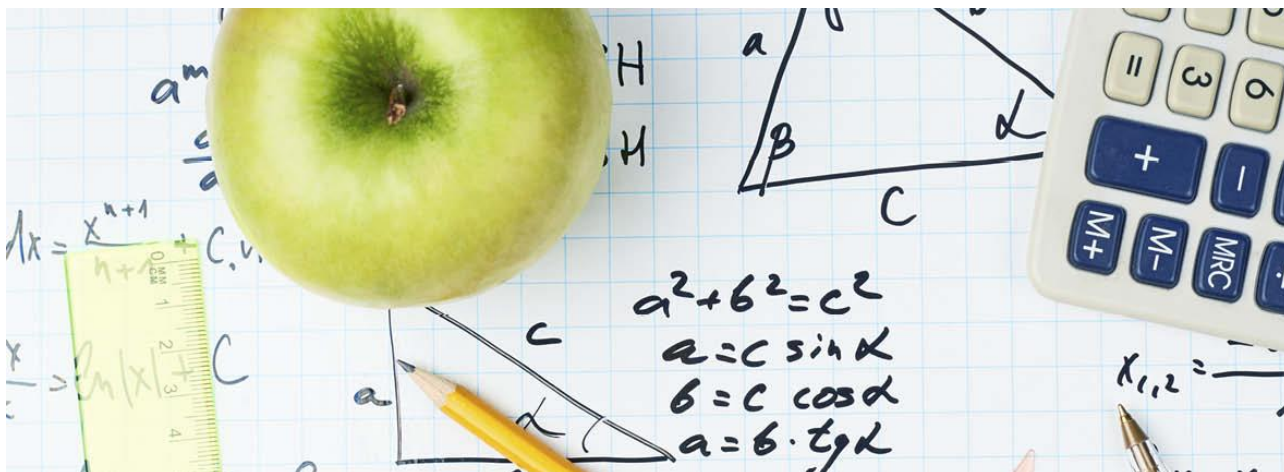


## COHERE - Centre of Health Economics Research



## Health and inequality in health in the Nordic countries

By

Terkel Christiansen, Department of Business and Economics, University of Southern Denmark – COHERE  
Jørgen Lauridsen, Department of Business and Economics, University of Southern Denmark – COHERE  
Carl Hampus Lyttkens, Department of Economics, University of Lund, Sweden  
Thorhildur Ólafsdóttir, Faculty of Business Administration, University of Iceland  
Hannu Valtonen, Department of Social and Health Management, University of Eastern Finland

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FURTHER INFORMATION  
Department of Business and Economics  
Faculty of Business and Social Sciences  
University of Southern Denmark  
Campusvej 55,  
DK-5230 Odense M Denmark  
[www.cohere.dk](http://www.cohere.dk)  
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## **Health and inequality in health in the Nordic countries**

Terkel Christiansen<sup>1</sup>, Jørgen Lauridsen<sup>1</sup>

Carl Hampus Lyttkens<sup>2</sup>, Thorhildur Ólafsdóttir<sup>3</sup>, Hannu Valtonen<sup>4</sup>

1,2. COHERE, University of Southern Denmark.

2. Department of Economics, University of Lund, Sweden.

3. Faculty of Business Administration, University of Iceland.

4. Institute of Public Health and Clinical Nutrition, University of Eastern Finland

## **Abstract**

All five Nordic countries emphasise equal and easy access to healthcare. It is the purpose to explore to which extent the populations of these countries have reached good health and high degree of socio-economic equality of health.

Each of the five countries has established extensive public health programmes, although with somewhat different emphasis on the causes of ill-health, such as individual behaviour or social circumstances. Attitudes have changed over time, though.

We compare these countries to the UK and Germany by using data from the European Social Survey 2002 and 2012 in addition to OECD Statistics from the same years.

Health is measured by self-assessed health in five categories, transformed to a cardinal scale using Swedish time trade-off weights. As socio-economic variable we use household income or length of education.

Mean health, based on Swedish TTO weights applied to all countries, is above 0.93 in all the Nordic countries and the UK in 2012, while lower in Germany.

Rates in good or very good health in the lower income half of the samples are above 0.6 in most countries and even higher in Iceland and Sweden, but below 0.5 in Germany. However, when displayed in a graph the concentration curves nearly follow the diagonal implying almost no income- or education related inequality in self-assessed health weighted by TTO based preferences. The difference is a natural consequence of using different methods.

We compared four key life-style related determinants of ill health and found that while there were differences in relative levels between the countries, Germany had a relatively high level of three of these, followed by the UK. We found no association between level of resources used and health status.

In general, the Nordic countries have accomplished good health for their populations and high degree of socioeconomic equality in health. Improvements in life-style related determinants of health would be possible, though.

Key words: International comparison of health systems; health status; health equity.

JEL classification codes: I11; I14; I19.

Carl Hampus Lyttkens, Thorhildur Ólafsdóttir, Hannu Valtonen contributed with information on public health policies in each of their countries.

## 1. Introduction

The Nordic countries include five countries (Denmark, Finland, Iceland, Norway and Sweden) all of which adhere to the concept of a welfare state with health care as an important element and with equal and easy access to health care as an important goal (Lyttkens et al., 2016). These countries are characterised by predominantly tax financed health care and universal coverage. If inequality in health and health care exists, it calls for political as well as research attentions, either directly focused on population segments with low socio-economic status and low health, or indirectly through improved health in general as these policies are interconnected. Among others, OECD has reported inequality in health for member countries (OECD,2015) as well difference in self-reported health status by income (OECD, 2016, p. 72-73).

It is the aim of the present paper to investigate to which extent health systems in the Nordic countries have reached good health for their populations and low socio-economic inequality in health. The chosen indicators are compared to the corresponding indicators for two other countries, Germany and the UK, the first having a health care system based on the principles of Bismarck with insurance financing, and the second on the principles of Lord Bevan with tax financing - knowing that there are many other features characterising these countries.

The term “socioeconomic” is a broad term which usually refers to social and economic status. Due to difficulties in creating comparable groups defined by social status across countries, socioeconomic status is usually measured by income as a proxy variable in international comparisons. Length of education would be another indicator on a cardinal scale which can easily be documented.

While health in itself is usually distributed inequitably across the population, so is income and education. Income-related inequality in health measures the joint distribution of income and health when individuals are ranked by income. Similarly, education-related inequality measures the joint distribution of health and education when individuals are ranked by length of education. We analyse both income- and education-related inequality based on individual level survey data.

Health and its distribution have numerous determinants which cannot be disentangled in the present paper, in particular due to data limitations on an individual level. Following this introduction, we describe public health policies on the basis of especially government reports and white papers from each country. Next, we use survey data from The European Social Survey (ESS) together with aggregate OECD data to describe socio-economic inequality in health, non-medical determinants of health, health behaviour and resources allocated to healthcare and public health policies. Finally, we discuss how these factors might have influenced the general health status as measured by self-assessed health, and its socio-economic distribution.

## **2. Public health policies in the Nordic countries**

As a collaboration between the Nordic countries The Nordic School of Public Health was established in 1953, and through educational programmes and research it became an inspiration for development of public health. It was closed in 2014 as each Nordic country had established its own educational and training programmes in public health (Foldspang, 2016).

Public health policies in the Nordic countries have much in common. Thus, all five countries have established public health institutes to monitor and analyse the health of the populations, public health education programmes has been established in each country, and each country has adopted national public health programmes, including comprehensive vaccination programmes for children, and public health activities are produced in the public sector or in collaboration with NGOs. However, as demonstrated by Vallgård (2011), there are differences between the countries with respect to how they see the causes of ill-health and consequently their approach to public health policies. She makes a distinction between policies that focus on individual behaviour and responsibility, and policies that focus on social conditions and other factors which are external to the individual. The first approach is seen as being in accordance with a liberal political ideology that emphasises the individuals' autonomous choices which can be enabled by necessary information. The second approach is seen as being in accordance with a social democratic ideology with emphasis on state

intervention to improve health as well as social and living conditions. A policy in between these extremes is seen as a social liberal policy which emphasises equal opportunities on the basis of a state intervention to facilitate self-determination (Vallgård, 2007). She concludes that all aspects are present in each of the four larger Nordic countries, but that there is a difference with respect to the extent to which social factors are emphasized and therefore to which extent politicians are seen as having responsibility for populations' health. In brief, public health policy in the 00s in Denmark is categorised as the most liberal and the Norwegian as the most social democratic or social liberal while Sweden and Finland are seen as in between. However, differences in national traditions are considered at least as important as differences between political ideologies in formulating the health policies by the observation that change of colour of government does not necessarily change the content of the policies (Vallgård, 2011).

Social inequality in health and life expectancy has been documented extensively in each country by academic researchers and authorities. The political approach to reducing inequality in health differs between the countries and is associated with different approaches reduce health risk and improve health and life expectancy. Compared to Denmark, Norway and Sweden emphasises to a greater extent the living conditions (poverty, being expelled from the labour market, poor education and poor housing) as cause of social inequalities in health ( Norwegian Government, 2003).

With respect to tackling inequality in health a distinction can be made between universal policies targeting the whole population and residual policies focussing on groups with specific characteristics (Vallgård, 2010). A universal approach accords with an interpretation of the problem as a social gradient while the residual approach accords with an interpretation of the problem of exclusion or disadvantaged, comprising a minor share of the population. Vallgård identifies the Danish policies in the 2000s as a residual policy while she argues that Sweden changed from a universal to a residual policy due to the change of government. The Finnish and Norwegian policies are seen to rely on a combined strategy.

## *Denmark*

Public health service in Denmark during the 2000s was based on a 10-year programme that was launched by a social democratic – social liberal government in 1999 (Danish Government, 1999). The programme was the second public health programme, and it was launched in response to, in particular, a relatively low life expectancy in Denmark. With inspiration from WHO's strategy for the 21st century, the programme listed 17 targets covering specific risk factors. The main elements in the programme were retained in the "Healthy throughout life 2002-2010" programme (Danish Government, 2002) that was launched by a newly elected liberal-conservative government, but it added a focus on preventing a number of diseases and disorders that are common in the population. For each of eight risk factors it outlined suggestions as to what could be done by the individual itself, the close community and the society at large. Individuals should be provided with necessary knowledge and tools to lead a healthy life. The programme also listed a number of services and measures that targeted the quality of life of the population. To continuously monitor trends in life expectancy, health, health behaviour and public services, a list of indicators was developed.

In connection with a structural reform 2007 responsibility for primary disease prevention and health promotion was transferred from the former counties to municipalities, and since then it has been strengthened. To increase local preventive efforts by the municipalities they were given an economic incentive through co-payment of regional health services for each patient contact or admission. The co-payment was based on a list of fees, and it covered all types of contact irrespective of whether the municipalities were able to prevent a contact or not, either in the short or the longer run. It is worth noticing that municipalities have no direct influence on access to health care by general practitioners or referrals to hospitals. The average amount of co-payment amounts to about 18% of the total regional health care budget.

A Government Commission on Prevention released its report in 2009 with 52 concrete suggestions to a strengthened national preventive effort with the aim to improve life expectancy (Forebyggelseskommissionen ,2009). Among the suggested tools to reduce the most important risk factors (unhealthy nutrition, tobacco, alcohol and lack of exercise) were public campaigns and



regulation through taxes and subsidies, regulation and prohibition, and infrastructure. Individual with weak resources should be supported to make healthy choices. A distinction was made between patient focussed prevention which was seen as the responsibility of the regions, and citizen focussed prevention which was seen as a municipal responsibility.

The “Health package 2009” (Danish Government, 2009) was a follow-up on the recommendations of the Commission on Prevention. One policy was to strengthen the municipalities’ incentive to increase prevention of their citizens and listed 30 disease-preventing initiatives through a national action plan for prevention. The plan included a goal of increasing life expectancy by 3 years during the coming 10 years. The government’s policy was based on six principles: personal responsibility supported by good public information; clear economic incentives to make a healthy choice using increased taxes on unhealthy consumption; social responsibility for children and young people and those with few resources; municipal responsibility through close contact to its citizens; firms’ responsibility for employees, and economic responsibility with focus on activities that provides most value for money.

### *Finland*

In health policy, there have been two lines: a “targeted program policy” and a “structural reform policy” - reforming the organisation of the whole health and social care. Both of the policies have aimed at reducing both service availability and health and social inequality. The present Finnish public health program is based on a Health2015 Health Cooperation Program (Finnish Ministry of Social Affairs and Health, 2001a) which outlined targets for the national health policy, based on WHO’s Health for All programme. The term ‘cooperation’ refers to the approach that different sectors outside health care are involved in promoting health, including NGOs. The programme contains a strategy with eight targets for public health which requires concerted actions by various bodies, and 36 lines of action (Vuorenkoski, 2008). While the state has an overall responsibility for setting guidelines and monitoring health of the population, the employers have responsibility for arranging occupational health promotion for their employees, advising on health risks and check employee’s

health status in case of a job-related risk, and municipalities have responsibility for environmental health policy. Public health at the municipal level is the responsibility of local health centres and includes a wide array of activities including school health service, immunization, cancer screening programmes, family planning and environmental health services. The main undertaking has been public health campaigns in various specific areas. (Finnish Government, 2015).

The governments in the 2000s have had various programs targeting the health and social inequality. However, "(V)arious indicators show that the health of the Finnish population has improved but socioeconomic health inequalities have generally remained or even widened. It appears increasingly difficult to reach the Health 2015 Public Health Programme goals for reducing differences in mortality by a fifth by 2015. --- Reducing health inequalities has been an objective in the Finnish health policy programmes since 1986. --- In recent years, health inequalities have been increasingly viewed as larger socio-political problems than just a problem of traditional health policy (e.g. in the Government Programmes of 2003 and 2007)." (Palosuo et al., 2007)

Also several governments in the 2000's have tried, with very limited success, to reform the whole health and social care system. The ongoing (Finnish Ministry of Social Affairs and Health and the Ministry of Finance, 2017) structural reform's main points are: 1) the organiser, purchaser and the financier will be county councils (18) financed by the state and the municipalities. 2) Both public and private providers can produce the services, and their legal position will be similar. There will be (hopefully) fixed price competition, so that the providers get a fixed compensation for patients on their lists. 3) the citizens have free choice of the providers, at least in primary care, but also to some extent in secondary care, they can change the provider once a year.

### *Iceland*

In 2001, a 10-year national health plan was launched in Iceland by a liberal conservative coalition government. 21 targets from WHO's Healthy21 were adapted for Iceland and 7 priority projects identified. It was stated that within the health care services the emphasis is placed on improving

health and preventing disease and in order to achieve this “a coordinated effort is required on the part of the government, health care service administrators, health care professionals, special-interest organisations and NGOs” (Icelandic Ministry of Health, 2001). The Public Health Institute was then established in 2003. In 2007, a government of same parties published a mission statement on priorities regarding general health and prevention, appealing to „the collective effort of the nation“(Icelandic Ministry of Health, 2007a). It mainly emphasized the government’s specific aims from the Health plan from 2001. A one year pilot-project was launched with the goal of increasing general access to regular exercise through the collaboration of the Ministry of Health, the Public Health Institute, the National Olympic and Sports Association of Iceland, health care centers, sports clubs and the Municipalities.

In 2008, a public health policy with the main purpose of “establishing the societal conditions necessary to help individuals make choices that are beneficial to their health” was launched by a coalition government of liberal conservatives and social democrats (Icelandic Ministry of Health, 2008). Three key elements were targeted: Mental health, nutrition and regular exercise. A total of 11 aims were defined with 30 actions. The instrument used was mainly the provision and distribution of health-related information, by means of educational material aimed at parents of newborns, teachers and children in all levels of the school system, employers, employees as well as the unemployed. In this health plan a responsible agent and the executing agent is defined for each goal specified, where schools and workplaces are encouraged to implement their own health policies. Factors other than individual behavior that are known to contribute to health inequality, such as distribution in income, education, employment and housing are not addressed specifically in this public health policy – which could indicate that it was not considered a problem in this context. Individual behavior is mainly targeted as in other white papers on public health in the 2000s in Iceland.

In a final report for the 2001 Health Plan, seven of 21 targets had been reached, seven were considered within reach, three had drifted further from the target and three targets could not be estimated because of lack of information/data (Icelandic Ministry of Health, 2011).

## *Norway*

In Norway public health activities are mainly carried out at the local level, involving GPs and municipalities while counties take care of monitoring and strategic planning (Ringard et al., 2013). In 2003 the government issued an extensive White Paper on public health by a conservative-liberal government (Norwegian Government, 2003) which was incorporated in a 10 year strategic plan. The main approach was to focus on circumstances that create health problems, and circumstances that counteract ill-health while it is acknowledged that “our own choices and how we create our society within a range of areas is far more important.” The government emphasised the association between the responsibility of society and the individual, and that “public health measures should be strengthened within all sectors of the society through an active partnership that places responsibility and obligations and stimulates activity”. While the individual is seen as having choices and responsibility, society should influence these choices through providing knowledge and influencing attitudes. Ethical aspects thereof are discussed, and it is underlined that public health activities must be based on respect for different values have its basis in democratic institutions involving the population at large. In a section on diagnosing the problems it is acknowledged that public health work has previously been uncoordinated and that there is a need for continuity and integration with the rest of societal planning and based to a greater extent on knowledge. One of the recommended means is to enable individuals to take responsibility through changed life style and through circumstances around the individual.

The government has during the 00s introduced a number of strategies to improve health through action plans directed towards for example smoking, nutrition, physical activity, alcohol and drugs. A Public Health Act was introduced in 2012 to improve coordination of public work both horizontally between various actors and vertically between authorities at local, regional and national levels (Ringard et al., 2013).

## *Sweden*

Several organizational changes have taken place in the public health area in Sweden since the turn of the millennium. The Public Health Institute was reorganized in 2001. Following on a number of reports from the National Committee for Public Health in the late 1990s, the social democratic Swedish government in 2002 issued a white paper on public health (cf. Vallgård, 2007) and the following year the government adopted a program covering 11 domains which were seen as the most important determinants of Swedish health and which should guide the public authorities involved (Annell et al., 2012).

In the 2006 elections, government power shifted to a liberal-conservative coalition. In 2008, the new government issued a white paper on "a renewed public health policy" (Swedish Government, 2008) which was followed by a renewed public health bill. While the 2002-programme emphasized causes of social health inequalities, the new programme expressed the view that one of the central tasks for government is to provide information in a form that "will enable people to voluntarily change their behaviour," emphasising individual choice and responsibility. The new Swedish programme "represents a combination of liberal, socio-liberal, social-democratic, and paternalistic conservative ideal of the responsibilities of the government" (Vallgård, 2011). The shift away from socially determined ill health was thus far from complete. Since the 2014 elections, the Swedish government is once again in the hands of the social democratic party, and in 2015 a commission was appointed to restructure public health policy (Swedish Government, 2015), cf. below

Despite the changes in focus, it is difficult to discern any major changes in actual public health measures from 2006 and onwards. Possibly this has been due to persistent social democratic attitudes in public health organizations (Vallgård, 2011). It remains to be seen whether the sitting government commission on equality in health will suggest policy changes that matches their assignment – to eradicate within the space of one generation all social inequalities in health that are amenable to policy influence.

A related phenomenon that has emerged since 2000 is an interest for “the social costs of inequality in health”. There is no national programme on this, but several public organisations have been active. Suppose, for example, that health is positively correlated with education. One can then calculate the shortfall in health that is due to some people being less educated than others. If additionally we ascribe monetary values to this shortfall, we would find out how much it would be worth to eradicate health gaps in society. To the economist, however, such exercises are of questionable value (Gerdtham & Lyttkens, 2013). Their popularity probably originates in the fact that big numbers impress.

Finally, we note a typically Swedish feature. On the home-page of the Public Health Agency, you will find the proclamation: “Everyone is entitled to feel well”. This encapsulates a lot of Swedish attitudes towards public action in areas related to health. It looks nice as an overall ambition, but it is difficult to see it being taken at face value.

### **3. Data**

For a quantitative comparison of health and inequality in the Nordic countries, data from the European Social Survey (ESS) were applied (European Social Survey, 2017). For Denmark, Finland, Norway and Sweden, data from Round 1 of 2002 were applied together with data from Round 2 of 2004 for Iceland, as data were not collected in Round 1 for Iceland. Results from these rounds are compared to results from Round 6 of 2012, in which all countries participated. Furthermore, we use OECD data to describe non-medical determinants of health and life expectancy. Table 1 provides description of variables based on ESS data. Health is measured by a self-assessed health variable with five categories and converted to a cardinal scale using Swedish weights developed by Burström et al., (2014) who used a time trade-off method (TTO). The post sample design weights provided by the ESS variable PSPWGHT were applied to all calculations based on ESS data. These weights account for pre-sampling design representativeness issues and further adjust for post-sampling representativeness shortfalls (European Social Survey 2017). Table 2 shows some descriptive statistics for the sample. Descriptive aggregate data from other sources, among others the OECD Statistics, are selected for the same years.

**Table 1. Definition of variables, based on ESS data**

Variable	ESS name	Definition
Health	Health	TTO recoding of SAH (Burström <i>et al.</i> 2014): Very good = 1 (reference) Good=1-0.0315=0.9685 Fair=1-0.1414=0.8586 Bad=1-0.3189=0.6811 Very bad=1-0.4817=0.5183
Income	hinctnta	Annual household income in €, reported as deciles 1-10, equivalized by OECD / Eurostat formula $1+0.7*(adults-1)+0.3*children$ For deciles 1 and 10, decile monetary values used For other deciles, monetary values of decile mid-point used
Education	eduys	Self-reported number of years of full-time education

Source: European Social Survey (2017)

Consistent with the selected survey years, we describe public health policies during the first decade of this century, although it might be claimed that the health of a population is a result of long-term policies during the past. However, in accordance with the theme of this issue, it is also a purpose to describe what has been accomplished in terms of health policy, and the approaches taken in different countries.

**Table 2. Selected statistics for the Nordic countries, 2002 (Iceland 2004) and 2012**

Variable	Denmark		Finland		Iceland		Norway		Sweden	
	2002	2012	2002	2012	2004	2012	2002	2012	2002	2012
Household income	17866	22457	12710	16711	21294	16400	21055	32496	13716	19696
Education	13.5	13.2	12.1	12.2	13.5	13.6	13.3	13.9	12.1	12.7
Age	47	50	47	50	46	44	46	44	47	49
Male %	53	52	53	52	48	51	54	51	52	52
N	1281	1407	1790	2058	480	641	1970	1552	1864	1664

Notes. Income is in nominal prices

Source: Own calculations, based on ESS data. European Social Survey (2017).

#### 4. Methods

In the present study socio-related inequality in health is calculated by a concentration index showing either income-related inequality or education-related inequality in self-assessed health. The measure is relative to the mean of income or education in a given country which can vary from country to country. The index is described in a number of earlier studies, among others van Doorslaer et al., (1997) and van Doorslaer and Koolman (2004), and is briefly summarised below. A concentration curve shows the cumulative share of a sample (ranked by socioeconomic status (SES) from lowest to highest) against the cumulative share of total health. If the curve coincides with the diagonal, everybody is treated equally. If it is below the diagonal, there exists an inequality in the health to the advantage of the higher socio-economic groups, and vice versa in case the curve lies above the diagonal. The index is measured by twice the area between the diagonal and the concentration curve. The greater the distance between the curve and the diagonal, the greater the inequality. The index varies between -1 and +1 for the hypothetical extreme situations where total health is concentrated with either those with the poorest or the best socio-economic status.

A calculation formula for the concentration index  $C$  which allows application of sample weights has been described Kakwani et al., (1997):

$$C = \frac{2}{n\mu} \sum_{i=1}^n w_i y_i R_i - 1,$$

where  $\mu = \frac{1}{n} \sum_{i=1}^n w_i y_i$  is the weighted average of health,  $n$  is sample size,  $y_i$  is health,  $w_i$  is sample weights of individuals which adds to  $n$ , and  $R_i$  is the rank order, expressed as a fraction, defined by Kakwani et al. as

$$R_i = \frac{1}{n} \sum_{j=1}^{i-1} w_j + \frac{w_i}{2},$$

which is the cumulative fraction of the population up to the mid-point of each weight.



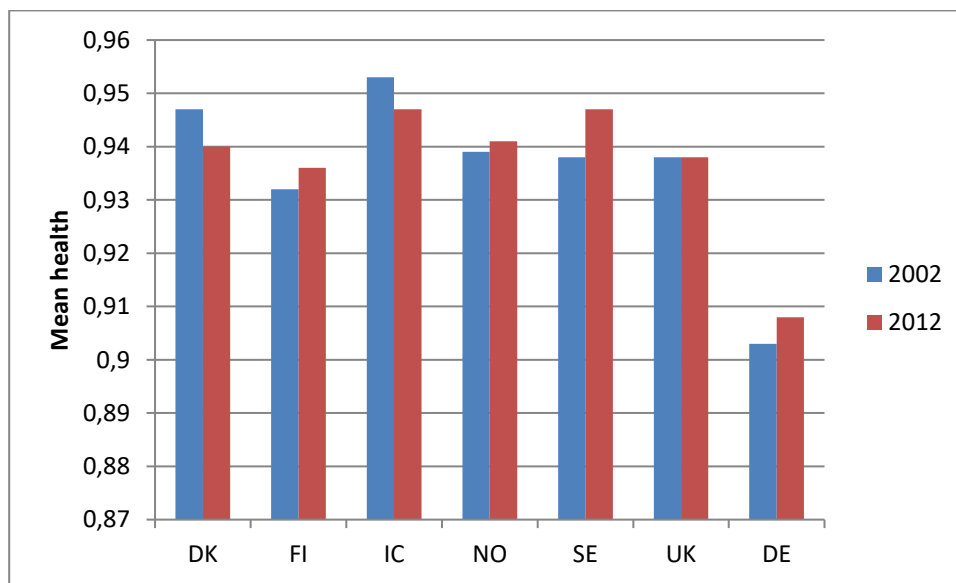
Post sample weights were used to weight results. Given that the calculation of the concentration index do not allow for weights being incorporated directly, the approach of van Doorslaer and Koolman (2004) were used, i.e., the weight for each observation were recalculated into  $w = \text{round}(\text{weight} / \min(\text{weight}))$ , and the observation duplicated the number of times given by this number.

## 5. Results

### Health

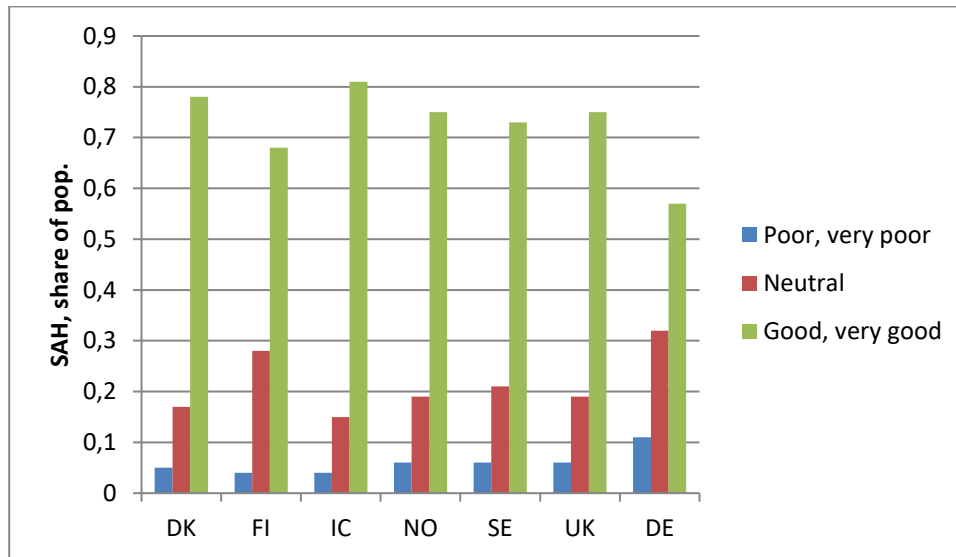
Mean health, based on self-assessed health reported in five categories and weighted by TTO weights, is shown in Figure 1. The level is above 0.93 in all Nordic countries and the UK in 2012, while lower in Germany. The highest level was reached in Iceland in 2004 and Sweden in 2012. Only minor changes took place since 2002 in each country. Mean health and confidence intervals is shown in Table 3.

**Figure 1. Mean health on a 0 – 1 scale, based on self-assessed health with categories weighted by TTO weights. The Nordic countries, UK and Germany, 2002 and 2012.**



Source: European Social Survey 2002 and 2012. (European Social Survey, 2017)

**Figure 2. Self-assessed health status by category in the Nordic countries, UK and Germany, 2012.**



*Source: European Social Survey 2012 (European Social Survey, 2017)*

The distribution of categories of self-assessed health 2012 according to ESS data are shown in Figure 2. The average of combined categories ‘good’ and ‘very good’ is above 0.70 in all Nordic countries as well as the UK, while in Germany the share is below 0.60. The share with poor or very poor health is lowest in Finland, Iceland and Sweden, while Germany has a higher share, followed by the UK. Minor changes have taken place since 2002 according to Table 3.

Female Life Expectancy (LE) is shown in Figure 3. It has increased about equally in all countries and has reached more than 84 years in Iceland, followed by Finland and Sweden. Denmark is at the lowest level by 82 years, while UK and Germany has reached a level about 83 years. As seen from Table 3, the gender difference in LE has decreased since 2002, and male LE is between 2.7 and 6 years lower than female LE in the Nordic countries in 2012.

**Table 3. Socio-economic inequalities in health and mean health. Nordic countries, UK and Germany 2002 (Iceland 2004) and 2012**

Variable	Denmark		Finland		Iceland		Norway		Sweden		UK		Germany	
	2002	2012	2002	2012	2004	2012	2002	2012	2002	2012	2002	2012	2002	2012
Mean of Health (TTO)	0.947 (0.945 , 0.950)	0.940 (0.938 , 0.942)	0.932 (0.929 , 0.935)	0.936 (0.933 , 0.938)	0.953 (0.949 , 0.957)	0.947 (0.943 , 0.951)	0.939 (0.937 , 0.941)	0.941 (0.938 , 0.944)	0.938 (0.935 , 0.940)	0.947 (0.945 , 0.949)	0.938 (0.938 , 0.939)	0.938 (0.936 , 0.940)	0.903 (0.901 , 0.905)	0.908 (0.907 , 0.909)
SAH=very poor, poor	0.05 (0.04, 0.06)	0.05 (0.04, 0.06)	0.04 (0.03, 0.05)	0.03 (0.03, 0.04)	0.04 (0.03, 0.05)	0.04 (0.03, 0.05)	0.06 (0.06, 0.07)	0.06 (0.05, 0.07)	0.06 (0.05, 0.06)	0.04 (0.03, 0.05)	0.06 (0.06, 0.06)	0.07 (0.06, 0.07)	0.11 (0.10, 0.12)	0.10 (0.09, 0.10)
SAH=neutral	0.17 (0.16, 0.18)	0.21 (0.20, 0.23)	0.28 (0.26, 0.30)	0.26 (0.24, 0.27)	0.15 (0.13, 0.17)	0.18 (0.17, 0.20)	0.19 (0.18, 0.20)	0.17 (0.15, 0.18)	0.21 (0.19, 0.22)	0.17 (0.16, 0.18)	0.19 (0.18, 0.19)	0.18 (0.17, 0.19)	0.32 (0.31, 0.33)	0.31 (0.31, 0.32)
SAH=good, very good	0.78 (0.76, 0.79)	0.74 (0.72, 0.75)	0.68 (0.66, 0.70)	0.71 (0.69, 0.73)	0.81 (0.79, 0.83)	0.78 (0.75, 0.81)	0.75 (0.74, 0.76)	0.77 (0.76, 0.79)	0.73 (0.72, 0.75)	0.79 (0.78, 0.80)	0.75 (0.75, 0.76)	0.75 (0.74, 0.77)	0.57 (0.56, 0.58)	0.59 (0.58, 0.60)
SAH45, lower income, pct.	0.696	0.638	0.570	0.624	0.615	0.735	0.609	0.697	0.666	0.712	0.644	0.660	0.480	0.493
SAH45, upper income, pct.	0.817	0.826	0.783	0.775	0.851	0.876	0.793	0.868	0.782	0.841	0.822	0.836	0.648	0.686
LE, females <sup>1</sup>	79.4	82.1	81.60	83.7	82.5	84.3	81.6	83.5	82.1	83.6	80.6	82.8	81.3	83.3
Difference F-M <sup>1</sup>	4.6	4.0	6.7	6	3.9	2.7	5.2	4.0	4.4	3.7	4.6	3.7	5.6	4.7
Overweight*	32.2	33.3	33.5	34.1	35.9	37.5	34.0	36.0	34.4	35.3			36.3	36.7
Gini coefficient	0.288 (0.281 , 0.293)	0.231 (0.227 , 0.234)	0.309 (0.300 , 0.317)	0.237 (0.232 , 0.241)	0.299 (0.288 , 0.309)	0.172 (0.167 , 0.179)	0.314 (0.309 , 0.319)	0.233 (0.218 , 0.228)	0.275 (0.270 , 0.281)	0.219 (0.215 , 0.222)	0.401 (0.399 , 0.403)	0.304 (0.300 , 0.308)	0.337 (0.333 , 0.342)	0.250 (0.248 , 0.251)
Concentration index, C, ranked by income	0.008 (0.006 , 0.009)	0.011 (0.010 , 0.012)	0.010 (0.009 , 0.012)	0.007 (0.005 , 0.009)	0.009 (0.007 , 0.012)	0.002 (0.000 , 0.005)	0.010 (0.009 , 0.012)	0.010 (0.008 , 0.012)	0.007 (0.005 , 0.008)	0.007 (0.005 , 0.009)	0.012 (0.011 , 0.012)	0.012 (0.011 , 0.013)	0.009 (0.008 , 0.011)	0.011 (0.011 , 0.012)
C ranked by educ.	0.010 (0.008 , 0.012)	0.011 (0.010 , 0.013)	0.016 (0.014 , 0.017)	0.011 (0.010 , 0.013)	0.010 (0.008 , 0.013)	0.005 (0.003 , 0.008)	0.013 (0.012 , 0.015)	0.006 (0.004 , 0.007)	0.008 (0.006 , 0.009)	0.007 (0.006 , 0.009)	0.010 (0.010 , 0.011)	0.010 (0.009 , 0.012)	0.019 (0.017 , 0.020)	0.009 (0.008 , 0.009)
Sample size, N	1281	1407	1790	2058	480	641	1970	1552	1864	1664	1759	1772	2316	2545

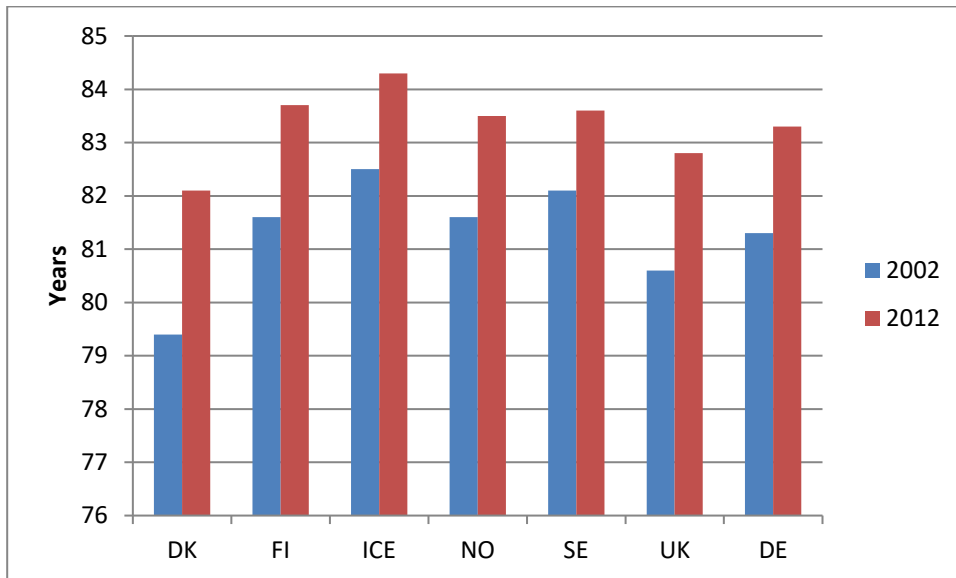
Source: European Social Survey 2002 and 2012. European Social Survey (2017).

Notes. Income is in nominal prices. ESS results weighted with ESS post-sample weights. 95% confidence interval in brackets.

<sup>1</sup> is based on OECD Statistics (OECD 2017)

Overweight defined as BMI  $\geq$  25 has increased in all included countries during the decade. It varied in 2011 between 33 per cent of the population in Denmark and 38 per cent in Iceland, followed by

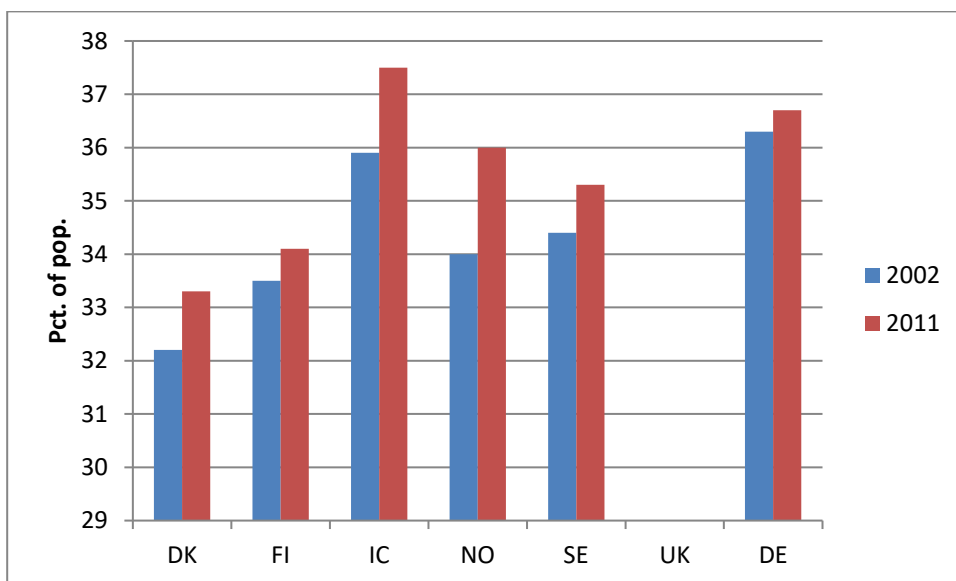
**Figure 3. Life expectancy, females at birth, Nordic countries, UK and Germany, 2002 and 2012.**



Source: OECD Statistics, OECD (2017)

Norway and Sweden. The level in Germany lies slightly below Iceland. Overweight by country is shown in Figure 4 and documented in Table 3.

**Figure 4. Overweight as share of the population in the Nordic countries and Germany, 2011 and 2012.**

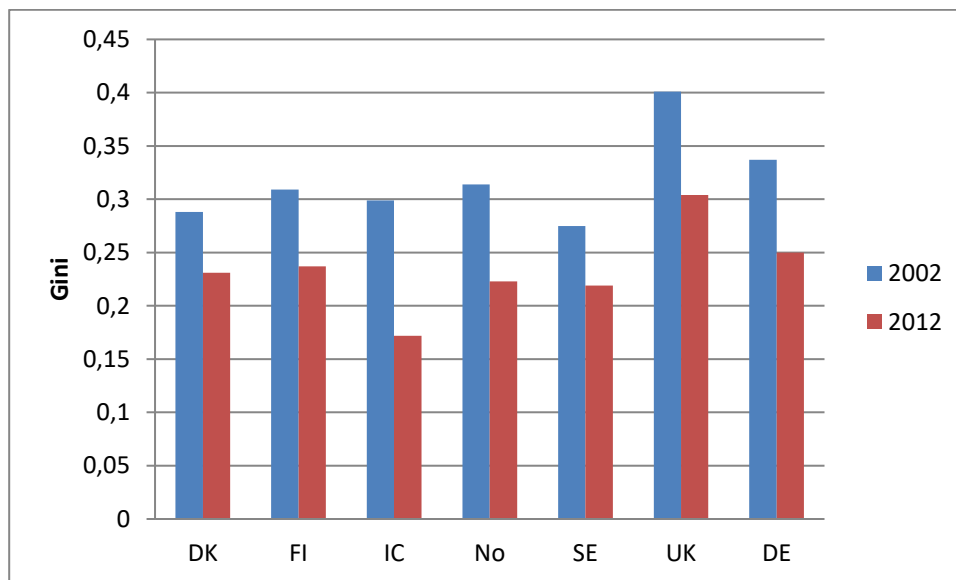


Source: OECD Statistics, OECD (2017)

### *Income distribution*

Inequality in income as measured by the Gini coefficient is shown in Figure 5, based on ESS data. Inequality has decreased in all countries. Denmark, Finland, Norway and Sweden are about the same level while Iceland lies below and the UK and Germany lie above. Thus, income inequality in the Nordic countries is below the level of the benchmarking countries. Data are documented in Table 3. While a skewed distribution of income does not in itself lead to inequality in income-related health, such relationship would arise if income and health are associated.

**Figure 5. Income inequality as measured by the Gini coefficient. Based on equivalized household income in the Nordic countries, UK and Germany, 2002 and 2012.**

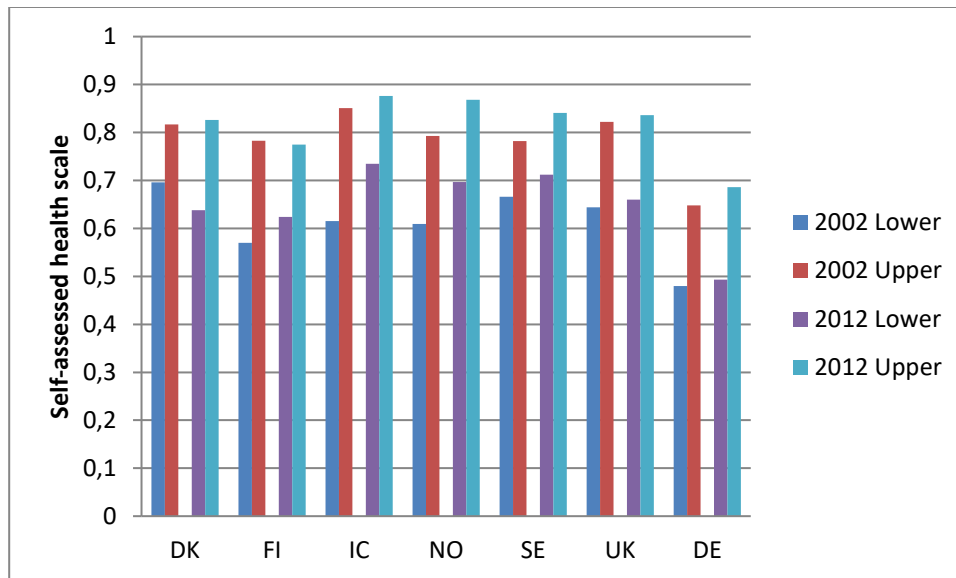


*Source: European Social Survey 2012 (European Social Survey, 2017)*

### *Income and education related inequality in health*

Figure 6 shows the percentage of respondents reporting good or very good self-reported health by countries and income group (lower half versus upper half). Different patterns are seen. For Denmark, the percentage among the lower income group has reduced from 2002 to 2012, while the percentage

**Figure 6. Good and very good self-assessed health in lower and upper half of income groups in the Nordic countries, UK and Germany, 2002 and 2012**

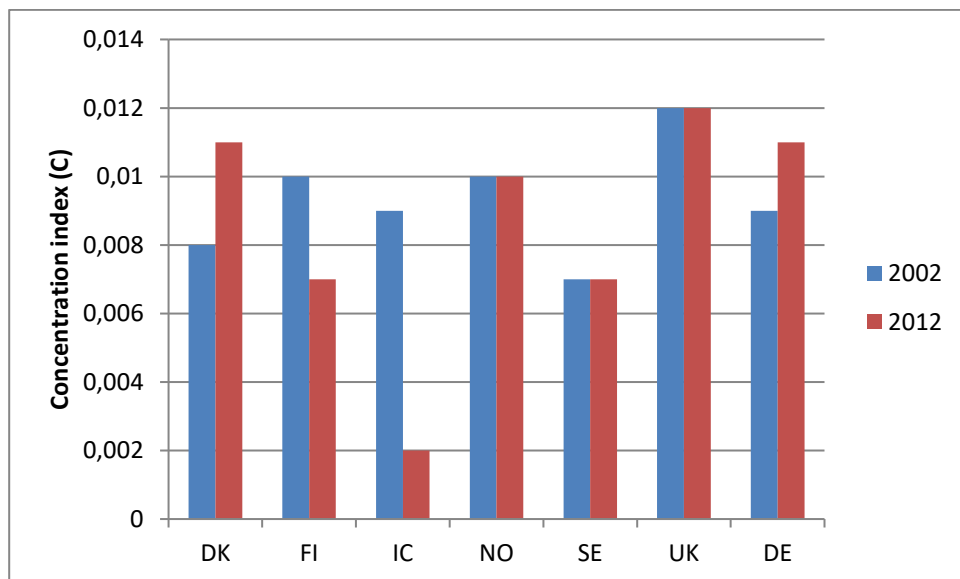


Source: European Social Survey 2012 (European Social Survey, 2017)

has increased for the upper income group. For Germany, the percentage has increased for both groups, but the increase is larger for the upper income group than for the lower. Thus, inequality in health has increased for Denmark and Germany. For Finland, Iceland, Norway and Sweden, the percentages rose faster for the lower income groups than for the upper, thus indicating reductions in inequality. For UK, both income groups had approximately the same increase from 2002 to 2012, thus indicating that inequality was unchanged over time.

Figure 7 compares income-related inequality in health among the Nordic countries as measured by the concentration index, based on data from the ESS survey. These figures, together with confidence intervals, are documented in Table 3. By comparing these confidence intervals, it can furthermore be assessed as to whether differences in concentration indices are significant. While in 2012 the concentration index is relatively low in Iceland, Finland and Sweden and significantly lower than in the benchmark countries, it is higher in Denmark and Norway. Still, the index for the UK and Germany is

**Figure 7. Income-related inequality in self-assessed health as measured by the concentration index (C), Nordic countries, UK and Germany, 2002 and 2012.**



Source: European Social Survey 2012 (European Social Survey, 2017)

higher, although not significantly higher than in Denmark and Norway. The index has increased significantly for Denmark and Germany since 2002 while it has decreased significantly for Finland and Iceland. For Norway, Sweden, Germany and UK, the concentration indices are unchanged.

A graphical presentation of the concentration curve would show a curve which almost coincide with the diagonal, showing no substantial income- related-inequality in health.

We calculated the concentration index for education-related inequality in health and found comparable results with a concentration curve very close to the diagonal in all countries showing no substantial education-related inequality in health.

### *Non-medical determinants of ill-health*

As shown in Table 3, health inequality exists among income groups (although it is very small when weighted by preference weights. One interesting question would be how far the Nordic countries have reached in reducing non-medical determinants of ill-health, in particular life-style related determinants of ill-health. Among data from OECD Statistics (OED 2017a), we show consumption of tobacco, alcohol, sugar and fat in Table 4.

Consumption of tobacco has decreased in all countries except for Finland since 2002. The level in the Nordic countries lies between the UK with the lowest level and Germany with the highest level. The level for Sweden in 2011 is not available due to the extended use of snuff as a substitute for tobacco.

**Table 4. Consumption of tobacco, alcohol, sugar and fat, Nordic countries, UK and Germany, 2002 and 2011**

<b>Consumption of:</b>	<b>Substance</b>	<b>Units:</b>	<b>Denmark</b>	<b>Finland</b>	<b>Iceland</b>	<b>Norway</b>	<b>Sweden</b>	<b>UK</b>	<b>Germany</b>
<b>Tobacco</b>	g/capita/year (15+ years)	2002	1522,0	1012,0	1724,0	1391,0	1713,0	1224,0	2396,0
		2011	1250,0	1221,0	1230,0	1073,0	n.a.	955,4	1664,0
<b>Alcohol</b>	liter/capita/yr (15+ years)	2002	13,1	9,2	6,6	5,9	6,9	11,1	12,3
		2011	10,5	9,8	8,1	6,4	7,4	9,9	11,2
<b>Sugar</b>	kg/capita/year	2002	57,6	34,8	52,3	44,3	42,1	41,1	45,2
		2011	53,3	30,8	46,6	40,1	40,1	47,8	40,1
<b>Fat</b>	g/capita/day	2002	130,4	127,5	137,9	145,7	125,1	135,4	139,0
		2011	132,3	136,7	146,2	150,3	132,1	138,1	145,8

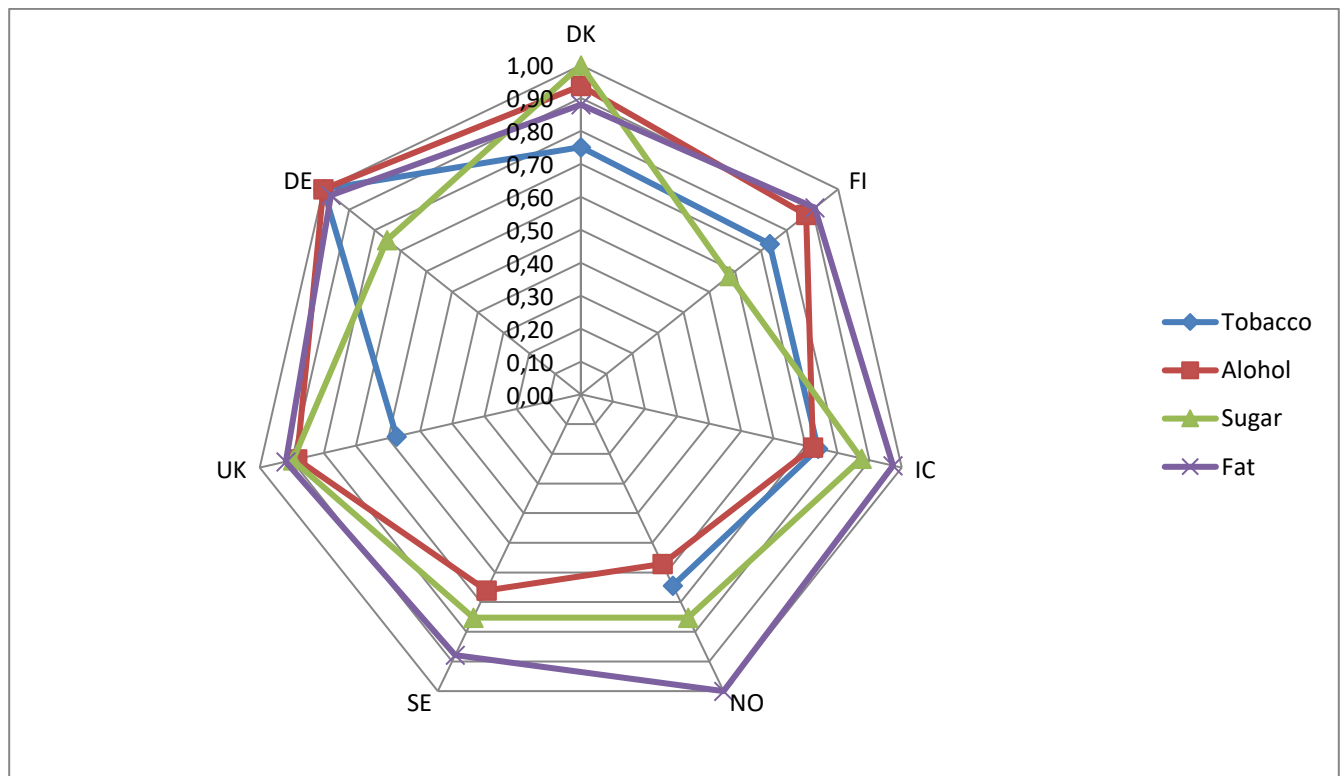
*Source: OECD (2017a)*



Alcohol consumption has decreased in Denmark, but from the highest level among the compared countries. For the other Nordic countries there were some increases. For UK and Germany the consumption decreased, but also from a relatively high level.

Consumption of sugar varies substantially between the countries. The extreme levels are found for Denmark with more than 50 kg per person per year, while in Finland the consumption is 30 kg. The other countries have a level in between, and it decreased in all countries except for the UK.

**Figure 8. Relative distribution of non-medical determinants of health by country, 2012.**



Source: Based on OECD Statistics (2017a)

Fat consumption has increased in all countries during the studied decade. It varies between 132 g/person/day in Denmark and Sweden and 150 g in Norway. UK and Germany lie between these extremes.

The cobweb diagram in Figure 8 shows the distribution of each of four non-medical determinants of health by country. Each determinant is shown by an index relative to the highest value among countries, for example is tobacco consumption shown relative to the consumption in Germany which is the highest. Germany appears to be relatively high on three of the determinants, followed by Denmark.

### *Resources allocated to health*

Resources allocated to health care is shown in Table 5, based on OECD (2017b). The share of the population employed in health care varies substantially between countries. Among the Nordic countries it increased in Finland and Norway during the decade, while it decreased in the other Nordic countries. The lowest level in 2012 is seen in Iceland, UK and Denmark, all about 6 per cent. Norway has by far the highest share close to 11 per cent. Definitions may vary between countries, though.

The share of GDP has increased in all countries except for Iceland. Sweden has the highest share close to 11 per cent, followed by Denmark. Norway has the lowest share, but of the highest GDP. Denmark, Finland and Iceland are at a level between the UK and Germany in 2012.

Current expenditure on health, measured in US dollars, is by far the highest in Norway with more than 5700 dollars, followed by Sweden and Denmark. Denmark is at the level of Germany while Iceland is at the level of UK.

Out-of-pocket expenditure on health care has increased in all countries with the highest levels found in Norway and Sweden in 2012.

## **6. Discussion and conclusion**

White papers and government reports on public health from the various Nordic countries all show that public health has become an important policy issue during the last two decades or more. This

Table 5. Resources in health care in the Nordic countries, UK and Germany, 2002 and 2012.

Units			Denmark	Finland	Iceland	Norway	Sweden	UK	Germany
	Pct. of pop	2002	9,29	6,06	7,65	9,64	8,87	3,75	4,56
	Pct. of pop	2012	8,89	7,56	6,02	10,86	7,54	6,16	6,06
Current expend	US doll/ capita	2002	2750	2100	3078	3398	2575	2060	2870
		2012	4545	3759	3506	5738	4860	3492	4675
	Pct. of GDP	2002	8,7	7,4	9,6	6,1	8,4	6,8	10,1
		2012	10,3	9,3	8,7	6,2	10,9	8,5	10,8
Out-of- pocket	US doll/cap	2002	405	469	572	572	433	236	358
		2012	586	705	629	849	749	340	663

Source: OECD (2017b)

development has undoubtedly been inspired by international tendencies, in particular WHO as witnessed by direct reference in some white papers, but in the Danish case the stagnation in life expectancy during the 1980s and early 1990s as analysed by the Government's Committee on Life Expectancy (Bjerregaard, 1994) has given impetus to improve public health.

As documented by Vallgård (2007, 2010, 2011) there are some differences between the countries with respect to the interpretation of public health problems, and approaches seem to have changed somewhat over time within each country. How this has influenced legislation and actual efforts has yet to be explored. Thus, we can only conclude from the documents that public health with some variation in approaches has been high on the political agenda during the last two decades. While institutes of public health were established during the last century to monitor the health of the populations (except for Iceland, which established an institute in 2003), an increasing

professionalisation of the public health work force has taken place through establishment of public health education programmes during the last two decades.

There are spectacular differences between the countries, in particular that life expectancy in Denmark is between 1.5 and 2 years lower than in the other Nordic countries as well as in the UK and Germany. Recurrent efforts has succeeded in increasing life expectancy since the mid-1990s in steps with the other Nordic countries, but there is still a gap between Denmark and these countries in life expectancy. Reasons for this gap dates back to the 1970s or earlier and will not be dealt with here, but it may be related to increased smoking among women.

Another spectacular development is overweight which has increased in all Nordic countries during the studied decade. Overweight is particularly high in Iceland and may be related to non-medical determinants of health. Among these, consumption of fat and sugar is relatively high in Iceland.

Mean self-assessed health in the Nordic countries as weighted by the TTO weights developed for Sweden by Burström et al. (2012) are relatively close with few statistically significant differences, and higher than in Germany. We use Swedish weights assuming that respondents in other Nordic countries would assign the same weights to the five response categories of self-assessed health. The levels and their statistical variations are within 0.93 and 0.95 on a scale from 0 to 1 in 2012. Substantially, this may be considered a state of affairs with good accomplishments, although some improvements would still be possible.

By comparing percentages reporting good or very good health across the lower and the upper income half, it was indicated that health inequality increased in Germany and Denmark. However, while the change in Germany was Pareto optimal in the sense that the percentage in both income groups increased, although with a faster increase for the upper income group, Denmark was outstanding, as the percentage dropped in the lower income group while it increased in the upper. For the remaining Nordic countries (Finland, Iceland, Norway and Sweden), the percentage rose faster in the lower income group than in the upper, thus indicating a reduction in inequality. For the UK, the changes in

percentage for the upper and lower income group were similar, thus indicating an unchanged inequality.

We found very low concentration indices in all countries, although they are statistically significantly different from zero. These results are not surprising compared to what has been found in earlier international studies, for example van Doorslaer et al. (1997). Furthermore, our results show that income-related inequalities in health in the Nordic countries are similar or lower than in less egalitarian countries like Germany and the UK. The differences across countries as well as tendencies over time in the concentration indices are comparable to those shown for percentages reporting good or very good health across lower and upper income groups.

It has been indicated by former studies (Brekke and Kverndokk, 2011) that the concentration index may be a misleading measure of health inequality, as a reduction in income inequality (in the sense that income is transferred from the poor to the rich) may lead to an increase in the concentration index. However, our results indicate reduced inequality over time in four of five Nordic countries, which conflicts with this suggestion, as the Gini coefficient for income actually dropped over time for all countries in the study. For the case of Denmark and Germany, health inequality rose over time, which may support the suggestion, but the increases are in concert with the above discussed distribution of percentages reporting good or very good health across income groups, where it was shown that the percentage rose faster for those in the upper income group than for those in the lower. Also, the unchanged health inequality for the case of the UK is neither supportive of the suggestion.

We used two approaches to analyse socio-economic differences in health, one comparing health in two different socio-economic groups (low and high), another by computing the concentration index. The first approach is a traditional approach, see for example OECD (2016, p. 72-73) that uses only limited information (average health in two groups), the concentration index approach is based on information about the whole range of socio-economic groups (or individuals ranked by socio-economic status), and their self-reported health status is weighted by a scale that expresses preference weights. Thus, the information contained in this method is more comprehensive. There is

no contradiction between results from these two approaches, as they are related to different questions.

The analysis of non-medical determinants of health, which has often been seen as indicators of health behaviours, shows great variation between the countries. Along with traditional determinants, such as tobacco, alcohol and fat, consumption of sugar is included because it has been shown that excessive intake of sugar leads to risk of overweight. Similar results were found by Asgeirsdottir (2016) who concluded that in spite of the often perceived homogeneity of the Nordic populations, there are interesting differences that need to be further explored. Due to the cross sectional nature of the data the present study does not allow any causal relations between these determinants and health to be concluded. But it can be concluded from the observed differences that more can be accomplished in terms of reducing these risk factors. Still, a greater level of most risk factors was found in the two non-Nordic countries.

Resources in health care vary substantially between the countries. Some of this reflects variation in income. Norway with the highest GDP has the greatest share of the population employed in health care and the highest expenditures measured in US dollars, but the lowest share of GDP. Although OECD uses common definitions, what is included may differ between countries. We found no significant association between use of resources and various measures of health.

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