Kardiologia Polska 2015; 73, 3: 207–215; DOI: 10.5603/KP.2015.0040 ISSN 0022–9032

ARTYKUŁ ORYGINALNY / *ORIGINAL ARTICLE*

Regional variation in mortality from ischaemic heart disease in Poland, 2006–2010

Magdalena M. Muszyńska[1], Urszula Sulkowska[2], Witold A. Zatoński[2]

[1]Insitute of Statistics and Demography, Warsaw School of Economics, Warsaw, Poland

[2]Cancer Epidemiology and Prevention Division, M. Skłodowska-Curie Memorial Cancer Centre and Institute of Oncology, Warsaw, Poland

Abstract

Background: Spatial differences in mortality in Poland are large and remain unexplained to a large extent. Ischaemic heart disease (IHD) is a good candidate for explaining regional inequalities in mortality in Poland due to the high level of mortality from this cause and the large spatial differences.

Aim: We describe the contribution of IHD to all-cause mortality in Poland in 2006–2010 on a powiat (Polish district) level and explain the differences in mortality by selected socio-economic factors.

Methods: We use mortality data from the population registry at the NUTS-4 level for 2006–2010. We map age-standardised all-cause and IHD mortality rates. The contribution of IHD mortality to all-cause mortality was also assessed through variance decomposition. Correlation coefficients between age-standardised mortality rates and selected socio-economic variables were estimated for all powiats and for a group excluding large cities.

Results: We demonstrated that regional differences between powiats in IHD mortality do not constitute a major factor behind regional mortality disparities in Poland. However, the spatial patterns for all-cause and IHD mortality in Polish powiats were both related to the level of urbanisation, with group of powiats characterised by the lowest IHD mortality comprising only large cities. The negative effect of large cities on the level of all-cause and IHD mortality was confirmed by the significant correlation between the socio-economic contextual variables, standing for the level of urbanisation, and IHD mortality.

Conclusions: Ease of access to medical care in large cities and in particular to cardiology units is an important factor behind the levels of all-cause and IHD mortality in Poland.

Key words: ischaemic heart disease, Poland, spatial differences in mortality, urban mortality advantage

Kardiol Pol 2015; 73, 3: 207–215

INTRODUCTION

In 2010 the gap between the highest and lowest life expectancy in Polish NUTS-2 regions (Polish voivodeships) was 2.5 and 3.6 years for women and men, respectively [1]. Despite these large spatial differences, to our knowledge there have been only three studies aiming to explain regional variation in mortality in Poland [1–3]. Ischaemic heart disease (IHD) mortality is a good candidate for explaining territorial variation in mortality in Poland: IHD is now the leading cause of death worldwide [4] and is responsible for a variation in mortality level between countries [5] and within countries (e.g. [6–8]). Large spatial differences in IHD mortality in Poland at NUTS-2 level units were reported by Wojtyniak et al. [1].

The aetiology of IHD is complex, with morbidity and mortality from this cause dependent on a set of "classical" risk factors and medical treatment. An example of a successful analytic tool for estimating the effect of medical treatments and changes in each of the classical risk factors on development of IHD mortality is the IMPACT model. The IMPACT model has been validated for explaining developments in IHD mortality in the majority of developed countries (e.g. [9–12]) and has recently been applied to explain changes in IHD mortality in Poland by Bandosz et al. [13]. The classic risk factors responsible for the level and changes in mortality from IHD are: smoking, high cholesterol, high systolic blood pressure, obesity, diabetes, and physical inactivity [14, 15].

Address for correspondence:
Magdalena Maria Muszyńska, PhD, Institute of Statistics and Demography, Warsaw School of Economics, ul. Madalińskiego 6/8, 02–513 Warszawa, Poland, e-mail: mmuszyns@sgh.waw.pl

Received: 28.08.2014 **Accepted:** 04.02.2015

Four out of the six classical risk factors are related to dietary habits [13, 16]. According to Zatoński [17], Zatoński et al. [18], Zatoński and Willett [19], and Zatoński and Bhala [20], it was the shift in the composition of calorie intake that was the driving factor behind the rapid decrease in IHD mortality in Poland, which started at the beginning of the 1990s. According to the results of the Polish IMPACT model estimated for the years 1991–2005 (ages 25–74 years) by Bandosz et al. [13], 54% of the fall in IHD mortality in Poland resulted from changes in the risk factors, mainly reductions in total cholesterol concentration and an increase in physical activity.

Next to these risk factors, an important determinant of IHD mortality is access to and timely use of modern medical care, and of emergency care services in particular (e.g. [10, 11, 21, 22]). According to the results of the Polish IMPACT model, about 37% of the decrease in IHD mortality between 1991 and 2005 may be attributed to the application of modern medical treatment and the dynamic development of clinical cardiology in Poland [13].

The aim of our paper is to describe the spatial variation in mortality attributable to IHD at a relatively low level of administrative division of Poland (NUTS-4 regions or powiats [Polish district]) and its contribution to differences between powiats in all-cause mortality in 2006–2010. We investigate spatial differences in mortality from all causes and IHD in relation to a set of explanatory variables linked to the classical risk factors for IHD and proxies for ease of access to medical care.

METHODS

Death counts by sex, age, and place of residence at the NUTS-4 level (379 powiats) by cause of death for the years 2006–2010, as well as corresponding mid-year population counts, were obtained from the Polish Central Statistical Office, and the data was drawn from the population registry. IHD deaths were estimated using an algorithm proposed by Jasiński et al. [23] and applied by Bandosz et al. [13]. The algorithm assumes high reliability of official data on cardiovascular disease (CVD) mortality, and IHD deaths are derived from data on CVD deaths with the assumption of a constant contribution of deaths due to IHD in overall CVD mortality.

As a result, we assumed that the proportion of IHD in CVD by sex in five-year age groups in each powiat is equal to the proportion in Poland in 2006–2010. Altogether in Poland the share of IHD in CVD deaths for all age groups was 32% for males and 24% for females, and in the powiats it varied from 30% to 34% for males and 24% to 25% for females.

In order to compare the values of the statistics over time and between the Polish regions, we directly standardised crude rates, using the mid-year Polish population in 2000 as a standard population. The Polish population was also derived from data provided by the Polish Central Statistical Office.

In the first part of the study, the importance of IHD to differences in all-cause mortality between Polish NUTS-4 regions in 2006–2010 was assessed. We decomposed the total variance of age-standardised all-cause mortality rates in the regions into the variance of age-standardised IHD rates, the variance in age-standardised rates for the remaining causes of death, and two times the covariance between them.

Spatial patterns of all-cause, IHD and non-IHD age-standardised rates by sex were presented on maps. For each map, the data was classified into five quantiles of 20% of the distribution. Next, we divided the powiats according to deciles of the distributions in 2006–2010, for all-cause and IHD mortality rates separately. We compared the share of large cities in each of the sub-groups of powiats and the mean values of the rates in the subgroups. One-way ANOVA was performed to test whether the differences in the mean values of age-standardised all-cause and IHD rates between the subgroups were significant.

Finally, we made an attempt to explain spatial differences in mortality from all causes and IHD in 2006–2010 by the following explanatory variables: medical doctors (per 10,000 population, 2006–2010), employed in agriculture (as the percentage of the total working population, 2006–2010), employed in services (as the percentage of the total working population, 2006–2010), number of hospital beds (per 10,000 population, 2006–2008), population active on the labour market (as the percentage of the population aged 18+ years, 2011), unemployment rate (2011), mean income per person (2006–2010), urban population (as the percentage of the total population, 2011), and population with higher educational attainment (as the percentage of the total population, 2011). All data are from the regional database of the Polish Central Statistical Office and were downloaded from: www.stat.gov.pl. We estimated correlation coefficients between the above list of explanatory variables and, separately, age-standardised all-cause and IHD mortality rates in powiats. The significance of the correlation coefficients was statistically tested. Correlation between the variables was assessed for the full sample of 379 powiats in 2006–2010, as well as for a subgroup that excluded 65 powiats with a wholly urban population. We compared pairwise correlation coefficients estimated for the full sample of powiats and the group of 314 powiats (subgroup excluding large cities) and statistically tested whether the relationship between socio-economic variables and mortality was different after large cities were excluded from the study group.

RESULTS

In 2006–2010, IHD deaths constituted 13% of all deaths in Poland among both men and women. In powiats this number varied between 9% and 17% of deaths for men and 9% and 16% for women (not shown in tables). The mean value of age-standardised all-cause mortality rates in the Polish powiats was 74 per 10,000 population for women and 95 per 10,000 population for men. At the same time, the mean

value of age-standardised IHD mortality rates equalled 13 for women and 17 for men per 10,000 population, that is 18% of the mean value of age-standardised all-cause mortality rates for both sexes (Table 1). A positive relationship existed between the level of all-cause and IHD mortality in powiats, the correlation coefficients between age-standardised all-cause mortality rates and age-standardised IHD mortality rates being significant ($p < 0.0001$) and positive (0.69 for women and 0.72 for men, values not shown in tables). The differences between powiats in IHD mortality were greater than in all-cause mortality (compare values of CV in Table 1). Altogether, variance in age-standardised mortality rates due to IHD was only 6% of the total variance in age-standardised mortality rates between powiats for males and less than 8% for females (Table 2).

In 2006–2010, the majority of powiats with the lowest all-cause and IHD mortality were large cities with a wholly urban population. This pattern is visible on the maps for both sexes, where large cities with low all-cause and IHD mortality are displayed as light-coloured spots located between powiats with higher rates. Similarly, when the powiats were divided into 10% quantiles according to the distribution of all-cause rates, 70% of the powiats with the lowest mortality (lowest 10% of the distribution) were large Polish cities (Table 3). The same result was obtained for the distribution of IHD mortality. In the remaining deciles of the distributions, the share of large cities varied from 0% to 26%. Mortality of the lowest deciles of the distribution stood well apart from the second-lowest

Table 1. Mean values (per 10,000 population) and coefficients of variation (CV) (in per cent) of age-standardised all-cause and ischaemic heart disease (IHD) mortality rates for Polish powiats (Polish district), by sex, 2006–2010

	Women		Men	
	Mean	CV	Mean	CV
All-cause rates	74	8	95	10
IHD rates	13	14	17	14
Non-IHD rates	61	8	78	11

Source: Authors' estimations, data from the Central Statistical Office

Table 2. Variance in age-standardised mortality rates and decomposition according to age-standardised ischaemic heart disease (IHD) and non-IHD mortality rates (per 1,000,000 population) for Polish powiats (Polish district) by sex, 2006–2010

Statistic	Women	Men
Total variance: variance in all-cause mortality	0.38	0.95
Variance in IHD mortality	0.03	0.06
Variance in non-IHD mortality	0.26	0.67
Covariance between IHD and non-IHD mortality	0.09	0.22
Variance in IHD mortality as percentage of the total variance	7.8	6.0

Source: Authors' estimations, data from the Central Statistical Office

Table 3. Percentage of powiats (Polish district) with a wholly urban population and mean age-standardised all-cause and ischaemic heart disease (IHD) mortality in Polish powiats (per 10,000 population) in groups of powiats by quantiles of the distribution of all-cause and IHD mortality in 2006–2010. One-way ANOVA for mean mortality rates in the subgroups of powiats

	All-cause		IHD	
	Percentage of powiats with wholly urban population	Mean rate	Percentage of powiats with wholly urban population	Mean rate
Quantile:				
1	70.3	77.2	70.3	11.3
2	23.7	83.6	26.3	12.9
3	23.7	87.7	13.2	13.6
4	18.4	91.9	21.1	14.2
5	5.3	94.5	13.2	14.7
6	2.7	97.0	0.0	15.2
7	13.2	99.1	7.9	15.7
8	2.6	101.3	2.6	16.3
9	0.0	103.9	5.3	17.1
10	10.5	109.3	10.5	18.2
One-way ANOVA:				
F-statistic	–	5686	–	5976
Significant	–	0.000	–	0.000

Source: Authors' estimations, data from the Central Statistical Office

Table 4. Correlation coefficients between age-standardised ischaemic heart disease mortality rates and contextual variables in Polish powiats (Polish district). All powiats and group of 314 powiats excluding large cities, 2006–2010. Significance level for decrease in correlation coefficients when large cities are excluded from study group

Explanatory variable	All-cause						Ischaemic heart disease					
	All		No large cities		Decrease in		All		No large cities		Decrease in	
	Coefficients	Significant	Coefficients	Significant	Coefficients	Significant	Coefficients	Significant	Coefficients	Significant	Coefficients	Significant
Medical doctors	–0.31	***	–0.31	***			–0.28	***	–0.13	*	*	
Population active on the labour market	–0.24	***	–0.30	***			–0.18	***	–0.19	***		
Employed in agriculture	0.46	***	0.32	***	*		0.30	***	0.09		***	
Employed in services	–0.50	***	–0.23	***	***		–0.41	***	–0.08		***	
Number of hospital beds	–0.33	***	–0.01		***		–0.29	***	0.01		***	
Mean income per person	–0.34	***	–0.20	**	*		–0.32	***	–0.16	**	***	
Unemployment rate	0.25	***	0.27	***			0.16	**	0.16	**		
Urban population	–0.39	***	–0.05		***		–0.35	***	–0.01		***	
Population with higher education	–0.60	***	–0.33	***	***		–0.52	***	–0.22	***	***	

***p < 0.001,**p < 0.01,*p < 0.1; Source: Authors' estimations, data from the Central Statistical Office

decile: the largest gaps in the mean level of age-standardised all-cause and IHD mortality rates was between the lowest two deciles of the distribution. This gap was 6.4 (the difference between 77.2 and 83.6) per 10,000 population for all-cause mortality and 1.6 (the difference between 11.3 and 12.9) for IHD rates. Differences in the mean values of age-standardised all-cause rates in the subgroups, as assessed through analysis of variance, were significant ($p < 0.0001$), as were differences in the mean values of age-standardised IHD rates in the subgroups ($p < 0.0001$) (Figs. 1, 2).

In Table 4, we present coefficients of correlation between age-standardised all-cause mortality rates and selected socio-economic factors in Polish powiats in 2006–2010, as well as coefficients of correlation between IHD mortality rates and these factors. For each of the distributions, we separately present the results for all 379 Polish powiats and for the group of 314 powiats excluding large cities.

A significant negative correlation coefficient existed between age-standardised mortality rates, both all-cause and IHD, and the following variables that approximate the labour market situation and structure of employment in Polish powiats: employment in services, share of population active on the labour market, and unemployment rate. At the same time, the opposite was true for the relationship between age-standardised IHD mortality rates and the level of employment in agriculture, as well as the relationship between IHD mortality and unemployment rates in powiats: the correlation coefficients were positive and significant. In addition, powiats with a higher mean income per person, higher share of urban population, and higher share of population with higher educational attainment also had a lower level of IHD mortality. Differences in access to medical services in powiats, as represented by the following variables: number of medical doctors and number of hospital beds per 10,000 population, had a significant effect on the level of both all-cause and IHD mortality, as indicated by the significant and negative correlation between each of the two contextual variables and age-standardised mortality rates in Polish powiats. Altogether, the contextual socio-economic variables employed in this study replicate the majority of information included in the variable standing for the level of urbanisation of powiats, i.e. reflected in significant correlation coefficients between the variables and the share of urban population in powiats ($p < 0.001$, not shown in tables).

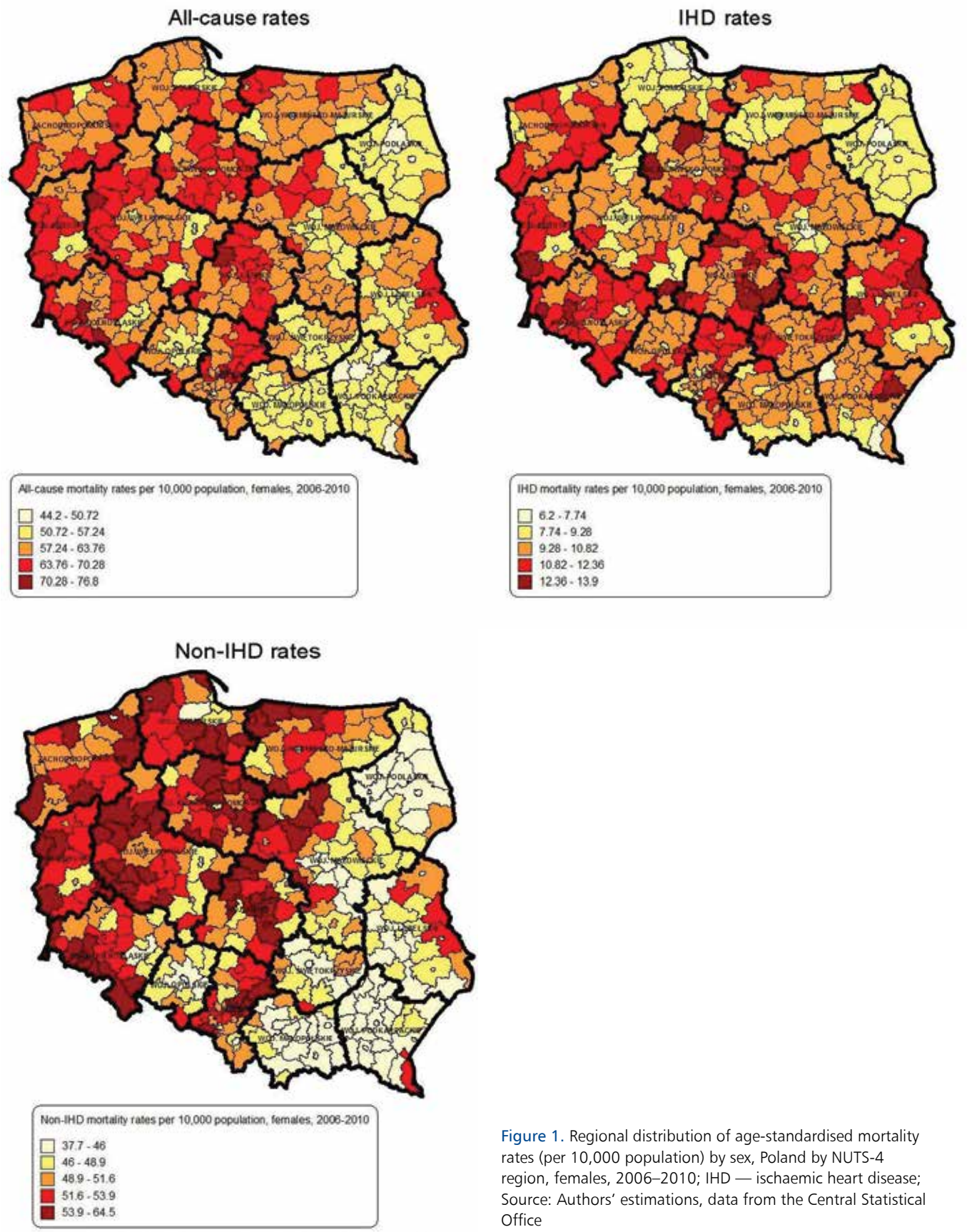

Figure 1. Regional distribution of age-standardised mortality rates (per 10,000 population) by sex, Poland by NUTS-4 region, females, 2006–2010; IHD — ischaemic heart disease; Source: Authors' estimations, data from the Central Statistical Office

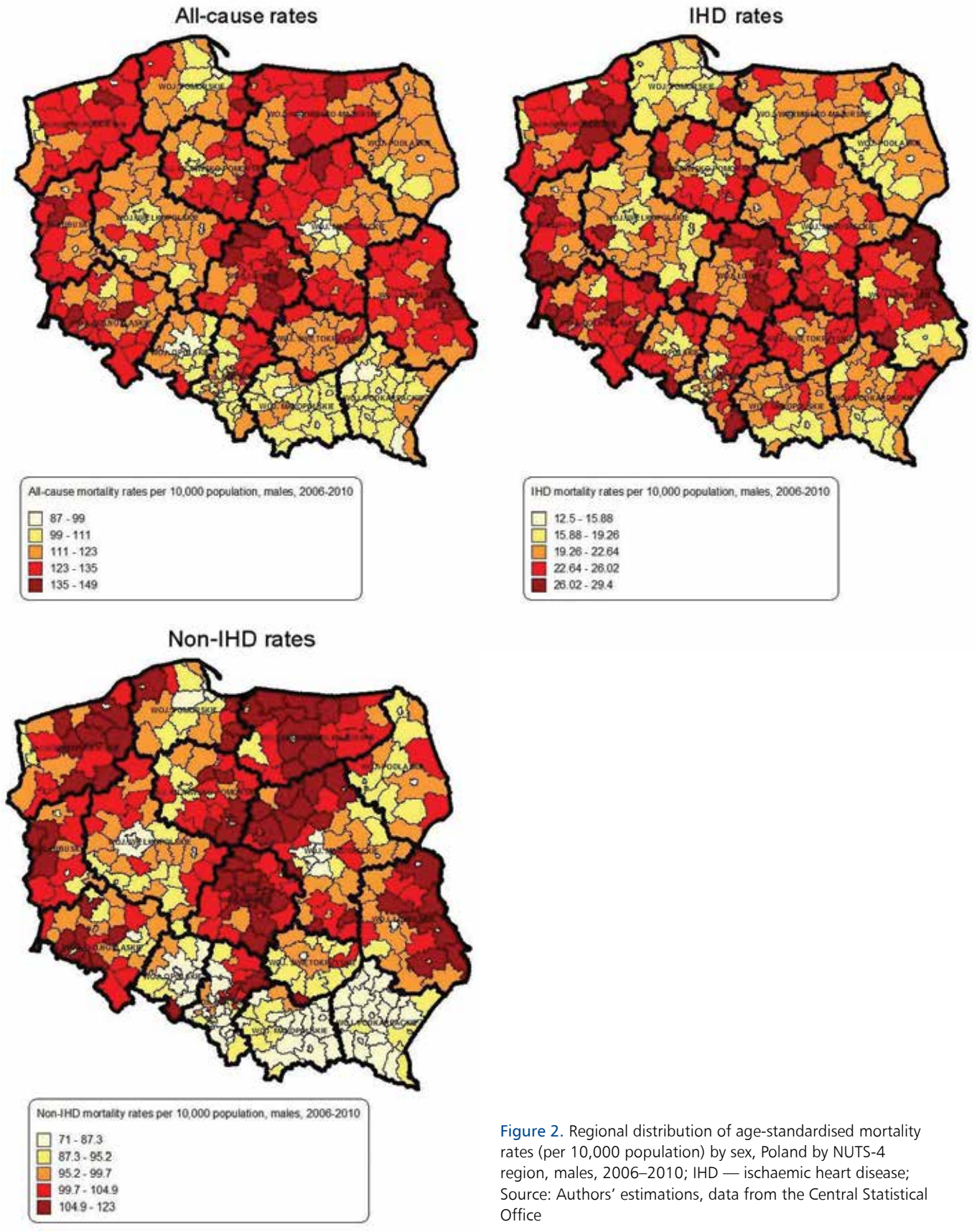

Figure 2. Regional distribution of age-standardised mortality rates (per 10,000 population) by sex, Poland by NUTS-4 region, males, 2006–2010; IHD — ischaemic heart disease; Source: Authors' estimations, data from the Central Statistical Office

In Table 4, we also report correlation coefficients between age-standardised all-cause mortality rates and contextual variables, and between age-standardised IHD mortality rates and contextual variables for 314 powiats, i.e. the group of powiats without large Polish cities. By comparing correlation coefficients for all powiats and for the group excluding large cities for both all-cause and IHD mortality, we come to the conclusion that there is a significant gap separating large Polish cities and the remaining parts of the country as far as the socio-economic contextual factors of all-cause and IHD mortality are concerned. After large cities are excluded from the study group, only variables that approximate the situation on the local labour market ("population active on the labour market" and "unemployment rate") retain their level of importance for the level of all-cause and IHD mortality. The remaining socio-economic variables either become significantly less important for mortality in powiats when large Polish cities are excluded from the study group, or they become insignificant altogether. As far as contextual variables approximating access to medical care in powiats are concerned, the variable "number of hospital beds" also lost significance for all-cause and IHD mortality after large cities were excluded. The correlation coefficient between the variable "number of medical doctors" and all-cause mortality is at a similar level in the two groups of powiats; however, after the exclusion of large cities the importance of this variable for IHD mortality decreases significantly.

DISCUSSION

In 2006–2010, despite a high contribution of IHD mortality to the mean level of age-standardised all-cause mortality rates, differences between powiats in IHD mortality did not constitute a major factor behind regional mortality disparities in Poland. However, regions characterised by a high level of overall mortality also had a relatively high level of IHD mortality (as indicated by the significant positive correlation between age-standardised all-cause and IHD mortality rates for both sexes in 2006–2010).

The pattern in the level of all-cause and IHD mortality in Polish powiats was strongly related to the level of urbanisation: the group of powiats characterised by the lowest all-cause and IHD mortality comprised mainly large cities (with 100% urban population). The negative effect of large cities on the level of all-cause and IHD mortality in 2006–2010 was also confirmed by a significant change in the level of coefficients of correlation between the socio-economic contextual variables and IHD mortality: these became significantly lower or insignificant altogether when large cities (with 100% urban population) were excluded from the study group. This effect of large cities on mortality was observed for contextual variables that stand for the level of urbanisation, but not for variables describing the situation on the local labour market.

According to the results of the Polish IMPACT model, 54% of the fall in IHD mortality in Poland over the period 1991–2005 resulted from changes in risk factors — mainly reductions in total cholesterol concentration and an increase in physical activity — while about 37% of the decrease in IHD mortality was attributed to modern medical treatment [10]. According to our findings, an important factor behind regional variation in all-cause and IHD mortality is the level of urbanisation, as mortality is significantly lower in large Polish cities than in the remaining powiats. Furthermore, ease of access to medical care in small towns or rural areas (approximated by the variables "number of hospital beds" and "number of medical doctors") turned out to be of relatively low importance for IHD mortality. However, the number of medical doctors available per 10,000 population in small Polish towns and rural areas was still important for all-cause mortality. The results of this study demonstrate that the existing differences in access to specialised cardiology units depending on the size of place of residence have an effect on IHD and, as a result, on all-cause mortality. Large Polish cities, as compared to small towns and rural areas, are characterised by ease of access to modern medical cardiological care units, and also a higher level of utilisation of cardiological care by its population [24]. Residents of large cities constituted the majority of patients of outpatient cardiac rehabilitation centres in Poland in 2003–2005 because outpatient clinics are located only in 11 large Polish cities [25]. However, access to and efficiency of emergency care services in Poland in 2009–2012 were reported to be independent of the size of place of residence by Chlebus et al. [24].

Limitations of this study

Major limitations of this study are related to the relatively low quality of official data on causes of death in Poland as a result of a high percentage of deaths due to ill-defined causes [26]. In addition, coding procedures for causes of death are significantly different between Polish regions: regions differ not only in their share of ill-defined causes of death [27] but also in mortality due to certain CVD [28]. However, since the IHD deaths were derived in this study as a constant share of the whole group of CVD, the problem of large regional variation in the coding procedures of IHD mortality was corrected for.

An additional limitation of the study is the fact that conclusions are derived based on very general information on health-care in Polish powiats. This is because no statistical information is available on the number of specialised medical doctors available per 10,000 population, beds in cardiological units at the powiat level, and on the utilisation of medical care in Polish powiats.

CONCLUSIONS

Since the size of place of residence in Poland largely determines access to modern medical care, the results of our

study confirm the importance of medical care for the level of all-cause and IHD mortality in Poland.

Acknowledgements

The study was supported by the National Science Centre of Poland, grant no. 2011/01/B/HS4/04797 entitled "Regional variation in mortality in Poland". The authors are thankful to Krystyna Kupiszewska for language editing of the manuscript.

Conflict of interest: *none declared*

References

1. Wojtyniak B, Stokwiszewski J, Goryński P, Poznańska A: [Life expectancy and mortality of the Polish population]. In: Wojtyniak B, Goryński P eds. [Health status of the Polish population]. National Institute of Public Health — National Institute of Hygiene, Warsaw 2008, 31–87.
2. Chłoń-Domińczak A, Marek M, Rabczenko D et al. Analysis of health and socio-economic characteristics of district level populations in Poland. Ministry of Health of Poland, Warsaw, 2011.
3. Kołodziej H, Łopuszanska M. [Regional differences in premature mortality in Poland]. Przegl Epidemiol, 2010; 64: 543–550.
4. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med, 2006; 3: e442.
5. Levi F, Chatenoud L, Bertuccio P et al. Mortality from cardiovascular and cerebrovascular diseases in Europe and other areas of the world: an update. Eur J Cardiovasc Prev Rehabil, 2009;16: 333–350. doi: 10.1097/HJR.0b013e328325d67d.
6. Andersohn F, Schlattmann P, Roll S et al. Regional variation of mortality from ischemic heart disease in Germany from 1998 to 2007. Clin Res Cardiol, 2010; 99: 511–518. doi: 10.1007/s00392-010-0150-x.
7. Muller-Nordhorn J, Rossnagel K, Mey W, Willich SN. Regional variation and time trends in mortality from ischaemic heart disease: East and West Germany 10 years after reunification. J Epidemiol Community Health, 2004; 58: 481–485.
8. Wing S, Casper M, Davis W et al. Trends in the geographic inequality of cardiovascular disease mortality in the United States, 1962–1982. Soc Sci Med, 1990; 30: 261–266.
9. Bennett K, Kabir Z, Unal B, et al. Explaining the recent decrease in coronary heart disease mortality rates in Ireland, 1985–2000. J Epidemiol Community Health, 2006; 60: 322–327.
10. Bjorck L, Rosengren A, Bennett K et al. Modelling the decreasing coronary heart disease mortality in Sweden between 1986 and 2002. Eur Heart J, 2009; 30: 1046–1056. doi: 10.1093/eurheartj/ehn554.
11. Capewell S, Hayes DK, Ford ES et al. Life-years gained among US adults from modern treatments and changes in the prevalence of 6 coronary heart disease risk factors between 1980 and 2000. Am J Epidemiol, 2009; 170: 229–236. doi: 10.1093/aje/kwp150.
12. Ford ES, Ajani UA, Croft JB et al. Explaining the decrease in U.S. deaths from coronary disease, 1980–2000. N Engl J Med, 2007; 356: 2388–2398.
13. Bandosz P, O'Flaherty M, Drygas W et al. Decline in mortality from coronary heart disease in Poland after socioeconomic transformation: modelling study. BMJ, 2012; 344: d8136. doi: 10.1136/bmj.d8136.
14. Kannel WB, Larson M. Long-term epidemiologic prediction of coronary disease. The Framingham experience. Cardiology, 1993; 82: 137–152.
15. Kuulasmaa K, Tunstall-Pedoe H, Dobson A et al. Estimation of contribution of changes in classic risk factors to trends in coronary-event rates across the WHO MONICA Project populations. Lancet, 2000; 355: 675–687.
16. Vartiainen E, Jousilahti P, Alfthan G et al. Cardiovascular risk factor changes in Finland, 1972–1997. Int J Epidemiol, 2000; 29: 49–56.
17. Zatonski WA: Evolution of Health in Poland since 1988. Maria Skłodowska-Curie Cancer Centre and Institute of Oncology Department of Epidemiology and Cancer Prevention, Warsaw, 1996.
18. Zatonski WA, McMichael AJ, Powles JW. Ecological study of reasons for sharp decline in mortality from ischaemic heart disease in Poland since 1991. BMJ, 1998; 316: 1047–1051.
19. Zatonski WA, Willett W. Changes in dietary fat and declining coronary heart disease in Poland: population based study. BMJ, 2005; 331: 187–188.
20. Zatonski WA, Bhala N. Changing trends of diseases in Eastern Europe: closing the gap. Public Health, 2012; 126: 248–252. doi: 10.1016/j.puhe.2011.11.017.
21. Capewell S, Beaglehole R, Seddon M, McMurray J. Explanation for the decline in coronary heart disease mortality rates in Auckland, New Zealand, between 1982 and 1993. Circulation, 2000; 102: 1511–1516.
22. Ingram DD, Gillum RF. Regional and urbanization differentials in coronary heart disease mortality in the United States, 1968–1985. J Clin Epidemiol, 1989; 42: 857–868.
23. Jasiński B, Bandosz P, Wojtyniak B et al. Mortality from ischaemic heart disease in Poland in 1991–1996 estimated by the coding system used since 1997. Kardiol Pol, 2010; 68: 520–527.
24. Chlebus K, Gąsior M, Gierlotka M et al. [Occurrence, treatment and secondary prevention of myocardial infarction in Poland. Evaluation based on the National Database of Cardiac Infarct]. National Institute of Public Health — National Institute of Hygiene. Warsaw, 2014.
25. Piotrowicz R. [Cardiological rehabilitation in Polish National Program for Prevention and Therapy of Cardiovascular Diseases POLKARD — the unfortunate state of things]. Kardiol Pol, 2006; 64: 1158–1160.
26. Mathers CD, Fat DM, Inoue M et al. Counting the dead and what they died from: an assessment of the global status of cause of death data. Bull World Health Organ, 2005; 83: 171–177.
27. Fihel A, Muszyńska M, Wróblewska W. [Mortality from ill-defined causes of death and its persistent regional variation in Poland]. Studia Demogr, 2014; 165: 83–102.
28. Wojtyniak B, Jankowski K, Zdrojewski T, Opolski G. Regional differences in determining cardiovascular diseases as the cause of death in Poland: time for change. Kardiol Pol, 2012; 70: 695–701.

Terytorialne zróżnicowanie umieralności w Polsce ze względu na chorobę niedokrwienną serca, 2006–2010

Magdalena M. Muszyńska[1], Urszula Sulkowska[2], Witold A. Zatoński[2]

[1]Instytut Statystyki i Demografii, Szkoła Główna Handlowa, Warszawa

[2]Zakład Epidemiologii i Prewencji Nowotworów, Centrum Onkologii — Instytut im. Marii Skłodowskiej-Curie, Warszawa

Streszczenie

Wstęp: W 2010 r. różnica między najdłuższym i najkrótszym czasem trwania życia w województwach w Polsce wynosiła 2,5 roku dla kobiet i 3,6 roku dla mężczyzn. Pomimo występujących znacznych różnic terytorialnych w umieralności w Polsce, zjawisko to w dużym stopniu pozostaje niezbadane. Ze względu na dobrze rozpoznane we wcześniejszych badaniach znaczenie choroby niedokrwiennej serca (IHD) dla różnic w umieralności między krajami, między regionami w wybranych krajach, ale także między województwami, ta przyczyna zgonu jest dobrym parametrem do wytłumaczenia terytorialnych różnic w umieralności w Polsce.

Cel: Celem badania była analiza wpływu IHD na terytorialne zróżnicowanie umieralności na poziomie powiatów w Polsce w latach 2006–2010 oraz wytłumaczenie zaobserwowanych różnic poprzez wybrane czynniki społeczno-ekonomiczne.

Metody: W badaniu wykorzystano informacje dotyczące zgonów oraz liczby ludności na poziomie powiatów w latach 2006–2010. Terytorialne zróżnicowanie umieralności w Polsce opisano, opierając się na podstawowych statystykach dotyczących standaryzowanych współczynników zgonów ze względu na wszystkie przyczyny i standaryzowanych współczynników zgonów ze względu na IHD w powiatach. Wyznaczone współczynniki przedstawiono na mapach. Wpływ IHD na zróżnicowanie umieralności w Polsce oszacowano na podstawie dekompozycji wariancji współczynników zgonów w powiatach. Porównano też udział dużych miast w poszczególnych decylach rozkładu współczynników. Ponadto wyznaczono współczynniki korelacji między standaryzowanymi współczynnikami zgonów i wybranymi charakterystykami społeczno-ekonomicznymi dla wszystkich powiatów oraz dla grupy powiatów po wyeliminowaniu dużych miast.

Wyniki: Mimo że IHD jest jedną z ważniejszych przyczyn zgonów w Polsce dla obu płci, różnice w umieralności z powodu tej choroby tylko w niewielkim stopniu były odpowiedzialne za ogólne zróżnicowanie współczynników umieralności w Polsce. Wzorzec terytorialny umieralności ze względu na IHD w Polsce wskazał na istotne różnice w poziomie umieralności ze względu na tę przyczynę między dużymi miastami i resztą powiatów. Zbliżony wzorzec terytorialny obserwowano jednocześnie dla wszystkich zgonów, które nastąpiły w latach 2006–2010. W rezultacie powiaty o najniższej umieralności ze względu na IHD (pierwszy decyl rozkładu w powiatach) stanowiły wyłącznie duże miasta. Natomiast w przypadku wszystkich przyczyn zgonów łącznie duże miasta stanowiły 70% powiatów o najniższej umieralności. Wpływ poziomu urbanizacji na umieralność ze względu na wszystkie przyczyny i ze względu na IHD potwierdzono także poprzez istotną wysoką dodatnią korelację między współczynnikami zgonów i czynnikami społeczno-ekonomicznymi uwzględnionymi w badaniu. Czynniki społeczno-ekonomiczne uwzględnione w badaniu wiązały się bezpośrednio w Polsce z poziomem urbanizacji lub sytuacją na rynku pracy w powiatach. Wyznaczone współczynniki korelacji między standaryzowanymi współczynnikami zgonów i czynnikami społeczno-ekonomicznymi po wyeliminowaniu z badanej grupy powiatów dużych miast okazały się nieistotne dla grupy czynników określających poziom urbanizacji powiatów. Ze względu na to, że wcześniejsze badania pokazały, że nie istnieją istotne różnice między obszarami miejskimi i wiejskimi w dostępie do szybkiej interwencji medycznej w przypadku zagrożenia życia, natomiast duże miasta charakteryzuje ułatwiony dostęp do specjalistycznej pomocy medycznej, uzyskany gradient umieralności interpretowano jako wynik różnic w dostępie do specjalistycznej opieki kardiologicznej, która występowała wyłącznie w dużych miastach.

Wnioski: Wyniki analizy podkreśliły znaczenie różnic w dostępie do specjalistycznej opieki kardiologicznej w dużych miastach w Polsce dla terytorialnego zróżnicowania umieralności ze względu na IHD i umieralność ogółem.

Słowa kluczowe: choroba niedokrwienna serca, Polska, terytorialne zróżnicowanie umieralności, umieralność w miastach

Kardiol Pol 2015; 73, 3: 207–215

Adres do korespondencji:
Dr Magdalena Maria Muszyńska, Instytut Statystyki i Demografii, Szkoła Główna Handlowa, ul. Madalińskiego 6/8, 02–513 Warszawa, e-mail: mmuszyns@sgh.waw.pl

Praca wpłynęła: 28.08.2014 r. **Zaakceptowana do druku:** 04.02.2015 r.