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# The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland. An Analysis of Diversification

Abstract:     Along with an increase in the level of societies' wealth, factors such as the state of health, the quality of education and negative output effects including environment quality are becoming increasingly important in assessing the standard of living and well-being of the average person. A category that has long been used to measure the economic and social well-being of societies is GDP per capita. However, in contemporary research, other attempts, more comprehensively describing important aspects of life, are being proposed.

The main aim of this article is to examine the standard of living in NUTS–4 districts in Poland in 2020 in aggregate and in its particular dimensions. Spatial differentiation of the standard of living index and sub-indices describing its individual dimensions was also examined. The standard of living was measured on the basis of a composite variable. This variable was constructed as Hellwig's measure of economic development on the basis of values of partial indicators describing successive dimensions. Those indicators were determined as arithmetic means of normalised diagnostic variables.

The highest standard of living is observed in cities with powiat status. Among them, there are both the largest agglomerations and smaller cities constituting local centres. In the spatial distribution of the standard of living measure, attention is drawn to the large concentration of districts with the lowest values in the north-east of Poland, in the Kujawy Region and in the south-east.

Partial indicators describing the dimensions of the standard of living, constructed for the purposes of the study, reflect the situation with regard to the degree of implementation of detailed tasks of social policy. The analysis of the situation of districts in particular dimensions of the standard of living carried out in this paper makes it possible to indicate the districts that require the greatest attention of decision-makers and to direct the greatest resources to them.

## 1.    Introduction

One of the most widely used measures of wealth is Gross Domestic Product, which is the total value of all goods and services produced in a country expressed in money. As a measure of aggregate production, it does not take into account differences in population size. Therefore, the measure used to compare the size of economies is GDP per capita. However, there seems to be a consensus in the literature that GDP is not an adequate measure of quality of life. As the level of wealth of societies increases, other factors such as the state of health, the quality of education and negative output effects including environmental pollution are becoming increasingly important in assessing the standard of living and well-being of the average person. These components are not taken into account in the GDP accounts, nor are goods and services produced by households or Internet transactions. Inadequate measurement of the services sector is yet another shortcoming – GDP reflects only its material value and not the quality. Kubiszewski et al. (2013), Coyle (2014), Pilling (2018), Kapoor, Debroy (2019), and Stiglitz (2020) are some of the authors who point out that neither GDP nor GDP per capita can be regarded as a comprehensive measure of the economic and social reality and the standard of living of societies. According to Stiglitz (2020), 'it's time to replace gross domestic product with real metrics of well-being and sustainability.' Coyle (2014) considers GDP to be an important measure of the freedoms and human opportunities created by a market economy. He argues, however, that it was a good measure in the 20th century, but becomes increasingly inadequate for a 21st century economy driven by innovation, services and intangible goods.

Some confusion is caused by the interchangeable use by social and political stakeholders of the following terms: welfare, standard of living and quality of life. In fact, the differences between these terms are important. According to Petelewicz and Drabowicz (2016: 20–23), the living conditions (welfare) is defined by the degree to which needs are satisfied using objective material measures. The standard of living also depends

Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

on the degree of material needs fulfilment, but is a broader concept that also includes 'having': housing, health, as well as access to education and recreation. Furthermore, welfare and the standard of living are terms associated with the objective sphere. Quality of life, on the other hand, is a broader concept, encompassing also the level of satisfaction and contentment with life, i.e. the sphere of subjective experiences and assessments. Słaby (2017: 19–21) identifies four categories related to the degree of needs satisfaction. These are: living conditions, standard of living, quality of life, and dignity of life. The author defines living conditions as the extent to which material and housing needs are met. In turn, the standard of living is also affected by the ability to meet cultural needs and the availability of infrastructure. Quality and dignity of life are determined by living conditions and the standard of living, but are also related to an individual's perception of their own socio-economic situation.

Thus, there seems to be a consensus in the literature on the understanding of the concept of standard of living as the quality of the conditions of existence in terms of the degree of satisfaction of major needs, stability and comfort of life. This means that the standard of living depends on the amount of outlays incurred to fulfil the needs, and not just on the degree of fulfilment itself. These outlays include the length of time spent on work and its inconvenience, opportunities for attractive leisure activities including access to culture and recreation, and the quality of social relations. Problems arise, however, at the stage of measuring the standard of living in the regions. As a complex phenomenon, the standard of living is measured on the basis of the value of a composite variable, the construction of which requires a set of appropriately selected diagnostic variables. The problems concern both the definition of their scope, the method of constructing a composite variable and, especially for smaller regions, the availability of data in public statistics.

Work on developing the concept of measuring quality and standard of living was undertaken in the first decade of the 21st century by Eurostat. In 2008, the Commission on the Measurement of Economic Performance and Social Progress was established to identify the limits of GDP as an indicator of economic performance and social progress, including the problems with its measurement. In the Commission's report (Stiglitz, Sen, Fitoussi, 2009)[1] on page 8, the authors state that 'it has long been clear that GDP is an inadequate metric to gauge well-being over time particularly in its economic, environmental, and social dimension.' The authors indicate that it is possible to measure social progress and some aspects of quality of life using non-monetary indicators that can enrich the information provided by conventional economic indicators. However, in their opinion, creating a universal indicator to measure the degree of achievement of economic goals is impossible. Development goals are significantly differentiated and relative and depend on the system of professed values and needs. The Commission has proposed measuring

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1    The report was translated into Polish and published as: Stiglitz, Sen, Fitoussi, 2013.

well-being on the basis of eight dimensions which should be considered simultaneously (Stiglitz, Sen, Fitoussi, 2009: 14–15). These dimensions are: (1) material living standards: income, consumption and wealth, (2) personal activities including work, (3) health, (4) education, (5) social connections and relationships, (6) environment (present and future conditions), (7) security, of an economic as well as a physical nature, and (8) political voice and governance.

In line with the recommendations of the Stiglitz, Sen and Fitoussi Commission, in 2011, the OECD launched the Better Life Initiative aiming at the creation of an index which would capture multiple dimensions of economic and social progress. The platform https://www.oecdbetterlifeindex.org/ provides data on 11 topics identified as essential in the areas of material living conditions and quality of life and includes an interactive tool Your Better Life Index (BLI), which encourages citizens to create their own indices by ranking each of the indicators according to the importance for themselves.

Since 2006 the Central Statistical Office (GUS) has been publishing yearly editions of the report on the European Union Statistics on Income and Living Conditions (EU-SILC) (Statistics Poland, 2022). The report contains data on income inequalities in Poland, health, housing conditions, the equipment of households with selected durable goods, respondents' opinions on selected material and non-material living conditions aspects, and selected indicators of social cohesion. Data are presented by NUTS 2 regions, classes of locality and socio-economic groups.

Studies on the standard of living in districts (i.e. NUTS–4 regions, powiats) in Poland face some problems related to the availability of data. Some of the information on its determinants is available only on the national or NUTS–2 (voivodship) level. These include disposable income and the situation of households. Research on the quality of life, on the other hand, must be carried out on the basis of survey data, which can provide subjective information on the individual perception of the respondents' own socio-economic situation. Examples of analyses of the quality and standard of life in NUTS–2 regions include works by: Panek and Zwierzchowski (2013), Bąk and Szczecińska (2015), Polak (2016), Majecka and Nowak (2019). The author's concept of a tool for measuring subjective quality of life in districts was presented in a publication edited by Błoński, Burlita, and Witek (2017). Sobolewski, Migała-Warchoł and Mentel (2014) proposed a modified linear ordering method taking into account spatial relations between districts. On the other hand, the studies by Szaban (2019), Wolak (2020), and Dańska-Borsiak (2022) concern the districts of one voivodship.

The main aim of this article is to analyse the standard of living in NUTS–4 districts in Poland in 2020, in aggregate and in each dimension. Spatial differentiation of the standard of living index and sub-indices describing individual dimensions was also examined. Poland's economy has been developing and modernising intensively over the last 20 years. For the society, which has reached a relatively high level of satisfaction of basic

material needs, the availability of services and intangible goods becomes more and more important. The indication of districts where the standard of living is the lowest should be a signal for local authorities to change their policy. The analysis of the situation in each of the dimensions may help to direct activities towards those areas where the greatest deficiencies occur.

The standard of living is a complex phenomenon, and as such, can be determined on the basis of an indicator that is a composite variable. The construction of such variable, as well as of seven composite variables which are partial indicators of living standard dimensions, was an ancillary objective of the study. The living standard indicator was constructed as Hellwig's measure of economic development on the basis of values of partial indicators describing successive dimensions. These indicators were determined as arithmetic means of normalised diagnostic variables.

The article is structured as follows. The second section contains a description of data and methods used in the subsequent analysis. The empirical results are presented in the third section. First, the partial indicators for each dimension of the standard of living are calculated and their differentiation is discussed. Then the aggregate index is elaborated and analysed. The fourth section concludes the presented considerations.

## 2.    Data and methods

The standard of living is a complex phenomenon, determined by many factors. In the social sciences, the level of complex phenomena is often analysed using composite variables. This approach was also used in the presented study.

The diagnostic variables describing the standard of living were selected following the indications of Słaby (2017) and the report of the Stiglitz, Sen and Fitoussi Committee (2009) described in the Introduction. Of the eight dimensions listed in the report, only the political voice and governance does not fit into the concept of standard of living as defined by Słaby.

The presented analysis was carried out on the basis of data for 380 Polish districts (NUTS–4 regions) for the year 2020. The diagnostic variables listed in Table 1describing subsequent dimensions were used. The symbol (s) denotes stimulants and the symbol (d) – destimulants. The number of medical consultations per 1,000 inhabitants was treated as a nominant[2] because, on the one hand, a large number of consultations may be a sign of poor health, but, on the other hand, a low number may indicate poor accessibility to medical care.

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2    Stimulants are variables whose greater values indicate a greater level of the phenomenon. Destimulants are variables that have a negative impact on the phenomenon. In the case of nominants, a fixed level is desirable and all values out of this level have a negative impact on the phenomenon.

Table 1. Diagnostic variables characterising the dimensions of standard of living

| | (1) Material living standards (*MLS*) |
|---|---|
| (s) | average gross monthly wages and salaries in PLN |
| (s) | average useful floor area per 1 person in m$^2$ |
| (s) | dwelling stock per 1,000 population |
| (s) | persons using water supply system as % of total population |
| (d) | beneficiaries of social assistance per 10,000 population |
| | **(2) Economic activity and working conditions (*EA*)** |
| (s) | employed persons per 1,000 population of the working age |
| (d) | unemployment rate (%) |
| (d) | registered unemployed persons out of job for longer than 1 year as % of unemployed persons total |
| (d) | persons injured in accidents at work per 1,000 employed persons |
| | **(3) Health care (*HEC*)** |
| (n) | number of medical consultations per 1,000 population |
| (s) | doctors – employed persons in the main place of work per 10,000 population |
| (s) | nurses and midwives per 10,000 population |
| | **(4) Education (*EDU*)** |
| (s) | children in preschool education establishments per 1,000 children aged 3–5 years |
| (s) | upper secondary school students (excluding post-secondary) per 1,000 population aged 15–18 years |
| (s) | higher education students per 1,000 population aged 20–24 years |
| | **(5) Social connections and relationships (*REL*)** |
| (d) | divorces per 10,000 population |
| (s) | marriages per 10,000 population |
| (s) | public library borrowers per 1,000 population |
| (s) | members of groups (clubs/sections) per 10,000 population |
| (s) | persons practising sports as % of population |
| | **(6) Environment (*ENV*)** |
| (s) | population connected to wastewater treatment plants as % of total population |
| (s) | expenditure in Division 900 – municipal economy and environmental protection, % of total expenditure |
| (d) | emission of air pollutants, gases and particulates in t/km$^2$ |
| (s) | waste collected separately in relation to the total waste |
| | **(7) Security (*SEC*)** |
| (s) | expenditure in division 754 – Public safety and fire care as percentage of total expenditure |
| (d) | crimes ascertained by the police per 1,000 population |
| (s) | the rate of detectability of the delinquents in ascertained crimes by the police |
| (d) | number of suicide attempts (behaviours) per 100,000 population |

Source: own elaboration

Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

The list of variables is a compromise between the intentions and availability. A certain amount of information is only available for NUTS–2 regions. Therefore, the dimension *HEC*, which is intended to reflect the health status of the population, describes instead the accessibility to health care. The number of beds in hospitals has not been taken into account, as in the year of the outbreak of the pandemic and the creation of so-called covidien beds, it would not reflect access to regular, standard care. Data on households, including on average monthly available income per capita, are not published for the NUTS–4 level, so they have been replaced by average gross monthly wages and salaries in the *MLS* dimension. In the *REL* category, data on cinemas are not included as they are incomplete (e.g. information on the number of population per one seat in indoor cinemas lacks data concerning 97 districts (about 25% of the whole number) or data are not available for NUTS–4 regions.

In order to describe each dimension of standard of living, partial indicators were calculated based on diagnostic variables listed in Table 1. Then a composite variable based on these partial indicators values was determined.

The literature proposes alternative methods of constructing composite variables. They can be divided into benchmark and non-benchmark methods. The most often used benchmark methods are: the measure of economic development (Hellwig, 1968) or a similar method called the Technique for Order Preference by Similarity to Ideal Solution, TOPSIS proposed by Hwang and Yoon (1981). In economic and social research, non-benchmark methods are also often used, and include: the standardised sum method (Churchman, Ackoff, 1954),[3] the rank sum method, the point sum method, or the distance method. They are all based on sums or averages (simple or weighted) of normalised values of diagnostic variables, and differ in the way of normalisation. A comprehensive description of methods for composite variables construction, together with examples of applications, is presented in the work of Balicki (2013: 318–329). The variables listed in Table 1 are measured on metric scales, ratio or interval ones. Although not all tools of classical descriptive statistics are applicable in the case of interval scale, adding and subtracting operations are possible, so constructing a composite indicator using the Hellwig's measure of economic development and the standardised sum method is also possible. More information on measuring scales and variables normalisation can be found e.g. in Walesiak (2012; 2014).

The indicators of individual dimensions were calculated with the standardised sum method as arithmetic means of the normalised variables indicated in Table 1. Normalisation of diagnostic variables is used to unify their nature, units of measurement and range of variation. Such unification is necessary for these variables to act as sub-criteria in the process of evaluating a complex phenomenon. Different methods of normalisation

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3  An alternative name for this method is simple additive weighting. This name was used in the original paper by Churchman and Ackoff, but the name standardised sum method seems to be more often used in contemporary research.

are used in empirical studies and their advantages and disadvantages have been discussed in detail by Kukuła (1999). According to the author's findings, the min-max scaling (or unitarisation) proved to be the method satisfying all the requirements for normalisation methods (Kukuła, 1999: 17). For that reason, it was used in the presented research.

In the second stage of the study, the general indicator of the standard of living in the districts was calculated. Two alternative methods were used: Hellwig's measure of economic development and the standardised sum method. The correctness of the methods used was assessed on the basis of an aggregate measure determined by the characteristics of the effectiveness of individual methods. These characteristics reflect mapping compatibility, correlation of the composite variable with diagnostic variables, variability and concentration of the composite variable. Alternative methods for calculating efficiency characteristics are described, e.g.: in Müller-Frączek (2017), Bąk (2018), Sompolska-Rzechuła (2020), Kądziołka (2021). The aggregate measure is calculated as the square root of the sum of the squares of the efficiency characteristics.

## 3. Empirical results

In the first stage of the study, the diagnostic variables listed in Table 1 were used to construct seven sub-indices reflecting the dimensions that make up the standard of living. All variables were first normalised using the min-max scaling. As a result, they were transformed into the range [0, 1], meaning that the minimum and maximum value of a variable equals 0 and 1, respectively.

The results in Table 2 show that districts are most differentiated in the dimension of Education ($EDU$). To some extent, it results from the fact that higher education institutions are present only in around 40% of districts. However, the sub-index for Education calculated only on the basis of the variables describing preschool and upper secondary education is also highly varied: standard deviation is equal to 0.13 and coefficient V equals 35.13%. There is also great variation in the dimensions of Economic activity ($EA$), Social connections and relationships ($REL$) and Material living standards ($MLS$). The situation of districts is most similar in terms of Security ($SEC$).

As a result of the min-max scaling of the diagnostic variables, the range of variation of each sub-index is the interval [0, 1], so their mean values can be compared. Attention should be drawn to the high average level of the Security ($SEC$) index. In addition, the coefficient of variation V is by far the lowest, indicating an overall good situation of the districts in the security dimension. The dimensions Healthcare, Social connections and relationships and Education seem to perform relatively poorly. The situation in the area of education is particularly worrying, as the low average level is compounded by a high degree of variation, meaning that there are districts with a very bad situation in this respect.

Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

Table 2. Basic statistics of the sub-indices

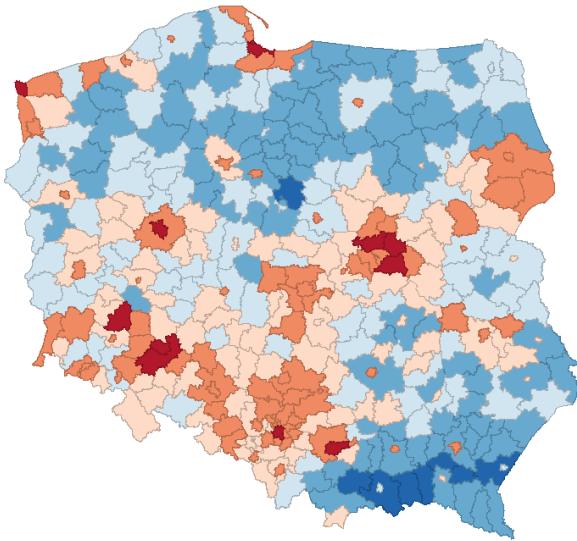|  | *MLS* | *EA* | *HEC* | *EDU* | *REL* | *ENV* | *SEC* |
|---|---|---|---|---|---|---|---|
| Mean | 0.4849 | 0.5028 | 0.3676 | 0.2632 | 0.3631 | 0.4495 | 0.6381 |
| St. dev. | 0.0947 | 0.1045 | 0.0635 | 0.1196 | 0.0755 | 0.0710 | 0.0548 |
| V (%) | 19.5284 | 20.7863 | 17.2880 | 45.4358 | 20.7823 | 15.7835 | 8.5955 |

Source: own calculation

A more detailed picture of the differentiation of the districts in each dimension is shown on the maps in Graph 1.

The map of the *MLS* index (Graph 1) shows that the highest material living standard is characteristic of the largest agglomerations: Warsaw, Cracow, Poznań, Wrocław, Katowice, and Gdańsk. Only Łódź does not belong to the upper outliers group but to the fourth quartile one. Districts in which material standards are among the highest are also Piaseczyński and Warszawski-Zachodni, neighbouring Warsaw, and Wrocławski, lying south-east of Wrocław. Other upper outliers are the districts of Sopot, Świnoujście and Lubiński. The high position of the Lubiński district is due to the activity of the mining company KGHM Polska Miedź, based in Lubin. The average remuneration in this district is the highest in Poland. The worst situation is in the south-eastern part of Poland, where all but one districts of the lower outliers group are located.
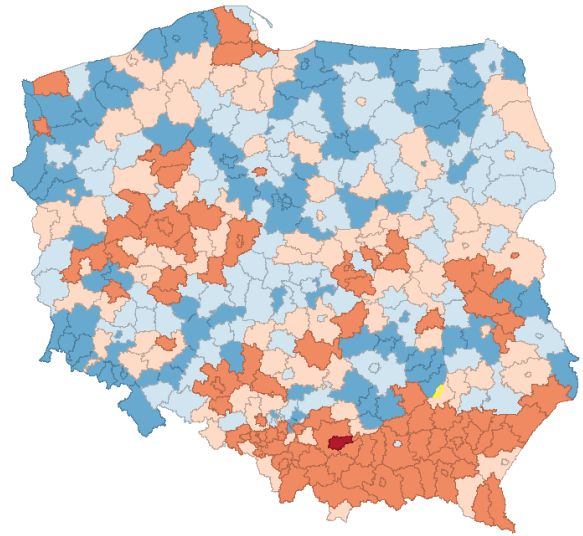
As expected, the economic activity index takes the highest values in agglomerations (Warsaw, Katowice and Poznań are the upper outliers) and in some cities with powiat status (see Graph 1). What is noteworthy is the high values of the index around Poznań and Warsaw, as well as in Silesia. What is worrying is the economic activity in the districts along the eastern border and in the Warmińsko-Mazurski region, where almost all of them have values of the index below the median.

The map of the *HEC* sub-index in Graph 1 shows that the situation in the health care dimension is worst in the districts lying near the borders of the Wielkopolskie, Zachodniopomorskie, Kujawsko-Pomorskie and Łódzkie regions, where a grouping of districts from the first quartile group is observable. High values of the *HEC* sub-index were recorded in districts with nationally known medical centres: the Silesian Centre for Heart Diseases in Zabrze, Children's Health Centre in Warsaw or Polish Mother's Health Centre in Łódź. Cities with powiat status (Cracow, Kielce, Katowice, Bydgoszcz, Olsztyn, Białystok, Rzeszów, and Lublin) with medical universities and smaller centres with hospitals and health centres serving patients from nearby locations are also local centres with a high level of medical care availability.
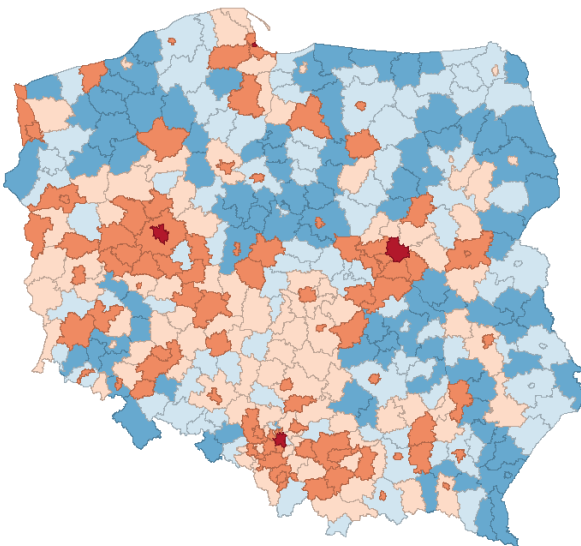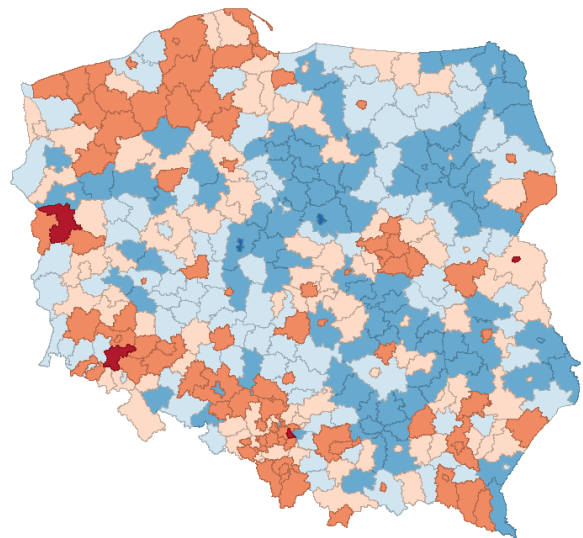
Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

Material living standards (*MLS*)

Social connections and relationships (*REL*)

Economic activity and working conditions (*EA*)

Environment (*ENV*)

Health care (*HEC*)                    Security (*SEC*)

Education (*EDU*)

lower outlier

1st quartile group

2nd quartile group

3rd quartile group

4th quartile group
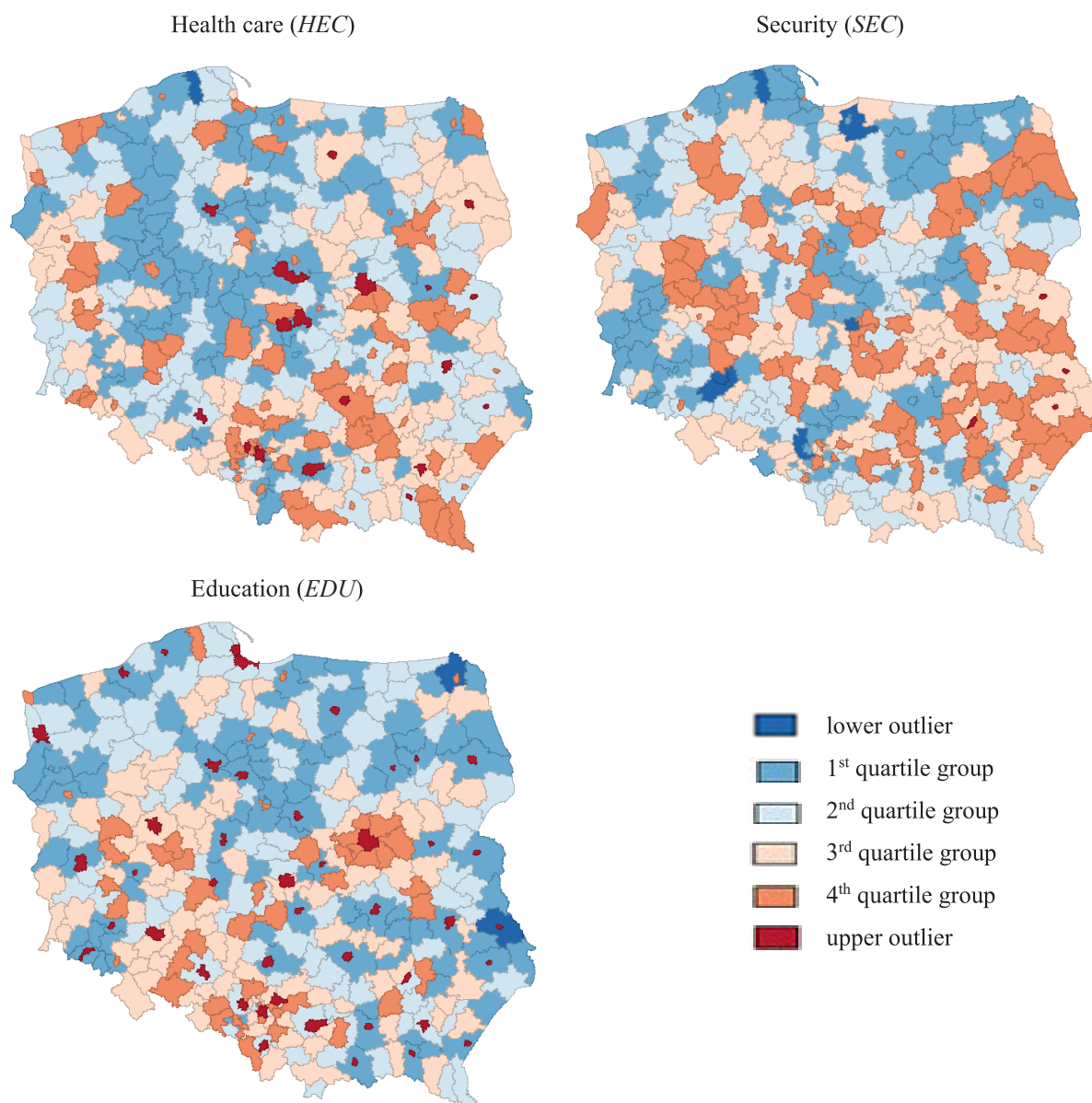
upper outlier

**Graph 1.** Spatial differentiation of the sub-indices of the standard of living

Note: Lower outliers are districts in the first quartile group, for which the index value is less than 1.5 times the interquartile range below the value of the first quartile. Upper outliers belong to the fourth quartile group, and the index value is more than 1.5 times the interquartile range above the value of the third quartile.

Source: own elaboration

In the field of Education (see Graph 1),the dominant position of cities with powiat status is visible. Only in 5 out of 66 such cities no higher education institution is located. All of them are within the Upper Silesian conurbation (Mysłowice, Piekary Śląskie, Świętochłowice, Tychy, and Zabrze), so their inhabitants have easy access to universities in other districts within the conurbation. Most upper-secondary schools are also located in larger centres, where students from neighbouring locations are educated. In as many as 79 districts, the number of students of such schools exceeds

Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

the number of the population aged 15–19, and it is over 2.5 times higher in the Krosno, Nowy Sącz and Zamość districts. The most uneven distribution of EDU values is visible in the north-east of Poland and in the area of Kujawy, where, apart from local centres, the majority of districts are in the first or second quartile group. The situation is much better in the districts neighbouring Warsaw and in the Wielkopolskie, Dolnośląskie and Śląskie regions, where access to education is easier, as reflected in a more even distribution of values of the sub-index.

Differentiation in the Social connections and relationships (*REL*) dimension contrasts with the distribution of the *MLS*, *EA* and *EDU* dimensions. This contrast is particularly striking in the south-east of the country, where practically all districts are in the highest quartile group for social connections and the lowest for material living standards. Poorly developed social connections and relationships are found in the south-west of Poland and in Łódź, where the situation in the *MLS*, *EA* and *EDU* dimensions is quite good. The area of Wielkopolska together with the region's capital city and the vicinity of Tricity (Sopot, Gdańsk and Gdynia) and Warsaw are characterised by a high level of social connections and relationships, and at the same time high material standards, economic activity and education. The good situation of south-western regions in the *REL* dimension is positively influenced by the number of marriages and divorces. On the other hand, in Wielkopolska, in the vicinity of Tricity and Warsaw, there are more persons practising sports and more library borrowers.

The south-eastern districts also score well in terms of Security (*SEC*) dimension, as does Wielkopolska (except for Poznań and the Poznański district). Interestingly, smaller cities with powiat status located in the south-east: Biała Podlaska, Chełm, Zamość and Tarnobrzeg form the upper outliers group. In general, the level of security in smaller cities with powiat status such as Wałbrzych, Leszno, Kalisz, Włocławek, Siedlce, Łomża, Koszalin, Słupsk and Radom is higher than in neighbouring districts. This is due to a low level of ascertained crime. The security level in the biggest cities leaves much to be desired, which is largely due to low crime detection rates.

Seemingly surprising is the territorial differentiation of the Environment dimension (*ENV*) in Graph 1. High values of the sub-index are achieved in higher urbanised districts, including Upper Silesia. These are not areas associated with environmental values, unlike in Warmia and Mazury or Kujawy, where the values of the indicator are low. In the study of standard of living, the Environment dimension is supposed to reflect the degree of care for the environment and the diagnostic variables were selected accordingly (see Table 1). They describe expenditures on the reduction of harmful factors such as wastewater treatment, the level of selective waste collection or expenditures on environmental protection as well as negative effects of human activity such as emission of air pollutants.

Table 3 presents correlation coefficients between sub-indices of the standard of living. The results confirm that the dimensions of *MLS*, *EA*, *EDU* and *HEC* are interdependent. These dimensions describe tangible aspects of living standards related to economic activities: the pursuit of financial and housing benefits and the effort made to obtain them: work and education. The level of health care is related to them because centres with a good labour market situation and good educational opportunities have good infrastructure. They often have medical universities, teaching hospitals and clinics, so access to medical care is easy. The relationship of these four dimensions with the *ENV* dimension is also noticeable. Human capital is concentrated in regions with a high intensity of economic activity, generating awareness of the need to act for environmental protection, e.g. waste selection. Richer districts are able to devote more resources to protecting the environment and create green areas, and better housing conditions are associated with connections to wastewater treatment plants. The Security dimension indicator has the lowest dispersion (see Table 2) and the spatial distribution of its values is different from that of the other indicators (see Graph 1). It is uncorrelated with *EDU*, *HEC* and *REL* and very weakly correlated with the other indicators. The dimension of social relations is also relatively weakly related to the dimensions describing tangible aspects of the standard of living. They can therefore be expected to contribute valuable information to the aggregate index of the standard of living.

Table 3. Correlation coefficients between the sub-indices

|       | *MLS*  | *EA*   | *HEC*  | *EDU*  | *REL*  | *SEC*  | *ENV* |
|-------|--------|--------|--------|--------|--------|--------|-------|
| *MLS* | 1      |        |        |        |        |        |       |
| *EA*  | 0.565  | 1      |        |        |        |        |       |
| *HEC* | 0.330  | 0.300  | 1.000  |        |        |        |       |
| *EDU* | 0.576  | 0.589  | 0.609  | 1.000  |        |        |       |
| *REL* | *0.098* | 0.311  | 0.146  | 0.264  | 1.000  |        |       |
| *SEC* | −0.176 | −0.130 | *0.034* | *0.044* | *0.028* | 1.000  |       |
| *ENV* | 0.473  | 0.418  | 0.377  | 0.530  | 0.184  | −0.128 | 1.000 |

Note: the critical value of the coefficient is $r^* = 0.101$. Non-significant statistical coefficients are marked in italics.

Source: own calculation

An aggregate index of the standard of living (*SLI*) was calculated using two alternative methods: Hellwig's measure of economic development and the standardised sum method. The aggregate measure of the methods correctness indicated that Hellwig's method performed better than the simple additive weighting, so for further analysis the Hellwig method was used.

The spatial distributions of the *SLI* index and group means of the seven sub-indices for each quartile group and for the upper outliers group are presented in Graph 2. Upper outliers are districts belonging to the highest quartile group for which the index value is more than 1.5 times the interquartile range above the value of the third quartile. A partial list of districts ordered according to the values of *MLS* index calculated with the use of Hellwig's method is presented in Table 4. Nineteen districts with the highest values of the *MLS* measure form the group of upper outliers marked in Graph 2. Nineteen districts with the lowest values of *MLS* are also listed in Table 4.

| Spatial differentiation of the *SLI* index | Group means of the sub-indices |
|---|---|
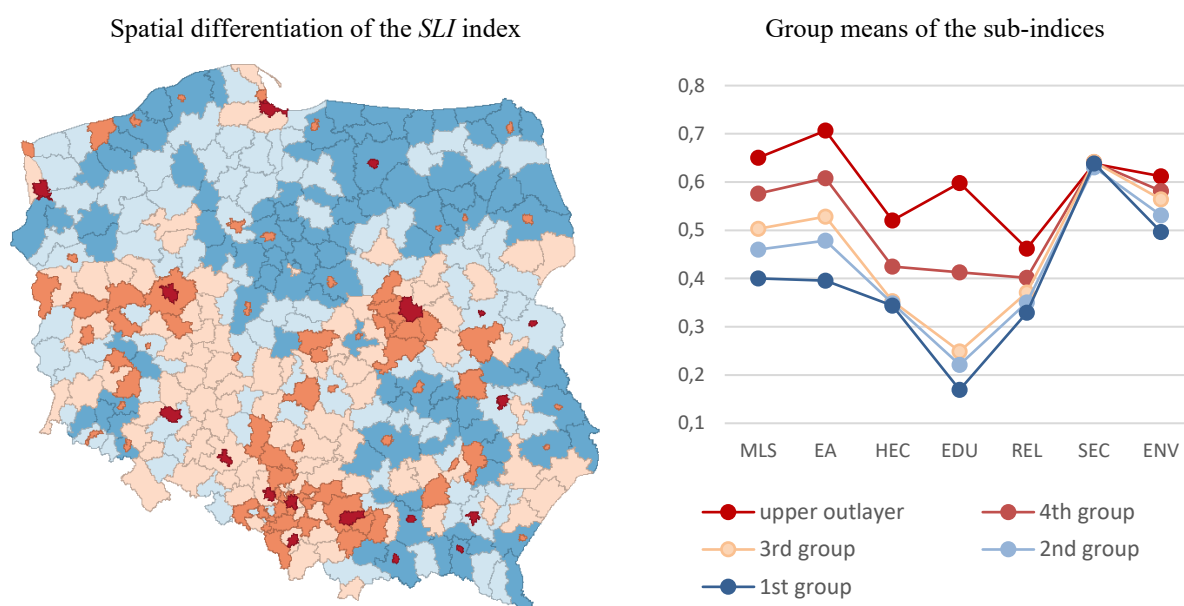


Graph 2. The standard of living index (*SLI*)
Source: own elaboration

Table 4. Ranking of districts by *MLS* measure value in 2020

| Ranking position | Code | District | *SLI* | Ranking position | Code | District | *SLI* |
|---|---|---|---|---|---|---|---|
| 1 | 1261000 | Cracow | 0.7080 | 362 | 1425000 | Radomski | 0.0757 |
| 2 | 2469000 | Katowice | 0.6873 | 363 | 1210000 | Nowosądecki | 0.0743 |
| 3 | 1863000 | Rzeszów | 0.6352 | 364 | 1819000 | Strzyżowski | 0.0726 |
| 4 | 1465000 | Warsaw | 0.6345 | 365 | 3201000 | Białogardzki | 0.0671 |
| 5 | 2264000 | Sopot | 0.6120 | 366 | 1415000 | Ostrołęcki | 0.0611 |
| 6 | 3064000 | Poznań | 0.6075 | 367 | 0418000 | Włocławski | 0.0602 |
| 7 | 0264000 | Wrocław | 0.5903 | 368 | 2007000 | Łomżyński | 0.0553 |
| 8 | 2862000 | Olsztyn | 0.5901 | 369 | 2808000 | Kętrzyński | 0.0507 |
| 9 | 0663000 | Lublin | 0.5886 | 370 | 0603000 | Chełmski | 0.0488 |
| 10 | 2461000 | Bielsko-Biała | 0.5754 | 371 | 0204000 | Górowski | 0.0484 |

| Ranking position | Code | District | *SLI* | Ranking position | Code | District | *SLI* |
|---|---|---|---|---|---|---|---|
| 11 | 1661000 | Opole | 0.5649 | 372 | 2802000 | Braniewski | 0.0395 |
| 12 | 1861000 | Krosno | 0.5549 | 373 | 2012000 | Suwalski | 0.0375 |
| 13 | 1262000 | NowySącz | 0.5511 | 374 | 1430000 | Szydłowiecki | 0.0369 |
| 14 | 1464000 | Siedlce | 0.5489 | 375 | 1802000 | Brzozowski | 0.0311 |
| 15 | 2261000 | Gdańsk | 0.5451 | 376 | 0406000 | Grudziądzki | 0.0303 |
| 16 | 3262000 | Szczecin | 0.5335 | 377 | 0408000 | Lipnowski | 0.0237 |
| 17 | 0661000 | BiałaPodlaska | 0.5161 | 378 | 1813000 | Przemyski | 0.0127 |
| 18 | 1263000 | Tarnów | 0.5034 | 379 | 2006000 | Kolneński | 0.0034 |
| 19 | 2466000 | Gliwice | 0.5018 | 380 | 2804000 | Elbląski | 0.0031 |

Source: own calculation

All districts with the highest standard of living are cities with powiat status (see Table 4). Among them, there are both the largest agglomerations (except for Łódź, which occupied the 25th place in the ranking) and smaller cities, which are local centres. In the spatial distribution of the *MLS* index (see Graph 2), attention is drawn to the large concentration of districts in the lowest quartile group in the north-east of Poland and in the Kujawy region. In the Warmińsko-Mazurskie and Podlaskie regions, there are as many as 24.2% of all districts from this group, and the percentage is 14.8% in the Kujawsko-Pomorskie region. Within the borders of these regions lie as many as nine districts from the nineteen listed in Table 4 in the bottom positions of the ranking. Their codes begin with 04, 20 and 28. Only cities with powiat status: Białystok, Suwałki, Elbląg, Ostrołęka, Łomża, Toruń, Bydgoszcz and Płock can be found in the highest group, and Olsztyn was even in the upper outliers group as the only district in these areas. In the case of Elbląg, it is worth noting that the surrounding Elbląski district is in the last place of the ranking (see Table 4).

The standard of living in the local centres of south-eastern Poland (cities with powiat status: Tarnów, Nowy Sącz, Rzeszów, Krosno, and Przemyśl) is higher than in the north-eastern centres. Only Przemyśl does not belong to the group of upper outliers. However, also in these areas, there are significant differences between the cities and the neighbouring districts, all of which except for Rzeszowski are in the lowest quartile group. On the other hand, south-west and central Poland are dominated by districts with the standard of living above the median. In southern and central Poland, there is also a majority of districts with the highest values of *MLS*, classified as upper outliers. In the Śląskie and Opolskie regions, there is not a single district from the first quartile group and only four from the second one. This means that only 2.1% of districts in these regions have *MLS* values below the median.

Graph 2 shows the mean values of individual sub-indices for the four quartile groups. Means for the fourth group are calculated for all 95 districts belonging to it, from which the upper outliers group was separated and the means were also calculated. Based on these means, the factors that most differentiate between the groups can be identified.

Upper outliers are characterised by the highest values of all sub-indices, with the most outstanding being the average level of the *EDU* index. Such a good situation in the education dimension is influenced by high values of all diagnostic variables, but first of all by the number of high school students and the number of children in pre-schools. Eastern Poland's cities with powiat status belonging to the upper outliers are also characterised by the number of upper secondary school students exceeding the population aged 15–18, which results from the fact that students from other districts of the region also attend schools in these cities.

Subsequent quartile groups have increasingly lower values for all sub-indices. This decrease is particularly visible in the dimensions of economic activity and material living standards, smaller in the more intangible dimensions of social connections and relationships or environment and negligible in the security dimension. In this context, the situation of districts from the lowest quartile group is particularly disturbing. The bad situation in the areas of material living standards and economic activity reflects, on the one hand, the weakness of the labour market (low salaries and a small number of job offers) and, on the other hand, the low activity of the inhabitants in searching for employment, which is indicated by the high unemployment rate and the large share of long-term unemployed. It is also noticeable that the difference between the mean values of the *EA* sub-index between the best and the weakest group is greater than the analogous difference of the *MLS* sub-index. As these two dimensions are closely related, measures to reduce unemployment, especially long-term unemployment, seem to be the best means to raise the standard of living in the weakest districts.

## 4.    Conclusions

The standard of living is a complex phenomenon. It is made up of material and intangible factors. Income, housing and working conditions, but also health and education have a significant impact on the standard of living. Equally important are social relations and leisure opportunities, as well as the quality of the environment and the level of security.

The spatial distribution of indicators describing the living standard dimensions is uneven. The best situation in the dimensions of material living standards, economic activity and working conditions was found in central, western and south-western regions, while the worst situation was in the south-east. Particularly outstanding are the cities

Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

of Warsaw and Poznań with powiat status, which are also among the best in the dimensions of health care and education. The distribution of sub-indices of these dimensions is most contrasted with the distribution of the social connections and relationships sub-index, which is particularly visible in the south-eastern districts. Poor material conditions coexist there with very high levels of social connections.

The creation of social progress, measured by the improvement of the level and quality of life of the population, is the basic objective of social policy. This policy includes a set of specific policies concerning, among others: housing, health care, education and culture, environmental protection, prevention and overcoming the phenomena of social pathology (Grzywna et. al., 2017: 12). The sub-indices describing the dimensions of the standard of living constructed in this paper thus reflect the situation with regard to the specific tasks of social policy. Identification of the strengths and weaknesses of districts is needed in order to conduct social policy effectively and direct resources to where they are most needed. On the basis of the analysis of the situation of the districts with regard to the particular dimensions of the standard of living carried out in this article, it is possible to identify the districts that require the greatest attention from decision-makers. In terms of housing, these are the following districts: Brzozowski, Przemyski, Jasielski, Strzyżowski and Krośnieński (Podkarpackie Voivodship), Nowosądecki, Limanowski and Gorlicki (Małopolskie Voivodship) and Lipnowski (Kujawsko-Pomorskie Voivodship). A high level of economic activity is an important factor reducing poverty and social pathology phenomena. Measures stimulating that activity should be undertaken first of all in the following districts: Włodawski (Lubelskie), Kętrzyński and Braniewski (Warmińsko-Mazurskie), Szydłowiecki and Makowski (Małopolskie), Bieszczadzki and Brzozowski (Podkarpackie), Kolneński (Podlaskie), Białogardzki (Zachodniopomorskie) and Górowski (Dolnośląskie). In the dimensions of education and culture, the greatest needs are in the Chełmski (Lubelskie), Suwalski and Olecki (Warmińsko-Mazurskie) districts, in health care in the Lęborski (Pomorskie) and Słupecki (Wielkopolskie) districts.

In the spatial distribution of the aggregate standard of living index, districts located in Warmia, Mazury, Podlasie and Kujawy stand out unfavourably. Districts with a high standard of living are concentrated in central Poland, in Silesia and Wielkopolska. Definitely the highest living standards are characteristic of cities with powiat status, of which only six are not in the highest quartile group. Nineteen of them form the upper outliers group. Among them there are also smaller centres, located mainly in the east and south. The diversity of the standard of living in the districts of south-eastern Poland is particularly worrying. It seems that cities with powiat status located there are distinguished by upwardly diverging values of the standard of living index 'at the expense' of other districts, mostly included in the lowest quartile group. Another disturbing observation is a large difference between the group of upper outliers and the lowest quartile group

in the dimensions of education and economic activity. This phenomenon, to some extent natural, may however mean the preservation of a low standard of living in the weakest districts. Difficult access to education combined with higher unemployment, especially long-term unemployment, may reinforce unfavourable social patterns.

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Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...

# Poziom życia i jego wymiary w powiatach w Polsce. Analiza zróżnicowania

| Streszczenie: | Wraz ze wzrostem poziomu zamożności społeczeństw coraz większego znaczenia w ocenie poziomu życia i dobrobytu przeciętnego człowieka nabierają takie czynniki, jak stan zdrowia, jakość edukacji oraz negatywne efekty produkcji, w tym jakość środowiska naturalnego. Kategorią od dawna stosowaną do pomiaru dobrobytu ekonomicznego i społecznego społeczeństw jest PKB *per capita*. Jednak we współczesnych badaniach proponuje się inne podejścia, bardziej kompleksowo opisujące ważne aspekty życia. |
| --- | --- |
| | Głównym celem niniejszego artykułu jest zbadanie poziomu życia w powiatach (regionach NUTS–4) w Polsce w 2020 r. w ujęciu łącznym oraz w poszczególnych jego wymiarach. Zbadano również przestrzenne zróżnicowanie indeksu poziomu życia i wskaźników cząstkowych opisujących jego poszczególne wymiary. Poziom życia zmierzono na podstawie zmiennej syntetycznej. Zmienna ta została skonstruowana jako miara rozwoju gospodarczego Hellwiga na podstawie wartości wskaźników cząstkowych opisujących kolejne wymiary. Wskaźniki te zostały wyznaczone jako średnie arytmetyczne znormalizowanych zmiennych diagnostycznych. |
| | Najwyższy poziom życia obserwuje się w miastach na prawach powiatu. Wśród nich znajdują się zarówno największe aglomeracje, jak i mniejsze miasta, będące ośrodkami lokalnymi. W rozkładzie przestrzennym miernika poziomu życia zwraca uwagę duża koncentracja powiatów o najniższych wartościach w północno-wschodniej części Polski oraz na Kujawach i południowym wschodzie. |
| | Skonstruowane na potrzeby badania wskaźniki cząstkowe opisujące wymiary poziomu życia odzwierciedlają sytuację w zakresie stopnia realizacji szczegółowych zadań polityki społecznej. Przeprowadzona w artykule analiza sytuacji powiatów w poszczególnych wymiarach poziomu życia pozwala wskazać te, które wymagają największej uwagi decydentów i skierowania do nich największych środków. |
| Słowa kluczowe: | poziom życia, jakość życia, zmienna syntetyczna, powiat, region NUTS–4 |
| JEL: | I31, R13, O18 |

Barbara Dańska-Borsiak

The Standard of Living and Its Dimensions in NUTS–4 Districts in Poland...