married			0.001
			(0.003)
Female * Married			-0.004
			(0.003)
Number of children			0.001*
			(0.001)
Any children			-0.005**
			(0.002)
Income (Inverse Hyperbolic Sine)			-0.000
			(0.000)
Wealth (Inverse Hyperbolic Sine)			0
			(0.000)
Less than high school			0
			(0.002)
Some college			-0.002
			(0.003)
College or more			-0.003
			(0.003)
Constant	0.001	0.057	0.049
	(0.001)	(0.063)	(0.067)
N	10,318	10,318	9,234
F	20	18	5
p	0	0	0
r2	0.004	0.007	0.007

Source: SHARE (waves 1, 2, 4, 5, 6 y 7). Notes: Standard errors in parentheses. Standard errors are clustered at the respondent level="* p<0.05, ** p<0.01, *** p<0.001". Proxies who are identified as cognitively impaired are placed into groups "Score 0 - 6 Only" and "2+ ADLs and Score 0 - 6", depending on the number of ADL limitations.

Table 7: Total cost of long-term care by cognitive score and ADL limitations

		0 - 1 ADLs & Score 7+	2+ ADLs & Score 7+	Score 0 - 6 (All ADLs)	Total
	N	730	58	296	1084
	Population (millions)	2.94	0.16	0.23	3.33
Formal Care	National total (Million €))	1,007.56	310.14	1,263.12	**2,240.00**
	Per user (€)	906.86	2,213.43	23,756.42	1,717.35
	Per capita (€)	113.87	33.83	131.83	247.04
	% of GDP	0.08%	0.02%	0.10%	0.18%
Informal Care	National total (Million €))	5,366.93	1,594.58	6,213.01	**11,643.00**
	Per user (€)	3,174.24	7,747.61	83,153.80	5,906.22
	Per capita (€)	21.38	6.58	26.80	47.53
	% of GDP	0.43%	0.13%	0.50%	0.93%
Nursing Home	National total (Million €))	1,720.36	2,096.05	3,379.79	**7,321.00**
	Per user (€)	5,087.99	12,418.65	133,287.38	13,754.51
	Per capita (€)	36.50	44.47	71.71	155.34
	% of GDP	0.14%	0.17%	0.27%	0.58%
Total Cost	National total (Million €))	**8,094.85**	**4,000.77**	**10,855.93**	**21,204.00**
	Per user (€)	2,860.37	11,113.26	83,507.13	6,386.75
	Per capita (€)	171.76	84.89	230.34	449.90
	% of GDP	0.65%	0.32%	0.87%	1.69%

Source: SHARE wave 7. Notes: in euros 2019. See Costa-Font et al. (2025) for clarifications of the calculations.