Health Care Utilization in The Netherlands

Before and After the Health Insurance Reform 2006

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Student: Gerdine Naaktgeboren
Student number: 286923
Thesis Supervisor: Dr. T.M. Marreiros Bago d'Uva

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Abstract

This thesis investigates changes in health care utilization in the Netherlands after the introduction of a new health insurance system in January 2006. The objective of this thesis is to analyze whether the new health insurance system is an influencing factor of the change in health care utilization. Data were obtained from the Permanent Onderzoek Leefsituatie (POLS) for the years 2004 to 2007. In this thesis, corrections were made for age, gender, marital status, family size, nationality, self-assessed health, chronic conditions and education. To test whether health care use changed after the reform, overall levels of health care utilization were investigated, as well as changes of utilization for different levels of education and the type of health insurance people had before the reform. Changes between these groups before and after the reform were tested.

While this study observed that overall levels of some types of health care use changed after the reform, whether total health care utilization increased or decreased was not clear. Generally, inequity in the number of visits to specialists seemed to have increased. For physiotherapy visits there was a decreased inequity by level of education as evidenced by the increased utilization of physiotherapy by the lowest education groups while the utilization in the higher education groups remained constant. For other types of health care use, inequity between people with different education levels stayed the same.

Analysis of changes in health care use between people with different types of health insurance coverage suggested that those who were previously publically insured visited a general practitioner less often after the reform than before. A decrease in inequity of dental care utilization was also observed while inequity in the number of specialist visits increased after the reform between people with different types of health insurance coverage. While it can be concluded that health care use changed after the reform, the change in the health insurance system is not the only factor that could have influenced this change. Also family care giver usage changed significantly, while family care giver coverage did not change after the Health Insurance Reform. Increasing waiting times, satisfaction about the health care system and differences in treatment methods after the reform may also explain changes in health care utilization after the reform.

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1 Introduction

In January 2006 a new insurance system, the Health Insurance Act (HIA), was introduced in the Netherlands. The old health care system had two different types of health insurance: compulsory public health insurance, for people with lower incomes, and a voluntarily private health insurance. About 60 percent of the population had public health insurance (Rosenau & Lako, 2008). After the reform, only one single compulsory private insurance system remained. In this new system consumer mobility plays an important role. Because consumers can choose between insurers, insurers are forced to compete to strive for affordable high quality care for their insured in a way to keep consumers satisfied (De Jong, Van den Brink-Muinen & Groenewegen, 2008).

1.1 Problem

Many believed that the old insurance system offered little choice and was ineffective in controlling increasing health care expenditures (Knottnerus & Ten Velden, 2007). After the reform, citizens were given more freedom to select health insurance, thus driving insurers to strive for optimal care for the lowest price. The new system aimed to reduce the costs and improve the quality of health care by increasing competition between health insurance companies (Maarse & Ter Meulen, 2006).

However, there are some criticisms about the new health care system. First of all, consumers' premiums have increased. Individual health insurance premiums in the Netherlands rose between 8 to 10 percent in 2007 compared to 2006 (Rosenau & Lako, 2008, pp. 1040-1041). Secondly, total health costs have also increased. In 2006, total costs were 65.7 billion euro, which was a 4.4 percent increase compared to 2005. During 2007, total health care costs increased by 5.1 percent (Centraal Bureau voor de Statistiek Persbericht 2007, 2008). Thirdly, incentives for personal accountability, which means that citizens have to choose a health insurer by themselves, have been revised. Incentives for personal responsibility for health status were included in the reform legislation to control costs, but there was a shortcoming in the way to achieve this (Rosenau & Lako, pp. 1040-1041). These criticisms are related to the question of whether health utilization changed after the health insurance reform and whether this change might partly be caused by the HIA. In the next chapter I will discuss the old and new health insurance systems in more detail. Factors which influence health care utilization will be discussed in chapter 3.

1.2 Research question

Although the old insurance system provided affordable and high quality care compared to other European countries, many believed that the insurance system offered little choice and was not effective in preventing increasing health care expenditures (Knottnerus & Ten Velden, 2007). However, after the HIA was introduced in 2006, health care expenditures began to rise at a higher rate compared to before 2006 (CBS Persbericht 2007, 2008).

Besides more expensive treatments, increasing health care expenditures may be partially explained by a higher use of health care. Therefore I want to analyze whether utilization in the Netherlands changed after the health insurance reform in 2006 and whether the new health insurance system might be an influencing factor of changing health care utilization. Change in the health insurance system may cause a change in reimbursements of different types of health care. I also want to analyze whether the overall level of utilization changed and whether there were also differences in utilization across socioeconomic groups. Even if overall levels of utilization appear to have stayed the same, it is possible that utilization across socioeconomic subgroups groups may have changed. If this is the case, and the subgroup differences were not a result of changes in health care need, inequity has changed.

1.3 Social relevance

In the Netherlands the cost of health care is a main issue for the government. Predicted costs made over the past few years often underestimated real expenditures. The main reason for increasing health care costs is the increasing need for care (Financieel Dagblad, February 24, 2011). According to the CBS, health care costs seem to be rising more than the economy in the Netherlands. Real growth in health care spending is more than 4 percent, while income is expected to increase only by 1.75 percent from 2011 till 2040 (CPB, 2011). The CPB states that a family with two children and on the minimum income level spends 42 percent of its income on health care. If health care costs continue to rise according to current expectations about ageing and technical improvements, health care costs for this family would be 83 percent of their total income in 2040. If the current 4 percent growth rate of health care spending remains constant, it will lead to a doubling of the share of health care in GDP in the next 30 years, from 9.8 percent of GDP in 2011 to 18.4 percent of GDP in 2040 (CPB, 2011).

There are many studies about health care utilization under a variety of health care systems in different countries. Van Doorslaer et al. (2004) investigated on the factors that drive inequalities in the use of

general practitioner and specialist services in 12 EU member states. There are also many studies on the old health care system in the Netherlands (Vliet & Van de Ven; 1983, 1986). However, little research has been done on the changes in health care utilization in the Netherlands after the new Health Insurance Act was introduced in 2006. Studies about differences in utilization, for example studies from the CBS in 2007, did not clarify whether these changes occurred because of differences in the health care insurance system or whether other changes inside or outside the health care sector might have influenced health care utilization. Therefore this thesis will focus on changes in health care utilization in the Netherlands since the introduction of the HIA in 2006. Changes inside and outside the health care system will be taken into account in order to analyze whether differences in the health insurance system may have influenced these changes.

1.4 Structure of the thesis

The purpose of this thesis was to investigate whether health care utilization changed after the health insurance reform in 2006 and whether there are differences in utilization across socioeconomic groups.

Sub questions of the thesis are:

Q1 Did the overall levels of health care use change after the reform?

Q2 Are there differences in utilization across socioeconomic groups? If so, is there inequity in utilization?

Q3 Did the level of health care use of each socioeconomic group change with respect to each other? If so, did inequity change?

I hypothesize that:

- Overall levels of health care use will be slightly reduced after the reform. Technological developments, demographics, public health trends and socio-cultural developments are all factors which influence health care use in the long term. However, in a period of only a few years, these factors might not significantly influence health care use. Some important components of the new health insurance system, such as higher responsibilities for citizens and higher market stimulus, may influence health care use within a shorter period of time. In the next chapter I will discuss the new health insurance system in more detail.
- Lower socioeconomic groups make more use of health care than higher socioeconomic groups. Karmakar and Breslin (2008) state that every step of improved education leads to a better

health. Since health seems to influence health care use, I suggest that people with better health make less use of health care. However, after correcting for health status, people in lower socioeconomic groups might actually make less use of health care, since it is well demonstrated that there are social inequalities in use of health care in all European countries (Van Doorslaer et al., 2000). One finding from the study from Van Doorslaer et al. was that a significant pro-rich inequity emerges for physician contacts in the Netherlands. One explanation may be that if there is some degree of reimbursement, people in a worse financial situation are less likely to visit a physician.

- After the reform, besides similar premiums, everyone also has the same basic service, which was not the case before the reform. Type of insurance no longer depends on someone's work situation, income, civil status or health state. As a result, health care utilization may only depend on health need, what should result in a disappearance of social inequalities. However, since there is still some degree of reimbursement after the reform, the decrease in inequity after the reform may not be very high.

This thesis is organized in the following way. Chapter 2 gives general information about the Dutch health care system before 2006 and the changes in the insurance system since the introduction of the new HIA in 2006. Chapter 3 then reviews studies on health care utilization in and outside the Netherlands. Chapter 4 presents the data and methodology of the research and chapter 5 explains the methods that were used. Finally, chapter 6 discusses the findings and presents conclusions of the research.

2 The Dutch health care system

2.1 Health insurance system before 2006

Before the Health Insurance Reform in 2006, the Netherlands had a complex health insurance system that was a mix of both public and private health insurance. People with an income below a certain threshold (about 60 percent of the population) were automatically insured by public health insurance funds, which were managed by non-profit organizations (Rosenau & Lako, 2008). This program was funded mainly by income-related contributions (6.5% of the first € 30,000 in annual income). Employers were required to compensate their employees for these contributions, but this was then taxable income for employees (Enthoven & Van de Ven, 2007). A smaller part was financed with community-rated individual premiums. Most people with incomes above the threshold were voluntarily privately insured and paid for their own health insurance. About 2 percent of the population was uninsured (Rosenau & Lako, 2008).

Although the Dutch system provided care with high quality at relatively low cost compared to other European countries, many believed that the insurance system offered little choice and did little to control increasing health care expenditures (Knottnerus & Ten Velden, 2007). For example, regulation of doctors' fees and hospital budgets resulted in inadequate incentives for efficiency and innovation (Enthoven & Van de Ven, 2007). In addition, there was dissatisfaction with the existence of two health insurance systems, one private and one public. Because they had different rules and spread the financial burden unevenly, this two system solution was seen as unfair (Rosenau & Lako, 2008).

2.2 Health Insurance Act

To deal with these problems, a new health insurance system, the Health Insurance Act, was introduced in January 2006. The HIA aimed to reduce the costs and improve the quality of health care by increasing competition between health insurance companies and by placing more incentives for personal responsibility on citizens for health care (Maarse & Ter Meulen, 2006). More responsibility, in this context, means that citizens have to choose a health insurer by themselves that offer good, suitable care for them for a good price. Instead of both a private and public health insurance, there is now only one single compulsory private insurance system. All citizens are required to purchase a basic package of essential health care services, with an annual deductible of 170 euros in 2011 (Stichting AB www.st-

ab.nl/wetzvw.htm, 2011). There is also an option to purchase an additional package to cover extra health care costs.

Insurers compete on the basis of premiums, service, and the quality of care offered by their contracted providers. Health care providers now must negotiate more extensively over price and quality of care (Knottnerus & Ten Velden, 2007). Insurers may contract with independent doctors and hospitals, which means that an insurer could refuse to contract with a certain physician or hospital. Since patients generally want to choose their own physicians, insurers try to avoid excluding physicians from their networks. However, since 2008, selection from insurers on physicians and hospitals is much more common, which is forcing hospitals to specialize in only certain types of health care (NOS at http://nos.nl, 2011). In the new system, consumer mobility plays an important role. Consumers are free to change their insurer every calendar year. This forces insurers to compete to offer good prices and quality of care (De Jong et al., 2008).

Although the insurers and providers are predominantly private businesses, they are heavily regulated. Benefits of the basic package are specified by law and all insurers must accept all applicants regardless of their health risk. All adults pay a community-rated premium to the insurers, who set their own price. People with low incomes receive a subsidy for the basic insurance. In addition, all citizens must pay an income-related contribution to the Risk Equalization Fund (Enthoven & Van de Ven, 2007). Because the Risk Equalization Fund pays a high risk-adjusted equalization payment to insurers whose enrollees' care is predicted to cost more than average, insurers' incentives for risk selection are substantially reduced. For insured people with a low risk, insurers have to pay an equalization payment to the Risk Equalization Fund (Enthoven & Van de Ven, 2007).

The new legislation allows for various groups to form collectives and negotiate group contracts with lower premiums. The different groups are company collectives, consumer collectives and patient collectives. Because of this new ability, patient associations may become powerful players in the health insurance market. However, they have to attract sufficient members to influence the quality of care. Patient collectives have only one percent of the total collective market (Maarse & Bartholomée, 2007, pp. 164-165). If someone belongs to a patient collective, it is likely that it is more difficult to switch to another insurer or to purchase complementary insurance. Also, since they have the stigma of being a

patient, taking out a life insurance or getting a mortgage may be more difficult (Maarse & Bartholomée, 2007, pp. 167-168).

2.3 AWBZ

In addition to the standard benefits package, all citizens are covered by the statutory Exceptional Medical Expenses Act (AWBZ) scheme. This scheme covers exceptional medical expenses, such as home care, care in nursing homes, hospital admission longer than a year and psychiatric care. Contributions to the fund come for two-thirds from people's income tax payments (CBS at www.cbs.nl, 2011). The AWBZ also receives a grant from general government revenue and co-payments from consumers for nursing home costs depending on one's financial position. The fund is managed by the Health Care Insurance Board (CVZ) (World Health Organization Discussion Paper 2007). The Netherlands was the first country that introduced a universal mandatory social health insurance scheme for covering a broad range of long-term care services.

Total expenditures, and mainly the public expenditures, on long-term care are high (Schut, 2010). Since 2000, AWBZ expenses increased by almost 75 percent (CBS at www.cbs.nl, 2011). The main reason for this excessive increase is ageing. Because of the excessive increase in expenses on AWBZ, a part of reimbursements of AWBZ belong to the HIA since 2006, and other parts of reimbursement belong now to the new Law of Social Support (WMO), which was formed in 2007 and where local governments are responsible for. Therefore although AWBZ did not suffer a reform in 2006, some parts of long-term health care changed after the HIA, like some types of psychiatric care (GGZ-kompas at http://www.ggzbeleid.nl/pdfwetgeving /ggzkompas.pdf).

2.4 Comparing the old system and the HIA

The following table gives an overview of the reimbursements of the two health insurance systems for the types of health care which are mentioned in this thesis. As is shown in the table, the public health insurance in the old system has a lot of similarities with the basic package in the Health Insurance Act.

Table 1: reimbursement of the old system and the new HIA in 2006 and 2007

Type of health care	*old system*	*HIA*
General practitioner	in public insurance	in basic package (no premium own risk)
Specialist	in public insurance	in basic package
Dentist	in public insurance only for people below 18 years	in basic package only for people below 18 years
Physiotherapist	in public insurance: starts from 10th treatment with chronic indication (or below 18 years fully insured with chronic indication); 1st till 9th treatment only in supplement insurance	in basic package only from 13th treatment and with chronic indication (or below 18 years for the first 9 treatments), 1st till 12th treatment only in supplemental package; no referral from general practitioner necessary
Homeopathic specialist	not in basic package	only in supplemental package
Psychiatrist	in AWBZ	in basic package (if longer than one year, in AWBZ)
District nurse	in AWBZ	in AWBZ
Family caregiver	in AWBZ	in AWBZ
Social worker	in AWBZ	in AWBZ
Medicines	in public insurance (not all medicines) with no premium own risk	in basic package (not all medicines)
Hospitalization	in public insurance	in basic package (if longer than one year in AWBZ)

Reimbursements of private health insurance in the old system and as well as new supplemental insurance depend on the type of private or supplemental insurance since there is not a standard private or supplemental insurance. Dental care, physiotherapy, and some kinds of medicines are not in the basic insurance. After the reform, short psychiatric care was covered under the basic insurance instead of under AWBZ. Other types of long term health care, which are district nurse usage, family caregiver usage and social worker usage, are still in the AWBZ after the reform (and under WMO after 2007).

3 Theoretical framework

3.1 Health care utilization

Andersen and Newman (2005) consider health care utilization to be a function of three sets of variables. The most immediate cause of health care is health care need, which is the illness level. The second set of variables is predisposing factors, which provide the motivation to seek care such as demographic factors, health beliefs and social structure. Third, enabling factors represent resources for health care use, such as the ability to pay for medical care and community factors.

Health care need

Pappa and Nikas (2006), who studied the public-private mix of the Greek health system, conclude that health care need is the factor most strongly associated with all measures of health care utilization. Only for visits to public (provided by health insurance funds) physicians, demographic variables such as age and gender were most strongly associated. Health care need can be represented as a subjective judgment by the patient (the perceived illness level) or by an objective clinically judgment (the evaluated illness level) (Anderson and Newman, 2005). Because objective measures of need are seldom available in datasets, subjective self-reported measures of health are most often used in models for health care use. Presence of chronic illness is also taken into account in many models for health care use. The number of chronically ill people may have increased in a few years. For example, the prevalence of diabetes increased between 2000 and 2007. In January 2007, 668.000 patients with diabetes lived in the Netherlands (40.1 per 1,000 men and 41.6 per 1,000 women). By 2007, 71.000 new diabetes patients were diagnosed, which is 4.6 per 1,000 men and 4.1 per 1,000 women (Nationaal Kompas at http:// www.nationaalkompas.nl/gezondheid-en-ziekte/, 2011).

Demographic factors, social structure and health beliefs

Demographic factors which influence health care utilization are age, gender, marital status, family size and past illness. People in different age groups have different types and risks of diseases. The aging process is one of the main factors of rising health care utilization. The elderly require more health care, and the kind of health care required by the elderly involves expensive technology (Hashimoto & Tabata, 2010). Besides primary health care, elderly care involves social workers and nurses (Kunst, Meerdink, Varenik, Polder & Mackenbach, 2007). According to Joung, Van der Meer and Mackenbach (1995), there

are differences in health care utilization by marital status which are not due to confounding by other socio-demographic variables or differences in health status. Their study showed that divorced people were more frequently hospitalized than married people. According to Ahmad et al (2004), singles generally use less of all types of health care. Past illness is also included in this category, because there is evidence that people, who had health problems in the past, are more likely to use more health care in the future (Anderson & Newman, 2005).

Social structure refers to factors such as education, occupation, ethnicity, family size and religion. According to Karmakar and Breslin (2008), every step of improved education leads to a better health. However, there are contrary results about whether better education also leads to less health care utilization. According to Ter Have et al. (2003), people in the Netherlands with more education were less likely to use primary care, but more likely to use mental health care. Other types of health care were not investigated. According to Ravelli, Stronks and Reijneveld (2001), utilization of more specialized health care is lower for immigrant groups, even when socioeconomic status is controlled for. According to Kunst et al. (2007), members of one person households have a much higher health care utilization than people who live in a multi-person household, also when there is corrected for differences in health between the groups.

Health beliefs refer to attitudes towards medical care, values concerning illness and knowledge about diseases. The health belief model highlights perceived benefits and barriers for understanding why individuals do or do not engage in health related actions (Janz & Becker, 1984). According to Janz and Becker (1984), perceived barriers affect health behavior the most of the health belief model dimensions. Perceived barriers mean perceptions that it may be expensive, dangerous, unpleasant or inconvenient, time-consuming and so forth. Marcel and Harpern-Felsher (2004) studied the relationship between adolescents' health beliefs and their intentions to seek care for different types of health issues. Their result was that adolescents who believed physicians were more effective were more likely to intend to seek care.

Community factors and ability to pay

Examples of community factors which affect service availability are geographic location and population density. Sibley and Weiner (2011) studied the access to health care services along the rural-urban continuum in Canada. Their main conclusions were that people in the most urban areas were more likely

to have seen a specialist, people residing in the most urban and most rural communities were less likely to have a regular medical doctor, and those in any of the rural categories were less likely to report unmet need.

The ability to pay is usually measured by current income or household income. Van Doorslaer et al. (2004) found no evidence of income-related inequity in the probability of a general practitioner visit in European countries. However, he found a pro-rich inequity in the probability of contacting a medical specialist. Richer individuals appear to have a higher probability to see a specialist than poorer people, despite their lower need for this type of health care.

Other conditions are the level of health insurance coverage, or other source of third-party payment, and accessibility of care. In the RAND Health Insurance Experiment (RHIE) in the 1970s, patients were randomly assigned to health insurance with varying levels of patient co-insurance. The effect on their health care utilization and health was evaluated over a period of five years. The researchers discovered that the greater the portion of the health care bill that individuals had to pay, the less health care they choose to purchase. Fully insured individuals utilized roughly 40 percent more health care than those who had to pay their own bills (Folland, Goodman & Stano, 2010). That means that, besides health status, insurance coverage affected the amount of health care utilized.

Many studies support the conclusion of the RAND Health Insurance Experiment. Ekman (2007) studied the effect of different types of health insurance programs on the probability of utilizing care, the frequency of utilization, and individual spending on care in Jordan. The study showed that insurance coverage increases the intensity of utilization and reduces out-of-pocket spending, but no general insurance effect on the probability of utilization is found. However, similar results have not been found in all studies. A recent study looked at whether provision of subsidized insurance which required employee contribution had an impact upon preventive health utilization among small businesses and their employees (Kahn et al. 2007). The findings of this study suggested a significant increase in health service utilization among the previously uninsured. This study suggested that employees of small businesses are willing to contribute to the cost of a health insurance premium, and, once insured, they are more likely to use preventive services.

Sepehri, Simpson and Sarna (2006) researched the influence of Vietnam's health insurance schemes on both hospital admission and the length of stay. Their findings suggest that the influence of health insurance on hospital admission and the length of stay vary across insurance schemes. The compulsory insurance scheme and the insurance scheme for the poor increases the expected length of stay and the likelihood of hospital admission significantly, while the voluntary insurance scheme has a much smaller effect on the likelihood of hospital admission and a minimal effect on the expected length of stay.

Mirvis, Cecil, Chang, Kasteridis & Waters (2011) investigated the impact of high-deductible health plans on health care utilization and costs in a heterogeneous group of enrollees from a variety of individual and employer-based health plans. High-deductible health plan enrollment was associated with reduced emergency room use, increases in prescription medication use, and no change in overall outpatient expenditures. The impact of high-deductible health plans on utilization differed by subgroup. Chronically ill enrollees and those who clearly had a choice of plans were more likely to increase utilization in specific categories after switching to a high-deductible health plan. However, another research described the results of an empirical study into the design and effectiveness of the co-payment in Dutch health care (Lako, 2002). The conclusion of this research is that co-payments have no effect on health care utilization.

Health insurance might also increase utilization due to supply-induced demand (SID). Supply-induced demand means that the quantity of supplied services might not be driven by health care needs of the patient alone. Economic self-interest of physicians, in combination with information asymmetry between the financing body, the patient and the provider, generates an overconsumption of medical services. This might especially be the case under a fee-for-service system, where health care providers have a financial incentive to do more medical procedures (Sorensen & Grytten, 1999).

3.2 Health care utilization in the Netherlands

Research on public and private insurance concluded that people with public health insurance visited a general practitioner more often than people who were privately insured (Mootz, 1984). However, Mootz stated that this was because of their worse health condition and when there is correction for health status, the type of their insurance has no influence on health care use. Van Vliet and Van de Ven (1983) also concluded that people with public health insurance visited a general practitioner more often and used more medicines than people who had a private insurance. However, they concluded that

differences in health care use are not only influenced by the large difference in health status, which is correlated with type of job, education and living situation. They state that systemic factors, such as differences in coverage, also influence health care utilization. Other researches also have concluded that people with public health insurance visit a general practitioner more often even after correction for variables such as age, gender, self-assessed health, education and family composition (Van Vliet & Van de Ven, 1986; Reijneveld, 1995).

After the reform, types of health care with the largest increase in utilization were specialist visits and physiotherapist visits, especially for older women. Number of general practitioner visits decreased (Central Bureau of Statistics, 2007). In 2006, direct access to physiotherapy was introduced in the Netherlands. Before the reform, physiotherapist visits were only possible following referral by a physician. In 2008, the number of patients visiting a physiotherapist was significantly higher than in the year 2005, especially for women (Central Bureau of Statistics, 2008).

Little research has been done on the changes in health care utilization in the Netherlands since the introduction of new HIA in 2006. Therefore, in this thesis there will be a focus on changes in health care utilization in the Netherlands since the introduction of the HIA in 2006. There will also be an analysis of whether differences in the health insurance system might have influenced these changes.

4 Data and Methodology

4.1 Data

Data was obtained from the Permanent Onderzoek Leefsituatie (POLS). POLS data is random sample data with about 10,000 respondents every year since 1981. The yearly response rate is about 0.6 (CBS www.cbs.nl, 2011). Respondents are people of all ages from private households. To correct for differences between the compilation of the sample and the total population, a correction was done with the help of a weighting based on the characteristics gender, age, civil status, urbanity, province, household size and survey month (CBS www.cbs.nl). Data was collected during interviews at the respondent's house using a laptop.

Health care utilization was analyzed by measuring the number of visits to health care workers during the last 12 months (unless stated otherwise):

1) General practitioners (during the last 2 months)
2) Specialists (during the last 2 months)
3) Dentists (during the last 2 months)
4) Physiotherapists
5) Homeopathic specialists
6) Psychiatrists
7) District nurses
8) Family caregivers
9) Social workers

Other types of health care utilization were also recorded:

10) Medicine use (during the last two weeks)
11) Frequency of hospitalization
12) Length of hospitalization

Although long term care did not suffer a reform in 2006, district nurse usage, family caregiver usage and social worker usage was included in this thesis to show the extent to which utilization could have changed in types of care not affected by the reform. There may be changes in care affected by changes due to common trends which would have occurred anyway. A approach commonly used is differences-

in-differences, where the differences before and after the reform could be assessed for types of care unaffected and affected and then the effect of the reform could be estimated (Bertrand et al., 2004). However, the types of care that were used in this thesis are so different that it is very likely that there are different trends behind all different types of health care. Therefore this approach is just descriptive and since it is very unlikely that the assumption of common trends holds, I did not adapt this.

Categories of number of visits to the general practitioner, specialist and dentist were 0, 1, 2, 3, 4, 5 and 6 and more times. Physiotherapist visits had the categories 0, 1 or 2, 3 or 4, 5 or 6, 7 to 9, 10 or 11, 12 to 15, 16 to 20, 21 to 50 and more than 50 times. Medicine use had 2 categories. The question 'Did you get medicines prescribed during the last 2 weeks?' could be answered with 'yes' or 'no'. Also district nurse usage and family care giver usage had two categories: 0 and 1 or more. Categories of homeopath visits were 0, 1 or 2, or 3 and more times. Psychiatrist visits and social worker use had the categories 0, 1 to 6 and 7 or more times. Psychiatrist visits were all visits to the 'riagg', which is the local institution for ambulant mental health care, so clinical mental health care was not taken into account. Frequency of hospitalization had the categories 0, 1, and 2 or more times. Length of hospitalization had the categories 1, 2, 3 or 4, 5 to 10, 11 to 20, and 21 or more days.

Data from two years before and two years after the reform was used (2004 to 2007) to analyze the short term changes which might be due to the reform. Since general practitioner visits, specialist visits and dentist visits contained visits during 2 months before the date of the interview, interviews done in January and February of 2006 were removed from the data to make sure that 2006 contained only information about the period after the reform. Since information from these two months consisted of information about January and February 2006 and November and December 2005, this information is also not suitable to add to the data of 2005. For the remaining types of utilization, the entire year 2006 was removed so that there was no health care use for which it is not clear whether it is utilized before or after the reform. Years used for every type of health care use when 'after reform' is included in the model is summarized in table 2. A grey box means that the explanatory variable is included in the model of the relevant year.

Table 2: Years used for every type of health care use when 'after reform' is included in the model

Type of health care use	*2004*	*2005*	*2006*	*2007*
general practitioners				
specialists				
dentists				
medicine use				
physiotherapists				
homeopathic specialists				
psychiatrists				
district nurses				
family caregivers				
social workers				
frequency of hospitalization				
length of hospitalization				

A correction was made for age, gender, marital status, family size, nationality, self-assessed health, chronic conditions and education. The six age categories for age were: 0 to 14, 15 to 29, 30 to 44, 45 to 59, 60 to 74 and age 75 and older. A dummy variable for being female was included in order to control for sex-specific health care requirements. Categories of marital status were: married, divorced, widowed or never married. Family size had the categories: no children, 1 child, 2 children, and 3 or more children. Nationality a binary variable: Dutch or not Dutch. To determine people's health, general health was based on the survey question how healthy people feel. The five conditions of self-reported health were: excellent health, good health, fair, poor health and very poor health.

Chronic conditions which were distinguished were: migraine or serious headache, high blood pressure, arteriosclerosis in abdomen or legs, asthma, psoriasis, chronic eczema, dizziness with falling, serious intestinal disorder longer than three months, incontinence, arthritis of hips and knees, chronic arthritis, serious back condition, serious neck or shoulder condition, serious elbow, wrist or hand disease, diabetes, stroke, myocardial infarct, other serious heart diseases, and cancer. Information about chronic conditions contained information about chronic conditions over the last twelve months.

The level of education was taken into account by a categorical variable for the highest level of education achieved. The groups which were considered (with Dutch abbreviations)were:

Level I: Primary School

Level II: Lower Vocational Education (LBO)

Level III: Lower Secondary Education (MAVO)
Level IV: Upper Secondary and Middle Vocational Education (HAVO, VWO & MBO)
Level V: Tertiary Education (HBO & University).

Besides changes over time, changes between socio-economic groups were also investigated. Socio-economic groups can be defined in several ways. One way is to separate people by the highest education level completed. Another division is to look at income level. However, only income levels from 2004 are present in the POLS data. Therefore, income level was not included into the model. A third definition of a socio-economic group is division by the type of insurance. The types of insurance before the reform were public health insurance, civil servants and private insurance. For the years 2006 and 2007, there was no private or public insurance anymore. However, the 2006 POLS questionnaire asked how someone was insured in 2005. With this question, the association between the type of insurance in 2005 and health care utilization in 2006 was measured. About 0.2 percent of all respondents had no insurance coverage. Because this percentage is too small to draw conclusions on, this group was removed from the sample.

Because there are still some differences in insurance type after the reform, after the reform utilization is also likely to depend on the type of health insurance. Differences in insurance types still exist because people can choose their deductible amount and they can choose whether they want to purchase supplementary insurance. Therefore insurance type after the reform was also taken into account by including deductible amount and supplementary insurance into the model. People may also receive different amounts of income-related subsidies (care allowance) from the government. Although having an income-related subsidy does not mean that the type of insurance is different, it is a change in the health insurance system compared to the old system. Therefore also whether someone receives care allowance or not was included into the model. Explanatory variables that were used are summarized in table 3. A grey box means that the explanatory variable is included in the model of the relevant year.

Table 3: Explanatory variables used in the models

Explanatory variables	2004	2005	2006	2007
age	■	■	■	■
gender	■	■	■	■
marital status	■	■	■	■
family size	■	■	■	■
nationality	■	■	■	■
self-assessed health	■	■	■	■
chronic conditions	■	■	■	■
education	■	■	■	■
income	■			
pre-reform insurance type	■	■	■	
after-reform insurance type			■	

4.2 Methods

To analyze the data, the program STATA/SE was used. An ordered logit regression model was used since the number of visits is always top-coded, which would complicate analyses with a traditional count data model. Also, the number of visits has a large proportion of zeroes which makes the ordered regression model most suitable (Munkin and Trivedi, 2008).

The linear regression model for the continuous, unmeasured, latent variable y*:

$$y^* = \sum_{k=1}^{K} \beta_k X_{ki} + \varepsilon$$

y* relates to observed variable y, with categories j=1,..,m, such as:

$y = 1 \; if \; -\infty \leq y^* < \tau_1$

$y = 2 \; if \; \tau_{j-1} \leq y^* < \tau_j \qquad j = 2, .., m-1$

$y = m \; if \; \tau_{m-1} \leq y^* < -\infty$

$where \; \tau_1 \leq \tau_2 \leq \cdots \leq \tau_{m-1}$

(Long and Freese, 2006)

The τ's are the unknown threshold parameters where the discrete observed responses are defined. The logit coefficients present the effects of the independent variable on the logarithm of the odds of being in

a high versus low category (Pevalin & Robson, 2009). The coefficients that describe the relationship between the highest versus all lower categories of the dependent variable are the same as those that describe the relationship between the next highest category and all lower categories. Therefore, there is only one set of coefficients (Long and Freese, 2006).

The predicted probability of the number of visits is:

$$\Pr(y_i = j|x_i) = \frac{\exp(\tau_j - x_i\beta)}{1 + \exp(\tau_j - x_i\beta)} - \frac{\exp(\tau_{j-1} - x_i\beta)}{1 + \exp(\tau_{j-1} - x_i\beta)}$$

Odds ratios are the exponential of the logit coefficient. Odds ratios range from 0 to +∞, with the value for no effect being equal to 1. This means that odds ratios lower than 1 are negative effects and odds ratios greater than 1 are positive effects.

To investigate whether the overall levels of health care use changed after the reform, first the change in health care use before and after the reform was analyzed.
The regression is:

Model 1:

$$y^* = \beta * after\ reform + \varepsilon$$

To investigate whether this change in utilization is the result of changes in health conditions, demographic changes or social changes, also an ordered logit regression with a correction for age, gender, interaction between age and gender, health, education level, chronic conditions, marital status, nationality and family composition was done.

Model 2:

$$
\begin{aligned}
y^* = {} & \beta_1 * female + \beta_2 * age15\_29 + \beta_3 * age30\_44 + \beta_4 * age45\_59 + \beta_5 * age60\_74 + \beta_6 * age \\
& > 75 + \beta_7 * age15\_29 * female + \beta_8 * age30\_44 * female + \beta_9 * age45\_59 \\
& * female + \beta_{10} * age60\_74 * female + \beta_{11} * age \\
& > 75 * female + \beta_{12} * good\ health + \beta_{13} * fair\ health + \beta_{14} * bad\ health + \beta_{15} \\
& * very\ bad\ health + \beta_{16} * diabetes + \beta_{17} * stroke + \beta_{18} * myocardial\ infarct \\
& + \beta_{19} * other\ serious\ heart\ diseases + \beta_{20} * cancer + \beta_{21} * migraine + \beta_{22} \\
& * high\ blood\ pressure + \beta_{23} * arteriosclerosis + \beta_{24} * asthma + \beta_{25} * psoriasis \\
& + \beta_{26} * chronic\ eczema + \beta_{27} * dizziness\ with\ falling + \beta_{28} \\
& * serious\ intestinal\ disorder + \beta_{29} * incontinence + \beta_{30} \\
& * arthritis\ of\ hips\ and\ knees + \beta_{31} * chronic\ arthritis + \beta_{32} \\
& * serious\ back\ condition + \beta_{33} * serious\ neck\ or\ shoulder\ condition + \beta_{34} \\
& * serious\ elbow, wrist\ or\ hand\ disease\ + \beta_{35} * education\ level\ II + \beta_{36} \\
& * education\ level\ III + \beta_{37} * education\ level\ IV + \beta_{38} * education\ level\ V + \beta_{39} \\
& * divorced + \beta_{40} * widow + \beta_{41} * never\ married + \beta_{42} * dutch + \beta_{43} * 1\ child \\
& + \beta_{44} * 2\ children + \beta_{45} * > 3\ children + \beta_{46} * after\ reform + \varepsilon
\end{aligned}
$$

After focusing on changes in health care use after the reform, utilization of people in different education groups were compared with each other. The point of time of health care utilization was ignored. Since information of all years was combined and changes after the reform were not taken into account, a variant of model 2 was used where the variable ‘after reform’ was excluded from model 2.

After that, the change in health care use after the reform for every socioeconomic group was investigated. Utilization of people in different education groups after the reform was compared with utilization of the groups before the reform. Therefore a distinction was made between whether the information was before or after the reform, using the interaction coefficient “education level * after reform”. The model that was used was:

Model 3:

$$
\begin{aligned}
y^* = {} & \beta_1 * female + \beta_2 * age15\_29 + \beta_3 * age30\_44 + \beta_4 * age45\_59 + \beta_5 * age60\_74 + \beta_6 * age \\
& > 75 + \beta_7 * age15\_29 * female + \beta_8 * age30\_44 * female + \beta_9 * age45\_59 \\
& * female + \beta_{10} * age60\_74 * female + \beta_{11} * age \\
& > 75 * female + \beta_{12} * good\ health + \beta_{13} * fair\ health + \beta_{14} * bad\ health + \beta_{15} \\
& * very\ bad\ health + \beta_{16} * diabetes + \beta_{17} * stroke + \beta_{18} * myocardial\ infarct \\
& + \beta_{19} * other\ serious\ heart\ diseases + \beta_{20} * cancer + \beta_{21} * migraine + \beta_{22} \\
& * high\ blood\ pressure + \beta_{23} * arteriosclerosis + \beta_{24} * asthma + \beta_{25} * psoriasis \\
& + \beta_{26} * chronic\ eczema + \beta_{27} * dizziness\ with\ falling + \beta_{28} \\
& * serious\ intestinal\ disorder + \beta_{29} * incontinence + \beta_{30} \\
& * arthritis\ of\ hips\ and\ knees + \beta_{31} * chronic\ arthritis + \beta_{32} \\
& * serious\ back\ condition + \beta_{33} * serious\ neck\ or\ shoulder\ condition + \beta_{34} \\
& * serious\ elbow, wrist\ or\ hand\ disease\ + \beta_{35} * education\ level\ II + \beta_{36} \\
& * education\ level\ III + \beta_{37} * education\ level\ IV + \beta_{38} * education\ level\ V + \beta_{39} \\
& * after\ reform + \beta_{40} * education\ level\ II * after\ reform + \beta_{41} \\
& * education\ level\ III * after\ reform + \beta_{42} * education\ level\ IV * after\ reform \\
& + \beta_{43} * education\ level\ V * after\ reform + \beta_{44} * divorced + \beta_{45} * widow + \beta_{46} \\
& * never\ married + \beta_{47} * dutch + \beta_{48} * 1\ child + \beta_{49} * 2\ children + \beta_{50} * \\
& > 3\ children + \varepsilon
\end{aligned}
$$

The results for the different education levels were observed to see whether there were differences in utilization over time between people with different education levels. The coefficients β_{35}, β_{36}, β_{37} and β_{38} showed the differences in utilization respectively of education levels II, III, IV and V before the reform compared to education level I before the reform. The ordered logit coefficient of the differences between utilization of an education level group after the reform and education level I after the reform was estimated using a test for linear combinations of estimators. When combining coefficient β_{35} with β_{40}, the coefficient of the differences in utilization of education level II after the reform compared to education level I after the reform was estimated. When combining coefficients β_{36} with β_{41}, β_{37} with β_{42} and β_{38} with β_{43}, the ordered logit coefficient of the differences in utilization of respectively education level III, IV and V after the reform compared to education level I after the reform was estimated. The coefficients β_{39}, β_{40}, β_{41}, β_{42} and β_{43} showed the differences in the ordered logit coefficients between before and after the reform for every education level. Also a test for joint significance of education level for all types of health care use was done to test whether the coefficients of all education levels were equal to zero which implies that education has no explanatory power on health care use.

Besides using education level as a division in socioeconomic groups, insurance coverage before the reform is also used. Therefore, health care utilization by people with different health insurance coverage before the reform was compared with each other, again using an interaction term. To decide which model should be extended here, model 2 without the interaction term “education level * after reform”

or model 3 with the interaction term education level * after reform", a Wald test was performed. Education level was still included into the model because of its explanatory power on health care use, but had no interaction term anymore. Since we have no information in 2007 about the type of health care insurance before the reform, information of 2007 is not useful and was thus excluded from the model.

Model 4:

$$
\begin{aligned}
y^* = {} & \beta_1 * female + \beta_2 * age15\_29 + \beta_3 * age30\_44 + \beta_4 * age45\_59 + \beta_5 * age60\_74 + \beta_6 * age \\
& > 75 + \beta_7 * age15\_29 * female + \beta_8 * age30\_44 * female + \beta_9 * age45\_59 \\
& * female + \beta_{10} * age60\_74 * female + \beta_{11} * age \\
& > 75 * female + \beta_{12} * good\ health + \beta_{13} * fair\ health + \beta_{14} * bad\ health + \beta_{15} \\
& * very\ bad\ health + \beta_{16} * diabetes + \beta_{17} * stroke + \beta_{18} * myocardial\ infarct \\
& + \beta_{19} * other\ serious\ heart\ diseases + \beta_{20} * cancer + \beta_{21} * migraine + \beta_{22} \\
& * high\ blood\ pressure + \beta_{23} * arteriosclerosis + \beta_{24} * asthma + \beta_{25} * psoriasis \\
& + \beta_{26} * chronic\ eczema + \beta_{27} * dizziness\ with\ falling + \beta_{28} \\
& * serious\ intestinal\ disorder + \beta_{29} * incontinence + \beta_{30} \\
& * arthritis\ of\ hips\ and\ knees + \beta_{31} * chronic\ arthritis + \beta_{32} \\
& * serious\ back\ condition + \beta_{33} * serious\ neck\ or\ shoulder\ condition + \beta_{34} \\
& * serious\ elbow, wrist\ or\ hand\ disease\ + \beta_{35} * education\ level\ II + \beta_{36} \\
& * education\ level\ III + \beta_{37} * education\ level\ IV + \beta_{38} * education\ level\ V + \beta_{39} \\
& * divorced + \beta_{40} * widow + \beta_{41} * never\ married + \beta_{42} * dutch + \beta_{43} * 1\ child \\
& + \beta_{44} * 2\ children + \beta_{45} * \\
& > 3\ children + \beta_{46} * civil\ servants + \beta_{47} * private\ insurance + \beta_{48} \\
& * after\ reform + \beta_{49} * civil\ servants * after\ reform + \beta_{50} * private\ insurance \\
& * after\ after\ reform + \varepsilon
\end{aligned}
$$

The coefficients β_{46} and β_{47} showed the differences in utilization respectively of people with civil servants and private insurance before the reform compared to people who had a public insurance before the reform. When combining coefficient β_{46} with β_{49}, the ordered logit coefficient of the differences in utilization of civil servants after the reform compared to public insurance after the reform was estimated, using a test for linear combinations of estimators. When combining coefficients β_{47} with β_{50}, the ordered logit coefficient of the differences in utilization of private insured after the reform compared to public insured after the reform was estimated. The coefficients β_{48}, β_{49}, and β_{50} showed the differences in the ordered logit coefficients between before and after the reform for every insurance coverage type.

After the reform, there are still some differences in insurance coverage. Therefore, the model was extended with information about deductibles and supplementary insurance (physiotherapist and dentist insurance). Also income-related subsidy (care allowance) was included into the model. Since only the

year 2006 contained information about insurance types before the reform as well as insurance types after the reform, only information from the year 2006 was used.

Model 5:

$$
\begin{aligned}
y^* = \ & \beta_1 * female + \beta_2 * age15\_29 + \beta_3 * age30\_44 + \beta_4 * age45\_59 \ + \beta_5 * age60\_74 + \beta_6 * age \\
& > 75 + \beta_7 * age15\_29 * female + \beta_8 * age30\_44 * female + \beta_9 * age45\_59 \\
& * female + \beta_{10} * age60\_74 * female + \beta_{11} * age \\
& > 75 * female + \beta_{12} * good\ health + \beta_{13} * fair\ health + \beta_{14} * bad\ health + \beta_{15} \\
& * very\ bad\ health + \beta_{16} * diabetes + \beta_{17} * stroke + \beta_{18} * myocardial\ infarct \\
& + \beta_{19} * other\ serious\ heart\ diseases + \beta_{20} * cancer + \beta_{21} * migraine + \beta_{22} \\
& * high\ blood\ pressure + \beta_{23} * arteriosclerosis + \beta_{24} * asthma + \beta_{25} * psoriasis \\
& + \beta_{26} * chronic\ eczema + \beta_{27} * dizziness\ with\ falling + \beta_{28} \\
& * serious\ intestinal\ disorder + \beta_{29} * incontinence + \beta_{30} \\
& * arthritis\ of\ hips\ and\ knees + \beta_{31} * chronic\ arthritis + \beta_{32} \\
& * serious\ back\ condition + \beta_{33} * serious\ neck\ or\ shoulder\ condition + \beta_{34} \\
& * serious\ elbow, wrist\ or\ hand\ disease \ + \beta_{35} * education\ level\ II + \beta_{36} \\
& * education\ level\ III + \beta_{37} * education\ level\ IV + \beta_{38} * education\ level\ V + \beta_{39} \\
& * divorced + \beta_{40} * widow + \beta_{41} * never\ married + \beta_{42} * dutch + \beta_{43} * 1\ child \\
& + \beta_{44} * 2\ children + \beta_{45} * \\
& > 3\ children + \beta_{46} * civil\ servants + \ \beta_{47} * private\ insurance + \beta_{48} \\
& * care\ allowance + \beta_{49} * deductibles + \beta_{50} * supplemental\ dentist\ insurance \\
& + \beta_{51} * supplemental\ physiotherapist\ insurance + \varepsilon
\end{aligned}
$$

Table 4 summarizes which years are used for which model. A grey box means that the model included information about the relevant year.

Table 4: Years used in the models

Models	***2004***	***2005***	***2006***	***2007***
Model 1: "after reform"				
Model 2: model 1 extended with health conditions, education level and demographic characteristics				
Model 3 model 2 extended with interaction term "education level * after reform"				
Model 4: model 2 extended with interaction term "pre-reform insurance type * after reform"				
Model 5: model 2 extended with pre-reform insurance type and after-reform insurance type				

From the literature we know that income growth is responsible for 2 percent of the health care spending (Besseling, 2011). However, since information of income levels is limited, only completed education level was used which might be a good approximate for income level. To test whether the model might be better when including income level, a Wald test was done. The Wald test examines whether restricting income seriously harms the fit of the model. A variant of model 2 (model 2 without "after reform") was

used and the variable income was included. Since only income levels from 2004 were present in the POLS data, only information from the year 2004 was used. The test for misspecification is: H_0: $\beta_{income} = 0$.

Next, a Mann-Whitney U-test was done to examine differences in waiting time for specialists between before and after the reform. Waiting times can be used as a proxy for accessibility of health care. Because the data set only contained information about waiting times for specialists, information about accessibility is limited. It was tested whether there was a change between waiting times before the reform and waiting times after the reform. If waiting times for specialists did not significantly change after the reform, it was assumed that influence of accessibility on health care utilization is restricted. The test is: H_0: waiting time specialist (before reform) = waiting time specialist (after reform).

There is a relation between satisfaction about the health care system and utilization. Unfortunately, only information about the satisfaction of maternity care was accessible in the data set. With a Mann-Whitney test the null hypothesis that the difference between satisfaction of maternity care before and after the reform is the same was tested. It is one factor of satisfaction, which might influence health care utilization. Satisfaction about maternity care may not say much about satisfaction of health care in general, but there may be a relation between changes in satisfaction of different types of health care. The test is: H_0: satisfaction of maternity care (before reform) = satisfaction of maternity care (after reform).

5 Results

5.1 Health care use before and after the reform

Information about quantity of health care use of the participants in this study is given in table 5. If there is no percentage given for a category, it means that the category before the category without a percentage includes all higher quantities of health care use, in some cases till the next category with a percentage is given. Of the 21,477 participants who reported their number of general practitioner visits in 2004 and 2005, 68.26 percent did not go to their general practitioner during the last 2 months. After the reform, of the 18,326 participants, 68.56 percent of them did not go to their general practitioner during the last 2 months, which is an increase of 0.30 percent. The percentage of people who went to their general practitioner once during the last 2 months decreased by 0.57 percent. The percentage of participants who did not go to a specialist during the last 2 months decreased by 0.80 percent. Other notable changes in percentages after the reform were the decrease of people who did not go to the physiotherapist during the last 12 months (1.38 percent less than before the reform), an increase of people who did not get help from a family caregiver during the last two months (1.24 percent more than before the reform), and in increase of hospital stays of only 1 day (3.92 percent more than before the reform).

		0	1	2	3	4	5	6	7	10	11	12	16	21	26	51
General	before (N=21,477)	68.26	21.57	6.50	2.12	0.86	0.31	0.38[a]								
practitioner	after (N=18,326)	68.56	21.00	6.59	2.22	0.95	0.35	0.33[a]								
	change	0. 30	-0. 57	0.09	0.10	0.09	0.04	-0.05								
Specialist	before (N=21,486)	83.91	11.25	2.97	0.96	0.42	0.22	0.27[a]								
	after (N=18,340)	83.11	11.34	3.43	1.19	0.51	0.20	0.21[a]								
	change	-0.80	0.09	0.46	0.23	0.09	-0.02	-0.06								
Dentist	before (N=21,491)	74.60	21.50	2.76	0.74	0.21	0.10	0.09[a]								
	after (N=18,339)	74.98	20.94	3.00	0.73	0.20	0.07	0.08[a]								
	change	0.38	-0.56	0.24	-0.01	-0.01	-0.03	-0.01								
Medicine	before (N=21,492)	89.18	10.82[b]													
use	after (N=18,346)	88.96	11.04[b]													
	change	-0.22	0.22													
Physio-	before (N=21,464)	83.33	1.45[c]		1.73[d]		1.99[e]		3.21[f]	1.29[g]		2.04[h]	1.58[i]	2.18[j]		1.21[k]
therapist	after (N=18,326)	81.95	1.81[c]		2.03[d]		2.48[e]		2.91[f]	1.60[g]		1.93[h]	1.47[i]	2.32[j]		1.49[k]
	change	-1.38	0.36		0.30		0.49		-0.30	0.31		-0.11	-0.11	0.14		0.28
Homeo-	before (N=21,493)	97.93	1.15[c]		0.92[l]											
path	after (N=18,343)	98.29	0.95[c]		0.76[l]											
	change	0.34	-0.20		-0.14											
Psychiatrist	before (N=20,233)	98.61	0.76[m]						0.63[n]							
	after (N=17,533)	98.75	0.63[m]						0.62[n]							
	change	0.14	-0.13						-0.01							
District	before (N=21,482)	98.62	1.38[o]													
nurse	after (N=18,340)	98.64	1.36[o]													
	change	0.02	-0.02													
Family	before (N=16,704)	96.38	3.62[o]													
caregiver	after (N=14,485)	97.62	2.38[o]													
	change	1.24	-1.24													

		0	1	2	3	4	5	6	7	10	11	12	16	21	26	51
Social	before (N=20,232)	98.65	0.84[m]						0.52[n]							
worker	after (N=17,335)	98.62	0.95[m]						0.43[n]							
	change	-0.03	0.11						-0.09							
Frequency	before (N=21,495)	93.71	5.27	1.02[q]												
of hospitali-	after (N=18,348)	93.49	5.59	0.92[q]												
zation	change	-0.22	0.32	-0.10												
Length of	before (N=1,351)		31.01	11.62	17.17[r]		25.68[s]				8.96[t]			5.55[u]		
hospitali-	after (N=1,188)		34.93	10.19	17.85[r]		24.24[s]				7.66[t]			5.13[u]		
zation	change		3.92	-1.43	0.68		-1.44				-1.30			-0.42		

[a] = 6 visits or more
[b] = at least once
[c] = 1 or 2 visits
[d] = 3 or 4 visits
[e] = 5 or 6 visits
[f] = 7, 8 or 9 visits
[g] = 10 or 11 visits
[h] = 12 to 15 visits
[i] = 16 to 20 visits
[j] = 21 to 50 visits
[k] = 51 visits or more
[l] = 3 visits or more
[m] = 1 to 6 visits
[n] = 7 visits or more
[o] = 1 visit or more
[p] = 26 visits or more
[q] = 2 times or more
[r] = 3 or 4 days
[s] = 5 to 10 days
[t] = 11 to 20 days
[u] = 21 days or more

To test whether health care utilization changed significantly after the reform, an ordered logit model was used. Table 6 shows the coefficient and odds ratios of the ordered logit equations of model 1 and model 2. A positively signed coefficient implies an increase in the log of the odds ratio. In model 1, the 'after reform' variable was negatively signed for general practitioner visits. However, the coefficient was not significant which implies that there were no significant changes in general practitioner visits after the reform.

After the reform, the number of specialist visits and physiotherapist visits increased significantly at a 5 percent significance level in model 1. The odds ratio of the variable after2006 for specialist visits was 1.065, which means that after the reform, the odds of many specialist visits versus fewer visits was 1.065 times greater than before the reform. The odds ratio of the variable after2006 for physiotherapist visit was 1.095. Number of homeopath visits, quantity of family caregiver and average length of hospitalization use decreased significantly at a 5 percent level. The odds ratio of the variable after2006 for homeopath visits was .826. The odds ratio of after2006 for family caregiver use was .650, and the odds ratio of the variable after the reform for frequency of hospitalization was .869.

To make a correction for changes in health care utilization that might be caused by gender, age, health, chronic conditions, education level, marital status, nationality and family composition, variables for these factors were included into the ordered logit model. According to the results using model 2, physiotherapist visits increased significantly, and length of hospitalization and family caregiver use decreased significantly at a 5 percent significance level. When taking health, education and demographic factors into account, change in homeopath visits after the reform was no longer significant. In addition, the increase in specialist visits after the reform was only significant at a 10 percent level.

The odds ratio of the parameter after2006 for physiotherapist was 1.230, which means that after the reform, the odds of many physiotherapist visits versus fewer visits was 1.230 times greater than before the reform. The odds ratio of the parameter after2006 for length of hospitalization was 0.722, and the odds ratio of the parameter after2006 for family caregiver use was .722. Other types of health care utilization did not change significantly after the reform.

Also overall health care utilization did not change significantly. My next step will be to test whether utilization changed across different groups in society.

Table 6: Regression results for expected health care use after the reform using model 1 and 2 (all years used)

Type of health care use	*Model 1*		*Model 2*	
	after reform		after reform	
	Coefficient	Odds ratio	Coefficient	Odds ratio
General practitioner	-.008 (.021)	.992 (.021)	-.031 (.027)	.969 (.026)
Specialist	.063 (.027)**	1.065 (.029)	.057 (.034)*	1.059 (.036)
Dentist	-.017 (.023)	.984 (.023)	-.027 (.029)	.973 (.028)
Medicine use	.023 (.032)	1.023 (.033)	.040 (.051)	1.041 (.053)
Physiotherapist	.091 (.026)**	1.095 (.029)	.207 (.041)**	1.230 (.050)
Homeopath	-.192 (.074)**	.826 (.062)	-.086 (.116)	.918 (.107)
Psychiatrist	-.107 (.091)	.899 (.082)	-.230 (.156)	.795 (.124)
District nurse	-.014 (.058)	.986 (.085)	.075 (.144)	1.078 (.155)
Family caregiver	-.430 (.068)**	.650 (.044)	-.905 (.141)**	0.405 (.057)
Social worker	.018 (.089)	1.018 (.091)	-.008 (.144)	.992 (.14325)
Frequency of hospitalization	.035 (.041)	1.036 (.043)	-.020 (.067)	.981 (.066)
Length of hospitalization	-.140 (.071)**	.869 (.062)	-.325 (.114)**	.722 (.082)
Robust standard errors in parenthesis * = significant at 10 percent level ** = significant at 5 percent level				

5.2 Differences in utilization across socioeconomic groups

5.2.1 Overall differences in utilization across socioeconomic groups

Groups based on education level

Health care utilization per educational level using the previous model was performed to determine whether educational level is a factor in health care utilization. Results of the comparisons of people with different educational levels are presented in table 7. Model 2 was used, however the variable after2006 was removed because the difference between before and after the reform was not relevant for answering this question.

When looking at the results from the joint test in table 7, it can be concluded that education level had a significant explanatory power (5 percent level) on the number of visits to a general

practitioner, specialist, dentist, physiotherapist, homeopath and social worker. Education level had a less significant (10 percent level) explanatory power on family caregiver usage.

Other results from table 7 show that people with education levels II, III, IV and V visited a general practitioner more often than people with education level I. Their odds ratios (OR) were respectively 1.132, 1.241, 1.176 and 1.130. Also, for visits to specialists (OR=1.162, =1.338, =1.162, =1.314), dentists (OR=1.223, =1.297, =1.440, =1.471) and physiotherapists (OR=1.143, =1.309, =1.303, =1.323), the odds ratios were significantly higher for higher education levels compared to the lowest education level. People with education levels IV (OR=1.859) and V (OR=2.673) visited a homeopath significantly more often than people with the lowest education level. People with education levels III (OR=.658) and V (OR=.734) made significantly less use of a family caregiver. People with education level V made significantly less use of a social worker compared to people with the lowest educational level (OR=460). For medication usage, psychiatrist visits, district nurse usage, frequency of hospitalization and length of hospitalization, there were no significant differences in utilization between educational level I and any other educational level.

Table 7: Regression results for different types of health care utilization by education level using model 2 (but without 'after reform' variable) (all years used)

Type of health care use		*II*	*III*	*IV*	*V (high)*	*Joint test*
General practitioner	Coefficient	.124 (.050)**	.216 (.056)**	.162 (.044)**	.121 (.048)**	0.001
	Odds ratio	1.132 (.057)	1.241 (.070)	1.176 (.052)	1.130 (.055)	
Specialist	Coefficient	.150 (.062)**	.291 (.070)**	.151 (.055)**	.273 (.060)**	0.000
	Odds ratio	1.162 (.072)	1.338 (.094)	1.162 (.064)	1.314 (.079)	
Dentist	Coefficient	.202 (.059)**	.260 (.064)**	.365 (.052)**	.386 (.055)**	0.000
	Odds ratio	1.223 (.072)	1.297 (.083)	1.440 (.075)	1.471 (.081)	
Medicine use	Coefficient	.031 (.071)	.094 (.081)	.044 (.063)	.051 (.070)	0.843
	Odds ratio	1.032 (.074)	1.099 (.089)	1.045 (.066)	1.052 (.073)	
Physiotherapist	Coefficient	.134 (.062)**	.269 (.069)**	.265 (.054)**	.280 (.059)**	0.000
	Odds ratio	1.143 (.070)	1.309 (.090)	1.303 (.071)	1.323 (.078)	
Homeopath	Coefficient	.285 (.197)	.319 (.212)	.620 (.171)**	.9831 (.177)**	0.000
	Odds ratio	1.329 (.262)	1.376 (.293)	1.859 (.318)	2.673 (.472)	
Psychiatrist	Coefficient	-.148 (.198)	-.190 (.223)	-.160 (.169)	-.306 (.200)	0.665
	Odds ratio	.863 (.171)	.827 (.185)	.853 (.144)	.737 (.147)	
District nurse	Coefficient	-.290 (.189)	-.311 (.237)	-.038 (.161)	-.024 (.187)	0.402
	Odds ratio	.749 (.141)	.733 (.174)	.963 (.155)	.977 (.183)	

Type of health care use		*II*	*III*	*IV*	*V (high)*	*Joint test*
Family caregiver	Coefficient	-.230 (.134)*	-.419 (.181)**	-.048 (.123)	-.309 (.161)*	0.053
	Odds ratio	.795 (.106)	.658 (.119)	.953 (.117)	.734 (.118)	
Social worker	Coefficient	.046 (.193)	.171 (.207)	-.192 (.172)	-.777 (.226)**	0.001
	Odds ratio	1.047 (.202)	1.187 (.246)	.826 (.142)	.460 (.104)	
Frequency of hospitalization	Coefficient	.105 (.088)	-.014 (.106)	-.004 (.079)	.069 (.087)	0.559
	Odds ratio	1.111 (.097)	.986 (.104)	.996 (.079)	1.072 (.093)	
Length of hospitalization	Coefficient	.137 (.146)	.165 (.181)	.113 (.131)	.155 (.144)	0.821
	Odds ratio	1.146 (.167)	1.180 (.213)	1.119 (.147)	1.168 (.168)	

Robust standard errors in parenthesis
* = significant at 10 percent level
** = significant at 5 percent level

5.2.2 Differences in changes in utilization before and after the reform across socioeconomic groups.

Groups based on education level

In previous models, a correction was made for education level. Next the results for the different educational levels before and after the reform were examined to see whether there were changes in inequality across people with different education levels, after the reform. Educational levels II thru V were compared with educational level I. Model 3 was used to obtain information about the coefficients and odds ratios of before reform and the difference between before and after the reform. However, for some types of health care use, the year 2006 was removed. To obtain information about after the reform, a test for linear combinations of estimators was done by combining the result of before the reform and the result of the difference between before and after the reform.

Table 8: Regression results for different types of health care utilization before and after the reform by education level using model 3 (all years used)

Educational level	*Before reform*	*Odds ratio*	*After reform*	*Odds ratio*	*Difference between before and after reform*	*Odds ratio*
General practitioner						
I					-.089 (.063)	.915 (.058)
II	.086 (.068)	1.090 (.074)	.162 (.070)**	1.175 (.083)	.075 (.094)	1.078 (.102)
III	.169 (.075)**	1.184 (.089)	.263 (.079)**	1.301 (.102)	.094 (.105)	1.099 (.115)
IV	.136 (.058)**	1.145 (.066)	.183 (.061)**	1.201 (.073)	.048 (.078)	1.049 (.082)
V (high)	.076 (.063)	1.079 (.068)	.168 (.066)**	1.183 (.078)	.092 (.086)	1.096 (.094)
Specialist						
I					.030 (.078)	1.031 (.080)
II	.177 (.084)**	1.193 (.100)	.120 (.087)	1.128 (.098)	-.057 (.117)	.945 (.111)
III	.180 (.097)*	1.197 (.116)	.407 (.096)**	1.502 (.144)	.227 (.132)*	1.255 (.165)
IV	.185 (.072)**	1.203 (.087)	.108 (.076)	1.114 (.085)	-.077 (.099)	.926 (.091)
V (high)	.197 (.079)**	1.218 (.097)	.361 (.081)**	1.435 (.116)	.164 (.107)	1.178 (.126)
Dentist						
I					.002 (.072)	1.002 (.072)
II	.248 (.078)**	1.282 (.100)	.148 (.081)*	1.160 (.094)	-.100 (.106)	.905 (.096)
III	.272 (.084)**	1.313 (.111)	.246 (.089)**	1.279 (.113)	-.026 (.115)	.974 (.112)
IV	.394 (.066)**	1.483 (.098)	.327 (.069)**	1.386 (.095)	-.067 (.086)	.935 (.080)
V (high)	.365 (.071)**	1.440 (.103)	.411 (.073)**	1.508 (.109)	.046 (.092)	1.048 (.097)
Medicine use						
I					-.054 (.090)	.948 (.086)
II	.006 (.097)	1.007 (.097)	.057 (.100)	1.059 (.106)	.050 (.136)	1.051 (.143)
III	.049 (.110)	1.051 (.116)	.142 (.114)	1.153 (.132)	.093 (.155)	1.098 (.170)
IV	-.001 (.083)	.999 (.083)	.094 (.087)	1.098 (.096)	.095 (.114)	1.099 (.125)
V (high)	-.009 (.092)	.992 (.092)	.116 (.096)	1.123 (.108)	.125 (.126)	1.133 (.143)
Physiotherapist						
I					.298 (.098)**	1.347 (.132)
II	.081 (.086)	1.084 (.094)	.164 (.118)	1.178 (.139)	.083 (.143)	1.087 (.155)
III	.285 (.095)**	1.330 (.126)	.188 (.135)	1.207 (.162)	-.097 (.160)	.907 (.145)
IV	.296 (.074)**	1.344 (.099)	.198 (.102)*	1.219 (.125)	-.098 (.119)	.907 (.108)
V (high)	.285 (.080)**	1.346 (.106)	.021 (.112)	1.021 (.114)	-.264 (.131)**	.768 (.101)
Homeopath						
I					-.019 (.333)	.981 (.326)
II	.315 (.260)	1.370 (.356)	.496 (.383)	1.642 (.629)	.181 (.449)	1.198 (.538
III	.293 (.283)	1.340 (.379)	.440 (.425)	1.553 (.660)	.147 (.495)	1.159 (.574)
IV	.625 (.223)**	1.869 (.416)	.542 (.342)	1.720 (.588)	-.083 (.387)	.920 (.356)
V (high)	1.062 (.229)**	2.891 (.663)	.796 (.353)**	2.217 (.783)	-.266 (.399)	.767 (.306)

Educational level	*Before reform*	*Odds ratio*	*After reform*	*Odds ratio*	*Difference between before and after reform*	*Odds ratio*
Psychiatrist						
I					-.092 (.292)	.912 (.266)
II	-.232 (.255)	.793 (.202)	-.788 (.468)*	.455 (.213)	-.556 (.524)	.574 (.301)
III	-.356 (.294)	.700 (.206)	-.266 (.464)	.766 (.356)	.090 (.538)	1.094 (.588)
IV	-.488 (.221)**	.614 (.136)	-.646 (.364)*	.524 (.191)	-.158 (.409)	.854 (.349)
V (high)	-.568 (.261)**	.567 (.148)	-.699 (.427)	.497 (.212)	-.131 (.484)	.878 (.424)
District nurse						
I					-.014 (.265)	.986 (.261)
II	-.245 (.255)	.783 (.200)	-.666 (.429)	.514 (.220)	-.422 (.496)	.656 (.325)
III	-.376 (.327)	.686 (.224)	.230 (.416)	1.259 (.523)	.607 (.522)	1.834 (.958)
IV	-.092 (.216)	.912 (.197)	.075 (.316)	1.078 (.341)	.167 (.368)	1.182 (.435)
V (high)	-.216 (.259)	.806 (.209)	-.057 (.369)	.944 (.348)	.159 (.434)	1.172 (.509)
Family caregiver						
I					-1.359 (.267)**	.257 (.069)
II	-.329 (.174)*	.720 (.125)	.157 (.399)	1.170 (.467)	.486 (.434)	1.626 (.707)
III	-.576 (.235)**	.562 (.132)	.444 (.477)	1.559 (.743)	1.019 (.529)*	2.772 (1.468)
IV	-.061 (.153)	.941 (.144)	.772 (.335)**	2.164 (.725)	.833 (.361)**	2.300 (.830)
V (high)	-.366 (.197)*	.694 (.137)	.124 (.446)	1.132 (.505)	.490 (.481)	1.632 (.784)
Social worker						
I					.209 (.285)	1.233 (.351)
II	.228 (.254)	1.256 (.319)	-.175 (.384)	.839 (.322)	-.403 (.445)	.668 (.297)
III	.252 (.274)	1.286 (.352)	-.102 (.421)	.903 (.380)	-.354 (.484)	.702 (.339)
IV	-.198 (.232)	.821 (.190)	-.491 (.338)	.612 (.207)	-.293 (.386)	.746 (.288)
V (high)	-.784 (.305)**	.457 (.140)	-.804 (.420)*	.448 (.188)	-.021 (.498)	.980 (.488)
Frequency of hospitalization						
I					-.128 (.144)	.880 (.127)
II	-.024 (.120)	.976 (.117)	.085 (.181)	1.089 (.197)	.109 (.215)	1.115 (.239)
III	-.327 (.151)**	.721 (.109)	.211 (.208)	1.234 (.256)	.538 (.253)**	1.712 (.433)
IV	-.206 (.105)*	.814 (.086)	-.066 (.163)	.936 (.153)	.140 (.188)	1.150 (.216)
V (high)	-.028 (.116)	.973 (.112)	-.056 (.180)	.946 (.170)	-.028 (.207)	.972 (.201)
Length of hospitalization						
I					-.440 (.244)*	.644 (.157)
II	.095 (.199)	1.099 (.219)	.038 (.305)	1.039 (.317)	-.056 (.359)	.945 (.340)
III	-.216 (.263)	.805 (.212)	.290 (.350)	1.337 (.468)	.507 (.430)	1.660 (.714)
IV	-.024 (.177)	.976 (.173)	.209 (.280)	1.232 (.344)	.233 (.322)	1.263 (.407)
V (high)	.042 (.193)	1.043 (.201)	.062 (.304)	1.064 (.324)	0.020 (.352)	1.020 (.359)

Robust standard errors in parenthesis

* = significant at 10 percent level

** = significant at 5 percent level

Table 8 shows that before the reform, there was a significant difference in general practitioner visits between level I and III (OR=1.184) and between level I and IV (OR=1.145). After the reform, there was a significant difference in general practitioner visits between educational level I and all other educational levels (OR=1.175, =1.301, =1.201, =1.183). When comparing the coefficient before and after the reform for every educational level, no significant changes were observed.

Before the reform, people with a higher education level (level II, IV and V) went significantly (5 percent level) more often to a specialist than people with a lower education (OR=1.193, =1.203, =1.218). People with education level III also appeared to have gone more often to a specialist (OR=1.197). However this difference was not highly significant (significance level of 10 percent). After the reform, there was a significant difference (significance level of 5 percent) in specialist visits between educational level I and III (OR=1.502) and level I and V (OR=1.435). When comparing coefficients before the reform with coefficients after the reform, only specialist visits of people with education level III after the reform was significantly different (10 percent level) with visits of people with that education level before the reform (OR=1.255).

The higher the education level, the more people went to a dentist before the reform (with the exception that people with level IV have on average more dentist visits than level V) (OR=1.282, =1.313, =1.483, =1.440). After the reform, the level of education seemed to be an even stronger predictor of dental visits (OR=1.160, =1,270, =1.386, =1.508). Comparing the visits of every education level before the reform with after the reform, there were no significant differences between before and after the reform.

In terms of physiotherapist visits, people with a higher educational level (level III, IV and V) went significantly more often to a physiotherapist than people with the lowest educational level before the reform (OR=1.330, =1.344, =1.346). After the reform, only for educational level IV there was a significant difference detected in comparison with educational level I (OR=1.219). Comparing the visits of every education level before the reform with after the reform, it seemed that the coefficient of education level V decreased significantly after the reform compared to before the reform (OR=.768). Before the reform, people with a higher educational level (level IV and V) went significantly more to a homeopath than people with the lowest educational level (significance level of 5 percent) (OR=1.869, =2.891). After the reform, people with the highest

education level (level V) still had significantly more homeopath visits (OR=2.217). No significant changes in coefficients of all education levels were found.

Before the reform, education level had a predictive power for people in the two highest education levels for the number of psychiatrist visits. People with education level IV (OR=.614) and V (OR=.567) went significantly less to a psychiatrist than people with education level I. After the reform, people with educational level II (OR=.455) and IV (OR=.524) went slightly more (significance level of 10 percent) to a psychiatrist than people with educational level I.

No significant changes in coefficients of all education levels were found. In terms of family caregiver use, there was a difference in utilization between educational level I and II (OR=.720) (significance level of 10 percent), I and III (OR=.562), and I and V (OR=.694) (significance level of 10 percent) before the reform. After the reform, the difference between level I and II disappeared, this change compared to before the reform is not significant. The difference between level I and III also disappeared, which is significant at a 10 percent level (OR=2.772). The difference between level I and V disappeared also but this was not a significant change compared to before the reform. After the reform, the difference between level I and IV is significant (OR=.772), this difference compared with the difference before the reform is significant (OR=.833) (5 percent level).

In terms of social worker use, there was a significant difference (5 percent level) before the reform in utilization between educational level I and V (OR=.457), which was still significant (10 percent level) after the reform (OR=.448). The difference in total visits social worker visits by itself was not significant. There was a significant difference in terms of the frequency of hospitalization between people with educational level I and III (OR=.721) (5 percent level) and level I and IV (OR=.814) (10 percent level) before the reform. After the reform, no higher education level coefficient was significantly different from the coefficient of education level I. The coefficient of education level III therefore changed significantly after the reform (OR=1.712). Education level did not appear to have a predictive value for medicine use, district nurse use and length of hospitalization.

Groups based on type of pre-reform insurance

To make a distinction between the types of insurance that people had before the reform, the type of insurance was added to the model. To determine to which basic model the type of insurance should be added to, a Wald test was performed to test whether the model with the interaction term "educational level * after reform" gives a better fit than a model without the interaction term. Model 2 without the interaction term was compared with model 3 with the interaction term. As presented in table 9, the null hypothesis that the interaction term does not improve the model could only be rejected in the model of specialist visits with a significance level of 5 percent. This means that including the interaction term creates a statistically significant improvement of the fit of the model only in the model for specialist visits. For the other three types of health care, model 3 does not give a significant improvement compared to model 2. In order to use a consistent model for the different types of health care use, the interaction term is not extended to model 4.

*Table 9: Results of the Wald-test for including the interaction term "educational level * after reform" into model 2 (years 2004, 2005 and 2006 used)*

Type of health care utilization	X^2	*p-value*
General practitioner	1.48	0.830
Specialist	11.13	0.025
Dentist	3.32	0.505
Medicine use	1.16	0.884

Since the data set did not contain information for 2007 about the insurance type before the reform, only information from 2006 and before was used. Results of the ordered logit regression of model 4 are presented in table 10, with public health insurance as reference group.

Table 10: Regression results for different types of health care utilization before and after the reform by insurance type (before the reform) using model 4 (years 2004, 2005 and 2006 used)

Insurance type	*Before reform*	*Odds ratio*	*After reform*	*Odds ratio*	*Difference between before and after reform*	*Odds ratio*
General practitioner						
Public insurance					-.080 (.043)*	.923 (.039)
Civil servants	.045 (.084)	1.046 (.088)	.074 (.132)	1.077 (.142)	.029 (.155)	1.029 (.160)
Private insurance	-.018 (.042)	.982 (.042)	.065 (.060)	1.067 (.065)	.082 (.070)	1.086 (.077)
Educational level	*ß*	*Odds ratio*				
II	.125 (.057)**	1.134 (.065)				
III	.234 (.064)**	1.263 (.081)				
IV	.163 (.051)**	1.177 (.060)				
V	.129 (.058)**	1.138 (.066)				
Insurance type	*Before reform*	*Odds ratio*	*After reform*	*Odds ratio*	*Difference between before and after reform*	*Odds ratio*
Specialist						
Public insurance					.013 (.054)	1.013 (.054)
Civil servants	.061 (.109)	1.063 (.116)	.348 (.157)**	1.416 (.222)	.287 (.190)	1.333 (.253)
Private insurance	.068 (.054)	1.070 (.058)	.146 (.076)*	1.158 (.088)	.079 (.089)	1.082 (.096)
Educational level	*ß*	*Odds ratio*				
II	.165 (.071)**	1.179 (.083)				
III	.256 (.081)**	1.292 (.105)				
IV	.180 (.063)**	1.198 (.076)				
V	.189 (.072)**	1.208 (.087)				
Insurance type	*Before reform*	*Odds ratio*	*After reform*	*Odds ratio*	*Difference between before and after reform*	*Odds ratio*
Dentist						
Public insurance					.038 (.046)	1.038 (.047)
Civil servants	.103 (.088)	1.108 (.098)	-.046 (.140)	.955 (.133)	-.149 (.164)	.862 (.142)
Private insurance	.088 (.043)**	1.092 (.047)	-.025 (.063)	.975 (.061)	-.113 (.073)	.893 (.065)
Educational level	*ß*	*Odds ratio*				
II	.250 (.068)**	1.284 (.087)				
III	.305 (.074)**	1.357 (.100)				
IV	.399 (.060)**	1.491 (.089)				
V	.391 (.065)**	1.479 (.097)				

Insurance type	*Before reform*	*Odds ratio*	*After reform*	*Odds ratio*	*Difference between before and after reform*	*Odds ratio*
Medicine use						
Public insurance					.252 (.244)	1.286 (.313)
Civil servants	-.235 (.140)*	.790 (.110)	.016 (.201)	1.016 (.204)	.252 (.244)	1.286 (.313)
Private insurance	.009 (.064)	1.010 (.065)	.051 (.091)	1.052 (.096)	.042 (.106)	1.042 (.111)
Educational level	*β*	*Odds ratio*				
II	.070 (.081)	1.072 (.087)				
III	.126 (.093)	1.134 (.106)				
IV	.059 (.073)	1.061 (.077)				
V	.057 (.084)	1.059 (.089)				

Robust standard errors in parenthesis
* = significant at 10 percent level
** = significant at 5 percent level

People with public health insurance went less often (significance level of 10 percent) to a general practitioner after the reform compared to before the reform. The other types of health insurance coverage had no explanatory power for general practitioners visits either before or after the reform. People who were privately insured before the reform did not go significantly more often to a specialist than people who had public health insurance. After the reform, the same group of people, the formerly privately insured people, went significantly more often to a specialist than formerly public insured people (OR=1.158) (significance level of 10 percent). However, this change was not significantly different from visits of privately insured people before the reform. Civil servants also went significantly more often to a specialist after the reform compared to formerly public insured people (OR=.1416) (significance level of 5 percent). This change was not significantly different compared to specialist visits of civil servants before the reform. There was no significant change in specialist visits after the reform for people with public health insurance.

People who were privately insured before the reform went significantly more often to a dentist than people who had public health insurance (OR=1.092) (5 percent significance level). After the reform, the same group of people, the formerly privately insured people, did not go significantly more often to a dentist than formerly public insured people. The change within this insurance group before and after the reform was not significantly large, as it was for civil servants and public insured people. Civil servants used slightly less medicine than people with a public

insurance before the reform (OR=.790) (significance level of 10 percent). The type of insurance before the reform had no explanatory power of the degree of medicine use after the reform. The visits within this insurance group before and after the reform also did not significantly change.

As is shown in table 10, educational level is still a significant coefficient for explaining the number of visits to a general practitioner, specialist and dentist when type of pre-reform insurance is included into the model. This means that the explanatory power of educational level on health care utilization is not explained by the type of pre-reform insurance but by the level of education itself.

After the reform, there were still some differences in insurances. Therefore, also deductible, care allowance and supplementary insurance (physiotherapist and dentist insurance) were included into the new model. In this model, model 5, only the year 2006 is included because only for 2006 both insurance type before the reform and insurance type after the reform are known.

Table 11: Regression results for different types of health care utilization after the reform by insurance type (after the reform) using model 5 (only year 2006 is used)

Insurance type	*β*	*Odds ratio*	*Insurance type*	*β*	*Odds ratio*
General practitioner			**Dentist**		
care allowance	-.148 (.087)*	.863 (.075)	care allowance	-.075 (.094)	.928 (.087)
deductible	-.122 (.106)	.885 (.094)	deductible	.058 (.109)	1.059 (.116)
supplemental dentist insurance	-.060 (.104)	.942 (.098)	supplemental dentist insurance	.739 (.134)**	2.094 (.280)
supplemental physiotherapist insurance	.123 (.105)	1.131 (.119)	supplemental physiotherapist insurance	-.152 (.108)	.859 (.093)
civil servants	.122 (.191)	1.130 (.215)	civil servants	-.075 (.199)	.928 (.184)
private insurance	.166 (.092)*	1.181 (.108)	private insurance	-.087 (.099)	.917 (.090)
Education level II	.053 (.135)	1.054 (.142)	Education level II	.155 (.163)	1.168 (.191)
Education level III	.023 (.160)	1.024 (.164)	Education level III	.305 (.189)	1.357 (.256)
Education level IV	-.026 (.124)	.975 (.121)	Education level IV	.470 (.146)**	1.600 (.233)
Education level V	-.015 (.141)	.985 (.139)	Education level V	.547 (.161)**	1.729 (.279)

Insurance type	*β*	*Odds ratio*	*Insurance type*	*β*	*Odds ratio*
Specialist			**Medicine use**		
care allowance	-.171 (.108)	.843 (.091)	care allowance	-.073 (.123)	.863 (.075)
deductible	-.363 (.144)**	.695 (.100)	deductible	-.208 (.160)	.885 (.094)
supplemental dentist insurance	-.017 (.126)	.983 (.123)	supplemental dentist insurance	.040 (.150)	.942 (.098)
supplemental physiotherapist insurance	.027 (.131)	1.027 (.134)	supplemental physiotherapist insurance	.088 (.152)	1.131 (.119)
civil servants	.344 (.231)	1.410 (.325)	civil servants	.278 (.271)	1.320 (.357)
private insurance	.199 (.115)*	1.220 (.140)	private insurance	.287 (.131)**	1.333 (.174)
Education level II	.174 (.162)	1.190 (.193)	Education level II	.189 (.183)	1.208 (.221)
Education level III	.498 (.183)**	1.645 (.302)	Education level III	-.029 (.225)	.971 (.219)
Education level IV	-.010 (.153)	.990 (.151)	Education level IV	-.091 (.173)	.913 (.158)
Education level V	.243 (.174)	1.275 (.221)	Education level V	-.005 (.199)	.995 (.198)

Robust standard errors in parenthesis
*= significant at 10 percent level
**=significant at 5 percent level

People with care allowance went less often to a general practitioner (OR=.863) (significance level of 10 percent). Care allowance had no predictive value for specialist visits, dentist visits and medicine usage. People with higher deductibles went significantly (5 percent level) less often to a specialist (OR=.695). Higher deductibles had no predictive value for general practitioner visits, dentist visits and medicine usage. People with supplemental dental insurance visited the dentist significantly more often (p=0.000) (OR=2.094). Other supplemental insurances had no predictive value for health care use.

Income

To test whether income should be included into the model, a Wald test was performed with only data from 2004. Model 2 without income was compared with model 2 with income included. As presented in table 12, based on the p-value, the null hypothesis that income does not improve the model could be rejected in the model of psychiatrist and social worker with a significance level of 5 percent. This means that including income level in the model for psychiatrist visits and social worker use creates a statistically significant improvement in the fit of the model. In the model of the other types of health care utilization, including income level will not create a significant improvement in the fit of the model. Therefore, not including income level in the model did not seem to be an issue (except that the models for psychiatrist and social worker might be a little biased).

Table 12: Results of the Wald-test for including income into model 2 (only year 2004 used)

Type of health care utilization	*X^2*	*p-value*
General practitioner	0.49	0.483
Specialist	0.06	0.811
Dentist	1.65	0.200
Medicine use	0.85	0.356
Physiotherapist	0.90	0.318
Homeopath	0.10	0.750
Psychiatrist	5.34	0.021
District nurse	0.01	0.928
Family caregiver	0.00	0.964
Social worker	6.39	0.012
Frequency of hospitalization	1.25	0.264
Length of hospitalization	0.10	0.752

Accessibility of health care

To test whether waiting times for specialists changed, a Mann-Whitney U-test was performed. The z-score of the test "waiting time specialist (before reform) = waiting time specialist (after reform)" is 0.791 with a p-value of 0.4287, which was not significant at a 5 percent significance level. Therefore, the conclusion of this test is that waiting time for specialists did not significantly change after the reform. Although waiting time for different types of health care use may be influenced by different factors, there might be a small correlation between waiting times of different types of health care use because of some general trends in the health care system. Therefore waiting time for other types of health care use might have stayed the same as well.

Satisfaction with the health care system

To test whether satisfaction with maternity care changed, a Mann-Whitney U-test was again performed. There may be a relation between changes in satisfaction of different types of health care. The z-score of the test was -1.830 with a p-value of 0.0673, which was not significant at a 5 percent significance level. The conclusion of this test is that satisfaction of maternity care did not significantly change after the reform. Therefore, there is no indication that the overall satisfaction of the health care system has changed after the reform.

6 Discussion

This thesis assessed the influence of the health insurance reform in the Netherlands on health care utilization while adjusting for self-reported health status, chronic conditions, demographic factors and social factors. Different types of health care utilization before and after the health insurance reform on January 2006 were compared. Overall changes as well as changes between groups of people with a different socioeconomic status and different pre-reform and after-reform insurances were examined. The results suggest that the influence of the reform varies across the types of health care utilization and depends on socioeconomic status.

Looking solely at the change in utilization, specialist visits and physiotherapist visits increased significantly, while homeopath visits, family caregiver usage and length of hospitalization decreased significantly. Total health care use, therefore, might not have changed substantially. Rising health care costs after the reform cannot be attributed to changes in utilization patterns alone. Even after adjusting for health and socio-demographic factors, the number of visits to a specialist and physiotherapist still increased significantly after the reform while family caregiver use and the length of hospitalization still decreased significantly. Decrease in homeopath visits may thus be explained by health and socio-demographic factors. From these results, it appears that overall levels of health care use did change after the reform. However, most types of health care use did not change and whether total health care utilization increased or decreased is not very clear.

From 2004 until 2007, people with a higher education level went significantly more often to a general practitioner, specialist, dentist and physiotherapist than people with the lowest educational level, when adjusting for health and socio-demographic factors. In addition, for number of homeopath visits, family caregiver use and social worker use it appears also that educational level has some predictive value for utilization. After adjusting for health and socio-demographic factors, people with the lowest educational level went significantly less often to a homeopath compared to some groups of higher educational levels, and people with the lowest educational level made significantly more use of a family care giver and social worker compared to some groups of higher educational levels. Inequity in health care use between people with different education levels thus seems to be present. When comparing utilization within each

educational level after the reform with utilization before the reform, overall differences in utilization did not significantly change. The conclusion that family caregiver and social worker use is higher for lower educated people cannot be explained by changes in the health insurance system. Whether differences in health care use between educational level groups can be explained by changes in the health insurance system is unclear.

When looking at utilization within these socioeconomic groups, specialist visits increased significantly after the reform for the highest educated people and for people in the middle education level group. Since people with the highest educational level have the highest increase in number of specialist visits after the reform, and the total number of specialist visits also increased after the reform, the inequity in specialist visits between the socioeconomic groups has risen even more after the reform. Inequity in physiotherapy use decreased, since people with a higher educational level went more to a physiotherapist than people with the lowest educational level before the reform. After the reform, these changes between the educational level groups almost disappeared.

Use of a family caregiver declined after the reform for people with a low education level, but also for people with the highest education level. Frequency of hospitalization increased after the reform for people with education level III. Length of hospitalization decreased significantly after the reform for people with the highest educational level.

Generally, inequity in number of specialist visits increased and inequity in number of physiotherapist visits decreased. For other types of health care use, inequity between people with different education levels did not change significantly.

When looking at the type of health insurance held by people in 2005, we see that there was a significant increase in specialist visits after the reform for people with civil servants and private insurance compared to people with public health insurance. An explanation for the difference in utilization between insurance groups may be that possibly a lot of people with civil servants or private insurance had a partial insurance coverage for specialist visits. Specialist care, compared to other types of health care, is very expensive. After the reform, specialist visits are fully covered in the basic insurance for everyone. Comparing changes in health care use within the

three health insurance groups, it appears that, before the reform, privately insured people went more to a dentist, while after the reform the difference in dentist visits between people with a private and public health insurance was not significant anymore. The type of insurance people had before the reform thus has some explanatory power for health care utilization.

When looking at the different types of insurances after the reform, it appears that people with care allowance went less often to a specialist than people without care allowance. People with higher deductibles went less often to a specialist and use slightly less medicines. People with a supplemental insurance for dental care went significantly more often to a dentist.

Major changes in health care use after the reform in 2006 that can be concluded from this research are:

- previously publically insured people went less often to a general practitioner after the reform compared to before the reform
- visits to specialists and physiotherapists increased significantly after the reform while the length of hospitalization decreased
- inequity in number of physiotherapist visits between people with different educational levels decreased after the reform
- inequity in number of specialist visits between people with different types of health insurance increased after the reform while inequity in number of dentist visits decreased

Strengths and limitations

An interesting conclusion that can be drawn from this research is that previously publically insured people went less often to a general practitioner after the reform compared to before the reform. Information about differences in health care use between formerly public and privately insured people after the reform is limited (only 2006 is used). Therefore, it would be interesting to have data for 2007 and onwards to see if this trend persists.

In this research, health care utilization is only measured by the number of visits to a health caregiver. However, besides the number of visits to a health care giver, also the length of the consultation and the number of operations of a health care giver is likely to have some impact

on total health care volume. It seemed that the number of operations of a general practitioner increased far more than the number of visits. Explanations for this result may be that general practitioners have more long consultations, longer visits and more repeat prescriptions (Zorgmarkt Researchbase http://www.zorgmarktreserchbase.nl, n.d.). Volume of care provided by general practitioners did thus increase, but not because of more general practitioners visits.

Since most types of long term care were still covered in the AWBZ, there was no change in coverage for district nurse, family caregiver and social worker use. District nurse use and social worker use did not seem to be different after the health insurance reform. However, another result from this thesis was that family care giver use declined after the reform for people with a low education and for people with the highest education. This means that other factors, besides changes in the health insurance system, may have caused changes in health care utilization for all types of health care.

The change in health care utilization after the reform might be caused by other factors besides the change in the health insurance system. Other influencing factors on the change in health utilization, which were not included into the model, might also explain changes in health care use:

- Satisfaction about the health care system before and after the reform. Satisfaction about the health care system and utilization are closely related to each other. Unfortunately, only information about the satisfaction of maternity care was accessible in the data set. The conclusion of this test is that satisfaction of maternity care did not significantly change after the reform. Of course, this test does not give a good impression of overall satisfaction of health care. Therefore, since also satisfaction of health care might be an influencing factor of health care utilization, including satisfaction of all the different types of health care might improve the model significantly.

- Differences in treatment methods after the reform. Utilization for some types of health care seems to decrease, however this may not be caused by change in the health insurance system alone. Length of hospitalization decreased significantly after the

reform, however there are other explanations besides the changes in health care system. For example, treatment methods may have improved which may cause a shorter duration of hospital stays. In addition, pressure for hospitals to save is likely to influence duration of hospitalization.

- Accessibility of health care. Waiting lists, number of general practitioners and specialists in one area might influence health care utilization. However, from the POLS questionnaire, only information about waiting time for specialists was accessible. Of course, only waiting time for specialists does not give a good impression of overall accessibility of other types of health care. Therefore, since accessibility of health care might be an influencing factor of health care utilization, including accessibility of different types of health care might improve the results. In addition, utilization of some types of health care might depend on its accessibility. Waiting time may also differ depending on the type of health insurance. Testing whether type of health insurance is of influence on the waiting time may therefore be a good test.

Especially the last topic, accessibility of health care, may be an explanation for the decline in family care giver usage. If demand for family care giver usage increases but supply does not, waiting lists will grow and usage, after controlling for health will decline. According to the CBS (2011), the number of vacancies was higher in 2006 and 2007 than in 2004 and 2005. Since staff shortages exist in the health care sector, increasing waiting lists may be an explanation for less health care utilization for some types of health care.

While results seem to suggest that changes in health care utilization were caused by the reform, we cannot necessarily interpret the results obtained as causal effects of the reform because other things could have changed that changed the demand for health care use. An example of this is the change in health care utilization for physiotherapy. Physiotherapist utilization increased significantly after the reform. However, after the reform, physiotherapy became much more accessible for every insured person and demand may have changed as well. A physiotherapist can now be consulted without prior recommendation of a general practitioner. This change in accessibility might explain a large part of the increased utilization of physiotherapy. In addition, the reason that the number of general practitioner visits did not

increase after the reform may be partly explained by people no longer needing to first see the general practitioner simply to ask for referral to physiotherapist. Therefore, a change in physiotherapist visits and potentially also general practitioner visits after the reform is not necessarily caused by the change in health insurance coverage, but has more to do with a change in rules about mediation of general practitioners in 2006.

Dentist visits also changed after the reform in the sense that the level of education seemed to be an even stronger predictor of dental visits than before the reform, and differences in dentist visits between the different formerly types of health insurance decreased. After the reform, people with supplemental dental insurance visited the dentist significantly more often. An explanation for this change is that, according to the results of this research, the change in insurance type since the reform changed the demand for dentists. Unlike some changes in physiotherapist visits after the reform, this result can probably be more directly linked to the reform, since number of dentist visits and supplemental dentist insurance are closely related. After the reform, people had to make a more aware decision about their dentist insurance than they had to before the reform, since choices about dentist insurances are now more broadened.

The introduction of the Health Insurance Act in 2006 seems to have advantages and disadvantages. One disadvantage is the overall increase of health care utilization after 2006. However, it is likely that other factors besides the new health insurance system have an important influence on health care use. An advantage is that, when looking at the overall changes in health care use, it seems that inequity in health care use decreased after the reform. However, from this research, a significant decrease in equity is only obvious for physiotherapist visits and dentist visits. Therefore, a focus on only some important types of health care use in further studies may give clearer conclusions about change in equity of health care use after the introduction of the Health Insurance Act.

Despite the limited capacity of this study, this thesis is still relevant because it is one of the first studies on the change in health care use after the Health Insurance Act was introduced in the Netherlands in 2006. It is a good departure point for more elaborate studies on the causal effects of the reform.

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Appendix

Table I

General practitioner visits

		β	*Odds ratio*
τ_1		1.719 (.157)	
τ_2		3.245 (.158)	
τ_3		4.408 (.160)	
τ_4		5.331 (.164)	
τ_5		6.158 (.173)	
τ_6		6.840 (.187)	
Age			
	0-14		
	15-29	-.191 (.132)	.826 (.109)
	30-44	-.133 (.133)	.876 (.116)
	45-59	-.073 (.135)	.930 (.126)
	60-74	.168 (.141)	1.184 (.167)
	75+	.256 (.155)	1.291 (.201)
Female		.014 (.155)	1.015 (.157)
Age*Female			
	0-14*female		
	15-29*female	.716 (.169)**	2.047 (.346)
	30-44*female	.422 (.164)**	1.526 (.250)
	45-59*female	.200 (.163)	1.221 (.199)
	60-74*female	.051 (.167)	1.052 (.175)
	75+*female	-.093 (.186)	.911 (.169)
Educational level			
	I		
	II	.123 (.050)**	1.131 (.057)
	III	.214 (.056)**	1.239 (.069)
	IV	.156 (.044)**	1.174 (.052)
	V	.121 (.048)**	1.128 (.055)
Health status			
	excellent health		
	good health	.473 (.038)**	1.605 (.061)
	fair	1.081 (.049)**	2.947 (.144)
	bad health	1.386 (.080)**	3.999 (.320)
	very bad health	1.275 (.196)**	3.578 (.703)

	β	*Odds ratio*
Marital status		
married		
divorced	.120 (.054)**	1.127 (.061)
widow	.049 (.064)	1.050 (.067)
never married	-.103 (.046)**	.902 (.041)
Dutch	-.006 (.088)	.994 (.087)
Family composition		
0 children		
1 child	-.011 (.042)	.989 (.042)
2 children	-.037 (.041)	.964 (.040)
>3 children	-.150 (.052)**	.860 (.045)
After reform	-.031 (.027)	.969 (.026)
Chronic conditions		
diabetes	.336 (.062)**	1.399 (.086)
stroke	.059 (.084)	1.060 (.089)
myocardial infarct	-.008 (.078)	.992 (.078)
other serious heart diseases	.282 (.092)**	1.326 (.122)
cancer	.054 (.057)	1.056 (.060)
migraine	.224 (.039)**	1.251 (.049)
high blood pressure	.617 (.039)**	1.854 (.072)
arteriosclerosis	-.081 (.090)	.923 (.083)
asthma	.481 (.048)**	1.618 (.077)
psoriasis	.099 (.090)	1.104 (.100)
chronic eczema	.263 (.064)**	1.301 (.084)
dizziness with falling	.313 (.076)**	1.368 (.103)
serious intestinal disorder	.340 (.074)**	1.405 (.104)
incontinence	.008 (.062)	1.008 (.063)
arthritis of hips and knees	.108 (.044)**	1.114 (.049)
chronic arthritis	.084 (.063)	1.088 (.068)
serious back condition	.157 (.044)**	1.170 (.051)
serious neck or shoulder condition	.223 (.045)**	1.249 (.056)
serious elbow, wrist or hand disease	.154 (.055)**	1.167 (.064)

Robust standard errors in parenthesis
*= significant at 10 percent level
**= significant at 5 percent level

Table II

Specialist visits

		β	*Odds ratio*
τ_1		2.424 (.210)	
τ_2		3.807 (.211)	
τ_3		4.846 (.213)	
τ_4		5.675 (.218)	
τ_5		6.382 (.227)	
τ_6		7.026 (.241)	
Age			
	0-14		
	15-29	-.300 (.178)*	.741 (.132)
	30-44	-.349 (.178)*	.705 (.126)
	45-59	-.293 (.181)	.746 (.135)
	60-74	-.089 (.187)	.915 (.171)
	75+	-.038 (.200)	.963 (.193)
Female		.072 (.208)	1.074 (.223)
Age*Female			
	0-14*female		
	15-29*female	.169 (.228)	1.184 (.270)
	30-44*female	.339 (.220)	1.403 (.309)
	45-59*female	.048 (.218)	1.049 (.229)
	60-74*female	-.140 (.220)	.870 (.192)
	75+*female	-.363 (.240)	.696 (.167)
Educational level			
I			
II		.151 (.062)**	1.163 (.072)
III		.292 (.070)**	1.339 (.094)
IV		.154 (.055)**	1.166 (.065)
V		.276 (.060)**	1.317 (.079)
Health status			
	excellent health		
	good health	.514 (.054)**	1.671 (.091)
	fair	1.319 (.063)**	3.739 (.236)
	bad health	1.929 (.090)**	6.885 (.617)
	very bad health	2.403 (.193)**	11.058 (2.135)
Marital status			
	married		
	divorced	.028 (.066)	1.028 (.068)
	widow	-.144 (.077)*	.866 (.067)
	never married	-.094 (.058)	.910 (.053)

	β	*Odds ratio*
Dutch	.036 (.114)	1.037 (.118)
Family composition		
0 children		
1 child	-.175 (.054)**	.839 (.045)
2 children	-.253 (.054)**	.776 (.042)
>3 children	-.343 (.070)**	.710 (.050)
After reform	.057 (.034)*	1.059 (.036)
Chronic conditions		
diabetes	.428 (.068)**	1.534 (.105)
stroke	.218 (.092)**	1.243 (.115)
myocardial infarct	.129 (.085)	1.1379 (.100)
other serious heart diseases	.649 (.094)**	1.913 (.180)
cancer	.897 (.059)**	2.452 (.145)
migraine	-.086 (.050)*	.918 (.046)
high blood pressure	.263 (.047)**	1.301 (.061)
arteriosclerosis	.222 (.095)**	1.249 (.119)
asthma	.163 (.058)**	1.177 (.068)
psoriasis	.250 (.104)**	1.284 (.134)
chronic eczema	.210 (.079)**	1.234 (.098)
dizziness with falling	-.045 (.090)	.956 (.086)
serious intestinal disorder	.482 (.082)**	1.620 (.133)
incontinence	-.066 (.074)	.937 (.069)
arthritis of hips and knees	.106 (.052)**	1.112 (.058)
chronic arthritis	.174 (.070)**	1.190 (.083)
serious back condition	.110 (.053)**	1.116 (.059)
serious neck or shoulder condition	-.035 (.056)	.966 (.054)
serious elbow, wrist or hand disease	.211 (.064)**	1.235 (.080)

Robust standard errors in parenthesis
*= significant at 10 percent level
**= significant at 5 percent level

Table III

Physiotherapist visits

		β	*Odds ratio*
τ_1		2.639 (.235)	
τ_2		2.768 (.235)	
τ_3		2.936 (.236)	
τ_4		3.155 (.236)	
τ_5		3.559 (.236)	
τ_6		3.785 (.236)	
τ_7		4.196 (.237)	
τ_8		4.632 (.238)	
τ_9		5.721 (.243)	
Age			
	0-14		
	15-29	-.008 (.201)	.992 (.199)
	30-44	.075 (.202)	1.078 (.217)
	45-59	.094 (.204)	1.099 (.225)
	60-74	-.018 (.214)	.982 (.210)
	75+	-.038 (.236)	.963 (.227)
Female		-.271 (.254)	.762 (.194)
Age*Female			
	0-14*female		
	15-29*female	.295 (.273)	1.343 (.366)
	30-44*female	.409 (.265)	1.505 (.398)
	45-59*female	.514 (.263)*	1.671 (.440)
	60-74*female	.521 (.269)*	1.683 (.453)
	75+*female	.495 (.296)*	1.641 (.486)
Educational level			
	I		
	II	.107 (.071)	1.113 (.079)
	III	.253 (.079)**	1.288 (.102)
	IV	.263 (.062)**	1.301 (.081)
	V	.202 (.068)**	1.224 (.083)
Health status			
	excellent health		
	good health	.359 (.054)**	1.432 (.077)
	fair	.783 (.067)**	2.188 (.147)
	bad health	1.126 (.105)**	3.083 (.322)
	very bad health	.788 (.260)**	2.198 (.571)

	β	*Odds ratio*
Marital status		
married		
divorced	-.102 (.074)	.903 (.067)
widow	-.077 (.092)	.926 (.085)
never married	-.096 (.062)	.909 (.056)
Dutch	.185 (.126)	1.204 (.152)
Family composition		
0 children		
1 child	-.094 (.057)	.911 (.052)
2 children	-.018 (.056)	.983 (.055)
>3 children	-.181 (.073)**	.8355 (.061)
After reform	.207 (.041)**	1.230 (.050)
Chronic conditions		
diabetes	-.127 (.092)	.881 (.081)
stroke	.416 (.114)**	1.516 (.172)
myocardial infarct	-.065 (.111)	.937 (.104)
other serious heart diseases	.033 (.126)	1.034 (.130)
cancer	-.032 (.080)	.968 (.077)
migraine	.051 (.052)	1.052 (.055)
high blood pressure	-.063 (.056)	.939 (.053)
arteriosclerosis	-.128 (.127)	.880 (.111)
asthma	-.141 (.071)**	.869 (.061)
psoriasis	.036 (.125)	1.037 (.129)
chronic eczema	-.060 (.092)	.942 (.087)
dizziness with falling	-.179 (.107)*	.836 (.090)
serious intestinal disorder	.055 (.098)	1.056 (.104)
incontinence	-.011 (.083)	.989 (.082)
arthritis of hips and knees	.338 (.058)**	1.401 (.081)
chronic arthritis	.245 (.0799)**	1.278 (.100)
serious back condition	.888 (.052)**	2.430 (.126)
serious neck or shoulder condition	1.187 (.052)**	3.277 (.171)
serious elbow, wrist or hand disease	.288 (.068)**	1.334 (.091)

Robust standard errors in parenthesis
*= significant at 10 percent level
**= significant at 5 percent level