Utilisation of specialist care in the Netherlands before and after 2006

Effects of education and insurance

Master thesis Health Economics

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Abstract

The investigation in this thesis concluded that education has a significant positive effect on the probability of visiting a specialist in 2004. For 2007 and for the amount of specialist care once someone has visited a specialist no significant effects were found. For someone´s type of insurance in 2004 just a positive significant effect on the amount of specialist care used has been found in 2007. For 2004 no significant effects of type of insurance in 2004 on the probability of care nor significant effects on the amount of care once someone visited a specialist already once, are shown.

The results on education mentioned above are in contradiction with the results of Naaktgeboren (2012). This research has shown that the inequity according to education has increased after the health insurance reform of 2006. The finding of an increase in specialist care utilisation after the reform for people who were privately insured before 2006 was also obtained in this same research and is in line with the findings of this investigation. Both effects were the motive to investigate in the effect of education and insurance on specialist care utilisation to conclude if the goals of cost containment and equal access were met in the new health insurance system.

To model specialist care utilisation predisposing, enabling and need factors are taken into account. Data are obtained from the Survey of Health, Ageing and Retirement in Europe (SHARE project) for the year 2004 (before the system) and 2007 (after the system). A two part Hurdle model is used to estimate both the effects of education and insurance on the probability of visiting a specialist in the previous twelve months and to estimate the effects of education and insurance on the amount of specialist care used once someone has visited a specialist.

This investigation does not confirm the increasing inequity on specialist care utilisation according to education after the health insurance reform which is in line with the objective of equal access of the new health insurance system. The fact that specialist care utilisation has increased after the reform is a negative conclusion for the objectives of the new health insurance system. This conclusion goes against the objective of cost containment.

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1. Introduction

Main goals of the market-oriented health care reform of 2006 are to improve efficiency, equity, cost containment and responsiveness of the system, while equal access is maintained (Schut & Van de Ven, 2005). Questionable is if all goals of the new health insurance system are met. Earlier research has concluded that specialist care utilisation has increased after the changes of the health care insurance system and that inequity according to education in specialist care utilisation has increased after the health insurance reform of 2006 (Naaktgeboren, 2012). These increases are in contradiction with the objectives of the new health care insurance system, so more investigation in the effects of type of insurance and highest education obtained is valuable to conclude if the goals of the new health insurance system are met on the field of specialist care utilisation.

1.1 Objective and relevance

The objective of this thesis is to investigate the effects of someone´s educational level and type of insurance in 2004 on specialist care utilisation in the Netherlands before and after the changes of the health insurance system of 2006. The motivation to analyse the effects on specialist care utilisation is the fact that specialist care is very expensive, compared to other types of health care. Another fact is that specialist visits are fully covered in the basic insurance of the new insurance system. Due to these two facts the objective of this thesis is to investigate specialist care utilisation.

As described above an investigation of Naaktgeboren (2012) has shown a significant increase for specialist care utilisation after the reform (at a 10% significance level). Another conclusion of this research is that inequity according to education has increased after the reform compared to before the reform. Insurance could be an influencing factor on this, because the same investigation shows that civil servants and privately insured people have an increase in specialist care utilisation compared to people with a public insurance on a 10% significance level. More details about the main approach and conclusions of this research can be found in paragraph 2.3.

The effects of insurance and educational level on specialist care will be researched in this thesis. To have clear background information the changes of the new Health Insurance System of 2006 and their effect on health care utilisation will be investigated. Next to this, other factors outside the insurance system will be taken into account, but the emphasis of this thesis lies on differences due to insurance and highest education obtained. The reason why insurance and highest education

obtained will be researched more in detail, is that the conclusions of Naaktgeboren (2012) are in contradiction with the objectives of the health insurance reform. One of the main goals of this new insurance system is cost containment. Two factors which are in line with the objective of cost containment are cheaper treatments and lower health care utilisation. An increasing health care utilisation, as shown above, is not in line with cost containment. Questionable is if the new universal insurance is in line with this goal of cost containment compared to having public insurance, civil servants and private insurances. Another goal of the new insurance system is to improve equal access to care. By having a universal insurance costs will be shared by all citizens of a country, so everyone has the same financial incentive to make use of health care. Next to that the basic insurance includes the same for everyone, so access to health care should be equal to everyone.

If inequity according to education increases after the health insurance reform, equal access is questionable. Because of these questions the effects of education and insurance on specialist care utilisation will be investigated in this thesis using a different dataset to provide further evidence whether the goals of the new insurance system are met on specialist care utilisation.

1.2 Main Research Question

To investigate the problem above a main research question has been framed. The main research question of this thesis is:

What is the effect of someone's education and type of insurance in 2004 on specialist care utilisation in the Netherlands before and after the changes of the health insurance system of 2006?

By answering this main research question research there will be investigated in how someone´s educational level and someone´s type of insurance in 2004 affect specialist care utilisation.

1.3 Structure

To have a more detailed insight on the answer on the main research question several sub-questions have been framed. These sub-questions are described below:

1 What are the changes of the health insurance system of 2006 for specialist care?

2 Which factors could have an effect on specialist care utilisation?

3 What is the effect of highest education obtained on specialist care utilisation before and after the health insurance reform?

4 What is the effect of someone's type of insurance in 2004 on specialist care use before and after the health insurance reform?

The answers of these sub questions jointly lead to the answer on the main research question of this thesis. The four research questions are dedicated to different chapters. Question one will be answered in chapter two, question two is dedicated to chapter three and the third and fourth question are answered in chapter 4 and 5.

2. Health Insurance Reform of 2006

In 2006 the Dutch government enacted the Health Insurance Act. This act should lead to health care which is efficient, accessible and from high-quality. It has brought several changes for the organisation and financing of the health care system. What these changes are and how these affect the utilisation of specialist care is described in the following paragraphs.

2.1 Health insurance reform in general

Before 2006 the Dutch Health Care System was a combination of a statutory sickness fund scheme for the majority of the population and private health insurance for the rest (Maarse & Bartholomée, 2007). Curbing the rapid growth of health care expenditures and increasing solidarity in health insurance are main arguments to introduce the mandatory single private insurance scheme in 2006. In this new system all citizens are required to purchase a basic insurance package from a private insurance organisation (Knottnerus & Ten Velden, 2007). The new insurance system brings an extension of market competition, free choice of health insurers by customers, a standard basic package plus the option to buy a supplementary insurance, open enrolment and premium-setting by a nominal fee and an income-related contribution (Maarse & Bartholomée, 2007).

2.1.1 Health insurance system before 2006

From the beginning of the twentieth century the government tried to arrange health insurance in the Netherlands by law. Until 1941 the health insurance scheme in the Netherlands has been a private system. In 1940 more than 50% of the Dutch citizens were voluntarily insured for health care costs. These citizens were the least fortunate of the society. In 1941 the 'Ziekenfondsbesluit' was implemented, which was applicable until 1966. In 1966 the 'Ziekenfondswet' was implemented. Health insurances were offered on a public basis (sickness fund) to people with an income below a certain boundary. In 2004 this is a yearly income of € 32.600 for people of 65 years and younger (Ministry of health, welfare and sport, 2004). People with a higher income could still insure for their health care expenses by a private insurance. For this private insurance there was a social premium- and acceptance policy, which was not arranged by law. Risk selection and premium differentiation did almost not occur. Later on private insurers started to offer younger people better premiums. Insurance became not payable for the elderly. In 1986 the sickness fund insurance became mandatory for people with an income under this certain boundary. All others could buy a private health insurance. Next to their other packages private insurers had to offer a standard package with the same value as the policies of the public insurances. The private insurers were obliged to offer

these to high-risk groups and could not refuse these groups. The government set the premium for these packages and paid a solidarity surcharge for the losses of the insurers. The main element of the 'Ziekenfondswet' is that there is a dichotomy in insurance (Hamilton, 2005). Before 2006 63% of the population were covered by the statutory health insurance scheme operated by sickness funds and 37% were covered by private health insurance (Maarse & Bartholomée, 2007).

2.1.2 Health insurance system after 2006

After implementing the 'Ziekenfondwet' in 1966 and the mandatory sickness funds insurance, national health care expenses had increased strongly. This was the motive to implement a new insurance system which would lead to efficiency, accessible and high-quality of health care.

On 1 January 2006 the Dutch government enacted the Health Insurance Act. In this act every person who legally lives or works in the Netherlands is obliged to buy individual health insurance whose benefits are specified by law (Enthoven & van der Ven, 2007). These individual health insurance packages are offered by private insurance companies. About 98.5% of all eligible Dutch people have enrolled (Enthoven & van der Ven, 2007).

The base of the Health Insurance Act of 2006 is described in the Dekker Report of 1987. The Dekker report includes a strategy of reforms which involves the introduction of a universal insurance arrangement covering virtually all health services and administered by competing insurance organizations (Ham & Brommels, 1994). Another key element of the Dekker proposal was that insurers should contract selectively with health care providers, which in the Netherlands are largely private. Dekker argued that selective contracting by insurers with providers would create a market on the supply side, which would increase efficiency and raise standards of care (Ham & Brommels, 1994).

To achieve the goals set in the Dekker Report, several elements are implemented in the health insurance system. These are a nominal premium, an income related premium, government grant, risk equalization fund and health care allowance (Hamilton, 2005).

Fifty per cent of the premium of the health insurance package is paid by a nominal premium directly to the insurer. In this way consumers are aware of the fact that health care costs money. This premium could differ between insurers, but the insurer is not allowed to ask different premiums to different people for the same package. Premium differentiation is prohibited. Just a collective discount can be offered to a collectivity. People with an income under a certain boundary receive an allowance from the government, to make insurance affordable for them.

Next to the nominal premium an income related premium should be paid by the employer. This contribution will be deposited to the health insurance fund. The government contributes financially to this health insurance fund as well. They deposit money for all children under 18 years, which all have a complementary health insurance. This health insurance fund was established to pay insurers a risk equalization contribution for consumers with a high risk. For consumers with a low risk the insurer has to deposit a risk equalization contribution. In this way all types of consumers should bring the same profit for the insurer. Without this system compulsory enrolment of consumers by insurers would not be possible. (Hamilton, 2005)

Another element of the new insurance system is that insurers are allowed to make profits. The elements above ensure on beforehand that every consumer could bring the same profit for the insurer. Therefore selective contracting of the providers has been introduced. Insurers could contract the providers with the best quality and price option to ensure high-quality of care and make most profit out of it (Knottnerus & Ten Velden, 2007).

2.2 Organisation and financing of specialist care utilisation before and after 2006

Before 2006 specialists were paid by the sickness funds by a fee for service system. Private insurers reimbursed the patients. Throughout this system the price, volume, and capacity of both publicly and privately financed services are closely regulated by the Dutch government (Hurst, 1991). Specialist consultations were covered by sickness funds insurance only after referral of the general practitioner (Hamilton, 2005). For privately insured people it depended on the type of insurance they had if specialist care is covered and whether they had a gatekeeper.
In 2005 a new financing system for hospitals is implemented. Hospitals do now declare their costs by 'Diagnose-Behandel-Combinaties' (Diagnose-treatment-combinations) for about 32.000 diagnoses (Zorgvisie, 2010). A DBC typifies the methodology in which the diagnosis is linked to the care provided. The corresponding costs of the hospital and the specialists are declared to these specific DCB-groups (Linders & van Hekesen-van Bruggen). After the changes of 2006 specialist care is still covered by insurance, only after referral of the general practitioner.

There are not many differences in the way of financing specialist care utilisation before and after 2006. The main difference is that people with a private insurance did decide and buy their own coverage and the way of financing health care could be different than the consumers with a sickness fund insurance. There is no difference in financing specialist care between people with sickness funds insurance before 2006 and people with the compulsory insurance after 2006.

A difference of the new compulsory insurance compared to the old sickness funds insurance is, that every insured person has a deductible of € 220 in 2012 (Rijksoverheid, 2012). It is possible to choose a higher deductible and receive a discount on the health insurance premium. Before 2006 private insurers could offer deductibles to their consumers, but people who were insured by sickness fund did not have a deductible. Deductibles were implemented in the new health insurance system (van Leeuwen et al, 1997).

2.3 Changes in health care utilisation after the health insurance reform

Naaktgeboren (2012) has investigated in health care utilisation in the Netherlands before and after the health insurance reform of 2006. Health care utilisation was analysed by measuring the number of visits to health care workers during the last twelve months. Several types of health care utilisation have been researched, including specialist visits. The following paragraphs show the main approach, data and results of this investigation.

The data used in this investigation was obtained from the Permanent Onderzoek Leefsituatie (POLS) which is random sample data with about 10,000 respondents of all ages every year since 1981. To investigate health care utilisation in the Netherlands the models control for self-reported health status, chronic conditions, demographic factors and social factors. Data was used from two years before (2004, 2005) and two years after the health insurance reform (2006, 2007).

To analyse the data several ordered logit regression models have been used. The first model investigated whether the overall levels of health care use changed after the reform. This model shows a significant increase for specialist visits after the reform (at a 5% significance level). Even when a second model is created, which controls for demographic and health factors, specialist care utilisation shows an increase after the reform on a 10% significance level.

A third model includes interaction variables with education and a variable after the reform to assess the results in health care utilisation for different education levels. This model shows that from 2004 until 2007, people with a higher educational level went significantly more often to a specialist than people with the lowest educational level. Next to that the inequity in specialist care utilisation according to education has increased after the reform. This means that the difference in utilisation between higher en lower educated people is larger after the reform.

To show the differences in utilisation respectively to people with civil servants and private insurance before the reform compared to people who had public insurance before the reform a fourth model has been created including the variables civil servants and private insurance. This model assesses that civil servants and privately insured people have an increase in specialist care utilisation compared to people with a public insurance on a 10% significance level. The investigation does not show the results of the educational variables, so questionable is if parts of education effects are taken away by including the insurance variables.

The last model includes the variables care allowance, deductibles and supplementary insurance. Just information from the year 2006 is used. A conclusion of this model is that after the reform people with higher deductibles went significantly (at a 5 percent level) less often to a specialist.

The conclusions above show that specialist care utilisation has increased after the reform and the difference of specialist care utilisation between higher en lower educated people is larger after the reform. Another interesting conclusion is that civil servants and privately insured people have an increase in specialist care utilisation after the reform compared to people with a public insurance on a 10% significance level. This could mean that the type of insurance after the reform could be an influencing factor on increasing health care utilisation which is in contraction with the goals of the new insurance system. The goals of cost containment and equal access of the new insurance system are not met according to the conclusions above.

To contribute to the evidence of the effects of education and insurance on specialist care utilisation and the evidence if goals of the new insurance system are met, the effects of education and insurance type in 2004 will be investigated in detail in this thesis. Comparisons of levels of use for each education and insurance group will be made.

3. Determinants of health care utilisation

Health care utilisation can be viewed as a type of individual behaviour. Factors which have an impact on health care utilisation are characteristics of the individual himself, characteristics of the environment in which he lives and-or some interaction of these individual and societal forces (Moore, 1969). In this chapter health care utilisation in general will be described. If information is available specialist care is emphasized.

3.1 Health care utilisation

Health care utilisation is affected by many factors from both the demand and supply side of health care. Health care demand determinants can be divided in health factors, socio-economic factors and demographic factors. From the supply point of view utilisation can be affected by regulation, financing and delivery of health care (Bolin et at, 2007).

According to the framework of health services utilisation of Anderson and Newman (1990s) access to and use of health care is considered to be a function of three characteristics: predisposing factors, enabling factors and need factors. All types are described in the next paragraphs.

3.1.1 Predisposing factors

Predisposing factors are also called socio-cultural characteristics of individuals that exist prior to their illness. Factors related to social structure, health beliefs and demographic factors are types of predisposing factors (Anderson and Newman, 1990s).

Demographic factors which have an influence on the individual's health care utilisation are age, gender, marital status and family size (de Boer, Wijker & de Haes, 1997). Overall age has a positive effect on health care utilisation. In general people in a higher age category make more and use of health care services. Next to use of physician services and hospital services, elderly use more types of health care such as nursing home and home care services (Diehr & Evashwick, 1984). Gender is also one of the demographic factors, which has an effect on health care utilisation. Women make more use of health care than men, even when the effects are adjusted for specific women health care services, such as gynaecology (Briscoe, 1987; Corney, 1990; Green & Pope, 1999; Ladwig, Marten-Mittag, Formanek & Dammann, 2000; Svarstad, Cleary, Mechanic & Robers, 1987). Women tend to have more minor illnesses and nonfatal chronic diseases, while men have the opposite (Lahelma, Martikainen, Rahkonen & Silvertoinen, 1999; Wingard, Cohn, Kaplan, Cirillo & Cohen, 1989). Several

studies have proven that there is a difference in health care utilisation by marital status. In comparison to married people, the divorced and widowed individuals appear to have a high health care utilisation, and the never married have a low health care utilisation (Verbrugge, 1979; Carter & Glick, 1970; Anson, 1989; Morgan, 1980; CBS Netherlands Health Interview Survey 1981-1991).
Family size has an effect on health care utilisation which could be caused by household income. Because of having a greater household income, the additional disposable income available for increased premiums or uninsured medical care is higher, which is related to an increase of health care utilisation (Leclere, Jensen & Biddlecom, 1994).

Factors related to social structure are education, occupation, ethnicity, social networks and culture (Anderson and Newman, 1990s). Traditionally social structure was just measured by education, occupation and ethnicity. Later on social networks, social interactions and culture became more important (Bass & Noelker, 1987; Guendelman, 1991; Portes, Kyle & Eaton, 1992).
Education, occupation and ethnicity factors are easy to measure. For example studies have shown that there are some differences by race and ethnicity in health care access and utilisation and in health status and outcomes for adults with type 2 diabetes (Harris, 2001). People with different ethnical backgrounds have differences in health care utilisation. Social networks and culture can be measured less easily. However, there are statements that people in large non-dispersed social networks were associated with increased use of health care (Coe, Wolinsky & Miller, 1984).
Education is another predisposing factor of health care utilisation related to social structure. Because of the importance of this factor in the main research question, education will be described more in detail in paragraph 3.2.

Health beliefs consist of attitudes, values and knowledge that people have concerning and towards the health care system (Anderson and Newman, 1990s). These health beliefs do not always accurately reflect the individual's physical health. Individuals have different health perceptions, even when they have the same level of general health. Why these health perceptions differ among individuals in not well understood (Mechanic, 1978). Health beliefs are influenced by sociocultural factors as well as demographic factors (Szpalski, Norden, Skovron, Melot & Cukier, 1995). For example, women have different health beliefs than men. They have been found to be more predisposed to report their health as poor (Bertakis, Azari, Helms, Callahan, Robbins, 2000).

3.1.2 Enabling factors

Someone's ability to obtain care is influenced by enabling factors. Examples of these factors are income, insurance, social support and geographic factors (de Boer et al, 1997). These factors could be divided in two groups; factors which have an influence on the access to care and factors which have an influence on the ability to pay care.

Access to care can be divided in two main aspects, organisational and geographical accessibility.
Organisational factors of accessibility include the distribution and organization of manpower and facilities. A study in the United States (Freeman, Blendon, Aiken, Sudman, Millinix & Corey, 1987) has concluded that a growing supply of physicians and more and better technologies led to significant increases in use of health care per person. This shows that organisational factors have an effect on health care utilisation.
Geographical accessibility is the function of time and distance that must be traversed to receive care (Aday & Andersen, 1974). There are also differences in types of health care. For example a study in the US has shown that the accessibility and availability of physical health physicians is greater than the accessibility and availability of mental health specialists (Fortney, Rost & Warren, 2000).

Ability to pay is a complex empirical question. Usually this is measured by income or household income. Susceptible is that higher-income groups may have better or quicker access to certain services, because they are more likely to have for example a supplementary insurance coverage (van Doorslaer et al, 2000). Although no evidence has been found for income-related inequity in the probability of a visiting a general practitioner in European countries (Van Doorslaer, Koolman & Jones, 2004). A reason for this could be the many differences in household priorities, resources and vulnerability of households (Russell, 1996).
Another reason why income does not show an effect on health care utilisation could be the existence of insurance. Insurance coverage has a positive effect on outpatient utilisation (Buchmueller, Grumbach, Kronick & Kahn, 2005). Individuals having their health care expenses covered have a higher health care use. Because of the importance of insurance in this study, the effect of insurance will be explained more in detail in paragraph 3.2.

3.1.3 Need factors

Need factors are the most important predictors of use of physician services and hospitalisations (Diehr et al, 1984) combined with predisposing and enabling factors. Perceived factors, such as self-assessed health are common used factors which help to understand the care-seeking behaviour of an

individual. Next to that it could be very useful to look at evaluated factors, the more objective factors, such as having a specific disease, to explain the kind and amount of treatment that will be provided after an individual has presented to a medical care provider (Anderson, 1995).

To illustrate how important the need factor of health care utilisation is, in the Netherlands 25 % of the citizens has either one or more chronic diseases. 57% of these people are in the age category of 75 years and older. Individuals with a chronic disease make more and longer use of health care, such as visiting general practitioners or visiting specialists (Hoeymans, & Schellevis, 2009).

3.2 Effect of education and insurance type

The main subject of this thesis is how the effect of education and insurance is on health care utilisation due to the changes of the health insurance reform. Therefore the effect of education and insurance type will be described more in detail in this paragraph. In paragraph 3.2.3 the differences of these effects of education and insurance are described in combination with the changes of the health insurance reform of 2006.

3.2.1 Education

Results of the Italian national health survey are that the better educated population visit general practitioners and hospitals less frequent, but various specialist outpatient consultations are more frequent among the better educated population (La Vecchia, Negri, Pagano & Decarl, 1987). La Vecchia et al (1987) do also conclude that better educated people experience lower risks of several chronic diseases. Higher educated people have more knowledge about prevention of diseases (for example diabetes and obese). A result of Zgibor et al (2000) is that patients receiving specialist care are more likely to be female, have an education level beyond high school and have health insurance. A Canadian study confirms the result of higher educated people visiting specialists more often even when adjusted for health factors; Canadians with lower incomes and fewer years of schooling visit specialists at a lower rate than people with moderate or high income and higher levels of education attained (Dunlop, Coyte & McIsaac, 2000).

The results above show that higher educated people make more use of specialist care, although insurance could have an impact on this. Higher educated people often earn more, so they are more likely to buy health insurance. The studies above do not control for having insurance and the type of insurance. The model in chapter four does control for type of insurance in 2004 to control for factors of insurance in educational levels and other variables.

3.2.2 Health insurance

Health insurance may have a positive effect on health care utilisation. Having insurance decreases the financial barriers to use health care. For example in Taiwan, the number of overall physician visits per person increased after the implementation of universal insurance. This increase is smaller for higher income individuals than for others (Cheng & Chiang, 1997). This increase in health care utilisation for people being fully insured compared to people not being insured could run up to 40% (Folland, Goodman & Stano, 2010).

The existence of coinsurance decreases the financial barriers of using health care even more than just having basic insurance. The moral hazard of using more health care increases, because consumers are not price sensitive anymore. Having a coinsurance takes away the awareness of the true resource costs of the care someone consumes (Folland, Goodman & Stano, 2010). Implementing a deductible could be used to take away this increase in health care use. When the deductible is large enough, individuals will self-insure and consume the amount of care they would use without a health insurance (Folland, Goodman & Stano, 2010).

Another side of moral hazard is supplier induced demand. Health insurance could be an incentive for physicians to provide more care than necessary because of financial interests. Information asymmetry makes the patient not know how much care is necessary, so the physician can generate overconsumption. For example if physicians are financed on a fee-for-service basis, this forms an incentive for suppliers to induce demand (Sorensen & Grytten, 2007).

3.2.3 Health insurance reform

Before the health insurance reform of 2006 there were significant differences in health care utilisation between publicly and privately insured individuals. After adjusting the results for age and gender, the individuals publicly insured visited the general practitioner 10 to 20 % more than the privately insured individuals (Reijneveld, 1995; Van Vliet & Van de Ven, 1983). Consumers with a public insurance have approximately 45% more days in hospital compared to consumers with a private insurance (Van Vliet & Van de Ven, 1983). This shows that insurance did have an effect on health care utilisation before 2006.

After the changes of the health insurance reform of 2006 inequity in specialist care utilisation according to education has increased (Naaktgeboren, 2012). Differences in specialist care use are also shown by type of insurance of 2004. After the reform there is a significant increase in the number of specialist visits for people who were privately insured compared to the number of visits of people who were publicly insured (Naaktgeboren, 2012). Before the insurance reform no significant differences were found.

4. Methods

To analyse what the effects of education and health care insurance are on specialist care utilisation due to the health insurance reform of 2006, several research methods have been applied. The data used and which methods have been applied, are described in this chapter.

4.1 Data

For this investigation data were obtained from the Survey of Health, Ageing and Retirement in Europe (SHARE project). This dataset is a panel dataset in which the respondents were interviewed in two different waves. The first wave was from May 2004 until December 2004 and respondents in the second wave were interviewed between January 2007 and August 2007. These two waves give data about specialist utilisation before the health care reform (2004) and after the reform (2007). The total sample consists of 5,640 Dutch respondents.

The SHARE dataset has different advantages and limitations. The biggest advantage of the SHARE dataset is that the data is longitudinal. With longitudinal data the same person is interviewed in the different waves, so type of insurance in 2004 of this person is known for both waves.
One of the limitations of using the SHARE dataset is that the majority of the respondents has an age of 50 years and older. This could lead to biased results of the research, because older people could have different motives for using specialist care. Another limitation of this dataset is that just two waves are available. Because of this, differences over a short period can only be measured. Therefore it is questionable if all differences measured are due to the health insurance reform or that specific differences will not be measured yet, because they occur on the long term.
These limitations could affect the results in a negative way. After weighting the advantages and limitations, the advantage of using longitudinal data exceeds the limitations, so the SHARE data set is used in this research.

4.2 Variables

Visits to a specialist is the dependent variable of this investigation. Respondents are asked how many times they saw or spoke to a medical doctor in the previous twelve months. Another question was how many of these visits were with a general practitioner. The remainder of the total visits minus the visits with a general practitioner is used as a measure of specialist visits (Bago d'Uva, Lindeboom, O'Donnell, van Doorslaer, 2011). 5,582 respondents answered the question about visiting a medical doctor and about visiting a GP. The maximum number of specialist visits by a respondent in 98 times and 3,211 respondents did not visit a specialist at all in the previous twelve months.

To investigate the effect of education and insurance before and after the changes of the health insurance reform, the model controls for several predisposing, enabling and need factors.
The description of these factors are shown in table 1 till 3 . The variables are categorized per type of variable, predisposing, enabling and need variables. For every variable the explanation, type of variable and descriptive statistics separately for wave 1 and 2 are shown.

As shown in table 1 on the next page the predisposing factors for this model are being a female, age, having a partner, household size, education and whether the respondent is Dutch. An interesting fact is that the average age of the respondents is 63.6 years. As mentioned before the survey was designed for people with an age of 50 years and older. A few respondents, only 148, are younger. The other predisposing factors from chapter three are social networks, culture and values and knowledge about the health care system. These factors are hard to measure and no information about these factors is available within the SHARE dataset, so the model does not control for these influences. Research has shown that the age effect is larger for women than for men (Naaktgeboren, 2012), so an interaction variable for age and being a female has been included in the model, to control for this effect. To measure the difference in effect of education and insurance in different waves, an interaction variable of education and an interaction variable of insurance with the two different waves has been included into the model to provide further evidence if the effects before and after the health insurance reform differ.

Variable	Explanation	Type of variable	Desciptives wave 1	Desciptives wave 2
Predisposing variables				
Female	Whether the respondent is a male or a female	0 = male 1 = female	Male: 45.9% Female: 54.1%	Male: 45.5% Female: 54.5%
Age	The age of the respondents	Continuous: 24 – 99 years	Mean: 63 yrs	Mean: 64 yrs
Partner	The marital status of the respondents	1 = living with a spouse or partner 2 = living as a single	Partner: 81.8% Single: 18.2%	Partner: 80.3% Single: 19.7%
Household size	The household size of the respondent	Continuous: 1 – 8 persons	Mean: 2.1 persons	Mean: 2.1 persons
Education	The type of education of the respondent	1 = no education and primary education (ISCED 0 or 1) 2 = Lower secondary or second stage of basic education (ISCED 2) 3 = Upper secondary education (ISCED 3 or 4) 4 = Recognized third-level education, which includes higher vocational education and university degree (ISCED 5-6)	1 = 16.7% 2 = 40.3% 3 = 23.2% 4 =19.8%	1 = 14.4% 2 = 38.2% 3 = 23.8% 4 = 23.6%
Dutch	Whether the respondent is Dutch or not	0 = non-Dutch 1 = Dutch	Non-Dutch: 6.3% Dutch: 93.7 %	Non-Dutch: 5.4% Dutch: 94.6%

Table 1: Predisposing variables

Table 2 on the next page shows the enabling factors taken into account in this model. These factors are wealth and insurance type of the respondent in 2004. Information of income was not available for the respondents, so the models control for the variable wealth to say something about the respondent's ability to pay health care. The variable wealth is measured by the respondents' assets minus the liabilities in logarithms. There are many zeros and negative values for wealth, so an extra variable of the effect of wealth being zero is included in the model. This dummy variable shows high values for no wealth. This number is high, because there are many missings for log wealth because of the many negative and zero values for the wealth variable. To provide further evidence whether wealth and no wealth has a different influence in the different waves and to avoid that the interactions of education and insurance are picking up changes in wealth effects, an interaction variable has been included in the model. This interaction variable did not make a difference in the main results, so it has been left out. For this reason just the logarithm variable of wealth and a dummy variable of no wealth are included in the model.

Because of the universal insurance in 2007, the basic insurance would not make a difference in ability to pay between people. In 2004 there was a difference in ability to pay and insurance did matter in this case. The variable used in this model is insurance2004, which gives information about the respondent's ability to pay in 2004 and is the type of insurance the respondent had in 2004. This question is just asked in wave 1, so there is no information about the respondents who entered the dataset in the second wave. The variable insurance2004 did have a little category with only 60 respondents having another insurance than the two types mentioned above. This insurance category is considered as missing values, because it was too little to say something about.

Other variables which have an influence on ability to pay are supplementary insurances and deductibles for both wave 1 and 2. These variables were added to the model, but did not show any significant results, so they have not been implemented in the final model. The marginal effects and the significances of these variables for the two waves can be found in appendix 1. These effects are a result of a negative binominal model for specialist care utilisation. Other enabling factors identified in section 3.1.2 above are social support and geographic factors. The dataset does not contain information about these factors, so these are excluded from the model. To measure the difference in effect of insurance in different waves, an interaction variable of insurance with the wave 2 dummy has been included into the model to provide further evidence whether the effects differ.

Variable	Explanation	Type of variable	Desciptives wave 1	Desciptives wave 2
Enabling factors				
Wealth	Respondents' assets minus liabilities	In logarithm	Mean: 13.8	Mean: 15.8
No Wealth	If the respondents' assets minus liabilities is equal to zero	0 = if wealth is not equal to 0 1 = if wealth is equal to 0	0 = 14.3 % 1 = 85.7 %	0 = 43.8 % 1 = 56.2 %
Insurance 2004	How the respondent was insured in 2004	1 = private insurance 2 = public insurance (sickness fund)	Private: 43.4 % Public: 56.6%	Private: 44.5 % Public: 55.5%

Table 2: Enabling factors

To control for the effect of the respondent´s need, many factors are included in this model. The need factors can be found in table 3 on the following pages. The table includes all need factors used in the model. The variable self-perceived health is measured by asking respondents how they feel about their health. The variable obese was derived from questions about height and weight. This variable included many missing values, because the question about obese was only been asked to respondents who were new in the data set. Therefore the values for obese for wave 2 have been adjusted with the values of the same person in wave one. After adjusting just a few missing values were left, which were not taken into account in the model. The variables orientation and numeracy are categorical variables. Orientation is measured by questions about the respondent's orientation to date, month, year and day of week. These scores combined show a score between 0 and 4 points. Numeracy is measured on the same way. A score between 0 and 4 shows how well someone answered the questions about numeracy. All need factors in table 3 help the model to control for need influences.

Variable	Explanation	Type of variable	Desciptives wave 1	Desciptives wave 2
Need factors				
Self-perceived health	The respondents rate their own health from poor to excellent	1 = excellent 2 = very good 3 = good 4 = fair 5 = poor	1 = 12.9% 2 = 18.0% 3 = 42.9% 4 = 22.0% 5 = 4.2%	1 = 12.2% 2 = 15.4% 3 = 43.2% 4 = 24.4% 5 = 4.8%
Obese	Whether the respondent has obese or not	0 = not obese 1 = obese	Not obese: 85.3% Obese: 14.7%	Not obese: 86.2% Obese: 13.8%
Maximum grip strength	The measurement of maximum of grip strength	Continuous: 3 – 80 scale	Mean: 36.4	Mean: 36.0
Number of limitations with activities of daily living	Number of limitations with activities of daily living	Continuous: 0 – 6 limitations	Mean: 0.15	Mean: 0.133
Mobility	Number of limitations with mobility, arm function and fine motor function	Continuous: 0 – 10 limitations	Mean: 1.14	Mean: 1.05
Any mobility symptoms	Whether the respondent has any symptoms which affect their mobility	0 = no symptoms 1 = symptoms	No sympt: 83.1 % Symptons: 16.9%	No sympt: 84.3% Symptons: 15.7%
Orientation	Orientation in time (score of date recall test)	0 = bad 1 2 3 4 = good	Mean: 3.7	Mean: 3.8
Numeracy	The numeracy score (mathematical performance)	1 = bad 2 3 4 = good	Mean: 2.6	Mean: 2.7
Back pain	Whether the respondent is bothered by pain in back, knees, hips or other joint	0 = not bothered 1 = bothered	0 = 61.2% 1 = 38.8%	0 = 59.0% 1 = 41.0%

Sleeping problems	Whether the respondent is bothered by sleeping problems or not	0 = no problems 1 = problems	0 = 85.9% 1 = 14.1%	0 = 85.2% 1 = 14.8%
Sleeping drugs	Whether the respondent takes drugs for these problems	0 = no medication 1 = medication	0 = 94.9% 1 = 5.1%	0 = 95.1% 1 = 4.9%
Depression	Depression scale EURO-D	Continuous: 0 – 11 points	Mean: 2.0	Mean: 1.9
Breathlessness	Whether the respondent is bothered by breathlessness	0 = not bothered 1 = bothered	0 = 92.3% 1 = 7.7%	0 = 91.0% 1 = 9.0%
Cough	Whether the respondent is bothered by persistent cough	0 = not bothered 1 = bothered	0 = 94.2% 1 = 5.8%	0 = 93.9% 1 = 6.1%
Heart	Whether the doctor has told that the respondent had heart attack	0 = no heart attack 1 = heart attack	0 = 89.2% 1 = 10.8%	0 = 90.6% 1 = 9.4%
High blood pressure	Whether the doctor has told that the respondent had high blood pressure or hypertension	0 = no high blood pressure 1 = high blood pressure	0 = 75.2% 1 = 24.8%	0 = 73.6% 1 = 26.4%
High cholesterol	Whether the doctor has told that the respondent had high blood cholesterol	0 = no high cholesterol 1 = high cholesterol	0 = 85.2% 1 = 14.8%	0 = 84.3% 1 = 15.7%
Stroke	Whether the doctor has told that the respondent had stroke	0 = no stroke 1 = stroke	0 = 95.9% 1 = 4.1%	0 = 96.9% 1 = 3.1%
Diabetes	Whether the doctor has told that the respondent had diabetes or high blood sugar	0 = no diabetes 1 = diabetes	0 = 92.3% 1 = 7.7%	0 = 91.1% 1 = 8.9%
Lung	Whether the doctor has told that the respondent had a chronic lung disease	0 = no lung disease 1 = lung disease	0 = 93.6% 1 = 6.4%	0 = 94.3% 1 = 5.7%
Asthma	Whether the respondent had asthma or not	0 = no asthma 1 = asthma	0 = 95.8% 1 = 4.2%	0 = 95.7% 1 = 4.3%
Arthritis	Whether the doctor has told that the respondent had arthritis	0 = no arthritis 1 = arthritis	0 = 90.5% 1 = 9.5%	0 = 89.8% 1 = 10.2%
Osteoporosis	Whether the doctor has told that the respondent had osteoporosis	0 = no osteoporosis 1 = osteoporosis	0 = 93.1% 1 = 6.9%	0 = 92.9% 1 = 7.1%
Cancer	Whether the doctor has told that the respondent had cancer	0 = no cancer 1 = cancer	0 = 94.0% 1 = 6.0%	0 = 96.0% 1 = 4.0%

Stomach	Whether the doctor has told that the respondent had stomach or duodenal ulcer, peptic ulcer	0 = no stomach ulcer 1 = stomach ulcer	0 = 95.0% 1 = 5.0%	0 = 98.0% 1 = 2.0%
Parkinson	Whether the doctor has told that the respondent had Parkinson disease	0 = no Parkinson 1 = Parkinson	0 = 99.5% 1 = 0.5%	0 = 99.4% 1 = 0.6%
Cataracts	Whether the doctor has told that the respondent had cataracts	0 = no cataracts 1 = cataracts	0 = 93.4% 1 = 6.6%	0 = 94.6% 1 = 5.4%
Fracture	Whether the doctor has told that the respondent had a hip fracture or femoral fracture	0 = no fracture 1 = fracture	0 = 98.1% 1 = 1.9%	0 = 99.2% 1 = 0.8%
Other chronic diseases	Whether the doctor has told that the respondent had other chronic diseases	0 = no other chronic diseases 1 = other chronic disease	0 = 82.7% 1 = 17.3%	0 = 84.2% 1 = 15.8%

Table 3: need factors

4.3 Methods

The program STATA/SE was used to analyse the effects of the independent variables on specialist care utilisation. Two different methods for count data have been used to analyse the effects. These models are the Negative Binomial model and the Hurdle model. Using the Negative Binomial model, the average marginal and incremental effects on the expected number of specialist visits can be calculated. The negative binomial model is a count data regression model. The Hurdle model allows for the count measure of health care utilisation to be a result of two different decision processes. The first part of the model models the decision to seek care and the second part models the amount of care used for the individuals who seek care. This can be interpreted as a model where the patient (patient-level) decides to seek care (first part of the model) and once initial contact is made the physician (site-level) has an influence on how much care will be used (Kim 2011). Depending on the results, the Hurdle model is often preferred above the Negative Binomial model, because this last model is not able to account for the many 0 specialist visits, even after it allows for over dispersion. As described above the hurdle model makes a distinction between the probability of visiting the specialist and the amount of health care used. When looking at the significances of the variables in both the negative binomial model and the hurdle model, there are not many differences. The effects in the Hurdle model are similar to the effects of the negative binomial model. When this is the case, the Hurdle model is the preferred model to use in this investigation. For this reason the Hurdle model will be used by researching the effects of education and insurance on specialist care utilisation. The marginal effects of the Negative Binomial model can be found in appendix 2.

The Hurdle method consists of a logit model for the probability of any visits and a truncated-at-zero negative binomial II model for the count of positive visits (Grootendorst, 1995; Gurmu 1998; Winkelman, 2004). In the following equation y_i is the number of visits to the specialist made by individual i in the last 12 months and $I_i = 1\ (y_i > 0)$, where 1(·) is the indicator function. The probability of observing a number of specialist visits is (Gurmu 1998; Winkelman, 2004):

$$f(y_i) = (1 - f_{1i})^{1-I_i}\{f_{1i}\, f_T\,(y_i\,|y_i > 0)\}^{I_i}$$

Where

$$f_{1i} = P(y_i > 0;\ \beta_1|X_1) = \ \lambda_{ii}\,/(1 + \lambda_{1i})\,,$$

$$f_T\ (y_i|y_i > 0) = \ f_2\,(y_i)/\{1 - f_2\,(0)\},$$

$$f_{2i} = P(y_i; \alpha, \beta_2 | X_i) = \frac{\Gamma(\alpha^{-1} + y_i)}{\Gamma(\alpha^{-1}\Gamma(y_i + 1)} \left(\frac{\alpha^{-1}}{\alpha^{-1} + \lambda_{2i}} \right)^{\alpha^{-1}} \left(\frac{\lambda_{2i}}{\lambda_{2i} + \alpha^{-1}} \right)^{y_i},$$

$\lambda_{Si} = \exp(X_i \beta_S), s = 1,2, \Gamma(\cdot)$ is the gamma function and α>0 denotes and over dispersion parameter that is estimated. The assumption is made that both parts of the model are stochastically independent.

Implementing the variables in the model above results in the model on the next page.

$X_i\beta_S =$

$$\begin{aligned}
&\beta_{1s} * female_i + \beta_{2s} * age_i + \beta_{3s} * age_i * gender_i + \beta_{4s} * living\ as\ a\ single_i + \beta_{5s} * household\ size_i \\
&+ \beta_{6s} * Dutch_i + \beta_{7s} * log_{wealth\,i} + \beta_{8s} * log_{nowealth\ i} + \beta_{9s} * very\ good\ health_i \\
&+ \beta_{10s} * good\ health_i + \beta_{11s} * fair\ health_i + \beta_{12s} * poor\ health_i + \beta_{13s} \\
&* being\ obese_i + \beta_{14s} * maximum\ grip\ strength_i + \beta_{15s} * number\ of\ l_simitations_i \\
&+ \beta_{16s} * mobility_i + \beta_{17s} * any\ mobility\ symptoms_i + \beta_{18s} * Orientation1_i + \beta_{19s} \\
&* Orientation2_i + \beta_{20s} * Orientation3_i + \beta_{21s} * Orientation4_i + \beta_{22s} * Numeracy2_i \\
&+ \beta_{23s} * Numeracy3_i + \beta_{24s} * Orientation4_i + \beta_{25s} * Backpain_i + \beta_{26s} \\
&* Sleeping\ problems_i + \beta_{27s} * Sleeping\ drugs_i + \beta_{28s} * Depression_i + \beta_{29s} \\
&* Breathlessness_i + \beta_{30s} * Cough_i + \beta_{31s} * Heart_i + \beta_{32s} * High\ blood\ pressure_i \\
&+ \beta_{32s} * High\ cholesterol_i + \beta_{34s} * Stroke_i + \beta_{35s} * Diabetes_i + \beta_{36s} * Lung_i \\
&+ \beta_{37s} * Asthma_i + \beta_{38s} * Arthritis_i + \beta_{39s} * Osteoporosis_i + \beta_{40s} * Cancer_i + \beta_{41s} \\
&* Stomach_i + \beta_{42s} * Parkinson_i + \beta_{43s} * Cataracts_i + \beta_{44s} * Fracture_i + \beta_{45s} \\
&* Other\ chronis\ diseases_i + \beta_{46s} * Education2_i + \beta_{47s} * Education3_i + \beta_{48s} \\
&* Eudation4_i + \beta_{49s} * Education2_i * wave\ 2_i + \beta_{50s} * Education3_i * wave\ 2_i + \beta_{51s} \\
&* Eudation4_i * wave\ 2_i + \beta_{52s} * Public\ insurance_i + \beta_{53s} * Public\ insurance_i \\
&* wave\ 2_i + \beta_{54s} * wave\ 2_i + \varepsilon
\end{aligned}$$

S = 1, 2

Just the signs of the coefficients of the model above can be interpreted. To look at the magnitude of the effects of the different explanatory variables, marginal effects will be shown. The model itself includes variables for education and insurance either in 2004 and 2007, but the marginal effects of education and insurance per wave will be presented as well to have clear information about how these effects have changed over time. Interaction variables for education and insurance2004 have been included in the model to distinguish the results for these variables before and after the health insurance reform.

Some of the variables in this model do not show a significant effect on specialist care utilisation. The reason why they are still in the model is that there has been tested for joint significance. Some of the variables were jointly significant, others were not. Therefore a smaller model without these variables has been compared to the complete model shown above. This did not result in a better explanation of the effects of education and health insurance on specialist care utilisation. The results of the marginal effects of this smaller model can be found in appendix 3. The marginal effects for education and insurance are similar to the effects of the complete model used in the following paragraphs. An interesting effect is the effect of insurance in wave 1. This effect shows that people who were privately insured visited the specialist more often in wave 1 than people with a public insurance. A reason for this could be that the model includes less health variables, so the insurance effect may also partly capture health effects. People with public insurance have a lower Social-Economical-Status than privately insured people. Evidence has shown that people with a lower Social-Economical-Status are less healthy (Crombie et al. 1989; Curtis 1990).

The model on the previous page is similar to the model of Naaktgeboren (2012), but there are some differences in explanatory variables. The number of health variables is in the model of Naaktgeboren three times smaller than the model on the previous page. All other variables are the same, except for wealth. The model on the previous page includes wealth, the model of Naaktgeboren includes a variable income. Because of using more health variables, this could lead to differences in results. To control for this fact a more similar model to the model of Naaktgeboren has been introduced. This model includes fewer variables. Just ten health variables are used in this model and wealth is taken out. The marginal effects of this model are shown in appendix 4. This model does not show differences of the effects of education and insurances on specialist care utilisation. The only effect which differs is the effect of insurance in wave one. The model shows a significant effect of publicly insured people using more specialist care in wave 1 than privately insured people. This positive effect is also found in the smaller negative binomial model. The same explanation could be used that this model includes less health variables, so the insurance effect may also partly capture health effects. The effects in the second wave are not significant, so the conclusion of Naaktgeboren (2012) of privately insured people in 2004 going more often to the specialist in 2007 in comparison to publicly insured people cannot be confirmed with this model. Because of the small differences in effects, the model of Naaktgeboren will not be used in the following part of the research. The Hurdle model is the model used in the following paragraphs and chapters.

5. Results

The results of the designed model of chapter four consist of two categories; specialist care seeking effects and effects on the amount of specialist care used. For both categories the effects of education and insurance are analysed. Next to this other effects of the specialist care utilisation model are analysed. Just the marginal effects are discussed in the following paragraphs. The results of the Hurdle model for specialist visits can be found in appendix 5.

5.1 Health care seeking effects

The marginal effects on seeking specialist care are described in table 4, 5 and 6.

		Delta-method		
	dy/dx	**Std. Err.**	**Z**	**P>z**
Female	-.028	.022	-1.29	0.197
Age	-.000	.001	-0.25	0.806
Partner	-.061**[1]	.023	-2.60	0.009
Household size	-.031**	.012	-2.53	0.011
Dutch	.005	.034	0.16	0.872
Log wealth	-.011	.007	-1.55	0.122
No wealth	-.117	.072	-1.63	0.102

Table 4: Health care seeking effects: demographic variables

Table 4 does not show many significant factors. According to this model having a partner and household size show a significant effect on the probability of visiting a specialist (at a 5% level). On average living with a partner or spouse decreases the probability of visiting a specialist with 0.061 percentage points compared to living as a single. Household size has a smaller average effect on the probability of visiting a specialist. If a respondent's household increases with one person, the average probability of visiting a specialist decreases with 0.031 percentage points. All other factors are not significant, so the model does not show any significant effects for these factors. Table 5 on the next page shows the average marginal effects of the health variables on the probability of visiting a specialist. Self-perceived health is one of the health variables which shows an average marginal effect which is significant at a 5% level. On average having a poorer health status increases the probability of going to the specialist. Other explanatory variables as mobility, back pain, depression and breathlessness have a positive effect on the probability of specialist visits as well. Just the effect of the number of limitations in daily living on the probability of visiting a specialist is negative. On average this means that having an additional limitation in daily living, will decrease the probability of going to a specialist. The other diagnosed conditions which are significant show on average a positive

[1] ** = Significant at a 5% level
* = Significant at a 10% level

marginal effect on the probability of visiting a specialist. This effect confirms the theory about the effect of the need factor on specialist care utilisation.

	Delta-method			
	dy/dx	Std. Err.	z	P>z
Self-perceived health				
2	.060**	.028	2.10	0.035
3	.092**	.025	3.63	0.000
4	.224**	.033	6.86	0.000
5	.384**	.063	6.06	0.000
Obese	-.006	.022	-0.26	0.793
Max grip strength	-.001	.001	-0.99	0.321
Number of limitations daily living	-.039**	.019	-2.03	0.042
Mobility	.008	.007	1.25	0.211
Any mobility symptoms	-.034	.024	-1.42	0.155
Orientation				
1	.063	.181	0.35	0.729
2	.063	.150	0.42	0.672
3	.173	.132	1.31	0.192
4	.164	.132	1.25	0.213
Numeracy				
2	-.003	.026	-0.11	0.908
3	.009	.027	0.35	0.725
4	-.004	.028	-0.14	0.887
Back pain	.030*	.017	1.72	0.085
Sleeping problems	.029	.026	1.12	0.261
Sleeping drugs	.056	.043	1.28	0.200
Depression	.007	.005	1.45	0.148
Breathlessness	.052	0.035	1.49	0.136
Cough	-.021	.034	-0.62	0.534
Heart	.189**	.029	6.43	0.000
High blood pressure	.010	.018	0.58	0.560
High cholesterol	.012	.022	0.57	0.570
Stroke	.079	.049	1.62	0.105
Diabetes	.140**	.031	4.55	0.000
Lung	.057	.036	1.59	0.112
asthma	.108**	.043	2.52	0.012
arthritis	.062**	.029	2.14	0.032
Osteoporosis	.082**	.033	2.52	0.012
Cancer	.287**	.037	7.82	0.000
Stomach	.013	.044	0.29	0.770
Parkinson	.206	.130	1.59	0.112
Cataracts	.119**	.036	3.30	0.001
Fracture	-.021	.066	-0.32	0.752
Other chronic disease	.075**	.022	3.35	0.001

Table 5: Health care seeking effects: health variables

Table 6 shows the effect of education, wave and insurance on the probability of visiting a specialist.

		Delta-method		
	dy/dx	Std. Err.	z	P>z
Education				
2	.057**	.024	2.38	0.017
3	.050*	.027	1.86	0.063
4	.065**	.029	2.29	0.022
Wave	.038**	.017	2.21	0.027
Insurance - ziekenfonds	.002	.015	0.10	0.922

Table 6: Health care seeking effects: Education, wave and insurance

The average marginal effects of education are significant at a 5% significance level, but they are very small. The results show that the probability of someone with a high educational level visiting a specialist is 0.065 percentage points higher than someone with a low educational level. The variable insurance is not significant, which means that no significant effect on the probability of visiting a specialist can be calculated. The variable of wave is significant, which means that the probability of someone going to the specialist in the second wave is 0.038 percentage points higher than someone in the first wave. This confirms the conclusion of people using more specialist care after the reform of Naaktgeboren (2012). In the next paragraphs the educational and insurance effects are discussed more in detail.

5.1.1 Results of the interaction between education and wave

As shown before education did show a significant effect on the probability of visiting a specialist. An interaction for education is included in the model, so the change in gradient between the two different waves will be calculated. Because of this reason table 7 shows the average marginal effects of education for wave 1 (2004) and wave 2 (2007). The results below show that the small positive effect for education as mentioned in paragraph 5.1 is only present for respondents in the first wave. In the second wave there is no significant effect of education on the probability of visiting a specialist.

		Delta-method		
	dy/dx	Std. Err.	Z	P>z
Wave 1				
Education				
2	.086**	.029	2.97	0.003
3	.056*	.032	1.74	0.082
4	.085**	.034	2.51	0.012
Wave 2				
Education				
2	.011	.041	0.28	0.781
3	.041	.044	0.91	0.362
4	.033	.046	0.73	0.468

Table 7: Health care seeking effects: education wave 1 and 2

5.1.2 Results of the interaction of insurance and wave

As discussed before insurance did not show any significant results on average between the different waves in this first part of the model. Table 8 shows these results of insurance per wave.

Wave 1		**Delta-method**		
	dy/dx	**Std. Err.**	**Z**	**P>z**
Wave 1				
Insurance – ziekenfonds	.011	.019	0.55	0.585
Wave 2				
Insurance - ziekenfonds	-.013	.025	-0.53	0.593

Table 8: Health care seeking effects: insurance wave 1 and 2

The results in this table do not show significant coefficients either, so based on this model there are no significant effects from having a private or public insurance in 2004 on the probability of visiting a specialist in the two different waves.

5.1.3 Results wave 1 and wave 2

The results of the differences per wave for education and insurance are showed in table 9 on next page. This table shows significance effects for educational level 3 and private insurance. Someone with educational level 3 has a probability to visit a specialist which is 0.067 percentage points higher in wave 2 than in wave 1. The table also shows a significant effect for people who were privately insured in 2004. The probability of visiting a specialist for people with a private insurance in 2004 is 0.051 percentage points higher in wave 2 than in wave 1. The other values of the variables do not show a significant effect. The effect of privately insured people in 2004 having a higher probability of visiting a specialist confirms the conclusion of Naaktgeboren (2012) earlier in this thesis.

		Delta-method		
	dy/dx	Std. Err.	Z	P>z
Education = 1				
Wave 2	.083*	.044	1.90	0.057
Education = 2				
Wave 2	.009	.025	0.35	0.729
Education = 3				
Wave 2	.067**	.033	2.06	0.039
Education = 4				
Wave 2	.031	.034	0.91	0.365
Insurance = Private				
Wave 2	.051**	.024	2.08	0.038
Insurance = Public				
Wave 2	.027	0.022	1.23	0.219

Table 9: effects of s for education and insurance

5.2 Effects on amount of specialist care used

The effects on amount of care used are shown in table 10, 11 and 12.

	Delta-method			
	dy/dx	Std. Err.	Z	P>z
Female	.093	.251	0.37	0.710
Age	.002	.012	0.18	0.857
Partner	-.099	.288	-0.34	0.731
Household size	-.086	.154	-0.56	0.577
Dutch	.298	.345	0.85	0.395
Log wealth	-.053	.088	-0.60	0.548
No wealth	-.491	.852	-0.58	0.564

Table 10: Effects on amount of care used: demographic variables

Table 10 shows that neither being a female, age, having a partner, household size, being Dutch nor wealth has an significant effect on the amount of specialist care used. As described in chapter 4 the patient has an influence in the first part of the model and once initial contact is made, the physician determines the amount of care that will be used. According to the results in the table above the demographic and wealth factors do not have an influence, so this is in line with the physician deciding how much care is used.

		Delta-method		
	dy/dx	Std. Err.	Z	P>z
Self-perceived health				
2	.097	.234	0.41	0.685
3	.642**	.230	2.79	0.005
4	1.303**	.312	4.17	0.000
5	2.941**	.872	3.37	0.001
Obese	.234	.276	0.85	0.396
Max grip strength	.026**	.012	2.21	0.027
Number of limitations daily living	.195	.214	0.91	0.364
Mobility	.095	.070	1.35	0.178
Any mobility symptoms	-.172	.268	-0.64	0.522
Orientation				
1	.340	.844	0.40	0.687
2	4.334	2.707	1.60	0.109
3	1.445**	.586	2.47	0.014
4	1.617**	.550	2.94	0.003
Numeracy				
2	.424	.269	1.58	0.114
3	.594**	.300	1.98	0.048
4	.424	.305	1.39	0.164
Back pain	.112	.209	0.54	0.591
Sleeping problems	-.110	.283	-0.39	0.698
Sleeping drugs	.864	.566	1.53	0.127
Depression	.142**	0.056	2.52	0.012
Breathlessness	.654	.431	1.52	0.129
Cough	.176	.406	0.43	0.664
Heart	-.104	.274	-0.38	0.706
High blood pressure	-.213	.208	-1.03	0.304
High cholesterol	-.436*	.229	-1.91	0.057
Stroke	.266	.504	053	0.598
Diabetes	.409	.338	1.21	0.227
Lung	-.124	.365	-0.34	0.733
Asthma	-.861**	.286	-3.01	0.003
Arthritis	-.197	.296	-0.66	0.506
Osteoporosis	.240	.361	0.67	0.505
Cancer	1.721**	.579	2.97	0.003
Stomach	-.377	.399	-0.94	0.345
Parkinson	-.832	.698	-1.19	0.234
Cataracts	.229	.375	0.61	0.541
Fracture	1.925	1.370	1.40	0.160
Other chronic disease	1.045**	.331	3.15	0.002

Table 11: Effects on amount of care used: health variables

Table 11 on the previous page shows the average marginal effects of the health variables on how much care is used once the specialist is visited.

Some of the significant health care factors of the probability model do also have an average positive effect on the amount of specialist care used. These variables are self-perceived health, mobility, depression and from the diagnosed conditions cancer and other chronic diseases. Asthma did have a positive relationship with the probability of visiting a specialist, but has a negative significant relationship with the amount of specialist care used. Someone being diagnosed with asthma visits the specialist on average -.861 times less than someone without asthma once contacted the specialist (on a 5% significance level). Another interesting effect is the effect of high cholesterol, this effect is also negative. Someone who has high cholesterol visits the specialist -.436 less than someone without high cholesterol once contacted the specialist on a 10% significance level. Maximum grip strength, orientation and numeracy do have a significant positive effect on the amount of specialist care once visited the specialist, but did not affect the probability of visiting a specialist. This means that these variables do not affect the patient's decision regarding whether to go to the specialist, but do affect the specialist to decide how much specialist visits are needed.

Table 12 show the effects on amount of care used once visited a specialist for education, wave and insurance.

		Delta-method		
	dy/dx	**Std. Err.**	**Z**	**P>z**
Education				
2	.158	.294	0.54	0.592
3	.219	.337	0.65	0.515
4	.225	.359	0.63	0.530
Wave	.299	.217	1.38	0.169
Insurance - ziekenfonds	-.069	.190	-0.36	0.717

Table 12: Effects on amount of care used: education, wave and insurance

As shown in table 12 none of the education, wave or insurance variables show a significant effect on the amount of care used once visited a specialist. This is in line with the statement that once a patient visited a specialist, the physician decides the amount of care used. In the next paragraphs the educational and insurance effects are discussed more in detail per wave to find if there might be any wave specific effects for these explanatory variables.

5.2.1 Results of education

In the previous paragraph is concluded that there is no significant effect of education on average on the amount of specialist visits once the patient has contacted the specialist. Table 13 shows the effect of education per wave.

When looking at the effects of education per wave, there is a significant effect of education on the amount of specialist visits once someone went to the specialist in wave 1 (on a 10% significance level). Someone with a high education will visit the specialist 0.695 times more in wave 1 than someone with low education. The second wave does not show any significant values, so no significant effects are calculated for wave 2.

		Delta-method		
Wave 1	**dy/dx**	**Std. Err.**	**Z**	**P>z**
Education				
2	.526*	.316	1.66	0.096
3	.231	.345	0.67	0.503
4	.695*	.411	1.69	0.092
Wave 2				
Education				
2	-.433	.522	-0.78	0.443
3	.200	.634	0.32	0.753
4	-.527	.6072	-0.87	0.385

Table 13: Effects on amount of care use: education wave 1 and 2

5.2.2 Results of insurance

Table 14 shows the results of insurance on the amount of specialist visits once someone visited the specialist for the different waves. As shown in the table, insurance is significant in the second wave. This means that people with a public insurance in 2004, visit specialist -0.605 times less in the second wave than people who were privately insured before (at a 10% significance level). The effect in the first wave is not significant, so insurance did not have an effect on the number of specialist visits before the insurance reform.

		Delta-method		
	dy/dx	**Std. Err.**	**Z**	**P>z**
Wave 1				
Insurance – ziekenfonds	.267	.227	1.17	0.241
Wave 2				
Insurance - ziekenfonds	-.605*	.342	-1.77	0.077

Table 14: effects on amount of care used: Insurance wave 1 and 2

5.2.3 Results wave 1 and wave 2

The results of the differences per wave for education and insurance are showed in table 15. This tables shows significance effects for educational level 1 and 3 and for private insurance (either on a 5% or 10% significance level). This means that people with educational level 1 visit specialists 0.945 times more in wave 2 than in wave 1. For educational level this increase is 0.914 times more in wave 2 than wave 1. People with a private insurance in 2004 visit the specialist 0.790 times more in wave 2 than in wave 1. This confirms the overall increase in specialist care utilisation.

		Delta-method			
		dy/dx	**Std. Err.**	**Z**	**P>z**
	Education = 1				
Wave 2		.945*	.558	1.70	0.090
	Education = 2				
Wave 2		-.013	.302	-0.04	0.965
	Education = 3				
Wave 2		.914**	.452	2.02	0.043
	Education = 4				
Wave 2		-.276	.431	-0.64	0.521
	Insurance = Private				
Wave 2		.790**	.348	2.27	0.023
	Insurance = Public				
Wave 2		-.081	.245	-0.32	0.748

Table 15: effects of waves for education and insurance

5.3 Conclusion

The main goal of this research was to assess the effects of education and insurance on specialist care utilisation before and after the changes of the health insurance system. Overall a few significant effects are found. In 2004 education had a significant positive effect on the probability of visiting a specialist. In 2007 no significant effect of education on the probability to visit a specialist was calculated. Neither was this correlation shown on the amount of specialist care used once going to a specialist in 2004 nor in 2007. Insurance does not have an effect on specialist care utilisation in 2004. In 2007 there is an effect of insurance on the amount of specialist care used. People who were privately insured in 2004 do visit a specialist more often in 2007 compared to people with a public insurance in 2004. One of the explanations for this could be that specialist visits were only covered when having a referral from the general practitioner for publicly insured people and that the ability to pay factor - insurance is not applicable for people who were privately insured before. This positive effect also counts for the amount of specialist care used by privately insured people.

Conclusion and discussion

To answer the main research question of this thesis the effects of someone's education and type of insurance in 2004 on specialist care utilisation in the Netherlands before and after the changes of the health insurance system of 2006 have been investigated. The main conclusions of this research are:

- In 2004 having a higher education has a significant positive effect on the probability of visiting a specialist and the amount of specialist care used.
- For 2007 education has neither a significant effect on the probability of visiting a specialist nor on the amount of specialist care used.
- The finding of Naaktgeboren (2012) of an increasing inequity according to education after the health care reform cannot be confirmed with this investigation, because no significant effects of education have been found in 2007.

- Someone's type of insurance in 2004 has an effect on the amount of specialist care utilisation in 2007. The amount of specialist care used of people who had a public insurance in 2004 is less in 2007 compared to people who had a private insurance in 2004.
- The finding of Naaktgeboren (2012) of people who were privately insured in 2004 using more specialist care after the reform compared to people with a public insurance in 2004, can be confirmed with this investigation.
- For wave 1 no significant effects have been found between type of insurance someone has in 2004 and the probability of visiting a specialist nor the amount of specialist care used.
- Neither is a significant effect calculated in 2007 between insurance type in 2004 and the probability of visiting a specialist.

- In 2007 the probability of visiting a specialist was 0.038 percentage points higher than in 2004. This is in line with the finding of Naaktgeboren (2012) that specialist care utilisation increased after the health insurance reform.
- People with educational levels 1 and 3 have a higher probability of visiting a specialist and a higher amount of specialist care used in the second wave than in the first wave.
- This positive effect is also significant for people who were privately insured in 2004.

Some of the conclusions are in line with the findings of Naaktgeboren (2012) and some of the conclusions are not. In the following paragraphs these conclusions will be discussed more in detail and are linked to the changes of the health care system before and after the reform. Next to that it will be discussed if these findings are in line with the objectives of the new insurance system.

Chapter 5 concluded that highest education obtained only has a significant positive effect on the probability of visiting a specialist and the amount of specialist care used in 2004. The characteristics of the health care system before 2006 could be an explanation for this finding. Before 2006 there was no universal insurance and therefore incentives for making use of health care were different. Although the effect on the probability of visiting a specialist does not differ much between the educational levels two until four, it does differ from low educated people. The lower educated people have a lower probability and make less use of specialist care than people with higher educational levels. For 2007 no significant effects have been calculated. This conclusion is in line with the new health care system's objective of equal access. Education should not be a factor which will lead to inequity in health care utilisation.

Because of the conclusion that no significant effects of highest education obtained were found in 2007, it is not possible to confirm the finding of increasing inequity after the reform according to education which was found by Naaktgeboren (2012). Explanations for these differences in conclusions could lie in the type of data used. The age of the respondents in the data set used could influence the results. Having the age restriction of people interviewed being 50 years and older could lead to biased results. There could be differences in specialist care use determinants between people over 50 years old and people below this age. Another fact which could lead to biased results is the time period of this investigation. Just information of two waves, 2004 and 2007 is available. This time period could be too short. Only a few years before and one year after the reform have been researched. A recommendation would be to investigate in the same effects over a longer period of time, to provide further evidence if the changes in health care utilisation are due to the health insurance reform or other factors have influenced the results in both investigations.

The main finding of the effect of type of insurance in 2004 is that the amount of specialist care used by people who had a public insurance in 2004 is less in 2007 compared to people who had a private insurance in 2004. Before the health insurance reform the financial barriers to visit a specialist was much smaller for a publicly insured patient than for someone with a private insurance. People with a private insurance did have these financial barriers, because private insurers reimbursed the specialist visits for privately insured patients. After the insurance reform a mandatory deductible was

implemented. After 2006 all patients do have the same incentive to go to the specialist. The mandatory deductibles could have a higher impact on people who had a public insurance before, because they finally realize that health care costs money. This could be an explanation why people who had a public insurance before go less to the specialist in 2007 than people who were privately insured in 2004.

Overall in 2007 the probability of visiting a specialist was 0.038 percentage points higher than in 2004. This conclusion is in line with the finding of Naaktgeboren (2012) that specialist care utilisation increased after the health insurance reform. The positive significant effect is only found for the probability of visiting a specialist and is not fount for the amount of care used once someone visited a specialist. This conclusion goes against (one of) the objectives of the new health care system: cost containment. Specialist care is very expensive and higher utilisation is not in line with cost containment. The fact of increasing specialist care utilisation after the reform increases costs, so the objective of cost containment is not met on the field of specialist care.

Another significant increase on the probability to use specialist care and the amount of specialist care used in 2007 has been found for people who were privately insured in 2004. Before private insurers reimbursed patients with a private insurance. In the new insurance system the specialist declares the treatments directly at the insurer. Another explanation could be that people who were privately insured before did not have specialist care fully covered. In the new system specialist care is part of the basic package which means that it is covered for everyone. The observation that people with a private insurance in 2004 have higher specialist care utilisation in 2007 is not in line with the objectives of the new health care system. As described in the previous paragraph higher utilisation is not in line with cost containment.

Overall this investigation has shown several significant effects between education or insurance on specialist care utilisation in the two different waves. The conclusion Naaktgeboren (2012) of higher specialist care utilisation in 2007 compared to 2004 is confirmed by this research, but it goes against the objective of cost containment of the new insurance system. This investigation has not shown any significant results on inequity in specialist care utilisation according to education after the reform, so the reliability of the finding of Naaktgeboren (2012) is questionable due to the fact that insurance was not included in the model about the educational effects. If indeed there are no significant effects on education, this is positive for the new health insurance system, because the objective of equal access on the field of specialist care is met according to this research.

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Appendix 1 – Effects supplementary insurance and deductible

Wave 1

		Delta-method		
	dy/dx	**Std. Err.**	**z**	**P>z**
Supplementary insurance2004	.031	.161	0.19	0.847
Log_deductibles2004	.028	.118	0.24	0.813
Log_nodeductible2004	-.296	.610	-0.49	0.627

Wave 2

		Delta-method		
	dy/dx	**Std. Err.**	**z**	**P>z**
Supplementary insurance2004	.037	.192	0.19	0.847
Log_deductibles2004	.033	.141	0.24	0.813
Log_nodeductible2004	-.354	.733	-0.48	0.629

Appendix 2 – Negative Binomial model

Average marginal effects

		Delta-method		
	dy/dx	Std. Err.	z	P>z
Female	-.234	.182	-1.28	0.199
Age	.007	.008	0.89	0.371
Partner	-.316*	.190	-1.67	0.095
Household size	-.240**	.101	-2.37	0.018
Dutch	.173	.260	0.67	0.506
Log wealth	-.081	.063	-1.29	0.198
No wealth	-.788	.612	-1.29	0.198
Self-perceived health				
2	.262**	.129	2.04	0.042
3	.727**	.120	6.06	0.000
4	1.678**	.208	8.06	0.000
5	3.597**	.846	4.25	0.000
Obese	.111	.190	0.58	0.560
Max gripstrength	.010	.008	1.26	0.207
Number of limitations daily living	-.029	.158	-0.18	0.853
mobility	.086	.055	1.59	0.113
Any mobility symptoms	-.292	.192	-1.52	0.130
Orientation				
1	-.077	.602	-0.13	0.899
2	1.712*	.983	1.74	0.082
3	1.217**	.527	2.31	0.021
4	1.315**	.504	2.61	0.009
Numeracy				
2	.194	.202	0.96	0.337
3	.399*	.220	1.81	0.070
4	.140	.220	0.64	0.525
Back pain	.330**	.147	2.24	0.025
Sleeping problems	.050	.214	0.24	0.814
Sleeping drugs	1.048**	.483	2.17	0.030
Depression	.126**	.040	3.15	0.002
Breathlessness	.483	.321	1.50	0.133
Cough	-.076	.275	-0.28	0.782
Heart	.887**	.300	2.95	0.003
High blood pressure	-.020	.151	-0.13	0.894
High cholesterol	-.139	.177	-0.78	0.433
Stroke	.443	.437	1.01	0.311
Diabetes	.965**	.324	2.98	0.003
Lung	.317	.327	0.97	0.332

asthma	-.110	.316	-0.35	0.728
arthritis	.161	.250	0.64	0.520
Osteoporosis	.477	.304	1.57	0.116
Cancer	3.250**	.703	4.62	0.000
Stomach	-.132	.336	-0.39	0.694
Parkinson	.167	1.069	0.16	0.876
Cataracts	.763**	.363	2.10	0.036
Fracture	1.203	.863	1.39	0.163
Other chronic disease	1.184**	.253	4.68	0.000
Education				
2	.410**	.192	2.13	0.033
3	.382*	.218	1.75	0.080
4	.551**	.242	2.28	0.022
Wave	.340**	.152	2.23	0.026
Insurance - ziekenfonds	-.006	.130	-0.05	0.962

Marginal effects per wave

Wave 1

		Delta-method		
	dy/dx	**Std. Err.**	**z**	**P>z**
Education				
2	.708**	.206	3.44	0.001
3	.326	.218	1.50	0.134
4	.897**	.273	3.28	0.001
Insurance - ziekenfonds	.234	.153	1.52	0.128

Wave 2

		Delta-method		
	dy/dx	**Std. Err.**	**z**	**P>z**
Education				
2	-.105	.365	-0.29	0.774
3	.475	.431	1.10	0.270
4	-.045	.412	-0.11	0.914
Insurance - ziekenfonds	-.417*	.239	-1.75	0.081

Appendix 3 – Marginal effects of the smaller Negative Binomial model

Average marginal effects

		Delta-method		
	dy/dx	**Std. Err.**	**z**	**P>z**
Female	-.518**	.146	-3.56	0.000
Age	.005	.007	0.72	0.470
Self-perceived health				
2	.277**	.122	2.27	0.023
3	.857**	.117	7.32	0.000
4	1.854**	.203	9.15	0.000
5	3.342**	.679	4.92	0.000
Sleeping problems	.123	.217	0.57	0.570
Sleeping drugs	.820*	.437	1.88	0.061
Depression	.111**	.039	2.85	0.004
Breathlessness	.700**	.330	2.12	0.034
Cough	-.053	.276	-0.19	0.848
Heart	.764**	.282	2.72	0.007
High blood pressure	-.128	.147	-0.87	0.387
High cholesterol	-.133	.178	-0.75	0.454
Stroke	.204	.381	0.54	0.592
Diabetes	.994**	.319	3.12	0.002
Lung	.168	.306	0.55	0.582
Asthma	-.171	.308	-0.55	0.580
Arthritis	.573**	.263	2.18	0.029
Osteoporosis	.493*	.297	1.66	0.096
Cancer	3.176**	.677	4.69	0.000
Stomach	-.300	.308	-0.97	0.330
Parkinson	.162	.986	0.16	0.869
Cataracts	.566*	.337	1.68	0.093
Fracture	1.207	.837	1.44	0.149
Other chronic disease	1.174**	.248	4.74	0.000
Education				
2	.542**	.188	2.89	0.004
3	.361*	.204	1.77	0.077
4	.473**	.219	2.16	0.031
Wave	.288**	.140	2.05	0.040
Insurance - ziekenfonds	.073	.129	0.57	0.572

Marginal effects per wave

Wave 1

			Delta-method		
		dy/dx	Std. Err.	z	P>z
Education					
	2	.920**	.207	4.44	0.000
	3	.305	.203	1.51	0.132
	4	.816**	.251	3.25	0.001
Insurance – ziekenfonds		.292*	.155	1.89	0.059

Wave 2

		dy/dx	Std. Err.	z	P>z
Education					
	2	-.112	.354	-0.32	0.752
	3	.458	.417	1.10	0.272
	4	-.120	.389	-0.31	0.757
Insurance – ziekenfonds		-.304	.233	-1.30	0.193

Appendix 4 – Marginal effects of the model similar to the model of Naaktgeboren

Average marginal effects negative binomial model

	Delta method			
	dy/dx	**Std. Err.**	**z**	**P>z**
Female	-.527**	.149	-3.55	0.000
Age	-.004	.007	-0.55	0.581
Partner	-.082	.196	-0.42	0.676
Household size	-.255**	.099	-2.58	0.010
Dutch	.162	.251	0.65	0.519
Self-perceived health				
2	.286**	.113	2.54	0.011
3	.874**	.110	7.97	0.000
4	2.171**	.211	10.29	0.000
5	3.842**	.776	4.95	0.000
Mobility	.189**	.045	4.22	0.000
Orientation	.043	.095	0.45	0.652
Back pain	.276*	.147	1.88	0.059
Heart	.875**	.289	3.03	0.002
High blood pressure	-.067	.147	-0.46	0.648
Stroke	-.001	.343	-0.00	0.997
Diabetes	.857**	.302	2.84	0.005
Asthma	-.126	.304	-0.41	0.680
Arthritis	.104	.230	0.45	0.651
Cancer	2.851**	.633	4.50	0.000
Education				
2	.330*	.186	1.77	0.077
3	.383*	.211	1.81	0.070
4	.547**	.230	2.38	0.017
Wave	.195	.138	1.41	0.157
Insurance - ziekenfonds	.161	.129	1.25	0.211

Marginal effects per wave

Wave 1

			Delta-method		
		dy/dx	Std. Err.	z	P>z
Education					
	2	.604**	.210	2.88	0.004
	3	.356	.223	1.60	0.110
	4	.860**	.276	3.11	0.002
Insurance – ziekenfonds		.378**	.158	2.40	0.016

Wave 2

			Delta-method		
		dy/dx	Std. Err.	z	P>z
Education					
	2	-.134	.339	-0.39	0.693
	3	.426	.406	1.05	0.295
	4	.020	.383	0.05	0.959
Insurance – ziekenfonds		-.201	.225	-0.89	0.371

Appendix 5 – Hurdle model

Part 1: Probability of visiting a specialist

Specialist visits	Coef.	Std. Err.	z	P>z
Female	.326	.518	0.63	0.529
Age	.003	.007	0.42	0.677
Interaction female age	-.007	.008	-0.93	0.352
Partner	-.300**	.119	-2.53	0.012
Household size	-.151**	.060	-2.53	0.012
Dutch	.026	.163	0.16	0.872
Log wealth	-.055	.036	-1.55	0.122
No wealth	-.568	.348	-1.63	0.103
Self-perceived health				
2	.294**	.142	2.08	0.038
3	.447**	.128	3.50	0.000
4	1.031**	.154	6.72	0.000
5	1.762**	.313	5.63	0.000
Obese	-.028	.108	-0.26	0.793
Max gripstrength	-.005	.005	-0.99	0.321
Number of limitations daily living	-.188**	.093	-2.03	0.042
Mobility	.040	.032	1.25	0.211
Any mobility symptoms	-.165	.118	-1.40	0.162
Orientation				
1	.366	1.066	0.34	0.731
2	.371	.913	0.41	0.684
3	.929	.827	1.12	0.261
4	.884	.823	1.07	0.283
Numeracy				
2	-.015	.126	-0.12	0.908
3	.046	.129	0.35	0.725
4	-.020	.138	-0.14	0.887
Back pain	.144*	.083	1.73	0.083
Sleeping problems	.139	.122	1.14	0.256
Sleeping drugs	.264	.203	1.30	0.193
Depression	.032	.022	1.45	0.148
Breathlessness	.250	.165	1.52	0.130
Cough	-.102	.166	-0.62	0.538
Heart	.870**	.135	6.44	0.000
High blood pressure	.051	.087	0.58	0.559
High cholesterol	.060	.105	0.57	0.568
Stroke	.373*	.226	1.65	0.099
Diabetes	.654**	.142	4.60	0.000
Lung	.269	.167	1.61	0.107

Asthma	.505**	.197	2.56	0.010
Arthritis	.294**	.135	2.18	0.029
Osteoporosis	.386**	.151	2.56	0.010
Cancer	1.361**	.190	7.15	0.000
Stomach	.062	.211	0.29	0.769
Parkinson	.970	.626	1.55	0.122
Cataracts	.559**	.167	3.35	0.001
Fracture	-.103	.327	-0.31	0.754
Other chronic disease	.353**	.104	3.40	0.001
Education				
2	.431**	.150	2.87	0.004
3	.287*	.168	1.71	0.086
4	.429**	.174	2.46	0.014
Wave	.481**	.239	2.02	0.044
Education # Wave				
2 2	-.376	.244	-1.54	0.123
3 2	-.093	.264	-0.35	0.723
4 2	-.270	.268	-1.01	0.313
Insurance2004	.052	.095	0.55	0.585
Insurance2004 # Wave				
2 2	-.115	.151	-0.76	0.447
Constant	-1.786	1.100	-1.62	0.105

Part 2: Amount of specialist care used

Specialist visits	**Coef.**	**Std. Err.**	**z**	**P>z**
Female	2.509**	.605	4.15	0.000
Age	.021**	.007	3.00	0.003
Interaction female age	-.038**	.009	-4.13	0.000
Partner	-.047	.139	-0.34	0.734
Household size	-.040	.072	-0.56	0.576
Dutch	.149	.186	0.80	0.423
Log wealth	-.024	.041	-0.60	0.547
No Wealth	-.231	.400	-0.58	0.563
Self-perceived health				
2	.083	.207	0.40	0.689
3	.453**	.182	2.49	0.013
4	.771**	.201	3.83	0.000
5	1.287**	.278	4.62	0.000
Obese	.107	.121	0.88	0.377
Maxgrip	.012**	.005	2.28	0.022
Number of limitations daily living	.092	.100	0.92	0.360
Mobility	.045	.033	1.36	0.173
Any mobility symptoms	-.082	.131	-0.63	0.528

Orientation				
1	.498	1.240	0.40	0.688
2	2.223**	1.110	2.00	0.045
3	1.321	.983	1.34	0.179
4	1.404	.976	1.44	0.150
Numeracy				
2	.222	.145	1.53	0.125
3	.298*	.155	1.93	0.054
4	.222	.161	1.37	0.170
Back pain	.053	.098	0.54	0.591
Sleeping problems	-.052	.136	-0.38	0.701
Sleeping drugs	.353*	.198	1.78	0.075
Depression	.067**	.025	2.65	0.008
Breathlessness	.282*	.167	1.68	0.092
Cough	.080	.179	0.45	0.653
Heart	-.050	.133	-0.37	0.710
High blood pressure	-.102	.101	-1.01	0.311
High cholesterol	-.219*	.120	-1.83	0.067
Stroke	.119	.213	0.56	0.578
Diabetes	.180	.138	1.30	0.193
Lung	-.060	.179	-0.33	0.739
asthma	-.500**	.195	-2.56	0.010
arthritis	-.096	.148	-0.65	0.519
Osteoporosis	.109	.156	0.69	0.487
Cancer	.629**	.157	4.00	0.000
Stomach	-.193	.222	-0.87	0.384
Parkinson	-.495	.532	-0.93	0.352
Cataracts	.103	.162	0.64	0.524
Fracture	.652*	.340	1.92	0.055
Other chronic disease	.438**	.116	3.78	0.000
Education				
2	.284	.180	1.58	0.114
3	.135	.204	0.66	0.508
4	.361*	.211	1.71	0.087
Wave	.680**	.269	2.53	0.011
Education # Wave				
2 2	-.471*	.280	-1.68	0.092
3 2	-.059	.303	-0.20	0.845
4 2	-.593*	.315	-1.88	0.060
Insurance - ziekenfonds	.134	.114	1.17	0.240
Insurance # Wave				
2 2	-.393*	.180	-2.19	0.029
Constant	-3.996**	1.281	-3.12	0.002