**Erasmus School of Economics**

Priority setting in the Spanish health system: A discrete choice experiment discussing mental health

**Rotterdam, 2013**

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Rotterdam, 2013

**MSc Economics and Business**

**Specialization: Health Economics**

**Master thesis**



**Abstract**

In most countries, priority setting of health interventions is often ad hoc or based on heuristic approaches and political motives, resulting in the exclusion of important information. In a context of competing demands and constrained health resources, it becomes apparent that more rational and transparent approaches are needed. Spain is not an exception. Within an environment of continuously increasing health care needs and costs, the recent economic crisis threatens the sustainability of the Spanish National Health System. The economic and health consequences of the crisis urge the implementation of effective and rational policies in the long-run. This thesis elaborates the impact of equity and efficiency criteria on Spanish stakeholders’ preferences. A discrete choice experiment is employed among policy makers, health managers and researchers from different regions in Spain and the relative importance of these attributes is established. Using aggregate equity and efficiency attributes, an empirical measure of the equity/efficiency trade-offs is calculated. The results of the experiment are used in order to rank health interventions based on their equity and efficiency characteristics. Mental disorders among other disease areas are extensively analysed, given the increasing burden of mental illness in all high-income countries. The results of the DCE indicate that preferences among equity and efficiency criteria vary among regions and some trade-offs indeed take place. DCEs have already been identified as a useful approach to inform and rationalise priority setting processes. This thesis shows that multi-criteria decision analysis (MCDA) can be a valuable tool in supporting rational prioritisation decisions and incorporate aggregate equity and efficiency preferences in Spain.

*Keywords*: Discrete choice experiment, priority setting, MCDA, policy makers, mental disorders, Spain

**Acknowledgments**

I am sincerely and heartily grateful to my advisor and mentor, Francesco Paolucci, for the support, attention and guidance he showed me throughout my thesis writing. I am sure it would have not been possible without his help. Besides I would like to thank Dr. Emmanouil Mentzakis for his advices and help during my writing. I would also like to express my gratitude to my parents, friends and colleagues for their help and moral support.

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# INTRODUCTION

## The need for rational approaches to priority setting

In every health system, policy makers need to make important decisions on the utilization of public funds, in a context of increasingly constrained health resources. However, decisions concerning the prioritisation of health interventions are often made ad hoc, based on political motives and heuristic approaches (Mentzakis, Paolucci and Rubicko 2012). The underlying problem is that, although information is provided by multiple disciplines (including public health, social sciences and evidence-based medicine) it is inadequate to form complex decisions on priority setting. As a result, important criteria affecting choices are not taken into account and the decision process does not lead to an optimal use of health resources. The inconsistency of these decision making processes can be attributed to the absence of clear and specific guidelines targeting common goals. Thus, a transparent and explicit approach in priority setting is needed. A holistic view of the available information and knowledge of the relationships between the various characteristics of each health system are required in order to effectively plan improvements on different aspects of the system.

At present, many countries focus on cost-containment health policies, due to significant increases in health expenditure and the current economic crisis. Health care policy makers intervene with policies targeting the promotion of savings rather than the efficiency of the system. Spain is not an exception. As in most European countries, health care demands are rising in Spain, resulting in increased health care costs. Health expenditures have continuously and significantly increased from 5.3% of GDP in 1980 to 9.3% of GDP in 2009 (OECD Health Data 2013). This is not only due to an increase in life expectancy, but also a rise in population caused by inward migration (A decentralised system in constant flux). During this period, the Spanish health system has undergone deep institutional and economic changes; mainly the transition towards a national health system (*Systema Nacional de Salud*, SNS) with universal coverage and the devolution process of health responsibilities from the central government to the autonomous communities (García-Armesto, et al. 2010).

During the last years, the consequences of the financial crisis made the level of health expenditure a great concern for Spanish policy makers. The current financial situation threatens the sustainability of the Spanish NHS with its specific characteristics of universality and equity. For instance, unemployment rates have increased up to more than 26% of the active population (Instituto Nacional de Estadística 2012). At the same time, public deficit reached more than 10% of the GDP in 2012, resulting in the introduction of austerity measures for public policies. One example of these measures is the significant cuts in pharmaceutical expenditure that have been implemented during these years. Pharmaceutical spending is of special interest in Spain for two main reasons. First, real pharmaceutical expenditures are the second most important determinant of total health spending in Spain, after personnel costs. Second, and more relevant for this thesis, there is a lack of effective decision-making concerning pharmaceutical policies. These issues are extensively analysed later.

It becomes apparent that efforts have to be made, targeted at linking health priorities with an efficient allocation of resources. Policy makers and other stakeholders in Spain have already initiated strategies aiming to rationalise the use of constrained resources. These approaches targeted cost-containment as well as improvements in the appropriateness and quality of care. To this end, services were excluded from the basic healthcare benefits package, based on efficiency and equity criteria. Furthermore, co-payments for the pharmaceutical benefits and private insurance schemes were introduced (Gaminde 1999). Despite the positive impact of these strategies on the reorganization of the health system, an overall effective coordination of regional health plans is still absent. In addition, the urgent need for a reduction of the public debt led to policy measures that are not effective in the long-run. That is, decision makers were not aware of the opportunity costs or externalities produced by alternative options.

The evaluation of these strategies, in order to prove whether they are beneficial for countries like Spain, is outside the scope of this analysis. The focus of this thesis is on analysing whether health policy making is in line with the preferences of various stakeholders along the Autonomous Communities (ACs). Over the last decades, various approaches of rational priority setting have been developed. There is a general consensus that economic evaluation of health technology innovations can provide useful guidance to policy makers concerning the implementation of cost-effective strategies. In Spain, several regions promoted the utilization of economic evaluation methods for decisions on the inclusion of new medicines in the list of publicly financed drugs. At the same time, health technology assessment agencies have been established in order to improve the quality of care provided (Lopez-Casasnovas, Costa-Font and Planasa 2005). However, the adaptation of these methods is not yet comprehensive and thus, some regions are more advanced. For instance, Catalonia and Andalucía are already implementing economic evaluation of pharmaceutical products at a significant extent.

The criteria on which decisions are made vary among the regions and therefore, economic evaluation might not be the most efficient tool in advising policy makers. Furthermore, economic evaluation focuses on the economic criterion of efficiency. That is, it prioritises interventions that exhibit a positive balance between costs and benefits in the context of cost-utility or cost-effectiveness analysis. However, when it comes for public health care provision, other determinants rather than efficiency are equivalently important. Equity principles, as well as the potential trade-offs between different criteria should be taken into account in the prioritisation process of publicly funded interventions. This does not necessarily mean that economic evaluation methods should not be used (Peacock, et al. 2009). It rather indicates that, given the significant scarcity of resources in the current economic situation, health policy making should be based on a wider range of criteria. In other words, the prioritisation of health interventions should be aligned with the preferences of different stakeholders. The choice process on the criteria included in this analysis is extensively discussed in Chapter 4.

Discrete choice experiments (DCEs) are a convenient and effective tool that enhances such analyses. The DCE approach belongs to a broader methodology used for rational priority setting, called multi-criteria decision analysis (MCDA). Compared to other methods, DCEs allow for the utilization of all available information, as well as for comparisons between the different criteria (Baltussen and Niessen 2006). By eliciting stakeholders’ preferences regarding multiple criteria simultaneously, MCDA offers valuable guidance in explicit decision making. DCEs have been widely accepted and applied in other disciplines (e.g. environmental sciences) and during the last decades they are gaining ground as a tool to inform decisions on health care resource allocation. Some countries have already shifted towards more transparent processes of decision-making. For instance, United Kingdom’s National Institute for Health and Clinical Excellence (NICE) strongly supports value-based decisions in health care (Mirelman, et al. 2012). However, priority setting is still less formalised in Spain. Given the extraordinary scarcity of resources and the financial instability, there is an urgent need for rational decision processes in Spain.

This thesis elaborates the impact of equity and efficiency criteria on Spanish stakeholders’ choices concerning the design of health care policies. The paper focuses on the equity-efficiency trade-offs decision makers have to make when they prioritise interventions. A DCE is implemented in Spain to analyse the preferences on these criteria of various health care agents among the ACs. Subsequently, interventions that should be implemented are ranked, by first being mapped to these criteria and then ranked according to the individual preferences elicited. This step of MCDA is also known as a Composite League Table (CLT) construction. Similar to cost-utility analysis, this methodology ranks programs such as the provision of care to cancer or diabetes patients, taking into account equity and efficiency values. Patients’ status varies in terms of their number, individual characteristics and the level of illness severity. Therefore, other determinants apart from cost-effectiveness of interventions are taken into account in this analysis. The factors that are considered equally important include: the level of severity of different diseases; the number of patients benefited from the intervention; the effect of the intervention on patients’ quality of life; the willingness of agents to subsidise the provision of care for others; and the age of those patients at which the interventions are directed.

Hence, multiple criteria are considered, representing not only efficiency but also equity principles and social values. As mentioned before, all these factors should have an important effect on public funding decisions among different interventions. Finally, interventions targeting mental disorders are compared to other programs, in order to assess the relative weight Spanish decision-makers give to mental health policies. The importance of mental health is extensively discussed in the next section. The remainder of the thesis is organised as follows. Chapter 2 provides an overview of the Spanish health system development and current organisation, as well as a discussion on mental disorders burden and policies. Chapter 3 presents a detailed review of the MCDA literature. Chapter 4 provides a theoretical background of DCEs, as well as a detailed description of the variables and the model used for the empirical analysis of this paper. Chapter 5 presents the results of both the estimation and the CLTs; Chapter 6 discusses the findings, as well as policy recommendations and limitations of this study. Finally, Chapter 7 refers to concluding remarks.

## The burden of mental disorders

Worldwide, mental health is considered to be a key driver of the overall well-being of individuals, since it enables them to be realistic, productive and contribute to the community. However, compared to physical health, mental health and disorders have been significantly neglected throughout the years. According to several studies on the Global Burden of Disease a continuously increasing percentage of the global burden of disease can be attributed to mental disorders. These disorders are universal, affecting more than 25% of individuals of different countries, age, sexes or income (WHO, 2001; WHO, 2003; WHO, 2008). Other recent studies concluded that diseases of the brain accounted for more than 13% of the global burden of disease, outperforming common diseases as cancer (Collins, et al. 2011). It should be noted that “disorders of the brain” refers to the combination of mental disorders (such as depression and schizophrenia) and neurological disorders (such as dementia).

However, these global estimates cannot sufficiently explain the burden of brain disorders in Europe, since they are affected by the diversity of the countries in terms of health and socio-economic characteristics. Within the European Union (EU), it has been observed that ill mental health affects every fourth citizen (in 2005) and can cause, apart from life losses also notable burdens to the economic, social, educational as well as criminal and justice systems (McDaid, 2005). Even more, it doubts core social values, since phenomena of discrimination towards mentally ill individuals and non-respect towards human rights are observed. According to the European Commission’s Green Paper on Mental Health, mental disorders are considered to become the highest ranking cause of illness in high income countries by 2020 (European Commission Green Paper, 2005).

A number of publications during the last decade have focused specifically on the burden of brain disorders in Europe and offered comprehensive data on prevalence, direct and indirect costs as well as economic features of both mental and neurological disorders. In particular, Wittchen et al. report in 2005, which has been updated in 2011, had an immense contribution in the overall understanding of the size, burden and costs of brain diseases (Wittchen, et al. 2011). The updated report included 14 new main diagnoses of mental disorders that faced limited diagnostic scope in the past, such as adolescent and childhood disorders, as well as three new countries, covering in total 514 million inhabitants of the EU. According to the report, more than 38.2% of the total EU population suffers from at least one of the 27 disorders included in the analysis. In terms of the number of persons affected, this percentage corresponds to 164.7 million persons.

Comparing the estimates of the 2005 and 2011 reports, a significant increase in the prevalence of brain disorders is being observed. This difference in percentages can be highly attributed to the inclusion of diagnoses of important mental disorders and age groups. Even more, substantial differences are noted in the number of individuals across EU that has been affected by mental disorders, with a raise from 82.7 million in 2005 to 164.7 million in 2011. Calculations of the burden of disease have been implemented using DALYs as a measure of the overall burden. DALYs combine in one measure the years lost because of early death (mortality) and non-healthy years because of a state of disability or poor health (morbidity). Thus, it is considered a very useful tool of measurement for mental disorders, since their burden is mainly attributed to disability of the brain functioning, rather than premature death.

Based on the results of the 2011 report, the most common forms of brain disorders are: a) Anxiety disorders with 14.0% rate of prevalence, b) Insomnia (included in sleep disorders), 7.0%, c) Major depression (mood disorders), 6.9%, d)Somatoform disorders, 4.9%, e) Substance use disorders, with a best estimate of 3.4% prevalence for alcohol dependence and up to 1.8% and 0.4% for cannabis and opioid dependence, respectively, f) Attention deficit hyperkinetic disorder, 5.0% with an applicable age range from 6 to 17 years and finally g) Dementia, with varying rates estimated by age group specific estimates after 60 years, 1.0%-31.7% according to age. Differences in the estimates among regions, age groups and sexes are observed.

These estimates are considered to be accurate since they were based on extensive literature search for publications in epidemiology as well as reanalysis of existing data and national surveys on mental and neurological disorders. However, it should be mentioned that this analysis faced some limitations, especially due to the lack of adequate data on different age groups and specific diagnoses. A detailed review of all the estimates in both 2005 and 2011 reports are given in Table 1 above.

**Table 1: 2005 and 2011 estimates and overall number of cases affected by mental disorders in the EU (in millions)**

|  |  |  |
| --- | --- | --- |
|  | Prevalence estimate | No. of persons affected |
|  | **2005 (%)** | **2011(%)** | **2005 (Million)** | **2011 (Million)** |
| *Group A: 2005 report diagnoses* |  |  |  |  |
| Alcohol dependence | 2.4 | 3.4 | 7.2 | 14.6 |
| Opioid dependence (drug dep.) | 0.5  | 0.1-0.4 | 2.0 | 1.0 |
| Cannabis dependence (drug dep.) | 0.3  | 0.3-1.8 | 1.4 | 1.4 |
| Psychotic disorders | 0.8  | 1.2. | 3.7 | 5.0 |
| Major depression | 6.9  | 6.9 | 18.4 | 30.3 |
| Bipolar disorder | 0.9 | 0.9 | 2.4 | 3.0 |
| Panic disorder | 1.8 | 1.8 | 5.3 | 7.9 |
| Agoraphobia | 1.3 | 2.0 | 4.0 | 8.8 |
| Social phobia | 2.3 | 2.3 | 6.7 | 10.1 |
| Generalised anxiety disorder | 1.7 | 1.7-3.4 | 5.9 | 8.9 |
| Specific phobias | 6.4 | 6.4 | 18.5 | 22.7 |
| OCD | 0.7 | 0.7 | 2.7 | 2.9 |
| PTSD | - | 1.1-2.9 | - | 7.7 |
| Somatoform disorders d | 6.3 | 4.9 | 18.9 | 20.4 |
| Anorexia nervosa (eating disorders) | 0.4 | 0.2-0.5 | 1.2 | 0.8 |
| Bulimia nervosa (eating dis.) | 0.3 | 0.1-0.9 | 0.7 | 0.7 |
| Subtotal any group A | *27.4%* | *27.1%* | *82.7* | *118.1* |
|  |  |  |  |  |
| *Group B: additional 2011 diagnoses* |  |  |  |  |
| Borderline personality disorder a | - | 0.7 | - | 2.3 |
| Dissocial personality disorder a | - | 0.6 | - | 2.0 |
| Hyperkinetic dis. /ADHD | - | (5.0) 0.6 | - | 3.3 |
| Pervasive dev. dis. /Autism | - | 0.6 | - | 0.6 |
| Conduct disorders b | - | (3.0) 0.4 | - | 2.1 |
| Mental retardation | - | 1.0 | - | 4.2 |
| Insomnia | - | (7.0) 3.5 | - | (29.1) 14.6 |
| Hypersomnia | - | 0.8 | - | 3.1 |
| Narcolepsy | - | 0.02 | - | 0.1 |
| Sleep apnoea | - | 3.0 | - | 12.5 |
| Dementias b | - | (5.4) 1.2 | - | 6.3 |
| Total any group B | - | *27.1* | *-* | *51.0* |
| Total A and B | 27.4% | 38.2% | 82.7 | 164.8 |
| Note: Estimated prevalences do not correspond to number of persons due to age group-specific adjustments. a Borderline and dissocial personality disorders not counted in subtotal to avoid double counting with disorders from Group A.b Childhood/Adolescence disorders, except for autism, rates () refer to age group 2-17. Therefore the age group prevalence was adjusted to reflect the total population. Dementia rates (applicable age range 60+) were also adjusted.c Insomnia counted only for 50% (as a conservative strategy in order to avoid double counting with disorders from Group A.d Without headache. |

Source: Wittchen et al. 2010

## Economic burden of mental disorders

It becomes evident that, given the prevalence of brain disorders in the EU, their economic burden is immense. The economic impacts of ill mental health include, apart from the direct costs of care and treatment, significant financial, social and emotional burden for the patients and their families. A summary of the overall economic burden of mental disorders is given in Table 2 (WHO, Investing in Mental Health 2003). As noted in the Table, the types of measurable costs include also indirect costs concerning the earning and productivity losses due to the brain disorders. These economic impacts affect not only the patients, but also the productivity contributions of their caregivers as well as the contributions to the national economy.

**Table 2: The overall economic burden of mental disorders**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Care costs | Productivity costs | Other costs |
| Sufferers | Treatment and service fees/payments | Work disability; lost earnings | Anguish/suffering; treatments side-effects; suicide |
| Family and friends | Informal care giving | Time off work | Anguish; isolation; stigma |
| Employers | Contributions to treatment and care | Reduced productivity | - |
| Society | Provision of mental health care and general medical care (taxation/insurance) | Reduced productivity | Loss of lives; untreated illnesses (unmet needs); social exclusion |

 Source: WHO Department of Mental Health and Substance Dependence, 2003 (Investing in Mental Health, 2003)

A recent study on the economic costs of brain disorders in Europe estimated that, given the 19 major groups of disorders included, the total European costs for 2010 reached 798 billion. Direct health care costs alone accounted for 37%, while indirect costs counted for 40% of the total costs (Olesen, et al. 2012). Moreover, compared to certain physical diseases, neurological disorders such as Alzheimer’s disease and schizophrenia are proved to be more costly in terms of average cost per patient. Compared to other chronic diseases, mental chronic disease conditions such as neurosis and psychosis tend to have higher annual expenditure (WHO, Investing in Mental Health 2003). However, these extreme cost levels of mental disorders are highly attributed to their indirect costs. In many high income countries, 35% to 45% of sick leaves from work are due to mental health problems. Health care expenditure for mental diseases is considered to be significantly lower than the direct costs of other physical disorders (Wittchen, et al. 2011).

These findings indicate that the economic and disease burden of brain disorders has been significantly growing during the last decade. Mental and neurological disorders and poor mental health appear across different age and population groups, as well as diverse cultures. The total costs of mental health problems are continuously increasing and up to 2006 they have been estimated at between 3% and 4% of GDP (Jané-Llopis and Anderson 2006). The main driver of these costs is lost productivity at work due to mental disability. Further non-health costs include the impact of mental disorders on social, educational and criminal systems as well as the stigmatization of mentally ill individuals. This continuously increasing prevalence of mental health disorders gradually upgraded mental health policy to a core health care challenge across the EU.

# BACKGROUND

## The Spanish health system reforms

The Spanish Health System has been significantly transformed during the last two decades. In 1986, the General Health Law (*Ley General de Sanidad*) provided all citizens the right to health care by creating a universal and decentralised health system, the Spanish National Health System (*Systema Nacional de Salud*, SNS). According to this law, SNS is characterised, among others, by the extension of services to the entire population and the provision of comprehensive health care, including promotion of care and prevention of disease (RDL 14/1986). The expansion of health coverage has been followed by a decentralisation process which gradually transferred health management responsibilities to the distinct regions, also named ACs of Spain. This procedure was completed in 2002, when all seventeen ACs have been authorised with health responsibilities (Lopez-Casasnovas, Costa-Font and Planasa 2005).

The creation of SNS and the devolution of health care to the Spanish regions were accompanied by a reorganization of the legislative and financing regimes of the health system. The General Health Law introduced the Interterritorial Council of the Spanish National Health Service (*Consejo Interterritorial del Servicio Nacional de Salud de España*, CISNS) as an organ of cohesion among the regional health policies. While the Ministry of Health, Social Services and Equality (*Ministerio de Sanidad, Servicios Sociales e Igualdad, MSSSI)* is still delegated with the central governance of health care, CISNS functions as the general coordinator in health care issues between the central state and the regional governments of the ACs. Jointly composed by central and regional representatives, CISNS consorts with the diverse health activities of the autonomous communities.

Gradually, ACs developed regional financing and delivery schemes. At present, all ACs are delegated with full health care responsibilities, except for some financial constraints imposed by the central state (Lopez-Casasnovas, Costa-Font and Planasa 2005). However, these reforms occurred at different speeds across the country, resulting in potential health care inequalities among the regions. This led to the Law of Cohesion and Quality (*Ley de Cohesión y Calidad de Sistema Nacional de Salud*) in 2003, which complemented the General Health Act basic lines in order to reflect the current social reality. The law demonstrated a further cooperation of public health authorities in order to warrant citizens’ rights to health protection and quality of care; strengthen the equality of health services among regions; and support the social participation in the SNS.

During the last years, the Spanish health system faced further challenges due to the global economic downturn. The economic crisis put pressure on the sustainability of public finances in Spain. In a context of continuously rising health care expenditure, this led to a need for structural reforms in order to reassure the efficiency of the health system. To this end, two new Royal Decree-Acts (20 April 2012 and 3 August 2012, respectively) have been implemented (RDL 20/2012; RDL 3/2012). These laws introduced several structural changes in the SNS, targeting the effective coordination of the system and the application of community and pharmaceutical legislation (International Social Security Association, ISSA 2013).

Overall, the Spanish health system has undergone significant changes during the last decades. The consolidation of health care services under the SNS and the devolution of health responsibilities to the ACs have given ambiguous results. The devolution of health authorities and fiscal responsibilities to the autonomous communities seems to have improved the quality of health care, without necessarily increasing inequalities among the regions in terms of access to health care (Martin-Moreno and Collegues 2009). However, several discrepancies between the regions are observed concerning health outcomes and health care funding. In order to tackle these inequalities, further improvements have to take place in the coordination of regional governments.

## Health care financing and delivery in Spain

### Health care funding and expenditure

Health expenditures in Spain have been significantly increasing during the last decades. Total expenditures have increased from 5.3% of the GDP in 1980 to 7.5% in 2001 and 9.5% of the GDP in 2009 (OECD Health Data, 2013). However, health expenditures in Spain exhibit negative growth rates in 2010 and 2011 due to significant cuts in public health spending. In 2011, total spending accounted for 9.3% of GDP, with the largest share being public health expenditures (73% of total expenditure). Considering the devolved structure of the health system, public expenditures vary across the Spanish regions, from 877 thousand in Cantabria to 11 million in Catalonia and 8 million in Madrid (FBBVA 2011)**.**

SNS reforms have driven significant changes in the financing and resource allocation schemes. Currently, SNS is publicly funded by general taxes (excluding the mutual funds of civil servants), which are collected by the central government and further allocated to the ACs (Lopez-Casasnovas, Costa-Font and Planasa 2005). The Spanish financing scheme is overall proportional or mildly progressive, based on income and consumption taxes. The total amount of health expenditure is defined by the Spanish Parliament in the National General Budget and subsequently distributed to the regions, following a certain allocation formula. This formula has been transformed after 2002, in order to reduce overspending in certain regions. This reform established the participation of the ACs in the revenues collection. Even more, new funds have been introduced, which acted as mechanisms to reassure equity of health care spending among the regions.

### Pharmaceutical expenditure

As discussed earlier, the importance of pharmaceutical expenditure in Spain is of great interest for two main reasons. First, pharmaceutical costs remain uncontrolled, despite the initiatives of the Spanish government during the last decades. This is mainly attributed to the introduction of new, more expensive drug treatments which do not often contribute in the improvement of existing therapies. Moreover, there is a lack of generic markets and effective control on the demand side (Lopez Bastida and Mossialos 2000). Pharmaceutical expenditures in Spain have been continuously increasing until 2002, when they reached their maximum (21.8% of total health expenditures).

Although an essential decrease is being noticed since then, the relative weight of these expenditures is still greater in Spain than in other countries (the average of OECD countries was of 16.9% in 2008) (OECD 2011). In 2011, pharmaceutical spending accounted for 17.4% of total expenditure in Spain. However, if hospitals’ expenditures in pharmaceuticals are taken into account, this share might reach 34% of total spending. In these terms, real pharmaceutical expenditures become the second most important determinant of total health spending, after personnel costs. Figure 1 presents the trends of pharmaceutical expenditures for certain OECD countries between 1990 and 2010 (OECD 2013).

Second, the failure of cost-containment measures applied in Spain indicates a lack of effective decision-making concerning pharmaceutical polices. The decentralization process resulted in separate regional health plans for each community. However, the Ministry of Health, Social Services and Equality remains responsible for pharmaceutical policy initiatives. Several measures targeting cuts on pharmaceutical expenditure were applied in Spain during the last decades. Until 1993, every approved drug was eligible for public funding (Gaminde 1999). In order to reduce pharmaceutical costs, the Royal Decree in 1993 (83/1993) introduced a negative list of drugs not to be reimbursed by the Spanish NHS. This list has been extended in 1998 (Royal Decree 1663/1998).

**Figure 1: Pharmaceutical expenditures PPP US$. 1995-2011**



Source: OECD Health Data 2013

Furthermore, the new Health Law passed in 2006 modified several aspects of public financing (Ley 29/2006, de 26 de Julio, Boletín Oficial del Estado, 2006). These aspects included changes in reference pricing systems and sales margins for pharmaceutical laboratories. More recently, the economic crisis posed further restrictions on public finances. Therefore, extended cuts in pharmaceutical spending have been implemented. The last health reform in Spain (RDL 16/2012) introduced increased co-payments for pharmaceutical products.

Currently, cost-sharing of prescribed drugs is mandatory not only for individuals under 65 years but also retirees with ceiling costs depending on the level of income. However, some groups of individuals are exempted from the co-payment (e.g. patients with specific chronic diseases). The cuts in pharmaceutical expenditures have been accompanied by a reduction in public workers’ wages up to 7% in July 2012 (RDL 20/2012). These regulations reflect the current general consensus that personnel and pharmaceutical costs are the most important determinants of total health expenditures in Spain.

Despite all these efforts, the relative weight of pharmaceutical expenditures is still at high levels, imposing further challenges in the Spanish health system. This is extremely relevant in times of financial crisis, when all social sectors are being affected. Therefore, priorities on the allocation of these scarce health resources should be reconsidered. In the Spanish context, preferences of stakeholders responsible for pharmaceutical polices are of great importance.

### Health care planning and delivery

The General Health Law in 1986 established the Spanish national health system of universal coverage. However, some regions enjoy greater health responsibilities than others, due to the delay in the decentralisation process completion. For instance, Catalonia was the first community that created a regional health plan in 1981, followed by Andalucía in 1984 and the Basque Country in 1988. Therefore, important inequalities in health care access are being observed among the regions. The basic health benefits package provided by the NHS offers coverage of all main services.

Still, each AC is allowed to establish its own package, by adding new services without necessarily dropping any of the existing ones (Gaminde 1999). Therefore, the coverage of additional services, such as dental and long-term care varies within the country. In each community, the Health Council (Consejería de Salud) is responsible for the overall organization, funding and delivery of health care. The coordination of the regional health departments and health services is achieved through a contract programme, which regulates the objectives, the budget and the evaluation of the system.

Health care delivery is mostly provided by publicly owned centres and services, free at the point of use. Despite the free access, SNS health care coverage is often supplemented by a private health insurance that offers improved health care benefits, in terms of waiting lists and hospital amenities (Lopez-Casasnovas, Costa-Font and Planasa 2005). Primary care provision is integrated into geographical health zones, which are managed at the level of health areas, covering certain amounts of the population. Due to the discrepancies among regions, significant geographical differences are observed in terms of primary care and inpatient care provision.

## Mental health policy in Spain

As in most European countries, mental health has until recently been a neglected policy area within the Spanish health system. It was not until the 1980s that Spain shifted towards mental health policy reforms, following a general focus on mental health strategies across European countries. Initially, mental health services were provided through a fragmented network of public organizations outside the NHS (often called asylums) as well as private and religious institutions. These services were characterised by limited coordination among organizations and provision of outpatient care (García-Armesto, et al. 2010). The first initiative towards mental health reform was in 1985, with the establishment of a Ministerial Commission for Psychiatric Reform focusing on the integration of mental health services within the general health system. Following the principles of the General Health Act (1986), several reforms have taken place targeting the creation of a community-based network for mental health care provision, treatment and promotion.

However, these reforms targeted a rather small proportion of the mentally ill population, especially those with severe mental conditions. The need for further reforms with the participation of a wider range of stakeholders led to the SNS Strategy on Mental Health (2007). This reform was in line with the principles of Helsinki Declaration, signed in 2005 by WHO European Region health ministers (WHO 2005). According to the strategy, mental health is recognised as a primary policy area and several objectives have to be satisfied, including mental health prevention and stigma eradication, continuity of mental health care, institutional coordination and research empowerment (Strategy on Mental Health, 2008). These objectives are not only consistent with the WHO suggestions but also in accordance with the specific constitutional structure of Spain.

Put differently, the initiative for the latest mental health reforms is attributed not only to the need for a convergence of mental health polices in Europe but also to the changes in the general welfare governance of Spain. The reorganization of the Spanish mental health policy coincided with the deinstitutionalization process. Consequently, reforms were adapted at different speeds across the country potentially causing inequalities in mental health care access among the regions. Therefore, the strategy on mental health aimed at the coordination of these different plans nationwide (Costa-Font, et al. 2011). This strategy has been updated to the 2009-2013 Mental Health Strategic Plan, after evaluation and improvement of the 2006 plan (Bobes, et al. 2012).

At present, the Spanish health system ranks as one of the most efficient systems among the European countries. The move towards universal and free health coverage and the improvement of primary care services resulted in more equitable access to health care. At the same time, the devolution of health responsibilities into the 17 ACs led to a variety of efficient regional health models. Autonomous government of health care services allowed for policy initiatives targeting specific populations’ needs and resulting in great health benefits for regions like Catalonia and the Basque country (Martin-Moreno and Collegues 2009). Concerning mental health, it has been argued that the decentralization process contributed to a greater awareness for the need of mental health reforms in Spain (Costa-Font, et al. 2011). In other words, the participation of different stakeholders in decision-making processes (including public support) led to the prioritisation of mental health reforms in the Spanish policy agenda.

However, several problems concerning resource allocation have not yet been addressed. The Spanish central government fails at coordinating the regional health plans, since each region structures its priorities differently. In this context, the preceded mental health reforms have not yet addressed inequalities in access to specialised care and treatment. Even more, information networks and evidence-based research are still underdeveloped (García-Armesto, et al. 2010). Therefore, mental health policy in Spain has not yet reached the European standards. Mental health care remains underfunded (up to 5% of total health expenditure), while prevention and promotion of mental health are still limited (Cabasés and Salvador-Carulla 2010). Although implemented reforms have rendered mental health crucial in the policy agenda, further initiatives have to take place in order to address mental health disorders.

## Evidence from Spain

### Burden of disease

The National Plan on Research and Development (Plan Nacional de I+D+i 2008-2013) and the Quality Plan for the Spanish NHS (Quality Plan Report 2006-2010) indicate that the burden of disease depicts the need for health care provision within the Spanish NHS. However, a greater burden of disease conditions does not necessarily imply greater benefits from the health intervention. That is, other dimensions apart from the burden of disease should be taken into account in prioritisation processes.

Catalá López et al. (Catalá López, et al. 2009) provided burden of disease calculations for Spain in 2006. These calculations were based on the methodology proposed by Murray and López (Murray and Lopez 1996) and adapted by World Health Organization (WHO), the World Bank and Harvard University. According to this method, the set of conditions is divided into three main groups: communicable diseases, non-communicable diseases and accidents. Subsequently, they are separated into different sub-categories. The calculations are based on Disability Adjusted Life Years (DALYs), which take into account both the years lost due to premature death and the quality of life lost due to the years with disability.

The results in Spain indicate the importance of the burden of disease as a determinant of health care decisions. In particular, Spain exhibits a loss of 5.025.472 DALYs only in 2006, meaning 11.404 DALYs per 100.000 inhabitants. Around 58% of those are attributed to lost quality or disability, while 42% are related to early death. In burden of disease terms, the most significant groups include neuropsychiatric disorders (31.8% of total cost); malign tumors’ (15.9%); and cardiovascular and respiratory diseases (12.3% and 7.5% respectively). Table 3 provides a summary of this information.

**Table 3: Burden of disease in Spain in 2006**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | DALYS (thousands) | % | Lost years (thousands) | % | Mortality (thousands) | % |
| Communicable, maternal, perinatal and nutritional diseases | **247,7** | **4,9** | **133,1** | **6,3** | **17,6** | **4,7** |
| Infectious and parasitic  | 113,7 | 2,3 | 66,9 | 3,1 | 7,4 | 2 |
| *HIV / AIDS* | *36,9* | *0,7* | *28,1* | *1,3* | *1,4* | *0,4* |
| *Diarrhea* | *11,5* | *0,2* | *1,5* | *0,1* | *0,4* | *0,1* |
| *Hepatitis B and C* | *10,3* | *0,2* | *8,9* | *0,4* | *1* | *0,3* |
|  *ETS* | *8,9* | *0,2* | *0,2* | *0* | *0* | *0* |
| *Meningitis* | *4,9* | *0,1* | *3* | *0,1* | *0,2* | *0,1* |
| *Tuberculosis* | *4,6* | *0,1* | *2,9* | *0,1* | *0,4* | *0,1* |
| Respiratory infections | 36,6 | 0,7 | 31,6 | 1,5 | 8,8 | 2,4 |
| *Lower respiratory tract* | *32,7* | *0,7* | *31,3* | *1,5* | *8,8* | *2,4* |
| *Otitis media* | *3,2* | *0,1* | *0* | *0* | *0* | *0* |
| *Upper respiratory tract* | *0,6* | *0* | *0,3* | *0* | *0,1* | *0* |
| Maternal conditions | 18,2 | 0,4 | 0,4 | 0 | 0 | 0 |
| Perinatal conditions | 49,2 | 1 | 33,2 | 1,6 | 1 | 0,3 |
| Nutritional deficiencies | 30,1 | 0,6 | 1,1 | 0,1 | 0,3 | 0,1 |
| Non-communicable diseases |  |  |  |  |  |  |
| Malignancies   | **4.441,00** | **88,4** | **1.748,80** | **82,4** | **337,8** | **90,9** |
| *Lung* | 797,7 | 15,9 | 720,2 | 33,9 | 101 | 27,2 |
|  *Colon / rectum* | *171,4* | *3,4* | *166,4* | *7,8* | *21,1* | *5,7* |
| *Breast* | *101,3* | *2* | *84* | *4* | *14,3* | *3,8* |
| *Stomach* | *70,6* | *1,4* | *58,2* | *2,7* | *6,6* | *1,8* |
| *Pancreas* | *42,4* | *0,8* | *40,6* | *1,9* | *6,2* | *1,7* |
| *Lymphoma, myeloma* | *37,9* | *0,8* | *36,9* | *1,7* | *5,3* | *1,4* |
| *Liver* | *33,7* | *0,7* | *31,9* | *1,5* | *4,5* | *1,2* |
| *Bladder* | *32,5* | *0,6* | *31,9* | *1,5* | *4,8* | *1,3* |
| *Brain* | *31,9* | *0,6* | *25,2* | *1,2* | *4,9* | *1,3* |
| *Leukemia* | *30,7* | *0,6* | *29,9* | *1,4* | *2,7* | *0,7* |
| *Prostate* | *28,9* | *0,6* | *27,6* | *1,3* | *3,4* | *0,9* |
| *Mouth and oropharynx* | *27,5* | *0,5* | *21,8* | *1* | *5,8* | *1,6* |
| *Ovary* | *23,9* | *0,5* | *22,3* | *1,1* | *2,3* | *0,6* |
| *Uterine corpus* | *19,1* | *0,4* | *16,8* | *0,8* | *1,9* | *0,5* |
| *Esophagus* | *19,1* | *0,4* | *9,5* | *0,4* | *1,5* | *0,4* |
| *Kidney* | *16,5* | *0,3* | *16* | *0,8* | *1,9* | *0,5* |
| *Larynx* | *15,9* | *0,3* | *14,7* | *0,7* | *2,1* | *0,6* |
| *Melanoma* | *14,6* | *0,3* | *13,7* | *0,6* | *1,7* | *0,4* |
| *Cervix* | *11,9* | *0,2* | *11* | *0,5* | *1,4* | *0,4* |
| *Bone and cartilage* | *9,5* | *0,2* | *7,7* | *0,4* | *0,7* | *0,2* |
| *Thyroid* | *5,8* | *0,1* | *5,5* | *0,3* | *0,3* | *0,1* |
| Other tumours | *2* | *0* | *1,8* | *0,1* | *0,3* | *0,1* |
| Diabetes mellitus | 21,4 | 0,4 | 21,4 | 1 | 3,5 | 0,9 |
| Endocrine and blood | 84,4 | 1,7 | 39,3 | 1,8 | 10 | 2,7 |
| Neuropsyciatric disorders | 59,5 | 1,2 | 19,4 | 0,9 | 2,8 | 0,8 |
| *Unipolar depression* | **1.599,50** | **31,8** | **110,9** | **5,2** | **28,7** | **7,7** |
| *Dementia* | *444,7* | *8,8* | *0,2* | *0* | *0,1* | *0* |
| *Alcohol abuse* | *381,3* | *7,6* | *56* | *2,6* | *21,9* | *5,9* |
| *Migraine* | *208,4* | *4,1* | *3,6* | *0,2* | *0,3* | *0,1* |
| *Addiction to drugs* | *79,6* | *1,6* | *0* | *0* | *0* | *0* |
| *Bipolar disorders* | *70* | *1,4* | *2,3* | *0,1* | *0,1* | *0* |
| *Schizophrenia* | *68,3* | *1,4* | *0,1* | *0* | *0* | *0* |
| *Parkinson's disease* | *64,1* | *1,3* | *1* | *0* | *0,1* | *0* |
| *Obsessive-Compulsive Disorder* | *30,2* | *0,6* | *8,5* | *0,4* | *2,6* | *0,7* |
| *Epilepsy* | *28,7* | *0,6* | *0* | *0* | *0* | *0* |
| *Multiple Sclerosis* | *13,9* | *0,3* | *4,8* | *0,2* | *0,4* | *0,1* |
| Sense organs | *10,1* | *0,2* | *2,3* | *0,1* | *0,2* | *0* |
| *Glaucoma* | 260 | 5,2 | 0 | 0 | 0 | 0 |
| Cardiovascular Diseases | *11,1* | *0,2* | *0* | *0* | *0* | *0* |
| *Ischemic heart disease* | 618,2 | 12,3 | 517,9 | 24,4 | 124,8 | 33,6 |
| *Cerebrovascular**Disease (stroke)* | *227* | *4,5* | *194,5* | *9,2* | *38,5* | *10,4* |
| *Inflammatory heart* | *145,1* | *2,9* | *130,3* | *6,1* | *34* | *9,2* |
| *Hypertension* | *50,2* | *1* | *30,4* | *1,4* | *6,3* | *1,7* |
| Respiratory disorders | *26,1* | *0,5* | *21,2* | *1* | *6,9* | *1,9* |
| *COPD* | 377,4 | 7,5 | 123,7 | 5,8 | 31,7 | 8,5 |
| *Asthma* | *114,4* | *2,3* | *56,8* | *2,7* | *16,6* | *4,5* |
| Gastrointenstinal diseases | *67,4* | *1,3* | *4* | *0,2* | *0,8* | *0,2* |
| *Cirrhosis* | 225,9 | 4,5 | 120,8 | 5,7 | 20 | 5,4 |
| Genital-urinary disorders | *61,4* | *1,2* | *49,6* | *2,3* | *4,9* | *1,3* |
| *Nephritis, nephrosis* | 63,8 | 1,3 | 33 | 1,6 | 9,7 | 2,6 |
| Skin disorders | *24,3* | *0,5* | *23,1* | *1,1* | *6,6* | *1,8* |
| Musculoskeletal and connective tissue disorders | 10,4 | 0,2 | 3,4 | 0,2 | 1,1 | 0,3 |
| *Osteoarthritis* | 234,8 | 4,7 | 11,4 | 0,5 | 3,5 | 0,9 |
| *Rheumatoid arthritis* | *124* | *2,5* | *0,2* | *0* | *0,1* | *0* |
| *Congenital abnormalities* | *41,5* | *0,8* | *1,2* | *0,1* | *0,2* | *0,1* |
| *Oral conditions* | 49,3 | 1 | 27,2 | 1,3 | 1 | 0,3 |
| Accidents and injuries | 38,8 | 0,8 | 0,1 | 0 | 0 | 0 |
| *Unintentional* | **336,8** | **6,7** | **241,6** | **11,4** | **16,1** | **4,3** |
| *Intentional* | 268,9 | 5,4 | 180,7 | 8,5 | 12,5 | 3,4 |
| TOTALS | 67,8 | 1,3 | 60,9 | 2,9 | 3,6 | 1 |
|  | **5.025,50** | **100** | **2.123,60** | **100** | **371,5** | **100** |

Source: Catalá López et al. (2009)

### The burden of mental disorders in Spain

The regional devolution of health care responsibilities in Spain resulted in different mental health strategies for each autonomous community, based on specific regional priorities. The mental care benefits package, as defined in 2006 (Royal Decree 1030/2006), aimed at integrating mental health services within the general health system through the coordination of primary and specialised as well as health and social mental care. Empirical evidence shows that the devolution process played a catalytic role in the development of efficient mental health polices within the country (Costa-Font, et al. 2011). Furthermore, there is evidence that due to these reforms the utilization of pharmaceutical products targeting mental health has been significantly increased. However, inequalities among the regions concerning mental health care access and expenditure are still being observed, based on various socio-demographic factors. The universal coverage scheme with free access to publicly funded health care resulted in overuse of primary care services. Therefore, the integration of mental health services at the primary care level is becoming more and more challenging.

Evidence suggests that once mental health policy in Spain was reorganised, the use of formal mental health services has been increased in the total population compared to EU. However, the importance of mental health problems within primary care is still underestimated (Grandes, et al. 2011). Due to the structure of the health system, most individuals suffering from mental disorders will first visit their general practitioner. Therefore, the prevalence of mental illness within the primary care sector indicates the need for mental health prevention and promotion. Mood and anxiety disorders are the most common within the country, exhibiting 10% and 9% one-year prevalence, respectively. Major depression alone accounts for an 8.4% 12-month prevalence, while it is estimated that about 5% to 10% of the total population faces one major depressive episode in a lifetime (Ayuso-Mateos, et al. 2008).

Depressive disorders are the most prevalent mental disease in Spain, bearing high societal costs due to the chronic functional disabilities they produce. In Catalonia (7 million inhabitants), the annual prevalence of depression in 2006 was estimated at 6.85%, accounting for 736 million total depression costs (Salvador-Carulla, et al. 2011). Although depressive episodes do not exhibit high mortality rates, they are a major background factor in 30%-45% of successful suicides in Spain (Ayuso-Mateos, et al. 2008). In Europe depression is considered to be the major risk factor of suicide attempts (28% risk rate), while suicides account for 1.3% of all DALYs (Miret, et al. 2013). Therefore, successful prevention or treatment of depression in Spain would lead to a significant reduction in the total burden of disease.

Apart from depressive disorders, other studies suggest a strong association between poor mental health and income reductions. The most severe mental disorders in Spain are related to great losses of economic productivity due to premature death and functional disabilities (Barbaglia, et al. 2012). In particular, indirect costs of lost productivity associated to mental disorders account for 2.9 billion euros in Spain, resulting in significant earning gaps between healthy and mentally ill individuals. Relevant to these findings is the proven association between mental illness and precarious employment. Evidence from Spain shows that employment precariousness is highly related to poor mental health outcomes (Vives, et al. 2013). The social and emotional deprivation imposed by job instability leads to mentally ill workers and thus to higher indirect costs.

This phenomenon is exacerbated due to the financial situation in Spain. The economic recession of the last years had profound consequences on unemployment rates and earnings reductions. The collapse of the housing market in 2007 led to significant income losses, difficulties in loan payments and great government dept (Gili, et al. 2012). The economic impact of the crisis on individuals’ life had several health effects. It has been estimated that the increase of unemployment is highly associated with an increase of mental disorders in Spain. In particular, job losses (or instability) are associated with 3.1% risk of suffering from a major depressive episode. This is relevant not only for patients but also for their relatives and the society. Even more, suicide rates for individuals under 65 years have risen in Spain due to the recession. Overall, the economic crisis is responsible for a significant increase of mental disorders prevalence within the Spanish population between 2006 and 2010.

It becomes apparent that mental disorders in Spain have notable economic and health consequences. Although several regions have taken initiatives to develop evidence-based mental health polices, research and investment in mental health are still underfunded. Estimations on the true burden of affective disorders are still absent, which makes the prioritisation of mental health even more challenging. Therefore, the need for rational priority setting within the Spanish health system becomes essential. The DCE conducted in this thesis highlights the challenges of such decision processes in a context of constrained health care resources and economic recession.

# REVIEW OF THE LITERATURE

## Moving towards MCDA

As discussed earlier, multi-criteria decision analysis (MCDA) draws upon the principle that health policy decisions can be complex and affected by several factors. Therefore, the process of priority setting is often ad-hoc or based on past experiences, leading to implicit choices. The concept of priority setting covers a wide range of policy questions concerning different aspects of each health system. A recent review on MCDA literature identifies two major groups of priority setting studies (Baltussen, Youngkong, et al. 2010). First, priority setting processes could be implemented within a specific context, such as reimbursement of a particular intervention. Such decisions are made given the available human and budget resources. Second, priority setting can be applied in a more generalised framework, providing guidance on the relative importance of various health interventions. In both cases, MCDA play a catalytic role in resource allocation decisions, by making the priority setting process more transparent and consistent with all the relevant information.

As Jehu-Appiah et al. (2008) claim, “MCDA is a conceptual framework that aids people in making complex decisions and has evolved as a response to the observed inability of people to effectively analyse multiple streams of dissimilar information” (Jehu-Appiah, et al. 2008). Until recently priority setting of health interventions has been heavily relied on other methods, such as burden of disease and cost-effectiveness analyses (Baltussen and Niessen, 2006). However, these approaches give limited guidance to policy makers since they neither take into account all the relevant criteria nor allow for trade-offs between these criteria. As mentioned earlier, cost-effectiveness analysis focuses on the economic criterion of efficiency, which aims at maximizing population’s health, given a budget constraint. On the other hand, equity principles focus on minimizing health differences between population groups (Jehu-Appiah, et al. 2008).

Therefore, the trade-offs between equity and efficiency objectives that decision-makers make could have a significant impact on the choice of health interventions. That is, based on these trade-offs they would adopt more treatment-oriented (equity) or more prevention-oriented (efficiency) strategies. This indicates the need for MCDA, in order to account for other objectives in priority setting beyond cost-effectiveness (Youngkong, Teerawattananon, et al. 2012). In fact, there is an ongoing debate concerning the use of economic evaluation as a guidance tool for national health priority decisions (Baltussen and Niessen, 2006; Baltussen, Stolk, et al. 2006; Robinson 1999). Within the literature, there is a growing consensus that MCDA is becoming one of the most important issues in health economics research. It has been argued that explicit priority setting exercises give the opportunity to combine societal concerns on health needs with evidence-based strategies for the efficient allocation of scarce resources (González-Pier, et al. 2006).

Peacock et.al in a recent paper established the contribution of interdisciplinary methods in developing more rational, fair and legitimate priority setting approaches (Peacock, et al. 2009). For instance, they focused on the effective implementation of program budgeting and marginal analysis (PBMA) in the realm of context-specific priority setting. Thereby, they highlighted the potential of MCDA to overcome barriers that appear during the process of local priority setting. Such barriers could refer to a failure to sufficiently capture decision-makers’ preferences while decisions are formulated. Thus, MCDA could improve the credibility and consistency of priority setting processes by allowing policy makers to learn more about their preferences on a large amount of relevant information. Moreover, Baltussen et.al emphasised the important role of MCDA in the context of generalised priority setting (Baltussen, Youngkong, et al. 2010). A first review of case-studies indicates that MCDA is eligible to define general, national-level criteria for priority setting and provide information on the relative ranking of interventions priorities. Thereby, it adds to the overall accountability and transparency of the process.

An example of such explicit processes is observed in the Netherlands, where the Dunning committee identified a set of criteria that interventions should satisfy in order to be included in the national insurance package. Another example is the case of policy makers in Ghana, who applied MCDA in order to define the criteria that set intervention priorities in their Health Sector Plan of Work 2007-2012 (Jehu-Appiah, et al. 2008). Furthermore, MCDA has been used within the literature in order to identify the relative importance of interventions targeting specific disease areas. First cases are being observed in low and middle-income countries, such as Nepal which applied MCDA to guide decisions on the implementation of a lung health programme (Baltussen, et al. 2007). Other applications include priority setting in HIV/AIDS control in Thailand (Youngkong, Baltussen, et al. 2010); and priority setting across a wide range of interventions to guide national policy makers in countries like Brazil, Cuba, Ghana and China (Baltussen, Stolk, et al. 2006; Shi, Paolucci and Yu 2009; Soares, et al. 2009; Niessen and Paolucci 2009).

Within this literature, several methodological issues of MCDA are being identified. For instance, there is a growing debate concerning who should be involved in decision-making processes. Indeed, the participation of various stakeholders in decisions concerning interventions priorities is considered to improve the accountability and credibility of the results (Martin, Giacomini and Singer 2002; McKie, et al. 2008). The MCDA application in Thailand indicated that preferences on HIV/AIDS interventions differ between policy makers, patients and the public. Still, the involvement of different stakeholders improves the transparency and credibility of the priority setting process, as recognised by the Accountability for Reasonableness framework. The importance of the inclusion of patients and community members in the decision process has already been analysed in other studies (Youngkong, Kapiriri and Baltussen, 2009). However, the Thailand case doubts the usefulness of MCDA approaches, given the risk of dominance of certain stakeholders over others. That is, the preferences of well-educated stakeholders, such as policy makers, could potentially override those of less-educated people, such as community members (Youngkong, Teerawattananon, et al. 2012). Although the focus of the study was not on reaching a general consensus, these issues indicate potential shortcomings of the MCDA approach.

Moreover, these studies used different methods in order to identify the criteria that are relevant to priority setting. Countries such as Nepal, Ghana, Uganda and Thailand based their choices on focus group discussions among different stakeholders. Other studies, such as those in China and Brazil, identified the relevant criteria through a review of the literature and related theories. Therefore, differences in the criteria could reflect not only differences in the countries’ preferences but also different methodological approaches (Baltussen, Youngkong, et al. 2010). In any case, these methods could lead to the exclusion of potentially important factors in priority setting and to processes that are not consistent with the social and political context of each country. One way to overcome these issues, as proposed by Baltussen et.al would be to define a comprehensive list of criteria based on past experiences, which would be further elaborated through country-specific group discussions. The HIV/AIDS study in Thailand was the first to implement such procedures.

More recently, MCDA has been applied to developed countries, reflecting the fact that scarcity of resources is present in both low and high income settings. An application to Norway indicated that indeed, explicit approaches to priority setting can be a valuable tool even in countries which exhibit high levels of population health (Defechereux, et al. 2012). In the Netherlands, MCDA was applied in order to identify which criteria, as defined within the HTA literature, are important for decision-makers in health priority setting (Koopmanschap and Stolk 2010). Finally, MCDA was recently applied in Austria in order to inform stakeholders on priority setting, with a focus on the area of mental disorders (Mentzakis, Paolucci and Rubicko 2012). Although the results of these studies were found to be consistent with current health strategies, they indicated that interventions ranking methods have a great potential to improve the policy process.

## Discrete choice experiments in health economics

All the aforementioned studies employed discrete-choice experiments (DCEs) within the context of MCDA, in order to elicit stakeholders’ preferences. Although other methods exist, discrete choice questionnaires are the most commonly used technique to measure the performance of different alternatives based on relevant criteria (Defechereux, et al. 2012). DCEs were introduced in health economics in the early 1990s as a tool for health benefits valuation. Since then, they have become a widely used instrument, addressing several policy questions (De Bekker-Grob, Ryan and Gerard 2012). DCEs are an attribute-based method for measuring benefits, drawing upon the assumption that individuals’ preferences depend on the levels of these attributes. Ryan et al. have systematically reviewed the application of DCEs in health economics (Ryan, et al. 2001) (Ryan and Gerard, Using discrete choice experiments to value health care programmes: current practise and future research reflections 2003). According to these reviews, DCEs were initially used for the valuation of patients’ experiences within an economic evaluation framework. Other related studies indicate the use of DCEs in evaluating health outcomes or assessing potential trade-offs between patients’ experiences and health outcomes. These applications indicated an effort to go beyond clinical outcomes and there is still a great focus on this area.

To this end, DCEs have been used to address several issues including non-health outcomes. More recent areas of application include the evaluation of health professionals’ preferences and the estimation of utility weights with health technology assessments. Finally, DCEs have gained acceptance in other policy areas, such as in the formulation of priority setting frameworks. The key findings of these applications were initially oriented to utility scores, but an increased use of odds ratios and probability scores has been observed during the last years. A comparison of DCE studies between 1990-2000 and 2001-2008 indicates that United Kingdom is still the most common user of this technique, while United States, Canada and Australia are identified as major contributors. Moreover, multiple methodological developments are being noticed throughout the years. For instance, changes are observed in the design of the experiments’ questionnaires (i.e. experimental design), reflecting concerns about the task complexity and efficiency (De Bekker-Grob, Ryan and Gerard 2012). Even more, there has been a move towards more advanced but also more flexible econometric models, in order to better capture real choice behaviour.

 These changes reflect concerns about the successful application of DCEs in more complex health care topic areas, such as decision making. The results from recent DCEs applications highlight the importance of these methodological changes, as well as the contribution of the technique in the general context of MCDA. In fact, most applications reported draw upon the principles of efficient experimental designs. Even more, recent studies indicate the effectiveness of more advanced statistical models in explaining preference heterogeneity among different individuals (Mirelman, et al. 2012). These methodological aspects are extensively analysed in Chapter 4. Throughout the literature, DCEs show promising results as a method to model preferences and provide further insights to interventions priority setting processes. Applications of DCEs highlighted the feasibility of such approaches to explore the relative impact of different criteria on prioritisation decisions.

This is extremely relevant in low and middle-income settings, given the extraordinary scarcity of resources and the low level of general population health due to the epidemiological transition of specific diseases (Baltussen, Stolk, et al. 2006; Baltussen et al. 2007; (Youngkong, Kapiriri and Baltussen 2009; González-Pier et al. 2006). However, more recent studies indicate that DCEs can be a valuable tool also for decision-makers in high income countries. Although these countries exhibit efficient health systems and high levels of population health, the findings of DCEs implemented suggest a re-evaluation of their current priority policies (Defechereux, et al. 2012; Mentzakis, Paolucci and Rubicko 2012; Koopmanschap and Stolk 2010).The choice of criteria included varies within these studies according to the policy question and the country where research is implemented. In most cases however, this choice is based on equity, efficiency and societal concerns, which, as mentioned earlier, are the major groups of criteria affecting priority setting.

As mentioned earlier, the list of criteria included in MCDA is an issue of utmost importance. Due to their quantitative nature, DCEs can weigh the relative impact only of quantifiable criteria and therefore interventions’ rankings will be based only on those factors. However, not all relevant criteria are amenable to quantification, such as ethical judgments and interventions’ complexity issues (Jehu-Appiah, et al. 2008). Therefore, the guidance that DCEs offer to policy makers can be misleading in that important factors are excluded from the process of decision making. Within the literature, it has been proposed that a deliberative process is necessary in order to create efficient priority setting structures. That is, the DCE approach should be accompanied by an assessment of the non-quantifiable criteria through advisory panels and focus groups. In other words, the rankings of interventions as proposed by the experiment should be reconsidered by the different stakeholders before reaching a final approval (Peacock, et al. 2009). This way, further ethical and societal concerns are taken into account, leading to more comprehensive prioritization decisions. The recent DCE study on HIV/AIDS interventions was the first to include a deliberative process and highlighted the importance of such approaches in rational priority setting processes (Youngkong, Teerawattananon, et al. 2012).

Overall, the feasibility and acceptability of the DCE approach in health economics has increased rapidly during the last decades. Despite their potential disadvantages, DCEs are proved to be a very supportive tool for explicit prioritisation processes. This thesis focuses on priority setting in the Spanish health care system based on the DCE results. Subsequently, health interventions targeting mental health are being discussed. This study draws upon the lines of previous research on priority setting procedures. However, it is the first DCE study that aims at eliciting policy makers and other stakeholders’ preferences in Spain. Given the specific characteristics of the Spanish NHS as well as the austerity in public policies of the last years, Spain is an excellent choice in evaluating the allocation of health resources.

# METHODS

## Theoretical background

Discrete choice experiments (DCEs) are a survey method for eliciting preferences and measuring benefits of policy changes and health interventions. It is a stated preference (SP) valuation approach in which individuals face multiple hypothetical scenarios (choice sets) with two or more alternatives. Each scenario comprises a bundle of attributes and different levels of these attributes. The respondents are asked to value and choose their preferred alternative according to its characteristics and the level of utility (benefit) derived. Since DCEs belong to SP methods, only hypothetical individual behaviour is being observed. Thus, their actions in real market terms cannot be analysed. The sample of choice sets is created according to experimental design principles, which are discussed later (Ryan, Gerard and Amaya-Amaya 2008).

The theoretical framework of DCEs contains elements of various economic theories. Drawing upon the principles of classic consumer theory, discrete choice analysis assumes that respondents are rational decision makers who seek to maximise their self-interest. That is, out of the number of goods (scenarios) they are presented with, they choose the alternative that maximises their preferences (utility), subject to budget constraints (Kjaer 2005). Consistent with neoclassical economics, discrete choice behaviour assumes that these utility levels are defined taking into account any preferences individuals have; that is, it comprises all the components that provide individuals with utility, including also non-health outcomes, process utility and psychological factors (Drummond, et al. 1997).

However, discrete choice behaviour differs from classic consumer theory at three key points. First, DCE builds on Lancaster’s economic theory of value (Lancaster 1966) assuming that it is the characteristics of the goods that provide utility to the individuals, rather than the good or service per se. Hence, the values respondents assign to the alternatives depends on the nature and the levels of their attributes (Ryan, et al. 2001). According to the design principles of DCEs, the attributes levels vary across alternatives. Secondly, while standard consumer theory assumes an infinitive spectrum of goods, respondents of DCEs have to choose among a set of finite and mutually exclusive alternatives (Ryan, Gerard and Amaya-Amaya 2008). Finally, DCEs draw upon the idea that individual choice behaviour contains random elements and hence it can be described as probabilistic rather than deterministic.

The theoretical implications of these random elements led to the use of probabilistic choice theory as the basis for discrete choice modelling. In particular, DCEs are based on a subgroup of probabilistic choice models, named Random Utility Models (RUM). The concept of random utility has first been developed in psychology by Thurstone (1927) who attempted to analyse uncertainty in individual choice behaviour. It has then been introduced into economics by Marschak (1960), who examined the effect of random utility on utility maximization behaviour (D. McFadden, Economic Choices 2001). Among others, Mc Fadden (McFadden 1974) and Manski ( (Manski 1977) further developed random utility theory (RUT) as an econometric illustration of qualitative choice behaviour. In this setting, each alternative in a DCE is assigned with a probability of being chosen.

The utilities derived from each alternative in a DCE are considered as random variables, since individual choice cannot be perfectly predicted. The uncertainty encompassing utility does not imply that decision makers are not rational or do not have perfect discriminatory power among alternatives. It rather reflects a lack of adequate information on the part of the researcher regarding the attributes of the alternatives and the determinants that affect respondents’ choices. This implies that the utility function is deterministic from the respondents’ perspective and thus consistent with neoclassical economics. On the other hand, the researcher can observe only the part of utility that is explainable by the characteristics of the alternatives (Ryan, Gerard and Amaya-Amaya 2008). The composition of this indirect utility function will be further analysed in the following sections.

Based on these theoretical foundations, a detailed description of the key DCE stages is following. Section 2.2 provides information on the choice of attributes and context of the experiment, while section 2.3 analyses the experimental design principles used as the basis for this survey. Section 2.4 focuses on the techniques of data collection used in this experiment. Finally, section 2.5 describes the statistical process and modelling used for the empirical analysis.

##  Criteria and experimental context

During the last years, priority setting in health care has become an issue of great importance. The underlying problem is that health care needs are growing disproportionately with health resources. Therefore, decision makers have to choose among health interventions based on multiple and complex criteria (Baltussen and Niessen 2006). There has been a great debate on which criteria should be taken into consideration when decisions on resource allocation are made. Several approaches to priority setting have been proposed in the literature. The definition and selection of these criteria should enhance the accountability, acceptability and credibility by society. In this context, multi-criteria decision analysis (MCDA) can help in defining more general, national or individual level criteria, as well as their relative importance. This procedure makes the decision process more explicit, thus more accountable for the society (Baltussen, Youngkong, et al. 2010).

Moreover, it has been argued that priority setting of health interventions should be based on a fair and rational process. This is consistent with the framework of accountability for reasonableness developed by Daniels and Sabin (Daniels and Sabin 1997; Daniels and Sabin 1998). According to this framework, priority setting should contain general and specific elements of fairness. Among others, these elements include transparency of the process; multiple perspectives taken into account; and the aim of reaching a consensus of most participants in decision making (Martin, Giacomini and Singer 2002). These goals become more relevant when developing (versus developed) countries and publicly funded health systems are concerned (Kapiriri and Norheim 2004). Finally, it has been suggested that political criteria play an important role in the decision process. Thus not only the ethical judgments of policy makers should be taken into account, but also the public participation in priority setting (McKie, et al. 2008).

Based on this framework, respondents in this experiment were asked to choose between pairs of health care interventions, each defined in terms of equity and efficiency criteria. The DCE design pattern and the selection of the specific criteria included are based on past studies. As mentioned before, DCEs fall into a more general framework of evidence-based priority setting, named multi-criteria decision analysis (MCDA). It has been argued that MCDA offers better guidance to policy makers on priority setting since it allows for an explicit and simultaneous assessment of multiple and comprehensive sets of criteria (Baltussen and Niessen 2006). Therefore, trade-offs between different characteristics of the interventions can be calculated and the relative importance of these criteria is established. Thus, a rank ordering of the interventions is mapped. In that way, the process of decision making becomes more transparent and effective.

Furthermore, more aspects of the various health care systems have to be taken into account in the process of priority setting. These aspects include equity considerations; medical criteria such as the severity of disease; and non-medical criteria, such as the average age of the targeted population (Baeten, et al. 2010). Even more, the identification of the criteria included should be relevant to the stated polices of each country, as well as their societal values and objectives (Noordani, et al. 2007). Compared to other priority setting approaches, MCDA enables the definition and integration of a wider range of criteria to inform the prioritisation process.

In these terms, the criteria chosen for this experiment offer the most relevant information and can be grouped under two major categories, those of equity and efficiency. The set of criteria is originally chosen based on existing literature (Defechereux, et al. 2012) (Baltussen, et al. 2007) (Baeten, et al. 2010) (Mirelman, et al. 2012). These criteria are identified as context-relevant and consistent with the properties of completeness, feasibility and mutual independence required for the experimental design. In addition, further adaptation has been implemented using the suggestions of focus groups in which health care policy makers and health professionals participated. Table 4 summarises the criteria definitions and their levels, while a more detailed description is given in the following parts.

**Table 4: Definition of criteria and levels**

|  |  |  |
| --- | --- | --- |
| Attribute | Level (regression variables) | Definition |
| EQUITY CRITERIA |  |  |
| Severity of disease  | Not severe (NotSev)\* | Remaining life expectancy more than two years in absence of intervention, when acquiring/having disease |
| Severe (Sev) | Life expectancy < 2 years |
| Willingness to subsidise others | Low Level \* | Less than 70% of total health expenditures are financed from public funds (poverty reduction criterion) |
| High level  | Subsidise at more than 70% |
| Age of target group | Young \* | 0-15 years |
| Middle-age  | 15-59 years |
| Elderly  | 60 years and older |
| EFFICIENCY CRITERIA |  |  |
| Individual health benefits | Small\* | Less than five healthy life years on average for whole target group  |
| Large  | More than five healthy life years |
| Number of potential beneficiaries | Few\* | Less than 100 000 (those who could potentially benefit from intervention) |
| Many | More than 100 000 |
| Cost-effectiveness | Not cost-effective\* | Cost/DALY > GDP/capita |
| Cost-effective | Cost/ DALY < GDP/capita |

\*Baseline levels of variables in the regression model

*Equity attributes*

In this experiment, three equity criteria were used. First, the “severity of disease” attribute reflects the societal preference to the patients’ population with worse initial condition (all other things being equal) and the consequent inequalities in health prospects. Society values higher the health gains of severely-ill patients, since they are considered to be in greater need for health care and show decreasing marginal utility of health (Stolk, et al. 2004). Secondly, the “age of the target group” criterion establishes the rationale for age related preferences in the assessment of health benefits. That is, societal preferences vary with age based on two key factors. One, the different social values of health at each age; and second, the differences in social welfare caused by the distribution of health in the population according to age (Tsuchiya 1999).

Finally, the “willingness to subsidise others” attribute mirrors societal concerns for poverty reduction. Societies might be willing to give higher value not only to interventions that maximise general population health but also to interventions that give priorities to vulnerable groups due to low income. According to WHO Commission Report on Macroeconomics and Health, investing in health improvements for the disadvantaged populations could result in poverty reduction (WHO Commission 2001).That is, giving preferential treatment to the poor populations could lead to an increase of their “stock” of health and eventually to economic development (McIntyre and Gilson 2000). This is highly relevant in developing countries where the need for efficient and equitable resource allocation is becoming more and more apparent.

*Efficiency attributes*

For the purposes of this experiment, also three efficiency criteria were chosen. First, the “number of potential beneficiaries” criterion reflects that interventions which target many individuals might have a larger impact on social welfare (Baltussen, et al. 2007). In other words, the total number of beneficiaries indicates the total population impact of the health intervention and could therefore be used for efficiency measurements. Secondly, the “individual health benefits” attribute establishes that for an equal total effect size, interventions with a large health impact on a few individuals might be preferred over those with a small health impact on many individuals. The rationale underlying this assumption is that although the former interventions can be more costly, they might be favoured by societies because they show greater capacity to decrease health inequalities (James, et al. 2005).

Finally, the “cost-effectiveness” criterion reflects the use of the cost effectiveness analysis for allocation decisions within the health sector. In this context, efficiency is defined as the maximization of total societal benefits, subject to budget constraints. Therefore, societies might wish to choose between health interventions on the basis of cost effectiveness criteria, since this could result in the highest health gains for the population, given the available budget (James, et al. 2005). However, cost effectiveness can offer only limited guidance to decision makers concerning priority setting. Equity principles should be equally considered in this process. Even more, potential trade-offs between these criteria could offer further insights to policy makers. The experimental design of the DCE allows for trade-offs to be calculated and is extensively analysed in the next section.

##  Experimental design

Conducting a DCE involves several key stages. The first two steps are concerned with the definition of the policy question and the identification of the relevant attributes that are policy relevant. Once the criteria and their corresponding values are defined, the attributes levels have to be combined into alternatives. Then, the scenarios are presented to the respondents within different binary or multinomial choice sets. The construction of these choice sets and the selection of the experimental design are crucial for many reasons. As Louviere and his colleagues note (Louviere, Hensher and Swait, Stated choice methods: analysis and applications. 2000), there are four design principles for DCEs: (a) *identification,* which assures that the desired form of the utility function used in the experiment can be estimated; (b) *precision,* ensuring that the design of the experiment allows for efficient parameter estimates; (c) *cognitive complexity,* which protects the respondents from an excessive cognitive burden and (d) *market realism,* which ensures that the choice process as presented in the experiment is realistic.

For the construction of the choice sets, most studies start with a full factorial design (FFD) which includes all the possible combinations of the attribute levels. This construction is, by definition, a statistically efficient design. For this experiment, five attributes with two levels and one attribute with three levels were used. Therefore, the total number of unique combinations was 96, based on the product of the number of levels for each criterion (i.e. 25 \* 31=96). The main advantage of FFDs is that it allows for the examination of all effects of attributes on choices. Parameter estimates are obtained for both main effects of each attribute on utility and for all the possible interactions of them. This is consistent with the principle that also non-linearities in the utility function should be taken into account. However, using the full set of combinations in the experiment can be restrictively costly. Even more, it could produce a greater cognitive burden of the respondents. For these reasons, many studies proposed the use of a subset of all combinations, also named fractional factorial designs (Ryan, Gerard and Amaya-Amaya 2008).

In fractional factorial designs, the subset of combinations should be at least equal or greater than the number of the parameters that the researcher wishes to estimates. In statistical terms, it should be equal or greater than the degrees of freedom of the model used. Most studies use main effects fractional factorial designs, which assume that only the main effects of the attributes are significant. This can be a potential drawback of using fewer combinations, since the possible correlation between the levels of the attributes is not taken into account. In other words, these designs consider all interaction effects insignificant. Thus, they do not account for the probability that respondents’ preferences for one attribute will depend on the level of one or more other attributes (Kjaer 2005). The resolution of the design could help to identify whether also interaction effects can be estimated. However, this approach has its own limitations and as Louviere et.al note (2000), omitting interaction effects does not necessarily lead to biased results.

One way to deal with these limitations is to draw upon the properties of optimal experimental designs, as proposed by Huber and Zwerina (Huber and Zwerina 1996). According to the authors, the characteristics that describe an efficient choice design are: (a) *Level balance*, indicating that all the levels of an attribute are presented with equal frequency; (b) *Orthogonality*, which ensures that the levels of each attribute vary independently of each other; that is, all combinations of pairs of levels occur with proportional frequencies; (c) *Minimal overlap*, which assures that the probability that any attribute level appears within each choice set is as small as possible; and (d) *Utility balance*, ensuring that every alternative within a choice set is equally attractive to the participants. Orthogonal designs can be equivalent to main effects fractional factorial designs in the sense that the uncorrelated main effects estimated are considered to be orthogonal.

 In this context, an orthogonal design for linear models has been used in this experiment. Subsequently, it has been converted into a choice design. In particular, Sawtooth Software was used to select 32 unique alternatives for the fractional factorial design. These alternatives were then randomly assigned into 16 pair comparisons, in order to represent an orthogonal array. This design ensured that the effects of individual criteria will not be confounded, meaning that the variations of the attributes are uncorrelated in all choice sets. Even more, it was consistent with the properties of optimal designs and allowed for the estimation of all main effects within the DCE. Once the questionnaires were formulated, they were delivered for the purposes of data collection. The procedure is further analysed in the next section. Appendix A provides an example of a questionnaire that respondents were presented with.

##  Data collection

The focus of this thesis is on identifying whether the preferences of specialists in different aspects of the Spanish health care sector are in line with actual policy implementations. Therefore, the formulated questionnaire was presented at two health economics events in Spain: the Spanish Health Economics Association Meeting in May 2011; and the Encounter of the Drug Industry in September 2011. The attendees of these events were mostly policy makers, public health managers and representatives of the pharmaceutical industry. In total, about 150 copies of the questionnaire were delivered in these events, while around 100 more copies were sent to Spanish health economists at various Regional Health Services. These regions included Valencia, Madrid, the Basque country and Catalonia. During the following months, a monitoring of those regional services took place.

As mentioned before, in order to assess the total efficiency of a choice experiment, it is important to evaluate the cognitive complexity of the experiment, also named “respondent efficiency” (Louviere 2001). Respondents’ choices can be affected by several determinants. That is, their familiarity with the commodity being assessed; the accuracy and simplicity of the questionnaire; and the size of the design. Many approaches have been proposed in the literature to diminish the cognitive burden for the respondents in DCEs. In this case, a detailed presentation of the study goal preceded the experiment. At the same time, guidance in understanding and dealing with the questionnaire was provided, in both the events and the sent copies.

Some socio-demographic questions followed, concerning the respondents’ age, gender, profession, workplace and experience in the health sector. These data were especially relevant for the assessment of preference heterogeneity caused by the differences in socio-economic factors. Once the completed questionnaires were received, several had to be dropped from the analysis due to invalid answers. Even more, two questionnaires were excluded for being incomplete. Finally, 69 valid and fully answered questionnaires were collected, giving a response rate of about 27%. A detailed description of the respondents’ characteristics is given in Table 5. It is worth mentioning that most valid questionnaires stemmed from health sector technocrats working in different regions.

For instance, 24 respondents were from Madrid, 20 from Valencia and 15 from the Basque Country, making these regions the three most represented ACs. Five more questionnaires were obtained from Catalonia (3) and Cantabria (2), completed by regional health care technocrats. Finally, five valid questionnaires were collected in Madrid, but this time from health care workers at the national level. The average respondent age was 45.4 years and the average years of work experience was of 14.2 years. However, differences are being observed between the regions, with the respondents from the Basque Country being slightly older than the rest. Even more, the average experience is notably higher for those technicians that work at the national level, as compared to those working at the regional level.

With respect to the job type, the questionnaire was delivered to individuals representing several aspects of the Spanish health system. That is, senior members of decision making groups at various political and legislative levels responsible for strategy, implementation, supervision and funding of health polices; individual managers and directors in the pharmaceutical industry; national research associates and executives of health care institutions; and health care academics. The selection was based on the general principle that rational priority setting needs the participation of different groups, inside and outside the political area. Their choices were according their responsibilities and role in the health care system.

As shown in Table 5, most respondents were public health managers at the national or regional level (37). Questionnaires have been collected also from policy makers responsible for health care at the regional level (14); researchers (7); health technology assessment (HTA) executives (4); and directors and managers representing the pharmaceutical industry (3). Lastly, four valid questionnaires have been received from two health economics consultants, a health journalist and a physician who had worked in health management positions. Those individuals are categorised as others in Table 5. A more detailed presentation of descriptive statistics is given in Chapter 5.

**Table 5: Characteristics of DCE respondents**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Region** | **N** | **%** | **Average age (std.dev)** | **Male** | **Female** | **Experience** | **Public Health Managers** | **Research** | **Drug Industry** | **Health Policy** | **HTA** | **Others** |
| **Madrid** | 24 | 34,78 | 44,50 | 10 | 14 | 13,79 | 14 | 5 | 1 | 0 | 1 | 3 |
| **Valencia** | 20 | 28,99 | 43,90 | 10 | 10 | 14,45 | 7 | 0 | 0 | 13 | 0 | 0 |
| **Basque Country** | 15 | 21,74 | 47,93 | 11 | 4 | 13,60 | 8 | 0 | 2 | 1 | 3 | 1 |
| **Other regions** | 5 | 7,25 | 42,80 | 2 | 3 | 11,20 | 3 | 2 | 0 | 0 | 0 | 0 |
| **National level** | 5 | 7,25 | 51,40 | 4 | 1 | 20,00 | 5 | 0 | 0 | 0 | 0 | 0 |

##  Data analysis

Discrete choice modelling (DCM) is of utmost significance in the application of DCEs. First, the questionnaires are formulated and the data gathered. Then, DCM under the theoretical framework of RUT is applied in order to analyse the responses obtained from participants. As mentioned before, RUT assumes that, researchers cannot observe all factors that affect their preferences and thus, individual choice behaviour is considered random. In this context, the latent utility derived from an alternative *i*, as perceived from individual *q*, is decomposed into two additively separable parts: a systematic part explained by the characteristics of the alternative *Viq* and a stochastic part *εiq*, i.e. *Uiq* = *Viq* +*εiq = ΣKk=1 βκΧiκq + εiq*, where k are the criteria and βk are the parameters to be estimated. For the estimation purposes of this experiment, the deterministic part Viq is assumed to be linear-in-parameters, which leads to an additive linear utility model estimated by main effects fractional factorial designs.

The representative component of utility (Viq) establishes the observed relative effect of each attribute on the overall utility. (εiq)comprises the unmeasured factors that affect choice, such as heterogeneity in tastes and unobserved attributes that have not been anticipated in the design. The underlying behavioural rule is that an individual will choose one alternative over another among a set of J alternatives, if and only if that alternative maximises his utility. That is, the probability that one alternative is chosen over another is equal to the probability that the difference between the unobserved components of the two alternatives is equal or less than the difference between the explainable parts of the utility function (Hensher, Rose and Green 2005). In order to derive a basic choice model, a particular distribution of the random component of utility has to be defined, since the actual distribution is unknown to the researcher. In this experiment, Gumbel or extreme value type 1 (EV1) distribution was assumed, which indicates that the difference between the random variables follows a logistic distribution.

Furthermore, since each attribute has its own random component, the relationship between the different εj‘s has to be established. For this experiment, the error terms were assumed to be Independent and Identically Distributed (IID) for the purposes of statistical inference. The assumptions of IID and Gumbel distributed errors gave rise to McFadden’s conditional logit model (CLM) being used for estimation (McFadden 1974). CLM assumes that the probability of individual *q* choosing alternative *i* among a set of *J* alternatives is given by the type *Piq =*  (McFadden, Conditional logit analysis). In CLMs, the assumption of IID errors leads to the Independence of Irrelevant Alternatives (IIA) property. According to IIA, the ratio of the selection probabilities of any two alternatives is unaffected by other alternatives, for any given individual. This assumption allows for consistent estimation of model parameters but it can be quite restrictive.

### Model specification

CLMs are essentially equivalent to Multinomial Logit Models (MNL). Given that, the parameters of the choice model can be estimated using the standard technique of Maximum Likelihood for binary outcomes. That is, under the assumptions of IID and EV1 errors, the CLM is estimated by finding the values of the coefficients (βs) that maximise the log-likelihood function(Ryan, Gerard and Amaya-Amaya 2008). In this experiment, parameters for all main effects (i.e. for the six attributes included in the experiment) were estimated. The data analysis was implemented using statistical software Stata. Apart from the variables representing the attributes, interaction terms between the attributes and socio-demographic characteristics were calculated and estimated in order to incorporate the observed heterogeneity in respondents’ choices.

However, MNL models cannot represent unobserved heterogeneity. The IIA assumption, although simplifying the estimation procedure, has some essential disadvantages. That is, the observed and unobserved characteristics of utility are not always independent and/or the random components of utility are often correlated with each other. In these cases, the IIA assumption is violated and the MNL results are biased (Kjaer 2005). For this analysis, unobserved heterogeneity was incorporated and modelled through a Mixed Logit Model (MXL). As McFadden and Train (2000) noted, every random utility maximization model can be resembled by MXL (or else random parameters model) models, with a consistent choice of variables and mixing distribution (McFadden and Train 2000). MXL models relax the IIA assumption by allowing for random taste variation and flexible substitution patterns.

Since MXL models assume that the coefficients are random, they allow for the marginal utility to be random. That is, in MXL models a percentage change for the probability of one alternative being chosen does not necessarily imply the same change in the probability of each other alternative being chosen (Hensher, Rose and Green 2005). Since the coefficients are also random variables, their distribution has to be defined. In this analysis, a normal distribution was assumed. Comparisons have been implemented between the CLM and the MXL model assessing their goodness of fit, based on BIC and AIC criteria. Backward selection (at the 0.10 significance level) and goodness of fit tests have been used in order to choose which variables will be included and reach a final model specification. The form of the conditional logit model estimated is the following:

Where *kq*indicates the vector of measured attributes for individual *q* and *Cq*indicates a choice set.

Finally, in order to account for potential regional diversity in priority setting, three sub-models are estimated, one for each of the three regions included in the study. Before separating the model, some assumptions have to be tested. In particular, the IID property implies that the error terms are not only independent of each other but also identically distributed among alternatives, thus homoskedastic. That is, the error variances (or equivalently the inversely related scale parameters) are equal across alternatives and individuals (Ryan, Gerard and Amaya-Amaya, 2008). Therefore, in order to obtain efficient parameter estimates from the sub-models, the scale factors should not be significantly different. To test this assumption, a fitted heteroskedastic conditional logit model is used, which establishes that the differences in scale parameters between the three regions are not significant, hence the model is separable.

##  Probability analysis

In most cases, the interpretation of the model results would be based on the comparison of the size and significance of the estimated parameters for the attributes. However, in discrete choice models the relative impact of attributes is not directly comparable since the coefficients estimates are confounded with the implicit subjective utility scale. Put differently, parameters estimates combine the relative impact (or weight) of an attribute on respondents’ choice and the utility scale values related with its levels (Lanscar, Louviere and Flynn 2007). Consequently, the researcher cannot distinguish whether the magnitude of the coefficients estimated are a result of the attribute’s impact or the location of each attribute level on the latent utility interval scale. Therefore, for statistical inference in DCEs other methods have to be used rather than simply calculating the marginal effects of the attributes.

Several methods to investigate the relative weights of attributes in DCEs have been proposed in the literature (Lancsar 2002) (Louviere & Islam 2004). In this experiment, probability analysis is applied, which calculates the probability of an alternative being chosen given a particular attribute (and its associated level). For inference, once the parameters are estimated, the predicted probability of a base case alternative is calculated (i.e. an alternative where all attributes are set to their mean values). Next, one of the criteria is set equal to 1 and again the predicted probability is obtained. The two probabilities are then compared and their percentage difference is calculated. Separately repeating this procedure for each attribute leads to an implicit ordering of the relative importance of each criterion according to its impact on the probability of choosing each alternative (Lanscar, Louviere and Flynn 2007). This procedure is applied for all the three regions and is implemented using Excel.

Finally, to analyse the overall effect of efficiency over equity attributes, percentage changes are calculated for the aggregate equity and efficiency criteria. That is, predicted probabilities are again computed for each case, by setting first all equity and then all efficiency criteria equal to 1 simultaneously. Next, the percentage changes between the aggregate probabilities and the base case alternative are calculated. These percentage differences are then used to construct an equity/efficiency ratio, which estimates the “size” of the equity/efficiency trade-off. Given the three mutually exclusive levels of “age of target group” attribute, three different calculations had to be implemented, one for each level. For the rest of the binary criteria, that was not an issue. Lastly, three different computations were performed, one for each of the regions.

###  Composite league table

One last step of MCDA is the broad classification and ranking of health interventions within the context of specific clinical conditions and country-specific policy questions, also named composite league tables (CLTs). That is, health interventions across several disease areas that are of interest in Spain are rank-ordered in order to give a further insight for the determinants that affect priority setting. The disease areas and risk factors included in the construction of the CLT consisted of burden of disease data from high-income countries. These data originated from WHO and partner communities reports on non-communicable diseases and health policy (Alwan, et al. 2010) (WHO Action Plan 2008) (Lopez, et al. 2006) (Chisholm, et al. 2004). Primary/secondary preventive and inpatient/outpatient therapy interventions treating such clinical conditions and risk factors were then mapped on the experiment’s attributes and levels (e.g. if an intervention targeted severe conditions, the ‘Severity’ criterion would be mapped as Severe, i.e. 1, while if an intervention had small individual health benefits then the ‘Individual health benefits’ criterion would take the value Small, i.e. 0). Table 6 provides a summary of the types of health conditions examined.

**Table 6: Types of conditions**

|  |
| --- |
| **Colour coded types of conditions** |
| Risk factors |
| Neoplasia |
| CVD |
| Pulmonology |
| Endocrinology |
| Mental disorders |

Based on the coefficients estimates, a “composite index” score (CI) was defined for each intervention, establishing its relative priority as a function of its characteristics (Defechereux, et al. 2012). In other words, CI scores were calculated based again on a linear additive utility model, but in this case the alternatives were the different health interventions. According to the CI results, interventions were ranked in the CLT. As before, the three age categories of target groups imply that three different CLTs had to be created. Even more, within each target group, three different rankings were included, associated with the three different regions.

# RESULTS

## Sample descriptive statistics

This section illustrates some basic descriptive statistics regarding the sample used in the analysis. As discussed earlier, out of the 71 participants, 69 questionnaires were valid and fully completed. The sample is almost equally composed by males (37) and females (32), with males’ participation being slightly dominant (53.62% as compared to 46.38% of women). Concerning their work experience, 41% exhibits more than 10 years of experience in health care decision making. In terms of regions, the highest percentage represents the region of Madrid (41%), while 32% and 27% represent the combined areas of Cantabria/Valencia and Basque country/Catalonia, respectively.

Finally, regarding to job types, the largest share (49%) are public health care managers at the regional and national level, including representatives of the pharmaceutical industry. The remainder consists of consultants (27%), including university research associates and HTA executives; and policy makers (24%), responsible for social insurance, health care and funding structures at the regional level. A summary of descriptive statistics is given in Table 7, along with the characteristics of DCE respondents.

**Table 7: Descriptive statistics of DCE respondents**

|  |  |  |
| --- | --- | --- |
| Characteristics | Frequency | Percent |
| Sex *Male**Female* | 3732 | 54%47% |
| Experience*More than 10 years**Less than/equal to 10 years* | 2841 | 41%59% |
| Job type*Policy maker**Health manager**Consultant* | 144015 | 24%49%27% |
| Region*Catalonia/Basque country**Cantabria/Valencia**Madrid* | 182224 | 27%32%41% |

## Regression results

### Final model specification

As mentioned in the previous chapter, in order to reach a final model the performance of different model specifications has been compared. First, a main- effects only conditional logit (CL) model was estimated (i.e. a model including only the six attributes). Subsequently, several interaction terms between the attributes and socio-economic characteristics were created and tested. Based on a backward selection (i.e. using stepwise commands at the 0.10 significance level) most interaction terms have been removed, due to their insignificance.

Those remained (i.e. cost-effectiveness\*djobtype2, high age group\*male and individual benefits\*male) have been included in the final specification. Various measures for the goodness of fit were calculated in order to compare the fit of the main effects (null) model with the one derived from backward selection (alternative model). These measures included a Wald test as well as likelihood-ratio tests (LR test). Results provided strong support for the alternative model. Three separated CL models were estimated, one for each set of regions included in the study.

Furthermore, it has been tested whether alternative-specific constants (ASCs) should be included in the model. In discrete choice modelling, the ASC of an alternative reflects the average effect of all non-included factors on utility levels (A review of DCEs). However, when generic (unlabelled) alternatives are being used, differences in their utilities are caused only by the attributes. This effect is already incorporated in the model and thus, the ASC is assumed to be zero. As expected, the inclusion of an ASC in this generic model gave a statistically insignificant parameter (p-valueASC1=0.18) and it has therefore been dropped from the estimation.

Comparisons between the CL and MXL model were based on the values of Bayesian Information Criterion (BIC). BIC is a model selection criterion which introduces penalty terms for the model when it is over-fitted (Chen 2008). Given any two estimated models, the one with the lower BIC value should be preferred. Based on these values, the CL model outperformed the MXL specification, both in the case where only main effects were considered random (BICCL=1.11 and BICMXL=1.21); and when also interaction terms were included in the random variables list (BICCL=1.11 and BICMXL=1.12).

### Estimation results

Table 8 illustrates the results of the four different conditional models. In the context of logistic regression, the size (magnitude) of the coefficients does not provide any relevant information for the interpretation of results. In CL models, it is rather the sign and significance of the coefficients that indicate the effect of each attribute on respondents’ preferences.

*General model*

Regarding the main effects, respondents penalise the interventions targeting middle and high age groups, as compared to those targeting young age groups (baseline category). They also condemn those interventions that require public support (or willingness to subsidise). On the other hand, they show greater preference for interventions that benefit a larger share of the population; interventions that offer substantial health benefits for those treated; and those that target the severely-ill. Even more, they favour interventions that are proved to be cost-effective.

Concerning interaction effects, it appears that male respondents are more likely to choose interventions that mark the elderly, as compared to young age groups. Conversely, male participants put lower weight on interventions that increase individual health benefits. Finally, it seems that health managers and directors in the pharmaceutical industry prioritise interventions that give a positive balance between benefits and costs, thus they are cost-effective.

All main effects coefficients, with the exception of middle age group attribute, appear to be statistically significant. That is, their p-values are essentially zero, rejecting the null hypothesis that = 0. Regarding interaction effects, indben\*male and cea\*jobtype2 terms appear to be significant at 5% significance level. The interaction term agehigh\*male however, is statistically significant at 10%.

**Table 8: Conditional logit estimation results with individual characteristics interactions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | General Model | Catalonia/Basque Model | Cantabria/ValenciaModel | MadridModel |
| Equity attributesSeverity of diseaseAge of target group: MiddleAge of target group: HighWillingness to subsidise others | 0.650\*\*\*(0.110)-0.093(0.111)-1.257\*\*\*(0.193)-0.236\*\*\*(0.090) | 0.641\*\*\*(0.219)-0.034(0.253)-1.031\*\*\*(0.308)-0.289(0.227) | 0.488\*\*\*(0.166)-0.049(0.175)-2.254\*\*\*(0.468)-0.072(0.145) | 0.796\*\*\*(0.193)-0.110(0.169)-0.744\*\*\*(0.244)-0.297\*\*(0.140) |
| Efficiency attributesNumber of potential beneficiariesIndividual health benefitsCost-effectiveness | 0.906\*\*\*(0.097)1.263\*\*\*(0.170)0.900\*\*\*(0.153) | 0.856\*\*\*(0.204)1.054\*(0.556)0.983\*\*(0.391) | 1.121\*\*\*(0.178)1.562\*\*\*(0.297)1.289\*\*\*(0.307) | 0.881\*\*\*(0.162)1.392\*\*\*(0.180)0.612\*\*\*(0.183) |
| InteractionsAge of target group: High \* MaleIndividual health benefits\* maleCost-effectiveness\*HealthManager | 0.437\*(0.256)-0.389\*\*(0.191)0.392\*\*(0.186) | 0.344(0.363)0.069(0.516)0.499(0.361) | 1.011(0.689)-0.649\*(0.393)-0.079(0.406) | 0.076(0.362)-0.685\*\*\*(0.221)0.634\*\*(0.263) |
| # IndividualsObservationsLogLPseudo-R2 | 692210-516.80.325 | 18608-142.20.324 | 22734-153.20.398 | 24868-205.10.318 |

*Notes: Numbers in parenthesis are t-values. The (\*), (\*\*) (\*\*\*) indicate that the estimated coefficients are significant at 10%, 5% and 1% significant level, respectively.*

*Sub-models for each region*

As mentioned before, a fitted heteroskedastic model has been estimated in order to establish whether the main model is separable. The results show that the region coefficients are not statistically significant (p-valueregion1=0.37 and p-valueregion2=0.62). The estimation results for the three sub-models are quite similar to those of the general model. However, some important differences are being observed. In particular, all main effects coefficients have the same signs as in the main model. In other words, respondents from all regions favour interventions that target the severely-ill, that offer greater total and individual benefits and are cost-effective. Conversely, they penalise interventions targeting middle and high age groups as well as those that demand public support.

Some discrepancies are being noticed regarding the interaction terms. For instance, male respondents from all three regions put an “extra” weight on interventions targeting the elderly. Nevertheless, male participants from Catalonia and the Basque Country appear to favour interventions that offer substantial health benefits to individual patients (as compared to the main and the sub models). Even more, managers and pharmaceutical executives from Cantabria and Valencia condemn those interventions that are proven to be cost-effective. Overall, the estimated coefficients for the three sub-models show similar patterns of statistical significance for all main effects apart from willingness to subsidise. Moreover, the interaction effects coefficients appear to be non-significant in Catalonia/Basque, while the indben\*male term seems to be the most significant coefficient in the other two regions.

## Predicted probabilities

As mentioned in Chapter 2, in such models it is the percentage differences in predicted probabilities that are relevant for statistical inference. That is, the differences in predicted probabilities for each attribute, as compared to a base alternative. The results are presented in Table 9. The probabilities for the aggregated criteria are measured separately for each age group. Again, calculations are based on the general as well as the three sub-models.

*Equity criteria*

With regard to the general model, severity of disease and willingness to subsidise increase the probability of selection for the intervention by 4.5% and 1.7% respectively, as compared to the base alternative. On the other hand, interventions that benefit middle and high age groups display a decrease in their chance of selection, by 1% and around 11% respectively. However, the effect of the middle age attribute is considered insignificant, in the view of its insignificant coefficient. In the regions of Catalonia and the Basque Country, results are similar for all attributes apart from willingness to subsidise. That is, severity is the only criterion that increases the selection probability (by 4.5%), while the criterion reflecting public support has a negative effect up to 2.4%. Even more, the effects of the age groups attributes are lower in this case (0.4% and 8.6%).

The regions of Valencia and Cantabria display similar results in terms of their sign. Nonetheless, the negative effect of willingness to subsidise on the probability of selection is minimised to 0.7%, while the interventions targeting the elderly decrease the choice probability for the intervention by almost 21%. Finally, in Madrid the severity of disease has the largest effect on the chance of selection (6.3%). The remaining equity attributes follow analogous patterns, with interventions benefiting the elderly having the largest negative effect (9.5%). It should again be mentioned that the magnitudes of these effects are associated with the insignificance of the attributes’ coefficients. That is, the estimated parameters for willingness to subsidise criterion are non-significant for both sets of Catalonia/Basque and Valencia/Cantabria regions. Therefore, their relative effect on the probability of selection for the intervention is also considered insignificant.

*Efficiency criteria*

Turning to efficiency attributes, all three criteria exhibit great positive effects for the general model. For instance, high individual benefits increase the probability of selection by 5.8% as compared to the baseline value. Interventions benefitting a large share of the population and that are cost-effective display a rise in their chance of selection by 6% and 8% respectively. These results are in line with the significant estimated parameters for these attributes. Similar outputs are obtained for the regions of Basque Country and Catalonia, although the number of beneficiaries increases the chance of selection for the intervention by a higher percent (9%). The other two attributes also increase the selection probability, by 7% for the individual benefits and around 9% for the cost-effectiveness of the intervention. For the regions of Valencia and Cantabria the results are almost equivalent to those for Basque/Catalonia in terms of their sign and magnitude. Small differences are being observed in the positive effects of cost-effectiveness and individual benefits attributes, which reach 10% and 8%, respectively. Finally, in Madrid the effects remain positive but they are slightly lower for interventions targeting high numbers of beneficiaries and individual benefits (6% and 5.7% respectively).

**Table 9: (Unconditional) Predicted probabilities and % changes as compared to base alternative**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | General Model | Catalonia/Basque Model | Cantabria/ValenciaModel | MadridModel |
|  | Predicted Probability b | %Δ compared to base | Predicted Probability | %Δ compared to base | Predicted Probability | %Δ compared to base | Predicted Probability | %Δ compared to base |
| Base alternative a | 0.84 |  | 0.84 |  | 0.81 |  | 0.80 |  |
| Equity attributesSeverity of diseaseMiddle age groupHigh age group Willingness to subsidise others | 0.880.830.750.86 | 4.5-0.97-10.541.76 | 0.880.840.770.82 | 4.5-0.36-8.66-2.38 | 0.840.800.640.80 | 4.38-0.63-20.75-0.71 | 0.860.790.720.78 | 6.34-1.33-9.47-2.81 |
| Efficiency attributesNumber of potential beneficiariesIndividual health benefitsCost-effectiveness | 0.890.890.91 | 6.015.837.99 | 0.920.900.92 | 9.027.248.95 | 0.880.870.88 | 9.087.659.65 | 0.860.850.88 | 6.925.719.21 |

a Based alternative is based on setting all attributes at their mean

b Each alternative is identical to the base with the exception of the attribute of interest that is set at one.

*Percentage differences for aggregate criteria*

Due to the three categories of the “age of the target group” attribute, calculations were repeated for each group. In this case, only the sub-models according to region were used. Results are presented in Table 10 along with the calculated equity-efficiency trade-offs for each age category.

1. *Interventions targeting young age groups:* In the regions of Basque Country and Catalonia, fully equitable interventions (as described by the three criteria) are 2.1% more likely to be chosen compared to the baseline value. On the other hand, for a fully efficient intervention this figure increases up to 12%. Concerning the regions of Cantabria and Valencia, the equity aggregate percentage difference in probabilities rises up to 2.7%, while this figure for aggregate efficiency criteria increases only by 0.5% (i.e. 12.5%). Finally in Madrid, for interventions targeting young ages both figures increase, up to 3.6% and 13.7%, respectively.
2. *Interventions targeting middle age groups:* In this sub-group, results are similar for all three regions. In particular, fully equitable interventions are 1.9% more likely to be chosen (as compared to the baseline case) in Catalonia/Basque country; this figure increases up to 2.3% and 2.7% for the regions of Cantabria/Valencia and Madrid respectively. Conversely, efficiency aggregate percentage differences in probabilities are higher in all regions, with figures reaching 12%, 12.7% and 14.2% for Catalonia/Basque, Cantabria/Valencia and Madrid respectively.
3. *Interventions targeting high-age groups:* Results from this groups exhibit some significant differences. For instance, for interventions targeting older ages the equity aggregate difference in probabilities turns negative in Catalonia/Basque country (4.3%). That is, the baseline alternative is being preferred[[1]](#footnote-1). This figure remains negative in the other regions, with Madrid showing almost equivalent results (4.2%); and Cantabria/Valencia giving the highest percentage observed (15%). On the other hand, fully efficient interventions are more likely to be chosen compared to the base case in all regions. The percentage differences in probabilities are even higher in this case, with figures up to 12.4%, 18.1% and 17% for Catalonia/Basque, Valencia/Cantabria and Madrid, respectively.

**Table 10: Aggregate predicted probabilities, % changes and equity-efficiency trade-offs**

|  |  |
| --- | --- |
|  | Interventions targeting young age groups |
|  | **Catalonia/Basque country** | **Valencia****/Cantabria** | **Madrid** |
|  | **Agg. Prob.** | **% Δ** | **EE Ratio** | **Agg. Prob.** | **% Δ**  | **EE Ratio** | **Agg. Prob.** | **% Δ** | **EE Ratio** |
| Base alternative | 0.87 |  |  | 0.86 |  |  | 0.84 |  |  |
| Aggregate equity alternative | 0.89 | 2.13 |  | 0.88 | 2.66 |  | 0.87 | 3.63 |  |
|  |  |  | 5.58 |  |  | 4.68 |  |  | 3.76 |
| Aggregate efficiency alternative | 0.97 | 11.90 |  | 0.97 | 12.48 |  | 0.96 | 13.68 |  |
|  | **Interventions targeting middle age groups** |
|  | **Catalonia/Basque country** | **Valencia****/Cantabria** | **Madrid** |
|  | **Agg. Prob.** | **% Δ** | **EE Ratio** | **Agg. Prob.** | **% Δ**  | **EE Ratio** | **Agg. Prob.** | **% Δ** | **EE Ratio** |
| Base alternative | 0.87 |  |  | 0.86 |  |  | 0.83 |  |  |
| Aggregate equity alternative | 0.88 | 1.89 |  | 0.88 | 2.31 |  | 0.86 | 2.73 |  |
|  |  |  | 6.37 |  |  | 5.48 |  |  | 5.19 |
| Aggregate efficiency alternative | 0.97 | 12.04 |  | 0.97 | 12.68 |  | 0.95 | 14.19 |  |
|  | **Interventions targeting old age groups** |
|  | **Catalonia/Basque country** | **Valencia****/Cantabria** | **Madrid** |
|  | **Agg. Prob.** | **% Δ** | **EE Ratio** | **Agg. Prob.** | **% Δ**  | **EE Ratio** | **Agg. Prob.** | **% Δ** | **EE Ratio** |
| Base alternative | 0.84 |  |  | 0.81 |  |  | 0.81 |  |  |
| Aggregate equity alternative | 0.8 | -4.29 |  | 0.69 | -14.81 |  | 0.78 | -4.24 |  |
|  |  |  | -2.88 |  |  | -1.22 |  |  | -3.94 |
| Aggregate efficiency alternative | 0.97 | 12.39 |  | 0.95 | 18.13 |  | 0.95 | 16.70 |  |

*Equity-Efficiency trade offs*

Based on the aggregate percentage differences in probabilities for the two sets of criteria, equity-efficiency trade-offs ratios are calculated. Once again, estimations are implemented for each age group and each region.

1. *Interventions targeting young age groups:* In the setting of Catalonia/Basque and Cantabria/Valencia regions, equity-efficiency ratios of 5.6 and 4.7 are being observed. That is, efficiency is 5.6 and 4.7 times more desirable than equity, respectively. In the region of Madrid, this figure turns to 3.8, indicating the times that efficiency is preferred over equity.
2. *Interventions targeting middle age groups:* The equity-efficiency ratios do not change significantly for interventions targeting middle age groups. For instance, in Catalonia and the Basque country efficiency criteria are 6.4 times more important than equity criteria. This ratio is lower for the other regions, with efficiency being 5.5 and 5.2 times more desirable in Cantabria/Valencia and Madrid, respectively.
3. *Interventions targeting old age groups:* With respect to interventions targeting the elderly, results should be interpreted with caution. Given the negative value obtained for the aggregate equity criteria, the aforementioned explanation is less meaningful. That is, equity aspects are not desirable in any region and policy makers are willing to sacrifice efficiency in order to avoid any equity gains. In other words, respondents from Catalonia and the Basque country are indifferent (or find equally desirable) between one unit drop in efficiency and an almost 3 times increase in equity (given the negative equity-efficiency ratio of 2.9). These figures are similar in the regions of Cantabria/Valencia and Madrid, with equity-efficiency ratios of 1.22 and 4%, respectively.

## Composite league table calculations

As discussed earlier, based on the parameters estimates health interventions have been ranked in a CLT, according to their selection probabilities. This policy exercise aimed at establishing the relative priority that respondents give to interventions according to their characteristics. Overall rankings are provided, based on the estimated coefficients of both the general and the three sub-models. Overall results for general as well as the three sub-models are presented in Tables 11 and 12. As mentioned earlier, different calculations were required, in order to take into account the three categories of the “age of target group” criterion. Further, measurements were repeated for each region included in the study. Tables 13, 14 and 15 summarise the results for each age category in all three regions.

**Table 11: CLT rankings for the general model**

|  |  |  |
| --- | --- | --- |
| **CLINICAL CONDITION** | **Intervention** | **Conditional Rank** |
|  |  |  |
| Suicide and intentional self-harm  | Education, promote individual, family, community connectedness | 1 |
| Major depressive disorder | Older antidepressant drug medication (TCA) | 2 |
| Major depressive disorder | Newer antidepressant drug medication  | 2 |
| Major depressive disorder | Psychosocial treatment | 2 |
| MN of colon, rectum and anus  | Surgery with/without adjuvant treatment (a) | 5 |
| MN of the female breast  | Surgery (Lumpectomy, Mastectomy) with adjuvant treatment (b) | 5 |
| MN of prostate  | Monitor cancer (Watchful Waiting, Active Surveillance) | 5 |
| MN of prostate  | Surgery with/without adjuvant treatment (c) | 5 |
| Acute Myocardial Infarction (AMI) | Medication (aspirin, atenolol, streptokinase, tissue plasminogen activator) | 5 |
| Acute Myocardial Infarction (AMI) | Surgery (Primary angioplasty, primary stenting, percutaneous transluminal coronary angioplasty (PTCA)) | 5 |
| Atherosclerosis  | Medication (aspirin, atenolol, ACE inhibitors, Statins) | 5 |
| Atherosclerosis  |  Surgery (percutaneous transluminal coronary angioplasty - PTCA)  | 5 |
| Angina pectoris (stable angina) | Angioplasty, Stenting | 5 |
| Angina pectoris (stable angina) | Surgery (Coronary artery bypass graft) | 5 |
| Diabetes mellitus type 2 | Foot care (patient and provider education, foot examination, foot hygiene, appropriate footwear) | 5 |
| Diabetes mellitus type 2 | Education (patient self-management) | 5 |
| Congestive Heart Failure (CHF) | Medication (ACE inhibitors, Beta-Blockers) | 17 |
| Unhealthy diet | Promote healthy eating in school  | 18 |
| Physical Inactivity | Promote physical activity in schools | 18 |
| Unhealthy diet | Reduce salt intake | 20 |
| MN of colon, rectum and anus | Screening (Fecal occult blood testing (FOBT), Colonoscopy, Sigmoidoscopy) | 20 |
| MN of the female breast  | Screening (self-examination, clinical breast examination, ultrasound, mammography) | 20 |
| Hypertension | Medication (ACE inhibitors, beta-blockers) | 20 |
| High blood cholesterol | Medication (Statins) | 20 |
| Angina pectoris (stable angina) | Medication (Atenolol, ACE inhibitors, Beta-Blockers) | 20 |
| Asthma control | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 20 |
| Chronic obstructive pulmonary disease (COPD) - Stage 1-2 | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 20 |
| Diabetes mellitus type 2 | Glucose control (insulin, oral glucose-lowering agents) | 20 |
| Unhealthy diet | Provide health education in worksites | 30 |
| Congestive Heart Failure (CHF) | Surgery (Coronary artery bypass graft) | 31 |
| MN of larynx and trachea, bronchus, lung  | Surgery with/without adjuvant treatment (a) | 32 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Home oxygen therapy | 32 |
| Tobacco use | Raise tax on tobacco | 34 |
| Tobacco use | Enforce bans on tobacco advertising | 34 |
| Tobacco use | Enforce clean indoor air law | 34 |
| Harmful alcohol use  | Raise tax on alcohol | 34 |
| Harmful alcohol use  | Enforce bans on alcohol advertising | 34 |
| Unhealthy diet | Promote public awareness about diet | 34 |
| Physical Inactivity | Promote physical activity in mass media | 34 |
| Alzheimer's disease & dementias (Stage 1) | Comprehensive in-home care | 34 |
| Physical Inactivity | Offer counselling in primary care | 42 |
| Congestive Heart Failure (CHF) | Surgery (Heart transplant) | 43 |
| Cerebrovascular disease (acute treatment) | Medication (Aspirin, Heparin, rt-PA) | 44 |
| Cerebrovascular disease (prevention of recurrence) | Medication (Aspirin, dipyridamole, carotid endarterectomy) | 44 |
| Harmful alcohol use  | Enforce drink-driving laws (breath-testing) | 46 |
| Alzheimer's disease & dementias (Stage 2) | Nursing home/hospital care | 46 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Surgery (Lung volume reduction, lung transplant) | 48 |

**Table 12: CLT rankings for every region**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CLINICAL CONDITION** | **Intervention** | **Rank Catalonia/Basque** | **Rank Cantabria/Valencia** |  **Rank****Madrid** |
|  |  |   |   |  |
| Suicide and intentional self-harm  | Education, promote individual, family, community connectedness | 1 | 1 | 1 |
| Major depressive disorder | Older antidepressant drug medication (TCA) | 2 | 2 | 2 |
| Major depressive disorder | Newer antidepressant drug medication  | 2 | 2 | 2 |
| Major depressive disorder | Psychosocial treatment | 2 | 2 | 2 |
| MN of colon, rectum and anus  | Surgery with/without adjuvant treatment (a) | 5 | 5 | 5 |
| MN of the female breast  | Surgery (Lumpectomy, Mastectomy) with adjuvant treatment (b) | 5 | 5 | 5 |
| MN of prostate  | Monitor cancer (Watchful Waiting, Active Surveillance) | 5 | 7 | 5 |
| MN of prostate  | Surgery with/without adjuvant treatment (c) | 5 | 7 | 5 |
| Acute Myocardial Infarction (AMI) | Medication (aspirin, atenolol, streptokinase, tissue plasminogen activator) | 5 | 7 | 5 |
| Acute Myocardial Infarction (AMI) | Surgery (Primary angioplasty, primary stenting, percutaneous transluminal coronary angioplasty (PTCA)) | 5 | 7 | 5 |
| Atherosclerosis  | Medication (aspirin, atenolol, ACE inhibitors, Statins) | 5 | 7 | 5 |
| Atherosclerosis  |  Surgery (percutaneous transluminal coronary angioplasty - PTCA)  | 5 | 7 | 5 |
| Angina pectoris (stable angina) | Angioplasty, Stenting | 5 | 7 | 5 |
| Angina pectoris (stable angina) | Surgery (Coronary artery bypass graft) | 5 | 7 | 5 |
| Diabetes mellitus type 2 | Foot care (patient and provider education, foot examination, foot hygiene, appropriate footwear) | 5 | 7 | 5 |
| Diabetes mellitus type 2 | Education (patient self-management) | 5 | 7 | 5 |
| Congestive Heart Failure (CHF) | Medication (ACE inhibitors, Beta-Blockers) | 17 | 7 | 17 |
| Unhealthy diet | Reduce salt intake | 18 | 7 | 18 |
| MN of colon, rectum and anus | Screening (Fecal occult blood testing (FOBT), Colonoscopy, Sigmoidoscopy) | 18 | 19 | 18 |
| MN of the female breast  | Screening (self-examination, clinical breast examination, ultrasound, mammography) | 18 | 20 | 18 |
| MN of prostate  | Screening (Digital rectal exam (DRE), Prostate specific antigen test (PSA)) | 18 | 21 | 18 |
| Hypertension | Medication (ACE inhibitors, beta-blockers) | 18 | 21 | 18 |
| High blood cholesterol | Medication (Statins) | 18 | 21 | 18 |
| Angina pectoris (stable angina) | Medication (Atenolol, ACE inhibitors, Beta-Blockers) | 18 | 21 | 18 |
| Asthma control | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 18 | 21 | 18 |
| Chronic obstructive pulmonary disease (COPD) - Stage 1-2 | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 18 | 21 | 18 |
| Diabetes mellitus type 2 | Glucose control (insulin, oral glucose-lowering agents) | 18 | 21 | 18 |
| Unhealthy diet | Promote healthy eating in school  | 28 | 21 | 28 |
| Physical Inactivity | Promote physical activity in schools | 28 | 21 | 29 |
| Unhealthy diet | Provide health education in worksites | 30 | 21 | 29 |
| MN of larynx and trachea, bronchus, lung  | Surgery with/without adjuvant treatment (a) | 31 | 31 | 31 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Home oxygen therapy | 31 | 32 | 32 |
| Congestive Heart Failure (CHF) | Surgery (Coronary artery bypass graft) | 33 | 32 | 32 |
| Tobacco use | Raise tax on tobacco | 34 | 34 | 34 |
| Tobacco use | Enforce bans on tobacco advertising | 34 | 34 | 35 |
| Tobacco use | Enforce clean indoor air law | 34 | 34 | 36 |
| Harmful alcohol use  | Raise tax on alcohol | 34 | 34 | 37 |
| Harmful alcohol use  | Enforce bans on alcohol advertising | 34 | 34 | 37 |
| Unhealthy diet | Promote public awareness about diet | 34 | 34 | 37 |
| Physical Inactivity | Promote physical activity in mass media | 34 | 34 | 37 |
| Alzheimer's disease & dementias (Stage 1) | Comprehensive in-home care | 34 | 34 | 37 |
| Physical Inactivity | Offer counselling in primary care | 42 | 42 | 37 |
| Cerebrovascular disease (acute treatment) | Medication (Aspirin, Heparin, rt-PA) | 43 | 43 | 37 |
| Cerebrovascular disease (prevention of recurrence) | Medication (Aspirin, dipyridamole, carotid endarterectomy) | 43 | 44 | 44 |
| Congestive Heart Failure (CHF) | Surgery (Heart transplant) | 45 | 44 | 44 |
| Harmful alcohol use  | Enforce drink-driving laws (breath-testing) | 46 | 46 | 46 |
| Alzheimer's disease & dementias (Stage 2) | Nursing home/hospital care | 46 | 46 | 46 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Surgery (Lung volume reduction, lung transplant) | 48 | 48 | 48 |

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Overall, interventions targeting mental disorders exhibit the highest ranking scores, with those targeting suicide and intentional self-harm attempts ranking first. This is true not only for the country as a whole but also for each region examined. Interventions targeting neoplasia diseases follow, with the exception of Cantabria/Valencia, which gives higher priority to interventions addressing risk factors. Disease areas such as cardiovascular (CVD) and endocrinology diseases are ranked similarly. The rankings of interventions for the three regions are highly comparable, meaning that CLT calculations give similar results.

An exception is age-specific interventions, such as initiatives promoting healthy nutrition in schools which target only young age groups; medication and surgery for congestive heart failure targeting only the young and the elderly; and drug and hospital treatment for mental disorders, which vary according to the age group. It should be noted however, that several interventions examined exhibit similar characteristics with respect to the equity/efficiency attributes. That is, composite index calculations give relatively similar results and therefore, rankings of interventions do not significantly vary among the regions.

Results are relatively similar when rankings for each age category are compared. In particular, mental disorders seem to be the most highly ranked in young and middle age categories. Nevertheless, this is not the case for elderly groups, where CVDs are most highly prioritised. Endocrinology and neoplasia diseases are also important disease areas, although differences are being noticed depending on the type of illness and the intervention. Finally, risk factors concerning alcohol overuse and unhealthy diet are highly taken into consideration. Results are almost equivalent for the regions of Catalonia/Basque Country and Cantabria/Valencia. Some minor differences are being observed in the rankings for Madrid.

**Table 13: Composite league table rankings for interventions targeting young age groups**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- | --- |
| **CLINICAL CONDITION** | **Intervention** | **Rank C/B** | **Rank****C/V** | **Rank Madrid** |
| Major depressive disorder | Older antidepressant drug medication (TCA) | 1 | 1 | 1 |
| Major depressive disorder | Newer antidepressant drug medication  | 1 | 1 | 1 |
| Major depressive disorder | Psychosocial treatment | 1 | 1 | 1 |
| Acute Myocardial Infarction (AMI) | Medication (aspirin, atenolol, streptokinase, tissue plasminogen activator) | 4 | 4 | 4 |
| Acute Myocardial Infarction (AMI) | Surgery (Primary angioplasty, primary stenting, percutaneous transluminal coronary angioplasty (PTCA)) | 4 | 4 | 4 |
| Angina pectoris (stable angina) | Angioplasty, Stenting | 4 | 4 | 4 |
| Angina pectoris (stable angina) | Surgery (Coronary artery bypass graft) | 4 | 4 | 4 |
| Atherosclerosis  | Medication (aspirin, atenolol, ACE inhibitors, Statins) | 4 | 4 | 4 |
| Atherosclerosis  |  Surgery (percutaneous transluminal coronary angioplasty - PTCA)  | 4 | 4 | 4 |
| Diabetes mellitus type 2 | Foot care (patient and provider education, foot examination, foot hygiene, appropriate footwear) | 4 | 4 | 4 |
| Diabetes mellitus type 2 | Education (patient self-management) | 4 | 4 | 4 |
| MN of colon, rectum and anus  | Surgery with/without adjuvant treatment (a) | 4 | 4 | 4 |
| MN of prostate  | Monitor cancer (Watchful Waiting, Active Surveillance) | 4 | 4 | 4 |
| MN of prostate  | Surgery with/without adjuvant treatment (c) | 4 | 4 | 4 |
| MN of the female breast  | Surgery (Lumpectomy, Mastectomy) with adjuvant treatment (b) | 4 | 4 | 4 |
| Angina pectoris (stable angina) | Medication (Atenolol, ACE inhibitors, Beta-Blockers) | 16 | 16 | 16 |
| Asthma control | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 16 | 16 | 16 |
| Chronic obstructive pulmonary disease (COPD) - Stage 1-2 | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 16 | 16 | 16 |
| Congestive Heart Failure (CHF) | Medication (ACE inhibitors, Beta-Blockers) | 16 | 16 | 16 |
| Diabetes mellitus type 2 | Glucose control (insulin, oral glucose-lowering agents) | 16 | 16 | 16 |
| High blood cholesterol | Medication (Statins) | 16 | 16 | 16 |
| Hypertension | Medication (ACE inhibitors, beta-blockers) | 16 | 16 | 16 |
| MN of colon, rectum and anus | Screening (Fecal occult blood testing (FOBT), Colonoscopy, Sigmoidoscopy) | 16 | 16 | 16 |
| MN of the female breast  | Screening (self-examination, clinical breast examination, ultrasound, mammography) | 16 | 16 | 16 |
| Unhealthy diet | Reduce salt intake | 16 | 16 | 16 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Home oxygen therapy | 26 | 26 | 27 |
| MN of larynx and trachea, bronchus, lung  | Surgery with/without adjuvant treatment (a) | 26 | 26 | 27 |
| Congestive Heart Failure (CHF) | Surgery (Coronary artery bypass graft) | 28 | 28 | 26 |
| Harmful alcohol use  | Raise tax on alcohol | 29 | 29 | 33 |
| Harmful alcohol use  | Enforce bans on alcohol advertising | 29 | 29 | 33 |
| Physical Inactivity | Promote physical activity in mass media | 29 | 29 | 33 |
| Tobacco use | Raise tax on tobacco | 29 | 29 | 33 |
| Tobacco use | Enforce bans on tobacco advertising | 29 | 29 | 33 |
| Tobacco use | Enforce clean indoor air law | 29 | 29 | 33 |
| Unhealthy diet | Promote public awareness about diet | 29 | 29 | 33 |
| Physical Inactivity | Offer counselling in primary care | 36 | 36 | 29 |
| Physical Inactivity | Promote physical activity in schools | 36 | 36 | 29 |
| Unhealthy diet | Promote healthy eating in school  | 36 | 36 | 29 |
| Cerebrovascular disease (acute treatment) | Medication (Aspirin, Heparin, rt-PA) | 39 | 39 | 40 |
| Cerebrovascular disease (prevention of recurrence) | Medication (Aspirin, dipyridamole, carotid endarterectomy) | 39 | 39 | 40 |
| Congestive Heart Failure (CHF) | Surgery (Heart transplant) | 41 | 41 | 32 |
| Harmful alcohol use  | Enforce drink-driving laws (breath-testing) | 42 | 42 | 42 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Surgery (Lung volume reduction, lung transplant) | 43 | 43 | 43 |

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**Table 14: Composite league table rankings for interventions targeting middle age groups**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **CLINICAL CONDITION** | **Intervention** | **Rank C/B** | **Rank C/V** | **Rank Madrid** |
| Alzheimer's disease & dementias (Stage 1) | Comprehensive in-home care | 1 | 1 | 1 |
| Cerebrovascular disease (acute treatment) | Medication (Aspirin, Heparin, rt-PA) | 1 | 1 | 1 |
| Cerebrovascular disease (prevention of recurrence) | Medication (Aspirin, dipyridamole, carotid endarterectomy) | 1 | 1 | 1 |
| Angina pectoris (stable angina) | Angioplasty, Stenting | 4 | 4 | 4 |
| Diabetes mellitus type 2 | Education (patient self-management) | 4 | 4 | 4 |
| Unhealthy diet | Reduce salt intake | 4 | 4 | 4 |
| MN of colon, rectum and anus | Screening (Fecal occult blood testing (FOBT), Colonoscopy, Sigmoidoscopy) | 4 | 4 | 4 |
| Hypertension | Medication (ACE inhibitors, beta-blockers) | 4 | 4 | 4 |
| High blood cholesterol | Medication (Statins) | 4 | 4 | 4 |
| Angina pectoris (stable angina) | Medication (Atenolol, ACE inhibitors, Beta-Blockers) | 4 | 4 | 4 |
| Asthma control | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 4 | 4 | 4 |
| Diabetes mellitus type 2 | Glucose control (insulin, oral glucose-lowering agents) | 4 | 4 | 4 |
| MN of larynx and trachea, bronchus, lung  | Surgery with/without adjuvant treatment (a) | 4 | 4 | 4 |
| Unhealthy diet | Promote public awareness about diet | 4 | 4 | 4 |
| Physical Inactivity | Promote physical activity in mass media | 4 | 4 | 4 |
| Harmful alcohol use  | Enforce drink-driving laws (breath-testing) | 4 | 4 | 4 |
| MN of prostate  | Surgery with/without adjuvant treatment (c) | 17 | 17 | 17 |
| Atherosclerosis  |  Surgery (percutaneous transluminal coronary angioplasty - PTCA)  | 17 | 17 | 17 |
| Diabetes mellitus type 2 | Foot care (patient and provider education, foot examination, foot hygiene, appropriate footwear) | 17 | 17 | 17 |
| Suicide and intentional self-harm  | Education, promote individual, family, community connectedness | 17 | 17 | 17 |
| MN of the female breast  | Screening (self-examination, clinical breast examination, ultrasound, mammography) | 17 | 17 | 17 |
| MN of prostate  | Screening (Digital rectal exam (DRE), Prostate specific antigen test (PSA)) | 17 | 17 | 17 |
| Chronic obstructive pulmonary disease (COPD) - Stage 1-2 | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 17 | 17 | 17 |
| Tobacco use | Raise tax on tobacco | 17 | 17 | 17 |
| Tobacco use | Enforce bans on tobacco advertising | 17 | 17 | 17 |
| Harmful alcohol use  | Enforce bans on alcohol advertising | 17 | 17 | 17 |
| Angina pectoris (stable angina) | Surgery (Coronary artery bypass graft) | 27 | 27 | 27 |
| Tobacco use | Enforce clean indoor air law | 27 | 27 | 27 |
| Major depressive disorder | Older antidepressant drug medication (TCA) | 29 | 29 | 30 |
| Major depressive disorder | Newer antidepressant drug medication  | 29 | 29 | 30 |
| Major depressive disorder | Psychosocial treatment | 29 | 29 | 30 |
| MN of colon, rectum and anus  | Surgery with/without adjuvant treatment (a) | 29 | 29 | 30 |
| MN of the female breast  | Surgery (Lumpectomy, Mastectomy) with adjuvant treatment (b) | 29 | 29 | 30 |
| Acute Myocardial Infarction (AMI) | Medication (aspirin, atenolol, streptokinase, tissue plasminogen activator) | 29 | 29 | 30 |
| Atherosclerosis  | Medication (aspirin, atenolol, ACE inhibitors, Statins) | 29 | 29 | 30 |
| Alzheimer's disease & dementias (Stage 2) | Nursing home/hospital care | 29 | 29 | 30 |
| Acute Myocardial Infarction (AMI) | Surgery (Primary angioplasty, primary stenting, percutaneous transluminal coronary angioplasty (PTCA)) | 37 | 37 | 29 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Home oxygen therapy | 38 | 38 | 38 |
| Unhealthy diet | Provide health education in worksites | 38 | 38 | 38 |
| MN of prostate  | Monitor cancer (Watchful Waiting, Active Surveillance) | 40 | 40 | 40 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Surgery (Lung volume reduction, lung transplant) | 40 | 40 | 40 |
| Harmful alcohol use  | Raise tax on alcohol | 42 | 42 | 42 |

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**Table 15: Composite league table rankings for interventions targeting old age groups**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- | --- |
| **CLINICAL CONDITION** | **Intervention** | **Rank C/B** | **Rank C/V**  | **Rank Madrid** |
| Cerebrovascular disease (acute treatment) | Medication (Aspirin, Heparin, rt-PA) | 1 | 1 | 1 |
| Cerebrovascular disease (prevention of recurrence) | Medication (Aspirin, dipyridamole, carotid endarterectomy) | 1 | 1 | 1 |
| Harmful alcohol use  | Enforce drink-driving laws (breath-testing) | 1 | 1 | 1 |
| Atherosclerosis  |  Surgery (percutaneous transluminal coronary angioplasty - PTCA)  | 4 | 4 | 4 |
| Diabetes mellitus type 2 | Foot care (patient and provider education, foot examination, foot hygiene, appropriate footwear) | 4 | 4 | 4 |
| Unhealthy diet | Reduce salt intake | 4 | 4 | 4 |
| MN of colon, rectum and anus | Screening (Fecal occult blood testing (FOBT), Colonoscopy, Sigmoidoscopy) | 4 | 4 | 4 |
| Hypertension | Medication (ACE inhibitors, beta-blockers) | 4 | 4 | 4 |
| High blood cholesterol | Medication (Statins) | 4 | 4 | 4 |
| Angina pectoris (stable angina) | Medication (Atenolol, ACE inhibitors, Beta-Blockers) | 4 | 4 | 4 |
| Congestive Heart Failure (CHF) | Medication (ACE inhibitors, Beta-Blockers) | 4 | 4 | 4 |
| Chronic obstructive pulmonary disease (COPD) - Stage 1-2 | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 4 | 4 | 4 |
| Diabetes mellitus type 2 | Glucose control (insulin, oral glucose-lowering agents) | 4 | 4 | 4 |
| Physical Inactivity | Promote physical activity in mass media | 4 | 4 | 4 |
| Alzheimer's disease & dementias (Stage 1) | Comprehensive in-home care | 4 | 4 | 4 |
| MN of prostate  | Surgery with/without adjuvant treatment (c) | 16 | 16 | 16 |
| Atherosclerosis  | Medication (aspirin, atenolol, ACE inhibitors, Statins) | 16 | 16 | 16 |
| Angina pectoris (stable angina) | Surgery (Coronary artery bypass graft) | 16 | 16 | 16 |
| Diabetes mellitus type 2 | Education (patient self-management) | 16 | 16 | 16 |
| MN of the female breast  | Screening (self-examination, clinical breast examination, ultrasound, mammography) | 16 | 16 | 16 |
| MN of prostate  | Screening (Digital rectal exam (DRE), Prostate specific antigen test (PSA)) | 16 | 16 | 16 |
| Asthma control | Medication (inhaled ipratropium bromide, rapid-acting bronchodilators, inhaled corticosteroid) | 16 | 16 | 16 |
| Congestive Heart Failure (CHF) | Surgery (Coronary artery bypass graft) | 16 | 16 | 16 |
| Tobacco use | Enforce bans on tobacco advertising | 16 | 16 | 16 |
| Tobacco use | Enforce clean indoor air law | 16 | 16 | 16 |
| Unhealthy diet | Promote public awareness about diet | 16 | 16 | 16 |
| Angina pectoris (stable angina) | Angioplasty, Stenting | 27 | 27 | 28 |
| Harmful alcohol use  | Raise tax on alcohol | 27 | 27 | 28 |
| MN of larynx and trachea, bronchus, lung  | Surgery with/without adjuvant treatment (a) | 29 | 29 | 27 |
| Major depressive disorder | Older antidepressant drug medication (TCA) | 30 | 30 | 31 |
| Major depressive disorder | Newer antidepressant drug medication  | 30 | 30 | 31 |
| Major depressive disorder | Psychosocial treatment | 30 | 30 | 31 |
| MN of colon, rectum and anus  | Surgery with/without adjuvant treatment (a) | 30 | 30 | 31 |
| MN of the female breast  | Surgery (Lumpectomy, Mastectomy) with adjuvant treatment (b) | 30 | 30 | 31 |
| Acute Myocardial Infarction (AMI) | Medication (aspirin, atenolol, streptokinase, tissue plasminogen activator) | 30 | 30 | 31 |
| Acute Myocardial Infarction (AMI) | Surgery (Primary angioplasty, primary stenting, percutaneous transluminal coronary angioplasty (PTCA)) | 30 | 30 | 31 |
| Alzheimer's disease & dementias (Stage 2) | Nursing home/hospital care | 30 | 30 | 31 |
| Congestive Heart Failure (CHF) | Surgery (Heart transplant) | 38 | 38 | 39 |
| Tobacco use | Raise tax on tobacco | 38 | 38 | 39 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Home oxygen therapy | 40 | 40 | 30 |
| MN of prostate  | Monitor cancer (Watchful Waiting, Active Surveillance) | 41 | 41 | 41 |
| Chronic obstructive pulmonary disease (COPD) - Stage 3-4 | Surgery (Lung volume reduction, lung transplant) | 41 | 41 | 41 |
| Harmful alcohol use  | Enforce bans on alcohol advertising | 43 | 43 | 43 |

 |

# DISCUSSION

## Findings

This study highlighted the feasibility of Discrete Choice Experiments (DCEs) to formulate rational priority setting frameworks by accounting for efficiency, equity and other societal concerns in prioritisation processes. The results of the experiments present some notable remarks. Spanish policy makers and other stakeholders displayed their preferences towards equity and efficiency criteria. Overall, severity of disease, total number of beneficiaries and cost-effectiveness are considered as important criteria in the prioritisation of health interventions. These findings are in line with *a priori* expectations concerning the structure of the Spanish health system. That is, in the context of a high-income country with universal health coverage, criteria such as willingness to subsidise do not play an important role in decision making (Defechereux, et al. 2012).

Furthermore, efficiency attributes such as cost-effectiveness and individual benefits are associated with a higher probability of being chosen than any equity criterion, with the exception of severity of disease. The equity/efficiency ratios calculated indicate an overall preference of efficiency over equity criteria for the Spanish policy makers, except for interventions targeting the elderly. This is consistent with already existing patterns of decision making, which are based on the economic criterion of efficiency and target cost-containment policies. Even more, these preferences depict the current economic situation in Spain. That is, due to the financial crisis policy makers tend to prefer initiatives that are efficient in the short-term but not equitable or effective in the long-term.

However, these results should be interpreted with caution. The overall preference of efficiency over equity criteria does not necessarily imply that equity aspects are not taken into account. The National Plan on Research and Development (Plan Nacional 2008-2011) and the Quality Plan for the Spanish NHS (Quality Plan Report 2006-2010) identified the burden of disease as an extremely important determinant in health care priority setting. These strategies are in line with the WHO “2008-2013 Action Plan on the Global Strategy for Prevention and Control of Non-communicable Diseases”, which highlights the need for prevention and early treatment of mental illness and other NCDs (WHO, Action Plan 2008). Moreover, policy reforms in Spain (including reforms in mental policy) highlighted the need for improvements in the coordination of health services within the country in order to reduce health access discrepancies among the regions.

Finally, the most recent health reform focused not only on promoting efficient resource allocation but also on guaranteeing equal access to health services (ISSA 2013). Therefore, the outperformance of efficiency criteria does not indicate that equity aspects are neglected per se. It could also be attributed to the diversity in respondents’ characteristics, mostly regarding the region and the job type. In fact, the highest percentage of participants is represented by health managers and executives in the drug industry. Given the relatively high pharmaceutical expenditures in Spain and the consequences of the economic crisis, the need for efficient health care financing becomes apparent. Further, differences in the relative weights of equity/efficiency criteria among the regions imply that preferences depend on the performance of each regional health plan in Spain (Costa-Font, et al. 2011).

The CLTs results confirm earlier findings stating that mental disorders have scaled up in the Spanish policy agenda and are currently top ranked. In fact, the highest rankings contain interventions targeting severe mental disorders, i.e. major depressive disorders and suicides (or suicidal attempts). Such clinical conditions are highly correlated with 70% to 90% of those individuals that commit suicide, suffering mostly from affective disorders (Harris and Barraclough 1997) (Hawton and van Heeringen 2009). Furthermore, these findings are consistent with the growing consensus in Spain that economic crisis led to significant increases in mental disorders and suicides rates among the population aged under 65 (Gili, et al. 2012). Other non-communicable diseases (e.g. neoplasia, CVDs) are following, that have already been established as important contributors to the total burden of disease.

Moreover, these rankings confirm evidence-based outpatient treatment guidelines for major depressive disorders in prioritising antidepressants, psychotherapy or a combination of those (Davidson 2010). For instance, in Spain 90% of the price for antidepressant drugs is publicly funded (Cruz, et al. 2012). However, these results concern mostly interventions targeting young age populations. CLTs rankings for middle age groups indicate that interventions targeting cognitive disorders (e.g. dementia) are most highly prioritised, while depressive disorders and suicides show relatively low rankings. Within the elderly population, interventions addressing dementia and Alzheimer’s disease, although highly prioritised at the level of in-home care, are found close to the bottom of CLTs when specialised hospital care is considered.

Finally, interventions that fail to satisfy most efficiency criteria are found in the bottom of all CLTs. That is, preventive interventions targeting substance-related disorders, such as harmful alcohol use, are not considered important within any age category. These findings reflect the low priority that policy makers give to interventions that are not classified as severe within World Mental Health (WMH) surveys (Wang, et al. 2007). Even more, they raise concerns considering the increasing prevalence of such clinical conditions within the Spanish population and the efficiency of mental health policies.

### Comparisons with other countries

As discussed earlier, the set of criteria involved in this thesis was borrowed by past studies that employed similar analyses. A comparison of the CLTs constructed for Spain with those of other high-income countries, such as Norway and Austria, reveals some notable differences (Defechereux, et al. 2012) (Mentzakis, Paolucci and Rubicko 2012). Non-communicable diseases, including cancer, diabetes, and cardiovascular diseases constitute the major burden of disease in all countries. This is confirmed by the CLTs results that give relatively high rankings for interventions targeting those disease areas. However, as compared to Norway, Spanish and Austrian decision makers give the highest priority to interventions targeting conditions that affect young and middle-age populations rather than the elderly. This indicates that national policy makers in Spain focus on the working population in the interest of productivity and economic growth (Baltussen and Niessen 2006).

Furthermore, the rankings of interventions targeting mental disorders exhibit opposite results in Spain and Austria, as compared to Norway. Norwegian policy makers seem to be the least attracted in mental health, although strategies have been promoted to control disease areas such dementia. On the other hand, Spanish (and Austrian) stakeholders give the highest priority to depressive disorders, with results from Spain showing a great focus on suicides and intentional self-harm. These results possibly reflect concerns about the current economic situation and its significant effect on the productivity of the working population. However, in all countries neuropsychiatric as well as substance-related disorders are ranked at relatively low levels, reflecting a neglect of this disease area despite its increasing burden.

Overall, a trade-off between criteria takes place among decision makers of all three countries. These tradeoffs display a higher preference for efficiency over equity criteria, although the severity of disease significantly increases the probability of selection in Norway and Spain. As mentioned before, this is in line with current health policy objectives in Spain. The same stands for Norway, where the Patients Rights Act (2001) identifies the severity of the health condition as one of the most important factors in prioritisation processes. However, the Spanish case exhibits some significant heterogeneity concerning the trade-offs and interventions rankings calculated for each region. This results in diverse prioritisation processes within the Spanish health system. Therefore, as compared to other studies, this analysis highlights the impact of such factors in the formalization process of priority setting.

## Policy recommendations

During the last years, several austerity measures have been implemented in Spain, based on national stability programmes for controlling the fierce economic consequences of the financial crisis. European Commission revised these programmes and made some council recommendations on the actions that should be taken. These recommendations indicate, among others, that “Spain should take action toimprove theefficiency and quality of public expenditure at all levels of government and [….] increase the cost-effectivenessof the health-care sector, while maintaining accessibility for vulnerablegroups, for example by reducing hospital pharmaceutical spending, strengtheningcoordination across types of care and improving incentives for an efficient use ofresources” (EE Council Recommendation 2013, p. 7). To this end, the recent healthcare reform (RDL 16/2012) introduced a series of measures targeting the effective management of the health system.

Key factors of this reform include the fulfilment of universal free coverage for all citizens; the establishment of a fairer system by protecting the vulnerable, such as the unemployed population; the organization of an HTA Network in order to improve quality of health care; and the guarantee of the system’s sustainability, by balancing health budgets and introducing new cost-sharing schemes (Reforma Sanidad 2013). A comparison between these goals and the findings of the analysis confirms that the preferences of Spanish stakeholders agree (at least partly) with the official health policy initiatives. The overall preference on efficiency over equity criteria indicates that decision-makers focus on the search of policies that will improve general population health without exceeding the current budget constraints.

In fact, one of the main amendments of the new health plan introduced a new scheme of cost-sharing for pharmaceutical products. This measure was proposed by the Spanish government to protect the financial sustainability of the NHS (ISSA 2013). However, the level of publicly funded pharmaceutical products is now defined based on the income level, the age and the severity of illness for the insured. The participants in this experiment seem to take into account these criteria when they prioritise interventions. This is an expected result, given that most respondents are health managers and executives in the drug industry from Madrid, Catalonia, Valencia and the Basque country. These areas are considered to be four of the most active regions in terms of pharmaceutical policy.

The CLTs results show that the choices on health interventions are in accordance with European guidelines concerning the burden of disease. Even more, they confirm that decision-making in Spain is in line with current policy objectives. That is, there is a focus on young and middle-age populations which are the most affected by the crisis in terms of unemployment and financial instability. However, a neglect of specific disease areas as well as discrepancies in priority setting processes among the regions examined is being observed. Therefore, the results of this thesis could encourage the implementation of some policy recommendations, with a special focus on mental disorders.

 The reform and expansion of mental health systems in Spain coincided with the regional devolution of health responsibilities to the ACs. Evidence shows that this de-institutionalization process led to significant heterogeneity among the regional mental health plans (Salvador-Carulla, et al. 2010). The different times of policy implementation within the country and the lack of successful reform monitoring resulted in substantial inequalities for the financing and delivery of mental health services. This becomes apparent by the different relative weights that policy makers assigned to equity/efficiency criteria among the regions. Therefore, the study suggests that the objective of the recent reform regarding equal access to health services is not completely satisfied yet. Further improvements in the coordination of mental health plans across the country could possibly result in a more efficient system.

The discrepancies in mental health access and financing can be explained by several facts. The reorganization of the Spanish health system suggested a move towards community-based health care services. However, community mental health services are still developing in many ACs, which leads to inequalities in mental health access (Costa-Font, et al. 2009). Further, it leads to a greater reliance on drug treatments, which is extremely relevant given the already high pharmaceutical expenditure. Mental health is mostly publicly financed, with mental health expenditures being relatively low and varying significantly within the regions.

 However, psychiatric care is one of the most neglected mental health areas and psychotherapy is covered only for a short-period of time. Access to psychiatric care is provided through a general practitioner’s referral, with the coordination between primary and mental health varying between the communities (Bobes, et al. 2012). These phenomena lead to an overuse of primary care services and an imbalance between need and provision of specialised care. Therefore, although psychiatric treatment interventions are highly ranked in the CLTs calculations, further improvements in mental health access are needed. That is, addressing problems with unmet mental health need becomes essential, particularly in the current context of constrained resources. That way, both efficiency and equity improvements could be established.

Last but not least, the CLTs rankings highlight that Spanish stakeholders give relatively low priority to interventions targeting significant disease areas and risk factors. The European Pact for Mental Health and Well-being, as proposed by the European Commission, identified five top-priority areas in mental health policy. Spain, as a member state of the European Union included these objectives in its Mental Health Strategy Plan within 2009-2013 (Mental Health Strategy Plan 2009-2013). The priority areas include: Mental health among the young population and in educational systems; Prevention of depressive disorders and suicide; Mental health within the working environment; Mental health of the elderly; and prevention of stigma eradication and social exclusion.

As can be noticed in the CLTs, the objectives of mental health among the young and prevention of depression and suicides are already taken into account by Spanish stakeholders. However, the relatively low rankings of interventions targeting patients with Alzheimer and dementia diseases indicate that the need for appropriate long-term care is still underestimated. That is, patients with long-term severe mental disorders do not receive appropriate hospital or nursing care (Caldas de Almeida and Killaspy 2011). This is extremely relevant for the elderly population, given the growing life expectancy rates. Therefore, this study highlights the necessity for further strategies targeting mental health for the elderly and improvement of long-term health care in Spain.

Finally, as mentioned earlier, stigma and social discrimination of mentally ill individuals and their families is considered as a potential cost of mental disorders for the societies. Despite the overall improvements in mental health care financing and delivery, these barriers still remain. Evidence shows that in 2006, 30%-40% of the Spanish population reported that mental health affected their participation in social activities, with this feature still being lower than the EU average (Costa-Font, et al. 2011). Nevertheless, this does not necessarily imply that prevalence of mental disorders has decreased. It could also be attributed to underestimation of mental illness burden due to stigma or other related factors (Tackling neglect). As it has been argued, Spain is within the countries with the lowest consultation rates among the population without a diagnosed mental problem (Alonso, et al. 2007). Therefore, although mental disorders exhibit the highest rankings, it could be suggested that prevention efforts should be encouraged within the Spanish health system.

Overall, these findings indicate that despite the recent policy reforms in Spain, several challenges have to be addressed. Spain is an example of a country that encountered several institutional and economic changes within a relatively short time frame. Therefore, the modernization of its health policies had occurred in relatively recent times. Concerning mental disorders, this analysis highlights the need for better integration of mental health services within the general community-based framework. Even more, it indicates the importance of an effective coordination among the regional health plans in order to reduce potential geographical disparities. This becomes even more relevant in times of economic crisis, when substantial health and economic consequences are being observed. Last but not least, the development of more comprehensive evidence on the burden of severe mental disorders becomes urgent. That is, evidence informed mental health policies should be followed in Spain, in order to reach the European standards.

## Limitations of the study

This explorative study confirms that there are measureable differences in policy makers’ preferences among equity and efficiency criteria. The applied DCE approach indicates that using multiple criteria allows for rational insights into priority-setting processes. That is, DCEs guide policy makers to take into account the implications of potential trade-offs between several concerns on decision making (Baltussen, Stolk, et al. 2006). However, this approach exhibits some substantial limitations.

First, the experimental design of the DCE raises some concerns regarding the accountability of the results. As discussed earlier, decisions on health interventions are multifaceted in that several socio-economic factors have to be taken into account. However, in order to reduce the task complexity for the respondents the number of criteria included should be finite and preferably small. The choice of the relevant and appropriate criteria for this experiment has been challenging. Finally, the study focused only on a set of generic efficiency and equity attributes, possibly ignoring other determinants that influence decision-making in real-life settings.

Secondly, most attributes were defined only at two levels, possibly limiting the scope of respondents’ preferences for specific interventions. Further, this set of attributes has been borrowed from previous studies and therefore, it might not reflect specific social and economic standards formulated in the Spanish context (Defechereux, et al. 2012). Even more, no deliberative process has taken place within Spanish advisory panels. As discussed earlier, this has possibly led to the exclusion of important but non-quantifiable criteria (Jehu-Appiah, et al. 2008). Finally, a main effects only experimental design has been used, resulting in the exclusion of potential interaction effects between the criteria which could significantly affect responses. Future studies should therefore focus on the feasibility of more elaborate experimental designs, without leading to informational overload for the participants.

Moreover, several methodological concerns are raised regarding the empirical analysis of the DCE results. The conditional logit model used in this experiment simplifies the estimation procedure. However, it poses significant constraints on the relationships between the criteria. The IIA assumption indicates that the preferences of respondents for a health intervention are not affected by the characteristics of any other intervention examined. This assumption might be restrictive when human behaviour is being described. Therefore, the validity of policy decisions can be challenged. In this analysis, the efficiency of the conditional logit model has been established when compared with the advanced mixed logit model. However, further research should be implemented in order to develop more advanced but also realistic econometric models. Future studies should focus on the use of alternative models that relax these types of assumptions (De Bekker-Grob, Ryan and Gerard 2012).

Finally, the population sample used in this analysis yells concerns regarding the validity and generalizability of the results. This survey did not target the general or patient population of Spain. It was addressed to specific policy makers, research associates and health managers in the pharmaceutical industry, based on the assumption that those individuals represent (at least partially) the preferences of the total population. However, this could lead to biased CLTs results and eventually to misguidance in health allocation decisions. In the future, relative weights of both policy makers and the public should be taken into account, in order to incorporate more comprehensive preferences in the sample (Baltussen, Stolk, et al. 2006).

Even more, the DCE application is based on stated preferences elicitation. This process, although convenient, is based on heuristics and hypothetical frameworks. Therefore, the preferences elicited do not necessarily depict prioritisation decisions in real-life setting. Further research should be implemented on the combination of stated and revealed preferences methods in future applications of DCEs (Kjaer 2005). Finally, the results from this application are comparable with other high-income countries but not directly generalizable to the settings of developing countries. This is due to differences in the relevance of these criteria in other priority settings; the relative priority that policy makers in other countries attach to those criteria; and the characteristics of the interventions examined.

Overall, MCDA offers further insights in priority setting of health interventions, by incorporating a wider range of relevant criteria. However, it has been argued that a potential disadvantage of this analysis is that important information is ignored, since the performance of the criteria is assessed on the basis of a single outcome, i.e. the probability of selection (Baeten, et al. 2010). Given that the levels of criteria used in this thesis are similar for all interventions examined, the respondents could have faced difficulties in formulating their preferences.

# CONCLUDING REMARKS

Decisions on the choice of health interventions and resource allocation can be complex and affected by multiple factors. Multi-criteria decision analysis (MCDA) allows for a more transparent prioritisation process and may be a valuable tool to evaluate health system efforts in terms of equity and efficiency. A DCE has been applied in Spain using general priority criteria with equity/efficiency characteristics. While the findings of this thesis should be considered as explorative in nature, they provide further insights concerning the underlying equity/efficiency trade-offs in health care decision processes. Such applications establish a shift towards evidence-based approaches in the prioritisation of health interventions. Therefore, they could lead to better informed and transparent decisions in health care priority setting.

Based on the empirical results, this thesis focuses on mental disorders. Worldwide, mental health is considered to be an important determinant of individuals’ well-being. However mental disorders have been one of the most neglected policy areas. Several studies initiated by WHO and other relevant organizations, indicated that the economic and disease burden of mental illness has sharply increased during the last decades. Based on these results, many European countries established mental health strategies towards improvements in mental health care financing and delivery. Nonetheless, significant increases in the prevalence of mental disorders, accompanied by financial constraints due to the global economic crisis, impose further challenges for policy makers.

Spain is an example of a country that has undergone significant economic and institutional transitions within the last decades. The establishment of the Spanish NHS and the devolution of health responsibilities to the 17 autonomous communities had ambiguous results. There has been a shift towards comprehensive, community-based health care provision, which reassured treatment for all the individuals in need. However, geographical disparities in health care access and funding are being observed, resulting in health inequalities within the country. This phenomenon is exacerbated by the recent economic downturn in Spain, which had several health and economic consequences.

Despite the establishment of effective mental health strategies in Spain, mental health care is still considered underfunded, while inequalities in mental health care access are growing. It therefore becomes apparent that further reforms are needed, targeting the improvement of mental health services. In other words, further initiatives are required, in order to improve the overall efficiency of the Spanish health system, as well as to correct for health inequalities. To this end, guidelines to policy makers concerning rational prioritisation processes can deem extremely useful.

The findings of this analysis confirmed current policy strategies within the Spanish health system and illuminated potential policy recommendations, based on European and local standards. To conclude, this thesis demonstrated the feasibility of DCE approaches to account for several criteria relevant to policy making and inform prioritisation processes among health interventions. Despite its potential drawbacks, the utilization of MCDA in guiding rational priority setting exhibits growing acceptance within the field of health economics. Future studies could suggest improvements in the experimental design and the statistical analysis of the model examined. Still, the establishment of DCEs as a rational priority setting method is a big step towards alternative approaches in policy making worldwide.

APPENDIX A**- Example of pair comparison scenario in the questionnaire**

|  |
| --- |
| Example scenario |
| If these were your only options, which would you choose? Check one of the options below:  |
|  | **Alternative A** | **Alternative B** |
| Severity of disease  | SevereHealth expectancy < 2 years without intervention | Not severeHealth expectancy > 2 years without intervention |
| Number of potential beneficiaries | Many ( > 100 000) | Few ( < 100 000) |
| Age of target group | Middle age (15-59 years) | Old age (60 years and older) |
| Individual health benefits | Large ( > 5 healthy years) | Few ( < 5 healthy years) |
| Willingness to subsidise | More than 70% of total health expenditure | Less than 70% of total health expenditure |
| Cost-effectiveness | Cost-effective (Cost/DALY< GDP/capita) | Not cost-effective (Cost/DALY > GDP/capita)  |
| YOUR CHOICE: Tick a box |  |  |

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1. The base alternative has a higher predicted probability compared to an alternative whose efficiency attributes are set to their mean and all equity criteria are set to one. [↑](#footnote-ref-1)