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GEOGRAPHICAL DISTRIBUTION OF POVERTY IN POLAND

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Abstract: Local indicators of spatial association (acronym: LISA) were used to identify regions of high and low poverty in Poland. Poverty is defined as the percentage of individuals on welfare – mean values for the period 2007–2009. Each region was assigned a name based on location. Twelve indices commonly associated with poverty were analyzed – 4 of the 12 describe financial status, next 4 social and demographic diversity, and last 4 the standard of living. The authors considered the selected indexes and the way they indicate poverty in some regions and are not related to poverty in other regions. The paper concerns cities, suburban gminas and rural gminas.

Keywords: poverty, Poland, LISA

Introduction

The problem of poverty and social exclusion is becoming increasingly apparent in Polish society. The reduction of poverty is a key challenge for national and regional authorities. The index of relative poverty amountes in 2009 17% people. Most them live in small towns and rural areas (*Ubóstwo w Polsce*… 2010). Such geographical distribution of poverty is characteristic of Central and Eastern Europe and stands in contrast to the situation in Western Europe, where poverty is concentrated in large cities, especially in their centers (Domański 2001; Węcławowicz 2003). However, recent American research shows that poverty is slowly migrating to suburbs, due to low-cost housing initiatives run by the government, while inner cities are experiencing gentrification (Sink, Ceh 2011; Kneebone, Garr 2010).

In welfare states and in those aspiring to be, the problem of poverty creates the expectation that the government will cover at least some costs of living. In Poland, 7.8% of households received welfare income from municipal governments in 2008, i.e. 1.1 mln individuals. The profile of households receiving welfare payments differs considerably from that of the average Polish household. While rural households constitute 46% of households living on welfare, they only constitute 34% of all households in Poland (*Beneficjenci*… 2009).

According to 2009 data, the extreme poverty rate in urban areas amounted 4.1% more than twice over that in rural ones. Over 10% of urban residents used welfare benefits, while almost 22% did the of rural ones. The income of 4.6 mln people was classified at a minimal level of the standard of living, while 7 mln people were just above the national poverty line (Łopato 2010; Podstawski 2012).

Average income and the average standard of living have risen steadily over the last 20 years, due of political and economic transformation in Poland. On the other hand, the number of the extremely poor has risen, also did the income gap between geographical regions and that between metropolitan areas and rural ones. The success or failure of cities as local or regional labor markets has created either regions of dynamic growth or those of stagnation. Stagnating regions are usually those where structural problems such as lack of rural development or the decline of traditional industries are accompanied by other negative factors such as low levels of education, depopulation, alcoholism, crime and a long-term unemployment among the young generation. Research on those factors showed that low education level, long-term unemployment and large family top the list of the poverty-inducing ones (Tarkowska 2001).

Purpose and scope of paper

The purpose of the paper was to identify areas with a high concentration of welfare recipients in Poland. The income criterion used to identify welfare recipients is the Welfare Bill of March 12, 2004. Areas of poverty, as defined in the Welfare Bill, are compared with a number of social, demographic, and economic characteristics. The authors have analyze the issue in a variety of ways and using a variety of spatial scales. Areas with a high concentration of welfare recipients and those with a low concentration of welfare recipients are compared in terms of internal characteristics as well as the geographic continuum – city, suburbs, rural areas.

Due to this procedure it was possible to show where welfare benefits were the most common and to identify the relationship between local economic, social and infrastructural development and poverty. In addition, atypical areas are identified in the paper – those with high poverty and low poverty-related indicators and vice versa. Further research is needed in order to find why individuals in presumably high poverty areas do not necessarily apply for welfare benefits.

Sources and organization of data

Poland's Ministry of Labour and Social Policy is the governmental body which mission is to fight against poverty and to solve other basic social problems. The Ministry coordinates the efforts of local institutions such as regional centres for social policy, county family assistance centers, social assistance centers, specialist assistance centers, childcare centers, adoption centers, support centers, and crisis management posts. According to the above mentioned Welfare Bill, poverty is a fundamental basis for applying for welfare benefits in Poland.

The level of income is a basic criterion in the assessment of poverty and can be determined either for a one-person household or for the a multi-person one. The Welfare Bill sets the income threshold and updates it every three years basing on current minimum living costs. Households with incomes below this threshold are chosen for monetary and non-monetary benefits.

The principal source of spatial data on poverty is the registry of households receiving welfare benefits from city and municipal assistance centers. According to the Welfare Bill of March 12, 2004 (*Ustawa*… 2004), welfare benefits are offered to individuals and families affected by poverty. The Division of Statistics, Analysis, and the Budget at the Department of Social Policy and Integration of the Ministry of Labour and Social Policy operates a database of welfare recipients. This database includes data on individuals and families on welfare, the number of family members on welfare, reasons for being on welfare, and other municipal-level data. These data come from MPiPS-3 reports on financial and non-financial assistance.

The number of welfare recipients is sensitive to changes in the national economy. This is especially true of individuals applying for welfare benefits because of poverty, as their net income must be below a national poverty line that changes over time. The paper is based on an average of data from 2007–2009 period. The form of the data provided by the Ministry of Labour and Social Policy is a problem in itself. The available data tables list the number of families and the number of individuals in families receiving welfare but do not contain information on residence. These are available only for census years.

In order to solve this problem, the authors have provided the percentage of individuals in families with at least one welfare recipient. This percentage largely depends on the number of children per family and family size in general, which can distort data in areas with high rates of population increase. It is an imperfect indicator. However, it does reflect the percentage of persons affected by poverty.

In order to determine the level of demographic, social and economic development at the gminas level, twelve indices were selected based on the Central Statistical Office Local Data Bank (www.stat.gov.pl), as shown in Table 1.

Research methods

Local indicators of spatial association (LISA) were used in order to identify areas with either high or low poverty. LISA is a local equivalent to Moran's I, a measure of global spatial autocorrelation, with a proportional sum. Moran's I statistic is fragmented into local clusters with either high or low values. LISA can be used to evaluate geographical areas, models of heterogeneity, atypical areas (hot spots, cold spots), distance correlation, and the decomposition of global measures (Suchecki 2010).

The principal reason behind the use of LISA in this paper is the identification of neighboring gminas similar in terms of the spatial similarity or dissimilarity of a given characteristic, which makes it possible to identify continuous areas of poverty. Gminas grouping models depend on the assigned spatial weight, which describes the extent of

Table. 1. Component variables for comprehensive indices of economic, demographic, and social development as well as the standard of living

Dimension	Data for 2007–2009	Indicator
Economic	entrepreneurship	number of businesses registered in the REGON system per 1,000 residents
	local taxes	personal income tax per 1,000 residents
	unemployment	number of registered unemployed over the age of 15 per 1,000 residents
	employment in agriculture	number of individuals dependent on agricultural income per 1,000 residents
Demographic and social	working age ratio	ratio of the number of persons in working age and that of those in non-working age
	preschool	number of children between the ages of 3 and 6 years attending preschool per 1,000 residents
	education level (2002)	number of individuals over the age of 13 with an elementary education or less per 1,000 residents
	population outflow	number of persons officially leaving the gmina per 1,000 residents
Standard of living	living conditions: apartment overcrowding residential conditions living conditions	average number of persons per room
		average number of square meters of living space per apartment per 1,000 residents
		namber of apartments with a bathroom per 1,000 residents
	access to shopping	number of stores per 1,000 residents

All the indices were calculated for gminas with either high or low poverty rates and were then used to calculate synthetic index.

Source: authors' own work.

similarity with respect to a given characteristic. The authors uses a contiguity matrix based on a criterion of 25 km of distance from the center of each gmina. This distance indicates that poverty is not local and it matches the influence of the job market of small towns. Indices for gminas *i* were calculated using the following formula:

$$I_i = x_i \sum_{j,\, j \neq i}^{n} w_{ij} \cdot x_j \qquad [1]$$

Where:
x_i – is the value of a characteristic in gmina *i*,
w_{ij} – is the weight matrix.

The creation of comprehensive measures (economic, demographic, social, standard of living) is based on the calculation of Perkal indices (*Z-scores*, Perkal 1953) for each of the four comprehensive indices. This method is based on the calculation of standardized values of each given variable using the following formula:

$$U = \frac{x_i - \bar{x}}{s(x)} \quad [2]$$

Where:
x_i – is the value of a characteristic in gminas i,
$\bar{x}$ – is the mean of the set of numbers,
$s(x)$ – is the standard deviation of the set of all gminas.

The calculation of a Perkal index P_i for m variables is based on the summation of appropriate U values for each spatial unit:

$$P_i = x_i \sum_{j=i}^{j=m} U_i \quad [3]$$

The find result is a comprehensive index providing information on each of the selected variables. The higher the value of this index, the better the situation with respect to a particular factor. It is important to note that the variables used to construct a Perkal index should not be strongly correlated with each other ($r > 0.7$), and this has been shown to be the case in this paper.

Poverty as a research field in geography

One of the most popular theories on poverty today links the causes of poverty with geographical site. In other words, the threat of poverty is directly linked to place of residence. Some regions are perceived as better prepared for economic development, while others are weak and unable to follow a successful trajectory (Cotter 2002; Bradshaw 2006). Development usually begins first in already developed regions, while the wearer ones have problems due to the outflow of educated individuals, young people and entrepreneurs (Fitchen 1995; Bański 2002).

This creates a certain self-sustaining mechanism, making the poor region less attractive and more blighted. A spatial mismatch can be observed, whereby a poor region is far removed from job growth and more successful regions. In effect, poverty increases and expands spatially because of the proximity effect. Hence, poverty can be understood as the effect of uneven opportunities for development. They are linked with a variety of factors such as the initial size and diversity of the local job market, transportation networks, and social capital (Blank 2004). A good example of an intrinsically disadvantaged region is that with traditional industry not ready to become modern.

Many American and British geographers have been studying poverty and social deprivation for the last few decades. This research also includes small towns and counties. In the United States, poverty is analyzed at the city or county level based on the percentage of inhabitants whose income falls below a threshold set by the U.S. Federal Government. However, other measures of poverty are also used to assess the concentration of poverty, which is focused on areas with poverty rates at 40% or more (Jargowsky 1997, 2003). In United Kingdom, three basic geographic measures of poverty are used: 1) Jarman Index (Jarman 1983), 2) Castairs Index (Castairs, Mor-

ris 1991), 3) Townsend Index (Townsend *et al.* 1988). Those indices are designed to help understand the situation of the small areas not that of households or individuals.

Each index is based on British census data such as unemployment, car and house ownership, and overcrowded flat. Only some of those indices listed above were used in this paper due to limited amount of data in the GUS Local Data Bank. Therefore the authors had difficulties to create indices identical to British ones.

One of the best factors in explaining poverty is the household income. However, not all countries collect these data and in many permit accessible are only some data or the aggregated ones. That is why the related indices are so useful, because they reflect poverty in an approximated manner and in various spatial scales. Of course, this situation to differences between papers focused on the same geographic area (Harris, Longley 2002). Comprehensive indices calculated for small areas suggest a relationship between poverty and place of residence. It is important to note that they only identify "environmental" determinants of poverty and reflect an approximation characteristics of the individual of poor households (Testi *et al.* 2004). Since poverty research involves administrative units, not closed or isolated in any way, it is necessary to consider neighboring gminas with different rates of poverty.

The position of a household in the job market strongly determines its economic status (*Wielowymiarowa*… 2010). The fight for reduction of the unemployment is in fact that for reduction of poverty. Unemployment abates standard of living, and social status and leads to one's social exclusion (Skóra 2011). The papers focused on geographical differences of the job market in Poland are those by include Witkowski (1994), Budzyński (2003), and Kabaj (2005). Budniowski (2009) explains regional differences in the rate of unemployment and that of poverty in terms of structural changes in the economy and those in post-socialist farm ownership. However, other economic factors are just as relevant like job migrations and illegal labor, are not covered by any statistics. Only a full analysis of related social issues and that of the standard of living would provide a true image of concentrated poverty zones in Poland.

Areas of poverty in Poland

The poverty data obtained by the authors were used to identify zones of high/low poverty in Poland. Local indicators of spatial association were used to consider not only the poverty rate in a given municipality but those in gminas 25 km away. If positive spatial autocorrelation is observed in a given area, then similar objects or units are found near one another in that given area more frequently, than it would be in the case of a purely random situation (high-high relationship). If negative spatial autocorrelation is observed, then dissimilar objects or units are found near one another in this area more frequently, than it would be in the case of a purely random situation (low-low relationship).

This approach allows for the analysis of poverty as the a regional and subregional problem, since the poverty often crosses administrative boundaries and impacts large areas around cities in crisis. This is consistent with the assumption that close proximity to poor gminas can lead to the poverty increase. Figure 1 shows the above listed indices and corresponding levels of statistical significance.

The analysis above was used to identify seven regions with a high concentration of welfare recipients who receive welfare benefits based on their poverty. They were are named "poor regions". Next seven identified regions with a high concentration of individuals not receiving any aid based on poverty. They were called the "prosperous regions" (Fig. 2). Gminas designated as either poor or prosperous are gminas with a statistically significant ($p < 0.05$) autocorrelation between high or low poverty rates and analogous high or low poverty rates for gminas located 25 km away.

The calculations were based on gminas that truly fit the high-high and low-low model and form clear spatial systems, which make it possible to identify regions in terms of cohesion, spatial distinctiveness, and number – at least 15 neighboring gminas per region. This was a critical step in the region identification and not merely local clusters. The authors have made an exception for the Warszawa and Łódź voivodeships by following voivodeship boundaries, and also for Poznań and Eastern Wielkopolska historical regions.

The geographical image of Poland emerging in this paper is the traditional division of Poland into an affluent, urbanized, and rapidly developing West and a traditional and retarded East. Some call it these parts: "Poland A" and "Poland B". Nevertheless, all the prosperous areas are situated in Central and South-Western Poland. This division of Poland in terms of poverty correlates well with the well known division of Poland into metropolitan areas and peripheral ones. The largest cities of Poland have created prosperous zones around, having by a low shores welfare recipients. These metropolitan areas benefit from the overlap of favorable trends associated with residential as well as commercial suburbanization, commuter zones providing access to urban labor markets, and a considerable commercialization of agriculture. They tend to follow growth patterns by F. Perroux (1955).

Poverty in Poland tends to affect peripheral rural areas, especially those of post-socialist state-owned farms, and zones formerly dominated by industrial plants companies were closed. Many industrial employees had worked in such the plants commuting from a number of gminas, especially close to the cities of Radom, Nowy Sącz, Jasło and in the Pomerania region.

Differences in the percentage of welfare recipients in the studied regions are a reflection of the unequal distribution of poverty in Poland. The poverty rate in poor regions is several times higher than the poverty rate in prosperous regions. For example, the poverty rate in the Wrocław region is 2.7%, while the poverty rate in the Bieszczady – Przemyśl region is 16.4% (Table 2). The poverty rate is clearly higher in rural areas. Particulary large differences between the city and adjacent rural areas can be found in regions where the poverty rate in the city is 9–12% and the poverty rate in the nearby countryside is 14–17%.

The emerging image of poverty in Poland includes several surprises. The Gdańsk–Sopot–Gdynia Metropolitan Area has not been defined as the prosperous region, because gminas with a poverty rate amouting 10–13% in the second ring of gminas around (Gdańsk–Sopot–Gdynia). Another surprise is the Sudety Mountains, called often "the problem area" in Poland. The western part prosperous, due to a tourist boom following the collapse of traditional industry after 1990. The third surprise is

Table 2. Regions of high and low concentrations of welfare recipients in Poland and corresponding rates of poverty (W) during the 2007–2009 period

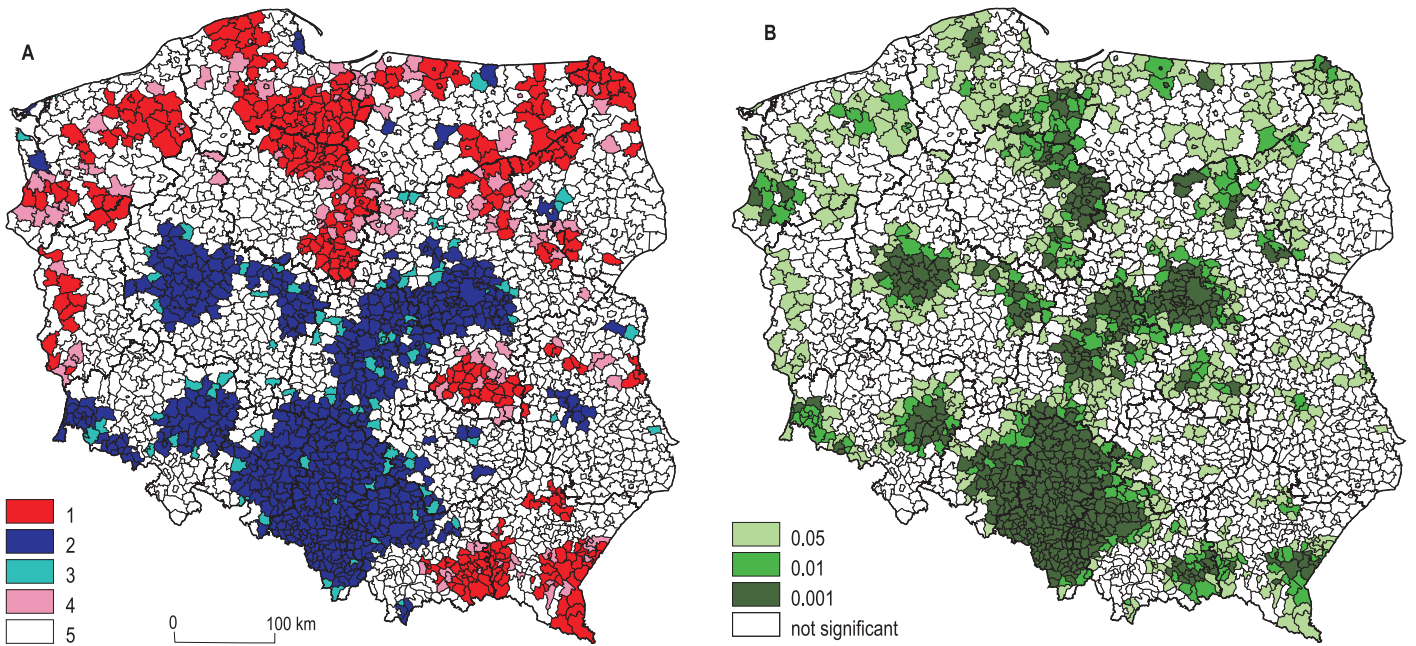
No.	Region	Gminas							
		total number	W (%)	urban number	W (%)	rural number	W (%)	urban--rural number	W (%)
poor									
1	Bieszczady–Przemyśl	24	16.4	1	8.5	22	17.0	1	10.6
2	Kujawy	34	15.6	4	13.0	26	16.1	4	14.6
3	Podlasie–Mazury	32	15.3	1	9.2	25	15.8	6	14.1
4	Pomerania	63	14.4	4	12.4	43	14.9	16	13.6
5	Nowy Sącz–Jasło	39	14.4	2	11.6	32	14.1	5	17.5
6	Western Pomerania	20	14.4	1	9.8	11	17.2	8	11.1
7	Radom	24	12.3	0	–	21	12.6	3	10.5
1–7 Total poor		236	14.7	13	10.2	180	14.0	43	12.6
prosperous									
8	Łódź	76	3.6	12	3.4	54	3.6	10	4.0
9	Warszawa	80	3.5	18	2.6	44	4.3	18	2.7
10	Poznań	56	3.5	7	3.1	23	3.5	26	3.7
11	Silesia–Malopolska	305	3.1	54	3.2	181	3.0	70	3.2
12	Eastern Wielkopolska	24	3.0	3	3.4	16	2.9	5	3.1
13	Sudety	25	2.8	7	2.5	10	2.8	8	3.2
14	Wrocław	34	2.7	5	2.0	18	2.5	11	3.3
8–14 Total prosperous		600	3.2	106	3.0	346	3.2	148	3.3
Total		836	17.9	119	13.2	526	17.2	191	15.9

Source: MPiPS data.

the absence among of poor regions of Świętokrzyskie and Lubelskie voivodeship. This does not mean that there are not such zones in those voivodeships, but simply the authors did not find large areas showing a high percentage of welfare recipients.

Socio-economic and development and the standard of living in poor and prosperous regions

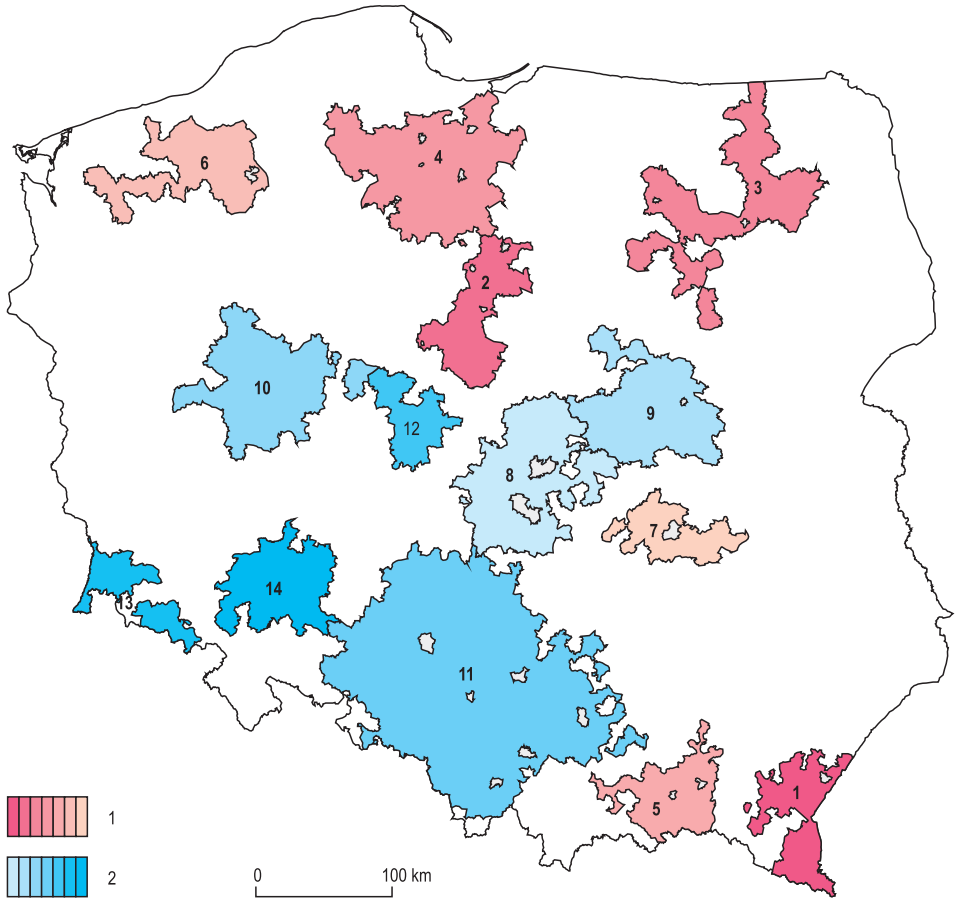
The analysed literature lists a number of factors driving poverty related to economic and, social status, and to general living conditions. The authors have assumed that in poor regions income is low, and unemployment high, few individuals start their own businesses, and the main source of income in rural areas is low-paid work in agriculture. These poor regions are also affected by a variety of social and demographic problems, including the large number of non-working age individuals, outflow of the population, low education levels, and weak social infrastructure (e.g. daycare). All these factors are responsible for a lower standard of living reflected in poor living conditions and poor access to services. Therefore the poor regions are not attractive places to live, as show few building permits.



Legend: indice value (A): 1 – high-high, 2 – low-low, 3 – high-low, 4 – low-high. Statistical significance was established using schemes for drawing 999 permutations.

Fig. 1. Areas with high and low percentages of welfare recipients in Poland identified using local indicators of spatial association (LISA) (A) and corresponding levels of statistical significance (B)

Source: authors' own work using GeoDa software and Ministry of Labour and Social Policy.



Legend: 1 – "poor" regions, 2 – "prosperous" regions, region numbers correspond with table 2.

Fig. 2. Areas with high (1) and low (2) percentages of welfare recipients in Poland – red color intensity corresponds to higher poverty, blue color intensity corresponds to lower poverty

Source: Ministry of Labour and Social Policy data.

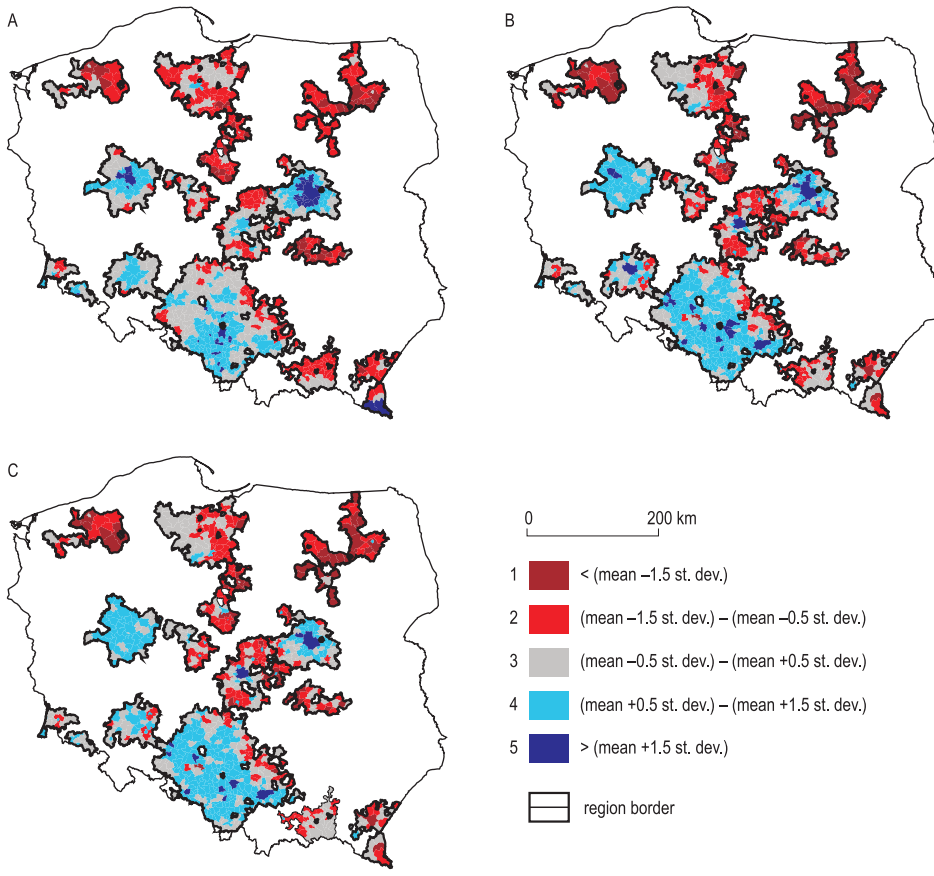
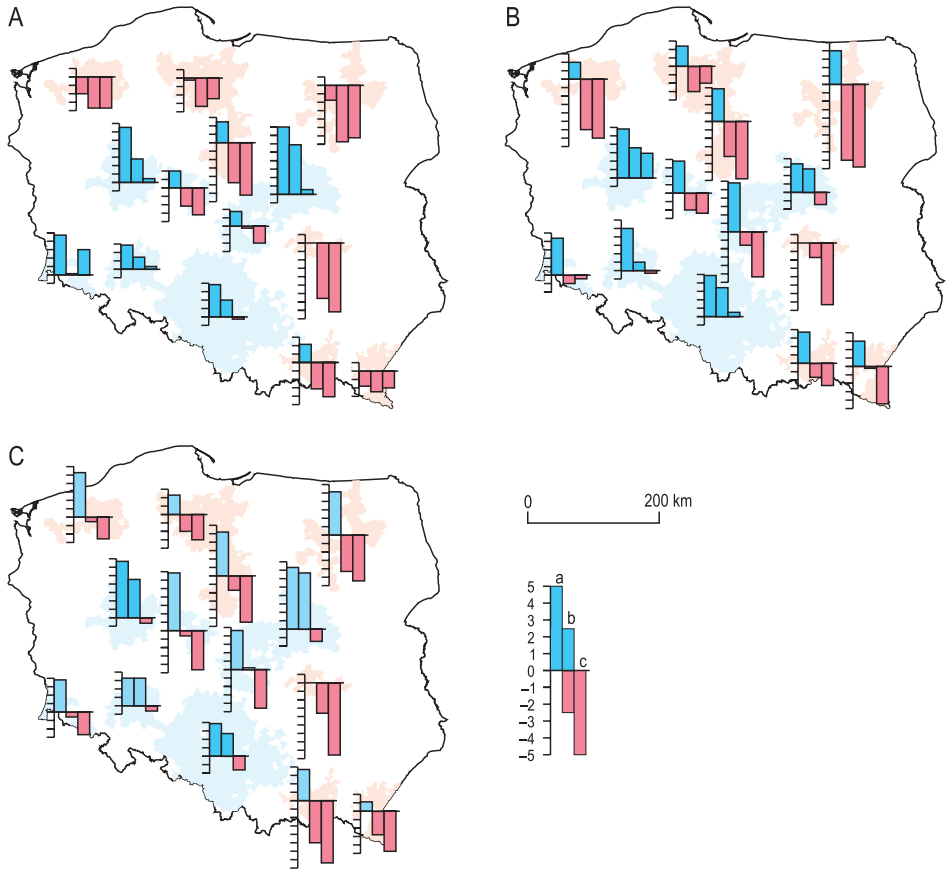


Fig. 3. Values of comprehensive indices in poor and prosperous regions: A – economic, B – social and demographic, C – standard of living

Source: Local Data Bank Central Statistical Office.



Legend: a – urban areas, b – urban-rural and suburban areas, c – rural areas.

Fig. 4. Comprehensive indices values for urban areas, urban-rural areas, suburban areas, and peripheral rural areas in the poor and prosperous regions of Poland. Indices: A – economic, B – social and demographic, C – that of standard of living

Source: authors' own work.

Figure 3 answers the following question: Are the above factors found in all of the poor regions identified in the paper? Conversely, are they absent in the prosperous regions identified? Figure 4 shows values of three comprehensive indices: (A) economic, (B) social and demographic, (C) standard of living.

It appears that negative economic, social, and demographic conditions, together with the a low standard of living usually overlap with areas of poverty. This is especially true in the regions of Podlasie–Mazury, Western Pomerania, Kujawy and that of Radom region, all four are characterized by the low indicator values. The first three are peripheral-agricultural regions within their respective voivodeships. Each of them has major structural problems, including fallen state-owned farms and unemployment reaching 50% in the 1990s.

The Radom poverty region emerged as a result of the bankruptcy of large industrial plants, which caused one of the highest unemployment rates in Poland. In the other poor regions, negative factors associated with poverty are mitigated to some extent by the economic impact of local metropolitan areas (e.g. Gdańsk Metropolitan Area in Pomerania). Other mitigating factors were alternative sources of income like job migrations and employment in the tourist sector, in following regions of: Bieszczady Mts.–Przemyśl (Cisna and Lutowiska gminas), Nowy Sącz–Jasło.

On the other hand, the prosperous regions identified by the authors include zones where the calculated indices are not unequivocally positive. This is especially true in the Eastern Wielkopolska region and that of the Łódź, where those indices are average or low. The general low rate of poverty in Eastern Wielkopolska can be explained by the presence of major power producers and developed commercial farming in the region. These positive factors mitigate generally low level of economic and social indices in this region. Weaker social and economic development and a lower standard of living in the Łódź region, and in some parts of the Silesian, Kraków and Warszawa regions concerns only the peripheral rural zones.

Gminas characterized by high comprehensive indices values are usually situated close to the metropolitan areas. Gminas along the border between Mazowieckie and Łódzkie voivodeship, and partially in the Świętokrzyskie voivodeship, close to the Silesian and Kraków voivodeship region show negative demographic and social indices and a lower standard of living, but not so low economic level. This means that the labor markets of three largest cities in Poland increase incomes and decrease poverty but have not yet made the significant progress neither in the social development nor in the quality of life. In more prosperous Western Poland regions of (Poznań, Wrocław and Sudety Mts.), it is difficult gminas characterized by low indices values are scarce.

In light of the differences in comprehensive indice values in the distinguished regions of poverty and prosperity, further analysis was based on the following categories of spatial units:

– urban areas (urban gminas),
– urban-rural areas and suburban areas (urban-rural gminas and rural gminas neighburing large and midsize cities),
– rural areas (other rural gminas).

Generally, all the rural areas poor and prosperous, show clearly lower comprehensive indice values. Suburban gminas and the urban-rural ones do better, while cities clearly stand out. However, in poor regions such as Mazury–Podlasie, Pomerania, Western Pomerania and Bieszczady–Przemyśl, their cities are characterized by very low indice values, despite slightly better economic position than their surrounding country sides.

The cities in poor regions are often even worse than the rural areas of the prosperous regions. On the other hand, the cities in the regions Kujawy, and Nowy Sącz, Jasło rank higher. Substantially larger differences between the city and the countryside in prosperous regions can be found in the Łódź and Warszawa regions. Peripheral rural areas in those great cities show comprehensive indice values comparable to those in poor regions. For these two regions typical is the marked difference between the metropolitan area with its immediate vicinity and the peripheral areas. A good example of such situation are the Skierniewice and Łowicz poviats located halfway between the Warszawa and Łódź metropolitan areas. The low percentage of welfare recipients in those counties is not accompanied neither by the high level of social development nor by the a high standard of living. The relatively higher income of their population exceeds the level of welfare benefits, but is too low to generate a higher standard of living. The Poznań and Wrocław regions are characterized by generally high index values (in dimensions) and smaller differences between urban and rural areas.

Conclusions

Prosperous regions are characterized by larger differences in the values of three indices and a general dependence of those values on site in relation to the metropolitan areas. This suggests a shift in the spatial model of the distribution of poverty and prosperity. The prosperous urban areas of prosperity are expanding into suburban zones. This trend may be described as the diffusion of wealth from metropolitan areas into directly their hinterland. This is especially true in the Warszawa, Poznań, Silesian and Kraków regions of prosperity.

Differences between metropolitan areas and peripheral rural areas tend to increase despite the benefits of close proximity to large cities, because peripheral gminas do not increase neither in the values of social development indices nor in the standard of living. Moreover, differences between peripheral gminas and the suburban ones tend to grow, too.

Regional differences in the distribution of areas of poverty are quite significant, although the spatial distribution of the poor regions and the prosperous ones follows a north and east versus southwest pattern, instead of traditional for Poland east *vs*. west pattern found. However, areas of poverty are larger in the north, than in the east. High-poverty regions are clearly superimposed on areas featuring high structural unemployment.

In addition to regional differences, poverty in Poland tends to follow the urban, suburban and peripheral rural pattern. The rural areas are much more often affected by poverty, and in fact, most poor areas are just rural. The cities generally have less welfare recipients and often are "islands of prosperity". When the city declines

the same does the adjacent regions, due to the strong economic effect that the city exerts on surrounding areas. Hence, the level of urban economy ultimately affects the rate of poverty in the neighbouring regions.

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