

A Comparative Analysis of Capitation

*How to link payments to value in the Healthcare
Capitation formula and Risk adjustments: Variation in
practice across seven European Countries*

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ABSTRACT

BACKGROUND: Rice and Smith in 2001 wrote that “capitation is without doubt here to stay. There is a remarkable degree of unanimity that – whatever the structure of the health care system – a policy of cost containment and devolved responsibility for health care entails the need to set prospective budgets on the basis of capitations. The question is therefore not whether to set capitations, but how to do so”. Since then, a series of strategies have been undertaken by the governments of the seven European countries analyzed in this thesis, in order to align the elements of the formula with equity and efficiency objectives.

OBJECTIVE: To describe and examine the capitation formula and its elements, with a special focus on the allocation of resources regarding hospital care services, of seven high-income and publicly financed health care systems: Italy, Spain, Denmark, Norway, England, Scotland and Wales. The analysis serves as basis for the evaluation of the capitation methods as satisfying equitable objectives or failing in the achievement of them.

METHODS: Core components of each formula are described after a preliminary description of the health system and the funding structure of each country taken into consideration. The resources allocations refer to the most recent policies and to the most updated information available on the capitation structures of the seven jurisdictions. Similarities and differences are discussed.

RESULTS: The comparison led to the detection of significant analogies in the factors used to guide need and cost adjustments. Nevertheless, there is a considerable variation in the interpretation and implementation of those factors.

CONCLUSION: Although a generally similar framework among the countries, there are distinct differences in the structure of the formulas across the health systems considered. The development of capitation formulas is a dynamic and complex process, subject to the availability of data reflecting health needs, the influence of socio-political elements and to the factors intrinsically dependent on the health care system organization.

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Abbreviations and acronyms

NHS	National Health System (UK)
GP	General Practitioners
SMR	Standardized Mortality Ratio
ACRA	Allocation of Resources to English Areas
DFLE	disability-free life expectancy
HCHS	Hospital and Community Health Service (UK)
MFF	Market Forces Factor (UK)
EACA	Emergency Ambulance Cost Adjustment (UK)
CCGs	Clinical Commissioning Groups (UK)
DCLG	Department of Communities and Local Government (UK)
PCTs	Primary Care Trusts (UK)
LEA	Essential Levels of Healthcare (Italy)
NHP	National Health Pact (NHP)
PA	Autonomous Provinces (Italy)
ASL	Local Health Authorities (Italy)
AO	Public Hospital Authorities (Italy)
FSN	National Health Fund
CAs	Comunidades Autonomas (Spain)
EAP	Primary Care Responsibility Group (Spain)
SNS	Spanish National Health System
RHA	Regional Health Authority (Norway)
NOKC	Norwegian Knowledge Centre for the Health Services
POBO	Health and Social Services (Norway)
SAK	Norwegian Registration Authority for Health Personnel
HELFO	Norwegian Health Economic Administration
ISD	Information Services Division (Scotland)
MLC	Morbidity and Life Circumstances
MYEs	Mid-Year Population Estimates (Scotland)

1. INTRODUCTION

In the complex economic landscape, health has usually been a special good that economists generally classify as merit goods, or goods that society believes should be guaranteed to every citizen, regardless of whether there is the individual's willingness to pay to buy them. The attribution of the meritorious nature of the health service can, in fact, better than any other, justify public interventions in the healthcare sector, in particular by the State, which have a key responsibility to establish and guarantee the amount of public health. In this context, is particularly important the degree of consistency between the levels of health protection that the public authorities undertake to provide within the context of a single country, and the use of particular allocative rules, as these are related to the own equalization character of the financing.

A health system can be analyzed from a *financial* point of view and its ability to cover financially the costs associated with the diseases, taking into account the demand; but also from its ability to provide an adequate amount of health services to the population. This thesis focuses on the financial aspects and specifically on the allocative rules used to deliver the health services. Briefly, the thesis answer the question of what services are delivered to the population and how the financial resources are allocated based on which priority setting (the reasons behind are mainly of political concern).

The resources allocation mechanisms of seven European countries are analyzed throughout the dissertation; the countries are the following: Italy, Spain, Norway, Denmark, and United Kingdom with England, Scotland and Wales. The countries described can be all defined as public health systems; a commonly accepted classification mostly based on historical traditions of social systems leads the distinctions among the European healthcare systems based on the adopted funding criteria and models consolidated throughout the years. This classification refers to two different configurations; the health systems originally based on a decentralized structure and a social insurance model with a private orientation, named after the Chancellor Otto von Bismarck who was the originator of the universal health insurance in Germany in 1883. Examples of countries which are considered following a Bismarck health system are: The Netherlands, Germany and USA. While United Kingdom, Italy or the Scandinavian countries follow a system which had originally a highly centralized structure and with a public orientation, whose prototype is the universalistic welfare state model conceived in 1943 by Lord Beveridge.

The countries under the consideration of this thesis would, hence, be following the Beveridge-style health care model.

The countries which follow the Bismarck model systems are out of the scope of this thesis. The analysis of the private healthcare systems with respect to the capitation formula adopted is omitted for several reasons; one of those is the scarcity of time and availability of sources and consistent information in English. The linguistic problem has affected most of the research work and the revision of the research objectives.

Scope of the thesis is the comparison of the different capitation formulas and risk adjustments' systems used in healthcare across Europe with the objective of describing similarities and differences among the chosen countries, therefore the language, but above all, the absence of English official documents and data was a deterrent.

1.1 The public system: Beveridge and Capitation

In the Beveridge model, the healthcare systems are primarily financed through tax revenues, which guarantee the functioning of the health service by providing all the services. In this model, the taxation forms are heterogeneous and they can be both direct and indirect, at different levels: national or local. All kinds of taxes have many different implications on equity and efficiency (Evans, 2002). Kutzin (2001) stated that within tax-financed systems, risk-adjusted capitation method, based on the needs of population, and were developed to ensure equity of access by ensuring a fair allocation of resources to territorial health authorities. Kutzin (2001) also specified that regardless of the source of funds, the underlying rationale for allocating based on risk-adjusted capitation is the same: to ensure that each pool¹ has the “correct” relative level of resources for the population for which it is responsible.

Resource scarcity leads to choices; the problem of compatibility between needs and resources is solved through the price. In the public healthcare sector, however, the price is not accepted as a tool for balancing due to fairness reasons. Furthermore, the problem of making the health needs of the population compatible with the amount of resources collected through taxation² is predominant. One of the methods used to solve this problem is the use of waiting lists.

¹ Insurance fund or territorial health authority

² For public health systems

While rationing is a measure of economic policy which refers to the allocation process. The term “rationing” may be considered a limiting term compared to the complexity of the objectives to pursue; it is a matter of choices and priorities that all the public health systems must face.

Not many countries have started on this path and, above all, have achieved concrete results. However, in countries like England, Norway, Italy, they are addressing these issues more explicitly than in the past and they are making more transparent choices. The reasons that prompted the governments of these countries to deal with the problem of how to reconcile the health needs with the availability of resources are, on the one hand, the concern for the uncontrolled growth of health care spending, and on the other, the reforms undertaken in recent years that require to define by law the guaranteed health services.

1.2 Outline - how capitation models are developed, implemented and used

There are substantial differences in the health systems of countries with a consolidated economy, but also a common conceptual aspect seems to exist, which is the transfer of responsibility of planning of the health services to a health plan, related to either a geographical dimension (Italy, England, Sweden), an insurance pool (United States) or to a sickness fund (German, Netherlands) (Rice & Smith, 2001). The plan has the objective of defending the guiding principles, the “demand and supply” profile, the organization, purposes, contents, and the temporal dimension of the activities to be provided by the health services. To this comprehensive set, an economic value is associated, which should allow control and consistency between economic resources and the response to the health needs of a population.

The process of deciding a capitation model starts with the parliament deciding on the goals of the health care sector, like equal access; and possibly a financing structure (e.g., no copayments, tax based etc.). Then the Ministry of health develops a model. Typically, a capitation model is developed if equality goals are important. In this process operationalization of equality must be done (similar for need, etc.)

A capitation quota is the amount of funds allocated to a person with certain characteristics (age, sex, health, socio-economic conditions, geography...) used to cover the costs associated with a specific healthcare service, for the period chosen, with the constraint of the total budget allocated to this sector. The most significant effort that has to be made in the calculation of the

single capitation quota is, therefore, the adjustment of the share for the specific risk of the individual i.e. risks adjustment.

An additional element that has to be pointed out before any comment on the allocative model, concerns the ethical principles that should guide the distribution of resources to finance health activities. In fact, the key element that governs the health systems with a universalistic vocation, the majority of European countries, is the principle of equity³. This principle, to be fully applicable, needs to be defined precisely, since only in this way it is possible to identify factors that influence its achievement. In other words, the principle of distributive justice has been the main reference point in health systems, and it requires that the benefits, on the one hand, and the economic burden on the other hand, has to be distributed in a morally relevant and shared way. An explicit and common definition of these elements would make the allocation decisions relatively simple. However, in practice the equitable distribution of resources is extremely complex because there is no full agreement on what elements should enter the allocative process, how they should be translated into operational terms, how to combine them with each other, and finally, how to manage the transition processes caused by the different allocation decisions.

In case of geographically organized health systems, like for example Italy or England, ensuring equal resources for equivalent needs⁴, means giving the same level of funds to “health areas” characterized by similar profiles of healthcare needs. In general, the principle of equity regarding access to services has been used to allocate financial resources to the health sector, assuming that the other types of equity (use of services, quality of services) were not achievable through the instrument of capitation.

The purpose of allocative formulas used to distribute the available resources to the different geographical areas, is to assign similar resources for equivalent needs (*horizontal equity*)⁵ and more resources to higher needs (*vertical equity*)⁶ (Rice & Smith, 2001). It is important to point out that the allocative models for the definition of capitation cannot in any way intervene in the formulation of the overall quota to finance the healthcare of a country, and can only be marginally used to manage the transition phase from a level of funding to another. The different

³ The concepts disclosed in this paragraph will be discussed in Chapter 3.

⁴ The concepts disclosed in this paragraph will be discussed in Chapter 3.

⁵ Discussed in chapter 3

⁶ Discussed in chapter 3

regions would have difficulties to sustain significant changes in the historical funding in either adapting to a contractions of the available resources in a too short time (in terms of composition, structure, technologies, human resources and organization), or in excess of resources, especially in the case of low-programmed capacity areas, with the risk of an improper use of the additional resources.

The models used for the calculation of the weighted capitation quota changed over time (from a simple structure of proportional models of the expenditure modular indicators, towards two-stage statistical models). It also changed the elementary statistical reference unit (vast geographical areas like for example the Italian regions as it will be described later on in the thesis, micro-areas, individuals), and the indicators used to represent the variables that are thought to influence healthcare spending.

As stated before, in the selection process of the criteria for individual capitation adjustments, it is necessary to take into account the ethical principles considered binding in the social context, and the effects on the system eventually generated by the errors in the determination of this quota. It is necessary to remove the economic, social, geographical, cultural barriers and those related to the health status of the individual. The mechanisms to build the capitation quota should not contain elements that could discourage an efficient use of financial resource. The construction of the model and the results of its application should also be evaluated in terms of operational practicability, providing an explicit and shared transition system towards the financial arrangements proposed by the chosen model.

The countries mentioned in this thesis, in recent years, has got to deal with the implementation of the reforms of the health systems, developing different interventions strategies on the basis of real needs; but the issue linked to the reorganization of healthcare budget and the consequent instruments prepared by the different governments depends incontrovertibly on the setting of the central system for the mobilization, procurement and allocation of resources.

Every country, therefore, as was mentioned at the beginning, follows its own model, which is determined by historical, political, economic and social factors. The level of diffusion of the sickness funds, the diversity in the principles of contribution, demographic trends, the characteristics of the labor market, the nature of the income received and its distribution mechanisms, and the role of trade unions assume a fundamental significance and are considered as a necessary element for the development of a system, representing the historical and

economical dimension. Likewise, the multiple transformations, the behavior of voters, the level of responsibility attributed to the manager, the degree of intervention of the finance and/ or treasury ministries and expenditure control, all depend on political and social factors.

Without neglecting the impact of the proliferation of supplementary private insurance schemes on the economic equilibrium and the social solidarity levels of the different structures, the current European configuration features models with forms of decentralization led to local authorities both in the funding system as in the provision (Scandinavian countries). One of the issues raised by the changes that the health systems have undergone in the last twenty years, resolves around the understanding of the needs inherent to the reform process.

Looking closer, the causes of the last two decades, that have led the European governments to a substantial revision of the health systems, can be divided into exogenous and endogenous. Among the exogenous there is undoubtedly an ageing population and the population growth which together with a greater awareness of the right to health and a related increase in life expectancy at birth in the industrialized countries, have pushed, on the one hand, the population to a higher demand for hospital services, and on the other, the systems to increase the supply with a consequent increase in costs incurred for the maintenance of the healthcare organization. Among the endogenous factors, the most common ones are: the emergence of new diseases, technological progress, which has contributed to multiply the chances of recovery from disease, but at the same time, has increased the operational and administrative costs.

The health reforms, considered as an overall structural redesign of the system, aim to improve the regulation, so as to obtain, from the actors who administer the operations, a proper utilization of the funds granted to them in order to deliver the health services. In practice, the adjustment of the application methods can be located on three levels. Firstly, it is unrealistic to think that the functioning of the health sector settles spontaneously around a predetermined funding system. Secondly, the method of resources allocation from the central level to the peripheral level can reveal a diversity of budget not completely justified. Finally, the coordination between users, payers, and providers can generate some kind of waste, advantageous positions or agreements that may be symptomatic of an incorrect use of resources. For example, hospital policies, on which comes to depend more than half of the delivery of health service, concentrate the greatest commitment of policy makers. It can be said that, while a number of changes in the use of hospitals were generated by deliberate policy initiatives,

many others were not explicitly planned but have evolved where the culture and the policy framework has allowed it.

The effort on which the European countries have concentrated, has led to a combination of market mechanisms and planning, working on both the supply side and demand side, confirming that changes are rarely possible only through maneuvers on the funding system. The change in fact, should also cover the management of the facilities that provide the services, as well as the attitude of potential users of the system. A health system that delivers high quality services effectively and efficiently is not only dependent on political decisions of central governments, which decide the arrangements for the allocations of resources, but also on the degree of participation and responsibility (accountability) of the operators who use those resources.

1.3 Data and Methodology

Data for this study is collected through the various health departments of each country analyzed; for example, the Italian Ministry of Health regularly publishes very detailed tables with the allocations of resources to deliver to the sector (being Italian myself made the research for Italy a lot easier).

For United Kingdom (England, Scotland and Wales), official Reports on the Capitation Formula and its specificities are available to the public. Furthermore, the English experience is widely used in literature as benchmark for the public health systems that are planning to reform the capitation formula.

Comparative analysis of the most recent literature about weighted capitation formulas employed by the seven governments and the implications in terms of equity for the population has been extensively conducted.

1.4 Thesis Structure

The introduction indicates the general objective of the thesis which is the description of allocative rules adopted by Italy, Spain, Norway, Denmark, and United Kingdom with England, Scotland and Wales. Chapter two describes the HC system organization of those countries, which also includes the healthcare funding structure; chapter three is about the theory behind *capitation* as financing method, the definition of *need* and how to measure it according to current literature and the methodological problems associated with that, and equity implications

from a theoretical point of view. Chapter four is the core chapter from a technical point of view because it discusses the distribution of costs and benefits across the population, the resources allocation procedures and hence the services delivered criteria through the weighted capitation formula (when it applies) and their shares compared to the total health expenditure in the different countries. The thesis concludes with two additional chapters: discussion and conclusion.

2. BACKGROUND - The healthcare structure, organization and funding system of seven countries

The health systems in the European Union, are managed in many different ways. This chapter describes the seven health systems mentioned above in order to define the structures, the subjects and the principal competences, the delivery methods of health services, the funding mechanisms and the main expenditures. In many cases the reference documents have been the *Health Systems in Transition (HiT)* series of Reports realized by the European Observatory on Health Systems and Policies, which are updated on a regular basis⁷.

It is important to make a brief digression in this paragraph in order to specify some important definitions for the content of the next sub-chapters.

In relation to the role of the local and regional subjects, five main types of health systems can be distinguished in Europe. The first type or *decentralized systems*, includes the actual regional health systems i.e. those systems in which the responsibilities of regulation, functioning and co-financing are delegated to the regional governments (for example Italy and Spain) or to the states (e.g. Austria). Type two refers to those health systems where some executives and planning functions, other than co-financing, are given to local and regional authorities; also in this model local and regional authorities manage the health facilities. Type 2 refers to the *semi-decentralized systems*. Type three refers to those systems whose operating functions executives) are carried out by local and regional authorities, also because the regions own the health facilities. Type three includes two unusual situations: The Netherlands and United Kingdom. In the Netherlands, the hospital governance is centralized, but the local and regional authorities have planning and operating functions; they also participate with a limited financial contribution through the sub-national budget. Since in the Netherlands, the “operating” function of the local authorities is evident, their health system has been classified as *operationally decentralized system*. In the United Kingdom, each of its four constitutive nations (England, Scotland, Wales and Northern Ireland) has its own “national health system”, managed at the level of every singular nation and so fitting type three, even if within each nation a *centralized but structured at territorial level system* applies. Types four and five are characterized by *centralized health systems* (type five) or *centralized, but structured at territorial level* (type four). In type four, the majority of competences are given to the central government, although

⁷ latest HiT reports of each Country provided by the European Observatory have been used for this Thesis

the implementation occurs at territorial level through agencies and authorities which represent the central administration; furthermore, the local and regional authorities of type four can also manage the healthcare facilities (European Union, 2012).

2.1 Italy

The Italian health system is a highly decentralized system, in which the responsibilities are transferred to the regions. It provides an almost universal coverage, mainly free at the point of service. The health expenditure is financed through public funds, through taxation levied by the State and the Regions. It provides mixed services, both public and private. (Ferre`, et al., 2014)

The National Health System consists of three levels: national, regional and local. At national level, the health ministry has the responsibility to grant the right to health to every citizen⁸. The ministry of health guarantees equity, quality and efficiency of the National Health Service and it also promotes actions of improvement, innovation and change. The central government has the task to establish the core benefit package (*Livelli Essenziali di Assistenza- LEA*), which are the services that the health system has to deliver to every citizen free of charge or with a payment of a fee⁹. Moreover, it allocates regions the resources for the healthcare among the regions as established by National the Health Pact between the government, the regions, and the two autonomous provinces of Trento and Bolzano. The health pact 2014-2016 provides an initial contribution¹⁰ from the State of € 109.928,00 to distribute and allocate among the regions and the autonomous provinces (PA) for 2014.

The nineteen regions and the two PA have the responsibility of governance and organization of all the activities intended to guarantee the distribution of the health services. The regional level has functions of legislation, administration, planning, financing, and monitoring. The executive functions are established by the regional health plans, lasting three years. The regions also have the responsibility to assign resources to the local health authorities (ASL) and to the public hospital authorities (AO), the definition of accreditation parameters of the public and private healthcare facilities, the election of the general directors of the ASLs and public hospitals, the definition of the regulatory framework for the functioning of the ASLs and public hospitals and the scheduling of the technical and management approaches for the service provision. Since the

⁸ Art. 32 of the Italian Constitution

⁹ This fee (cost sharing) in Italian is called "ticket" and there are more than 5700 types of services for prevention, care, and rehabilitation.

¹⁰ Details are provided in chapter 4

regions are free to elaborate their own health policy, their engagement in the direct management of health services considerably varies. For example the hospital beds, managed directly at regional level, can oscillate from 60% to 1%.. (Ferre`, et al., 2014).

Since October 2009, the distribution of services at local level is organized through e network of 184 local health authorities. These ASLs are public entities with an entrepreneurial autonomy regarding the organization, administration, accounting and management. The services are delivered through public and private accredited structures. The public structures include the hospitals directly managed by the ASL i.e. the AOs which are independent structures, generally with regional or interregional users, autonomously managed and with a buying power, among them research hospitals are included (Ferre`, et al., 2014).

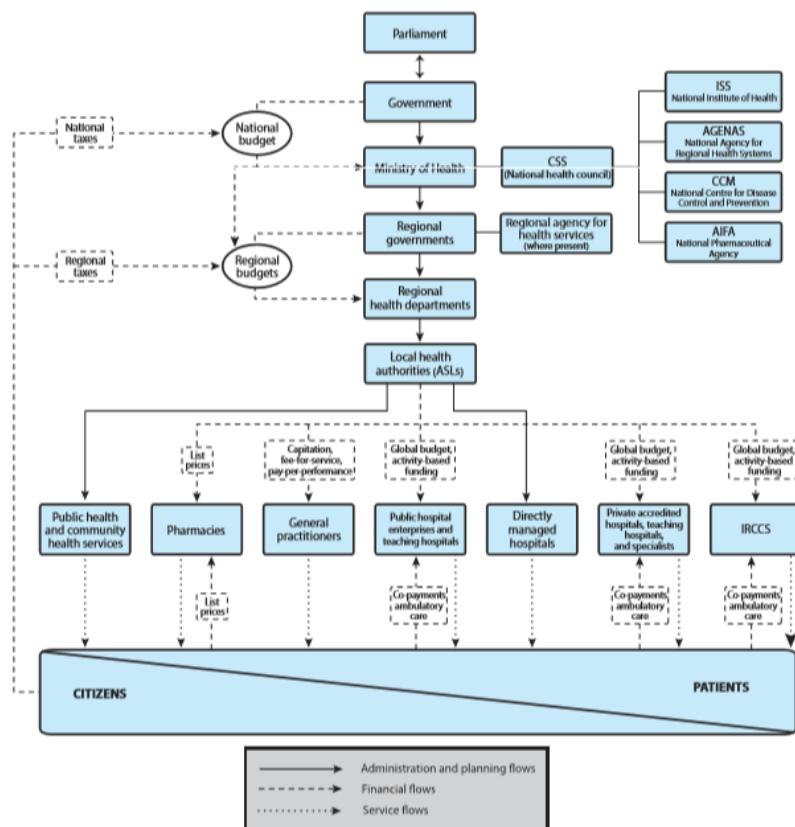


Figure 1. Overview of the Italian health-care system (Source: *European Observatory on Health Systems and Policies, WHO, 2014*)

Healthcare is mainly financed through taxation applied to regional and national levels, and with specific destination. The direct taxes include: 1) IRAP, a regional tax on companies collected at national level, but the vast majority (90%) paid back to the regions where it is applied and

2) a “supplementary IRPEF”, which is a regional tax collected, besides the national one, on the physical persons. The indirect taxes include a VAT percentage and taxes on gasoline. Furthermore, the ASLs receive the revenues from the purchase of OTC¹¹ pharmaceuticals and from the fee paid by the patients on pharmaceuticals, diagnostic procedures and specialist medical examinations (Ferre`, et al., 2014).

The public financing represents 70% of the total public health expenditure while the private one is 11%. Direct payments (out of pocket) and cost sharing cover the remaining part (about 19 %). Voluntary insurance does not carry out a significant role in financing terms (Ferre`, et al., 2014).

2.2 Spain

The Spanish health system is highly decentralized; the regions (seventeen autonomous communities) play an important role in this matter. It provides a universal coverage, mostly free of charge at the point of service. The healthcare expenditure is financed through public funds coming from general taxation, including regional taxes. It provides mixed services, mainly public and, to a lesser extent, private (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

Since 2002, the healthcare responsibilities have been transferred to the 17 autonomous communities (*Comunidades Autonomas- CAs*). The National Health and Social Policies Ministry is responsible for system financing, supervises the pharmaceutical sector, and guarantees an adequate functioning of the system, issues the basic legislation of health and social care, defines the minimum benefit package and the quality criteria, monitors, and guarantees the general coordination. The coordination body is the inter-territorial board of the national health system, controlled by the national minister and composed of 17 regional health ministers. The council can uniquely formulate recommendations (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

The responsibilities for policies, regulations, planning and organization of the regional health systems are given to the regional health ministries (*Consejeria de Salud*). In the core benefit package, defined at national level, the regional health ministries can define suitable packages for the regional needs; they also decide the scheme of the health areas and the basic health

¹¹ Over the Counter

zones. The regional health service (*Servicio Regional de Salud*) delivers the services, generally through two organizations, one for primary care and another one for secondary care, even if they are going through different integrated regional structures that provides both types of care. The regional health service can also buy health services from third parties, awarding contracts to not public providers through several “law formulas” and conventions. The responsibility of operational planning, management of service network and the coordination of healthcare is given to the regional health service. The local entities have been always involved in the healthcare management; their participation is organized through local councils, which have monitoring and consultation functions. Moreover, the hospital participation committees, where, among the others, sit the representatives of the municipalities and local consumers’ associations, allow to contribute to the hospital management. However, in general, the role of the local authorities is limited, although some large municipalities may even have resources to achieve important initiatives in the health sector. Regions, generally, run almost 90% of the resources allocated to healthcare; a small percentage (over 1%) is also managed directly by the municipalities, while the rest is spent at the central level (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

About 95% of the population is covered by the social insurance scheme, which enables people to use the public health system; furthermore, there are three specific schemes for public employees: finally, private voluntary schemes are also envisaged, which are increasingly spreading and that cover on average, among the various regions, 13% of the population. The voluntary insurance system provides access to services with long waiting times in the public system, or to those which are not part of the benefits package, as for example dental care for adults (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

The service provision is organized within a regional structured framework, based on a system of areas and health zones (“map” of healthcare) that often do not correspond to the administrative delimitation. Each health area (161 in 2010) covers a territory with a population of 200.000/250.000 inhabitants and includes several basic health zones, which are the smallest units of the organizational structure for the primary care delivery. Basic care is provided through a public network of health centers. In the rural areas, with a low population density, local medical services are running. In each health area, with a user’s ‘group that can vary between 5.000 and 25.000 inhabitants, there is a responsibility group for primary care (*Equipos*

de atencion primaria- EAP) which performs a filter function (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

To benefit from the secondary care, a prescription issued by a GP is necessary, except for services of emergency care, managed through operation centers 24 hours per day, or through the corresponding hospitals departments. Specialist care is provided in specialized centers (Centros de Especialidades) and in hospitals, as inpatient and outpatient care. Each health area has at least a general hospital. In 2008, hospitals were 804, and 40% of them belonged to the public health system, and the others were private. The hospital management is under responsibility of the CAs or it is granted through other agreements, such as public/private partnerships (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

In Catalonia, the purchaser of health services is the regional health service¹², through the Catalan hospital network of public usage¹³. This network includes public and private provider, such as municipal associations and union groups, public companies, private foundations etc. These providers represent entities with a membership base (Entitas de Base Asociativa –EBA) which are groups of primary care professionals, set up as companies with an independent legal status which manage the basic health zones under contracts concluded with the regional health services, becoming in practice the benchmark group for primary care (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

There is no specific budget for healthcare; regions cover the healthcare spending through their regional budgets that, in turn, are determined by financing mechanisms of regional governments through central government. On average, public healthcare accounts for 30% of the total budget of the region (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

The public health expenditure quota is 71%; the private financing of the total health expenditure corresponds to 28.8% (2007), and concerns, almost entirely, direct payments of the users for pharmaceuticals (participation share of 40%) (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

Public health spending is almost entirely financed (94%) through general tax revenues. Tax revenues are entirely or partially assigned to the regions; the regions have a direct control over

¹² CatSalud

¹³ Xarsa Hospitalaria di Utilizacio Publica- XHUP)

taxation on donations and on transfer of properties. Furthermore, they receive 35% of income taxes on physical persons and of VAT, and 40% tax on the consumptions of products like hydrocarbons, tobacco, alcoholic beverages and electricity (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

The regional ministries assign research funds, in the majority of cases to the regional health service, which is the main provider, with whom the annual global budgets are negotiated. The regional service negotiates, in turn, annual global contracts with primary care providers, specialist care and hospital care. The contacts can also be concluded with private providers, and the regional health service can act as a buyer instead of supplier (Garcia-Armesto, Abadia-Taira, Duran , Hernandez- Quevedo , & Bernal-Delgado, 2010).

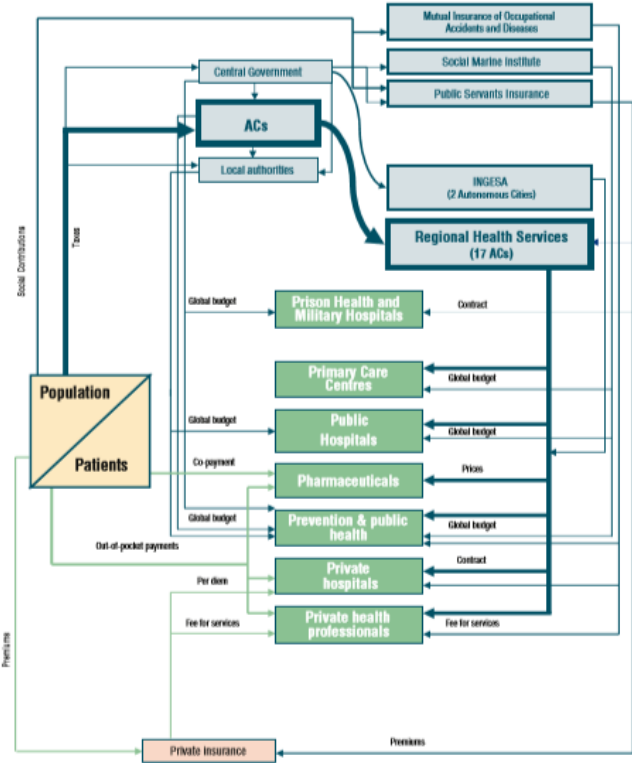


Figure 2. Financial flow across the SNS (Source: *European Observatory on Health Systems and Policies, WHO, 2010*)

2.3 Denmark

“The health system is decentralized. The regional and local entities (municipalities) play a significant role; the second ones in financial terms too. It provides a universal coverage, mostly

free of charge at the point of service. The healthcare expenditure is financed through public funds coming from national and local taxation. It delivers services, mostly public” (Olejaz, et al., 2012).

“At central level, the Ministry of Health and Prevention is competent for policy and legislation in the health sector. It also defines the national guidelines for the delivery of health services, it controls and promotes the exchange of experience and information and manages the economic incentives and the payments of the activities” (Olejaz, et al., 2012).

The hospitals management and the primary care provision belong to the 5 regions¹⁴, with the possibility to deliver the services in function of the needs of the regional structures, but always within a general framework set by the central government. “The 98 municipalities have several competencies in the healthcare field: public health, the provision of primary care at local level, nursing care at home, prevention and rehabilitation. The municipalities have also a financing responsibility and for the majority of the social services, including care for the elderly people” (Olejaz, et al., 2012).

“The GPs act as a filter for the specialist care, and hence in order to use the hospital or specialist care a prescription is needed, but not for the emergency room. Specialist care is delivered through hospitals, mainly managed by the regions. The hospitals with highly specialized units can be used by patients of other regions, based on inter-regional agreements, with the objective of allowing everybody to use the specialist hospital care. The regions can also suggest to the patients to go abroad and sustain the expenses. If the waiting times exceed one month, the patients have the right to go for a private hospital or to go abroad. The private hospitals, especially the specialist ones, are used through the public system, based on conventions with the regions” (Olejaz, et al., 2012).

¹⁴ A process of re(centralization) changed the number of regions from 14 to 5 and municipalities from 275 to 98

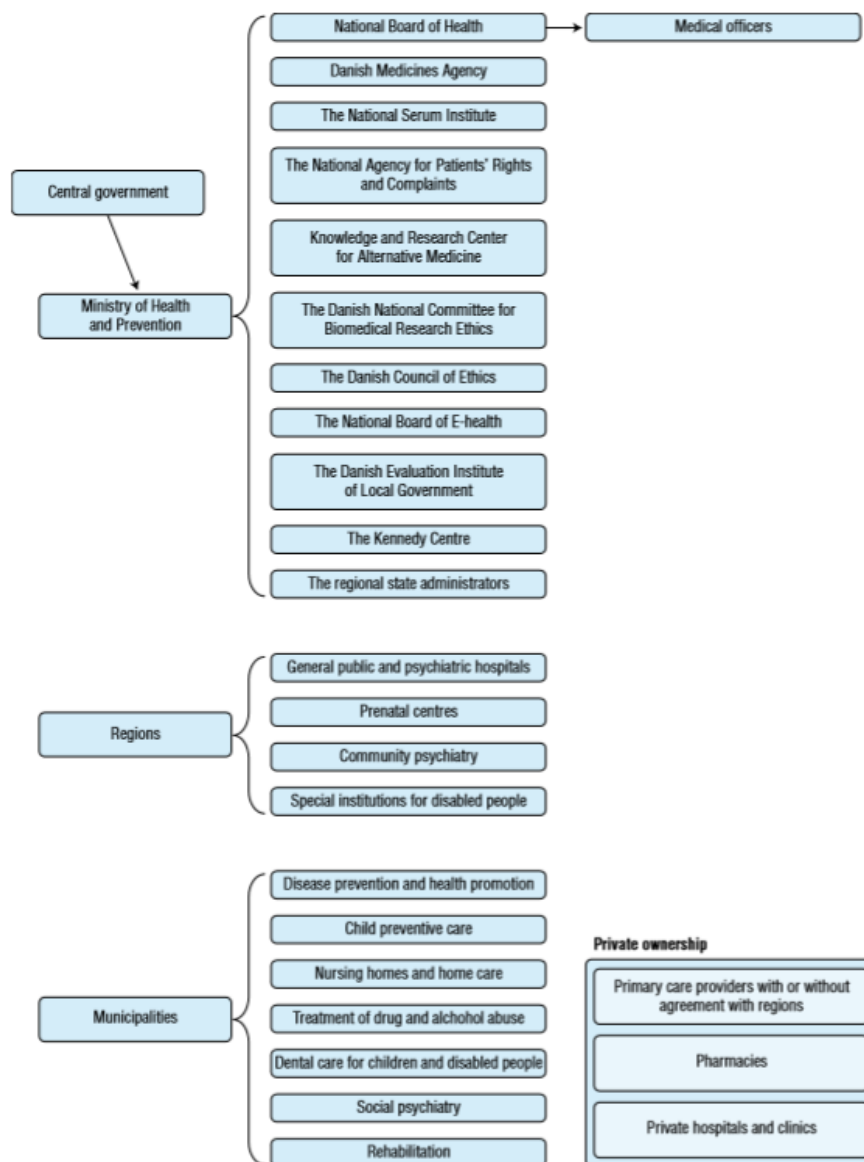


Figure 3. Overview of the Danish health-care system (Source: *European Observatory on Health Systems and Policies, WHO, 2012*)

“The public health services are financed through a tax for healthcare with a rate of 8% on taxable income. At regional level, the funds coming from the central government are completed by resources received locally. The majority of funds come from a national global subsidy (77% of the total); the central government contributes with a national subsidy for the activities (3% of the total) intended to incentivize the activities within the hospitals. The remaining 20% of the total healthcare financing is collected at local level through a basic contribution (8%) and a contribution for activities (12%). The basic contribution is a lump sum payment for every citizen and determined by the region; the contribution for activity depends on the degree of

usage of the regional health services by the citizens, and hence connected to the hospitals and ambulatories of general medicine. The 50% of this contribution is redistributed from the regions to the hospitals” (Olejaz, et al., 2012).

“The public health expenditure represents the 84% of the total health expenditure; the difference represents the private expenditure, as direct payments for pharmaceuticals and dental care” (Olejaz, et al., 2012).

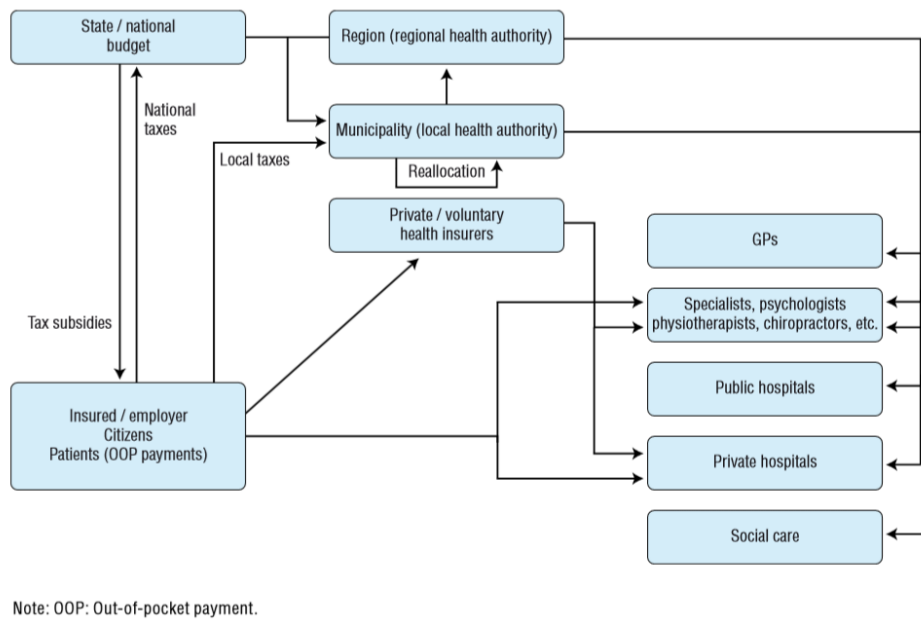


Figure 4. Financial flow in the Danish health care system (Source: *European Observatory on Health Systems and Policies, WHO, 2012*)

2.4 Norway

“The Norwegian health care system is semi-decentralized. Since 2002, the Government has the responsibility for specialist care (administered by four Regional Health Authorities), while the municipalities are responsible for primary care and they are quite free in organizing health services; dental care is provided by the counties” (Ringard, Sagan, Saunes, & Lindahl, 2013).

“The Ministry of Health regulates and supervises the system, but many subordinate agencies actually perform these tasks like the Directorate of Health and the Norwegian Medicines Agency (NoMA). Fifteen Compulsory National registers of health data exist since 2012, and

about 200 other medical registries. The National Board of Health Supervision provides overall supervision and monitoring of health services” (Ringard, Sagan, Saunes, & Lindahl, 2013).

“Over the past few years, in order to address social health inequalities, inter-sectoral cooperation across government has played an important role. The improvement of resource allocation (priority setting, health technology assessment), has become increasingly important, as well as quality issues and patient safety” (Ringard, Sagan, Saunes, & Lindahl, 2013).

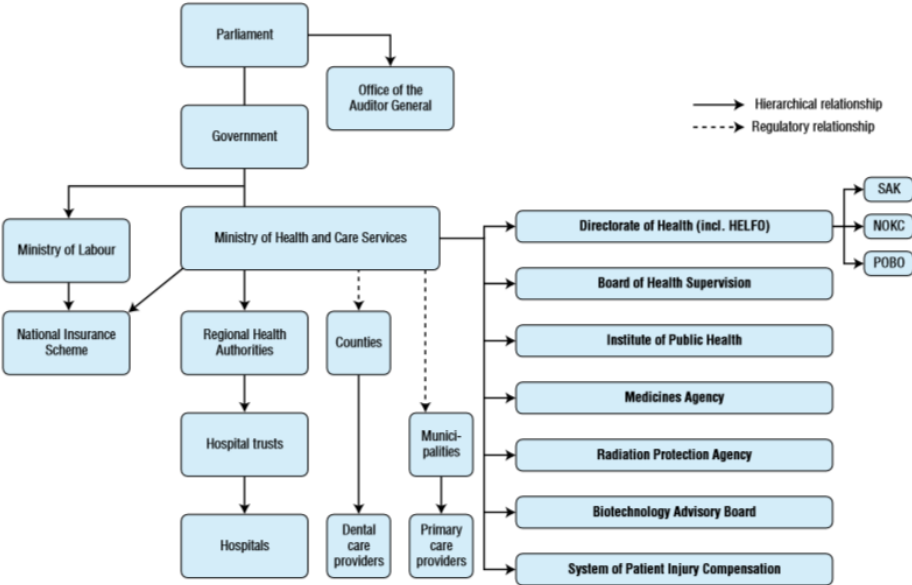


Figure 5. Overview of the health system (Source: *European Observatory on Health Systems and Policies, WHO, 2013*)

“Public funds account for over 85% of the total health expenditure, mostly from the central and local governments, as well as from the National Insurance Scheme (NIS), this last one accounts for about 12% of the total health expenditure. The majority of the privately financed health expenditure comes from out- of- pocket payments (for pharmaceuticals and dental care). Voluntary health insurance does not play a significant role but its adoption among the population is increasing” (Ringard, Sagan, Saunes, & Lindahl, 2013)

“Primary care is financed through municipal taxes, block grants from the central government, and earmarked grants for specific purposes. The majority of specialist care is financed through block grants (60%), plus partly through activity based financing from the central government to the RHAs (40%), with the latter component based on Diagnosis Related Groups” (Ringard, Sagan, Saunes, & Lindahl, 2013).

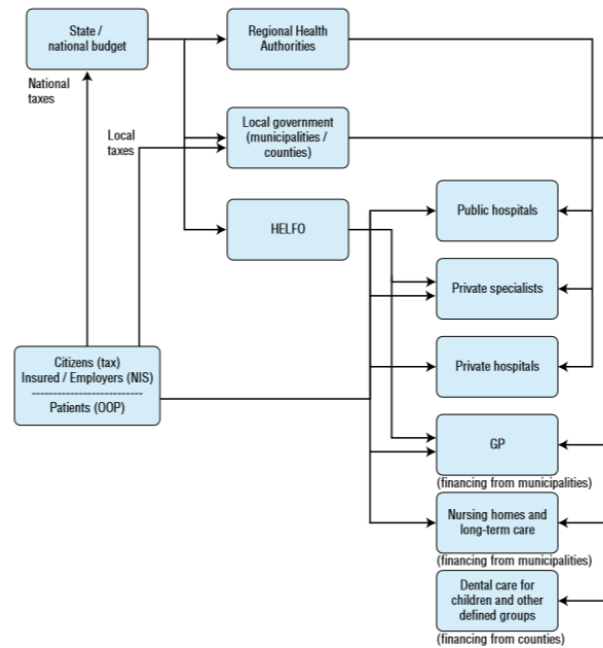


Figure 6. Main financial flows in the Norwegian health-care system (Source: *European Observatory on Health Systems and Policies, WHO, 2013*)

2.5 England

“The United Kingdom is characterized by a decentralized health system, depending on the different entities that constitute the Country, but centralized within each of them and organized and managed on a local base; in England, the local authorities (Councils) contribute to the provision and financing of social care. It provides coverage largely free at the point of service the regular residents. The health expenditure is mostly financed through public funds coming from general taxation and from the contribution for the national insurance. It delivers services mainly public” (Boyle, 2011).

“Each of the four entities that constitute the United Kingdom¹⁵ has its own National Health Service, publicly funded. As the English NHS covers 84% of the united kingdom`s population and because of the reference position it occupies in the capitation literature, a special attention has been paid to the description of such system” (Boyle, 2011).

“The overall responsibility for the public healthcare is entrusted to the Health Secretariat, which is accountable in front of the UK Parliament. The Department of Health, headed by its minister and a permanent secretary, is responsible for the policy and regulation in the health sector and

¹⁵ Northern Ireland is not analyzed in this Thesis

for the implementation of the central budget; it operates at regional level through ten health strategic authorities. Locally, there is a separation between buyers and the service delivery; health services are purchased from 151 organizations of primary care, mainly primary care units (Primary Care Trust- PCT), each one with catchment area of about 340.000 inhabitants. The primary care units can also provide some direct health services. GPs also contribute to the purchase of services, commissioned through the ambulatory” (Boyle, 2011).

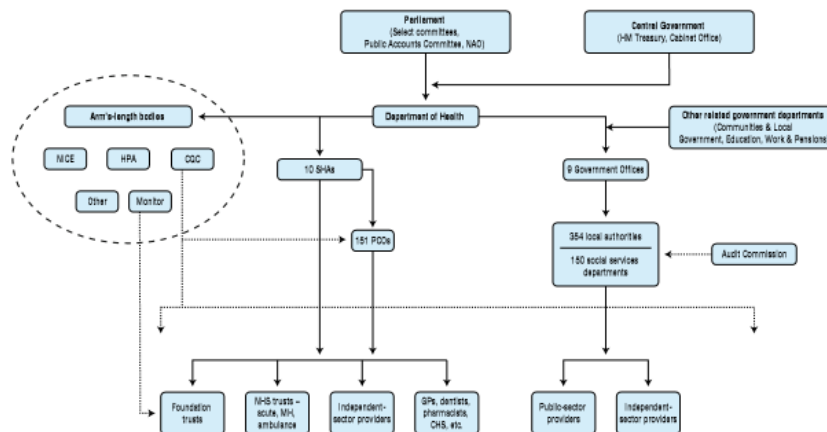


Figure 7. Overview of the health care system in England 2010 (Source: *European Observatory on Health Systems and Policies, WHO, 2011*)

“Primary care is provided by independent GPs and their ambulatories, as well as other facilities like community health services, NHS clinics, etc. The primary care system performs a filter function toward secondary care, which is provide by employed professionals, public hospitals (NHS *trust*) and *foundation trust*. These last ones are an example of devolution if responsibilities from the central level for the hospital *governance* and management; they are managed by local executives, their staff and local community members. The provision of services in the private sector is limited. The more specialized tertiary care is provided by the NHS *trust*. Almost all the emergency services are provided by public services within the NHS and financed through public funds; 11 *trust* of NHS ambulances for the provision of ambulance service” (Boyle, 2011).

“The local authorities (Councils) are responsible for social care. In this case, social care is, by law, a responsibility of the 152 councils, responsible for adults’ social services (*Councils with Adult Social Services Responsibilities – CASSR*). It is financed through public funds (budgets

of the local authorities, funded through local taxes and taxes on companies) and private funds (generally direct contributions or from private insurance). Direct payments constitute another type of support, provided by the local authorities to the citizens to meet their health need; based on the needs assessment, the local authorities allocate individual budgets which are used by the beneficiaries to buy the necessary services. The local authorities are also consulted by the primary care units to determine the local priorities and, in particular, they participate to the elaboration of local agreements that establish the priorities for action and the objectives in the health sector. After the law on local government and public participation to public health of 2007, local participation networks have been created in 2008; these networks allow the participation of the citizens to the provision and control of the social healthcare services: they are financially and organizational sustained by the local authorities, although the funds come from the central level” (Boyle, 2011).

“The services are mainly financed through public funds, primarily from general taxation (income tax, VAT, corporation tax and excise duties) and national insurance contributions (such as compulsory contributions paid by employers and employees on gross income). Private expenditure is composed of private health insurance, contributions paid by the patients or cost sharing for those services not provided or not completely covered by the NHS, and direct payments for the services provided by private providers. The funds come from the central government and from the health department, which transfers 80% of the NHS budget to the primary care units. The primary care units are responsible for buying primary services, but they can also include private providers and from the voluntary work sector. In 2008, more than 82% of the health expenditure was financed through public funds” (Boyle, 2011).

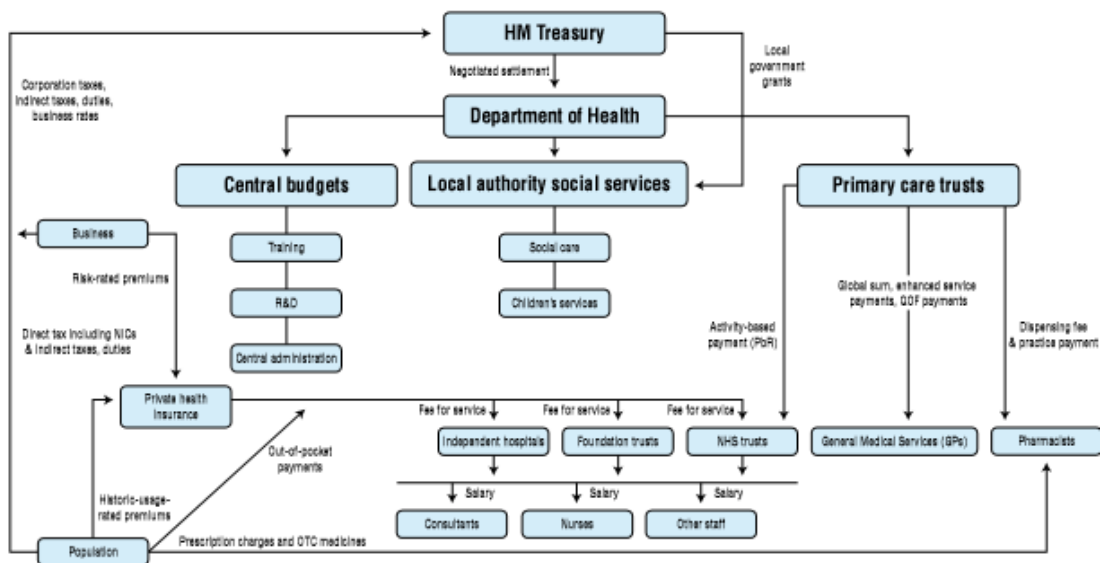


Figure 8. Financial flow in the English health care system (Source: *European Observatory on Health Systems and Policies, WHO, 2010*)

2.6 Scotland

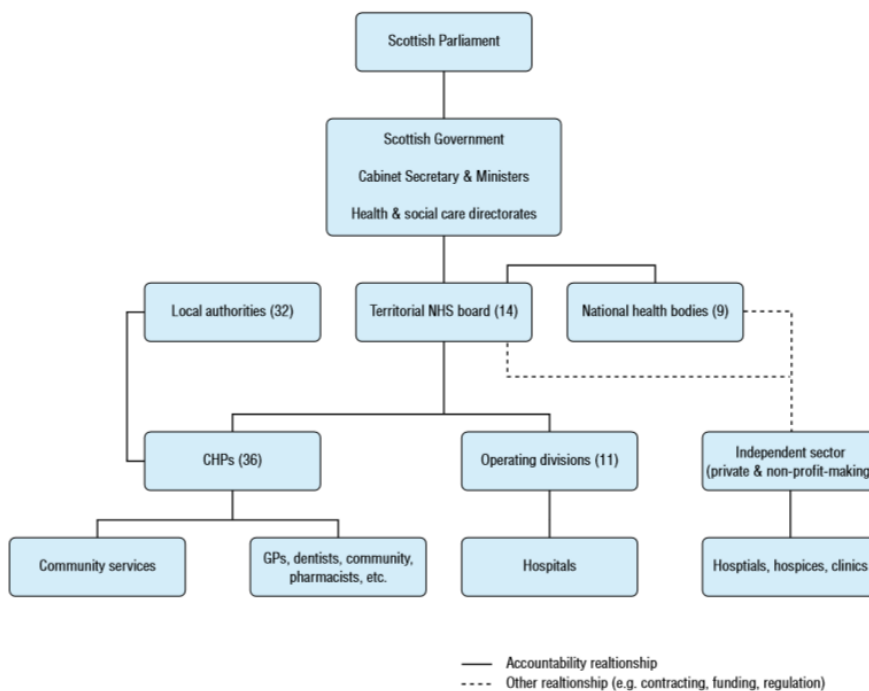


Figure 9. Overview of the health system in Scotland (Source: *European Observatory on Health Systems and Policies, WHO, 2012*)

“The Scottish Health Government is responsible for the Scottish NHS and for the development and implementation of health and social care policies. Primary and secondary care services are planned through 14 regional councils. The *Local Delivery Plans* are established by the government and the regional Councils; they are three years’ delivery contracts, which contain a number of objectives to accomplish, the improvement of health, improvement of efficiency and governance, access to services and appropriate care for the citizens, indicated as HEAT objectives (*Health Improvement, Efficiency and Governance Improvements, Access to Services, Treatment Appropriate to Individuals*). The Councils have legal duties concerning the coordination and participation of the public” (Steel & Cylus, 2012).

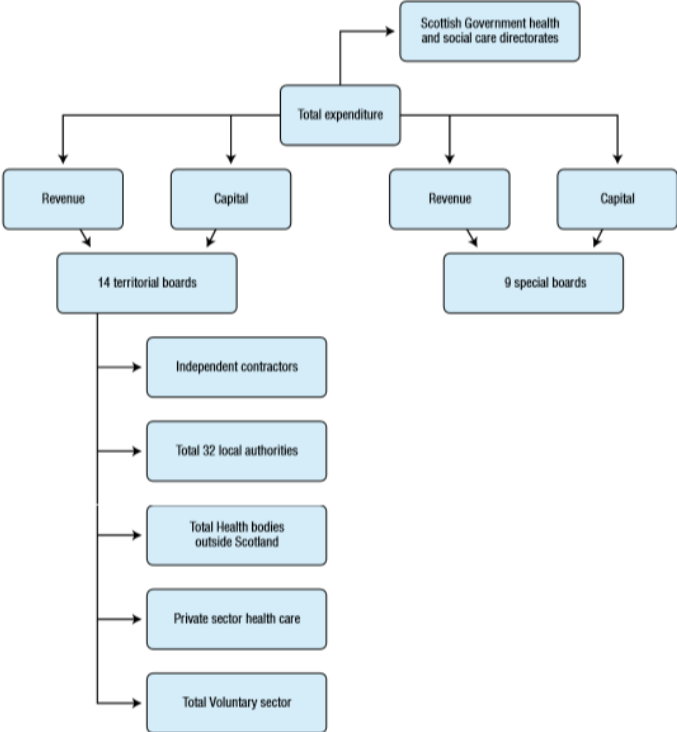


Figure 10. NHS financial flows (Source: *European Observatory on Health Systems and Policies, WHO, 2012*)

2.7 Wales

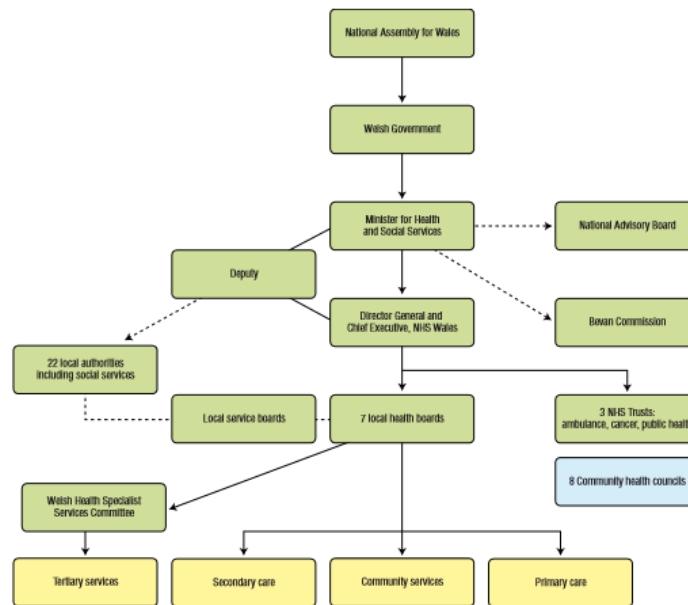


Figure 11. Overview of the Welsh health system (Source: *European Observatory on Health Systems and Policies, WHO, 2012*)

“The *Welsh Assembly Government* is responsible for the NHS. The Health and Social Services department gives advices to the government on strategies, policies, regulations and financing issues in the healthcare sector. At the end of 2009 the NHS has been restructured in order to include 7 local health authorities (*Local Health Board- LHB*) and 3 *trust* (the *Welsh Ambulance Services Trust* for emergency services, the *Velindre NHS Trust* for oncological services, and the *Public Health Wales*). The local health councils plan, organize, and deliver health services locally. Primary health care is provided by GPs and other health professionals; secondary and tertiary care is provided by the hospitals. Community care services are generally provided in collaboration with local social services” (Longley , Riley, Davies, & Hernandez-Quevedo).

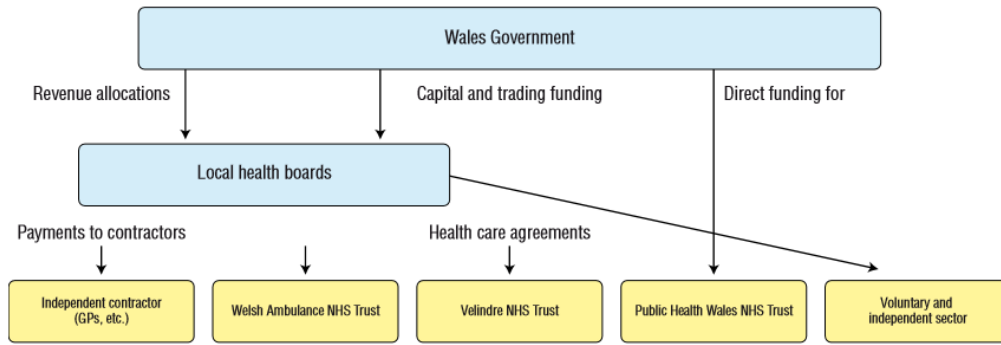


Figure 12. How funds flow to the NHS organizations (Source: *European Observatory on Health Systems and Policies, WHO, 2012*)

3. THEORY

Equity

The elements that differentiate the health systems from the other social systems and from the markets of common consumer goods and services can be identified in the equity, vertical and horizontal, and in the responsiveness of individuals. Equity is, together with the efficiency, keeping in mind what has been happening during the last decade in Europe, the most important health policy objective that the countries have tried to pursue.

The essential treatments are often unpredictable and the mechanisms for sharing the risks and the financial coverage represent then, a crucial argument that governments hardly solve, given the progressive growth of healthcare spending. For that reason, in recent years, the need to avoid the risk of healthcare rationing has emerged. Public intervention, whether is intended as a contribution of public authority in the exercise of fundamental human rights, whether it is directed to the correction of market failures, or even conducted in the name of social cohesion, can be considered legitimated only if it is able to use instruments which are appropriate to the objectives pursued and whose costs are always under control.

Access to health care and quality in a reasonable time must be guaranteed regardless of individual risk or means, without allowing discriminating factors of a financial or congenital nature may exclude the population from a health insurance system, which is based on the principle of solidarity.

Capitation

Rice and Smith (2001) define capitation as «the contribution to a plan's budget associated with a plan member for the service in question for a given period of time» and in public health care system, frequently, explicit equity objectives underlie health care capitation (Rice & Smith, 2001). Among those objectives, Rice and Smith (2001) mention the Italian case with its aim «to overcome territorial inequalities in social and health conditions» and the English one «to secure equal opportunity of access to those at equal risk». However the efficiency argument behind the capitation systems because of their intention to secure control of expenditures cannot be avoided (Rice & Smith, 2001). According to Magnussen (2010) «there is tradeoff between equity and efficiency» but also an important distinction within equity. The distinction is between horizontal and vertical equity. Magnussen (2010) defines horizontal equity «as a

distribution of resources that makes the benefit of each individual in terms of health equal at the margin [...], such a resource allocation would be efficient in the sense that it would maximize health at any given level of resources». The «resource allocations aiming at vertical equity generally do not maximize health and, in that sense, are not efficient» as described by Magnussen (2010) because «an individual with a lower capacity to benefit from health services nevertheless would have a higher priority if he/she had an initially lower level of health».

Inequalities

Hauck et al. (2002) identified inequalities lead by the capitation method, and these might happen under three situations which are: variations in technical efficiency, variations in access to care, and variations in personal health production.

Variation in technical efficiency refer to the quality of the services delivered and the result might be a less efficient services to less healthy populations for a number of different reasons like, as Huck et al. (2002) wrote: “expenditure may not be allocated optimally across an individual’s lifetime, health care staff may be less motivated to secure good outcomes or may communicate poorly with less healthy individuals, recruitment of staff may be more difficult or capital configurations less appropriate in areas where the less healthy live etc.”

Variations in access to care might regard disadvantaged socio-economic groups, elderly people, or who lives in remote areas (Huck , Shaw, & Smith, 2002). The recognition of unmet needs and the inclusion of adjustments in the capitation formula does not guarantee that the funds are directly to the population that experience unmet needs (Huck , Shaw, & Smith, 2002).

Variations in personal health production happen because of the differences among the individuals, which are outside the control of the health services (Huck , Shaw, & Smith, 2002), and as Hauck et al. wrote “this last one poses the most fundamental challenge to capitation policy, as addressing it implies a desire to move away from a policy of equality of access (horizontal equity) towards one of targeting health care at particular classes of individual (vertical equity)”.

Therefore, when setting capitations it is necessary to decide either to pursue horizontal or vertical equity (Magnussen, 2010) but also considering the inequalities arising from that decision. Then, which factors are legitimate determinants of need (Magnussen, 2010) and how to weight the different types of services (Magnussen, 2010) have to be considered as well.

Need

The hard process of judging what constitutes “need” in this context has been considered primarily subjective (Rice & Smith, 2001) and the use of “needs factor” as basis for risk adjustment has become a statistical significance evaluation (Magnussen, 2010). The unmet need issue is relevant while evaluating the determinants of health care utilization (Magnussen, 2010). Magnussen (2010) distinguishes between “general and specific unmet need”. When the services provided are considered inadequate to meet the population expected standards, that is the case of a general unmet need (Magnussen, 2010) while this happens to particular groups within the population, that is specific unmet need (Magnussen, 2010). On the other hand, unjustified utilization¹⁶, might also occur (Magnussen, 2010). Hauck et al. (2002) specified that “even if capitation payments can be corrected to account for unmet need, there remains a performance management problem of ensuring that the increased funds associated with unmet need are indeed directed towards the currently underserved population”

In deciding on the criteria to be implemented to set the capitation, defining what is a legitimate and illegitimate determinant of need is important but might be considered a political concern, not only statistical (Magnussen, 2010). A legitimate need is what is considered statistically relevant factor, while illegitimate (non-need) might be all the other irrelevant factors¹⁷ that the literature define as supply factor (Magnussen, 2010).

Methodological problems

Methodological difficulties need also to be included in the discussion. These difficulties are, according to Rice & Smith (2001), the individual-level data problem and the ecological fallacy. Specifically, individual-level data might be necessary in setting capitation methods but many systems only have aggregate data (Rice & Smith, 2001). The solutions adopted by the health systems is either to use more aggregate data or the *index approach*, which is the combination of aggregate measures of the characteristics of a plan’s population, to create an index that seeks to indicate the aggregate spending needs of that population (Rice & Smith, 2001). Nevertheless, using aggregate data also presents problems and one of these is the ecological fallacy i.e. “the possibility of identifying a relationship between a putative needs factor and health care

¹⁶ For example supplier-induced demand or excessive use of services by some groups of the population (Magnussen, 2010)

¹⁷ “such as variations in the efficiency levels, accounting methods, or policy choices of individual plans” (Magnussen, 2010)

expenditure at the aggregate level that does not hold at the individual level” as termed by Rice & Smith (2001).

Now that all the major elements in setting capitation model have been presented, the following section will describe the actual allocation mechanisms currently used by the seven countries, object of the thesis.

4. DISTRIBUTION OF NHS RESOURCES AMONG THE COUNTRIES - Capitation quota and risk adjustments

The adoption of allocative models based on a correct capitation generally aims to distribute the resources on the basis of needs that characterize the different reference populations. The differences that distinguish the various allocation methods concern the way in which the health needs of a populations are assessed, the data used to define/ estimate these needs and the characteristics (statistical/mathematical) of the proposed model, including the fact of using the individual or a geographical division as elementary reference unit.

Rice & Smith (2001) wrote that “capitation is here to stay. There is a remarkable degree of agreement that – whatever the structure of the health care system – a policy of cost containment and devolved responsibility for health care requires setting prospective budgets on the basis of capitation payments”. They also pointed out that “the question is not *whether* to set capitations, but *how* to do so”.

The capitation quota described in the thesis focuses on hospital care when possible.

4.1 Italy

The Italian capitation system, at first glance, seems absolutely comparable to the English one¹⁸, and this is not surprising since the two systems have many similarities. But with a further study significant differences among them emerge (Spadonaro, Mennini, & Atella, 2004), that will be discussed later or in the paragraph.

The Italian health care system is financed through a national fund- FSN, dedicated and redefined every year by the Parliament with the Finance Act. Once that the total value of the Fund has been established, it is then allocated to every region. The general mechanism of the allocation is called in Italian “quota capitaria peseta” (weighted capitation quota) and is constituted of a set of rules applied to the population of the regions: the amount of resident population is the guiding principle (i.e. higher resources for more residents), but that value, for each LEA, is weighted based on the agreements existing between the regions. The result is a “weighted” regional population (less, equal or greater than the real population as a function of the weighting criteria adopted), which defines the allocation quota of the FSN to each region.

¹⁸ Refer to section 4.5

From a technical point of view, the FSN allocation mechanism consists of two steps; briefly: the first step is to identify the LEAs and the related share of the fund assigned to them and the second step is to define the weights of each LEA identified i.e. the criteria to be applied to the population of the regions. That happens through the technical instruments that regulate the regional healthcare (Health Commission, Government-Regions Conference) and it creates an agreement between the regions and the competent ministries that, in itself, contains some compensation elements which are considered to be political (or, at least, not strictly technical). Table 1, contained in Appendix A, summarizes the LEAs` details that were considered in the allocation for 2014, as well as the weighting criteria adopted, and the individual weight coefficients for age classes. Table 2 (Appendix A) contains the resident population of every region and the economic values of the allocation among the regions of the health fund, as function of the adopted criteria. But since the tables are in Italian, the key points are described in the following paragraph.

As stated in the second chapter, the health pact 2014-2016 provided an initial contribution from the State of € 109.928,00 to distribute and allocate among the regions and the autonomous provinces (PA) for 2014. The amount to allocate is € 105.775,97 MLN and it is composed of the following financing shares:

1. € 105.341,89 MLN: *indistinct* and calculated subtracting the amount of 2.029,46 MLN ¹⁹ to the total quota of € 109.928,00, and € 1.923,74 MLN²⁰ and € 632,91 MLN ²¹
2. € 6.68 MLN: *restricted to regions and PA*
3. € 427,40 MLN: *restricted to other authorities*²². (Presidency of the Ministers Councils, 2014)

4.1.1 Allocation criteria

Specifically, after the calculation of the average per capita cost of the 3 benchmark regions (Umbria, Emilia Romagna e Veneto), compared to the weighted population (December 31st 2013), calculated using the weights of the allocation of the FSN in the year 2012, it was decided

¹⁹ Restricted to the plan objectives

²⁰ Fund reserve art. 9 comma 2, 2011. n.149

²¹ Amount allocated to other SSN authorities

²² 265,99 MLN: financing of IZS (*Istituti Zooprofilattici Sperimentali- Institutes of experimental Veterinary medicine*); 146, 41: CRI (*Croce Rossa Italiana-Italian red cross*); 10,00: IZS staff for the year 2002-2003 and 2004-2005; 30,00: specialist physicians' education; 3,00: IZS staff for the years: 2006-2007; 2,50: contracts payments; 2,00; *Centro Nazionale Trapianti- National transplants center*)

to multiply it for the weighted population of each region and autonomous province, dividing the results for the individual essential levels of assistance (LEA). It was decided then, to determine in proportion the individual sub-levels (prevention, primary care, pharmaceutical, specialized, local and hospital) as a percentage of each in relation to the overall general funding within the conditions listed in Table 1. (Presidency of the Ministers Councils, 2014). In the FSN allocation, *prevention* accounts for 5% of the fund, and the allocation parameter is composed of four levels: primary care (7%) allocated to gross population, pharmaceutical care (13,57%) which is taken directly from the total amount, specialist care (13,3%) allocated to the weighted population, where the age weights are calculated from the distribution of ambulatory services consumption registered at national level, local medicine (17,13%) allocated to gross population. The level of hospital care represents the 44% of the fund; half of this quota (22%) is allocated to gross population and the other half (22%) is allocated to weighted population, where the weights for age are calculated based on the inpatient distribution at national level. The numerical effects of these criteria are reported in Table 2, where it has been added two columns: the allocation of the FSN quota corresponding to the “restricted” resources, and the allocation of “balance” resources (subdivision corresponding to agreements between the regions, different than technical criteria) (Presidency of the Ministers Councils, 2014). To understand the source of these criteria it is necessary to refer to reforms that changed over time in Italy since 1992²³.

Coming back to the similarities with the English capitation system we mentioned at beginning of this chapter, the Italian capitation can be described as mainly following a logic based on equity, coherent with choices of the English NHS, even if logics of “balance” of the delayed changes in the structure of some regions are also present in the Italian institutional system (Spadonaro, Mennini, & Atella, 2004), as showed before. Nevertheless, the health consumption occupies a central role in the formula: supply corrections, or *non-need variables* “sterilization” are not considered: in this way the Italian capitation systems is highly exposed to finance what already exists, just because it “exists” (Spadonaro, Mennini, & Atella, 2004). The English criterion of “small areas” forecasts cannot be taken into consideration by the Italian government at the moment because of the lack of adequate statistical information (Spadonaro, Mennini, & Atella, 2004). In fact, the Italian “weights” continue to be estimated at national or regional level

²³ Constitutional reform that redistributed powers to the regions; the NHS was regionalized with the “managerialization” of health service organizations and competition between public and private providers but then mitigated over time by other reforms (Ferre`, et al., 2014)

with univariate models which are not “purified” by the effects of the other variables that influence the demand (Ringard, Sagan, Saunes, & Lindahl, 2013).

Finally, there is a fundamental institutional problem. The English system remains, highly centralized, and this might explain the “lack of interest” in the allocation phase for the efficiency and pertinence issues, managed with upstream controls at central level (Spadonaro, Mennini, & Atella, 2004). On the other hand, in a federal system, it seems that more attention should be paid to the central control of efficiency and appropriateness, in order to monitor the standard levels of care and to avoid wrong estimations of needs based on an effective resources consumption, that in the end might incentive not virtuous behaviors by the regions (Spadonaro, Mennini, & Atella, 2004).

Generally the Italian allocation method appears to be only a little justifiable for the “weights” estimates and because it seems to privilege the status quo and not the population needs: it does not appear to be acceptable, for horizontal equity reasons, the frequency of consumption instead of needs; finally the problem of consumption appropriateness needs to be solved because, at the moment, it does not find a solution in the allocation formula, nor in the existence of extra funds to use at central level, at its discretion, for that reason. (Spadonaro, Mennini, & Atella, 2004)

The allocation formula used until now presents some weaknesses from a methodological and theoretical point of view, which lead to misallocate the resources among the regions and without promising a substantial equal treatment (Mapelli, 2007). The main weaknesses are: 1. The identification of the equity principle with the uniformity one; 2. The adoption of a unique health consumption model in every region; 3. The adoption of a national per head value for the financing (Mapelli, 2007)

1. The *equity principle* (all the citizens are equal and the resources for them are the same – same age- without any distinction in the varieties and differences in the health needs, which characterize the population within the same age class of the regions (Mapelli, 2007). The *uniformity principle* corresponds to a bureaucratic notion, typical of the public administrations, which has to act following standards of impersonality and impartiality in the health services delivery. Nevertheless, in services like health care and/or education, the uniformity in the treatment can end up in a substantial inequality. In fact, age is considered a need indicator and it leads to discrimination among the age classes, but within the same age group the probability to get ill and use the same health

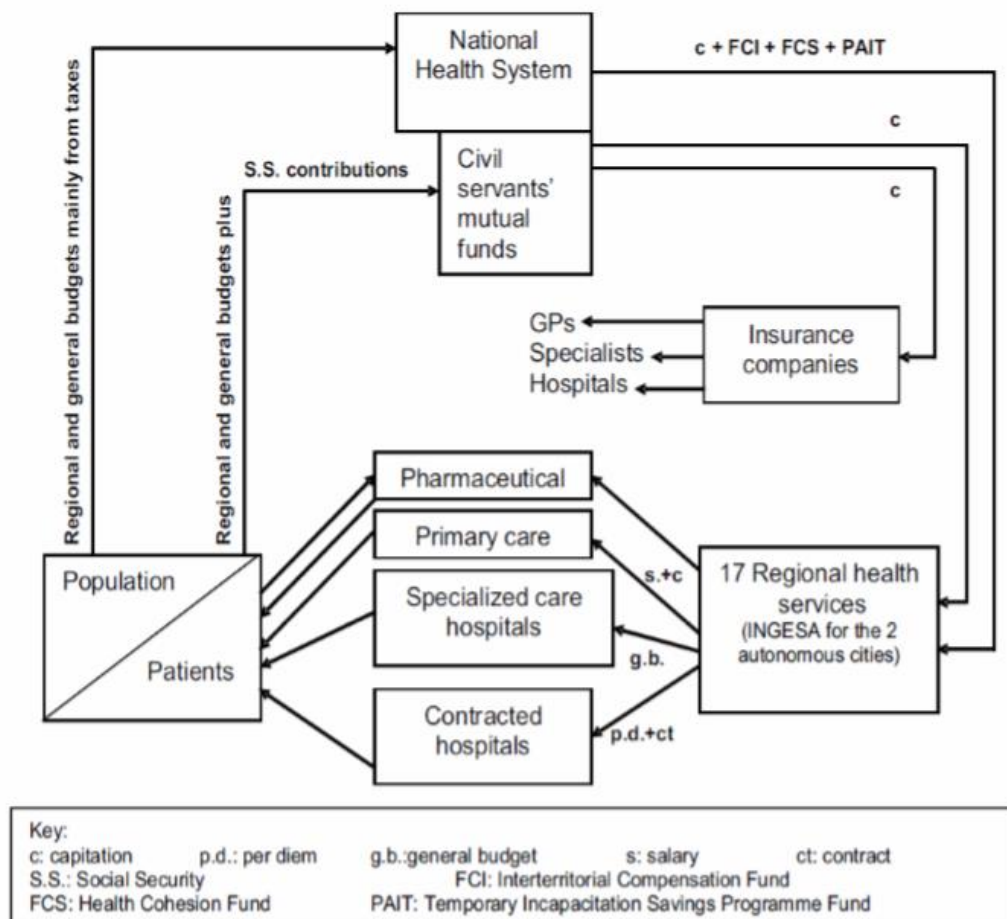
services which are the same in the whole Country is doubtful (Mapelli, 2007). The vertical equity principle (unequal treatments for unequal patients) should be preferred to the horizontal one, because the health needs are highly diversified among the regions, even within the same age group (Mapelli, 2007).

2. The assumption of equity as uniformity leads to a unique model of health consumption for all the regions. Generally, the health conditions, but also the supply, preferences and health consumption propensity of the patients are very different among the regions. Hence, imposing the same funds composition (prevention: 5%, hospital care: 44%, local care: 51%) and, through the per head national value, the same pharmaceuticals consumption models, inpatient and specialist care do not seem appropriate under an epidemiological, cultural and economic profile (Mapelli, 2007)
3. The financing based on the definition of an average national value per care level can be unequal. The allocation procedure, using average national values can end up to a sum zero game between the regions, where some gain resources (the ones with an historical expense lower than the national average) and the other ones losing resources. The gain or loss can be determined by different factors, some relative to the demand (number of ill people within the population, different access to services and different consumptions amount), or to the supply (efficiency and production cost of the health services) (Mapelli, 2007). Some of these factors can be considered “legitimate” (according to the English NHS terminology) like a high number of ill persons in the population; and other “illegitimate” like an exaggerated services consumption or high costs levels) (Mapelli, 2007). The negative consequences of this procedure might be: 1. It can assign insufficient or excessive resources to the effective health needs of the regions, or no coverage guaranteed for the expense even if objectively necessary. 2. It can redistribute the inefficiencies among the regions, the excess consumptions present in the historical expense. 3. The equity of treatments can be uncertain, even if efficient (Mapelli, 2007).

4.2 Spain

“The public funding system adopted in Spain has allowed some taxing autonomy to regions under the common regime and in the delivery of public services, including the healthcare services. in terms of spending, both types of regions have similar responsibilities” (Puig-Junoy,

Planas-Miret, & Tur-Prats, 2005). However, there is a considerable variability in the geographical distribution of health needs and taxing capacity from the regional administrations; the areas with the highest need are usually also those ones with lesser ability. The federal regime that operates in Spain makes sure that the responsibility for the provision of public services such as education, social services, and healthcare, concerns the individual autonomous regions. For two of these regions, the Basque Country and Navarra, there is a particular funding mechanism (*Régimen Foral*²⁴), while the remaining fifteen regions share a common system (*Régimen Común*). The financing of healthcare in Spain, comes from public funds for about 70% and the remaining percentage from private mechanisms. The first ones, substantially derived from general taxation, while the latter from a direct payment of the services by the citizens²⁵. The following figure reproduces the flow of funds for the Spanish healthcare since 2004.



²⁴ Communities of chartered regime, with fiscal autonomy

²⁵ Out of pocket

Figure 13. Financial flow in the Spanish health care system (Source: *Agenzia Nazionale per I Servizi Sanitari Regionali- AGE.NA.S*; 2010)

4.2.1 Allocation criteria

“A General Fund for regional Distribution which accounts for 98.5% of total resources exists²⁶. In the agreements for the regional allocation of general revenues²⁷, the health care expenditure was included into the general transfer system” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005); that expanded the basis for calculation to other factors than population like isolation, average income and density of population and age. “A Cohesion Fund was developed and funded by the central budget in order to devote resources to the cross boundary flows of patients among the regions” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005).” Public funds have been allocated to the ACs according to different criteria but the reform of 2002 introduced some notable changes” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005).” Health services are now integrated under the general regional financing system which includes all the public services²⁸ but the ACs must assign to health service a minimum amount established by the central government²⁹. This minimum amount is calculated as a weighted function of covered population (75%), population over 65 years (24,5%), and insularity (0.5%) This leads to a regional variation in the aged population with the result of a greater differences in expenditure per capita than under the old system, in which this factor was not considered” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005)

“The rough capitation criterion employed until 2001 imposed the same per capita expenditure in all the regions and the variation range in the per capita expenditure was very low, about 5%. The differences in the Spanish health care expenditure per capita at regional level have been, quite often, object of political debate on their equity justification; the reason for that was the lack of any objective need-based and transparent formula for the regional allocation of resources. Nevertheless with the reform of 2002 it is not possible to conclude that the new allocation formula has introduced any needs adjustment” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005).

In particular, the formula for the calculation of local relative needs index (D_i/D) is given by:

²⁶ Since the agreement *Consejo de Política Fiscal y Financiera* in 1997

²⁷ Year 2001

²⁸ Education, health, social services etc.

²⁹ Expenditure needs level

$$\frac{D_i}{D} = \alpha_{0i} + \alpha_1 \frac{P_i^P}{P^P} + \alpha_2 \frac{P_i^{65}}{P^{65}} + \alpha_3 \frac{I_i}{I}$$

Figure 14. Spanish formula for the calculation of local relative needs index (Source: Agenzia Nazionale per I Servizi Sanitari Regionali- AGE.NA.S; 2010)

“Where p is the population with access to healthcare services, p^{65} is the population over 65 years old and I is a variable that measures the distance of islands from the country. The weight coefficients’ value is as follow: 1= 0.75, 2= 3= 0.245 and 0.005” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005) .

“The expenditure needs level is established and guaranteed by the government and it increases every year, according to the growth rate in state revenues, or every three years, according to the annual GDP (if higher than the last one). That seems to be contrary to the principle of autonomy granted to the regions and to the equity principle (through the so-called expenditure needs level) which does seem to fail in practice” (Puig-Junoy, Planas-Miret, & Tur-Prats, 2005)

“The lack of objective weights in the funding formula in Spain is attributed to lack of data. However, in principle, some suitable primary data sources are available; the residence, age and sex of every individual in Spain is recorded in the Patron Municipal and published annually by the Instituto Nacional de Estadística (INE), and therefore in principle age and sex could be variables in a regional resource allocation formula, and updated annually. Data is collected by the INE on the use of inpatient services by residence, age and gender, and this data could be used to construct empirical weights. The INE commissions large-scale national social surveys on health, demography, economic status, and use of health-care ever 3 years or so, which may also provide a basis for predicting need for healthcare” (Epstein, Jimenez Aquilera, & Montero Granados, 2009).

“However, *territorial equity* is pursued by three mechanisms: 1. the ‘cohesion fund’ to compensate cross- boundary flows and for foreign European patients treated in the regions, 2. the ‘sufficiency fund’ to ensure a minimum financial capacity and the “equalization fund’ to contain regional diversity. In order to preserve cohesion by avoiding ‘excessive’ deviation in per capita health spending amongst regions, central transfers will favor those ACs that show

increases in public health care coverage (e.g., due to immigration) by a pre-specified amount (three points above the Spanish average)” (Lopez-Csanovas, Costa-Font , & Planas, 2005).

“The allocation of regional health care funds now³⁰ depend, firstly, on the bargaining between Finance Ministers at the central and regional level (to determine the overall ACs funding) and, secondly, at the regional level, between ministers with expenditure responsibilities within each AC. However, if the autonomy in rising regional tax revenues is higher, a higher diversity in health care resources is expected to occur. Diversity, provided that the basic minimum package is covered, should not be a cause for concern. In fact, additional funds to the regional health system come from region specific–sources and a pre-equalization system is already in place to match basic expenditure needs with regional fiscal capacity” (Lopez-Csanovas, Costa-Font , & Planas, 2005). “At any rate, the central state requires ACs to achieve minimum health expenditure; it is mostly defined by regional expenses at the point of transfer, with a minimum rate of increase that is centrally determined plus a vertical levelling fund according to the differential evolution of the population covered by the regions” (Lopez-Csanovas, Costa-Font , & Planas, 2005).

4.3 Denmark

The WHO report³¹ on the Danish health care system described the four income resources of the regions for health care and these are:” 1. a block grant from the national government (79% of the regions’ income in 2011); 2. activity-based financing from the national government (3% of the regions’ income in 2011); 3. a contribution from each municipality in the region paid in proportion to the number of inhabitants in the municipality (7% of the regions’ income in 2011); and 4. activity-based financing from each municipality in the region (11% of the regions’ income in 2011)” (Olejaz, et al., 2012).

4.3.1 Allocation criteria

“By 2011, resources allocation and hence the size (%) of the state’s block grants to each region for healthcare depends on the following sociodemographic criteria, as defined by the over mentioned WHO report (2012):

- the number of elderly people (65+ years) living alone (25%);

³⁰ Since 2002

³¹ Health System in Transition; Denmark, 2012

- the number of families receiving social security (17.5%);
- the number of children of single parents (15%);
- the number of people living in rented housing (15%);
- the number of lost living years, calculated by comparing with the region with the highest average life expectancy (10%);
- the number of psychiatric patients who have been in contact with a psychiatric hospital department within the latest 10 years (5%);
- the number of patients with a diagnosis of schizophrenia who have been in contact with a psychiatric hospital department within the latest 10 years (5%);
- the average travel time to area with 18000 inhabitants multiplied by the number of inhabitants (5%); and
- the number of citizens living on islands without a fixed connection to the mainland (2.5%)” (Olejaz, et al., 2012) .

It is also specified that “the size of the activity-based contribution from the national government to each region depends on whether the region produces a specified amount of health care services” (Olejaz, et al., 2012). “There is an upper limit to the amount of money each region can earn through activity-based financing from the national government. The size of the activity-based contribution paid by the municipality in each region depends on the number and kind of health care services provided to citizens in the municipality” (Olejaz, et al., 2012).

4.4 Norway

“Over the past decades, the issue of how to finance hospital care has been an important topic in the health policy field” (Ringard, Sagan, Saunes, & Lindahl, 2013). “Needs-based formulas for the health-care financing have been used since 1980 and one of the main objective has been to ensure geographical equity in the provision of health services” (Magnussen, 2010).

“In 2002 the central government, instead of the counties, got the responsibility for hospitals and since then, an initiative was taken to better adapt the hospital financing model to this new

organization” (Ringard, Sagan, Saunes, & Lindahl, 2013). “An appointed³² expert committee was appointed; it recommended to replace the activity-based financing in relation to the RHAs with a fixed share of the total health care budget to be given to each RHA”. A new needs-based formula for allocating resources between the five RHAs was proposed too, which would result in a redistribution of more resources from the northern Norway RHA to the western and central RHAs, but in the end all the new advices were not implemented. The government retained the partial activity-based financing of RHAs system and the new needs-based allocation formula was rejected as politically unacceptable at the time” (Magnussen, 2010).

“In 2008, a new expert committee was appointed do develop an allocation formula and a new solution was proposed. The new formula considered a new set of variables and means of weighting services, and a compensation for structural cost differences between the RHAs was also included” (Ringard, Sagan, Saunes, & Lindahl, 2013); “the estimation of the redistribution due to the new formula implementation within the existing budgets was around NKr 800 MLN from the south-eastern RHA³³ to the three other RHAs. There was a large public debate but finally the minister of health declared that the government intended to follow the recommendations of the committee and the new model was approved in 2008” (Magnussen, 2010).

The following figure shows the criteria used in the current Norwegian capitation model.

Somatic services (weight 73%)	Psychiatric services (weight 18%)	Substance abuse services (weight 3%)	Ambulances and patient transport (weight 6%)
Age (58%)	Age (55%)	Age (55%)	Travel distance to hospital
Health and social variables (42%)	Health and social variables (45%)	Health and social variables (45%)	
- Mortality	- Martial status	- Martial status	
- Employment status	- Disability pension	- Social care recipient	
- Receiving rehabilitation compensation	- Living with one parent	- Level of education	
- Level of education	- Child protective services	- Disability pension	
- Municipal socio-economic index	- Level of education	- Metropolitan area (Oslo)	
- Index for climate and latitude	- Non-Western immigrants		

Figure 15. Criteria used in the capitation model. (Source: *Equal access for equal need in Norway`s health care.* Magnussen J., 2010)

³² By the government by royal decree (Magnussen, 2010)

³³ 2.2% of the south-eastern RHA income

The structure of the Norwegian weighted capitation formula includes four types of services: somatic care which weights 73% of the allocation, psychiatric care (18%), substance abuse services (3%) and ambulance and patient transport (6%) (Magnussen, 2010). It can also be seen like a priority setting with some services having a higher one and that resource allocation should be based on the factors driving the need for these and within each type of services listed before. The percentages in brackets indicate which group of variables are the most important criteria of need (Magnussen, 2010). The age parameter weights 58% for somatic care, 55% for psychiatric services, 55% for substance abuse services and 6% for ambulance services.

Socio economic variables are used in the allocation procedure for needs-based allocation purposes, at aggregate level, and the percentages are displayed in the figure.

4.5 England

“The weighted capitation scheme, in England, has been adopted since 1977” (Boyle, 2011). The formula has to meet principles, clearly defined by the NHS; among these principles, as cited by Spandonaro et al. (2004), it is specified that “the allocation of resources for health care across geographical areas in the NHS is based on the principle that individuals in equal need should have equal access to care, irrespective of where they live” (Sutton et al, 2002, cited in Spandonaro et al., 2004).

A second important aspect is the assumption behind the econometric model used for the needs estimation (Spadonaro, Mennini, & Atella, 2004), which is that “the use of health care services is determined by patient needs and by supply” (Sutton et al, 2002, cited in Spandonaro et al., 2004).

Another important aspect is the intention to maintain a certain amount of discretion, assigned to the central government, in the budget allocation (Spadonaro, Mennini, & Atella, 2004); an application of that principle is represented by the existence of adjustments based on past expenditures (Spadonaro, Mennini, & Atella, 2004). “The weighted capitation formula is used to set targets which then inform allocations. The formula does not determine allocations. Actual allocations reflect decisions on the speed at which health authorities are brought nearer to target through the distribution of extra funds” (Sutton et al, 2002, cited in Spandonaro et al., 2004).

Among the main reasons that made necessary a revision of the system, there is the evidence to adjust the past formulas, in order to include the different input costs at local level, the unmet needs, and especially the part of population highly deprived to reallocate the budgets from the health authorities to the primary care groups (Spadonaro, Mennini, & Atella, 2004). Furthermore, it was decided to combine the resources distribution to cover the three main funds flows: hospital and community health services- HCHS, discretionary general medical services- GMSCL, and prescribing ³⁴ (Spadonaro, Mennini, & Atella, 2004).

The fund available for each area of the NHS is calculated by adjusting the resident population for the health needs relative to the amount estimated in the different geographical areas. The weighting system adopted in the various allocative formulas adjusts the capitation by age groups, by additional needs (over and above) other than those due to age, and by costs defined as unavoidable and due to the contingent features of providing health services; not those related to aspects of technical inefficiency and of local tendency to health use. The records of GPs are used to define the reference population inside each small area. The health needs are estimated indirectly, using the consumption data of health services, socio-economic characteristics of the population, its health status and data on existing healthcare supply in the reference area. A separate allocation formula is used to correct the inequalities in health, through indicators based on disability-free life expectancy.

4.5.1 Historical background of the formula

As I mentioned above, in England, since the early '70s, the resources centrally collected through general taxation were distributed to the different geographical areas through a formula whose formal structure is representable as the product of three components: the age and sex of the population structure (using health consumption as a proxy for needs), the morbidity detected in a specific area (Standardized Mortality ratio "cut" to 75 years) and the costs linked to local production processes of services (net of inefficiencies). These factors, considered as linearly associated with the consumption of health services, used to change the resident population, leading to the redistribution of the English population in relation to the weight attributed to the different age groups, gender, chronic needs, and to the territorially defined cost. The total population stayed the same but the population for single geographical area increased or decreased according to the resulting profile. This mechanism has remained in force, with some

³⁴ A different allocation process has been used for the financing of actions against Hiv and drugs and alcohol abuse (Spadonaro, Mennini, & Atella, 2004)

minor changes, until the end of the '90s, and responded to the principle of equal access to health services for people with equal levels of risk. The criticisms of this approach have been many, from the structure to the fact that the profile of existing supply was privileged, with a special emphasis on the hospital sector, and to the fact that the structures considered as best practices were not considered, which, by their very nature, tend to have higher operating costs, to the scarce capacity to adequately capture additional needs by the SMR indicator, and so on.

Nevertheless, to avoid the constant uncertainties on funds' amount that would have been determined by continuous changes of the allocative mechanism, these changes occurred marginally over time. Since the end of the '90s it has been given a mandate to a Commission to revise the formula for the distribution of health resources, deeming that it was time for a more sophisticated modulation, even from the modeling point of view, of the redistributive mechanisms, while reducing the spatial dimension of the geographical reference unit (healthcare districts). In particular, in 1993, the NHS entrusted the University of York to reformulate the allocative model and the result was: 1. The use of healthcare consumption (mainly hospital care) for small areas; 2. The use of a statistical model of a two-stage regression (as alternative to the previous models that used traditional methods for parameters estimation, with the technique of linear regression), in order to adjust the estimates of needs' indicators to the effect of the healthcare supply structure. This change should explain the variability in the use of services per small area. For each elementary unit, the information to build up the area profile are formed by the socio-economic conditions of the population, by the structure of healthcare services' supply, and by the intensity of the usage of acute care.

The revision of the resource allocation formulas by ACRA (Allocation of Resources to English Areas) continued over time and has led, since 2002, to the inclusion of variables relative to unmet needs into the formula, based on information derived from the sample survey "Health Survey for England"³⁵.

Since the end of 2008, a comprehensive review of the allocative model has been conducted, starting from the way the reference population is estimated, the composition of need factors, to

³⁵ The Health Survey for England (HSE) is a series of annual surveys about the health of people living in England; carried out annually since 1991. It is commissioned by The Health and Social Care Information Centre. Since 1994, the survey has been carried out by the HSE team of the Health and Social Survey Research group at the Department of Epidemiology at UCL with NatCen Social Research. The survey is used to help plan NHS services, look at ways of improving people's health and changes to the nation's health over time, and at inequalities in health (Source: UCL, Uk 2016)

the operating mechanisms of the market forces. The committee proposed the use of the registers of GPs for the calculation of the resident population, but it also indicated the necessity to include the unregistered population, in the areas where data were available (prisoners, armed forces, political asylum seekers, migrants).

ACRA has proposed that resources are allocated according to various models that consider separately the need variables for each of the 18 age classes, for the general and acute sector, for the maternal sector and for the mental health one. A schematic representation of this model is given by the following figure and explained in details in the paragraph titled *weighted capitation calculation*:

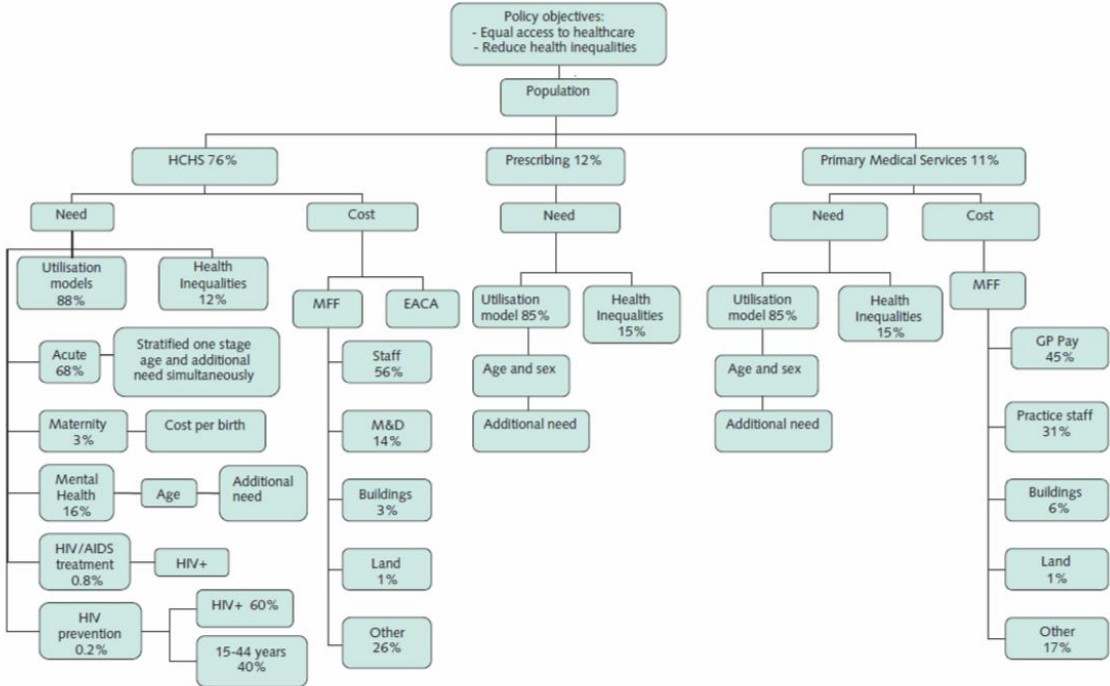


Figure 16. Overview if the English capitation formula (Source: *Department of Health, 2009*)

Details on the elements of the HCHS components and the weights associated with them are provided in Appendix C.

In the last proposal, while maintaining only the consumption variables to represent the need, for the construction of the need indicators, also the data derived from the outpatients’ archives have been used. Since the formulas currently employed do not respond directly to the aim of reducing social inequalities, ACRA has proposed to deal with them through a separate model using the disability-free life expectancy (DFLE) variable – i.e. the expected number of years of

life from birth, lived free from chronic diseases. Estimates of the coefficients of the ACRA model are presented in the following table:

Constant	-0.152		
1. Legitimate needs variables		2. Supply variables	
SMR under 75 years	0.070	Mean waiting time	-0.101
Proportion of LBW babies born	0.013	Distance to general practice	-0.047
Standardized birth ratio	0.108	Distance to hospital	-0.021
Index of education deprivation	0.008	Outpatients seen <13 weeks	0.160
Aged 75+ living alone	0.026	Residential/nursing homes	-0.003
Index of income deprivation	0.103	Access to private providers	-0.034
Nervous system morbidity index	0.225	Number of hospital beds	0.013
Circulatory morbidity index	0.548	Distance to maternity hospitals	0.023
Musculoskeletal morbidity index	0.375	3. Other variables	
		Proportion of ethnic minorities	-0.013
		Index of employment deprivation	-0.158

Table 3. The English allocation formula (ACRA) for hospital and community care (Source: Department of Health, 2009)

4.5.2 Weighted capitation calculation

The technical guide to the formulae for 2014-2015 and 2015-6 revenue allocations to Clinical Commissioning Groups and Area Teams, prepared by the NHS England Analytical Services (Finance) is a comprehensive tool to better understand the current weighted capitation formula and make the process more transparent.

It describes the weighted population³⁶ for each CCG as “based on: the size of each CCG’s population; a weight, or adjustment, for need for health care services related to age (all else being equal, areas with older populations have a higher need per head); a weight, or adjustment for need over and above that due to age (all else being equal, areas with poorer health have a higher need per head); a weight, or adjustment, for ‘unmet’ need and health inequalities; a weight, or adjustment, for unavoidable differences in costs due to location alone (higher unit

³⁶ The populations used in the formula are the registered lists of all GP practice members of each CCG (England, N. H. S., 2014).

staff, land and building costs) and the higher cost of providing emergency ambulance services in sparsely populated areas”.

In calculating HCHS weighted populations, the technical guide describes three methods, which are: to weight or adjust registered populations for need; to weight or adjust for unavoidable costs due to location; and to adjust for unmet need/health inequalities (England, N. H. S., 2014).

When calculating need weighted populations, the basic approach is “to multiply the population for each age-sex group for each GP practice by the relative need per head estimated by academic researchers. The products for each age-sex group are summed to give the relative need weighted population for each GP practice. The weighted populations for GP practices are summed to give the relative need weighted populations for each CCG”³⁷.

Regarding the unmet need, “the standardized mortality ratio for those under 75 years of age (SMR<75) is applied at small area level to take account of inequality in health outcomes within as well as between CCGs”³⁸.

Then, the unavoidable costs due to MFF and EACA are “added at CCG level. The SMR<75 weighted population combined with the need and unavoidable cost weighted population gives the relative overall weighted population for each CCG”³⁹.

However, need per head, in this context, vary between general and acute care, mental health, maternity (England, N. H. S., 2014). For general and acute care, relative need is based on past patterns of utilization of health service relatively to the patients’ characteristics (England, N. H. S., 2014). Supply variables (as distance travelled to outpatient appointments) are adjusted (England, N. H. S., 2014)

For mental health, an approach called “the person-based resource allocation for mental health-PRAMH” is used; “it estimates need related to age and additional need over and above due to age”⁴⁰. It is a two-stage model because firstly, the share of the population who uses mental health services is modelled and then the need based costs for the utilization of those services by the population (England, N. H. S., 2014). “There are separate models for males aged 20-64, females aged 20-64 and those aged 65 and over. This is because relative need differs between

³⁷ England, N. H. S. (2014)

³⁸ England, N. H. S. (2014)

³⁹ England, N. H. S. (2014)

⁴⁰ England, N. H. S. (2014)

these groups, the latter being heavily influenced by dementia and related illnesses. The explanatory variables in the models include for example age, psychiatric diagnosis, severe mental illness prevalence [...], categories of condition of mental health severity, the proportion who are single, and ethnicity”⁴¹. Supply variables like the existence of a nearby mental health provider, are included here as well (England, N. H. S., 2014).

Maternity care model is “based on the number of births and the need weighted cost per birth”⁴².

“There are two adjustments for unavoidable costs, the market forces factor (MFF) and the emergency ambulance cost adjustment (EACA)”⁴³. The market forces factor, which is the difference in costs between areas to geographical location, depends on medical and dental staff, other staff, land, and buildings (England, N. H. S., 2014). The emergency ambulance cost adjusts for variations in the cost of providing that service in different geographical area (England, N. H. S., 2014).

Regarding the unmet need adjustment, ACRA recommended the use of SMR<5 indicator⁴⁴.

The technical guide also defined the *the Better Care Fund* value for 2015-16. It “amounts to £3,813,641k, made up of revenue funding of £3,460,000k and capital funding of £353,641k”⁴⁵

Revenue funding is from:

- £430,000k already in CCG recurrent allocations for reablement (£300,000k) and carers’ breaks fund (£130,000k) (England, N. H. S., 2014);
- £1,100,000k existing transfer from health to social care (to be allocated non-recurrently to CCGs) England, N. H. S., 2014);
- £1,930,000k additional funding from CCG recurrent allocations England, N. H. S., 2014).

⁴¹ England, N. H. S. (2014)

⁴² England, N. H. S. (2014)

⁴³ England, N. H. S. (2014)

⁴⁴ “The SMR<75 is a measure of how many more or fewer deaths there are in a local area compared with the national average, having adjusted for the difference between the age profile of local areas compared with the national average” (England, N. H. S., 2014)

⁴⁵ England, N. H. S. (2014)

“Capital funding is £220,000k from the Disabled Facilities Grant from the Department of Communities and Local Government- DCLG and the £133,641k social care capital grant”⁴⁶.

The distribution of the funding is:

a) “CCGs’ contributions from recurrent allocations of £2,360,000k was distributed in proportion to CCGs’ 2015-16 programme allocations. The ratio $2,360,000/65,680,146.000$ (= circa 3.593%) was multiplied by each CCG’s 2015-16 actual allocation”⁴⁷

b) “The existing transfer from health to social care of £1,100,000 was distributed using the 2013-14 social care formula. The social care formula operates at local authority level”⁴⁸.

c) “The social care capital grant of £133,641k was distributed using the 2013-14 (revenue) social care formula”⁴⁹.

d) The Disabled Facilities Grant of £220,000k was distributed using an approach developed by DCLG and which operates at local authority level⁵⁰.

Even if the English capitation is a reference method for the health systems with a similar health care setting as in the countries analyzed in this thesis⁵¹, there are no easy solutions on how to distribute the available resources and not even “perfect” formulas. There are no reliable estimates of the resident population of the single areas. The ability to correctly measure the health needs of a population still face the identification problem of an acceptable and shared definition of need, the identification of the right indicators to represent it as well as the unmet needs issue resolution; the differential production costs per area are not easily separable in the non-modifiable component, compared to that due to inefficiencies or overuse. A tricky element continues to be the transition from small areas resource allocation formulas, characterized by

⁴⁶ England, N. H. S. (2014)

⁴⁷ England, N. H. S. (2014)

⁴⁸ England, N. H. S. (2014)

⁴⁹ England, N. H. S. (2014)

⁵⁰ “The distribution was on the basis of each local housing authority having a starting point of the same allocations they will receive in 2014-15, and then applying a relative need weighted index to allocate the £35m uplift from the headline total of £185m in 2014-15 to £220m in 2015-16. The model takes into account disability related benefit claimants, the proportion of population over 60 years of age, the proportion of local authority owned housing stock, and local variations in building costs, to provide a relative need weighted index” (England, N. H. S., 2014)

⁵¹ Beveridge models

problems of estimates' stability and ecological bias, to models based on individual data, which can be more easily understood by the GPs and on which they can actually exert more control.

4.6 Scotland

“The Resource Allocation Formula is used to inform the allocation of around 70% of the total NHS Budget to each of the fourteen NHS boards in Scotland. The principal output from the formula is a target percentage share for each Board. This is calculated by aggregating the predicted healthcare needs of the small areas (data zones or GP practices) within each NHS Board” (ISD Scotland, 2015).

The capitation system adopted in Scotland's main objective is to minimize the significant differences, existing in the distribution of the Scottish population, between urban and rural areas, net of healthcare needs. In this case, the factor that mostly influences the distribution of resources to finance health services is the size of the resident population. The population data within each healthcare area are corrected for the variables associated with sex, health status, costs due to the isolation and with the extreme dispersion of the Scottish population. Census data are the base for the resident population's estimates, while a number of variables that measure indirectly the health needs of the population are aggregate variables in order to reduce the local instability of the estimates (small dimension populations)

4.6.1 Resource Allocation

“The resource allocation formula (NRAC)⁵² has been used to calculate 2016/17 target shares. These target shares are used by the Scottish government to inform the allocation of NHS revenue budget between the 14 territorial NHS boards in Scotland” (ISD Scotland, 2015) .

“The policy of the Scottish government health directorate (SGHD) is to phase in the Formula by way of 'differential growth' whereby all Boards would continue to enjoy real-terms growth in their allocations year-on-year, with those above parity (i.e. above their formula target share) receiving less growth than those below parity until the new distribution was achieved” (ISD Scotland, 2015).

⁵² To know how the formula works in practice see Appendix B (i)

“The latest resource allocations (2016/17) are displayed in the following figures which are the target shares produced by the resource allocation formula and are not the final shares allocated to the NHS boards” (ISD Scotland, 2015).

POPULATION x AGE SEX INDEX x MLC INDEX x EXCESS COST INDEX

Total						Overall share
HB	Health Board	Population Share ¹	Age-sex share	Age-sex and MLC share	Age-sex, MLC and excess cost share	+ Age-sex, Additional needs, Excess cost share and Out of Hours adjustment
A	Ayrshire & Arran	6,88%	7,26%	7,42%	7,35%	7,34%
B	Borders	2,12%	2,33%	2,08%	2,09%	2,10%
F	Fife	6,86%	7,00%	6,81%	6,71%	6,70%
G	Greater Glasgow & Clyde	21,32%	20,69%	22,83%	22,65%	22,61%
H	Highland	5,96%	6,36%	6,03%	6,47%	6,50%
L	Lanarkshire	12,14%	11,95%	12,65%	12,44%	12,42%
N	Grampian	11,00%	10,74%	9,89%	9,92%	9,94%
R	Orkney	0,40%	0,43%	0,40%	0,48%	0,48%
S	Lothian	16,21%	15,50%	14,82%	14,67%	14,66%
T	Tayside	7,76%	8,05%	7,72%	7,71%	7,71%
V	Forth Valley	5,64%	5,60%	5,51%	5,43%	5,43%
W	Western Isles	0,50%	0,56%	0,55%	0,67%	0,67%
Y	Dumfries & Galloway	2,77%	3,08%	2,90%	2,94%	2,95%
Z	Shetland	0,43%	0,44%	0,40%	0,48%	0,48%

Table 4. Unified Budget target shares (source: ISD Scotland, 2015)

Table 4. shows “the board's overall target share of the unified budget, relative to the share based solely on population. In addition, the shares based on adding age-sex, additional needs due to morbidity and life circumstances (MLC) and out of hours’ adjustment to population are also shown” (ISD Scotland, 2015).

Total						
HB	Health Board	Population Share ¹	Age-sex index ²	MLC index ³	Excess cost index ⁴	Overall index ⁵
A	Ayrshire & Arran	6,88%	1,055	1,021	0,991	1,068
B	Borders	2,12%	1,100	0,891	1,008	0,988
F	Fife	6,86%	1,019	0,974	0,984	0,977
G	Greater Glasgow & Clyde	21,32%	0,970	1,104	0,992	1,062
H	Highland	5,96%	1,067	0,948	1,074	1,086
L	Lanarkshire	12,14%	0,985	1,058	0,983	1,025
N	Grampian	11,00%	0,976	0,921	1,003	0,902
R	Orkney	0,40%	1,072	0,928	1,188	1,182
S	Lothian	16,21%	0,956	0,956	0,990	0,905
T	Tayside	7,76%	1,038	0,959	0,999	0,994
V	Forth Valley	5,64%	0,994	0,984	0,985	0,964
W	Western Isles	0,50%	1,122	0,984	1,208	1,333
Y	Dumfries & Galloway	2,77%	1,111	0,942	1,013	1,060
Z	Shetland	0,43%	1,010	0,903	1,199	1,094

Table 5. Unified budget indices (source: ISD Scotland, 2015)

Table 5. shows “the board's overall index that is applied to the population share to give the overall target share.” (ISD Scotland, 2015)

HCHS					
HB	HB name	Population Share ¹	Age-sex share	Age-sex and MLC share	Overall share
A	Ayrshire & Arran	6,88%	7,24%	7,41%	7,33%
B	Borders	2,12%	2,33%	2,08%	2,10%
F	Fife	6,87%	7,00%	6,82%	6,69%
G	Greater Glasgow & Clyde	21,30%	20,70%	22,77%	22,57%
H	Highland	5,96%	6,34%	6,04%	6,55%
L	Lanarkshire	12,16%	11,96%	12,58%	12,34%
N	Grampian	11,00%	10,75%	9,94%	9,98%
R	Orkney	0,40%	0,43%	0,40%	0,49%
S	Lothian	16,21%	15,54%	14,87%	14,71%
T	Tayside	7,76%	8,06%	7,74%	7,73%
V	Forth Valley	5,63%	5,58%	5,49%	5,40%
W	Western Isles	0,50%	0,56%	0,55%	0,68%
Y	Dumfries & Galloway	2,77%	3,07%	2,90%	2,94%
Z	Shetland	0,43%	0,44%	0,40%	0,49%

Table 6. NCHS Target shares (source: *ISD Scotland, 2015*)

Table 6. shows “the board's overall target share of the unified budget, relative to the share based solely on population. In addition, the shares based on adding age-sex, additional needs (MLC) and unavoidable excess costs of supply to population are also shown”(ISD Scotland, 2015).

HCHS						
HB	HB name	Population Share ¹	Age-sex index ²	MLC index ³	Excess cost index ⁴	Overall index ⁵
A	Ayrshire & Arran	6,88%	1,053	1,022	0,989	1,065
B	Borders	2,12%	1,097	0,896	1,009	0,991
F	Fife	6,87%	1,019	0,974	0,982	0,975
G	Greater Glasgow & Clyde	21,30%	0,972	1,100	0,991	1,059
H	Highland	5,96%	1,063	0,952	1,084	1,098
L	Lanarkshire	12,16%	0,984	1,051	0,981	1,015
N	Grampian	11,00%	0,977	0,925	1,003	0,907
R	Orkney	0,40%	1,068	0,933	1,212	1,208
S	Lothian	16,21%	0,959	0,957	0,989	0,908
T	Tayside	7,76%	1,038	0,961	0,999	0,997
V	Forth Valley	5,63%	0,992	0,984	0,983	0,960
W	Western Isles	0,50%	1,118	0,987	1,235	1,363
Y	Dumfries & Galloway	2,77%	1,107	0,944	1,015	1,061
Z	Shetland	0,43%	1,009	0,907	1,225	1,122

Table 7. NCHS Indices (source: *ISD Scotland, 2015*)

Table 7. shows “the board's overall index that is applied to the population share to give the overall target share. This shows the allocation per head of population relative to a national average of 1.0” (ISD Scotland, 2015) .

	Acute	Care of the Elderly	Mental Health & Learning Difficulties	Maternity	Community Travel-based	Community Clinic-based	Overall HCHS
Care programme weights	52,4%	2,4%	10,8%	3,6%	12,7%	6,4%	88,3%

Table 8. NCHS Care programme weights (% of allocations) (source: *ISD Scotland, 2015*)⁵³

4.7 Wales

“A formula based approach is used in Wales to allocate resources between Wales’s various health bodies. The objective of that formula is to promote equity of access by matching resources to health needs. However, the funds’ allocation from the United Kingdom government to Wales is becoming an issue, as the effects of the formula used results in increasing pressure on Wales’s allocation. This formula is now widely perceived as being outdated and it is under review. Wales have similar problems to the rest of UK in ensuring that access to good quality services matches need. There have been efforts to increase provision in the more deprived neighborhoods through the selective deployment of Local Health Boards (LHB)-employed doctors to areas of greatest need In the future, the Welsh Government is interested in introducing a greater element of transparency A lack of national data has made the monitoring of improvement difficult” (Longley , Riley, Davies, & Hernandez-Quevedo).

4.7.1 Allocation Criteria

According to Rice and Smith (2001) the formula follows a scheme of Health Authority allocation and there five health authorities and so five plans (geography). At individual level the age and sex parameters are used and mortality at aggregate level.

The essential characteristics of the Welsh resource allocation formula are depicted in the following figure:

⁵³ NCHS Indices by care programme and combined by using care programme expenditure weights are displayed in Appendix B

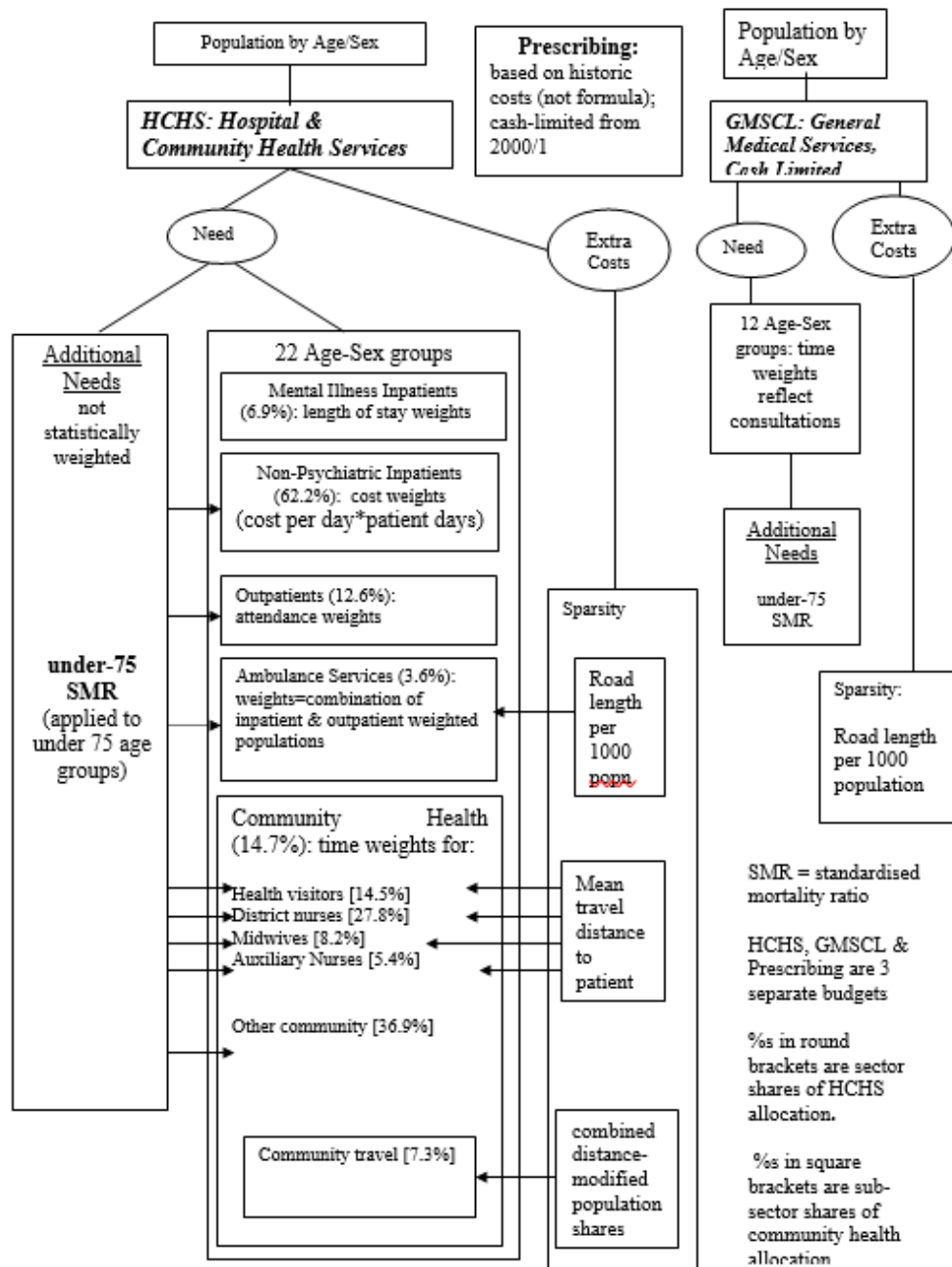


Figure 17. Welsh resource allocation 2000/1 (source: <http://www.bristol.ac.uk>)

“The Welsh formula might not be considered the ‘best current practice’ as its neighbors England and Scotland. There are several reasons: the under-75 SMR is the unique indicator of additional health and it is inappropriate for mental health services, for example. Furthermore, this SMR indicator is not validated and weighted against any health service utilization data and it has been assumed a weight of 1” (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001).

“The age-gender weights and sparsity cost adjustments for community health services are based on data from 1982. The expenditure percentages used to combine resource estimates for each health sector (in-patient, out-patient, community health, ambulance and mental illness) are based on expenditures in 1990. Statistical methods used to separate out need and supply influences on utilization have not been used in the formula construction. It was suggested⁵⁴ to include weighted socio-economic indicators used in the English formula, modified according to Welsh expenditure but that was not implemented” (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001)

⁵⁴ (Independent Commission on Funding and Finance for Wales, 2010)

5. DISCUSSION

5.1 Study objective

The study aimed to describe and examine the different capitation formulas used in healthcare sector across seven chosen European countries: Italy, Spain, Denmark, Norway, England, Scotland, Wales. It is important to point out that there has been a focus on hospital care, whenever possible.

The ultimate objective might be the suggestion of a best practice among the countries mentioned above or, if this is not the case, an outline of positive aspects, if any, related to the capitation models adopted by the countries and that can be used as benchmark for the others.

The general parameter adopted in this discussion to evaluate if a capitation model is good or not, or if it can be used as benchmark or not, is the “degree” of equality reached or if avoidable health inequalities are reduced through the capitation system.

The decision of equity instead of the efficiency objective as criterion is purely based on my personal decision to look closer to that side of the trade-off, even if efficient intents are always implied in the capitation models and hence still part of the evaluation of the system. As Rice and Smith (2001) mentioned “it is therefore important to keep in mind that the motive behind many capitation systems is to secure control of expenditures – a macroeconomic efficiency concern- and that there is an inextricable link between the equity and efficiency rationale for capitation”.

Considering that the capitation schemes are dependent to the health care systems they seek to serve (Rice & Smith, 2001) and hence to health care setting, the political objectives, or more precisely political consensus, are inevitably part of the evaluation and sometimes the cause of the “success” of a capitation system.

The role of parameters of need (at both aggregate and individual level, when possible) is essential for an equity oriented allocation of funds, as well as the precision and sophistication of the variables included in the formula but this also strictly dependent to the quality and availability of the information gathered. These are all features that serve as basis for the discussion.

5.2 Main findings

There are some similarities in how the formulas are constructed, like for example the factors which are considered fundamental elements; demography with age and sex, might be considered as such. Factors defined as socio-economic are found in some formulas, although the level of refinement differs. Demography and socio-economic variables are considered as widely accepted but considerable variation exists in the use of factors like ethnicity and/or geographic location, which depends on the peculiar objectives that the healthcare system aims to face. Nevertheless, even if a factor is included in a capitation formula, this might not have a strong influence on the allocation funds (Rice & Smith, 2001).

In the following section, the seven countries are considered one by one.

Italy

The Italian capitation can be described as mainly following a logic based on equity, coherent with choices of the English NHS; the two systems might be considered similar in the objectives intended to pursue but the health consumption occupies a central role in the Italian formula and exposes the system to finance what already exists, just because it exists

In general, the Italian allocation method appears to be only a little justifiable for the weights estimates and because it seems to privilege the status quo and not the population needs. As already explained, the consumption instead of needs does not appear to be acceptable for horizontal equity objectives.

Spain

The Spanish capitation cannot be considered neither sophisticated nor particularly equitable. Lack of data is the main justification, in Spain, for lack of objective weights. Nevertheless, age and sex of the population are generally easy to retrieve because recorded but those factors are not used as individual level measures (the only country analyzed in this paper not doing so)

However, geographical equity is guaranteed in cross boundary flows and foreign European patients through a cohesion fund that compensate the regions, as well as a containment of regional diversity through an equalization fund. Furthermore, the excessive deviation in per capita health expenditures among the regions (e.g., due to immigration), is covered by central transfers through a pre-specified amount.

Denmark

The Danish capitation formula includes several sociodemographic criteria in allocating the resources for healthcare to each region. These criteria are, on order of importance (and hence from the highest associated weight): the number of elderly people living alone, the number of families receiving social security, the number of children of single parents, of people living in rented housing, of lost living years, calculated by comparing with the region with the highest average life expectancy, of psychiatric patients who have been in contact with a psychiatric hospital department within the latest 10 years and the number of patients with a diagnosis of schizophrenia who have been in contact with a psychiatric hospital department within the latest 10 years.

It can be derived that at aggregate level, there is a high level of refinement of the formula, nevertheless this cannot be used as an indicator of equitable objectives because of “their use being predominantly opportunistic (that is, usually based on data availability rather than on a direct link to health care needs)” (Rice & Smith, 2001).

Norway

The Norwegian capitation aims to pursue both horizontal and vertical equity, as the official documents say, but that might not be feasible at the same time because of the reasons mentioned before in this paper. There is a certain level of refinement at aggregate level, based on the numerous socio-economic variable employed.

The model identifies four types of services, as described in the previous chapter, and for each service the percentages determine which group of variables are the most important determinant of need and also the actual share of expenses (Magnussen, 2010). For somatic services age accounts for 58% and social variables for 42%; among those variables there are: mortality, employment status, receiving rehabilitation compensation, level of education, municipal socio-economic index and index for climate and latitude. For psychiatric services, on the other hand, age accounts for 55% but social variables for 45% (among which: marital status, disability pension, living with one parent, child protective services, level of education and non-western immigrants).

Risk adjustments are suggested by a public committee, but consensus is needed in order to be a powerful instrument (Magnussen, 2010) and not always the government accepts reallocation

of resources, typically for political reasons. As Rice et al., (2001) wrote, in Norway “empirical results are moderated by political judgement”.

England, Scotland and Wales

The systems in the UK population data are cross-classified by age and sex, but not by other dimensions of socio-economic variation, which are handled in an aggregate manner.

“All UK resource allocation formulae operate on the principle of fairness or equity. They have the objective of equalizing access to health care for equal need. As the health care system in the UK is geographically based, this means that ‘health areas’ in equal need of health care should receive equal resource allocations” (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001). But another objective for the allocation of resources has been included and it is important to mention i.e. the reduction of avoidable inequalities.

The English formula presents some essential features that can be used as reference points for Wales, which is considered to fail to reflect best current practices.

- “Formula review and development: continuous development and improvement which also influenced the reviews in Scotland
- Additional needs indicators
- Market forces factors –England has the most sophisticated treatment of such factors
- In-patient treatment costs
- Rurality and emergency ambulance cost adjustment (EACA)
- Unavoidable costs of ethnicity
- Adjustments for unmet needs
- Avoidable health inequalities reduction” (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001)

The Scottish essential characteristics that can be used as reference points for Wales are the following:

- “the resource allocation formula uses indirect evidence of health needs (a very data demanding approach because it uses complex statistical analysis)
- Extent and testing of evidence on health needs (premature mortality and a wide range of socio-economics and indirect demographic measures of health needs
- Identification of the most important (and updateable) needs indicators

- In-patient treatment costs (more transparent and accurate costing of hospitalization using fixed treatment and variable length-of-stay costs)
- Excess costs in rural/remote areas
- Market forces factors (staff, land and building costs)
- Unmet need and health inequalities” (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001)

The Welsh formula presents the following weaknesses:

- “Weak evidence base – the under-75 SMR sole proxy indicator of additional needs
- Use of out-of- date information
- No control of supply effects when using utilization data” (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001).

Confronting resources allocation formulas highlighted similarities among the seven countries analyzed but also differences in their interpretation because of the political, socio-demographic and health systems determining factors. “The construction of the capitation formula is partly technical and partly a contextual process” (Marmor , Freeman, & Okma, 2009).

Basic demographic factors shape a common empirical method in attributing expected health expenditures; age and in most cases sex can be considered a starting point common to all the seven countries (only Spain is excluded). Likewise, variable reflecting socio-economic status are found in all the formulas, even if they differ in the choice of area-level and individual-level data differs in all of them. Nevertheless, in contrast to these generally accepted factors, there is a high variation among the elements associated to exceptional challenges faced by each country. For example, immigration in Spain that can differ from one region to another and hence the expenditures deviation of those regions experiencing higher immigration, is covered by the central government. Similarly, “England has the most sophisticated treatment of the *market forces* factors, especially for staff costs but its relevance to Wales, for example, is questionable, especially as Wales does not appear to have the equivalent of a ‘London and South East’ effect, particularly on wages and salaries”⁵⁵, while the English treatment of land values for NHS Trusts should be of interest in Wales (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001).

⁵⁵ (Lloyd , Senior, Rigby , Shaw, & Shlomo, 2001)

6. CONCLUSION

The interpretation and implementation of the core structural elements of the capitation formulas are inevitably a function of broader political, socio-demographic and health system factors, meaning that there are also considerable differences among the seven approaches studied and not only similarities as mentioned in the discussion. This indicates that the formula construction, like most health policy issues, is partly a technical and partly a contextual process (Marmor , Freeman, & Okma, 2009); as Huck et al. (2002) wrote “the resource allocation based on equity principle is an acute political problem”.

Searching for one best method among the seven jurisdictions was behind the scope of this thesis but studying the different health systems have led to a deeper knowledge of the models analyzed and the awareness that any attempts to develop a formula is dependent on data availability and the decision of goals and parameters by policy makers, which in turn is influenced by public preferences

The comparative approach taken in this thesis, also implies that further work and research is necessary to examine if the seven health systems adequately represent and account for the characteristics and the health care needs involved in the formulas. Likewise, further studies are needed in terms of political decisions, policies and recommendations with regards to the formula composition of the health systems, including the strength of data and other information used for that. Additional studies evaluating reform implementation in this context are required. Ultimately, research is needed to assess if any of the formulas used in the different health systems performs better than others in achieving similar policy purposes, or if the specific elements that characterize the formulas of each country cannot be used as basis for measuring the improvement or weakening of performance.

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APPENDICIES

Appendix A- Allocation tables (Italy)

Table 1. Allocation 2012: levels of care considered, weighting criteria used, weighted coefficients for age classes (Source: Presidency of the Council of Ministers, 2014)

<i>Livello di assistenza</i>	<i>Quota FSN</i>	<i>Sotto livello di assistenza</i>	<i>Quota FSN</i>	<i>Criteri di riparto</i>
Prevenzione	5%			Popolazione non pesata
Distrettuale	51%	Medicina di base	7%	Popolazione non pesata
		Farmaceutica	13,57%	Tetto imposto sul fabbisogno complessivo
		Specialistica	13,3%	Popolazione pesata
		Territoriale	17,13%	Popolazione non pesata
Ospedaliera	44%			50% Popolazione non pesata; 50% Popolazione pesata

Livello di assistenza	Meno 1 anno	1-4 anni	5-14 anni	15-24 anni	25-44 anni	45-64 anni	65-74 anni	Oltre 75 anni
Specialistica	0,391	0,288	0,341	0,382	0,627	1,123	2,155	2,136
Ospedaliera	3,184	0,364	0,234	0,371	0,544	0,923	2,047	2,844

Table 2: Resident Population and economic values (in millions of euros) of the FSN allocation for year 2012 as function of the adopted criteria (Source: Presidency of the Council of Ministers, 2014)

Regione	Popolazione	Prevenzione	Distrettuale				Totale
			Territoriale	Med di base	Farmaceutica	Specialistica	
Piemonte	4.457.335	389	1.335	545	1.080	1.088	4.048
Valle D'Aosta	128.230	11	38	16	31	30	115
Lombardia	9.917.714	867	2.970	1.213	2.348	2.305	8.837
PA Bolzano	507.657	44	152	62	118	112	443
Pa Trento	529.457	46	159	65	125	121	469
Veneto	4.937.854	431	1.479	604	1.168	1.145	4.396
Friuli Venezia Giulia	1.235.808	108	370	151	301	305	1.127
Liguria	1.616.788	141	484	198	403	419	1.505
Emilia Romagna	4.432.418	387	1.328	542	1.069	1.068	4.007
Toscana	3.749.813	328	1.123	459	911	920	3.413
Umbria	906.486	79	271	111	220	221	823
Marche	1.565.335	137	469	191	378	377	1.415
Lazio	5.728.688	501	1.716	701	1.353	1.324	5.094
Abruzzo	1.342.366	117	402	164	321	317	1.205
Molise	319.780	28	96	39	77	76	288
Campania	5.834.056	510	1.747	714	1.331	1.242	5.034
Puglia	4.091.259	357	1.225	500	953	915	3.594
Basilicata	587.517	51	176	72	139	136	523
Calabria	2.011.395	176	602	246	470	452	1.771
Sicilia	5.051.075	441	1.513	618	1.176	1.125	4.432
Sardegna	1.675.411	146	502	205	396	389	1.492
Totale complessivo	60.626.442	5.297	18.158	7.416	14.367	14.091	54.032

Table 2: (Second Part⁵⁶) Resident Population and economic values (in millions of euros) of the FSN allocation for year 2012 as function of the adopted criteria. (Source:

Presidency of the Council of Ministers, 2014)

Regione	Ospedaliera			Fabbisogno	Finalizzate	Riequilibrio	Finanziamento
	Pesata	Non Pesata	Totale	Totale	Totale	Totale	Totale
Piemonte	1.811	1.714	3.524	7.962	13	3	7.978
Valle D'Aosta	50	49	99	226	0	- 1	225
Lombardia	3.801	3.813	7.614	17.318	68	- 44	17.341
PA Bolzano	184	195	379	866	1	- 3	865
Pa Trento	200	204	403	918	2	- 2	918
Veneto	1.888	1.898	3.786	8.614	23	- 29	8.608
Friuli Venezia Giulia	507	475	982	2.217	3	- 3	2.218
Liguria	707	622	1.328	2.974	7	72	3.054
Emilia Romagna	1.786	1.704	3.490	7.885	29	- 13	7.901
Toscana	1.538	1.442	2.980	6.720	16	- 6	6.730
Umbria	370	348	718	1.620	3	- 1	1.622
Marche	631	602	1.233	2.784	6	- 3	2.787
Lazio	2.183	2.202	4.385	9.980	31	- 29	9.982
Abruzzo	529	516	1.045	2.367	4	13	2.383
Molise	128	123	251	567	1	7	575
Campania	2.028	2.243	4.271	9.815	25	55	9.895
Puglia	1.503	1.573	3.076	7.028	11	- 11	7.028
Basilicata	225	226	451	1.026	1	5	1.032
Calabria	747	773	1.520	3.466	8	10	3.484
Sicilia	1.857	1.942	3.799	8.672	13	- 12	8.674
Sardegna	636	644	1.280	2.918	3	- 9	2.912
Totale complessivo	23.308	23.308	46.616	105.945	269		106.214

⁵⁶ Important for hospital care (in table: *ospedaliera*)

Appendix B- NCHS Indices by care programme (Scotland)

Age Sex Index							
HB	Health Board	Acute	Care of the Elderly	Mental Health & Learning Difficulties	Maternity	Community	Overall HCHS
A	Ayrshire & Arran	1,074	1,142	1,025	0,955	1,018	1,053
B	Borders	1,132	1,247	1,053	0,955	1,033	1,097
F	Fife	1,026	1,041	1,002	1,011	1,006	1,019
G	Greater Glasgow & Clyde	0,958	0,932	0,984	1,053	0,992	0,972
H	Highland	1,092	1,177	1,040	0,885	1,018	1,063
L	Lanarkshire	0,981	0,911	0,984	1,029	0,992	0,984
N	Grampian	0,970	0,934	0,994	0,994	0,991	0,977
R	Orkney	1,098	1,167	1,048	0,885	1,020	1,068
S	Lothian	0,940	0,891	0,979	1,050	0,989	0,959
T	Tayside	1,051	1,172	1,026	0,929	1,014	1,038
V	Forth Valley	0,996	0,953	0,994	0,963	0,994	0,992
W	Western Isles	1,158	1,392	1,080	0,882	1,040	1,118
Y	Dumfries & Galloway	1,149	1,310	1,066	0,862	1,037	1,107
Z	Shetland	1,012	0,978	1,003	1,072	0,997	1,009

Table 9. Age Sex Index (Source: ISD Scotland, 2015)

Table 9. shows “the age-sex indices by care programme. It shows the allocation per head of population relative to a national average of 1.0 (e.g. Highland's Acute index is 9.2% above the national average, while Lothian's Acute index is 6.0% below the national average)” (ISD Scotland, 2015). To produce the overall HCHS index, all care programmes indices are combined by using care programme expenditure weights (Table 8-in text).

Additional Needs (MLC) Index							
HB	Health Board	Acute	Care of the Elderly	Mental Health & Learning Difficulties	Maternity	Community	Overall HCHS
A	Ayrshire & Arran	1,014	1,015	1,073	1,013	1,021	1,022
B	Borders	0,887	0,897	0,855	0,995	0,927	0,896
F	Fife	0,979	0,985	0,936	0,998	0,977	0,974
G	Greater Glasgow & Clyde	1,100	1,095	1,178	1,009	1,075	1,100
H	Highland	0,941	0,949	0,967	0,995	0,971	0,952
L	Lanarkshire	1,071	1,077	1,013	1,009	1,026	1,051
N	Grampian	0,917	0,924	0,901	0,988	0,948	0,925
R	Orkney	0,918	0,932	0,948	0,997	0,957	0,933
S	Lothian	0,958	0,952	0,926	0,985	0,969	0,957
T	Tayside	0,955	0,955	0,956	0,999	0,975	0,961
V	Forth Valley	0,995	0,999	0,925	1,001	0,980	0,984
W	Western Isles	0,971	0,982	1,044	1,017	0,998	0,987
Y	Dumfries & Galloway	0,948	0,956	0,885	1,005	0,956	0,944
Z	Shetland	0,907	0,917	0,833	1,011	0,928	0,907

Table 10. Additional Needs (MLC) Index (Source: ISD Scotland, 2015)

Table 10. shows “the Additional Needs (MLC) Index by care programme. It shows the allocation per head of population relative to a national average of 1.0 (e.g. Shetland's Maternity index is 1.1% above the national average, while Tayside's Maternity index is 0.1% below the

national average)” (ISD Scotland, 2015) To produce the overall HCHS index, all care programmes indices are combined by using care programme expenditure weights (figure 22-in text).

Excess Costs Index								
HB	Health Board	Acute	Care of the Elderly	Mental Health & Learning Difficulties	Maternity	Community Travel-based	Community Clinic-based	Overall HCHS
A	Ayrshire & Arran	0,989	1,038	0,976	1,026	0,989	0,978	0,989
B	Borders	0,997	1,061	0,986	1,034	0,996	1,142	1,009
F	Fife	0,988	1,003	0,959	1,010	0,976	0,959	0,982
G	Greater Glasgow & Clyde	1,005	0,874	1,008	0,951	0,984	0,923	0,991
H	Highland	1,013	1,203	1,111	1,125	1,179	1,384	1,084
L	Lanarkshire	0,987	0,985	0,966	1,003	0,981	0,943	0,981
N	Grampian	1,002	1,009	1,010	1,002	0,984	1,038	1,003
R	Orkney	1,136	2,238	1,129	1,340	1,336	1,264	1,212
S	Lothian	1,001	0,922	0,997	0,971	0,982	0,935	0,989
T	Tayside	1,000	0,981	1,001	0,992	0,985	1,020	0,999
V	Forth Valley	0,986	1,003	0,962	1,011	0,982	0,968	0,983
W	Western Isles	1,134	2,236	1,127	1,338	1,385	1,483	1,235
Y	Dumfries & Galloway	0,997	1,101	1,001	1,052	0,995	1,177	1,015
Z	Shetland	1,140	2,247	1,133	1,345	1,355	1,343	1,225

Table 11. Excess Costs Index (Source: ISD Scotland, 2015)

Table 11. shows “Unavoidable Excess Costs Index by care programme. It shows the allocation per head of population relative to a national average of 1.0 (e.g. Orkney's Care of the Elderly index is 123.8% above the national average, while Lanarkshire's Care of the Elderly index is 1.5% below the national average)” (ISD Scotland, 2015).

Appendix B (i) - How the formula works in practice (Scotland)

As in most resource allocation formulae the main driver is the population size of each area. The more people you have, the more resources you will get. However, this on its own would not be a fair way of distributing resources as it is widely known that older populations, deprived populations etc. need a higher amount of resource than average. For this reason, a series of adjustments are made to the base population of each area in what is known as a weighted capitation approach.

“The four components of the formula are: 1. Population; 2. Age/Sex adjustment; 3. MLC adjustments ⁵⁷ and 4. Unavoidable Excess Costs of Supply adjustment often referred to as Excess Costs ⁵⁸. The population of an area is taken as a starting point and it is actually the primary component of the formula; this is then multiplied by a series of ‘indices’ – the age-sex index, the MLC index, and the excess costs index – to arrive at a final *weighted* population” (ISD Scotland, 2015) as showed in the following figure:

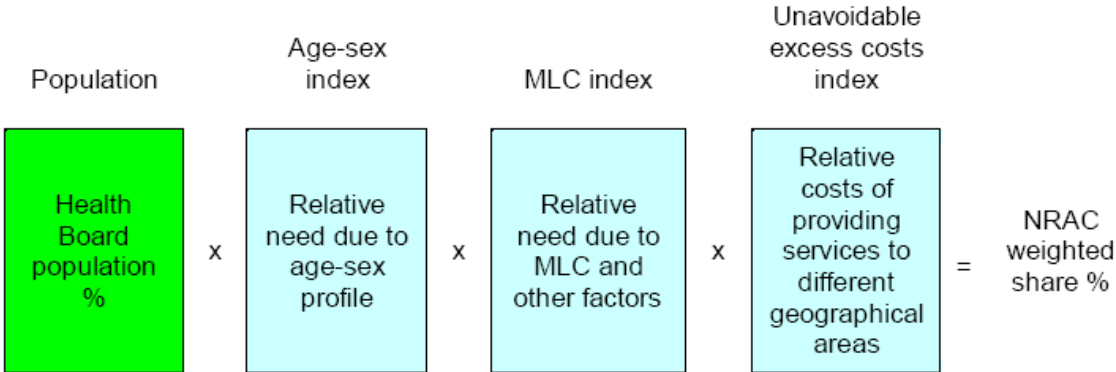


Figure 18. Illustration of the NRAC weighted share process (source: ISD Scotland, 2015)

“An index is defined as the predicted cost per head of healthcare in the area divided by the national average cost per head⁵⁹

⁵⁷ accounts for additional needs of the population over and above those due to age and sex
⁵⁸ accounts for unavoidable additional costs of delivering services due to remoteness and rurality
⁵⁹ For example, the age-sex index is the expected cost per head, taking into account the age and sex structure of the population, divided by the national average cost per head.) Thus, an area in which the expected cost per head is “average” will have an index value of 1 (ISD Scotland, 2015).

For Hospital & Community Health Services (HCHS), population shares are based on re-based population projections, which are simple adjustments made to the NRS population projections to update them using recent population estimates⁶⁰ “(ISD Scotland, 2015). “Age/sex index takes account of the differing need for healthcare across different age groups for males and females separately. Additional needs (MLC) index takes into account factors that predict the need for healthcare in addition to the needs due to age and sex, for example due to higher underlying morbidity. Unavoidable excess cost index takes account of the cost of supplying health services in remote and rural areas relative to more urban areas. There is no excess costs adjustment for GP Prescribing as drug reimbursement costs are uniform across the country. Out of hours (OoH) adjustment takes account for the out of hours` services. The overall ‘weighted’ share reflects the combined influence of the three elements (age-sex, MLC and excess costs) on the population share. It is calculated by multiplying the indices for these different factors. The indices are relative to the Scottish average value equal to 1.0.” (ISD Scotland, 2015)

⁶⁰ Mid-Year Population Estimates –MYEs (National Records of Scotland)

Appendix C- Elements in the HCHS component (England)

The HCHS component of the English formula has adjustments for a number of elements. The weights associated with the HCHS components of the English formula are listed below (Department of Health, 2009);

Element	Weight
Acute	67.5%
Maternity	2.9%
Mental health	16.1%
HIV/ AIDS Treatment and care	0.8%
HIV Prevention	0.2%
Health inequalities	12.4%

Table 12. Elements in HCHS component. (Source: *Department of Health, 2009*)

“For each element, the English formula makes adjustments for each Primary Care Trust- PCTs’ age related need, and its ‘additional need’ over and above age. The resulting population need is then adjusted to account for costs incurred by PCTs in providing healthcare” (Department of Health, 2009).

Acute

“Within each of the 18 age-bands, coefficients are applied to the relevant additional needs indicators to calculate a score which is used to estimate an average cost per head in each age-band” (Department of Health, 2009). “For example, for those aged 40-44, the PCT score is calculated as:

$$\begin{aligned}
 &476.9 \\
 &+ (418 * \text{death rate in 40-44 age category}) \\
 &+ (22.4 * \text{standardized proportion aged 16-74 with no qualifications}) \\
 &+ (27.6 * \text{standardized proportion of people with a long-term limiting illness}) \\
 &+ 15.7 * \text{proportion of Incapacity Benefit/ Severe Disability Allowance Claimants}
 \end{aligned}$$

The values of the additional needs variables used in this process are normalized so that they are each based around a national mean of 0 and standard deviation of 1, enabling straightforward comparison of variables that would otherwise be expressed on different scales”⁶¹.

Maternity

The Maternity need index calculates an average score per birth in each PCT derived from the equation:

$$\begin{aligned} & \text{“}2308.8 + \\ & 24.7 * \text{proportion of low-weight births} \\ & - 96.06 * \text{mean house price} \end{aligned}$$

As with the Acute element, the variables are normalized before being applied to the coefficients. The resulting average costs per birth are multiplied by the number of registered births to derive the total score for each PCT”⁶².

Mental health

“The mental health element of the English formula first calculates need associated with the age structure of the population, and then the ‘additional need’ associated with socio-economic factors. The age weights range from 0.0032 for the 0-4 year age band to 3.2985 for the 85+ age band, and represent the relative cost per head of providing mental health care to individuals in each age group. For each PCT, the age weights are multiplied by the population in each age group and summed over all age groups to estimate age-weighted need”⁶³.

The additional need score across all ages is calculated as:

$$\begin{aligned} & \text{“}0.385 \\ & + 0.358 * \text{Comparative Mortality Factor under 65 years} \\ & + 0.338 * \text{Proportion aged 60+ claiming income support} \\ & + 0.636 * \text{Psycho-social morbidity index} \end{aligned}$$

⁶¹ Department of Health, 2009

⁶² Department of Health, 2009

⁶³ Department of Health, 2009

+ 0.034*Indicator of housing deprivation”⁶⁴.

HIV/AIDS treatment and care

“This element accounts for 0.8% of the HCHS index”⁶⁵.

HIV prevention

“This element accounts for 0.2% of the HCHS index and is derived from SOPHID⁶⁶ data combined with data on the proportion of the population aged 15-44”⁶⁷.

⁶⁴ Department of Health, 2009

⁶⁵ Department of Health, 2009

⁶⁶ Survey of Prevalent HIV infections Diagnosed (UK)

⁶⁷ Department of Health, 2009

