

# BMJ Open Two tales of cardiovascular risks – middle-aged women living in Sweden and Scotland: a cross-sectional comparative study

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**To cite:** Wennerholm C, Bromley C, Johansson AK, *et al*. Two tales of cardiovascular risks—middle-aged women living in Sweden and Scotland: a cross-sectional comparative study. *BMJ Open* 2017;7:e016527. doi:10.1136/bmjopen-2017-016527

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2017-016527>).

Received 24 February 2017  
Revised 9 June 2017  
Accepted 22 June 2017



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## ABSTRACT

**Objectives** To compare cardiovascular risk factors as well as rates of cardiovascular diseases in middle-aged women from urban areas in Scotland and Sweden.

**Design** Comparative cross-sectional study.

**Setting** Data from the general population in urban areas of Scotland and the general population in two major Swedish cities in southeast Sweden, south of Stockholm.

**Participants** Comparable data of middle-aged women (40–65 years) from the Scottish Health Survey (n=6250) and the Swedish QWIN study (n=741) were merged together into a new dataset (n=6991 participants).

**Main outcome measure** We compared middle-aged women in urban areas in Sweden and Scotland regarding risk factors for cardiovascular disease (CVD), CVD diagnosis, anthropometrics, psychological distress and lifestyle.

**Results** In almost all measurements, there were significant differences between the countries, favouring the Swedish women. Scottish women demonstrated a higher frequency of alcohol consumption, smoking, obesity, low vegetable consumption, a sedentary lifestyle and also more psychological distress. For doctor-diagnosed coronary heart disease, there were also significant differences, with a higher prevalence among the Scottish women.

**Conclusions** This is one of the first studies that clearly shows that Scottish middle-aged women are particularly affected by a worse profile of CVD risks. The profound differences in CVD risk and outcome frequency in the two populations are likely to have arisen from differences in the two groups of women's social, cultural, political and economic environments.

## INTRODUCTION

Despite major reductions in recent decades, cardiovascular disease (CVD) is one of the leading causes of mortality and hospitalisation for both genders in all European countries. The public health burden of CVD events is substantial, and it is a valid reason for implementing prevention programs of first and recurrent events.<sup>1 2</sup> In industrial countries worldwide, low socioeconomic status has been demonstrated to be associated with higher rates of coronary disease. Low level of education was

## Strengths and limitations of this study

- Comparisons of health and health risks in different countries could improve our understanding of how factors in the social environment influence health.
- There is much scope for improving the cardiovascular risks of Scottish middle-aged women, even from targeting traditional risk factors for cardiovascular diseases.
- Many of the questions in the Swedish questionnaire were replicated from the Scottish Health Survey questionnaire, which improves the comparison between data from the two countries.
- Self-reported diagnoses were available in both countries. In addition, the Swedish data included details of doctor diagnoses.
- As the incidence of cardiovascular diagnosis in general is relatively low for middle-aged women, the absolute number of affected women in the Swedish data needs to be considered in the comparisons.

the socioeconomic status marker most consistently associated with increased risk of acute myocardial infarction across 52 countries.<sup>1</sup> About half of the increased risk associated with low education was due to modifiable lifestyle factors. The effect of education was more marked in high-income countries, compared with low-income and middle-income countries and probably reflects different stages in the epidemiological transition.<sup>3 4</sup>

The crucial role of social, economic and cultural factors in determining such a common disease is more evident when evaluating data on women; for them, recent societal evolution has led to impressive increases in labour force participation and changes in their economic role. Furthermore, in the past 20 years, the political and economic profile of Europe has undergone extraordinary changes. When describing the epidemiology of CVD and its risk factors in European women, this profound evolution cannot be neglected.<sup>5</sup>

Mortality from CVD has fallen steadily in Europe since the 1970s, except for Russia, where the mortality rate is now 10–15 times higher than in France, Italy and Sweden. In Hungary, Poland and Scotland, the downward trend is less marked than in other European countries, suggesting the need for greater prevention efforts.<sup>16</sup> In 2012, CVD was the most common cause of death in the UK for women, but not for men, where cancer is now the most common cause of death. Mortality from CVD varies widely throughout the UK, with the highest age-standardised CVD death rates in Scotland and the North of England.<sup>7</sup> In Sweden, the mortality rate from CVD has also decreased substantially in recent decades, in terms of myocardial infarction, other coronary heart disease (CHD) manifestations and stroke. The decline is stronger among men than among women, which has contributed to a convergence between men and women in life expectancy.<sup>8</sup>

Previous studies have compared public health in Sweden and the UK. For example, a study comparing child mortality revealed significant differences between the two countries.<sup>2,9</sup> Sweden has the lowest child mortality rates in Europe.<sup>6</sup> Socioeconomic inequalities in general are more profound in the UK than in Sweden and are therefore likely to be a major contributor to the significantly greater rate of child deaths in the UK.<sup>9</sup> Both Scotland and Sweden, compared in this paper, have a dominant public healthcare system and similar levels of economic and social development and both countries spend about 8% of their gross domestic product (GDP) on healthcare.<sup>6</sup>

In a previous study,<sup>10</sup> we compared the occurrence of CVDs and cardiovascular mortality in two comparable but different social environments. Two twin cities in the south-east of Sweden were compared: one could be labelled a 'blue collar' city and the other a 'white collar' city. This comparison revealed significant differences in frequency for all cardiovascular diagnoses. The occurrence rates were in all aspects higher in the blue-collar twin city for both sexes, demonstrating the relative importance of the social environment for cardiovascular risks.<sup>10</sup> In the present study, we go further, making a comparison between middle-aged women from urban areas in Sweden and Scotland with respect to cardiovascular risk factors and CVD rates, thereby shedding a light on the importance of different social environments for the aetiology of CVD.

The aim of this study was to compare the prevalence of cardiovascular risk factors as well as rates of CVDs among middle-aged women in Scotland and Sweden.

## MATERIAL AND METHODS

### Study design

This was a comparative cross-sectional study between Scotland and Sweden of middle-aged women aged 40–65 years. The variables included in the final Swedish–Scottish merged database were: sociodemographic characteristics, anthropometrics, lifestyle, classic risk factors for CVD and diagnoses for CVD and psychosocial distress (General Health Questionnaire (GHQ) 12 items).

## Study population and data collection

### Sweden

The Swedish data collection was mainly based on a postal survey to middle-aged women (aged 40–65 years). Besides this data collection, some additional data on cardiovascular diagnoses were merged from a Regional Health Care Register, based on healthcare visits and doctors' diagnosis. The study subjects were randomly selected from the urban population attached to eight healthcare centres in two major cities in a region in southeast Sweden, south of Stockholm, covering a population of almost 80 000 inhabitants. The sample size was weighted proportionally to the population size in each of the eight healthcare centres. A total of n=1282 women were invited to participate in the study, and of these n=741 responded, giving a response rate of 58%.

### Scotland

The Scottish data were based on the Scottish Health Survey (SHeS), which was designed to provide data at a national level about the population living in private households in Scotland. Since 2008, the survey has taken place every year, with a core set of questions repeated annually so that multiple waves can be combined to create larger samples—typically in 4-year blocks—for analysis. The dataset used in this study is the combined dataset for 2008–2011, following the User guide for 2011.<sup>11</sup>

The sample for the 2008–2011 survey was drawn from the postcode address file. All private households in the sample were eligible for inclusion in the survey (up to a maximum of three households per address). Data collection involved an interview (with height and weight measurements), and if applicable, adults in the main sample also had a follow-up visit from a specially trained nurse to measure blood pressure and take blood samples for basic chronic disease risk factors such as serum cholesterol fractions. The Swedish sample was derived only from urban areas. For this study, we excluded Scottish women living in the regions of Highlands, Orkney, Shetland and Western Isles, as these are rural and remote areas. In the Scottish sample, 6250 women aged 40–65 years were included, which the analyses presented here are based on.

### Questionnaire

#### *The Swedish Questionnaire*

The Swedish Questionnaire (QWIN) was developed mainly using questions from the Swedish National Health Survey Questionnaire<sup>12</sup> and selected parts from The SHeS Questionnaire.<sup>11</sup> The main topics of the questionnaire focused on psychosocial factors and classical risk factors for CVD, such as educational level, age, residential area, height, weight, waist circumference, general health, psychosocial distress, medication, healthcare contacts, physical activity, eating habits, smoking and alcohol consumption, economic conditions, work and employment, security and social relations. Education levels are defined as follows: low education = elementary school education, medium education = high school education

and high education = college and university education. The General Health Questionnaire (GHQ 12) included in the survey provides a standardised way to summarise the answers in a score, ranging from 0 to 12 points. A higher score indicates a higher degree of psychological distress.<sup>13</sup> Swedish data on CVD were derived from medical records while Scottish data are based on self-reports of doctor-diagnosed diseases.

#### *The Scottish Health Survey Questionnaire*

In the SHeS Questionnaire, each survey in the series consists of a set of core questions and measurements (eg, anthropometric and, if applicable, blood pressure measurements and analysis of blood and saliva samples) plus modules of questions on specific health conditions (self-reported), general health and psychosocial distress (GHQ 12) and risk factors such as physical activity, fruit and vegetable consumption, smoking, drinking, employment status and educational background. As with the earlier surveys in the series, the principal focus of the 2011 survey was CVDs and related risk factors. The main components measured in the SHeS are ischaemic heart disease (IHD) and stroke. In the Scottish survey, people were simply asked if their reported diseases were doctor-diagnosed.<sup>11</sup>

#### *QWIN/SHeS combined dataset*

The two datasets, QWIN and SHeS, were examined for comparable variables and these data were merged into a new dataset entitled QwinSHeS. A group of qualified researchers from each site evaluated the questions and defined the variables eligible for valid comparisons between the two countries. The variables included in the final Swedish–Scottish merged database were: sociodemographic characteristics, anthropometrics, lifestyle, classic risk factors for CVD and diagnoses for CVD, general health and psychosocial distress (GHQ 12). Regarding GHQ 12, it is basically meant to calculate the total outcome score, but here we also present every single item in the score to get an overview over the answers. The variable ‘CHD’ includes the diagnoses angina pectoris, unstable angina pectoris, IHD and myocardial infarction merged together. The variable ‘CVD’ includes the diagnoses heart failure, angina pectoris, unstable angina pectoris, stroke, IHD and myocardial infarction merged together.

#### **Statistical analysis**

To identify differences between the Swedish and Scottish subgroups, social characteristics and anthropometric data were analysed using independent t-test for continuous variables and the Pearson’s  $\chi^2$  test for categorical variables. Prevalence OR estimates were calculated for almost all outcomes. In the analysis we adjusted, by using logistic regression, for age and educational level. Variables with more than two categories were divided according to the following for body mass index (BMI): underweight <18.5, normal weight 18.5–24.9, overweight 25–29.9 were compared with obese 30–50. For self-assessed health,

good and fair were compared with bad, and for education level, high and medium education were compared with low education. Each GHQ variable were dichotomised from four answer options to two for the OR estimate. In the  $\chi^2$  test and crosstabs, variables with more than two possible answers were dichotomised. All data were analysed using SPSS version 23.0. A p value of <0.05 was considered statistically significant.

#### **Ethical consideration**

This study was approved by the Regional Ethics Committee at Linköping University, Sweden, Dnr. 2014/240-32 and Dnr. 2015/240-32. Ethical approval for the Scottish surveys (2008–2011) was granted by the Multi-Centre Research Ethics Committee for Wales (REC reference numbers: 07/MRE09/55 and 08/MRE09/62).

#### **RESULTS**

We compared middle-aged women in urban areas in Sweden and Scotland regarding risk factors for CVD (including lifestyle), a history of CVD diagnosis and psychological distress. The mean age of the participating women was similar between the two countries, as shown in [table 1](#). Swedish women were almost 5 cm taller than the Scottish women (p=0.001). Scottish women were also more low educated than the Swedish women (OR=3.31, 95%CI 1.58 to 4.25). Long-standing illness was more common (OR=1.57, 95% CI 1.35 to 1.84) among Scottish women than in the Swedish women and the same for self-assessed bad general health for the Scottish women (OR=2.47, 95% CI 1.70 to 3.59).

For lifestyle risk factors, there were differences between the Scottish and Swedish women, favouring the Swedish women, as shown in [table 2](#). This was evident for smoking (OR=1.53, 95% CI 1.27 to 1.86), alcohol consumption (OR=4.23, 95% CI 3.59 to 4.97), vegetable consumption (OR=5.37, 95% CI 4.00 to 7.21), fruit consumption (OR=1.53, 95% CI 1.23 to 1.90) and sedentary lifestyle (OR=2.28, 95% CI 1.74 to 3.01).

The total scores of the GHQ were significantly higher (p<0.0001) for Scottish women (mean score=1.77) than the Swedish women (mean score=1.12). As shown in [table 3](#), there were differences between the two countries, favouring the Swedish women in almost all questions in the GHQ, particularly ‘Lost sleep over worry’ (OR=2.01, 95% CI 1.58 to 2.55), ‘Been feeling unhappy and depressed’ (OR=1.93, 95% CI 1.52 to 2.45), ‘Been losing confidence in self’ (OR=2.91, 95% CI 2.15 to 3.96) and ‘Felt constantly under strain’ (OR=1.85, 95% CI 1.49 to 2.30).

Data on specific CVD risk factors are shown in [table 4](#). Concerning risk factors for hypertension as well as CVD, there were twice as many (OR=2.71, 95% CI 2.19 to 3.35) obese Scottish women compared with the Swedish. More women in Scotland than in Sweden reported hypertension (OR=1.81, 95% CI 1.50 to 2.91), for diagnosed hypertension (OR=1.69, 95% CI 1.38 to 2.06).

**Table 1** Background characteristics of the participating middle-aged women from Scotland and Sweden and OR calculations

	Scotland (n=6250)		Sweden (n=741)		p Value	OR	95% CI	OR*	95% CI
<b>Age</b>									
Mean(±SD)	52.2 (7.6)		52.7 (7.7)		0.137				
<b>Height</b>									
Mean(±SD)	161.1 (6.4)		166.03 (6.5)		0.001				
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>					
<b>Self-assessed general health:</b>									
Good	4533	72.5	542	73.4					
Fair	1125	18.0	166	22.5					
Bad	592	9.5	30	4.1		2.47	1.70 to 3.59	1.79	1.22 to 2.64
<b>Long-standing illness:</b>									
Yes	3003	48.0	272	37.0		1.57	1.35 to 1.84	1.44	1.22 to 1.70
No	3247	52.0	463	63.0					
<b>Education:</b>									
Low education	1955	31.4	85	11.6		3.31	1.58 to 4.25	4.13†	3.17 to 5.37
Medium education	2009	32.3	289	39.4					
High education	2265	36.4	360	49.0					

\*OR adjusted for age and education.

†OR adjusted only for age.

Rates of doctor-diagnosed CVD in Scotland and Sweden are shown in [table 5](#). For the variable 'CHD' (including angina pectoris and myocardial infarction), there were differences between the countries, with a higher prevalence for Scotland (OR=4.81, 95% CI 2.47 to 9.36). Angina pectoris alone was also more common for the Scottish women than the Swedish (OR=4.47, 95% CI 1.98 to 10.09). The picture is the same for myocardial

infarction (OR=3.12, 95% CI 1.15 to 8.49). Notice small number for the Swedish women, especially for all CHD diagnoses.

## DISCUSSION

When Charles Dickens published his novel 'A Tale of Two Cities',<sup>14</sup> he described the social stratification in

**Table 2** Description of lifestyle among participating middle-aged women from Scotland and Sweden and OR calculations

	Scotland (n=6250)		Sweden (n=741)		OR	95% CI	OR*	95% CI
	n	%	n	%				
<b>Smoking</b>								
Yes	1694	27.2	143	19.6	1.53	1.27 to 1.86	1.23	1.01 to 1.50
No	4545	72.8	588	80.4				
<b>Drink alcohol</b>								
Often	3325	53.3	248	33.7	4.23	3.59 to 4.97	5.27	4.46 to 6.24
Seldom	2909	46.7	487	66.3				
<b>Physical inactivity</b>								
Sedentary	1044	16.8	59	8.1	2.28	1.74 to 3.01	1.80	1.36 to 2.39
Not sedentary	5182	83.2	670	91.9				
<b>Eating fruit</b>								
Often	4999	80.0	632	86.0	2.28			
Seldom	1248	20.0	103	14.0	2.28	1.74 to 3.01	1.80	1.36 to 2.39
<b>Eating vegetables</b>								
Often	4517	72.3	687	93.3				
Seldom	1730	27.7	49	6.7	5.37	4.00 to 7.21	4.70	3.47 to 6.36

\*OR adjusted for age and education.



**Table 3** Presentation of all single items in the General Health Questionnaire (GHQ 12) for middle-aged women in Scotland and Sweden and OR calculations

	Scotland (n=6250)		Sweden (n=741)		OR	95% CI	OR*	95% CI
	n	%	n	%				
<b>Able to concentrate</b>								
Good	5858	86.0	654	88.7				
Bad	823	14.0	83	11.3	1.28	1.01 to 1.63	1.14	0.89 to 1.46
<b>Able to enjoy day-to-day activities</b>								
As usual	4826	82.0	650	88.4				
Less than usual	1061	18.0	85	11.6	1.68	1.33 to 2.13	1.52	1.20 to 1.94
<b>Lost sleep over worry</b>								
As usual	4698	79.9	653	88.8				
More than usual	1185	20.1	82	11.2	2.01	1.58 to 2.55	1.88	1.47 to 2.39
<b>Been able to face problems</b>								
Same as usual	5232	88.9	667	91.4				
Less able than usual	650	11.1	63	8.6	1.32	1.00 to 1.73	1.15	0.87 to 1.52
<b>Felt playing useful part in things</b>								
Same as usual	5247	89.4	684	92.7				
Less useful than usual	623	10.6	54	7.3	1.50	1.13 to 2.01	1.35	1.00 to 1.81
<b>Been feeling unhappy and depressed</b>								
No more than usual	4726	80.3	653	88.7				
More than usual	1159	19.7	83	11.3	1.93	1.52 to 2.45	1.68	1.32 to 2.13
<b>Felt capable of making decisions</b>								
Same as usual	5363	91.1	692	94.1				
Less so than usual	522	8.9	43	5.9	1.57	1.14 to 2.16	1.40	1.01 to 1.95
<b>Been losing confidence in self</b>								
No more than usual	4929	83.7	689	93.7				
More than usual	959	16.3	46	6.3	2.91	2.15 to 3.96	2.54	1.87 to 3.47
<b>Felt constantly under strain</b>								
No more than usual	4524	76.9	634	86.0				
More than usual	1359	23.1	103	14.0	1.85	1.49 to 2.30	1.76	1.41 to 2.19
<b>Been thinking of self as worthless</b>								
No more than usual	5283	89.8	687	93.3				
More than usual	598	10.2	49	6.7	1.59	1.17 to 2.15	1.31	0.96 to 1.78
<b>Felt could not overcome difficulties</b>								
No more than usual	5147	87.5	667	90.6				
More than usual	736	12.5	69	9.4	1.38	1.07 to 1.79	1.22	0.93 to 1.59
<b>Been feeling reasonably happy</b>								
As usual	5105	86.7	667	90.5				
Less than usual	782	13.3	70	9.5	1.46	1.13 to 1.89	1.31	1.01 to 1.70

\*OR adjusted for age and education.

19th century England. He noted that living conditions for people could be completely different although they were living in two relatively comparable cities. In this study, we have compared the frequency of cardiovascular outcomes and risk factors for Scottish and Swedish middle-aged women living in comparable but nonetheless different social environments. To

summarise, the overall picture of cardiovascular risks for Scottish women is, by almost all measurements, substantially worse than for Swedish women of the same age and education.

There were remarkable lifestyle differences between the Swedish and the Scottish women. Many more middle-aged women in Scotland than in Sweden

**Table 4** Risk factors for CVD among participating middle-aged women from Scotland and Sweden

	Scotland (n=6250)		Sweden (n=741)		OR	95% CI	OR*	95% CI
	n	%	n	%				
<b>BMI</b>								
Underweight BMI<18.5	42	0.8	10	1.4				
Normal weight BMI 18.5–24.9	1619	30.9	373	51.6				
Overweight BMI 25–29.9	1878	35.8	231	32.0				
Obese BMI 30–50	1701	32.5	109	15.1	2.71	2.19 to 3.35	2.59	2.09 to 3.21
<b>High blood pressure (self-reported)</b>								
Yes	1886	30.2	142	19.3	1.81	1.50 to 2.91	1.72	1.42 to 2.10
No	4359	69.8	594	80.7				
<b>High blood pressure (doctor-diagnosed)<sup>†</sup></b>								
Yes	1595	25.5	125	16.9	1.69	1.38 to 2.06	1.61	1.31 to 1.99
No	4655	74.5	616	83.1				

\*OR adjusted for age and education.

<sup>†</sup>Swedish data derive from medical records while Scottish data are based on self-reported doctor-diagnosed hypertension.

BMI, body mass index.

drank alcohol frequently, had a higher frequency of smoking, were obese, reported a low vegetable consumption and generally exposed a more sedentary lifestyle.

There are many possible explanations why Scottish women tend to have a higher alcohol consumption than Swedish women. With the exception of Denmark, there is a Nordic model of alcohol control—most notably in Sweden—characterised by high taxation and restrictions on alcohol sales.<sup>15</sup> This has been linked to lower levels

of consumption, lower levels of liver cirrhosis mortality and other alcohol-related mortality and social problems due to alcohol. In contrast, Scotland (and the UK) has historically had a much more permissive approach to alcohol and a ‘wet’ drinking culture, whereby consumption is integral to everyday life and complete abstinence is atypical.<sup>16</sup> A range of policies has been introduced in recent years in an attempt to reduce alcohol-related harm in Scotland, but the impact of such interventions will take time to manifest in the population.<sup>17</sup> Recent estimates

**Table 5** Doctor-diagnosed CVD among participating middle-aged women in Scotland and Sweden

	Scotland (n=6250)		Sweden (n=741)		OR*	95% CI
	n	%	n	%		
<b>Angina pectoris<sup>†</sup></b>						
Yes	220	3.5	6	0.8	4.47	1.98 to 10.09
No	6030	96.5	735	99.2		
<b>MI<sup>†</sup></b>						
Yes	104	1.7	4	0.5	3.12	1.15 to 8.49
No	6146	98.3	737	99.5		
<b>Stroke/TIA<sup>†</sup></b>						
Yes	124	2.0	10	1.3	1.48	0.77 to 2.83
No	6126	98.0	731	98.7		
<b>CVD (angina, MI stroke)<sup>†</sup></b>						
Yes	265	4.2	23	3.1	1.38	0.90 to 2.13
No	5985	95.8	718	96.9		
<b>CHD (angina, MI)<sup>†</sup></b>						
Yes	349	5.6	9	1.2	4.81	2.47 to 9.36
No	5901	94.4	732	98.8		

\*OR adjusted for age and education.

<sup>†</sup>Swedish data derive from medical records while Scottish data are based on self-reported, doctor-diagnosed diseases.

CVD, cardiovascular disease; MI, myocardial infarction; TIA, transient ischaemic attack.

show increasing sales of alcohol in Scotland in supermarkets and off-licences, where prices have been stable, and a decline in sales in licensed premises, where prices have been increasing.<sup>18</sup> Hence, alcohol control policies are one example of a policy area in which the Nordic experience is of obvious interest.<sup>19</sup>

The difference in obesity rates is also striking. Self-reported BMI data, as collected in the Swedish survey, has a tendency to underestimate obesity prevalence. However, the reported obesity prevalence for Swedish women in this study (15%) matches that recorded for all Swedish adults in 2016.<sup>20</sup> The proportion of women with a diagnosis of high blood pressure was substantially higher for Scottish women. We cannot tell from this data whether they actually have higher rates of high blood pressure or whether Scottish women are simply diagnosed more often by their general practitioner (GP). During the time period covered by this study, GPs in Scotland were financially incentivised to identify cases of hypertension. No such system exists in Sweden, which might partly explain the differences.<sup>21</sup>

Although severe CVDs are quite rare in middle-aged women, we found a fourfold higher prevalence of doctor-diagnosed angina pectoris, myocardial infarction and 'CHD' (both combined) among Scottish women compared with Swedish women. More women in Scotland also reported worse psychosocial health and a lower grade of general health. In sum, although we adjusted for education level attained, the sociodemographic variable usually most strongly associated with social class differences in chronic disease rates, virtually all the measures of CVD risk factors and outcomes in our dataset showed much worse profiles in middle-aged Scottish women than in their Swedish counterparts.

While some might argue that genetic differences may contribute to this striking picture, modern population-genetic studies have revealed that many Scots have significant Nordic origins. Even Scots from other ethnic backgrounds based historically in the UK (over 95% of the current population of Scotland), including its invading peoples over the last few millennia, are not regarded as very genetically different from Swedes—compared with, for example, European ethnic groups with markedly different languages, such as the Basques.<sup>22</sup> In our view, these profound differences in CVD risk and outcome frequency in the two populations are much more likely to have arisen from differences in the social, cultural, political and economic environments in which the two groups of women live. The worse health status and worse health inequalities by social class of Scotland overall (compared with most of Western Europe) are well documented.<sup>23 24</sup>

Studies have shown that large income differences are damaging to health and have negative social consequences. Income inequality is increasing in many western countries, but it is certainly greater in Scotland than in Sweden. It is important to take into account that in order to improve health, long-term work to reduce inequalities is needed.<sup>25</sup> The role of the social, economic and cultural factors is more evident when determining such a frequent disease

as CVD, especially when it comes to women. The societal development has led to increased labour force participation of women and thereby changes in their economic role. This development cannot be overlooked when describing the epidemiology of CVD and its risk factor in European women.<sup>5</sup>

The proportion of women in the labour force is generally higher among Swedish women than the Scottish, which is also evident in this study. Family policy legislation, particularly dual-earner family support, seems to have become of importance for cross-national differences in infant mortality in present-day Organisation for Economic Co-operation and Development countries, while GDP seems to have become less important. These family policies are particularly developed in the Nordic countries.<sup>19</sup>

The Nordic welfare states are distinguished by their emphasis on universal social policies rather than a reliance on targeted, selective and means-tested policies. The Nordic countries have been successful in reducing poverty and fostering equality of opportunity as well as equality of outcomes, with regard to class, income and gender. By providing many citizens with welfare resources through welfare state institutions, universal social policies are also likely to affect public health. In general, command over the resources by which we can control and consciously direct our conditions of life is of vital importance to health. These resources include both the material and the intangible.<sup>19 26</sup> People with lower material and intangible resources tend to lose the motivation to take care of their own health. These factors could contribute to the reasons why we see higher levels of obesity, alcohol consumption and sedentary behaviour in women in Scotland. There are important regulatory differences as well—Sweden has much stricter alcohol control policies (both price and supply), stricter regulation of the food environment and the transport infrastructure gives more opportunities for walking and cycling and less reliance on cars.

Scottish women reported higher levels of psychological distress than Swedish women. This difference is likely to be related to the impact of inequality on the quality of social relationships and the scale of status differentiation in the two societies. Studies have shown that greater income inequality in rich societies is associated with higher levels of mental illness and drug misuse.<sup>27</sup>

This study has some strengths and limitations. One strength is that validated instruments and questions have been used. Many of the questions in the Swedish questionnaire were replicated from the SHeS Questionnaire, which improves the comparison between data from the two countries. Besides self-reports, we also had access to diagnoses set by doctors for the Swedish data, while the Scottish data were based on self-reported diagnoses. This might somehow impair the comparability of the estimates. However, the self-reported Scottish diagnoses are likely to have been underestimates of the true prevalence of conditions, so the difference observed between the two countries is likely to have been under, rather than over, estimated. As the incidence of cardiovascular diagnosis in general is

relatively low for middle-aged women, the absolute number of affected women in the Swedish data must be considered in the comparisons. As with most surveys, there might have been a problem reaching those in the population most seriously affected, such as the unhealthiest and also those with language difficulties. However, this is likely to have been a problem in both countries.

Yet, this is one of the first studies to clearly show that Scottish middle-aged women are—relative to Swedish women—particularly affected by a worse profile of CVD risks, even after adjustment for education. The good news is that virtually all of the cardiovascular risk factors documented here (height excepted, although this can be changed over generations) as being of higher levels in Scottish women are—unlike genes—completely preventable and/or treatable. There is thus much scope for improving the health of Scottish women in this age group. For example, this could be done via better identification and management of traditional ‘Framingham’ risk factors for CVD, via regulatory actions to target the price and supply of alcohol and unhealthy food and via policies designed to address the structural causes of health inequalities.

In conclusion, the most likely reason why we see these different pictures of health in each country seems to have cultural, historical, economic and political origin. In future research, using an anthropological design to investigate how these two cultures, with their specific economy and political environments affect people’s ways of thinking and acting could be interesting.

**Contributors** TF and CW were responsible for the study concept and design. JF and CB were responsible for acquisition of data in Scotland. All authors were responsible for analysis and interpretation of data. CW drafted the manuscript, and TF, JF, CB, AKJ and SN undertook for critical revision of the manuscript for important intellectual content. CW and TF did the statistical analysis. CW has full access to all of the data in the study, takes responsibility for the integrity of the data and accuracy of the data analysis and had the final responsibility to submit for publication.

**Funding** This work was partially funded by the Swedish Heart and Lung Association (E136-15/E106/13) and Clinic ALF funds, Region Östergötland, Sweden (LiO-446241). The Research and PhD studies Committee (FUN), Linköping University, Sweden (LiU-2014-020251).

**Competing interests** None declared.

**Patient consent** Obtained.

**Ethics approval** This study was approved by the Regional Ethics Committee at Linköping University, Sweden, Dnr. 2014/240-32 and Dnr. 2015/240-32. Ethical approval for the Scottish surveys (2008-2011) was granted from the Multi-Centre Research Ethics Committee for Wales (REC reference numbers: 07/MRE09/55 and 08/MRE09/62).

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data sharing statement** Extra data can be accessed via the Dryad data repository at <http://datadryad.org/> with the doi:10.5061/dryad.g7n7g.

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