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Trend analysis of cardiovascular disease mortality in the population aged 65 and over in Poland: results from a registry study (2000-2022)

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Abstract

Background

. To assess trends in cardiovascular mortality among people aged 65 years and older in Poland in the period 2000–2022.

Methods

. Mortality rates for women and men were analysed separately in two groups: early old age (65–74 years) and late old age (75+). The analysis of time trends has been carried out with joinpoint models. The Annual Percentage Change (APC) and the Average Annual Percentage Change (AAPC) and standardized death rates (SDRs) were calculated.

Results

. In 2000, cardiovascular diseases (CVD) were responsible for 45.6% of deaths in men in early old age (65–74 years) and for 56.2% of deaths in men in late old age (75 years or older). In the female group, these values were 48.4% and 63.3%, respectively. In 2022, the proportion of deaths due to cardiovascular diseases decreased in all groups respectively to 31.7%, 39.7%, 26.6% and 47.4%. SDRs also decreased: from 2069.8 to 1109.4 per 100,000 among men aged 65–74; from 7928.6 to 4326.7 per 100,000 among men 75+. Among women in early and late olde age rates decreased respectively from 1027.3 to 427.3 and from 6452.0 to 3631.1 per 100,000.

Conclusions.

CVD still represents a significant health risk, particularly in the oldest people.

Background

In all countries of the European Union, the number of people aged 65 and over is rapidly increasing. In 2023, this group made up 21.3% of the general population. It is estimated that by 2100, the value will have been 32.5%, which means that the number of senior citizens will have increased from 94 million to 136 million [1]. The demographic structure of societies determines the epidemiological profile of the population, the structure of health problems and the demand for particular medical services. Cardiovascular diseases are the leading cause of mortality among the elderly in Poland and worldwide. They account for more than 50% of all deaths in this subpopulation [2]. Age is a separate and unavoidable risk factor that reduces the ability of the cardiovascular system to perform at its best. According to the American Heart Association, nearly 70% of men and women aged 60–79 years have some form of cardiovascular disease. In 2019, the incidence of CVD in people aged 60–80 years was

usually 77–80%, and in patients older than 80 years of age, the incidence was above 85% [3]. Among the elderly, the risk of hypertension, ischaemic heart disease, heart failure and stroke increases due to progressive vascular atherosclerosis, decreased vascular wall elasticity and comorbidities such as diabetes or chronic kidney disease [4]. It is estimated that 75% of people over 65 years of age suffer from hypertension, about 40% have ischemic heart disease (IHD), about 15% have heart failure and 10–20% suffer from atrial fibrillation [5, 6].

In 2020, 84.9% of all deaths registered in the EU population occurred in people aged 65 years and older. Just over one-third (34.7%) of all deaths noted in the EU elderly population in 2021 was caused by diseases of the circulatory system. Nearly one in three deaths (i.e. 11.2% of all deaths) was caused by ischaemic heart disease [7]. The mortality rate due to diseases of the circulatory system was higher among men than women, i.e. 670 vs 391 per 100,000 population, respectively [8]. The current demographic situation and projected changes in the age distribution of the population translate into an increasing burden manifesting with mortality and generating socio-economic costs related to CVD. The aim of this study was to assess trends in cardiovascular mortality among people aged 65 years and older in Poland in the period 2000–2022.

Methods

The database containing information on all deaths of Polish residents aged 65 and over in the years 2000–2022, obtained from the Central Statistical Office, was the research material.

The present study involves the assessment of mortality trends due to cardiovascular diseases and distinguishes three major groups of causes in this class: ischemic heart diseases (I20-I25), cerebrovascular diseases (I60-I69) and diseases of arteries, arterioles and capillaries (I70-I79). Considering the fact that various health problems are related to the gender and age of seniors, mortality rates for women and men were analysed separately in two age groups: early old age (65–74 years) and late old age (75 years and over).

Proportional mortality rates were calculated for the first and last year of the analysed period to assess changes in the pattern of deaths. Standardised Death Rates (SDRs) were also calculated. The standardisation procedure was performed using the direct method, according to the European Standard Population updated in 2012 [9]. A time trend analysis of SDRs was performed using Joinpoint models and the Joinpoint Regression programme [10]. The authors calculated annual percentage changes (APCs) of standardised death rates for each segment of broken lines and the average annual percentage changes (AAPCs) for the entire analysed period with the corresponding 95% confidence intervals (CIs). All methods were performed in accordance with the relevant guidelines and regulations. The study was based solely on secondary data obtained from death certificates. No procedures were performed on human participants and no intervention was applied. The study was approved by Bioethics Committee of the Medical University of Lodz, No. RNN/422/12/KB. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Results

In 2000, cardiovascular diseases were responsible for 45.6% of deaths in men in early old age (65–74 years) and for 56.2% of deaths in men in late old age (75 years or older). In the female group, these values were 48.4% and 63.3%, respectively. In 2022, the proportion of deaths due to cardiovascular diseases decreased in both sex and age groups. In the group of men in early old age, deaths due to this class of causes accounted for 31.7% and for late old age the value was 39.7%. In the female group, the percentage of deaths was 26.6 and 47.4, respectively. In the class of cardiovascular diseases, the most common groups of causes of death were, ischaemic heart disease, cerebrovascular diseases and diseases of the arteries, arterioles and capillaries. It should be noted that a decrease in mortality rates was observed for all the three groups of causes in both sex and age groups except for ischaemic heart disease in the male and female late old age groups. SDRs due to diseases of the circulatory system decreased in the period 2000–2022 in all the four analysed gender and age groups (Fig. 1).

The most rapid decline was noted in the early old age group of women. In the year 2000, SDR due to cardiovascular diseases was 1027.3 per 100,000 women and in 2022, it decreased to 427.3 (Table 1). The Average Annual Percentage Change (AAPC) over the entire observed period was − 3.7%. Between 2000 and 2007, the Annual Percentage Change (APC) was − 5.5% and it decreased to -2.9% between 2007 and 2022 (Table 3). The lowest SDR values in the cardiovascular disease class in women aged 65–74 years, and at the same time the most favourable change trends, were observed for mortality due to diseases of arteries, arterioles and capillaries.

Table 1

Standardized death rates (SDR) from the leading causes of death within cardiovascular diseases among women aged 65–74 years and 75 years and older in Poland, 2000–2022

Year	Diseases of the circulatory system (I00-I99)		Ischemic heart diseases (I20-I25)		Cerebrovascular diseases (I60-I69)		Diseases of arteries, arterioles and capillaries (I70-I79)	
	65–74	75+	65–74	75+	65–74	75+	65–74	75+
2000	1027.3	6452.0	333.3	1559.6	300.9	1490.6	118.7	1773.3
2001	960.6	6289.5	308.1	1487.4	286.7	1520.4	106.4	1704.6
2002	885.4	6078.7	278.1	1428.7	266.0	1458.7	103.1	1676.4
2003	851.7	6205.5	264.4	1444.0	253.1	1401.4	107.9	1831.3
2004	803.3	5809.0	247.5	1335.4	229.0	1340.6	105.3	1662.6
2005	757.6	5618.4	228.1	1359.5	219.6	1273.3	97.9	1583.4
2006	725.2	5404.6	219.9	1308.2	204.4	1213.2	90.1	1461.4
2007	694.6	5305.3	208.7	1184.5	187.4	1150.5	90.3	1545.8
2008	661.9	5147.9	194.9	1215.7	178.3	1085.8	83.8	1436.1
2009	651.2	5149.2	175.4	1178.7	172.0	1029.2	85.0	1363.5
2010	624.0	4820.7	167.3	1052.3	164.1	982.0	81.6	1245.6
2011	584.5	4551.4	164.7	1054.5	154.5	965.5	53.9	1018.3
2012	601.2	4592.3	160.7	945.4	147.9	898.0	62.5	1173.0
2013	584.3	4503.7	151.0	826.1	138.1	839.0	66.8	1317.3
2014	541.5	4173.5	129.9	758.1	127.0	768.8	62.6	1257.1
2015	552.0	4356.4	128.4	763.9	114.2	746.5	60.7	1075.2
2016	495.0	3961.6	125.7	754.2	109.5	675.3	57.3	1059.1
2017	473.0	3939.8	134.0	898.3	110.3	696.1	58.0	1074.4
2018	474.7	3852.8	131.9	843.2	105.8	669.7	60.3	1052.8
2018	471.5	3535.7	139.2	866.7	100.8	627.5	53.7	872.8
2020	490.2	3823.5	156.4	1038.3	110.5	704.4	51.2	952.8
2021	490.8	4044.0	183.4	1575.0	105.7	684.3	56.4	722.9
2022	427.3	3631.1	151.8	1407.2	101.3	715.4	36.5	436.5

Table 3
Time trends of standardized death rates (SDR) for the leading causes of death within cardiovascular diseases among women and men aged 65–74 years and 75 years and older in Poland, 2000–2022 – a joinpoint regression analysis

Causes of death	Number of joinpoints	Years	APC (95% CI)	AAPC (95% CI)
	Women aged 65–74			
Diseases of the circulatory system (I00-I99):	1	2000–2007	-5.5* (-6.9; -4.2)	-3.7* (-4.2; -3.2)
		2007–2022	-2.9* (-3.3; -2.4)	
Ischemic heart disease (I20-I25)	1	2000–2016	-5.8* (-6.4; -5.3)	-2.8* (-3.5; -2.1)
		2016–2022	5.7* (3.0; 8.5)	
Cerebrovascular diseases (I60-I69)	1	2000–2016	-6.0* (-6.3; -5.8)	-4.8* (-5.2; -4.4)
		2016–2022	-1.3 (-2.6; 0.1)	
Diseases of arteries, arterioles and capillaries (I70-I79)	0	2000–2022	-4.2* (-4.9; -3.6)	
		2008–2022	6.8* (5.5; 8.1)	
	Women aged 75+			
Diseases of the circulatory system (I00-I99):	0	2000–2022	-2.7* (-2.9; -2.5)	
Ischemic heart disease (I20-I25)	2	2000–2009	-3.2* (-5.4; -0.9)	-0.3 (-2.2; 1.6)
		2009–2016	-6.9* (-10.8; -2.8)	
		2016–2022	12.8* (8.0; 17.8)	
Cerebrovascular diseases (I60-I69)	1	2000–2018	-4.9* (-5.2; -4.6)	-3.7* (-4.2; -3.1)
		2018–2022	2.2 (-0.9; 5.4)	
Diseases of arteries, arterioles and capillaries (I70-I79)	1	2000–2020	-3.3* (-3.9; -2.7)	-6.1* (-8.0; -4.2)

*p < 0.05

Causes of death	Number of joinpoints	Years	APC (95% CI)	AAPC (95% CI)
	Women aged 65–74			
		2020–2022	-30.2* (-44.5; -12.2)	
	Men aged 65–74			
Diseases of the circulatory system (I00-I99):	1	2000–2017	-3.1* (-3.4; -2.8)	-2.4* (-2.9; -2.0)
		2017–2022	-0.1 (-2.1; 1.9)	
Ischemic heart disease (I20-I25)	1	2000–2016	-4.9* (-5.4; -4.5)	-2.3* (-2.9; -1.7)
		2016–2022	5.0* (2.8; 7.2)	
Cerebrovascular diseases (I60-I69)	1	2000–2016	-4.6* (-4.9; -4.3)	-3.4* (-3.7; -3.0)
		2016–2022	-0.1 (-1.4; 1.2)	
Diseases of arteries, arterioles and capillaries (I70-I79)	0	2000–2022	-3.5* (-4.1; -2.9)	
	Men aged 75+			
Diseases of the circulatory system (I00-I99):	0	2000–2022	-2.6* (-2.9; -2.4)	
Ischemic heart disease (I20-I25)	1	2000–2016	-4.3* (-5.1; -3.4)	-0.9* (-2.0; 0.3)
		2016–2022	8.7* (4.6; 13.0)	
Cerebrovascular diseases (I60-I69)	1	2000–2018	-4.7* (-5.0; -4.4)	-3.5* (-4.1; -2.9)
		2018–2022	2.2 (-1.1; 5.6)	
Diseases of arteries, arterioles and capillaries (I70-I79)	1	2000–2020	-3.4* (-4.2; -3.0)	-6.2* (-8.0; -4.3)
		2020–2022	-29.7* (-43.8; -12.0; 8.1)	
*$p < 0.05$				

SDRs due to this group of causes declined between 2000 and 2022 at a constant annual rate of -4.2% ($p < 0.05$) from 118.7 to 36.5 per 100,000 women. A decline in SDR values was also observed for cerebrovascular diseases. After a rapid decline between the years 2000 and 2016, when the rate was −6.0%, it got stable and reached the value of -1.3% ($p > 0.05$) for this group of causes of death. In consequence, SDR decreased from 300.9 in 2000 to 101.3 in 2022. The least favourable changes among women in early old age were observed for ischaemic heart disease. Between 2000 and 2016, SDR decreased from 333.3 to 125.7 (APC=-5.8%, $p < 0.05$); after 2016, it started to increase at a rate of 5.7% ($p < 0.05$), and in 2022 it reached the value of 151.8 per 100,000 women (Table 1, Table 3).

In the group of women aged 75 years and older, SDRs due to cardiovascular disease decreased from 6452.0 per 100,000 women in 2000 to 3631.1 in 2022 (Fig. 1, Table 1). APC was − 2.7% ($p < 0.05$) (Table 2). In this class of mortality causes among women in late old age, the highest SDR values observed by the year 2019 referred to diseases of arteries, arterioles and capillaries.

Table 2
Standardized death rates (SDR) from the leading causes of death within cardiovascular diseases among men aged 65–74 years and 75 years and older in Poland, 2000–2022

Year	Diseases of the circulatory system (I00-I99)		Ischemic heart diseases (I20-I25)		Cerebrovascular diseases (I60-I69)		Diseases of arteries, arterioles and capillaries (I70-I79)	
	65–74	75+	65–74	75+	65–74	75+	65–74	75+
2000	2069.8	7928.6	812.6	2174.9	467.3	1659.4	257.5	2055.1
2001	1973.9	7658.6	758.9	2080.0	459.1	1626.8	235.5	1938.2
2002	1836.1	7337.0	720.9	1990.4	421.4	1563.7	228.3	1896.6
2003	1826.9	7520.8	694.0	2044.5	412.6	1539.4	258.0	2076.5
2004	1734.3	6963.9	650.1	1875.8	391.5	1417.0	251.9	1908.3
2005	1664.9	6667.3	616.4	1849.0	378.4	1343.7	233.3	1800.7
2006	1620.2	6449.4	604.3	1813.4	358.2	1303.9	220.2	1634.8
2007	1584.3	6336.0	585.1	1658.9	341.1	1257.6	217.8	1740.9
2008	1539.9	6210.0	545.4	1707.1	333.3	1183.9	212.0	1605.6
2009	1534.9	6304.6	509.2	1682.3	312.9	1147.6	213.3	1552.7
2010	1456.6	5967.8	500.7	1534.8	299.0	1082.8	187.5	1454.8
2011	1363.3	5648.6	475.8	1551.5	287.1	1038.1	144.9	1210.8
2012	1404.1	5737.3	461.1	1405.5	274.2	997.6	156.6	1376.9
2013	1358.5	5555.0	414.5	1236.3	258.1	903.5	162.5	1543.7
2014	1271.5	5159.0	376.5	1146.7	240.7	829.2	158.8	1440.4
2015	1327.6	5304.0	385.0	1134.2	233.6	808.4	148.0	1198.7
2016	1183.5	4857.5	361.1	1138.4	225.7	759.9	153.6	1174.2
2017	1140.4	4811.6	387.6	1299.8	227.9	799.3	153.2	1173.0
2018	1146.9	4651.9	369.5	1241.8	216.3	759.5	154.0	1134.0
2018	1152.0	4323.8	388.3	1252.0	211.7	696.9	137.7	938.0
2020	1219.0	4814.1	450.5	1525.7	240.3	801.7	136.4	1061.0
2021	1204.2	4908.5	508.1	2067.1	220.0	778.5	143.9	829.2
2022	1109.4	4326.7	459.0	1810.9	223.1	781.8	98.9	486.8

In 2000, the SDR value due to diseases of arteries, arterioles and capillaries was 1773.3 and decreased to 436.5 in 2022 (AAPC=-6.1%). However, a substantial change in the rate of decline that occurred in the year 2020 is worth noting. APC between 2000 and 2020 was − 3.3% ($p < 0.05$), while between 2020 and 2022, it was − 30.2% ($p < 0.05$). As a result of these changes, IHD became a cause of mortality with the highest SDR values in the class of cardiovascular diseases in the late old age female group. For ischaemic heart disease, the rate of decline in the SDR value between 2000 and 2009 was − 3.2% ($p < 0.05$), and between 2009 and 2016, the rate of decline increased to -6.9% ($p < 0.05$). After 2016, SDR began to increase at a rapid rate of 12.8% ($p < 0.05$). In consequence, SDR in 2021 was 1575.0. It was higher than in the year 2000, when it was 1559.6. With regards to cerebrovascular diseases, a decrease in the SDR value was observed between 2000 and 2018 (APC=-4.9%, $p < 0.05$). After 2018, SDR started to increase at a rate of 2.2% ($p > 0.05$). In consequence, SDR values in the years 2000 and 2022 were 1490.6 and 715.4, respectively (Table 1, Table 3).

Among men aged 65–74 years, cardiovascular mortality rates decreased between 2000 and 2017 from 2069.8 to 1140.4 per 100,000 at a rate of -3.1% ($p < 0.05$) (Table 2, Table 3, Fig. 1). Between 2017 and 2022, SDR values got stable (APC=-0.1%, $p > 0.05$). By far, the highest values of mortality rates in this class of causes and an unfavourable increase in SDR values since 2016 were observed for IHD.

Between 2000 and 2016, SDRs decreased from 812.6 to 361.1 per 100,000 men (APC=-4.9%, $p < 0.05$). After 2016, SDRs began to increase at a rate of 5% ($p < 0.05$), reaching a value of 459.0 in 2022.The second highest death rates due to cardiovascular diseases among men in early old age related to cerebrovascular diseases. ischaemic heart disease, decreased SDRs were observed in the period 2000–2016 when the annual rate of decline was − 4.6% ($p < 0.05$). After 2016, SDRs got stable (APC=-0.1, $p > 0.05$). The lowest values of death rates in the cardiovascular disease class among men in early old age and a steady decline at an annual rate of -3.5% were noted for diseases of arteries, arterioles and capillaries. SDRs decreased from 257.5 per 100,000 in 2000 to 98.9 in 2022 (Tables 2, Table 3).

Among men aged 75 years and older, cardiovascular mortality rates were the highest of the four subgroups analysed by gender and age, i.e. 7928.6 in 2000 and 4326.7 in 2022 (APC=-2.6%, $p < 0.05$) (Tables 2, Table 3, Fig. 1). Similarly to the group of women in late old age, the most favourable changes related to mortality due to diseases of arteries, arterioles and capillaries. Between 2000 and 2020, SDRs due to this group of causes decreased at a rate of -3.4% ($p < 0.05$), whereas between 2020 and 2022 the decline rate was − 29.7% ($p < 0.05$). As a result, death rates decreased from 2055.1 in the year 2000 to 486.8 in the year 2022.

SDRs for IHD decreased from 2174.9 in 2000 to 1138.4 in 2016 (APC=-4.3%, $p < 0.05$). From 2016 onwards, they began to increase at a rate of 8.7% ($p < 0.05$), and in 2022, they reached a value of 1810.9 per 100,000 women. Death rates in men aged 75 years or older, who died due to cerebrovascular diseases, decreased from 1659.4 in 2000 to 696.9 in 2019 (APC=-4.7%, $p < 0.05$). The decline was followed by a statistically insignificant increase after 2019 (Table 2, Table 3).

Discussion

Historical data indicate that decreasing trends in mortality due to cardiovascular diseases began in Poland in 1991 and was the strongest in the 1990s. After this time, it slowed down [18]. Despite these favourable declining trends, SDRs due to cardiovascular diseases are around 40% higher than the average value for European men and women [12]. According to estimates by Bandosz et al., based on the IMPACT coronary heart disease (CHD) mortality model, about 54% reduction of CHD deaths can be attributed to favourable changes in risk factors, and about 37% – to advanced treatment methods [13].

The political transformation which occurred in Poland after the year 1989 had a significant impact on lifestyle, including a change in dietary habits of Polish society. Mean cholesterol levels noticeably dropped (by 0.4 mmol/l). Changes in smoking, especially in men, were also observed. Smoking prevalence fell by 15.7%. The mean systolic blood pressure decreased by 2.7 mm Hg in men and by 5.2 mm Hg in women. People more often engaged in leisure time physical activity [13]. However, these relatively favourable patterns were not long-lasting. Results of the National Multicentre Health Survey WOBASZ II (2013–2014) clearly indicate that Poles' dietary habits are negative. People are not really physically active and prevalence of obesity and overweight is still high [14–16]. This fact is reflected in results of the present study in relation to the leading group of mortality causes in the analysed class of cardiovascular diseases. Indeed, the favourable trend got reversed in 2016 and SDRs due to IHD in older people in all particular age groups of both men and women increased.

Studies show that regular physical activity is the cornerstone of preventive and therapeutic interventions in older people [17, 18]. In seniors with ischaemic heart disease, adequate physical exercise effectively slows the progression of the disease and reduces the risk of acute cardiac incidents, commonly referred to as myocardial infarctions, thereby reducing the risk of death [19]. Although the proportion of physically active Poles, aged 60–69 years, who follow recommendations regarding the amount of physical activity required to stay healthy increased from 31.7% in 2014 to 46.3% in 2018, age is the key determinant of these trends [20]. The process of ageing is associated with a gradual reduction in both the time spent on physical activity and the intensity of this activity [21]. Decreased levels of physical activity and functional fitness result from reduced upper and lower limb muscle strength and changed levels of body fat, impaired flexibility, agility and endurance [22]. A 2018 report of the Central Statistical Office clearly confirms that older Poles are less active. On average, 46.4% of the Polish population get engaged in sport and recreation. In the group of seniors, only 25.1% are physically active and only 10.6% get engaged in such activity regularly/frequently [23].

The negative trend in ischaemic heart disease mortality in the elderly population observed in recent years can also be linked to a significant increase in the prevalence of diabetes. The average global trend in diabetes incidence from 1990 to 2019 was upward, with an annual increase of 3.73 cases per 100,000 population. The trends in diabetes observed in Poland are not favorable, either. Results of a study on changes in the pattern of mortality in the Polish population due to diabetes revealed increased SDRs for both types of diabetes in the period 2000–2022 [24]. The risk of death due to ischaemic heart disease

also increases in people with excess body weight. Simultaneously, an increase in the number of overweight and obese people has been observed in Poland for years. According to data of the Global Obesity Observatory, between 2000 and 2020, the proportion of people with excess body weight increased from 40% to 50% [25]. In 2019, the proportion of overweight adults in the EU-27 was 52.7%, whereas in older adults (65 years and older), the proportion exceeded 60% [26]. Research indicates that there is a significant association between IHD mortality and the prevalence of metabolic syndrome (MS) [27]. In Poland, in the decade between the WOBASZ I (2003–2005) and WOBASZ II (2013–2014) representative epidemiological studies, the prevalence of MS in adults aged 20–74 years significantly increased by 3.3% in women (26.6% vs 29.9%; $p < 0.001$) and by 8.8% in men (30.7% vs 39.4%; $p < 0.001$) [28].

In most developed countries, mortality due to cardiovascular disease has been declining over the past few decades [29], which was confirmed in our study. In the USA, mortality rates have been dropping for several decades in both men and women. This trend has been observed in almost all regions of the world, especially in North America, Western Europe, Japan, Australia and New Zealand. In some countries, such as the Netherlands and the UK, the decrease has been significant, i.e. 70% and 60%, respectively. It has been noted that reduced mortality rates are a consequence of reduced major risk factors such as high cholesterol, abnormal blood pressure and smoking, which implies that primary prevention may have considerably changed this trend [30]. In Sweden, the decrease is explained by a change in diet, while in Japan – by a decrease in smoking prevalence. Death rates due to cardiovascular diseases have also significantly declined in Australia, which is most likely contributed by the implementation of increasingly advanced cardiovascular treatments [31]. In the elderly, improvements in hospital care have been the main factor which contributes to a reduction in the number of deaths due to cardiovascular diseases. Advances in diagnosing cardiovascular diseases at an early stage may have contributed to delayed recurrences and thus deaths [32]. At the same time, in the light of apparent global ageing process, the health and financial burden of cardiovascular diseases continues to increase, posing a powerful challenge to the health care system [33]. Most of the total expenditure on cardiovascular diseases, i.e. almost three fourths, is assigned for people aged 65 years or older [34]. The process of ageing is increasingly associated with challenges for the health care system, both in organisational and financial aspects [35, 36]. An increasing demand for specialised care, particularly cardiological care, requires not only adequate funding but also effective medical resource management strategies. It is becoming crucial to adapt hospital infrastructure and the model of care for seniors in order to cope with rising treatment costs and make the healthcare system efficient. Further investment is needed in cardiovascular disease prevention and health education because it may enable to reduce hospital admissions, thereby reducing the number of complications and considerably relieving the burden on the health care system in the long term [37, 38].

Conclusions

Our study is an extensive assessment of the burden of CVD in older adults. Between 2000 and 2022, mortality due to cardiovascular diseases significantly decreased in all analysed age and gender groups,

with the exception of IHD. The greatest reduction was observed among women aged 65–74 years. Despite the positive trends, cardiovascular disease still represents a significant health risk, particularly in the oldest people. This calls for continued preventive action and systemic interventions to monitor risk factors. It is necessary to constantly monitor trends and adopt health strategies which must be adequate and adjusted to changing needs of the senior population.

Declarations

Use of artificial intelligence (AI) tools

AI tools were not used in this study or for writing the paper.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Consent for publication

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Author Contribution

Conceptualization: [Małgorzata Pikala, Monika Burzyńska, Tomasz Kopiec]; Methodology: [Małgorzata Pikala, Monika Burzyńska, Tomasz Kopiec]; Data curation: [Małgorzata Pikala], Formal analysis: [Małgorzata Pikala]; Visualization: [Małgorzata Pikala]; Writing – original draft: [Monika Burzyńska, Małgorzata Pikala]; Writing – review & editing: [Monika Burzyńska], Validation: [Monika Burzyńska]. All authors reviewed the manuscript and approved the final version of the manuscript.

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Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics statement

The study was approved by Bioethics Committee of the Medical University of Lodz, No. RNN/422/12/KB.

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Figures

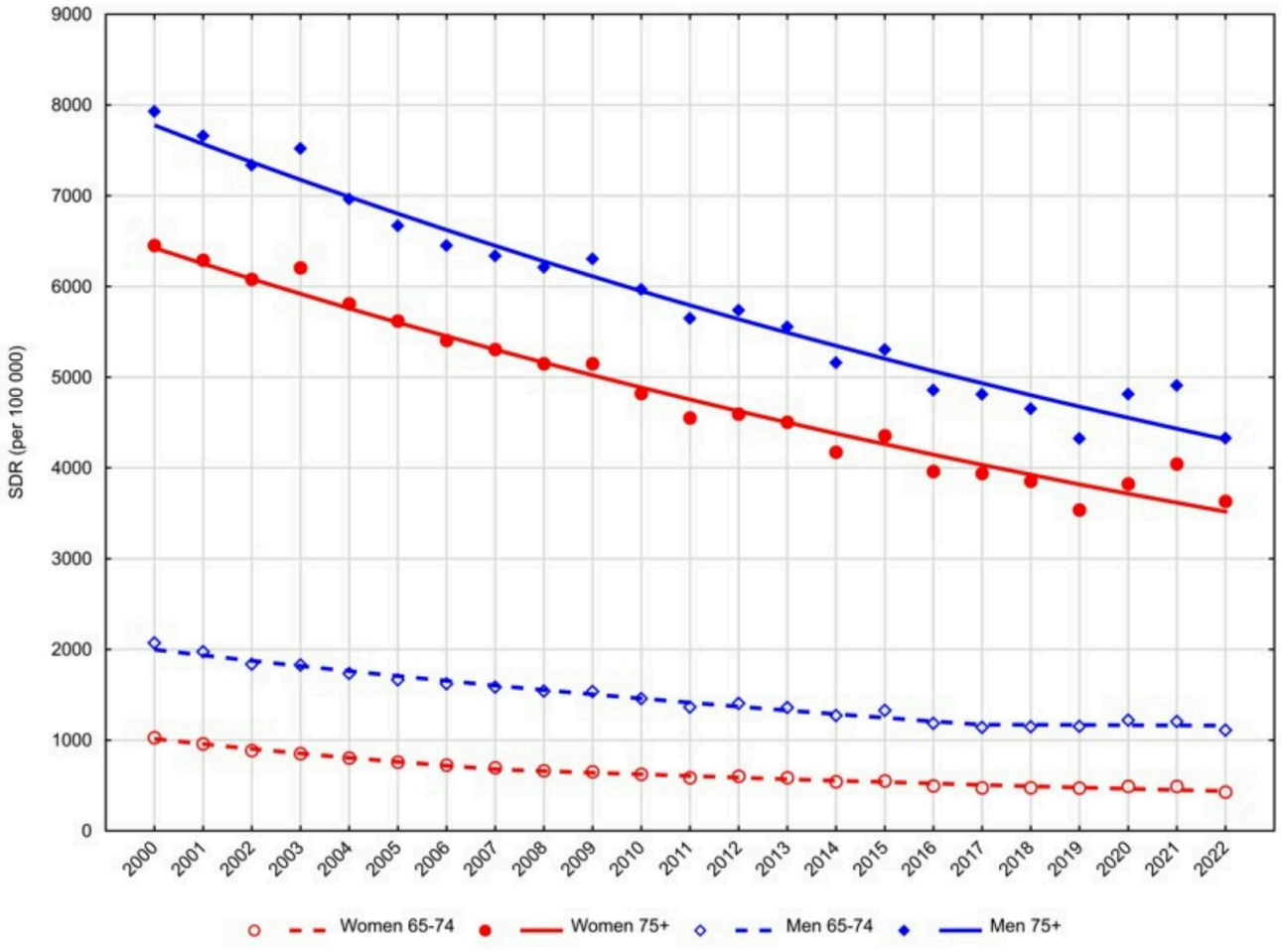


Figure 1

Standardized death rates (SDR) for the cardiovascular diseases among women and men aged 65–74 years and 75 years and older in Poland, 2000–2022