Folia Oeconomica
Acta Universitatis Lodziensis
ISSN 0208-6018 e-ISSN 2353-7663
www.czasopisma.uni.lodz.pl/foe/
6(332) 2017

DOI: http://dx.doi.org/10.18778/0208-6018.332.03

Alicja Anna Olejnik
University of Lodz, Faculty of Economics and Sociology, Department of Spatial Econometrics, olejnika@uni.lodz.pl

Agata Żółtaszek
University of Lodz, Faculty of Economics and Sociology, Department of Spatial Econometrics, zoltaszek@uni.lodz.pl

Spatial Econometric Approach to Modelling of Selected Western Diseases

Abstract: For years now, developed countries face an epidemic of high blood pressure, diabetes and high cholesterol, risk factors related to heart and circulatory disease, and a suite of psychological disorders ranging from depression, anxiety, to compulsive behaviours. These health risks have traditionally been associated with affluence, however by 2008 there is no clear link between national income and these diseases. E.g. according to Danaei, there was no relationship between national income and blood pressure in men, and in women blood pressure was even higher in poorer countries. This paper provides an in depth analysis of this correlation, applying spatial econometrics tools. The spatial aspect of the prevalence of western diseases does not seem to be obvious and, to our knowledge, is not widely explored in the literature. In particular, the paper investigates the spatial processes of selected diseases of affluence in regions of the European Union. The research covers 261 NUTS 2 regions for the period 2003–2010. This study provides the spatial analysis of circulatory and mental health disorders. In our opinion, the presented spatial econometric approach may constitute an important contribution to the field of epidemiology.

Keywords: diseases of affluence, health, socioeconomic development, spatial analysis

JEL: I14, I15, O18, C23

1. Introduction

Modern medicine gives us a vast knowledge on microbiology and epidemiology of transmittable diseases. Although, as shown by a scientific evidence, this knowledge is insufficient to eradicate all the possible "plagues". The Asian SARS epidemic in 2003 and epidemic of Ebola virus in 2013, in West Africa are the proof of that. Moreover, despite of our growing knowledge on transmission, symptoms, counter-measurements, and safety procedures ignoring the governmental warnings and directives is not uncommon. This facilitates the spread of modern plagues firstly to neighbouring regions and countries, and then across continents (Scott, Duncan, 2007: 1–5; Cook, Halsall, 2012: 22–24). However, communicable diseases are a typical epidemic problem in poorer and less developed regions, and consequently they are perceived as *diseases of poverty* rather than *diseases of affluence*. Contrary to the common misconception, epidemiology is not only a science about epidemics defined as an expected number of contagion cases in given time and space (Porta, 2008: 79). Nowadays, epidemiology is about transmission of diseases and factors stimulating and inhibiting them. Primarily, they are health-related factors but also other e.g. socio-economic. Moreover, this filed of studies is dedicated not only to analysing prevalence and prevalence associated aspects, but also to preventing and controlling of health problems. Hence, the concern of the epidemiologists with the analysis of spatio-temporal patterns of diseases (Beaglehole, Bonita, Kjellstrom, 1993: 3–7). Therefore, not only contagious diseases are being considered, but also the potential *diseases of affluence*. For years now, developed countries have faced an epidemic of high blood pressure, diabetes and high cholesterol, risk factors related to heart and circulatory disease, and a suite of psychological disorders ranging from depression, anxiety, addictions to compulsive behaviours. These health risks have traditionally been associated with affluence however by the year 2008 there is no clear link between national income and these diseases. For instance, according to Danaei (Danaei et al., 2013), there was no relationship between national income and blood pressure of men, while for women blood pressure was even higher in poorer countries. On the other hand, WHO highlights these non-communicable, chronic disorders as major epidemiological risks of the 21st century (*WHO Report: ATLAS…*, 2010: 7–22; *WHO Report: Global Report…*, 2016: 90–91; *WHO Report: Global status…*, 2011: 1–160).

There in no one unified definition of a *disease of affluence*, also referred to as a *western diseases* and *diseases of the 21st century* (and in Poland as *civilizational diseases*), thereby it is difficult to create a list of potential threats. Commonly, the following disorders are mentioned among the diseases of affluence: cardiovascular diseases, respiratory system diseases, cancer, obesity, diabetes, allergy, mental disorders, and HIV (which has some characteristics of both the *diseases of poverty* and of *affluence*). The working definition which we adopted for the purpose of this paper states, that the prevalence (understood as a frequency of cases, severity of symptoms, or mortality rate) intensifies with higher socioeconomic development of the country, region, social group, household, or with time. They can be considered as negative but sometimes also as inevitable effects of progress (social, cultural, technological, and economic) (Kotarski, 2013: 117–125; Link, 2007: 75–76; Aue, 2009: 175). The chronic aspect of these illnesses is also a concern, as they last from 3–6 months or even a lifetime, often being the cause of death (WHO; Ferrante, 2014: 321). Among these numerous affluent diseases and disorders, two are considered in this paper: cardiovascular and mental disorders.

Cardiovascular or circulatory system diseases (DCS) cause almost a half of deaths in most developed countries. They include major heart disorders, as well as arterial circulation, and blood vessels disorders. For decades, they have been the main cause of death. Nowadays, since more than 80% of prevalence affects people over 65, with increasing people's life span and aging progression of the populations the problem increases. Researches state that the cases of circulatory system diseases and deaths caused by them are not necessarily equally distributed over time and space. Generally, it is observed that mortality is higher in the developing countries than in the developed ones. The prevalence is determined mainly by the risk factor, e.g. obesity, cholesterol level, and smoking, which are more distinct problems in developed countries. Therefore, the socioeconomic development affects mortality in two ways: increasing the risk of becoming ill in the first place, and then reducing mortality by incorporating better health services (Marmot, Elliott, 2005: 3–6; Labarthe, 2011: 3–32).

Mental and behavioural disorders (MBD) are clinically significant behavioural or psychological syndromes or patterns which increase the risk of suffering, disability or death. Among them, the most common and most known are: schizophrenia, depression, anxiety, bipolar disorders, eating disorders, personality disorders, attention deficit hyperactivity disorder (ADHD), addictions (substance and behavioural), and suicide attempts. The risk factors are both genetic and social (stress and lifestyle) (Farrell, 2010: 1–2; Tsuang, Tohen, Jones, 2011: 2–58; Offer, 2006: 355).

In the case of communicable diseases spatial patterns are fairly clear. Geographic Information System (GIS), spatial econometrics, and spatial statistical tools, such as spatial diffusion (see Suchecki, 2010: 220–225) are often employed to estimate and forecast the number of infections and spatiotemporal patterns of prevalence. This is possible due to the knowledge of means of transmission, frequency of infections and death as well as the Tobler's First Law of Geography ("Everything is related to everything else, but near things are more related than distant things" – Tobler, 1970: 236). Dr Snow's mapping of cholera infections presented a very innovative approach in the 19th century. His work became a foundation for tools widely used in modern epidemiology, such as spatial statistics, spatial econometrics, and GIS. On the other hand, identification of spatial patterns of non-communicable diseases is not straightforward, but nevertheless recognition of these dependences could be crucial for improving health care systems and prevention techniques for some cases of diseases of affluence.

Therefore, this paper provides an in depth analysis of correlations between economic development and prevalence of chosen diseases of affluence by the means of spatial econometric tools. The spatial aspect of the prevalence of western diseases does not seem to be obvious and, to our knowledge, is not widely explored in the literature. In particular, this paper investigates the spatial processes of selected diseases of affluence in regions of the European Union for the period 2003–2010. This study provides the spatial analysis of circulatory and mental disorders. In our opinion, the presented spatial econometric approach may constitute an important contribution to the field of epidemiology.

The rest of the paper is structured as follows. Section 2 covers methodology used in the empirical study. It provides a discussion on spatial econometric models and emphasises the benefits of the preferred model. Section 3 introduces data used in the research and presents the estimates of the models and finally a discussion of the obtained empirical results. Concluding thoughts are offered in the final section.

2. Methodology

In the empirical part of the study we have employed some Spatial Panel Econometric techniques. Namely, Spatial Autoregressive Model (SAR) and Spatial Durbin Panel Model (SDPM).

Firstly, let us consider a classic spatial autoregressive SAR model for cross-sectional observations with normal disturbances:

$$\mathbf{y} = \rho \mathbf{W} \mathbf{y} + \mathbf{X}\beta + \varepsilon,\ \varepsilon \sim N(0, \sigma^2 I), \tag{1}$$

where $\mathbf{y}$ ($N \times 1$) is a vector of observations on the dependent variable and $\mathbf{X}$ ($N \times K$) represents matrix of observations on K independent variables. Typically, matrix $\mathbf{W}$ is a given *a priori* spatial weight matrix of $N \times N$ dimension, which represents the spatial structure of observations. The elements w_{ij} of $\mathbf{W}$ are ones ($w_{ij} = 1$) if the locations i and j are neighbours and all other elements, in particular the diagonal ones, are zero. Therefore, the neighbourhood structure is represented by the spatial weight matrix $\mathbf{W}$. The most common weight matrices, in regional science, are those in which neighbourhood is based on distance relationship or contiguity (Anselin, 1988).

The alternative model is a Spatial Error Model – econometric model with spatially correlated error term (Anselin, 1988). In this model each error term u_i for each location is spatially correlated with the error terms in other locations:

$$\mathbf{y} = \mathbf{X}\beta + \mathbf{u},\ \mathbf{u} = \lambda\mathbf{W}\mathbf{u} + \varepsilon,\ \varepsilon \sim N(0, \sigma^2 I), \tag{2}$$

where $\mathbf{y}$ $(N \times 1)$ is a vector of observations on the dependent variable and $\mathbf{X}$ $(N \times K)$ is a matrix of observations on K exogenous variables and $\mathbf{W}$ is a spatial weight matrix, analogously to the previous equation. Variable $\mathbf{u}$ is an N-dimensional vector of spatially correlated error terms and ε is a white noise process with $\sigma^2\mathbf{I}$ representing variance-covariance matrix. λ is a parameter of spatially lagged error term, with assumption: $|\lambda| < 1$.

Though very popular, those models do not allow for enough flexibility in the aspect of specification and, as a result, they increase probability of obtaining a misspecification. Indeed, as in SAR model the spatial autocorrelation can exhibit only through the coefficient ρ, the standard tests (Anselin, 1988) favour the Spatial Error Model. However, let us notice that the spatial autocorrelation of error term is often produced spuriously by model misspecification. Therefore, in recent years, there has been an increasing concern related to the methodology of Spatial Econometrics, and especially the problem in question.

The validity of the models with structures of dependence in the error term has been widely questioned. It seems to be reasonable to find a substantive way to describe cross-sectional dependence relationships in order to avoid residual dependence. In the recent literature there is an agreement that residual autocorrelation is a results of misspecification problem of the equation. This is a consequence of the omission of the relevant variables on the right-hand side of the equation, that is, where the lags in the exogenous variable are necessary. Solution for this is, what the literature calls, the Spatial Durbin Model. This model is a very helpful and flexible instrument in the process of specification of econometric model, as it can incorporate spatial lags of the exogenous variables on the right-hand side of the equation:

$$\mathbf{y} = \rho\mathbf{W}\mathbf{y} + \mathbf{X}\boldsymbol{\beta} + \mathbf{W}\mathbf{X}\boldsymbol{\gamma} + \varepsilon,\ \varepsilon \sim N(0, \sigma^2 I), \tag{3}$$

where $\mathbf{y}$ $(N \times 1)$ is a vector of observations on the dependent variable and $\mathbf{X}$ $(N \times K)$ represents matrix of observations on K independent variables, $\mathbf{W}$ is a spatial weight matrix which represents the spatial structure of observations. $\mathbf{WX}$ is a spatial lag of the independent variables.

Though the above discussion is devoted to a cross-sectional data, it can be rewritten for the panel data setting in the analogues manner. Hence, in our analysis we employ SAR model's and Spatial Durbin Model's panel counterparts, that is SAR Panel Model and Spatial Panel Durbin Model, as better instruments for specification of the spatial process of western diseases.

3. Empirical results and discussion

All the data used in the below analysis is taken from the Eurostat Database. The data covers 261 regions of European Union for the 2003–2010 period. Due to the lack of data, on the prevalence of chosen diseases, we considered standardised death rates (per 100 000 inhabitants) by cause: Mental and Behavioural Disorders, Diseases of the Circulatory System, as the three years average. Gross Domestic Product (GDP) is expressed in Purchasing Power Standard per active population. GDP is taken for the first year of each three-year average, correspondingly to the three years average of causes of deaths. This reflects the possible gap between the change in affluence and getting ill or dying because of these diseases. All data is presented in the natural logarithms. Table 1 presents basic statistics of variables used in the analysis.

Table 1. Basic statistics of variables used in the model

Variable	Mean	σ	Min	Max
lnM	2.69	1.35	–3.40	4.47
lnC	6.14	0.39	5.27	7.27
lnGDP	10.10	1.06	6.86	13.13

Source: own compilation

Figures 1 and 2 present the spatial distribution of average 2008–2010 standardised death rates for Mental and Behavioural Disorders and Diseases of the Circulatory System, respectively. Mental and Behavioural Disorders take most fatalities in the Northern Europe. Most hazardous regions may be found especially in Scandinavia, Denmark, and Scotland. In general, Western Europe is also at high risk of death from mental disorders. On the other hand, the lowest death rates appear in Central and Eastern Europe. This includes Poland, Balkans, and Baltic states. Hungary is the only exception due to the quite high death rates.

Circulatory System Diseases create a very distinct line between Western and Eastern Europe. The Eastern and Central Europe, including Poland, Balkans, and Baltic states, together with Germany, create a dark cluster of high mortality rates. In contrast, low death rates are grouped in France, Denmark, some parts of Iberian Peninsula and Italy.

Let us notice, that these two illnesses have very different spatial distributions in EU regions. It is difficult to establish, judging solely by the regional dispersion of the prevalence, whether mental disorders and cardiovascular diseases dependent on the level of affluence, or not.

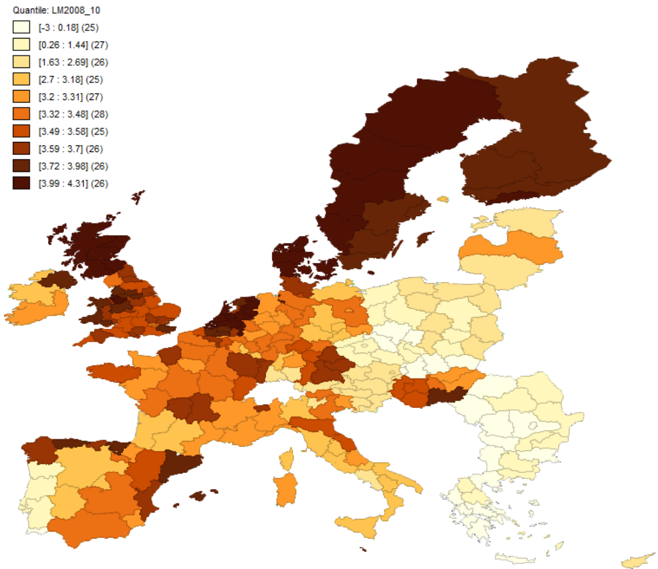

Figure 1. Standardized death rates of Mental and Behavioural Disorders, average 2008–2010, by region of residence, by deciles

Source: own study based on research

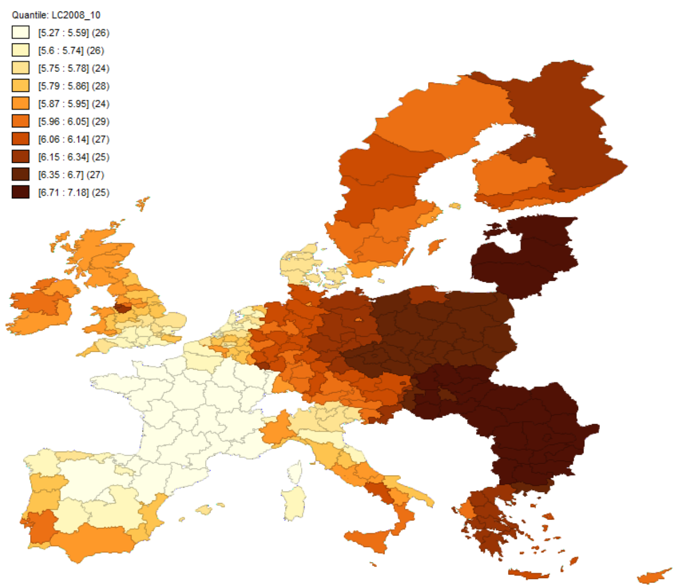

Figure 2. Standardized death rates of Diseases of the Circulatory System, average 2008–2010, by region of residence, by deciles

Source: own study based on research

As a first step in our analysis, we have employed Spatial Autoregressive Panel Models (SAR Panel Model). In those models, the spatial autoregressive terms (**W**lnM and **W**lnC) refer to the standardised death rates caused by the diseases in question, present in the neighbouring regions:

$$\ln M = \alpha_0 + \rho \mathbf{W} \ln M + \alpha_1 \ln GDP + \varepsilon,\ \varepsilon \sim N(0, \sigma^2), \tag{4}$$

$$\ln C = \alpha_0 + \rho \mathbf{W} \ln C + \alpha_1 \ln GDP + \varepsilon,\ \varepsilon \sim N(0, \sigma^2). \tag{5}$$

Table 2 presents estimation results of models (4) and (5). Let us notice, that GDP is a significant factor for both DCSs and MBDs. In our model, the impact of GDP is negative, which suggest that higher GDP indirectly decreases the mortality rate, *ceteris paribus* (spatial auto-dependence accounted for). This is presumably due to better health care, which decreases the mortality rate, but not necessarily the prevalence. It is worth mentioning that in the case of MBDs, the standard Pearson correlation coefficient for both lnM and lnGDP is positive. This was obviously expected as MBDs are considered to be diseases of affluence. Yet, the spatial autoregressive model identifies GDP as a negative explanatory factor. Since it identifies the relation between Δy and lnGDP, were $\Delta = I - \rho W$, it turns out that higher outcome determines lower MBDs related mortality rates as compared to neighbouring regions. This duality in signs of Pearson correlation and model coefficients has not been observed in the case of DCSs, presumably due to a higher level of awareness and high level of recognition of those illnesses.

Table 2. Estimation results for Mental and Behavioural Disorders and Diseases of the Circulatory System, SAR Panel Model, 2003–2010

Variable	Mental and Behavioural Disorders		Diseases of the Circulatory System	
	Coefficient	t-stat	Coefficient	t-stat
ρ	0.55	24.40	0.87	98.78
lnGDP	–0.31	–3.27	–0.14	–10.92
pseudo R^2	0.96		0.97	
N	261		261	
T	6		6	
Spatial fixed effects	YES		YES	

Source: own compilation

The spatial component ρ is a significant factor for both illnesses. This means that the higher the death rate in neighbouring region, the higher the death rate in a given region. In addition, the research shows that the spatial fixed effects play important role in explaining the spatial process. The goodness of fit measures suggests that both MBD and DCS models capture certain important spatial patterns of prevalence of the western diseases. On the other hand, for time period random effects and pooled regression, the results were significantly worse.

In the next step of our research, we have tested spatial relation between the prevalence of the diseases and the affluence of the given region as well as the neighbouring regions, by the means of a Spatial Panel Durbin Model (SPDM). Namely, equations (4) and (5) were extended to the form of the following SPDM relation:

$$\ln M = \alpha_0 + \rho \mathbf{W} \ln M + \alpha_1 \ln GDP + \alpha_2 \mathbf{W} \ln GDP + \varepsilon,\ \varepsilon \sim N(0, \sigma^2), \quad (6)$$

$$\ln C = \alpha_0 + \rho \mathbf{W} \ln C + \alpha_1 \ln GDP + \alpha_2 \mathbf{W} \ln GDP + \varepsilon,\ \varepsilon \sim N(0, \sigma^2). \quad (7)$$

Table 3. Estimation results for Mental and Behavioural Disorders and Diseases of the Circulatory System, SPDM, 2003–2010

Variable	Mental and Behavioural Disorders		Diseases of the Circulatory System	
	Coefficient	t-stat	Coefficient	t-stat
ρ	0.56	25.49	0.86	91.78
lnGDP	–0.94	–4.59	–0.03	–1.45
WlnGDP	0.76	3.47	–0.13	–5.29
pseudo R^2	0.96		0.98	
N	261		261	
T	6		6	
Spatial fixed effects	YES		YES	

Source: own compilation

Table 3 presents the estimation results of models (6) and (7). Let us notice that, although the level of GDP in the neighbouring regions (WlnGDP) is a significant factor for both DCSs and MBDs, the direct effect for a given region (lnGDP) is barely so. The positive impact of GDP in neighbouring regions for MBDs suggests that more affluent neighbours stimulate the number of deaths (and probably occurrences) in a given region. On the other hand, the negative impact of GDP in neighbouring regions for DCSs suggests that more affluent neighbours decrease the number of deaths (not occurrences) in a given region, probably due to better health services. Therefore, we can conclude that, although the level of affluence of the region has direct positive impact on the occurrence of the illness (due to the pollution, etc.), the accessibility of the health services is wider because of health migrations and unified country-specific health policy.

A spatial coefficient ρ turned out to be significant for both illnesses. As previously, spatial fixed effects proved to play an important role in the explanation of the spatial process in question. The goodness of fit measures indicates a slight improvement of the SPDM models in comparison to the SAR models for both MBDs and DCSs.

4. Conclusions

Western diseases are recognized as a growing threat to the modern world. As a consequence, there is a great need for carrying out analyses which might be helpful in understanding the determinants and the consequences of western diseases. Apart from the medical one, researchers have not yet established, a reliable and flexible methodological approach to the diseases of affluence. Therefore, this paper aims to be a trial of incorporating spatial econometrics to the epidemiology of these illnesses. Essentially, the purpose of this research was to verify the dependence between the standardised death rates of circulatory and mental disorders with the economic development (GDP per active population), within the region in question and for its neighbours. Generally, the results from the employed spatial panel models (SAR and SPDM) show statistical significance of GDP and the spatial interactions as well as a very high level of goodness-of-fit. Therefore, we conclude that the spatial econometrics is a useful tool in researching the patterns of the diseases of affluence. However, both SAR and Durbin models indicate that the higher the GDP per active population, the lower the death rate of selected diseases, which does not confirm the hypothesis about Mental and Behavioural Disorders and Diseases of the Circulatory System being the disease of affluence. Though, in the case of Mental Disorders, spatially lagged GDP (WlnGDP) has an opposite sign (and therefore direction of the relation) to the GDP itself.

Let us notice though, that employed models use panel data, so it is assumed by default that all tendencies are constant over time (2003–2010) and space (261 regions of 26 countries). If the opposite is truth and the strength and/or direction of interaction vary over time and/or space, any econometric model will show average value and sign of parameters. It is possible that being the *disease of affluence* it may not be stable in time. Perhaps incorporating time variable could influence the outcomes, by extracting time change from GDP influence. On the other hand, it is also possible that there are no common tendencies for the *diseases of affluence* across the whole EU. Notice, that both models indicate spatial fixed effects for NUTS 2 region. Furthermore, preliminary statistical analysis (see Figures 1 and 2) indicated that the distribution is diversified over EU regions. If relation between GDP (also lagged over space) and the prevalence is different for instance for different countries or for Eastern vs. Western Europe, it could be beneficial to add group effects in the model specification in order to account for this heterogeneity. This single research does not confirm that cardiovascular or mental disorders are indeed diseases of the 21st century. However further, more detailed analysis may ultimately dismiss or confirm the affluence hypothesis. Finally, the spatial panel models proved to be well fitted to empirical data, which attests to their usefulness in carrying out supplementary epidemiological research of western diseases.

References

Anselin L. (1988), *Spatial Econometrics: Methods and Models*, Kluwer Academic Publications, Dordrecht.

Aue W. (2009), *Człowiek w środowisku: podręcznik. Cz. 1*, WSiP, Warszawa.

Beaglehole R., Bonita R., Kjellstrom T. (1993), *Podstawy epidemiologii*, Instytut Medycyny Pracy, Łódź.

Cook I.G., Halsall J. (2012), *Aging in Comparative Perspective: Processes and Policies*, Springer Science & Business Media.

Danaei G., Singh G.M., Paciorek K.J., Lin J.K., Cowan M.J., Finucane M.M., Farzadfa F., Stevens G.A., Riley L.M., Lu Y., Rao M., Ezzati M. (2013), *The Global Cardiovascular Risk Transition: Associations of Four Metabolic Risk Factors with Macroeconomic Variables in 1980 and 2008*, "Circulation", no. 127, pp. 1493–1502, doi: 10.1161/CIRCULATIONAHA.113.001470.

Farrell C. (2010), *Mental Disorders*, ABDO Publishing Company, North Mankato.

Ferrante J. (2014), *Sociology: A Global Perspective*, Cengage Learning, Stamford.

http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA–13–028 [accessed: 25.06.2016].

http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Standardised_death_rate_(SDR) [accessed: 25.06.2016].

Kotarski H. (2013), *Kapitał ludzki i kapitał społeczny a rozwój województwa podkarpackiego*, Wydawnictwo Uniwersytetu Rzeszowskiego, Rzeszów.

Labarthe D. (2011), *Epidemiology and Prevention of Cardiovascular Diseases: A Global Challenge*, Jones & Bartlett Publishers, Sundbury.

Link K. (2007), *Understanding New, Resurgent, and Resistant Diseases: How Man and Globalization Create and Spread Illness*, Greenwood Publishing Group, Westport, London.

Marmot M.G., Elliott P. (2005), *Coronary Heart Disease Epidemiology: From Aetiology to Public Health*, Oxford University Press, Oxford.

Moran P. (1950), *Notes on Continuous Stochastic Phenomena*, "Biometrika", vol. 37, pp. 17–23.

Offer A. (2006), *The Challenge of Affluence: Self-Control and Well-Being in the United States and Britain Since 1950*, Oxford University Press, Oxford.

Porta M. (2008), *A Dictionary of Epidemiology*, Oxford University Press, Oxford.

Report of Eurostat's task force: Revision of the European Standard Population 2013, http://ec.europa.eu/eurostat/documents/3859598/5926869/KS-RA–13–028-EN.PDF/e713fa79–1add–44e8-b23d–5e8fa09b3f8f [accessed: 25.06.2016].

Scott S., Duncan C. (2007), *Return of the Black Death: The World's Greatest Serial Killer*, John Wiley & Sons, Chichester.

Suchecki B. (ed.) (2010), *Ekonometria przestrzenna*, Wydawnictwo C.H. Beck, Warszawa.

Tobler W. (1970), *A computer movie simulating urban growth in the Detroit region*, "Economic Geography", vol. 46(2), pp. 234–140.

Tsuang M.T., Tohen M., Jones P. (2011), *Textbook of Psychiatric Epidemiology*, John Wiley & Sons, Chichester.

WHO Report: ATLAS on Substance Use (2010), Chapter 1: *Psychoactive substance use: epidemiology and burden of disease*, http://www.who.int/substance_abuse/publications/treatment/en/ [accessed: 25.06.2016].
WHO Report: Global Report on Urban Health (2016), http://www.who.int/kobe_centre/publications/urban-global-report/en/ [accessed: 25.06.2016].
WHO Report: Global status report on noncommunicable diseases 2010 (2011), http://www.who.int/nmh/publications/ncd_report2010/en/ [accessed: 25.06.2016].

Podejście przestrzenne do modelowania wybranych chorób cywilizacyjnych

Streszczenie: Od lat kraje rozwinięte borykają się z epidemią wysokiego ciśnienia krwi, cukrzycą, podwyższonym poziomem cholesterolu, czynnikami ryzyka związanymi z chorobami serca i układu krążenia, ale także z szeregiem zaburzeń psychicznych, począwszy od depresji, stanów lękowych, aż po stany kompulsywne. Te zagrożenia wiązano zazwyczaj z zamożnością kraju, jednak do 2008 roku związek między dochodem narodowym a chorobami cywilizacyjnymi nie miał jasnego potwierdzenia w literaturze przedmiotu. Co więcej, według Danaei nie stwierdzono żadnej zależności między dochodem narodowym a ciśnieniem krwi u mężczyzn, u kobiet zaś ciśnienie krwi było nawet wyższe w krajach biedniejszych. Celem niniejszego artykułu jest przeprowadzenie pogłębionej analizy tej korelacji z użyciem narzędzi ekonometrii przestrzennej. Aspekt przestrzenny rozpowszechnienia chorób cywilizacyjnych nie wydaje się oczywisty, a zgodnie z naszą wiedzą nie jest szeroko opisywany w literaturze. Nasza analiza dotyczy procesów przestrzennych wybranych chorób cywilizacyjnych w regionach Unii Europejskiej. Badanie obejmuje 261 regionów NUTS 2 w latach 2003–2010. Stanowi ono analizę przestrzenną chorób układu krążenia oraz chorób psychicznych. Prezentowane w artykule podejście z zastosowaniem ekonometrii przestrzennej może stanowić istotny wkład w rozwój dziedziny epidemiologii chorób cywilizacyjnych.

Słowa kluczowe: choroby cywilizacyjne, zdrowie, rozwój społeczno-ekonomiczny, przestrzenny model ekonometryczny, przestrzenny model Durbina

JEL: I14, I15, O18, C23

Received: 2016-09-10; verified: 2017-05-12. Accepted: 2017-11-03