UNIVERSITY OF PIRAEUS
SCHOOL OF ECONOMICS, BUSINESS AND INTERNATIONAL STUDIES
DEPARTMENT OF ECONOMICS

AN ECONOMIC ANALYSIS OF SERVICE QUALITY AND PATIENT SATISFACTION OF GREEK HEALTHCARE SYSTEM

Ph.D. Thesis

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A DISSERTATION SUBMITTED
TO THE DEPARTMENT OF ECONOMICS
OF UNIVERSITY OF PIRAEUS
IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Piraeus, 2015

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΑ
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ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΗΣ ΕΠΙΣΤΗΜΗΣ

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Διδακτορική Διατριβή

Σοφία Ξεσφίγγη

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Acknowledgements

First and foremost I want to thank my advisor Professor Yannis Pollalis. It has been an honor to be one of his Ph.D. students. He has taught me, both consciously and unconsciously. I appreciate all his contributions of time, ideas, and facilities to make my Ph.D. experience productive and stimulating. The joy and enthusiasm he has was contagious and motivational for me, even during tough times in the Ph.D. pursuit. I am also thankful for the excellent example he has provided as a successful person and professor.

The studies discussed in this dissertation would not have been possible without the help from Assistant Professor Athanassios Vozikis and the personnel of the hospital Agia Olga. I have appreciated their collaboration and the impressive willingness not only to participate in this research study providing the corresponding data, but also the effort to be always at my side. Some elements of the present thesis have been based on their collective work and have been presented in conferences.

For the econometric analysis, I am particularly indebted to Associate Professor Claire Economidou. She taught me the software STATA, how quality econometric research is performed and took care all the technical details of my research. Her insisting on the systematic publication of my research results helped me to retain an evolving research pace. Most of all, I thank her for being 'there for me' and treating me as an equal peer.

I would like to thank Assistant Professor Maria Raikou, for the support she gave me through the whole process and for sharing her ideas with me. I thank her for marathon, yet joyful, discussions and sharing of research experiences. I also thank Kyriakos Drivas and Dimitrios Karamanis for inspirational discussions, great assistance, and useful and intriguing comments on my research.

For this dissertation I would like to thank my reading committee members: Professors Christos Agiakloglou and Pantelis Pantelidis for their time, interest, and helpful comments. I would also like to thank the other members of my oral defense committee for their time and insightful questions. I take this opportunity to express gratitude to all of the Department of Economics faculty members for their help and support.

My time at University of Piraeus was made enjoyable in large part due to the many friends

that I have had the pleasure to work with or alongside of. I am grateful for time spent with other Ph.D. students and friends, and most of all for our memorable memories. Special thanks to Georgia Papadopoulou, not only for supporting me through the writing of this dissertation, but for being an excellent friend and part of my life.

I would also like to thank my family for all their love and encouragement. For my mother who raised me with a love of science and supported me in all my pursuits. For the understanding of my sisters during this period. And most of all for my loving, supportive, and encouraging grandparent whose was and always will be present in my life. I cannot Thank you more for this.

Last but not least, I place on record, my sense of gratitude to anyone who directly or indirectly, have lent their hand in this venture.

Sofia Xesfingi

Abstract

Quality in healthcare has been studied largely from the clinical perspective, excluding the patient's perception of service quality. Patient satisfaction is a topic that is important both to medical (health) providers, the patients (consumers) and other third-party stakeholders in the medical care industry. Patients' opinions are taken as part of producing a quality management, and the users' satisfaction is taken to determine the service quality dimension.

This dissertation aims to evaluate the quality of the Health System through the revealed preferences of its users. Among other factors, we take into account various socioeconomic factors and demographic parameters and derive relevant policy implications.

Chapter 1 introduces the topic of patient's satisfaction, relates it with the quality of healthcare service. The literature review reveals its importance, the factors related to it and previous ways to quantify it and measure it. The research motivation factors along with the research problems and questions are also presented.

Chapter 2 studies whether the European patients are satisfied with their country's healthcare system quality. The results demonstrate that more than half of the European patients are in general satisfied with their healthcare system. Public health expenditures as a percentage of GDP, population aging, as well as number of doctors and number of nurses increase patient satisfaction.

Chapter 3 examines the deviation documented between patients' preferences with respect to healthcare resources allocation and actual public spending on health. There is a small deviation between citizens' preferences with respect to health resources allocation and actual public health spending, while income, number of family members and residence seem to greatly shape these preferences.

Chapter 4 explores ehealth literacy as the ability in searching, analyzing, processing and comprehending information from the Internet in order to address or solve health related issues and reveals that the ehealth literacy level of Greek citizens is fair. The degree of ehealth literacy depends positively on education level and physical exercise, and negatively on the age of the participant.

Chapter 5 examines the case study of Konstantopouleio General Hospital, providing evidence

for the relationship between patient's satisfaction level and received services. The results demonstrate the important role of the attention received by the medical staff, nursing staff, and hospital's environment for both groups of in- and out-patients, while among the demographic factors, the perceived health status and age also play a significant role for the in-patients' satisfaction. The latter remains significant for out-patients, along with education and insurance.

Overall, patient satisfaction is related to healthcare outcomes, but it is also considered to be a tool for disseminating social inequalities; therefore, lightening how several factors associate with patients' preferences, and in consequence with patient satisfaction, taking into consideration specific characteristics of users, is extremely important. This research contributes to important discussions in the literature, for instance, the encouragement of patients' participation by introducing policies of empowerment the knowledge dissemination along with the democratization of the decision making process.

Περίληψη

Η ποιότητα στον τομέα της υγείας έχει μελετηθεί σε μεγάλο βαθμό από την κλινική οπτική γωνία, αφήνοντας εκτός την αντίληψη του ασθενούς για την ποιότητα των παρεχόμενων υπηρεσιών. Η ικανοποίηση των ασθενών είναι πολύ σημαντική για τους ιατρικούς παρόχους, τους ίδιους τους ασθενείς (καταναλωτές) και για τρίτους ενδιαφερόμενους στον ιατρικό κλάδο της υγειονομικής περίθαλψης. Οι απόψεις των ασθενών υιοθετούνται ως μέρος της διαδικασίας παραγωγής ενός συστήματος διαχείρισης ποιότητας και η ικανοποίηση των χρηστών για να καθοριστεί η διάσταση της ποιότητας των παρεχόμενων υπηρεσιών.

Η παρούσα διατριβή αποσκοπεί στην αξιολόγηση της ποιότητας του Ελληνικού Συστήματος Υγείας μέσω των προτιμήσεων των ίδιων των καταναλωτών του. Ανάμεσα σε άλλους παράγοντες, αρκετοί κοινωνικοοικονομικές παράμετροι λαμβάνονται υπόψη, όπως και αντίστοιχοι δημογραφικές, και χαράσσονται σχετικές πολιτικές.

Το Κεφάλαιο 1 εισάγει το θέμα της ικανοποίησης των ασθενών και το συνδέει με την ποιότητα του συστήματος υγείας. Μέσω της βιβλιογραφικής ανασκόπησης αναδεικνύεται η σημασία του, οι παράγοντες που το επηρεάζουν και άλλες προσπάθειες ποσοτικοποίησης και μέτρησής του. Παρουσιάζονται, επίσης, τα κίνητρα για την παρούσα διατριβή, καθώς και τα προβλήματα και τα ερωτήματα μελέτης.

Το Κεφάλαιο 2 μελετά το βαθμό ικανοποίησης των Ευρωπαίων πολιτών-ασθενών από την αποδοτικότητα και την ποιότητα του συστήματος υγείας της χώρας τους. Τα αποτελέσματα δείχνουν ότι περισσότεροι από τους μισούς Ευρωπαίους πολίτες είναι ικανοποιημένοι με το σύστημα υγείας της χώρας τους, με το επίπεδο αυτό να σχετίζεται θετικά με τις δημόσιες δαπάνες υγείας, τη γήρανση του πληθυσμού και τον αριθμό των νοσηλευτών-κλινών.

Το Κεφάλαιο 3 εξετάζει την απόκλιση που παρατηρείται ανάμεσα στις προτιμήσεις των ασθενών για τη χρηματοδότηση του συστήματος υγείας και στην πραγματική δημόσια χρηματοδότησή του. Η απόκλιση που καταγράφεται ανάμεσα στην πραγματική δαπάνη σε σχέση με τις προτιμήσεις των ασθενών για την κατανομή των πόρων είναι μικρή. Οι προτιμήσεις αυτές φαίνεται να επηρεάζονται σε μεγάλο βαθμό από το επίπεδο εισοδήματος, τον αριθμό των μελών οικογένειας και τον τόπο κατοικίας.

Το Κεφάλαιο 4 αναδεικνύει τη σημασία της ηλεκτρονικής παιδείας για τον τομέα της υγείας

και μελετά το επίπεδο των Ελλήνων πολιτών. Οι Έλληνες έχουν χαμηλό επίπεδο ηλεκτρονικής παιδείας όσον αφορά στα θέματα υγείας. Το επίπεδο της σχετικής με τα ζητήματα υγείας ηλεκτρονικής παιδείας σχετίζεται θετικά με το επίπεδο εκπαίδευσης και με το βαθμό φυσικής άσκησης, ενώ αρνητικά σχετίζεται με την ηλικία.

Το Κεφάλαιο 5 παρουσιάζει τη μελέτη περίπτωσης του Γενικού Νοσοκομείου «Κωνσταντοπούλειο». Τα δεδομένα συγκεντρώθηκαν από τον Ιούνιο του 2011 μέχρι τον Οκτώβριο του 2012 και αφορούν σε 745 νοσηλευόμενους ασθενείς (εσωτερικούς) και 420 ασθενείς που επισκέφτηκαν τα εξωτερικά ιατρεία (εξωτερικούς). Για την εκμαίευση του επιπέδου ικανοποίησης των ασθενών, μελετήθηκε η συσχέτιση της πρόθεσής τους να συστήσουν το νοσοκομείου σε άλλους με δημογραφικούς παράγοντες και παράγοντες που αφορούν στην αποτελεσματικότητα της παροχής υπηρεσιών υγείας. Τα αποτελέσματα δείχνουν ότι οι παράγοντες που σχετίζονται με τη λειτουργία του νοσοκομείου είναι οι πιο σημαντικοί για τη διαμόρφωση του επιπέδου ικανοποίησης των ασθενών. Από τους δημογραφικούς παράγοντες, η ηλικία των ασθενών είναι η μεταβλητή που παραμένει στατιστικά σημαντικά και για τις δύο ομάδες.

Συνοπτικά, η ικανοποίηση των ασθενών σχετίζεται με τις εκροές του συστήματος υγείας, αλλά, επίσης, θεωρείται ως ένα εργαλείο για τη διεύρυνση των κοινωνιών ανισοτήτων. Για το λόγο αυτό, η αποτύπωση των παραγόντων που επηρεάζουν το επίπεδο την ικανοποίησης των ασθενών, λαμβάνοντας υπόψη διάφορα χαρακτηριστικά τους, είναι πολύ σημαντική. Η παρούσα διατριβή συμβάλει σε σημαντικά θέματα της διεθνούς βιβλιογραφίας, όπως για παράδειγμα την ενθάρρυνση της συμμετοχής των ασθενών μέσω πολιτικών ενδυνάμωσης της γνώσης τους, διευρύνοντας ακόμα περισσότερο τη δημοκρατική φύση της διαδικασίας λήψης αποφάσεων.

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Chapter 1
Introduction

The thesis investigates three self-contained, yet strongly interrelated domains: (i) the performance of a healthcare system according to its users' point of view, (ii) the citizens' preferences with respect to the allocation of limited healthcare resources, and (iii) the importance of health literacy in order to assess the level of patient satisfaction. The latter is further evaluated through a case study of in- and out-patients of a General Hospital in Greece.

This chapter is structured as follows: Section 1.1 describes the motivating factors for the present research while Section 1.2 contains a short analysis of the corresponding theory, through a broad literature review. Section 1.3 poses the research problems and objectives, and associates them to the generated contributions. Finally, Section 1.4 provides the structure of the thesis.

1.1 Research Motivation

Patient satisfaction is a topic that is important both to healthcare providers, the patients and other third party stakeholders in the healthcare industry, but its measurement is challenged by the lack of an universally accepted definition. Patients' opinions are taken as part of producing a quality management, and the user's satisfaction is taken to determine the service quality dimension. Quality in healthcare has been studied largely from the clinical perspective, excluding the patients' perception of service quality. Based in these observations, a set of motivating factors fueled our research and are described in the sequel.

The rapidly increase of publications with respect to patient satisfaction stimulated our interest to further expand our knowledge in the aforementioned domain. Through a preliminary literature review, we first realized that there is not a systematic framework to measure patient satisfaction degree, which, at the same time, would be flexible enough in order to be applicable in different healthcare systems. We thus decided to proceed to an extensive literature review on research works of the last

decade and to extract results, covering both its measurement and its possible implementation.

Our first aim was to assess the Greeks patients' satisfaction level, using the records that all Quality Offices were obligated to keep, along the guidelines of the Ministry of Health. Among the 400 hospitals in Greece, no matter what their size is, only one was able to provide these records of in- and out-patients and agreed to cooperate with us. We decided, finally, to use the data collected and the results of this research are presented in the corresponding case study of Chapter 5.

The aforementioned literature review revealed that there is no estimation method on which we can base in order to evaluate the patient's satisfaction level. The method used from the Greek Ministry of Health, although it was aiming to cover a great number of issues, was very difficult to be expanded in other healthcare institutions. We, therefore, decided to use the collected data in a case study and to follow different directions with respect to patient satisfaction measurement. Nevertheless, the literature review highlighted the importance of service quality and citizens' involvement in decision making process.

The literature suggests that the measurement of patient satisfaction reflects dimensions considered important by researchers and not by responders; therefore, we decided to turn to the perceived health service quality. In doing so, we used web-published data regarding the performance of a healthcare system, as revealed through the eyes of its users, and we tried to assess patients' satisfaction. This research resulted in the construction of the *Satisfaction Index*, presented in Chapter 2.

The Satisfaction Index revealed that public spending on health plays prominent role on patient's satisfaction. Therefore, we investigate if the actual public spending on healthcare functions is meeting the citizens' preferences. In doing so, we collected web- and interview-based data and we associate the deviation documented between citizens and public spending on health with socio-demographic factors. This research is presented in Chapter 3.

Both of the aforementioned studies demonstrated that apart from healthcare provision factors, results significantly depend on demographics factors. We thus focus our actions on the investigation of the importance of the eHealth literacy level of the

participants. The latter is mentioned in the literature but poorly evaluated. This research is presented in Chapter 4, where the eHealth literacy level of Greek citizens is evaluated and related to other demographic factors.

1.2 Literature review

Quality of care from the patient's perspective and patient satisfaction are two major multidimensional concepts that are used several times interchangeably (Raftopoulos, 2005). There has been confusion and controversy in healthcare as to whether patients are in fact consumers. This confusion may be at the root of the overall service failing of hospitals (Fottler *et al.*, 2002). Using a technical definition, a customer is anyone who has expectations about process operations or outputs (James, 2003); therefore all patients are customers, but not all customers are patients. A gravity-efficiency analysis, first proposed by Martilla and James (1977), was used as a tool for determining the quality factors of products or services, on which should focus an organization that wants to have satisfied customers. The Kano model is used in order to understand customer requirements and their impact on customer satisfaction.

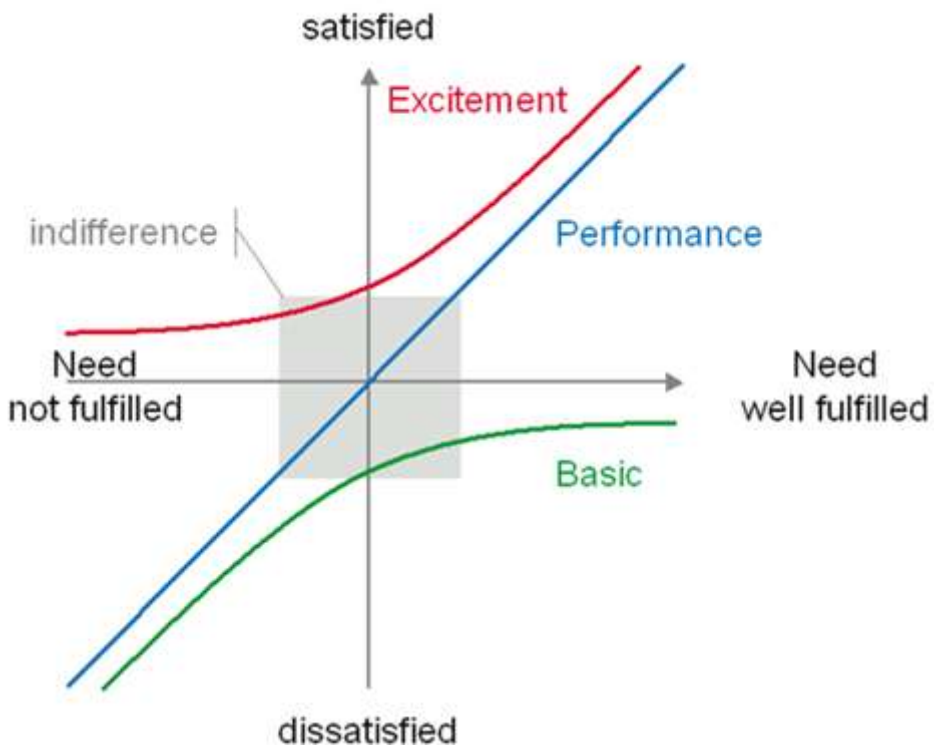
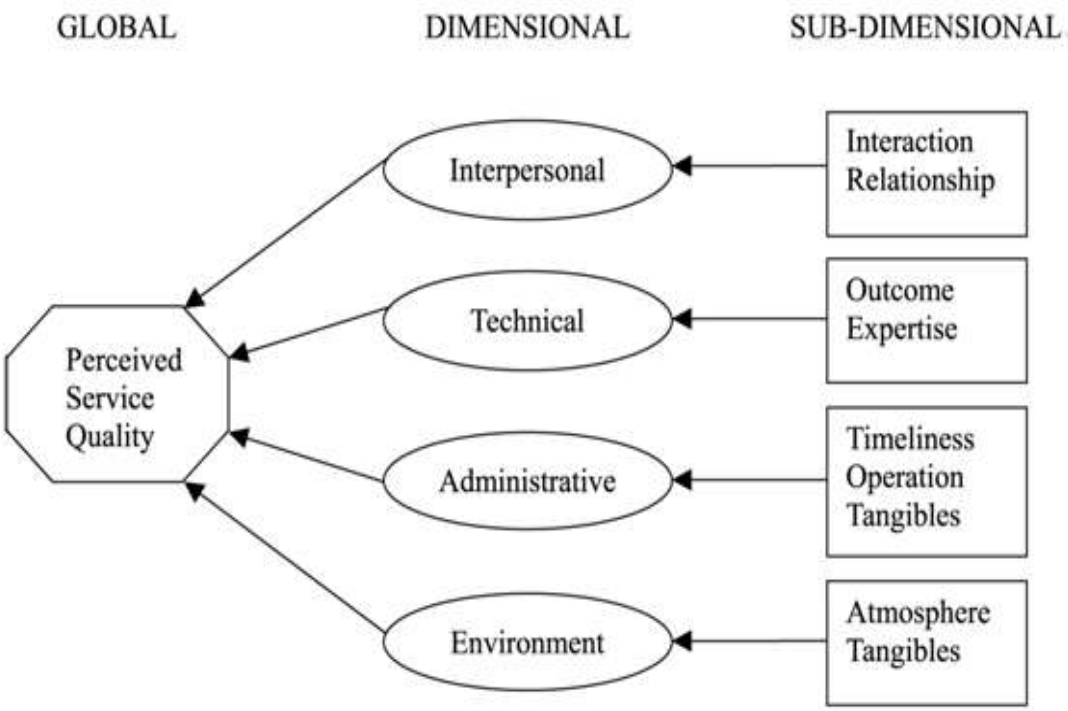


Figure 1.1: The Kano model

According to Kano *et al.* (1984), there are three categories of quality factors and those are: the key factors, the performance factors and the excitement factors. Donabedian (1988) was one of the first who focused their interest on healthcare quality by separating it into structure, process, and outcome, and pursuing quality in all three aforementioned areas in order to achieve greatest benefit for the patient with the minimum cost. In the majority of the research study, simple deterministic models or multiple linear regression models are used for the assessment of the factors' gravity in shaping patients' satisfaction level. According to Hansen and Bush (1999), the allocation of the available health resources is based on those models.

According to Raftopoulos (2005), the quality of care has a subjective profile as it involves a cognitive evaluation process and an objective determinant, which is "care" as an outcome, a process or a structure measure. On the other hand patient satisfaction tends to have an objective profile and determinant, which is patient's subjection. If we add the word perceived to both terms (quality and satisfaction) we conclude to an opposite meaning result: perceived quality of care and perceived satisfaction become a totally subjective concept as they are based on patients' own feelings.



Source: Dagger *et al.* (2007).

Figure 1.2: Multi-dimensional hierarchical model of perceived service quality.

A competitive health market is usually quality-oriented, and improving the quality of care service is a continuing challenge to healthcare providers (Tzeng, 2002). According to Bleich *et al.* (2009), consumer satisfaction studies are challenged by the lack of a universally accepted definition of measure and by a dual focus: while some researchers focus on patient satisfaction with the quality and type of healthcare services received, others focus on people's satisfaction with the health system more generally. According to (Harron *et al.*, 2012), the patients' opinions are taken as part of producing a quality management, and the users' satisfaction is taken to determine the service quality dimension. The key to solving this problem may be for the healthcare sector to focus on perceived health service quality.

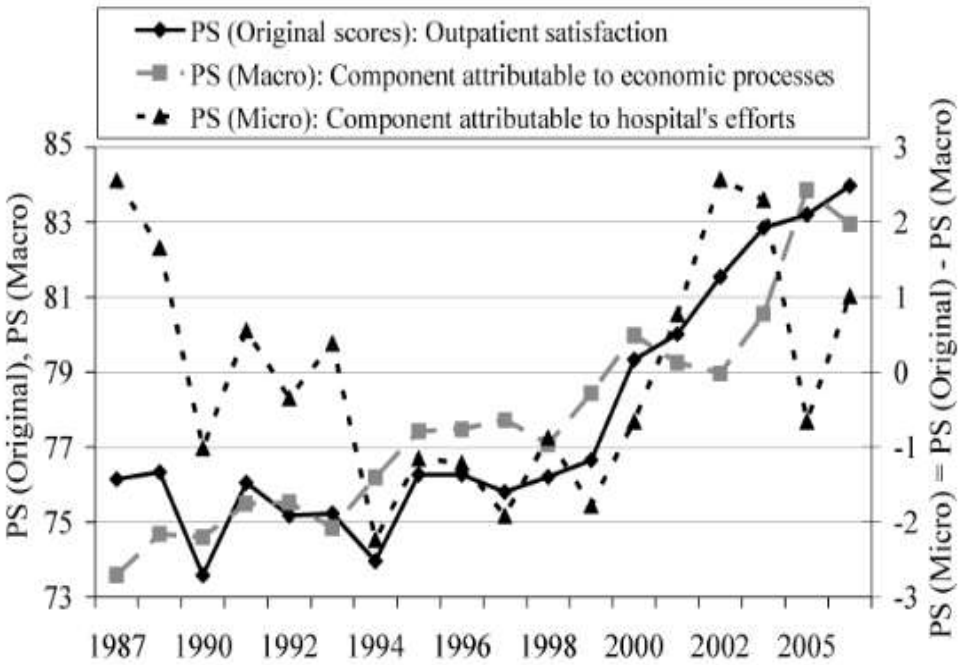
Quality was very popular in the marketing literature where the notion of satisfying the customer was a dominant model of quality of service provided and consumer satisfaction ("Satisfaction with Physician and Primary Care Scale", Hulka *et al.*, 1970; "Patient Satisfaction Questionnaire", Ware and Snyder, 1975; "Client Satisfaction Questionnaire", Larsen, 1979, later transformed to "Patient Satisfaction Scale", e.tc.). Only a few researchers developed a conceptual framework for conceptualization of service quality and patient satisfaction, before validating their scale (Wilde *et al.*, 1983). Measurement of patient satisfaction lacks a conceptual soundness as it reflects dimensions considered important by researchers and not by responders. Further, quality in healthcare has been studied largely from the clinical perspective, excluding the patient's perception of service quality (Gill and White, 2009). The most frequently used theoretical model of consumers satisfaction is the one developed by Parasuraman *et al.* (1988). SERVQUAL was designed to accommodate measurement of service quality across a wide spectrum of services including healthcare services.

The importance of quality in the healthcare sector has been recognized recently, but it has been accelerated over the past years. According to Montazeri (2008), the minimum required for a basic model to evaluate the quality of service, should include the following five dimensions: treatment, time of hospitalization and other resource utilization measurements, mortality, health status, and finally patient satisfaction with the health services provided. The stated aims of patient feedback programmes are normally twofold: to monitor performance and to stimulate improvements in the quality of care. These goals are not contradictory, but neither are entirely

complementary (Reeves and Secombe, 2007). For example, assessing patient satisfaction can be mandatory for French hospitals since 1998, which is used to improve the hospital environment, patient amenities and facilities in a consumerist sense, but not necessarily to improve care (Boyer *et al.*, 2006).

Patient satisfaction is a topic that is important both to medical (health) providers, the patients (consumers) and other third-party stakeholders in the medical care industry (Ofili, 2014). It is, therefore, a dominant concept in quality assurance and quality improvement programmes (Raftopoulos, 2005). Understanding satisfaction and service quality have, for some considerable time, been recognized as critical to developing service improvement strategies to (Bleich *et al.*, 2009). Macro-level economic processes have an overwhelming impact up to 89% on variations in patient satisfaction (Frank et al., 2009); therefore improvement programmes cannot ignore these external factors when using patient satisfaction surveys to evaluate the effects of managerial decisions (Lee and Yom, 2007).

Figure 5.1 demonstrates that the long-term rise in total satisfaction is mainly caused by economic processes.



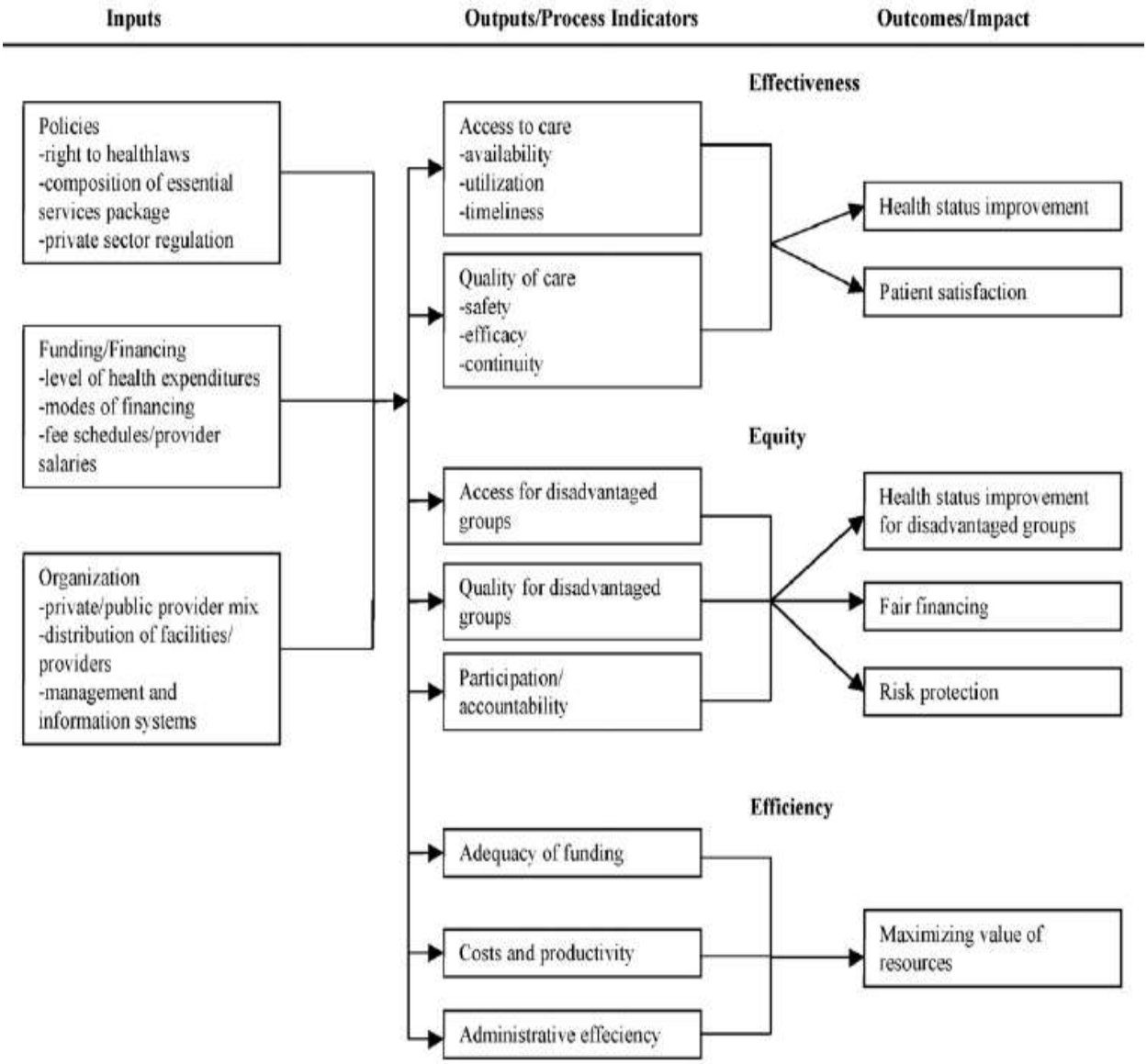
Source: Frank *et al.*, 2009

Figure 1.3: Macro and micro components of outpatient satisfaction.

According to Gill and White (2009), there is no consensus on how to best conceptualize the relationship between patient satisfaction and theirs perceptions of the quality if their healthcare. Health sector research into patients' perceptions of the dimensions of service quality (perceived service quality) has been limited (Clemes *et al.*, 2001), yet studies seeking to assess the components of the quality of care in health services predominately continue to measure patient satisfaction (Lee *et al.*, 2006). O'Connor and Shewchuck (2003) emphasized that much of the work on patient satisfaction is based on simple descriptive and correlation analyses with no theoretical framework. They concluded that, with regard, to health services, the focus should be on measuring technical and functional (how care is delivered) quality and not patient satisfaction. Ferris *et al.* (1992) suggest that the behavioral consequences of patient satisfaction should result in betted medical care and improved outcomes, but only if satisfaction correlated primarily with healthcare of high technical quality.

Patient satisfaction is an important measure of healthcare quality because it offers information on the provider's success at meeting the expectations of most relevance to the client (Donabedian, 1983). Recent research has shown than service satisfaction can significantly enhance patients' quality of life (Dagger and Sweeney, 2006) and enable service providers to determine specific problems of customers, on which corrective action can then be taken (Oja *et al.*, 2006). With the advent of the patient rights movement (Williams, 1994), the debate over the relationship between patient satisfaction as an evaluation of the process of care versus the standard of technical care was well established. As a result, the use of patient satisfaction measures in the health sector became increasingly widespread (Gill and White, 2009). The inaugural quality assurance work of Donabedian (1980) identified the importance of patient satisfaction as well as providing much of the basis for research in the area of quality assurance in healthcare. The desired need for measurement of patient satisfaction has been largely driven by the underlying politics of "new public management" (Hood, 1995) and the concomitant rise in the health consumer movement, with patient satisfaction being the one of the articulated goals if healthcare delivery (Gill and White, 2009). In countries where health systems are largely funded through tax revenue or where access to health is guaranteed by the constitution, surveys of patient satisfaction can give the population an opportunity to express its opinion about an important social programme and hence about the ability of government to deliver on a

key obligation (Kurt and Freedman, 2008).



Source: Kurk and Freedman, 2008.

Figure 1.4: Framework for health systems performance measures

Mackintosh (2001) states that claiming to health services and conditions that promote health can be seen as assets of citizenship. Researches in developing countries have shown a clear link between a set of explanatory factors, among which service quality has been prominent (Rao et al., 2006; Zineldin, 2006), and patient satisfaction. Thus, distinct from clinical and economic goals, we could include public participation in decision making, accountability, and patient satisfaction as key aims of health systems (Kurk and Freedman, 2008). The latter has been studied and measured extensively as a standalone construct and as a component of outcome quality (Heidegger *et al.*,

2006) and continues to be measured as a proxy for the patient's assessment of service quality (Turris, 2005).

Although patient experience surveys are now widely accepted as valid indicators of healthcare performance, their usefulness in improving the quality of care at the organizational level has not yet been systematically researched (Reeves and Secombe, 2007). Lin and Kelly (1995) well articulated the importance of measuring patient satisfaction in the healthcare sector, while Hawthorne (2006) believes that patient satisfaction is a multidimensional concept, not yet tightly defined, and part of an apparently yet to be determined complex model, affirming Heidegger *et al.*, (2006), according to whom the concept of satisfaction is complicated, irrespective of the area in which is studied. According to Gill and White (2009), the continued misuse and perpetuation of the inter-changeability of terminology not only compromises the worth of research, it inhibits the possibility of finding much needed answers as how best to conceive and measure health service quality from the patient's perspective.

According to Vuori (1999), the validity of patient satisfaction measurement is challenged for five major reasons: a) patients have not the scientific and technical knowledge to assess the quality of care, b) patients may be on a psychological state that they are not allowed to express objective opinions, c) the rapid alternation of interventions, diagnostic tests and measurements leaves patients unable to formulate a comprehensive and impartial picture of what is happening around them, d) healthcare professionals and patients can have different objectives, and e) the concept of quality depends on cultural habits and may differ from place to place.

Gill and White (2009) provided a summary of the theories of patient satisfaction in the healthcare. According to Hawthorne (2006), the more recent theories are largely restatements of the five key theories that were published in the 1980s. Those theories were:

1. Healthcare quality theory of Donabedian (1980): satisfaction is the principal outcome of the interpersonal process of care.

2. Discrepancy and transgression theories of Fox and Storms (1981): if patients' healthcare orientations and provider conditions were congruent then patients were satisfied, if not, then they were dissatisfied.

3. Expectancy-value theory of Linder-Pelz (1982): satisfaction is mediated by personal beliefs and values about care as well as prior expectations about care. Pascoe (1983) developed the Linder-Pelz model to take into account the influence of expectations on satisfaction; Strasser *et al.* (1993) further developed the same model to create a six factor psychological model: cognitive and affective perception formation, multidimensional construct, dynamic process, attitudinal response, iterative, and ameliorated by individual difference.

4. Determinants and components theory of Ware *et al.* (1983): patient satisfaction is a function of patients' subjective responses to experienced care mediated by their personal preferences and expectations.

5. Multiple models theory of Fitzpatrick and Hopkins (1983): expectations are socially mediated, reflecting the health goals of the patient and the extent to which illness and healthcare violated the patient's personal sense of self.

Although patient satisfaction is now deemed an important outcome measure for health services, this processes utility rests on a number of implicit assumptions about the nature and meaning of expressions of "satisfaction" since patients may have a complex set of important and relevant beliefs which cannot be embodied in terms of satisfaction (Williams, 1994). Gilbert *et al.* (2004) claim that satisfaction varies depending on the assumptions made as to what satisfaction means. The design of questionnaires by the majority of the investigators, as well as the lack of standardized measures, makes it quite difficult to interpret and compare results across countries. More important, the distribution of scores on patient satisfaction surveys are highly skewed (Ferris *et al.*, 1992).

Gonzales *et al.* (2005) argued that satisfaction questionnaires have been the most commonly used method to survey patient perceptions of healthcare for more than 30 years, but only over the previous five years, had studies tried to ensure that the validity of the instrument was well grounded. Hawthorne (2006) further concluded that of the patient satisfaction literature conducted, none of the instruments reviewed could be considered satisfactory. There is an urgent need for differentiation and standardization of the definitions and constructs for satisfaction and perceived health service quality and their adoption in all future health services research (Gill and

White, 2009).

Patient satisfaction surveys typically ask consumers to evaluate the technical quality of the care they receive, the interpersonal aspects of care and the accessibility and availability of services or professionals. On the other hand, the assessment of technical aspects has traditionally been the domain of professionals. According to Raftopoulos (2005), the most consistent predictor of satisfaction is perhaps patient's age with older people being far more satisfied with healthcare than do younger people. This could be attributed with a halo effect, as elderly patients give socially favorable answers and are not willing to challenge physician and nurse authority. Wirtz and Bateson (1995) argued that it is difficult to distinguish between true correlations and halo effects and that the density of the problem relates to the importance of the service provided.

As core social institutions, health systems also need to be responsive to the needs and demands of the population (Freedman, 2005). Since Andaleeb *et al.* (2007), measuring service quality and satisfaction is very important since a comprehensive model of patient satisfaction has many policy implications in regard to identifying patient needs, developing standards, designing services systems and processes, establishing employee and patient roles in service delivery, enhancing training programmes, managing demand and capacity, and delivering the needed quality of services. Identification of the needs of individuals, whether through formal needs assessment or some surrogate, is an essential first step towards optimizing the use of allocated resources (Asadi-Lari *et al*., 2004). Basing healthcare needs on quality of life scores, however, necessarily incorporates several sources of uncertainty due to factors such as age, sex, social class and individual patient's health status. In addition, quality of life tools may fail to distinguish between health problems and the desire to get professional attention (Osse *et al.*, 2000). The optimum approach, perhaps, could be a combination of needs and outcome assessment, preferably at individual levels (Leplege and Hunt, 1997).

There is growing evidence indicating that "quality of life assessment" can be considered as adjuvant to clinical and physiological assessments in many chronic diseases (Goodwin *et al.*, 2003). This approach is postulated to be the "gold standard" in the evaluation of healthcare services and outcome assessment (Asadi-Lari *et al*.,

2004). Patients with better health status have often been shown to be more satisfied with their medical care, but the causal factors in this relation have not been determined (Hall *et al.*, 2003). According to the study of Cheng *et al.* (2006), where the authors investigate what quality and cost factors influence whether patients perceive healthcare services as expensive, and therefore will recommend a hospital to other patients, they found that quality of care rather than price is the main concern in healthcare.

Research on health system satisfaction, which is largely comparative, has identified ways to improve health, reduce costs and implement reform (Blendon *et al.*, 2003). The increasing importance of patient experience and the sustained interest in comparing people's satisfaction with the health system across different countries and time periods suggests the need to characterize the relationship between them (Bleich *et al.*, 2009). Research relating global satisfaction ratings with patient experience has revealed strong associations between the two (Young *et al.*, 2000). Yet, to what extent patient experience explains satisfaction with the healthcare system remains unclear.

Assessing the performance of a health system begins with defining its goals (Kruk and Freedman, 2008). According to World Health Organization, the goal of a health system is the delivery of effective, preventive and curative health services to the full population, equitably and efficiently, while protecting individuals from catastrophic healthcare costs (WHO, 2000). National health accounts, a record of health sources and uses of health funds, are increasingly being used to assess progressivity of health financing methods (Rannan-Eliya, 2004) and the distribution of government expenditures to different parts of the country and different social groups (Kurk and Freedman, 2008).

According to Iacobuţă (2012), citizens of developed countries have a positive opinion about quality of healthcare in their country while patients' from developing countries evaluate it rather negatively. Patients are the ones situated at the front lines of care (Schoen et al., 2005), therefore their comparison may provide useful insights into the quality of healthcare in different European systems, nevertheless the methodological limitations that should be taken into consideration (Jankauskiene and Jankauskaite, 2011).

1.3 Research problems and questions

As mentioned before, there are several problems with respect to the measurement of patient satisfaction. Although it is universally accepted that patient satisfaction is an important factor of healthcare quality and that it should be measured not only to capture the customers' opinions about the services delivered but to improve those services, there is not a universally accepted definition regarding its components; therefore there is no universally established framework for its measurement.

Our first aim was to evaluate the patient satisfaction degree of Greek citizens using the corresponding formal questionnaire by the Greek Ministry of Health for in- and out-patients, respectively. Unfortunately, there are no available data from the greek hospitals, no matter their size; therefore, at the present time it is impossible to compare them and draw concrete conclusions. Nevertheless, the data collected are used in a case study analysis, although we do not aim to construct a universally accepted tool for the measurement of patient satisfaction.

In addition, we further investigate various questions that related to patient satisfaction and healthcare quality such as the healthcare systems' performance, the health resources allocation and the level of eHealth literacy. Nevertheless, the tools used for the latter may and should be used in other countries, no matter whether the type of the healthcare system is similar or not with the greek one, since they are based on the patients' point of view.

In summary, this thesis tries to answer the following questions, dedicating a separate research study in each one of them:

#1 The European citizens are satisfied with the performance of theirs' country healthcare system?

#2 The citizens' preferences with respect to resources allocation match with the actual public funding of healthcare functions?

#3 Are Greek citizens eHealth literate?

#4 Are Greek patients satisfied?

1.4 Structure of the thesis

This dissertation proceeds as follows:

Chapter 2 studies the relationship between patient's satisfaction of healthcare system and a set of socio-economic and healthcare provision indicators and analyses patients' satisfaction in 31 countries. We use data from the Eurohealth Consumer Powerhouse and for 4 years. We construct a Satisfaction Index, based on the country's score regarding the sample average. Logistic regressions show that among macroeconomic indicators, Public Health Expenditures as a percentage of GDP and Population Aging associate strongly and positive with patient's satisfaction, while among healthcare provision indicators, a strong and positive association is documented for physicians and nurses. Public health expenditures play a prominent role for the patients' satisfaction. Patient satisfaction is an important measure of healthcare quality as it offers information on the provider's success at meeting clients' expectations and is a key determinant of patients' perspective behavioral intention. Since strong primary care has on better population health, fewer disparities and lower rated of unnecessary hospitalizations, further research is needed in order to study how not so wealthy countries can afford to gear their governance, healthcare workforce, and funding arrangements to meet public expectations.

Chapter 3 studies citizens' preferences and public healthcare expenditure allocation as priority setting and resource allocation across various healthcare functions are critical issues in health policy and strategic decision making. Health resources are limited while there are so many health challenges to resolve, consumers and payers have to make difficult decisions about expenditure allocation._Using survey data of 3,029 citizens in Greece for the year 2012 and employing logit estimation techniques, we analyze the effect of demographic and other factors in shaping citizens' (dis)agreement with respect to the realized public health expenditure allocation. Among all factors tested, income, number of family members and residence seem to greatly shape citizens' preferences. Other demographic factors such as age, employment, marital status and employment do partly associate. Health resources are limited and at the same time there are so many health challenges to resolve. Although it seems that government is meeting the citizens' preferences with respect to health expenditures allocation, it should also encourage the citizens' participation by

introducing policies of empowering the knowledge dissemination along with the democratization of the decision making process.

Chapter 4 examines the importance of the eHealth literacy since understanding what influences eHealth literacy in a country is particularly important for health policy makers and the healthcare market. The latter, provides critical information to develop targeted and tailored interventions for relevant patient-consumer segments, and further suggest appropriate strategies for training the health illiterate part of the population. The objective of this chapter is to assess the ability in searching, analyzing, processing and comprehending information from the Internet in order to address or solve health related issues and the factors that shape it, The study relies on a unique sample of 1,064 citizens in Greece for the year 2013 using a modified questionnaire of EHEALS. The results demonstrate a negative age effect and a positive education effect on a citizen's probability of being ehealth literate. Among the life-style indicators studied, physical exercise is the one who strongly associates with the level of ehealth literacy. The latter is related to healthcare outcomes, but it is also considered to be a tool for disseminating social inequalities; therefore further research is needed to examine how several factors associate with ehealth literacy taking into consideration specific characteristics of users in various countries.

Chapter 5 provided a case study with respect to patient satisfaction. More specifically, in- and out-patients are requested to assess the performance of Konstantopouleio General Hospital, by answering a pilot questionnaire along with the guidelines of Ministry of Health. Several questions of these questionnaires are used to evaluate the patients' intention to recommend the hospital to friends and family; therefore to evaluate their satisfaction. This study relies on a unique sample of 1,165 patients (745 in- and 420 out-patients) in Greece. The results demonstrate that all indicators regarding the hospital's performance, i.e. the attention received by medical and nursery staff, and the hospital's environment play the most important role with respect to patients' satisfaction for both groups of in- and out-patients. Among the demographic characteristics, the perceived health status and age are the most important for the in-patients, while age, education and insurance play a significant role for the out-patients.

Chapter 2

Patients' satisfaction with the healthcare system: Assessing the impact of socio-economic and healthcare provision factors

2.1 Introduction

Although the concept of quality is extensively mentioned in the literature, the eight "articles of faith" (Lee and Jones, 1933) made Donabedian believe, since 1966, that "the definition of quality may be almost anything anyone wishes it to be, although it is, ordinarily, a reflection of values and goals current in the medical care system and in the larger society of which it is a part" (Donabedian, 1966). Maxwell (1992) described six dimensions of quality: accessibility, equity, appropriateness, effectiveness, efficiency and social acceptability. According to Parasuraman *et al.* (1985), it appears that judgments of high and low service quality depend on how consumers perceive the actual service performance in the context of what they expected. "What" the service delivers is evaluated after performance (outcome quality) and "how" the service is delivered is evaluated during delivery (process quality). Arguably, the concept of quality itself is problematic, given that it is multi-dimensional and means different things to different audiences and in different circumstances (Cacace *et al.*, 2013).

Quality of care is a dominant concept in quality assurance and quality improvement programs in the health sector. The importance of quality in the health sector has been recognized recently, but it has been accelerated over the past years through the development of quality insurance, quality improvement programs and patients' agendas (Raftopoulos, 2005). While quality of care, rather than price, is the main concern in healthcare (Cheng *et al.*, 2006), the service provider's technical competence, as well as the immediate results from many treatments, is very difficult for a patient to evaluate (Asubonteng *et al.*, 1996).

It has been proposed that we can measure the quality of healthcare by observing its structure, its processes and its outcomes (Donabedian, 1988). Whereas the aims of effectiveness and safety of healthcare are nearly universal, societies and cultures around the world differ more in how much they emphasize the additional aims of

patient-centeredness, timeliness, efficiency and equity. Healthcare measures – including process measures– are developed for varied audiences who may wish to use them for healthcare purchasing, utilization, or performance improvement (Rubin *et al.*, 2001). For all these purposes it is imperative that are meaningful, scientifically sound, generalizable, and interpretable (McGlynn, 1998).

Patient satisfaction is an important measure of healthcare quality as it offers information on the provider's success at meeting the expectations of most relevance to the client (Huang *et al.*, 2004) and a key determinant of patients' perspective behavioral intention (Al-Refaie, 2011). Patient satisfaction is correlated with important outcomes, such as superior compliance, decreased utilization of medical services, less malpractice litigation and better prognosis (Huang *et al.*, 2004). The absence of a solid conceptual basis and consistent measurement tool for consumer satisfaction has led, over the past ten years, to a proliferation of surveys that focus exclusively on patient experience, i.e., aspects of the care experience such as waiting times, the quality of basic amenities, and communication with healthcare providers, all of which help identify tangible priorities for quality improvement (Bleich *et al.*, 2009). Some researchers have suggested that defining quality improvement from patients' perspective provides better value for their money with improved safety, accessibility, equity, and comprehensiveness of care and from a provider's point of view, quality improvement may be more efficient, providing more effective services to a greater number of consumers with a reasonable level of satisfaction, enough for customer retention (Patwardhan and Spencer, 2012).

A handful of studies have attempted to relate patient's health status to factors such as the performance of healthcare system (Bleich *et al*., 2009) or other demographic and economic factors (Mummalaneni and Gopalakrishna, 1995; Gordo, 2006; Popescu *et al*., 2007).[1]

More specifically, Bleich *et al*. (2009) find that about a quarter of the variation of patient's satisfaction is attributed to healthcare system itself and to patient expectations, health status, type of care and immunization coverage for 21 EU countries for the year 2003. Furthermore, the study of Mummalaneni and Gopalakrishna (1995) examines socio-demographic factors such as age, gender,

[1] For a comprehensive review on patient satisfaction, see Pascoe (1983) and Naidu (2009).

occupation, employment status, education and income and reveals that income is the only socio-demographic factor found to have an influence on patient satisfaction. In addition, Gordo (2006) examines data from the German Socio-Economic Panel and finds a strong association between long-term unemployment and patient satisfaction, while a weak association is documented for the short-term unemployment and patient satisfaction depending on the gender. Lastly, the study of Popescu *et al*. (2007) investigates health status in relation to expenditures on health along with healthcare provisions (hospital beds and physicians per person) and find a strong relationship between reporting a good or bad health status and health expenditures and provisions.[2]

The purpose of this chapter is first, to map the degree of the patient's satisfaction in relevance with the health system of their country during the years 2007, 2008, 2009 and 2012 in a panel of 31 countries, and second, to assess the impact of socio-economic and healthcare provision factors on the degree of patient's satisfaction.

The contribution of this study is twofold. First, the hospital performance is transformed into a satisfaction index based on the patient's perceptions about their country healthcare system. The latter, consists the first attempt in the literature. Second, the degree of patient's satisfaction is examined along with a set of socio-economic and healthcare provision indicators. This is the first time in the literature as the majority of relevant studies explore only some indicators and for a limited number of countries and years.

Our findings document the significant role of number of physicians and nurses provided in the healthcare system. Public spending on health plays prominent role on patient's satisfaction, while the elderly appear to exhibit higher satisfaction from countries' healthcare system. Finally, private spending on health and the number of hospital beds are negatively associated with patient's satisfaction.

The remaining of this chapter is organized as follows: Section 2 presents our framework of analysis, data and model. Section 3 presents and discusses our findings. Finally, Section 4 concludes.

[2] A relevant study, that of Zhao *et al*. (2011), examines instead the willingness to pay (WTP) per Quality-Adjusted Life Year for a sample of chronic prostates patients. The WTP is associated with demographic factors of patients such as age, gender, education, marital status and with economic factors such as employment and level of income.

2.2 Methods

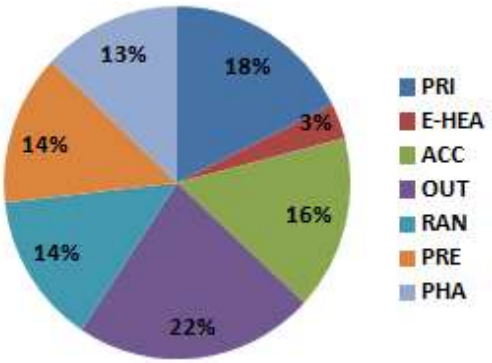
This section presents the research methodology and the data used, and describes the model and the estimation method.

2.2.1 Data

This empirical analysis covers 31 countries: 28 EU Member States, Iceland, Norway, and Switzerland. The dependent variable, the satisfaction index, is defined as the patients' satisfaction with respect to their country's health system, for the years 2007, 2008, 2009 and 2012. Information for the years 2010 and 2011 was not available. For the construction of the satisfaction index, data for the corresponding years were used from the Euro Health Consumer Powerhouse, particularly from the Euro Health Consumer Indexes (EHCI), where the performance of a country's health system is evaluated through personal interviews and an active feedback from national healthcare agencies and institutions.

The EHCI is built up with indicators grouped in seven sub-disciplines, namely "Patient Rights and Information (PRI)", "Accessibility (ACC)", "Outcomes (OUT)", "Range (RAN)", "Pharmaceuticals (PHA)", "Prevention (PRE)" and "E-Health (E-HEA)". The performance of the respective national healthcare systems were graded on a three-grade scale where the grades have the rather obvious meaning of "Good"=3 points, "So-so"=2 points and "Not so good"=1 point. For each of the sub-disciplines, the country's score is calculated as a percentage of the maximum possible (for example, the sub-discipline "ACC" consists of 5 indicators, therefore the maximum possible score here is 15), and then multiplied by the weight coefficients since certain indicators are being more important than others and therefore, their scores are multiplied by numbers other than 1. Consequently, the maximum score attainable for a national healthcare system is 1,000 and the lowest possible score is 333. We used the sub-disciplines' total scores for each country to construct the Satisfaction Index. A country's satisfaction index is a dummy and takes the value of 1 if its satisfaction index value is above the sample average; otherwise is 0.

Graph 2.1 shows the distribution of the seven components of the satisfaction index.



Graph 2.1: Share of the components of the satisfaction index

A number of (macro)economic indicators were employed, such as Gross Domestic Product (GDP) per capita (measured in constant 2005 US$), Health Expenditures as a percentage of GDP, Public Health Expenditures as a percentage of GDP, Private Health Expenditures as a percentage of GDP, Unemployment rate as a percentage of total labor force, and Population Aging as a percentage of the total population above the age of 65 years, obtained from World Bank. Furthermore, we also include some healthcare provision indicators, namely Number of Physicians per 100,000 habitants, Number of Nurses per 100,000 habitants and Number of Hospital Beds per 100,000 habitants, from Eurostat.

Table 2.1 presents the summary statistics of all variables.

Table 2.1: Summary statistics of socio-economic and healthcare provision indicators

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Satisfaction	124	0.5080645	0.5019631	0	1
GDP per capita	124	29,637.5	19,275.12	4,274.643	87,716.73
Dummy	124	0.483871	0.8017671	0	1
Health Expenditures (%GDP)	124	8.695808	1.728513	5.111	12.437
Public Health Expenditures (%)	124	6.419485	1.646271	2.57804	10.12504
Private Health Expenditures (%)	124	2.254283	0.8318939	0.9284464	4.329047
Unemployment (%labor force)	124	7.651613	3.894325	2.3	25
Population Aging (% total)	124	16.09518	2.350816	11.00852	21.1009
Physicians/100,000 habitants	124	89.62338	51.19852	27.204	326.413
Nurses/100,000 habitants	124	844.2589	366.8735	316.771	1,696.853
Hospital Beds/100,000 habitants	124	540.0877	154.7351	261.855	823.945

As Table 2.1 shows, countries in our sample spend about 8.4% of their GDP on health. Specifically, public health expenditures are three times larger than private ones. 7.5% of the total labor force is unemployed while 16% of the total population, on average, is above the age of 65 years old. Moreover, 8 nurses, 3 physicians and 1 hospital bed, on average, correspond per 1,000 patients (corresponding numbers of Table 2.1 divided by 100). Box plots for each one of the macroeconomic and xtline graphs for the healthcare provision indicators are provided in the Appendix (Graphs AI.1-AI.6 and Graphs AI.7-AI.9, respectively).

The results of decomposing standard deviation into between and within components are shown in Table AI.1 (see Appendix I). The between figure refers to the standard deviation, minimum and maximum of the averages for each individual. The within figure calculates the statistics for the deviations of each individual for his own average. If a variable does not vary over time, the within standard deviation will be zero.

The relationship between satisfaction index and all other set of variables (macroeconomic and healthcare provision indicators) are shown in Figure AI.10 and Figure AI.11, respectively.

2.2.2 Model

The likelihood of a certain patient being satisfied of a country's healthcare system can be described by a probit model defined as follows:

$$\text{Prob}(Y = 1|X_i) = F(X_i\beta),$$

where the endogenous variable Y is the degree of patient's satisfaction and takes the value 1, if the patient is satisfied with his/her country's healthcare system, and 0 otherwise; F is the standard logistic cumulative distribution function and X_i is a set of covariates. The model is defined as:

$$Y_i = \beta_0 + \beta_1 GDPcapita_i + \beta_2 HealthExpenditures_i + \beta_3 Unemployment_i + \beta_4 PopulationAging_i + \beta_5 \text{IPhysicians}_i + \beta_6 Nurses_i + \beta_7 HospitalBeds_i + \varepsilon_i,$$
$$\varepsilon_i \sim \text{Logistic}(0,1)$$

where *GDPcapita* is gross domestic product (GDP) per capita, *HealthExpenditures* is

public and private expenditures on health (%GDP), *Unemployment* is the unemployment rate, *PopulationAging* is the people above the age of 65 years old (%total population), *Physicians* is the number of physicians per 100,000 habitants, *Nurses* is the number of nurses per 100,000 habitants and *HospitalBeds* is the number of hospital beds per 100,000 habitants. The first four variables capture socio-economic conditions, whereas the remaining three proxy healthcare provision.

The selection of the variables in X_i set can be justified by relevant studies. More specifically, many studies have analyzed the relationship between GDP per capita and the health spending. These studies led to the extremely robust conclusion that even after statistical control for many other factors, the effect of GDP per capita (income) on expenditure is clearly positive and significant (Gerdtham & Jönsson, 2000). As patients of each country are getting older, we expect them to spend more money for their health status. Therefore, it seems natural to conclude that a nation's per capita health spending will rise significantly as the average age of its population rises and that cross-national variations in health spending per capita are driven significantly by cross-national variations in the percentage of the population that is age sixty-five and older (Reinhardt *et al.*, 2002).

According to Kotzian (2009), a patient's satisfaction with the healthcare system might be influenced by other economic factors and properties of the healthcare system. As pointed out in the same article, the healthcare system might work well, but the distribution of the financial burden of its financing might be considered unfair by the patients. Public health expenditures play an important role for the patients' satisfaction. Strong primary care has on better population health, fewer health disparities and lower rates of unnecessary hospitalizations (Kringos *et al.*, 2013b). Some countries are wealthy enough and they can afford to gear their governance, healthcare workforce, and funding arrangements towards expensive specialized care to satisfy public expectations (Kringos *et al*,, 2013a).

When it comes to healthcare provision, the literature finds that patient-to-nurse workloads were significantly associated with patients' ratings and recommendation of the hospital to others, and with their satisfaction with the receipt of discharge information (Kutney-Lee *et al.*, 2009). Furthermore, Kotzian (2009) suggested that a relatively low level of physicians per capita indicates a relative shortage of medical

staff, and this might lower the satisfaction in the sense that there is not enough personnel to deliver beyond-health outputs. In the study of Ghose and Adhish (2011), it was observed that patients' satisfaction was greatly influenced by timing of admission, medical research and development, pharmacy, pantry services, nursing care and doctor's care. More specifically, a very high percentage of the patients were satisfied with the physician services like availability of the doctor, doctor's care and the treatment given by them.

2.3 Results

Table 2.2 presents the odds ratios for all specifications. The odd ratios can be interpreted as follows: if the odd ratio, a, is bigger than 1 (a >1), then the probability of a patient being satisfied with the performance of his/her country's healthcare system, i.e. Y =1, increases by (a-1)*100%, whereas the probability decreases by (1-a)*100%, if the odd ratio is smaller than one (a<1). Column (1) presents estimates of the baseline model, where health expenditures are aggregated into public and private spending. Column (2) splits the health expenditures into two categories, public and private health expenditures. For robustness purposes, columns (3) and (4), re-estimate specifications (1) and (2), but this time countries are classified as "high-income" and "low-income". In doing so, a new variable, Dummy, is defined as follows: if a country's GDP per capita is above sample average, then Dummy is one; otherwise is zero.

In order to test the robustness of our results, we choose to treat our data set as a panel data set and we run simple regressions. In doing so, we do not use the Satisfaction Index we constructed, but the total score of each country (sum of all sub-disciplines; minimum 333 and maximum 1,000). Therefore, the performance of each healthcare system is now the dependent variable of our estimates, which is a continuous variable. As Table AI.3 indicates, the results do not differ significantly, providing evidence that our choice to proceed with the construction of the satisfaction index, transforming each country's total performance score to a citizens' satisfaction level, was correct. Furthermore, Table AI.4 provides the correlations between the total performance score of each country and its predicted values, for the second analysis approach.

Table 2.2, below, presents the estimates of all specifications.

Table 2. 2: Logit estimates (odds ratio) of different model specifications (dependent variable is *patient's satisfaction*)

Variables	**(1)**	**(2)**	**(3)**	**(4)**
GDP per capita	1.00007 (0.00006)	1.00007 (0.0001)		
Dummy *(for income level)*			**10.268*** (12.979)	6.493 (9.416)
Health Expenditures	1.493 (0.472)		1.538 (0.413)	
Public Expenditures		**2.641**** (1.154)		**2.819***** (1.109)
Private Expenditures		**0.346*** (0.211)		**0.376*** (0.207)
Unemployment	1.067 (0.083)	**1.163*** (0.105)	1.085 (0.091)	**1.189*** (0.118)
Population Aging	**1.385*** (0.247)	**1.223**** (0.248)	**1.194**** (0.226)	1.098 (0.237)
Physicians	0.988 (0.007)	0.989 (0.008)	**0.986*** (0.007)	**0.987*** (0.007)
Nurses	**1.007***** (0.003)	**1.005*** (0.003)	**1.007***** (0.003)	**1.006**** (0.002)
Hospital Beds	**1.006**** (0.002)	**1.007**** (0.003)	**1.005**** (0.003)	**1.006**** (0.003)
Observations	124	124	124	124
Likelihood Ratio (X^2)	98.89	110.49	100.06	110.61
Pseudo-R^2	0.5754	0.6429	0.5822	0.6435

Note: Numbers in parentheses are standard errors; (***), (**), (*) indicate significance at 1%, 5%, and 10% respectively.

In specification (1), where one does not account for different type of health expenditures, i.e., public vs. private, the logit estimates are consistent with the theory and carry the right sign. Among the socio-economic variables, *GDPcapita HealthExpenditures*, *Unemployment* and *PopulationAging*, only the latter appears to be statistically significant. More specifically, if population aging increases, the probability of a patient being satisfied increases by 38.5% [(1.385-1)*100%]. This is in line with other studies showing that elderly patients are more likely to express satisfaction with their healthcare than other sections of the patient population (Owens

and Batchelor, 1996). As Table 2.2 shows, two of the three healthcare provision variables are statistically significant. Particularly, if the number of nurses per 1,000 habitants increases, the satisfaction level also increases by almost 1%. Similar effect has an increase of the number of hospital beds per 100,000 habitants (the probability of a patient being satisfied increases by 1%). These findings are consistent with the studies of Kutney-Lee *et al.* (2009) and Kotzian (2009), excluding the number of physicians per 100,000 habitants which in our research does not seem to play a significant role in shaping the patients' satisfaction level. The unsolved issue of overcapacity which is documented in several studies, such as Kosnik (2006) and Fidler *et al.* (2007), is not demonstrated in our study, since an increase of the available beds leads to an increase of the satisfaction level.

In column (2), once we decompose aggregated health expenditures into public and private, findings appear somewhat different. Particularly, public health spending appears to be positively and statistically associated with patient's satisfaction, that is, if public health expenditures increase, the probability of a patient being satisfied increases tremendously, by 164%. The public spending on health has a large impact on patient's satisfaction simply because health services are perceived to be provided free of charge by the state. The latter is more important for countries which are less wealthy. The important role of public health spending is also documented in numerous studies (Kotzian, 2009; Kringos *et al.*, 2013a). In contrast, private health spending appears to be negatively correlated with patient's satisfaction as an increase of private health expenditures decreases patient's satisfaction by 65.4%. The negative relation between private health spending and patient's satisfaction seems reasonable if one takes into consideration that patients of all countries although contribute to public health expenditures, through taxation, they pay out of their pockets to receive (better) private healthcare when public healthcare fails. This is also consistent with other studies findings (Reinhardt *et al.*, 2002).

In order to capture the income differences across countries, the *Dummy* variable is introduced in the model in column (3). The estimates of the baseline model still carry the right sign while the statistical significance pertains. Independent of country's income level, we find that the same set of variables associates in shaping patient's satisfaction degree. The number of physicians per 100,000 habitants now plays a

borderline significant role, leading to the decrease of patients' satisfaction level by 1.4%. This finding may be proving that European patients are already satisfied with the corresponding number of physicians, and an increase of their number may lead to less attendance towards them. The importance of the income level here is captured in the more concrete way, since the habitants of wealthier countries are about 1,000 times more satisfied with respect to the habitants of low-income countries.

Finally, as column (4) indicates, if a patient's income is high, the probability of being satisfied with the country's health system is about 180 times higher compared to a patient's satisfaction from a low-income country. This dramatic difference between "high-income" vs. "low-income" countries reflects the different perceptions existing, since wealthier counties are able to keep their patients more satisfied than poor ones.

With respect to the overall performance of our specifications, correlations between *patient's satisfaction* (Y_{it}) and *predicted patient's satisfaction* ($\hat{Y}_{it}$) range for 80% to 90% (at 5% level of significance), indicating that the fitness of our specifications is satisfactory (see Table AI.2). The likelihood ratios from the diagnostics (bottom of Table 2.2), further confirm the goodness of the fit of our model.

2.4 Discussion

Many studies have analyzed the relationship between GDP per capita and the health spending. These studies led to the extremely robust conclusion that even after statistical control for many other factors, the effect of GDP per capita (income) on expenditure is clearly positive and significant (Gerdtham and Jönsson, 2000). Public health expenditures play an important role for the patients' satisfaction. Strong primary care has on better population health, fewer health disparities and lower rates of unnecessary hospitalizations (Kringos *et al.*, 2013b). Some countries are wealthy enough and they can afford to gear their governance, healthcare workforce, and funding arrangements towards expensive specialized care to satisfy public expectations (Kringos *et al.*, 2013a). Cross-national health services research has moved from the age-old normative question, "Which country has the best health system?" to more narrowly focused, positive question about the apparent effect of particular facets of the healthcare infrastructures (Reinhardt *et al.*, 2002).

The public spending on health has a large impact on patient's satisfaction simply because health services are perceived to be provided free of charge by the state. The latter is more important for countries which are less wealthy. The important role of public health spending is also documented in numerous studies (Kringos *et al.*, 2013a; Kutney Lee *et al.*, 2009). In contrast, private health spending appears to be negatively correlated with patient's satisfaction as an increase of private health expenditures decreases patient's satisfaction by 98.7%. The negative relation between private health spending and patient's satisfaction seems reasonable if one takes into consideration that citizens of all countries although contribute to public health expenditures, through taxation, they pay out of their pockets to receive (better) private healthcare when public healthcare fails. This is also consistent with other studies findings (Kotzian, 2009).

According to Kotzian (2009), a patient's satisfaction with the healthcare system might be influenced by other economic factors and properties of the healthcare system. As pointed out in the same article, the healthcare system might work well, but the distribution of the financial burden of its financing might be considered unfair by the patients. As patients of each country are getting older, we expect them to spend more money for their health status. Therefore, it seems natural to conclude that a nation's per capita health spending will rise significantly as the average age of its population rises and that cross-national variations in health spending per capita are driven significantly by cross-national variations in the percentage of the population that is age sixty-five and older (Reinhardt *et al.*, 2002).

Finally, if a patient is the habitant of a high-income country, his/her probability of being satisfied with the country's health system is about 3,400 times higher compared to a patient's satisfaction from a low-income country. This dramatic difference between "high-income" vs. "low-income" countries reflects the different perceptions existing among patients from different countries, implying that patients who reside in wealthier countries are more satisfied in general with the healthcare system compared to patients from less wealthy economies. It seems that wealthier counties are able to keep their patients more satisfied than poor ones, as expected. According to O'Donnell *et al.* (2007), national income is an obvious candidate to explain cross-country variation in the targeting of public health spending and at the same time,

levels of public spending on health and health system characteristics might be expected to explain part of the residual cross-country variation in targeting of the poor.

When it comes to healthcare provision, the literature finds that patient-to-nurse workloads were significantly associated with patients' ratings and recommendation of the hospital to others, and with their satisfaction with the receipt of discharge information (Kutney Lee *et al.*, 2009). Furthermore, Kotzian (2009) suggested that a relatively low level of physicians per capita indicates a relative shortage of medical staff, and this might lower the satisfaction in the sense that there is not enough personnel to deliver beyond-health outputs. In the study of Ghose and Adhish (2011), it was observed that patients' satisfaction was greatly influenced by timing of admission, medical research and development, pharmacy, pantry services, nursing care and doctor's care. More specifically, a very high percentage of the patients were satisfied with the physician services like availability of the doctor, doctor's care and the treatment given by them.

All healthcare provision indicators seem to be statistically significant, but their relationships with patient's satisfaction level do not carry the same sign for all of them. Particularly, the positive associations between the number of physicians and the satisfaction level, as well as the number of nurses and the satisfaction level, have also been documented to have similar effects in other studies. These findings are consistent with the studies of Kutney-Lee *et al.* (2009) and Kotzian (2009). However, this increase of doctors and/or nurses could lead to higher public expenses and in countries with high debt/deficit could be challenging. In contrast, if the number of hospital beds increases, the probability of a patient being satisfied with the healthcare system decreases by 1.3%. This finding may reflect the unsolved issue of overcapacity which is documented in several studies, such as Kosnik (2006) and Fidler *et al.* (2007).

Since there is the first time to our knowledge that the healthcare systems' performance is transformed into patient's satisfaction, it is worth to evaluate further the construction of the satisfaction index. There was no methodology to base upon and in addition there were missing data for some of the countries (for the variables or the years). Our methodology though, for the construction of the satisfaction index, is based first on the sample average and second on the ranking of each country with

respect to the aforementioned average. We try with alternative indices constructed with higher deviations with respect to the proposed one. Results do not change significantly. Rankings of each country do not change dramatically across the years, so we may assume that even with the addition of some data, a country would probably stay above or under the sample average. Further analysis is also needed with respect to the impact of the healthcare provision indicators, which may provoke changes in the results. One key group of constraints is environmental constraints (Hanson *et al.*, 2003) which include factors such as unemployment and political instability. Constraints beyond the control of an individual programmes –e.g. public sector employment rules which can have a major effect on the way health services operate– may not be even identified (Travis *et al.*, 2004).

2.5 Conclusions

This chapter studied the relationship between patient's satisfaction of a country's healthcare system and a set of socio-economic and healthcare provision indicators.

Our findings based on 31 countries and four years, support that there is a strong association between patients' satisfaction level and healthcare provision indicators, such as number of hospital beds, nurses and physicians per 1,000 habitants, with the latter being the most important contributor. Among the socio-economic variables, public health expenditures greatly shape and positive relate to patient's satisfaction, while private spending on health relates negatively. Finally, the elder a patient is, the more satisfied with a country's healthcare system appears to be.

A policy implication of our findings is that the role of government on health spending is highly important for a patient's satisfaction of a healthcare system. Future research should control also for the type and quality of public as well as spending in health.

Chapter 3
Citizens' Preferences on Healthcare Expenditure Allocation: Evidence from Greece

3.1 Introduction

Priority setting and resource allocation has received much attention in recent years; however, despite the expected benefits of public engagement, there is currently little evidence on how to undertake it effectively (Bolsewicz *et al.*, 2013). Citizens' preferences have been analyzed extensively in healthcare, but few studies have examined how preference formation may impact on resource allocation decisions in public and private health service delivery (Kylänen *et al.*, 2012). Cammett *et al.* (2014) found that trust in government is significantly lower where the health system is financed to a greater degree by private sources.

Developed countries spend considerable resources on health, though there are large variations in the levels and rates of growth in the health spending. In 2012, the public spending on health across EU member states was on average 8.7% of their GDP (OECD, 2014a). According to recent estimates, spending on health will mount to 20% of GDP by 2050 in most of OECD countries (Drouin *et al.* 2008).

Health systems are mostly funded either from general public revenues (e.g. Canada), or through a social security system with a separate budget and hypothecated taxes or contributions (e.g. Australia, France, Belgium, Japan and Germany). Healthcare rationing refers to mechanisms that are used to allocate healthcare resources. As (financial and health services related) resources are limited, to meet health system goals set by the World Health Organization (WHO, 2010; 2015), consumers and payers demand greater accountability and have to make difficult decisions about which health functions to support (Dresser, 2009), while unequal provision of health services, rapid urbanization and civil conflict are documented, even when the same level of resources is allocated to public health across different countries (Ghobarah *et al.*, 2004). Consequently, priority setting and resource allocation across different health functions are issues of utmost importance for the present and for the years to come.

Although citizens' preferences formation may shape resource allocation decisions in public and private health services delivery, there is still scant evidence on formal public involvement in healthcare priority setting and resource allocation activity (Mitton *et al.*, 2009). Early debates on public involvement in healthcare decision-making have mainly aimed at strengthening the role of citizens as consumers in the healthcare sector, while later debates emphasized the role of citizen participation and competency as a means of improving the performance of the healthcare system (Deutscher Bundestag, 2001). Waillo and Anand (2005) studied six dimensions of procedures in relation to health-care rationing. Among the recent attempts, the study of Church *et al.* (2002) examined the concept of citizen participation in the context of a series of basic questions through which decision-makers may draw some policy relevance. This study became a point of reference for an informed discussion of the possibilities for improved citizen participation in healthcare decision-making.

Whitty *et al.* (2014) discussed the theoretical framework about the optimal approach to access public preferences. Furthermore, Rosen and Karlberg (2002) compared the views of citizens and healthcare decision-makers on healthcare financing and revealed that the general public have high expectations on public healthcare that do not fit with the decision-makers' views on what should be offered. In a review of the empirical literature, Delli Carpini *et al*. (2004) discussed the expectations, drawn from deliberative democratic theory, regarding the benefits (and, for some, pitfalls) assumed to derive from discursive participation and citizen engagement. According to Shaw *et al.* (2001), citizens require resource allocation decision in health to be informed by considerations of equity as well as efficiency. The study of Dolan and Shaw (2001) demonstrated that people are willing to sacrifice overall health benefits for a more equal distribution of health. Analogous evidence is documented in Schwappach (2003), where the vast majority of the respondents were willing to trade efficiency for a more equal distribution of resources. In similar vein, the study of Anderson *et al.* (2011) showed that there was strong support among respondents for giving equal priority to people regardless of their personal characteristics, while findings of other studies suggest that healthcare is informally rationed according to the age and sex of the patient (Brockmann, 2002). Finally, in Wiseman *et al.* (2003) respondents were asked whether they felt the preferences of general public should be used to inform priority setting. Results showed that the public overwhelmingly

wanted their preferences to inform priority-setting decision in healthcare.

The purpose of this chapter is to study whether there is a (dis)agreement between citizens' preferences with respect to healthcare resources allocation and actual public spending on a spectrum of healthcare functions, whether this (dis)agreement is persistent across broad healthcare programs, whether demographic factors of the participants amplify this (dis)agreement and to derive useful implications for public healthcare policies.

We choose to study Greece for three main reasons: First, the out-of-pocket health expenditure is higher than anywhere else in the European Union either as a proportion of gross domestic product (GDP), or in per capita terms (OECD, 2014b). Second, the healthcare system in Greece is financed by a mix of public and private resources. Public statutory financing is based on social insurance and tax (Economou, 2010). Greece has seen per capita health spending fall by 9% each year since the onset of the severe economic crisis in 2009. Given the tight budgets, it is interesting to analyze the allocation of the limited health resources and whether citizens consent to this (Zavras *et al.*, 2012). At the same time, it can be argued that the financial crisis is a no easy way out, as elevated prevalence of certain diseases is already reported (WHO, 2011), although many researchers dispute over a causal association between recession and these health outcomes (Fragoulakis *et al.*, 2014). Finally, Greece, as also many of the Mediterranean countries, has demographics (low birth rate, high longevity, high unemployment, e.tc.) that could consist of a serious issue for the future of the healthcare sector (OECD, 2014a).[3]

Overall, our results demonstrate that there is a large deviation between citizens' preferences and actual public spending with respect to the resources allocated particularly to the functions of "curative care services" (strong disagreement) and

[3] The population age structure in Greece is very similar to other Mediterranean countries, especially Italy and Portugal (almost 20% of total population is above the age of 65 years old). Although life expectancy is the same in all those countries, the percentage of permanent employment in Greece is the lowest (34.2%) and at the same time the percentage of long-term unemployment is the highest (from 45% for the year 2011, jumped to 55.6% and 66.4% for the years 2012 and 2013, respectively).

"medical goods and services dispensed to out-patients" (modest disagreement).[4] In all other health functions, the deviation documented is relatively small, thus we consider that public spending almost meets citizens' preferences.

Demographic factors seem to play an important role in explaining the deviations between citizens' preferences and public health spending. More particularly, our findings show the important role of income, family members and residence in shaping citizens' preferences regarding health financing priorities in almost all healthcare functions, while other demographic factors such as job, age, gender and marital status do partly associate and play a significant role.

3.2 Methods

This section presents the research methodology and the data used, and describes the model and the estimation method.

3.2.1 Data

We conducted a survey taking a convenient sample[5] of 3,029 persons (citizens) in Greece during the year 2012. Our research included a wide range of socio-economic characteristics such as gender, age, education level, number of family members, residence, income level and employment status of the participant, who were requested to allocate a hypothetical amount of money (i.e. €100) in the System of Health Accounts (SHA) healthcare functions (ICHA-HC) according to their preferences. These functions were explained to them by providing a short description as shown below, at Table 3.1. We also include investment, though treated separately as "Capital formation" in health, in order to meet the total expenditure in health, i.e. current spending (personal services and public health services) plus Capital formation (OECD-Eurostat-WHO, 2011).

[4] These two particular health functions enjoy the biggest proportion of public spending in Greece and elsewhere in the Mediterranean countries (e.g. Italy, Portugal and Spain). However, in Greece, public funding of "medical goods and services dispensed to out-patients" is almost double or triple compared to for instance Spain and Italy/Portugal, respectively.

[5] Convenience sampling is a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher.

Table 3.1, below, presents a short description of these categories.

Table 3.1: The classification of healthcare functions at the first-digit level

Healthcare functions		Description
1	Curative care	The principal medical intent is to relieve symptoms of illness or injury, to reduce the severity of an illness or injury or to protect against exacerbation and/or complication of an illness which could threaten life.
2	Rehabilitative care	Emphasis lies on improving the functional levels of the persons served and where the functional limitations are either due to a recent event of illness or injury or of a recurrent nature (regression or progression).
3	Long-term care (health)	Ongoing health and nursing care given to in-patients who need assistance on a continuing basis due to chronic impairments and a reduced degree of independence and activities of daily living.
4	Ancillary services	Clinical laboratory, diagnostic imaging, patient transport and emergency rescue.
5	Medical goods	Retail trade, fitting, maintaining and renting medical goods and appliances (public pharmacies, opticians, sanitary shops, teleshopping).
6	Preventive care	Vaccination campaigns, school health services, prevention of (non)communicable diseases, occupational healthcare.
7	Governance, and health system and financing administration	Planning, management, regulation and collection of funds and handling of claims of the delivery system.
8	Capital account	Capital formation, education and training of health personnel, research and development, environmental health, food and hygiene.

Source: International Classification of Health Accounts (OECD-Eurostat-WHO, 2011).

The first five healthcare functions constitute the major component of the personal health services and goods, here stated as T1 (see Graph AII.1 in the Appendix II), while functions (6) and (7) form the major component of the public health (collective) services, here stated as T2 (Graph AII.2). The sum of functions (1) to (7) constitutes the total current expenditure on health (T3; Graph AII.3). Finally, adding function (8) one gets the total health expenditure categories (Invest, Graph AII.4). Given the actual public spending on all equivalent health programs, we were able to calculate the size and the statistical significance of the difference between citizens' preferences and the public spending in healthcare in each healthcare function. Finally, we employed logit

estimation techniques to study the effect of demographic factors in shaping citizens' (dis)agreement with public spending on healthcare.

A number of demographic factors were also requested and recorded from the participants such as *Gender*, *Age*, *MaritalStatus*, *Job*, *Residence*, *Members* and *Income*. The ordinal variables were classified according to Hellenic Statistical Authority classification standards (EL.STAT, 2014). More specifically, *Gender* takes the value of 0 for male and 1 for female; *Age* consists of six intervals and takes the value of 1 for 15-24, 2 for 25-39, 3 for 40-54, 4 for 55-64, 5 for 65-79 and 6 for >80 years old; *MaritalStatus* is a categorical variable and takes the value of 1 for singles, 2 for married, 3 for divorcees, 4 for separated and 5 for widows; *Job* represents the employment status and is 1 for employed, 0 otherwise; *Residence* indicates the location of residency (1 for the prefecture of Athens, 0 otherwise); *Members* is 1 for a single individual, 2 for a (married) couple, 3 for a family with one child, and so on; *Income* level is grouped in eight classes and takes the value of 1 for <€750, 2 for €751-1100, 3 for €1101-1450, 4 for €1451-1800, 5 for €1801-2200, 6 for €2201-2800, 7 for €2801-3500, 8 for >€3501.

The numbers here are used to indicate or identify the levels, and do not have intrinsic meaning of their own. Since there is no numerical relationship between the different values of each one of our variables, we work with dummy variables to sort data into mutually exclusive categories. A dummy variable is one that takes the value 0 or 1 to indicate the absence or presence of some categorical effect that may be expected to shift the outcome. The number of dummy variables necessary to represent a single attribute variable is equal to the number of levels in that variable minus one; therefore, for the *Age* variable dummy variables are included in the regression model. The omitted category serves as a baseline to which the other categories are compared.

Table 3.2, below, presents the summary statistics of our sample participants.

Table 3.2: Descriptive statistics

Variables	**Frequency**	**Percentage**	**Cumulative Percentage**
Gender			
Male	1,505	46.69%	46.69%
Female	1,524	50.31%	100.00%

Age			
15-24 years old	519	17.13%	17.13%
25-39 years old	840	27.23%	44.87%
40-54 years old	723	23.87%	68.74%
55-64 years old	347	11.46%	80.19%
65-79 years old	495	16.34%	96.53%
> 80 years old	105	3.47%	100.00%
MaritalStatus			
Single	1,245	41.10%	41.10%
Married	1,550	51.17%	92.27%
Divorcee	133	4.39%	96.67%
Separated	88	2.91%	99.57%
Widow	13	0.43%	100.00%
Job			
Unemployed	951	31.40%	31.40%
Employed	2,078	68.60%	100.00%
Residence			
Other	492	16.24%	16.24%
Athens	2,537	83.76%	100.00%
Members			
Single individual	737	24.33%	24.33%
(Married) Couple	458	15.12%	39.45%
Couple with 1 child	578	19.08%	58.53%
Couple with 2 children	960	31.69%	90.23%
Couple with 3 children	255	8.42%	98.65%
Couple with 4 children	41	1.35%	100.00%
Income			
≤ €750	141	4.66%	4.66%
€751-1,100	404	13.34%	17.99%
€1,101-1,450	282	9.31%	27.30%
€1,451-1,800	365	12.05%	39.35%
€1,801-2,200	348	11.49%	50.84%
€2,201-2,800	380	12.55%	63.39%
€2,801-3,500	523	17.27%	80.65%
> €3,500	586	19.35%	100.00%

As Table 3.2 shows, half of our sample participants are men, while the majority of the participants are between ages of 25 and 39 years old. Participants, on average, are

married and have two children. They live in the prefecture of Athens and about 70% of them are employed. Finally, they belong, on average, to middle income classes. Further analysis was conducted in order to capture the preferences of a citizen with respect to the funding of T1 (personal healthcare services and goods), T2 (collective healthcare services), T3 (total current health expenditures) and Invest, according to his/her demographic characteristics. Box plots in the Appendix represent those preferences (Graphs AII.5-AII).

Next, Table 3.3 presents the citizens' preferences to public health expenditure allocation, along with the actual public health spending among Healthcare functions in Greece for 2012.

Table 3.3: Summary statistics for health expenditure allocation
(citizens' preferences vs. actual public spending)

	Citizens' preferences over health expenditure allocation %					**Actual public health expenditure allocation %**
Variables	**Obs.**	**Mean %**	**Std. Dev.**	**Min %**	**Max %**	
1. Curative care	3,029	17.520	8.867	0	60	64.23
2. Rehabilitative care	3,029	12.157	6.564	0	75	0.63
3. Long-term care	3,029	11.104	6.337	0	82	0.66
4. Ancillary care	3,029	8.633	5.239	0	60	4.01
5. Out-patients	3,029	9.095	5.833	0	50	26.55
6. Prevention-Public health	3,029	15.331	8.960	0	79	1.68
7. Administration	3,029	11.170	6.521	0	50	2.15
8. Capital formation	3,029	14.992	11.078	0	98	0.09

Source: OECD Health Statistics (2014b) and own calculations.

Table 3.3 shows that Greek citizens allocated the hypothetical amount (on health expenditure) almost equally (about 12.5%) across all health categories. Furthermore, they allocated more than half of the budget (almost 60%) to personal health services and goods (variables 1-5), one quarter to collective healthcare services (variables 6-7), and the rest (15%) to capital formation (variable 8). The corresponding actual public expenditure in the aforementioned categories is 64.23, 0.63, 0.66, 4.01, 26.55, 1.68, 2.15 and 0.09, respectively. Information on the public's health expenditure in Greece

for the year 2012 among Healthcare functions is calculated from OECD (2014b) data. As one observes, in health functions (1) and (5), public spending is higher than citizens' preferences, while in the rest of the health functions the opposite holds.

Interaction and correlation of explanatory variables are empirically and logically distinct phenomena. Two variables can interact whether or not they are related to one another statistically. Interaction refers to the manner in which explanatory variables combine to affect a response variable, not to the relationship between the explanatory variables themselves.

Table 3.4, below, presents the correlations across Healthcare functions (citizens' preferences).

Table 3.4: Correlations across Healthcare functions (citizens' preferences)

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Curative care	1.000							
2. Rehabilitative care	0.148*	1.000						
3. Long-term care	-0.068*	0.164*	1.000					
4. Ancillary care	-0.114*	-0.067*	0.071*	1.000				
5. Out-patients	-0.153*	-0.105*	-0.098*	0.088*	1.000			
6. Prevention-Public health	-0.265*	-0.233*	-0.214*	-0.230*	-0.131*	1.000		
7. Administration	-0.271*	-0.280*	-0.213*	-0.143*	-0.085*	0.067*	1.000	
8. Capital formation	-0.340*	-0.364*	-0.298*	-0.159*	-0.171*	-0.198*	-0.026	1.000

Note: (*) indicate significance at 5% level of significance.

As Table 3.4 shows, there is no strong correlation across Healthcare functions, as the Pearson correlation coefficient is small (smaller than 0.3 in most cases). A stronger association, however, is demonstrated between the variables "capital formation" with "curative care" (0.34) and "rehabilitative care" (0.36).

So far, we have discussed how citizens have expressed their preferences for allocating a hypothetical amount of money (budget) across major Healthcare functions. This allocation reveals only the preferences of the citizens on how the government should allocate (and prioritize) the expenditure across these Healthcare functions. Nevertheless, actual public health expenditure on these functions seems to be indeed

very different.

To statistically examine these differences, we performed the following test: The citizens' expenditure allocation preferences means were tested under the hypothesis that they are equal with the public health expenditure allocation means in every Healthcare function (variable). We reject the null hypothesis at 95% interval confidence (a=5% level of significance) for all cases. Therefore, the means of the citizens' preferences are statistically different from the actual public expenditure means for all eight functions. Consequently, there seems to be some disagreement between citizens' preferences and actual public expenditure on health expenditure allocation.

Furthermore, this chapter aims to quantify this 'disagreement'. In doing so, we took the difference between the two stakeholders' (citizens and government) means, for each of the eight variables (functions) and calculated the distribution of deviations. Then, we introduce a dummy variable taking the value of 1 for 'strong' disagreement between the two stakeholders for deviations higher than the 66th percentile of the distribution; 2 for 'modest' agreement for deviations between the 3rd and 66th percentile of distribution; and finally, 3 for 'almost' agreement for deviations below the 33rd percentile of the distribution.

In the next section, we present our model, which aims to explain the sources of this (dis)agreement.

3.2.3 Model

Logistic regression is used for prediction of the probability of occurrence of an event by fitting data to a logit function logistic curve. The likelihood of a citizen's preferences to coincide with actual public health expenditure allocation can be described by an ordered logit model as follows:

$$\Pr(Y=c|Xi) = F(Xi\beta),$$

where, the endogenous variable Y is the degree of citizens' agreement with actual public health expenditure allocation and is an integer ranging from 1 (fully disagree) to 3 (fully agree); F is the standard logistic cumulative distribution function; and X is

a set of covariates. The model is defined as:

$$Y_i = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 MaritalStatus_i + \beta_4 Job_i + \beta_5 Residence_i + \beta_6 Members_i + \beta_7 Income_i + \varepsilon_i,\ \varepsilon_i \sim \text{Logistic}(0,1)$$

where, *Gender* is a dummy variable that takes the values 0 and 1 if the citizen is male and female respectively; *Age* is the age of the citizen and is a dummy that takes the value of 1 (for ages 15 to 24), 2 (for ages 25 to 39), 3 (for ages 40 to 54), 4 (for ages 55 to 64), 5 (for ages 65 to 79), and 6 (for ages >80 years old); *MaritalStatus* is a dummy and is 1 for singles, 2 for married, 3 for divorced, 4 for separated, and 5 for window; *Job* is a dummy for the employment status of the citizen and takes the values 0 for unemployed and 1 employed; *Residence* is a dummy variable that takes the value 1 if the citizen lives in Athens and 0 otherwise; *Members* is the citizen's total family members (is 1 for a single person, 2 for a married couple, 3 for a family with one child, and so on; *Income* is a dummy for the income level of the citizen and is 1 for income level < €750, 2 for €751-€1100, 3 for €1101-€1450, 4 for €1451-€1800, 5 for €1801-€2200, 6 for €2201-€2800, 7 for €2801-€3500, and 8 for income level > €3501.

The selection of the variables in X_i set can be justified by various studies (Rosen and Karlberg, 2002; Economou *et al.*, 2004; Werntoft *et al.*, 2007a; Werntoft *et al.*, 2007b; WHO, 2010; Anderson *et al.*, 2011; Diederich *et al.*, 2011; Kyriopoulos *et al.*, 2014). More particularly, Anderson *et al.* (2011) identified five key clusters of factors that contribute to explaining the healthcare preferences of the general public. These factors are: age, marital status, educational level, social welfare and general religiosity. Furthermore, the distribution of public healthcare in relation to economic status is assessed in O'Donnell *et al.* (2007) study, where the distribution of public health spending is compared with the Lorenz curve of household income, providing evidence that effective targeting is easier to realize at higher levels on national income.

3.3 Results

Table 3.5, below, presents estimates of odds ratios for each one of the eight

Healthcare functions. One can read the odds ratios as follows: if the odd ratio, a, is bigger than 1 (a >1, then the probability of a citizen being satisfied with the actual public health expenditure allocation, i.e. *Y* =3 (full agreement), increases by (a-1)*100%, whereas the probability decreases by (1-a)*100%, if the odd ratio is smaller than one (a<1).

Testing for omitted variable bias is important for our model, since it is related to the assumption that the error term and the independent variables in the model are not correlated. Therefore, Table AII.1, presents a more comprehensive analysis per age, marital status, family members and income class. For every variable of our model that has more than two categories, we constructed one new variable for each one of the aforementioned categories. One of new variables (usually the variable corresponding to the first category) is omitted from our specification and is considered to be our reference or baseline variable. Overall, results remain robust and do not alter in any significant manner.

Table 3.5: Logit Estimates (odds ratios) for Various Healthcare functions

(dependent variable: Deviation between citizens' preferences and actual public health expenditure)

Odds Ratios	*Personal health services and goods*					*Public (Collective) healthcare services*		*Capital formation*
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Curative care	*Rehabilitative care*	*Long-term care*	*Ancillary care*	*Out-patients*	*Prevention - Public Health*	*Administration*	*Capital formation*
Gender	0.975 (0.191)	**1.231***** (0.094)	0.939 (0.078)	0.937 (0.148)	1.041 (0.106)	1.008 (0.075)	**0.852***** (0.083)	**1.194****** (0.085)
Age	0.875 (0.073)	**0.932*** (0.031)	1.026 (0.037)	1.067 (0.077)	0.936 (0.043)	0.976 (0.032)	0.980 (0.044)	**1.091***** (0.034)
Marital Status	1.062 (0.135)	1.007 (0.059)	**0.851****** (0.055)	1.105 (0.165)	0.989 (0.090)	0.997 (0.062)	**1.191****** (0.101)	1.010 (0.057)
Job	**3.322***** (0.943)	0.974 (0.090)	**1.246****** (0.124)	1.260 (0.227)	0.884 (0.105)	0.917 (0.082)	**0.758****** (0.092)	**1.389***** (0.119)
Residence	**0.610****** (0.140)	**0.748***** (0.080)	0.903 (0.104)	1.344 (0.264)	**0.693***** (0.089)	**0.756***** (0.082)	1.152 (0.147)	**1.180*** (0.115)
Members	1.041 (0.076)	**0.917***** (0.029)	**0.910***** (0.030)	1.008 (0.066)	**1.146***** (0.049)	**1.170***** (0.036)	**1.094****** (0.045)	0.974 (0.030)
Income	**0.783***** (0.039)	1.037* (0.020)	**1.061***** (0.022)	1.051 (0.041)	**0.937****** (0.024)	**0.932***** (0.017)	1.007 (0.025)	0.998 (0.018)
Pseudo-R^2	0.0614	0.0057	0.0072	0.0072	0.0117	0.0081	0.0075	0.0055
Wald	50.13	26.45	29.40	12.85	34.25	43.02	23.72	31.22
Obs.	3,029	3,029	3,029	3,029	3,029	3,029	3,029	3,029

Note: Heteroscedasticity-robust standard errors in parentheses; (***), (**), (*) indicate significance at 1%, 5%, and 10%, respectively.

According to Table 3.5, all demographic factors explain the deviations between citizens' preferences with actual public health expenditure allocation. Among the demographic factors, *Members*, *Residence* and *Income* appear to be statistically significant in the majority (5 out of 8) of Healthcare functions. The factor *Job* is statistically significant in almost half of the Healthcare functions, *Gender* is statistically significant in three functions and finally *Age* and *MaritalStatus* are statistically significant in only two functions.

More specifically, the number of family members (*Members*) has a positive and statistically significant role in the majority of Healthcare functions. For instance, for the category "medical goods and services dispensed on out-patients" (5), when an additional member enters in a participant's family, the probability of a citizen's preference to be in agreement with public health expenditure allocation increases by 14.6% [=(1.146-1)*100%]. Similar positive effect is also documented for the functions "public health-prevention" (6) and "administration" (7), where the probability of a citizen to be satisfied with public health expenditure allocation increases by 17% and 9.4%, respectively. However, the opposite holds for the categories of "rehabilitative care" (2) and "long-term care" (3). In particular, when a citizen's family is getting bigger, then his/her probability of being satisfied with public health expenditure allocation decreases by 8% and 9%, respectively.

Furthermore, the income class of a participant (*Income*) has a positive and statistically significant association with the function "long-term care" (3). As the citizen's level of income increases and changes income class, the probability of being satisfied increases by 6.1%. For the functions "curative care" (1), "medical goods dispensed to out-patients" (5) and "prevention-public health" (6), the income effect is negative. That means the higher the level of income of a citizen is, the probability of being in agreement with public's spending decreases by 21.7%, 6.3% and 6.8%, respectively.

Where the civilian resides (*Residence*) also plays a role in a civilian's preferences and perception of health rationing. This factor is statistically associated with the health categories of "curative care" (column 1), "rehabilitative care" (column 2), "medical goods and services dispensed to out- patients" (column 5), "prevention-public health" (6) and "capital formation" (column 8). In the latter case, there is a positive association, with the probability of a civilian being in fully agreement with public

health expenditure allocation to increase by 18% if the citizen moves from the rest of the country to the prefecture of Athens. In all other aforementioned cases, the *Residence* effect is negative and the average decrease of a citizen's probability of being in fully agreement with the actual public health expenditure allocation is 30%.

The employment status of a citizen is also an important factor for shaping the degree of (dis)agreement between public and his/her own hypothetical expenditure allocation. The estimate of *Job* is statistical significant in four functions, namely "curative care" (1), "long-term care" (3), "administration" (7) and "capital formation" (8). More specifically, there is a positive association with respect to "curative care". Positive is also the *Job* effect for the functions "long-term care" (3) and "capital formation" (8). When a citizen is employed, the probability of being in fully agreement with the actual public health expenditure allocation increases by 24.6% and 38.9%, respectively compared to an unemployed person. The opposite effect is documented for the "administration", where the holding of a job leads to a decrease of the probability of in fully agreement by 24.2%.

The factor *Gender* seems to be statistically important only for the function "rehabilitative care" (2) and "capital formation" (8). In both variables, there is a positive and strong effect (at 1% and 5% level of significance, respectively) while a negative but with marginal statistical significance (at 10% level of significance) is documented for the function "administration" (7). More particularly, women are more likely to be in agreement with actual public health expenditure allocation (about 23.1% and 19.6% respectively for the functions 2 and 8) compared to a man.

Further, the demographic factor of *Age* seems to be statistically significant only for the function "capital formation" (8). We find that as the citizens grow older, the likelihood of being in fully agreement with actual public health expenditure allocation increases by 9.1%. A marginal significance is also demonstrated for the function "rehabilitative care" (2).

Finally, the marital status (*MaritalStatus*), which plays an important role in two functions that of "long-term care" (3) and "capital formation" (8), is a categorical variable, i.e., there is no intrinsic ordering to the categories, and, therefore, a marginal effect analysis is required and performed in Table 3.6 in this section below.

Table 3.6, below, presents the marginal effect analysis for *MaritalStatus* and for the functions in which appear to be statistically significant.

Table 3.6: Marginal Effects Analysis

Marginal effect	*Long-term care*	*Administration*
MaritalStatus		
Single	0.747 (0.015)	0.795 (0.014)
Married	0.718 (0.013)	0.843 (0.010)
Divorcee	0.667 (0.043)	0.795 (0.039)
Separated	0.620 (0.052)	0.886 (0.033)
Widow	0.842 (0.100)	0.772 (0.133)

Note: Heteroscedasticity robust standard errors in parentheses.

The marginal effect analysis of the marital status effect can be read as follows: the probability of a citizen being satisfied because the government met his/her preferences with respect to public health expenditure of "long-term care" function is 74.7% among those who are single, 71.8% among those who are married, 66.7% among those who are divorced, 62% among those who are separated and 84.2% among widowers. With respect to the function "administration", the probabilities are 79.5%, 84.3%, 79.5%, 88.6% and 77.2%, respectively.

3.4 Discussion

Aging population, shifting demographics, rising unemployment and financial strain, increasing healthcare costs and reductions in tax revenues are contributing to deeply stress the Greek healthcare system, while decreased disposable income has made access to healthcare more difficult for many households (Eurofound, 2014). The citizens' extremely low level of satisfaction from the Greek Health System (Health Consumer Powerhouse, 2015), reflects the impact of economic crisis and austerity in healthcare and in the social policy in general (Kyriopoulos *et al.*, 2014).

In this context, policymakers and service providers are faced with the challenge of

better allocate the available (scarce) resources. Priority setting and better allocation in healthcare expenditure are being introduced as a means to overcome these problems and to provide a fair distribution of resources (Rosen and Karlberg, 2002). Béhague and Storeng (2008) stated that vertical approaches are generally disease specific and promote targeted clinical interventions delivered by a specialized service while the horizontal ones, by contrast, tackle several interrelated health issues by strengthening health systems and developing integrated delivery systems.

Healthcare expenditure is both determined exogenously, through non-system external pressures, which may occur at the macroeconomic level, and endogenously, through factors that impact directly on expenditure and are determined mostly at the microeconomic level through a complex set of relationships (Kanavos, 1999). According to O'Donnell *et al.* (2007), there are evidence that the poor do not receive their population share of health spending and that would be sufficient to reject equity in the allocation of public healthcare, although than from an egalitarian perspective, an equitable distribution of health-care demands that resources be concentrated on the poor. A common approach to policy formulation in the face of resource constraints is to adopt the framework of societal health benefits maximization through reliance on the cost-effectiveness of health services provision, though does not always seem to be socially accepted (Hadorn, 1991). On the other hand, the *Accountability for Reasonableness* (A4R) framework (Ham and Robert, 2003; Daniels and Sabin, 2008) states that power differences must be mitigated to facilitate effective participation of diverse members in the decision making context for priority setting in healthcare financing. Finally, Botelho *et al.* (2013) found that although citizens wish to be consulted, they believe doctors should play the most important role on health expenditure allocation and rationing decisions.

In our research we found that, the number of family members seems to play a significant role shaping the citizens' agreement with respect to actual public health expenditure allocation, in the majority of healthcare functions. The effect, however, of this demographic factor, is not the same in all cases. "Collective health services", for example, have a great impact on children, since vaccination is essential. The same is true with the "medical goods and services dispensed to out-patients" function since it includes public pharmacies and sanitary shops. In contrast, the "long-term care" and

“rehabilitative care” is not highly ranked in parents’ preferences, finding present in other study for Greece (Theodorou *et al.*, 2010). According to Olsen *et al.* (2003), when it comes to healthcare rationing, the participants are more willing to favor parents or small children, and to discriminate against substance users, while they do not base their decision on characteristics related to a person’s life.

Other demographic factors such as job, age, gender and marital status do partly associate and play a significant role. These findings are consistent with other studies where these criteria for prioritizing medical services, have also controversial results (Kanavos, 1999; Werntoft *et al.*, 2007a, b; Werntoft and Edberg, 2009; Diederich *et al.*, 2012). However, other findings (Theodorou *et al.*, 2010; Fotaki, 2013; Broqvist and Garpenby, 2014) indicate that personal characteristics such as gender, age, education are context specific of choices in health.

With respect to income, it appears that poor citizens in Greece are in agreement with the public spending in the biggest health functions which are “curative services” and “medical goods and services dispensed to out-patients”. The importance of income in “collective health services” is also reasonable (Economou *et al.*, 2004). The higher the income class of a citizen, the lower his/her hypothetical spending on this function will be. Civilians would prefer more expenditure to be allocated to the functions of “curative care” and to “medical goods and services dispensed to out-patients.” This is also quite reasonable as these functions are very important in daily life, in contrast to the “long-term nursing care” function, which usually include chronic impairment. Citizens tend to focus more on present needs and less on future or expected chronic situations (Hauck *et al.*, 2004; Werntoft *et al.*, 2007b).

The preferences of citizens, who live outside the prefecture of Athens, seem to be in disagreement with actual public health expenditure for the majority of healthcare functions. We must not forget that mechanisms for needs assessment and priority-setting are underdeveloped in the Greek Health System and, as a consequence, the regional distribution of health resources is unequal (Economou, 2010). The study of Ranson *et al*. (2012) suggested that a more equitable distribution of resources should be done selectively on rural and urban slum areas since in theory, government provision of universal and free healthcare should cover the poor, but in practice it often does not. According to O’Donnell *et al.* (2007), the scale of public spending

may influence its incidence by affording a wider geographic distribution of public health facilities and so bring services closer to poor, rural populations, although there may also be a trickle-down effect: at low levels of spending the politically powerful, higher income urban elite may be more successful than the rural poor in capturing spending for programs that meet their own needs. In Greece all major health facilities are concentrated in the capital city, Athens, where the majority of the Greek population resides, leaving the rest of the country unarmed and to struggle with limited budgets. Our estimate on the variable *Capital formation*, which shows that the citizens tend to agree with that reality, is consistent with similar findings as appear in the Coelho (2013) study. It seems even more reasonable if someone takes into account that this category includes as well the training of health personnel and research and development.

In addition, one would expect an employed civilian to allocate more resources to all categories that potential directly related to his/her medical treatment and the utility s/he drives currently or in the future for the medical system and its functions (Sibbald *et al.*, 2010). Such health services are those of "curative care", which is covered by his/her insurance, or "long-term nursing care", which may cover the possibility of a labor accident, whereas spending on the category "regulation and collection of funds" would not rank high in his/her preferences (Diederich *et al.*, 2011; Schreier *et al.*, 2011).

Overall, our results demonstrate that there is a large deviation between citizens' preferences and actual public spending with respect to the resources allocated particularly to the functions of "curative care services" (strong disagreement) and "medical goods and services dispensed to out-patients" (modest disagreement).6 In all other health functions, the deviation documented is relatively small, thus we consider that public spending almost meets citizens' preferences.

Demographic factors seem to play an important role in explaining the deviations between citizens' preferences and public health spending. More particularly, our

[6] These two particular health functions enjoy the biggest proportion of public spending in Greece and elsewhere in the Mediterranean countries (e.g. Italy, Portugal and Spain). However, in Greece, public funding of "medical goods and services dispensed to out-patients" is almost double or triple compared to for instance Spain and Italy/Portugal, respectively.

findings show the important role of income, family members and residence in shaping citizens' preferences regarding health financing priorities in almost all healthcare functions, while other demographic factors such as job, age, gender and marital status do partly associate and play a significant role.

Several studies demonstrated so far that there is a gap between public preferences and actual public spending on health care. According to Rosen and Karlberg (11), the general public have high expectations of public care, expectation that do not fit with the decision-makers' views on what it should be offered. Nevertheless, the majority of these studies first focus on how the citizens rank different population groups in terms of their importance, and second on how the citizens' involvement in the decision making process would lead in a more effective allocation. To our knowledge this is the first attempt in the literature that the citizens' preferences are studied in terms of health care functions' funding; therefore, we are not able to perform comparisons with existed related studies.

Finally, it is worth to further evaluate the construction of the corresponding questionnaire as there was no methodology to base upon. Although it is demonstrated that income, the numbers of family members and residence play an important role in shaping citizens' preferences, further research is needed to be done in order to evaluate the potential effect of confounding factors. Our methodology for the construction of the citizens' agreement index, is based first on the sample average and second on the comparison of each health care function funding with respect to the aforementioned average. We also experimented with alternative indices constructed with higher deviations with respect to the proposed one and results do not change significantly. So we may assume that even with the addition of some data, a deviation between citizens' preferences and actual public spending on health will still be presented.

3.5 Conclusions

Government and citizens' rankings alongside health are one of the general topics they are most interested in. But still there are wide disparities between the level and the means of participation in the decision making process. Priority setting and resource

allocation across various healthcare functions are critical issues in health policy and strategic decision making. As health resources are limited while there are so many health challenges to resolve, consumers and payers have to make difficult decisions about expenditure allocation.

Our research unveiled the significant disagreement between citizens' preferences and actual public health expenditure across all healthcare functions, focusing on various demographic factors and deriving useful implications for public health policies.

As a result, government should encourage the citizens' participation, by introducing policies of empowering the knowledge dissemination and democratization in the decision making process.

Chapter 4
eHealth Literacy in Greece:
In the quest of the contributing factors

4.1 Introduction

Health literacy has been identified as a public health goal for the 21st century and a significant challenge in health education. With the trend towards a more consumer-centric healthcare system as part of an overall effort to improve the quality of healthcare and to reduce healthcare costs, it is important that services and training be provided so that consumer of healthcare could take a more active role in healthcare related decisions (Chan *et al.*, 2009). Despite the concerns regarding the quality of online health information (Silence *et al*., 2006), the advent of the Internet has dramatically changed the landscape of health information, as recent estimates document that more than 80% of Internet users search for health-related information online (Fox, 2005; Salesforce, 2015). According to a recent Pew Internet Research (2012) study on health, the Internet, and mobile, "80% of Internet users, or 59% of U.S. adults, look online for health information" and "17% of cell phone owners, or 15% of adults, have used their phone to look up health or medical information". Another study (Manhattan Research, 2012) estimates that 75 million people will use their smart-phone in 2014 to access health information.

With the tremendous growth of available information, users face the challenge of how to search, locate, evaluate and effectively use the health related information on the Internet as data safety remains one of the most commonly identified barrier with respect to the effective use of information in the Web (Cline and Haynes, 2001; Chan *et al*., 2009). People searching for healthcare information are becoming more demanding and sophisticated with regards to information and web site quality (Bodkin and Miaoulis, 2007). According to the study of Tang and Ng (2006), 72% of internet searchers expressed trust in most or all of the information they found online. Internet users must still be cautious that, when seeking healthcare information online, there may be incomplete, inaccurate and even dangerous information abounds in cyberspace (Karp and Monroe, 2002), as data safety is one of the most commonly

identified barriers with respect to the effective use of e-health tools. Despite these perils, studies have showed that health consumers are increasingly using the Internet not only for information, but also for communicating with peers and health professionals and purchasing health products and services (Adler, 2006; Infosys, 2014).

In today's technology-rich healthcare environment, there is a strong need for validated, computer-based tools to assess health literacy (Collins *et al.*, 2011). According to Hemming and Langille (2006), a person's life context impacts his or her relationship with health and literacy and when people have the ability to access and use information for self-perceived improvements within their life contexts, they are empowered. Recently, a subfield within medical informatics that develops information and communication technology tools and applications for use in healthcare has emerged, that of eHealth, i.e., the ability of the individuals in searching, analyzing and processing information from the Internet in order to address or solve health related issues (Eysenbach, 2011).

Consequently, understanding what shapes eHealth in a specific country is particularly important for health policy decision makers and the healthcare market, as it provides critical information to develop targeted and tailored interventions for relevant patient-consumer segments, and further suggest appropriate strategies for training the health illiterate part of the population. Furthermore, the implementation of eHealth and health information technologies is seen by many as an effective way to address current concerns about the quality and safety of a healthcare system, with the rising costs of healthcare being another major concern that eHealth may help address (IOM, 2009).

Within ehealth are consumer-oriented tools designed to engage consumers in managing their own healthcare, communicating with providers and social networks, and meeting their information needs (Demiris *et al.*, 2008). Health information orientation reflects the intrinsic consumer interest in issues of health and fundamentally contributes to the consumer motivation to use information technologies for health purposes (Dutta-Bergman, 2004). Among the first studies in the field is the seminal study of Norman and Skinner (2006a) who examine in a systematic way attributes that contribute to eHealth literacy. The authors state that eHealth literacy

could be defined by a set of factors such as a person's ability presenting health issue, educational background, health status at the time of the eHealth encounter, motivation for seeking the information, and the technologies used, and aims to empower individuals and enable them to fully participate in health decisions informed be eHealth resources. eHealth literacy combines facets of different literacy skills and it is the heart of six core skills: traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy. The relationship of these individual skills to each other is depicted in Figure AIII.1 in the Appendix. Using the metaphor of a lily, the petals (literacies) feed the pistil (eHealth literacy), and yet the pistil overlaps the petals, tying them together. Within the lily model, the six literacies are organized into two central types: analytic (traditional, media, information) and context-specific (computer, scientific, health), shown in Figures AIII.2 and AIII.3, respectively.

Numerous subsequent studies have investigated the relationship between eHealth literacy and various, mainly demographic, factors. For example, the study of Adreassen *et al.* (2007) argued that the use of Internet for health purposes was positively related with youth, higher education, white-collar or no paid job, visits to the general practitioner during the past year, long-term illness or disabilities, and a subjective assessment of one's own health as good. Baker *et al.* (2003) concluded that higher education is associated with higher use of the Internet for health purposes. Cross-country evidence also emphasis the significance of general literacy level on using information technologies. For instance, as literacy skill level rise, the perceived usefulness of computers, diversity and intensity of Internet use, and use of computers for task-oriented purposes rise too, even when factors such as age, income, and education levels are taken into account (Veenhorf *et al*., 2005). The study of Rudd *et al*. (2004) further documents the importance of education, along with income, country of birth, age and race (ethnicity), for a person's eHealth performance. Additionally, the study of Norman and Skinner (2006a) revealed that baseline levels of ehealth literacy were higher among males; age did not predict eHealth literacy scores at any point in time, while no significant relationship was found between eHealth literacy and use of information technology overall. Finally, a more recent study of Amante *et al.* (2015) examined various reasons and odds of using the Internet to obtain health information.

Our research study contributes to the aforementioned vein of literature and brings evidence on the factors that influence the eHealth literacy in Greece, where, lately, government policies were focused on enabling the access to the Internet for a large part of population.

We focus on Greece as 8 out of 10 Internet users are searching the Internet seeking health information (IOBE, 2013). This is a surprisingly high rate, given the low penetration of internet in Greece (World Economic Forum, 2015). A recent study (IOBE, 2012) identifies and explains the reasons for the slower than anticipated growth of Internet use in Greece. A series of factors hindering e-services adoption were identified, such as: (i) limited commercial trust and user concerns for transactions security, (ii) factors connected with social background, (iii) low quality of available Greek electronic services, (iv) intellectual property rights and privacy issues and (v) complex/time consuming processes. Furthermore, according to OECD health data (2009), Greece has demographics that could consist a serious issue for the future, such as low birth rate and population distribution. At the same time, Greeks are on severe economic crisis and an elevated prevalence of certain diseases is already reported (WHO, 2011).

We, therefore, first constructed an index for the measurement of eHealth literacy, enriching and adapting the Norman and Skinner (2006b) eHealth Literacy Scale and using unique survey data from a sample of 1,064 individuals for the year 2013. The marking of the eHealth literacy index is based on the answers of the interviewees on eight questions about a user's ability in searching, analyzing and processing information from the Internet in order to address or solve health related issues. Next, we estimate the effect of various demographic, life-style factors and levels of technology literacy on the users' eHealth performance.

Our results demonstrate that among the demographic and life style factors, the age and education level as well as the physical exercise have an important impact on eHealth literacy, respectively. Other types of technology literacy, such as computer literacy and information literacy, further enhance the eHealth performance of citizens and, overall, they have the greatest impact among all factors.

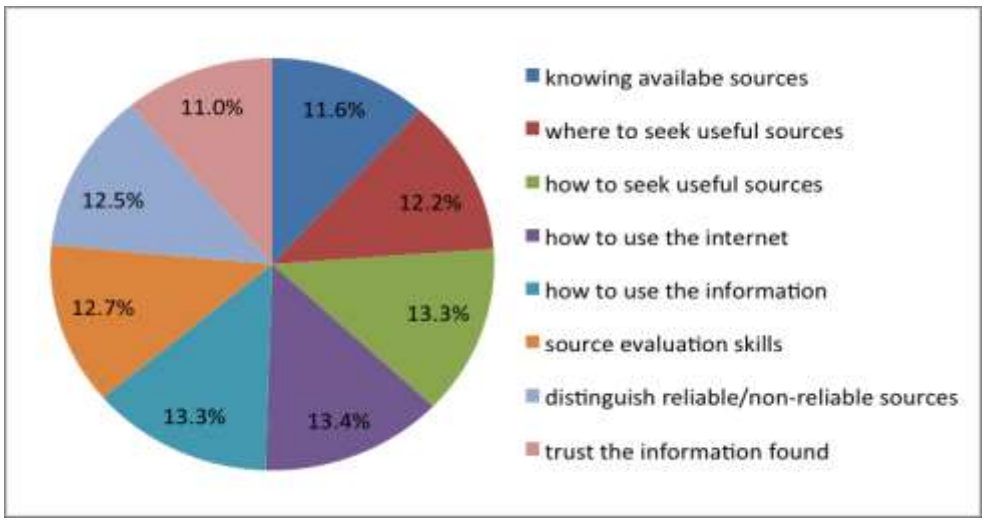
4.2 Methods

This section discusses the survey data, the modified eHealth literacy index and presents the selection of the estimation method.

4.2.1 Data

This empirical analysis relies on data obtained from a sample of 1,064 citizens in Greece for the year 2013, using the *Convenient Sampling Method*. The participants were requested to answer various questions about their ability to solve health related issues using information from the Internet. The dependent variable, the *eHealth literacy* index, is defined as the ability of a certain individual to seek, find, understand and appraise health information from electronic resources and apply such knowledge to addressing or solving a health problem, according to Norman and Skinner (2006b). The *eHealth literacy* index is based on the marking-evaluation of the following eight components, namely "*knowledge of available sources*", "*where to seek useful sources*", "*how to seek useful sources*", "*how to use the internet*", "*how to use the information from the internet*", "*source evaluation skills*", "*distinguish reliable and non-reliable sources*" and "*trust the information for decision making*". Each component was measured on a five-grade scale so the total summary of the *eHealth literacy* index ranges from eight to forty grades.

Graph 4.1, below, shows the distribution of each one of eight components of the *eHealth literacy* index.



Graph 4.1: Share of the components of the eHealth literacy index

Further, the users were asked to provide information about their demographic characteristics and life-style habits. Various demographic factors were included in the questionnaire (see Appendix IV-Questionnaires), such as *Gender*, *Age*, *Marital Status*, *Education* and *Income*, grouped according to Hellenic Statistical Authority classification. More specifically, demographic variables are grouped as follows: *Gender*: 0 for male and 1 for female; Age: 1 for 15-24 years old, 2 for 25-39 years old, 3 for 40-54 years old, 4 for 55-64 years old, 5 for 65-79 years old and 6 for >80 years old; *MaritalStatus*: 1 for single, 2 for married, 3 for divorced, 4 for separated and 5 for widow; *Education*: 1 for primary school, 2 for high school-3 first years, 3 for technical education, 4 for high school-3 last years, 5 for post high school-excl. university, 6 for university, 7 for master, and 8 for Ph.D; *Income*: 1 for < €750, 2 for €751-1,100, 3 for €1,101-1,450, 4 for €1,451-1,800, 5 for €1,801-2,200, 6 for €2,201-2,800, 7 for €2,801-3,500, 8 for > €3,501.

Additionally, they were requested to answer whether they smoke or not, whether they workout more than once per week and whether they consume alcohol on a regular basis.

Finally, the participants were invited to evaluate their skills with respect to computer and information literacy. The former, measures the skills of the participant regarding the use of computers, i.e. use of search engines, send e-mails, upload messages on forums, use of the Internet for chatting or construction of web pages, while the latter measures the degree of frequency of relying on internet search as a primary source of health related issues and the importance of accessing the internet in order to find health related sources.

Table 4.1, below, presents the summary statistics of all variables.

Table 4.1: Descriptive statistics of all variables

Variables	**Frequency**	**Percentage**	**Cum. Per.**
eHealth literacy			
Low	189	17.76%	17.76%
Fair	328	30.83%	48.59%
Enough	445	41.82%	90.41%
High	102	9.59%	100.00%

Gender			
Male	477	44.83%	44.83%
Female	587	55.17%	100.00%
Age			
15-24 years old	186	17.48%	17.48%
25-39 years old	503	47.27%	64.76%
40-54 years old	232	21.80%	86.56%
55-64 years old	56	5.26%	91.82%
65-79 years old	72	6.77%	98.59%
> 80 years old	15	1.41%	100.00%
Marital Status			
Single	549	51.60%	51.60%
Married	448	42.11%	93.70%
Divorcee	34	3.20%	96.90%
Separated	31	2.91%	99.81%
Widow	2	0.19%	100.00%
Education			
Primary	35	3.29%	3.29%
High school-3 first years	30	2.82%	6.11%
Technical education	33	3.10%	9.21%
High school-3 last years	272	25.56%	34.77%
Post high school-excl. university	51	4.79%	39.57%
University	516	48.50%	88.06%
Master	106	9.96%	90.03%
Ph.D.	21	1.97%	100.00%
Income			
≤ €750	143	13.44%	13.44%
€751-1,100	242	22.74%	36.18%
€1,101-1,450	100	9.40%	45.58%
€1,451-1,800	164	15.41%	61.00%
€1,801-2,200	155	14.57%	75.56%
€2,201-2,800	114	10.71%	86.28%
€2,801-3,500	94	8.83%	95.11%
> €3,500	52	4.89%	100.00%

Smoke			
Non-smokers	641	60.24%	60.24%
Smokers	423	39.76%	100.00%
Physical Exercise			
Once per week	564	53.01%	53.01%
More than once per week	500	46.99%	100.00%
Alcohol			
Not on a regular basis	829	77.91%	77.91%
On a regular basis	235	22.09%	100.00%
Computer literacy			
Low	122	11.47%	11.47%
Fair	381	35.81%	47.27%
High	561	52.73%	100.00%
Information literacy			
Low	160	15.04%	15.04%
Fair	547	51.41%	66.45%
High	357	33.55%	100.00%

As the Table 4.1 shows, our sample participants are in the middle classes of *eHealth literacy* levels. The distribution of our participants with respect to their level of ehealth literacy is shown in the Appendix Figure AIII.4.

Furthermore, half of the participants are men, while the majority of the interviewers are between the age of 25 and 39 years old, they hold a bachelor degree and belong to middle income class, while the majority of them are singles or married.

In addition, participants appear to lead healthy life-style, as they do not smoke or consume alcohol on a regular basis and workout once per week. A more explicit representation of the relationship between all variables and ehealth literacy is provided in cross-tabulations in the Appendix III (ehealth literacy-demographic factors, Tables AIII.1-AIII.5; ehealth literacy-lifestyle factors, Tables AIII.6-AIII.8; ehealth literacy-literacy factors, Tables AIII.9-AIII.10).

Table 4.2, below, presents the correlations between the dependent variable *eHealth literacy* and all the other factors (independent variables).

Table 4.2: Correlations between all variables

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1 eHealth Literacy	1.00										
2 Gender	0.01	1.00									
3 Age	-0.29*	-0.02	1.00								
4 Marital Status	-0.17*	0.08*	0.57*	1.00							
5 Education	0.41*	0.01	-0.22*	-0.16*	1.00						
6 Income	0.07*	-0.07*	0.05	0.11*	0.18*	1.00					
7 Smoke	-0.02	-0.07*	-0.06*	0.01	-0.09*	0.04	1.00				
8 Exercise	0.20*	-0.11*	-0.22*	-0.22*	0.11*	-0.09*	-0.06	1.00			
9 Alcohol	-0.03	-0.18*	-0.01	-0.05	-0.01	-0.02	0.19*	0.01	1.00		
10 Computer Literacy	0.46*	-0.05	-0.45*	-0.31*	0.35*	0.13*	-0.01	0.17*	0.04	1.00	
11 Information Literacy	0.45*	0.04	-0.17*	-0.08*	0.27*	0.13*	-0.06*	0.12*	-0.09*	0.31*	1.00

Note: (*) indicate significance at 5% level of significance.

As Table 4.2 shows, the two types of technology literacy, *computer and information literacy*, are highly related with *eHealth literacy* (0.46 and 0.45 respectively). These two variables are also positively related with each other. Further, *age*, *education*, and *exercise* are also strongly related with *eHealth literacy* (-0.29, 0.41, and 0.20 respectively).

4.2.2 Model

The likelihood of a certain user (citizen-patient) being *eHealth Literate* (able in searching, analyzing and processing information from the Internet in order to address or solve health related issues, can be described by an ordered logit model defined as follows:

$$\Pr(Y = c|X_i) = F(X_i\beta),$$

where the endogenous variable Y is the degree of *eHealth literacy* and takes values from 1 to 4 (c) in accordance with the aforementioned abilities (1 for low, 2 for fair, 3 for enough, 4 for high); F is the standard logistic cumulative distribution function and X_i is a set of covariates. The model is defined as:

$$Y_i = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 MaritalStatus_i + \beta_4 Education_i + \beta_5 \text{Income}_i + \beta_6 Smoking_i + \beta_7 Exercise_i + \beta_8 Alcohol_i + \beta_9 CI_i + \beta_{10} IL_i + \varepsilon_i,\ \varepsilon_i \sim \text{Logistic}(0,1)$$

where the first five variables consist the demographic factors (set *D*): *Gender* is a dummy variable that takes the values 0 and 1 if the participant is male and female respectively; *Age* is the age of the participants clustered as follows: class 1 (15-24), class 2 (25-39), class 3 (40-54), class 4 (55-64), class 5 (65-79), class 6 (>80 years old); *MaritalStatus* represents whether a participant is single (1), married (2), divorced (3), separated (4) or widow (5); *Education* is the level of education of each participant ranging from for primary school (1) to Ph.D (8); *Income* is the income level of the participants clustered in eight groups (see preceding discussion about classes' classification).

The next three variables form the life-style set (set *H*) and are: *Smoking* is a dummy variable and represents whether the participants are smokers or not; *Exercise* is a dummy variable that takes the value 0 if the participant is not exercising more than once per week, otherwise is 1; *Alcohol* is a dummy variable and takes the value 0 if the participant is not drinking on a regular basis, otherwise is 1.

Finally, we also included technology related literacy covariates, namely *CI,* which captures the computer literacy of each participant and ranges from (0) for non knowledge at all to (2) for high knowledge, and *IL* is the information literacy of the participant and takes the values (1), (2) and (3) for low, fair and high knowledge (see preceding discussion about classes' classification).

The selection of the variables in X_i set can be justified by relevant studies. More specifically, the demographic variables of age and education are documented in the studies of Baker *et al.* (2003); Petch *et al.* (2005); Watkins and Xie (2014), while Schwartz *et al.* (2005); Andreasen *et al*. (2007); Rudd *et al.* (2004) and Veenhorf *et al.* (2005), along with the variables of age and education, take into account the variable of income. Further, the variable of gender is explored in the study of Norman and Skinner (2006b). When it comes to life-style factors, such as smoking, they are mentioned in the study of Bodie and Dutta (2008). Finally, technology literacy, it is included in a handful of studies (Eysenback, 2001; Norman and Skinner, 2006a; Bodie and Dutta, 2008).

The model only applies to data that meet the proportional odds assumption. Suppose that the proportions of members of the statistical population who would answer Y=1,

Y=2, Y=3, Y=4 and Y=5 are respectively p1, p2, p3, p4 and p5. Then the logarithms of the odds (not the logarithms of the probabilities) of answering in certain ways are:

Y=1,	log [p1/(p2+p3+p4+p5)], 0
Y=1 or Y=2,	log [(p1+p2)/(p3+p4+p5)], 1
Y=1, Y=2 or Y=3,	log [(p1+p2+p3)/(p4+p5)], 2
Y=1, Y=2, Y=3 or Y=4,	log [(p1+p2+p3+p4)/p5], 3

The proportional odds assumption is that the number added to each of these logarithms to get the next is the same in every case. In other words, these logarithms form an arithmetic sequence.

4.3 Results

Table 4.3 presents the odds ratios for all specifications. One can read the odd ratios as follows: if the odd ratio, *a*, is bigger than one ($a>1$), then the probability of a user being health literate, i.e. $Y_{it}=4$ (maximum level of eHealth literacy), increases by (a-1)*100%, whereas the probability decreases by (1-a)*100%, if the odd ratio is smaller than one ($a<1$).

Columns (1)-(4) present estimates of the model, where only the demographic (*D*) and literacy factors (*C*) are included. Next, columns (5)-(8) show estimates of the model, where only the indicators of the participants' lifestyle (*L*) and literacy are included. Finally, columns (9)-(12) present estimates, where the full set of covariates (*X*) are included.

Table AIII.11 presents the same estimates calculated per age, marital status, education, income, computer literacy and information literacy class.

Table 4.3: Logit estimates (odds ratios) of different specifications

(maximum level of *eHealth literacy* is the dependent variable)

		Demographic (*D*)				**Life-style (*L*)**				**Full Set (*X*)**			
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Demographic	*Gender*	1.022	1.108	0.951	1.021					1.059	1.138	1.005	1.069
		(0.12)	(0.133)	(0.114)	(0.125)					(0.127)	(0.139)	(0.123)	(0.133)
	Age	**0.617*** **	**0.752*** **	**0.643*** **	**0.752*** **					**0.635*** **	**0.770*** **	**0.663*** **	**0.771*** **
		(0.043)	(0.054)	(0.046)	(0.055)					(0.044)	(0.056)	(0.048)	(0.058)
	Marital Status	1.081	1.187	1.064	1.169					1.121	**1.227***	1.098	**1.201***
		(0.113)	(0.125)	(0.113)	(0.126)					(0.118)	(0.131)	(0.118)	(0.131)
	Education	**1.698*** **	**1.576*** **	**1.616*** **	**1.526*** **					**1.686*** **	**1.569*** **	**1.616*** **	**1.530*** **
		(0.077)	(0.074)	(0.076)	(0.073)					(0.077)	(0.742)	(0.07)	(0.074)
	Income	1.020	0.976	0.984	0.950					1.033	0.986	0.993	0.958
		(0.030)	(0.029)	(0.029)	(0.029)					(0.030)	(0.030)	(0.030)	(0.029)
Life-style	*Smoke*					0.956	0.967	1.071	1.070	1.024	1.046	1.140	1.157
						(0.112)	(0.117)	(0.129)	(0.133)	(0.126)	(0.13)	(0.143)	(0.147)
	Exercise					**2.083*** **	**1.740*** **	**1.907*** **	**1.638*** **	**1.704*** **	**1.638*** **	**1.585*** **	**1.540*** **
						(0.239)	(0.207)	(0.225)	(0.198)	(0.208)	(0.203)	(0.197)	(0.194)
	Alcohol					0.877	0.779	1.072	0.926	0.868	0.819	1.004	0.929
						(0.121)	(0.112)	(0.151)	(0.136)	(0.126)	(0.122)	(0.148)	(0.14)
Literacy	*Computer Literacy*		**3.035*** **		**2.584*** **		**4.019*** **		**3.246*** **		**3.011*** **		**2.568*** **
			(0.320)		(0.282)		(0.382)		(0.321)		(0.319)		(0.281)
	Information Literacy			**3.493*** **	**3.102*** **			**4.121***	**3.273*** **			**3.465*** **	**3.072*** **
				(0.353)	(0.318)			(0.407)	(0.332)			(0.353)	(0.318)
Observations		1064	1064	1064	1064	1064	1064	1064	1064	1064	1064	1064	1064
Likelihood Ratio		260.45	375.96	428.70	506.93	42.88	276.42	272.29	424.24	280.79	393.84	443.25	519.79
Pseudo-R^2		0.097	0.140	0.160	0.189	0.016	0.103	0.102	0.158	0.105	0.147	0.165	0.194

Note: Numbers in parenthesis are standard errors; (***) and (*) indicate significance at 1% and 10%, respectively.

As Table 4.3 shows, among the demographic factors (*D*) presented in columns (1)-(4), only *Age* and *Education* have a statistical significant effect on the probability of being *eHealth literate*. More specifically, when it comes to the *Age* effect, there is a negative relationship between *eHealth literacy* and aging. We find that as the participants grow older, the likelihood of being *eHealth literate* at the maximum level decreases by 38%, as column (1) indicates. By including other literacy factors (*C*), namely *ComputerLiteracy* and *InformationLiteracy* (columns 2-4) the *Age* effect decreases, ranging from to 25% (columns 2 & 4) to 35% (column 3). The opposite finding emerges with respect to the *Education* effect, which is positively related to the *eHealth literacy*. Particularly, the higher the level of education of the participant is, the higher the likelihood of the eHealth maximum level of literacy of the participant, ranging from 70% increase (excluding literacy factors, column 1) to 53% (when literacy factors are included, column 4). The literacy factors in all specifications (1-4) are found to greatly affect the *eHealth literacy* performance of the participants. For example, when we control for both literacy factors in column (4), results show that the higher the *ComputerLiteracy* and the *InformationLiteracy* are, the probability of a participant's maximum level of *eHealth literacy* increases by 116% and 210%, respectively. The inclusion of these factors slightly decreases the role of the demographic variables, with the former still to pertain their significance.

Next, columns (5)-(8) include only the health lifestyle (*L*) factors along with the literacy factors (*C*). Results demonstrate all health habit factors carry the expected sign with respect to their impact on *eHealth literacy*; however, only physical *Exercise* is found to be statistically important. If a user works-out more than once per week, his/her *eHealth literacy* increases by 108% (column 5). In addition, if the participant has high *computer and information literacy*, then the effect of physical exercise reduces to 64%, as column (8) indicates.

Finally, columns (9)-(12) show estimates of various combinations of all sets of variables. Particularly, last column presents the fully-fledge specification with all demographic, life-style and literacy variables included. As before, the same variables appear to be statistically significant, maintaining the expected sign according to the theory. For instance, among the demographic factors, the probability of a participant's *eHealth literacy* decreases by 23% when the participant ages, while the probability

increases by 53% when the participant acquires higher level of education. There is also a positive *Marital* effect, significant at 10%, on participant's *eHealth literacy*; however it's difficult at this stage of analysis to draw concrete conclusions about the marital effect on *eHealth literacy*. The reason is that the movement from one class to the next one would not be necessarily the case in reality (e.g. a divorced person who belongs to class 3 does not necessarily become separated, meaning being member of class 4). Therefore, we cannot compare whether there is an improvement (or deterioration), of any sort, by changing classes, as it is the case with the rest of the variables which follow an order. Therefore, the marital effect on *eHealth literacy* requires a marginal effect analysis which is performed in Table 4.3 in this section). With respect to the life-style variables, again physical exercise appears to have a positive and statistical significant effect on a participant's *eHealth literacy*, which is about 54%. Literacy factors, relating to computers and information, also document their strong association with *eHealth literacy* and range from 157% (*ComputerLiteracy*) to 207% (*InformationLiteracy*).

In sum, estimates do not alter neither in sign, nor in statistical importance across all specifications of Table 4.3, and remain robust. Overall, our findings strongly support that the age and education are important contributors to eHealth literacy of an individual. The (negative) effect of age ranges from 23% (column 12) to 37% (column 1), while the (positive) effect of education varies from 70% (column 1) to 53% (column 12). Marital status, only in some cases has a statistically borderline significant role (at 10% level of significance), while the two other remaining demographic variables, i.e., income and gender, play no role at all. Physical exercise is the only factor among the life-style set of habit indicators that has a positive and significant effect that ranges from 108% (column 5) to 54% (column 12). Smoking and alcohol consumption have no impact on eHealth. In addition, high level of computer and information literacy is positively associated with high probability of eHealth status: 302%-157%, for computer literacy, and 312%-207%, for information literacy. Finally, as diagnostics of bottom part of Table 4.2 demonstrate, all specifications have a satisfactory fitness. For the last column, in particular, the fitted values and the actual values are related by 60%.

Next, in Table 4.4 below, we perform a marginal effect analysis, which captures the

effect on maximum *eHealth literacy* level when an individual changes within variable classes, e.g. (low to high income, primary to high-school, etc.) at the data means. The analysis is performed for the last column of Table 4.3, which is the fully-fledged specification and only for the statistical significant variables.[7]

Table 4.4: Marginal Effects Analysis

(maximum level of *eHealth literacy* is the dependent variable)

Variables	Marginal Effect	Std. Err.
Age		
15-24 years old	0.069	0.012
25-39 years old	0.052	0.007
40-54 years old	0.044	0.008
55-64 years old	0.038	0.011
65-79 years old	0.028	0.008
> 80 years old	0.003	0.004
Marital Status		
Single	0.046	0.006
Married	0.053	0.007
Divorced	0.008	0.005
Separated	0.095	0.032
Widow	0.364	0.326
Education		
Primary	0.016	0.007
High school-3 first years	0.009	0.004
Technical education	0.021	0.008
High school-3 last years	0.029	0.005
Post high school-excl. university	0.025	0.007
University	0.066	0.008
Master	0.103	0.019
Ph.D.	0.174	0.062
Exercise		
Once per week	0.040	0.006
More than once per week	0.061	0.008
Computer Literacy		
Low	0.005	0.001
Fair	0.048	0.008
High	0.078	0.009
Information Literacy		
Low	0.016	0.003
Fair	0.035	0.005
High	0.120	0.014

[7] Marginal effect analysis results for the rest of the specifications are also available upon request.

Holding all variables at their mean value, the probability of an individual being *eHealth literate* at the maximum level is 7% among those who are 15-24 years old, 5% among the class age of 25-39 years old, 4% among those who are 40-54- years old, 4% among those of next category (55-64 years old), 3% among those who are between the age of 65 and 79 years old, and 0.3% among those who are above the age of 80 years old. For example, as an individual grows old and moves to class 8 (above 80 years old), her probability of being eHealth literate at the maximum level decreases by 2.5% (=[0.028-0.003]*100%). The marginal effect analysis of the effect of various age classes on *eHealth literacy* confirms the finding from Table 4.3 that the age effect on *eHealth literacy* increases as participants becomes older.

The marginal effect analysis of the marital status on e-heath literacy can be read as follows: the probability of an individual being *eHealth literate* at the maximum level is about 5% among the singles, 5% among the married, 0.8% among the divorcees, 9% among the separated, and 36% among the widows.

The education effect on *eHealth literacy* is also consistent with findings from Table 4.3 as the marginal effects indicate. Overall, as the level of education of the participant is getting higher, the larger is the effect on *eHealth literacy*. For example, when a master holder user (group 7) obtains his Ph.D. and moves to group 8, there is a 7% (=[0.174-0.103]*100%) higher probability in being *eHealth literate*.

With respect to the impact of physical exercise on *eHealth literacy*, the marginal effect indicates that if someone is physically active more than once per week (group 1) has a 20% more chances to be *eHealth literate*.

Finally, when it comes to the technology literacy effects on *eHealth literacy* again we find that the higher the *computer literacy* the higher the eHealth performance. Particularly, we find no big difference when an individual moves from one computer literacy class to the next higher one. In contrast, there is a twofold and a fourfold effect when a participant increases his abilities on *information literacy* moving from class (1) to (2) and (2) to (3), respectively.

Overall, the marginal effect analysis is in accordance with the odds ratio analysis and strengthens even further the robustness of our results.

4.4 Discussion

At this point, we are able to compare our findings with those of other related studies. For example, our findings are in line with many studies that document an association between age and level of education with eHealth literacy (Baker *et al*., 2003; Rudd *et al.*, 2004; Petch *et al*,. 2005; Schwartz *et al.*, 2005; Veenhorf *et al.*, 2005; Andreasen *et al*., 2007; Choi, 2011; Kontos et al. (2014); Neufingerl, 2014; Silver, 2015; Tenant et al., 2015). The Greek educational system can justify this relationship as Greek students are heavily exposed in new technologies throughout their education. In contrast, we do not particularly align with studies that find strong association between income and gender with eHealth literacy (Rudd *et al.*, 2004; Schwartz *et al.*, 2005; Veenhorf *et al.*, 2005; Kontos et al., 2014; Neufingerl et al., 2014; Norman and Skinner, 2006; Lenhart, 2015), as we didn't document a strong relation between sex and eHealth literacy, such as the findings of similar studies (Rice, 2006; Meppelink, 2015). In particularly, the negative relationship we find can be justified as elderly, who live mostly in urban regions, may not have access to the Internet.

The linkage between life-style factors and eHealth literacy is mentioned in the study of Bodie and Dutta (2008), but the positive association of those two is not supported. Also, the Neufingerl *et al.* (2014) findings suggest the low ehealth literacy of smokers, a statement that couldn't be documented in our research. In contrast, our findings are in line with the Hsu *et al.* (2014) findings, where higher levels of critical eHealth literacy have promoted students' health status and their practice of multiple positive health behaviors, including eating, exercise, and sleep behaviors. Also, the Kontos *et al.* (2014) study found linkage between physical activity and eHealth literacy. Further, our results are in accordance with the studies supporting a positive and strong association between technology literacy and eHealth literacy (Eysenback, 2001; Bodie and Dutta, 2008; Neter E, Brainin, 2012). As van Deursen and van Dijk (2011) documented, operational and formal Internet skills are not sufficient when using the Internet for health purposes. Particularly in Greece, limited internet skills are identified as significant contributing factors to low ehealth literacy (IOBE, 2012; ELTRUN, 2013).

4.5 Conclusions

The advent and development of Internet and its use via various devices, was certainly a disruptive factor in the health provider-consumer (patient) relationship. Further, the Internet has a great potential for disseminating health information to the general public and at the same time is a tool that can be utilized to reach low-income, less educated, minority, and older populations.

Our research aims at studying whether certain factors such as demographic, life-style and types of technology literacy, shape the ability of the individuals in searching, analyzing and processing information from the Internet in order to address or solve health related issues.

Using unique survey data of 1,064 citizens in Greece for the year 2013, we constructed an eHealth literacy index, based on eight questions, as it has been proposed in the literature, relating a participant's ability on using the internet for health matters. Then, we estimated the effect of various factors on an individual's eHealth activity.

Our results demonstrated the important role of the age and education effect as well as that of physical exercise on *eHealth literacy*. Other types of technology literacy, such as computer skills and information obtained from the Internet, further enhance the eHealth performance of an individual having the greatest impact among all others factors.

Our study, confirmed factors that influence ehealth literacy are complex and interdependent. Therefore, more research should be conducted to further explore how these factors may influence one another, taking into consideration specific characteristics of users in various countries.

Chapter 5
Patient satisfaction:
The case of Konstantopouleio General Hospital

5.1 Introduction

Expectations and the perceived value of goods and services were found to exert the strongest influences on customer satisfaction. Fornell *et al.*, (1996) demonstrated that the expectations an individual has before proceeding to the purchase of a product or service have a negative impact on customer experience. In other words, according to Frank *et al.* (2009), higher perceived quality and lower expectations lead to higher customer satisfaction. Choi *et al.* (2004) confirmed the same findings for patient satisfaction as well, i.e. the satisfaction with respect to the services provided by the health system.

Over the last decades, hospitals have been working on improving patient-centered care by developing and implementing quality improvement strategies and activities based on the patients' perspectives (Kleefstra *et al.*, 2015). Several studies has shown that significant improvement may be achieved if organizations adopt a more strategic approach and give focus to the patients (Barr *et al.*, 2006; Luxford *et al.* 2011). Nevertheless, the measurement of patient's satisfaction has proven to be a difficult task.

According to Pascoe (1983), who provided an explicit literature review with respect to patient satisfaction, the patient variables that have been studied in patient satisfaction research can be grouped into three areas: attitudes, socio-demographic characteristics, and health- related behaviors. As a variable in understanding health-related behavior and clinical outcome, satisfaction is hypothesized to be both a dependent variable and a predictor of subsequent health-related behavior (Pascoe, 1983). While the recent studies regarding patient satisfaction explore the relationship between factors that contribute to higher levels of satisfaction and a very specific procedure, such as the study of Bamashmus *et al.* (2015), this chapter documents the factors that correlate positively and negatively with the level of in- and out-patients' satisfaction with respect to the performance of the Konstantopouleio General Hospital of Athens.

In Greece, several researches have been carried out, targeting on investigating patients' satisfaction from healthcare services provided by general hospitals (Niakas *et al.*, 2004; Gnardellis and Niakas, 2005; Priporas *et al.*, 2008; Matis *et al.*, 2009). The majority of them does not refer both to in- and out-patients, while the case mix studied is related with a specialized hospital or clinic (Pini *et al.*, 2014; Panteli and Patistea, 2007; Aletras *et al.*, 2007); therefore, it is difficult to extract a complete picture. However, overall, Papanikolaou and Ntani (2008) underline, that according to previous results a higher level of patient satisfaction emerges with respect to medical and nursing services comparing to the one emerging from accommodation and administration services.

This chapter purports to evaluate the degree of patients' satisfaction, as is revealed by patients' intention to recommend a hospital and its services to a relative or friend, and further assess the role of socioeconomic and healthcare provision factors in shaping patients' satisfaction. To further enhance our understanding, we interview in- and out-patients (i.e. patients that have been hospitalized/admitted to the hospital and patients that have received medical attention without being hospitalized/admitted to the hospital, respectively) about their degree of content with the hospital. This would allow us to derive more detailed conclusions and propose more concrete suggestions.

The contribution of this research lies in consisting the first attempt in the greek literature that studies both in- and out-patients in a greek general hospital, following international procedures and protocols for surveying data.

Our results demonstrate that the attention provided by medical and nursery stuff along with the hospital environment, are positively correlated with patients' satisfaction for both groups of in- and out-patients. Among the other demographic factors, the same holds for the age effect, while the perceived health status plays a positive and significant role in shaping in-patient satisfaction, and education and insurance associate with out-patient satisfaction.

The remaining of this chapter is organized as follows: Section 2 presents our framework of analysis, data and model. Section 3 presents and discusses our findings. Finally, Section 4 concludes.

5.2 Methods

This section discusses the data used and presents the research methodology.

5.2.1 Data

Since 2011, every hospital in Greece with more than 400 hospital beds was obligated to run a Quality Office. One of its responsibilities was to collect data with respect to patient satisfaction in order to use them for the evaluation of hospital performance and service quality. This research relies on a survey performed and on data collected by the employees of Konstantopouleio General Hospital. We choose to collaborate with this hospital, first because it was one the few which has complied with the Ministry of Health guidelines, and second, because it is well known for its pilot studies aiming to improve the quality of provided services.

Although more than 3,000 questionnaires were collected, our survey relies on a convenient sample[8] of 745 in-patients and 420 out-patients in Greece from June 2011 till October 2012. Each patient discharging from the hospital was asked to fill the corresponding questionnaire. The research included a wide range of socio-economic characteristics of the patient, who was requested to evaluate his/her experiences with respect to the services provided by the hospital and then grade these experiences on a 11-grade scale of patient satisfaction. We choose not to rely on the grade from 0 to 10 given to the hospital, but to the question "Would you recommend our hospital to friends and family?" in order to capture the patient's satisfaction level, an instrument that has been used in relative studies (Joffe *et al.*, 2003; Goldstein *et al.*, 2005).

The questionnaire of in-patients consists of almost 30 questions, excluding the ones referring to the demographic characteristics of the participant, while the questionnaire of out-patients consists of 25 questions. Several questions of the initials questionnaires were not used in our analysis, since no significant information was provided. The complete questionnaires can be found online and the ones used for this research can be found at the corresponding section of this thesis. Furthermore, we constructed four new variables, namely "doctors' attention", "nurses' attention", "hospital environment" and "hospital administration" using the total score of several

[8] Convenience sampling technique is the t

questions and then dividing it by the number of questions participating in each new variable. Finally, we employed logit estimation techniques to study the effect of demographic and healthcare provision factors, namely above, in shaping patients' satisfaction.

Tables 5.1 and 5.2, below, present the demographic characteristics of our two groups of patients, in- and out-patients, respectively.

Table 5.1: Descriptive statistics of in-patients

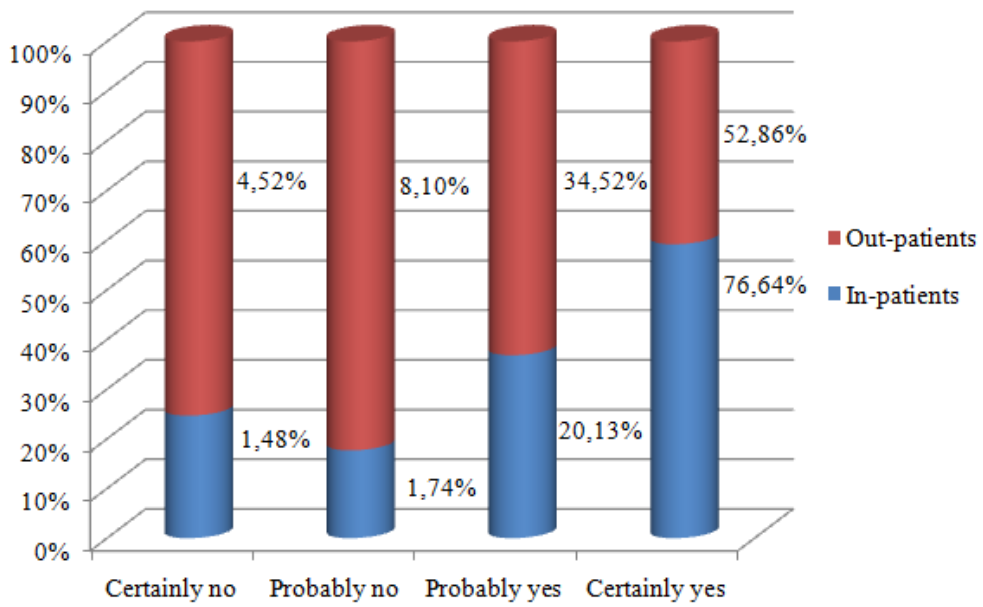
Variables	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Recommend	745	3.719	0.571	1	4
Gender	745	1.546	0.478	1	2
Age	745	5.003	1.884	1	7
Education	745	2.647	1.159	1	4
Health Status	745	2.863	0.986	1	5
Insurance	745	1.009	0.965	1	2
Nationality	745	1.042	0.200	1	2
Doctors' attention	745	3.795	0.449	1	4
Nurses' attention	745	3.685	0.532	1.333	4
Environment	745	3.519	0.550	1.5	4
Pain related procedures	745	1.849	0.660	1	2.5

Table 5.2: Descriptive statistics of out-patients

Variables	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Recommend	420	3.357	0.815	1	4
Gender	420	1.583	0.493	1	2
Age	420	4.007	1.900	1	7
Education	420	2.962	0.862	1	4
Insurance	420	1.031	0.173	1	2
Nationality	420	1.043	0.203	1	2
Doctors' attention	420	4.280	0.908	1	5
Nurses' attention	420	4.094	1.013	1	5
Environment	420	3.838	0.789	1	5
Administration's attention	420	3.675	1.045	1	5

Although it appears that both patient groups are willing to recommend the hospital to a friend and family, there are several characteristics that shape their differences with respect to this recommendation. For frequency and cumulative percentage analysis, see Tables AIV.1 and AIV.2 (Appendix AIV).

Graph 5.1, below, shows the distribution of our dependent variable (recommendation of the hospital to friends and family).



Graph 5.1: Different in- and out-patient intention to recommend the hospital

Form the Graph 5.1, above, we observe that the in-patients are, on average, more satisfied than the out-patients.

5.2.2 Model

The likelihood of a certain patient being satisfied is assessed through his/her intention to recommend the hospital to others and can be described by a logit model defined as follows:

$$\text{Prob}(Y = c|X_i) = F(X_i\beta), \qquad (1)$$

where the endogenous variable Y is the willingness to recommend the hospital and

takes values from 1 to 4 (c) and more specifically, the value 1 if the patient is certainly not willing to recommend the hospital, the value 2 if s/he is probably not willing to recommend it, the value 3 if s/he is probably willing to recommend it, and the value 4 if s/he is certainly willing to recommend it; F is the standard logistic cumulative distribution function and X_i is a set of covariates. The model for the in-patients is defined as follows:

$$Y_i = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Education_i + \beta_4 Perceived\_Health\_Status_i + \beta_5 Insurance_i + \beta_6 Nationality_i + \beta_7 Doctors\_Attention_i + \beta_8 Nurses\_Attention_i + \beta_9 Environment_i + \beta_{10} Pain\_Related\_Procedures_i \; \varepsilon_i, \; \varepsilon_i \sim \text{Logistic}(0,1) \qquad (1a)$$

and for the out-patients as follows:

$$Y_i = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Education_i + \beta_4 Insurance_i + \beta_5 Nationality_i + \beta_6 Doctor\_Attention_i + \beta_7 Nurses\_Attention_i + \beta_8 Environment_i \; \beta_9 Administation\_Attention_i + \varepsilon_i, \; \varepsilon_i \sim \text{Logistic}(0,1) \qquad (1b)$$

where, *Gender* is a dummy variable that takes the values 0 and 1 if the patient is male and female respectively; *Age* is the age of the patient and is a dummy that takes the value of 1 for ages less than or equal to 24 years old, 2 for ages 25-34 years old, 3 for ages 35-44 years old, 4 for ages 45-55 years old, 5 for ages 55-64 years old, 6 for ages 65-74 years old, and 7 for ages more than or equal to 75 years old; *Education* is a dummy variable that takes the value of 1 for primary school, 2 for high school-3 first years (out of six), 3 for high school-3 last years (out of six), and 4 for university; *Perceived_Health_Status* is a dummy corresponding to the health status of the participant ranging from terrible health status (1) to excellent (5); *Doctors_Attention*, *Nurses_Attention*, *Environment* and *Administation_Attention* are dummy variables that take the values of 1 to 4 along with the grades given from the patients with respect to the doctors' attendance, nurses' attendance, hospital's environment and administrative staff, respectively.

The selection of our variables can be justified by various studies, such as Niakas *et al.* (2004), Gnardellis and Niakas (2005), Panteli and Patistea (2007), Priporas *et al.* (2008), Matis *et al.* (2009), and Pini *et al.* (2014) with respect to greek literature. Furthermore, Linn *et al.* (2014) provided evidence for the importance of the attention received by the nursery staff. The latter is also demonstrated in the studies of

Horrocks *et al.* (2002) and Kutney-Lee *et al.* (2009). Several studies have examined the importance of the attention received by the medical staff, such as the ones of Dugdale *et al.* (1999), Epstein *et al.* (2005) and Mast *et al.* (2008). Hall *et al.* (2002) and Beach *et al.* (2006) investigated in particular the importance of doctors' behavior, while Krupat *et al.* (2000) studied the effect of doctor-patient congruence on satisfaction, where apart from doctors' attention gender, age and perceived health status were also investigated.

The significance of education is mentioned in the studies of van Ryn and Burke (2000), Siminoff *et al.* (2006), Tarn *et al.* (2006), Street *et al.* (2007). Hall and Press (1995) identified the key elements for patient satisfaction in the emergency department. The importance of the hospital's environment is mentioned in the study of and Lövgren *et al.* (1996) and Johansson *et al.* (2002). Finally, a review with respect to issues and concepts regarding patient satisfaction (Sitzia and Wood, 1997) examined all the demographic and psychological variables as determinants of satisfaction.

5.3 Results

Tables 5.3 and 5.4, below, present estimates of odds ratios for in- and out-patients, respectively, with respect to their satisfaction with hospital's performance and the probability of recommend it to friends and family.

One can read the odds ratios as follows: if the odd ratio, a, is bigger than 1 (a >1, then the probability of a patient to recommend the hospital, increases by (a-1)*100%, whereas the probability decreases by (1-a)*100%, if the odd ratio is smaller than one (a<1).

Column (1) presents estimates of the model, where only the demographic (*D*) factors are included. Next, column (2) shows estimates of the model, where only the indicators regarding the hospital's performance (*H*) are included. Finally, column (3) presents estimates, where the full set of covariates (*X*) is included. Tables AIV.3 and AIV.4 demonstrate the analysis preformed per each class of the demographic variables.

Table 5.3: Logit estimates (odds ratios) of different specifications for in-patients (the probability of recommend the hospital to others is the dependent variable)

Odds ratios	**Demographic (*D*)**	**Hospital (*H*)**	**Full set (*X*)**
	(1)	(2)	(3)
Gender	0.862 (0.159)		0.997 (0.208)
Age	**1.208***** (0.062)		**1.157***** (0.064)
Education	0.882 (0.077)		0.987 (0.097)
Perceived Health Status	**1.403***** (0.148)		**1.207*** (0.136)
Insurance	0.485 (0.406)		0.807 (1.174)
Nationality	0.587 (0.241)		0.726 (0.289)
Doctors' Attention		**1.363***** (0.219)	**4.192***** (1.025)
Nurses' Attention		**1.121***** (0.190)	**3.161***** (0.611)
Environment		**0.441**** (0.177)	**1.520***** (0.277)
Pain Related Procedures		**0.405**** (0.162)	**1.346***** (0.204)
Pseudo-R^2	0.0321	0.2162	0.2219
Wald	29.49	153.79	164.36
Obs.	745	745	745

Note: Heteroscedasticity robust standard errors in parentheses; (***), (**), (*) indicate significance at 1%, 5% and 10%, respectively.

As Table 5.3 shows, among the demographic factors (Column 1) only the age and the perceived health status of each patient seem to play a significant role in forming his/her satisfaction level. The same holds for the fully fledged specification, when all the variables are included. Nevertheless, of great importance are the variables corresponding to the hospital's performance. The attention given to patients by the medical and nursery staff, the hospital environment, and the procedures followed for the pain management are all of them positively correlated with patients' satisfaction level and statistically significant.

Table 5.4: Logit estimations (odds ratios) of different specifications for out-patients (the probability of recommend the hospital to others is the dependent variable)

Odds ratios	**Demographic (*D*)**	**Hospital (*H*)**	**Full set (*X*)**
	(1)	(2)	(3)
Gender	1.002 (0.201)		**1.601**** (0.382)
Age	**1.180***** (0.068)		**1.120*** (0.073)
Education	**0.817*** (0.096)		0.939 (0.130)
Insurance	0.735 (0.409)		**4.911***** (3.013)
Nationality	**4.263***** (2.555)		1.720 (1.281)
Doctors' Attention		**2.139***** (0.502)	**2.020***** (0.503)
Nurses' Attention		**1.570***** (0.264)	**1.645***** (0.288)
Environment		**3.664***** (0.760)	**3.843***** (0.800)
Administration's Attention		1.294 (0.221)	**1.338*** (0.226)
Pseudo-R^2	0.0256	0.3274	0.3426
Wald	19.59	212.07	215.03
Obs.	420	420	420

Note: Heteroscedasticity robust standard errors in parentheses; (***), (**), (*) indicate significance at 1%, 5% and 10%, respectively.

As Table 5.4 demonstrates, same findings hold for the out-patients. All the variables referring to the hospital performance are statistically significant and associate positively with out-patients' satisfaction level. Among the demographic factors, the age effect pertains statistically significant at a borderline level of significance (10%), and the gender of the patient along with whether he/she has an insurance also play an important role.

More specifically, if the attention to a patient by the medical staff increases, the patient's satisfaction level also increases by [(4.192-1)*100%] = 319.2% for the in-patients and [(2.020-1)*100%] = 102% for the out-patients. Furthermore, if the

attention to a patient by the nursery staff increase, the probability of a patient being satisfied increases by 216.1% and 64.5%, for the in- and out-patients, respectively. Similar effect has a melioration of the hospital environment (the probability of a patient being satisfied increases by 52% and 284.3%, for the in- and out-patients, respectively). An improvement of the procedures followed for pain management with respect to in-patients and of the attention received by the administrative staff with respect to out-patients, leads to an increase of their satisfaction level by 34.6% and 33.8%, respectively.

Next, in Tables 5.5 and Table 5.6 below, we perform a marginal effect analysis, in order to capture the effect on maximum level of our dependent variable when an individual changes within variable classes, at the data means. The analysis is performed for the last column of Tables 5.3 and 5.4, which is the fully-fledged specification and only for the statistical significant demographic variables.

Table 5.5: Marginal Effect Analysis for in-patients
(maximum level of *Recommendation* is the dependent variable)

Variables	Marginal Effect	Heteroscadasticity Robust Std. Err.
Age		
≤ 24 years old	0.707	0.648
25-34 years old	0.707	0.047
35-44 years old	0.730	0.047
45-54 years old	0.723	0.041
55-64 years old	0.769	0.032
65-74 years old	0.771	0.031
≥ 75 years old	0.814	0.022
Perceived Health Status		
Terrible	0.675	0.099
Bad	0.767	0.027
Moderate	0.828	0.029
Good	0.841	0.033
Excellent	0.776	0.069

Holding all the variables at their mean value, the probability of an in-patient to

recommend the hospital with certainty is 70.7% among the two first age-class, almost 73.0% among those who are between 35 and 54 years old, almost 77% among those belonging to the two next age classes (55-74 years old), and 81.4% among those who are older than 75 years old. The marginal effect analysis confirms the findings of Table 5.3, i.e. the positive age effect on patients' satisfaction, since as the patient is getting older, his/her probability of recommending the hospital is increasing.

With respect to the impact of perceived health status on in-patients' satisfaction, the marginal effect indicates that those that are perceiving to have a terrible or a bad health status, the probability of recommending the hospital is 67.5% and 76.7% respectively, while the probability is 82.8%, 84.1% and 77.6% among those who believe that their personal health status is moderate, good or excellent, respectively.

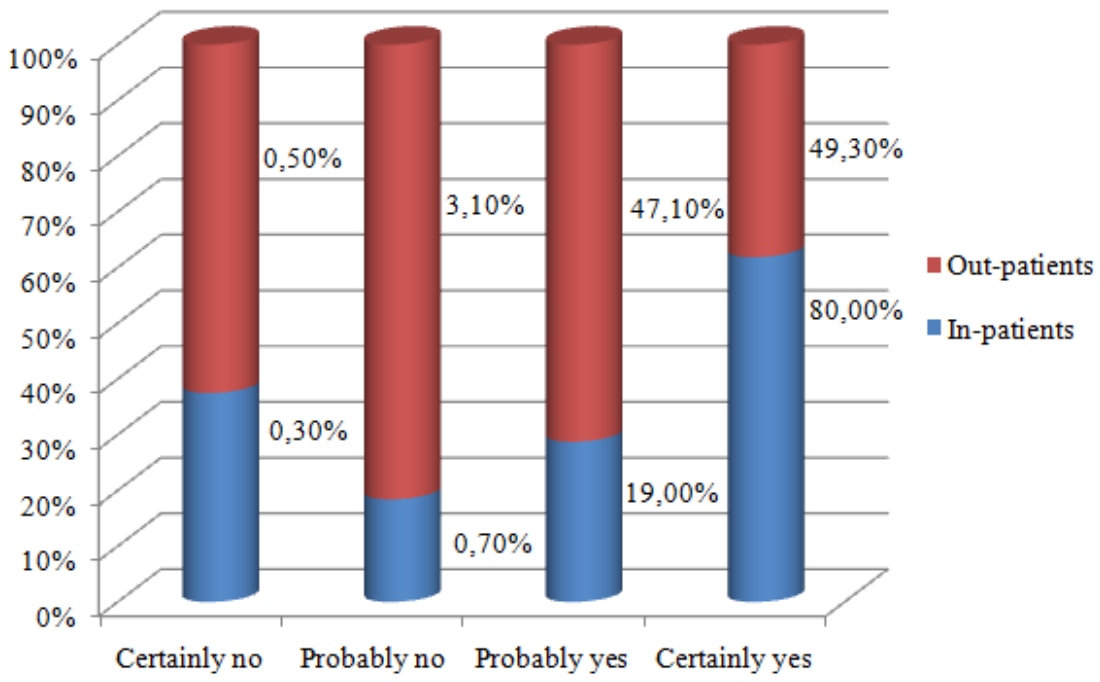
Table 5.6: Marginal Effect Analysis for the out-patients
(maximum level of *Recommendation* is the dependent variable)

Variables	Marginal Effect	Heteroscadasticity Robust Std. Err.
Gender		
Male	0.425	0.046
Female	0.542	0.043
Age		
≤ 24 years old	0.383	0.078
25-34 years old	0.321	0.066
35-44 years old	0.654	0.088
45-54 years old	0.558	0.094
55-64 years old	0.548	0.072
65-74 years old	0.428	0.063
≥ 75 years old	0.608	0.092
Insurance		
No	0.480	0.034
Yes	0.819	0.090

Holding all variables at their mean value, the probability of an out-patient being satisfied with the services received by the hospital, and therefore certainly recommending it is 42.5% among men and 54.2% among women. The probability of

certainly recommend the hospital is 38.3% among those who are younger than 24 years old, 32.1% among the class age of 25-34 years old, 65.4% among those who are 35-44 years old, 55.8% among those of next category, 54.8% among those who are between the age of 55 and 64 years old, 42% among the class age 65-74 years old, and 60.8% among those who are above the age of 75 years old. The marginal effect analysis of the effect of various age classes on patient satisfaction confirms, on average, the finding from Table 5.4 that the age effect on recommendation increases as participants becomes older. The positive insurance effect on patients' satisfaction is also consistent with findings from Table 5.4 as the marginal effects indicates, since the probability of recommending the hospital is 81.9% among those who have insurance and only 48% among those who have not.

Graph 5.2, below, shows the probabilities of the average in- and out-patient to recommend the hospital, given that all variables are at their mean value.



Graph 5.2: Probabilities of recommending the hospital

As shown above, there are differences between in- and out-patients. The first ones are more willing to recommend the hospital with respect to the second ones. For example, the probability of an in-patient to certainly recommend the hospital, given that the rest of the variables are at their mean value, is 80%, while the same probability for an out-patient is more than 30% lower (49.3%).

5.4 Discussion

Healthcare consumers are demanding excellence in care and services delivered form care providers (Urden, 2002). The relationship between physicians and patients has been extensively studied in the literature and is more than reasonable that this relationship has positive effect on patient satisfaction. When the care delivered is patient-centered, the patient feels that he/she has the necessary time to ask questions and get the information needed. Dugdale *et al.* (1999) pointed that physicians' behavior can improve outcome and satisfaction. The aforementioned relationship, and particularly the communication between doctor and patient, is related not only to satisfaction (Epstein *et al.*, 2005) but to patients' quality of life (Ong *et al.*, 2000). More recent studies (Mast *et al.*, 2008) suggest that nonverbal behavior plays an important role for patient outcomes such as satisfaction.

The same finding holds for the attention received by the nursery staff. Nurse practitioners providing front line care in general practice and in emergency departments may potentially substitute for doctors (Horrocks *et al.*, 2002) and therefore increase levels of patients' satisfaction. The importance of nursery is demonstrated in the study of Kutney-Lee *et al.* (2009), where the patients' satisfaction with respect to the services received by the nursery staff is related with the probability of recommend the hospital to others. Hospital's environment usually refers to cleanliness, food, temperature and sound level and has proved to be an important factor for patient satisfaction (Johansson *et al.*, 2002). Nevertheless, clean clothes and beds, and tasty food sometimes are considered to be tokens of good nursing care (Lövgren *et al.*, 1996), although in modern hospitals, the overall control on several physical aspects is on hand of technology or administration.

Quality of care may also be affected by physicians' perceptions of patients. For example, Hall *et al.* (2002) demonstrated that if a patient likes his/her physician, s/he will give a more positive evaluation with respect to the physician's behavior, and therefore, s/he will have higher ratings of satisfaction. According to more recent studies (Beach *et al.*, 2006), physicians who have provided more information or shown more empathy toward patients, they were respected and viewed favorably.

Understanding the current health status of the patient is useful because it can affect

directly their quality of life and their ultimate satisfaction with care (Chow *et al.*, 2009). Finally, age is the most constant socio-demographic determinant of patient satisfaction. According to Blanchard *et al.* (1990), the older generations tend to be more satisfied with healthcare than the younger generations, and they tend to demand less information from their doctors (Chow *et al.*, 2009). In addition to age, gender and education, and previous experience of nursing care have a primary influence on expectations, therefore, on satisfaction (Johansson *et al.*, 2002). It has been shown that men receive information more spontaneously from the nursing staff compared with women (Ottosson *et al.*, 1997).

Reciprocity and mutual influence have a strong impact on the relation between medical staff and patients. Therefore, a more positive communication from one participant leads to similar responses from the other (Street *et al.*, 2007). Consequently, educational level may play an important role for the patients, since some physicians associate more negative attributes to minority and less educated patients (van Ryn and Burke, 2000). Physicians generally are more responsive to the actively involved patient in part because they have a better understanding of his/her needs (Street *et al.*, 2007), while college educated patients are often more assertive and inquisitive than patients with a high school education or less (Siminoff *et al.*, 2006). Furthermore, education about the prescribed medication is particularly important because it may lead to an increase in knowledge and a decrease in misunderstandings about the necessity or possible side effects of the medication (Tarn *et al.*, 2006; Linn *et al.*, 2012).

Although many studies have shown the importance of income with respect to patient's satisfaction, such as the study of Willems *et al.* (2005), unfortunately there was no relevant question for this case study. Further research could focus on studying the patients' satisfaction degree before and after the economic crisis of 2007.

5.5 Conclusions

Patient satisfaction has been proven to be an important measure of healthcare quality. No matter where the study has taken place, all measures regarding the hospital's performance, i.e. the attention received by the medical and nursery staff and the

hospital's environment, they greatly correlate and positively affect patients' satisfaction.

Our study aligns with this vein of literature and demonstrates the important role of the aforementioned variables, along with the positive age effect, that holds for both in- and out-patients. Importance should also be given in the perceived health status of patients.

Hospitals and healthcare systems that invest in programs to determine how patients evaluate their experiences will have valuable information to make transformational changes in care delivery and services. Further research is required in order to examine the impact of economic crisis on patient satisfaction and their willingness to pay for services of better quality.

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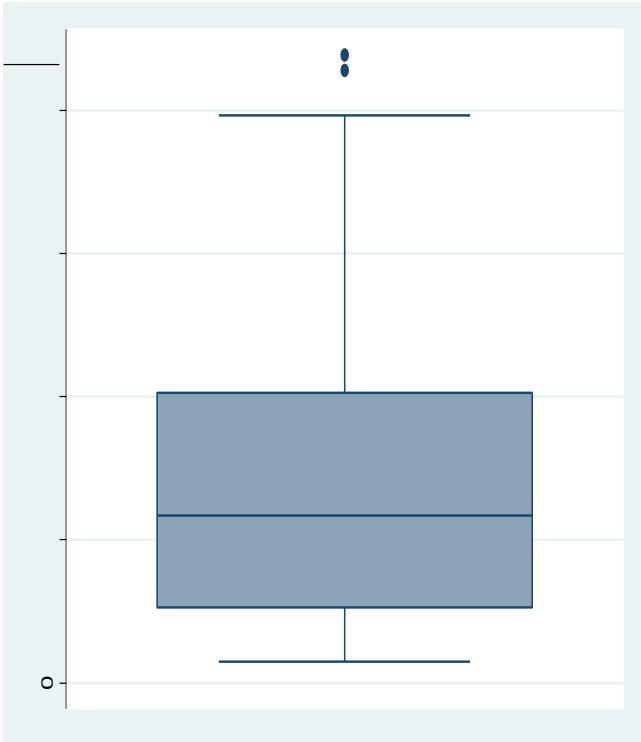
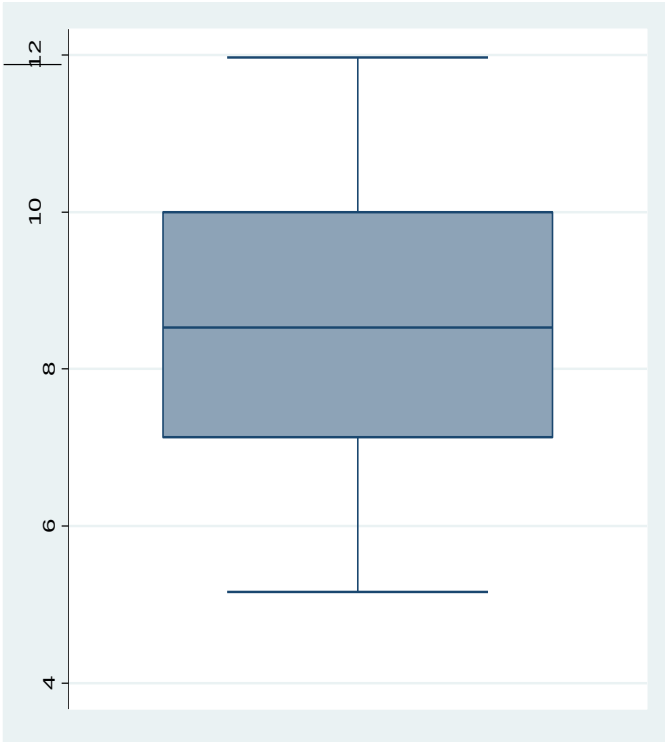
Appendices

Appendix I

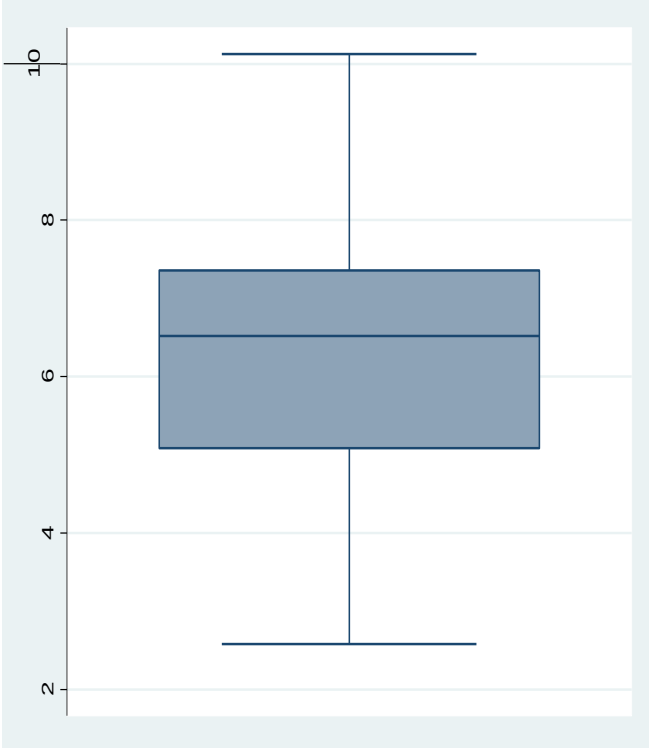
(Chapter 2)



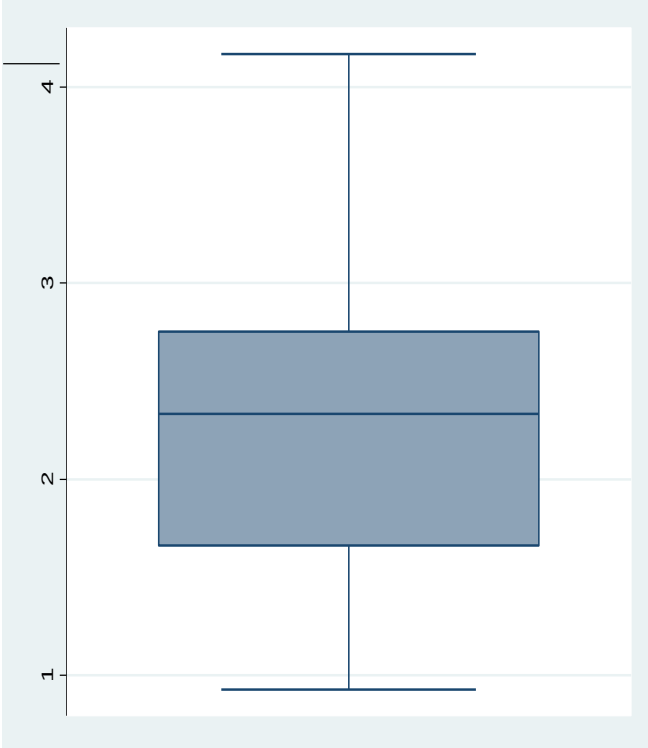
Graph AI.1: Growth Domestic Product per capita



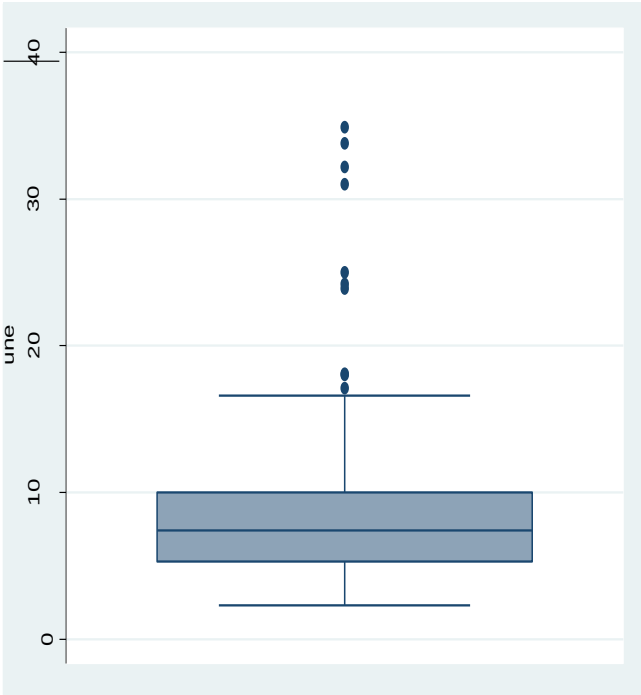
Graph AI.2: Health Expenditures as %GDP



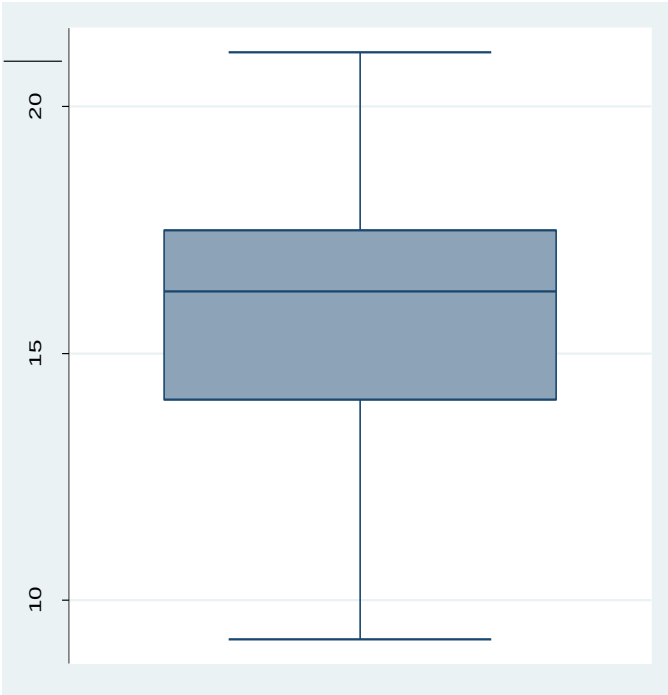
Graph AI.3: Public Health Expenditures as %GDP



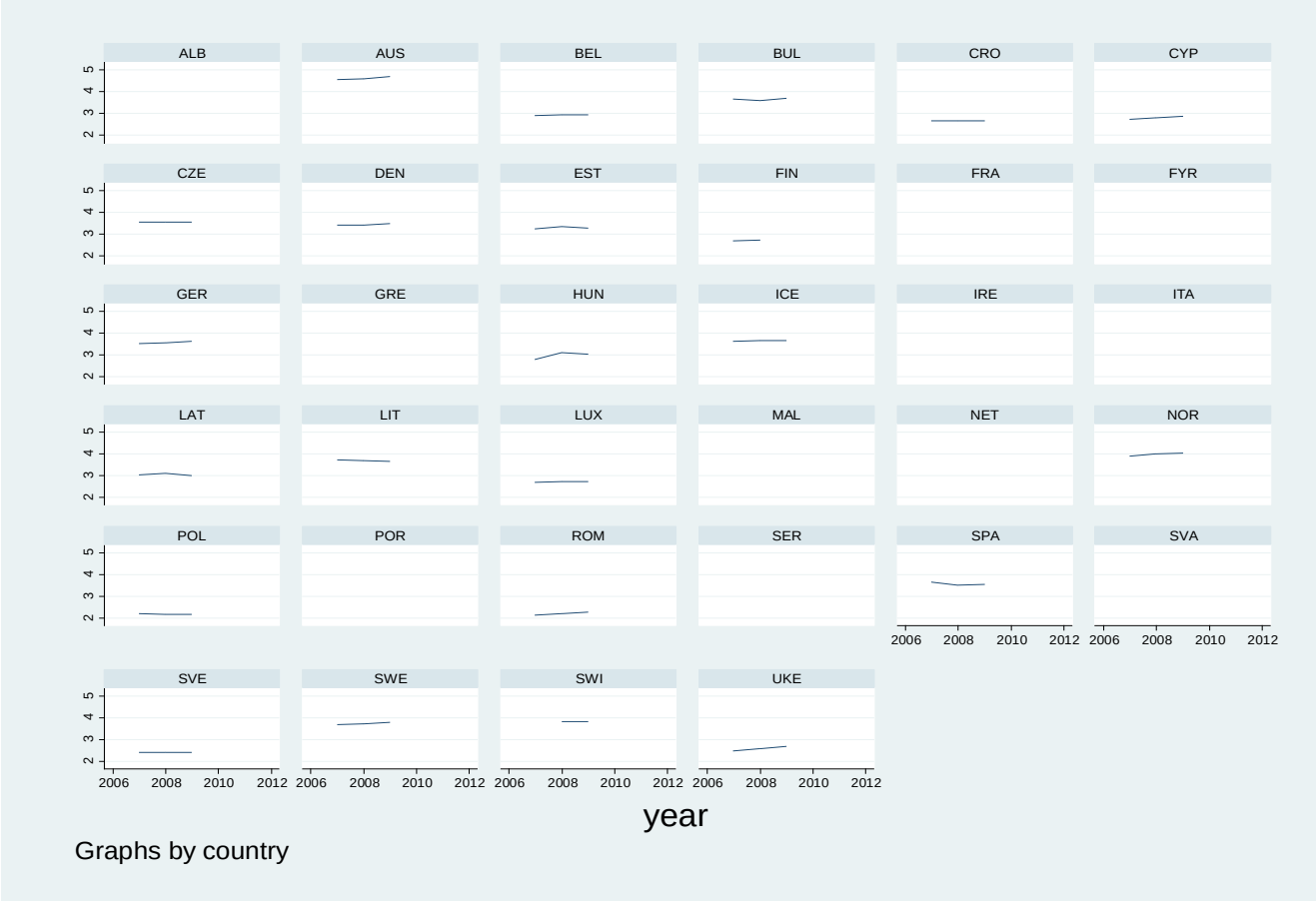
Graph AI.4: Private health Expenditures as %GDP



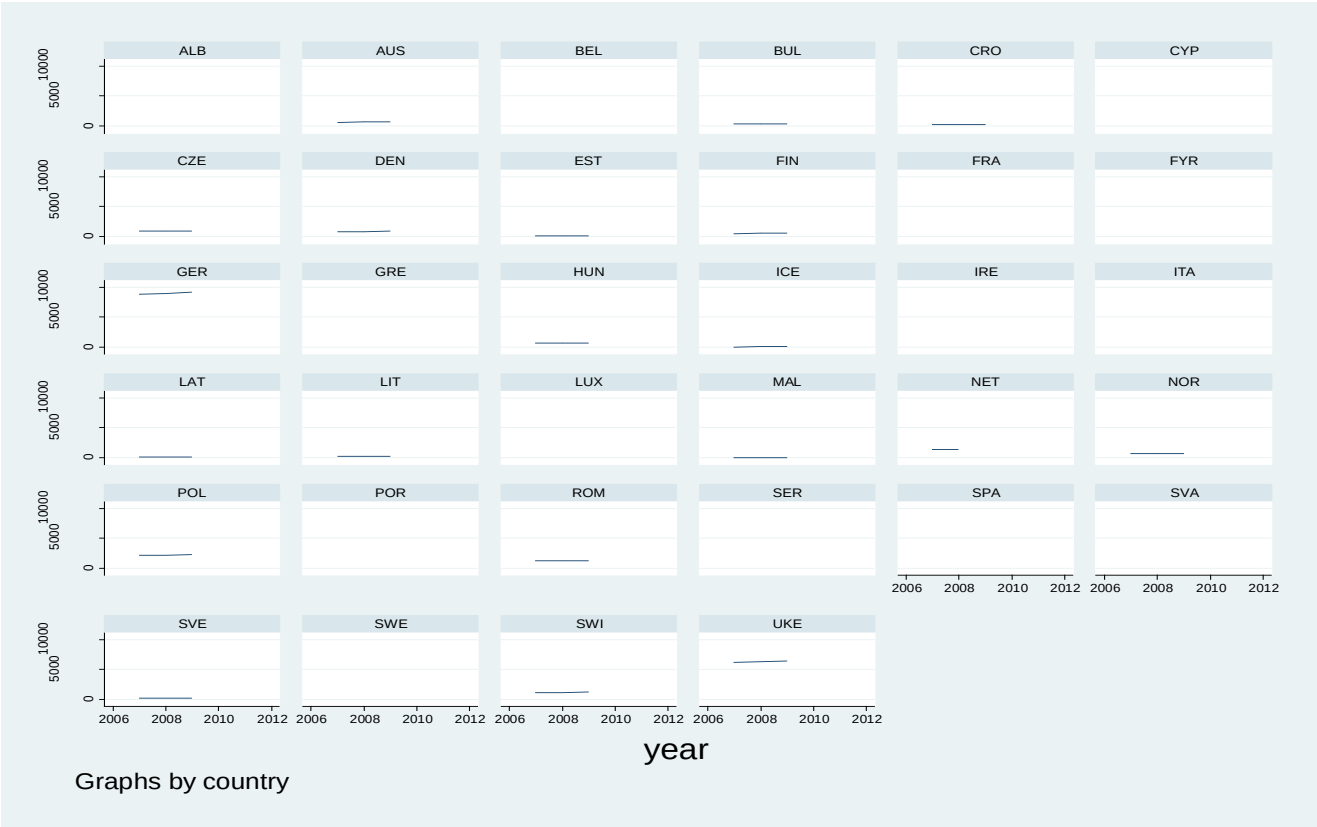
Graph AI.5: Unemployment Rate



Graph AI.6: Population aging (% total population)



Graph AI.7: Number of Physicians per 1,000 habitants in each country for the years 2007-2012



Graph AI.8: Number of Nurses per 1,000 habitants in each country for the years 2007-2012

Graph AI.9: Number of Hospital Beds per 1,000 habitants in each country for the years 2007-2012

Table AI.1: Additional information

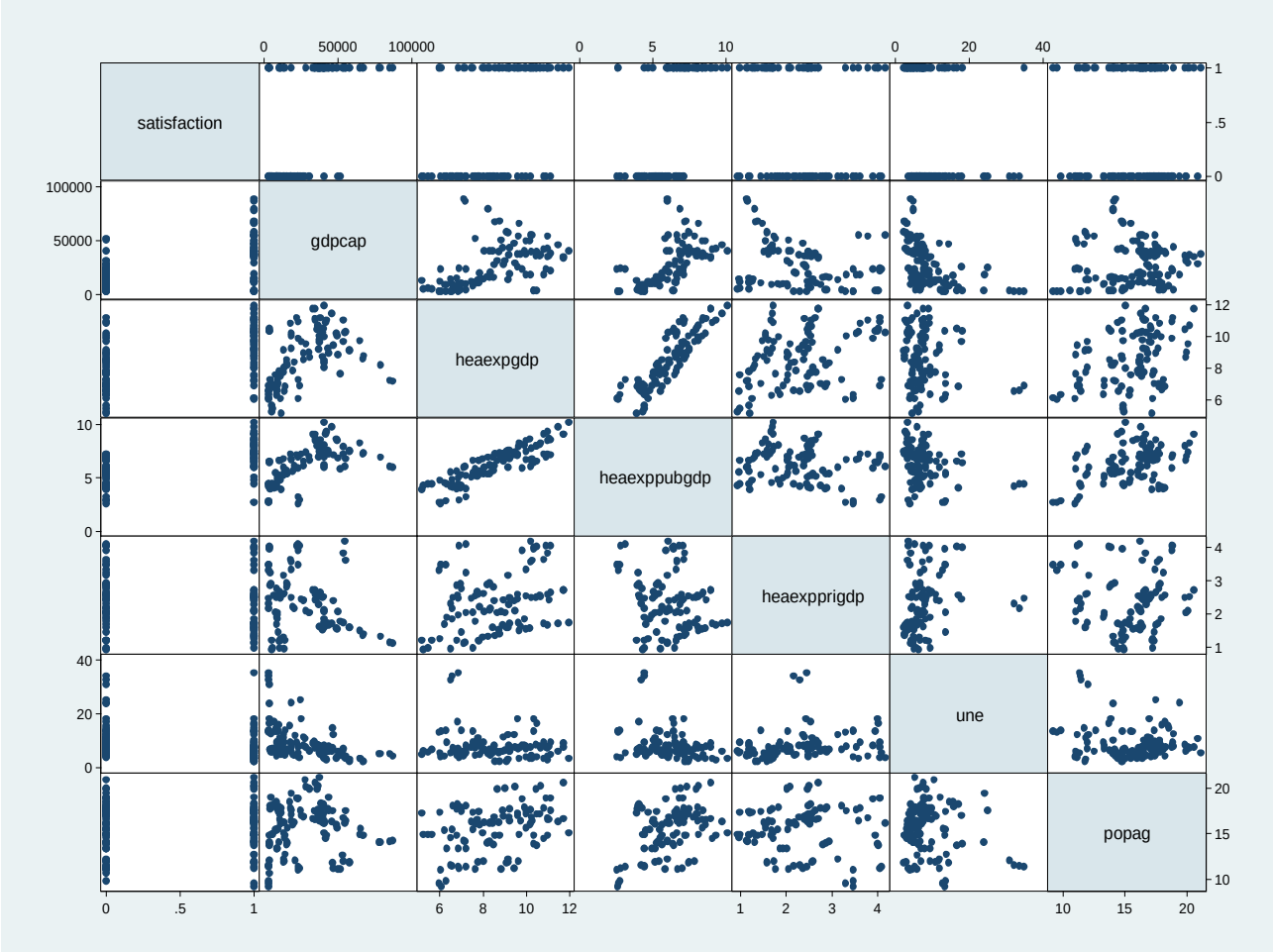
Variable		Mean	Std. Dev.	Min	Max	Observations	
Satisfaction	Overall	0.5073529	0.5017942	0	1	N =	136
	Between		0.4241091	0	1	n =	34
	Within		0.2755466	-0.2426471	1.257353	T =	4
GDP per capita	Overall	28409.26	23005.15	2941.749	163449.9	N =	136
	Between		20392.72	3239.387	82610.18	n =	34
	Within		11073.17	-8713.045	139150.9	T =	4
Public Health Expenditures as %GDP	Overall	6.252384	1.6889997	2.57804	10.12504	N =	102
	Between		1.666442	2.708367	9.52683	n =	34
	Within		0.3614854	5.531895	7.061168	T =	3
Unemployment	Overall	8.838519	6.008973	2.3	34.9	N =	135
	Between		5.435125	2.875	32.975	n =	34
	Within		2.676653	1.488519	20.61352	T =	3.97059
Hospital Beds	Overall	5.470029	1.546791	2.759	8.239	N =	94
	Between		1.516797	2.809333	8.230667	n =	32
	Within		0.3065413	3.630696	6.619695	T =	2.9375

For all variables of the model, between values are higher than within, which means that variability across patients is bigger to the one observed within patients. For the unemployment, for example, the between value is 5.435125 and the within value is 2.676653. This tells us that the variation of unemployment across patients is unequal to that observed within patients over time. That is, if you were to draw two citizens randomly from the data, the difference in unemployment is expected to be unequal to the difference for the same patients in two randomly years.

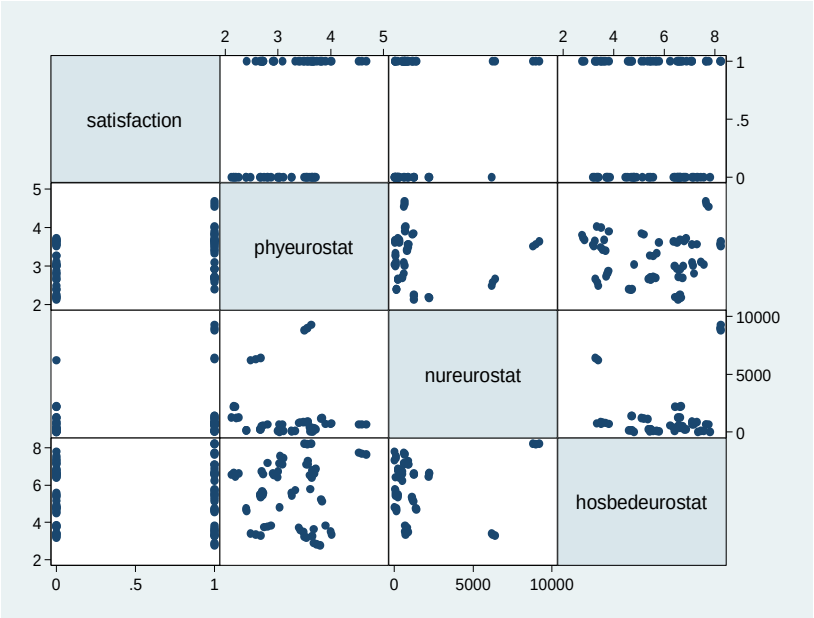
Table AI.2: Correlation between satisfaction (Yit) and its predicted values (Ŷit)

	Predicted Satisfaction 1	Predicted Satisfaction 2	Predicted Satisfaction 3	Predicted Satisfaction 4
Satisfaction	0.8129*	0.8834*	0.8192*	0.8987*

* p-value is <0.05



Graph AI.10: Relationship between Satisfaction index and macroeconomic indicators



Graph AI.11: Relationship between Satisfaction index and healthcare provision indicators

Table AI.3: Estimates of different model specifications with dummies

(dependent variable is *total score of healthcare system performance*)

Variables	**(1)**	**(2)**	**(3)**	**(4)**
GDPcapita	**0.002*** ** (0.0004)	**0.002*** ** (0.0004)		
Dummy (for income level)			**101.353*** ** (21.232)	**81.111*** ** (21.839)
HealthExpenditures	**27.038*** ** (5.216)		**24.388*** ** (5.041)	
PublicExpenditures		**36.654*** ** (5.108)		**33.607*** ** (5.275)
PrivateExpenditures		3.655 (7.609)		5.388 (7.588)
Unemployment	0.462 (1.526)	1.338 (1.610)	0.969 (1.455)	1.458 (1.495)
PopulationAging	-1.551 (2.880)	-3.386 (2.757)	**-5.711*** (3.027)	**-6.603** ** (2.967)
Physicians	-0.099 (0.122)	-0.150 (0.112)	**-0.239** ** (0.011)	**-0.249** ** (0.113)
Nurses	**0.067*** ** (0.022)	**0.043** ** (0.021)	**0.057** ** (0.022)	**0.047** ** (0.022)
HospitalBeds	0.025 (0.035)	0.025 (0.035)	-0.005 (0.033)	-0.005 (0.034)
Observations	121	121	121	121
F	39.61	39.48	45.22	41.20
R^2	0.7076	0.7464	0.7161	0.7411

Note: Numbers in parentheses are robust standard errors; (***), (**), (*) indicate significance at 1%, 5%, and 10% respectively.

Table AI.4: Correlation between Total score (Yit) and its predicted values (Ŷit)

	Predicted Total score 1	Predicted Total score 2	Predicted Total score 3	Predicted Total score 4
Total score	0.8412*	0.8640*	0.8462*	0.8608*

* p-value is <0.05

EURO HEALTH CONSUMER INDEX 2007

● = Good
◐ = Intermediaryt
○ = Poor
n.a = Data not available

SUBDISCIPLINE	INDICATOR	Austria	Belgium	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxemburg	Malta	Netherlands	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	United Kingdom
Patient rights and information	Healthcare law based on Patients' Rights	◐	●	◐	●	○	●	◐	●	●	○	●	●	○	◐	○	●	○	○	●	●	◐	◐	◐	◐	◐	◐	○	●	◐
	Patient org. involved in decision making?	○	○	○	○	◐	◐	●	◐	◐	◐	○	○	●	○	◐	○	◐	○	◐	◐	○	◐	○	○	○	◐	◐	○	◐
	No-fault malpractice insurance	○	○	○	○	○	●	○	●	◐	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	●	○	○
	Right to second opinion	●	●	◐	◐	◐	●	●	◐	●	●	◐	◐	◐	◐	○	●	●	●	●	◐	◐	◐	●	◐	●	◐	◐	●	○
	Access to own medical record	●	●	◐	◐	●	●	◐	●	●	◐	◐	●	◐	◐	◐	●	●	○	●	●	◐	◐	●	●	●	●	●	◐	◐
	Register of legit doctors	●	○	◐	◐	◐	●	●	●	●	◐	◐	○	●	●	○	◐	○	◐	●	○	○	○	○	○	◐	○	○	○	◐
	Electronic Patient Record (% of GP:s using)	◐	◐	○	n.a.	○	●	◐	●	○	○	○	○	◐	◐	○	○	◐	n.a.	●	●	○	◐	○	○	n.a.	◐	●	◐	●
	Provider catalogue with quality ranking	○	○	○	◐	●	●	○	○	◐	○	○	○	○	○	○	○	○	○	◐	◐	○	○	○	○	○	○	○	○	●
	Web or 24/7 telephone healthcare info	○	○	○	○	○	◐	●	◐	○	◐	○	○	○	○	○	○	○	●	◐	○	○	●	○	○	○	○	◐	◐	●
	Subdiscipline score	17	16	13	15	16	25	20	22	20	15	14	14	16	15	11	16	15	14	22	20	12	16	14	13	15	15	18	16	19
Waiting times	Family doctor same day	●	●	◐	●	●	●	◐	○	●	●	○	●	◐	◐	◐	○	●	●	●	●	◐	○	●	●	●	◐	○	●	◐
	Direct access to specialist	●	●	○	●	○	○	◐	○	●	●	●	○	○	○	○	○	◐	○	○	○	○	○	○	●	○	○	○	●	○
	Major non-acute operations <90 days	◐	●	◐	◐	○	◐	○	◐	◐	●	◐	○	○	○	○	◐	○	◐	◐	◐	○	○	◐	○	○	○	○	●	○
	Cancer therapy < 21 days	●	●	◐	●	●	◐	○	●	●	●	◐	◐	○	◐	◐	◐	●	●	◐	●	◐	◐	◐	◐	◐	◐	◐	●	◐
	MRI scan < 7days	●	●	◐	◐	◐	○	○	○	◐	◐	○	○	○	○	○	◐	◐	○	◐	◐	○	◐	○	◐	○	○	○	◐	○
	Subdiscipline score	14	15	9	13	10	9	7	8	13	14	9	8	6	7	7	8	11	10	10	11	7	7	9	11	8	7	6	14	7
Outcomes	Heart infarct mortality	●	◐	n.a.	○	○	○	○	◐	◐	◐	○	○	◐	◐	○	○	◐	○	●	n.a.	○	○	n.a.	○	●	◐	●	●	●
	Infant deaths/1000 live births	◐	◐	○	●	●	◐	◐	●	●	◐	◐	○	◐	◐	○	○	●	◐	◐	●	○	●	○	○	◐	●	●	◐	◐
	Cancer 5-year survival	●	◐	○	n.a.	○	◐	○	◐	●	◐	○	○	◐	◐	○	◐	◐	◐	◐	◐	○	◐	○	○	○	◐	●	●	○
	Avoidable deaths – Potential years of Life Lost (PYLL)/100 000	●	◐	○	◐	◐	◐	◐	◐	◐	●	●	○	●	●	○	○	●	◐	●	●	○	◐	○	○	◐	◐	●	●	◐
	MRSA infections	◐	○	○	○	◐	●	●	●	○	◐	○	○	○	○	◐	◐	◐	○	●	●	○	○	○	◐	◐	○	●	n.a.	○
	Subdiscipline score	13	9	5	8	9	10	9	12	11	11	8	5	10	10	6	7	12	8	13	12	5	9	5	6	10	10	15	12	9
"Generosity" of public healthcare systems	Cataract operations per 100 000	◐	●	○	n.a.	n.a.	◐	◐	●	●	●	◐	●	◐	●	n.a.	n.a.	●	◐	●	◐	○	○	○	n.a.	n.a.	●	●	◐	◐
	Infant 4-disease vaccination	○	◐	◐	●	●	◐	●	●	●	◐	○	●	○	◐	●	◐	◐	◐	●	○	●	●	●	●	○	◐	●	◐	○
	Kidney transplants p.m.p.	●	◐	○	n.a.	●	◐	●	●	●	◐	○	◐	◐	◐	◐	○	○	n.a.	●	●	○	◐	○	○	○	●	●	◐	◐
	Dental care in public healthcare system	●	○	○	○	◐	○	○	◐	◐	●	●	●	◐	○	○	◐	○	●	○	○	●	○	●	○	●	○	◐	○	○
	Subdiscipline score	9	8	5	6	9	7	9	11	11	10	7	11	7	8	7	6	7	8	10	7	8	7	8	6	6	9	11	7	6
Pharmaceuticals	Rx subsidy %	◐	◐	○	○	◐	◐	○	○	●	●	◐	◐	●	●	○	○	●	◐	●	◐	◐	◐	○	●	●	●	◐	●	●
	Layman-adapted pharmacopeia?	○	○	○	○	○	●	●	◐	◐	○	○	○	◐	○	○	○	○	○	●	◐	○	◐	●	○	○	◐	●	○	○
	New cancer drugs deployment speed	●	◐	○	◐	○	◐	◐	◐	◐	◐	◐	○	◐	◐	○	○	●	○	◐	○	○	◐	○	○	○	●	◐	●	○
	Access to new drugs (time to subsidy)	●	○	○	●	○	●	●	◐	○	●	◐	○	●	○	○	○	○	○	◐	●	○	◐	○	○	○	◐	●	●	●
	Subdiscipline score	9	6	4	7	5	10	9	7	8	9	7	5	10	7	4	4	8	5	10	8	5	8	6	6	6	10	10	10	8
	TOTAL SCORE	806	701	445	629	612	712	633	719	786	767	561	513	592	580	435	496	687	568	794	724	447	570	508	532	564	624	740	770	581
	RANK	1	10	28	13	15	9	12	8	3	5	22	24	16	18	29	26	11	20	2	7	27	19	25	23	21	14	6	4	17

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Figure AI.1: Available data for the year 2007

Euro Consumer Heart Index 2008

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Heart Index at a glance:
Winner: Luxembourg
Second: France
Third: Norway

Sub category winners:
Information, consumer rights, choice:
Denmark
Austria
Slovenia

Access:
Belgium
France
Luxembourg
Malta
Switzerland

Prevention:
France

Procedures:
Norway
United Kingdom

Outcomes:
Luxembourg
Switzerland

● = Good
◐ = Intermediary
○ = Poor
n.a = Data not available

SUBDISCIPLINE	INDICATOR	Austria	Belgium	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	United Kingdom
Information, consumer rights, choice	Quality information about CVH care providers?	●	○	○	○	○	●	◐	○	◐	○	○	○	◐	○	○	◐	○	○	◐	◐	○	◐	○	○	○	○	◐	○	●
	Right to choose among providers, domestic	●	◐	●	◐	●	●	●	○	●	◐	○	●	◐	●	●	●	●	●	◐	●	○	○	●	●	●	○	◐	●	◐
	Right to choose among providers, EU	○	○	○	○	○	◐	○	◐	○	○	○	○	◐	◐	○	○	●	○	◐	◐	○	○	○	○	◐	○	◐	◐	○
	Letters (e.g. from specialist to GP) copied to patients	◐	○	○	○	◐	○	○	●	○	◐	○	○	○	◐	◐	◐	○	○	○	○	◐	○	○	●	●	◐	○	◐	◐
	Subdiscipline score	9	5	6	5	7	9	7	7	7	6	4	6	7	8	7	8	8	6	7	8	5	5	6	8	9	5	7	8	8
Access	Number of centers per million population with 24-hour PCI	●	●	○	●	●	◐	●	◐	●	●	○	●	○	n.a.	○	●	●	●	◐	●	n.a.	n.a.	○	◐	◐	n.a.	●	●	○
	Same-day access to doctor for chest pain	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◐	●	●	●	●	●	●	●
	Same-day access to echocardiography and diagnostics for suspected heart disease	◐	●	○	●	◐	◐	●	●	●	●	○	◐	◐	◐	◐	◐	●	●	○	●	◐	○	○	●	●	○	○	●	○
	Waiting time for non-acute CABG/ PCI	●	●	●	◐	●	◐	◐	●	●	◐	○	●	○	◐	○	○	●	●	◐	◐	○	○	○	○	◐	◐	◐	●	◐
	Subdiscipline score	11	12	8	11	11	9	11	11	12	11	6	11	7	8	7	9	12	12	8	11	7	5	6	9	10	7	9	12	7
Prevention	National CVD screening programme?	◐	●	○	●	○	○	◐	◐	●	◐	●	◐	○	◐	◐	◐	●	◐	○	◐	◐	●	○	●	◐	◐	○	●	○
	HC providers incentivised for preventive measures?	●	○	●	○	◐	○	◐	●	●	n.a.	○	◐	●	◐	●	●	○	●	◐	◐	n.a.	n.a.	○	●	●	○	○	○	●
	Hypertension; mean systolic pressure	◐	●	◐	◐	◐	●	◐	◐	◐	○	◐	○	○	◐	○	○	●	n.a.	◐	○	◐	◐	◐	○	◐	●	◐	●	○
	Smoking cessation assistance	◐	●	○	◐	○	●	◐	●	◐	◐	○	○	◐	◐	○	○	◐	◐	○	●	○	◐	○	○	○	◐	◐	◐	●
	Smoking restrictions	○	◐	◐	○	○	○	◐	◐	●	○	○	○	●	◐	○	○	○	●	◐	●	◐	○	◐	○	◐	◐	●	○	●
	Exercise in compulsory school	●	◐	○	◐	◐	◐	◐	◐	●	●	◐	●	○	●	○	◐	◐	○	○	◐	◐	○	○	◐	●	○	○	◐	●
	Diet: Fruit & vegetable consumption	◐	○	○	●	○	◐	○	○	◐	◐	●	○	○	●	○	○	○	◐	●	○	○	●	◐	○	◐	●	○	◐	◐
	Obesity	○	●	○	◐	○	●	●	○	●	○	○	◐	○	◐	◐	◐	◐	○	●	●	◐	◐	●	◐	○	◐	●	◐	○
	Subdiscipline score	16	18	12	16	11	16	16	16	21	13	14	13	13	18	12	13	15	15	15	17	13	15	13	14	16	16	14	16	17
Procedures	Ambulance swiftness	◐	◐	○	◐	◐	●	◐	◐	◐	●	○	◐	n.a.	◐	◐	◐	●	◐	●	●	n.a.	n.a.	◐	◐	●	○	●	◐	◐
	"Door to needle" time	●	n.a.	○	◐	●	○	●	○	○	●	●	●	●	○	●	◐	●	n.a.	◐	●	n.a.	n.a.	n.a.	◐	◐	◐	◐	n.a.	●
	Reperfusion (Thombolysis/PCI)	●	●	◐	◐	●	●	◐	●	◐	n.a.	◐	●	◐	n.a.	○	○	●	◐	◐	◐	n.a.	n.a.	◐	○	●	n.a.	●	●	◐
	Medication; statins	○	●	○	n.a.	◐	●	○	●	●	◐	◐	◐	●	○	○	○	●	●	●	●	◐	●	○	◐	◐	◐	◐	◐	●
	Medication; clopidogrel	◐	◐	○	n.a.	○	○	○	○	●	◐	●	○	◐	○	○	○	●	n.a.	○	○	○	●	○	○	○	◐	○	◐	◐
	Pre-hospital thrombolysis	●	○	○	○	○	○	○	●	●	n.a.	○	○	●	○	●	○	○	●	●	●	n.a.	n.a.	○	◐	○	◐	●	○	●
	Defibrillators available in public places?	◐	○	○	○	○	◐	○	◐	◐	◐	○	◐	◐	○	○	○	○	○	●	●	○	◐	○	○	◐	○	◐	●	●
	Subdiscipline score	16	13	8	10	13	14	11	15	16	14	13	14	16	8	12	9	17	13	17	18	8	12	9	11	14	11	16	14	18
Outcomes	AMI 30-day case fatality	◐	◐	◐	◐	◐	◐	◐	◐	●	◐	◐	○	◐	◐	○	◐	●	◐	●	●	●	○	○	○	◐	●	●	●	◐
	Ischaemic stroke 30-day case fatality	●	◐	○	◐	◐	●	○	●	◐	◐	◐	○	◐	●	○	○	●	◐	●	●	○	●	○	◐	◐	◐	●	●	●
	Death rates from CHD (SDR / 100 000)	◐	◐	○	●	○	◐	○	◐	●	◐	●	○	◐	●	○	○	●	◐	●	●	◐	●	○	○	●	●	◐	●	◐
	Death rates from stroke (SDR / 100 000)	●	◐	○	◐	◐	◐	○	◐	●	●	◐	○	●	●	○	○	●	◐	●	●	○	◐	○	◐	◐	●	●	●	●
	Rehabilitation/post-event programme	◐	◐	○	○	◐	◐	●	◐	◐	●	○	◐	◐	◐	○	○	●	◐	◐	◐	○	○	○	●	◐	○	◐	●	○
	Subdiscipline score	12	10	6	10	9	11	8	11	13	12	10	6	11	13	5	6	15	10	14	14	8	10	5	9	11	12	13	15	11
	TOTAL SCORE	769	691	468	638	605	711	619	718	834	693	576	553	652	715	473	517	836	670	761	830	504	579	441	611	721	650	730	825	719
	RANK	5	14	28	18	21	12	19	10	2	13	23	24	16	11	27	25	1	15	6	3	26	22	29	20	8	17	7	4	9

Figure AI.2: Available data for the year 2008

EuroHealth Consumer Index 2009

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Euro Health Consumer Index at a glance:

Winner: **Netherlands**
Runner-up: **Denmark**
Third place: **Iceland**

Sub-disciplines:

Patient rights and information:
Denmark

e-Health:
Portugal

Waiting time for treatment :
Albania, Belgium, Germany, Switzerland

Outcomes :
Sweden

Range and reach of services
Belgium, Luxembourg, Sweden

Pharmaceuticals :
Denmark, Netherlands

● = Good (3)
◐ = Intermediary (2)
○ = Not-so-good (1)
n.a. = data not available (1)
n.ap. = not applicable (2)

SUB-DISCIPLINE	INDICATOR	Albania	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	FYR Macedonia	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	United Kingdom
1. Patient rights and information	1.1 Healthcare law based on Patients' Rights	●	●	●	○	●	●	○	●	●	●	●	●	○	●	●	●	◐	◐	○	●	◐	○	●	●	●	◐	●	●	●	●	○	●	◐
	1.2 Patient organisations involved in decision making	○	◐	●	○	●	◐	◐	●	●	◐	●	○	●	○	●	◐	◐	◐	◐	●	◐	◐	●	●	●	◐	◐	●	◐	○	◐	●	◐
	1.3 No-fault malpractice insurance	○	●	○	○	○	○	○	●	○	●	◐	◐	○	○	○	◐	○	○	○	◐	○	○	◐	●	○	○	○	○	●	○	●	○	○
	1.4 Right to second opinion	●	●	●	◐	●	◐	◐	●	●	◐	●	○	●	●	●	●	●	◐	○	●	●	●	●	◐	◐	●	●	◐	●	◐	◐	●	◐
	1.5 Access to own medical record	●	●	●	◐	●	◐	◐	●	◐	●	●	●	●	○	●	●	◐	◐	●	●	●	○	●	●	●	◐	○	◐	◐	◐	●	●	◐
	1.6 Register of legit doctors	●	●	●	●	○	●	◐	●	●	●	●	◐	◐	○	●	●	●	●	●	●	●	●	●	○	●	●	○	○	●	○	○	●	●
	1.7 Web or 24/7 telephone HC info	○	●	○	○	○	○	○	●	●	●	○	○	◐	○	○	●	◐	○	○	◐	●	◐	●	◐	○	●	○	◐	●	○	●	◐	●
	1.8 Cross-border care seeking	n.ap.	◐	◐	○	n.ap.	○	○	●	○	◐	◐	n.ap.	○	○	◐	n.ap.	○	◐	○	○	●	○	●	n.ap.	○	○	○	○	◐	○	◐	n.ap.	○
	1.9 Provider catalogue with quality ranking	○	○	○	○	○	◐	○	●	○	○	◐	◐	●	○	◐	○	○	◐	○	○	○	○	◐	◐	○	◐	○	○	◐	○	○	○	●
	Subdiscipline weighted score	117	149	130	84	117	110	84	175	130	143	143	110	123	84	136	143	110	110	91	136	136	97	162	136	117	123	91	104	149	84	117	136	123
2. e-Health	2.1 EPR penetration	○	◐	◐	●	●	◐	◐	●	◐	◐	◐	●	●	○	●	●	◐	◐	○	○	◐	○	●	●	○	●	○	◐	◐	◐	●	●	●
	2.2 e-transfer of medical data between professionals	○	◐	○	○	●	●	○	●	◐	●	○	◐	◐	○	○	●	●	○	○	○	○	○	●	●	○	●	○	○	○	◐	◐	◐	●
	2.3 Lab test results direct to *patients* via e-health?	○	◐	○	○	○	○	○	◐	○	◐	○	◐	○	○	○	○	○	○	○	◐	◐	○	◐	○	◐	◐	○	○	○	○	○	○	○
	2.4 On-line booking of appointments?	○	○	○	○	●	○	○	◐	◐	◐	◐	○	○	○	◐	○	○	○	○	◐	◐	○	◐	◐	◐	●	○	○	◐	◐	◐	○	◐
	2.5 On-line access to personal care costs (by insurers)	n.ap.	●	●	●	n.ap.	○	●	n.ap.	n.ap.	n.ap.	○	n.ap.	○	○	●	n.ap.	n.ap.	n.ap.	n.ap.	n.ap.	n.ap.	n.ap.	◐	n.ap.	n.ap.	n.ap.	○	○	n.ap.	n.ap.	n.ap.	●	n.ap.
	2.6 e-prescriptions	○	◐	○	○	○	○	○	●	◐	○	○	◐	○	○	○	●	○	○	○	○	○	○	●	○	○	●	○	○	○	○	●	n.a.	◐
	Subdiscipline weighted score	29	50	38	42	54	38	38	63	46	50	33	50	38	25	46	54	42	33	29	38	42	29	63	50	38	67	25	29	38	42	54	46	54
3. Waiting time for treatment	3.1 Family doctor same day access	●	●	●	●	●	◐	●	◐	◐	○	●	●	◐	◐	◐	◐	●	◐	○	◐	◐	●	◐	○	◐	○	◐	●	●	◐	○	◐	○
	3.2 Direct access to specialist	●	●	●	○	○	●	●	○	○	○	◐	◐	●	●	◐	●	●	◐	◐	◐	●	○	◐	○	◐	○	○	◐	○	○	○	●	○
	3.3 Major non-acute operations <90 days	●	◐	●	◐	◐	◐	◐	◐	◐	○	●	●	●	◐	◐	◐	◐	◐	○	◐	●	○	●	◐	○	○	◐	○	○	○	◐	●	○
	3.4 Cancer therapy < 21 days	●	◐	●	◐	◐	●	◐	◐	◐	◐	●	◐	●	◐	◐	●	◐	◐	●	◐	●	●	◐	◐	◐	◐	◐	◐	●	◐	◐	●	◐
	3.5 CT scan < 7days	◐	●	◐	○	○	◐	○	◐	◐	◐	◐	◐	●	◐	●	●	○	○	○	○	○	○	◐	◐	○	○	◐	◐	○	○	○	●	○
	Subdiscipline weighted score	187	173	187	120	120	160	133	120	120	93	173	160	187	147	147	173	120	120	120	120	173	120	147	107	107	80	120	133	120	93	93	187	80
4. Outcomes	4.1 Heart infarct case fatality	○	◐	◐	◐	◐	◐	◐	◐	◐	◐	●	n.a.	◐	◐	○	●	◐	◐	○	◐	●	◐	●	●	●	○	○	○	◐	●	●	●	◐
	4.2 Infant deaths	○	●	●	○	◐	●	●	●	◐	●	●	○	●	●	○	●	●	●	○	◐	●	○	◐	●	◐	●	○	○	●	●	●	●	◐
	4.3 Ratio of cancer deaths to number of cancer cases	○	●	◐	○	○	◐	○	◐	○	●	●	○	●	◐	○	●	●	●	○	○	◐	◐	◐	●	○	◐	○	○	○	◐	●	●	◐
	4.4 Preventable Years of Life Lost	◐	●	◐	○	◐	●	◐	◐	○	◐	◐	○	●	●	○	●	●	●	○	○	●	●	●	●	○	◐	○	○	◐	●	●	●	◐
	4.5 MRSA (resistant) infections	○	◐	○	○	○	○	◐	●	●	●	○	n.a.	◐	○	○	●	○	○	◐	◐	◐	○	●	●	◐	○	○	◐	◐	○	●	◐	○
	4.6 Rate of decline of suicide	○	◐	◐	◐	◐	○	●	◐	◐	●	●	◐	●	●	●	◐	◐	●	◐	◐	◐	○	●	●	○	○	●	◐	◐	●	●	●	◐
	4.7 % of diabetics with high HbA1c levels	○	○	○	n.a	◐	○	●	●	n.a.	●	◐	◐	◐	●	◐	◐	●	●	●	○	◐	n.a.	●	○	○	i	n.a.	n.a	○	○	●	n.a.	●
	Subdiscipline weighted score	95	190	155	95	143	155	190	202	143	226	202	107	214	190	119	226	202	214	131	131	202	131	226	226	131	155	107	95	155	179	250	214	179
5. Range and reach of services provided	5.1 Equity of healthcare systems	○	◐	◐	○	○	○	●	●	◐	◐	◐	○	◐	○	◐	●	●	◐	○	◐	●	◐	●	●	◐	◐	○	○	◐	◐	●	●	●
	5.2 Cataract operations per 100 000 age 65+	n.a.	◐	●	○	◐	○	●	◐	●	◐	●	n.a.	◐	●	◐	◐	○	●	◐	○	●	◐	●	◐	○	◐	○	○	◐	●	◐	○	◐
	5.3 Infant 4-disease vaccination	●	○	●	◐	●	●	●	◐	●	●	●	◐	○	●	●	●	◐	◐	●	◐	●	○	◐	◐	●	◐	●	●	●	◐	●	◐	◐
	5.4 Kidney transplants per million population	○	●	●	○	○	●	◐	◐	●	◐	●	◐	◐	○	◐	◐	◐	○	◐	○	◐	◐	●	●	○	●	○	◐	○	●	●	◐	◐
	5.5 Dental care included in public healthcare?	○	●	●	○	●	●	●	●	○	◐	○	●	●	○	○	○	●	○	○	◐	●	●	○	○	●	○	◐	●	●	○	◐	n.a.	●
	5.6 Rate of mammography	○	◐	◐	n.a.	○	○	○	◐	○	●	◐	◐	○	○	○	◐	◐	◐	○	○	●	n.a.	●	●	○	◐	n.a.	○	○	○	●	○	◐
	5.7 Informal payments to doctors	○	◐	●	○	◐	◐	◐	●	◐	●	◐	○	●	○	○	●	●	◐	○	○	◐	●	●	●	○	●	○	○	●	●	●	●	●
	Subdiscipline weighted score	64	107	136	57	93	100	121	121	100	121	114	86	100	79	86	114	114	93	79	71	136	100	129	121	86	107	71	86	107	107	136	93	121
6. Pharmaceuticals	6.1 Prescription drug subsidy, %	n.a.	●	◐	○	●	○	◐	◐	◐	○	●	○	●	◐	◐	◐	●	●	◐	○	●	◐	●	◐	◐	◐	○	●	●	●	◐	●	●
	6.2 Layman-adapted pharmacopoeia?	○	●	○	○	◐	○	●	●	●	◐	◐	○	○	○	●	●	○	○	○	○	●	●	●	●	○	●	●	●	○	◐	●	○	●
	6.3 Novel cancer drugs deployment rate	○	●	●	○	n.a.	n.a.	○	●	○	◐	●	n.a.	●	○	◐	n.a.	○	●	○	○	◐	n.a.	◐	◐	○	○	○	◐	◐	●	◐	●	○
	6.4 Access to new drugs (time to subsidy)	○	○	○	○	◐	●	◐	●	◐	◐	○	n.a.	●	◐	○	◐	●	○	○	○	○	○	●	◐	◐	◐	○	○	◐	◐	◐	◐	●
	Subdiscipline weighted score	50	125	88	50	100	75	100	138	100	88	113	63	125	75	100	100	113	100	63	50	88	88	138	100	88	100	75	113	100	125	113	113	125
	TOTAL SCORE	542	795	732	448	627	637	667	819	638	721	778	576	787	600	633	811	701	671	512	546	777	565	863	740	565	632	489	560	668	630	762	788	682
	RANK	30	4	11	33	23	19	17	2	18	12	7	25	6	24	20	3	13	15	31	29	8	26	1	10	26	21	32	28	16	22	9	5	14

European Commission
Information Society and Media

Figure AI.3: Available data for the year 2009

EuroHealth Consumer Index 2012

Health Consumer Powerhouse

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Euro Health Consumer Index at a glance:

Winner: **Netherlands**
Runner-up: **Denmark**
Third place: **Iceland**

Sub-disciplines:

Patient rights and information:
Denmark

Accessibility:
Belgium, Luxembourg, Switzerland

Outcomes :
Norway, Sweden

Range and reach of services
Netherlands

Pharmaceuticals :
Denmark

- = Good (3)
- = Intermediary (2)
- = Not-so-good (1)
- n.a. = data not available (1)
- n.ap. = not applicable (2)

For more info please visit:
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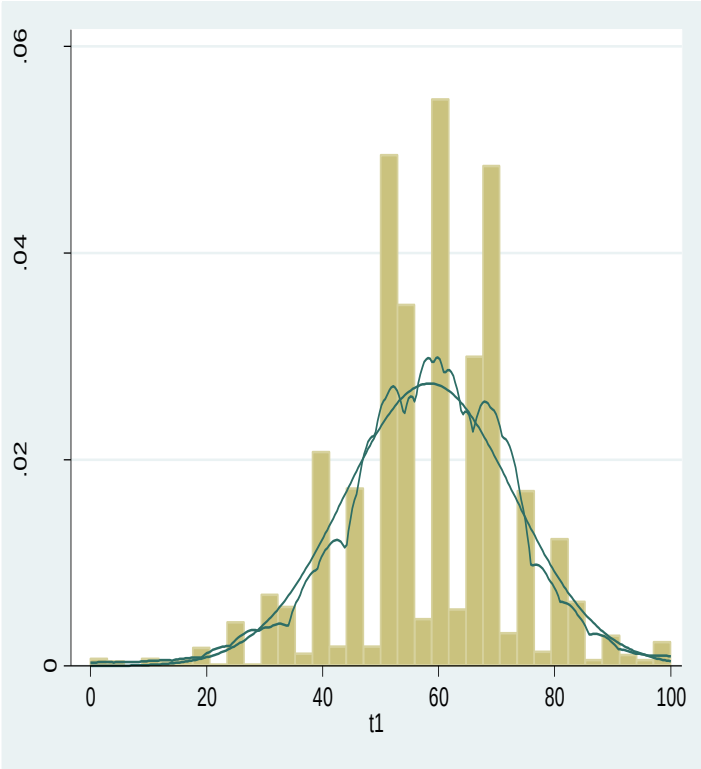
Sub-discipline	Indicator	Albania	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	FYR Macedonia	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Norway	Poland	Portugal	Romania	Serbia	Slovakia	Slovenia	Spain	Sweden	Switzerland	United Kingdom
1. Patient rights and information	1.1 Healthcare law based on Patients' Rights	3	3	3	1	3	3	3	3	3	3	3	3	1	1	3	3	2	2	3	3	2	1	3	3	3	2	3	3	2	3	3	1	3	3
	1.2 Patient organisation involvement	2	3	2	3	3	3	2	3	2	2	3	1	3	1	1	3	2	3	3	3	3	3	3	3	2	1	2	2	3	2	1	2	2	3
	1.3 No-fault malpractice insurance	1	3	1	1	1	1	1	3	1	3	2	2	1	1	1	3	2	2	1	2	1	1	3	3	1	1	1	1	2	2	1	3	1	2
	1.4 Right to second opinion	3	3	2	1	3	2	2	3	2	2	3	3	3	3	3	3	2	2	1	3	3	1	3	3	2	2	2	1	1	3	2	3	3	3
	1.5 Access to own medical record	2	3	3	2	3	3	3	3	3	3	3	2	2	1	3	3	2	3	3	3	3	1	3	3	3	2	3	3	3	2	2	3	3	2
	1.6 Registry of *bona fide* doctors	2	3	3	2	3	3	2	3	3	3	3	2	3	1	3	3	2	3	3	3	3	2	3	3	2	3	1	2	3	2	1	2	3	3
	1.7 Web or 24/7 telephone HC info	1	2	1	1	3	1	1	3	3	2	2	1	2	2	2	3	2	3	3	3	1	2	3	3	2	3	1	2	2	2	2	3	3	2
	1.8 Cross-border care seeking freely allowed	n.ap.	2	2	1	n.ap.	1	1	3	2	1	2	n.ap.	2	2	2	n.ap.	2	2	1	1	3	1	3	n.ap.	2	1	1	n.ap.	1	1	1	2	n.ap.	2
	1.9 Provider catalogue with quality ranking	1	2	1	1	1	1	1	3	1	1	3	1	2	1	1	n.ap.	1	2	1	1	1	n.ap.	3	3	2	3	1	1	3	1	1	2	1	3
	1.10 EPR penetration	1	2	2	3	3	2	2	3	3	3	2	3	3	3	3	3	2	2	1	1	2	1	3	3	3	3	1	1	2	2	2	2	2	3
	1.11 On-line booking of appointments?	2	1	2	1	2	1	2	3	3	2	1	1	1	1	2	1	1	2	3	3	1	1	2	3	2	3	1	1	3	2	2	2	1	3
	1.12 e-prescriptions	1	2	2	1	3	2	2	3	3	2	1	2	1	2	3	3	1	2	2	1	1	1	3	2	2	2	1	1	1	1	3	3	1	3
	Subdiscipline weighted score	102	141	117	88	146	112	107	175	141	131	136	112	117	88	122	146	107	131	107	131	112	88	170	160	126	126	88	102	122	112	102	141	126	160
2. Accessibility (waiting times for treatment)	2.1 Family doctor same day access	3	2	2	2	3	3	3	2	2	1	2	3	1	2	3	1	3	2	2	2	3	3	3	1	2	1	2	2	3	1	1	2	2	2
	2.2 Direct access to specialist	3	3	3	1	1	3	2	2	2	1	2	2	2	3	2	3	1	2	2	2	3	2	1	1	2	1	2	2	3	1	1	1	3	1
	2.3 Major elective surgery <90 days	3	2	3	2	1	1	2	2	2	2	3	3	3	2	2	2	2	1	1	2	2	1	3	3	1	1	2	2	1	1	1	2	3	2
	2.4 Cancer therapy < 21 days	2	3	3	1	2	3	2	3	1	1	2	2	2	2	2	3	2	2	1	3	3	3	3	1	1	2	2	1	3	2	2	1	3	2
	2.5 CT scan < 7days	2	3	2	2	1	1	2	1	3	3	2	1	2	3	1	2	1	1	2	2	3	2	2	1	1	1	2	1	2	1	1	1	3	1
	Subdiscipline weighted score	217	217	233	133	133	183	183	167	167	133	167	183	200	200	167	183	150	133	117	183	233	183	200	83	117	117	167	117	200	133	100	100	233	133
3. Outcomes	3.1 Heart infarct case fatality	1	2	2	1	2	3	3	3	2	2	3	1	3	3	1	3	3	3	1	1	3	1	2	3	2	3	1	1	2	2	2	2	2	2
	3.2 Infant deaths	1	3	2	1	2	3	3	3	3	3	3	1	3	3	2	3	3	3	2	2	3	1	3	3	2	3	1	1	2	3	3	3	3	3
	3.3 Cancer deaths relative to incidence	1	2	3	2	2	2	2	1	3	1	3	1	1	1	1	2	3	3	1	1	3	2	2	3	1	2	1	1	1	2	2	3	3	2
	3.4 Preventable Years of Life Lost	2	2	3	1	2	3	3	2	1	2	2	1	2	2	1	3	3	3	1	1	3	3	3	3	3	1	1	1	3	2	2	3	2	2
	3.5 MRSA infections	1	2	1	2	1	1	2	3	3	3	1	n.a.	1	2	1	3	1	1	2	2	2	1	3	3	2	3	1	1	2	2	1	3	2	1
	3.6 Caesarean sections	1	1	3	1	3	1	2	2	2	3	3	2	1	1	1	3	1	1	2	2	1	1	3	3	3	1	1	2	2	2	3	3	1	2
	3.7 Undiagnosed diabetes	1	1	3	1	3	1	3	2	1	1	2	1	2	3	3	3	3	2	1	1	3	1	3	3	1	1	1	1	3	1	3	3	2	3
	3.8 Depression	n.a.	2	2	2	n.a.	2	2	3	2	1	2	n.a.	3	1	2	n.a.	3	1	1	1	3	2	3	3	2	2	1	n.a.	2	2	2	3	n.a.	2
	Subdiscipline weighted score	113	188	213	138	200	188	225	250	175	250	238	113	200	175	138	263	238	213	138	138	250	163	263	300	188	163	100	113	188	213	213	300	213	200
4. Prevention/ Range and reach of services provided	4.1 Equity of healthcare systems	1	2	2	1	3	1	3	3	2	2	2	1	2	1	1	3	2	2	1	2	3	2	3	3	2	1	1	1	1	2	2	3	3	3
	4.2 Cataract operations per 100 000 age 65+	n.a.	3	3	1	2	1	3	3	2	3	3	n.a.	1	3	2	3	1	1	2	2	3	3	3	3	3	3	1	n.a.	1	1	2	2	1	2
	4.3 Infant 4-disease vaccination	3	1	3	2	2	3	1	2	3	3	2	2	3	2	2	2	2	2	2	3	3	1	2	3	3	3	3	3	3	2	2	3	2	1
	4.4 Kidney transplants per million pop.	1	3	3	1	3	2	2	3	2	2	3	1	2	1	2	3	3	1	1	1	3	2	3	3	1	3	1	n.a.	2	2	3	2	2	3
	4.5 Dental care included in public healthcare?	1	3	3	1	3	2	2	1	2	3	3	3	3	1	2	1	2	1	1	3	3	2	3	3	2	1	2	2	3	3	2	1	3	3
	4.6 Rate of mammography	1	1	2	n.a.	2	2	1	3	2	3	3	2	2	2	2	2	3	3	2	2	2	1	3	3	1	2	n.a.	1	1	3	3	1	3	3
	4.7 Informal payments to doctors	1	2	2	1	2	2	3	2	3	3	2	1	3	1	1	3	3	2	1	1	2	3	3	3	2	3	1	1	1	2	3	3	3	3
	4.8 Smoking Prevention	n.a.	1	2	1	n.a.	1	1	2	3	3	3	n.a.	1	1	1	3	3	2	2	2	1	3	3	3	2	2	2	n.a.	2	2	2	3	2	3
	4.9 Long term care for the elderly	1	2	3	1	n.a.	n.a.	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	3	3	3	1	n.a.	1	n.a.	2	n.a.	1	3	3	2
	4.10 % of dialysis done outside of clinic	n.a.	1	1	1	3	n.a.	1	3	3	3	1	1	1	1	2	2	2	2	3	1	n.a.	3	3	2	1	1	2	2	1	1	1	3	n.a.	2
	Subdiscipline weighted score	70	111	140	64	128	88	117	140	123	152	140	82	111	88	99	146	134	93	88	99	134	128	163	146	99	117	88	82	99	99	117	158	111	146
5. Pharmaceuticals	5.1 Rx subsidy	1	2	2	1	3	3	2	2	3	3	3	1	3	2	2	2	2	2	1	1	2	2	3	3	1	2	1	1	2	2	3	3	3	3
	5.2 Layman-adapted pharmacopoeia?	1	3	3	1	2	2	3	3	3	3	2	2	2	1	3	3	3	3	3	1	1	1	3	3	2	3	3	1	3	2	2	3	3	3
	5.3 Novel cancer drugs deployment rate	n.a.	3	2	1	1	n.a.	2	3	1	2	3	n.a.	2	1	1	2	2	2	1	1	2	1	2	2	1	n.a.	1	1	2	2	2	2	3	1
	5.4 Access to new drugs (time to subsidy)	1	2	1	n.a.	n.a.	3	1	3	1	2	2	n.a.	3	2	1	2	2	1	n.a.	n.a.	1	n.a.	2	2	1	2	1	1	2	2	1	3	3	3
	5.5 Alzheimer drugs	n.a.	3	3	1	1	n.a.	2	2	1	3	2	n.a.	2	3	1	2	2	2	1	2	1	n.a.	1	2	2	3	2	1	2	3	2	2	2	2
	5.6 Schizophrenia drugs	n.a.	3	3	1	2	n.a.	1	3	1	3	2	n.a.	3	3	2	n.a.	3	1	1	1	2	1	2	2	1	2	1	1	1	2	3	2	3	2
	5.7 Awareness: Antibiotics against viruses?	n.a.	1	3	1	1	1	2	3	2	3	3	n.a.	1	1	1	n.a.	2	2	1	2	1	3	3	n.a.	1	1	1	n.a.	2	3	3	3	n.a.	3
	Subdiscipline weighted score	33	81	81	33	48	57	62	90	48	86	86	38	76	67	52	62	86	52	43	33	62	48	76	67	48	67	48	38	67	81	71	76	86	81
	Total score	535	737	783	456	655	627	694	822	653	752	766	527	704	617	577	799	714	623	491	585	791	609	872	756	577	589	489	451	675	638	603	775	769	721
	Rank	29	11	5	33	17	20	15	2	18	10	8	30	14	22	28	3	13	21	31	26	4	26	1	9	27	25	32	34	16	19	24	6	7	12

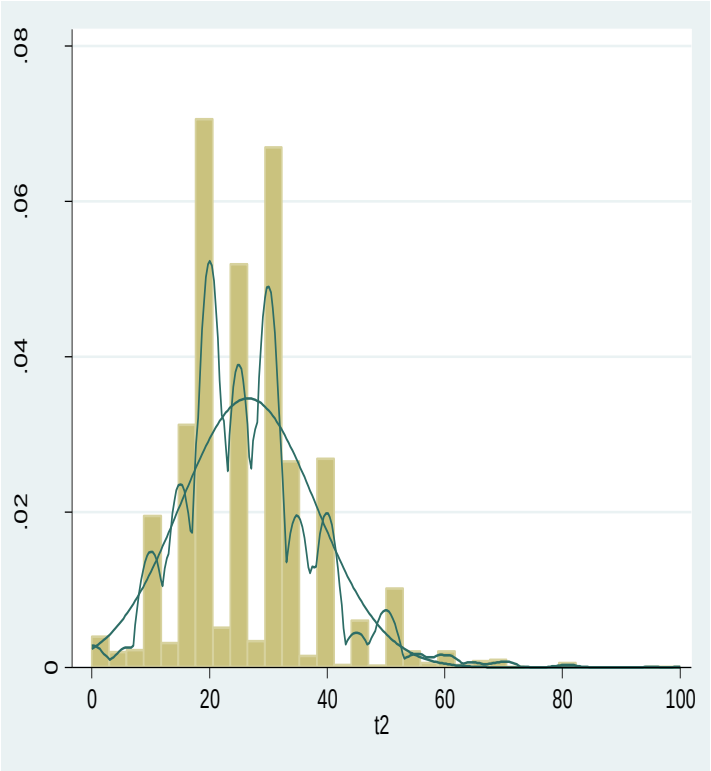
Figure AI.4: Available data for the year 2012

Appendix II

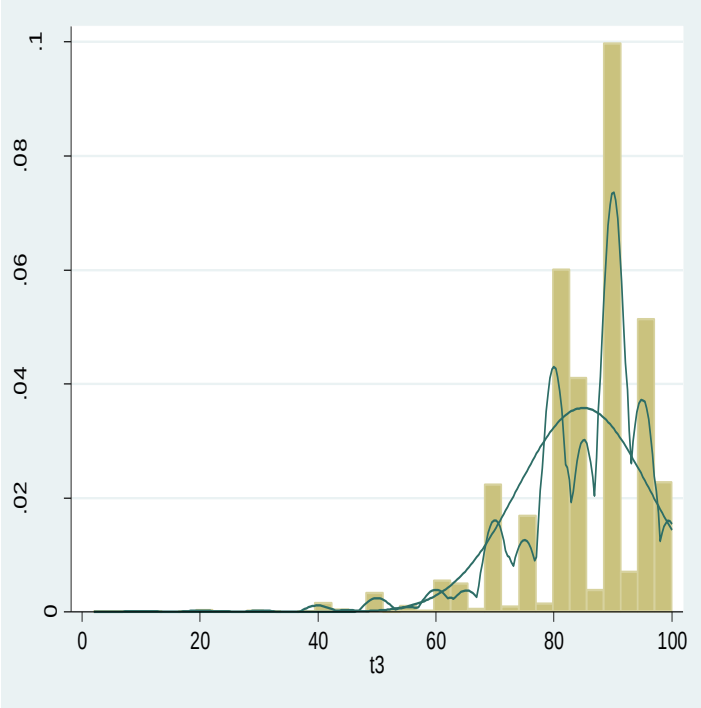
(Chapter 3)



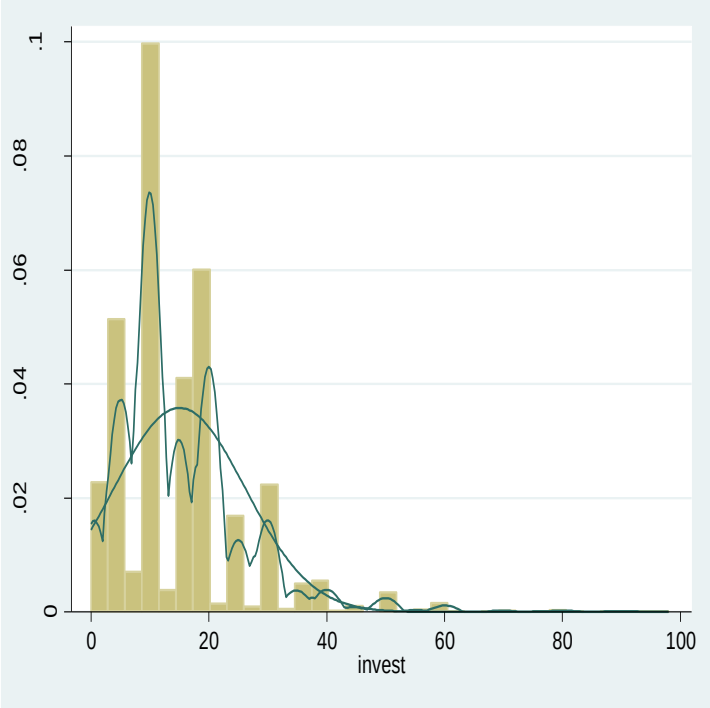
Graph AII.1: Density of T1



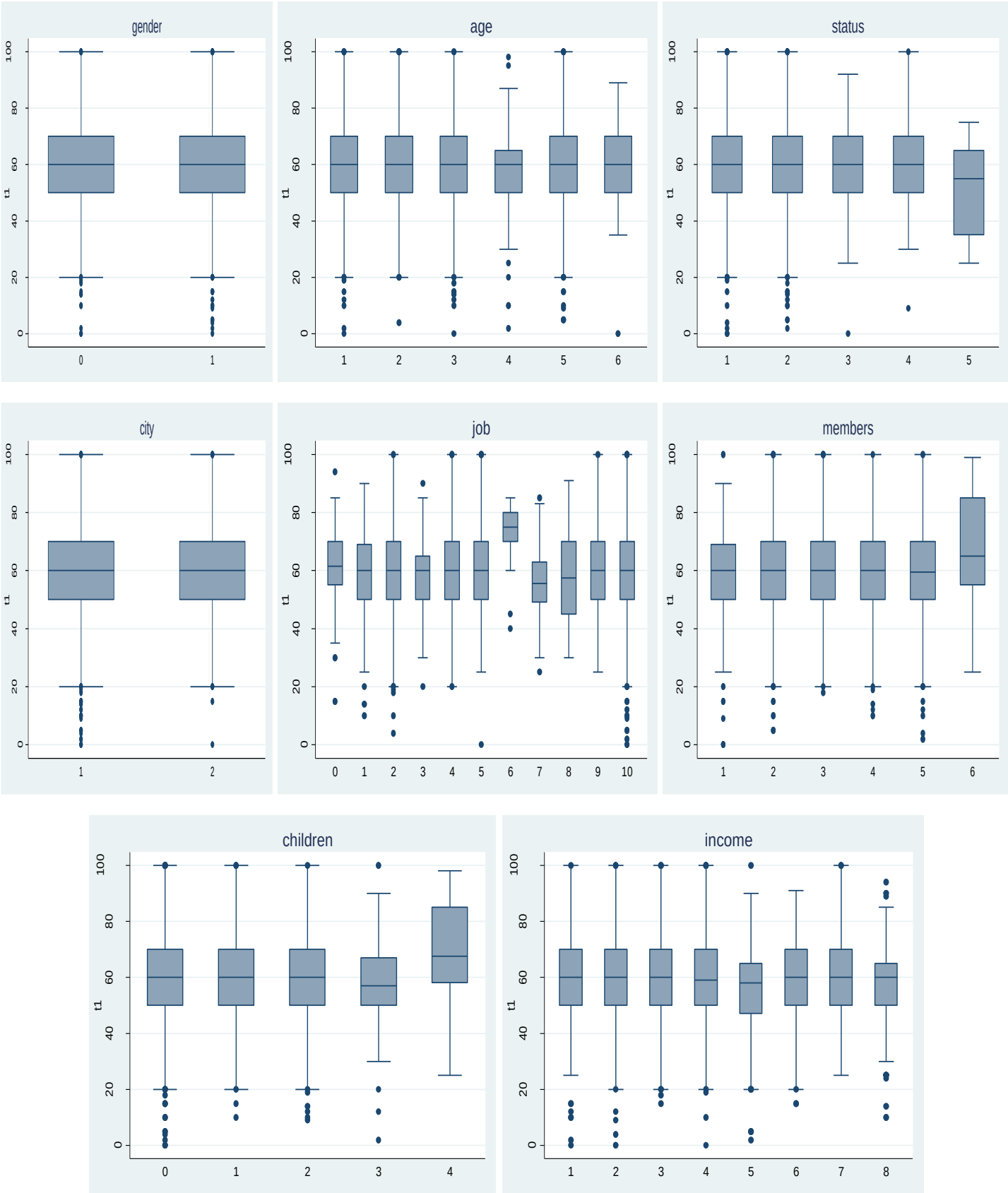
Graph AII.2: Density of T2



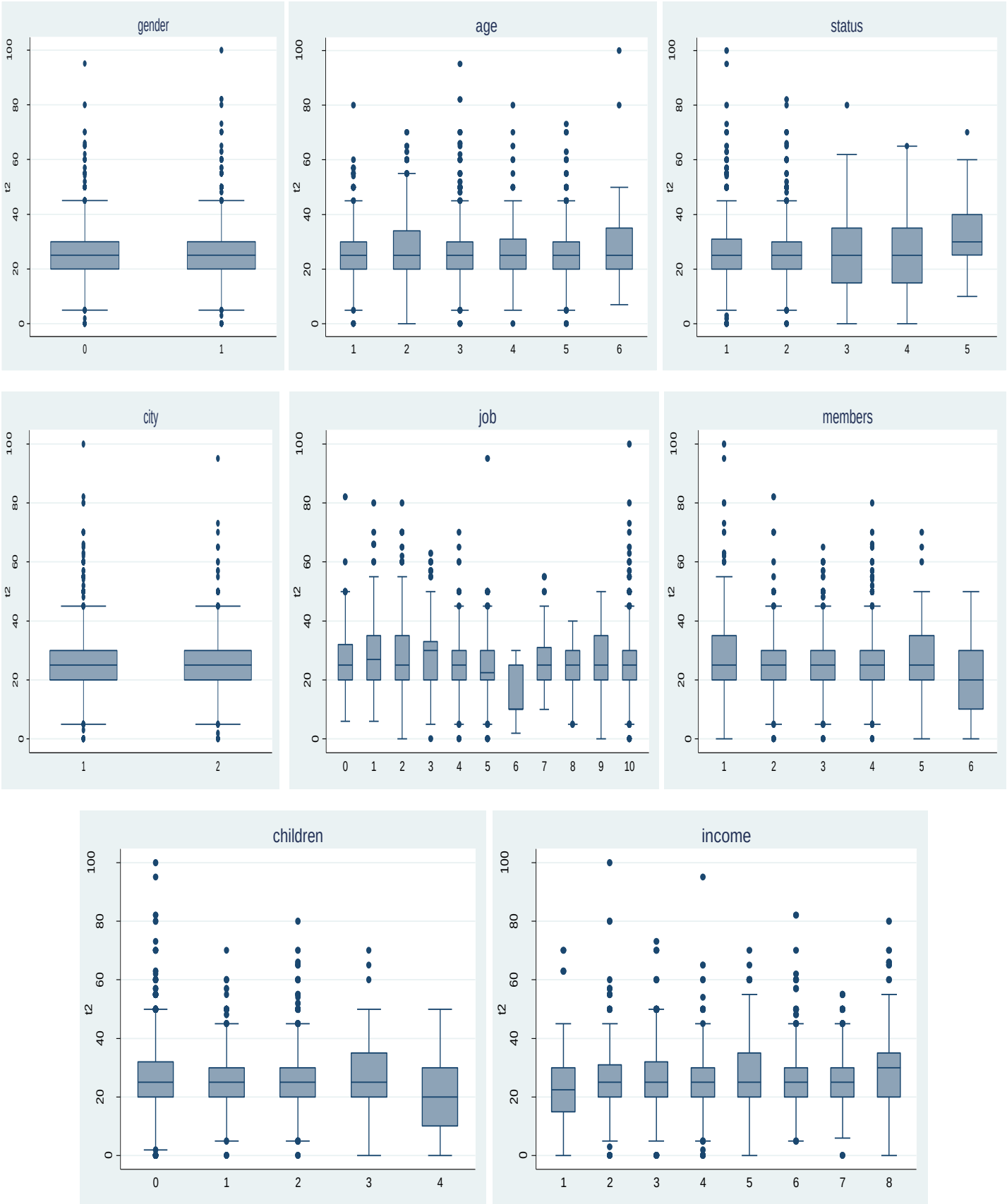
Graph AII.3: Density of T3



Graph AII.4: Density of Invest



Graph AII.5: Citizens' preferences for health allocation of T1 according to their demographic characteristics (gender, age, family status, residence, employment, family members, number of children and income)



Graph AII.6: Citizens' preferences for health allocation of T2 according to their demographic characteristics (gender, age, family status, residence, employment, family members, number of children and income)

Graph AII.7: Citizens' preferences for health allocation of T3 according to their demographic characteristics (gender, age, family status, residence, employment, family members, number of children and income)

Graph AII.8: Citizens' preferences for health allocation of Invest according to demographic characteristics (gender, age, family status, residence, employment, family members, number of children and income)

Table AII.1: Logit estimates for various healthcare functions with dummies

(dependent variable: Deviation between citizens' preferences and actual public health expenditure)

Odds Ratios	*Personal health services and goods*					*Public (Collective) healthcare services*		*Capital formation*
	1	2	3	4	5	6	7	8
	Curative care	*Rehabilitative care*	*Long-term care*	*Ancillary care*	*Out-patients*	*Prevention - Public Health*	*Administration*	*Capital formation*
Gender	1.002 (0.201)	**1.261***** **(0.098)**	0.965 (0.081)	0.938 (0.149)	1.089 (0.113)	0.984 (0.075)	0.865 (0.085)	**1.168**** (0.084)
Age 2	0.835 (0.283)	1.072 (0.151)	1.113 (0.168)	0.0978 (0.275)	1.057 (0.195)	1.077 (0.142)	0.960 (0.157)	1.089 (0.142)
Age 3	0.727 (0.309)	1.050 (0.173)	0.928 (0.160)	1.277 (0.457)	0.799 (0.178)	0.869 (0.138)	1.229 (0.244)	1.261 (0.189)
Age 4	**0.238**** (0.145)	1.015 (0.184)	1.051 (0.200)	1.104 (0.417)	0.885 (0.212)	0.914 (0.158)	0.967 (0.216)	1.268 (0.215)
Age 5	0.562 (0.269)	0.826 (0.145)	1.043 (0.193)	0.957 (0.306)	1.051 (0.244)	0.874 (0.148)	1.222 (0.278)	**1.800***** (0.289)
Age 6	0.266 (0.449)	0.757 (0.202)	1.156 (0.321)	1.273 (0.715)	0.473 (0.222)	0.711 (0.184)	**0.475**** (0.158)	**1.760***** (0.483)
Single	**0.454***** (0.178)	1.091 (0.145)	1.001 (0.135)	0.700 0.181	1.0123 (0.192)	0.874 (0.113)	0.955 (0.153)	**1.324**** (0.160)
Divorcee	0.661 (0.449)	0.925 (0.200)	0.736 (0.161)	0.995 (0.422)	1.008 (0.345)	1.197 (0.273)	1.155 (0.336)	1.123 (0.229)
Separated	0.346 (0.265)	1.305 (.0301)	**0.639*** (0.153)	0.526 (0.219)	1.0245 (0.392)	0.680 (0.158)	1.154 (0.521)	**1.982***** (0.504)
Widow	**0.001***** (0.001)	**3.640*** (2.823)	1.231 (0.967)	**2.841***** (0.941)	**3.451**** (2.069)	**0.489*** (0.256)	1.018 (0.783)	1.087 (0.469)
Job	**3.292***** (1.119)	0.916 (0.115)	**1.188**** (0.163)	1.101 (0.278)	0.968 (0.162)	0.882 (0.111)	0.758 (0.127)	**1.643***** (0.190)

Residence	**0.585**** (0.138)	**0.724***** (0.081)	0.909 (0.105)	1.322 (0.264)	**0.700***** (0.090)	**0.756**** (0.083)	1.111 (0.145)	1.170 (0.115)
2 members	0.863 (0.362)	**0.680**** (0.109)	**0.700**** (0.117)	0.826 (0.263)	1.240 (0.268)	**1.313*** (0.202)	**1.746***** (0.341)	**1.401**** (0.207)
3 members	0.623 (0.252)	**0.665***** (0.098)	**0.591***** (0.092)	0.827 (0.240)	1.113 (0.229)	**1.557***** (0.221)	**1.562**** (0.284)	1.131 (0.155)
4 members	1.094 (0.385)	0.805 (0.114)	**0.647***** (0.096)	0.939 (0.256)	**1.990***** (0.369)	**1.640***** (0.225)	**1.407**** (0.245)	1.197 (0.159)
5 members	0.624 (0.336)	**0.618***** (0.111)	**0.663**** (0.127)	0.883 (0.311)	**1.683**** (0.401)	**1.639***** (0.294)	**1.780**** (0.418)	1.127 (0.192)
6 members	0.625 (0.680)	**0.242***** (0.094)	0.568 (0.198)	0.415 (0.224)	**2.181*** (0.883)	**3.970***** (1.492)	1.839 (0.821)	1.217 (0.387)
Income 2	1.150 (0.480)	**0.572***** (0.124)	1.222 (0.251)	1.190 (0.458)	1.027 (0.286)	0.932 (0.182)	0.754 (0.199)	1.191 (0.253)
Income 3	0.487 (0.241)	**0.619**** (0.143)	**1.531*** (0.345)	1.188 (0.479)	**1.723*** (0.486)	0.746 (0.152)	0.729 (0.201)	1.147 (0.256)
Income 4	**0.444**** (0.212)	0.699 (0.155)	**1.778***** (0.390)	1.019 (0.396)	1.307 (0.365)	0.744 (0.146)	1.413 (0.403)	0.819 (0.178)
Income 5	**0.333**** (0.176)	0.705 (0.159)	**2.258***** (0.511)	1.065 (0.431)	0.779 (0.233)	**0.589***** (0.119)	0.860 (0.244)	0.864 (0.189)
Income 6	**0.171***** (0.95)	0.715 (0.159)	**1.632**** (0.355)	1.806 (0.783)	0.985 (0.283)	**0.600**** (0.121)	1.110 (0.322)	1.088 (0.238)
Income 7	**0.337**** (0.164)	0.842 (0.182)	**1.939***** (0.412)	1.537 (621)	0.872 (0.244)	**0.687**** (0.120)	0.873 (0.238)	1.242 (0.268)
Income 8	**0.141***** (0.072)	0.856 (0.186)	**1.808***** (0.384)	1.204 (0.460)	0.822 (0.229)	**0.542***** (0.104)	0.755 (0.205)	0.985 (0.210)
Pseudo-R^2	0.0614	0.0057	0.0072	0.0072	0.0117	0.0081	0.0075	0.0055
Wald	50.13	26.45	29.40	12.85	34.25	43.02	23.72	31.22
Obs	3,029	3,029	3,029	3,029	3,029	3,029	3,029	3,029

Note: Heteroscedasticity-robust standard errors in parentheses; (***), (**), (*) indicate significance at 1%, 5%, and 10%, respectively.

Appendix III

(Chapter 4)

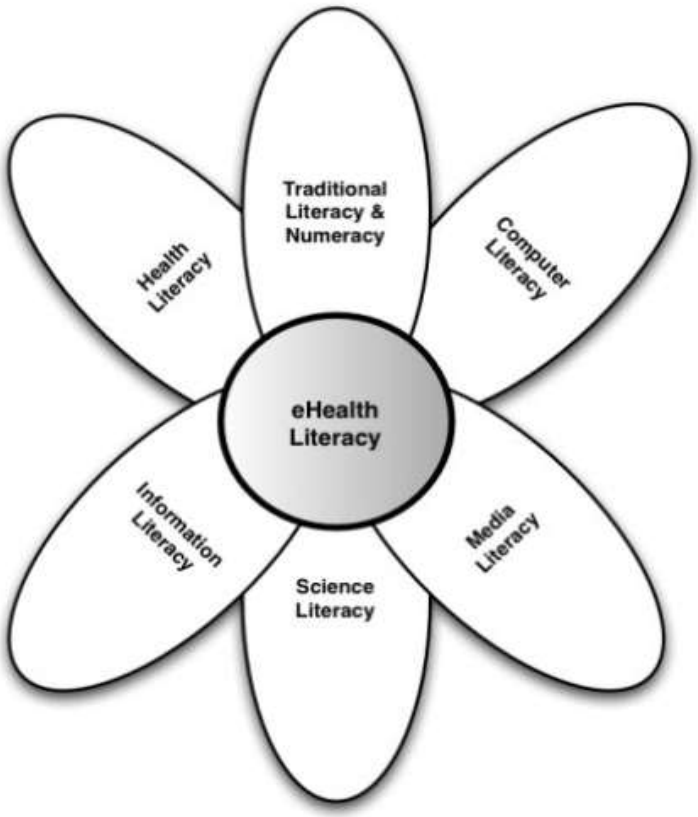


Figure AIII.1: eHealth traditional lily model

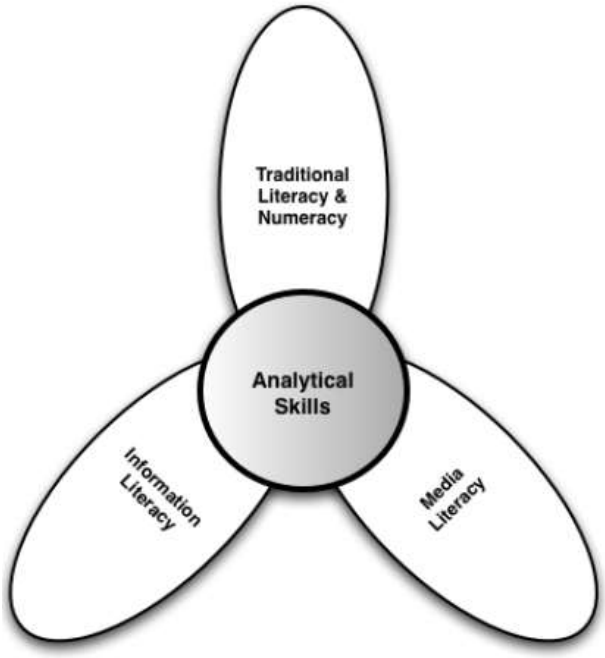


Figure AIII.2: eHealth literacy analytic model

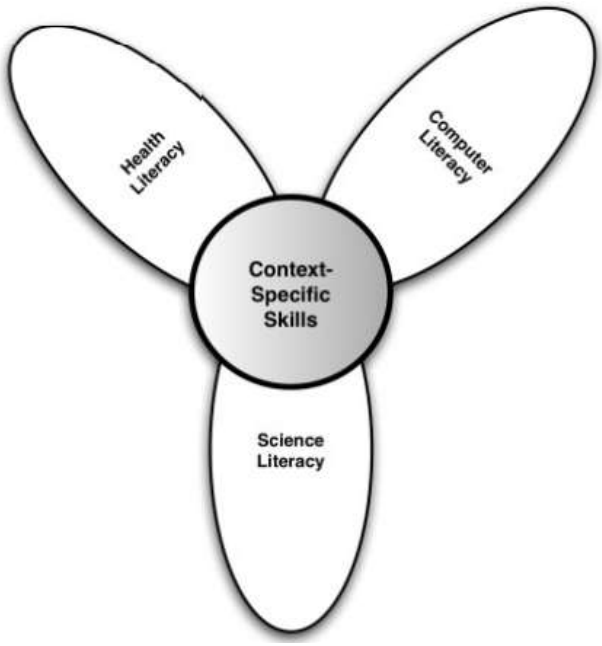
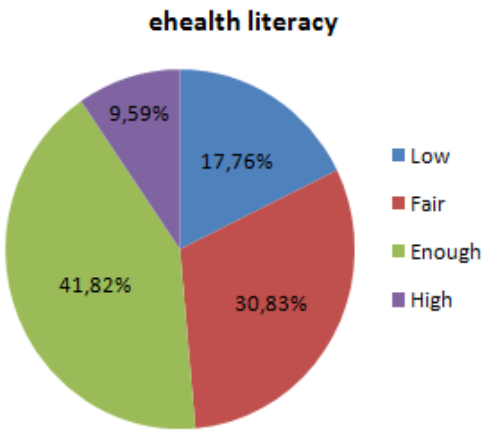


Figure AIII.3: eHealth literacy context-specific model



Graph AIII.1: Distribution of eHealth literacy

Table AIII.1: Cross-tabulation between eHealth literacy and Gender

	Gender		
eHealth literacy	*Male*	*Femate*	Total
Low	81	108	189
Fair	156	172	328
Enough	199	246	445
High	41	61	102
Total	477	587	1,064

Table AIII.2: Cross-tabulation between eHealth literacy and Age

	Age						
eHealth literacy	*15-24*	*25-39*	*40-54*	*55-64*	*65-79*	*>80*	Total
Low	16	44	51	26	38	14	189
Fair	64	159	79	9	17	0	328
Enough	85	255	77	16	12	0	445
High	21	45	25	5	5	1	102
Total	186	503	232	56	72	15	1,064

Table AIII.3: Cross-tabulation between eHealth literacy and Marital status

	Marital status					
eHealth literacy	*Single*	*Married*	*Divorced*	*Separated*	*Widow*	Total
Low	46	107	30	6	0	189
Fair	186	133	1	8	0	328
Enough	261	171	3	9	1	445
High	56	37	0	8	1	102
Total	549	448	34	31	2	1,064

Table AIII.4: Cross-tabulation between eHealth literacy and Education

	Education								
eHealth literacy	*Primary*	*High (3 first years)*	*Technical*	*High (3 last years)*	*Post-high*	*University*	*M.Sc.*	*Ph.D.*	Total
Low	28	16	7	82	11	45	0	0	189
Fair	4	7	17	89	22	161	25	3	328
Enough	3	6	8	86	14	252	64	12	445
High	0	1	1	15	4	58	17	6	102
Total	35	30	39	272	51	516	106	21	1,064

Table AIII.5: Cross-tabulation between eHealth literacy and Income

	Income								
eHealth literacy	*<€750*	*€751-1,100*	*€1,101-1,450*	*€1,451-1,800*	*€1,801-2,200*	*€2,201-2,800*	*€2,801-3,500*	*>€3,501*	Total
Low	29	51	16	32	20	20	13	8	189
Fair	51	63	27	54	50	43	29	11	328
Enough	50	108	48	66	72	40	38	23	445
High	13	20	9	12	13	11	14	10	102
Total	143	242	100	164	155	114	94	52	1,064

Table AIII.6: Cross-tabulation between eHealth literacy and Smoking

	Smoking		
eHealth literacy	*Yes*	*No*	Total
Low	121	68	189
Fair	180	148	328
Enough	271	174	445
High	69	33	102
Total	641	423	1,064

Table AIII.7: Cross-tabulation between eHealth literacy and Exercise

	Exercise		
eHealth literacy	*Yes*	*No*	Total
Low	146	43	189
Fair	173	155	328
Enough	195	250	445
High	50	52	102
Total	564	500	1,064

Table AIII.8: Cross-tabulation between eHealth literacy and Alcohol

	Alcohol		
eHealth literacy	*Yes*	*No*	Total
Low	147	42	189
Fair	248	80	328
Enough	352	93	445
High	82	20	102
Total	829	235	1,064

Table AIII.9: Cross-tabulation between eHealth literacy and Computer literacy

	Computer literacy			
eHealth literacy	*Low*	*Medium*	*High*	Total
Low	100	55	34	189
Fair	15	142	171	328
Enough	7	159	279	445
High	0	25	77	102
Total	122	381	561	1,064

Table AIII.10: Cross-tabulation between eHealth literacy and Information literacy

	Information literacy			
eHealth literacy	*Low*	*Medium*	*High*	Total
Low	87	90	12	189
Fair	36	215	77	328
Enough	34	215	196	445
High	3	27	72	102
Total	160	547	357	1,064

Table AIII.11: Logit estimates of different specifications with dummies
(maximum level of *eHealth literacy* is the dependent variable)

Odds ratios		Demographic (*D*)		Life-style (*L*)		Full Set (*X*)	
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Demographic (*D*)	*Female*	1.153	1.128			1.184	1.167
		(0.139)	(0.143)			(0.144)	(0.147)
	Age 2	**0.678****	**0.738***			**0.668****	0.718
		(0.121)	(0.136)			(0.120)	(0.133)
	Age 3	**0.459*****	**0.641***			**0.453*****	**0.625***
		(0.107)	(0.170)			(0.111)	(0.165)
	Age 4	**0.303*****	0.702			**0.319*****	**0.738***
		(0.106)	(0.266)			(0.129)	(0.282)
	Age 5	**0.264*****	0.504			**0.290*****	0.527
		(0.089)	(0.205)			(0.109)	(0.214)
	Age 6	**0.055****	**0.170***			**0.062***	0.183
		(0.067)	(0.342)			(0.095)	(0.342)
	Single	1.002	0.958			0.955	0.916
		(0.164)	(0.177)			(0.159)	(0.169)
	Divorcee	**0.089*****	**0.185*****			**0.095*****	**0.196*****
		(0.055)	(0.108)			(0.068)	(0.115)
	Separated	**1.892***	1.886			2.039	1.924
		(0.728)	(0.838)			(0.987)	(0.885)
	Widow	**21.339****	**12.140****			22.478	**10.964****
		(31.759)	(13.296)			(53.608)	(13.221)
	Education 2	1.718	0.337			1.474	0.318
		(1.025)	(0.230)			(0.899)	(0.219)
	Education 3	**4.022****	0.717			**3.994****	0.736
		(2.260)	(0.398)			(2.177)	(0.407)
	Education 4	**4.528*****	1.041			**4.456*****	1.059
		(2.161)	(0.504)			(2.039)	(0.505)
	Education 5	**6.319*****	0.898			**6.253*****	0.925
		(3.393)	(0.507)			(3.197)	(0.511)
	Education 6	**13.516*****	**2.416***			**12.887*****	**2.491***
		(6.435)	(1.167)			(5.860)	(1.179)
	Education 7	**24.677*****	**4.068*****			**23.752*****	**4.287*****
		(12.626)	(2.086)			(11.589)	(2.168)
	Education 8	**48.727*****	**7.054*****			**43.864*****	**7.062*****
		(30.970)	(4.0329)			(26.725)	(4.325)
	Income 2	1.172	1.102			1.195	1.117
		(0.246)	(0.263)			(0.262)	(0.269)
	Income 3	1.293	0.981			1.405	1.030
		(0.336)	(0.273)			(0.368)	(0.290)
	Income 4	1.120	0.790			1.154	0.807
		(0.257)	(0.202)			(0.269)	(0.208)

	Income 5	1.308 (0.307)	0.944 (0.246)			1.330 (0.322)	0.949 (0.250)
	Income 6	0.831 (0.210)	**0.590*** (0.160)			0.910 (0.232)	**0.618*** (0.169)
	Income 7	1.471 (0.398)	0.870 (0.267)			**1.646*** (0.476)	0.932 (0.288)
	Income 8	1.199 (0.401)	0.789 (0.301)			1.232 (0.501)	0.794 (0.312)
Life-style *(L)*	*Smoke*			0.956 (0.111)	0.979 (0.127)	0.996 (0.127)	1.148 (0.157)
	Exercise			**2.083*** ** (0.238)	**1.481*** ** (0.189)	**1.659*** ** (0.208)	**1.402** ** (0.186)
	Alcohol			0.877 (0.118)	0.956 (0.141)	0.833 (0.123)	0.917 (0.141)
Literacy *(C)*	*Computer Literacy 2*		**10.874*** ** (3.451)		**17.377*** ** (5.121)		**10.127*** ** (3.208)
	Computer Literacy 3		**17.235*** ** (5.535)		**30.801*** ** (8.975)		**16.396*** ** (5.243)
	Information Literacy 2		**2.248*** ** (0.496)		**2.621*** ** (0.567)		**2.253*** ** (0.498)
	Information Literacy 3		**8.624*** ** (2.053)		**8.998*** ** (2.135)		**8.551*** ** (2.066)
Observations		1064	1064	1064	1064	1064	1064
Likelihood Ratio		244.72	477.79	42.59	396.32	265.49	489.47
Pseudo-R^2		0.1137	0.2155	0.016	0.1779	0.1207	0.2184

Note: Numbers in parenthesis are standard errors; (***), (**) and (*) indicate significance at 1%, 5% and 10%, respectively.

Appendix IV

(Chapter 5)

Table AIV.1: Frequency and cumulative percentage analysis for the in-patients

Variables	Frequency	Percentage	Cumulative Percentage
Recommend			
Certainly no	11	1.48%	1.48%
Probably no	13	1.74%	3.22%
Probably yes	150	20.13%	23.36%
Certainly yes	571	76.64%	100.00%
Gender			
Male	338	45.37%	45.37%
Female	407	54.63%	100.00%
Age			
≤24 years old	39	5.23%	5.23%
25-34 years old	72	9.66%	14.90%
35-44 years old	63	8.46%	23.36%
45-54 years old	88	11.81%	35.17%
55-64 years old	116	15.57%	50.74%
65-74 years old	146	19.60%	70.34%
≥75 years old	221	29.66%	100.00%
Perceived Health Status			
Terrible	27	3.62%	3.62%
Bad	296	39.73%	43.36%
Moderate	217	29.13%	72.48%
Good	162	21.74%	94.23%
Excellent	43	5.77%	100.00%
Insurance			
No	7	0.04%	0.04%
Yes	738	99.06%	100.00%
Nationality			
Other than Greek	31	4.16%	4.16%
Greek	714	95.84%	100.00%

The variables corresponding to the hospital's performance, i.e. the doctors' attention, nurses' attention, hospital's environment and pain related procedures, they were constructed based on the average grade patients gave to several questions. Therefore, although those questions were

Likert-type, the average grade takes all possible values between 1 to 4 (such as 1.333, 1.5, 1.666, 1.75, 2.333, and so on). This is why there is no reason to provide frequency and cumulative percent analysis for those variables. The same holds for Table AIV.2 that follows.

Table AIV.2: Frequency and cumulative percentage analysis for the out-patients

Variables	**Frequency**	**Percentage**	**Cumulative Percentage**
Recommend			
Certainly no	19	4.52%	4.52%
Probably no	34	8.10%	12.62%
Probably yes	145	34.52%	47.14%
Certainly yes	222	52.86%	100.00%
Gender			
Male	175	41.67%	41.67%
Female	245	58.33%	100.00%
Age			
≤24 years old	51	12.14%	12.14%
25-34 years old	64	15.24%	27.38%
35-44 years old	61	14.52%	41.90%
45-54 years old	53	12.62%	54.52%
55-64 years old	79	18.81%	73.33%
65-74 years old	70	16.67%	90.00%
≥75 years old	42	10.00%	100.00%
Insurance			
No	13	3.10%	3.10%
Yes	407	96.90%	100.00%
Nationality			
Other than Greek	18	4.16%	4.16%
Greek	402	95.71%	100.00%

With respect to the age of two patient groups, it seems that out-patients are more equally distributed in all age classes, while in-patients seem to be older. In is quite reasonable if one takes into account that as out-patients we are referring to those visiting the emergency room and as in-patients we referring to those who proceed in admittance in one of the hospital's clinics. Furthermore, the highest percentage of not insured patients is documented among the out-patients (this is the meaning of emergency room).

Table AIV.3: Logit estimates of different specifications for in-patients
(the probability of recommend the hospital to others is the dependent variable)

Odds ratios	**Demographic (*D*)**	**Hospital (*H*)**	**Full set (*X*)**
Gender2	0.836 (0.157)		0.964 (0.204)
Age2	**1.218***** (0.501)		**0.879***** (0.461)
Age3	1.299 (0.559)		1.001 (0.509)
Age4	1.601 (0.634)		0.989 (0.500)
Age5	**2.072*** (0.835)		1.368 (0.683)
Age6	**2.455**** (1.008)		1.355 (0.678)
Age7	**2.867***** (1.087)		2.027 (0.978)
Education2	1.459 (0.474)		1.563 (0.599)
Education3	0.800 (0.212)		1.044 (0.310)
Education4	0.741 (0.204)		1.001 (0.308)
Perceived Health Status2	**2.339*** (1.031)		1.663 (0.798)
Perceived Health Status3	**3.248***** (1.471)		**2.476*** (1.238)
Perceived Health Status4	**4.843***** (2.303)		**2.644*** (1.361)
Perceived Health Status5	**3.677**** (2.093)		1.576 (0.943)
Insurance2	0.452 (0.386)		0.747 (1.011)
Nationality2	0.578 (0.240)		0.739 (0.304)
Doctors' Attention		**4.162***** (1.006)	**4.380***** (1.099)
Nurses' Attention		**3.318***** (0.639)	**3.062***** (0.598)
Environment		**1.619***** (0.296)	**1.568**** (0.295)
Pain Related Procedures		**1.311*** (0.195)	**1.345*** (0.207)
Pseudo-R^2	0.0384	0.2126	0.2285
Wald	35.60	153.79	176.45
Obs.	745	745	745

Note: Heteroscedasticity robust standard errors in parentheses; (***), (**), (*) indicate significance at 1%, 5% and 10%, respectively.

Table AIV 4: Logit estimates of different specifications for out-patients

(the probability of recommend the hospital to others is the dependent variable)

Odds ratios	**Demographic (*D*)**	**Hospital (*H*)**	**Full set (*X*)**
Gender2	0.836		0.964
	(0.157)		(0.204)
Age2	**1.218*** **		**0.879*** **
	(0.501)		(0.461)
Age3	1.299		1.001
	(0.559)		(0.509)
Age4	1.601		0.989
	(0.634)		(0.500)
Age5	**2.072***		1.368
	(0.835)		(0.683)
Age6	**2.455** **		1.355
	(1.008)		(0.678)
Age7	**2.867*** **		2.027
	(1.087)		(0.978)
Education2	1.459		1.563
	(0.474)		(0.599)
Education3	0.800		1.044
	(0.212)		(0.310)
Education4	0.741		1.001
	(0.204)		(0.308)
Perceived Health Status2	**2.339***		1.663
	(1.031)		(0.798)
Perceived Health Status3	**3.248*** **		**2.476***
	(1.471)		(1.238)
Perceived Health Status4	**4.843*** **		**2.644***
	(2.303)		(1.361)
Perceived Health Status5	**3.677** **		1.576
	(2.093)		(0.943)
Insurance2	0.452		0.747
	(0.386)		(1.011)
Nationality2	0.578		0.739
	(0.240)		(0.304)
Doctors' Attention		**4.162*** **	**4.380*** **
		(1.006)	(1.099)
Nurses' Attention		**3.318*** **	**3.062*** **
		(0.639)	(0.598)
Environment		**1.619*** **	**1.568** **
		(0.296)	(0.295)
Pain Related Procedures		**1.311***	**1.345***
		(0.195)	(0.207)
Pseudo-R^2	0.0384	0.2126	0.2285
Wald	35.60	153.79	176.45
Obs.	745	745	745

Note: Heteroscedasticity robust standard errors in parentheses; (***), (**), (*) indicate significance at 1%, 5% and 10%, respectively.

Questionnaires

Preferences with respect to healthcare resources allocation Questionnaire

If an amount of €100 is given to you, how would you spend it in order to fund all healthcare functions? Distribute this amount according to your preferences, writing down the percentage that it should be spent for the funding of each one of the eight healthcare functions. In the first part of the questionnaire, complete the questions regarding your demographic characteristics.

Demographic factors

Gender

o Male

o Female

Age

o 15-24 years old

o 25-39 years old

o 40-54 years old

o 55-64 years old

o 65-79 years old

o >80 years old

Marital status

o Single

o Married

o Divorced

o Separated

o Widow

Employment status

o Employed

o Unemployed

Residence

o Athens

o Other

Number of family members

o 1

o 2

o 3

o 4

o ≥5

Income level

o <€750

o €751-1,100

o €1,101-1,450

o €1,451-1,800

o €1,801-2,200

o €2,201-2,800

o €2,801-3,500

o >€3,501

Healthcare resources allocation

Healthcare functions		*Percentage*
Personal health services and goods	Curative care	
	Rehabilitative care	
	Long-term care (health)	
	Ancillary services	
	Medical goods dispensed to out-patients	
Collective healthcare services	Preventive care	
	Governance, and health system and financing administration	
Capital account		

eHealth Literacy Questionnaire

In order to obtain your opinion and your experience with respect to the use of the Internet for health information, as long as your daily life-style habits, for each statement choose the response which best reflects your opinion and experience right now. In the first part of the questionnaire, complete the questions regarding your demographic characteristics.

Gender

o Male

o Female

Age

o 15-24 years old

o 25-39 years old

o 40-54 years old

o 55-64 years old

o 65-79 years old

o >80 years old

Marital status

o Single

o Married

o Divorced

o Separated

o Widow

Education level

o Primary school

o High school-3 first years

o Technical education

o High school-3 last years

o Post high school-excl. University

o University

o Master

o Phd

Income level

o <€750

o €751-1,100

o €1,101-1,450

o €1,451-1,800

o €1,801-2,200

o €2,201-2,800

o €2,801-3,500

o >€3,501

Do you smoke on a regular basis?

o Yes

o No

Do you exercise more than once per week?

o Yes

o No

Do you consume alcohol on a regular basis?

o Yes

o No

I know what health resources are available on the Internet

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I know where to find helpful health resources on the Internet

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I know how to find helpful health resources on the Internet

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I know how to use the Internet to answer my questions about health

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I know how to use the health information I find on the Internet to help me

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I have the skills I need to evaluate the health resources I find on the Internet

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I can tell high quality health resources from low quality health resources on the Internet

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

I feel confident in using information from the Internet to make health decisions

o Strongly Disagree

o Disagree

o Undecided

o Agree

o Strongly Agree

Questionnaire for in- and out-patients' satisfaction

In-patient satisfaction questionnaire

You should complete this questionnaire only if you were hospitalized. The completion of the questionnaire is anonymous; our Hospital has received all required measures to protect your personal data. Answer all questions by checking the appropriate box to the left part.

Gender

o Male

o Female

Age

o ≤ 24 years old

o 25-34 years old

o 35-44 years old

o 45-54 years old

o 55-64 years old

o 65-74 years old

o ≥ 75 years old

Education level

o Primary school

o High school-3 first years

o High school-3 last years

o University

Which is your nationality?

o Greek

o Other than Greek

Do you have insurance?

o Yes

o No

How would you evaluate your health status in general?

o Terrible

o Bad

o Moderate

o Good

o Excellent

During your hospital stay, how often nurses were behaved with courtesy and respect?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often nurses listened to you carefully?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often nurses explained to you things in understandable way?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often doctors were behaved with courtesy and respect?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often doctors listened to you carefully?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often doctors explained to you things in understandable way?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often was your room and bath cleaned?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often was quiet around your room?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, before you receive any new medicine, how often hospital staff informed you on the ground which is granted?

o Never

o Sometimes

o Usually

o Always

During your hospital stay, how often was the pain well managed?

o Never

o Sometimes

o Usually

o Always

Using grades from 0 to 10, where 0 represents the worst hospital and 10 the best, how would you evaluate your stay in this hospital?

o 0

o 1

o 2

o 3

o 4

o 5

o 6

o 7

o 8

o 9

o 10

Would you recommend this hospital to friends and family?

o Certainly no

o Probably no

o Probably yes

o Certainly yes

Out-patients' satisfaction Questionnaire

Please express your opinion with respect to the services of our hospital by checking the boxes of the following questions. The questionnaire is anonymous and the information included will help us improve the health services of our hospital.

Gender

o Male

o Female

Age

o ≤ 24 years old

o 25-34 years old

o 35-44 years old

o 45-54 years old

o 55-64 years old

o 65-74 years old

o ≥ 75 years old

Education level

o Primary school

o High school-3 first years

o High school-3 last years

o University

Which is your nationality?

o Greek

o Other than Greek

Do you have insurance?

o Yes

o No

Experiences with respect to cleanliness of the reception rooms

o Very bad

o Bad

o Moderate

o Good

o Very good

Experiences with respect to available seats while waiting

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the medical care with respect to healthcare quality (expertise and competence of doctors)

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the medical care with respect to doctors' behavior (courtesy, respect, support) during the exams

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the medical care with respect to full and comprehensive information provided by the doctors

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the nursery care with respect to healthcare quality (expertise and competence of nurses)

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the nursery care with respect to nurses' behavior (courtesy, respect, information) during the exams

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the administrative care with respect to administers' behavior (information, courtesy, respect)

o Very bad

o Bad

o Moderate

o Good

o Very good

Impressions from the administrative care with respect to speed of service

o Very bad

o Bad

o Moderate

o Good

o Very good

Using grades from 0 to 10, where 0 represents the worst hospital and 10 the best, how would you evaluate your stay in this hospital?

o 0

o 1

o 2

o 3

o 4

o 5

o 6

o 7

o 8

o 9

o 10

Would you recommend this hospital to friends and family?

o Certainly no

o Probably no

o Probably yes

o Certainly yes