Cardiovascular disease in Europe — epidemiological update 2015

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This article provides an update for 2015 on the burden of cardiovascular disease (CVD), with a particular focus on coronary heart disease (CHD) and stroke, across the countries of Europe. Cardiovascular disease is still the most common cause of death within Europe, causing almost two times as many deaths as cancer across the continent. Although there is clear evidence, where data are available, that mortality from CHD and stroke has decreased substantially over the last 5–10 years, there are still large inequalities found between European countries, in both current rates of death and the rate at which these decreases have occurred. Similarly, rates of treatment, particularly surgical intervention, differ widely between those countries for which data are available, indicating a range of inequalities between them. This is also the first time in the series that we use the 2013 European Standard Population (ESP) to calculate age-standardized death rates (ASDRs). This new standard results in ASDRs around two times as large as the 1976 ESP for CVD conditions such as CHD but changes little the relative rankings of countries according to ASDR.

Keywords   Cardiovascular disease • Epidemiology • Coronary heart disease • Mortality • Morbidity • Treatment

Introduction

Cardiovascular disease (CVD) is the most common cause of death globally. The 2010 Global Burden of Disease study estimated that CVD caused 15.6 million deaths worldwide, 29.6% of all deaths. This was two times as many deaths as was caused by cancer and was more than all communicable, maternal, neonatal, and nutritional disorders combined.[1] Statistics presented in this journal over the last 2 years[2,3] report that CVD is also the most common cause of death among Europeans and that despite steady decreases in CVD mortality rates across the continent, >4 million Europeans die of CVD every year. This overview updates work published, presenting statistics describing the burden of CVD, in particular coronary heart disease (CHD) and stroke, within Europe. It also presents new data in relation to mortality, morbidity, and treatment for the European countries, and for the first time in the series, we calculate age-standardized mortality rates using the new European Standard Population (ESP).[4]

Methods

In this article, we describe data from a number of data sources. Data sources and data are chosen with consideration of data quality, date of most recent update, and coverage of the European region (with data for as many European countries as possible). To obtain data on CVD throughout Europe, with a particular focus on the two most common forms of CVD, CHD and stroke, international sources were used that collect and report comparable data for a number of countries. These sources are updated relatively frequently through routine and administrative data collections and they allow for an overview of the burden and distribution of CVD in Europe through the mortality, morbidity, and treatment associated with CVD in the continent. As these data sources are often reliant on individual countries to provide the data they collate, in some instances, the data that are centrally available in a consistent and comparable format may not be as up to date as found in some individual countries' databases.

Throughout this article, Europe is defined as the 53 member states of the World Health Organization (WHO) European region. Comparability and quality of the data varies by topic, and there were no 'ideal' data sources that provided complete, up-to-date, high-quality, and representative information for all 53 countries for any topic in this overview. Where possible, data are standardized, using the 2013 ESP. The 2013 ESP was developed by the European Commission for the EU27 + European Free Trade Association countries, as an update to the 1976 ESP, to reflect better the current age structure of the present European population, which, with increasing life expectancies, now includes a larger proportion of older adults.[4] As CVD affects older age groups more than younger age groups, the larger number of older people in the

2013 ESP means that any age-standardized rates calculated for CVD using the new ESP will be greater than if they were calculated using the 1976 ESP.[5] A comparison of recent age-standardized death rates (ASDRs) calculated using both ESPs is presented in this article and demonstrates how the ESP 2013 affects the calculation of rates within Europe. Age-standardized rates can only be calculated where data on the absolute number of an outcome and the population are available in comparable age-specific aggregates.

Mortality data come from the WHO Mortality Database,[6] using the most recent 25 May 2015 update of age- and cause-specific mortality data, and age-specific population data, by country. All analyses, interpretations, and conclusions are those of the authors, not the WHO, which is responsible only for the provision of the original information. The WHO database collates data reported by national authorities based on their civil registration systems and contains data for 52 of 53 European countries, with no data available for Andorra. In order to calculate rates, population data from the same database were applied to these mortality data. Where rates are presented for the 'most recent year', this relates to the most recent data for which both mortality and population data were available. For one country (Monaco), although mortality data were available, population data were not. These could not, therefore, be used in presentation of ASDRs but were included in the calculations for total numbers of deaths and premature deaths in Europe. World Health Organization mortality data are relatively up to date, with data for 39 of the 52 countries available up to 2011, 2012, or 2013, with a total of 34 countries providing updated mortality and population data to allow for more recent ASDRs than in the 2014 article.[3] Mortality rates are presented for CVD and CHD for all ages and for those under the ages of 65 and 75 years separately; deaths before these ages are often described as premature. Life expectancy statistics for newborns and those aged 65 years, presented with mortality data for this first time in this series, come from the European Commission's Eurostat database.[7]

Case fatality rates and hospital discharge data come from the Organisation for Economic Co-operation and Development (OECD) health statistics[8] and the WHO European Region's Health for All Database, respectively.[9] As these morbidity data have not been not updated since our last report, these are included here as Supplementary material online, Tables S1–S5, with descriptions of their findings provided in the text. For the first time, we include OECD data[8] on surgery rates for CHD within Europe.

Mortality

Cardiovascular disease remains the most common cause of death in Europe and is responsible for 45% of all deaths, equating to >4 million deaths per year. Coronary heart disease is the most common single cause of death, resulting in 19% of deaths in men and 20% of deaths in women, much greater than breast cancer in women (2%) and lung cancer in men (6%) (Figure 1). Although the proportion of deaths from CHD is similar between the sexes, a higher proportion of women die from cerebrovascular disease and other CVDs than men, resulting in a higher proportion of deaths from CVD in women overall. Cardiovascular disease accounts for 49% of all deaths among women and 40% of all deaths among men in Europe, considerably greater than the proportion of deaths attributed to cancer for both sexes (women = 19% and men = 26%).

There is substantial variation across Europe, however, with the most recent available data indicating that there are now 13 countries in which cancer is a more common cause of death than CVD in men (Belgium, Denmark, France, Israel, Italy, Luxembourg, the Netherlands, Norway, Portugal, Slovenia, Spain, Switzerland, and the UK). There are also now two countries in which cancer deaths out number CVD deaths among women (Denmark and Israel).

Premature mortality

The proportion of deaths from CVD increases with age, and CVD is a less common cause of death in younger age groups. However, CVD still causes >1.4 million deaths in those aged under 75 years and close to 700 000 deaths for those under 65. In contrast to the greater proportion of deaths from CVD in women overall, similar proportions of women (36%) and men (35%) under the age of 75 years die from CVD, while 30% of deaths in men under the age of 65 years are as a result of CVD compared with 26% for women (Table 1).

Mortality rates across European countries

The most recent available data from the individual countries demonstrate large geographical inequalities in CVD mortality, with eight countries having ASDRs, calculated using the new 2013 ESP, of <250 deaths per 100 000 women (France, Israel, Spain, Denmark, the Netherlands, Norway, Switzerland, and the UK), while six suffer ASDRs of >1000 per 100 000 women (TFYR Macedonia, Ukraine, Republic of Moldova, Kyrgyzstan, Uzbekistan, and Turkmenistan). It should be noted, however, that Uzbekistan and Turkmenistan, the countries with the two highest ASDRs from CVD in women, also have less recent mortality data than most countries, 2005 and 1998, respectively. Similar results are found for men; Israel, France, and Spain all have ASDRs for CVD <300 per 100 000 men, while Ukraine and Turkmenistan suffer CVD ASDRs of >1500 per 100 000 men, although issues of data comparability across years remain.

Similar disparities are found for premature mortality; Switzerland, Norway, San Marino, Luxembourg, the Netherlands, Israel, and France have ASDRs among men under 75 years of age <80 per 100 000 individuals compared with Uzbekistan, Belarus, and Turkmenistan all of which have ASDRs >650 per 100 000 men in that age group. A similar pattern is found among women under 75 years, with France, Switzerland, Spain, Israel, Iceland, and Norway showing CVD ASDRs of <35 per 100 000 women and Tajikistan, Uzbekistan, and Turkmenistan all reporting ASDRs >10 times that rate (see Supplementary material online, Table S1). Similar inequalities can be found in deaths among those under 65 years (see Supplementary material online, Table S2).

Comparing death rates from the same year age standardized using different European Standard Populations

Rates calculated from the same year of mortality data differ markedly depending on which ESP is used to age standardize them, 1976 or 2013. On average, when using the same data, CHD ASDRs for the
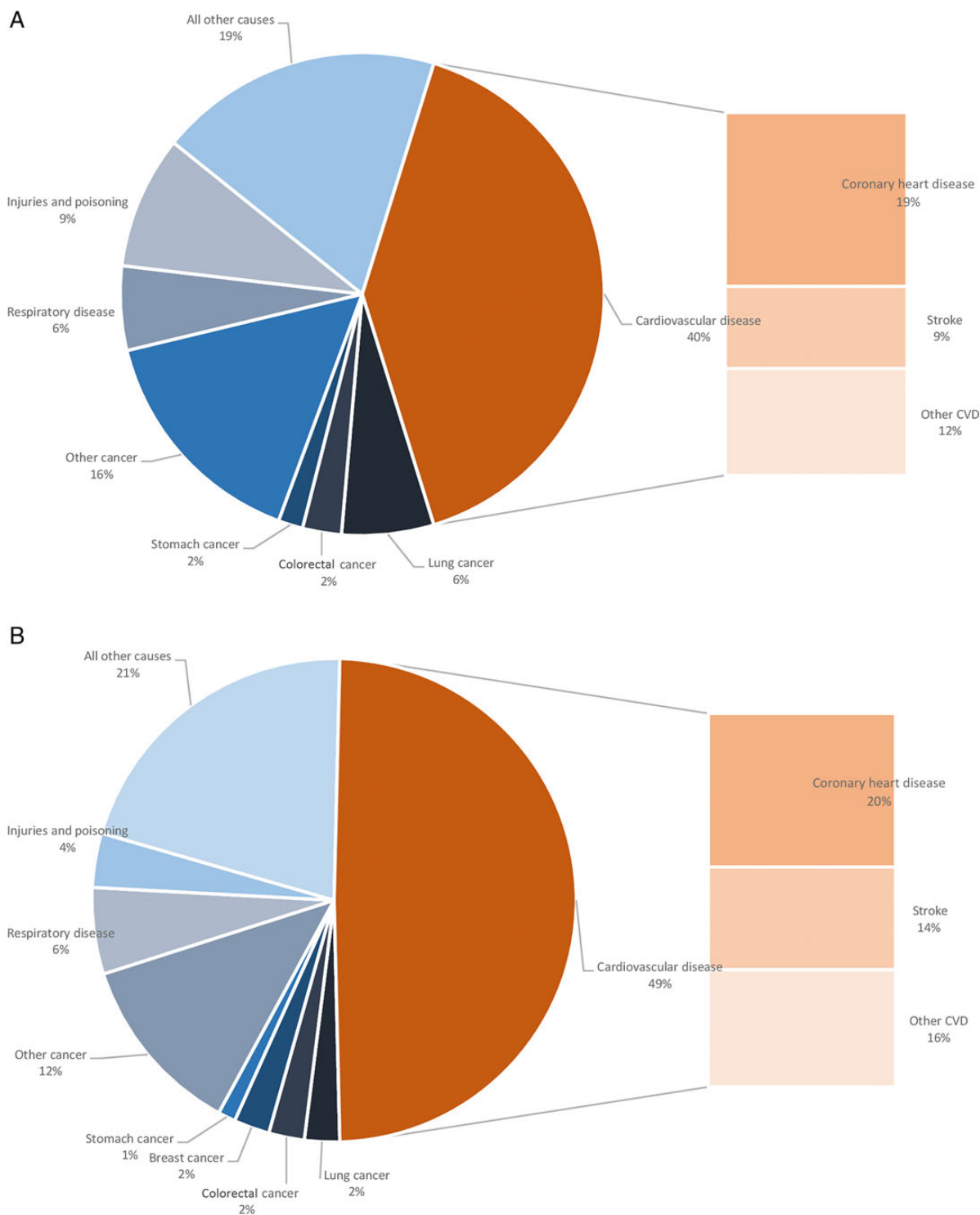
Figure 1 Proportion of all deaths due to major causes in Europe, latest available year, among men (*A*) and women (*B*). No data available for Andorra. Source: WHO Mortality Database.

European countries included in this article, calculated using the 1976 ESP, are around half as large as those calculated using the 2013 ESP among women and are even lower for men, ~45% (*Figure 2*). Additionally, when countries were ranked by CHD mortality rates using

data from the latest available year, there was little change in ranking depending on which ESP was used. Only four countries moved more than two places in the ranking when 1976 ESP ASDRs were converted to 2013 ESP ASDRs for men (Azerbaijan three places lower,

Table 1 Number and percentage of deaths from cardiovascular diseases in Europe—latest available year[a]

	Cardiovascular disease (total)		Coronary heart disease		Cerebrovascular disease		Other cardiovascular diseases	
	n	%	n	%	n	%	n	%
Males								
Total deaths (all ages)	1 832 844	40	877 354	19	415 619	9	539 871	12
Premature deaths—before age 75	901 204	35	467 439	18	190 780	7	242 985	10
Premature deaths—before age 65	490 834	30	253 139	16	92 315	6	145 380	9
Females								
Total deaths (all ages)	2 177 549	49	894 809	20	598 837	14	683 903	15
Premature deaths—before age 75	509 090	36	227 833	16	145 630	10	135 627	10
Premature deaths—before age 65	193 481	26	77 759	10	53 050	7	62 672	8
Total								
Total deaths (all ages)	4 010 393	45	1 772 163	20	1 014 456	11	1 223 774	14
Premature deaths—before age 75	1 410 294	35	695 272	17	336 410	8	378 612	10
Premature deaths—before age 65	684 315	29	330 898	14	145 365	6	208 052	9

[a]No data available for Andorra. Source: WHO Mortality Database.

Switzerland and France both three places higher). Greater change in the rankings was found for CHD in women, with four countries moving more than four places (Kazakhstan nine places lower, Montenegro six places lower, TFYR Macedonia five places lower, and Switzerland five places higher). For both sexes, the top and bottom five countries remained the same for rates calculated using both ESP.

Trends in mortality

Although mortality rates have fallen in most European countries, the magnitude of this fall varies across Europe with some countries actually showing an increase. Discounting Turkmenistan, for which the most recent mortality data came from 1998, one country, Albania, showed increases in ASDRs for both CHD and CVD in both sexes. One other country, Kyrgyzstan, showed increases in ASDRs for CHD in both men and women. The only other countries to show increases in ASDRs over 10 years of the most recent data were Azerbaijan, which experienced increases in ASDRs from CVD in women, but conversely showed some of the largest decreases in ASDRs from CHD in the same sex, and Tajikistan that showed an increase in CVD ASDR in men. Azerbaijan also showed some of the largest decreases for ASDRs from CHD in men, along with Kazakhstan and Georgia, two countries that also showed the largest decreases in ASDRs from CVD and CHD in women and CVD in men (Table 2). Annual ASDRs from CHD in countries from 2002 until the latest year of available data can be found in Supplementary material online, Table S3.

Life expectancy

Eurostat, the statistical office of the European Union, provides recent data for European countries on life expectancy at birth and at the age of 65 years. The most recent data show that in Europe, males have a lower average life expectancy (at birth = 76.2 years, at 65 years = 16.6 years) than females (at birth = 82.1 years, at 65 years = 20.3) with life expectancy for males shorter than for females in all countries for which data are available. Comparing between countries, Russia had the lowest life expectancy for both sexes for newborns (males = 62.8 years and females = 74.7 years) and for males of 65 years (12 years). TFYR of Macedonia had the shortest life expectancy for females at the age of 65 years (16.0 years). It should be noted, however, that Russia was the only country for which 2013 data were not available, with the latest available year for this country from 2009. Switzerland had the highest life expectancy for males (newborns = 80.7 years, 65 years = 19.4 years) and Spain the highest for female newborns (86.1 years). France had the highest life expectancy for females of 65 years (23.6 years). Examining the latest year of CVD mortality data against life expectancy, we find a strong negative correlation between newborn life expectancy and CVD ASDRs for both sexes (males: $r = -0.94$, $P < 0.0001$; females: $r = -0.94$, $P < 0.0001$) and for those aged 65 years (males: $r = -0.96$, $P < 0.0001$; females: $r = -0.97$, $P < 0.0001$) (Table 3).

Case fatality rates

Most countries for which data are available have shown substantial reductions in hospitalized case fatality rates for acute myocardial infarction (AMI), haemorrhagic, and ischaemic stroke over the last 5 years (see Supplementary material online, Table S4). Similar to mortality rates, there are variations in the magnitude of these changes and the overall case fatality rates between countries. Although Latvia and Hungary have the two highest rates for both AMI and haemorrhagic stroke (HS), with Latvia also highest for ischaemic stroke (IS), they have the least up to date data (2009).
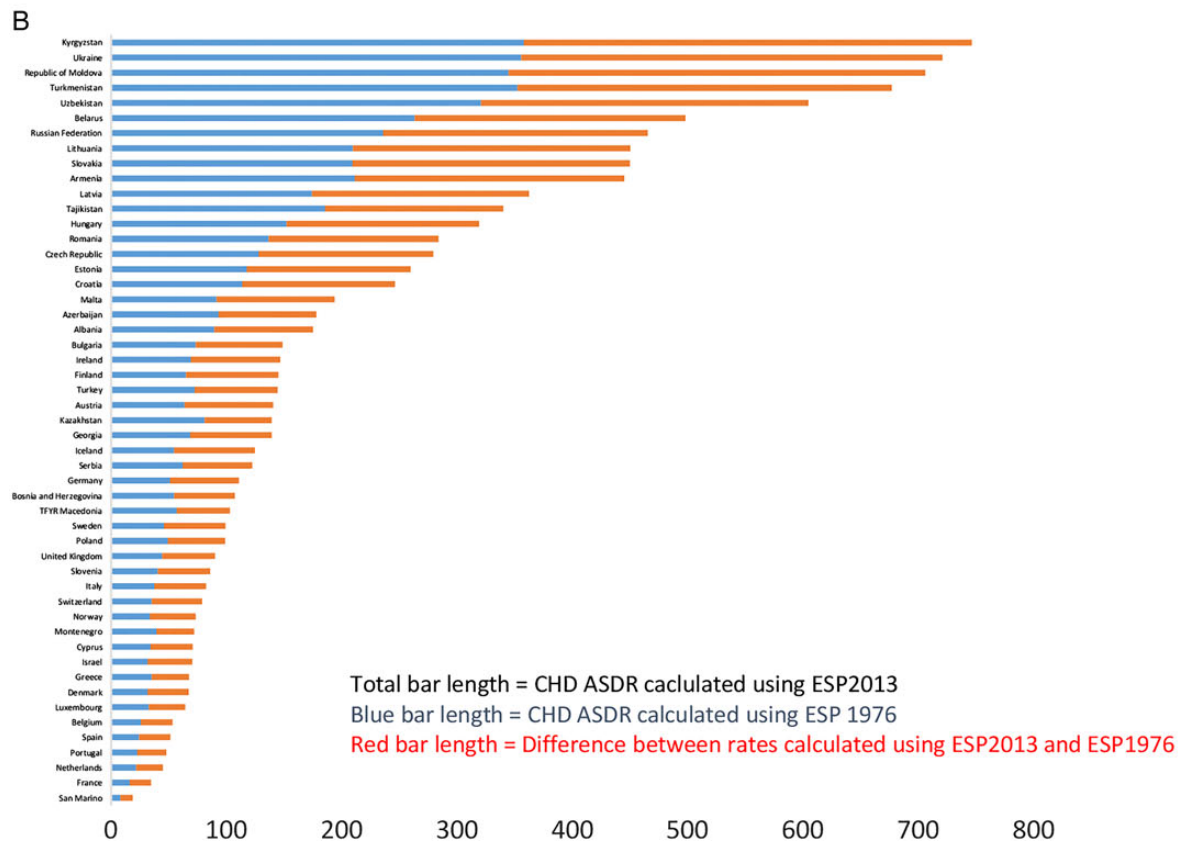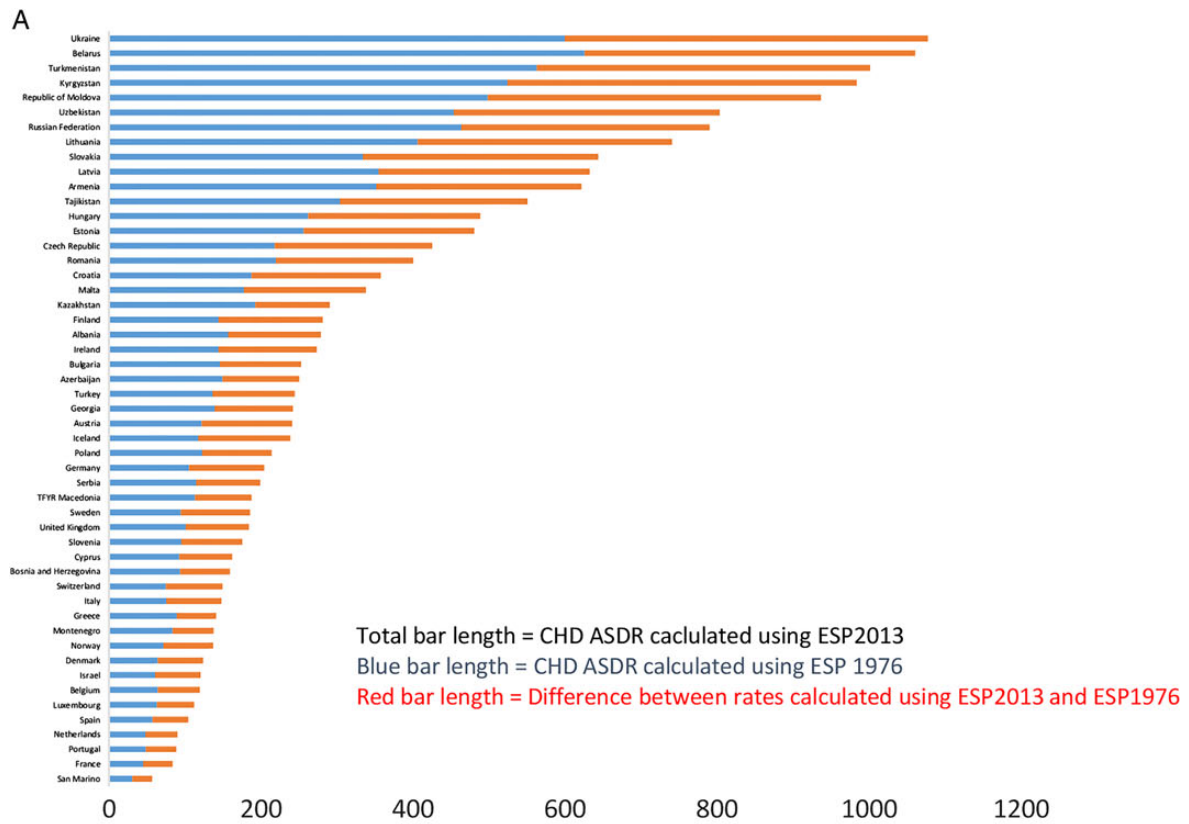
Figure 2 Coronary heart disease mortality data from the latest available year standardized using two different standard populations, ESP 2013 and ESP 1976, by European country, among men (*A*) and women (*B*).

Table 2 Age-standardized death rates from cardiovascular disease and coronary heart disease by country and sex (per 100 000 population); rate for most recent year of data and percentage change in rates over 10 years

Country	Latest year	Males				Females			
		CVD—total		CHD		CVD—total		CHD	
		Age-standardized mortality rate	10-Year change in mortality rate (%)	Age-standardized mortality rate	10-Year change in mortality rate (%)	Age-standardized mortality rate	10-Year change in mortality rate (%)	Age-standardized mortality rate	10-Year change in mortality rate (%)
Albania	2004	950.7	20.5	278.5	85.9	724.5	50.2	175.4	143.5
Armenia	2012	946.5	−30.8	621.6	−30.1	743.9	−33.1	445.3	−33.8
Austria	2013	483.0	−26.2	241.2	−24.4	366.6	−28.6	140.8	−33.3
Azerbaijan	2007	1078.1	−14.6	250.1	−72.5	944.7	6.5	178.1	−69.3
Belarus	2011	1448.0	−9.3	1060.7	−5.2	726.9	−26.8	498.4	−23.6
Belgium	2012	357.1	−34.3	119.6	−42.8	252.9	−34.1	53.6	−49.0
Bosnia and Herzegovina	2011	918.6	NA	159.19	NA	805.2	NA	107.3	NA
Bulgaria	2011	1332.3	−13.6	252.7	−41.2	970.3	−17.6	148.7	−49.3
Croatia	2013	761.4	−34.3	357.6	−6.0	581.2	−35.2	246.4	−20.2
Cyprus	2012	428.8	NA	161.9	NA	343.9	NA	70.9	NA
Czech Republic	2013	747.6	−32.4	425.3	−4.1	538.2	−43.0	279.6	−1.3
Denmark	2012	337.6	−43.9	123.9	−52.6	229.9	−42.3	67.3	−55.1
Estonia	2012	920.3	−30.3	480.6	−42.1	572.4	−35.1	259.8	−48.4
Finland	2013	480.7	−27.7	281.3	−32.9	295.6	−30.4	145.1	−38.8
France	2011	275.2	−34.0	83.6	−37.3	174.1	−35.2	34.7	−44.6
Georgia[a]	2012	746.6	−49.8	241.7	−71.5	499.3	−52.5	139.3	−75.8
Germany	2013	477.2	−29.7	204.1	−35.2	362.1	−29.9	111.2	−41.4
Greece	2012	485.0	−31.3	145.3	−28.3	391.3	−38.6	67.7	−39.0
Hungary	2013	921.3	−21.9	488.3	−11.8	646.3	−22.6	319.2	−12.4
Iceland	2009	441.6	−29.3	238.2	−36.8	297.5	−30.8	125.0	−40.0
Ireland	2009	463.2	−43.7	273.2	−40.4	321.6	−40.5	146.9	−42.2
Israel	2012	266.6	−36.4	120.2	−42.6	201.5	−38.2	70.6	−47.5
Italy	2012	393.8	−27.9	148.0	−23.8	290.0	−25.3	82.7	−22.4
Kazakhstan	2012	779.9	−56.5	290.2	−71.7	437.5	−65.6	139.3	−78.9
Kyrgyzstan	2013	1443.9	−1.3	983.7	13.6	1087.4	−6.3	746.6	15.2
Latvia	2012	1156.8	−18.2	632.3	−15.5	718.6	−21.6	362.7	−13.1
Lithuania	2012	1096.9	−15.3	740.4	−14.4	706.4	−20.3	450.4	−18.4
Luxembourg	2013	332.7	−49.7	109.9	−55.4	254.9	−42.5	64.6	−51.5
Malta	2011	571.5	−9.9	338.0	−9.8	397.4	−23.6	193.9	−24.5
Montenegro	2009	922.3	NA	137.6	NA	829.4	NA	72.2	NA
The Netherlands	2013	332.0	−39.2	90.1	−53.8	233.5	−31.9	45.1	−52.0
Norway	2013	334.7	−38.9	136.8	−49.0	235.1	−35.8	73.4	−48.3
Poland	2013	756.0	−23.9	190.8	−39.0	505.6	−26.5	99.0	−58.2
Portugal	2013	347.0	−40.1	88.6	−39.5	259.7	−42.9	48.0	−46.9
Republic of Moldova	2013	1380.2	−27.7	936.5	−31.8	1071.6	−28.0	706.4	−33.2
Romania	2012	1143.9	−25.2	400.3	−23.9	903.9	−25.8	284.1	−24.5
Russian Federation	2011	1423.1	−19.0	790.3	−10.4	914.0	−23.9	465.6	−9.1
San Marino	2005	516.6	−28.5	56.8	−51.0	322.0	−11.2	18.9	−71.0
Serbia	2013	990.9	−22.0	198.6	−27.8	836.4	−26.0	122.8	−34.3
Slovakia	2010	1048.1	−13.1	643.6	−4.8	758.5	−15.5	450.3	−7.6
Slovenia	2010	532.9	−30.6	175.2	−35.0	390.6	−26.3	86.2	−45.6
Spain	2013	292.4	−33.2	104.0	−35.8	221.5	−33.1	47.3	−41.9
Sweden	2013	414.8	−30.6	185.7	−40.6	292.3	−25.9	99.3	−38.7

Continued

Table 2 Continued

Country	Latest year	Males				Females			
		CVD—total		CHD		CVD—total		CHD	
		Age-standardized mortality rate	10-Year change in mortality rate (%)	Age-standardized mortality rate	10-Year change in mortality rate (%)	Age-standardized mortality rate	10-Year change in mortality rate (%)	Age-standardized mortality rate	10-Year change in mortality rate (%)
Switzerland	2012	348.9	−26.2	149.2	−32.2	249.2	−25.8	78.9	−38.9
Tajikistan	2004	1332.5	4.8	550.3	−9.0	920.0	−12.8	340.4	−25.4
TFYR Macedonia	2010	1228.8	−6.3	187.6	−21.7	1012.5	−8.5	103.1	−21.5
Turkey	2013	582.7	NA	244.1	NA	458.2	NA	144.6	NA
Turkmenistan	1998	1748.3	17.5	1001.4	4.3	1300.0	15.5	677.4	3.2
Ukraine	2012	1544.9	−15.5	1077.4	−12.5	1065.8	−15.7	721.2	−9.8
UK	2011	342.2	−44.4	184.0	−46.9	232.5	−43.6	90.3	−50.0
Uzbekistan	2005	1492.4	−7.9	803.2	−23.0	1225.1	−7.4	604.8	−26.7

Rates not available for Monaco due to missing population data. No mortality data available for Andorra. Age standardized to the 2013 European Standard Population. Source: WHO Mortality Database. CVD, cardiovascular disease; CHD, coronary heart disease; NA, not available.

[a]Change in rates for Georgia is over 11 years due to missing data for the 10 years earlier than the most recent available data.

Turkey, for which 2012 data are available, reports the third highest case fatality rate for AMI and HS and the second highest for IS. Only one year of data are available for Turkey, however, so change in rates in this country cannot be calculated. Denmark showed the lowest rates for AMI and IS with Finland the lowest for HS.

Morbidity

The most comparable data available to track the burden of CVD morbidity across European countries are hospital discharge data, with prevalence and incidence data for CVD largely unavailable from a central source. These data show that the population-based rates of hospitalization for CVDs have increased since the early 2000s with more countries (34) experiencing increases in hospital discharge rates for CVD than decreases (15) (see Supplementary material online, *Table S5*). A similar pattern was found for stroke, with 32 countries showing an increase in hospitalization for cerebrovascular disease compared with 18 with a decrease, while for CHD, almost an equal number of countries showed increases and decreases in hospitalization (24 vs. 26). It should be noted, however, that these rates are not age standardized, so any increase in hospitalization over time could be a result of ageing populations throughout Europe. Variations between countries may indicate some differences in incidence as well as rates at which incident cases result in death before or without hospitalization or may be due to differences in health system organization and efficiency, coding practices, etc. These high rates of hospitalization also highlight the burden of CVD on healthcare systems and can be considered alongside other treatment data presented below.

Treatment

Data from the OECD show increases in the rates of Transluminal Coronary Angioplasties (TCAs) carried out in most European countries for which data are available, since 2005. Only four countries showed a decrease in rates since then (Belgium, Denmark, Israel, and Luxembourg) with a mean rate across all countries of >190 per 100 000 population. In comparison, only two countries (Poland and Slovenia) have shown increases in the rate of coronary artery bypass grafts (CABGs), with all countries showing much lower rates for these than for TCAs (mean = 53 per 100 000). This may reflect a move away from CABGs towards less invasive procedures, such as TCAs, although CABGs may remain as one of the main surgical treatments for certain more complex conditions (*Table 4*). As with hospitalizations, differences between countries in rates of both these procedures may reflect a number of issues including variations in incidence of the condition, diagnosis, and treatment approaches.

Summary and discussion

Mortality statistics show the stark reality of a high burden of CVD across Europe, with >4 million people dying of these diseases each year. It is also the most common cause of death, resulting in 49% of deaths among women and 41% among men. There have been decreases in ASDRs from CVD across the last decade, since our first publication in this series,[2] with small decreases in the

Table 3 Life expectancy at birth and at 65 years of age by country and sex, latest available year

Country	Latest year	Male		Female	
		Life expectancy at birth	Life expectancy at 65 years	Life expectancy at birth	Life expectancy at 65 years
Austria	2013	78.6	18.2	83.8	21.5
Belgium	2013	78.1	17.8	83.2	21.4
Bulgaria	2013	71.3	14.2	78.6	17.9
Croatia	2013	74.5	15.3	81.0	19.1
Cyprus	2013	80.1	18.6	85.0	21.6
Czech Republic	2013	75.2	15.7	81.3	19.3
Denmark	2013	78.3	17.7	82.4	20.4
Estonia	2013	72.8	15.2	81.7	20.3
Finland	2013	78.0	18.0	84.1	21.8
France	2013	79.0	19.3	85.6	23.6
Germany	2013	78.6	18.2	83.2	21.1
Greece	2013	78.7	18.7	84.0	21.6
Hungary	2013	72.2	14.5	79.1	18.4
Iceland	2013	80.5	18.8	83.7	21.2
Ireland	2013	79.0	18.1	83.1	20.8
Italy	2013	80.3	18.9	85.2	22.6
Latvia	2013	69.3	13.9	78.9	18.6
Lithuania	2013	68.5	14.1	79.6	19.2
Luxembourg	2013	79.8	19.1	83.9	21.9
Malta	2013	79.6	18.4	84.0	21.4
Montenegro	2013	74.1	15.0	79.0	17.5
The Netherlands	2013	79.5	18.2	83.2	21.2
Norway	2013	79.8	18.5	83.8	21.4
Poland	2013	73.0	15.5	81.2	19.9
Portugal	2013	77.6	17.8	84.0	21.6
Romania	2013	71.6	14.7	78.7	18.1
Russia	2009	62.8	12.0	74.7	16.5
Serbia	2013	72.6	14.3	77.9	16.9
Slovakia	2013	72.9	14.7	80.1	18.8
Slovenia	2013	77.2	17.2	83.6	21.4
Spain	2013	80.2	19.2	86.1	23.4
Sweden	2013	80.2	18.8	83.8	21.3
Switzerland	2013	80.7	19.4	85.0	22.4
TFYR Macedonia	2013	73.4	14.4	77.5	16.4
Turkey	2013	75.4	16.3	81.1	19.8
UK	2013	79.2	18.6	82.9	20.9

Life expectancy at birth relates to the mean number of years that a newborn child can expect to live if subjected throughout their life to the current mortality conditions (age-specific probabilities of dying). Life expectancy at age 65 is defined as the mean number of years still to be lived by a person at age 65, if subjected throughout the rest of his or her life to the current mortality conditions. Source: European Commission, Eurostat database http://ec.europa.eu/eurostat/data/database.

absolute numbers and proportion of deaths from CVD also found. There remains evidence of wide inequalities across Europe in the burden of CVD mortality, with huge differences in the ASDRs between countries and a small number of countries still experiencing an increase. This is concerning especially in light of growing evidence that decreases in mortality rates may have begun to slow or even reverse in some specific subpopulations.[10,11]

Although death rates for all countries were standardized for between country and across time comparability, it should be noted that this results only in age-standardized rates and does not standardize all aspects of these populations. For example, migration and other features of country structure may vary between countries and across the years of data presented here, but these changes are not accounted for when standardizing using the ESP.

The burden of CVD in Europe is not confined to mortality. With statistics describing increasing levels of hospitalization and surgical intervention, alongside high prescription rates, the treatment of CVD within Europe may have a high economic and social cost.

Table 4 Rates for surgical-based intervention for coronary heart disease latest available year and annual percentage change in rates since 2005, by country, Organisation for Economic Co-operation and Development

Country	Year	Transluminal coronary angioplasty		Coronary artery bypass graft	
		Rate per 100 000	Change since 2005 (%)	Rate per 100 000	Change since 2005 (%)
Austria	2012	238.5	13.2	43.5	−16.8
Belgium	2011	225.3	−6.7	67.9	NA
Czech Republic	2012	212.4	3.5	50.1	−34.1
Denmark	2013	173.7	−16.0	68	−26.4
Estonia	2012	228.0	95.5	32.7	−36.5
Finland	2012	167.6	14.0	47.5	−36.5
France	2012	206.3	14.3	29.6	−2.3
Germany	2012	361.6	29.5	68.4	−14.4
Greece	2009	178.5	NA	–	–
Hungary	2012	234.0	47.7	91	−7.5
Ireland	2012	106.4	0.3	21.6	−23.7
Israel	2012	244.8	−10.9	33.2	−47.6
Italy	2012	202.8	17.0	37.8	−28.8
Luxembourg	2010	183.7	−0.6	46.5	−27.2
The Netherlands	2010	241.1	NA	54.4	NA
Poland	2012	137.0	87.7	54	7.4
Slovenia	2012	185.9	117.9	40.6	18.4
Spain	2012	118.0	28.7	17.7	−2.2
Sweden	2008	196.8	32.2	34.6	−31.5
Switzerland	2008	195.5	10.2	49.4	4.4
Turkey	2012	114.0	NA	67	NA
UK	2012	123.6	25.4	28.8	−23.6

Total rates have been age−sex standardized to the 2010 OECD population (45+). Source: Organization for Economic Co-operation and Development (OECD) Health Statistics. NA, not available.

Although case fatality rates show improved survival for those suffering CVD, perhaps as a result of the changes in treatment described here, without good incidence and prevalence data, the true burden of CVD within Europe is difficult to describe accurately. The collection and collation of quality, comparable, morbidity statistics across Europe would both benefit our understanding of CVD within Europe and allow policy makers to target and focus resources within countries and across Europe.

Some may point to decreases in CVD mortality as an indication of success for both national and Europe wide efforts to tackle CVD. However, the inequality of the current burden between European countries, the high mortality burden from CVD in comparison with other noncommunicable diseases, along with increases in risk factors for CVD, such as obesity,[12] should sound a note of warning to health professionals throughout Europe.

Authors' contributions

N.T. and M.N. performed statistical analysis; N.T., M.N., P.S., and M.R. handled funding and supervision; N.T. and M.N. acquired the data; N.T., M.N., P.S., and M.R. conceived and designed the research; N.T. and M.N. drafted the manuscript; and P.S. and M.R. made critical revision of the manuscript for key intellectual content.

Supplementary material

Supplementary material is available at *European Heart Journal* online.

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