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Health inequalities in the Netherlands: Which socio-economic factors play a role in explaining ethnic-related health inequalities in the Netherlands?

by

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Abstract

This thesis examines socio-economic factors that play a role in explaining ethnic-related health inequalities in the Netherlands. Hypotheses are tested using two different approaches. Estimations are done using the ordered logistic regression. The results indicate that the socio-economic factors education and income play a role in explaining ethnic-related health inequalities in the Netherlands, whereas occupation, behavioral factors and environmental factors play little to no role in explaining these inequalities. Ethnic minorities not only tend to have lower levels of self-assessed health, but they also tend to have lower levels of education and income. Although there seems to be an association between the factors and self-assessed health the results cannot be interpreted as causal and further research is necessary in order to determine the causality of the relationships. Further research is also required in order to determine the size of the effects that education and income have on explaining ethnic-related health inequalities in the Netherlands. Possible interventions or policies aiming at reducing ethnic-related health inequalities should target reducing disparities in the causes of these health inequalities and equalizing the distribution of the determinants of health. Interventions may include the government being an intermediary between employee seeking businesses and the unemployed, reducing labor taxes and subsidizing education. Such interventions must be thoroughly thought and further research on the outcome of these interventions by the government is necessary before policies are formed and implemented.

Keywords: socio-economic, health inequalities, The Netherlands, ethnicity, origin.

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1. Introduction

The beginning of the twenty-first century marked the era in which much attention was being given to socio-economic inequalities in health in various European countries (Mackenbach 2006). Large inequalities were found in countries such as Spain, Finland, Great Britain and Italy. The magnitude of these inequalities vary by country, socio-economic indicators and the type of health problems present in that country. There has been growing interest in the existence of socio-economic inequalities in health in the Netherlands. Like in other western countries health status varies with socio-economic status, gender, residential regions and different ethnicities (Mackenbach 1993).

Two national programs were developed in order for researchers to be able to understand the issue of socio-economic inequalities in health in the Netherlands (Mackenbach et al 2002). The first national research program was developed in 1985 in order to obtain information on the magnitude and nature of socio-economic inequalities in health and the determinants of these inequalities. The results of this program indicated that living and working conditions were just as important as behavioral factors such as smoking, alcohol consumption and physical activity when explaining socio-economic health inequalities. The explanation of socio-economic inequalities in health continued during the second national research program which was developed in 1995. This program was aimed at generating more knowledge on socio-economic inequalities in health and on the effectiveness of policies and interventions in order to reduce socio-economic health inequalities.[1]

The Netherlands is home to various ethnic groups. The largest migrant groups in the Netherlands are from Morocco, Turkey, Suriname and the Netherlands Antilles and Aruba. Even though there is literature on socio-economic inequalities in health, there is not much literature ethnic-related health inequalities in the Netherlands. It is important to study these inequalities in order to determine solutions for ethnic-related health inequalities in the Netherlands. Research is valuable as it may provide a better understanding of possible relationships between socio-economic factors, ethnicity and health in the Netherlands.

[1] This program identified four potential strategies aimed at reducing health inequalities. These strategies consisted of improving the socio-economic position of individual's in lower classes, diminishing the effect that health problems might have on an individual's socio-economic position, reducing the exposure to health threatening circumstances and behaviours and offering additional therapeutic health care to individuals in lower socio-economic groups.

This thesis is aimed at adding to the existing literature on ethnic-related health inequalities in the Netherlands. First, it provides an overview of literature on socio-economic inequalities in health in Europe and in the Netherlands. It also indicates which socio-economic factors might have contributed to explaining ethnic-related health inequalities in the Netherlands. The research question thus follows:

What socio-economic factors play a role in explaining ethnic-related health inequalities in the Netherlands?

Note however, that although the emphasis of this thesis is on socio-economic factors, behavioral and environmental factors are also considered. This decision was made based on the chosen framework. The outline of this thesis is as follows: section 2 presents a literature review, section 3 discusses the data and methodology used in this thesis, section 4 presents the results, section 5 outlines the discussion which includes the limitations of this thesis and policy implications, and lastly the conclusion is presented in section 6.

2. Literature review

2.1 Definition of health and health inequalities

A person's health is partly determined by the circumstances they find themselves in. It is therefore difficult for someone to directly control or influence all the determinants of health. The World Health Organization (WHO) defines health as a "state of complete physical, mental and social well-being and not merely the absence of diseases or infirmity".[2] According to the WHO, the determinants of health include: a person's social and economic environment, their physical environment, and individual characteristics and behaviors.[3] Health inequalities are present across different ethnic and social groups worldwide. The WHO defines health inequalities as disparities in the health status or in the distribution of health determinants, between different population groups. The WHO suggests that one way to resolve the unequal distribution of health is to create policies and interventions that aim at addressing and equalizing the distribution of health determinants.

2.2 Framework used for analyzing health inequalities

The social model of health constructed by Whitehead (1995) attempts to capture the relationship between various ways of explaining inequalities by presenting tiers of influences. These tiers map the relationship between individuals, their environment and their health. There is no specific order of the tiers in this model. This model is used as a framework for analyzing health inequalities. The following figure illustrates the model.

[2] http://www.who.int/about/definition/en/print.html
[3] http://www.who.int/hia/evidence/doh/en/

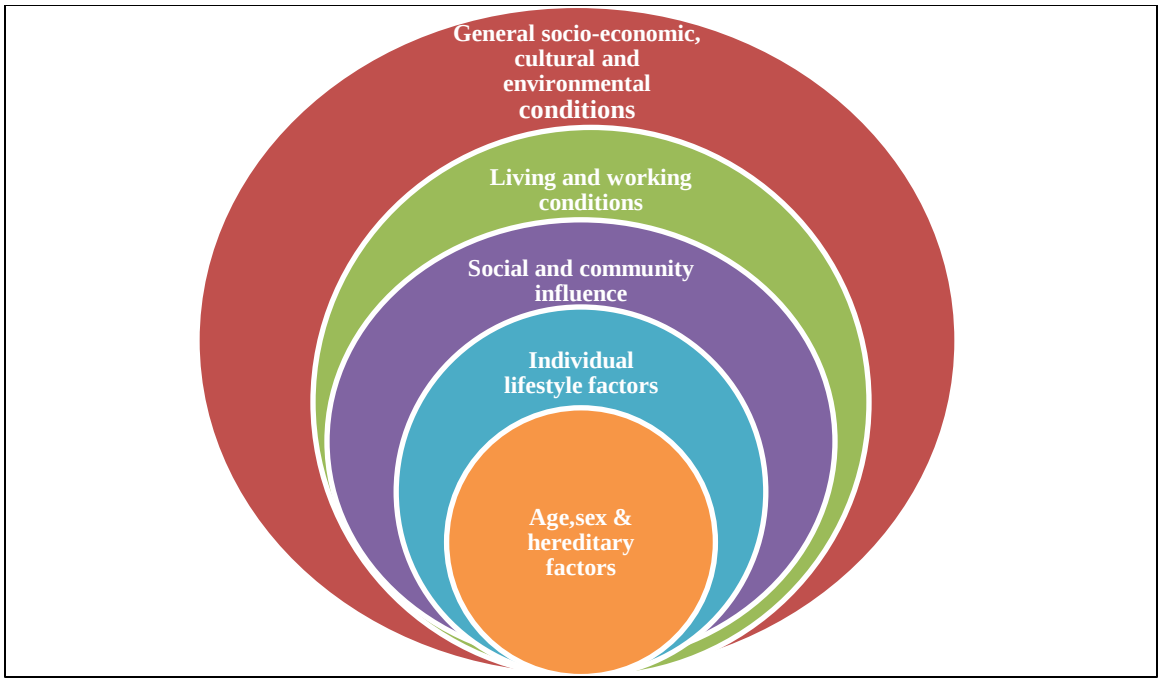

Figure 1: *The Whitehead/Dahlgren model.* Popay, Williams, Thomas and Gatrell. Theorizing inequalities in health: the place of lay knowledge. 1998. Vol.20 No.5. Sociology of Health &Illness.

The model consists of biological determinants such as age, sex and hereditary factors over which individuals have no control. Surrounding the biological determinants in the model are individual lifestyle factors which are factors that are capable of impacting a person's chances of developing a particular illness. Such individual lifestyle factors include smoking, drinking and eating patterns, over which individuals have some form of control. The model displays social and community influences, followed by living and working conditions which include structural factors such as housing, working conditions, access to services and the supply of vital facilities. The last tier consists of general socio-economic, cultural and environmental factors.

Williams (1990) discusses the relationship between social status and health. According to Williams (1990), individuals with a high social status lived longer than their inferior counterparts. The author claims that over the years major developments have taken place with the aim of reducing and even eliminating socio-economic discrepancies in health. These developments include a decrease in infectious diseases that were the cause of mortality, decent housing and making water and adequate nutrition more accessible to most families. The author explains that variations in the type and quantity of stress at home and at work, are associated with someone's socio-economic position.

2.3 Defining socio-economic status

Socio-economic status (SES) is a measure used to indicate the influence that the social environment has on individuals or families. Factors such as education, income and occupation are commonly used to measure the socio-economic status. Williams (1990) presents evidence which states that groups with a lower socio-economic status had greater death rates than higher SES groups irrespective of whether income, occupation or education was used as an indicator for SES. He moves on to further discuss that national surveys have constantly revealed that morbidity, disabilities and impairments are common among lower social groups. SES differences in health status are viewed as a universal phenomenon. The previous mentioned study shows that the association between SES and health focused on the living conditions and lifestyle of lower groups. Researchers and policy-makers expected SES differentials in health to disappear as public health measures became more extensive. However, this was not realized and there still seems to be SES differentials in health.

Williams (1990) states that the analysis of three essential principles is necessary in order to understand the relationship between social structures and health outcomes. The three principles are: the components principle, the proximity principle and the psychological principle. The components principle requires a coherent comprehension of the social structure. Research on the theory and measurement of SES is vital in order to determine the circumstances under which specific determinants are relevant. Prior research evaluated social structures as income, occupation, education or a combined version of all three. According to the proximity principle, social structures apply their effects through factors that have a direct or indirect effect on individuals. Such factors include stress, social ties and health behaviors and practices, such as drug use and nutritional behavior. The psychological principle demands an identification of the psychological process through which individuals acknowledge social structure. The way others in someone's direct environment behave can play a key role in the development and preservation of behavior. This phenomenon is commonly known as peer effects.

2.4 Health inequalities in Europe

2.4.1 Socio-economic related health inequalities in Europe

European countries are being confronted with health inequalities. Mackenbach et al. (1997) describe socio-economic inequalities in health in Europe. The authors found that the size of socio-economic inequalities in health were similar across countries in Western Europe. Risks of morbidity and mortality were higher in lower socio-economic groups in all countries but relative inequalities in mortality and morbidity were larger than average in Norway and Sweden.

Doorslaer and Koolman (2004) report a high level of health inequalities for Portugal, England and Denmark. The authors also state that there is a low level of health inequalities in Belgium, Spain, the Netherlands, Germany, Ireland, Italy and Austria. The authors state that there are health inequalities favoring higher income groups in all European countries. The authors decomposition analysis showed that income the most important factor in explaining health inequalities. It is however not the only factor. Education, region and labor force status are other contributors to health inequalities. Mackenbach (2006) and Mackenbach et al. (2008) found that individuals with lower levels of education, income and occupation are more likely to die at a younger age than those with higher levels of education, income and occupation. Mackenbach (2006) further explains that inequalities in mortality have substantially increased in many European countries and they have three important characteristics which include: inequalities in mortality begin early in life and carry on through old age, they affect both men and women but they tend to be much more substantial amongst men and they are found for most but not all causes of death. Morbidity rates seem to also be higher among individuals with a low socio-economic status, but no clear trends have been discovered in these inequalities. As a result, individuals with lower socio-economic rankings tend to live shorter lives, and spend more years being ill. Mackenbach et al. (2008) found that inequalities in mortality were quite substantial in Eastern European countries, and small in a few Southern European countries. This contradicts the findings of Doorslaer and Koolman (2004). According to Mackenbach et al. (2008), differences among countries are attributable to socio-economic variations in behavioral factors such as, excessive alcohol consumption and smoking, and access to health care.

Over the years, development has been made in identifying the determinants of health inequalities. Material factors such as exposure to health risks in the physical environment and exposure to low income may help explain health inequalities in Europe. According to Mackenbach (2006), 15 percent of the European Union's population had an income of less than 60 percent of the national average in 2001. Financial disadvantages have a way of affecting a person's health through different mechanisms such as psychosocial stress, risk-seeking behaviors and limited access to health promoting facilities and products

such as fruit and vegetables. Risk factors that play a role in explaining morbidity and mortality are frequently found in lower socio-economic groups and inequalities in exposure are the primary explanation for the existence of health inequalities. Occupational health risks and any health risks that might be related to housing are other cases of material factors. Psychosocial factors may also contribute to explaining health inequalities. Forms of psychosocial stress such as negative life occurrences may lead to health complications through either behavioral or biological channels. Lastly, health related behaviors such as smoking, excessive alcohol consumption, lack of physical activity and inadequate diet are typical factors that are common in lower socio-economic groups in many European countries. Lifestyle choices are usually made based on inequalities that may exist in general living conditions possibly influenced by economic, social, political and cultural factors.

2.4.2 Ethnic-related health inequalities in Europe.

Differences in health in terms or morbidity and mortality, have been reported across ethnic groups throughout Europe. Factors that may explain these differences in health are still being discussed. Some researchers claim that social and economic inequalities have minimal to absolutely no contribution to health inequalities that are present across ethnic groups (Wild and McKeigue 1997). Other researchers believe that ethnic health inequalities are mainly determined by socio-economic inequalities (Smaje 1996). Nazroo and Williams (2005) analyzed data which reported fair or bad health by ethnicity for the UK. Each ethnic group had been stratified by income and the authors concluded that there is a relationship between economic position and general health for each ethnicity. Furthermore, the authors compared ethnic groups stratified by occupational class and concluded that Caribbean and Indian or African Asian individuals are of equivalence in society, while white people (natives) are better off than them and Pakistani or Bangladeshi people are worse off than them. The authors also mention that within occupational groups white people have higher incomes than black people. The authors conclude that racism and discrimination appear to be central in the lives of ethnic minorities. Minority people who have reported experiences of racial harassment and discrimination, are reportedly more likely of reporting fair or poor health. This relationship was proven to be independent of socio-economic effects. When analyzing ethnic-related health inequalities it is therefore important to consider racism.

Malmusi, Borrel, and Benach (2010) present the healthy immigrant effect which explains that newly arrived immigrants have better health than the native population, or at least better than what is expected for their socio-economic characteristics. Culture-based lifestyles that are healthy, stronger social bonds and sufficient support from an individual's country of origin have a protective effect on immigrant's health.

However, the effect of these factors progressively diminishes as immigrants undergo acculturation. The authors mention that it has been proven that a low socio-economic status accounts somewhat if not completely for the less privileged outcomes of individuals from low income countries. Chronic exposure to danger on the work site, underprivileged living conditions, grief and discrimination are well established causal factors for the existence of racial and ethnic-related health inequalities. Malmusi, Borrel, and Benach (2010) present evidence which describes the health of Finns in Sweden as poor and higher mortality among Irish and Scottish immigrants in England in comparison to natives. They also explain that there is less hypertension and obesity for employment related migrants in Croatia compared to the natives of Croatia.

2.5 Health inequalities in The Netherlands.

2.5.1 Socio-economic related health inequalities in the Netherlands.

The existing literature has provided sufficient evidence indicating that inequalities in health are present between different socio-economic groups in the Netherlands. Mackenbach (1992) reviews empirical findings on socio-economic health differences in the Netherlands. The author explains that socio-economic differences in the Netherlands are equal to socio-economic health differences in other industrialized countries; however the magnitude of these differences remains unknown. Assessing the magnitude of socio-economic health differences in the Netherlands is impeded by the lack of nationally representative and recent data on standards used to measure socio-economic differences, such as mortality. The author concludes that the higher frequency of health problems in lower socio-economic groups in the Netherlands can partially be explained by variations in smoking, obesity, material living conditions, physical working conditions, psychosocial stress, social support and the supply and/or use of health care. The author further concludes that the higher frequency of health issues in lower socio-economic groups in the Netherlands is not associated with high alcohol consumption, high blood pressure or high serum cholesterol.

Mackenbach (1993) compares the degree of variation of morbidity rates which were associated with six different socio-demographic components. These included age, gender, marital status, education level, degree of urbanization, and region. He concluded that the Dutch population is heterogeneous with respect to health problems. He presents theoretical evidence which states that a given group of factors possibly always contributes to varying health inequalities. These factors include aspects of behavior, material life circumstances, psychosocial stress-related circumstances and the supply and use of health care.

The changes in socio-economic inequalities in self-reported health in the last two decades of the 20th century in the Netherlands were studied by Dalstra et al. (2002). According to the authors, socio-economic inequalities in self-assessed health displayed somewhat of a consistent increase over the years. However, socio-economic inequalities in other health indicators remained stable over time and under no circumstances did socio-economic inequalities in health decrease over time. The increase over the said time period was more noticeable for income in comparison with education and for women in comparison to men.

2.5.2 Ethnic-related health inequalities in The Netherlands.

The Netherlands is currently home to various ethnic groups including mainly, Surinamese, Turks, Moroccans and Antilleans. These ethnic groups happen to also be the largest in the Netherlands. In 2012, the total non-western immigrants in the Netherlands amounted to approximately 12% of the total population of the Netherlands.[4] Venema et al. (1995) study the health of migrant groups in the Netherlands. The authors explain that there are three groups of factors that may explain the relationship between ethnicity and health. These factors include biological/genetic factors, socio-cultural factors, and socio-economic factors.

Biological factors can be linked to health both directly and indirectly. The direct effect of biological factors is for example when a particular health problem or disease is prevalent among a specific group of immigrants which results from genetic differences. The indirect effect has an effect on health through discrimination which is caused by physical characteristics that some migrants might have. Secondly, socio-cultural factors are relevant in explaining the relationship between ethnicity and health, because different cultures indicate differences in nutrition, life-style and ideas on morbidity and treatment.

Lastly, socio-economic factors play a role in explaining the relationship between ethnicity and health. These factors include material goods and housing, working conditions, lifestyle, adequate use of health care facilities and psychosocial stress. Turks and Moroccans in the Netherlands, usually live in overcrowded houses that are commonly known to be in poor conditions (Venema et al. 1995). Venema et al. (1995) also discusses the working conditions for migrants. Migrants are frequently employed in physically demanding jobs. Furthermore, the author mentions that obesity is common amongst Turkish groups in comparison to Dutch groups, however Turks and Moroccans hardly consume alcohol. Smoking is common among Turkish men but not among Turkish women.

[4] http://www.nationaalkompas.nl/bevolking/etniciteit/huidig/

According to Venema et al. (1995), Turks and Moroccans and low class Surinamers, find themselves in lower socio-economic groups which might contribute to explaining the larger prevalence of health problems within these migrant groups. Variation is present in the health status and mortality patterns of natives and immigrants in the Netherlands.

2.6 Classifying ethnicity in the Netherlands

Since August 1999 the Netherlands has been employing standard definitions for classifying the population with a foreign background. The population with a foreign background is defined in two steps which were developed by the CBS. These steps specify first and second generation. The first generation consists of individuals who were born abroad and have at least one parent who was also born abroad. This implies that individuals who are born abroad but have parents who were both born in the Netherlands, is not classified as someone with a foreign background. Also, foreign born children of Dutch migrants who returned to the Netherlands are excluded from the first generation. The second generation consists of individuals who were born in the Netherlands and have at least one parent who fit the criteria for first generation. Anyone who does not fit the criteria for the first or second generation is classified as a native.

Individuals who have a foreign background are usually classified as western or non-western according to their country of birth. Second generation individuals were born in the Netherlands, are classified based on their mother's country of birth, unless she was also born in the Netherlands. Then the classification is done based on the father's country of birth. In order to determine whether an individual belongs to the second generation information on the country of birth of their grandparents is necessary. The non-western categories include individuals from Turkey, Africa, Asia and Latin-America and the Caribbean. Because of their position in the Dutch society, individuals with a Japanese or Indonesian background are classified as western. Most researchers and policy makers refer to non-western immigrants as ethnic minorities. The western categories include individuals from Europe excluding Turkey and the Netherlands, North America, Oceania, Japan and Indonesia. These individuals are usually labor migrants and persons from neighboring countries.

3. Data & Methodology

3.1 Data selection

The literature on the determinants of socio-economic health inequalities is quite extensive, therefore the empirical analysis will include the most essential determinants for which sufficient data is available. The empirical analysis is based on data obtained from the "Permanent onderzoek naar de leefsituatie" (POLS) 2009 carried out by the Dutch Department of Statistics (Centraal Bureau voor de Statistiek, CBS). The POLS is an annual research done by the CBS in order to obtain information on various topics concerning living conditions of the Dutch population such as health, labor, safety and housing. The 2009 POLS data contains 9,118 observations. The data was adjusted in order to fit the purpose of the analysis by excluding survey respondents who were 14 years of age and younger which caused the analysis to only consist of 7,278 observations. Table A-1of the Appendix provides a general description of the variables that were chosen to be included in the analysis. The selected variables were chosen with the purpose of testing the hypotheses in Table A-2 of the Appendix. The dependent variable is *genhealth. Genhealth* indicates an individual's self-assessed health and has five ordinal categories namely; excellent, good, average, bad, or extremely bad. The categories are coded, 1,2,3,4 and 5 respectively.

Ethnicity is measured using three alternative variables; *origin, origin_agg* and *origingnrt*. This approach supports the results by allowing for a more distinct description of not only which countries immigrants originate from, but also whether they belong to western immigrants, non-western immigrants, immigrants with a first generation, or immigrants with a second generation. The variable origin has the following categories; Native, Morocco, Turkey, Suriname, Neth. Antilles and Aruba, Other non-western countries and Other western countries. *Origin_agg* was created by aggregating the non-western countries into one category. This variable has the following categories; native, western immigrants and non-western immigrants. The variable *origingnrt* indicates whether survey respondents are native, western immigrants, non-western immigrants with a first generation, or non-western immigrants with a second generation. As mentioned in section 2.6. The first generation consists of individuals who were born abroad and have at least one parent who was born abroad. The second generation includes those individuals who were born in the Netherlands but have at least one parent who fits the criteria for first generation.

The control variables used in the analysis include *age_categorized, gender* and *marstat. Age_categorized* was created in order to determine the effect of age more accurately. It is quite possible that age may have a non-linear relationship with the independent variable *genhealth.* Therefore, including *age_categorized* in the analysis enables for modelling the effect for differing age categories.

Gender is self-explanatory. It indicates whether the survey respondent is a man or woman, by taking the values 1 if it is a man and 2 if it is a woman. *Marstat* gives the interviewer's marital status on the day of the interview and consists of the categories married, divorced, widow/widower, never married and unknown.

In order to test the hypotheses I used the variables *education, soc_part, soc_ben, smoke_, weight_kg, region* and *urbanmuni*. The variable *education* indicates the interviewer's level of education. *Soc_part* indicates the interviewer's occupation. This has the categories employed, student or other. The other category consists of individuals who are for example unemployed or those who have already gone on pension. The variable *soc_ben* was used as a measure for income. It indicates whether the interviewer receives a social benefit. Unfortunately, the POLS dataset does not provide any information on the interviewer's income level per year, monthly income or total household income. Therefore, *soc_ben* was the only measure of income that could have been used from the POLS dataset. The behavioral factors used in the analysis include *smoke_* and *weight_kg*. *Smoke_* indicates whether the interviewer occasionally smokes or not and *weight_kg* indicates the category in which the interviewer's weight in kilograms fits. The variables region indicates in which region of the Netherlands the interviewer lives, with the options of being from North-Holland, South-Holland and Utrecht, or the rest of the Netherlands. *Urbanmuni* indicates the level of urbanization of the municipality in which the interviewer lives.

3.2 Estimation method

Given that the dependent variable can take one of five ordered outcomes, the models are estimated using the ordered logistic regression. The model estimates the probability of being in each category. In the ordered logit model there is an observed ordinal variable Y, that is a function of an unmeasured latent variable Y*. Y* has various threshold points, that determine the value of the observed variable. The value of the observed variable depends on whether or not a threshold is crossed. The latent variable Y* is equal to:

$$Y_i^* = \sum_{k=1}^{K} \beta_k \, x_{ki} + \varepsilon_i \; = \; Z_i + \varepsilon_i \; [5]$$

(3.1)

[5] The disturbance term has a logistic distribution, and it is included simply because significant variables may be excluded from the equation, or they may not be measured accurately. Y* can either be higher or lower than the Z due to the effect of the random disturbance term.

Where x_{ki} are explanatory variables and β_k are the respective coefficients. ε_i is a random error term with a logistic distribution. The categorization of individuals in terms of the five levels of general health rating is essentially based on the values of the latent variable Y_i^*, in combination with threshold values for each level. The thresholds are such that:

$$Y_i = 1 \; if \; Y_i^* \leq \delta_1$$
$$Y_i = 2 \; if \; \delta_2 \leq Y_i^* \leq \delta_1$$
$$Y_i = 3 \; if \; \delta_3 \leq Y_i^* \leq \delta_3$$
$$Y_i = 4 \; if \; \delta_4 \leq Y_i^* \leq \delta_3$$
$$Y_i = 5 \; if \; Y_i^* \geq \delta_4 \tag{3.2}$$

An individual's classification in terms of their general health level depends on whether the latent variable Y_i^* exceeds a threshold. The probabilities of Y_i^* taking the values 1, 2, 3, 4 and 5 are:

$$\Pr(Y = 1) = \Pr\,(Z_i + \varepsilon_i \leq \delta_1) = \Pr\,(\varepsilon_i \leq \delta_1 - Z_i)$$
$$\Pr(Y_i = 2) = \Pr\,(\delta_2 - Z_i \leq \varepsilon_i \leq \delta_1 - Z_i)$$
$$\Pr(Y_i = 3) = \Pr\,(\delta_3 - Z_i \leq \varepsilon_i \leq \delta_2 - Z_i)$$
$$\Pr(Y_i = 4) = \Pr\,(\delta_4 - Z_i \leq \varepsilon_i \leq \delta_3 - Z_i)$$
$$\Pr(Y^* = 5) = \Pr\,(\varepsilon_i \geq \delta_{14} - Z_i) \tag{3 .3}$$

In the case of the logit model, the corresponding probabilities for each category are:

$$\Pr(Y_i^* = 1) = \frac{1}{[1 + \exp\,(Z_i - \delta_{1)}]}$$
$$\Pr(Y_i^* = 2) = \frac{1}{[1 + \exp(Z_i - \delta_{2)}]} - \frac{1}{[1 + \exp(Z_i - \delta_1)]}$$
$$\Pr(Y_i^* = 3) = \frac{1}{[1 + \exp(Z_i - \delta_{3)}]} - \frac{1}{[1 + \exp(Z_i - \delta_2)]}$$
$$\Pr(Y_i^* = 4) = \frac{1}{[1 + \exp(Z_i - \delta_{4)}]} - \frac{1}{[1 + \exp(Z_i - \delta_3)]}$$
$$\Pr(Y_i^* = 5) = 1 - \frac{1}{[1 + \exp(Z_i - \delta_{4)}]}$$

(3.4)

The estimates of β_k, δ_1, δ_2, δ_3 and δ_4 are obtained by maximizing the resulting likelihood function.

4. Results

In this section the results of the empirical analysis are reviewed. The results for each of the hypotheses will be presented and compared with the results of the existing literature. Please note that the significance level maintained throughout the remainder of this section is 1% unless mentioned otherwise. Results are presented with the three alternative definitions of ethnicity in order to provide readers with a clear image of the relationship between socio-economic factors and ethnic-related health inequalities.

4.1 Base models

First, base models are presented in Table 1. Base models are models excluding any of the socio-economic factors that were used in the analysis.

4.1.1 Age

The base models indicate that individuals are more likely to have lower levels of self-assessed health when age increases. Power, Matthew and Manor (1998) found similar results. The authors study the effect of risk identified at various life stages, on inequalities in self-rated health in Britain and found that there is no single cause of health inequalities at that age. Explanations for these health inequalities are linked to early life and to adolescence. Doorslaer and Koolman (2004) also state that health decreases with age.

4.1.2 Gender

The models indicate that females are more likely to have lower levels of self –assessed health in comparison to men. Haavio-Mannila (1986), Popay, Bartley and Owen (1993), Arber and Ginn (1993) and Doorslaer and Koolman (2004) found similar results. Haavio-Mannila (1986) study gender inequalities in health for Nordic countries and found that women have higher rates of illness than men in countries where and during periods when they are full time housewives. Participation in the labor market is beneficial to women's health on a macro-level. On a micro-level gender inequalities in health are smaller for families with more than one economical provider in comparison to families where the wife stays at home. Popay, Bartley and Owen (1993) found that differences in gender health inequality are prominently explained by problems linked to menstruation and menopause, women's social position in modern western societies and that women happen to report an excess of psychosomatic physical disorders caused by a complicated interaction between physical and psychological distress.

The authors conclude that there is little evidence to support these explanations however their analysis suggested that higher rates are reported for women for both emotional disorders and minor physical morbidity. Lastly, Arber and Ginn (1993) found that elderly women evaluate their own health more negatively than men, but better health is reported for elderly women and men who live in better material circumstances.

4.1.3 Marital status

The results show that individuals who were divorced, widowed, and never married tend to have lower levels of self-assessed health in comparison to those who were married. Individuals who were never married tend to have lower levels of self-assessed health at a significance level of 5%. These results are similar to the ones found by Verbrugge (1979). Verbrugge (1979) found that married people are less vulnerable to chronic diseases and they appear to be the healthiest of all the marital groups. The author conclude that individuals who are divorced or separated have the worst health status followed by those who are widowed. The base models show that the coefficients for individuals who are divorced is smaller than the coefficients for those who are widowed, when marred individuals is the reference category therefore Verbrugge (1997) and I have similar results.

Ren (1997) found different results. Ren (1997) investigated how various family conditions influence global health perception, and found that perception varies in accordance to different marital status. The author states that divorced individuals experienced an increase in pre-divorce stress, that later declined. No clear relationship was found meaning that individuals who were not married demonstrated poorer health than those who were married. The base models in Table 1 indicate that there is no significant relationship between the marital category never married and self-assessed health, therefore the result from my analysis are not in line with Ren (1997). Doorslaer and Koolman (2004) found that there is a variation across European countries in the health of married, cohabiting, divorced and single individuals. It is however quite common for married or cohabiting individuals to report better health than those who are divorced or single.

4.1.4 Ethnicity

The results indicate that the origin categories Morocco, Turkey, Suriname and other non-western countries tend to have lower levels of self-assessed health in comparison to natives. When origin is replaced with origin_agg the results show that non-western immigrants are more likely to have lower levels of self-assessed health in comparison to natives. When origingnrt is controlled for in the model, the results indicate that both non-western immigrants with a first generation and those with a second

generation tend to have lower levels of self-assessed health. Evandrou (2000) also found similar results. The author studies the differences in the health status of ethnic minority elders in Britain. She found that significant differences exist both between and within ethnic minority groups in their health status and health risk behavior. Elderly people from ethnic minority groups, especially Pakistanis and Bangladeshis reported worse health than the white population. The significant differences in socio-economic conditions of elderly individuals in ethnic minority groups persistently reported that Pakistani and Bangladeshi elders are more likely to be worse off in terms of income and housing in comparison to other ethnic minority groups. Cooper (2002) examined health inequalities in self-reported health of men and women from white and ethnic minority groups in the UK. She concluded that poorer health prevails among all ethnic minority groups when compared to whites of the working age. Morbidity was higher among ethnic minority groups than for whites, with a huge disadvantage for Pakistanis and Bangladeshis.

4.1.5 Full model

The full model includes all the variables in the empirical analysis. In order to limit the amount of space used I will only present the results with the more detailed variable *origin* which is similar to the other two alternative variables used for ethnicity. The results for individuals in the age category 35-45 and older and for females remain positively significant. In comparison with the base models where socio-economic factors are not controlled for, the marital status divorced is now positively significant at a significance level of 10% and the category never married is not significant. Interestingly, the coefficients for the variable origin in the full model have decreased for all the origins in comparison with Model 1. However, only the categories Morocco, Turkey and other non-western countries remain positively significant at 1% whereas Suriname is positively significant at a 5% significance level. The full model includes the socio-economic factors that will further be analyzed in detail in the remainder of section 4.

Regarding the factors that are added to the full model, I will now discuss the effect of each factor briefly. Each category of the variable education is negatively significant and decreases with higher levels of education, indicating that individuals with higher levels of education tend to have higher levels of self-assessed health. As for those who receive a social benefit, they tend to have lower levels of self-assessed health than individuals who do not receive a social benefit. Individuals who do not smoke occasionally tend to have higher levels of self-assessed health compared to those who do smoke occasionally and lastly, individuals who live in the rest of the Netherlands tend to have lower levels of self-assessed health in comparison to individuals who live in North Holland, South Holland and Utrecht. The effects of these socio-economic factors will be discussed in more detail in the remainder of section 4.

Table 1: Estimated coefficients of ordered logistic regression models.

Variable	Base models			Full model
	Base model + origin	Base model + origin_agg	Base model + origingnrt	Full model
age_categorized				
25-35	0.0290	0.0247	0.0155	0.160
35-45	0.265***	0.257***	0.238**	0.356***
45-55	0.845***	0.829***	0.813***	0.868***
55-65	1.169***	1.151***	1.136***	0.795***
65-75	1.325***	1.307***	1.294***	0.900***
75-85	1.874***	1.856***	1.845***	1.490***
>85	0.959***	0.942***	0.928***	1.018***
gender				
Female	0.296***	0.293***	0.293***	0.380***
marstat				
Divorced	0.280***	0.268***	0.264***	0.158*
Widow/Widower	0.482***	0.480***	0.480***	0.177
Never married	0.104	0.0880	0.0911	0.192***
Unknown	0.890	0.889	0.891	0.475
origin				
Morocco	1.034***			0.827***
Turkey	0.969***			0.731***
Suriname	0.531***			0.393**
Neth. Antilles and Aruba	0.272			0.117
Other non- western countries	0.528***			0.437***
Other western countries	0.0229			-0.00949
origin_agg				
Non-Western immigrant		0.681***		
Western immigrant		0.0231		
origingnrt				
Western immigrant			0.0242	
Non-western immigrant, 1st generation			0.801***	
Non-western immigrant, 2nd generation			0.411**	
education				
VMBO,AVO,MBO, HAVO,VWO				-0.369***
HBO,WO bachelor				-0.769***
WO Master, Doctor				-0.937***
soc_ben				
Yes				1.283***
Not applicable, interviewer older than15 or younger than 18 or older than 64				0.142

soc_part	
Student	-0.0254
Other	0.666***
smoke	
No	-0.306***
region	
Rest of the Netherlands	0.125**
urbanmuni	
Strongly urbanized	0.0455
Moderately urbanized	-0.0477
Little urbanization	-0.0128
No urbanization	-0.0284
Weight_kg	
28-52 kg	-0.635
53-77 kg	-0.612
78-102 kg	-0.383
>103 kg	0.181

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

4.2 Testing the hypotheses

Two approaches were taken in order to test each hypothesis regarding the contributions of the socio-economic factors to ethnic-related health inequalities. The first approach compares the base models with base models that control for the specified socio-economic factor for the hypothesis being tested.[6] Base models consist of the control variables *age_categorized, gender marstat*, and either *origin, origin_agg* or *origingnrt*. This section discusses tables including the most relevant elements of each model. Tables B1-B4 of the appendix provides an extensive overview of all the models estimated in the paper.

The second approach compares the full model controlling for all the variables used in the empirical analysis, with the full model that does not control for the specified socio-economic factor for the given hypothesis. This comparison of base models that control, and do not control for socio-economic factors, and the full model with and without a socio-economic factor allows a clear illustration of how the coefficients for the different origin categories vary once a socio-economic factor is being controlled for in the model. Even though all factors are included in the full model, when put together they still do not completely explain the inequalities that exist for each ethnicity.

4.2.1 Education

The first hypothesis tested whether the socio-economic factor education plays a role in explaining ethnic-related health inequalities in the Netherlands. Coefficients for the various levels of education are negatively significant and decreasing with higher levels of education indicating that individuals tend to have higher levels of self-assessed health when they have higher levels of education. When education is not controlled for in the full model, the coefficients for the origin categories are higher than when education is controlled for. Also, when education is controlled for in the base models the coefficients for non-western immigrants and non-western immigrants with a first and second generation decreases but remain significant. The lower coefficients indicate that these individuals tend to have lower levels of self-assessed health. When education is controlled for in the base models the coefficients for each origin decreases and remains significant for the origins Morocco, Turkey, and other non-western countries. The coefficient for Suriname is significant at a level of 10%.

When education is controlled for it allows the coefficients for the origin categories to decrease indicating that ethnic minorities are less educated which improves health. This is also the case for non-western immigrants with a first generation. When education is added to the base models Table 2 illustrates that the

[6] See Appendix table A-2: Estimated coefficients of ordered logistic regression models used to assess the contribution of the factor education.

coefficients for the three alternative measures for ethnicity, decreases by much. Table 2 also shows that when education is excluded from the full model, the coefficients for ethnicity increase pretty fairly. Clearly, there is an association between education, ethnicity and self-assessed health.

Ross and Wu (1995), Cowell (2003 and Cooper (2002) found similar results. The authors found that there is a relationship between education and self-assessed health. Cooper (2002) main finding was that socio-economic factors account for a substantial proportion of ethnic inequalities in health. Adjusting for education greatly reduced the likelihood of poor health for ethnic minorities, while a reduction in the odds of poor health for working age minorities was found when the analysis controlled for employment status. Moreover, Feinstein et al. (2006) found that internationally, education is strongly associated with health and with the determinants of health which include health behaviors and the use of preventative service. The authors also found that the relationship between education and health is causal. Individuals with more years of schooling are more likely to have better health, well-being, and healthier behaviors. Education is an essential tool for improving overall health and well-being because it aids in promoting and sustaining healthy lifestyles and positive decisions especially where human development and relationships are concerned.

Table 2: Estimated coefficients of ordered logistic regression models used to assess the contribution of the factor education.

Variable	Base models						Full models	
	Base model+ origin	**Base model+ origin_agg**	**Base model+ origingnrt**	**Base model + origin + education**	**Base model + origin_agg + education**	**Base model + origingnrt + education**	**Full model - education**	**Full model**
origin								
Morocco	1.034***			0.852***			1.009***	0.827***
Turkey	0.969***			0.844***			0.846***	0.731***
Suriname	0.531***			0.400**			0.489**	0.393**
Neth. Antilles and Aruba	0.272			0.235			0.200	0.117
Other non- western countries	0.528***			0.400**			0.561***	0.437***
Other western countries	0.0229			0.0309			-0.0133	-0.00949
origin_agg								
Non-Western immigrant		0.681***			0.555***			
Western immigrant		0.0231			0.0311			
origingnrt								
Western immigrant			0.0242			0.0318		
Non-western immigrant, 1st generation			0.801***			0.638***		
Non-western immigrant, 2nd generation			0.411**			0.368**		
education								
VMBO,AVO,MBO, HAVO,VWO				-0.481***	-0.485***	-0.481***		-0.369***
HBO,WO bachelor				-1.018***	-1.024***	-1.019***		-0.769***
WO Master, Doctor				-1.308***	-1.312***	-1.307***		-0.937***

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

4.2.2 Occupation

The second hypothesis examined whether occupation plays a role in explaining ethnic-related health inequalities in the Netherlands. When occupation is controlled for in the base models, it causes the coefficients for origin to slightly decrease. The coefficients for Morocco, Turkey, and other non-western countries are positively significant but not much smaller than in the base model where occupation is not controlled for. The coefficient for Suriname has somewhat decreased and is significant at a significance level of 5%. The coefficients for non-western immigrants and non-western immigrants with a first or second generation are also significant but these coefficients decrease by a little when compared to the coefficients in the base models. The models also indicate that individuals within the occupation category other tend to have lower levels of self-assessed health when compared to those individuals who are employed.

In comparison to the full model, the full model that does not control for occupation also shows little variance in the coefficients for each origin category. When occupation is excluded from the full model the coefficients are smaller for Morocco and other non-western countries than in the full model but remains positively significant. However, the coefficient for Turkey slightly increases but remains positively significant. The coefficient for Suriname decreases in the full model excluding occupation and remains significant at a significance level of 10%. A socio-economic factor plays a role in explaining ethnic-related health inequalities if the coefficients of origin decreases or increases when the factor is added to the model. Evidently, although there seems to be an association between occupation and self-assessed health, when occupation is added to the model it causes the coefficients for ethnicity to decrease by very little. This indicates that occupation plays minor to no role in explaining ethnic-related health inequalities in the Netherlands.

Law, Steinwender, and Leclair (1998) found different results. The authors qualitatively focused on the relationship between occupation, health and well-being. The authors conclude that a relationship between occupation, health and well-being does exist but the size of the effect of occupation on health is significantly dependent on the relationship between the individual, their environment and occupation and their balance in self-care, productivity and leisure. If an individual has no occupation, may be the cause of increased stress, physiological changes, and decreased health. On the other hand, Doorslaer and Koolman (2004) found similar results to the analysis done in this thesis. The authors found that being economic inactivity such as being retired or unemployed, is associated with lower health.

Table 3: Estimated coefficients of ordered logistic regression models used to assess the contribution of the factor occupation.

	Base models						Full models	
Variable	**Base model+ origin**	**Base model+ origin_agg**	**Base model+ originggnrt**	**Base model + origin + occupation**	**Base model + origin_agg + occupation**	**Base model + originggnrt + occupation**	**Full model - occupation**	**Full model**
origin							0.813***	0.827***
Morocco	1.034***			0.997***			0.747***	0.731***
Turkey	0.969***			0.889***			0.383*	0.393**
Suriname	0.531***			0.492**			0.137	0.117
Neth. Antilles and Aruba	0.272			0.258			0.462***	0.437***
Other non- western countries	0.528***			0.447***			0.00923	-0.00949
Other western countries	0.0229			-0.0211				
origin_agg								
Non-Western immigrant		0.681***			0.623***			
Western immigrant		0.0231			-0.0209			
originggnrt								
Western immigrant			0.0242			-0.0202		
Non-western immigrant, 1st generation			0.801***			0.693***		
Non-western immigrant, 2nd generation			0.411**			0.460***		
occupation								-0.0254
Student				0.139	0.142	0.144		0.666***
Other				1.166***	1.166***	1.163***		

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

4.2.3 Income

The third hypothesis tested whether income plays a role in explaining ethnic-related health inequalities in the Netherlands. Controlling for income in the base models causes the coefficients for each origin category to decrease considerably. The coefficient for the origin categories Morocco, Turkey and other non-western countries decreases but remains positively significant. The coefficient for Suriname also decreases but remains significant at a 5%. The coefficients for the aggregated origin category non-western immigrants decreases and remains significant, and the coefficients for immigrants with a first generation also decreases. The coefficient for non-western immigrants with a second generation also decreases when income is added to the model, but is significant at 5%.

When income is controlled for in the base models there is an evident decrease in the coefficients for all three of the alternative variables used to measure ethnicity. This implies that minorities have lower levels of income which deteriorates health. The full model excluding income illustrates that the coefficients for each origin category increases by quite a bit. The coefficients for Moroccans, Turks and non-western immigrants increase and remains positively significant. The coefficient for Suriname also fairly increases but is significant at a 5% significance level. Generally, individuals who receive a social benefit i.e. those with a low level of income, tend to have lower levels of self-assessed health in comparison to those who do not receive a social benefit. There is evidence that income plays an important role in explaining ethnic-related health inequalities in the Netherlands.

The literature on the relationship between income and health also found similar results. Ettner (1995) estimated the effect of income on various health proxies. Her results indicate that significant improvements in mental and physical health are the result of increases in income, but it also increases the consumption of alcohol. Individual's with higher incomes consume alcohol significantly more, but this increase in alcohol consumption among higher income persons is a result of their higher probability of drinking any type of alcohol rather than an increase in the level of consumption. According to the author this finding probably explains the fact that there is a higher frequency of light social drinking among persons of higher income levels. Ecob and Smith (1999) examined the relationship between income and morbidity and found that there is a positive relationship between the logarithm of income and health, with the exception of very low and very high incomes. This indicates that better health is linked to increases in income, but there are diminishing returns at higher levels of income.

Table 4: Estimated coefficients of ordered logistic regression models used to assess the contribution of the factor income.

Variable	Base models						Full models	
	Base model+ origin	**Base model+ origin_agg**	**Base model+ origingnrt**	**Base model + origin + income**	**Base model + origin_agg + income**	**Base model + origingnrt + income**	**Full model - income**	**Full model**
origin							0.928***	0.827***
Morocco	1.034***			0.893***			0.843***	0.731***
Turkey	0.969***			0.780***			0.464**	0.393**
Suriname	0.531***			0.412**			0.190	0.117
Neth. Antilles and Aruba	0.272			0.152			0.489***	0.437***
Other non- western countries	0.528***			0.422***			0.0155	-0.00949
Other western countries	0.0229			-0.0217				
origin_agg								
Non-Western immigrant		0.681***			0.549***			
Western immigrant		0.0231			-0.0217			
origingnrt								
Western immigrant			0.0242			-0.0208		
Non-western immigrant, 1st generation			0.801***			0.623***		
Non-western immigrant, 2nd generation			0.411**			0.379**		
soc_ben								1.283***
Yes				1.739***	1.742***	1.738***		0.142
Not applicable, interviewer older than15 or younger than 18 or older than 64				0.266***	0.271***	0.276***		

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

4.2.4 Behavior

This hypothesis tested whether behavioral factors play a role in explaining ethnic-related health inequalities in the Netherlands. Individuals who do not occasionally smoke tend to have a higher level of self-assessed health in comparison to those who do occasionally smoke. When behavioral factors are controlled for in the base model the coefficients for the origin categories increase very little in comparison to the coefficients in the base model excluding these factors. This indicates that non-western immigrants including those with a first and second generation tend to have lower levels of self-assessed health. These non-western immigrants include Moroccans, Turks, Surinamers and other non-western countries. When the behavioral factors are excluded from the full model the coefficients for Morocco, Turkey, Suriname and other non-western countries decreases but remain positively significant, Suriname at a significance level of 10%. The results further indicate that there is no effect of *weight_kg* in any of the models.

When behavioral factors are controlled for in the base models the coefficient for each alternative variable for ethnicity increases by very little. When behavioral factors are not controlled for in full model the coefficients slightly decrease in comparison to the full model. I conclude that the behavioral factors do not explain anything. Behavioral factors do not play a role in explaining ethnic-related health inequalities in the Netherlands. Power, Matthew and Manor (1998) found similar results for the relationship between smoking and health. The authors found that smoking was the only factor to have a significant effect on health inequalities. Other behaviors such as alcohol consumption may have had a small influence on health inequalities but this remained unclear because such behaviors were not strongly associated with social position. The existence of health inequalities could thus only partially be explained by individual behavior.

Table 5: Estimated coefficients of ordered logistic regression models used to assess the contribution of behavioral factors.

Variable	Base models						Full models	
	Base model+ origin	Base model+ origin_agg	Base model+ originggnrt	Base model + origin + smoke_ + weight_kg	Base model + origin_agg + smoke_ + weight_kg	Base model + originggnrt + smoke_ + weight_kg	Full model - smoke_ - weight_kg	Full model
origin								
Morocco	1.034***			1.101***			0.765***	0.827***
Turkey	0.969***			1.024***			0.670***	0.731***
Suriname	0.531***			0.537***			0.350*	0.393**
Neth. Antilles and Aruba	0.272			0.310			0.134	0.117
Other non- western countries	0.528***			0.629***			0.303*	0.437***
Other western countries	0.0229			0.0506			-0.0261	-0.00949
origin_agg								
Non-Western immigrant		0.681***			0.742***			
Western immigrant		0.0231			0.0511			
originggnrt								
Western immigrant			0.0242			0.0519		
Non-western immigrant, 1st generation			0.801***			0.882***		
Non-western immigrant, 2nd generation			0.411**			0.433***		
smoke_								
No				-0.431***	-0.431***	-0.432***		-0.306***
weight_kg								
28-52 kg				-0.362	-0.356	-0.465		-0.635
53-77 kg				-0.340	-0.328	-0.444		-0.612
78-102 kg				-0.112	-0.102	-0.214		-0.383
>103 kg				0.439	0.445	0.336		0.181

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

4.2.5 Environment

The final hypothesis tested whether environmental factors play a role in explaining ethnic-related health inequalities in the Netherlands. When these factors are controlled for, the base models illustrate that the coefficients for each origin increases by very little in comparison to the coefficients in the base models where these factors are not controlled for. Individuals who live in the rest of the Netherlands tend to have lower levels of self-assessed health. The level of urbanization of a municipality is not significant in any of the models. The coefficients for the origins Morocco, Turkey, Suriname and other non-western countries slightly increase. These countries have positive significant coefficients. The full model excluding environmental factors shows that there is hardly any variance in the coefficients for the origin categories. When environmental factors are added to the models, the coefficients for the origin categories hardly changes indicating that environmental factors do not play a role in explaining ethnic-related health inequalities in the Netherlands. These result are the opposite of what Yen and Syme (1999) and Michael (2000) found. Yen and Syme (1999) explain that environmental factors impact the health of individuals and populations. Their evidence suggest that disease rates display a regular pattern over time, even after individual risk factors have been accounted for. The results indicate that the degree of urbanization does not have a significant effect in any of the models however this contradicts Michael (2000), who argues that urban areas provide its inhabitants with exposure to health hazards.

Table 6: Estimated coefficients of ordered logistic regression models used to assess the contribution of environmental factors.

	Base models						Full models	
Variable	**Base model+ origin**	**Base model+ origin_agg**	**Base model+ originggnrt**	**Base model + origin + region + urbanmuni**	**Base model + origin_agg + region + urbanmuni**	**Base model + originggnrt + region + urbanmuni**	**Full model – region - urbanmuni**	**Full model**
origin								
Morocco	1.034***			1.088***			0.803***	0.827***
Turkey	0.969***			0.998***			0.723***	0.731***
Suriname	0.531***			0.598***			0.359*	0.393**
Neth. Antilles and Aruba	0.272			0.327			0.0915	0.117
Other non- western countries	0.528***			0.570***			0.415**	0.437***
Other western countries	0.0229			0.0302			-0.0118	-0.00949
origin_agg								
Non-Western immigrant		0.681***			0.728***			
Western immigrant		0.0231			0.0300			
originggnrt								
Western immigrant			0.0242			0.0309		
Non-western immigrant, 1st generation			0.801***			0.846***		
Non-western immigrant, 2nd generation			0.411**			0.461***		
region								
Rest of the Netherlands				0.158***	0.161***	0.160**		0.125**
urbanmuni								
Strongly urbanized				0.0952	0.0951	0.0960		0.0455
Moderately urbanized				0.0282	0.0251	0.0241		-0.0477
Little urbanization				0.0602	0.0562	0.0550		-0.0128
No urbanization				0.0159	0.0103	0.00979		-0.0284

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

5. Discussion

5.1 Limitations

This study used common measures for socio-economic status and confirmed that the socio-economic factors education and income play the biggest role in explaining ethnic-related health inequalities in the Netherlands. The analysis shows that occupation, behavioral factors and environmental factors play a minor to no role in explaining ethnic-related health inequalities in the Netherlands. There are a few limitations to the analysis mostly where the data is concerned. Firstly, the model by Whitehead and Dahlgreen suggest that there are five tiers of influences that link a person to their health. The analysis considered different aspects of each tier of factors, but focused mainly on the socio-economic factors. Each tier was not fully considered due to the data that was available. The data did not include variables that provided sufficient information on living and working conditions or culture for example. Although the variable religion was included in the survey, it was insufficient to measure culture. Culture also consists of other aspects. For example higher levels of religious practice are positively associated with better health regardless of age (Ferraro and Almbrecht-Jensen 1991), but there was no way to examine this for the Netherlands, seeing that the extent to which religion was being practice in the Netherlands was not measured in the POLS survey.

Moreover, section 2 reviewed evidence which states that psychosocial factors such as stress may also be associated with a person's socio-economic position (Williams 1990) or health status (Mackenbach 2006), but the data did not include any measure for psycho-social factors. Also, it is essential that racial harassment and discrimination are included in the analysis when trying to understand health inequalities in ethnicity, however the data fell short of a measure for this as well (Nazoor and Williams 2005).

Additionally, including other lifestyle factors such as alcohol consumption was proven to be problematic in the analysis because of the way alcohol consumption was measured in the survey. Alcohol consumption was measured by asking questions such as how old were you when you first consumed alcohol, or how often have you had alcohol in the past year or 30 days. There is no information on the type of alcohol being consumed or how often alcohol is consumed on a daily basis. The literature presents evidence which explains that there is a relationship between alcohol consumption and health. Heavy drinking and a problematic drinking history have proven to be associated with functional disabilities, psychiatric issues and memory loss for late middle aged men (Perreira and Sloan 2001).

Lastly, this thesis examined survey data for 2009. In order to see whether the socio-economic, behavioral and environmental factors used in this thesis maintained their role in explaining ethnic-related health inequalities in the Netherlands, it is important that data for other years are also examined to see if there were any changes in the behavior of these factors. It is possible that the implementation of new policies caused different results or patterns in ethnic-related health inequalities in the Netherlands. The POLS dataset for other years however, does not include information on ethnicity. In order to analyze the long term effect of that these factor play in explaining ethnic inequalities in health a different dataset would have to be used.

To summarize, additional research is necessary in order to analyze the conditions for which different elements of SES are likely to be significant in predicting health outcomes. This thesis shows that socio-economic factors, behavioral factors and environmental factors are associated with self-assessed health; however the causation of the relationship remains unknown. Also, it shows that education and income play the biggest role in explaining ethnic-related health inequalities in the Netherlands, however the size and causality of the effect remains unknown. Future research should examine the causality of the relationships and the magnitude of the effects of each factor on ethnic-related health inequalities. Future research should include data that measures sufficient and relevant factors. The data should also enable assessing the magnitude or causal effects of the factors involved in explaining ethnic-related health inequalities.

5.2 Policy Implications

The international patterns of socio-economic inequalities in health suggest that these inequalities vary across countries, indicating that policies and interventions should differ for each country. Evidence indicates that ethnic-related health inequalities do exist in the Netherlands and that education and income play a role in explaining these inequalities. Socio-economic differences in health should be reduced because inequalities in health contradict principles of justice and because reducing such inequalities may lead to a better national health (Mackenbach and Bakker 2002).

Progress has been made in developing policies that aim to reduce socio-economic inequalities in health (Mackenbach and Bakker 2002). It is vital that policy makers set targets to reduce socio-economic inequalities in health and that health determinants are included in these targets. It is important that with the implementation of new policies to reduce socio-economic inequalities in health that governments routinely monitor, collect information and evaluate their policies and any effects it might have on socio-economic inequalities in health. This will enable assessment on the success or failure of policies and allow policy makers to indicate whether their strategy is on the right track.

Before policy-makers can address the issue of health inequalities it is important that they consider the components principle, the proximity principle and the psychological principle which will aid in better understanding the relationship between social organization and health outcomes (William 1990). Furthermore, policy-makers should address social conditions which include addressing differences in education and income since these are important socio-economic factors in explaining ethnic-related health inequalities. Policies and interventions should focus on stimulating higher education. This can be done by providing individuals with subsidies when they choose to pursue higher education. Policies should also target increasing labor market participation by decreasing labor taxes, or intervene in the labor market as an intermediary between organizations and the unemployed for instance. These policies cannot be implemented without conducting proper research on the possible outcomes. Generally, attempts to reduce socio-economic inequalities in health should be aimed at comprehending their causes. Policies or interventions aiming at reducing ethnic-related inequalities in health in the Netherlands should be aimed at addressing and equalizing the distribution of health determinants.

6. Conclusion

This thesis examined the socio-economic factors play a role in explaining ethnic-related health inequalities in the Netherlands. After presenting the framework on inequalities by Dahlgreen and Whitehead (1999), existing literature on socio-economic status, health inequalities in Europe and health inequalities in the Netherlands was discussed. Most studies support that individuals with a lower socio-economic status are more likely to have higher rates of mortality and morbidity in comparison to individuals of a higher socio-economic status. Some studies have shown that natives have a better level of health than immigrants, while other studies indicate that the health level of newly arrived immigrants is better than that of natives or at least better than expected for their socio-economic characteristics. It does however progressively diminish as immigrants undergo acculturation.

The relationship between socio-economic factors and ethnic-related health inequalities in the Netherlands was estimated using data from a 2009 POLS survey conducted by the Dutch Department of Statistics (Centraal Bureau voor de Statistiek (CBS)). Socio-economic, behavioral and environmental factors were used in the analysis. The results indicate that education and income play a role in explaining ethnic-related health inequalities in the Netherlands, and that ethnic minorities tend to have a lower levels of education and income in comparison to natives. The analysis further showed that occupation, behavioral factors and environmental factors play little to no role in explaining ethnic-related health inequalities in the Netherlands.

Although the results indicate that education and income play a role in the explaining ethnic-related health inequalities in the Netherlands, this relationship cannot be interpreted as causal. Further research is necessary in order to determine the causality of the relationships and the magnitude of the effects that these factors have in explaining ethnic-related health inequalities. This will provide policy makers and researchers with more insight in the causes of these health inequalities. Understanding the causes of the existing health inequalities will better enable policies and interventions to be aimed at equalizing the distribution of the determinants of health which after being implemented in proper sequence should reduce ethnic-related health inequalities in the Netherlands.

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8. Appendix

Section A: Descriptive statistics

Table A-1: General description of variables.

Variable name	Variable description
genhealth	Dependent variable which indicates the interviewer's self-assessed health with the ordinal categories: 1= excellent health (ref.), 2=good health, 3= average health, 4= poor health, 5=extremely poor health.
origin	Interviewer's origin/ethnicity with categories: Natives (ref.), Morocco, Turkey, Suriname, Neth. Antilles and Aruba, Other non-western countries, Other western countries.
origin_agg	Origins aggregated into three categories with categories: Native (ref.), Non-western immigrant, Western immigrant
origingnrt	Non-western immigrant with generation with categories: Native (ref.), Western immigrant, Non-western immigrant 1st generation, Non-western immigrant 2nd generation.
age _categorized	Age of the interviewer with categories: 15-25 (ref.), 25-35, 35-45, 45-55, 55-65, 65-75, 75-85 and >85.
female	Dummy variable for gender which takes the value 1 for female and 0 for male.
marstat	Interviewer's marital status on the day of interview with categories: Married (ref.), Divorced, Widow/widower, Never married, Unknown.
education	Interviewer's (highest) level of education with categories: Primary education (ref.); VMBO,AVO,MBO,HAVO,VWO; HBO,WO bachelor; WO Master, Doctor.
soc_part	Interviewer's occupation in society with categories: Employed (ref.), Student, Other.
soc_ben	Interviewer receiving a social benefit with categories: No (ref.), Yes, Not applicable, interviewer older than15 or younger than 18 or older than 64.

region	Regional division with categories: North-Holand, South-Holland and Utrecht (ref.), Rest of the Netherlands.
urbanmuni	Urban municipalities with categories: Highly urbanized (ref.), Strongly urbanized, Moderately urbanized, Little urbanization, No urbanization.
smoke_	Smokes occasionally with categories: Yes (ref.), No.
weight_kg	Interviewer's weight in kilograms categorized into five categories: 3-27 kg (ref.), 28-52 kg, 53-77 kg, 78-102 kg, >103 kg.

Table A-2: Overview of hypotheses.

	Null hypothesis	**Alternative hypothesis**	**Socio-economic factor used to test hypothesis**
1. Education	Education does not play a role in explaining ethnic-related health inequalities in the Netherlands.	Education does play a role in explaining ethnic-related health inequalities in the Netherlands.	Education
2. Occupation	Occupation does not play a role in explaining ethnic-related health inequalities in the Netherlands.	Occupation does play a role in explaining ethnic-related health inequalities in the Netherlands.	Soc_part
3. Income	Income does not play a role in explaining ethnic-related health inequalities in the Netherlands.	Income does play a role in explaining ethnic-related health inequalities in the Netherlands.	Soc_ben
4. Behavior	Behavioral factors do not play a role in explaining ethnic-related health inequalities in the Netherlands.	Behavioral factors play a role in explaining ethnic-related health inequalities in the Netherlands.	Smoke_ Weight_kg

5. Environment	Environmental factors do not play a role in explaining ethnic-related health inequalities in the Netherlands.	Environmental factors play a role in explaining ethnic-related health inequalities in the Netherlands.	Region Urbanmuni

Table A-3: Frequency table for variables used in the analysis.

Variables	Freq.	Percent
Ages 25-35	915	12.57
Ages 35-45	1,245	17.1
Ages 45-55	1,213	16.66
Ages 55-65	1,122	15.41
Ages 65-75	729	10.02
Ages 75-85	449	6.17
Ages >85	560	7.69
VMBO,AVO,MBO,HAVO,VWO	4,237	58
HBO,WO bachelor	1,284	18
WO Master, Doctor	491	6.75
Female	3,722	51.13
Divorced	564	8
Widow/widower	449	6
Never married	2,396	33
Unknown	10	0.14
Morocco	77	1.06
Turkey	103	1.42
Suriname	102	1.4
Neth. Antilles and Aruba	41	0.56
Other non-western countries	153	2.1
Other western countries	571	7.84
Non-western immigrant	476	7
Western immigrant	571	8
Western immigrant	571	7.84
Non-western immigrant, 1st generation	329	4.52
Non-western immigrant, 2nd generation	147	2.02
Rest of the Netherlands	4,257	58.48
No	5,261	72.28
Yes	698	7.66
Not applicable, interviewer older than15 or younger than 18 or older than 64	1,843	25.33

Student	582	8
Other	2,630	36.13
Strongly urbanized	2,012	27.64
Moderately urbanized	1,350	18.55
Little urbanization	1,724	23.68
No urbanization	1,006	13.82
28-52 kg	265	3.64
53-77 kg	3,785	52.00
78-102 kg	2,693	37.00
>103 kg	369	5.07

Table A-4: Frequency table of dependent variable genhealth

Self-assessed health	**Freq.**	**Percent**
Excellent	1,802	24.76
Good	3,871	53.19
Average	1,283	17.63
Poor	273	3.75
Extremely poor	49	0.67
Total	7,278	100.00

Section B: Overview of complete models

Table B-1: Estimated coefficients of ordered logistic regression models.

Variable	Base model + origin	Base model + origin_agg	Base model + originggnrt	Full model	Base model + origin + education	Base model+ orgin_agg + education	Base model + originggrt + education
age_categorized							
25-35	0.0290	0.0247	0.0155	0.160	0.354***	0.351***	0.344***
35-45	0.265***	0.257***	0.238**	0.356***	0.603***	0.596***	0.582***
45-55	0.845***	0.829***	0.813***	0.868***	1.460***	1.444***	1.433***
55-65	1.169***	1.151***	1.136***	0.795***	1.460***	1.444***	1.433***
65-75	1.325***	1.307***	1.294***	0.900***	1.531***	1.514***	1.505***
75-85	1.874***	1.856***	1.845***	1.490***	2.065***	2.048***	2.041***
>85	0.959***	0.942***	0.928***	1.018***	1.397***	1.381***	1.371***
gender							
Female	0.296***	0.293***	0.293***	0.380***	0.291***	0.288***	0.288***
marstat							
Divorced	0.280***	0.268***	0.264***	0.158*	0.260***	0.249***	0.246***
Widow/Widower	0.482***	0.480***	0.480***	0.177	0.306***	0.304***	0.305***
Never married	0.104	0.0880	0.0911	0.192***	0.231***	0.216***	0.218***
Unknown	0.890	0.889	0.891	0.475	0.786	0.783	0.788
origin							
Morocco	1.034***			0.827***	0.852***		
Turkey	0.969***			0.731***	0.844***		
Suriname	0.531***			0.393**	0.400**		
Neth. Antilles and Aruba	0.272			0.117	0.235		
Other non- western countries	0.528***			0.437***	0.400**		
Other western countries	0.0229			-0.00949	0.0309		
origin_agg							
Non-Western immigrant		0.681***				0.555***	
Western immigrant		0.0231				0.0311	

origingnrt					
Western immigrant	0.0242				0.0318
Non-western immigrant, 1st generation	0.801***				0.638***
Non-western immigrant, 2nd generation	0.411**				0.368**
education					
VMBO,AVO,MBO, HAVO,VWO		-0.369***	-0.481***	-0.485***	-0.481***
HBO,WO bachelor		-0.769***	-1.018***	-1.024***	-1.019***
WO Master, Doctor		-0.937***	-1.308***	-1.312***	-1.307***
soc_ben					
Yes		1.283***			
Not applicable, interviewer older than15 or younger than 18 or older than 64		0.142			
soc_part					
Student		-0.0254			
Other		0.666***			
smoke					
No		-0.306***			
region					
Rest of the Netherlands		0.125**			
urbanmuni					
Strongly urbanized		0.0455			
Moderately urbanized		-0.0477			
Little urbanization		-0.0128			
No urbanization		-0.0284			
Weight_kg					
28-52 kg		-0.635			
53-77 kg		-0.612			
78-102 kg		-0.383			
>103 kg		0.181			

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

Table B-2: Estimated coefficients of ordered logistic regression models.

Variable	Full model - education	Base model + origin + soc_part	Base model + origin_agg + soc_part	Base model + origingnrt + soc_part	Full model – soc_part	Base model + origin + soc_ben	Base model + origin_agg + soc_ben
age_categorized							
25-35	0.0230	0.149	0.146	0.141	0.224**	0.0338	0.0303
35-45	0.234**	0.405***	0.399***	0.387***	0.416***	0.200**	0.194**
45-55	0.756***	0.952***	0.938***	0.928***	0.939***	0.710***	0.696***
55-65	0.696***	0.965***	0.948***	0.940***	0.997***	0.761***	0.745***
65-75	0.678***	0.645***	0.629***	0.623***	1.291***	1.158***	1.139***
75-85	1.300***	1.204***	1.188***	1.183***	1.895***	1.769***	1.750***
>85	0.858***	0.834***	0.818***	0.811***	1.272***	0.865***	0.849***
gender							
Female	0.401***	0.169***	0.166***	0.166***	0.457***	0.301***	0.298***
marstat							
Divorced	0.176*	0.357***	0.346***	0.343***	0.0837	0.144	0.133
Widow/Widower	0.232**	0.315***	0.314***	0.314***	0.175	0.302***	0.300***
Never married	0.173**	0.286***	0.270***	0.271***	0.123*	-0.0116	-0.0262
Unknown	0.325	0.735	0.735	0.736	0.410	0.629	0.628
origin							
Morocco	1.009***	0.997***			0.813***	0.893***	
Turkey	0.846***	0.889***			0.747***	0.780***	
Suriname	0.489**	0.492**			0.383*	0.412**	
Neth. Antilles and Aruba	0.200	0.258			0.137	0.152	
Other non- western countries	0.561***	0.447***			0.462***	0.422***	
Other western countries	-0.0133	-0.0211			0.00923	-0.0217	
origin_agg							
Non-Western immigrant			0.623***				0.549***
Western immigrant			-0.0209				-0.0217

origingnrt							
Western immigrant				-0.0202			
Non-western immigrant, 1st generation				0.693***			
Non-western immigrant, 2nd generation				0.460***			
education							
VMBO,AVO,MBO, HAVO,VWO					-0.387***		
HBO,WO bachelor					-0.842***		
WO Master, Doctor					-1.022***		
soc_ben							
Yes	1.315***				1.625***	1.739***	1.742***
Not applicable, interviewer older than15 or younger than 18 or older than 64	0.313***				0.320***	0.266***	0.271***
soc_part							
Student	0.0384	0.139	0.142	0.144			
Other	0.761***	1.166***	1.166***	1.163***			
smoke							
No	-0.387***				-0.311***		
region							
Rest of the Netherlands	0.132**				0.133**		
urbanmuni							
Strongly urbanized	0.0808				0.0504		
Moderately urbanized	0.000635				-0.0480		
Little urbanization	0.0491				-0.00482		
No urbanization	0.0491				-0.0324		
Weight_kg							
28-52 kg	-0.525				-0.537		
53-77 kg	-0.487				-0.481		
78-102 kg	-0.247				-0.267		
>103 kg	0.377				0.277		

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

Table B-3: Estimated coefficients of ordered logistic regression models.

Variable	Base model + origingnrt + soc_ben	Full model – soc_ben	Base model + origin + smoke_ + weight_kg	Base model + origin_agg + smoke_+ weight_kg	Base model + origingnrt + smoke_+ weight_kg	Full model – smoke_ - weight_kg	Base model + origin + region+ urbanmuni
age_categorized							
25-35	0.0267	0.238**	-0.0515	-0.0561	-0.0675	0.239**	0.0382
35-45	0.184*	0.485***	0.218**	0.209**	0.185*	0.427***	0.274***
45-55	0.688***	1.024***	0.813***	0.796***	0.776***	0.926***	0.853***
55-65	0.738***	1.048***	1.176***	1.156***	1.137***	0.841***	1.184***
65-75	1.127***	0.754***	1.395***	1.376***	1.360***	1.028***	1.337***
75-85	1.739***	1.299***	1.959***	1.939***	1.925***	1.622***	1.897***
>85	0.839***	0.963***	1.157***	1.139***	1.120***	1.110***	1.019***
gender							
Female	0.298***	0.329***	0.482***	0.478***	0.479***	0.221***	0.297***
marstat							
Divorced	0.131	0.284***	0.213**	0.200**	0.195**	0.191**	0.283***
Widow/Widower	0.299***	0.268**	0.463***	0.462***	0.463***	0.149	0.472***
Never married	-0.0243	0.303***	0.164**	0.147**	0.151**	0.188***	0.120*
Unknown	0.630	0.645	0.591	0.591	0.594	0.572	0.853
origin							
Morocco		0.928***	1.101***			0.765***	1.088***
Turkey		0.843***	1.024***			0.670***	0.998***
Suriname		0.464**	0.537***			0.350*	0.598***
Neth. Antilles and Aruba		0.190	0.310			0.134	0.327
Other non- western countries		0.489***	0.629***			0.303*	0.570***
Other western countries		0.0155	0.0506			-0.0261	0.0302
origin_agg							
Non-Western immigrant				0.742***			
Western immigrant				0.0511			

origingnrt							
Western immigrant	-0.0208				0.0519		
Non-western immigrant, 1st generation	0.623***				0.882***		
Non-western immigrant, 2nd generation	0.379**				0.433***		
education							
VMBO,AVO,MBO, HAVO,VWO		-0.388***				-0.383***	
HBO,WO bachelor		-0.785***				-0.826***	
WO Master, Doctor		-0.968***				-1.063***	
soc_ben							
Yes	1.738***					1.312***	
Not applicable, interviewer older than15 or younger than 18 or older than 64	0.276***					0.0210	
soc_part							
Student		0.0805				-0.0348	
Other		1.059***				0.638***	
smoke							
No		-0.338***	-0.431***	-0.431***	-0.432***		
region							
Rest of the Netherlands		0.122**				0.124**	0.158***
urbanmuni							
Strongly urbanized		0.0393				0.0311	0.0952
Moderately urbanized		-0.0357				-0.0731	0.0282
Little urbanization		-0.0217				-0.0246	0.0602
No urbanization		-0.0375				-0.0577	0.0159
weight_kg							
28-52 kg		-0.554	-0.362	-0.356	-0.465		
53-77 kg		-0.574	-0.340	-0.328	-0.444		
78-102 kg		-0.326	-0.112	-0.102	-0.214		
>103 kg		0.212	0.439	0.445	0.336		

*****p-value<0.01, **p-value<0.05, *p-value<0.10**

Table B-4: Estimated coefficients of ordered logistic regression models.

Variable	Base model + origin_agg + region + urbanmuni	Base model + origingnrt + region + urbanmuni	Full model – region - urbanmuni
age_categorized			
25-35	0.0337	0.0246	0.164
35-45	0.266***	0.247***	0.359***
45-55	0.838***	0.822***	0.871***
55-65	1.166***	1.151***	0.793***
65-75	1.319***	1.307***	0.895***
75-85	1.879***	1.869***	1.481***
>85	1.004***	0.990***	0.980***
gender			
Female	0.295***	0.294***	0.379***
marstat			
Divorced	0.271***	0.267***	0.162*
Widow/Widower	0.471***	0.470***	0.185*
Never married	0.104	0.107	0.188***
Unknown	0.849	0.850	0.546
origin			
Morocco			0.803***
Turkey			0.723***
Suriname			0.359*
Neth. Antilles and Aruba			0.0915
Other non- western countries			0.415**
Other western countries			-0.0118
origin_agg			
Non-Western immigrant	0.728***		
Western immigrant	0.0300		

origingnrt			
Western immigrant		0.0309	
Non-western immigrant, 1st generation		0.846***	
Non-western immigrant, 2nd generation		0.461***	
education			
VMBO,AVO,MBO, HAVO,VWO			-0.371***
HBO,WO bachelor			-0.770***
WO Master, Doctor			-0.955***
soc_ben			
Yes			1.279***
Not applicable, interviewer older than15 or younger than 18 or older than 64			0.142
soc_part			
Student			-0.0180
Other			0.672***
smoke			
No			-0.308***
region			
Rest of the Netherlands	0.161***	0.160**	
urbanmuni			
Strongly urbanized	0.0951	0.0960	
Moderately urbanized	0.0251	0.0241	
Little urbanization	0.0562	0.0550	
No urbanization	0.0103	0.00979	
weight_kg			
28-52 kg			-0.668
53-77 kg			-0.647
78-102 kg			-0.418
>103 kg			0.148

*****p-value<0.01, **p-value<0.05, *p-value<0.10**