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SPATIAL DIFFERENTIATION OF CHILD WELL-BEING IN EUROPE

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Abstract

An important determinant of the level of development of each country and the whole Europe is the care about an adequate level of well-being and quality of life of all citizens, above all those to whom the future belongs – our children. In the times of demographic changes it is particularly important to understand specific needs and rights of the youngest generation of Europeans. Investing in children is investing in our future, the shape of which will depend precisely on whether the youngest generation will be healthy, well-educated and able to participate in the development of their societies. The aim of this study is to identify territorial differentiation of children's well-being in Europe at the end of the first decade of the 21st century using the methods of multivariate data analysis. The study was based on data published by Eurostat (among others EU-SILC), OECD (PISA), UNICEF, WORLD BANK and WHO (HBSC) for the years 2009 and 2010.

Keywords: children, well-being, Europe, regional differentiation, taxonomy.

JEL classification: C38, J13.

Introduction

One of the symptoms of a high standard of development of each country and the whole Europe is the care about ensuring an adequate level of well-being and quality of life to all citizens, and above all to those who will soon decide about the future – our children. In the times of demographic changes the lack of understanding for specific needs and rights of the youngest generation of Europeans may bring about negative consequences. Investing in children means investing in the future of us all, the future whose shape will depend exactly on whether the young generation will be healthy, educated, capable and ready to participate in the development of their societies.

Taking into account disproportions in the regional development of Europe, it is necessary to indicate the most important areas determining differentiation of well-being of the youngest in particular countries, to undertake activities allowing to eliminate the diagnosed differences and to continuously monitor the effects of those activities.

The aim of this study is an attempt to identify and evaluate territorial differentiation of child well-being in the countries of Europe at the end of the first decade of the 21st century.

Studies on the well-being of such a specific group as children are a difficult task due to the lack of uniform terminology. Moreover, a discussion is still going on about what should be understood under the term well-being or quality of life and about how to measure those categories.

The subject of this analysis is children understood as the total number of people below eighteen years of age¹. For the needs of this article, well-being was identified as resources and factors determining satisfaction of the basic needs of children in the short and long-term perspective along with evaluation of the level of satisfaction of those needs. The authors distinguished four crucial aspects of the life of the youngest, such as: material and housing conditions, health and safety, education, and behaviours and risks².

1. Source data

Child well-being should be regarded as a complex, interdisciplinary and directly non-measurable category. Therefore, in order to accomplish the research aims, the authors prepared a data base containing 39 indicators which characterize different aspects of children's life in the chosen countries of Europe. The source material was data published by Eurostat (among others EU-SILC), OECD (PISA), UNICEF, WORLD BANK and WHO (HBSC) for the years 2009 and 2010 (Table 1).

The indicators concerning child well-being gathered in the data base were grouped, in line with the accepted methodology, according to four dimensions.

The first dimension comprises indicators characterizing material (economic) conditions of the life of children and their families together with their housing situation – the key indicators for other aspects of life. The second dimension represents widely understood health (both physical and mental) and the sense of security (physical and emotional). A separate group is the factors which illustrate satisfaction of the children’s needs concerning such an important sphere of their life as education (including the so-called early education) perceived from the viewpoint of both participation and achievement. The last area defined as “behaviours and risks” includes the set of habits and behaviours of positive (e.g. proper eating habits, physical activity) and negative nature (using stimulants) which influence life quality of the youngest in the longer perspective (Table 1).

Table 1. Indicators of child well-being

Code	Indicator	Data Source
1	2	3
X_{11}	Children at risk of poverty or social exclusion (%)	Eurostat 2010
X_{12}	Children aged 0–17 years living in jobless households (%)	Eurostat 2010
X_{13}	Indicator of the low level of family affluence (%)	HBSC 2010
X_{14}	Children overcrowding rate (%)	Eurostat 2010
X_{15}	Severe housing deprivation (%)	Eurostat 2010
X_{16}	Relative median poverty risk gap, age 0–17 (%)	SILC 2010
X_{17}	Average number of rooms per person in households with dependent children	SILC 2010
X_{21}	Young people not living with both parents (%)	HBSC 2010
X_{22}	Fifteen-year olds feeling depressed more than once per week (%)	HBSC 2010
X_{23}	Fifteen-year olds with problem of overweight and obesity, WHO growth reference (%)	HBSC 2010
X_{24}	Fifteen-year olds been bullied at school at least once in the past couples of months (%)	HBSC 2010
X_{25}	Fifteen-year olds who rate their health as fair or poor (%)	HBSC 2010
X_{26}	Under-five mortality rate (per 1000 live births)	Eurostat 2010
X_{27}	Infant mortality rate (per 1000 live births)	Eurostat 2010
X_{28}	Neonatal mortality rate (per 1000 live births)	Eurostat 2010
X_{29}	Children aged less than two years old immunised against Diphtheria, Tetanus and Pertussis (%)	OECD 2010
X_{210}	Children aged less than two years old immunised against Measles (%)	OECD 2010
X_{211}	Low birth weight rate (%)	OECD 2010
X_{31}	Fifteen-year olds who like school very much (%)	HBSC 2010
X_{32}	Fifteen-year olds who feel pressured by schoolwork (%)	HBSC 2010
X_{33}	Fifteen-year olds who report good or very good perceived school performance (%)	HBSC 2010
X_{34}	Pupil-teacher ratio in primary education	Eurostat 2010
X_{35}	Participation in early childhood education (%)	Eurostat 2010
X_{36}	Average class size (ISCED 1)	Eurostat 2010
X_{37}	Children aged less than three years old with no formal childcare (%)	Eurostat 2010
X_{38}	Average result of test in mathematics	PISA 2009

1	2	3
X_{39}	Average result of test in science	PISA 2009
X_{310}	Average result of test in reading	PISA 2009
X_{311}	NEET rate – young people aged 15–19 not in employment and not in any education and training (%)	Eurostat 2010
X_{41}	Fifteen-year olds spending time with friends after school on four or more days per week (%)	HBSC 2010
X_{42}	Fifteen-year olds physically active for two or more hours per week (%)	HBSC 2010
X_{43}	Fifteen-year olds playing PC or console games for two or more games on weekdays (%)	HBSC 2010
X_{44}	Fifteen-year olds smoking cigarettes at least once a week (%)	HBSC 2010
X_{45}	Fifteen-year olds drinking beer at least once a week (%)	HBSC 2010
X_{46}	Fifteen-year olds drinking alcohol at least once a week (%)	HBSC 2010
X_{47}	Fifteen-year olds who eat breakfast every school day (%)	HBSC 2010
X_{48}	Adolescent fertility rate (number of births per 1000 women aged 15–19)	WB 2010
X_{49}	Fifteen-year olds eating fruit every day (%)	OECD 2010
X_{410}	Fifteen-year olds eating vegetable every day (%)	OECD 2010

Source: own collation.

1.2. Diagnostic variables

Taking into account a complex nature of the studied phenomenon, i.e. child well-being, the conducted analyses were based on taxonomic methods which allowed to analyze objects (in this case the countries of Europe) in a multi-feature space³.

Table 2. Diagnostic variables of child well-being

Code	Variable
X_1	Children aged 0–17 years living in jobless households (%)
X_2	Indicator of the low level of family affluence (%)
X_3	Young people not living with both parents (%)
X_4	Fifteen-year olds feeling depressed more than once a week (%)
X_5	Infant mortality rate (per 1000 live births)
X_6	Fifteen-year olds who like school very much (%)
X_7	Fifteen-year olds who feel pressured by schoolwork (%)
X_8	Pupil-teacher ratio in primary education
X_9	Participation in early childhood education (%)
X_{10}	Average result of PISA test in mathematics
X_{11}	Fifteen-year olds physically active for two or more hours per week (%)
X_{12}	Fifteen-year olds playing PC or console games for two or more games on weekdays (%)
X_{13}	Fifteen-year olds drinking beer at least once a week (%)
X_{14}	Fifteen-year olds eating fruit every day (%)

Source: own collation.

A significant assumption of the multidimensional comparative analysis methods is to limit the number of diagnostic variables. A too numerous set of characteristics frequently makes it difficult or even impossible to classify the studied objects. This is why a potential, frequently wide set of variables must be subject to selection due to a number of formal criteria⁴.

Making a selection of the final set of diagnostic variables, the authors first of all verified the collected data from the viewpoint of contents, evaluating their credibility and completeness. The next step was to select indicators according to the level of their internal differentiation. From the set of potential diagnostic variables the authors removed those for which the value of variation coefficient (CV) did not exceed the assumed level of 10%. These features were regarded as quasi-constant, without discriminating qualities. The last stage of selecting variables was to limit excessive correlation of the features representing the same groups of needs. Selection of representatives of these groups was made by means of Z. Hellwig's parametric method⁵. This procedure made it possible to select central and isolated variables representing the four areas of children's living conditions differentiated in the study. In this way the final set of fourteen diagnostic variables was established (Table 2).

2. Differentiation of children's well-being in Europe

An attempt to identify spatial differentiation in child well-being in Europe was made using taxonomic methods of multivariate data analysis. At the first stage of comparative analysis, the authors used an indicator approach to the research into complex phenomena, consisting in aggregating the set of diagnostic variables in order to obtain a synthetic measure⁶. Further on the same set of diagnostic variables was used to classify the European countries according to their similarities as regards child well-being.

2.1. Synthetic measures of child well-being

The idea in a vast majority of methods used to construct synthetic measures is the same. Values x_i of all n features of X_1, X_2, \dots, X_n representing the studied phenomenon are interpreted as points in n -dimensional space R^n . The essence of these methods is reduced to transformation of the units described by means of many variables into one-dimensional space, obtaining the so-called synthetic variable, which decidedly facilitates classification and comparison of the studied objects. There are many various methods of creating pattern and non-pattern synthetic variables. The idea of pattern methods consists in the fact that in space R^n point x^* called

“pattern” is differentiated. The synthetic measure of a unit characterized by the vector of value x is then defined as a function of distance $d(x, x^*)$ of vector x from an established point of reference x^* . Non-pattern methods (on the other hand) are reduced to calculating average values of vector x components⁷.

The basis to create the so-called synthetic measure of child well-being was the previously defined set of fourteen diagnostic variables (Table 2). Analysis of the direction of impact of the chosen variables on a given phenomenon made it possible to include the following features in the set of stimulants:

$$S: \{X_6, X_9, X_{10}, X_{11}, X_{14}\},$$

whereas the following variables were regarded as de-stimulants:

$$D: \{X_1, X_2, X_3, X_4, X_5, X_7, X_8, X_{12}, X_{13}\}.$$

For the sake of uniformity in the direction of impact of the features used in the study on the level of child well-being and in order to ensure their additivity and comparability, appropriate transformations were made according to two variants. In the first variant normalization was performed according to the formula proposed by D. Strahl⁸. The second variant was based on quotient transformation⁹.

Values z_i of synthetic measure Z illustrating child well-being for i -country were calculated as a mean arithmetic value of synthetic variables z_{iq} ($q = 1, \dots, 4$) determined for the spheres of children’s life included in the study, with each of those spheres considered as equally significant. Values z_{iq} were calculated as a mean arithmetic value of the normalized values of diagnostic variables.

Finally, two variants of the synthetic measures of children’s well-being in particular European countries at the end of the first decade of the 21st century were obtained (Table 3). As a result of sorting and ranking of the obtained values, slightly different classifications were received, depending on the applied variant of synthetic measure (z_i and z'_i). The analysis of conformity of the obtained results of classification based on the value of Spearman’s rank correlation coefficient ($p = 0.9794$) confirmed their high convergence. Thus the selection of the method of normalization did not influence the conducted linear ordering in any significant way.

Having analyzed the obtained results, the authors stated that the most favorable living conditions of children were found in the countries from outside the EU (Iceland, Norway, Switzerland) and also the Netherlands and Slovenia – the only country from the so-called New Union which found itself on the top of the ranking. In the remaining new EU countries child

well-being is much worse. The most difficult situation is in Romania and the Baltic states. In this respect the countries of Central Europe and Great Britain are characterized by only slightly better conditions.

Table 3. Synthetic measures of child well-being and ranks for particular European countries

Country	Variant of synthetic variable Z				Country	Variant of synthetic variable Z			
	z_i	rank (1)	z'_i	rank (2)		z_i	rank (1)	z'_i	rank (2)
Iceland	0.793	1	2.535	1	Belgium	0.505	15	1.116	15
Norway	0.654	2	1.832	2	Italy	0.485	16	1.022	18
Netherlands	0.628	3	1.575	4	Spain	0.481	17	1.054	16
Slovenia	0.622	4	1.517	6	Greece	0.478	18	1.047	17
Switzerland	0.616	5	1.608	3	Hungary	0.472	19	0.956	20
Luxembourg	0.607	6	1.574	5	Poland	0.462	20	0.995	19
Finland	0.597	7	1.500	7	Slovakia	0.446	21	0.937	22
Denmark	0.596	8	1.391	8	Czech Republic	0.434	22	0.942	21
Austria	0.559	9	1.303	10	UK	0.428	23	0.898	23
Sweden	0.556	10	1.338	9	Lithuania	0.425	24	0.876	26
Germany	0.544	11	1.210	13	Latvia	0.422	25	0.897	24
Portugal	0.544	12	1.249	11	Estonia	0.416	26	0.893	25
France	0.532	13	1.212	12	Romania	0.357	27	0.750	27
Ireland	0.514	14	1.131	14					

z_i – SM value with D. Strahl's normalization.

z'_i – SM value with T. Grabiński's normalization.

Source: own calculations.

Poland ranks 19th or 20th in the obtained specification (depending on the accepted synthetic measure) with child well-being below the European average. The situation of Polish children was particularly bad as regards the fourth sphere of their life distinguished in the study (behaviours and risks) where Poland occupied the last but one position among the analyzed countries.

The results of linear ordering show visible disproportions between relatively rich Northern and Western Europe and the countries of Southern and Central Europe. Therefore, one can assume that there is a certain connection between the level of children's well-being and affluence of a country (the connection with GDP per capita), although some deviations from this tendency may be observed. Particularly in Great Britain child well-being is worse whereas in Slovenia and the Netherlands it is much better than this indicated by their level of affluence¹⁰.

The next stage of a comparative analysis of child well-being in Europe in the spatial approach was to determine the measure of development for particular countries, based on their distance from the so-called pattern of development (Figure 1). The basis of research

procedure was the final set of diagnostic variables which were normalized. Hypothetical object Q representing maximum values of transformed variables was assumed to be a pattern of development. Euclidean distance was accepted as a measure of distance of the analyzed territorial units from the pattern¹¹.

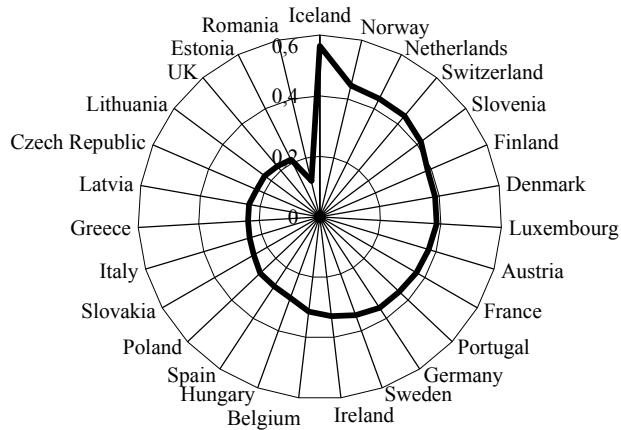


Fig. 1. Child well-being in the chosen countries of Europe according to the method of pattern of development

Source: own calculations.

The results of linear ordering of the countries using the pattern of development method confirmed the results obtained by means of synthetic non-pattern measures of the level of child well-being.

Children from Northern Europe (Iceland, Norway, Finland and Denmark) and also from the Netherlands, Switzerland and Slovenia, have the most favorable living conditions. Romania, the Baltic states, Great Britain and the Czech Republic are most distant from the pattern. Poland (with the measure of development at the level of 0.27) occupied a distant 18th position among the studied countries of Europe, among others, behind Hungary and Spain and before Slovakia, Greece and Italy (Figure 1).

2.2. Classification of European countries according to similarities in child well-being

In this study on spatial differentiation of child well-being the classification of European countries was made by using the criterion based on the main statistical parameters (arithmetic mean and standard deviation) of synthetic measure Z . Further on cluster analysis was applied.

The set of 27 European countries was divided into four groups including units with values of the synthetic measure of living conditions belonging to the following intervals:

$$G_1: z_i \in \langle \bar{z} + s_z; \max(z_i) \rangle, \quad G_2: z_i \in \langle \bar{z}; \bar{z} + s_z \rangle,$$

$$G_3: z_i \in \langle \bar{z} - s_z; \bar{z} \rangle, \quad G_4: z_i \in \langle \min(z_i); \bar{z} - s_z \rangle.$$

The grouping was conducted for both variants of the synthetic measure and the results of the analysis are presented in Table 4.

Table 4. Classification of European countries according to the value of synthetic measure of child well-being

Group	Variant of synthetic variable Z		Group	Variant of synthetic variable Z		
	z_i	z'_i		z_i	z'_i	
G ₁	Iceland Netherlands Norway Slovenia	Finland	G ₃	Belgium	Belgium	
		Iceland*		Czech Republic	Czech Republic	
		Luxembourg		Greece	Greece	
		Netherlands		Hungary	Hungary	
		Norway		Ireland	Ireland	
Slovenia	Italy	Italy				
Switzerland	Poland	Poland				
G ₂	Austria	Austria		G ₄	Slovakia	Slovakia
	Denmark	Denmark			Spain	Spain
	Finland	G ₄			Estonia	Estonia
	France		Latvia		Latvia	
	Germany		Lithuania		Lithuania	
	Luxembourg		Romania		Romania	
	Portugal		UK		UK	
	Sweden					
Switzerland						

z_i – SM value with D. Strahl's normalization

z'_i – SM value with T. Grabiński's normalization

* – SM value for Iceland, as being divergent, was not included when calculating the arithmetic mean.

Source: own calculations.

Having analyzed the obtained specification, the authors found a significant convergence in the results of classification of European countries for both variants of the synthetic measure. The first group of countries with the best living conditions for children is constituted by Iceland and Norway and also the Netherlands and Slovenia (with the second variant of SM also Finland, Luxembourg and Switzerland). The second group is also created by the countries characterized by a high level of child well-being, exceeding Europe's average, among others the countries of Northern Europe (Denmark, Sweden) and also Austria, France, Germany and Portugal. Poland,

like the remaining countries of Central and Southern Europe, Ireland and Belgium is placed in the group where child well-being is relatively worse (G_3). The least favorable situation is observed in Romania, Great Britain and the Baltic states.

The obtained specification of countries shows a positive skew of distribution of the synthetic measure of child well-being in Europe. Worth emphasizing is the fact that among the countries with the best well-being of children relatively small states dominate (G_1 group includes approximately 5–6% of the population of the studied area of Europe) whereas 14 states which occupy the lowest position in the classification (groups G_3 and G_4) are inhabited by almost 58% of the population of the analyzed area.

Another instrument used in the research to distinguish the countries with a similar level of child well-being was cluster analysis – grouping methods based on taxonomic similarity of multi-feature objects. The main aim of cluster analysis is division of n set of objects described by many features into two or more separate homogeneous groups¹².

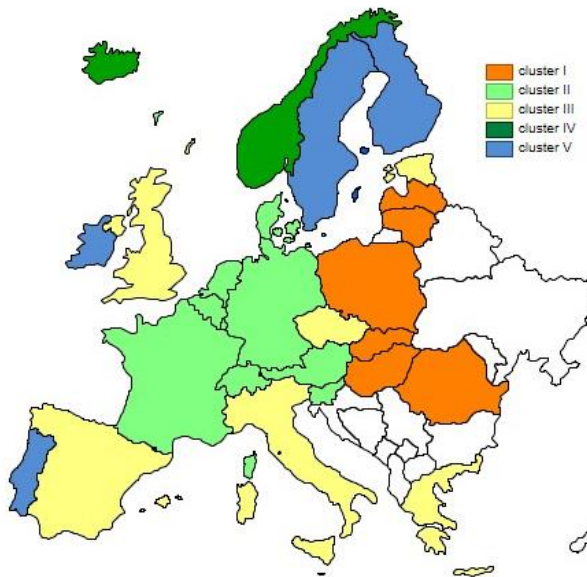


Fig. 2. Results of grouping of European countries according to similarity of child well-being (Ward's method)

Source: own calculations by means of STATISTICA 10.0.

In our research into spatial differentiation of child well-being in Europe, the set of 14 final diagnostic variables was accepted as a basis for the cluster analysis. These variables were

normalized according to D. Strahl proposal. The cluster analysis was conducted by means of Ward's method. This method was chosen due to the fact that its effectiveness is emphasized in the related literature thanks to estimating the distances between clusters using variance analysis¹³. In order to create the matrix of distances between the analyzed objects Euclidean distance was used. The border level of distances between the joined groups of similar objects, which showed the expected final number of clusters, was determined at the level of 50% of the maximum distance.

Ward's method used in the study allowed to differentiate five clusters of countries characterized by relatively similar conditions of child well-being (Figure 2). The first cluster consists of the countries of the so-called New Union (including Poland) which are characterized by relatively poor living conditions of children, above all in the economic and widely understood health aspects. Separate groups were constituted by highly developed West European countries and Slovenia (cluster II) and also two Northern countries of relatively good child well-being (cluster IV). Group III is strongly differentiated in respect of geography. This group includes both Great Britain and Estonia and the countries of Southern Europe, i.e. the countries where child well-being was also below the European average (Table 4).

Conclusions

Summing up our considerations, it should be stated that the European countries differ significantly as regards child well-being. There exists considerable stratification, above all between Northern and Western Europe on the one hand and the South of the continent and the countries of Central-Eastern Europe. Moreover, as proved by the research, those disproportions have not been clearly improved over the last few years¹⁴. Thus there is still much to do to accomplish the resolutions of the Convention on the Rights of the Child which, among others, state that: "States Parties shall ensure to the maximum extent possible the survival and development of the child"¹⁵.

Finally, it should be underlined that the questions about the scope of widely understood well-being of such a specific group as children, or about the selection of those dimensions of their existence which should be included in the study, still remain unanswered. Another problem is accessibility of statistical indicators concerning the distinguished research area which (taking into account their validity and comparability on the international scale) are still relatively scarce¹⁶.

Notes

- ¹ United Nations (1989).
- ² Richardson, Hoelscher, Bradshaw (2008); Bradshaw, Richardson (2009); Martorano et.al (2013).
- ³ Mynarski (1992), p. 117.
- ⁴ Zeliaś (2000), p. 37.
- ⁵ Hellwig (1981).
- ⁶ Ostasiewicz (2004), p. 23.
- ⁷ Ibidem, p. 24.
- ⁸ Strahl (1984).
- ⁹ Grabiński (1985).
- ¹⁰ Bradshaw, Richardson (2009), p. 348.
- ¹¹ Dudek, Krawiec, Landmesser (2011), p. 87.
- ¹² Stanisz (2007), p. 114.
- ¹³ Hair et. al (1998), p. 496.
- ¹⁴ Martorano et.al (2013).
- ¹⁵ United Nations (1989).
- ¹⁶ UNICEF (2013).

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