UNIVERSIDAD DE CANTABRIA

PROGRAMA DE DOCTORADO DE ECONOMÍA: INSTRUMENTOS DEL ANÁLISIS ECONÓMICO

TESIS DOCTORAL

Ensayos en Economía de la Salud: Utilización Sanitaria

Realizada por: JAVIER ISAAC LERA TORRES

Dirigida por: DAVID CANTARERO PRIETO
MARTA PASCUAL SÁEZ

Escuela de Doctorado de la Universidad de Cantabria

Santander, Noviembre 2020

UNIVERSITY OF CANTABRIA

PHD THESIS

Essays on Health Economics: Healthcare Utilization

Author: JAVIER ISAAC LERA TORRES

Supervisors: DAVID CANTARERO PRIETO
MARTA PASCUAL SÁEZ

Santander, November 2020

AGRADECIMIENTOS

Quisiera que estas líneas sirvieran para expresar mi más sincero agradecimiento y gratitud a todas aquellas personas que a lo largo del proceso de realización de esta tesis doctoral me han apoyado.

En primer lugar, me gustaría mostrar mi más sincero agradecimiento a mis directores Prof. Dr. D. David Cantarero Prieto y Prof. Dra. Dª. Marta Pascual Sáez. Sé que sin su apoyo, sus consejos y su paciencia no habría sido posible llevar esta tesis a buen puerto. Muchas gracias por haber confiado en mí en el Máster en Economía y por haberme descubierto el universo de la Economía de la Salud. Como bien sabéis, al principio tenía demasiadas ideas que quería explorar, vosotros me ayudasteis a centrarme en este precioso camino. Gracias por estar ahí y guiarme. Quisiera añadir que cualquier error dentro de esta tesis doctoral es en exclusiva responsabilidad mía.

En segundo lugar, quiero expresar mi gratitud a todos mis amigos/as. Gracias a "Los de Siempre": Marcos, Héctor, Mario, Jose, Carla, Patri, Alba y Rosa. Cada semana habéis estado ahí para sacarme una sonrisa y hacer que me evadiera en los momentos más duros de este camino. La verdad es que el simple nombre de "Los de Siempre" lo dice todo. Gracias por estar ahí. Gracias a ti también Adrián por todo tu apoyo, por estar en esos momentos de bajón, por todas nuestras charlas y debates. Has sido una fuente de apoyo y sobre todo de inspiración. No puedo tampoco olvidarme de vosotros Mario, Carlos, Ana, Javi Tapia y Javi Pozo. Cada uno en una esquina del mapa, pero ni siquiera esa distancia puede romper lo que construimos ese último año de carrera. Seguís siendo una importante fuente de apoyo, risas, reflexión, y de cariño. Muchas gracias, de verdad.

Por último, me gustaría dedicar unas palabras a mis padres, Javier y Yolanda. Gracias por apoyarme, gracias por aguantar esos malos momentos, gracias por estar ahí, gracias por educarme como lo habéis hecho, sois los mejores padres que se pueden tener. Este logro también es vuestro. No me olvido de ti, Hugo. Para mí siempre serás un pequeñin, es una suerte tener un hermano como tú. Siempre entendiéndome, escuchándome y aguantándome. No te imaginas lo importante que eres para mí, hermano.

A mi querida familia,

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCCIÓN / INTRODUCTION

Introducción

1. Objetivo y motivación general de la Tesis: Economía de la salud y utilización sanitaria

El estudio de la utilización sanitaria por parte de la población general lleva haciéndose durante muchos años pues es un tema se suma importancia para los ciudadanos, que son los usuarios, como para los gestores tanto públicos como privados.

Durante los últimos años se ha ido poniendo en valor el concepto porteriano de competición basada en el valor (Value-Based Competition). Para Porter (2006), es necesario redefinir el concepto de provisión de servicios sanitarios teniendo en cuenta lo siguiente: 1. El foco debe ponerse siempre sobre la creación de valor en los pacientes y no en la simple reducción de costes. 2. Este valor debe ser creado a lo largo de todo el ciclo del tratamiento y además debería estar guiado en gran parte por la experiencia del profesional sanitario. 3. Es imprescindible que haya un alto nivel de transparencia en la información relativa a los precios y resultados en salud para los pacientes.

A esto se suma el hecho de que vivimos en un mundo cambiante. Actualmente, las realidades se van transformando a una velocidad jamás antes vista. Algunos cambios tienen que ver con la demografía, según las proyecciones de (EUROSTAT, 2020b) la población mayor será la predominante en el conjunto de países de la Unión Europea en pocas décadas. Este grupo de población es uno de los que más uso de recursos sanitarios hace (Aguado *et al.*, 2012). Es por ello que un estudio pormenorizado de su utilización es imprescindible para el diseño de políticas sanitarias. Además, nuevos colectivos como el LGTBIQ+ cada vez están teniendo más visibilidad y más derechos debido a su lucha incansable. No obstante, siguen sufriendo de discriminaciones y peores resultados en salud (Zeeman *et al.*, 2019; Wiepjes *et al.*, 2020).

Si juntamos todo lo mencionado anteriormente: el concepto porteriano de Value-Based Competition, las rápidas transformaciones y los cambios demográficos y sociales que están teniendo lugar, se hace necesario tanto una actualización de la evidencia empírica como nuevos estudios que se centren en estos nuevos grupos sociales. Por ello, esta tesis tiene como objeto llenar el vacío existente en algunas áreas y la actualización de la evidencia empírica con nuevos datos y nuevos enfoques. Para ser más concretos, en esta tesis se evalúa lo siguiente: cómo los estilos de vida afectan a la utilización sanitaria de los mayores; cómo las condiciones socioeconómicas de los mayores afectan a los cuidados de larga duración (tanto formales como informales); cuáles son las barreras que sufren las personas trans y no conformes con su género asignado al nacer en su utilización de recursos sanitarios; por último, el retorno económico y social de una intervención para humanizar el uso de los cuidados paliativos. En este sentido, los diferentes análisis llevados a cabo en esta tesis están planteados desde el punto de vista microeconómico y siempre dándole importancia a la visión y características personales y socioeconómicas del usuario. Esto es básico, incluso imprescindible, en el buen diseño de políticas públicas que mejoren el acceso de los usuarios a los diferentes servicios sanitarios.

2. Metodología y fuentes de información

Para cumplir los objetivos descritos en el apartado anterior, esta tesis se centra en el empleo de métodos cuantitativos (a excepción del capítulo 1). Si bien es cierto que estos métodos se combinan con un marco teórico bien definido que sirve como base para cada uno de los capítulos de esta tesis. Dentro de las metodologías utilizadas encontramos regresiones econométricas basadas en modelos de conteo, modelos de datos de panel, técnicas de evaluación como es el matching, índices de concentración para medir desigualdad e inequidad y la metodología de Retorno Social de la Inversión (SROI en sus siglas en inglés). Mención aparte la del capítulo 1, al tratarse de una revisión de literatura se han seguido las directrices del modelo PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

Como fuente de datos principal se ha usado la Encuesta Europea de Salud, Envejecimiento y Jubilación, también conocida como SHARE (Survey of Health, Ageing and Retirement in Europe). Es una de las mejores bases de datos existentes con datos para mayores de 50 años por varias razones: Su carácter multidisciplinar pues incluye datos de características personales, socioeconómicas, de relaciones personales, de salud y utilización sanitaria. Además, cuenta con una gran muestra donde casi todos los países europeos han sido incluidos a lo largo de las olas. En relación a las oleadas, se dispone de siete olas que abarcan desde el 2002 hasta el 2017. Es necesario mencionar que para el Capítulo 1 se han utilizado bases bibliográficas como PubMed, Web of Science, Scopus y The Cochrane Library. En el caso del Capítulo 6, el dedicado al análisis SROI, además de estas bases bibliográficas se realizaron encuestas y entrevistas con los agentes involucrados: pacientes, voluntarios y profesionales.

3. Contribuciones de la Tesis: Grado de innovación

Dentro de los objetivos de esta tesis se encuentran: analizar la utilización sanitaria teniendo en cuenta factores socioeconómicos, estilos de vida, discriminación y valoración de intervenciones que mejoren la provisión de cuidados. En este sentido, esta Tesis se divide en 6 capítulos, destinándose cada capítulo al estudio pormenorizado de cada uno de los objetivos descritos. A pesar de ser capítulos independientes, todos ellos siguen un mismo hilo conductor: la utilización de recursos sanitarios. La estructura es la siguiente:

- Capítulo 1: Revisión literaria de barreras en la utilización sanitaria para las personas transgénero y las no conformes con su género asignado.
- Capítulo 2: Una aproximación empírica a desigualdades socioeconómicas en el uso de los cuidados de larga duración entre las personas mayores de Europa
- Capítulo 3; Actividad física y utilización sanitaria entre las personas mayores de Europa. Un análisis basado en un tratamiento de múltiples valores
- Capítulo 4: ¿Cómo puede afectar una dieta saludable a la utilización sanitaria? Evidencia empírica para las personas mayores de Europa.
- Capítulo 5: Utilización sanitaria y estilos de vida saludables entre las personas mayores del sur de Europa utilizando el SHARE
- Capítulo 6: Humanización en la utilización de los cuidados paliativos a través del arte. Un análisis del Retorno Social de la Inversión (SROI) del programa ProArt.

El Capítulo 1 es una revisión de literatura centrada en las barreras que sufren las personas trans en su acceso y utilización de servicios médicos. Estudiar esto es de suma importancia dado que muchas de estas personas necesitan tratamientos para su proceso de transición a su género. En este caso, nos centramos en estudios cuantitativos publicados entre 2015 y septiembre de 2020, en inglés y de libre acceso. Para ello seguimos las líneas metodológicas asociadas al método PRISMA para la realización de este tipo de revisiones. En el análisis final solamente quedan 15 artículos. Este capítulo demuestra varias cosas: la primera es que las barreras que el colectivo trans identifica son reales y no solamente autopercibidas. La segunda es que las principales barreras que este colectivo encuentra están relacionadas con la discriminación, experiencias negativas del pasado, características personales como puede ser el status socioeconómico, la falta de información, la falta de servicios adecuados y el coste de los tratamientos relacionados con la cobertura sanitaria.

El Capítulo 2 está centrado en el análisis de las desigualdades socioeconómicas en la utilización de cuidados de larga duración en Europa. En este caso se utiliza la última ola disponible del SHARE de 2017. Se llevan a cabo regresiones logísticas y se controla por características socioeconómicas y del hogar, la salud y regionales. También se calculan índices de concentración para analizar la distribución de los cuidados. Para analizar la inequidad horizontal se utiliza el proceso de estandarización basada en la necesidad indirecta para generar estos índices de concentración. Los resultados demuestran q e los cuidados informales se concentran en aquellos hogares más desfavorecidos mientras que los cuidados formales lo hacen en los hogares más favorecidos. En relación a la equidad horizontal, los resultados demuestran que ambos tipos de cuidados se concentran en los hogares más ricos. Esto demuestra el aumento de las desigualdades y la fragilidad a la que se enfrentan aquellos hogares más desfavorecidos que necesitan estos cuidados.

El Capítulo 3 está dedicado a analizar los efectos de la actividad física de los mayores en sus visitas ambulatorias y las noches que pasan hospitalizados Para ello, se utilizan seis olas del SHARE y se utiliza como variable de tratamiento el nivel de actividad física: sedentario, actividad moderada, actividad potente. Para medir el efecto del tratamiento utilizamos técnicas de emparejamiento por puntaje de propensión. Los resultados sugieren la existencia de diferentes efectos en la utilización sanitaria dependiendo del nivel de actividad física. Realizar una actividad física moderada podría reducir las hospitalizaciones en un 28.5% mientras que una actividad fuerte lo haría en un 27.43%. En relación a las visitas ambulatorias se podría concluir que las actividades moderadas las reducirían en un 8.78% y las actividades potentes lo harían en un 10.40%.

Por otra parte, el Capítulo 4 estudia el efecto del seguimiento de dietas saludables en la utilización sanitaria de los mayores de 60 años. Para ello, utilizamos datos del SHARE que cubre el periodo temporal de 2002-2017 y dividimos en tres regiones europeas: Europa del Norte, Europa del Oeste y Europa del Sur. Los resultados demostrarían dos cosas: la primera es que solamente las visitas ambulatorias se verían incrementadas por el seguimiento de una, la segunda sería la existencia de una brecha de género: las mujeres son más vulnerables a los efectos de las dietas no saludables.

En el Capítulo 5 se analiza como los estilos de vida saludables entre los mayores del sur de Europa afectan a su utilización de servicios sanitarios. En este caso, se estudian las visitas ambulatorias y las noches de hospitalización. Para ello se llevan a cabo regresiones econométricas basadas en un modelo binomial negativo sobre un panel de datos que cubre desde 2004 hasta 2015. Esto significa que se utilizan 5 olas del SHARE. Los resultados demuestran que la realización de actividades físicas que requieren una gran cantidad de energía reduce las visitas ambulatorias y las noches de hospitalización un 7.8% y 28.25% respectivamente. Por otra parte, el hábito tabáquico incrementaría las noches de hospitalización en un 14.22%. Cabe señalar que este capítulo ha sido recientemente publicado en la revista Atlantic Economic Journal[1].

---

[1] Cantarero-Prieto, D., Pascual-Sáez, M. & Lera, J. Healthcare Utilization and Healthy Lifestyles among Elderly People Living in Southern Europe: Recent Evidence from the SHARE. Atl Econ J 48, 53–66 (2020). https://doi.org/10.1007/s11293-020-09657-3

El Capítulo 6 está dedicado al análisis del Retorno Social de la Inversión (SROI) realizada en el proyecto ProArt. Dicho proyecto tenía por objeto humanizar los cuidados paliativos de la unidad del Hospital Santa Clotilde de Santander (Cantabria, España). El análisis demostró impactos positivos para todos los agentes involucrados (pacientes, familiares, profesionales y voluntarios). Los pacientes ven mejoras en su situación clínica, en su poder de decisión, en su bienestar emocional y las relaciones sociales con sus familiares. Estos últimos declaran una mejor gestión del paso del tiempo. Los voluntarios por su parte afirman que sus habilidades artísticas y la satisfacción personal han mejorado. Por último, los profesionales creen que se ha generado un mejor ambiente de trabajo y se ha reducido el burnout. El SROI tiene como resultado de 8.32€ de retorno social por cada 1€ invertido en el programa. Esta investigación demuestra como las intervenciones con el fin de humanizar los cuidados paliativos no solo tienen efectos positivos en todos los stakeholders, sino que además se consigue un SROI muy positivo. Es necesario mencionar que el artículo en proceso de evaluación se realizó junto a investigadores del grupo FRAGILCARE de la Fundación San Juan de Dios.

Por otra parte, algunos de los resultados han sido publicados (en colaboración con otros autores), o han superado alguna etapa de los procesos de revisión en diferentes revistas de impacto.

- Capítulo 1: En proceso de evaluación en revista JCR de economía
- Capítulo 2: En proceso de evaluación en revista JCR de economía
- Capítulo 3: En proceso de evaluación en revista SJR de economía
- Capítulo 4: En proceso de evaluación en revista SJR de economía
- Capítulo 5: Publicado en el Atlantic Economic Journal
- Capítulo 6: En proceso de evaluación en revista JCR de economía

Además, también han sido presentados en diferentes seminarios/congresos. En concreto los siguientes:

- XV International Conference Developments in Economic Theory and Policy (Bilbao, 28-29 Junio, 2018) – Versión preliminar del capítulo 1
- New Trends in Health Systems and Patients' Rights (Santander, 14-16 Noviembre 2018) – Capítulo 1
- XXXIX Jornadas de Economía de la Salud (Albacete, 12-14 Junio, 2019) – Capítulos 4 y 6
- Monday Health Economics Seminars 25+25 (Santander, 23 Noviembre, 2020) – Capítulo 2
- Seminario Ageingnomics, Fundación Mapfre (Madrid, 16 Diciembre 2020) – Capitulo 2 (aceptado)

Por último, me gustaría señalar que a lo largo de estos años también he asistido a diversos seminarios y conferencias relacionadas con la investigación de esta tesis. De especial interés son los módulos cursados del Master en Dirección y Gestión de Servicios Sanitarios de la Universidad de Cantabria en colaboración con la Consejería de Sanidad (este año completaré dicho máster). Además, he asistido a diversos cursos especializados para la formación del profesorado de la Universidad de Cantabria que me han servido para complementar esta investigación y mejoran mis capacidades relativas a la docencia y divulgación científica, el pensamiento creativo, la ética en la investigación, la colaboración entre universidad y sector privado o el emprendimiento. Son de especial interés todos aquellos relativos a la docencia pues me han sido de mucha utilidad en la impartición de docencia en inglés, algo que llevo haciendo desde el curso académico

2017/2018. Quiero resaltar que para impartir docencia en inglés es necesario tener acreditado, como mínimo, el nivel C1 en lengua inglesa del Marco Común Europeo de Referencia para las lenguas ante el Vicerrectorado de Profesorado de la UC. , algo que Creo que es de justicia reconocer y agradecer la colaboración y ayuda del Grupo de Economía de la Salud de la Universidad de Cantabria e IDIVAL.

Introduction

1. Purpose and general motivation of the Research: Health economics and healthcare utilization

During several years, studying the healthcare utilization among the general population has been done due to the relevance healthcare services has for citizens and public/private managers.

The new concept of "Value-Based Competition" for healthcare delivery has been implemented for the past 14 years. Porter (2006) thinks that it necessary to change how the delivery of care is done. To do so, he proposes the following core values: 1. Professionals and manager must focus in the value creation for patients and not in cost reduction principles. 2. This value must exist during all the treatment cycle and should be driven by the professional experiences. 3. Transparency is mandatory. Prices and health outcomes should be publicly available.

Moreover, we have to take into consideration the fact that we live in a changing world. Nowadays, societies are changing in a very high speed that we have never seen before. Some changes are related to demography, according to the population projections developed by EUROSTAT (2020), the elderly people will be greatest share of population in the European Countries in the next decades. This population group is the one who used more healthcare resources (Aguado *et al.*, 2012). This is the reason to study their healthcare utilization in order to design new health policies. Moreover, the visibility of new communities such as the LGTBIQ+ is increasing. Nevertheless, they are one of the groups that suffers more from discriminations and worst health outcomes (Zeeman *et al.*, 2019; Wiepjes *et al.*, 2020).

If the facts described above are combined with the concept of Value-Based Competition, the high speed demographic and social, it is necessary to update the empirical evidence on healthcare utilization and develop new studies focused on the new communities. In this regard, the different analyses developed in this dissertation are focused on micro econometrics and on the patients' perspectives by considering their personal and socioeconomic characteristics. This is mandatory to design new public policies that improve the healthcare access to every citizen.

2. Methodology and Data

To achieve the objectives described above, this dissertation employs quantitative methods (except Chapter 1). These methods are combined with a theoretical framework that is used as a base for every chapter. Regarding the quantitative methods, we work with different econometric approaches: count data models, panel data models, evaluation techniques like the propensity score matching, concentration indexes to measure inequities and the Social Return on the Investment methodology. Chapter 1 is a literature review so it follows the PRISMA guidelines.

As the main data base we use the SHARE survey (Survey of Health, Ageing and Retirement in Europe). It is one of the best database for people older than 50 for several reasons. The SHARE is a multidisciplinary survey that includes information on personal/household characteristics, social relationships, health status and healthcare utilization. Moreover, most of the European countries have been included in the last years. It is composed by 7 waves that cover from 2002 to 2017. It is necessary to note that in Chapter 1, PubMed, Web of Science, Scopus and The Cochrane Library are used as databases. Finally, Chapter 6 uses these last databases, surveys, and interviews with the stakeholders in the ProArt Project.

3. Research contribution: Degree of innovation

The objectives of this dissertation are the following: analyze how healthcare utilization is affected by socioeconomic factors, lifestyles, discrimination and how interventions can increase the value in the provision of care. Thus, this dissertation is divided in 6 chapters and each one tries to reach one of the objectives. These chapters are independent each other but they are linked by the concept of healthcare utilization. The structure is as follows:

- Chapter 1: Healthcare utilization barriers for the transgender and gender nonconforming (TGNC) community: A systematic literature review are utilization
- Chapter 2. Socioeconomic inequalities in the use of long-term care among European older adults. An empirical approach using the SHARE
- Chapter 3: Physical activity and healthcare utilization among European older adults. A multi-valued treatment effects
- Chapter 4. How can a healthy diet affect the healthcare utilization? An empirical approach for European older adults
- Chapter 5. Healthcare utilization and healthy lifestyles among elderly people living in Southern Europe: recent evidence from the SHARE
- Chapter 6. Humanization in palliative care utilization through art: A Social Return on Investment (SROI) analysis of ProArt

In Chapter 1, a systematic literature review is conducted to assess the TGNC community suffers in their access to healthcare services. This community requires extra care to follow up their transition process. A retrospective horizon from 2016 to September 2020 is considered. A qualitative analysis of the selected papers is conducted in several steps following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. Only fifteen papers are included in the analysis. Our results show the following: firstly, healthcare barriers are real and quantifiable and not only self-perceived. Secondly that the main barriers are related to discrimination, past bad experiences in healthcare settings, personal characteristics, socioeconomic status (SES), lack of information, lack of adequate healthcare facilities for their needs, cost and insurance coverage issues.

The objective in Chapter 2 is to examine socioeconomic inequalities in LTC utilization in Europe. We use the last wave from the Survey of Health, Ageing and Retirement in Europe (SHARE) dated 2017 to analyze the impact of the socioeconomic status (SES) on LTC. For this purpose, we carry out logistic models and control for socioeconomic/household characteristics, health status and regions. Then, concentration indexes are calculated to assess the distribution of LTC. Moreover, we also analyze the horizontal inequity by using the indirect need-standardization process. Findings demonstrate that informal care is concentrated among low SES households, whereas formal care is concentrated in high SES households. Results for Horizontal concentration indexes show a pro-rich distribution in both formal and informal LTC. These results show the dawning of deep social inequalities in the LTC utilization

Chapter 3 focuses on the effect of physical activity at advanced ages on their healthcare services utilization. We focus in the number of Outpatient Doctor Visits (ODV) and the number of Nights at Hospital (NH). Six waves from the Survey of Health, Ageing and Retirement in Europe (SHARE) are used. The treatment variable is the physical activity level. It has three levels: sedentary, moderate and vigorous. To measure the effect of the multivalued treatment, we use propensity score matching techniques Results suggest different effects on the services depending on the level of physical activity practiced. Moderate activities can reduce the NH by 28.50% while vigorous activities would reduce them by a 27.43%. In terms of ODV, moderate activities can have a negative impact in the utilization by 8.78% while the reduction due to engaging vigorous activities is approximately 10.40%.

Chapter 4 examines the effect of following healthy diets on healthcare utilization among elderly people (+60). We use the last data available from the Survey of Health, Ageing and Retirement in Europe (SHARE) covering the period 2002-2017 and consider three regions: Northern, Western and Southern Europe. We find that only ODV are affected by an unhealthy diet and a gender gap: women are more vulnerable to an unhealthy diet.

Chapter 5 analyses the effect of healthy lifestyles among Southern European older adults on healthcare utilization by focusing on the number of outpatient doctor visits (ODV) and nights hospitalized (NH). Negative binomian regressions were conducted using a panel data set consisting of five waves (2004-201) of the Survey of Health, Ageing and Retirement in Europe (SHARE). Results demonstrate the following. Engaging in vigorous physical activities reduces the number of ODV visits and NH by 7.8% and

28.25% respectively. Moreover, smoking increases NH by 14.22%. Finally, I want to note that this chapter has been published in the Atlantic Economic Journal[2].

Chapter 6 evaluates the social return on the investment (SROI) made in a program (ProArt) to humanize palliative care through art activities. ProArt was carried out in the palliative care unit of Santa Clotilde Hospital in the city of Santander (Northern Spain)

Our results show a positive impact in every stakeholder. Patients declare an improvement in their clinical situation, social relationships, power of decision and emotional well-being. Relatives have improved the management of their time. Health professionals state a better work environment and a reduction in the burnout. Volunteers have improved their artistic abilities and satisfaction with their duty. Finally, the SROI analysis yields a result of €8.32 for every €1 invested in the program. ProArt has proved that art is a very effective manner of humanizing the provision of palliative care. I want to note that the article that is in the peer-review process was made jointly with researchers from the FRAGILCARE group from the Fundación San Juan de Dios.

Some of the results have been published (in collaboration with other authors or have passed some steps of the peer-review process in different journals.

- Chapter 1: Under review in a JCR economics journal
- Chapter 2: Under review in a JCR economics journal
- Chapter 3: Under review in a SJR economics journal
- Chapter 4: Under review in a SJR economics journal

---

[2] Cantarero-Prieto, D., Pascual-Sáez, M. & Lera, J. Healthcare Utilization and Healthy Lifestyles among Elderly People Living in Southern Europe: Recent Evidence from the SHARE. Atl Econ J 48, 53–66 (2020). https://doi.org/10.1007/s11293-020-09657-3

- Chapter 5: Published in the Atlantic Economic Journal
- Chapter 6: Under review in a JCR economics journal

Moreover, they have been presented in different seminars/congress:

- XV International Conference Developments in Economic Theory and Policy (Bilbao, June 28-29, 2018) – A preliminary version of Chapter 1
- New Trends in Health Systems and Patients' Rights (Santander, November 14-16, 2018) – Chapter 1
- XXXIX Conference of the Spanish Health Economics Association (Albacete, June 12-14, 2019) – Chapters 4 y 6
- Monday Health Economics Seminars 25+25 (Santander, 23 November, 2020) – Chapter 2
- Seminar Ageingnomics, Mapfre Foundation (Madrid, 16 December, 2020) – Chapter 2 (accepted)

Finally, I have to note my attendance to various courses, conferences and seminars related to this research. I would like to specially refer to the Master in Health Services Direction and Management from the University of Cantabria and the Health Minister of Cantabria. I have attended to some modules during these three years and I will be able to finish this master this academic year. Moreover I have attended to some other courses for teachers in the University of Cantabria that have complemented my knowledge in several areas: teaching and science divulgation, creative thinking, ethics in research, and the different types of the collaboration between the university and the private sector or entrepreneurship. Those courses related to teaching are especially interesting, they have been very useful in my teaching activities in English since the academic course

2017/2018. I have to note that to teach subjects in English the Teaching Vicedean of the University of Cantabria requires to have, at least, a C1 level in English according to the Common European Framework of Reference for Languages. I would also like to acknowledge the collaboration and help of the research group in Health Economics from the University of Cantabria and IDIVAL.

CHAPTER 1

HEALTHCARE UTILIZATION BARRIERS FOR THE TRANSGENDER AND GENDER NONCONFORNMING (TGNC) COMMUNITY: A SYSTEMATIC LITERATURE REVIEW

Chapter 1. Healthcare utilization barriers for the transgender and gender nonconforming (TGNC) community: A systematic literature review

1.1. INTRODUCTION

Access to healthcare is considered as a human right. Nevertheless, some population groups are still vulnerable and suffer from barriers to access healthcare services. This is the case for the LGTBIQ+ community in general, but especially for the transgender and gender non-conforming (TGNC) community. These individuals usually require following a multidisciplinary set of transition related healthcare services. Indeed, they are one of the LGTBIQ+ groups that suffers more from discrimination in many aspects of their daily life. TGNC people make an effort to access healthcare even though the system discriminates them. Some people order the hormones they need or silicone procedures in the black market without a prescription or a medical monitoring (Glick *et al.*, 2018). Thus, TGNC people report poorer health and fewer preventive care visits than their peers (Rider *et al.*, 2018).

In general, the non-heterosexual orientation and gender identity are common discrimination factor in society and especially barriers to healthcare use (Roberts and Fantz, 2014; Alencar Albuquerque *et al.*, 2016). The TGNC community faces barriers in several healthcare areas such as preventive services, transition related care and a lack of inclusion in public health programs (Radix, Lelutiu-Weinberger and Gamarel, 2014) . This community have a higher risk of suicide than other people do (Wiepjes *et al.*, 2020). According to the report by Herman, Brown and Hass (Herman, Brown and Haas, 2019), the main risk factors are related to discrimination. TGNC individuals suffer from discrimination at home by their relatives or partners, in education, job or healthcare settings. Additionally, some transgender individuals suffer from violence, which also increase the probability of suicide attempt. The authors conclude that suicidal rates among TGNC community are linked to these facts.

Healthcare experiences also matter in the access to healthcare. The relationship between health professionals and patients must be based on respect and trust. In general, the LGTBIQ+ community suffers from the heteronormativity in healthcare settings. Health professionals assume the heterosexuality of their patients or believe that LGTBIQ+ people do not need specific care (McGlynn *et al.*, 2020). Sometimes TGNC people avoid care due to past discrimination experiences or having fear or being discriminated. This leads to a worse health status in general or higher odds of suffering from depression (Seelman *et al.*, 2017). Professionals should engage in delivering a high-value care based on the patient experience.

There is evidence based on perceived barriers like the study by Lerner and Robles (2017). They identified four main barriers. Firstly, the lack of professionals' knowledge on transgender issues. Secondly, negative past experiences. Thirdly, the costs associated to treatments. Finally, refusal from providers to give care. Nevertheless, to our knowledge there are not enough studies assessing healthcare barriers to the TGNC community by using quantitative methods. The objective of this study is to analyze all the available literature assessing healthcare barriers for TGNC individuals.

The chapter is organized as follows. The second section is based on the theoretical framework where methodology is presented. The third section is focused on the PRISMA results analysis. Fourth section discuss our results and the final one presents the conclusions and policy implications.

1.2. MATERIALS AND METHODS

A systematic literature search is conducted following Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Liberati *et al.*, 2009). Four databases were used (PubMed, Web of Science, Scopus and the Cochrane Library) to identify the most relevant published evidence from January 2016 to 21 September 2020. Nevertheless, additional records were identified through hand searching. Given the scope of this study, three components are included in the search strategy: (1) Transgender community, (2) health care access and (3) health care barriers. Terms related to these components were combined in all databases. Table 1.1 gathers up the search strategy by database.

Table 1.1. Search strategy by database

Web of Science (n=194) TI=(non binary OR trans OR transgender) AND TI=(healthcare OR doctor) AND TI=(barriers OR access) OR AB=(non binary OR trans OR transgender) AND AB=(healthcare OR doctor) AND AB=(barriersOR access)
SCOPUS (n=131) TITLE-ABS-KEY (("non binary" OR "trans" OR "transgender") AND ("healthcare" OR "doctor") AND (“barriers” OR “access”))
PubMed (n=289) (("non binary"[Title/Abstract] OR "trans"[Title/abstract] OR "transgender"[Title/abstract])) AND (("healthcare"[title/abstract] OR "doctor"[title/abstract])) AND (("barriers"[title/abstract] OR "access"[title/abstract]))
Cochrane Library (n=25) non-binary" OR "trans" OR "transgender" in Title Abstract Keyword AND "healthcare" OR "doctor" in Title Abstract Keyword AND "barrier" OR "access" in Title Abstract Keyword

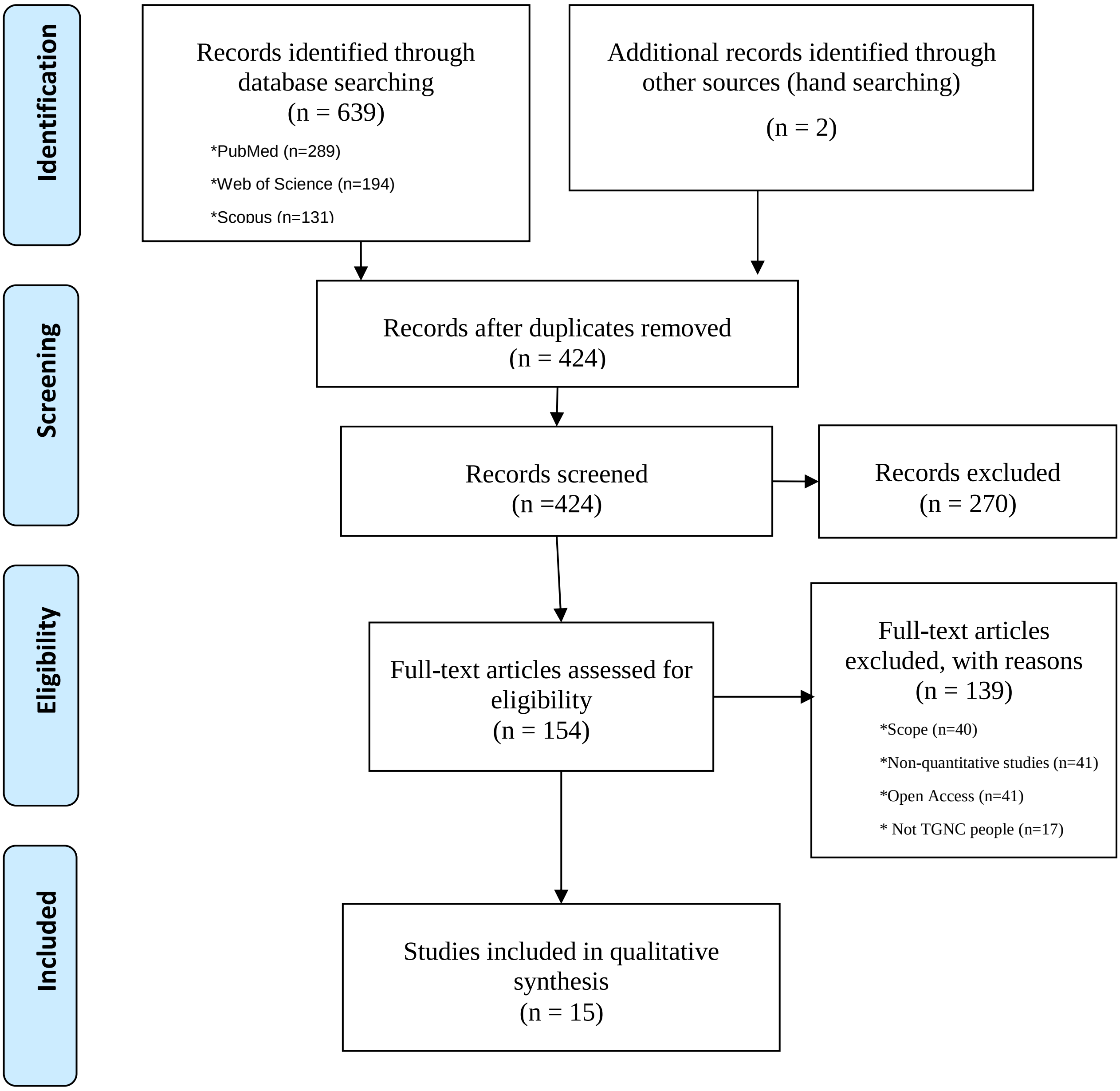
Source: Authors’ elaboration

After removing duplicates, several inclusion and exclusion criteria were applied in this study. Studies that satisfied the following inclusion criteria are included: (1) The paper focuses on the transgender community, (2) The paper evaluates the access to health care services and (3) full-text articles. Additionally, studies that met at least one of the following exclusion criteria are removed: (1) Non-English written papers, (2) Studies in the form of an abstract, editorials, opinion papers or with a non-quantitative analysis, (3) Papers not focused on the barriers to healthcare and (4) the study did not focus on the transgender community views.

1.3. RESULTS

In total, we found 641 studies published after January 2016 by using four databases. More specifically, we find 289 studies in PubMed, 194 in Web of Science, 131 in Scopus, 25 in the Cochrane Library and 2 by hand-searching. We eliminated 217 of the studies since they were duplicates. The first screening was done over 424 studies and 270 of them were excluded using the exclusion criteria. 154 articles were selected to be assessed for eligibility. 139 out of 154 were excluded due to the following reasons: Articles did not fit our scope (40), studies with no quantitative analysis (41), other studies were not published on open access (41) and other studies did not focus on the TGNC community but on the LGTBQI+ community in general (17). These steps left 15 studies to be finally analyzed. This process is illustrated in Figure 1.1.

Figure 1.1. Flow Diagram



1.3.1. Healthcare settings in general

Some studies used the 2008 National Transgender Discrimination Survey to analyze barriers TGNC people face in healthcare settings like the one from Rodriguez, Agardh and Asamoah (Rodriguez, Agardh and Asamoah, 2018). This study included 6106 transgender that identify as US citizens. Authors analyzed barriers in hospitals, emergency rooms, rape crisis and domestic violence centers, mental health clinics and drug programs. This study proved that being recognized as a transgender person leads to discrimination in healthcare, especially in mental health and social services. Additionally, being a sex worker or being related to other street economy jobs is also identified as a barrier in healthcare services.

The two following studies used the USTS as database. The first one (Kcomt *et al.*, 2020) analyzed healthcare avoidance due to past discrimination experiences. Specifically, they analyze whether respondents avoided visiting a doctor because of thinking they would be discriminated. They found that transgender men are more prone of avoiding healthcare services than transgender women. Other reasons were a low SES and visual non-conformity. On the other hand, having health insurance could act as protection against healthcare avoidance. The other study was the one from Romanelli and Lindsey (Romanelli and Lindsey, 2020). They developed a latent class analysis identifying a three class model. Authors confirm that being out as transgender and being a disable person were barriers to healthcare access

1.3.2. Transition related care

Five studies analyzed the barriers TGNC people find when trying to use transition related care. These services play a relevant role for TGNC community life since they help people to align their gender presentation to the one they identify.

Sineath et al. (Sineath *et al.*, 2016) based their study in an online survey conducted by the Emory University. To be included in the analysis, people must be at least 18 years old, their gender identity must differ from the one assigned at birth and not skip questions related to healthcare utilization. 280 people were eligible for their analysis. 84% were transwomen and 16 were transmen. Healthcare services included hormone therapy, chest surgery and genital reconstruction. They developed a multivariate analysis including variables capturing age, race, education, relationship status, insurance status and gender identity. This study found that cost and the possibility of having access to a trans-qualified professional were the main barriers in the access. Moreover, they found differences by gender.

The following study (White Hughto *et al.*, 2017) used a survey composed by 364 transgender people living in Massachusetts (United States). They considered the access to hormones or surgery in the last 12 months. By using a multivariate logistic regression model they tested the factors associated to healthcare use. Authors found that several personal/interpersonal and structural factors were associated to unmet health needs: being young, having to a low SES or problems in the coverage of their private insurance.

Agénor et al. (Agénor *et al.*, 2018) focuses on the barriers to access to PAP testing among female to male (FTM) people. A survey was developed in 2015-2016 including 150 people from the Greater Boston. Inclusion criteria were: being 21-64 years old, being assigned female at birth and now self-identify as a man, FTM or transgender man, having a cervix and a sexual partner in the last three years. Authors distinguished between been binary (self-identify as men, transgender men, or FTM) and non-binary (self-identify as other trans-masculine identity). Authors found that the main barrier was self-identifying as binary. Their odds ratio were lower than for their non-binary peers.

The next study (Costa, da Rosa Filho, *et al.*, 2018) used data from a survey under the project developed in a hospital in two Brazilian states (Rio Grande do Sul and São Paulo). This survey included 626 people meeting the inclusion criteria and studied the access to hormones and other medical services related to gender affirming health. Authors found that discrimination is one of the most important barriers in the access to healthcare among TGNC people in Brazil. Other barriers were the lack of information or the existence of a policy design that not take into consideration transgender needs.

The data used by Lee et al. (Lee *et al.*, 2018) included 278 transgender adults in South Korea in 2017. They analyzed transgender healthcare such as diagnosis, hormone therapy and surgery. As other studies do, they found that cost was the most common barrier. Other barriers were related to bad experiences in healthcare settings (including meeting professional without enough knowledge in transgender issues) and social stigma. Moreover, authors find that 25.1% of respondents had taken hormones without medical prescription.

Bakko and Kattari (Bakko and Kattari, 2020) studied seven healthcare services issues related to transgender transition: name change in records, hormone therapy, surgery, under-coverage in surgery, lack of network for transition related surgeries, other gender specific care (PAP test, prostate exams and mamograms) and denials in routine healthcare. To do so, authors used the 2015 United States Transgender Survey (USTS) which includes 27,715 respondents. Their multivariate analysis included information on insurance type, gender, race, education level, income, age, region and disabilities. They found that not having a private insurance predicted denials in healthcare. Being covered by Medicaid was associated to an unmet need of hormones and a lack of access to a trans-specific network. Moreover, those people covered by the military insurance were more prone of having denials in surgery

1.3.3. HIV related care

Scheim et al. (2016) used the 2014 Global Men's Health and Rights Survey that includes data on men who have sex with men and trans men. Authors tried to disentangle problems in the access to HIV prevention services. This study focused on transgender men and assessed four fields: perceived accessibility, anti-transgender violence, stigma from health professionals and discrimination. They found that being a victim of sexual assaults and discrimination (being arrested or convicted) are related to a lower access to HIV testing services. A similar effect is proved when transgender men are compared to their cisgender peers.

The study by Costa, Fontanari, et al. (2018) analyzed the Brazilian transgender community access to HIV prevention services. This study is similar to the one mentioned before (Costa, da Rosa Filho, *et al.*, 2018) and is developed in two Brazilian states. Authors analyzed the reasons of avoiding testing and discrimination in HIV context. They found that personal characteristics like age, marital status, race or religiosity were key factors to analyze HIV testing. The study concludes that lack of anonymity, past discrimination experiences in healthcare settings and lack of information were the main barriers to HIV related care.

1.3.4. Primary care

In the study by Clark et al. (2018), data was retrieved from the Canadian Youth Health Survey developed during 2013-2014. This study analyzed the barriers that young transgender people face to access primary care. In general, respondents reported a poor or fair mental and general health status. Authors proved that being comfortable with the GP was correlated with better health status. Confort is a key issue since it is very important that doctors were aware of the transgender status. Authors concluded that barriers in the access to GP are related to cost, bad past experiences in healthcare settings or having a doctor with little knowledge on transgender issues.

Other studies focus on other minorities among TGNC community. The study by Goldenberg et al. 2(019) studied the barriers to primary care that young black transgender people suffer. They included covariates capturing socio-demographic characteristics, vulnerability, health status and health coverage. Although including these variables and different experiences, authors only found that gender affirmation is a barrier to primary care use.

The study by Rahman, Li, and Moskowitz (2019) is a little part of a bigger study and developed a survey in 2016 for sexually active, English speaking that identified as non-cisgender men. They included an analysis for primary care, gynecologist or nurse practitioner. Authors identified different barriers: transgender community are more prone of being uncovered, having less medical knowledge and comfort with their doctor than their cisgender peers.

1.3.5. Mental Health

Williams et al. (2017) developed a bivariate regression analysis to disentangle barriers to mental health for TGNC women in Ontario (Canada). To do so, they retrieved data from the 2011-2012 Everyday Discrimination Scale and the PHQ-9 Questionnaire for Depression. They found that everyday discrimination is the main barrier to access to mental care. Nevertheless, other barrier exists like having a low SES or belonging to another minority group

Table 1.2. Characteristics of the studies included in the review

Study	Year	Country	Healthcare service	Methodology	Main barriers
Scheim et al. (2016)	2014	Worldwide	HIV related care	Conditional logistic regression	Being arrested due to belonging to the trans community (discrimination)
Sineath et al. (2016)	2012-2013	United States	Transition related care	Multivariable logistic regression	Treatment cost and having access to a qualified healthcare provider
White Hughto et al. (2017)	2013	United States	Transition related care	Multivariable logistic regression	Younger age, low socioeconomic status, private insurance coverage and healthcare discrimination
Williams et al. (2017)	2011-2012	Canada	Mental health	Bivariate regression	Everyday discrimination, low SES and belonging to marginalized identities
Agénor et al. (2018)	2015-2016	United States	PAP testing	Logistic models	Gender identity
Clark et al. (2018)	2013-2014	Canada	General practitioner and mental health	Chi-square analyses and Person's correlation coefficients	Lack of comfort with professionals, lack of confidence with professional competency on transgender issues
Costa, Rosa Filho et al (2018)	2014-2015	Brazil	Transition related care	Chi-square analyses and phi coefficients	Discrimination, lack of information and policy design.
Costa, Fontanari et al. (2018)	2014-2015	Brazil	HIV related care	Chi-square test, Mann-Whitney U-test and logistic regression	Discrimination in healthcare context, lack of information, lack of anonymity,
Lee et al. (2018)	2017	South Korea	Transition related care	Stratification analysis	Costs, negative experiences in healthcare settings, lack of specialized services and social stigma.
Rodriguez et al. (2018)	2008	United States	Healthcare settings in general	Binary logistic regression	Being recognized as a transgender person, working on the street or being a sex worker
Goldenberg et al. (2019)	2015	United States	Primary care	Multivariable logistic regression	Healthcare experience related to gender affirmation and stigma
Rahman et al. (2019)	2016	United States	Primary care, nurse practitioner and gynecologist	Chi-square analyses and ANOVA	Health knowledge and comfort with professionals
Bakko and Kattari (2020)	2015	United States	Transition related and gender specific care	Multivariate logistic regression	Insurance type and self-identifying as a transgender
Kcomt et al. (2020)	2015	United States	Healthcare settings in general	Multivariable logistic regression	Anticipated discrimination, low SES or visual non-conformity
Romanelli and Lindsey (2020)	2015	United States	Healthcare settings in general	Latent class analysis	Psychological distress, being out as trans to professionals or having disabilities

Source: Authors' elaboration

1.4. DISCUSSION

This study aimed at summarizing the existing literature on the TGNC barriers to healthcare in general. Hence, we focus on quantitative studies that have been published in the last five years. We have divided the studies by healthcare services: transition related care, healthcare settings in general, HIV related care, primary care and mental health.

Policy design plays a key role for the TGNC community and implementing non-discriminations laws increase the social inclusion. According to Goldenberg et al. (2020), individual policies do not have a direct impact on healthcare avoidance. Nevertheless, these policies generate a friendly environment where TGNC people do not avoid healthcare due to fear of being mistreated. It is also important to provide education on TGNC issues to health professionals (Loza *et al.*, 2018) since there is evidence that shows micro and meso level interventions compensate the absence of macro level policies (Ross, Law and Bell, 2016). Consequently, friendly policies might improve healthcare access (Sørlie, 2019), mental health (Kattari *et al.*, 2020) and reduce the suicide attempts ratios (Herman, Brown and Haas, 2019).

We have identified that socioeconomic status, cost and insurance coverage are healthcare barriers for TGNC people. In this case, the public intervention is mandatory to tackle socioeconomic inequalities. Healthcare delivery type and the treatments covered by public health depend on governments. In general, TGNC individuals are less insured than their peers and sometimes they experience denials for care although having an insurance (Bakko and Kattari, 2020).

Notwithstanding, this revision has the following limitations. Firstly, we have only used four databases (PubMed, Web of Science, Scopus and the Cochrane Library) to identify the studies considered. Secondly, we have only considered a period of nearly five years and open access quantitative articles. Some of the main critics to studies analyzing barriers to healthcare for TGNC people are related to the fact that these barriers are considered just perceived. We have tried to focus on quantitative studies to avoid this and prove that barriers are real and quantifiable. Finally, most of the studies were developed in the United States. It seems that North America (USA or Canada) have specific databases and surveys containing information on TGNC individuals. Hence, future reviews could mix quantitative and qualitative types of studies to provide further evidence.

1.5. CONCLUSIONS

Our results claim that there are yet plenty of barriers in all the healthcare settings for TGNC people. By focusing in quantitative studies, we can demonstrate that they are not self-perceived barriers but real and quantifiable ones. Most of the barriers are related to discrimination, personal characteristics, negative experiences in healthcare settings, socioeconomic positions, costs and health policy design.

It is necessary that policymakers became aware of these problems to promote micro, meso and macro interventions. These new policies should include the following. Firstly, include patients' views and experiences when planning interventions. Secondly, promote new training programs focuses on improve professionals' knowledge on transgender issues. Thirdly, specific anti-violence programs against TGCN people should be implemented in general to eliminate the transphobic stigma. Finally, A good example of intervention is The Vanderbilt Program for LGTB Health (Ding *et al.*, 2020). This program included the following: a volunteering support program for new patients, a community advisory board composed by TGNC people and their relatives and the creation of two new clinics specialized on TGNC issues with the facilities they need.

Overall, the conclusions of this review are intended to be used by policymakers to tackle the existing barriers in healthcare settings for the TGNC community. Moreover, we think is necessary that databases should overcome the binary gender basis on their questions. This a mandatory thing to provide more quantitative evidence for other countries.

CHAPTER 2

SOCIOECONOMIC INEQUALITIES IN THE USE OF LONG-TERM CARE AMONG EUROPEAN OLDER ADULTS. AN EMPIRICAL APPROACH USING THE SHARE

Chapter 2. Socioeconomic inequalities in the use of long-term care among European older adults. An empirical approach using the SHARE

2.1. INTRODUCTION

One consequence of the improvement in life expectancy rates is the increase in the number of people suffering from degenerative conditions or memory impairments in the next decades (Gaugler *et al.*, 2016; Andreas *et al.*, 2017). Elderly people may need care all day long and getting professional carers or even a bed in nursing homes is unaffordable for many patients due to the high costs associated. According to a 2020 report by the European Institute for Gender Equality (EIGE), 52% of European households cannot afford receiving long-term care (LTC). Therefore, care devolves upon non-professionals which are mainly women (Alzheimer's Disease International, 2019). In other report, the EIGE (2019) estimates that 62% of the people who provide care are women .This affects their careers, social relationships and well-being (Schwarzkopf *et al.*, 2012; World Health Organization, 2017; Spasova *et al.*, 2018).

Moreover, late 2000s economic and political crisis has deeply affected European economies and their governments have implemented general restrictive budgetary policies to reduce their high public debt rates (Zamora-Kapoor and Coller, 2014). These policies included tightens in the LTC eligibility criteria and cuts in public funds (Spasova *et al.*, 2018).

Thus, important inequalities and inequities may arise in LTC utilization among elderly people (Gaugler *et al.*, 2016). Becchetti and Pisani (2020) demonstrate the importance income has on life satisfaction. This gradient is more relevant for those people reporting at least one long-term illness and for those who declare having unmet care needs. Some studies point out the pro-rich distribution formal LTC services have (Larsson and Silverstein, 2004; Bonsang, 2009; Schmidt, 2017). In this regard, Jones (2017) concludes that social class matters in the diagnosis and care of dementia. Moreover, there is a loss in the social status caused by the diagnosis of this condition according to this author. Lindgren et al. (2017) prove the existence of a significant gap in the equity in dementia care between nationals and immigrants in Sweden. They suggest that factors explaining LTC use might vary along time. Differences in LTC utilization tend to disappear some years before dead. Being single and having a low income are characteristics related to a higher probability of being a formal care user (Korhonen *et al.*, 2018). Chuakhamfoo et al. (2020) have focused on patients suffering from dementia in low income rural areas. This study finds that 80% of the care provided was informal. According to Hu, Si, and Li (2020), people from low socioeconomic background need more LTC in China. Recent evidence also proves the importance of the offer of formal care from the institutions. Floridi, Carrino, and Glaser (2020) demonstrate that low-income households tend to mix more formal and informal care than their high income peers. These authors conclude that the LTC defamilization (offering families the possibility of institutional care for their relatives) may reduce the LTC inequalities in later life.

European institutions are worried about the future of LTC. According to a European Commission report (Spasova *et al.*, 2018), European countries are facing similar challenges. Firstly, the little development of public formal LTC reduces the access and adequacy. Moreover, there is no complementarity between informal and formal LTC.

Secondly, the volume of LTC demanded will grow leading to a reduction in the quality of LTC services if new measures are not implemented. Thirdly, regarding to employment, mostly women are in charge of care, which in most cases is not provided in a formal way. This situation affects women's professional careers. Finally, the European Commission is concerned about the financial sustainability of the LTC system. Although European countries must face similar challenges, regional disparities remain important. While some countries focus on providing services, other ones focus on cash benefits. Moreover, formal services are less developed in some Eastern and Southern European countries (Spasova *et al.*, 2018).

To tackle these challenges, the European Commission recommends some measures. First, developing formal home care without reducing the supply of residential institutions. Second, a greater control of cash benefits. Users must provide evidence that public funds are used for LTC. Third, supporting informal carers by training them, giving more social security rights or supporting their labour participation.

Hence, this chapter focuses on the first concern by assessing inequalities due to the SES in the LTC utilization in ten European countries. The aim is to analyse whether the SES affects the LTC services utilization in later life. We update the evidence regarding socioeconomic inequalities in LTC.

The structure of this chapter is as follows. The second section presents the methodology and data. The third one is focused on the empirical analysis. Fourth section discusses our results and the final one presents the conclusions and policy implications.

2.2. MATERIAL AND METHODS

The Survey of Health, Ageing and Retirement in Europe (SHARE) is our data source. The SHARE survey is a cross-national panel database focused on people aged 50 or older that covers 28 countries. It is a multidisciplinary survey that includes microdata on personal characteristics, socioeconomic status, health or personal networks. We use the last data available, which is and Wave 7 (2017). Table 1 gives a description of the variables and a summary of their main statistics. In addition, Table 2 differentiates the descriptive statistics by countries.

Our variables of interest are *FormalCare* (nursing home admissions and professional care received at home) and *InformalCare* (whether a non-professional from the respondent household or from outside it provides care).

Variables capturing personal characteristics include age, gender or marital status. We create three age groups as other studies do (Bähler *et al.*, 2015; Cantarero-Prieto, Pascual-Sáez and Blázquez-Fernández, 2018): people aged between 50 and 65 years old, 66-80 those who are older than 80. A covariate capturing whether the respondent is female or not *(Female)* is considered due to the gender relevance (Prince *et al.*, 2015). Household composition may affect the respondent probability of receiving LTC (Motel-Klingebiel, Tesch-Roemer and Von Kondratowitz, 2005; Rodrigues *et al.*, 2013). Thus, variables capturing respondents' marital status (*Single)*, the household size (*HHsize*) the number of descendants and whether they live near or in the respondents' household have been included (*NChild, and ChHH*). We also decided to include two variables to capture the number of people living in the same household as the respondent (*hhsize*). We also control whether respondents live in a rural or urban area (*urban)*

Moreover, health status is a key determinant behind healthcare utilization, particularly in LTC services. The following variables have been introduced: Self-Assessed Good Health Status (*SAGHS),* the number of limitations in Activities of Daily Living (*ADL),* the Number of Chronic Diseases *(NCD).* We also include 3 dichotomous variables capturing the geographical area of the respondent living place. These areas have been constructed following the EuroVoc criteria (EuroVoc-European Commission) 2019). EuroVoc is the official thesaurus that covers the EU activities, especially the ones developed by the European Parliament. Northern Europe is composed by Denmark and Sweden. Southern Europe: Greece, Italy and Spain. Western Europe: Austria, Belgium, France, Germany. The last one is Eastern and Central Europe, which is composed by the Czech Republic.

Table 2.1. Variables definition and summary of statistics

Variable	Definition	Coding	Mean	Std. Dev.
Long-Term Care				
InformalCare	Non-professional help inside or outside the household	1: whether respondent has received non-professional help inside or outside the household; 0: otherwise	0.2832	0.4506
FormalCare	Professional help at home or institutionalization	1: whether respondent has been institutionalized or has received professional help at home or. 0: otherwise	0.0913	0.2881
Personal Characteristics				
Female	Gender of respondent	1: whether respondent gender is female; 0 otherwise (male)	0.5605	0.4963
Age	Age of respondent	Age in years	69.6823	9.7148
Single	Marital status	1: Never married, divorced or widowed. 0: Married, living with spouse or not or registered partnership:	0.2933	0.4553
Education	Education level	1: Primary Education, 2: Secondary Education, 3: Tertiary Education	1.8250	0.7916
NChild	Number of descendants that are still alive	Number of children that are still alive	2.1526	1.2767
Household characteristics				
ChHH	Descendants' living place	Whether at least one child lives in the same household or the same building as respondent	0.0041	0.0642
HHsize	Household size	Number of people living in the same household as the respondent	2.0274	0.8721
Urban	Respondents' living area	1: respondent lives in an urban area, 0: otherwise	0.6771	0.4676
Health Status				
SAGHS	Self-Assessed Good Health Status	1: if respondent' Self-Assessed Good Health Status. is excellent, very good, good or fair; 0 otherwise (poor)	0.6321	0.4822
ADL	Number of limitations in Activities of Daily Living (ADLs)	Number of limitations in Activities of Daily Living (ADLs)	0.2792	0.9573
NCD	Number of chronic diseases	Number of chronic diseases	1.9179	1.6332

Source: Authors' elaboration

Table 2.2. Summary of statistics by country

	AT	DE	SE	ES	IT	FR	DK	GR	BE	CZ
Informal care (%)	41.0148	32.6139	24.1088	22.9379	20.2936	29.6752	38.0952	20.9694	27.5995	45.1754
	(49.2381)	(46.9080)	(42.7945)	(42.0599)	(40.2313)	(45.7027)	(48.5811)	(40.7198)	(44.7158)	(49.7940)
Formal Care (%)	10.7383	7.3471	7.3350	9.0217	5.3239	11.4109	6.7636	4.8249	18.9184	7.1810
	(30.9649)	(26.0942)	(26.0753)	((28.6524)	(22.4534)	(31.7992)	(25.1160)	(21.4326)	(39.1696)	(25.8204)
Female (%)	59.0210	52.9102	53.8172	55.6886	54.7803	57.9745	54.1356	57.3544	55.3472	59.9237
	(49.1872)	(49.9218)	(49.8619)	(49.6807)	(49.7765)	(49.3675)	(49.8364)	(49.4643)	(49.7184)	(49.0112)
Age (in years)	70.7449	68.1372	72.1986	71.5682	69.1585	69.6413	67.1915	69.6703	68.3192	70.3550
	(9.2835)	(9.3417)	(8.8213)	(10.2876)	(9.6743)	(10.2909)	(9.6754)	(9.3476)	(10.2364)	(8.5431)
Single (%)	36.3665	24.5194	28.7465	27.6305	22.9411	34.8696	26.1194	28.5620	32.0008	33.1345
	(48.1129)	(43.0259)	(45.2651)	(44.7217)	(42.0500)	(47.6630)	(43.9354)	(45.1784)	(46.6527)	(47.0753)
Primary Education (%)	23.3448	11.3247	33.8674	78.5714	68.8231	38.6598	16.6356	52.0237	36.5135	38.0248
	(42.3092)	(31.6937)	(47.3333)	(41.0370)	(46.3267)	(48.7044)	(37.2458)	(49.9673)	(48.1518)	(48.5506)
Secondary Education (%)	49.6392	56.4656	33.2077	10.5646	23.1398	37.0831	37.8731	29.8124	27.6942	47.6861
	(50.0065)	(49.5867)	(47.1032)	(30.7417)	(42.1773)	(48.3101)	(48.5147)	(45.7510)	(44.7534)	(49.9524)
Tertiary Education (%)	27.0160	32.2096	32.9249	10.8640	8.0371	24.2571	45.4913	18.1639	35.7923	14.2891
	(44.4112)	(46.7341)	(47.0014)	(31.1220)	(27.1897)	(42.8703)	(49.8040)	(38.5610)	(47.9439)	(35.0004)
Number of descendants	2.1064	1.9920	2.2164	2.5501	2.0571	2.3302	2.2384	1.8643	2.1507	2.1155
	(1.4066)	(1.2252)	(1.2165)	(1.5972)	(1.2274)	(1.4200)	(1.2377)	(0.9566)	(1.3817)	(0.9270)
Living with descendants (%)	0.2196	0.3687	0.1885	0.5560	0.8170	0.2426	0.4353	0.3620	0.4739	0.2624
	(4.6822)	(6.0618)	(4.3383)	(7.4368)	(9.0026)	(4.9199)	(6.5846)	(6.0064)	(6.8687)	(5.1164)
HH size	1.8817	1.9573	1.7908	2.2397	2.3449	1.8924	1.8955	2.1316	1.9825	1.9854
	(0.8651)	(0.7202)	(0.5652)	(0.9741)	(0.9966)	(0.8111)	(0.6819)	(0.9239)	(0.8694)	(0.9206)
Living in urban areas (%)	50.7085	59.1251	62.1395	84.6242	65.7284	51.8461	75.4119	84.3353	67.1958	71.1117
	(50.0034)	(49.1669)	(48.5121)	(36.0758)	(47.4673)	(49.9737)	(43.0677)	(36.3528)	(46.9550)	(45.3302)
At least good self-assessed health (%)	61.8136	56.9660	68.4889	55.1112	55.7960	62.4924	73.6629	66.8641	67.8137	67.5573
	(48.5920)	(49.5189)	(46.4633)	(49.7434)	(49.6684)	(48.4216)	(44.0530)	(47.0779)	(46.7239)	(46.8216)
Number of ADL limitations	0.2949	0.2499	0.1976	0.4134	0.2826	0.2674	0.1785	0.1612	0.3313	0.3137
	(1.0098)	(0.8489)	(0.7667)	(1.2438)	(1.0316)	(0.9070)	(0.7494)	(0.7394)	(0.9770)	(0.9620)
Number of chronic illnesses	1.9206	2.0716	1.6510	2.0079	1.6410	1.8451	1.5917	1.9197	2.0387	2.3447
	(1.6258)	(1.7347)	(1.4654)	(1.6905)	(1.5338)	(1.5316)	(1.4685)	(1.5968)	(1.6582)	(1.7571)

Source: Authors' elaboration

Our variables of interest are binary: FormalCare and InformalCare. They take value 1 if respondent receives formal care or informal care (with probability p) and 0 if not (with probability (1-p)). The probability of receiving LTC (p) is a function of two vectors: one of explanatory variables (x) and other of unknown parameters (β). Thus, the discrete choice models are as follows:

$$\text{Prob}(y=1)=F(x,\beta), \tag{1}$$

$$\text{Prob}(y=0)=1- F(x,\beta), \tag{2}$$

Considering this, the latent interpretation from both equations leads to the following specification

$$y=1 \quad \text{if } y^* > 0, \tag{3}$$

$$y=0 \quad \text{if } y^* \leq 0, \tag{4}$$

Where

$$y^* = x'\beta + \varepsilon \tag{5}$$

Therefore, we carry out logistic regression model to estimate the impact of dementia status over the LTC utilization by controlling by other socioeconomic, health and regional variables. In the logit model, the conditional probability allows the predicted probabilities being bounded between 0 and 1, by assuming the conditional probability takes the following form:

$$p = Prob\ (y = 1|X) = \frac{\exp(X'\beta)}{1 - \exp(X'\beta)} \tag{6}$$

Considering that the non-linearity of our models does not allow interpreting the coefficients as usual, the odds ratio are calculated. They are the ratio of the probability of success and the probability of failure:

$$ln\left(\frac{p}{1-p}\right) = X'\beta \tag{7}$$

Considering the existent literature concerning health care inequalities, we use the Concentration Index (CI) proposed by the existing literature (Wagstaff, Paci and van Doorslaer, 1991; Wagstaff and van Doorslaer, 2000; Wagstaff, 2005). It has been used in several studies like the one from Ilinca et al. (Ilinca, Rodrigues and Schmidt, 2017) where the factors driving inequality and inequity in home care are analyzed.

$$CI = \frac{2}{\mu}\,\mathrm{cov}(h_{\mathrm{i}}, \mathrm{r}_{\mathrm{i}}) \qquad (8)$$

Where, h_{i} and μ are the variable related to LTC utilization and its average respectively and r_{i} is the relative rank of the individual *i* in the socioeconomic distribution. CI is bounded between -1 and +1. If the CI takes positives values it means that, the distribution of LTC favors high socioeconomic status individuals. Thus, a CI below zero would mean that LTC is concentrated in the poorest households. Our LTC variable is binary so the CI would be bounded between 0 and 1 and depending on the mean of the LTC variable, CI could tend to zero, which would bias our results (Wagstaff, 2005) and needs to be transformed (Erreygers, 2009):

$$CCI = 4 \times \mu \times \mathrm{CI} = 8\,\mathrm{cov}(h_{\mathrm{i}}, \mathrm{r}_{\mathrm{i}}) \qquad (9)$$

Finally, we present horizontal inequity indexes (HI) in the use of formal and informal care. We follow the indirect need-standardization process by (Wagstaff and van Doorslaer, 2000). We consider two set of variables: need (N) LTC determinants (Age, gender, self-assessed health status, the number of limitations in activities of daily living and chronic diseases) and non-need (Z) LTC determinants (marital status, education level, household composition, number of descendants or the region the respondent lives).

$$h_{\mathrm{i}} = \alpha + \sum_{k} \beta_{\mathrm{k}} \mathrm{N}_{\mathrm{ik}} + \sum_{j} \delta_j Z_{\mathrm{ij}} + \varepsilon_i \tag{10}$$

Therefore, the HI are calculated by subtracting the CI for the need-predicted LTC use from the CI corresponding the real use (O'Donnell, van Doorslaer, Eddy Wagstaff and Lindelow, 2008; Pulok *et al.*, 2020). The interpretation is similar to the CI, values below from zero indicate a pro-poor distribution, whereas positive values indicate pro-rich inequity.

2.3. RESULTS

Table 2.3 shows the result for all the logistic models. Similar effects for both LTC are demonstrated for variables regarding age, gender, marital and health status. The LTC utilization increases with the age, the fact of being single and a woman, the number of limitations in daily living activities and chronic diseases. On the other hand, reporting at least a good health status and the greater the number of household members is, the LTC utilization is reduced.

Differences arise when analysing the education level, whether the household is in a rural or urban area and the residence region. The higher the education level received in is, the higher the probability of receiving formal LTC is. On the other hand, low education level might be associated with a higher informal care use. This supports the idea that formal LTC is more common among high education households. Moreover, respondents living in a rural area are more prone of being formal care users, whereas those living in rural areas tend to use more informal LTC. Regarding the regions, all of them have a less developed formal LTC services in comparison to Western Europe. In the case of informal care, Eastern and Northern Europe respondents tend to use more informal care than their Western peers.

Table 2.3. Estimates for Formal care and Informal care

	Formal care		**Informal care**	
Variable	Coef.	Odds ratio	Coef.	Odds ratio
Personal Characteristics				
Female	0.3556 ***	1.4270***	0.1415 ***	1.1520 ***
	0.0478	0.0682	0.0486	0.0560
Age66to80	0.5817 ***	1.7890 ***	0.0423	1.0432
	0.0601	0.1075	0.0628	0.0655
Age80plus	1.7870 ***	5.9716 ***	0.7107 ***	2.0354 ***
	0.0656	0.3917	0.0761	0.1548
Single	0.6815 ***	1.9768 ***	0.5967 ***	1.8161 ***
	0.0605	0.1196	0.0666	0.1209
Secondary Educ	-0.0919 *	0.9122 *	0.0244	1.0247
	0.0531	0.0484	0.0566	0.0580
Tertiary Educ	0.1363**	1.1460 **	-0.0372	0.9635
	0.0598	0.0686	0.0650	0.0627
NChild	0.0028***	1.0028 ***	0.0836 ***	1.0872 ***
	0.0004	0.0004	0.0183	0.0199
Household Characteristics				
ChHH	-0.2824	0.7540	-0.3232	0.7238
	0.3944	0.2974	0.2542	0.1840
HHsize	-0.1669 ***	0.8463 ***	-0.1995 ***	0.8192 ***
	0.0418	0.0354	0.0464	0.0380
Urban	0.2344 ***	1.2642 ***	-0.2925 ***	0.7464 ***
	0.0471	0.0596	0.0504	0.0376
Health Status				
SAGHS	-0.7566 ***	0.4693 ***	-0.5225 ***	0.5931 ***
	0.0500	0.0235	0.0528	0.0313
ADL	0.4994 ***	1.6477 ***	0.4329 ***	1.5417 ***
	0.0184	0.0303	0.0328	0.0506
NCD	0.1347 ***	1.1441 ***	0.1663 ***	1.1810 ***
	0.0134	0.0154	0.0160	0.0189
Region				
Southern Europe	-1.2364 ***	0.2904 ***	-0.5970 ***	0.5505 ***
	0.0623	0.0181	0.0598	0.0329
Eastern Europe	-0.6313 ***	0.5319 ***	0.2249 ***	1.2521 ***
	0.0597	0.0318	0.0637	0.0797
Northern Europe	-0.8903 ***	0.4105 ***	0.7492 ***	2.1154 ***
	0.0797	0.0327	0.0870	0.1841
Constant	-2.8983 ***	0.0551 ***	-1.1377 ***	0.3206 ***
	0.1330	0.0073	0.1479	0.0474
Log pseudolikelihood	-8031.1996		-5767.0237	
Number of obs	35718		11629	

Note: Standard deviations are under the estimates. ***, **, *, are the significance at level 1, 5 and 10% respectively.
Reference categories: Western Europe and primary education. Northern Europe: Denmark and Sweden. Southern Europe: Greece, Italy and Spain. Western Europe: Austria, Belgium, France and Germany. Eastern and Central Europe: Czech Republic

Table 2.4 includes the CIs for both formal and informal care by countries. Overall, our results suggest that most of the countries analysed follow the same pattern. Formal care is in general concentrated in high SES households. Czech Republic and Greece are the only countries where a pro-poor formal LTC can be found. In the case of the CR, it is only significant when the net household wealth is used as indicator of SES. Moreover, informal care is generally concentrated in low SES households. In this case, all the CIs are statistically significant using both SES indicators.

We also try to analyse the horizontal inequity in LTC services. To do so, we calculate the HIs for both formal and informal LTC. All the horizontal indexes are positive which shows a pro-rich distribution in the use of LTC. Both formal and informal care are concentrated in high SES households.

Table 2.4. Inequality in use of LTC (Concentration Indexes)

	AT	DE	SE	ES	IT	FR	DK	GR	BE	CZ
					Informal Care					
HH Total Income	-0.1875 ***	-0.2038 ***	-0.1634 ***	-0.1254 ***	-0.0936 ***	-0.2159 ***	-0.1672 ***	-0.1250 ***	-0.2164 ***	-0.1689 ***
	(0.0510)	(0.0361)	(0.0309)	(0.0262)	(0.0221)	(0.0309)	(0.0310)	(0.0205)	(0.0262)	(0.0375)
HH wealth	-0.1499***	-0.1674***	-0.0967 ***	-0.1332***	-0.1160 ***	-0.1331 ***	-0.1475 ***	-0.2045 ***	-0.2367 ***	-0.1843 ***
	(0.0526)	(0.0364)	(0.0304)	(0.0261)	(0.0234)	(0.0313)	(0.0308)	(0.0214)	(0.0256)	(0.0371)
					Formal Care					
HH Total Income	0.0176 *	0.0222 ***	0.0269 ***	-0.0026	0.0154 **	0.0003	0.0070	-0.0361 ***	0.0275 **	-0.0103
	(0.0089)	(0.0085)	(0.0101)	(0.0089)	(0.0072)	(0.0112)	(0.0089)	(0.0087)	(0.0116)	(0.0065)
HH wealth	0.0209 *	0.0375 ***	0.0506 ***	0.0427 ***	0.0243 ***	0.0111	0.0161	-0.0306***	0.0550 ***	-0.0175 ***
	(0.0086)	(0.0082)	(0.0097)	(0.0086)	(0.0070)	(0.0107)	(0.0087)	(0.0074)	(0.0113)	(0.0057)

Source: Authors' elaboration

Table 2.5. Horizontal inequity in use of LTC

	AT	DE	SE	ES	IT	FR	DK	GR	BE	CZ
					Informal Care					
HH Total Income	0.0880 ***	0.0775 ***	0.1221 ***	0.0944 ***	0.0487 ***	0.0914 ***	0.1001 ***	0.0487 ***	0.0901 ***	0.0761 ***
	(0.0128)	(0.0084)	(0.0074)	(0.0087)	(0.0068)	(0.0076)	(0.0069)	(0.0059)	(0.0063)	(0.0091)
HH wealth	0.0994 ***	0.0681 ***	0.1018 ***	0.0732 ***	0.0539 ***	0.0789 ***	0.0797 ***	0.0585 ***	0.0727 ***	0.1024 ***
	(0.0135)	(0.0091)	(0.0080)	(0.0083)	(0.0068)	(0.0074)	(0.0071)	(0.0058)	(0.0063)	(0.0093)
					Formal Care					
HH Total Income	0.1277 ***	0.0923 ***	0.1363 ***	0.1051 ***	0.0616 ***	0.1081 ***	0.1463 ***	0.0660 ***	0.1167 ***	0.1044 ***
	(0.0140)	(0.0090)	(0.0073)	(0.0105)	(0.0082)	(0.0081)	(0.0066)	(0.0075)	(0.0072)	(0.0102)
HH wealth	0.1360 ***	0.0899 ***	0.1017***	0.0918 ***	0.0721 ***	0.0935 ***	0.0982 ***	0.0972 ***	0.1034 ***	0.1150 ***
	(0.0154)	(0.0093)	(0.0079)	(0.0101)	(0.0083)	(0.0083)	(0.0070)	(0.0073)	(0.0072)	(0.0105)

Source: Authors' elaboration

2.4. DISCUSSION

In this paper, we have examined socioeconomic inequalities and inequities in the use of formal and informal LTC. This investigation focuses in European older adults from ten countries. We develop CIs and HIs using two approaches for SES: the net household income and the net household wealth. Our results suggest the pro-poor distribution for informal care and the pro-rich distribution of formal care when analysing the LTC access inequalities. On the other hand, we find pro-rich distributions when concentration indexes are calculated for the horizontal inequity. This means that LTC is concentrated among high SES households.

Our results regarding those variables capturing personal characteristics, socioeconomic and health status are consistent with previous literature (Larsson and Silverstein, 2004; Ilinca, Rodrigues and Schmidt, 2017; Cantarero-Prieto, Pascual-Sáez and Rodriguez-Sánchez, 2019). We also demonstrate the important role that family networks play in determining LTC services utilization. People with descendants receive more support and informal care that the ones who declare being childless or the ones whose descendants do not live near them. Moreover, we find a similar relationship between being single and receiving LTC in both cases. Single people use more LTC services than their non-single peers (Larsson and Silverstein, 2004; Broese van Groenou *et al.*, 2006; Albertini and Pavolini, 2017; Kjær and Siren, 2019). The composition of the variable *InformalCare* may determine the fact that single people receive informal care. Two items compose the variable: receiving care from someone inside or outside the household. At this regard, Schmidt) proves the existence of differences in the use of home care between single and non-single depending on their socioeconomic status.

Regarding the education level, we find a different effect on informal and formal care according to our results. Respondents with a high education level are more prone to using formal care while informal care is more spread among low education respondents. These results are consistent with our CIs. Both effects may be caused by the lack of information and by the impossibility of affording the high cost of a professional carer (Bonsang, 2009; García-Gómez *et al.*, 2015; Schmidt, 2017, 2018). Our results suggest that SES inequalities in formal LTC utilization are higher than for informal care. These inequalities may have increased in the last years due to the restrictive policies on LTC programs and their funds.

Moreover, we find pro-rich distributions when concentration indexes are calculated to analyse the horizontal inequity. We can conclude that both formal can informal care are concentrated in high class households when we take into consideration the need of care. These inequities may be partially explained by the fact that people who need others to have information on LTC or their entitlements are concentrated in low SES households (Schmidt, 2018).

Finally we would like to acknowledge some limitations of this study: firstly, we rely on self-reported data and the restrictions of this kind of data are well known. Secondly, information of regions inside the countries are not included due to the lack of precise indicators. Thirdly, we are comparing the access to LTC in European Countries where the LTC provision and laws are different. These limitations can be also understood as future research directions.

2.5. CONCLUSIONS

Our paper contributes to the existing literature on equity on LTC. It has several implications for the successful implementation of public policies. Those households and individuals who need more care and/or belong to a low SES are expected to be well covered by public systems. Nevertheless, we prove growing inequalities in the LTC use: while formal care is more spread among high SES, informal care is more used by low SES. Moreover, when we analyze the LTC use by the household needs, we conclude that all types of care are concentrated on high SES households. This proves the existence of two barriers to the access to LTC: firstly, belonging to a low SES group. Secondly, having more disabling conditions makes individuals more prone of having unmeet care necessities.

A better European strategy focused on tackling inequalities and inequities in the access to LTC is needed. We also recommend governments to promote policies improving their LTC systems as a measure to reduce the burden in the access to LTC especially for those people who need care

CHAPTER 3

PHYSICAL ACTIVITY AND HEALTHCARE UTILIZATION AMONG EUROPEAN OLDER ADULTS. A MULTI-VALUED TREATMENT EFFECTS ANALYSIS

Chapter 3. Physical activity and healthcare utilization among European older adults. A multi-valued treatment effects analysis

3.1. INTRODUCTION

Governments and supranational institutions are worried about the sustainability of national health systems due to demographic pressures (Jones et al. 2018; United Nations 2020). In the future, the proportion of people aged + 65 demanding more services will prevail in our societies. As a consequence, the public health expenditure is expected to increase (EUROSTAT, 2020a). To avoid cutting services, measures relying on preventive medicine have to be promoted. According to (Katz and Ali, 2009), preventive medicine can be divided into three groups: primary, which is focused on promoting health with recommendations such as following healthy diets, exercise routines or smoking avoidance; secondary prevention refers to the detection of presymptomatic diseases and the tertiary prevention focused on avoiding the disease progression to disability.

The World Health Organization (WHO) defines physical activity (PA) as “any bodily movement produced by skeletal muscles that requires energy expenditure”. Older adults (+65) are suggested to do at least 150 minutes of moderate PA or 75 minutes of vigorous PA per week (World Health Organization, 2018). According to the WHO, an absolute or relative scale can be used to define moderate PA and vigorous PA (World Health Organization, 2010). In absolute terms, activities requiring an intensity level of 3.0-5.9 or 6.0 or more times the intensity of rest refers to moderate and vigorous intensity activities respectively. On the other hand, a relative scale (from 0-10) considers the individual’s personal capacity. It ranges 5-6 for moderate PA or 7-8 for vigorous PA.

Physical activity has some health benefits: reducing mental disorders like depression (Harvey *et al.*, 2018) or helping to improve the clinical outcomes of patients suffering from liver problems (Berzigotti, Saran and Dufour, 2016). Other benefits are related to a diminution of the probability of suffering from atherosclerosis, cardiovascular diseases, diabetes mellitus type 2, hypertension, skeletal problems, some types of cancer (McPhee *et al.*, 2016; Orkaby and Forman, 2018; Gallardo-Alfaro *et al.*, 2019; Cauley and Giangregorio, 2020; Elliott *et al.*, 2020). Moreover, it helps maintaining functional capacity to do daily living activities (EU Working Group 'Sport & Health', 2008).

Therefore, engaging physical activities may lead to a reduction in the healthcare services utilization. Martin et al. (2006) suggest that engaging PA is related to a reduction in the number of times a person is hospitalized. Nevertheless, they do not find any association between PA and other healthcare services. Similar results are found by Woolcott et al. (2010) in their study for Canadians aged +65. They demonstrate that people who remain inactive are more likely to visit health professionals. Moreover, the literature revision made by Sari (2011) provides more evidence in this way. Older adults remaining active use fewer times hospital services like hospitalizations or emergency room (Jacobs et al. 2013). Rocca et al. (2015) also prove that as the level of PA increases, the reduction in the healthcare utilization becomes smaller. Gonzalez-Prieto (2016) demonstrates that practising sports reduces the number of emergency visits, inpatient hospital visits and in the number of hospitalization days. Cantarero-Prieto, Pascual-Sáez and Lera (2020) conclude that vigorous physical activity could reduce healthcare utilization in Southern European countries.

On the other hand, other studies have found different effects of physical activity on healthcare utilization. Lee et al. (2017) study the effect of lifestyles on the healthcare utilization in Taiwan. They include exercise habits in the definition of a healthy lifestyle. Their results suggest that engaging PA is associated with more physician visits. Similar results are found by Kang and Xiang (2017) in their study for US citizens aged 18 or over. They only show a reduction in the inpatient visits, while the outpatient visits increase when engaging physical activities.

The study attempts to disentangle the effects of engaging physical activities at advanced ages on healthcare utilization. We use data from six waves of the Survey of Health, Ageing and Retirement in Europe (SHARE). Propensity score and matching techniques are used to estimate this effect on the number of Outpatient Doctor Visits (ODV) and the number of Nights at Hospital (NH).

Our main contributions are the following. We provide new evidence on the potential reduction of ODV and NH by engaging physical activities at advanced ages. Our results suggest that governments should promote programs to engage people on practicing vigorous physical activities instead of just focusing in elementary physical activities. We also recommend that these programs should be focused on people aged 65-80. We prove that the potential reduction in the health services utilization is more significant in this age group.

The paper is organized as follows. The second section is based on the theoretical framework where methodology and data are presented. The third section is focused on the empirical analysis. Fourth section discuss our results and the final one presents the conclusions and policy implications.

3.2. MATERIAL AND METHODS

We use micro data from the Survey of Health, Ageing and Retirement in Europe (SHARE) (Börsch-Supan *et al.*, 2013). The SHARE survey is panel database focused on people aged 50 or older that covers 28 countries and includes microdata on personal characteristics, socioeconomic status, health status or lifestyles. Wave 1 (2004), Wave 2 (2007), Wave 4 (2011), Wave 5 (2013), Wave 6 (2015) and Wave 7 (2017) are used in this study. Wave 3 uses a different questionnaire (the SHARELIFE questionnaire), which registered information on individuals' childhood health. Thus, this wave is not included in our analysis. Table 3.1 provides a description of the variables and a summary of their main statistics. In addition, Table 3.2 presents a more complete description of the variables by age groups. Our main variables of study are *ModeratePA* and *VigorousPA.* Both variables have been created by using the data provided in questions BR015_PartInVigSprtsAct and BR016_ModSprtsAct from the SHARE survey. To transform this information into dichotomous variables, we have followed the National Health System recommendations for older adults: "engage activities that improve strength, balance and flexibility at least two times a week." (National Health System (NHS), 2018). Thus, *ModeratePA* and *VigorousPA* take value 1 if respondent engages PA at least twice a week. Physical activity related to physical work can be a health-endangering factor. Hence, we focus on retired people.

Table 3.1. Variables definition and summary of statistics

Variables	**Definition**	**Coding**	**Mean**	**Std. Dev.**
Healthcare utilization				
ODV	Outpatient Doctor Visits	Number of outpatient doctor visits in 365 days	6.722	8.692
NH	Nights hospitalized	Number of nights at hospital in 365 days	1.328	6.751
Physical Activity				
*NoPA**	No physical activity	1: whether respondent declares not practicing physical activities; 0:otherwise	0.250	0.433
*ModeratePA**	Moderate Physical Activity: Gardening, cleaning the car or walking	1: whether respondent declares only practicing activities that require a moderate level of energy consumption at least twice a week; 0: otherwise	0.427	0.495
*VigorousPA**	Vigorous Physical Activity: Sports or heavy housework	1: whether respondent declares also practicing activities that require a high level of energy consumption at least twice a week; 0: otherwise	0.323	0.468
Personal Characteristics and Socioeconomic Status				
Female	Gender of respondent	1: whether respondent gender is female; 0: otherwise	0.569	0.495
Age	Age of respondent	Number of years	68.558	9.015
Single	Marital status	1: respondent is single or widowed; 0:otherwise	0.278	0.448
PriEduc	Education level	1: whether respondent has primary education; 0: otherwise	0.462	0.499
SecEduc	Education level	1: whether respondent has secondary education; 0: otherwise	0.306	0.461
TerEduc	Education level	1: whether respondent has tertiary education; 0: otherwise	0.232	0.422
Health Status				
SAHS	Self-Assessed Health Status	Whether respondent has declared perceiving his/her health status as: 1. Excellent, 2. Very good, 3. Good, 4.Fair or 5. Poor	2.983	1.038
ADL	Limitations in activities of daily living	Number of limitations in activities of daily living	0.166	0.665
NCD	Number of chronic diseases	Number of chronic diseases	1.692	1.475
Depressed	Respondent suffers from depression (EURO-D Scale ≥ 4)	1: respondent suffers from depression. 0: Respondent does not suffer from depression	0.247	0.431
European System				
Social-democratic	Denmark and Sweden	1: whether respondent lives in this area; 0: otherwise	0.224	0.417
Continental	Austria, Belgium, France, Germany and Switzerland	1: whether respondent lives in this area; 0: otherwise	0.518	0.500
Mediterranean	Italy and Spain	1: whether respondent lives in this area; 0: otherwise	0.258	0.438

Source: Authors' calculations based on waves 1, 2, 4,5, 6 and 7 from the SHARE survey
**Note: Number of observations = 32,221*

Table 3.2. Summary of statistics by age group

	50-64 years old		65-80 years old		80+ years old	
Variables	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**
Healthcare utilization						
ODV	5.702	8.102	7.236	8.949	8.119	9.174
NH	0.906	5.137	1.433	7.220	2.416	9.200
Physical Activity						
NoPA	0.204	0.403	0.247	0.431	0.432	0.495
ModeratePA	0.396	0.489	0.453	0.498	0.423	0.494
VigorousPA	0.400	0.490	0.300	0.458	0.145	0.352
Personal						
Female	0.580	0.494	0.555	0.497	0.593	0.491
Single	0.211	0.408	0.284	0.451	0.505	0.500
PriEduc	0.377	0.485	0.493	0.500	0.635	0.481
SecEduc	0.353	0.478	0.287	0.452	0.224	0.417
TerEduc	0.270	0.444	0.221	0.415	0.140	0.347
Health Status						
SAHS	2.772	1.029	3.058	1.019	3.416	0.976
ADL	1.276	1.263	1.892	1.503	2.313	1.655
NCD	0.218	0.413	0.252	0.434	0.333	0.471
Depressed	0.079	0.426	0.159	0.618	0.525	1.243
European Region						
Social-democratic	0.233	0.423	0.218	0.413	0.219	0.414
Continental	0.538	0.499	0.505	0.500	0.505	0.500
Mediterranean	0.229	0.420	0.277	0.448	0.275	0.447

Source: Authors' calculations based on waves 1, 2, 4,5, 6 and 7 from the SHARE survey

Variables regarding personal characteristics (age, gender, and marital status) are included. To control for age related factors and compare individual, age groups are included in the second stage of the analysis: people aged between 50 and 64 years old, 65 and 80 years old and those who are older than 80. A variable for gender is included (*Female)* since women demand more healthcare services (Prince *et al.*, 2015). Moreover, variables capturing the respondents' marital status (*Single)* and socioeconomic status (*Educ* – Education level) are also included. To control for health status, we have included the self-assessed health status (*SAHS),* the chronicity level (*NCD*), the number of limitations in daily activities (*ADL*) and the depression status (*Depressed).* Region dummy variables are included in the model to control for specific regional differences: Mediterranean (Italy and Spain), Continental (Austria, Belgium, France, Germany, and Switzerland) and Social-democratic (Denmark and Sweden).

To measure the impact of the PA level on the number of ODV and NH, we apply the inverse-probability-weighted regression adjustment. The estimators obtained are said to be doubly robust. This technique only requires one model to be correctly specified: either the conditional mean or the propensity score (Wooldridge 2007; Robins and Rotnitzky 1995; Cattaneo 2010).

We distinguish three groups of people: the ones who are sedentary, the ones who just engage moderate activities and the ones that also engage vigorous activities. Being in one group eliminates the possibility of being in the other one. The analysis is mad in terms of counterfactuals (Cameron and Trivedi 2005, chap. 25). This means that our variables of interest (*ModeratePA* and *VigorousPA*) are compared with the sedentary group.

The outcome of individual *i* is y_t or y_0 representing whether she/he receives treatment or not respectively. Hence, variable *T* is the treatment variable which takes integer values between 0 and 2. Consider a large population of N individuals. For each individual, we have a random vector (*Yi, Ti, Xi).* Let consider $D_{it}(T_i)$ the indicator of receiving the treatment t for individual i:

$$D_{it}(T_i) = \begin{cases} 1, & if\, T_i = 1, 2 \\ 0, & if\, T_i = 0 \end{cases} \tag{1}$$

Let be X_i a vector of observable individuals' characteristics that affects the selection of the treatment. In this case, $T_i = 0$ captures a sedentary lifestyle while $T_i = 1\ and\ T_i = 2$ capture a moderate and high level of physical activity. Only one of the potential outcomes can be observed, then the observed outcome *Yi* can be expressed in terms of $D_{i,t}(T_i)$ and the potential outcomes *Yit:*

$$Y_i = \sum_{K=0}^{2} D_{it}(T_i) Y_{it} \tag{2}$$

Rosenbaum and Rubin (1983) define the Average Treatment Effect on the Treated (ATET) in this case ATET is the average effect of engaging any physical activity among those respondents who are physically active. The individual-level treatment effect can be estimated through the difference of two potential outcomes $(Y_{im} - Y_{il})$ depending on the treatment level (m or l). Thus, the population average treatment is:

$$\Delta ml = E[Y_{im} - Y_{il}] = \mu_m - \mu_l \tag{3}$$

According to Imbens (2000), it is necessary to conditionate on X_i to estimate Δml. The assumption of weak unconfoundedness assumes the assignment of each treatment is independent of the potential outcome and can be stated as follows:

$$Y_{it} \perp D_{it}(T_i)|X_i \, \forall \, t \in \mathfrak{T} \tag{4}$$

ATET is defined as

$$ATET_{\tilde{t}\check{t}} = E\{(y_{\tilde{t}} - y_0)|t = \check{t}\} \tag{5}$$

Where $\tilde{t}$ represents the moderate or vigorous physical activity level which is compared with the sedentary group(y_0). The $\check{t}$ allows to restrict the sample to the ones who have received the treatment

3.3. RESULTS

In general, our findings suggest that physically active people, demand fewer healthcare services than their non-active peers. Two different tables showing our estimates are presented: Table 3.3 ATET models for a moderate PA level while Table 3.4 includes model for vigorous PA level.

People may reduce the nights they pass at hospital by 0.222 – 0.533 nights and their visits to a physician 0.032 – 0.517 times, if they include practicing moderate physical activities in their habits. The age group whose PA engagement affects more to their healthcare utilization is the 50-64 years old in the case of ODV. While for the number of NH, it is the group of people aged 65-80.

Table 3.3. ATET on number of ODV and NH by *ModeratePA*

	Outpatient Doctor Visits (ODV)		Nights at Hospital (NH)	
	ATET	z	ATET	z
Single Matching				
Age 80+	-0.163	-0.49	-0.499	-1.93
	(0.335)		(0.258)	
Age 65-80	-0.494	-3.21	-0.533	-4.62
	(0.154)		(0.115)	
Age 50-64	-0.463	-2.84	-0.202	-2.12
	(0.163)		(0.095)	
Three matches				
Age 80+	-0.032	0.11	-0.405	-1.68
	(0.277)		(0.242)	
Age 65-80	-0.468	-3.14	-0.408	-3.97
	(0.149)		(0.103)	
Age 50-64	-0.517	-3.26	-0.222	-2.38
	(0.159)		(0.094)	
Three matches – bias adjustment				
Age 80+	0.044	0.160	-0.398	-1.65
	(0.277)		(0.242)	
Age 65-80	-0.464	-3.12	-0.407	-3.96
	(0.149)		(0.103)	
Age 50-64	-0.499	-3.15	-0.219	-2.34
	(0.159)		(0.94)	
Three matches – allowing heterokedasticity				
Age 80+	0.301	0.09	-0.405	-1.43
	(0.326)		(0.284)	
Age 65-80	-0.468	-2.72	-0.406	-3.26
	(0.172)		(0.125)	
Age 50-64	-0.517	-3.05	-0.222	-2.01
	(0.169)		(0.111)	

Source: Authors' calculations based on SHARE survey (Waves 1,2,4,5, 6 and 7)
Note: Standard deviations are under the estimates.

Table 3.4. ATET on number of ODV and NH by VigorousPA

	Outpatient Doctor Visits (ODV)		Nights at Hospital (NH)	
	ATET	z	ATET	z
Single Matching				
Age 80+	-1.062	-3.22	-0.876	-3.38
	(0.330)		(0.260)	
Age 65-80	-0.723	-5.81	-0.295	-3.24
	(0.125)		(0.091)	
Age 50-64	-0.517	-4.24	-0.167	-1.95
	(0.122)		(0.085)	
Three matches				
Age 80+	-0.842	-2.84	-0.660	-3.07
	(0.297)		(0.215)	
Age 65-80	-0.720	-5.91	-0.307	-3.85
	(0.122)		(0.080)	
Age 50-64	-0.513	-4.32	-0.172	-2.01
	(0.119)		(0.086)	
Three matches – bias adjustment				
Age 80+	-0.842	-2.84	-0.659	-3.07
	(0.297)		(0.215)	
Age 65-80	-0.719	-5.90	-0.307	-3.84
	(0.122)		(0.079)	
Age 50-64	-0.512	-4.31	-0.171	-2.01
	(0.119)		(0.085)	
Three matches – allowing heterokedasticity				
Age 80+	-0.843	-2.75	-0.659	-2.99
	(0.307)		(0.220)	
Age 65-80	-0.719	5.75	-0.307	-3.78
	(0.125)		(0.081)	
Age 50-64	-0.513	4.30	-0.173	-2.05
	(0.120)		(0.084)	

Source: Authors' calculations based on SHARE survey (Waves 1,2,4,5, 6 and 7)
Note: Standard deviations are under the estimates.

On the other hand, practicing PA requiring a vigorous amount of energy, may reduce the outpatient doctor visits by 0.513-0.842 times in a year depending on the respondent age. This reduction is higher for the elderly age group. Moreover, people including vigorous activities pass between 0.172 – 0.659 less nights at hospital per year. In this case, the group of people who take more advantage of this reduction is again the 80+ years old group

3.4. DISCUSSION

In this study, we have examined the relationship between physical activities and healthcare utilization among adults aged more than 50 years old from three European regions. We have developed four different models to provide robust results: single match, three matches, bias-adjustment and allowing for heterokedasticity.

Our results support the hypothesis that states that physical activity reduces healthcare utilization among older adults (Woolcott *et al.*, 2010; Sari, 2011). Nevertheless, this study provides new insights in the following aspects: Firstly, we demonstrate that engaging physical activities has a relevant impact on NH and ODV. Other studies only assess an effect on hospital care (Martin *et al.*, 2006; Jacobs *et al.*, 2013). Secondly, we prove that the higher the PA intensity is, the higher the reduction on healthcare services utilization. On the other hand, Rocca et al. (2015) gives evidence in the opposite sense. They differentiate between direct and indirect effects of PA on healthcare utilization. Regarding direct effects, their results suggest that vigorous activities are positively associated with healthcare use.

In terms of primary care utilization, significant reductions can be undertaken in many different ways like for example practicing physical activities. The average number of ODV in our sample are 8.09, 7.21 and 5.68 for the 80+, 65-80 and 50-64 groups respectively. Considering the average treatment effect on the treated, we can conclude that a moderate PA level may reduce ODV by about 6.43% - 8.78% depending on the age group. On the other hand, a vigorous PA level may reduce the primary care visits by 9.03% - 10.40%.

The average number of nights a person is hospitalized (NH) in our sample are 2.40, 1.43 and 0.91 for the 80+, 65-80 and 50-64 age groups respectively. Our results suggest a high reduction on the hospitalization if people practice physical activities. Depending to the PA intensity level, the potential reduction ranges from 16.57%-28.50% to 18.93%-27.43% in the case of moderate and vigorous level respectively.

Summing up, including physical activities in the habits may reduce significantly the healthcare utilization. Thus, our results support the idea that governments should promote PA to reduce the cost of aging societies. Therefore, in line with studies like the one by Dallmeyer, Wicker, and Breuer (2017), population aging demands further actions, public policies and initiatives to promote PA in general but especially for the eldest age group.

This study has some potential limitations. The effects on healthcare utilization are estimated under the use of self-reported data regarding PA, which cannot be independently verified. This means that some of our results can be overestimated. Moreover, SHARE only measures the frequency of the PA but not the duration. More effort in finding new ways of measuring PA has to be carried out.

3.5. CONCLUSIONS

This article aims at discussing the effect of physical activity on the primary care utilization and the length of stays at hospital in Europe. Our results add new evidence in this field by focusing on the elderly and distinguishing between moderate and vigorous PA levels.

Although age differences arise in our analysis, we can conclude practicing physical activities have a clear positive impact in the reduction of ODV and NH. This positive average effect is generally more relevant for the group of people aged from 50 to 64 and 80+ if moderate level activities are included in the habits. On the other hand, vigorous activities affect more on the 80+ years old group. While moderate activities have an important impact on the *NH* by reducing them by 16.57% - 28.5%, the reduction in ODV ranges only from 6.43% to 8.78%. Similar dynamics are demonstrated for vigorous activities.

Therefore, the results from this study can be used to guide institutions and governments in the policy design for the elderly and healthcare utilization. We encourage policymakers to promote public programs to extend physical activity among elder citizens. Thus, policymakers should promote programs aiming adhering people to a healthy routine that includes PA (Stathokostas *et al.*, 2017; Luan *et al.*, 2019). Although, focusing in promoting moderate activities would be beneficial to the health system, programs enhancing vigorous activities would be more appropriate.

CHAPTER 4

HOW CAN A HEALTHY DIET AFFECT THE HEALTHCARE UTILIZATION? AN EMPIRICAL APPROACH FOR EUROPEAN OLDER ADULTS

Chapter 4. How does a healthy diet affect the healthcare utilization? An empirical approach for European older adults

4.1. INTRODUCTION

European population is changing in terms of average age, dependency ratios, life expectancy, family structures, birth rates, etc. As a result, the number of elderly people has increased considerably (European Commission, 2019). Thus, Governments are focusing on preventive medicine policies to ensure the national health systems' sustainability. Prevention policies have been included in political agendas (Katz and Ali, 2009). Following healthy habits in older ages may attenuate demographic pressure by reducing the risk of polypharmacy or the use of health services (Hernández-Aceituno *et al.*, 2017). Moreover, people who do not follow healthy diets are more prone of suffering from multimorbidity (Afshin *et al.*, 2019).

The Council of the European Union (Council of the European Union, 2014) has invited Member States to promote new policies to enhance healthy diets and physical activity. Dietary patterns play a key role determining the health status of an individual. One of the most famous is the Mediterranean Diet due to its potential benefits for health. It can be defined as the dietary pattern primarily found in Spain, Greece or Italy (Trichopoulou *et al.*, 2014). Following the Mediterranean diet could reduce the probability of suffering from cardiovascular diseases and diabetes (Martinez-Gonzalez and Bes-Rastrollo, 2014; Salas-Salvadó *et al.*, 2014) or even help in the reduction of cognitive decline (Knight, Bryan and Murphy, 2016). In general, unhealthy dietary patterns may enhance the cognitive decline (Tsai, 2015; Abbatecola, Russo and Barbieri,

2018) while healthy ones reduce the risk of suffering from depression (Kim, Shin and Song, 2016)

Consequently, dietary habits may affect healthcare services demand by increasing the utilization and the public expenditure associated. According to Del Pozo Rubio et al. (2018), those people who do not eat fruit or vegetables are associated to more emergency room visits. This paper is focused on the primary prevention measures by analyzing the effect of healthy dietary patterns on healthcare utilization. We focus on nine European countries (Austria, Belgium, Denmark, France, Germany, Italy, Spain, Sweden and Switzerland). We use Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the Survey of Health, Ageing and Retirement in Europe (SHARE). Propensity score and matching techniques are used to estimate this effect on the number of Outpatient Doctor Visits (ODV) and the Nights at Hospital (NH).

The paper is organized as follows. The second section is based on the theoretical framework where methodology and data are presented. The third section is focused on the empirical analysis. Fourth section discuss our results and the final one presents the conclusions and policy implications

4.2. MATERIAL AND METHODS

To test our hypotheses, we use micro data from the Survey of Health, Aging and Retirement in Europe (SHARE) (Börsch-Supan *et al.*, 2013). It includes microdata on personal characteristics, socioeconomic status, health status or lifestyles for people aged 50 or older from 28 countries. This study uses the most recent data, which are Wave 4

(2011), Wave 5 (2013), Wave 6 (2015) and Wave 7 (2017). Wave 1 and Wave 2 do not content data on dietary habits. Moreover, Wave 3 is not included since the information provided in this wave is not useful for our analysis. This wave use a different questionnaire (the SHARELIFE questionnaire), which registered information on individuals' childhood health.

Table 4.1 provides a description of the variables and a summary of their main statistics. In addition, Table 4.2 presents a more complete description of the variables by regions which are constructed following the same criterion as in Chapter 2: the EuroVoc (EuroVoc (European Commission), 2019) criteria. Northern Europe (Denmark and Sweden), Southern Europe (Italy and Spain) and Western Europe (Austria, Belgium, France, Germany, Switzerland).

Table 4.1. Variables definition and summary of statistics

Variables	**Definition**	**Mean**	**SD**
Healthcare utilization			
ODV	Number of outpatient doctor visits in 365 days	6.952	8.675
NH	Number of nights at hospital in 365 days	1.528	7.634
Diet Habits			
DiaryProd	Consumption frequency* of dairy products: milk, cheese, yogurt or protein supplement	1.439	0.928
LegEggs	Consumption frequency* of legumes, beans or eggs	2.816	1.157
MeatFish	Consumption frequency* of meat, fish or poultry	1.789	0.876
FruitVeget	Consumption frequency* of fruits and vegetables	1.225	0.610
DegreeHealthyDiet	Values from 0 to 4. 0 represents not following any recommendation, while 4 corresponds to a person who follows all the recommendations	2.295	0.914
NoHealthyDiet	1: respondent does not follow at least 3 diet recommendations; 0: otherwise	0.599	1.789
Personal Characteristics and Socioeconomic Status			
Female	1: whether respondent gender is female; 0: otherwise	0.561	0.496
Age	Number of years	71.862	7.895
Single	1: respondent is single or widowed; 0:otherwise	0.295	0.456
PriEduc	1: whether respondent has primary education; 0: otherwise	0.300	0.458
SecEduc	1: whether respondent has secondary education; 0: otherwise	0.469	0.499
TerEduc	1: whether respondent has tertiary education; 0: otherwise	0.230	0.421
Health Status			
SAGHS	1: whether respondent has declared perceiving his/her health status is good, very good or excellent; 0: otherwise	0.658	0.474
Chronicity	Number of chronic diseases	1.843	1.524
ADL	Number of limitations in Activities of Daily Living	0.230	0.820

Source: Authors' calculations based on Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the SHARE survey

Note: Number of observations = 29,831

**Frequency is measured in the following way: 1: Every day; 2: 3-6 times a week; 3: twice a week; 4: once a week and 5: less than once a week*

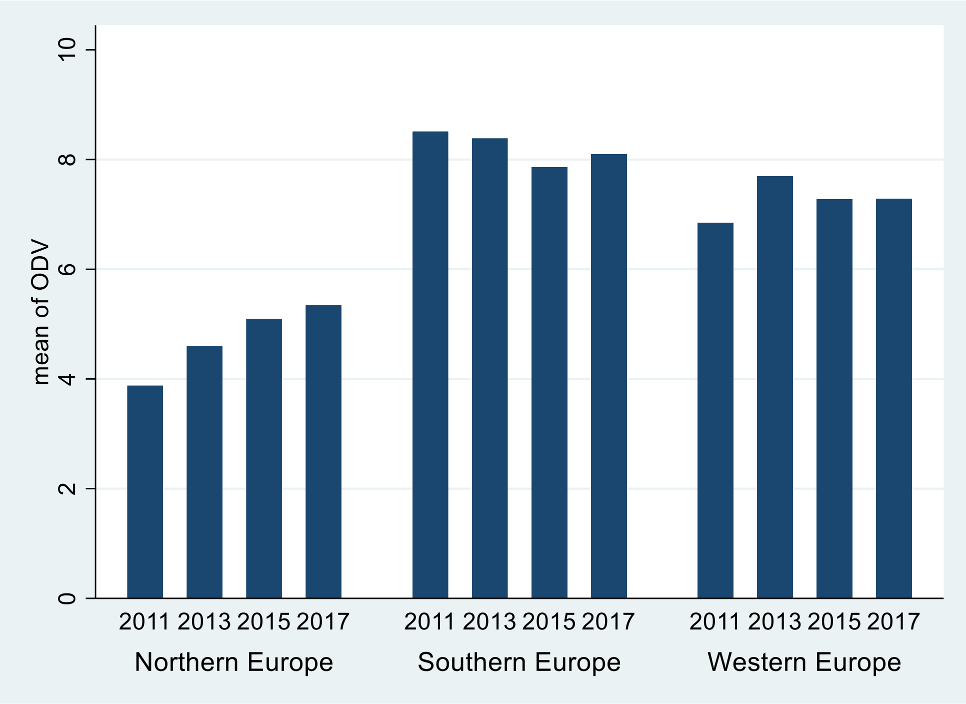
Table 4.2. Summary of statistics by European regions

	NORTHERN EUROPE		SOUTHERN EUROPE		WESTERN EUROPE	
Variables	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**
Healthcare utilization						
ODV	4.774	6.934	8.199	9.380	7.284	8.817
NH	0.892	4.232	1.471	7.878	1.865	8.667
Diet patterns						
DiaryProd	1.189	1.416	1.632	1.088	1.450	0.920
LegEggs	2.423	1.202	2.774	1.028	3.028	1.152
MeatFish	1.442	0.672	2.115	0.829	1.770	0.919
FruitsVeget	1.364	0.783	1.172	0.507	1.189	0.557
DegreeHealthyDiet	2.293	0.855	2.424	1.010	2.205	0.870
NoHealthyDiet	0.605	0.489	0.512	0.499	0.648	0.478
Personal Characteristics and Socioeconomic Status						
Female	0.567	0.495	0.562	0.496	0.558	0.497
Age	71.604	7.842	72.695	7.865	71.511	7.905
Single	0.307	0.461	0.236	0.425	0.323	0.467
PriEduc	0.169	0.375	0.626	0.484	0.175	0.382
SecEduc	0.462	0.499	0.318	0.466	0.559	0.497
TerEduc	0.368	0.482	0.056	0.231	0.264	0.441
Health Status						
SAGHS	0.755	0.430	0.504	0.500	0.699	0.459
Chronicity	1.647	1.416	2.095	1.630	1.795	1.493
ADL	0.167	0.701	0.329	1.042	0.204	0.718

Source: Authors' calculations based on Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the SHARE survey

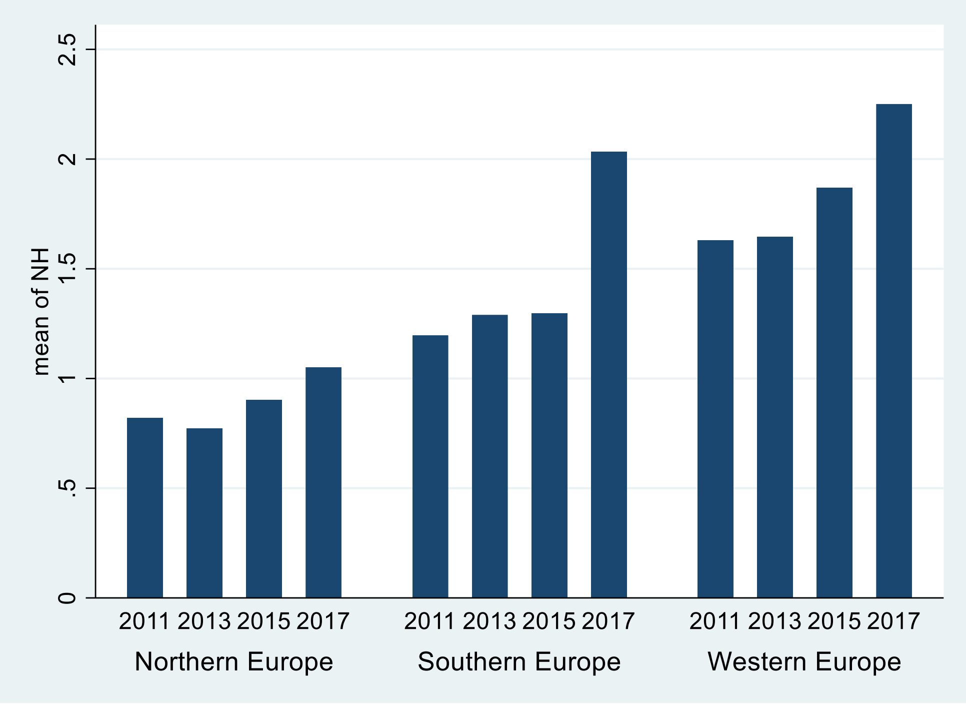
Figure 4.1 and Figure 4.2 show the healthcare utilization patters by year and region. In terms of health care utilization, Southern Europe leads the group of regions in terms of number of ODV while Northern Europe is the region where the people visit fewer times a doctor. On the other hand, Western Europe is the region where people pass more nights at hospital.

Figure 4.1. Number of Outpatient Doctor Visits by year and region.



Source: Authors' calculations based on Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the SHARE

Figure 4.2. Number of Nights at Hospital by year and region.



Source: Authors' calculations based on Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the SHARE

Furthermore, our main variables of study are *DiaryProd, LegEggs, MeatFish and FruitVeget.* They represent the number of times dairy products, legumes, eggs, meat, poultry, fish, fruit and vegetables are consumed in a week by the respondent. In order to check whether a person follows a healthy diet, we follow the Spanish Society of Nutrition criteria: Diary products, fruits and vegetables should be consumed every day. On the other hand, legumes, eggs, meat and fish from 3 to 6 times per week (Aranceta-Bartrina *et al.*, 2019). Since we have four variables of interest, we have created a new covariate capturing the attachment degree to a healthy diet (*DegreeHealthyDiet).* Once this variable is created, we divide the people in two groups: the ones who are considered to follow a healthy diet and the ones who do not. To build these groups we have assumed that the first group should be composed by the individuals whose attachment degree to recommendations is less than three, while the other people belong to the healthy diet group.

Finally, as control variables, we have included socio-demographic and health factors that are considered relevant in the empirical literature: age, gender, marital status, education level, limitations in activities and comorbidity (Bähler *et al.*, 2015; Prince *et al.*, 2015; Cantarero-Prieto, Pascual-Sáez and Blázquez-Fernández, 2016).

To assess how being engaged to a healthy diet affects the ODV and the NH, we have considered two different groups: the ones who do not follow a healthy diet and another with the people who do so. Belonging to the unhealthy group eliminates the possibility of being in the healthy one. At this regard, our treatment variable (*T*) is *NoHealthyDiet*. It takes value 1 if the person do not follow a healthy diet and 0 otherwise. Our analysis is carried out in terms of potential outcomes or counterfactuals (A. Cameron and Trivedi, 2005, chap. 25). Let be y_1 and y_0 the outcome of individual i if respondent receives the treatment or not respectively. Then, we have a random vector (y_0, y_1, T). The causal effect will be measured through y_1-y_0. Rosenbaum and Rubin (Rosenbaum and Rubin, 1983) define the following possible measurements. The Average Treatment Effect (ATE) and the Average Treatment Effect on the Treated (ATET):

$$ATE = E(y_1 - y_0) \tag{1}$$

$$ATET = E(y_1 - y_0 \,|T = 1) \tag{2}$$

The observed outcome is:

$$Y = TY_1 + (1 - T)Y_0 = \begin{cases} Y_0, & if\ T = 0 \\ Y_1, & if\ T = 1 \end{cases} \tag{3}$$

Let be x a vector of observable variables affecting the selection of the treatment. We use the specific ignorability assumption for the ATET since our calculations are based on this measurement (Rubin, 1978):

$$y_0 \perp T|x \tag{4}$$

Equation (4) implies conditional independence of participation and y_0. It means the no existence of omitted variable bias when x (vector of observable variables) is included in the regression.

The Stable Unit Treated Value Assumption (SUTVA) is an important assumption included in our model. It states that the potential outcome of an individual is not affected by the potential outcome of another individual. In order to compare individuals from different treatments groups (with similar characteristics) we use the Propensity Score (5), which is the conditional probability of receiving the treatment (Rosenbaum and Rubin, 1983):

$$e(x) = P[T = 1|x] \tag{5}$$

The predicted propensity score $\hat{e}(x)$ is calculated through a logistic regression with the following form:

$$\log\left\{\frac{e(x)}{1 - e(x)}\right\} = X\beta \tag{6}$$

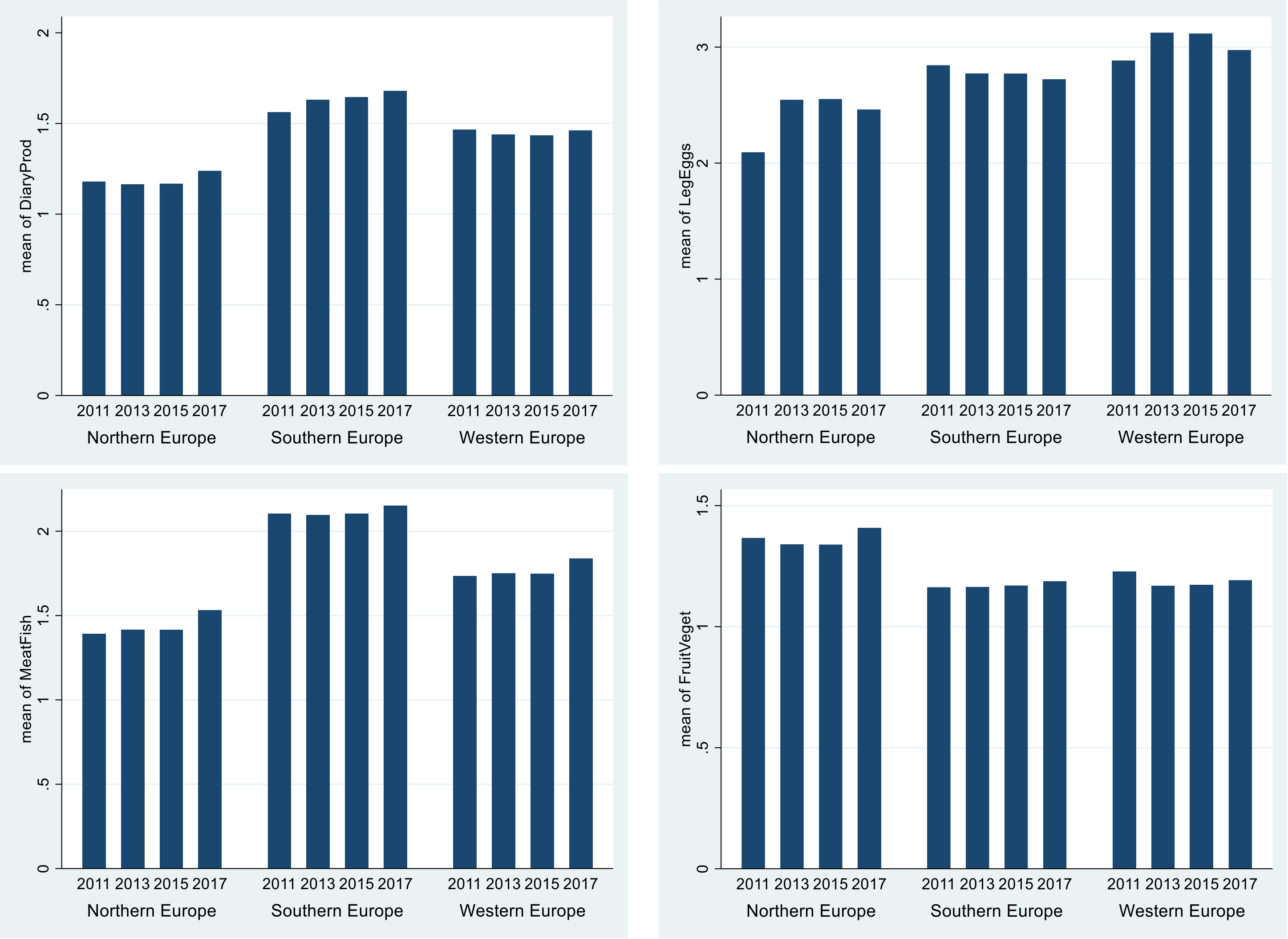
This propensity score is used to calculate the ATET. Under the assumptions of causal inference and the definition (6) the following equation for the ATET holds:

$$ATET = E_{e(x)}\big(E(y_1|e(x), T = 1) - E(y_0|e(x)x, T = 0)\big) \tag{7}$$

4.3. RESULTS

Figure 4.3 shows the dietary patterns by region and year. Following the Spanish Society of Nutrition criteria (Aranceta-Bartrina *et al.*, 2019), Northern Europe is the region where more people accomplish the objective of eating every day fruit/vegetables and dairy products. On the other hand, Western and Southern Europe are the best on having legumes/eggs and meat/fish from 3-6 times per week respectively. Moreover, Northern Europeans fail in these two items, while Southern and Western Europeans only fail in the consumption of dairy products and fruits/vegetables respectively. This result implies huge regional disparities which can be the result of different socioeconomic characteristics (Andreeva *et al.*, 2016).

Figure 4.3. Diet Patterns by year and region.



Source: Authors' calculations based on Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the SHARE survey Note: 1. Every day. 2. 3-6 times a week. 3. Twice a week. 4. Once a week. 5. Less than once a week.

Moreover, Table 3 shows our results for the Average Treatment Effect on the Treated for the number of ODV and NH by engaging a non-healthy dietary habit. Two different models are estimated to obtain robust results: Model 1 contain variables regarding personal characteristics and socioeconomic status, while Model 2 also includes health information (number of chronic diseases, self-assessed, health status or the number of limitations in daily activities).

Firstly, our results indicate the presence of a gender gap. Our results are not statistically significant for men in any health service or region. On the other hand, results for women are significant. It could mean that women may suffer more from following an unhealthy diet. In both models, women who follow an unhealthy diet visit more times a doctor. This increment ranges 0.405-1.096 and 0.241-1.166 in model 1 and model 2 respectively. Our results suggest that women following unhealthy diets increase their ODV by 5.06%-8.5%, 12.99%-13.82% and 5.43%-7.02% in Northern, Southern and Western Europe respectively depending on the model. Secondly, the lowest effect corresponds to Northern Europe (5.06%), while the highest to Southern Europe (13.82%). This finding proves the existence of regional disparities, which deepen the inequality among Europeans. Thirdly, our results also demonstrate that diet habits do not have a relevant effect on the number of nights at hospital. Other factors like the number of chronic diseases, number of past hospitalizations, depression or polypharmacy may explain better the number of nights at hospital (Lohman *et al.*, 2018; Wu, Zhu and Ghitza, 2018; Thorell *et al.*, 2019).

Table 4.3. Nearest Neighbor Matching results on the number of ODV and NH by gender and European region

	Women				Men			
Variable	**Model 1**		**Model 2**		**Model 1**		**Model 2**	
	ATET	z	ATET	z	ATET	z	ATET	z
ODV								
Northern Europe	0.405	1.93	0.241	1.15	0.478	1.71	0.252	0.85
	(0.210)		(0.210)		(0.280)		(0.296)	
Southern Europe	1.096	3.97	1.166	4.05	-0.301	-0.10	0.052	0.16
	(0.276)		(0.288)		(0.306)		(0.324)	
Western Europe	0.537	2.57	0.415	1.92	0.266	1.26	0.360	1.65
	(0.209)		(0.0.216)		(0.212)		(0.218)	
NH								
Northern Europe	0.176	1.33	0.226	1.75	0.090	0.59	0.025	0.14
	(0.132)		(0.129)		(0.153)		(0.180)	
Southern Europe	0.149	0.59	-0.014	-0.05	-0.052	-0.20	-0.347	-0.98
	(0.250)		(0.298)		(0.253)		(0.356)	
Western Europe	0.433	2.40	0.217	0.90	-0.350	-1.38	-0.612	-1.67
	(0.181)		(0.241)		(0.255)		(0.367)	

Source: Authors' calculations based on Waves 4 (2011), 5 (2013), 6 (2015) and 7 (2017) from the SHARE survey

Note: Standard deviations are under the estimates. Model 1 includes socioeconomic variables. Model 2 includes socioeconomic and health variables

4.4. DISCUSSION

Demographic pressure on health services has been widely studied and has been proved to have a negative effect on these services. New measures that include promoting healthy dietary habits are necessary to reduce this effect. Precisely, this study is focused on this issue and tries to provide new insights to explain the effect of dietary patterns on healthcare utilization.

Also, we conclude that gender matters when studying the effect of unhealthy diets on the number of ODV. Women are more vulnerable to this effect than men. Additionally, elderly women are more prone to suffering from disabling conditions like dementia (Snyder *et al.,* 2016) or delivering care which affects their wellbeing (Schwarzkopf *et al.*, 2012; World Health Organization, 2017; Patterson, 2018). At this regard, recent literature (Santos *et al.,* 2015; Andreeva *et al.,* 2016; De Mestral *et al.*, 2017; Sui *et al.*, 2017) prove that socio-demographic characteristics such as gender or education have different effects on dietary patterns.

Moreover, we demonstrate the existence of regional disparities. Southern European women are more vulnerable than Northern European women. Not only socio-demographic characteristics explain this fact. Different public health systems exist in Europe. Their funding and provision of care differ depending on the country. According to Peiro and Maynard (2015) geographic characteristics affect healthcare utilization. Specifically, hospital region factors are proved to affect significantly on healthcare utilization (Godoy and Huitfeldt, 2018).

To our knowledge, we provide new evidence to the existent literature. Firstly, we measure the potential effects of non-healthy dietary patterns on the number of ODV and the NH in European countries. Secondly, we suggest the existence of deep regional differences regarding the effect of diet patterns on healthcare utilization. Finally, the significance of our results for women indicate a specific women' vulnerability to unhealthy dietary patterns. The diet type followed may affect more to women and increase their healthcare utilization.

Nevertheless, some limitations should be considered. Our results rely on self-reported data and the restrictions of this kind of data are well known. Moreover, a deeper analysis in every country is necessary to assess better the specific country cultural characteristics.

4.5. CONCLUSIONS

In the study above, we present an empirical analysis of the effect of non-healthy dietary patterns on the ODV and NH. Moreover, we differentiate by gender and region. Our results suggest that this effect is relevant when the ODV and women are studied. Dietary habits do not seem to play a relevant role in the determination of men healthcare utilization. According to our results, women not following a healthy diet visit 0.405-1.166 times more a doctor than their peers. Unhealthy diets may increase the ODV by 8.5% in Northern Europe, 13.85% in Southern Europe and 7.02% in Western Europe.

Our results add new empirical evidence on the effect of diet on healthcare utilization. Firstly, we suggest the existence of a "dietary gap" between men and women. Women seem to be more vulnerable to the bad outcomes of unhealthy diets. Secondly, we demonstrate the relevant impact of dietary habits on women healthcare use. Thirdly, more attentions should be paid to Southern Europe. Although this region is well known for the Mediterranean Diet, its female citizens seems to be more affected by unhealthy dietary patterns...

In terms of policy implications, the results of the present study help policymakers to design deterrent measures such as new taxes on unhealthy food or new programs that promote healthy diets to reduce the pressure on health services. These programs could include some types of subsidies to healthy food, there exists some evidence that shows the efficacy of these measures (Lee et al. 2019). Moreover, they should pay special attention to elderly women and their dietary patterns to close this “dietary gap”. Specific programs for elderly women must be promoted. Undoubtedly, more effort is needed in Southern Europe to tackle women’ vulnerability.

.

CHAPTER 5

HEALTHCARE UTILIZATION AND HEALTHY LIFESTYLES AMONG ELDERLY PEOPLE LIVING IN SHOUTERN EUROPE: RECENT EVIDENCE FROM THE SHARE

Chapter 5. Healthcare utilization and healthy lifestyles among elderly people living in Southern Europe: recent evidence from the SHARE[3]

5.1. INTRODUCTION

Demographic change has become one of the most significant transformations in societies since it is expected that the ratio of elderly people over the entire population rises from 18% to 28% by 2060 (European Commission 2013, 2015). The European Union (EU) is concerned about how these population projections are going to affect the health care system over the next decades (Tordrup, Angelis and Kanavos, 2013; Vollaard and Martinsen, 2017)). Hence, if the European welfare state wants to continue being a cornerstone, it is necessary to evaluate this impact because health expenditure currently represents, on average, 15.3% of the total public expenditure in the EU28 (Eurostat, 2020). Older adults have a higher probability of using and expending more on health care (Denton, Mountain and Spencer, 2006; Aguado *et al.*, 2012; de Meijer *et al.*, 2013). Moreover, trying to disentangle how elderly people is using the health care system has a major relevance to generate forecasts based on plausible scenarios for the next decades. Achieving more equity among population and providing better services regardless the income or the economic status are key EU key objectives (Tordrup, Angelis and Kanavos, 2013; Viia *et al.*, 2016; Vollaard and Martinsen, 2017).

In many countries, elderly people play a major role in the society. Due to the economic crisis, some grandfathers have to be in charge of their descendants (children and grandchildren) helping them with housing or food. Hence, the economic limitations of this

---

[3] Cantarero-Prieto, D., Pascual-Sáez, M. & Lera, J. Healthcare Utilization and Healthy Lifestyles among Elderly People Living in Southern Europe: Recent Evidence from the SHARE. Atl Econ J 48, 53–66 (2020). https://doi.org/10.1007/s11293-020-09657-3

cohort have increased. Jeon et al. (2017) studied this issue for Korea considering the role of the most important social program, the National Basic Livelihood Security System (NBLSS) that provides non-contributory transfers to low-income families. An important finding is that the low-income disabled individuals not participating in the NBLSS have greater problems accessing medical services than those participating in the program.

The future of European health care services depends on the organization and funding measures (Åhs and Westerling 2006; Thomson et al. 2009; Hosseinichimeh et al. 2016; Jeon et al. 2017). Regidor et al. (2008) identified differences in the use of health care services between the public and private sectors. Hence, the type of health care model (National Health Services or Social Security Systems) is relevant. In addition, in some countries, visiting a specialist requires a general practitioner (GP) referral (Majo and van Soest, 2012). Thus, waiting times could increase the use of emergency services.

Going to a specialist may require an economic effort in those systems where total coverage is not compulsory. Utilization differences are related to income inequalities (Cseh, Koford and Phelps, 2015), which affect health outcomes (Pascual, Cantarero and Sarabia, 2005). Low-income households must wait until the public system provides them an appointment, while high-income ones do not have to wait (Hoebel *et al.*, 2017). Differences exist in medical resources utilization depending on the health system sector (Abásolo, Negrín and Pinilla, 2014): GPs, specialists or hospitalizations. The higher the income, the lower the probability of using the GP and being hospitalized is, but the probability of using a specialist is higher.

The European Commission wants member states to enhance primary care services, especially GPs. Aguado et al. (2012) collected data from thousands of patients and demonstrated that older adults use more services. The probability of suffering from multimorbidity is higher for elderly people, which explains this trend. According to Hewitt et al. (2016) the probability is 74% higher. Fortin (2005) suggests that it is nearly 100% for their study using Canadian data. Glynn et al. (2011) found that suffering from different illnesses at the same time increases health care utilization, especially for primary care.

Lifestyles are also a relevant factor in health care utilization. In general, following a balanced diet or engaging physical activities reduces health care utilization. These people are likely to have fewer health problems and higher levels in their cognitive functions than those who do not (Stegeman *et al.*, 2012; Kesavayuth, Liang and Zikos, 2018). Nevertheless, there is some disagreement in the literature on the effect of physical activity on health care utilization. According to Lee et al. (2017), people that usually engage in physical activities use more health services, while Qi et al. (2006) did not observe a significant association.

Promoting efficiency gains is a major aim of the European Commission. Therefore, European citizens are encouraged to use GPs more in order to reduce utilization of specialists, hospital care and emergency services. Remaining active in the labor market (as long as possible) or self-managing their chronic conditions, if hospitalization is not required, are also EU recommendations. Other public policies suggested by the European Commission (2013, 2014) include promoting good health by investing in disease prevention to reduce higher long-term costs and early deaths, promoting a healthy workforce, without a large increase in public expenditures, and reducing health inequalities.

The objective of this study was to examine the effect of healthier lifestyles among elderly people on health care utilization measured by the number of outpatient doctor visits (ODV) and the number of nights hospitalized in a year (NH). Southern European countries (Greece, Italy, Portugal, Spain and Slovenia) were the focus due to similarities in health systems and Mediterranean lifestyle.

5.2. MATERIAL AND METHODS

The data were retrieved from the 1st, 2nd, 4th, 5th and 6th waves of the Survey of Health, Aging and Retirement in Europe (SHARE) (Van den Hout 2015; Börsch-Supan 2018a, 2018b, 2018c, 2018d, 2018e). Wave 3 (SHARELIFE) was not included in the analysis since the questionnaire was dissimilar to the others and focused on childhood health. The SHARE survey developed as the result of the European institutional goal of creating deeper and strongest cooperation among member states in providing good data on elderly people. This survey includes data from health to socioeconomic status passing through lifestyles or personal networks. Table 5.1 depicts descriptive statistics and defines each variable.

Our dependent variables (ODV and NH) were obtained from the questions HC602_STtoMDoctor ("During the last twelve months, about how many times in total have you seen or talked to a medical doctor about your health? Please exclude dentist visits and hospital stays, but include emergency room or outpatient clinic visits") and HC014_TotNightsinPT ("How many nights altogether have you spent in hospitals during the last twelve months?") For simplicity, it was assumed that the first one can be simplified as the number of outpatient doctor visits (ODV).

Table 5.1 Descriptive statistics for variables in negative binomial models

Variable	Mean	Stand. Dev	Description
Health care utilization (Dependent Variables)			
ODV	6.856	6.856	Number of outpatient doctor visits in 365 days
NH	1.397	7.469	Number of Nights at Hospital in 365 days
Personal Characteristics			
Female	0.551	0.497	1 if female, 0 otherwise
Single	0.240	0.427	Respondent's marital status. 1 if single, 0 if not
Age	67.197	10.238	Respondent's age (years)
Socioeconomic Status			
Education	1.333	0.852	Respondent's education level. 0: No education; 1: Primary education; 2: Secondary education and 3: Tertiary Education
InLabFor	0.246	0.430	1 if respondent participates in the labor market, 0 otherwise
Health status			
SAGHS	0.872	0.334	Self-Assessed Good Health Status. 1 if respondents Self-Assessed Health Status is fair, good, very good or excellent, 0 otherwise
ADL	0.299	1.024	Number of Limitations in Activities of Daily Living
NCD	1.776	1.589	Number of Chronic Diseases
Obese	0.207	0.405	1 if respondent reported obesity, 0 otherwise
Lifestyle			
Smoke	0.436	0.496	1 if ever smoked daily, 0 otherwise
DrinkDaily	0.089	0.285	1 if respondent drinks alcoholic beverages daily, 0 if not
VPAE	0.407	0.491	1 if respondent engages sport or activities that are vigorous more than once a week, 0 otherwise

Source: Own calculations using data from all the SHARE waves available except 3rd wave (Börsch-Supan 2018a, 2018b, 2018c, 2018d, 2018e)

**Except: InLabFor (64 458), SAGHS (65 970), NCD (65 961), Obese (62 804), Smoke (65 981), DrinkDaily (52 674) and VPAE (65 805)*

As in previous studies (Majo and van Soest, 2012; Van den Hout, 2015), gender (Female), marital status (Single), participation in the labor market (InLabFor) and educational level (Education) were included. Education was considered a proxy for socioeconomic level. Moreover, country dummies variables were included to control for country differences. In the estimations, no education and Portugal were reference categories.

The number of chronic diseases (NCD) and number of limitations in Activities of Daily Living (ADL) were used to capture multimorbidity. Self-assessed good health status (SAGHS) was also included. Physical characteristics determined the physical health status and BMI was used to classify respondents. Obese corresponds to respondents whose BMI exceeded 30. Hence, the importance of obesity is double-sided. First, illness has a direct effect. Second, people who are obese have a higher probability of suffering from other sicknesses, like diabetes, and can become insulin resistant resistance (Algoblan, Alalfi and Khan, 2014; Kearns *et al.*, 2014)

Moreover, the aim was to study how lifestyle affects health care utilization among elderly people. Three covariates capture whether the person ever smoked daily (Smoke), engaged in vigorous activities nearly every day (Vigorous Physical Activities Engagement, VPAE) or drank alcohol daily (DrinkingDaily).

Count data models are often used to analyze health care utilization (Riphahn et al. 2003; Cameron and Trivedi 2005; González-Alvarez and Clavero-Barranquero 2005; Jones et al. 2013). The study aim was to explain the effect of lifestyles on ODV and NH controlling for other socioeconomic and health factors. Our models were based on the negative binomial distribution and estimated using the maximum likelihood method. The density function is as follows (Jones et al., 2013):

$$f_i(y_i|x_i) = \frac{\Gamma(\alpha^{-1}+y_i)}{\Gamma(\alpha^{-1})\Gamma(y_i+1)} (\frac{\alpha^{-1}}{\alpha^{-1}+\mu_i})^{\alpha^{-1}} (\frac{\lambda_i}{\lambda_i+\alpha^{-1}})^{y_i}, \qquad (1)$$

where:

$$\lambda_i = \mathrm{E}(\mathrm{y_i}|\mathrm{x_i}) = \ exp(\mathrm{x_i}\beta) \qquad (2)$$

$$V = \lambda_i + \alpha{\lambda_i}^2 \qquad (3)$$

If the parameter α tends to 0, it would be a Poisson distribution. An overdispersion test was carried out, where the null hypothesis is that the value of alpha equals zero, meaning that equidispersion exists. Test results indicated the existence of overdispersion.

Zero-inflated models are used if an excess of zeros exists. Moreover, (Jones *et al.*, 2013) differentiate between non-users and potential users. According to these authors, such models are not appropriate for potential users. Our database contains people older than 50 and every individual is considered a potential user.

Since the database has a panel structure, panel data models suitable for count data were used. Fixed effects (FE) and random effects (RE) models capture unobserved effects. The difference is that, in the RE model, this effect is assumed to be a variable which is not correlated with the other explanatory variables (Wooldridge, 2010). The Hausman Test was carried out to determine the most convenient model (FE or RE). The null hypothesis was that no correlation exists between the unobserved effect and the other variables. When the null hypothesis cannot be rejected, the FE model should be used. These results can be seen in Table 5.2 and Table 5.3. Pooled ordinary least squares (OLS) was the first approach used for the panel models. As this specification is merely an OLS regression, each individual was treated as a cluster in order to obtain robust standard errors.

5.3. RESULTS

Table 5.2 shows that when age increases doctor visits also increase, suggesting the existence of a non-linear relationship. Gender also matters as females make 7.14% more

ODV than men. Being single had a negative effect on the number of ODV. Moreover, people who remained active in the labor market were 16.05% less prone to visit a doctor than their unemployed peers. The country where respondents live was also relevant, since country-specific health systems differ. Higher education was associated with more ODV.

As SAGHS worsened, the probability of a doctor visit increased. Our results suggest that people whose self-assessed health status is at least fair visit a doctor 30% less often. A higher number of chronic diseases, limitations in daily living activities and being obese increased the ODV probability. Smoke was not statistically significant, but had a positive effect. Being a drinker was statistically significant and was related to lower ODV use. Considering this, an interaction term between drinking every day and the number of chronic conditions (DDNCD) was introduced. The results suggest that the probability of an ODV increased when the drinker suffered from chronic conditions. Finally, engaging in vigorous physical activities reduced ODV by 7.8%.

Table 5.3 shows the results for the NH. Women were hospitalized 26.58% less than men. Moreover, remaining active in the labor market reduced the number of nights in the hospital per year by 21.49%. Country differences remained statistically significant. Regarding the socioeconomic status proxies, people with tertiary education had fewer NH than those with less education. Serious health conditions can arise if a person is not sufficiently worried about their health status, which might lead to an increase in NH. Our results suggest that smoking habits and VPAE are relevant. Being a smoker increased the number of NH by 14.22%. Engaging vigorous physical activities reduced NH by 28.25%.

Table 5.2. Negative Binomial model. ODV as dependent variable (2004-2015)

Variable	**Robust Pooled OLS**	**Random Effects**
Personal Characteristics		
Female	0.068***	0.069***
	(0.015)	(0.011)
Single	0.023	0.004
	(0.016)	(0.711)
Age	0.021**	0.033***
	(0.008)	(0.006)
Age2	-0.0001**	-0.0002
	(0.00005)	(0.00004)
Socioeconomic Status		
PriEduc	0.026	0.043***
	(0.021)	(0.015)
SecEduc	0.003	0.036*
	(0.025)	(0.018)
TerEduc	0.010	0.054***
	(0.028)	(0.020)
InLabFor	-0.208***	-0.175***
	(0.019)	(0.014)
Health Status		
SAGHS	-0.449***	-0.344***
	(0.015)	(0.010)
ADL	0.069***	0.025***
	(0.08)	(0.005)
NCD	0.189***	0.152***
	(0.005)	(0.003)
Obese	0.041***	0.040***
	(0.016)	(0.011)
Lifestyle		
Smoke	0.018	0.010
	(0.014)	(0.009)
DrinkDaily	-0.125***	-0.205***
	(0.034)	(0.022)
DDNCD	0.038***	0.046***
	(0.012)	(0.008)
VPAE	-0.109***	-0.082***
	(0.013)	(0.009)
Constant	0.537*	-0.819***
	(0.299)	(0.214)
Country		
Spain	0.365***	0.269***
	(0.035)	(0.022)
Italy	0.655***	0.444***
	(0.034)	(0.022)
Greece	0.189***	0.086***
	(0.035)	(0.023)
Slovenia	0.191***	0.101***
	(0.036)	(0.024)
LR test vs Pooled		
χ^2		5342.34
$P \geq \chi^2$		0.000
Hausman Test		
χ^2		1405.69
$P \geq \chi^2$		0.000
Log likelihood		-129943.47
Number of obs	43 674	47 283

Source: Authors' calculations based on SHARE *(Börsch-Supan 2018a, 2018b, 2018c, 2018d, 2018e)*
Note: Standard deviation are in parentheses. ***, **, *, are the significance at level 1, 5 and 10% respectively

Table 5.3. Negative Binomial model. NH as dependent variable (2004-2015)

Variable	**Robust Pooled OLS**	**Random Effects**
Personal Characteristics		
Female	-0.388*** (0.058)	-0.309*** (0.032)
Single	0.184*** (0.068)	0.076** (0.034)
Age	0.005 (0.034)	0.002 (0.019)
Age2	-0.00003 (0.0002)	-0.00003 (0.0001)
Socioeconomic Status		
PriEduc	-0.174** (0.082)	-0.073* (0.042)
SecEduc	-0.292*** (0.103)	-0.079 (0.053)
TerEduc	-0.182 (0.118)	-0.036 (0.059)
InLabFor	-0.465*** (0.096)	-0.242*** (0.050)
Health Status		
SAGHS	-1.199*** (0.069)	-0.868*** (0.034)
ADL	0.277*** (0.024)	0.150*** (0.011)
NCD	0.186*** (0.016)	0.176*** (0.008)
Obese	-0.077 (0.058)	-0.019 (0.033)
Lifestyle		
Smoke	0.155*** (0.056)	0.133*** (0.031)
DrinkDaily	-0.053 (0.082)	-0.041 (0.049)
VPAE	-0.5345** (0.058)	-0.332*** (0.033)
Constant	-0.124 (1.249)	-0.819*** (0.214)
Country		
Spain	0.423*** (0.149)	0.333*** (0.067)
Italy	0.529*** (0.141)	0.402*** (0.067)
Greece	0.115 (0.148)	0.114 (0.072)
Slovenia	0.970*** (0.146)	0.671*** (0.071)
LR test vs Pooled		
χ^2		4.51
$P \geq \chi^2$		0.017
Hausman Test		
χ^2		154.06
$P \geq \chi^2$		0.000
Log likelihood		-31842.646
Number of obs	47 556	47 283

Source: Authors' calculations based on SHARE *(Börsch-Supan 2018a, 2018b, 2018c, 2018d, 2018e)*

Note: Standard deviation are in parentheses. ***, **, *, are the significance at level 1, 5 and 10% respectively

5.1. DISCUSSION

In general, our results regarding socioeconomic status were quite similar to those described in the literature. Nevertheless, the paper presents updated findings on the effect of lifestyle on health care utilization among elderly people living in Southern Europe controlling for country-specific differences. Note that the average age in the sample was 67 and that only people older than 50 were included. These reasons explain the finding that Age was not always highly statistically significant. Moreover, being female had a positive effect on ODV. Females are more likely to suffer from disabling conditions (World Health Organization and The World Bank, 2011) which may be a reason for more ODV. Glaesmer et al. (2012) suggested that part of this gender effect is attributable to the health care system. In some countries, specific programs for women are covered which may help women achieve better control of their health status. Women had fewer NH than men did. Being single had no clear effect on ODV but affected positively the NH. As most single people live alone, perhaps they do not worry about their health status as much as their married peers do.

Socioeconomic characteristics also had an important effect on health care utilization. Our results suggest that highly educated people had a higher number of ODV. According to (Devaux, 2015), highly educated people had better access to the health care system, which enabled visiting their GP or specialist more often than their less educated peers. Remaining active in the labor market also reduces the number of outpatient doctor visits. Kraut et al. (2000) showed that hospital admissions and physician visits are higher for unemployed people.

Moreover, our results regarding health status variables are consistent with previous literature. As expected, having at least a fair self-perceived health status had a negative impact on the use of both types of services. Nevertheless, multimorbidity, limitations of daily living and obesity were positively associated with ODV and NH. Lehnert et al. (2011), Hewitt et al. (2016) and Cantarero-Prieto et al. (2016) showed that multimorbitidy and limitations increase health services use and the associated costs.

Of particular interest is the group of variables capturing lifestyle. Our results suggest that a history of smoking daily increases NH. This is consistent with previous literature (Kahende et al. 2009; Wacker et al. 2013; Xu et al. 2015; Wang et al. 2018). Nevertheless, Schlichthorst et al. (2016) found a negative correlation, however, they only included men aged younger than 55. Our study only included elderly people and the effect of smoking daily may be more prominent at these ages.

Drinking every day, when the respondent is healthy, leads to less health care utilization. This can be explained by the fact that non-drinkers report poorer health status than their drinker peers (Ormond and Murphy, 2017). Nevertheless, the drinking habit when the respondent suffers from chronic diseases is associated with more visits to the GP. This shows that the drinking habit does play a key role in determining health care utilization (Polen *et al.*, 2001).

Engaging in vigorous physical activities reduced the probability of NH and the number of ODV. Similar results were found by Woolcott et al. (2010) and Sari (2011) Being physically active reduced the probability of suffering from illnesses and improved self-perceived health status (Stegeman *et al.*, 2012). Nevertheless, Lee et al. (2017) proved that healthy lifestyles increase health care utilization through the preventive services.

5.2. CONCLUSIONS

We have tried to determine how the lifestyles of elderly people affect their health care utilization in Southern European countries in order to provide new insight. New empirical evidence is added on the effect of lifestyles on the ODV and the NH by using five waves of the SHARE survey and focusing on elderly people. Our results highlight the effect that engaging in physical activities and remaining active in the labor market have on reducing ODV and NH. Hence, public health campaigns promoted by member states should incorporate this evidence. Moreover, policymakers must consider two facts: Firstly, employers promote early retirement among their oldest employees. Secondly, there is a conflict between promoting the country's productivity and trying to keep people active in the labor market (Van Dalen, Henkens and Schippers, 2010).

Because of the heterogeneous nature of ODVs and NH in Southern European countries and the growing elderly population, more effort in this area is needed to enhance healthcare system sustainability. Moreover, country differences remain relevant. In terms of ODV, Italy and Spain are the countries where people are more prone to use these services. On the other hand, Slovenia is the country where the number of nights in the hospital is higher. These two facts highlight the necessity of focalizing EU policies in some countries to achieve the goal of convergence in health care utilization. This study has some potential limitations. The effects on healthcare utilization are estimated using self-reported data on physical activity and self-assessed health status, which cannot be independently verified.

CHAPTER 6

HUMANIZATION IN PALLIATIVE CARE UTILIZATION THROUGN ART: A SOCIAL RETURN ON INVESTMENT (SROI) ANALYSIS OF PROART

Chapter 6. Humanization in palliative care utilization through art: A Social Return on Investment (SROI) analysis of ProArt [4]

6.1. INTRODUCTION

Budgetary constraints and the increasing demand of healthcare services due to an ageing society makes indispensable to establish priorities in the expenses. Establishing these priorities means to choose between different programs or services. To do so, it is mandatory to increase the patients' participation in the making decision process and to use different tools to make it in an objective manner.

A hot debate is still open in the field of the economic evaluation of palliative care services. Traditionally, in palliative care studies, the QALYs have been used as a way of measuring the effectiveness of the programs. The estimation of the results must be different since palliative patients have different characteristics from others: their health status is less relevant and their time is not valued in the same way at the end-of-life (Coast and Lavender, 2009; Normand, 2009). Moreover, there are some interventions that are desirable by these patients and that do not generate enough QALYs to be cost-effective (Hughes, 2005). Other studies argue that QALY methods are still the best in relocating resources according to the preferences (Round, 2012). Nevertheless, the fact that intangible benefits are more relevant than survival gains means that other additional factors to the number of life years that are gained must be considered.

---

[4] This study has been developed under a project from the research group FRAGILCARE from Fundacion San Juan de Dios (FJSD) with the collaboration of other researchers from the Research Group of Health Economics and Health Service Management from the University of Cantabria and IDIVAL

The Palliative Care Yardstick (PALY) is based in the QALY framework and includes other intangible variables (Normand, 2009). Some other variables that should be taken into consideration are dignity or emotional well-being (Wilson *et al.*, 2007; Chochinov *et al.*, 2011). New approaches should include other measurements like affection, emotional well-being, power in the decision making or dignity (Sutton and Coast, 2014). The promotion of patient dignity in the provision of palliative care is a key variable (Arantzamendi, Belar and Martínez, 2016). Moreover, there is evidence of the impact some intangible values like the gratitude have on the stakeholders involved (patients, relatives and health professionals) (Aparicio *et al.*, 2019; Aparicio, Centeno and Arantzamendi, 2019).

Additionally, not only more intangible measurements should be included but more stakeholders in the process like relatives or health professionals (O'Hanlon *et al.*, 2018). Thus, instruments like the EQ-5D are not relevant either since they are not able to evaluate the impact of these new measurements. The main problem is the difficulty in the assessment of the new facts that should be included in the process.

The concept of value creation in healthcare has been redefined in recent years. The main ideas are that the focus of attention should be on the value creation for patients more than on reducing costs. Moreover, competition should be centered on medical conditions of the entire treatment cycle not just on the cost. ProArt is based on the Porter's concepts (Porter, 2006). It provides not only efficiency in the delivery of care but emotional and spiritual well-being for patients. Moreover, the palliative care unit of Santa Clotilde Hospital (Santander/Cantabria, Spain) is engaged with the patient-centered care.

Patients take part of the decision making process as a more efficient and effective manner of delivering care (Barry and Edgman-Levitan, 2012; de Bronkart and Sands, 2014).

The SROI methodology was developed in 1990 in San Francisco (California). It measures in monetary units the social value generated by an investment (Nicholls *et al.*, 2012). It can be used to evaluate the investment in health programs. Another benefit of using this methodology is that allows allocating resources in an efficient and effective way (Maier *et al.*, 2015). The SROI method is an effective tool to measure the impact of investments over individuals' well-being and health status (Leck, Upton and Evans, 2016). Moreover, it takes into account tangible and intangible variables and evaluates the impact on every stakeholder involved in the process (Ivanova *et al.*, 2017). This makes the SROI methodology a very useful tool for evaluating health interventions.

This method has been used to measure the impact of different health and social programs. The Craft Café (a program based on art activities whose objective is to reduce isolation and loneliness in older adults) is evaluated through SROI. The result is that £8.21 are gained per £1 invested (August *et al.*, 2011). Other health studies analyzes the return of new therapeutic approaches to the following health problems: psoriasis, rheumatoid arthritis, multiple sclerosis and cardiac insufficiency (González *et al.*, 2016; Merino *et al.*, 2017, 2018, 2019). These examples show the power of the methodology: it allows to account for financial results and to analyze the program effect on every stakeholder and not only on the patient.

The delivery model carried out in this project was designed to ensure the co-participation of patients, relatives, health providers and researchers. We used innovative methodologies from “user centered design” like “empathy map” and the “patient journey map” to detect needs and expectations from each stakeholder, on which to prototype the final intervention based on arts. Value based outcomes reported by different stakeholders were identified.

An artistic intervention was designed by the stakeholders to humanize the attention in the palliative care unit of a concerted hospital. The program included weekly art workshops, design of comfortable spaces other than hospital settings, installation of artistic paintings in the rooms and common spaces. Patients and relatives were consulted through interviews and focus group about their preferred arts activities weekly. Each session typically ran for 2 hours, without restrictions in the number of participants. Usually, the number of participants ranged from 5 to 10.

The objective of this paper has a double side: firstly, to analyze the effect of art activities on the stakeholders (mainly the patients) involved in palliative care programs. Secondly, to evaluate the return of the investment made in the program ProArt.

Our main contributions are the following: firstly, we provide new evidence by measuring the social return on the investment made in a humanizer project in the palliative care unit of Santa Clotilde Hospital. Secondly, we present results including the patients’ perspective and their financial impact. Thirdly, the relevance of artistic activities on patients’ life.

The paper is organized as follows. The second section is based on the theoretical framework where methodology and data are presented. The third section is focused on the empirical analysis. The discussion of the results can be found in section four. The final one presents the conclusions.

6.2. MATERIAL AND METHODS

6.2.1. Study design

A quasi-experimental study was developed in a 120 bed surgical-medical hospital that offers humane, personalized and comprehensive care, taking care of physical, psychic, social and spiritual aspects. The palliative care unit has 20 beds (16 of them in single rooms). The study evaluated a health service before and after the humanization program was established.

This study follows the methodological process described in the SROI Guide investment (Nicholls *et al.*, 2012): 1. Establishing the scope and identifying key stakeholders. 2. Mapping outcomes. 3. Evidencing outcomes and giving them a value. 4. Establishing the impact. 5. Calculating the SROI ratio and finally, 6. Reporting, using and embedding.

The intervention efficacy has been evaluated through a qualitative and quantitative perspective. To do so, individual and group interviews took place as a first stage. Thirty-five people, including patients, relatives, health professionals and volunteers participated in this stage to account for their opinions.

The quantitative part includes a quasi-experimental study, which evaluates the health services delivered on a control group. Patients hospitalized in the palliative care unit during the six months before the study started compose this control group. Once the program was established, patients hospitalized in the same care unit were the experimental group. During one year, different data were collected: the average stage (in days), the pain level, drugs consumption, EDMONTON scales (pain, anxiety, etc.), the Palliative Outcome Scale (POS) and the Support Team Assessment Schedule (STAS).

All the calculations yield to the calculation of a ratio with the following form:

$$SROI = \frac{Total\ social\ value\ generated\ by\ ProArt}{Total\ investment\ made}$$

A positive ratio would mean that the total social value generated outweighs the total investment made. Moreover, it provides a simple interpretation of the results in terms of the profit per euro invested.

The Research Commission from the San Juan de Dios Foundation and the Clinical Research Ethics Committee from the Hospital Universitario de la Princesa (Madrid) have approved the study protocol.

6.2.2. Stakeholders

The researchers and the health professionals selected stakeholders. They included every patient hospitalized during the period of study (n=70), one relative per patient (n=210), health professionals (n=11), volunteers (n=5) and the host institution (n=1). Table 6.1 resumes this information and their participation in the program.

Table 6.1. Stakeholders included in the analysis.

Stakeholder	*Reason to be included*	*Participation*
Patients (n=70)	They are the cornerstone of ProArt.	Provide information by answering the questionnaires and participating in the interviews
Relatives (n=70)	An improvement in the life quality of the patients may affect their relatives' well-being. Moreover, one relative per patient participates in the activities	
Health professionals (n=11. Including 2 psychologist, 1 doctor, 5 nurses, 1 therapist, 1 social worker and 1 coordinator)	They are the care delivers. Moreover, they are in charge of collecting data.	Provide information by the collecting data through personal interviews and different scales.
Volunteers (n=5)	They help the patients and promote their participation in the art activities	Provide information by answering the questionnaires and participating in the interviews
Host Institution (Hospital Santa Clotilde)	Hospital Santa Clotilde provides the space and it is in charge of the hospital improvement jobs.	No intervention in the analysis

Source: Authors' elaboration

6.3. RESULTS

The investment made in ProArt allowed the hospital to host weekly artistic workshops and redesigning spaces. Figure 6.1 shows one of the activities done by patients in the workshops. In this activity, patients work with their relatives to build a sculpture cast that represents their hands

Moreover, ProArt redesign of some hospital settings to make them more comfortable for patients and relatives. Figure 2 and 3 show the patients' entrance and relatives' room before and after the intervention, respectively. The new entrance included a hand-made tree that was created with the patients' help. The paper-made birds were built in the artistic workshops.

Figure 6.1. Artistic workshop

Source: Authors' elaboration

Figure 6.2. Patients' entrance

Before **After**

Source: Authors' elaboration

The new relatives' room was humanize to make it more comfortable for relatives. Before the intervention, this room only was occupied by some chairs and vending machines. After ProArt, the room was refurbished. It included more comfortable chairs, a sofa and a little kitchen for relatives. Moreover, a little "bond wall" was installed. Patients' and relatives' could take a piece of cloth to write their feelings and expectations and hang in the wall.

Figure 6.3. Relatives' room

Before

After

Source: Authors' elaboration

6.3.1. Impact map

A theory of change was developed according to the expected changes experienced by the stakeholders as a consequence of their involvement in the study. Inputs, outputs and outcomes were calculated separately for each of the different group of stakeholders.

Funders and host institution were only included for the input they invested for the delivery of the art intervention. The coordinating organization, which implemented and managed the program and commissioned the complete evaluation, was excluded from the scope of analysis.

Table 6.2 resumes the inputs and outputs by stakeholder. An input can be defined as every resource that is necessary to carry on the project. Thus, patients and relatives' time is not included in this stage since their participation is not mandatory for ProArt execution. On the other hand, the participation of the health professionals, volunteers and Hospital Santa Clotilde is indispensable. Health professionals provide six hours per week to collect/analyze the data. Volunteers provide their time to develop their volunteering activities. Moreover, both groups have attended to different courses to improve their artistic expertise. Finally, Hospital Santa Clotilde has funded the unit improvement jobs and the art exhibition.

Table 6.2. Map impact: inputs and outputs.

Stakeholder	*Inputs*	*Value (€)*	*Outputs*
Patients	Participation in the activities (time)	NA	1 artistic workshop per week; pieces of art selection for the art exhibition of Venancio Blanco; structural changes in the palliative care unit and the patients and relatives room
Relatives	Participation in the activities (time)	NA	
Health professionals	Data collection through personal interviews and different scales (time)	56,114.64 €	
	Artistic training (time)	9,255.04 €	
Volunteers	Participation in the activities by helping patients (time)	9,541.80 €	
	Artistic training (time)	1,884.80€	
Host Institution	Financing the hospital improvement jobs (money)	32,609.50 €	
	Financing Venancio Blanco art exhibition	20,000.00 €	
TOTAL	129,405.78 €		

Source: Authors' elaboration using the data provided by Hospital Santa Clotilde

OUTPUTS IDENTIFICATION: With the investment made, weekly workshops conducted by artistic educators of the Venancio Blanco Foundation were carried out, as well as structural changes in the palliative care unit, designing a patient room, and turning the unit into a painting exhibition of the artist.

OUTCOMES IDENTIFICATION: according to the Schalock & Verdugo quality of life scale(Schalock and Verdugo Alonso, 2003), the stakeholders defined results related to 6 of the 8 dimensions in which they detected changes (based on “theory of change”): emotional, physical and material well-being; self-determination; interpersonal relationships and social inclusion. The changes generated in the fields of personal development and rights are considered non-quantifiable. Non-quantifiable outcomes were also detected: personal and rights development (patients), the implementation of systematic evaluation (professionals) and commitment and compliance with institutional values (Hospital Santa Clotilde).

IDENTIFICATION OF INDICATORS: To collect the outcomes’ indicators, online surveys were conducted to patients, family, professionals and volunteers.

PROXY IDENTIFICATION: We defined and estimated the proxies’ costs of each outcomes, besides considering the deadweight, attribution and drop off of each one. Deadweight responds to the question: ‘How much of the outcome would still be attained without the activity delivered?; Attribution responds to the question: ‘Who else contributed to the attainment of the outcome?.

In order to calculate the percentage of the outcome that would be attained even in the absence of the activity delivered, we carried out an online survey of each stakeholder group. Proxy costs were carefully selected through discussion between the implementation and evaluation teams and with reference to research evidence.

Table 6.3. Outcomes, indicators and financial proxies

Stakeholder	*Quantifiable outcomes*	*Indicator*	*Financial proxy*	*Value (€)*
Patients	Emotional well-being	Patients (%) that improve their emotional well-being.	QALY (Vallejo-Torres, García-Lorenzo and Serrano-Aguilar, 2018)	183,260.00 €
		Patients (%) declaring a reduction in their anxiety level	Reduction in the care delivery cost*	1,716.35 €
	Physical well-being	Patients (%) needing emergency treatments	Reduction in the cost associated*	275.28 €
		Patients (%) declaring a reduction in their pain level	Cost reduction due to less drug consumption*	796.94 €
		Patients (%) improving their results in the POS scale	QALY (Vallejo-Torres, García-Lorenzo and Serrano-Aguilar, 2018)	124,800.06 €
		Patients (%) declaring the pain level associated to their symptoms has been reduced (from intense, severe or unbearable to moderate)	Cost reduction due to less drug consumption*	139.55 €
	Material well-being	Patients (%) feeling their time passes faster at hospital	Time value (van den Berg, Gafni and Portrait, 2017)	5,129.60 €
	Personal relationships	Patients (%) improving their personal relationships	Meeting relatives every day (value) (Powdthavee, 2008)	183,992.78 €
	Self-determination	Patients (%) improving their decision making process	Cost of a similar artistic workshop (Council of Torrelavega, 2019)	2,800.00 €
	Social inclusion	Patients (%) participating in the activities	Cost of a similar artistic workshop (Council of Torrelavega, 2019)	18,368.00 €
Relatives	Emotional well-being	Relatives (%) that improve their emotional well-being.	QALY (Vallejo-Torres, García-Lorenzo and Serrano-Aguilar, 2018)	261,800.00€
		Relatives (%) declaring a reduction in their anxiety level	QALY (Vallejo-Torres, García-Lorenzo and Serrano-Aguilar, 2018)	46,600.40 €
	Material well-being	Relatives (%) feeling their time passes faster at hospital	Salary per hour (Instituto Nacional de Estadistica, 2020)	2,522.67 €
	Personal relationships	Relatives (%) improving their personal relationships	Meeting relatives every day (value) (Powdthavee, 2008)	551,978.35 €
	Social inclusion	Relatives (%) participating in the activities	Cost of similar artistic workshop (Council of Torrelavega, 2019)	22,960.00 €
Health professionals	Emotional well-being	Professionals (%) having more tasks in their job	Extra hours cost*	346.36 €
		Professionals (%) suffering less from burnout	QALY (Vallejo-Torres, García-Lorenzo and Serrano-Aguilar, 2018)	748.00 €
	Personal relationships	Professionals (%) improving their teamwork	Cost of a team work workshop (CEGOS, 2019)	3,570.00 €
		Professionals (%) improving the communication process with their colleagues	Cost of a EQ workshop(emagister, 2019)	1,143.65 €

		- Professionals (%) improving the communication process with their patients	Cost of a EQ workshop (emagister, 2019)	4,450.00 €
	Personal development	- Professionals (%) improving their artistic expertise	Cost of similar artistic workshop (Council of Torrelavega, 2019)	1,188.00 €
Volunteers	Emotional well-being	- Volunteers (%) that improve their emotional well-being.	QALY (Vallejo-Torres, García-Lorenzo and Serrano-Aguilar, 2018)	11,968.00 €
	Emotional Intelligence (EQ) skills	- Volunteers (%) that improve their EQ skills	Cost of a EQ workshop (emagister, 2019)	3,560.00 €
	Artistic skills	- Volunteers (%) improving their artistic expertise	Cost of similar artistic workshop (Council of Torrelavega, 2019)	1,485.00 €
Hospital Santa Clotilde	Social media impact	- Increase (%) in the visits to the Hospital social media	Subscription cost social network tool management (Hootsuite, 2019)	300.00 €
TOTAL VALUE GENERATED				1,435,898.99 €
Reference: Authors' elaboration using the data provided by Hospital Santa Clotilde *Note: Superscript numerals are the number of the references. Proxies with a * indicates that the data were retrieved from Hospital Santa Clotilde*				

6.3.2 SROI calculation

We specifically conducted the following calculations:

1. We multiplied the cost of the financial proxy by the number of stakeholders experiencing each outcome to calculate the impact for each stakeholder group.

2. We subtracted from the result a percentage of death-weight, attribution and drop off in each indicator.

3. We finally calculated the SROI ratio (impacts value/inputs value).

Hospital and funders invested 52.609,5 euros to run the program during the last 4 months of 2018 until September 2019. This funding covered all arts professionals' inputs, civil works and furniture, and all material necessary to develop the project. Volunteers invested 11.426,60 euros related to hours of work with patients and relatives at the artistic workshops. Health professionals invested 65.369,68 euros to manage the program and to collect data and surveys related to the program evaluation

Over the year, 70 palliative patients participated at least once in the artistic workshops; 210 palliative patients enjoy the new "living room" at the palliative unit care with their relatives; 5 volunteers got involved in the workshops and 11 health professionals got involved in the project.

Palliative patients and their relatives reported positive feelings toward the art activities they engaged in: “I enjoyed it so much”, “workshops have given meaning to my mother’s the end of life ”, “time passes faster”, “and I spent the week thinking about what I'm going to do in the next workshop”.

POS and STAS scale data were collected and compared between before and after the intervention. Data processing was carried out using SPSS software version 22. We analyzed the frequencies/percentages associated to qualitative variables and correlation between POS scale questionnaires. The following results were obtained: a reduction of patients suffering pain (12.3%), patients with intense, severe or unbearable symptoms (7%), patients with anxiety (9%); relatives with anxiety (17.8%). Besides, an increase in the number of patients improving their communication with professionals (5.2%), their relatives (37.4%) and professionals improving the communication with their colleagues (25.7%) and patients and relatives (27.7%).

Table 6.4 resumes the value generated for every quantifiable outcome after the application of the deadweight. The total social value generated by ProArt was 1,076,855.42 €, while the investment required to develop the Project was 129,405.78 €. After the calculation of the SROI ratio, our results show that per every euro invested in ProArt 8.32€ were generated in terms of social value.

Table 6.4. SROI Calculation

Stakeholder	*Value per stakeholder*	*Quantifiable outcomes*	*Value per outcome*
Patients	390,890.10 €	Emotional well-being	138,732.26 €
		Physical well-being	94,440.05 €
		Material well-being	3,847.20 €
		Personal relationships	137,994.59 €
		Self-determination	2,100.00 €
		Social inclusion	13,776.00 €
Relatives	664,396.07 €	Emotional well-being	231,300.30 €
		Material well-being	1,892.00 €
		Personal relationships	413,983.76 €
		Social inclusion	17,220.00 €
Health professionals	8,584.51 €	Emotional well-being	820.77 €
		Material well-being	0.00 €
		Personal relationships	6,872.74 €
		Personal development	891.00 €
Volunteers	12,759.75 €	Emotional well-being	8,976.00 €
		Emotional Intelligence (EQ) skills	2,670.00 €
		Artistic skills	1,113.75 €
Hospital Santa Clotilde	225.00 €	Social media impact	225.00 €
TOTAL SOCIAL VALUE GENERATED (1)		1,076,855.42 €	
TOTAL VALUE OF THE INVESTMENT (2)		129,405.78 €	

$SROI = \frac{TOTAL\ SOCIAL\ VALUE\ (1)}{TOTAL\ INVESTMENT\ (2)}$	8.32€ per 1€ invested

Reference: Authors' elaboration using the data provided by Hospital Santa Clotilde

6.1. DISCUSSION

The World Health Organization published in 2017 a positioning document with the aim of "Highlight the relevance of SROI to guide investments in health and well-being in the context of the implementation of the 2030 Agenda for sustainable development in general, and in the framework of the European health policy 2020 in particular (Hamelmann *et al.*, 2017).

There are more studies applying SROI analysis to an arts-based intervention for people with dementia and other mental disabilities, but not in palliative patients. Decision makers are seeking wider evaluation methods to evidence the costs and benefits of special activities. Patient experience is acknowledged as a key component of quality of care. But it is not enough if only we collect data but not use them to improve care, being unethical (Coulter *et al.*, 2014). In this way, this project focused on results from a design thinking session involving patients, relatives, health professionals and volunteers whose aim was to identify needs and expectations in order to co-create the intervention what is evaluated at this paper.

This SROI analysis of the Palliative Care and an intervention art program for people with dementia is useful for service providers at all levels, from local governments delivering arts programs, to individual care homes looking at how best to invest their activities budget. The detailed analysis allows readers to interpret which elements of the activities generated the most social impact, which has relevance for service providers worldwide.

As the most important limitation of the SROI method to highlight is the right identification of financial proxies adjusted to final outcomes and user preferences, which allow the benchmarking with other evaluations. To overcome this limitation, we conclude that is necessary to carry out an analysis of the willingness to pay of the people involved into the proposed intervention, and their expected profit. As it is usual, consumers and patients compare and examine quality and price before a purchasing decision on goods and services; however, it is difficult for patients to evaluate the price when purchase medical services. The Willingness to pay (WTP) is the most basic method to measure medical service, used widely in the field of medical economics (Yasunaga *et al.*, 2006). Contingent valuation method is a method developed to measure the benefits of service that have no market, such as environmental measures. Despite this, no references were founded in the field of palliative care.

6.2. LESSONS LEARNED

Setting up a project like ProArt requires a huge compromise of: Foundations, associations, volunteers, health professionals and managers. If managers and professionals want their projects to have a relevant impact on patients, they must take into account the opinion of every stakeholder involved in the process.

In palliative care, the emotional wellbeing and spiritual wellness are more relevant than the physical one for patients and their relatives. ProArt does not have a short term impact but a long term one by influencing positively in the later mourning and remembrance.

Evaluating the social impact of health interventions, especially if a SROI analysis is carried out, must be done carefully. One of the most difficult steps is the selection of financial proxies. In this selections process, stakeholders' opinions and preferences must be also considered and not only market prices. Including other variables in the contingent valuation technique like the willingness to pay would improve the comprehension of the impact on patients and their relatives. All in all, more projects like ProArt are necessary in other hospitals.

6.3. CONCLUSIONS

A humanizer project based on artistic activities (ProArt) took place in the palliative care unit of the Santa Clotilde Hospital (Santander/Cantabria, Spain). Moreover, an innovative economic and social evaluation method (Social Return on Investment) is used. The main strengths are the inclusion of the perspectives from all the stakeholders involved in the delivery of care (patients, relatives, professionals and volunteers) and the possibility of analyzing our results in term of social financial returns.

We demonstrate that ProArt has a general positive impact in all of the people involved in the process. Patients and their relatives declare that their quality of life improved thanks to ProArt. Professionals admitted that the project help them to communicate better with patients and the experience reduced the burnout by improving the work environment. Moreover, we provide evidence regarding the important amount of social value (€8.32) generated per every euro invested in ProArt.

CONCLUSIONES / CONCLUSIONS

Conclusiones

Esta tesis finaliza con una sección dedicada a hacer un resumen general de los principales resultados obtenidos en la investigación y, en especial, en cada capítulo. Además, también pretendemos resumir cuales son las principales implicaciones de estos resultados en términos de políticas públicas. A pesar de los resultados que hemos obtenido, lógicamente quedan muchos aspectos aún por analizar e intentar comprender desde la perspectiva de la Economía de la Salud. Por ello, esta última sección incluye una parte con las futuras líneas de investigación que podrían ser la extensión o continuación de algunos de los capítulos aquí presentados y que siempre irán en la misma dirección que marca el ámbito temático en el que se configura esta tesis doctoral.

Esta investigación ha proporcionado nueva evidencia empírica en relación a la utilización sanitaria de los mayores y de la comunidad trans. Esta tesis ha intentado resolver las siguientes cuestiones. Primero, hacer una recopilación de los principales estudios cuantitativos referidos a las barreras sanitarias de la comunidad trans. Segundo, analizar la distribución socioeconómica de los cuidados de larga duración, tanto los formales como los informales. Tercero, hemos intentado averiguar cómo afectan los estilos de vida saludable y no saludable a la utilización sanitaria. Por último, hemos aplicado una nueva metodología, la del Retorno Social de la Inversión (SROI en sus siglas en inglés), para analizar el valor social generado por un programa artístico desarrollado y cómo esto afecta a la utilización de la unidad de cuidados paliativos.

A continuación, pasamos a resumir los principales resultados, implicaciones y futuras líneas de investigación de cada uno de los capítulos.

El Capítulo 1 sigue las directrices del método PRISMA para llevar a cabo una revisión sistemática de la literatura existente sobre las barreras a los servicios sanitarios a las que la comunidad trans se enfrenta. Escogimos un horizonte temporal desde 2016 hasta septiembre de 2020 y analizamos 15 estudios de los 641 que se encontraron en la primera búsqueda. Una de las razones para escoger estudios cuantitativos es que una de las críticas que se hacen es el hecho de que las barreras son autopercibidas y no cuantificables. Nosotros logramos resumir aquellos estudios que demuestran que las barreras son reales y se pueden cuantificar sus efectos en el acceso a los servicios sanitarios de la comunidad trans. Aquellos impedimentos más relevantes estaban relacionados con algún tipo de discriminación, las experiencias negativas en el pasado con algún profesional de la medicina, el marco legal o los costes asociados al tratamiento. Nos gustaría remarcar la ausencia de datos y estudios para la Unión Europea, dado que en general, los estudios encontrados hasta la fecha, hacían referencia a EEUU o Canadá. Asimismo, en el futuro se podría apostar por incluir también estudios cualitativos en el análisis. También resultaría de interés perseverar en el corto y medio plazo en la obtención de datos y nueva información relevante con el fin de analizar las barreras a las que se enfrenta la comunidad trans en Europa y en particular en España.

En el Capítulo 2 intentamos analizar cómo el estatus socioeconómico afecta a la utilización de cuidados informales y formales en Europa. Utilizamos dos medidas de estatus socioeconómico: el ingreso neto y la riqueza neta del hogar. Para ello, primero construimos índices de concentración. Nuestros resultados mostraron como los cuidados formales están más extendidos entre aquellos hogares más pudientes, mientras que los cuidados de tipo informal son más comunes entre aquellos hogares más desfavorecidos.

Por otra parte, también analizamos la inequidad horizontal, es decir, si a igualdad necesidad de cuidados el estatus socioeconómico importa. Nuestros resultados fueron reveladores puesto que ambos tipos de cuidados de larga duración se encuentran más extendidos entre los hogares más ricos. Estos resultados pueden ser útiles para implementar nuevas medidas porque demuestran la existencia de un claro problema de la cobertura pública de los cuidados de larga duración: aquellos que más los necesitan, los más vulnerables, son también los que se ven más afectados por su estatus socioeconómico. En el futuro sería interesante descubrir dónde se encuentran esas inequidades horizontales y hacer un análisis pormenorizado por regiones. Además, hay que tener en cuenta que el paradigma de los cuidados puede haber cambiado debido a la COVID19. Por consiguiente, haría falta estudiar cuáles son las nuevas necesidades surgidas de esta pandemia para así poder desarrollar políticas que preparen los cuidados a medio/largo plazo.

Por otra parte, los Capítulos 3-5 se centran en los estilos de vida y cómo estos afectan a las visitas al médico y a las noches de hospitalización. El capítulo 3 está dedicado a la actividad física y distinguimos entre actividad moderada y fuerte. A pesar de las diferencias en los efectos por grupos de edad sobre la utilización sanitaria, podemos concluir que existe un impacto positivo de la actividad física en términos de una menor utilización de recursos sanitarios. En general, las visitas ambulatorias pueden reducirse entre un 6.43%--8.785, mientras que las hospitalizaciones podrían verse atenuadas en un 16.57%-28.5%.

El Capítulo 4 intenta analizar cómo las dietas saludables afectan a estos mismos servicios sanitarios. Nuestros resultados añaden nueva evidencia en tres sentidos. Primero, parece que existe una brecha de género por la que las mujeres si sufrirían este impacto negativo de las dietas no saludables, mientras que los hombres no lo padecerían. Segundo, demostramos que realmente la dieta sí importa a la hora de determinar el uso de recursos sanitarios entre los mayores. Finalmente, comprobamos la existencia de importantes diferencias a nivel regional. Es curioso como la región europea donde las mujeres parecen ser más vulnerables a los efectos negativos de las dietas no equilibradas es el sur de Europa (la cuna de la dieta Mediterránea).

Por otra parte, el Capítulo 5 incluye un análisis con el hábito tabáquico, el consumo de alcohol y seguimiento de actividades físicas que requiere una alta cantidad de energía. Nuestros resultados demostraron de nuevo la reducción de las visitas ambulatorias y de las hospitalizaciones cuando los individuos logran mantenerse físicamente. También que el hábito tabáquico empeoraría la salud del individuo lo que incrementaría su grado de utilización sanitaria en términos del número de noches que una persona pasa hospitalizada. En cuando al consumo de alcohol no se obtienen resultados significativos probablemente debido a que los indicadores publicados al respecto no diferencian de manera adecuada cuando dicho consumo de alcohol resulta excesivo.

Considerando todo lo anterior, los diferentes capítulos que comprenden dicha tesis doctoral resultan ser así originales y de gran utilidad al poder ser aplicados para el diseño de programas efectivos que promuevan estilos de vida saludables, especialmente, entre las personas mayores. De este modo, animamos a los decisores a que adopten, entre otras, al menos las siguientes medidas. Primero, la promoción de programas públicos centrados en fomentar la actividad física entre los mayores. Segundo, diseñar políticas que o bien promuevan y faciliten el consumo de alimentos saludables o bien desincentiven el de los productos considerados como no saludables. Además, dicho tipo de propuestas de programas y políticas públicas deberían tener entre sus objetivos el reducir las desigualdades de salud y aplicar cierta discriminación positiva hacia el género femenino debido a sus peores índices de salud subjetivos en términos generales tal y como se muestra en este capítulo con datos de la encuesta SHARE.

Los resultados obtenidos en esta tesis doctoral han generado varios interrogantes que es necesario plantearnos entre todos teniendo en cuenta el escenario pandémico actual: ¿se pueden combinar las recomendaciones de actividad física para los mayores con las restricciones por la COVID19? ¿Se pueden promover actividades físicas de alto gasto energético en un contexto con grandes restricciones? Si esto es posible, ¿es deseable que los mayores se expongan a un mayor riesgo de contagio para poder aprovechar los beneficios de la actividad física? En cuanto a la dieta, sería necesario conocer que hay detrás de las decisiones individuales sobre alimentación: ¿Estamos dispuestos a pagar diferentes impuestos por adquirir y consumir alimentos considerados como no saludables? ¿Este tipo de medidas realmente funcionan a pesar de que deberían ser ajustadas por el gradiente social de cada individuo? ¿Se pueden combinar nuestros estilos de vida cada vez más estresantes con una dieta realmente equilibrada dadas las dificultades extremas de renta y expansión de la pobreza que azotan a diferentes países europeos incluido el nuestro? ¿Cómo afectan las nuevas tendencias alimenticias como, por ejemplo, la dieta vegana a la utilización de recursos sanitarios e incluso un consumo más moderado de carne roja tal y como se recomienda desde diferentes organismos internacionales?

Finalmente, el Capítulo 6 trató de analizar el valor generado por ProArt, un programa planteado desde la Fundación San Juan de Dios (FSJD) que buscaba humanizar la provisión de cuidados paliativos a través del arte. Para ello y en colaboración con la experiencia previa del Grupo de Economía de la Salud de la UC e IDIVAL y del Grupo FRAGILCARE de FSJD se utilizó una metodología innovadora que es la relativa al Retorno Social de la Inversión (SROI por sus siglas en inglés). Esto nos permitió averiguar todos los efectos sociales y económicos sobre todos los actores involucrados (stakeholders). Asimismo, una de las mayores fortalezas de dicha metodología es que permite incluir en el análisis la perspectiva de todos esos stakeholders. Nuestros resultados señalaron que todos ellos se vieron beneficiados por el programa innovador ProArt. De este modo, los pacientes y sus familiares declaraban cómo su calidad de vida había aumentado; los profesionales sanitarios reconocían que la comunicación con los pacientes y el ambiente en el trabajo habían mejorado y los voluntarios se encontraban mucho más satisfechos con su propia actividad altruista. Finalmente, cuantificamos que el valor social generado podría llegar a alcanzar en el mejor de los escenarios hasta un 8.32€ por cada euro invertido en el programa. Asimismo, este último capítulo de la tesis doctoral podría verse ampliado en el futuro si se implementara dicha metodología SROI a otros servicios sanitarios. Además, sería interesante la búsqueda de un consenso en la selección de proxies financieras que evitara o redujera el sesgo a la hora de valorar algunos de los ítems abriendo así una línea futura de investigación realmente prometedora.

No obstante, esta tesis tiene algunas limitaciones que nos gustaría señalar. El Capítulo uno se centra en estudios cuantitativos, además la mayor parte de ellos se llevaron a cabo en EEUU o Canadá. Los siguientes capítulos (2-5) están realizados con datos de la encuesta SHARE. A pesar de que es una de las mejores bases de datos para mayores de 50 años, toda la información que contiene es reportada por los propios encuestados por lo que es posible que haya algún tipo de sesgo. Por último, el capítulo 6 se basa en la metodología SROI. Uno de los problemas de esta metodología es que es necesario escoger proxies financieras para los impactos declarados. Esto deja lugar a posibles sesgos en los resultados.

En términos generales y pudiendo servir como síntesis general para todos los capítulos incluidos en esta tesis doctoral, se puede destacar que, como futuras líneas de investigación, sería interesante analizar un periodo de tiempo más amplio que comprenda la actual fase pandémica de COVID19 para así pasados estos meses poder comprobar qué efecto ha tenido la recesión económica en el grado de utilización sanitaria y en el mix público-privado. Igualmente, elementos como el gradiente social y el empleo de nuevas técnicas de datos masivos o Big Data en el análisis económico sanitario además de un mayor Aprendizaje Automático (Machine Learning) e Inteligencia Artificial abren nuevos caminos para así explotar las correlaciones existentes entre diversas variables en grandes bancos de datos sanitarios generados automáticamente a fin de conocer el impacto final sobre el grado de utilización sanitaria. En definitiva, todas estas nuevas metodologías, junto a los avances más recientes en Estadística y Econometría de la Salud en el estudio de muchas series temporales interdependientes, ofrecen nuevos modelos de futuro para así comprender de manera más certera la realidad económico-sanitaria presente y futura.

Conclusions

This thesis concludes with this final section that contains the main results obtained in this research. Moreover, we also want to summarize some basic lessons learned through all the chapters and the main implications in terms of public policy. Although we have reached our objectives, there are still plenty of questions related to our subjects that we should address in the future. Thus, a section of future research lines is also included in this final part.

This research has provided new evidence on healthcare utilization among elderly people and the TGNC community. We have tried the following. Firstly, summarize the main quantitative studies on healthcare barriers for TGNC people. Secondly, analyze the distribution of long-term care, both formal and informal, by socioeconomic groups. Thirdly, we have tried to disentangle how healthy and unhealthy diets affect healthcare utilization. Finally, we have implemented a new methodology (Social Return on the Investment) to demonstrate the outcomes and the social value generated by a program who aimed at humanizing the delivery of palliative care.

Chapter 1 uses the PRISMA guidelines to develop a systematic review of the existing literature on healthcare barriers for the TGNC people. We considered a retrospective horizon from 2016 to September 2020 and analyzed 15 studies out of 641 founded in the first search. We just focus on quantitative studies to avoid one of the main critics to barriers for TGNC individuals: these are self-perceived and not real or quantifiable. Our results claim the existence of plenty of real barriers in healthcare settings for TGNC people. WE note the most important barriers were related to discrimination, negative experiences with providers, policy design, costs associated to treatments and the socioeconomic status. We must also notice the lack of reliable data for Europe, since most of the studies analyzed North America. In the future, it would be interesting to include quantitative and qualitative studies to compare them. Moreover, we should try to obtain data to analyze the healthcare barriers the TGNC community faces in Spain and Europe.

In Chapter 2, we tried to analyze how the socioeconomic status affects long-term care use, both formal and informal, in European countries. We use two measures of SES, the net household income and the net household wealth. Firstly, we built concentration indices to analyze the LTC distribution. Our results suggested that formal care is concentrated among high SES households, while informal care is more common among low SES households. Moreover, we used the indirect standardization process to study the horizontal inequity of both services. In general, LTC is concentrated among the richest households. This suggests that those individuals with healthcare needs that cannot afford these services are not well covered. Overall, we notice the existence of two LTC access barriers. First, belonging to a low SES household. Second, having more disabling conditions makes individuals more prone of having unmeet LTC care. Our results are useful for policymakers to develop better strategies to tackle these inequities. Moreover, we suggest that governments should check whether their systems protect the most vulnerable individuals. This chapter could be extended to a deeper analysis of these new inequities. A country by country analysis might be interesting to disentangle the reason behind these new inequities. Moreover, the COVID19 pandemic may have changed the paradigm and we should pay attention to the new needs and desires of elderly people on their care.

Besides, the following chapters (Chapter 3-5) aimed at disentangling the effects of healthy/unhealthy habits on the outpatient doctor visits (ODV) and the number of nights at hospital (NH). Chapter 3 focuses on physical activity. We distinguished between moderate and vigorous PA levels. Although age differences, we can conclude practicing physical activities have a positive impact in the reduction of ODV and NH by 6.43% to 8.78% and 16.57% - 28.5%, respectively.

Chapter 4 aimed at discussing how a healthy diet could affect healthcare utilization. Our results add new evidence in three ways. First, we suggest the existence of a “dietary gap” between men and women. Unhealthy diets have an impact on women healthcare utilization but not for men. Second, we demonstrate the relevant impact of dietary habits on women healthcare use. Finally, we notice some regional differences. Southern Europe is well known by its Mediterranean diet, nevertheless its female citizens seem to be more vulnerable to unhealthy diets than their European peers.

Chapter 5 included in the analysis the following habits: smoking, alcohol consumption and the engagement to vigorous physical activities. Our results suggest again the important reduction on ODV and NH by engaging vigorous activities, the increase in the number of NH if the respondent smoke and non-concluding results for the alcohol consumption.

All in all, the results from these three chapters are useful to foster the promotion of programs enhancing healthy lifestyles among elderly people. We encourage policymakers to do the following. First, promoting programs to extend vigorous physical activity among elder citizens. Second, designing programs to promote healthy food or policies to discourage unhealthy food.

Further research on healthy/unhealthy diets should consider the following ideas. We know the positive effects of physical activities, but how can we combine this recommendation with the COVID19 pandemic? Is it possible to promote vigorous physical activities for elderly people in this context with plenty of restrictions? If it is possible, is it desirable for elderly people to take the risk of catching the COVID19 to obtain the benefits from being physically active? Regarding diets, a deeper analysis on the drivers and desires of people should be made since some questions arise: Are we willing to pay accept new taxes on unhealthy food? Are these taxes really useful to promote healthy diets? Can we combine a real healthy diet with the new lifestyles? How can the new trends such as the vegan diet affect healthcare use?

Finally, Chapter 6 aimed at analyzing the social value generated by ProArt, a humanizer project for the delivery of palliative care based on artistic activities. We used an innovative methodology: the Social Return on the Investment. This allow us to disentangle all the effects of ProArt in every stakeholder. The main strengths were the inclusion of the perspectives from all the stakeholders and the possibility of analyzing our results in term of social financial returns. Our results proved the positive impact of ProArt. Patients and their relatives declare that their quality of life improved, professionals admitted improved the communication with patients and their work environment and volunteers were more satisfied with their duty. Moreover, we quantified the total social value generated. ProArt generate €8.32 per every euro invested. Future research must be focused on the following. First, the implementation of the SROI method on other healthcare services. Second, trying to reduce the bias associated to the election of financial proxies by developing new tools that allow researchers to measure better the impacts.

Nevertheless, we have to note the limitations of this research. Chapter 1 focuses on quantitative studies and most of them were carried out in North America. Chapters 2-5 relies on the SHARE survey. Although is one of the best data bases for people aged more than 50 years old, all the information is self-reported. This can bias our results. Chapter 6 uses the SROI method. This methodology is very sensitive to the election of financial proxies. The results from the SROI method may vary due to the type of financial proxies chosen.

To conclude we would to make a synthesis that could be used as general future research lines. It might be interesting to analyze a broader period of time that includes the COVID19 pandemic and its economic recession to study its impact on healthcare utilization and the tradeoff between the public and private sector. Moreover, including elements such as the social gradient and the use of new empirical approaches using Big Data could lead to a better health economic analysis. Machine Learning and Artificial Intelligence might be useful to explore the big databases and discover new insights on healthcare utilization. All in all, if these new methods are combined with the last advances in Statistics and Health Econometrics in the study of time series, new models could be developed to understand better the relationship between economics and health.

REFERENCES

References

Abásolo, I., Negrín, M. A. and Pinilla, J. (2014) 'Utilisation and Waiting Times: Two Inseparable Aspects of the Analysis of Equity', *Revista Hacienda Pública Española*, 208(1), pp. 11–38. doi: 10.7866/HPE-RPE.14.1.1.

Abbatecola, A. M., Russo, M. and Barbieri, M. (2018) 'Dietary patterns and cognition in older persons', *Current Opinion in Clinical Nutrition and Metabolic Care*, 21(1), pp. 10–13. doi: 10.1097/MCO.0000000000000434.

Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S., Mullany, E. C., Abate, K. H., Abbafati, C., Abebe, Z., Afarideh, M., Aggarwal, A., Agrawal, S., Akinyemiju, T., Alahdab, F., Bacha, U., Bachman, V. F., Badali, H., Badawi, A., Bensenor, I. M., Bernabe, E., Biadgilign, S. K. K., Biryukov, S. H., Cahill, L. E., Carrero, J. J., Cercy, K. M., Dandona, L., Dandona, R., Dang, A. K., Degefa, M. G., El Sayed Zaki, M., Esteghamati, A., Esteghamati, S., Fanzo, J., Farinha, C. S. e. S., Farvid, M. S., Farzadfar, F., Feigin, V. L., Fernandes, J. C., Flor, L. S., Foigt, N. A., Forouzanfar, M. H., Ganji, M., Geleijnse, J. M., Gillum, R. F., Goulart, A. C., Grosso, G., Guessous, I., Hamidi, S., Hankey, G. J., Harikrishnan, S., Hassen, H. Y., Hay, S. I., Hoang, C. L., Horino, M., Islami, F., Jackson, M. D., James, S. L., Johansson, L., Jonas, J. B., Kasaeian, A., Khader, Y. S., Khalil, I. A., Khang, Y. H., Kimokoti, R. W., Kokubo, Y., Kumar, G. A., Lallukka, T., Lopez, A. D., Lorkowski, S., Lotufo, P. A., Lozano, R., Malekzadeh, R., März, W., Meier, T., Melaku, Y. A., Mendoza, W., Mensink, G. B. M., Micha, R., Miller, T. R., Mirarefin, M., Mohan, V., Mokdad, A. H., Mozaffarian, D., Nagel, G., Naghavi, M., Nguyen, C. T., Nixon, M. R., Ong, K. L., Pereira, D. M., Poustchi, H., Qorbani, M., Rai, R. K., Razo-García, C., Rehm, C. D., Rivera, J. A., Rodríguez-Ramírez, S., Roshandel, G., Roth, G. A., Sanabria, J., Sánchez-Pimienta, T. G., Sartorius, B., Schmidhuber, J., Schutte, A. E., Sepanlou, S. G., Shin, M. J., Sorensen, R. J. D., Springmann, M., Szponar, L., Thorne-Lyman, A. L., Thrift, A. G., Touvier, M., Tran, B. X., Tyrovolas, S., Ukwaja, K. N., Ullah, I., Uthman, O. A., Vaezghasemi, M., Vasankari, T. J., Vollset, S. E., Vos, T., Vu, G. T., Vu, L. G., Weiderpass, E., Werdecker, A., Wijeratne, T., Willett, W. C., Wu, J. H., Xu, G., Yonemoto, N., Yu, C. and Murray, C. J. L. (2019) 'Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017', *The Lancet*, 393(10184), pp. 1958–1972. doi: 10.1016/S0140-6736(19)30041-8.

Agénor, M., White Hughto, J. M., Peitzmeier, S. M., Potter, J., Deutsch, M. B., Pardee, D. J. and Reisner, S. L. (2018) 'Gender identity disparities in Pap test use in a sample of binary and non-binary transmasculine adults', *Journal of General Internal Medicine*, 33(7), pp. 1015–1017. doi: 10.1007/s11606-018-4400-3.

Aguado, A., Rodríguez, D., Flor, F., Sicras, A., Ruiz, A. and Prados-Torres, A. (2012) 'Distribución del gasto sanitario en atención primaria según edad y sexo: un análisis retrospectivo', *Atención Primaria,* 44(3), pp. 145–152. doi: 10.1016/j.aprim.2011.01.011.

Åhs, A. M. H. and Westerling, R. (2006) 'Health care utilization among persons who are unemployed or outside the labour force', *Health Policy*, 78(2–3), pp. 178–193. doi: 10.1016/j.healthpol.2005.10.010.

Albertini, M. and Pavolini, E. (2017) ‘Unequal inequalities: The stratification of the use of formal care among older Europeans’, *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 72(3), pp. 510–521. doi: 10.1093/geronb/gbv038.

Alencar Albuquerque, G., de Lima Garcia, C., da Silva Quirino, G., Alves, M. J. H., Belém, J. M., dos Santos Figueiredo, F. W., da Silva Paiva, L., do Nascimento, V. B., da Silva Maciel, É., Valenti, V. E., de Abreu, L. C. and Adami, F. (2016) ‘Access to health services by lesbian, gay, bisexual, and transgender persons: systematic literature review’, *BMC International Health and Human Rights*, 16(1), p. 2. doi: 10.1186/s12914-015-0072-9.

Algoblan, A., Alalfi, M. and Khan, M. (2014) ‘Mechanism linking diabetes mellitus and obesity’, *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 7, pp. 587–591. doi: 10.2147/DMSO.S67400.

Alzheimer’s Disease International (2019) *World Alzheimer Report 2019: attitudes to dementia*. London. Available at: https://www.alz.co.uk/research/WorldAlzheimerReport2019.pdf.

Andreas, S., Schulz, H., Volkert, J., Dehoust, M., Sehner, S., Suling, A., Ausín, B., Canuto, A., Crawford, M., Da Ronch, C., Grassi, L., Hershkovitz, Y., Muñoz, M., Quirk, A., Rotenstein, O., Santos-Olmo, A. B., Shalev, A., Strehle, J., Weber, K., Wegscheider, K., Wittchen, H.-U. and Härter, M. (2017) ‘Prevalence of mental disorders in elderly people: the European MentDis_ICF65+ study’, *The British Journal of Psychiatry*, 210(2), pp. 125–131. doi: 10.1192/bjp.bp.115.180463.

Andreeva, V. A., Allès, B., Feron, G., Gonzalez, R., Sulmont-Rossé, C., Galan, P., Hercberg, S. and Méjean, C. (2016) ‘Sex-specific sociodemographic correlates of dietary patterns in a large sample of French elderly individuals’, *Nutrients*, 8(8). doi: 10.3390/nu8080484.

Aparicio, M., Centeno, C. and Arantzamendi, M. (2019) ‘The significance of gratitude for palliative care professionals: A mixed method protocol’, *BMC Palliative Care*. BMC Palliative Care, 18(1), pp. 5–7. doi: 10.1186/s12904-019-0412-y.

Aparicio, M., Centeno, C., Juliá, G. and Arantzamendi, M. (2019) ‘Gratitude from patients and relatives in palliative care-characteristics and impact: A national survey’, *BMJ Supportive and Palliative Care*, pp. 1–8. doi: 10.1136/bmjspcare-2019-001858.

Aranceta-Bartrina, J., Partearroyo, T., López-Sobaler, A. M., Ortega, R. M., Varela-Moreiras, G., Serra-Majem, L. and Pérez-Rodrigo, C. (2019) ‘Updating the Food-Based Dietary Guidelines for the Spanish Population: The Spanish Society of Community Nutrition (SENC) Proposal’, *Nutrients*, 11(11), p. 2675. doi: 10.3390/nu11112675.

Arantzamendi, M., Belar, A. and Martínez, M. (2016) ‘Promoting patient-centred palliative care: A scoping review of the patient dignity question’, *Current Opinion in Supportive and Palliative Care*, 10(4), pp. 324–329. doi: 10.1097/SPC.0000000000000237.

August, I. A., Innovation, S., Enterprise, S., Evaluation, S. and Impact, S. (2011) ‘Social Return on Investment Evaluation Craft Cafe’, (August), pp. 1–44.

Bähler, C., Huber, C. A., Brüngger, B. and Reich, O. (2015) ‘Multimorbidity, health care utilization and costs in an elderly community-dwelling population: A claims data based observational study’, *BMC Health Services Research*, 15(1), pp. 1–12. doi: 10.1186/s12913-015-0698-2.

Bakko, M. and Kattari, S. K. (2020) ‘Transgender-Related Insurance Denials as Barriers to Transgender Healthcare: Differences in Experience by Insurance Type’, *Journal of General Internal Medicine*, 35(6), pp. 1693–1700. doi: 10.1007/s11606-020-05724-2.

Barry, M. J. and Edgman-Levitan, S. (2012) ‘Shared Decision Making — The Pinnacle of Patient-Centered Care’, *New England Journal of Medicine*, 366(9), pp. 780–781. doi: 10.1056/NEJMp1109283.

Becchetti, L. and Pisani, F. (2020) ‘When Money Matters More: Long-Term Illness and the Income/Life Satisfaction Slope’, *Review of Income and Wealth*, p. roiw.12485. doi: 10.1111/roiw.12485.

van den Berg, B., Gafni, A. and Portrait, F. (2017) ‘Attributing a monetary value to patients’ time: A contingent valuation approach’, *Social Science & Medicine*, 179, pp. 182–190. doi: 10.1016/j.socscimed.2017.02.025.

Berzigotti, A., Saran, U. and Dufour, J.-F. (2016) ‘Physical activity and liver diseases’, *Hepatology*, 63(3), pp. 1026–1040. doi: 10.1002/hep.28132.

Bonsang, E. (2009) ‘Does informal care from children to their elderly parents substitute for formal care in Europe?’, *Journal of Health Economics*. North-Holland, 28(1), pp. 143–154. doi: 10.1016/J.JHEALECO.2008.09.002.

Börsch-Supan, A. (2018a) ‘Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 1. Release version: 6.1.1’. doi: 10.6103/SHARE.w1.611.

Börsch-Supan, A. (2018b) ‘Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 2. Release version: 6.1.1’. doi: 10.6103/SHARE.w2.611.

Börsch-Supan, A. (2018c) ‘Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 4. Release version: 6.1.1’. doi: 10.6103/SHARE.w4.611.

Börsch-Supan, A. (2018d) ‘Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 5. Release version: 6.1.1’. doi: 10.6103/SHARE.w5.611.

Börsch-Supan, A. (2018e) ‘Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 6. Release version: 6.1.1’. doi: 10.6103/SHARE.w6.611.

Börsch-Supan, A., Brandt, M., Hunkler, C., Kneip, T., Korbmacher, J., Malter, F., Schaan, B., Stuck, S. and Zuber, S. (2013) ‘Data resource profile: The survey of health, ageing and retirement in europe (share)’, *International Journal of Epidemiology*, 42(4), pp. 992–1001. doi: 10.1093/ije/dyt088.

Broese van Groenou, M., Glaser, K., Tomassini, C. and Jacobs, T. (2006) ‘Socio-economic status differences in older people’s use of informal and formal help: A comparison of four European countries’, *Ageing and Society*, 26(5), pp. 745–766. doi: 10.1017/S0144686X06005241.

de Bronkart, D. and Sands, D. (2014) *¡Dejad que los pacientes ayuden!* Createspace Independent Pub.

Cameron, A. C. and Trivedi, P. K. (2005) ‘Count data’, in *Microeconometrics. Methods and applications*. 1st Ed. New York: Cambridge University Press, pp. 802–808.

Cameron, A. and Trivedi, P. K. (2005) *Microeconometrics. Methods and applications*. 1st edn. New York: Cambridge University Press.

Cantarero-Prieto, D., Pascual-Sáez, M. and Blázquez-Fernández, C. (2016) *Statistical models of economic evaluation in public policies. Analysis of health care resource utilization*. 8. doi: http://www.ief.es/docs/destacados/publicacio.

Cantarero-Prieto, D., Pascual-Sáez, M. and Blázquez-Fernández, C. (2018) ‘What is Happening with Quality of Life Among the Oldest People in Southern European Countries? An Empirical Approach Based on the SHARE Data’, *Social Indicators Research*. Springer Netherlands, 140(3), pp. 1195–1209. doi: 10.1007/s11205-017-1828-5.

Cantarero-Prieto, D., Pascual-Sáez, M. and Lera, J. (2020) ‘Healthcare Utilization and Healthy Lifestyles among Elderly People Living in Southern Europe: Recent Evidence from the SHARE’, *Atlantic Economic Journal*, 48(1), pp. 53–66. doi: 10.1007/s11293-020-09657-3.

Cantarero-Prieto, D., Pascual-Sáez, M. and Rodriguez-Sánchez, B. (2019) *Differences in the provision of formal and informal care services after the implementation of the dependency act: the Spanish case*. 5/2019.

Cattaneo, M. D. (2010) ‘Efficient semiparametric estimation of multi-valued treatment effects under ignorability’, *Journal of Econometrics*, 155(2), pp. 138–154. doi: 10.1016/j.jeconom.2009.09.023.

Cauley, J. A. and Giangregorio, L. (2020) ‘Physical activity and skeletal health in adults’, *The Lancet Diabetes & Endocrinology*, 8(2), pp. 150–162. doi: 10.1016/S2213-8587(19)30351-1.

CEGOS (2019) *Aprender a trabajar en equipo con the human element*. Available at: https://www.cegos.es/formacion/eficacia-y-desarrollo-profesional/curso-elemento-humano-productividad-trabajo-en-equipo.

Chochinov, H. M., Kristjanson, L. J., Breitbart, W., McClement, S., Hack, T. F., Hassard, T. and Harlos, M. (2011) ‘Effect of dignity therapy on distress and end-of-life experience in terminally ill patients: a randomised controlled trial’, *The Lancet Oncology*. Elsevier, 12(8), pp. 753–762. doi: 10.1016/S1470-2045(11)70153-X.

Chuakhamfoo, N. N., Phanthunane, P., Chansirikarn, S. and Pannarunothai, S. (2020) ‘Health and long-term care of the elderly with dementia in rural Thailand: a cross-sectional survey through their caregivers’, *BMJ Open*, 10(3), p. e032637. doi: 10.1136/bmjopen-2019-032637.

Clark, B. A., Veale, J. F., Greyson, D. and Saewyc, E. (2018) ‘Primary care access and foregone care: a survey of transgender adolescents and young adults’, *Family Practice*, 35(3), pp. 302–306. doi: 10.1093/fampra/cmx112.

Coast, J. and Lavender, S. (2009) ‘An exploration of the economics of end of life care’, in. Manchester: Presented to the UK Health Economists’ Study Group Meeting.

Costa, A. B., Fontanari, A. M. V., Catelan, R. F., Schwarz, K., Stucky, J. L., da Rosa Filho, H. T., Pase, P. F., Gagliotti, D. A. M., Saadeh, A., Lobato, M. I. R., Nardi, H. C. and Koller, S. H. (2018) ‘HIV-Related Healthcare Needs and Access Barriers for Brazilian Transgender and Gender Diverse People’, *AIDS and Behavior*, 22(8), pp. 2534–2542. doi: 10.1007/s10461-017-2021-1.

Costa, A. B., da Rosa Filho, H. T., Pase, P. F., Fontanari, A. M. V., Catelan, R. F., Mueller, A., Cardoso, D., Soll, B., Schwarz, K., Schneider, M. A., Gagliotti, D. A. M., Saadeh, A., Lobato, M. I. R., Nardi, H. C. and Koller, S. H. (2018) ‘Healthcare Needs of and Access Barriers for Brazilian Transgender and Gender Diverse People’, *Journal of Immigrant and Minority Health*, 20(1), pp. 115–123. doi: 10.1007/s10903-016-0527-7.

Coulter, A., Locock, L., Ziebland, S. and Calabrese, J. (2014) ‘Collecting data on patient experience is not enough: they must be used to improve care’, *BMJ*, 348(mar26 1), pp. g2225–g2225. doi: 10.1136/bmj.g2225.

Council of the European Union (2014) *Council conclusions on nutrition and physical activity, Official Journal of the European Union*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2014.213.01.0001.01.ENG (Accessed: 11 February 2019).

Council of Torrelavega (2019) *Escuela de Arte Eduardo Lopez Pisano*. Available at: http://www.lopezpisano.es/curso-de-iniciacion-al-dibujo-y-la-pintura/.

Cseh, A., Koford, B. C. and Phelps, R. T. (2015) ‘Hospital Utilization and Universal Health Insurance Coverage: Evidence from the Massachusetts Health Care Reform Act’, *Applied Health Economics and Health Policy*, 13(6), pp. 627–635. doi: 10.1007/s40258-015-0178-1.

Van Dalen, H. P., Henkens, K. and Schippers, J. (2010) 'How do employers cope with an ageing workforce?', *Demographic Research*, 22, pp. 1015–1036. doi: 10.4054/DemRes.2010.22.32.

Dallmeyer, S., Wicker, P. and Breuer, C. (2017) 'How an aging society affects the economic costs of inactivity in Germany: empirical evidence and projections', *European Review of Aging and Physical Activity*, 14(1), p. 18. doi: 10.1186/s11556-017-0187-1.

Denton, F. T., Mountain, D. C. and Spencer, B. G. (2006) 'Age, Retirement, and Expenditure Patterns: An Econometric Study of Older Households', *Atlantic Economic Journal*, 34(4), pp. 421–434. doi: 10.1007/s11293-006-9028-8.

Devaux, M. (2015) 'Income-related inequalities and inequities in health care services utilisation in 18 selected OECD countries', *The European Journal of Health Economics*, 16(1), pp. 21–33. doi: 10.1007/s10198-013-0546-4.

Ding, J. M., Ehrenfeld, J. M., Edmiston, E. K., Eckstrand, K. and Beach, L. B. (2020) 'A Model for Improving Health Care Quality for Transgender and Gender Nonconforming Patients', *The Joint Commission Journal on Quality and Patient Safety*, 46(1), pp. 37–43. doi: 10.1016/j.jcjq.2019.09.005.

Elliott, A. D., Linz, D., Mishima, R., Kadhim, K., Gallagher, C., Middeldorp, M. E., Verdicchio, C. V, Hendriks, J. M. L., Lau, D. H., La Gerche, A. and Sanders, P. (2020) 'Association between physical activity and risk of incident arrhythmias in 402 406 individuals: evidence from the UK Biobank cohort', *European Heart Journal*. doi: 10.1093/eurheartj/ehz897.

emagister (2019) *Experto en inteligencia emocional sector sanitario*. doi: https://www.emagister.com/experto-inteligencia-emocional-sector-sanitario-tanatorio-duelo-cursos-3212546.htm.

Erreygers, G. (2009) 'Correcting the Concentration Index', *Journal of Health Economics*, 28(2), pp. 504–515. doi: 10.1016/j.jhealeco.2008.02.003.

EU Working Group 'Sport & Health' (2008) *EU Physical Activity Guidelines Recommended Policy Actions in Support of Health-Enhancing Physical Activity*. Available at: https://ec.europa.eu/health/sites/health/files/nutrition_physical_activity/docs/2008_eu_physical_activity_guidelines_en.pdf.

European Commision (2015) *The 2015 Ageing Report. Economic and budgetary projections for the 28 EU Member States (2013-2060)*. Luxembourg. doi: 10.2765/877631.

European Commission (2013) *Investing in health*. Available at: http://ec.europa.eu/economy_finance/publications/occasional_paper/2012/pdf/ocp125_en.pdf.

European Commission (2014) *On effective, accessible and resilient health systems*. Available at:

https://ec.europa.eu/health//sites/health/files/systems_performance_assessment/docs/com2014_215_final_en.pdf .

European Commission (2019) *Ageing Europe: Looking at the lives of older people in the EU*. Luxembourg. doi: 10.2785/811048.

European Institute for Gender Equality (EIGE) (2019) *Gender Equality Index 2019. Work-life balance*. doi: 10.2839/319154.

European Institute for Gender Equality (EIGE) (2020) *Gender equality and long-term care at home*. doi: 10.2839/007919.

Eurostat (2020) *EUROSTAT database*. Available at: http://ec.europa.eu/eurostat (Accessed: 21 July 2020).

EUROSTAT (2020a) *Healthcare expenditure statistics*. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_expenditure_statistics.

EUROSTAT (2020b) *Population projections in the EU*. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=People_in_the_EU_-_population_projections&oldid=497115#Population_projections.

EuroVoc (European Commission) (2019) *EuroVoc*. Available at: https://eur-lex.europa.eu/browse/eurovoc.html?params=72#arrow_72.

Floridi, G., Carrino, L. and Glaser, K. (2020) 'Socioeconomic Inequalities in Home-Care Use Across Regional Long-term Care Systems in Europe', *The Journals of Gerontology: Series B*. Edited by C. Kemp. doi: 10.1093/geronb/gbaa139.

Fortin, M. (2005) 'Prevalence of Multimorbidity Among Adults Seen in Family Practice', *The Annals of Family Medicine*, 3(3), pp. 223–228. doi: 10.1370/afm.272.

Gallardo-Alfaro, Bibiloni, Mateos, Ugarriza and Tur (2019) 'Leisure-Time Physical Activity and Metabolic Syndrome in Older Adults', *International Journal of Environmental Research and Public Health*, 16(18), p. 3358. doi: 10.3390/ijerph16183358.

García-Gómez, P., Hernández-Quevedo, C., Jiménez-Rubio, D. and Oliva-Moreno, J. (2015) 'Inequity in long-term care use and unmet need: Two sides of the same coin', *Journal of Health Economics*. North-Holland, 39, pp. 147–158. doi: 10.1016/J.JHEALECO.2014.11.004.

Gaugler, J., James, B., Johnson, T., Scholz, K. and Weuve, J. (2016) '2016 Alzheimer's disease facts and figures', *Alzheimer's and Dementia*. Elsevier Inc., 12(4), pp. 459–509. doi: 10.1016/j.jalz.2016.03.001.

Glaesmer, H., Brähler, E., Martin, A., Mewes, R. and Rief, W. (2012) 'Gender Differences in Healthcare Utilization: The Mediating Effect of Utilization Propensity', *Journal of Applied Social Psychology*, 42(5), pp. 1266–1279. doi: 10.1111/j.1559-1816.2011.00888.x.

Glick, J. L., Andrinopoulos, K. M., Theall, K. P. and Kendall, C. (2018) '"Tiptoeing Around the System": Alternative Healthcare Navigation Among Gender Minorities in New Orleans', *Transgender Health*, 3(1), pp. 118–126. doi: 10.1089/trgh.2018.0015.

Glynn, L. G., Valderas, J. M., Healy, P., Burke, E., Newell, J., Gillespie, P. and Murphy, A. W. (2011) 'The prevalence of multimorbidity in primary care and its effect on health care utilization and cost', *Family Practice*, 28(5), pp. 516–523. doi: 10.1093/fampra/cmr013.

Godoy, A. and Huitfeldt, I. (2018) *Regional variation in healthcare utilization and mortality*. 890. Oslo. Available at: https://www.econstor.eu/handle/10419/192872.

Goldenberg, T., Jadwin-Cakmak, L., Popoff, E., Reisner, S. L., Campbell, B. A. and Harper, G. W. (2019) 'Stigma, Gender Affirmation, and Primary Healthcare Use Among Black Transgender Youth', *Journal of Adolescent Health*, 65(4), pp. 483–490. doi: 10.1016/j.jadohealth.2019.04.029.

Goldenberg, T., Reisner, S. L., Harper, G. W., Gamarel, K. E. and Stephenson, R. (2020) 'State Policies and Healthcare Use Among Transgender People in the U.S.', *American Journal of Preventive Medicine*, 59(2), pp. 247–259. doi: 10.1016/j.amepre.2020.01.030.

González-Alvarez, M. L. and Clavero-Barranquero, A. (2005) 'Una revisión de modelos econométricos aplicados al análisis de demanda y utilización de servicios sanitarios', *Hacienda pública española*, 173, pp. 129–162. Available at: https://dialnet.unirioja.es/servlet/articulo?codigo=1270809.

Gonzalez-Prieto, N. (2016) *Ensayos sobre evaluación de políticas públicas*. University of Cantabria.

González, A., Ivanova, Y., Jiménez, M., Merino, M., Hidalgo, Á., Alfonso, S., Carretero, G., Ledesma, A., Sarquella, E., Carles, B., Costa, A. and Grupo de Expertos del Proyecto SROI-PSORIASIS (2016) *Retorno Social de la Inversión de un abordaje ideal de la psoriasis*. Available at: https://www.novartis.es/sites/www.novartis.es/files/informe-proyecto-sroi-psoriasis.pdf.

Hamelmann, C., Turatto, F., Then, V. and Dyakova, M. (2017) *Social return on investment: accounting for value in the context of implementing Health 2020 and the 2030 Agenda for Sustainable Development*. Copenhagen. Available at: http://www.euro.who.int/__data/assets/pdf_file/0009/347976/20170828-h0930-SROI-report-final-web.pdf?ua=1.

Harvey, S. B., Øverland, S., Hatch, S. L., Wessely, S., Mykletun, A. and Hotopf, M. (2018)

‘Exercise and the Prevention of Depression: Results of the HUNT Cohort Study’, *American Journal of Psychiatry*, 175(1), pp. 28–36. doi: 10.1176/appi.ajp.2017.16111223.

Herman, J. L., Brown, T. N. . and Haas, A. P. (2019) *Suicide thoughts and attempts among transgender adults. Findings from the 2015 U.S. Transgender Survey*. New York. Available at: https://williamsinstitute.law.ucla.edu/wp-content/uploads/Suicidality-Transgender-Sep-2019.pdf.

Hernández-Aceituno, A., Pérez-Tasigchana, R. F., Guallar-Castillón, P., López-García, E., Rodríguez-Artalejo, F. and Banegas, J. R. (2017) ‘Combined Healthy Behaviors and Healthcare Services Use in Older Adults’, *American Journal of Preventive Medicine*. Elsevier Inc., 53(6), pp. 872–881. doi: 10.1016/j.amepre.2017.06.023.

Hewitt, J., McCormack, C., Tay, H. S., Greig, M., Law, J., Tay, A., Asnan, N. H., Carter, B., Myint, P. K., Pearce, L., Moug, S. J., McCarthy, K. and Stechman, M. J. (2016) ‘Prevalence of multimorbidity and its association with outcomes in older emergency general surgical patients: an observational study’, *BMJ Open*, 6(3), p. e010126. doi: 10.1136/bmjopen-2015-010126.

Hoebel, J., Rommel, A., Schröder, S., Fuchs, J., Nowossadeck, E. and Lampert, T. (2017) ‘Socioeconomic Inequalities in Health and Perceived Unmet Needs for Healthcare among the Elderly in Germany’, *International Journal of Environmental Research and Public Health*, 14(10), p. 1127. doi: 10.3390/ijerph14101127.

Hootsuite (2019) *Annual subscription to Hootsuite*. Available at: https://hootsuite.com/es/planes/enterprise.

Hosseinichimeh, N., Martin, E. G. and Weinberg, S. (2016) ‘Do Changes in Health Insurance Coverage Explain Interstate Variation in Emergency Department Utilization?’, *World Medical & Health Policy*, 8(1), pp. 58–73. doi: 10.1002/wmh3.175.

Van den Hout, W. (2015) ‘The Value of Productivity in Health Policy’, *Applied Health Economics and Health Policy*, 13(4), pp. 311–313. doi: 10.1007/s40258-015-0173-6.

Hu, H., Si, Y. and Li, B. (2020) ‘Decomposing Inequality in Long-Term Care Need Among Older Adults with Chronic Diseases in China: A Life Course Perspective’, *International Journal of Environmental Research and Public Health*, 17(7), p. 2559. doi: 10.3390/ijerph17072559.

Hughes, J. (2005) ‘Palliative Care and the QALY Problem’, *Health Care Analysis*, 13(4), pp. 289–301. doi: 10.1007/s10728-005-8126-0.

Ilinca, S., Rodrigues, R. and Schmidt, A. E. (2017) ‘Fairness and eligibility to long-term care: An analysis of the factors driving inequality and inequity in the use of home care for older Europeans’, *International Journal of Environmental Research and Public Health*, 14(10). doi: 10.3390/ijerph14101224.

Imbens, G. (2000) ‘The Role of the Propensity Score in Estimating Dose-Response Functions’, *Biometrika*, 87(3), pp. 706–710.

Instituto Nacional de Estadistica (2020) *Encuesta nacional de estructura salarial*. Available at: https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177025&menu=resultados&idp=1254735976596.

Ivanova, Y., Merino, M., González, A. and Jiménez, M. (2017) ‘Retorno social de la inversión en salud’. Available at: http://www.economiadelasalud.com/pdf/V12N4/analisis02_SROI.pdf.

Jacobs, J. M., Rottenberg, Y., Cohen, A. and Stessman, J. (2013) ‘Physical Activity and Health Service Utilization Among Older People’, *Journal of the American Medical Directors Association*, 14(2), pp. 125–129. doi: 10.1016/j.jamda.2012.10.023.

Jeon, B., Noguchi, H., Kwon, S., Ito, T. and Tamiya, N. (2017) ‘Disability, poverty, and role of the basic livelihood security system on health services utilization among the elderly in South Korea’, *Social Science & Medicine*, 178, pp. 175–183. doi: 10.1016/j.socscimed.2017.02.013.

Jones, A. M., Rice, N., Bago d’Uva, T. and Balia, S. (2013) ‘Count data models’, in *Applied Health Economics*. Second Edi. Abingdon: Routledge, pp. 295–341.

Jones, I. R. (2017) ‘Social class, dementia and the fourth age’, *Sociology of Health and Illness*, 39(2), pp. 303–317. doi: 10.1111/1467-9566.12520.

Jones, M., Valentino, A., Castro, R., Fernandes, M. and Mcguinn, J. (2018) *Sustainability of Health Systems*. Belgium. Available at: http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/619029/IPOL_IDA(2018)619029_EN.pdf.

Kahende, J. W., Adhikari, B., Maurice, E., Rock, V. and Malarcher, A. (2009) ‘Disparities in health care utilization by smoking status--NHANES 1999-2004.’, *International journal of environmental research and public health*. Multidisciplinary Digital Publishing Institute (MDPI), 6(3), pp. 1095–106. doi: 10.3390/ijerph6031095.

Kang, S. and Xiang, X. (2017) ‘Physical activity and health services utilization and costs among U.S. adults’, *Preventive Medicine*. Academic Press, 96, pp. 101–105. doi: 10.1016/J.YPMED.2016.12.043.

Kattari, S. K., Bakko, M., Hecht, H. K. and Kattari, L. (2020) ‘Correlations between healthcare provider interactions and mental health among transgender and nonbinary adults’, *SSM - Population Health*, 10, p. 100525. doi: 10.1016/j.ssmph.2019.100525.

Katz, D. L. and Ali, A. (2009) ‘Preventive medicine, integrative medicine & the health of the public', *Summit on Integrative Medicine and the Health of the Public.v*, p. 45. Available at: https://www.researchgate.net/publication/237429179_Preventive_medicine_integrative_medicine_and_the_health_of_the_public.

Kcomt, L., Gorey, K. M., Barrett, B. J. and McCabe, S. E. (2020) 'Healthcare avoidance due to anticipated discrimination among transgender people: A call to create trans-affirmative environments', *SSM - Population Health*, 11, p. 100608. doi: 10.1016/j.ssmph.2020.100608.

Kearns, K., Dee, A., Fitzgerald, A. P., Doherty, E. and Perry, I. J. (2014) 'Chronic disease burden associated with overweight and obesity in Ireland: the effects of a small BMI reduction at population level', *BMC Public Health*, 14(1), p. 143. doi: 10.1186/1471-2458-14-143.

Kesavayuth, D., Liang, Y. and Zikos, V. (2018) 'An active lifestyle and cognitive function: Evidence from China', *Journal of the Economics of Ageing*. Elsevier, 12(September 1980), pp. 183–191. doi: 10.1016/j.jeoa.2018.05.001.

Kim, W. K., Shin, D. and Song, W. O. (2016) 'Are Dietary Patterns Associated with Depression in U.S. Adults?', *Journal of Medicinal Food*, 19(11), pp. 1074–1084. doi: 10.1089/jmf.2016.0043.

Kjær, A. A. and Siren, A. (2019) 'Formal and informal care: trajectories of home care use among Danish older adults', *Ageing and Society*, pp. 1–24. doi: 10.1017/S0144686X19000771.

Knight, A., Bryan, J. and Murphy, K. (2016) 'Is the Mediterranean diet a feasible approach to preserving cognitive function and reducing risk of dementia for older adults in Western countries? New insights and future directions', *Ageing Research Reviews*. Elsevier, 25, pp. 85–101. doi: 10.1016/J.ARR.2015.10.005.

Korhonen, K., Einiö, E., Leinonen, T., Tarkiainen, L. and Martikainen, P. (2018) 'Time-varying effects of socio-demographic and economic factors on the use of institutional long-term care before dementia-related death: A Finnish register-based study', *PLOS ONE*. Edited by H. T. A. Khan, 13(6), p. e0199551. doi: 10.1371/journal.pone.0199551.

Larsson, K. and Silverstein, M. (2004) 'The effects of marital and parental status on informal support and service utilization: A study of older Swedes living alone', *Journal of Aging Studies*, 18(2), pp. 231–244. doi: 10.1016/j.jaging.2004.01.001.

Leck, C., Upton, D. and Evans, N. (2016) 'Social Return on Investment: Valuing health outcomes or promoting economic values?', *Journal of Health Psychology*, 21(7), pp. 1481–1490. doi: 10.1177/1359105314557502.

Lee, H., Park, J., Choi, B., Yi, H. and Kim, S.-S. (2018) 'Experiences of and barriers to transition-related healthcare among Korean transgender adults: focus on gender identity disorder diagnosis, hormone therapy, and sex reassignment surgery', *Epidemiology and Health*, 40, p. e2018005. doi: 10.4178/epih.e2018005.

Lee, I.-C., Chang, C.-S. and Du, P.-L. (2017) ‘Do healthier lifestyles lead to less utilization of healthcare resources?’, *BMC Health Services Research*, 17(1), p. 243. doi: 10.1186/s12913-017-2185-4.

Lee, Y., Mozaffarian, D., Sy, S., Huang, Y., Liu, J., Wilde, P. E., Abrahams-Gessel, S., Jardim, T. de S. V., Gaziano, T. A. and Micha, R. (2019) ‘Cost-effectiveness of financial incentives for improving diet and health through Medicare and Medicaid: A microsimulation study’, *PLOS Medicine*. Edited by E. Gregg, 16(3), p. e1002761. doi: 10.1371/journal.pmed.1002761.

Lerner, J. E. and Robles, G. (2017) ‘Perceived Barriers and Facilitators to Health Care Utilization in the United States for Transgender People: A Review of Recent Literature’, *Journal of Health Care for the Poor and Underserved*, 28(1), pp. 127–152. doi: 10.1353/hpu.2017.0014.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J. and Moher, D. (2009) ‘The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration’, *PLoS Medicine*, 6(7), p. e1000100. doi: 10.1371/journal.pmed.1000100.

Lindgren, E., Sörenson, J., Nägga, K. and Wattmo, C. (2017) ‘Equity in dementia care focusing on immigrants in Sweden: a nationwide register-based study’, *European Journal of Public Health*, 27(suppl_3), p. 4556100. doi: 10.1093/eurpub/ckx187.130.

Lohman, M. C., Scherer, E. A., Whiteman, K. L., Greenberg, R. L. and Bruce, M. L. (2018) ‘Factors Associated With Accelerated Hospitalization and Re-hospitalization Among Medicare Home Health Patients’, *The Journals of Gerontology: Series A*, 73(9), pp. 1280–1286. doi: 10.1093/gerona/glw335.

Loza, O., Hernandez, P., Calderon-Mora, J., Laks, S., Leiner, M., Reddy, S., Lara, P. and Granados, H. (2018) ‘Developing Trans-Affirming Health Services in an Underserved Area: An Intersectional Approach’, *Transgender Health*, 3(1), pp. 127–135. doi: 10.1089/trgh.2018.0011.

Luan, X., Tian, X., Zhang, H., Huang, R., Li, N., Chen, P. and Wang, R. (2019) ‘Exercise as a prescription for patients with various diseases’, *Journal of Sport and Health Science*, 8(5), pp. 422–441. doi: 10.1016/j.jshs.2019.04.002.

Maier, F., Schober, C., Simsa, R. and Millner, R. (2015) ‘SROI as a Method for Evaluation Research: Understanding Merits and Limitations’, *Voluntas*. Springer US, 26(5), pp. 1805–1830. doi: 10.1007/s11266-014-9490-x.

Majo, M. C. and van Soest, A. (2012) ‘Income and health care utilization among the 50+ in Europe and the US’, *Applied Econometrics*, 28(4), pp. 3–22.

Martin, M. Y., Powell, M. P., Peel, C., Zhu, S. and Allman, R. (2006) 'Leisure-Time Physical Activity and Health-Care Utilization in Older Adults', *Journal of Aging and Physical Activity*, 14(4), pp. 392–410. doi: 10.1123/japa.14.4.392.

Martinez-Gonzalez, M. A. and Bes-Rastrollo, M. (2014) 'Dietary patterns, Mediterranean diet, and cardiovascular disease', *Current Opinion in Lipidology*, 25(1), pp. 20–26. doi: 10.1097/MOL.0000000000000044.

McGlynn, N., Browne, K., Sherriff, N., Zeeman, L., Mirandola, M., Gios, L., Davis, R., Donisi, V., Farinella, F., Rosińska, M., Niedźwiedzka-Stadnik, M., Pierson, A., Pinto, N. and Hugendubel, K. (2020) 'Healthcare professionals' assumptions as barriers to LGBTI healthcare', *Culture, Health & Sexuality*, 22(8), pp. 954–970. doi: 10.1080/13691058.2019.1643499.

McPhee, J. S., French, D. P., Jackson, D., Nazroo, J., Pendleton, N. and Degens, H. (2016) 'Physical activity in older age: perspectives for healthy ageing and frailty', *Biogerontology*. Springer Netherlands, 17(3), pp. 567–580. doi: 10.1007/s10522-016-9641-0.

de Meijer, C., Wouterse, B., Polder, J. and Koopmanschap, M. (2013) 'The effect of population aging on health expenditure growth: a critical review', *European Journal of Ageing*, 10(4), pp. 353–361. doi: 10.1007/s10433-013-0280-x.

Merino, M., Ivanova Markova, Y., Gómez-García, T., Hidalgo-Vega, A., Díaz González, F., García de Vicuña, R., Alcaide, L. and SROI-AR, G. M. de T. del P. (2019) *Impacto clínico, asistencial, económico y social del abordaje ideal de la Artritis Reumatoide en comparación con el abordaje actual.* Madrid. Available at: http://weber.org.es/wp-content/uploads/2019/04/Informe_completo_SROI_Lilly_AAFF-1.pdf.

Merino, M., Jiménez, M., Gómez-García, T., Ivanova, Y., Hidalgo-Vega, Á., Ester, M., Fernández, Ó., Carrascal, P. C., Ruiz-Beato, E., Estell, E., Manzanares, R. and Grupo Multidisciplinar de Trabajo del proyecto SROI-EM (2018) *Impacto clínico, asistencial, económico y social del aborjade ideal de la esclerosis múltiple*. Available at: http://weber.org.es/wp-content/uploads/2018/12/Informe-SROIEM_Weber-1.pdf.

Merino, M., Jiménez, M., Ivanova, Y., González, A., Villoro, R., Hidalgo, Á., Casariego, E., Manito, N., Saturnino, M. T. S., Fajardo, T. J., Blanch, C., Lloret, J. and SROI-IC, G. de T. M. del P. (2017) *Valor social de un abordaje ideal en insuficiencia cardiaca*. Madrid. Available at: http://weber.org.es/wp-content/uploads/2017/10/Informe-proyecto-SROI-Insuficiencia-Cardiaca.pdf.

De Mestral, C., Marques-Vidal, P., Gaspoz, J. M., Theler, J. M. and Guessous, I. (2017) 'Independent association between socioeconomic indicators and macro- and micro-nutrient intake in Switzerland', *PLoS ONE*, 12(4), pp. 1–15. doi: 10.1371/journal.pone.0174578.

Motel-Klingebiel, A., Tesch-Roemer, C. and Von Kondratowitz, H. J. (2005) 'Welfare states do not crowd out the family: Evidence for mixed responsibility from comparative analyses', *Ageing and Society*, 25(6), pp. 863–882. doi: 10.1017/S0144686X05003971.

National Health System (NHS) (2018) *Physical activity guidelines for older adults*. Available at: https://www.nhs.uk/live-well/exercise/physical-activity-guidelines-older-adults/.

Nicholls, J., Lawlor, E., Neitzert, E. and Goodspeed, T. (2012) ‘A guide to Social Return on Investment’, *The SROI Network. Accounting for Value*, (January), p. 108. doi: 10.4135/9781412973793.n132.

Normand, C. (2009) ‘Measuring Outcomes in Palliative Care: Limitations of QALYs and the Road to PalYs’, *Journal of Pain and Symptom Management*. Elsevier, 38(1), pp. 27–31. doi: 10.1016/j.jpainsymman.2009.04.005.

O’Donnell, O., van Doorslaer, Eddy Wagstaff, A. and Lindelow, M. (2008) *Analyzing Health Equity Using Household Survey Data : A Guide to Techniques and Their Implementation*. Edited by The World Bank. Washington, D.C. Available at: http://hdl.handle.net/10986/6896.

O’Hanlon, C. E., Walling, A. M., Okeke, E., Stevenson, S. and Wenger, N. S. (2018) ‘A Framework to Guide Economic Analysis of Advance Care Planning’, *Journal of Palliative Medicine*. Mary Ann Liebert, Inc., publishers 140 Huguenot Street, 3rd Floor New Rochelle, NY 10801 USA , 21(10), pp. 1480–1485. doi: 10.1089/jpm.2018.0041.

Orkaby, A. R. and Forman, D. E. (2018) ‘Physical activity and CVD in older adults: an expert’s perspective’, *Expert Review of Cardiovascular Therapy*. Taylor & Francis, 16(1), pp. 1–10. doi: 10.1080/14779072.2018.1419062.

Ormond, G. and Murphy, R. (2017) ‘An investigation into the effect of alcohol consumption on health status and health care utilization in Ireland’, *Alcohol*, 59, pp. 53–67. doi: 10.1016/j.alcohol.2017.01.008.

Pascual, M., Cantarero, D. and Sarabia, J. M. (2005) ‘Income Inequality and Health: Do the Equivalence Scales Matter?’, *Atlantic Economic Journal*, 33(2), pp. 169–178. doi: 10.1007/s11293-005-3769-7.

Patterson, C. (2018) *World Alzheimer Report 2018. The state of the art of dementia research: New frontiers*. London. Available at: https://www.alz.co.uk/research/WorldAlzheimerReport2018.pdf.

Peiro, S. and Maynard, A. (2015) ‘Variations in health care delivery within the European Union’, *The European Journal of Public Health*, 25(suppl 1), pp. 1–2. doi: 10.1093/eurpub/cku223.

Polen, M. R., Green, C. A., Freeborn, D. K., Mullooly, J. P. and Lynch, F. (2001) ‘Drinking patterns, health care utilization, and costs among HMO primary care patients’, *The Journal of Behavioral Health Services & Research*, 28(4), pp. 378–399. doi: 10.1007/BF02287770.

Porter, M. (2006) *Redefining health care: Creating value-based competition on results*. Harvard Business School Press.

Powdthavee, N. (2008) ‘Putting a price tag on friends, relatives, and neighbours: Using surveys of life satisfaction to value social relationships’, *The Journal of Socio-Economics*, 37(4), pp. 1459–1480. doi: 10.1016/j.socec.2007.04.004.

Del Pozo Rubio, R., Moya-Martínez, P., Escribano-Sotos, F. and Amo Saus, M. E. (2018) ‘Costes de los servicios sanitarios asociados a los hábitos de consumo de frutas y verduras’, *Nutrición Hospitalaria*, 35(4), p. 920. doi: 10.20960/nh.1629.

Prince, M., Wimo, A., Guerchet, M., Ali, G., Wu, Y. and Prina, M. (2015) *World Alzheimer Report 2015. The global impact of dementia: an analysis of prevalence, incidence, cost and trends., London: Alzheimer’s Disease International*. doi: http://dx.doi.org/10.1007/s00270-010-9954-3.

Pulok, M. H., van Gool, K., Hajizadeh, M., Allin, S. and Hall, J. (2020) ‘Measuring horizontal inequity in healthcare utilisation: a review of methodological developments and debates’, *The European Journal of Health Economics*, 21(2), pp. 171–180. doi: 10.1007/s10198-019-01118-2.

Qi, V., Phillips, S. P. and Hopman, W. M. (2006) ‘Determinants of a healthy lifestyle and use of preventive screening in Canada’, *BMC Public Health*, 6, pp. 1–8. doi: 10.1186/1471-2458-6-275.

Radix, A. E., Lelutiu-Weinberger, C. and Gamarel, K. E. (2014) ‘Satisfaction and Healthcare Utilization of Transgender and Gender Non-Conforming Individuals in NYC: A Community-Based Participatory Study’, *LGBT Health*, 1(4), pp. 302–308. doi: 10.1089/lgbt.2013.0042.

Rahman, M., Li, D. H. and Moskowitz, D. A. (2019) ‘Comparing the Healthcare Utilization and Engagement in a Sample of Transgender and Cisgender Bisexual+ Persons’, *Archives of Sexual Behavior*, 48(1), pp. 255–260. doi: 10.1007/s10508-018-1164-0.

Regidor, E., Martínez, D., Calle, M. E., Astasio, P., Ortega, P. and Domínguez, V. (2008) ‘Socioeconomic patterns in the use of public and private health services and equity in health care’, *BMC Health Services Research*, 8(1), p. 183. doi: 10.1186/1472-6963-8-183.

Rider, G. N., McMorris, B. J., Gower, A. L., Coleman, E. and Eisenberg, M. E. (2018) ‘Health and Care Utilization of Transgender and Gender Nonconforming Youth: A Population-Based Study’, *Pediatrics*, 141(3), p. e20171683. doi: 10.1542/peds.2017-1683.

Riphahn, R. T., Wambach, A. and Million, A. (2003) ‘Incentive effects in the demand for health care: a bivariate panel count data estimation’, *Journal of Applied Econometrics*, 18(4), pp. 387–405. doi: 10.1002/jae.680.

Roberts, T. K. and Fantz, C. R. (2014) ‘Barriers to quality health care for the transgender population’, *Clinical Biochemistry*, 47(10–11), pp. 983–987. doi:

10.1016/j.clinbiochem.2014.02.009.

Robins, J. M. and Rotnitzky, A. (1995) ‘Semiparametric Efficiency in Multivariate Regression Models with Missing Data’, *Journal of the American Statistical Association*, 90(429), pp. 122–129. doi: 10.1080/01621459.1995.10476494.

Rocca, P., Beckman, A., Ekvall Hansson, E. and Ohlsson, H. (2015) ‘Is the association between physical activity and healthcare utilization affected by self-rated health and socio-economic factors?’, *BMC Public Health*. BioMed Central, 15(1), p. 737. doi: 10.1186/s12889-015-2079-5.

Rodrigues, R., Schulmann, K., Schmidt, A., Kalavrezou, N. and Matsaganis, M. (2013) ‘The indirect costs of long-term care’, *Research note 8/2013. European Commission: Directorate-General for Employment, Social Affairs and Inclusion*, pp. 1–42.

Rodriguez, A., Agardh, A. and Asamoah, B. O. (2018) ‘Self-Reported Discrimination in Health-Care Settings Based on Recognizability as Transgender: A Cross-Sectional Study Among Transgender U.S. Citizens’, *Archives of Sexual Behavior*, 47(4), pp. 973–985. doi: 10.1007/s10508-017-1028-z.

Romanelli, M. and Lindsey, M. A. (2020) ‘Patterns of Healthcare Discrimination Among Transgender Help-Seekers’, *American Journal of Preventive Medicine*, 58(4), pp. e123–e131. doi: 10.1016/j.amepre.2019.11.002.

Rosenbaum, P. R. and Rubin, D. B. (1983) ‘The Central Role of the Propensity Score in Observational Studies for Causal Effects’, *Biometrika*, 70(1), pp. 41–55. doi: 10.1017/CBO9780511810725.016.

Ross, K. A. E., Law, M. P. and Bell, A. (2016) ‘Exploring Healthcare Experiences of Transgender Individuals’, *Transgender Health*, 1(1), pp. 238–249. doi: 10.1089/trgh.2016.0021.

Round, J. (2012) ‘Is a QALY still a QALY at the end of life?’, *Journal of Health Economics*, 31(3), pp. 521–527. doi: 10.1016/j.jhealeco.2012.01.006.

Rubin, D. B. (1978) ‘Bayesian inference for causal effects: The role of randomization’, *The Annals of Statistics*, 6(1), pp. 34–58. Available at: https://projecteuclid.org/download/pdf_1/euclid.aos/1176344064 (Accessed: 19 March 2019).

Salas-Salvadó, J., Bulló, M., Estruch, R., Ros, E., Covas, M.-I., Ibarrola-Jurado, N., Corella, D., Arós, F., Gómez-Gracia, E., Ruiz-Gutiérrez, V., Romaguera, D., Lapetra, J., Lamuela-Raventós, R. M., Serra-Majem, L., Pintó, X., Basora, J., Muñoz, M. A., Sorlí, J. V. and Martínez-González, M. A. (2014) ‘Prevention of Diabetes With Mediterranean Diets’, *Annals of Internal Medicine*, 160(1), pp. 1–10. doi: 10.7326/M13-1725.

Santos, D. M., Rodrigues, S. S., Oliveira, B. M. and De Almeida, M. D. V. (2015) ‘Dietary availability in elderly Portuguese households', *Public Health Nutrition*, 18(3), pp. 392–402. doi: 10.1017/S1368980014000494.

Sari, N. (2011) 'Exercise, physical activity and healthcare utilization: A review of literature for older adults', *Maturitas*, 70(3), pp. 285–289. doi: 10.1016/j.maturitas.2011.08.004.

Schalock, R. L. and Verdugo Alonso, M. Á. (2003) *Calidad de Vida: manual para profesionales de la educación, salud y servicios sociales*. Madrid: Alianza Editorial.

Scheim, A. I., Santos, G.-M., Arreola, S., Makofane, K., Do, T. D., Hebert, P., Thomann, M. and Ayala, G. (2016) 'Inequities in access to HIV prevention services for transgender men: results of a global survey of men who have sex with men', *Journal of the International AIDS Society*, 19, p. 20779. doi: 10.7448/IAS.19.3.20779.

Schlichthorst, M., Sanci, L. A., Pirkis, J., Spittal, M. J. and Hocking, J. S. (2016) 'Why do men go to the doctor? Socio-demographic and lifestyle factors associated with healthcare utilisation among a cohort of Australian men', *BMC Public Health*, 16(S3), p. 1028. doi: 10.1186/s12889-016-3706-5.

Schmidt, A. E. (2017) 'Analysing the importance of older people's resources for the use of home care in a cash-for-care scheme: evidence from Vienna', *Health and Social Care in the Community*, 25(2), pp. 514–526. doi: 10.1111/hsc.12334.

Schmidt, A. E. (2018) 'Older Persons' Views on Using Cash-for-Care Allowances at the Crossroads of Gender, Socio-economic Status and Care Needs in Vienna', *Social Policy & Administration*, 52(3), pp. 710–730. doi: 10.1111/spol.12334.

Schwarzkopf, L., Menn, P., Leidl, R., Wunder, S., Mehlig, H., Marx, P., Graessel, E. and Holle, R. (2012) 'Excess costs of dementia disorders and the role of age and gender - an analysis of German health and long-term care insurance claims data', *BMC health services research*, 12, pp. 1–12. doi: 10.1186/1472-6963-12-165.

Seelman, K. L., Colón-Diaz, M. J. P., LeCroix, R. H., Xavier-Brier, M. and Kattari, L. (2017) 'Transgender Noninclusive Healthcare and Delaying Care Because of Fear: Connections to General Health and Mental Health Among Transgender Adults', *Transgender Health*, 2(1), pp. 17–28. doi: 10.1089/trgh.2016.0024.

Sineath, R. C., Woodyatt, C., Sanchez, T., Giammattei, S., Gillespie, T., Hunkeler, E., Owen-Smith, A., Quinn, V. P., Roblin, D., Stephenson, R., Sullivan, P. S., Tangpricha, V. and Goodman, M. (2016) 'Determinants of and Barriers to Hormonal and Surgical Treatment Receipt Among Transgender People', *Transgender Health*, 1(1), pp. 129–136. doi: 10.1089/trgh.2016.0013.

Snyder, H. M., Asthana, S., Bain, L., Brinton, R., Craft, S., Dubal, D. B., Espeland, M. A., Gatz, M., Mielke, M. M., Raber, J., Rapp, P. R., Yaffe, K. and Carrillo, M. C. (2016) 'Sex biology contributions to vulnerability to Alzheimer's disease: A think tank convened by the Women's Alzheimer's Research Initiative', *Alzheimer's and Dementia*. Elsevier Inc., 12(11), pp. 1186–1196. doi: 10.1016/j.jalz.2016.08.004.

Sørlie, A. (2019) ‘The Right to Trans-Specific Healthcare in Norway: Understanding the Health Needs of Transgender People’, *Medical Law Review,* 27(2), pp. 295–317. doi: 10.1093/medlaw/fwy029.

Spasova, S., Baeten, R., Coster, S., Ghailani, D., Peña-casas, R. and Vanhercke, B. (2018) *Challenges in long-term care in Europe: A study of national policies*. European Commission.

Stathokostas, L., Speechley, M., Little, R. M. D., Doerksen, S., Copeland, J. and Paterson, D. H. (2017) ‘Long-term Evaluation of the Get Fit for Active Living Program’, *Canadian Journal on Aging,* 36(1), pp. 67–80. doi: 10.1017/S0714980816000635.

Stegeman, I., Otte-Trojel, T., Costongs, C. and Considine, J. (2012) *Healthy and active ageing*. Available at: http://www.healthyageing.eu/sites/www.healthyageing.eu/files/featured/Healthy and Active Ageing.pdf (Accessed: 4 March 2019).

Sui, Z., Wong, W. K., Louie, J. C. Y. and Rangan, A. (2017) ‘Discretionary food and beverage consumption and its association with demographic characteristics, weight status, and fruit and vegetable intakes in Australian adults’, *Public Health Nutrition,* 20(2), pp. 274–281. doi: 10.1017/S1368980016002305.

Sutton, E. J. and Coast, J. (2014) ‘Development of a supportive care measure for economic evaluation of end-of-life care using qualitative methods’, *Palliative Medicine*. SAGE PublicationsSage UK: London, England, 28(2), pp. 151–157. doi: 10.1177/0269216313489368.

Thomson, S., Foubister, T. and Mossialos, E. (2009) *Financing health care in the European Union: challenges and policy responses*. Copenhagen (Denmark): World Health Organization . Available at: http://www.euro.who.int/__data/assets/pdf_file/0009/98307/E92469.pdf (Accessed: 4 March 2019).

Thorell, K., Midlöv, P., Fastbom, J. and Halling, A. (2019) ‘Importance of potentially inappropriate medications, number of chronic conditions and medications for the risk of hospitalisation in elderly in Sweden: a case–control study’, *BMJ Open,* 9(9), p. e029477. doi: 10.1136/bmjopen-2019-029477.

Tordrup, D., Angelis, A. and Kanavos, P. (2013) ‘Preferences on Policy Options for Ensuring the Financial Sustainability of Health Care Services in the Future: Results of a Stakeholder Survey’, *Applied Health Economics and Health Policy,* 11(6), pp. 639–652. doi: 10.1007/s40258-013-0056-7.

Trichopoulou, A., Martínez-González, M. A., Tong, T. Y. N., Forouhi, N. G., Khandelwal, S., Prabhakaran, D., Mozaffarian, D. and de Lorgeril, M. (2014) ‘Definitions and potential health benefits of the Mediterranean diet: Views from experts around the world’, *BMC Medicine,* 12(1), pp. 1–16. doi: 10.1186/1741-7015-12-112.

Tsai, H.-J. (2015) 'Dietary patterns and cognitive decline in Taiwanese aged 65 years and older', *International Journal of Geriatric Psychiatry*, 30(5), pp. 523–530. doi: 10.1002/gps.4176.

United Nations (2020) *Shaping the Trends of Our Time*. Available at: https://www.un.org/development/desa/publications/wp-content/uploads/sites/10/2020/09/20-124-UNEN-75Report-2-1.pdf.

Vallejo-Torres, L., García-Lorenzo, B. and Serrano-Aguilar, P. (2018) 'Estimating a cost-effectiveness threshold for the Spanish NHS', *Health Economics*, 27(4), pp. 746–761. doi: 10.1002/hec.3633.

Viia, A., Toots, A., Mali, B. Č., Kerbler, B., Øverland, E. F., Terk, E., Tafel-Viia, K., Kaivo-oja, J., Finnerty, J., Considine, M., Sendi, R. and Lassur, S. (2016) 'Futures of European welfare models and policies: seeking actual research questions, and new problem-solving arsenal for European welfare states', *European Journal of Futures Research*, 4(1), p. 1. doi: 10.1007/s40309-015-0080-y.

Vollaard, H. and Martinsen, D. S. (2017) 'The rise of a European healthcare union', *Comparative European Politics*, 15(3), pp. 337–351. doi: 10.1057/cep.2016.3.

Wacker, M., Holle, R., Heinrich, J., Ladwig, K.-H., Peters, A., Leidl, R. and Menn, P. (2013) 'The association of smoking status with healthcare utilisation, productivity loss and resulting costs: results from the population-based KORA F4 study', *BMC Health Services Research*, 13(1), p. 278. doi: 10.1186/1472-6963-13-278.

Wagstaff, A. (2005) 'The bounds of the concentration index when the variable of interest is binary, with an application to immunization inequality', *Health Economics*, 14(4), pp. 429–432. doi: 10.1002/hec.953.

Wagstaff, A. and van Doorslaer, E. (2000) 'Measuring and Testing for Inequity in the Delivery of Health Care', *The Journal of Human Resources*, 35(4), p. 716. doi: 10.2307/146369.

Wagstaff, A., Paci, P. and van Doorslaer, E. (1991) 'On the measurement of inequalities in health', *Social Science & Medicine*, 33(5), pp. 545–557. doi: 10.1016/0277-9536(91)90212-U.

Wang, Y., Sung, H.-Y., Yao, T., Lightwood, J. and Max, W. (2018) 'Health Care Utilization and Expenditures Attributable to Cigar Smoking Among US Adults, 2000-2015', *Public Health Reports*, 133(3), pp. 329–337. doi: 10.1177/0033354918769873.

White Hughto, J. M., Rose, A. J., Pachankis, J. E. and Reisner, S. L. (2017) 'Barriers to Gender Transition-Related Healthcare: Identifying Underserved Transgender Adults in Massachusetts', *Transgender Health*, 2(1), pp. 107–118. doi: 10.1089/trgh.2017.0014.

Wiepjes, C. M., den Heijer, M., Bremmer, M. A., Nota, N. M., Blok, C. J. M., Coumou, B. J. G. and Steensma, T. D. (2020) 'Trends in suicide death risk in transgender people: results from the Amsterdam Cohort of Gender Dysphoria study (1972–2017)', *Acta Psychiatrica Scandinavica*, 141(6), pp. 486–491. doi: 10.1111/acps.13164.

Williams, C. C., Curling, D., Steele, L. S., Gibson, M. F., Daley, A., Green, D. C. and Ross, L. E. (2017) 'Depression and discrimination in the lives of women, transgender and gender liminal people in Ontario, Canada', *Health & Social Care in the Community*, 25(3), pp. 1139–1150. doi: 10.1111/hsc.12414.

Wilson, K. G., Chochinov, H. M., Graham Skirko, M., Allard, P., Chary, S., Gagnon, P. R., Macmillan, K., De Luca, M., O'Shea, F., Kuhl, D., Fainsinger, R. L. and Clinch, J. J. (2007) 'Depression and Anxiety Disorders in Palliative Cancer Care', *Journal of Pain and Symptom Management*. Elsevier, 33(2), pp. 118–129. doi: 10.1016/J.JPAINSYMMAN.2006.07.016.

Woolcott, J. C., Ashe, M. C., Miller, W. C., Shi, P. and Marra, C. A. (2010) 'Does physical activity reduce seniors' need for healthcare?: a study of 24 281 Canadians', *British Journal of Sports Medicine*, 44(12), pp. 902–904. doi: 10.1136/bjsm.2008.057216.

Wooldridge, J. (2010) 'Basic Linear Unobserved E¤ects Panel Data Models', in *Econometric analysis of cross section and panel data*. 2nd Ed. Cambridge (Massachusetts): The MIT Press, pp. 281–344.

Wooldridge, J. M. (2007) 'Inverse probability weighted estimation for general missing data problems', *Journal of Econometrics*, 141(2), pp. 1281–1301. doi: 10.1016/j.jeconom.2007.02.002.

World Health Organization (2010) *Global Recommendations on physical activity for health*.

World Health Organization (2017) 'Global action plan on the public health response to dementia 2017 - 2025', *World Health Organization*. Available at: https://www.who.int/mental_health/neurology/dementia/action_plan_2017_2025/en/.

World Health Organization (2018) *Physical activity*. Available at: https://www.who.int/en/news-room/fact-sheets/detail/physical-activity (Accessed: 23 January 2019).

World Health Organization and The World Bank (2011) *World Report on Disability, WHO Library*. Available at: https://www.who.int/disabilities/world_report/2011/en/.

Wu, L.-T., Zhu, H. and Ghitza, U. E. (2018) 'Multicomorbidity of chronic diseases and substance use disorders and their association with hospitalization: Results from electronic health records data', *Drug and Alcohol Dependence*, 192, pp. 316–323. doi: 10.1016/j.drugalcdep.2018.08.013.

Xu, X., Bishop, E. E., Kennedy, S. M., Simpson, S. A. and Pechacek, T. F. (2015) 'Annual Healthcare Spending Attributable to Cigarette Smoking', *American Journal of Preventive*

Medicine, 48(3), pp. 326–333. doi: 10.1016/j.amepre.2014.10.012.

Yasunaga, H., Ide, H., Imamura, T. and Ohe, K. (2006) ‘Willingness to pay for health care services in common cold, retinal detachment, and myocardiac infarction: an internet survey in Japan’, *BMC Health Services Research,* 6(1), p. 12. doi: 10.1186/1472-6963-6-12.

Zamora-Kapoor, A. and Coller, X. (2014) ‘The Effects of the Crisis: Why Southern Europe?’, *American Behavioral Scientist,* 58(12), pp. 1511–1516. doi: 10.1177/0002764214530649.

Zeeman, L., Sherriff, N., Browne, K., McGlynn, N., Mirandola, M., Gios, L., Davis, R., Sanchez-Lambert, J., Aujean, S., Pinto, N., Farinella, F., Donisi, V., Niedźwiedzka-Stadnik, M., Rosińska, M., Pierson, A., Amaddeo, F., Taibjee, R., Toskin, I., Jonas, K., van Der Veur, D., Allen, O., Troussier, T. and De Sutter, P. (2019) ‘A review of lesbian, gay, bisexual, trans and intersex (LGBTI) health and healthcare inequalities’, *European Journal of Public Health,* 29(5), pp. 974–980. doi: 10.1093/eurpub/cky226.