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The standard of living and its spatial differentiation in border districts of eastern Poland

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Abstract: The aim of the study was to evaluate the spatial diversity in living standards in the districts, which are the eastern border of the European Union. The variables of demography, housing, social and economic infrastructure, as well as access to culture and tourism were into account. The study included 25 counties Polish of the four provinces (Warman-Masurian, Podlaskie, Lublin and Subcarpathian). To assess the spatial differentiation in standard of living the cluster analysis (Hellwig method) was used, (using data for 2005 and 2012). The study shows that the highest standard of living has become the participation of the inhabitants of Podkarpackie districts (Krosno, Jaroslaw, Sanok), and the lowest recorded in the counties Hajnówka, Hrubieszów and Sejny. It was also noticed that only minor changes were observed in the ranking list, and synthetic indicator of the standard of living was relatively low.

Keywords: standard of living, district, eastern border of the EU
JEL codes: I31, J10, D63, R11

1. Introduction[1]

Among the multitude of problems that contemporary economy deals with, studies on social and economic well-being occupy an important position because of the constantly changing economic reality and the consequences it bears on the living standard of people. Well-being, the main objective of the state's economic policy, is gaining importance, which reflects itself in detailed

[1] The study under the framework of PRELUDIUM 2 titled „The housing situation in Poland as an indicator of disproportions in the standard of living". The project was funded by the National Science Centre, by decision No DEC-2011/03/N/HS4/03223

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analyses on every level of data aggregation and on every level of administrative divisions (Stec, 2008: 99-118; CBOS, 2010: 2-12; *Zróżnicowanie regionalne…*2010, Sobala-Gwosdz 2004, Kozera 2011: 123-133; Mierzyńska, 2011: 287; Gotowska and Jakubczak, 2012: 3-8). What makes such analyses extremely difficult is the multidisciplinary nature of research (Veenhoven, 2000: 2-20; Diener and Seligman, 2004: 22; Biernacki, 2006: 115-124; Turek, 2012: 9-21; Drabsch, 2012: 3-8). The primary obstacle is the lack of an unambiguous definition of the living standard[2].

Another difficulty arises from the fact that Poland demonstrates considerable spatial differentiation. The provinces which belong to the so-called East Wall, i.e. Warmian-Masurian, Podlaskie, Lublin and Subcarpathian (*województwo warmińsko-mazurskie, podlaskie, lubelskie, świętokrzyskie* and *podkarpackie*) struggle with numerous social and economic problems. The relatively low level of urbanization, difficult labour market, low social infrastructure level as well as high emigration necessitate an extremely careful monitoring of the living standard among residents in these regions (Pomianek, 2010: 227-239; Lęcznar, 2008: 152-159). Among the analyzed aspects is the borderline location of some of the districts within the above provinces. Research shows (Kawałko, 2008: 621; Komornicki and Miszczuk, 2011: 68-83) that the location close to the state's border is both a barrier and a stimulating factor. An event which contributed to the social and economic context was Poland's accession to the EU, with one of its principal aims being future convergence and cohesion of the whole territory of the European Community (the European Commission 2010: 254-259). In Poland, this aim particularly applied to the regions described herein.

Considering the above, the purpose of this study was to perform spatial analysis of the differentiation in the living standard in the border districts[3] of Poland's eastern provinces, using

[2] Literature does not provide us with one, widely accepted definition of the standard of living. At first, the standard of living was even equated with the quality of life [Zienkowski, 1979: 71]. The definition by J. Drewnowski (1966:60) is quite broadly accepted: '*the standard of living is the degree to which the needs are satisfied through goods, services and living conditions, available to a population of poeple in a time unit'*. A comprehensive review of definitions of the living standard can be found in (Zeliaś et al., 2004: 14-25). At present, having completed numerous analyses, it is commonly believed that studies on the living standard should deploy quantitative methods, and research on the quality of life can be successfully completed only through qualitative (subjective) methods. In recent years, the dominant approach has been to study well-being, which combines elements of the quality of life and standard of living (Drabsch, 2012: 3-8; Turek 2012: 9-21).

[3] The living standard was analyzed in 25 districts within 4 provinces; these were 5 districts in the Warmina-Masurian-Province (Braniewo, Bartoszyce, Kętrzyn, Węgorzewo and Gołdap), 7 in the province of Podlaskie (Suwałki, Sejny, Augustów, Sokółka, the rural district of Białystok, Hajnówka, Siemiatycze), 5 in the Province of Lublin (BiałaPodlaska, Włodawa, Chełm, Hrubieszów, TomaszówLubelski), and 8 in the Subcarpathian Province

the cluster analysis. The analysis comprised the years 2005 and 2012 so as to capture the changes which occurred in the given area within a few years after Poland's accession to the European Union. The Hellwig's model method was applied to achieve a synthetic view of differences in the living standard. Afterwards, the regions were classified into four groups, according to the synthetic value of the calculated coefficient.

2. Methodology

The living standard was evaluated with the so-called synthetic development index, which allows an easy presentation (with just one numerical value) of regional variation in the living standard, which nonetheless encompasses several social and economic categories. This is achieved through the transformation of a multi-dimensional set of variables to one numerical value, most frequently fitting in a predefined range. Next, the achieved numerical values are put in order, which enables the analyst to estimate mutual positions of individual regions. The final step is to classify regions into four groups, using for this aim the previously calculated development index value as well as basic statistical measures.

Having selected the diagnositc characteristics, the next step in the research was taken, which consisted in unitarization. This enabled us to reduce variables (often expressed in different units) to a comparable form (in our case, to values from the 0 to 1 interval), using the following formula:

$$z_{ij} = \frac{x_{ij} - \min_i\{x_{ij}\}}{\max_i\{x_{ij}\} - \min_i\{x_{ij}\}}$$

where:

z_{ij} – unitarized value of the j-th variable for the i-th object,

x_{ij} – vaue of the j-th variable for the i-th object.

Following the assessment of the nature of each of the variables included in the study, which consisted in the identification of stimulants and destimulants, the latter type required

(Lubaczów, Jarosław, Przemyśl, Ustrzyki Dolne, Lesko, Sanok, Krosno and Jasło). Admittedly, among the the analyzed districts in the latter province there were also the ones which do not actually belong to the East Wall, as they border with Slovakia to the south. However, since the Subcarpathian Province is considered as one of the province of Eastern Poland, it was assumed that all the border distrcts in this province should be analyzed. Nonetheless, these districts were marked with an asterisk (*) in tables and rank lists.

a stimulation process, i.e. transformation of destimulants into stimulants, so that the direction of action produced by all the variables was the same, and higher values of the produced synthetic index inform us about a higher standard of living. For this aim, the following stimulation formula was used (Walesiak, 2006: 18):

$$x_{ij} = a - bx_{ij}^{D}$$

where:

j - variable,

i – research object (region),

a, b – constants presumed arbitrarily: b = 1, a = $\max_i\{x_{ij}^{D}\}$,

x_{ij}^{D} – value of the j-th destimulant in the ith object.

The subsequent step was to distinguish coordinates of a model object, composed of the most favourable values of individual variables observed in particular administrative districts:

$$z_{0j} = \begin{cases} \max\limits_{i}\{z_{ij}\} \; for \; z_j^S \\ \min\limits_{i}\{zij\} \; for \; z_j^D \end{cases}$$

Next, distances were computed for each district relative to the model, using an Euclidean distance matrix in the following form (Panek, 2009: 69):

$$d_{i0} = \sqrt{\sum_{j=1}^{m}(z_{ij} - z_{0j})^2}$$

where:

d_{i0} – distance from the object to the model

z_{ij}– value of the normalized variable j for the i-th

z_{0j}– coordinates of the model object for the j-th

The penultimate step was to determine values of the synthetic coefficient, which served to put in order all analysed districts in terms of the living standard. The calculations employed the following formulas (Panek 2009: 69):

$$s_i = 1 - \frac{d_{i0}}{d_0}, \; d_0 = \bar{d}_0 + 2S(d_0), \; \bar{d}_0 = \frac{1}{n}\sum_{i=1}^{n} d_{i0}, \; S(d_0) = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(d_{i0} - \bar{d}_0)^2}$$

where:

S_i– the synthetic measure of development,

d_{i0} – the distance of the object to the model,

$\bar{d}$– the arithmetic mean $d_{0,}$

$S(d_0)$ – standard deviation d_0.

The last step in the analysis, after all the districts had been ordered in terms of the living standard they provided, was the classification of the regions into four clusters, according to the achieved synthetic index. The classification corresponded to the following intervals:

Class 1: $w_i \in \left[\overline{w} + s_w, 1\right]$,

Class 2: $w_i \in \left[\overline{w}, \overline{w} + s_w\right)$,

Class 3: $w_i \in \left[\overline{w} - s_w, \overline{w}\right)$,

Class 4: $w_i \in \left[0, \overline{w} - s_w\right)$.

where:

w_i – the synthetic index,

$\overline{w}$ - mean value of the synthetic index,

s_w - standard deviation of the synthetic index.

Based on the selected variables, analysis of the variation of living standard was performed, in which the Hellwig's method was employed. The produced values of the synthetic development index enabled us to put the districts in the linear order reflecting the intensity of the analyzed phenomenon.

3. Selection of diagnostic variables

When creating a synthetic measure of development, which will describe the spatial differentiation of the living standard, the first step of the taxonomic research is the selection of diagnostic

characteristics. It should be underlined that this is the most subjective[4] research stage because it requires the researcher the select such features that will best characterize a given phenomenon. The selection of diagnostic variables to calculate the synthetic index was therefore based on subject-related criteria and on formal and statistical data. The variables chosen in this preliminary procedure shared the following properties (Zeliaś et al., 2000: 37-38): they are commonly accepted, highly valuable in terms of the subject matter, measurable, possess well-accessible sets of data of relatively high quality, and are derived from a review of literature. The variable were made relative in respect to the number of residents in order to reduce the impact of the region's size on the achieved values of the variables.

The research sample comprised statistical data regarding the standard of living in 25 administrative districts lying in the provinces of Eastern Poland. The indices submitted to our analysis are measurable and reliable, as the data were derived from official publications of the Central Statistical Office in Poland (The Local Data Bank). The comparative analysis was run for the years 2005 and 2012 as the data available for these years were most complete.

The selected variables cover many areas of life, including demographic data, housing conditions, labour market, social and cultural infrastructure, nature conservation as well as financial indices measured on the level of each district. Some of potentially useful variables had to be eliminated at the stage of preliminary selection. The reason was the incompleteness of sets of data for some districts or, in other cases, aggregation of data on the NTS 4 level was impossible due to some organizational and formal considerations.

The subsequent selection stage was to perform formal and statistical tests, with the aim of eliminating poorly ($V<10\%$) spatially differentiated or else excessively correlated variables. Excessive correlation implicates a risk of multiplication of same information about the analyzed objects. A final set of variable data achieved through described, for example, the spatial variation of the living standard in districts lying in the Warmian-Masurian Province, based on the variables shown in table 1.

[4] To minimize the arbitrary character of the selection of variables and, on the other hand, wishing to continue the previously started reserach, the author used the sets of data employed before, for example in studies reported in (Sompolska-Rzechuła, 2007: 264-265) and (Zeliaś et al., 2000: 46).

Table 1. Final variables chosen for the study

Lp.	Variable
1	Population density per 1 km^2
2	Index of migration between districts and foreign immigration per 1,000 popluation
3	Natural growth rate per 1,000 population
4	Expenses from the district budget per 1 resident (in PLN)
5	Registered unemployment rate in %
6	Domestic business entities registered in the REGON per 10,000 population
7	Dwellings completed per 1 000 population
8	Average usable floor space per dwelling in m^2
9	Dwellings with bathrooms in villages as % of total number of dwellings
10	Population using WTP as % of the total population
11	Public roads with hardened surface per 100 km^2 in km
12	Tourist accommodation (beds) per 1,000 population
13	Collection lendings per borrower in vol.

Source: Author's own elaboration

The first three variables can be categorized as being of demographic nature. Most of the analyzed districts had similar population density, oscillating around 30-50 persons per 1 km^2. Against that backdrop, three districts stood out: the District of Jasło, Krosno and Jarosław, where the population density was much above 100 persons/1km^2 (tab. 2). The population density rate was fairly stable, with minimal differences discernable between 2005 and 2012.

All the provinces lying in Eastern Poland struggle with the problem of population outflow. Most districts, in particular rural ones, observed steadily progressing depopulation. This tendency was verified in our study, except two districts: the Rural District of Białystok and the Rural District of Krosno, which recorded a positive population growth in both 2005 and 2012. This seems to be connected with the widespread tendency to settle down in the vicinity of a leading urban centre in a given region, but not in a city itself. Both Białystok and Krosno are capitals of important urban districts. The least favourable population density values were noted in the region of Warmia and Mazury, where depopulation struck most severely the districts of Braniewo, Bartoszyce and Kętrzyn (tab. 2). At this point, it should be added that the strong population outflow in 2005 was associated with mass migration among young people after

Poland's accession to the EU. However, rather than declining, the rate of migration increased in some areas of the investigated parts of Poland between 2005 and 2012.

The birth rate in Poland is steadily decreasing, so that the population growth oscillates around zero. Interestingly, Subcarpathian Province, where the traditional model of family is deeply rooted, scored one of the highest birth rate values. Most of the examined districts in the Subcarpathian Province had a positive population growth rate (tab. 2). Podlaskie was found at the other extreme end, as all its districts recorded negative scores on this index. Notably, each subsequent year brought about a decrease in the population growth in most of the regions, which corresponded to the countrywide tendency in this respect.

In contrast, the passing of time had a beneficial effect on the financial indices in the analyzed communes and districts. The budgetary spending per head in each district clearly increased in every province between 2005 and 2012. The mutual positions of the regions did not change much, but the increments in the budgets sometimes reached 50% of the values noticed in 2005 (tabs 2 and 3). This would not have been attainable without the district authorities competing for the EU funds specifically dedicated to Eastern Poland.

As mentioned in the introduction, problems on the labour market are among the factors responsible for polarization of the living standard. The vast majority of the districts recorded very high unemployment rates, in some cases (in the Warmian-Masurian Province) as high as nearly 40%. And although the situation in 2005 was relatively worse than in 2012, it continued to be worrying and should be looked into deeply by those responsible for the labour policy in Poland. To be fair, the transborder areas develop a very strong 'grey zone', which may have slightly falsified the picture of the actual employment in those districts.

Table 2. Variables used in the analysis (data for 2005)

District	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
BiałaPodlaska	41	-40,4	-172	470,43	17,5	473	1,99	137,2	60,7	28,18	45,7	5,91	22,9
Chełm	41	-23,8	-38	809,94	22,3	344	1,40	134,3	60,8	24,02	48,2	7,58	18,0
Hrubieszów	54	-68,3	-248	430,46	18,8	552	1,23	115,6	52,6	40,57	68,5	1,92	20,0
TomaszówLubelski	60	-55,3	-127	500,54	18,9	689	1,02	137,7	64,5	31,77	58,6	12,19	16,6
Włodawa	32	-62,1	-232	536,68	22,7	567	1,61	122,1	66,3	59,99	27,1	88,87	18,1
UstrzykiDolne*	20	-69,2	59	836,88	29,1	923	0,67	166,7	79,5	46,77	30,1	66,55	17,4
Jarosław	119	-20,1	169	537,24	19,8	642	1,34	111,4	76,3	65,81	70,0	5,98	19,3
Jasło*	139	-23,5	14	344,30	22,0	589	1,11	121,1	78,5	38,28	75,1	2,98	17,7
Krosno*	119	8,4	135	585,94	21,2	583	2,10	138,2	81,0	54,76	74,0	11,56	15,6
Lubaczów	44	-50,7	36	979,06	22,4	444	1,50	143,2	85,3	49,23	38,2	15,58	18,9
Przemyśl	58	13,7	-30	640,01	22,7	466	2,18	133,2	77,0	31,74	49,6	7,41	15,3
Sanok*	77	-14,5	17	797,21	18,3	664	2,09	116,6	79,7	54,85	36,2	8,94	16,9
Lesko*	32	-29,8	12	289,83	26,5	946	1,43	133,9	74,8	16,88	25,3	159,71	15,6
Augustów	36	-15,0	-293	482,20	20,2	737	3,34	94,1	65,4	54,33	28,4	55,72	19,4
Rural District of Białystok	47	71,2	-277	528,94	17,3	604	4,73	143,1	52,7	47,14	39,2	6,32	24,1
Hajnówka	30	-60,3	-335	610,84	12,0	677	1,69	128,2	54,2	62,16	29,5	15,66	18,2
Sejny	25	-16,4	-279	584,72	23,4	561	1,77	158,0	52,0	30,30	26,1	24,70	20,3
Siemiatycze	33	-29,9	1	600,60	9,8	493	1,29	135,0	68,3	30,59	45,3	3,24	19,2
Sokółka	35	-67,0	-2	630,80	16,9	472	1,03	136,3	72,4	44,01	42,1	1,78	14,3
Suwałki	27	-49,9	28	480,03	14,7	456	2,24	156,1	76,2	22,36	42,5	41,13	19,6
Bartoszyce	47	-74,9	41	652,89	38,7	563	1,56	60,0	75,1	60,82	37,1	6,14	20,3
Braniewo	36	-70,2	55	601,71	39,1	667	0,23	111,5	82,5	68,85	31,2	15,48	20,5
Kętrzyn	55	-80,8	8	983,04	33,5	630	1,09	91,3	71,3	63,99	37,5	10,48	24,0
Gołdap	35	-39,9	25	618,16	37,4	756	1,07	158,5	73,1	68,26	27,8	26,76	20,6
Węgorzewo	34	-15,3	-49	852,51	38,2	623	3,41	85,5	72,2	57,35	33,0	39,17	26,1

Source: Author's own elaboration

Table 3. Variables used in the analysis (data for 2012)

District	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
BiałaPodlaska	41	-41,0	-89	674,67	16,0	551	2,98	123,3	68,0	42,2	52,1	7,74	22,6
Chełm	42	-30,5	-53	1482,47	19,6	432	2,16	135,1	69,7	26,3	57,7	1,72	17,9
Hrubieszów	53	-85,7	-207	717,13	20,3	603	0,90	132,1	63,7	43,2	78,5	2,20	17,2
TomaszówLubelski	59	-62,0	-187	765,19	15,8	744	1,20	111,8	71,5	41,7	69,7	8,31	18,7
Włodawa	32	-52,0	-172	1063,55	24,6	672	1,88	118,3	72,6	63,7	30,6	60,63	19,2
UstrzykiDolne*	20	-34,8	15	1293,03	24,3	971	1,39	152,8	87,2	47,2	22,3	89,10	17,0
Jarosław	119	-30,9	70	930,54	19,4	667	2,39	117,0	81,1	76,8	79,2	5,48	19,0
Jasło*	139	-23,1	63	624,72	18,9	667	1,17	120,9	83,0	57,8	91,8	6,83	18,5
Krosno*	121	-6,1	142	1080,89	19,5	643	2,28	132,9	85,3	68,9	82,7	24,75	16,6
Lubaczów	44	-54,4	-9	1142,51	18,0	538	2,44	119,3	91,0	66,5	44,0	14,23	18,3
Przemyśl	61	7,6	48	1193,30	20,7	511	3,64	134,4	82,8	50,0	59,7	6,34	14,7
Sanok*	79	-32,3	-64	1156,49	13,2	711	1,54	149,0	84,7	68,4	39,5	8,90	16,8
Lesko*	32	-38,1	69	484,62	23,0	1018	2,68	159,8	82,4	54,2	26,9	230,72	18,2
Augustów	36	-27,9	-158	726,21	19,4	702	2,04	149,5	73,2	58,4	37,4	42,01	21,5
Rural District of Białystok	49	53,4	-244	769,86	18,4	776	4,61	136,5	57,7	57,4	43,8	8,17	24,1
Hajnówka	28	-48,0	-373	908,41	13,6	643	2,91	113,8	60,4	67,6	35,8	27,33	21,0
Sejny	25	-28,3	-219	929,43	20,4	563	2,19	133,7	60,2	30,9	44,3	36,86	23,3
Siemiatycze	32	-55,0	-18	942,74	10,3	545	1,93	153,8	74,6	37,7	54,7	6,99	17,6
Sokółka	35	-65,7	-40	985,29	17,1	529	1,53	177,9	79,5	47,9	45,3	3,47	15,7
Suwałki	28	-33,6	6	779,98	10,8	500	3,13	172,3	83,3	24,4	47,0	26,63	21,1
Bartoszyce	46	-83,5	36	1034,17	29,8	660	1,12	108,0	80,7	68,8	37,6	4,53	23,6
Braniewo	36	-87,2	71	918,52	31,5	673	0,86	139,9	87,0	69,9	33,7	8,84	20,3
Kętrzyn	55	-63,8	-67	1667,31	30,2	683	2,17	82,5	80,1	76,7	41,4	11,36	29,0
Gołdap	36	-47,3	8	950,32	25,2	791	1,85	124,3	75,9	75,9	30,1	27,62	19,5
Węgorzewo	34	-34,3	-50	965,29	30,3	704	6,17	75,6	77,4	64,4	35,3	40,55	23,4

Source: Author's own elaboration

The labour market can be positively affected by the awoken spirit of entrepreneurship and changes in the way local populations earn a living. Statistics show that the number of business entities registered in the REGON system rose in 2005-2012 (tab. 3). This increase occurred practically in every province or district, which in the long run can contribute to the betterment of the financial situation of communities living there.

The housing situation in Poland is among the worst in the whole European Community. Dwellings in Poland are small and generally overcrowded. The standard of housing in the EU15 seems unattainable for an average Polish resident. However, some significant changes have taken place over the last fifteen years or so. New flats (especially in Subcarpathian) are significantly larger than the Polish average. On the other hand, there are just 2 new flats built every year per 1,000 people in Poland, which preserves the housing deficit in our country. There was a gradual increase in the percentage of flats and houses in rural areas equipped bathrooms[5], showing that the housing conditions of local populations have been improving.

During the analyzed time interval, there was also a large increase in the percentage of households connected to wastewater treatment plant. Obviously, the exact values were demonstrably different from the ones noted in towns, which oscillated around 100%. In most cases, the rural character of development made it difficult to achieve similar results in the analyzed districts, where – in extreme cases – just one in four households in 2012 was connected to a WTP (the districts of Chełm and Suwałki).

A well-developed road infrastructure successfully binds the whole transportation network. It helps people to travel, thus stimulating mobility, including the mobility of labour force. The road infrastructure composed of a grid of hardened surface public roads did not look so well in the analyzed regions. This undoubtedly had impact on the peripheral character of the regions included in the research. All available statistical information suggests that the transportation network in Easter Poland is less developed than elsewhere in the country. The given data places the analyzed districts on the last positions in countrywide statistics, with the mean values of 35-50 km per 100 km^2 of the surface area. And although these statistical results increased in the 2005 to 2012 time period, there is still room for further improvement.

[5] The 'bathroom' criterion in the mid-20th century was a significant component in constructing the synthetic indicator of the living standard in Europe, created according to the Geneva (distance) method (cf. Andrycz, 1996: 22).

These analyses on the living standard also dealt with the access to culture and tourism. During the examined period, the number of accommodation places (beds for tourists) increased in nearly every district. The leading districts were the ones situated in regions which are popular tourist destinations, such as the Bieszczady Mountains in the Subcarpathian Province, or the Great Masurian Lakes in the Warmian-Masurian and Podlaskie Provinces. The last places were occupied by districts in the Province of Lublin, both in the first and the last year of the analyzed period.

The library resources were most actively accessed by residents living in the Rural District of Białystok, and in most of the districts of the Warmian-Masurian Province. In general, the readership indices were not positive and corresponded to the overall tendency for a declining number of books read in whole Poland. The average values for all the analyzed districts were about 20 books borrowed per 1 reader (tab. 3).

In the whole catalogue of variables (tabs 2 and 3), there were just 2 variables (X_1, X_5) classified as destimulants[6] of the living standard, while the others were considered to be stimulants[7] of the social and economic growth.

4. The cluster analysis of the spatial variation in the standard of living

The comparative cluster analysis led to the comuptation of a synthetic index of the living standard in each of the 25 border districts in Eastern Poland. The cluster analysis was conducted for the years 2005 and 2012 in order to compare changes in the standard of living over the stretch of those years. The application of the above method enabled us to classify the districts into four clusters, characterised by significantly different values of the synthetic index. The final results are presented in table 4[8] and figure 1.

[6] A destimulant is such a variable which deteriorates the state of the analyzed phenomenon (here, the living standard) as it increases.

[7] That is the variables whose increase improves the situation within the analyzed scope (here, increases the standard of living).

[8] The table contains classification of the districts from the highest value of the synthetic index in 2012. The following columns present values for 2005, which gives us an image of changes in particular provinces and districts. As stated in the introduction, the districts in the Subcarpathian Province which border with Slovakia in the south of Poland are marked with (*).

Table 4. Rank list of districts according to the value of the synthetic index

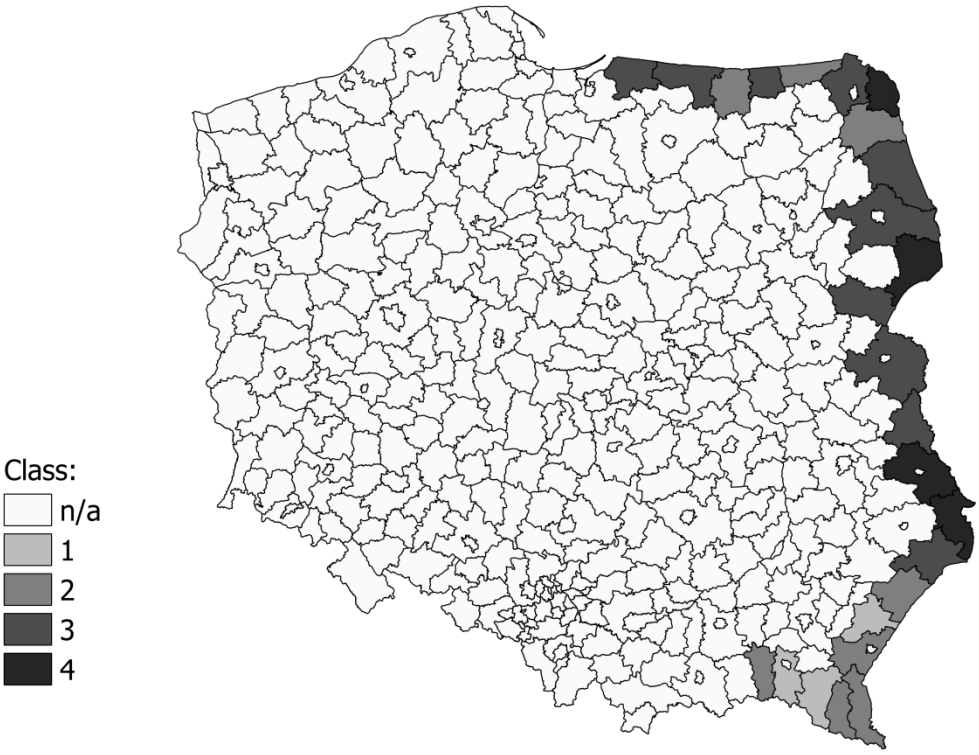
No	District	Province	Rank list in 2012	Rank list in 2005	Value of index in 2012	Value of index in 2005	Class in 2012	Class in 2005
1	Krosno*	Subcarpathian	1	2	0.277	0.294	1	1
2	Jarosław	Subcarpathian	2	1	0.275	0.318	1	1
3	Sanok*	Subcarpathian	3	3	0.217	0.261	1	1
4	Jasło*	Subcarpathian	4	6	0.195	0.204	2	2
5	Lesko*	Subcarpathian	5	22	0.190	0.073	2	4
6	Lubaczów	Subcarpathian	6	4	0.182	0.226	2	1
7	Kętrzyn	Warmian-Masurian	7	7	0.153	0.200	2	2
8	Przemyśl	Subcarpathian	8	14	0.146	0.135	2	3
9	Ustrzykidolne*	Subcarpathian	9	5	0.141	0.206	2	2
10	Augustów	Podlaskie	10	15	0.141	0.129	2	3
11	Gołdap	Warmian-Masurian	11	10	0.138	0.160	2	2
12	Węgorzewo	Warmian-Masurian	12	8	0.117	0.181	3	2
13	Suwałki	Podlaskie	13	9	0.116	0.169	3	2
14	Siemiatycze	Podlaskie	14	12	0.114	0.140	3	3
15	Bartoszyce	Warmian-Masurian	15	19	0.112	0.090	3	3
16	TomaszówLubelski	Lublin	16	11	0.109	0.156	3	2
17	BiałaPodlaska	Lublin	17	17	0.107	0.109	3	3
18	Włodawa	Lublin	18	13	0.104	0.136	3	3
19	Sokółka	Podlaskie	19	16	0.099	0.110	3	3
20	Braniewo	Warmian-Masurian	20	18	0.086	0.108	3	3
21	Rural District of Białystok	Podlaskie	21	23	0.065	0.072	3	4
22	Chełm	Lublin	22	21	0.053	0.074	4	3
23	Hajnówka	Podlaskie	23	24	0.047	0.067	4	4
24	Hrubieszów	Lublin	24	20	0.036	0.083	4	3
25	Sejny	Podlaskie	25	25	0.022	0.004	4	4

Source: Author's own elaboration

The above classification facilitated the identification of areas with different levels of the living standard. The first (best) group included districts with the synthetic index value above 0.196, i.e. the districts of Krosno, Jarosław and Sanok. The second (above average) group comprised the total of 8 districts with the index value between 0.131 and 0.195. The third cluster aggregated ten districts with the living standard assigned the synthetic index from 0.063 to 0.130 (below average). The last class, with the synthetic index score less than 0.062, was composed of 4 districts.

A detailed analysis of the living standard in the border districts of Eastern Poland is intriguing and far from generating obvious results. Overall, the most important finding was the fact that all values of the synthetic index were low, which certainly implicated a relatively lower standard of living there than in the major centres which attract the Polish population. The highest score (about 0.277) of all the analyzed communities was recorded in the District of Krosno, while the lowest one was computed for the District of Sejny (barely 0.022). It should be added that the highest standard of living was determined in the Subcarpathian Province, in which 8 districts occupied the 9 highest positions on the rank list, including the first six places. It seems, therefore, that against the background of the other provinces in Eastern Poland, Subcarpathian was the best place to live. Comparison of provinces demonstrates that the Province of Lublin was at the other extreme end, and one of its districts, the District of Tomaszów, was on the 16th position in the rank list drawn for the year 2012 (tab. 4).

Figure 1. Class of districts according to the value of the synthetic standard of living index in 2012



Source: Author's own elaboration

Of particular importance is the fact that, although the synthetic index scores were within a broader interval in 2005, the standard of living in those regions directly after Poland's accession to the EU was higher than in 2012. This questions the EU's cohesion policy, which failed to succeed in the analyzed parts of Poland[9]. In 2012, the synthetic index exceeded the value of 0.2 in just three districts, whereas in 2007, seven districts achieved that treshold.

The two leading districts, Krosno and Jarosław, offered the living standard much above that available in the other districts. The analysis of partial data enabled us to conclude that the

[9] It is worth recalling that the multi-faceted nature of studies on the living standard and constituent parts as well as some degree of the author's subjectivity when selecting variables have some impact on the final results. Studies on the living standard frequently highlight the fundamental difficulty in constructing a set of variables, where different catalogues of variables may generate different values of the synthetic index and therefore different positions of particular geographical units.

above result was attained mainly owing to relatively high values of the population density index, population growth rate and high levels of expenditure per capita from the district's budget. In the remaining cases, the contributory values typically surpassed the average values for the analyzed regions. Another significant factor was the close vicinity of strong urban centres in the mentioned districts (the towns Krosno and Jarosław), as it is generally agreed that town residents have relatively better chances to satisify many of their needs, more easily available and of better quality (health services, urbanization, participation in cultural life). For the sake of clarity, it needs to be added that the District of Krosno and other leaders in the rank, the Districts of Sanok, Jasło and Lesko, lie along the southern border of Poland, which may indicate that the inhabitants of the easternmost areas of our country generally have a lower standard of living.

Against this backdrop, the Warmian-Masurian Province made quite a good impression. The highest standard of living, among the districts lying within its boundaries, was achieved by the District of Kętrzyn, which had the leading position in 2012 in terms of finances (expenditure per capita), participation in cultural life (book rentals per 1 reader) or basic sanitary and technical facilities in households. The other districts (Braniewo, Bartoszyce, Gołdap, Węgorzewo) were characterized by moderate values of the partial indices. It is noteworthy that all the districts from this province included in our analysis had distinctly the highest unemployment rate. In extreme cases, it was almost 40% in 2005 and over 30% in 2012. The unemployment rate was one of the few variables which improved significantly over the analyzed period. A certain stimulus for development, which may have affected the social and sconomic growth of the examined regions was the so-called local border traffic, initiated in 2012 (Dudzińska and Dyner 2013; 2-6).

As mentioned before, the living standard in the districts of the Province of Lublin rarely exceeded the average level observed in the territories submitted to our research. This province has poorly developed tourism industry. It is also characterized by a low level of economic activity among its population (the number of registered businesses) and possesses a very poor sanitary and technical infrastructure (a very low number of household connected to wastewater treatment plants). Likewise, the population density was low. Values of the other analyzed elements oscillated around average scores, which translated into the last positions of the said districts on the rank list. The lowest standard of living was observed in the Districts of Lubaczów and Chełm.

The living standard in the border districts in Podlaskie (relatively poorly populated) was not high either. The distinctly lowest values of the synthetic index were recorded for the District of Sejny (it was close to negative in 2005). In that case, having analysed the partial data, it was concluded that the low rank position of that area was due to the generally low values assigned to almost all components of the analysis. This district was characterized by having scores of nearly all indices below the average, with the biggest disproportions in the demographic and infrastructural indicators. The position of the Rural District of Białystok, located in the vicinity of Białystok, the largest urban centre in all the analyzed regions, might look surprising. It was found that the standard of living among its residents was much lower than in the region's capital city, but also when confronted with the standard of living in most of the border districts included in our study.

5. Conclusion

It needs to be highlighted that the living standard is not a uniform category. The differentiation of this indicator mostly arises from specific characteristics of a given region, its structure and, above all, the social and economic situation. Hence, the purpose of this analysis was to uncover the spatial differences in the living standard in the border districts within the eastern provinces of Poland, and to trace changes in the post-accession time. For this aim, levels of the living standards were analysed as of 2005 and 2012. The standard of living in the analysed area was assessed in the context of demographic, social and economic as well as environmental conditions. The author applied the cluster method to achieve the set aim. Moreover, the subsequent step in the analytical procedure consisted in the classification of the districts to four categories, according to the value of the synthetic index of the living standard.

The analysis of several variables with the aid of the Hellwig's method led to the conclusion that the highest standard of living in 2012 was observed in three districts of the Subcarpathian Province: Krosno, Jarosław and Sanok. These districts were characterized by a relatively high level of investment inputs and a low recorded unemployment rate. The housing conditions in the three districts compared with the whole province were highly satisfying, as the average floor surface area per flat as well as the number of new flats per 1,000 residents ensured

these districts a very high position on the rank list. Values of the demographic indices (population growth, net migration and population density) were also among the highest.

An interesting feature of the analysed objects is that they were somehow stabilized, which manifested itself by very small shifts in the rank lists between 2005 and 2012. Rotations were rather symbolic and concerned shifts by just a few positions, usually within the same cluster (except the District of Lesko, where the standard of living was distincly shifted upwards owing to several investment projects in the local infrastructure). This also proved that there are certain sets of characteristics attributed to individual districts which are extremely difficult to overcome or modify in a significant way. Presumably, should a similar analysis be repeated in five or ten years' time, no bigger shifts could be expected. Demography and all types of infrastructure will continue to play an essential role.

The application of the cluster analysis enabled us to arrange the positions of the districts from the most to the least developed one. The results point to a distance between the living standard in the three best districts: Krosno, Jarosław and Sanok versus the other ones. However, it should be borne in mind that the clusters achieved from our analysis can be debatable and should be seen as such. To a large extent, this is due to the problem such as the selection of suitable indicators for the analysis, which will always be burdened with the author's subjective evaluation in any taxonomic research. The relevant literature underlines that studies on the same phenomenon conducted on different sets of diagnostic characteristics may generate different results.

Notwithstanding the above, diagnosis of the living standard in the regional context and identification of the main features and determinants are an extremely important step from the point of view of the ongoing economic or social policy as well as regional policy (the policy of cohesion) whose aim is to level the differences and to assure an effective development of districts, provinces and the whole country.

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Poziom życia i jego przestrzenne zróżnicowanie w przygranicznych powiatach Polski Wschodniej

Streszczenie

Celem artykułu była ocena przestrzennego zróżnicowania poziomu życia w powiatach, będących wschodnią granicą Unii Europejskiej. Do analizy włączono zmienne z zakresu demografii, mieszkalnictwa, oraz infrastruktury społeczno-gospodarczej, w tym także z zakresu środowiska naturalnego i kultury. Badaniem objęto 25 powiatów województw Polskich wschodniej z czterech województw: warmińsko-mazurskiego, podlaskiego, lubelskiego oraz podkarpackiego. Do oceny przestrzennego zróżnicowania poziomu życia wykorzystano metodę wzorcową Hellwiga, którą objęto 2005 i 2012 rok. Z przeprowadzonych badań wynika, że najwyższy poziom życia stał się udziałem mieszkańców powiatów województwa podkarpackiego (krośnieński, jarosławski, sanocki), zdecydowanie najniższy zaś odnotowano w powiatach hajnowskim, hrubieszowskim i sejneńskim. Zestawiając dwa uwzględnione lata stwierdzić ponadto należy, że zaobserwowano niewielkie zaledwie zmiany w liście rankingowej, a syntetyczny wskaźnik poziomu życia był relatywnie niski. Wydaje się przy tym, że poprawa takiego stanu rzeczy będzie procesem złożonym i długotrwałym. Jednym ze stymulatorów może stać się rozwój infrastruktury.

Słowa kluczowe: poziom życia, powiat, granica, Polska Wschodnia