The demand for health: differences between the native Dutch and immigrants in the Netherlands

by

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Abstract

This paper estimates the demand for health by using a health capital model for different population groups (native Dutch, Surinamese/Antillean, Moroccan, and Turkish) in the Netherlands. Also the effect of overweight on health utility is investigated. We found a decrease in the demand for health for age, overweight, and smoking, we found an increase in the demand for health for level of education and marital status. The analyses show a strong effect of gender. Being female in all groups is negatively related to health utility. Turkish and Moroccan ethnicity is negatively related to health status.

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Introduction

Health is affected by socioeconomic variables, including income and level of education, but culture (e.g. food habits, life style) may also have an effect on health. It is known that in the Netherlands, the health of immigrants is generally poorer than that of the native Dutch (Uniken Venema *et al*., 1995; Brussaard *et al*., 2001; CBS, 2000a). Until now, little is known about the distribution of the most important determinants of health over the ethnic groups. It is not clear which determinants are the most important. The well-known 'Black Report' (Black *et al*., 1988) has provided a start for a socioeconomic research on ethnic differences in health. Differences in health can be contributed to the migration itself (differences in climate etc.), as well as to lifestyle, psychosocial stress, and material circumstances. Food habits may also affect health, since certain food habits lead to overweight. Overweight has a negative effect on health because of the strong relation between the prevalence of overweight and cardiovascular disease, coronary heart disease, and cancer (Philipson, 2001; WHO, 2000; McGrinnis and Foege, 1993).

Three factors may explain how ethnic background relates to health: 1) biological/genetic factors, 2) socioeconomic factors, and 3) socio-cultural factors. Biological/genetic factors can be related to health both directly and indirectly: directly through genetic variations and indirectly through labor market discrimination, for example through lower wage rates for black people. The following factors affect socioeconomic status: material goods and housing conditions, working conditions, lifestyle, adequate use of health care, and psychosocial stress. Culture involves many health-related notions, such as nutrition, lifestyle, ideas on adequate treatment of illnesses etc. (Uniken Venema *et al*., 1995).

Between 1995 and 1999, 19 percent of the Dutch consider themselves as having a less good health status. In comparison with other EU countries, the Netherlands occupies a middle position with respect to life expectation and infant mortality (SCP, 2000). Immigrants feel themselves less healthy than the Dutch and report more chronic health problems (Reijneveld, 1998; Weide and Foets, 1998). Compared with people in other parts of the Netherlands, the

inhabitants of Amsterdam, Rotterdam, The Hague, and Utrecht (the four biggest cities in the Netherlands) are less healthy (CBS, 2001a). In 1998, sickness absence was 10 percent above average in the four big cities. Since immigrants mainly live in the four big cities, this could explain the lower average health condition in the four big cities. On the other hand, also natives living in the four big cities report a lower mean health status. Apparently, the physical and social environment affects the health situation of immigrants (Reijneveld, 1998). In general, the level of education of Antilleans is equal to that of the native Dutch, and the Surinamese are in the middle categories (Kee, 1995). The unemployment level among all immigrants is higher than among the native Dutch (CBS, 2001b). Turkish and Moroccan families are in the lower income categories because of their educational and professional level (CBS, 2001b). However, the health status of Turkish people appears to be lower than that of Dutch people of comparable socioeconomic status.

In general, men report better health than women (Groot and Maassen van den Brink, 2003c; CBS, 2001a; CBS, 1999; Ross and Bird, 1994). Women, on the other hand, appear to live longer than men (Schultz, 1996). Social stressors stemming from inequality could cause the poorer health status of women. Social stressors may cause acute illness and nonfatal chronic problems throughout life, but usually do not cause fatal disease. In contrast, the unhealthy lifestyle of men mainly in later life may cause life-threatening diseases (Ross and Bird, 1994). Also people with a less good health status, like the elderly and low educated, make use of medical services more frequently (CBS, 2000b). In the Netherlands, utilization of more specialized health care is less for immigrants than natives, especially for Turkish and Moroccan people. On the other hand, the use of GP care and the use of prescribed drugs are higher among people from Surinam, Turkey, and Morocco. This suggests that the type of health care consumption may be explained by ethnic background, possibly because of limited access (Reijneveld, 1998; Stronks *et al*., 2001).

Smoking is negatively related with health. Tobacco consumption is the number one death cause that could be prevented by behavioral change (Philipson, 2001; McGrinnis and Foege, 1993). Age is not only correlated with weight (weight increases over the years), but also with health (Maddox *et al.*, 1987). As from the age of 65, visits to GP and medical specialists increase, as well as the use of medicines and hospitalization. Data from 1987 show that for people aged above 55, only 33 percent of the Turks, 15 percent of the Moroccans, and 42 percent of the Surinamese report a good health. In contrast, 52 percent of the native Dutch aged above 55 report a good health (SCP, 1998). As mentioned above, the effect of overweight on health is negative. In 2000, the World Health Organization even declared overweight to be the number one global epidemic. Reidpath *et al*. (2002) show a positive relationship between Body Mass Index (BMI)[1] and the use of medical services. Obviously, also lack of exercise is associated with poor health, mainly via obesity (Philipson and Posner, 1999, Philipson, 2001, Health Council of the Netherlands, 2003). It would therefore be interesting to investigate the relationship between sports and health over the four ethnic groups in our data.

Empirical research on ethnic health differences is scarce. To obtain more insight in the differences between the health situation of the native Dutch and immigrants, it is important to learn more about the socioeconomic and cultural determinants of health. Differences in health could be caused by genetic predispositions, living and working conditions, lifestyle, and food consumption patterns (Weide and Foets, 1998). Outsourcing food preparation has become more popular over the past decades. It would be interesting to explore whether outsourcing of food affects health.

[1] To obtain a BMI score, a person's weight (in kg) is divided by their squared height (in meters). A BMI between 18.50 and 24.99 is the recommended range. People with a BMI $\geq$ 25.00 are overweight (World Health Organization, 2000).

This paper estimates the demand for health by using a health capital model for different population groups in the Netherlands. Also the effect of overweight on health utility is investigated. Four groups are studied: a native Dutch group, a Surinamese/Antillean group, a Moroccan group, and a Turkish group. The results of this study are of importance in explaining differences in health determinants over ethnic groups in the Netherlands.

The organization of the paper is as follows. Section 2 describes the model used and the estimation methods. This section describes the health capital model used for the ordered probit estimations and describes the Quality of Life Weights method used for calculating the loss in health utility due to overweight. Section 3 gives information about the used dataset containing native Dutch, Surinamese/Antillean, Moroccan, and Turkish respondents. In section 4 the estimation results are shown. Ordered probit analyses were done on the complete sample, but also separately per ethnic group. Quality of Life Weights were calculated using the probit results. Section 5 concludes and discusses the findings.

2. Model and estimation methods

2.1 Ordered probit analysis with subjective health as dependent variable

Grossman (1972) argues that 'good health' is a commodity produced by the individual. The commodity 'good health' is treated as part of his or her human capital, and as such it determines the total amount of time the individual can spend on productive activities in market and non-market sectors (Grossman, 1972 and 2000). Gerdtham *et al*. (1999) use Grossman's model to measure health capital H_i. They measure the stock of health by a rating scale, a time trade-off, and a categorical health rating.

In this paper, we estimate the demand for health (see also Gertdham *et al*., 1999, and Grossman, 2000). A linear dependence between health and the regressor variables is assumed between latent health variable h_i^* and x_i, β, and e_i:

$$h_i^* = \beta' x_i + e_i, \qquad e_i \sim N(0, \sigma^2) \tag{2.1}$$

The health variable h_i^* defines variable h_i, which is related to the five health categories (4 = excellent, 0 = poor). The categorical health rating (or self-reported health) is the same as used in the research of Cutler and Richardson (1998). The self-reported health can be used the measure the stock of health (the health status). The self-reported health has five categories: excellent, very good, good, fair, and poor, and is used in many investigations (see for example Wannamethee and Shaper, 1991). The health variable h_i and h_i^* are related in the following way (where $\theta_i = 0,1,2,3$ are unobservable thresholds):

$h_i = 0$ if $h_i^* \le \theta_0$

$h_i = 1$ if $\theta_0 < h_i^* \le \theta_1$

$h_i = 2$ if $\theta_1 < h_i^* \le \theta_2$

$h_i = 3$ if $\theta_2 < h_i^* \le \theta_3$

$h_i = 4$ if $\theta_3 < h_i^*$

For the estimations an ordered probit method is used (for references see Greene, 2000; Johnston and DiNardo, 1997; Agresti, 1996; Maddala, 1983). When normally distributed, the probabilities are:

Prob($y = 0$) = $\phi(\mu_0 - \beta' x)$,

Prob($y = 1$) = $\phi(\mu_1 - \beta' x) - \phi(\mu_0 - \beta' x)$,

Prob($y = 2$) = $\phi(\mu_2 - \beta' x) - \phi(\mu_1 - \beta' x)$,

Prob($y = 3$) = $\phi(\mu_3 - \beta' x) - \phi(\mu_2 - \beta' x)$,

Prob($y = 4$) = 1– $\phi(\mu_3 - \beta' x)$

Given five choices, without loss of generality Prob($y = 4$) can be set to 0 (as a reference), leaving only four thresholds to estimate: $\mu_i = 0,1,2,3$.

We included in the model a dummy for children living at home, living area, intake of vitamins, unemployment, and the following food habits: outsourcing food preparation (including takeaway food, ready-to-eat meals, and delivery food), convenience food, eating out, and fresh vegetables.

Although income is related to health (see for example Deaton, 2003; Duetz *et al*., 2003), one might argue whether to put income in the model for health production. For example, there will be less or no income if a person is not able to work because of serious illness. Therefore, we consider income to be endogenous. Schooling is associated with better health outcomes (Nayga, 2000). Level of education can be seen as a good representative of income, since there is a strong positive relation between level of education and income.

We estimate the following demand for health equation:

$$H = c_1 + \beta_1 X_j + e_j \qquad (2.2)$$

where H is the stock of health capital, which is measured by self-reported health, c_1 is a constant. β_1 is a vector of coefficients, and e_j is and error term with 0 mean and constant

variance 0 mean and constant variance. The vector X_j consists of 13 different variables that need to be estimated. It would be interesting to investigate the effect of doing sports on health. But the endogenous relation between health and sports may be a problem (people with a poor health condition will not be able to exercise). Still, the effect of sports on health is of interest. Therefore, we have included sports in some of the estimations and compared these results to the results of the estimations without sports.

2.2 Quality of Life Weights (QoLW)

The estimations as described in the previous section give the opportunity to interpret signs and significances of certain variables in relation with subjective health. In order to determine the marginal effect of overweight (BMI ≥ 25) on subjective health we calculate the Quality of Life Weight (QoLW) of overweight using the Quality Adjusted Life Year (QALY) method. This approach to calculate the QoLW is similar to the procedure described by Cutler and Richardson (1998) and later used by Groot and Maassen van den Brink (2003a and 2003b). QoLW weights can be contributed to the prevalence of specific chronic illnesses and physical handicaps (Van Praag and Ferrer-i-Carbonell, 2002, Groot and Maassen van den Brink, 2003a and 2003b). The QoLW is defined as:

$$QoLW = \beta - (\mu_0 / \mu_3 - \mu_0) \qquad (2.3)$$

Let β be the coefficients for BMI ≥ 25 in the subjective health equations for each group. These coefficients are not scaled, and therefore need to be normalized to produce a QoLW. We normalize by dividing them by the difference between highest health level and the lowest health level. By doing so it is assumed that the highest possible response to the health question

corresponds to a nearly perfect health condition and the lowest possible response corresponds to the poorest possible health condition.

3. Description of the data

Between September and November 2001, the data were collected amongst the native Dutch, Surinamese/Antilleans, Moroccans, and Turks by an agency specialized in collecting quantitative data. The total sample size is 2551 with a response rate of 23 percent. All respondents were older than 18 years. Moroccans, the Surinamese, Turkish and Antilleans were selected since they belong to the largest immigrant groups in the Netherlands. The Surinamese and Antilleans are considered as one group, since they are from comparable origin. The intention was to have 700 respondents of each group. However, Moroccans appeared hard to reach; only 449 Moroccan respondents agreed on participating within the time available for the data collection.

To investigate whether differences in socioeconomic status, lifestyle, and overweight affect health, the following independent variables are included: gender, level of education, age, smoking, BMI, marital status, children at home, outsourcing food preparation, convenience food, eating out, fresh vegetables, intake of extra vitamins, urban area, and unemployment. We use a dummy BMI $\geq$ 25 since the WHO (2000) describes a BMI $\geq$ 25 already as overweight. The dependent variable 'subjective health' is measured in five categories: excellent, very good, good, fair, and poor. See Appendix I for the definitions of the variables used. Table 3.1 gives the descriptives of the variables.

[Table 3.1 about here]

All immigrant groups have a lower mean value for health than the native Dutch have. The Turkish respondents have the highest prevalence of low educated people, while the

Surinamese/Antillean respondents have the highest prevalence for high-educated people. The Turkish respondents smoke the most and have the highest prevalence for overweight. Based on this information, it could be expected for the Turkish respondents to report the poorest health. Overweight and obesity are associated with large decreases in life expectancy as well as early mortality. These effects appear to be similar to those related to smoking. A 40-year-old female nonsmoker loses 7.1 years and a 40-year-old male nonsmoker loses 5.8 years because of obesity (BMI $\geq$ 30). For overweight (BMI $\geq$ 25) reduces life expectancy for a 40-year-ols female nonsmoker with 3.3 years and for a 40-year-old male nonsmoker with 3.1 years (Peeters *et al*., 2003). Obesity appears to reduce life expectancy considerably, especially among young adults. Associated with the fewest years of life lost, the optimal BMI differs between blacks and whites. For whites the optimal BMI is between 23 and 25, whereas for blacks the optimal BMI is between 23 and 30 (Fontaine *et al*., 2003).

The Dutch respondents outsource meal preparation to snack bars, pizza deliverers etc. the least frequently, while Moroccan respondents make use of these services the most frequently. To outsource meal preparation, the Dutch respondents make more use of convenience food and eating out in restaurants than the other groups, while Moroccan respondents make the least frequent use of these services.

People may take extra vitamins or minerals, because they expect it will improve their health. We include this variable in our analysis to test whether the intake of extra vitamins and minerals affects health positively. The Surinamese/Antillean respondents have the highest prevalence for the intake of extra vitamins/minerals, while the Turkish respondents show the lowest prevalence for intake of extra vitamins/minerals.

As reported in the introduction, immigrants mainly live in the four big cities, which is also shown in Table 3.1. The Turkish respondents are more unemployed compared to the other groups, while the Dutch respondents are the least unemployed. Our data in Table 3.1 show that about 50 percent of the four different ethnic groups do sports somewhat regularly, with the Dutch

respondents doing sports the most frequently, the Turkish respondents doing sport the least frequently, and the Surinamese/Antillean respondents and Moroccan respondents having an intermediate position.

A limitation of the sample is the low mean age for the Moroccan and Turkish respondents in the sample. About 60 percent of these groups in the sample is aged between 18-34, whereas the other groups have about 30 percent in these age categories. This could have affected the outcomes and the effect of age on health.

4. Results

4.1 Results of ordered probit analyses on health

An ordered probit analysis, as described in section 2, was conducted for the whole sample including dummies for the immigrant groups (where the Dutch group is taken as a reference group). Table 4.1 shows the results.

[Table 4.1 about here]

Table 4.1 shows that females have a significantly poorer health than males. Medium and higher education has a significantly positive effect on health. As hypothesized, age affects health significantly negatively[2], as well as smoking and a BMI ≥ 25. Being married/living together has a small positive significant effect on health. Table 4.1 shows that the effect of eating out on health is positive, for 1-4 times per month the effect is strong, for eating out more then 10 times per month the significant positive effect is smaller. The Turkish and the Moroccan respondents have

[2] To check whether the strong effect of age on health overrules effects of other variables, the estimation is repeated excluding age (results not shown). The results do not change much, only the Moroccan respondents show an age-effect. This age-effect indicates that when becoming older, the health of Moroccan respondents changes less than the health of native Dutch respondents.

a significantly poorer health than the Dutch natives. For all immigrants a negative effect on health was expected. Nevertheless, the results show no effect for the Surinamese/Antillean respondents. Unemployment has a significantly negative effect on health, meaning that unemployed people have a poorer health. The effect of the intake of extra vitamins on health was expected to be positive, which is proved by the estimation results.

In the estimations with sports included we see that sports has a positive significant effect on health. This effect does not change the effect of the other variables very much. Still, we would like to stress that interpreting this result should be done carefully, because of endogeneity since people with a poor health will do no sports at all. The effect of sports on health increases with the frequency of sporting per week.

[Table 4.2 about here]

Table 4.2 demonstrates a significant negative effect on health in all groups for females, indicating that the reported health of females is poorer than the reported health of males. Socioeconomic variables may affect the health differently over the groups, which is shown in the case of level of education. While for native Dutch respondents level of education has no significant effect on health, it affects health significantly positive for all immigrants groups. This means that in our sample, the level of education does not affect the health of native Dutch, while for all immigrant groups the respondent's health is better when higher educated. Age has a significant negative effect on health for in all groups, which means that older people have a poorer health. For the Surinamese/Antilleans respondents the effect of age starts from the age category between 45 and 64, while there is no effect of age for Turkish respondents aged above 65. Smoking has a negative effect for all groups.

Overweight ($BMI \geq 25$) has a strong significant negative effect on health for the Dutch and the Surinamese/Antilleans respondents, but not for the Turkish and Moroccan respondents,

indicating that only the native Dutch and Surinamese/Antillean respondents experience negative effects from overweight on their health. Eating out has a positive effect on health for the Surinamese/Antilleans, which means that this group encounters a positive effect from eating away from home on their health. There is a positive significant effect of the intake of extra vitamins for Moroccan and Turkish respondents. Unemployment has a negative effect on health for all immigrants groups, indicating that mainly immigrants experience a negative effect of being unemployed on their health.

[Table 4.3 about here]

These estimations are also done divided by gender. The results are shown in Table 4.3 and reveal some differences between males and females. For Dutch females age does not have significant effect on health, while Dutch males aged above 45 show a significant negative effect on their health. This means that contrary to Dutch males, the health of women does not get worse because of age indicating that other aspects than age are important for the health situation of Dutch females. Overweight affects health significantly negative for Dutch women, but has no effect for Dutch men[3]. Whereas Dutch males show significant negative effect for outsourcing food preparation, Dutch females do not show significant effect for any of the outsourcing food preparation categories. Surinamese/Antillean males and females differ less from each other. The main differences between them are on outsourcing food preparation. While Surinamese/Antillean females show significant negative effect for outsourcing food preparation and making use of convenience food, Surinamese/Antillean males only show a significant positive effect for eating out. This implies that while the Surinamese/Antillean women experience a negative effect from

[3] To check for endogeneity between overweight and health, correlation matrices were made for all groups. These results support the findings from the estimations that show a significant negative relation between overweight and health for the Dutch and the Surinamese/Antilleans. The correlation matrices show a stronger relation between overweight and health for females.

outsourcing food preparation on their health, the Surinamese/Antillean men experience a positive effect of eating away from home on their health. This could either be due to the difference in food itself, or indicate a different lifestyle (including food habits) resulting in difference health effects. The main difference between Moroccan males and females is the significant negative effect for unemployment, only for Moroccan females. Contrary to Turkish females, Turkish males show a significant positive effect for convenience food. This may be explained by the fact that Turkish males eat more or other (more 'healthy') convenience foods.

4.2 Results of Quality of Life Weights (QoLW)

The method of Quality Adjusted Life Years (QALY) is used to calculate Quality of Life Weights to determine the effect of overweight on health as described in section 2.2. To estimate the QoLW for the different groups, the estimations from Table 4.2 are used. Table 4.4 shows the QoLW by ethnic group for BMI $\geq$ 25. The second row in the table gives the prevalence of overweight per group.

[Table 4.4 about here]

Table 4.4 demonstrates that due to overweight the Surinamese/Antillean respondents encounter a reduction in QoLW of 39 percent. For the native Dutch the reduction in QoLW due to overweight is 35 percent, while for Turkish respondents it is 16 percent. For the Moroccans due to overweight the QoLW is about 70 percent. Unfortunately, no conclusions can be drawn form the results of the Turkish and Moroccan respondents, since they are not significant (as seen in Table 4.2 where the overweight variable gives no significant results for these groups). Due to overweight, the Dutch and Surinamese/Antillean respondents experience a reduction in their health utility of 35 – 39 percent. The result of the Surinamese/Antillean respondents is somewhat unexpected, because one could expect a less negative effect of overweight on health due to their

cultural background. In non-western cultures people may associate overweight with happiness, well-being, and peace, and not as ‘ unhealthy’.

With the results from Table 4.4, we can calculate the implicit costs of overweight for the native Dutch and Surinamese/Antillean respondents, which will give an indication of the monetary value of the overweight effect on health. In many studies a value of $100,000 per QALY is used as criterion for cost effectiveness (Cutler and McClellan, 2001; Cutler and Richardson, 1998; Viscusi, 1993). An alternative value of $230,000 per QALY is also often used as a criterion for cost effectiveness (Groot en Maassen van den Brink, 2003b). It is calculated by Moore and Viscusi (1988), who calculate the value of a statistical life year at approximately $230,000. We will use both values as lower and upper limit.

In the QALY the quality and quantity (mortality and morbidity) are unified in one measure of quality of life corrected life years. Life expectancy of the two groups in the Netherlands is 77.5 for the native Dutch and 76.8 for the Surinamese/Antilleans (Bos *et al*., 2003). As discussed in section 3, the years of life lost due to overweight (BMI $\geq$ 25) at the age of 40 is approximately 3.2 years for nonsmokers (for smokers even more) (Peeters *et al*., 2003)[45].

The implicit costs of overweight can then be calculated using the life expectancy, the years of life lost due to overweight, and the value of a life year. For the native Dutch, the implicit costs for overweight is $5.1 - $11.8 million. For the Surinamese/Antilleans the implicit costs for overweight are a little lower: $4.8 - $11.1 million.

[4] Although more than 30 percent of our sample smokes, we use the years of life lost due to overweight for nonsmokers, in order to measure the effect of overweight, not a combination of the effect of overweight and smoking on health. The life expectancy we use is including people having overweight. When also correcting life expectancy with years of life lost, we may have a life expectancy that is too low. However, this may be corrected by the fact that we use the correction for years of life lost due to overweight by using the figure of nonsmokers.

[5] The mean age in our sample is 39.4, we can therefore use the figures of Peeters *et al*. (2003) that give measurements of years of life lost for 40-year-old people.

5. Conclusions and discussion

In this paper we have investigated whether and how differences in socioeconomic status, lifestyle (mainly food habits), and overweight affect health status for the native Dutch, Surinamese/Antillean, Moroccan, and Turkish respondents. The data show that the Turkish have the poorest health, the Surinamese/Antilleans and the Moroccans have an intermediate health status. The Dutch report the most positive about their health. Table 5.1 provides an overview of the positive and negative determinants of health per group estimated in the ordered probit analyses.

[Table 5.1 here]

We have found a decrease in the demand for health for higher age, overweight, and smoking, and an increase in the demand for health for level of education and not living alone. These findings correspond with the findings of Gerdtham *et al*. (1999) and other literature (Philipson, 2001; CBS, 2000b; McGrinnis and Foege, 1993; Maddox *et al*., 1987). The analyses show a strong effect of gender: being female in all groups is negatively related to health utility in all groups, only not significant for the Dutch. The Turkish and Moroccan ethnicity is negatively related to health as hypothesized based on literature (CBS, 2001a; Brussaard *et al*., 2001; Uniken Venema *et al*., 1995). We found no effect for the Surinamese/Antilleans. This might be explained by the fact that the Surinamese/Antilleans are better educated than the other immigrant groups, and therefore have a higher socioeconomic status.

Moroccan and Turkish females show the expected negative effect of unemployment on health, indicating that the unemployed have a poorer health than the employed. Remarkably, Dutch women show a small positive effect of unemployment on health, which means that unemployed Dutch women have a better health than employed Dutch women. An explanation could be the fact that Dutch women who have children at home and have a job, suffer from severe

stress to combine their job with household activities and taking care of their children because of lack of (expensive) childcare. These women may also have less time to prepare and eat meals, which can be associated with a poorer health.

The results of food habits reveal some cultural differences between the four groups. Only the Dutch and the Surinamese/Antillean respondents show the expected negative significant effect for outsourcing food preparation. Native Dutch and Surinamese/Antillean respondents who eat takeaway food, ready-to-eat meals, or delivery food have a poorer health. This applies mainly for Dutch males and Surinamese/Antillean females. Apparently, Dutch males and Surinamese/Antillean females outsource more of their food preparation than their opposite sexes and therefore show a greater (negative) effect. On the other hand, the health is better for Surinamese/Antillean males who go eating out, which may be caused by healthier menus for these respondents when eating out. Only the Turkish respondents show effect for convenience food. While a negative effect of convenience food on health was hypothesized, the Turkish respondents show a positive effect for the frequent use of convenience food. Perhaps mainly Turkish respondents in higher socioeconomic positions (who have a better health) use convenience food and choose the 'healthy' convenience products (like pre-cut vegetables).

In contrast to Gerdtham *et al*. (1999), who included sports in all estimations, we only have included sports in some of our analyses. This is done, because sports may be endogenously related to health (people with a poor health will not do sports). Still, we were interested in the effect of sports on health, and differences between the ethnic groups. Therefore, we included sports in separate analyses. In our analysis, doing sports affect health positively. This result was also found by Gerdtham *et al*. (1999). The effect of doing sports on health increases with the frequency of doing sports. Doing sports more than two times per week has a stronger significant effect on health. This is not surprising, since regular doing sports is associated with a good health and a lower BMI (Health Council of the Netherlands, 2003). However, sports is not a complete

measure of time spent on exercising. For example, also domestic tasks can be moderately intensive exercise.

Native Dutch and Surinamese/Antillean respondents with overweight have a poorer health. Overweight has no significant effect on the health status of Turkish respondents, which is somewhat conflicting with their high prevalence of overweight. The last mentioned is probably caused by cultural differences in the way overweight is perceived. Turkish respondents may associate overweight with a life in welfare, happiness, and peace, and therefore experience less negative effects of overweight on their health status. Our findings suggest that overweight females report more health problems than males and non-overweight females.

The Quality of Life Weights give insight in the marginal effect of overweight on health. The results show a reduction in QoLW due to overweight of 35 percent for the native Dutch and 39 percent for Surinamese/Antillean respondents. The findings of the implicit costs of overweight calculation can be used to determine the welfare effects of expenditures on care for overweight people and can be useful in discussions on the allocation of expenditures on public health care. The findings may also be of interest for health insurance companies, in determining the costs of overweight.

Our research shows that health decreases with age, smoking, overweight, and being female, whereas health increases with level of education. To improve the health of the multicultural population of the Netherlands, people should be made more aware of the hazards of smoking and overweight. Especially the Turkish and Surinamese/Antillean groups should be induced to lose weight and to prevent overweight. To improve their health, the native Dutch and the Surinamese/Antilleans should make use of outsourcing food preparation less frequently.

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Table 3.1 Descriptives of variables for the whole sample and per group (in percentages)

Variable	Total (N=2551)	Dutch (N=701)	Sur./Antill. (N=701)	Moroccan (N=449)	Turks (N=700)
Health (mean value)	2.64	2.77	2.69	2.70	2.43
Female	56.7	63.3	57.6	47.4	55.0
Low educated	29.8	27.2	20.5	17.4	49.6
Mediate educated	42.9	44.8	45.8	44.5	37.1
High educated	21.9	27.1	30.5	19.6	9.6
Age 18-34	43.4	27.4	32.4	60.4	59.4
Age 35-44	25.8	23.5	29.1	21.2	27.7
Age 45-64	22.8	31.1	32.1	13.8	11.0
Age > 64	8.0	18.0	6.4	4.7	1.9
Smoking	32.4	34.0	27.4	18.7	44.5
BMI $\geq$ 25.0	43.9	41.4	43.9	38.8	49.6
Married/living together	67.3	67.9	52.4	71.9	78.7
Children at home	56.3	41.8	49.2	62.6	74.0
Outsourcing food preparation seldom	31.1	28.4	29.7	41.0	29.0
Outsourcing food preparation 1-5 p/month	62.9	66.5	65.3	50.6	64.9
Outsourcing food preparation 5-10 p/month	5.8	5.0	4.9	8.2	5.9
Outsourcing food preparation > 10 p/month	0.2	0.1	0.1	0.2	0.3
Convenience food seldom	55.7	41.8	60.9	65.3	58.1
Convenience food 1-2 p/w	29.4	38.5	25.4	23.8	28.0
Convenience food 2-4 p/w	11.1	13.7	11.0	8.5	10.3
Convenience food > 4 p/w	3.8	6.0	2.7	2.4	3.6
Eat out seldom	55.7	45.4	54.9	63.5	61.9
Eat out 1-4 p/month	39.6	48.8	40.7	32.7	33.6
Eat out 5-10 p/month	3.4	4.7	3.3	3.1	2.4
Eat out > 10 p/month	1.3	1.1	1.1	0.7	2.1
Fresh vegetables seldom	1.4	1.1	1.6	0.9	1.9
Fresh vegetables 1-2 p/w	8.8	8.6	7.1	6.5	12.1
Fresh vegetables 2-4 p/w	22.7	26.5	18.5	20.5	24.3
Fresh vegetables > 4 p/w	67.2	63.8	72.8	72.2	61.7
Taking extra vitamins	30.7	36.9	42.4	23.9	17.1
Urban area	30.8	10.3	43.4	39.9	32.9
Unemployed	2.9	1.1	2.6	2.2	5.4
No sport	47.7	42.9	44.9	47.7	55.4
Sports $\leq$ 1 time p/w	19.1	21.1	18.0	19.8	17.6
Sports 2-3 times p/w	21.3	25.8	24.0	18.3	16.2
Sports > 3 times p/w	11.9	10.1	13.1	14.3	10.9
Dutch	27.5				
Turkish	27.4				
Surinamese/Antillean	27.5				
Moroccan	17.6				

Table 4.1 Ordered probit of self-reported health for the whole sample with dummies for ethnicity (standard errors in parentheses)

Variable	Estimation	Estimation with sport included
Female	-0.323 (0.046)***	-0.302 (0.047)***
Mediate educated	0.190 (0.054)***	0.178 (0.054)***
High educated	0.398 (0.065)***	0.375 (0.066)***
Age2 (35-44)	-0.165 (0.057)***	-0.159 (0.058)***
Age3 (45-64)	-0.351 (0.064)***	-0.342 (0.064)***
Age4 (>64)	-0.438 (0.096)***	-0.392 (0.097)***
Smoking	-0.225 (0.048)***	-0.203 (0.048)***
BMI $\geq$ 25	-0.175 (0.045)***	-0.172 (0.045)***
Married/living together	0.113 (0.055)***	0.122 (0.055)**
Children at home	-0.040 (0.056)	-0.031 (0.056)
Outsourcing food preparation 1-5 p/m	-0.016 (0.052)	-0.027 (0.052)
Outsourcing food preparation > 5 p/m	-0.152 (0.102)	-0.173 (0.103)*
Convenience food 1-2 p/w	0.034 (0.051)	0.036 (0.051)
Convenience food 2-4 p/w	-0.106 (0.073)	-0.111 (0.074)
Convenience food > 4 p/w	-0.005 (0.116)	-0.006 (0.116)
Eat out 1-4 p/m	0.135 (0.049)***	0.118 (0.049)**
Eat out 5-10 p/m	0.070 (0.123)	0.041 (0.123)
Eat out > 10 p/m	0.338 (0.193)*	0.335 (0.194)*
Fresh vegetables 1-2 p/w	-0.022 (0.193)	-0.013 (0.193)
Fresh vegetables 2-4 p/w	0.045 (0.185)	0.046 (0.185)
Fresh vegetables > 4 p/w	0.250 (0.181)	0.245 (0.181)
Urban area	-0.065 (0.049)	-0.060 (0.049)
Turkish	-0.368 (0.068)***	-0.354 (0.068)***
Surinamese/Antillean	-0.098 (0.063)	-0.091 (0.063)
Moroccan	-0.229 (0.075)***	-0.217 (0.075)***
Unemployed	-0.386 (0.128)***	-0.382 (0.128)***
Intake vitamins	0.219(0.048)***	0.231 (0.049)***
Sports $\leq$ 1 p/w		0.103 (0.059)*
Sports 2-3 p/w		0.229 (0.059)***
Sports > 3 p/w		0.266 (0.071)***
μ_0 [6]	-1.737 (0.226)***	-1.606 (0.228)***
μ_1	-1.081 (0.223)***	-0.947 (0.225)***
μ_2	-0.290 (0.223)	-0.153 (0.225)
μ_3	1.147 (0.223)***	1.292 (0.226)***
N	2542	2542
Log-L	6282.068	6374.064
Pseudo R^2	0.129[a]	0.138

a= for the pseudo R^2, Nagelkerke is taken * $p< .10$ ** $p< .05$ *** $p<.01$

[6] Within an ordered probit analysis the projection is on a continuum, which is arbitrary. There are two ways to solve this problem: 1) to set one of the location parameters to 0, or 2) to exclude the intercept in the identification model and use all location parameters. Both methods give identical results for the independent variables. SPSS 11.0 uses the second method and includes an intercept within the different thresholds. We have chosen to use SPSS 11.0 and as a result make use of the second method.

Table 4.2 Ordered probit of self-reported health for all groups (standard errors in parentheses)

Variable	Dutch	Surin./Antilleans	Moroccans	Turks
Female	-0.183 (0.095)*	-0.302 (0.090)***	-0.406 (0.120)***	-0.471 (0.089)***
Mediate educated	-0.023 (0.111)	0.193 (0.113)*	0.333 (0.131)**	0.180 (0.096)*
High educated	0.108 (0.128)	0.475 (0.121)***	0.718 (0.167)***	0.371 (0.150)**
Age2 (35-44)	-0.220 (0.125)*	0.021 (0.113)	-0.344 (0.147)**	-0.221 (0.103)**
Age3 (45-64)	-0.334 (0.120)***	-0.223 (0.117)*	-0.393 (0.175)**	-0.573 (0.147)***
Age4 (>64)	-0.384 (0.153)***	-0.607 (0.199)***	-0.817 (0.284)***	-0.487 (0.312)
Smoking	-0.329 (0.091)***	-0.214 (0.097)**	-0.294 (0.145)**	-0.196 (0.084)**
BMI $\geq$ 25	-0.312 (0.090)***	-0.449 (0.086)***	0.172 (0.114)	-0.041 (0.088)
Married/living together	0.394 (0.100)***	0.015 (0.094)	0.165 (0.169)	-0.048 (0.137)
Children at home	-0.056 (0.109)	0.107 (0.097)	-0.129 (0.159)	0.070 (0.129)
Outsourcing food preparation 1-5 p/m	-0.077 (0.106)	-0.146 (0.104)	0.102 (0.126)	0.046 (0.098)
Outsourcing food preparation >5 p/m	-0.457 (0.211)**	0.022 (0.218)	0.015 (0.219)	-0.132 (0.196)
Conv. food 1-2 p/w	-0.017 (0.100)	-0.180 (0.102)*	0.057 (0.130)	0.133 (0.095)
Conv. food 2-4 p/w	-0.145 (0.148)	-0.182 (0.140)	-0.146 (0.204)	0.023 (0.139)
Conv. food > 4 p/w	0.021 (0.198)	-0.327 (0.260)	-0.418 (0.344)	0.484 (0.225)**
Eat out 1-4 p/m	0.027 (0.096)	0.285 (0.096)***	0.072 (0.124)	0.132 (0.094)
Eat out 5-10 p/m	0.192 (0.214)	0.112 (0.240)	0.116 (0.316)	-0.245 (0.271)
Eat out > 10 p/m	-0.053 (0.404)	0.589 (0.414)	0.268 (0.658)	0.303 (0.298)
Fresh vegetables 1-2 p/w	-0.022 (0.416)	-0.283 (0.369)	-0.772 (0.614)	0.420 (0.318)
Fresh vegetables 2-4 p/w	-0.026 (0.401)	-0.341 (0.347)	-0.287 (0.589)	0.446 (0.307)
Fresh vegetables > 4 p/w	0.258 (0.400)	-0.268 (0.338)	-0.216 (0.579)	0.662 (0.299)**
Intake vitamins	0.128 (0.090)	0.058 (0.085)	0.445 (0.127)***	0.435 (0.112)***
Urban area	-0.163 (0.140)	0.052 (0.084)	-0.181 (0.109)*	-0.107 (0.087)
Unemployed	0.639 (0.408)	-0.500 (0.262)*	-0.913 (0.361)**	-0.373 (0.186)**
μ_0	-2.055 (0.460)***	-2.546 (0.418)***	-1.598 (0.642)**	-0.539 (0.402)
μ_1	-1.587 (0.455)***	-1.760 (0.410)***	-0.803 (0.636)	0.149 (0.400)
μ_2	-0.686 (0.452)	-0.863 (0.407)**	-0.078 (0.635)	0.902 (0.401)**
μ_3	1.044 (0.453)**	0.490 (0.406)	1.530 (0.638)**	2.176 (0.401)***
N	700	698	447	697
Log-L	1520.108	1719.725	1028.852	1832.731
Pseudo R^2	0.126	0.174	0.222	0.158

** p< .10 ** p< .05 *** p<.01*

Table 4.3 Ordered probit of self-reported health by gender (standard errors in parentheses)

Variable	Dutch women	Surinamese/ Antillean women	Moroccan women	Turkish women
Mediate educated	-0.157 (0.146)	0.229 (0.151)	0.122 (0.188)	0.227 (0.135)*
High educated	-0.047 (0.178)	0.538 (0.168)***	0.583 (0.260)**	0.342 (0.213)
Age2 (35-44)	-0.211 (0.161)	-0.082 (0.143)	-0.341 (0.224)	-0.372 (0.140)***
Age3 (45-64)	-0.207 (0.155)	-0.168 (0.161)	-0.340 (0.287)	-0.597 (0.216)***
Age4 (>64)	-0.119 (0.209)	-0.566 (0.263)**	-1.420 (0.471)***	0.417 (1.112)
Smoking	-0.205 (0.117)*	-0.212 (0.139)	-0.494 (0.352)	-0.244 (0.118)**
BMI $\geq$ 25	-0.416 (0.116)***	-0.603 (0.119)***	0.176 (0.175)	-0.099 (0.127)
Married/living together	0.429 (0.128)***	0.016 (0.121)	0.087 (0.240)	0.136 (0.185)
Children at home	-0.059 (0.142)	0.203 (0.126)	0.054 (0.230)	-0.028 (0.182)
Outsourcing food preparation 1-5 p/m	0.064 (0.130)	-0.247 (0.139)*	-0.044 (0.177)	0.106 (0.132)
Outsourcing food preparation >5 p/m	-0.156 (0.309)	0.537 (0.355)	-0.138 (0.360)	0.205 (0.312)
Conv. food 1-2 p/w	0.190 (0.125)	-0.372 (0.134)***	0.114 (0.188)	0.212 (0.128)*
Conv. food 2-4 p/w	0.039 (0.185)	-0.363 (0.189)*	-0.018 (0.286)	0.020 (0.195)
Conv.food > 4 p/w	0.392 (0.296)	-0.445 (0.331)	-0.725 (0.433)*	-0.043 (0.309)
Eat out 1-4 p/m	0.166 (0.124)	0.200 (0.129)	0.247 (0.188)	0.111 (0.131)
Eat out 5-10 p/m	0.363 (0.288)	0.052 (0.291)	0.175 (0.389)	0.203 (0.407)
Eat out > 10 p/m	6.381 (0.000)	0.160 (0.826)	-0.074 (0.793)	0.233 (0.798)
Fresh vegetables 1-2 p/w	0.377 (0.673)	-0.301 (0.445)	-0.693 (1.165)	0.844 (0.519)
Fresh vegetables 2-4 p/w	0.573 (0.650)	-0.138 (0.402)	-0.335 (1.144)	1.015 (0.499)**
Fresh vegetables > 4 p/w	0.951 (0.648)	-0.337 (0.385)	-0.168 (1.127)	1.199 (0.494)**
Intake vitamins	0.124 (0.109)	0.072 (0.112)	0.400 (0.172)**	0.401 (0.134)***
Urban area	-0.235 (0.176)	0.054 (0.111)	-0.168 (0.158)	-0.006 (0.117)
Unemployed	0.927 (0.475)*	-0.488 (0.553)	-1.864 (0.849)**	-0.588 (0.279)**
μ_0	-0.966 (0.686)	-2.490 (0.491)***	-1.621 (1.196)	0.417 (0.600)
μ_1	-0.521 (0.683)	-1.561 (0.479)***	-0.615 (1.186)	1.159 (0.601)*
μ_2	0.480 (0.494)	-0.776 (0.476)	0.232 (1.185)	1.906 (0.604)***
μ_3	2.170 (0.687)***	0.670 (0.475)	1.893 (1.190)	3.311 (0.614)***
N	443	401	212	384
Log-L	952.788	991.208	483.312	956.054
Pseudo R^2	0.153	0.200	0.197	0.152

Variable	Dutch men	Surinamese/ Antillean men	Moroccan men	Turkish men
Mediate educated	0.089 (0.184)	0.041 (0.178)	0.710 (0.199)***	0.121 (0.144)
High educated	0.363 (0.205)*	0.335 (0.182)*	1.038 (0.246)***	0.442 (0.228)*
Age2 (35-44)	-0.260 (0.215)	0.236 (0.197)	-0.385 (0.216)*	-0.046 (0.162)
Age3 (45-64)	-0.642 (0.210)***	-0.265 (0.184)	-0.329 (0.249)	-0.524 (0.209)**
Age4 (>64)	-0.871 (0.246)***	-0.736 (0.317)**	-0.350 (0.389)	-0.476 (0.357)
Smoking	-0.528 (0.157)***	-0.179 (0.140)	-0.237 (0.164)	-0.060 (0.128)
BMI $\geq$ 25	-0.217 (0.152)	-0.273 (0.134)**	0.209 (0.159)	0.051 (0.130)
Married/living together	0.421 (0.190)**	0.023 (0.164)	0.247 (0.251)	-0.433 (0.220)*
Children at home	0.019 (0.196)	-0.015 (0.162)	-0.67 (0.231)	0.332 (0.196)*
Outsourcing food preparation 1-5 p/m	-0.238 (0.192)	0.035 (0.165)	0.225 (0.185)	0.024 (0.154)
Outsourcing food preparation >5 p/m	-0.714 (0.321)**	-0.185 (0.293)	0.195 (0.292)	-0.459 (0.263)*
Conv. food 1-2 p/w	-0.400 (0.177)**	0.083 (0.167)	-0.065 (0.191)	-0.019 (0.150)
Conv. food 2-4 p/w	-0.491 (0.269)*	0.042 (0.216)	-0.175 (0.314)	0.081 (0.210)
Conv. food > 4 p/w	-0.579 (0.292)**	-0.228 (0.433)	0.117 (0.639)	1.079 (0.362)***
Eat out 1-4 p/m	-0.237 (0.163)	0.409 (0.151)***	-0.035 (0.171)	0.165 (0.142)
Eat out 5-10 p/m	-0.161 (0.341)	0.314 (0.469)	0.138 (0.629)	-0.582 (0.377)
Eat out > 10 p/m	-1.011 (0.498)**	0.795 (0.503)	5.457 (0.000)	0.295 (0.327)
Fresh vegetables 1-2 p/w	-0.327 (0.571)	-0.825 (0.874)	-0.347 (0.797)	0.116 (0.417)
Fresh vegetables 2-4 p/w	-0.623 (0.541)	-1.024 (0.854)	0.083 (0.715)	0.047 (0.411)
Fresh vegetables > 4 p/w	-0.438 (0.540)	-0.699 (0.846)	0.118 (0.157)	0.328 (0.390)
Intake vitamins	0.080 (0.167)	0.011 (0.138)	0.510 (0.210)**	0.589 (0.219)***
Urban area	-0.138 (0.250)	0.105 (0.137)	-0.118 (0.157)	-0.196 (0.136)
Unemployed	-0.202 (0.839)	-0.416 (0.309)	-0.497 (0.419)	-0.210 (0.270)
μ_0	-3.467 (0.699)***	-2.793 (0.914)***	-0.636 (0.823)	-0.590 (0.613)
μ_1	-2.915 (0.685)***	-2.295 (0.906)**	0.033 (0.817)	0.054 (0.609)
μ_2	-2.122 (0.675)***	-1.156 (0.901)	0.666 (0.817)	0.867 (0.610)
μ_3	-0.155 (0.665)	0.160 (0.899)	2.297 (0.827)***	2.066 (0.616)***
N	257	297	235	313
Log-L	517.325	691.489	520.881	776.184
Pseudo R^2	0.221	0.186	0.265	0.172

Table 4.4 Quality of Life Weights for overweight (BMI ≥ 25) and prevalence of overweight

	Dutch	Surinamese/Antilleans	Moroccans	Turks
BMI ≥ 25	0.351	0.390	0.683	0.158
Prevalence (%)	41.4	43.9	38.8	49.6

Table 5.1 Determinants of health per ethnic group

Ethnic Group	*Dutch*		*Surinamese/ Antillean*		*Moroccan*		*Turkish*	
Determinants of health	*age (>45)*	-	*female*	-	*female*	-	*female*	-
	smoking	-	*age (>45)*	-	*age (>35)*	-	*age (>35)*	-
	BMI ≥ 25	-	*smoking*	-	*smoking*	-	*smoking*	-
	outsourcing food preparation	-	*BMI ≥ 25*	-	*unempl. (women)*	-	*unempl. (women)*	-
	conv.food (men)	-	*outsourcing food prep. (women)*	-	*intake vitamins*	+	*conv. food*	+
	eating out (men)	-	*conv. food (women)*	-	*education level*	+	*fresh vegetables*	+
	married/ cohabiting	+	*eating out (men)*	+			*education level*	+
			level of edu.	+			*intake vitamins*	+

- has negative effect on the demand for health, + has positive effect on the demand for health

Appendix I Definition of the variables used

Dependent variable:

Categorical/ self-reported health (4 = excellent, 3 = very good, 2 = good, 1 = fair, 0 = poor)

Independent variables:

Female	1 if female
Low educated	1 if low educated
Mediate educated	1 if mediate educated
High educated	1 if high educated
Age1	1 if age 18-34
Age2	1 if age 35-44
Age3	1 if age 45-64
Age4	1 if age >64
Smoking	1 if smoking
BMI $\geq$ 25	1 if BMI $\geq$ 25
Marital status	1 if married/living together
Children at home	1 if children living at home
Outsourcing food prep. seldom	1 if seldom or never outsourcing food preparation
Outsourcing food prep. 1-5 p/m	1 if 1-5 times a month outsourcing food preparation
Outsourcing food prep. >5 p/m	1 if >5 times a month outsourcing food preparation
Convenience food seldom	1 if seldom or never making use of convenience food
Convenience food 1-2 p/w	1 if 1-2 times a week making use of convenience food
Convenience food 2-4 p/w	1 if 2-4 times a week making use of convenience food
Convenience food >4 p/w	1 if >4 times a week making use of convenience food
Eat out seldom	1 if seldom or never going to eat out
Eat out 1-4 p/m	1 if 1-4 times a month going to eat out
Eat out 5-10 p/m	1 if 5-10 times a month going to eat out
Eat out >10 p/m	1 if more than 10 times a month going to eat out
Fresh vegetables seldom	1 if seldom or never eating fresh vegetables
Fresh vegetables 1-2 p/w	1 if 1-2 times a week eating fresh vegetables
Fresh vegetables 2-4 p/w	1 if 2-4 times a week eating fresh vegetables
Fresh vegetables >4 p/w	1 if > 4 times a week eating fresh vegetables
Intake extra vitamins	1 if taking extra vitamins and/or minerals
Urban area	1 if living in one of the four big cities
Unemployed	1 if unemployed