Centre for Research on Settlements and Urbanism

Journal of Settlements and Spatial Planning

Journal homepage: http://jssp.reviste.ubbcluj.ro/eng/index.html

Reorganization of the Primary School Network in the Polish Carpathians in the Period 2000 - 2020

Marcin SEMCZUK*[1], Karol MAJEWSKI[1], Diana-Elena ALEXANDRU[3], Artur HOŁUJ[2, 3], Mateusz ILBA[1], Piotr LITYŃSKI[2], Piotr SERAFIN[1], Vasile ZOTIC[3]

** Corresponding author*

[1] Kraków University of Economics, College of Public Economy and Administration, Institute of Spatial Management and Urban Studies, Department of Social-Economic Geography, Kraków, POLAND

[2] Kraków University of Economics, College of Public Economy and Administration, Institute of Spatial Management and Urban Studies, Department of Spatial Management, Kraków, POLAND

[3] Babeş-Bolyai University, Faculty of Geography, Department of Human Geography and Tourism, Centre for Research on Settlements and Urbanism, Cluj-Napoca, ROMANIA

✉ semczukm@uek.krakow.pl https://orcid.org/0000-0003-2327-148X

✉ majewskk@uek.krakow.pl https://orcid.org/0000-0003-0285-626X

✉ diana.alexandru@ubbcluj.ro https://orcid.org/0000-0002-2221-9316

✉ holuja@uek.krakow.pl https://orcid.org/0000-0003-1676-8965

✉ ilbam@uek.krakow.pl https://orcid.org/0000-0003-1005-5323

✉ litynskp@uek.krakow.pl https://orcid.org/0000-0002-1400-5545

✉ serafinp@uek.krakow.pl https://orcid.org/0000-0001-5601-8080

✉ vasile.zotic@ubbcluj.ro https://orcid.org/0000-0002-4489-0637

DOI: 10.24193/JSSPSI.07.CSPTER https://doi.org/10.24193/JSSPSI.07.CSPTER

K e y w o r d s: *primary school closure, mountain rural areas, primary education network, population dynamics, Polish Carpathians, Poland*

A B S T R A C T

The study focuses on the process of reorganization of the primary school network in the Polish Carpathians, in the period 2000-2020, determined by population dynamics and the education reform in Poland, which focused on the abolition of middle schools (junior high schools) and the return to eight-year primary schools. Primary schools located in the Polish Carpathians represent almost 10% of all schools of this type in Poland, usually with a smaller number of pupils/school (1/4 when compared to the national average). In mountainous areas with a specific settlement network, the closure of a primary school in a small village usually leads to several socioeconomic issues and may become subject to changing the managing authority due to budgetary reasons. The main aim was to determine the dynamics of the process and analyze spatial differentiations, by investigating the relation between population change in the 15-39 age group and the change in the number of schools, and to identify the location of the closed schools. Results show variability in the dynamics of the analysed variables in the case of Polish Carpathians compared to the national level, for instance, much slower dynamics of school closures than the rest of the country, the number of primary schools dropping by 14% between 2000 and 2020, while the greatest decrease in the number of pupils was observed in the Carpathian communes of Subcarpathian Voivodeship, especially in peripheral locations. However, we can conclude that in mountainous areas school closure has been highly avoided due to the engagement of different types of managing authorities, from local government to other public or private entities, in governing these schools.

1. INTRODUCTION

Significant changes of the primary school network in Poland have been observed for more than twenty years. These changes are mainly the result of the 1999 education reform (resulting in the introduction of middle schools), unfavourable demographic changes and the 2017 education reform, which reinstated eight-

year primary schools. In areas where the number of pupils is decreasing these changes are usually manifested by the closure of primary schools. The distribution of funding in the education system in Poland is largely based on the number of pupils attending schools in a given commune (Bajerski, 2020). As the number of children in schools decreases, the amount of subsidies for schools also decreases. As a result, the local governments are the ones that maintain schools. An additional challenge of recent years is the increasing cost of building maintenance, especially in winter. This process affects rural areas to a much greater extent than urban areas. This is particularly the case of rural areas with a predominantly agricultural function, which are characterised by extensive depopulation and a fragmented settlement network. Mountainous areas such as the Carpathian Mountains are a special case from this point of view. In areas with highly variable land morphology, school closure brings significant social and economic consequences, as transporting children to the nearest school often becomes very expensive and time-consuming. Moreover, it also results in fewer jobs, not only for teachers, but for the local community too since this is usually involved in the functioning of the school in many different ways (Bajerski and Błaszczyk, 2015; Trnková, 2009). It is also pointed out that such a case lowers the rank of the village in the local settlement structure due to the reduction or closure of bus routes, shops, post offices or kindergartens (Kucerová and Kucera, 2009; Amcoff, 2012; Kučerová, 2012; Mandujano et al., 2012; Šťastná and Vaishar, 2019).

The scientific literature related to the importance of a small school and the consequences of its closure is relatively extensive. This problem exists in almost all countries affected by depopulation. Most often, the problem first affects rural areas with poor spatial accessibility, such as mountainous areas.

School closures has been the subject of research for a considerable body of work in many European countries (Bell and Sigsworth, 1987; Post and Stambach, 1999; Lyson, 2002, 2005; Egelund and Laustsen, 2006; Bagley and Hillyard, 2011; Kučerová, 2012; Autti and Hyry-Beihammer, 2014; Slee and Miller, 2015; Kassai and Farkas, 2016; Kroismayr, 2019; Semczuk, 2018, 2020; Villa and Knutas, 2020; Fargas-Malet and Bagley, 2021) as well as North and South America (DeYoung and Howley, 1990; Mandujano et al., 2012; Corbett and Tinkham, 2014; Tieken and Auldridge-Reveles, 2019). It can be observed that schools in rural areas operate in similar ways regardless of the country. However, the differences in the functioning of rural and urban schools in a given country can be very significant. The cited publications mostly highlight the causes and social consequences of the closure of primary schools. There are relatively few works that focus on the analysis of the extremely important socio-economic issues of communes where primary school closures have occurred. These few works refer to countries such as Denmark (Egelund and Laustsen, 2006), Hungary (Kassai and Farkas, 2016), Austria (Kroismayr, 2019) or Poland (Semczuk, 2020).

In the light of the premises outlined above, the aim of the study was to investigate the spatial differentiation of the reorganization process of the primary school network in the Polish Carpathians within the larger national frame. The research also aimed to precisely identify the location of closed schools in the Polish Carpathians and to determine the relationship between population changes and the closure of a school in a given area.

2. THEORY AND METHODOLOGY

The study covered 199 communes (237 areas - including urban and rural subareas of urban-rural communes), which were defined as “Carpathian communes”. The selection of these communes was based on the latest physico-geographical regionalization of Poland, developed by a broad team of researchers representing key universities in Poland and research institutes including the Polish Academy of Sciences (Solon et al., 2018).

The criterion that was taken into account for the selection of the Carpathian communes was their area affiliation to the Central Western Carpathians, Outer Western Carpathians or Outer Eastern Carpathians sub-provinces. It was considered that a minimum of 60% of the area of a given commune should belong to the above-mentioned regions in order to be recognised as a Carpathian commune. Eventually, 123 areas were selected in the Lesser Poland Voivodeship, 83 areas in the Subcarpathian Voivodeship and 31 areas in the Silesian Voivodeship (Fig. 1). The applied selection criteria were previously used by other researchers to delimit Carpathian communes (Dobosz et al., 2019; Kolecka and Kozak, 2019). Both urban and rural communes were included in the study, but the analysis paid particular attention to those placed in rural areas, for which the closure of a primary school generates significant consequences at the level of the local community.

The time period under research in the current study stretches between 2000 and 2020, the main reason revolving around the education reform that took effect in 1999 and reduced the primary schooling time to six years (in favour of the newly created middle schools). However, in 2017, the eight-year primary school was reinstated, which subsequently increased the corresponding number of primary pupils in 2017 and 2018. Therefore, the aggregations of the number of schools and the number of pupils is analysed as

pertaining to distinct time frames: 2000-2016 and 2000-2020. The research is based on statistical data on primary schools obtained from the Local Data Bank deferential to the Central Statistical Office of Poland. The downloaded data for each year in the 2000-2020 interval refer to the number of schools and the number of pupils in primary schools in a given commune (urban, rural or urban-rural). In the case of urban-rural communes, the downloaded data contained statistics for urban and, respectively, rural subareas. If a given commune had undergone administrative changes (rural communes becoming rural-urban) during the time line mentioned above and as a direct result of being granted municipal rights, statistics for the subareas in case were aggregated to the commune level in order to maintain data continuity.

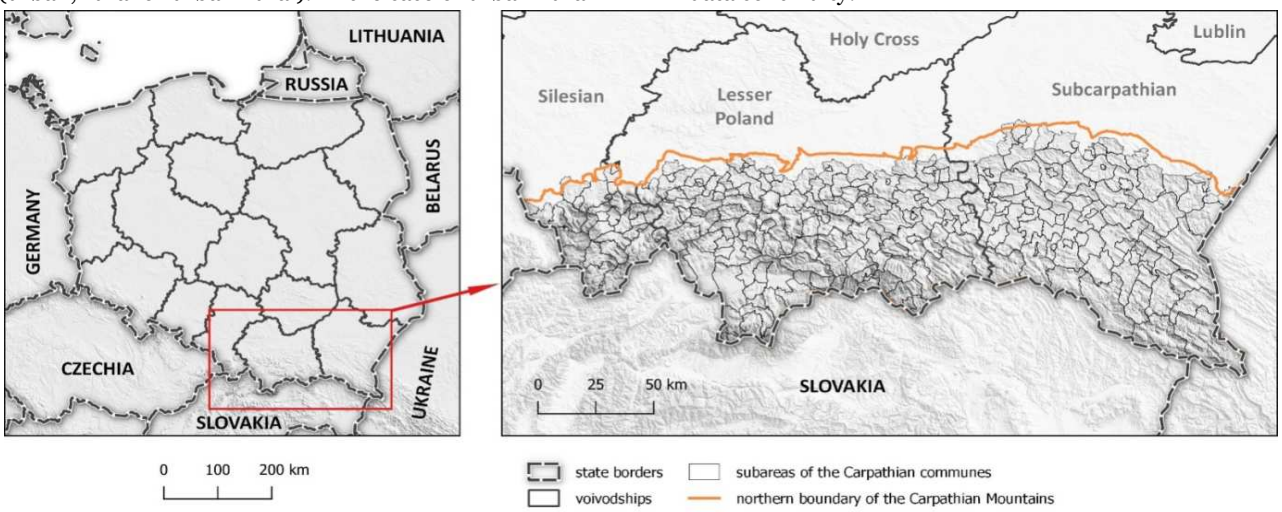

Fig. 1. Research area.

Data on primary schools additionally included information on the authorities managing the schools. Schools and the students attending them were allotted two basic types distinguished by the authority managing the school. The first type was represented by schools managed by self government units (at commune, county, voivodeship or central level). The second type included all other schools managed by, among others, social associations or religious organisations.

The Local Data Bank was also a source of data on population, more specifically on the number of people in the 15-39 age group. The statistical data (schools, pupils, population in the 15-39 age group) obtained at the commune level and its subareas could be aggregated at further stages of analysis to a higher level of the country's administrative division and also considered from a corresponding standpoint, namely as belonging to the urban, rural and urban-rural commune categories.

Data from the Register of Schools and Educational Establishments provided by the Ministry of Education and Science were used for rendering the location of closed primary schools. However, this data appeared to be incomplete in terms of schools that had been closed. This was particularly the case of schools closed before 2015, the year the database became available, more precisely the 18th of May 2015. In order to complete the database of closed schools, the specific lists were provided by regional education offices, when possible (as most of the education offices in Poland do not keep such lists) and by the Local Data Bank (the number of primary schools in a given locality, updated on the 22nd of January 2021, as well as archived data for 2000-2019). This allowed to identify those localities where schools had been closed and then to compare these results with the data of the Register of Schools and Educational Establishments. Eventually, only those localities where the number of schools has decreased and which were not included in the ministerial list were selected. For these localities, information about the precise location of the school, its name and date of closure were searched. For this purpose, websites such as www.katalog.szkolnictwa.pl, www.szkolnykatalog.pl, Public Information Bulletins, as well as any other data published on the closure of a school in a given locality (*e.g.* resolutions of the commune council documenting liquidation of a school) were used, the result being in-depth information on the location of 123 closed schools in the area of the Polish Carpathians.

For accuracy reasons, cartographic methods of representation, charts and tabular summaries were used as to determine the spatial differentiation of school network reorganization and the rate of increase or decrease in the number of schools from 2000 to 2020. The same methods and tools were also employed for comparative analyses of these processes targeting the Polish Carpathians within the national frame.

The analysis also aimed to establish the relationship between the change in the number of pupils in primary schools in the studied Carpathian communes between 2000-2020 and the change in the

population of the 15-39 age group that occurred over the same time span. For this purpose, the Pearson's linear correlation coefficient (r) was calculated based on the values of two variables for each of the studied communes: the dynamics of the number of primary school pupils in the period 2000-2020 and the dynamics of the population in the 15-39 age group over the same time period.

The values of the correlation coefficient were calculated overall and separately for urban areas (including urban communes and urban subareas within urban-rural communes) and rural areas (including rural communes and rural subareas within urban-rural communes). The results of the correlation tests were subjected to statistical significance analysis.

$$r = \frac{\mathrm{cov}(X;Y)}{\sqrt{\mathrm{var}(X)\,\mathrm{var}(Y)}}$$

where:
cov(X;Y) – the covariance of variables *X* and *Y*;
var(X) – the variance of variable *X*;
var(Y) – the variance of variable *Y*.

An important part of the research was to indicate the changes that are taking place in the number of primary schools and the number of pupils attending them in the Polish Carpathian communes, as well as in Poland, at the national level. To better illustrate the dynamics of the processes, a chain index was used. The same methodology was employed to analyse changes in the number of schools and pupils previously assigned to one of the two types set according to the authority managing the school.

$$i_{t/t-1} = \frac{Y_t}{Y_{t-1}}$$

where:
Y_t –value at period *t*;
Y_{t-1} – value at period *t-1*.

3. RESULTS AND DISCUSSION

3.1. Differentiation of the school network in the Carpathian communes within Poland, at the national level

The changes that have taken place over the past two decades in the network of primary schools, both in Poland and the Polish Carpathians, are characterised by great variability. In the years 2000-2020, the number of schools in Poland decreased by 2,720 (decrease of approx. 17%) (Table 1).

Table 1. Changes in the number of schools and pupils in Poland and Polish Carpathian communes in 2000-2020.

Year	Poland				Carpathian communes			
	Number of schools in Poland	Relative increase / decrease	Number of pupils	Relative increase / decrease	Number of schools in Polish Carpathian communes	Relative increase / decrease	Number of pupils	Relative increase / decrease
2000	15986	-	3168551	-	1514	-	236697	-
2001	15079	-5.67	3062742	-3.34	1466	-3.17	230445	-2.64
2002	14810	-1.78	2943109	-3.91	1459	-0.48	222644	-3.39
2003	14565	-1.65	2817959	-4.25	1450	-0.62	214574	-3.62
2004	13995	-3.91	2688609	-4.59	1420	-2.07	205330	-4.31
2005	13800	-1.39	2568811	-4.46	1410	-0.70	196379	-4.36
2006	13725	-0.54	2453600	-4.48	1408	-0.14	188800	-3.86
2007	13540	-1.35	2347921	-4.31	1395	-0.92	182649	-3.26
2008	13291	-1.84	2268486	-3.38	1380	-1.08	176404	-3.42
2009	13191	-0.75	2210279	-2.57	1376	-0.29	171897	-2.55
2010	13142	-0.37	2167200	-1.95	1366	-0.73	167171	-2.75
2011	12986	-1.19	2163399	-0.18	1352	-1.02	165297	-1.12
2012	12769	-1.67	2137346	-1.20	1336	-1.18	161920	-2.04
2013	12682	-0.68	2129170	-0.38	1328	-0.60	158551	-2.08
2014	12744	0.49	2282500	7.20	1334	0.45	168062	6.00
2015	12768	0.19	2456474	7.62	1336	0.15	176324	4.92
2016	12720	-0.38	2272218	-7.50	1329	-0.52	163594	-7.22
2017	13551	6.53	2626403	15.59	1361	2.41	190497	16.44
2018	13527	-0.18	3001061	14.27	1358	-0.22	217932	14.40
2019	13440	-0.64	3014366	0.44	1353	-0.37	218122	0.09
2020	13266	-1.29	3044828	1.01	1337	-1.18	220196	0.95
Increase/decrease between 2000-2020	-2720	-17.01	-123723	-3.90	-177	-11.69	-16501	-6.97
Increase/decrease between 2000-2016	-3266	-20.43	-896333	-28.29	-185	-12.22	-73103	-30.88

Source: based on data from the Local Data Bank of the Central Statistical Office of Poland.

However, it should be noted that this value includes the changes in the number of schools that occurred as a result of the education reform of 2017 (restoration of an eight-year primary school and

structurally eliminating middle schools from the educational system). By 2017, the decline in the number of primary schools at the national level was of approximately 20.5%. Closing down schools did not occur uniformly over time and some four-year cycles can be visible from this perspective. The years of 2006, 2010 and 2014 were clearly marked by a lower rate of school closure. These years correspond, not coincidentally, with the local government election calendar, the authorities attempting to avoid making sensitive decisions that could affect the local communities. An exception to this rule was noticed during 2014-2018 local government term, wherein the year of 2018 was characterised by not even the slightest decrease in the number of schools. Instead, in the preceding year (2017), there was a clear increase in the number of schools (by over 6.5%), which was caused by the adaptation of the school network to the aforementioned statutory changes. Modifications in the number of pupils attending primary schools in Poland were slightly different. During the period under study, the number of pupils decreased by nearly 124,000 children. While analyzing the fluctuation of this item (*i.e.* number of pupils in primary schools), two time intervals emerge: 2000-2013 and 2014-2020. The former corresponds to a national decrease by 3% on average per year, amounting to a total of 33%. The latter (with the exception of 2017) is characterised by an increase reaching a cumulative level of 43%, which has, *de facto*, excessively compensated for the earlier decline. However, it should be noted that this is partly due to the addition of children from two additional year groups to the total number of pupils. Despite the effect of the education reform, there is a noticeable increase in the number of children in primary schools generated by the 'echo' response of the post-war baby boom. A noteworthy observation would be that, despite such an extensive increase in the number of pupils between 2014 and 2020 (essentially complementing the loss between 2000 and 2013), the number of schools in this period has only increased by 4.7%. The cutback in the number of schools in the first period was of almost 23%, which obviously could not balance the decrease in the number of schools observed in the first period (2000-2013), which was of almost 21%.

In 2000, almost 10% (1514 schools) of all primary schools in Poland were located in the Polish Carpathians, indicating a significant representation. As in the case of Poland, at the national level, the Polish Carpathians also saw a decrease of 11.7% in the number of schools during the analysed time span. Only in three individual years (2014, 2015 and 2017) was there an increase in the number of schools, whereas an average annual decrease of 0.9% in the number of schools was observed throughout the interval under discussion. Eventually, the number of primary schools in the Polish Carpathians decreased by 177. At the same time, the number of children attending primary schools also decreased from 236.7 thousand to about 220 thousand, indicating a drop of approximately 7%.

From a national perspective, the change in the number of pupils in the Carpathian communes can also be divided into two periods. If the years between 2000 and 2013 are marked by a decrease in the number of pupils at an average annual rate of around 3%, while the overall decrease for this period was of 33%, from 2014 onwards, an increase in the number of pupils of primary schools was generally recorded, with the exception of 2016, ultimately recording the value of 39%.

Comparing the Polish Carpathians and Poland from the standpoint of changes in the primary school network, it is noticeable that fact that the processes under analysis undergo highly similar dynamics for each individual year (Fig. 2).

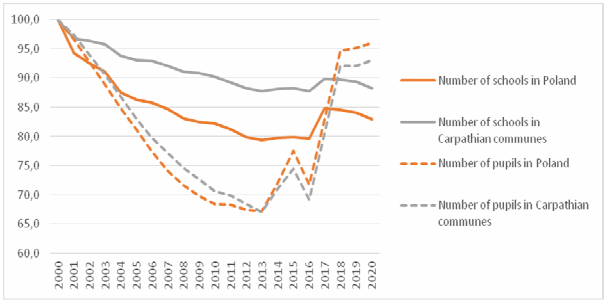

Fig. 2. Changes in the dynamics of the number of schools and pupils in Poland and the Polish Carpathian communes in 2000-2020.

However, a comparison of the rate of school closures shows that this process was much slower in the Carpathians. Moreover, between 2000 and 2013, almost a quarter of primary schools were closed altogether in Poland, while the same period saw the closure of 13% of schools in the Polish Carpathians. This occurred despite the very similar dynamics of the decline in the number of pupils. It should also be noted that schools in the Polish Carpathian region, compared to the entire country, have a lower number of pupils per school, namely about 156 children, while for Poland the value of this indicator is of 198 children per school. Thus, it can be concluded that, during the 2000-2020, the decision of closing a school was taken less frequently in the Carpathians than in the rest of Poland. In 2014 and 2015, the percentage increase in the number of pupils in the Polish Carpathian area was smaller than in the rest of the country. A smaller increase in pupil numbers is also apparent in more recent years. Therefore, a slightly slower average decline in pupil numbers was observed in the Polish Carpathians as compared to the rest of the country for the years 2000-2013, while from 2014 onwards primary schools in the Carpathians were characterised by a smaller increase in the number of pupils. This was accompanied by a much smaller increase in the number

of schools in 2017 as compared to 2016, namely 6.5% for Poland and only 2.4% for the Polish Carpathian communes. In addition, in 2020, there were around 164 pupils per primary school in the Carpathians, on average, which meant an increase of 8 pupils per school, whereas the value of this indicator at the national level was around 230, marking an increase of 32 pupils per school.

3.2. Changes in the organisational structure of primary education according to the managing authority

When considering both the change in the number of primary schools in the Carpathian communes and the number of pupils attending them over 2000-2020 while, at the same time, distinguishing between the two basic types of schools (according to the type of the managing authority), diametrically different change trends can be observed.

The number of schools administrated by local authorities (by far the most dominant in the school network) decreased from 1,500 in 2000 to 1,191 in 2020, which indicates a total decrease by 21% compared to the initial year (Table 2).

In 2012 alone, the number of schools of this type dropped by 57. The downward trend in the number of schools managed by local authorities continued year by year until 2017, when it increased by 27 as a result of the aforementioned educational reform. Nevertheless, a decline in the number of schools of this type was still noticeable in the following years.

Table 2. Changes in the number of schools and pupils in the Polish Carpathian communes according to the governing authority between 2000 and 2020.

Year	Carpathian communes							
	Schools run by local government units				Schools run by other types of entities			
	Number of schools	Relative increase / decrease	Number of pupils	Relative increase / decrease	Number of schools	Relative increase / decrease	Number of pupils	Relative increase / decrease
2000	1500	-	235667	-	14	-	1030	-
2001	1440	-4.00	228737	-2.94	26	85.71	1708	65.83
2002	1430	-0.69	220736	-3.50	29	11.54	1908	11.71
2003	1419	-0.77	212517	-3.72	31	6.90	2057	7.81
2004	1381	-2.68	202748	-4.60	39	25.81	2582	25.52
2005	1363	-1.30	193521	-4.55	47	20.51	2858	10.69
2006	1359	-0.29	185871	-3.95	49	4.26	2929	2.48
2007	1345	-1.03	179467	-3.45	50	2.04	3182	8.64
2008	1323	-1.64	172981	-3.61	57	14.00	3423	7.57
2009	1317	-0.45	168407	-2.64	59	3.51	3490	1.96
2010	1310	-0.53	163718	-2.78	56	-5.08	3453	-1.06
2011	1280	-2.29	160941	-1.70	72	28.57	4356	26.15
2012	1223	-4.45	156344	-2.86	113	56.94	5576	28.01
2013	1206	-1.39	152497	-2.46	122	7.96	6054	8.57
2014	1203	-0.25	161011	5.58	131	7.38	7051	16.47
2015	1194	-0.75	168328	4.54	142	8.40	7996	13.40
2016	1185	-0.75	155254	-7.77	144	1.41	8340	4.30
2017	1212	2.28	180084	15.99	149	3.47	10413	24.86
2018	1208	-0.33	205887	14.33	150	0.67	12045	15.67
2019	1205	-0.25	205888	0.00	148	-1.33	12234	1.57
2020	1191	-1.16	207559	0.81	146	-1.35	12637	3.29
Increase/decrease between 2000-2020	-309	-20.60	-28108	-11.93	132	942.86	11607	1126.89
Increase/decrease between 2000-2016	-315	-21.00	-80413	-34.12	130	928.57	7310	709.71

Source: based on data from the Local Data Bank of the Central Statistical Office of Poland.

In the Polish Carpathian communes, the number of pupils in primary schools managed by local government authorities, dropped by almost 12% in the time frame under analysis. Similarly, as in the case of all schools in Poland, all schools in the examined part of the Carpathian Mountains (regardless of the authority running the school) and all schools managed by local government units in the Carpathian communes, two different periods can be traced according to the trend in the number of pupils. During 2000-2013, the number of pupils in schools run by local government entities clearly decreased with each successive year, eventually reaching a level of minus 35% when compared to the initial year of the interval. Beginning with 2014, a

reverse trend occurred, marked by the positive value of the indicator (27%) showing an increase in the number of pupils between 2014 and 2020. However, there are two aspects worth noticing, namely the clear decrease in the number of pupils in this type of schools in one single year, 2016, and a very slight increase in their number in 2019 and 2020.

Clearly different trends of change were observed in the case of primary schools run by authorities other than local government units. In 2000, there were only 14 primary schools of this type in the Carpathian communes, which, at that time, represented less than 1% of all primary schools in the area under study. Their number increased more than tenfold over the first two decades of the 21st century and, by 2020, they accounted for almost 11% of all primary schools in the Polish Carpathians. The average annual increase in the number of primary schools run by authorities other than local government units calculated for 2000-2020 reached 14%. In 2012 alone, 41 schools of this type were added. However, during 2019 - 2020, the number of such schools decreased slightly.

Along with the increase in the number of primary schools run by entities other than local government units, the number of pupils in the Polish Carpathian communes attending this type of school also increased noticeably between 2000 and 2020. At the beginning of the 21st century, 1,030 pupils were being educated in schools of this type, which rendered a negligible proportion (0.4%) of all pupils attending primary schools in the area under study. The next two decades underwent a significant increase (more than twelve times over) in the share of pupils attending schools managed by entities other than local government units in the total number of primary school pupils in the Carpathian communes. By 2020, they already accounted for almost 6% of the total number of primary school pupils in the studied area. The highest value of annual absolute growth was observed in 2017, when the number of pupils in primary schools run by an entity other than local government units increased by more than two thousand as compared to the previous year. Nevertheless, the highest value of annual relative growth in the number of pupils attending schools of this type was noticed in 2001, with a value of 86% (when correlated with 2000).

3.3. Spatial differentiation of change in the number of pupils and closed primary schools in the Polish Carpathians

Changes in the number of pupils in primary schools in Polish Carpathian communes were characterised by large spatial differentiation (Fig. 3). The most significant decrease in the number of pupils pertained to communes of Subcarpathian Voivodeship (a drop of about 20%) - especially those of a peripheral character (border communes). In five communes, the number of pupils decreased by more than half during the studied period. The highest decline (by 57%) was observed in the commune of Krępna, located in the Low Beskids, where two primary schools were closed. In comparison to other border communes of the Low Beskids, the commune of Jaśliska stands out as the number of pupils increased by almost 18%, but mostly due to an expansion of its border in the detriment of the neighbouring commune of Komańcza (characterised by a decrease in the number of pupils by 45%).

At the voivodeship level, the number of pupils decreased slightly in the Lesser Poland voivodeship (by approximately 5%), while in the Silesia voivodeship it remained stable, though with a strong internal change differentiation, as there was a decrease in the number of pupils in the southern part of the voivodeship and a noticeable increase in the northern one. Analysis of the location of closed schools indicates that a significant decrease in the number of pupils resulting in the closure of a school was not the case for every situation under study. One such example is that of the rural communes of Dukla or Czarna in the Podkarpackie voivodeship. Moreover, the communes with the largest number of closed schools were also characterised by a distinct decrease in the number of pupils. The communes of Fredropoland and Dydnia are relevant examples, the former recording 5 closed schools and a drop in the number of pupils by 43%, whereas the latter enlisting 3 closed schools and a drop in the number of pupils by 37%. Similarly, the rural subarea of the Ustrzyki Dolne commune registered 3 closed schools and a drop in the number of pupils by 51%.

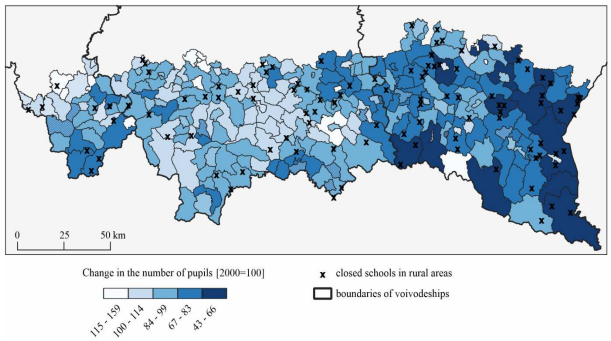

Fig. 3. Detailed location of closed schools and changes in the number of pupils in 2000-2020 *(source: based on data from the Local Data Bank of the Central Statistical Office of Poland).*

3.4. Relationship between change in pupil numbers and population change

At the level of all Polish Carpathian communes under study, one notices a low value of the correlation coefficient (0.33) between the change in the number of pupils in primary schools over 2000 - 2020 and the change in the population in the 15-39 age group corresponding to the same time period (Table 3).

However, when considering the same relationship distinctly for urban and rural areas, it is evident that the strength of the relationship between these variables is higher. This is particularly the case of rural areas, for which the value of the correlation coefficient (0.52) indicates a moderate relationship between these variables. Therefore, the decline in the number of primary school pupils in rural areas of the Polish Carpathians can be related, to a moderate extent, to the decrease of the population in the 15-39 age group, which the majority of parents of primary school children belong to.

Table 3. Correlation coefficient values of the variables under study.

Variable	Dynamics of population aged 15-39 (2000-2020)	Dynamics in the number of pupils (2000-2020)
All Polish Carpathian communes		
Dynamics of population aged 15-39 (2000-2020)	1,00	**0,33***
Dynamics in the number of pupils (2000-2020)	**0,33***	1,00
Urban areas		
Dynamics of population aged 15-39	1,00	**0,45***
Dynamics in the number of pupils (2000-2020)	**0,45***	1,00
Rural areas		
Dynamics of population aged 15-39	1,00	**0,52***
Dynamics in the number of pupils (2000-2020)	**0,52***	1,00

** statistically significant correlation at the 0.05 level.*

Moreover, there are also different trends in changes of correlated variables in the urban and rural areas of the Polish Carpathians, which may have contributed to the low level of correlation when both urban and rural areas were collectively analysed to determine the value of the correlation coefficient. Firstly, the urban areas of the Polish Carpathian communes were characterised by a lower decrease in the number of pupils over 2000-2020 (average dynamics indicator - 96% as compared to 2000) than in the case of rural areas (average dynamics indicator - 90% as compared to 2000). Eighteen of the studied urban areas (36%) underwent an increase in the number of pupils between 2000-2020, while 27% of the rural areas witnessed an increase in the number of pupils. Secondly, in the case of rural areas, during the same time frame, the population aged 15-39 changed only slightly (average dynamics indicator - 99.9% as compared to 2000). However, for all the rural areas, when considered collectively, this indicator reached 101% as compared to 2000, displaying a slight overall increase in population within the respective age group. In the Polish Carpathian urban areas, the number of people in the 15-39 age group declined sharply over 2000-2020 (average dynamics indicator - 85% as compared to 2000). Tackling all urban areas in their entirety, the decline was even more pronounced, namely 79% when compared to the year 2000. The 2000-2020 population increase in the target age group affected only two urban areas in the Polish Carpathians (4% of all the urban areas taken into consideration), while in the case of the rural areas, the increase was evidenced in 82 areas of this type (47% of all the rural areas under study). Distinct differences between urban and rural areas in the Polish Carpathians are also notable when dealing with changes in the number of primary schools over 2000-2020, which decreased in only 8 urban areas (16%) and 104 rural areas (60%). All in all, the number of primary schools in the rural areas of the Polish Carpathians was reduced by 181 units (14%) between 2000-2020, while in urban areas it increased by 12 units (6%).

4. CONCLUSIONS

The process of reorganisation of primary education, which in Poland generally involves the closure of small schools in rural areas, is difficult to avoid with a diminishing number of pupils. Local governments, which are responsible for managing schools, are faced with difficult and unpopular decisions concerning the closure of a school that has a small number of pupils and no prospect of corresponding development in the following years. According to the results of the current analysis, this process was slightly different in the Polish Carpathians when compared to the rest of the country. The closure of schools in the Polish Carpathians was much less dynamic than in the rest of the country, despite the fact that these have a lower number of pupils (by around 25%) per unit. It also shows that in a mountainous area it is much more difficult for local government authorities to close schools, since consequences such as expensive and time-consuming transport of children to farther away units are much more undesirable. Even more so, as one of the duties of the local government is to organise the transport of children to primary school if the distance between the place of residence and the school exceeds 4 km. As such, the lower number of closed schools in the Polish Carpathians between 2000 and 2016 led to a much smaller increase in the number of schools generated by the 2017 education reform

(focusing on to the extension of primary school education from 6 to 8 years). At the national level, the 2017-2020 growth in the number of schools reached 6.5%, compared to only 2.4% in the Polish Carpathians. Thus, an important conclusion of the study is that the percentage of schools closed turned out to be much higher than the decrease in the number of pupils would suggest. However, this disproportion proved to be smaller in the Polish Carpathian area when paralleled to the entire country. At the national level, about 17% of the primary schools were closed, simultaneously accompanied by a 3.9% decrease in the number of pupils. In the Polish Carpathians, about 12% of the primary schools were closed while the number of pupils decreased by 7%. Such a large decrease in the number of pupils in the Polish Carpathians was caused by the situation in the Polish-Slovak-Ukrainian borderlands in the Subcarpathian voivodeship. This is where the most significant decrease in the number of pupils was observed between 2000 and 2020, namely up to 60%.

The decline in the number of schools would certainly be much greater if there were no takeovers of schools by associations or community organisations. The takeover generally occur under Art. 5, para. 5g of the Education System Act, which was enacted in 2009 (Journal of Laws, 2009). If the highest increase in the number of schools run by an authority other than a local government unit was noticed between 2010 and 2015, when their number in the Polish Carpathians increased from 56 to 142, they (*i.e.* schools run by an authority other than a local government unit) multiplied tenfold between 2000-2020. The schools that underwent takeovers were mostly small units located in rural areas. It can be concluded that it was the activity of local communities that caused the scale of primary school closures in the Polish Carpathian area to be relatively smaller than the average at the national level.

Rural areas in the Polish Carpathians experienced a stronger decline in the number of pupils in primary schools over the period of 2000-2020. This decline reached a level of 90% in correspondence with 2000, whereas an average value for urban areas was of 96%. In the case of rural areas, a slightly stronger correlation was observed between the change in the population aged 15-39 and the change in the number of pupils in primary schools over the time frame under study, namely r=0.52 for rural areas and r=0.45 for urban areas. The decline of pupils in primary schools in rural areas was therefore more firmly correlated with the decline of the population in target age group, despite the fact that the urban areas were the ones where the number of people aged 15-39 declined much more sharply (a drop to a level of 85% compared to the year 2000, while for rural areas it was of 99.9%). In the case of urban areas, the weakening of this relationship may have resulted from the urban school absorption of pupils from rural areas surrounding towns and cities, an aspect which is supported by the number of primary schools diminishing mostly in rural areas (a drop of 15%), while simultaneously increasing in urban areas (6%) between the years 2000 and 2020.

5. ACKNOWLEDGEMENTS

This research was conducted under “Cities, suburbs and peripheries in the theory and in the empirical studies” Potential Program No. 52 / GGR / 2020 / POT. Project duration: April 8, 2020 – October 31, 2022. Funding institution: Krakow University of Economics, Poland.

REFERENCES

Amcoff J. (2012), Do Rural Districts Die When Their Schools Close? Evidence from Sweden around 2000. Educational Planning, 20(3), 47-60. URL: https://isep.info/wp-content/uploads/2015/03/20-3_4DoRuralDistrictsDie.pdf

Autti O., Hyry-Beihammer E. (2014), School closures in rural finish communities. Journal of Research in Rural Education, 29(1), 1–17. URL: https://jrre.psu.edu/sites/default/files/2019-08/29-1.pdf

Bagley C., Hillyard S. (2011), Village schools in England: at the heart of their community? Australian Journal of Education, 55(1), 37-49. DOI: https://doi.org/10.1177/000494411105500105

Bajerski A. (2020), Rural schools in Poland in the period of post-socialist decentralization and demographic decline. In Gristy C., Hargreaves L., Kučerová S. R. (eds.), Educational Research and Schooling in Rural Europe: An Engagement with Changing Patterns of Education, Space, and Place. Charlotte: Information Age Publishing, 125-145. ISBN 9781648021633

Bajerski A., Błaszczyk A. (2015), Likwidacja szkół podstawowych na wsi: perspektywa władz lokalnych, nauczycieli, rodziców, uczniów i pozostałych mieszkańców. Przegląd Badań Edukacyjnych. 21(2), 81-105. DOI: 10.12775/PBE.2015.049. (Article in Polish)

Bell A. B., Sigsworth A. (1987), The Small Rural Primary School: A Matter of Quality, Routledge, London. ISBN 1850001553

Corbett M., Tinkham J. (2014), Small Schools in a Big World: Thinking About a Wicked Problem. Alberta Journal of Educational Research, 60(4), 691-707. URL: https://www.academia.edu/24853826/Small_Schools_in_a_Big_World_Thinking_About_a_Wicked_Problem

DeYoung A. J., Howley C. B. (1990), The Political Economy of Rural School Consolidation, Peabody Journal of Education, 67(4), 63–89.DOI: https://doi.org/10.1080/01619569009538701

Dobosz M., Kozak J., Kolecka N. (2019), Integrating contemporary spatial forest cover data in

the polish Carpathians: does abundance of data increase knowledge or uncertainty? Geoinformatica Polonica, 2019, 31-43. DOI: https://doi.org/10.4467/21995923GP.19.002.10886

Egelund N., Laustsen H. (2006), School Closure: What are the Consequences for the Local Society?. Scandinavian Journal of Educational Research. 50(4), 429-439. DOI: https://doi.org/10.1080/00313830600823787

Fargas-Malet M., Bagley C. (2021), Is small beautiful? A scoping review of 21st-century research on small rural schools in Europe. European Educational Research Journal. 21(5), 822-844. DOI: https://doi.org/10.1177/14749041211022202

Journal of Laws (2009). Act of 19 March 2009 on Amendment of the Education System Act and Certain Other Acts. Available online at: https://eli.sejm.gov.pl/eli/DU/2009/458/ogl

Kassai Z., Farkas T. (2016), School closures in rural Hungary. Challenges for Natural Resources Management and Society, Slovak University of Agriculture in Nitra, 477-483. DOI: http://dx.doi.org/10.15414/isd2016.s7.064

Kolecka N., Kozak J. (2019), Wall-to-Wall Parcel-Level Mapping of Agricultural Land Abandonment in the Polish Carpathians. Land, 8(9), 129. DOI: https://doi.org/10.3390/land8090129

Kroismayr S. (2019), Small School Closures in Rural Areas - The Beginning or the End of a Downward Spiral? Some Evidence from Austria. In J. Anson, W. Bartl, A. Kulczycki (ed.), Studies in the Sociology of Population. Springer, Cham, 275–300. DOI: https://doi.org/10.1007/978-3-319-94869-0_11

Kučerová S. (2012), Proměny územní struktury základního školství v Česku. Praha: Česká geografická společnost. [Changes in the territorial structures of the elementary school system in the Czech Republic]. (Study in Czech). URL: https://geography.cz/wp-content/uploads/2018/09/eg8.pdf

Kucerová S., Kucera Z. (2009), Changes in the rural elementary schools network in Czechia during the second half of the 20th century and its possible impact on rural areas. European Countryside, 1(3), 125-140. DOI: https://doi.org/10.2478/v10091/009-0011-7

Lyson T. (2005), The importance of schools to rural community viability. In Waters N.S (ed.), A Mathematics Educator‘s Introduction to Rural Policy Issues, 48-53. URL: https://files.eric.ed.gov/fulltext/ED491046.pdf#page=59

Lyson T. A. (2002), What does a school mean to a community? Assessing the social and economic benefits of schools to rural villages in New York. Journal of Research in Rural Education, 17(3), 131-137. URL: https://jrre.psu.edu/sites/default/files/2019-08/17-3_1.pdf

Mandujano P., Giesen R., Ferrer J. C. (2012), Model for Optimization of Locations of Schools and Student Transportation in Rural Areas, Transportation Research Record: Journal of the Transportation Research Board, 2283(1), 74–80. DOI: https://doi.org/10.3141/2283-08

Post D., Stambach A. (1999), District consolidation and rural school closure: E pluribus unum?. Journal of Research in Rural Education, 15(2), 106-117. URL: https://jrre.psu.edu/sites/default/files/2019-08/15-2_2.pdf

Semczuk M. (2018), Changes of the primary schools network in rural areas in the Małopolskie Voivodeship over the 2000–2016 period. Biuletyn KPZK PAN, 272, 113-124. URL: https://journals.pan.pl/dlibra/publication/128623/edition/112210/content

Semczuk M. (2020a), The Impact of the Closure of Primary Schools on the Economic Development of Rural Areas in Małopolska Voivodeship. Przedsiębiorczość - Edukacja, 16(1), 247-256. DOI: http://dx.doi.org/10.24917/20833296.161.20

Slee R., Miller D. (2015), School Closures as a Driver of Rural Decline in Scotland: A Problem in Pursuit of Some Evidence? Scottish Geographical Journal. 131(2), 1-20. DOI: https://doi.org/10.1080/14702541.2014.988288

Solon J., Borzyszkowski J., Bidłasik M., Richling A., Badora K., Balon J., Brzezińska-Wójcik T., Chabudziński Ł., Dobrowolski R., Grzegorczyk I., Jodłowski M., Kistowski M., Kot R., Krąż P., Lechnio J., Macias A., Majchrowska A., Malinowska E., Migoń P., Myga-Piątek U., Nita J., Papińska E., Rodzik J., Strzyż M., Terpiłowski S., Ziaja, W. (2018), Physico-geographical mesoregions of Poland: Verification and adjustment of boundaries on the basis of contemporary spatial data. Geographia Polonica, 91(2). DOI: https://doi.org/10.7163/GPol.0115

Šťastná M., Vaishar A. (2017), The relationship between public transport and the progressive development of rural areas. Land use policy, 67, 107-114. DOI: https://doi.org/10.1016/j.landusepol.2017.05.022

Tieken M. C., Auldridge-Reveles T. R. (2019), Rethinking the school closure research: School closure as spatial injustice. Review of Educational Research, 89(6), 917-953. DOI: https://doi.org/10.3102/0034654319877151

Trnková K. (2009), Village Schools: Wrinkles for Mayors?. European Countryside. 1(2), 105–112. DOI: https://doi.org/10.2478/v10091-009-0009-1

Villa M., Knutas A. (2020), Rural communities and schools–valuing and reproducing local culture. Journal of Rural Studies, 80, 626-633. DOI: https://doi.org/10.1016/j.jrurstud.2020.09.004