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COMPARISON OF THE AVAILABILITY OF NURSERY SERVICES IN SELECTED VOIVODESHIP CAPITAL CITIES IN POLAND USING THE PRINCIPAL COMPONENT ANALYSIS¹

Summary

Purpose | The aim of the article was to create new measures for assessing the effectiveness of care for children up to 3 years of age using the principal components method, and then to compare the research group according to the obtained variables. The study covered 11 largest Polish cities associated in the Union of Polish Metropolises (UPM).

Research method | The article uses the principal components method (PCA), which made it possible to create unique measures and compare social behavior with regard to care for children up to 3 years of age in UPM cities.

Results | In the case of the examined entities, 3 factors showed an acceptable percentage level of explaining the total variance. The new factors were used to visualize the coexistence of UPM cities due to the social problem under consideration.

Originality/value/implications/recommendations | The results of the study can be used to create a comprehensive system for assessing the effectiveness of the social policy of local authorities, aimed at professional activation of young parents (families with children up to 3 years of age).

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JEL classification: C5, C6, I18, I25, J13, J68

1. Introduction

The parent/parents' return to work after a break caused by the birth of a child is a multidimensional challenge. Providing care to the new member of the community turns out to be crucial. It is implemented in various ways, including own resources (parents working shifts, limitation of employment, help from the family), or by using the sphere of paid and free childcare and educational services. From the perspective of the effective use of human potential in the labor market, it seems necessary to ensure an adequate – in relation to the declared one – number of places available in such facilities. In addition, the factors influencing the willingness of parents to use paid care need to be established.

The aim of the article is to present the possibilities of using the main components method in the analysis of the need and availability of care for children up to 3 years of age. The secondary goal was to create new parameters allowing for comparison of the research group in terms of the availability of care for the youngest urban residents. The study covered 11 largest Polish cities associated in the Union of Polish Metropolises (UPM). It resulted directly from the human potential existing in the area of these local government units (LGUs) and the nature of work (predominance of the service sector, and then – production sector). It was assumed that in large metropolitan cities, due to for example population density resulting in the elimination of some spatial restrictions, including access to infrastructure, it is possible to better correlate the demand and supply for places in nurseries and para-nurseries. Based on the preliminary analysis, a hypothesis was prepared that there are disproportions in spatial and financial access to care for children up to 3 years of age between individual provincial cities.

The article discusses the imbalance between the supply and demand for childcare up to 3 years of age in 11 UPM member cities. There is a clear need to

review the current deficit. The surveyed entities implement an independent policy in this area. Attention is paid not only to the availability and dissemination of the services provided, but also to the preferences of parents and guardians regarding their use. The specific objectives of the study were to define the legal and social conditions of childcare, the measures that explain the guardians' decisions to place the child in a childcare facility, and to compare the current situation in the cities of UPM in this matter.

Based on publicly available statistical data (BDL/GUS) and the form sent to the cities of the Union of Polish Metropolises, a study was prepared to enable statistical activities and inference. The study used data obtained from municipal offices in: Białystok, Bydgoszcz, Gdańsk, Katowice, Kraków, Lublin, Łódź, Poznań, Rzeszów, Szczecin and Warsaw. Substantive units from individual offices were asked to complete a list (a file with the .xls extension) as of May 31, 2020. For the purpose of the research, the principal components method was used. The results were presented, *inter alia*, using a scree chart. The analysis was supported by the literature on the subject and Polish legislation.

The article consists of five parts. After the introduction, an overview of issues related to institutional care for children up to 3 years of age in Poland and in the cities of UPM is presented. Next, the financial issues were discussed, indicating the levels of payment used in individual cities. The last, substantive part describes the model used and three components that enable the definition of parameters for the assessment of cities within the subject matter. In the conclusion, the level of target achievement was defined and the possibilities of extending the analysis in the future were indicated. At the beginning of considerations, the scale and formal structure of the problem should be assessed.

2. Institutional care for children up to 3 years of age

Formal aspects of childcare up to the age of 3 are regulated by the Act of February 4, 2011. According to the second article, the care "may be organized in the form of a nursery or a children's club, and also provided by a day carer

and a nanny; as part of the care, the following functions are performed: caring, upbringing and educational" [Ustawa z dnia 4 lutego..., 2011]. According to the Central Statistical Office (GUS) data, as of December 31, 2019, there were 4,400 care facilities for children up to 3 years of age in Poland, of which nurseries accounted for 83.3% of all facilities. These institutions provided a total of 159,900 childcare places for children [Przybylski, 2020] This is almost a twofold increase compared to 2015 – then in Poland there were 2,322 nursery and para-nursery facilities, which provided 80,891 places for children [Observatorium Rozwoju..., 2016, p. 11]. However, along with the increase in the number of operating facilities and the places offered, the number of children up to the age of 3 also increased (in 2015 – 1,106,141, while at the end of 2019 it was already 1,545,156) [www 1].

According to the data as of May 31, 2020, provided by 11 cities participating in the study, the total number of places available in city nurseries, non-public nurseries, children's clubs and day carers in all of the examined cities was 58,945, of which nearly 50% were non-public nurseries. The share of children's clubs in creating care places is only 5.6%, while day carers make up almost 9% of places. The total number of children up to 3 years of age in these cities was 187,618². The number of places available in city nurseries, non-public nurseries, children's clubs and day carers in the study group (in total) amounts to 31.4% of the total number of children.

What is an important aspect is the cost of keeping a child in a nursery. The fees are decisive here: for the child's stay in the institution and the nutritional fee. The daily nutritional fee in the city nurseries of the surveyed entities amounted to an average of PLN 6/day (with a deviation of approx. 15%). In 2019/2020, the lowest fixed fee (PLN 150) was collected by the city of Katowice, and the highest one (PLN 531.96) – by Poznań. From September 2019, Warsaw introduced a zero rate for a child's stay in a city nursery [www 2] (Table 1).

² Data as of May 31, 2020, except for Poznań (data on non-public nurseries and day carers – as of June 30, 2020).

TABLE 1

Fixed fee and the amount of the daily nutritional fee in municipal nurseries as of May 31, 2020

City	A fixed fee for a month of a child's stay in a municipal nursery in PLN	A daily nutritional rate in a municipal nursery in PLN
Białystok	200.00	7.00
Bydgoszcz	286.00	6.30
Gdańsk	492.00	7.00
Katowice	150.00	6.65
Kraków	190.00	6.00
Lublin	260.00	6.50
Łódź	390.00	4.00–5.00
Poznań	531.96	6.00
Rzeszów	270.00	5.00
Szczecin	260.00	6.00
Warszawa	0.00	5.96

Source: own study based on data provided by individual cities.

What is the last option of caring for children up to 3 years of age is the institution of a day carer. This function is performed by persons employed by local government units or companies and organizational units without legal personality [Fundacja im. Królowej..., 2016, p. 18]. They can look after up to five children at the same time, and these children must be at least 20 weeks old. However, taking the position of a day carer is considered problematic, as it is associated with the need to undergo specific training and meet specific housing conditions [Ustawa z dnia 28 stycznia..., 2020]. As a result, in many Polish cities, there are still only a few or no day carers; in 2020, such cities included, *inter alia*, Białystok, Katowice and Rzeszów. Nevertheless, this solution is still little known – the lack of appropriate information campaigns means that parents are not aware of all the solutions offered to them, and the activity of the day carer is associated with considerable uncertainty both among the guardians themselves and local authorities [Chłoń-Domińczak et

al., 2013, p. 11]. Among all cities included in the analysis, only Warsaw stands out, where 673 day carers offer 4,457 places to children (Table 2).

TABLE 2

Number of day carers and available places in individual cities as of May 31, 2020

City	Number of day carers	Number of places for children
Białystok	0	0
Bydgoszcz	4	33
Gdańsk	56	272
Katowice	0	0
Kraków	30	146
Lublin	1	5
Łódź	13	66
Poznań	38	209
Rzeszów	0	0
Szczecin	27	112
Warszawa	673	4457

Source: own study based on data provided by individual cities.

Both the availability of places and the cost incurred by parents influence the tendency to place children under the age of 3 in nursery and para-nursery facilities, both in Poland and in the world. According to a study by the Organization for Economic Co-operation and Development (OECD), there is a link between the availability of childcare facilities and women's labor force: "Affordable, high-quality early childhood education and care, together with adequate weekly working hours, can increase women's participation in the labor market. Working parents, especially mothers, are more likely to stop working or work fewer hours to look after their children, especially when they are small. Therefore, women need affordable, high-quality early childhood education and care to be able to return to work feeling that their children are well cared for and to achieve a better work-life balance" [www 3].

3. Care for children up to 3 years old – finances

Problems such as: domination of private institutions with relatively high fees in relation to earnings, low employment stability (due to the form of employment, it concerns about a quarter of working Poles), and one of the lowest number of apartments in Europe per 1,000 inhabitants contributed to the reduction in fertility. In 2020, the fertility rate in Poland amounted to 1.378, which does not guarantee the replacement of generations. According to a study by the Central Statistical Office, in October 2020, the average wage in the national economy was PLN 5,748.24 gross, but as many as half of the employees received gross wages up to PLN 4,702.66 gross, and 10% of the lowest-earning employees received only PLN 2,719.68 gross [Struktura wynagrodzeń..., 2021, pp. 1–6].

The monthly cost of a child's stay in a non-public nursery in the study group was PLN 1000–1500, which accounted for between 24% and 36% of the average monthly net salary in 2020 in the national economy. The following voivodeships were characterized by the highest share of fixed fees for a place in a city nursery in relation to the average monthly salary: Wielkopolskie (Poznań), Pomorskie (Gdańsk) and Łódzkie (Łódź); respectively: 13.4%, 11.6%, 9.9%; the lowest: Mazowieckie (Warsaw – 2%), Śląskie (Katowice – 5.5%), Małopolskie (Kraków – 5.8%)³.

There is also a correlation between the percentage share of the fixed fee and the monthly cost of food in the city nursery in relation to the average gross monthly salary, and the percentage coverage of the total number of children by the number of places available in the institutions. The increase in the share of fees (in total) for a child's stay in a city nursery in relation to the average gross monthly salary causes a decrease in the percentage coverage of the total number of children by the number of places available in nursery and para-nursery facilities, and this relationship is significant. This means that with the increase in the costs of attending a child to a municipal nursery, with the same salary, the number of families interested in using the services of nursery institutions decreases. The higher the fees, the more willingly parents use informal care

³ Own study based on data provided by individual cities and data from the Local Data Bank of the Central Statistical Office for October 2020 (gross salary), as of 12/07/2021.

provided by relatives, friends and unregistered nannies or carers. In 2016, informal care in Poland covered 30.2% of children under 3 years of age [Pomoc społeczna..., 2017]. This type of care is mainly used on a part-time basis, complementing other forms of care. In the future, in the case of deregulation of the care system, along with the change of the system of work in the economy into task-based rather than hourly work and the dissemination of remote work, it could constitute an important safeguard for the possibility of parents taking up professional activity.

TABLE 3

Statistical description of the variables used in the PCA analysis

Variables	Mean	Median	Min	Max	Sd	Se	Skewness	Kurtosis
Number of children per place in municipal nursery	8.96	8.43	5.70	14.45	2.52	0.76	1.12	1.03
% of total number of children covered by places in municipal nurseries	11.88	11.86	6.92	17.56	2.97	0.90	0.10	0.27
% of places in municipal nurseries in relation to all available places	42.56	40.06	23.03	69.59	13.80	4.16	0.43	-0.05
Number of children per place in non-public nurseries	9.62	7.18	3.47	23.00	6.24	1.88	1.44	1.16
% of total number of children covered by places in non-public nurseries	13.98	13.92	4.35	28.85	7.11	2.14	0.62	0.61
% of places in non-public nurseries in relation to all available places	45.86	44.22	21.29	71.97	16.54	4.99	0.04	-1.05
% of places in children's clubs in relation to all available places	7.80	3.33	0.00	29.49	9.41	2.84	1.71	2.08

Variables	Mean	Median	Min	Max	Sd	Se	Skewness	Kurtosis
Number of children per place in all facilities	3.58	3.28	2.49	4.90	0.75	0.23	0.53	-0.44
% of total number of children covered by all places	29.02	30.46	20.42	40.09	5.95	1.79	0.28	-0.20
Fixed fee ratio in municipal nurseries to average salary	0.06	0.06	0.00	0.11	0.03	0.01	0.03	0.29
Daily food rate ratio in municipal nursery to average salary	0.00125	0.00128	0.00094	0.00153	0.00	0.00	-0.48	-0.40
Annual cost of running municipal nurseries in 2019 per child (thousand PLN)	16.68	16.10	12.92	24.03	3.24	0.98	1.16	1.42

Source: own study.

The analyzed variables regarding nursery availability and costs reveal notable differences in concentration and distribution, as shown by skewness and kurtosis. The variable "Number of children per place in non-public nursery" (skewness 1.44, kurtosis 1.16) and "% of places in children's clubs in relation to all available places" (skewness 1.71, kurtosis 2.08) indicate high asymmetry and the presence of outliers, suggesting significant disparities in place availability across facilities. Variables reflecting the percentage of children covered by available places across different types of nurseries display moderate skewness and low kurtosis, with values close to symmetry (e.g. "% of places in municipal nurseries in relation to all available places" with kurtosis -0.05 and skewness 0.43), indicating a more balanced distribution. The "Daily food rate ratio in municipal nursery to average salary" shows negative skewness (-0.48) and low kurtosis (-0.40), suggesting a predominance of lower values and less variation in food cost rates.

It should be emphasized that all variables described in the table were standardized before performing dimensionality reduction using the PCA method.

4. Modeling care for children up to 3 years of age in selected cities of the UPM

The T. Hotelling method, also known as the Principal Components Analysis (PCA), was used for the purpose of the research [Hotelling, 1933, pp. 417–441], [Hotelling, 1936]. This method is based on the assumption that the set of k real variables described by the k -dimensional coordinate system can be transformed into another p -dimensional system (where $p \leq k$). If the new coordinate system has the same dimension, then this transformation is a simple rotation of the coordinate system in k -space (relative to the origin of the coordinate system). The new variables resulting from the transformation meet the following conditions: they are a linear combination of the input variables, they are uncorrelated, they are normalized (orthogonal), and they approximate the set of input variables well. The definition of new variables according to the above assumptions will be as follows:

$$PC_i = w_{i1}X_1 + w_{i2}X_2 + \dots + w_{ik}X_k$$

where:

$X_1, X_2, \dots, X_k$ – observed input variables,

$w_{i1}, w_{i2}, \dots, w_{ik}$ – linear combination coefficients (weights), where

$$\sum_{j=1}^k w_{ij}^2 = 1.$$

The weighting coefficients w_{ik} define the share of the input variables observed in the formation of the values of the individual components PC_i . The process of determining the weighting factors can be described by the following steps:

Step 1. Determining the variance-covariance matrix Σ (for non-standardized data) or the correlation matrix R for the set of observations.

Step 2. Finding the eigenvalues of the above matrices. For this purpose, the determinant equation is solved:

$$\det |R - \gamma I| = 0$$

or

$$\det |\Sigma - \gamma I| = 0.$$

Step 3. Sorting the eigenvalues determined in the previous step in descending order $\gamma_1 \geq \gamma_2 \geq \dots \geq \gamma_m$.

Step 4. Finding the eigenvalues of the matrix Σ or R , i.e. connecting successive systems of equations of the form:

$$Rw_1 = \gamma_1 w_1,$$

$$Rw_2 = \gamma_2 w_2,$$

where $w_1^T w_2 = 0$, etc.

Step 5. Normalization of the weight vectors.

Step 6. Selection of the criterion for determining the number of principal components.

PCA has many applications across various fields of study, including the social sciences. Seema Vyas and Liliani Kumaranayake conducted research on the application of PCA in constructing socio-economic status indices [Vyas, Kumaranayake, 2006, pp. 459–468]. They explored alternative methods to measure household wealth, such as income, consumption, or expenditure data, which often require substantial resources for accurate collection through household surveys. Given the growing prevalence of principal components analysis (PCA) utilizing asset data for generating socio-economic status (SES) indices, the authors provide an overview of the construction, utilization, validity, and limitations of PCA-based indices. The discussion encompasses considerations regarding variable selection, data preparation, and challenges like data clustering. Moreover, the authors delve into interpreting results and strategies for classifying households into SES categories.

Esmaili Abdoukarim and Zainab Shokoohi conducted studies concerning the co-movement of food prices and the macroeconomic index, especially the oil price, by principal component analysis to further understand the influence of the macroeconomic index on food prices [Esmaili, Shokoohi, 2011, pp. 1022–2025].

In PCA, it is recommended that the number of cases should be greater than the number of variables. In this analysis, we have 11 cities and 12 variables, which means the number of objects is close to the number of variables. While a larger sample would provide more robust results, PCA can still be conducted with this ratio, though caution should be taken in interpreting the results. PCA

is viable even with a relatively small number of cases, especially when the data quality is high. The quality of data is often more critical than the sheer number of cases. In this analysis, the 11 largest cities in Poland are likely to exhibit significant diversity in the 12 variables, which may include socio-economic, demographic, and infrastructure-related factors. Given the high quality and variation in the dataset, even a relatively small number of objects can provide meaningful and reliable results. The diversity among the cities compensates for the smaller sample size. PCA does not necessarily require a large number of cases if there is enough variability within the variables. Even with fewer cases, PCA can effectively extract principal components that explain the majority of variance in the data. Well-chosen variables can mitigate the effects of a smaller sample size by capturing the underlying patterns of variation.

In the case of the studies conducted in this article, eigenvalues calculated for the analyzed data are presented in the table below, along with the percentage of the total variance explained by the *i*-th component, cumulative eigenvalues, and cumulative percentage of explained variance.

TABLE 4

Eigenvalues calculated for the analyzed data

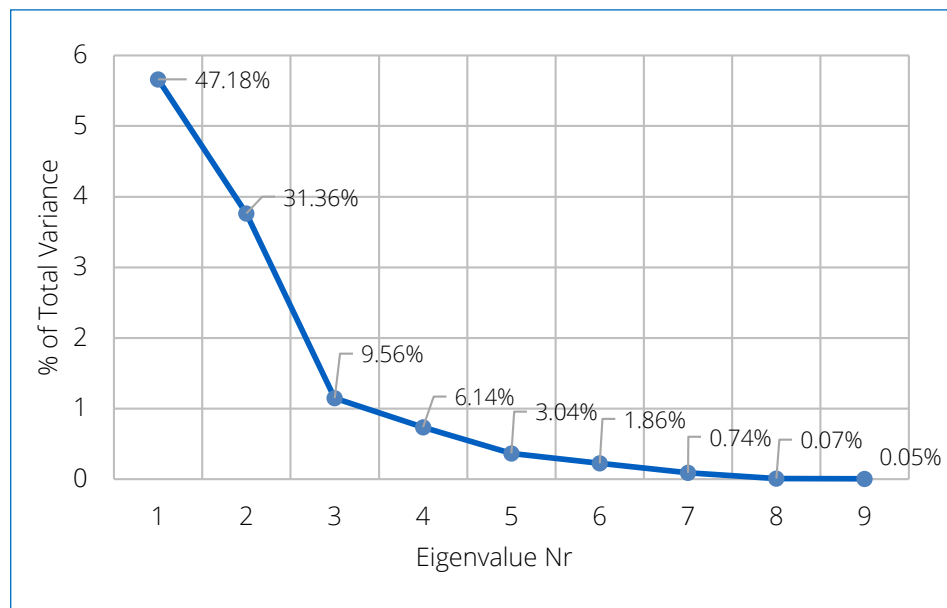
Eigenvalue no.	Eigenvalue	% of total variance	Cumulative	Eigenvalue cumulative %
1	5.6619	47.18	5.6619	47.18
2	3.7635	31.36	9.4254	78.55
3	1.1473	9.56	10.5727	88.11
4	0.7362	6.14	11.3090	94.24
5	0.3654	3.04	11.6743	97.29
6	0.2235	1.86	11.8978	99.15
7	0.0884	0.74	11.9863	99.89
8	0.0083	0.07	11.9945	99.95
9	0.0054	0.05	11.9999	100.00
10	0.0001	0.00	12.0000	100.00

Source: own study.

Among the entities under examination, three factors demonstrated a satisfactory level of explaining the total variance. This situation is depicted by the scree plot.

CHART 1

Scree plot (explanation of % of total variance)



Source: own study.

When analyzing the above chart, it should be stated that the first three main components (selected for further analysis) explain as much as 88.11% of the observed variation. This is a relatively high value; using the scree criterion, further considerations are limited to the first three main components.

The first factor is charged mainly by the following variables: the percentage share of places in city nurseries in relation to all available places, the number of children per place in non-public nurseries, the number of children per place in all institutions. Thus, the first factor determines the demand for nursery services (public and private).

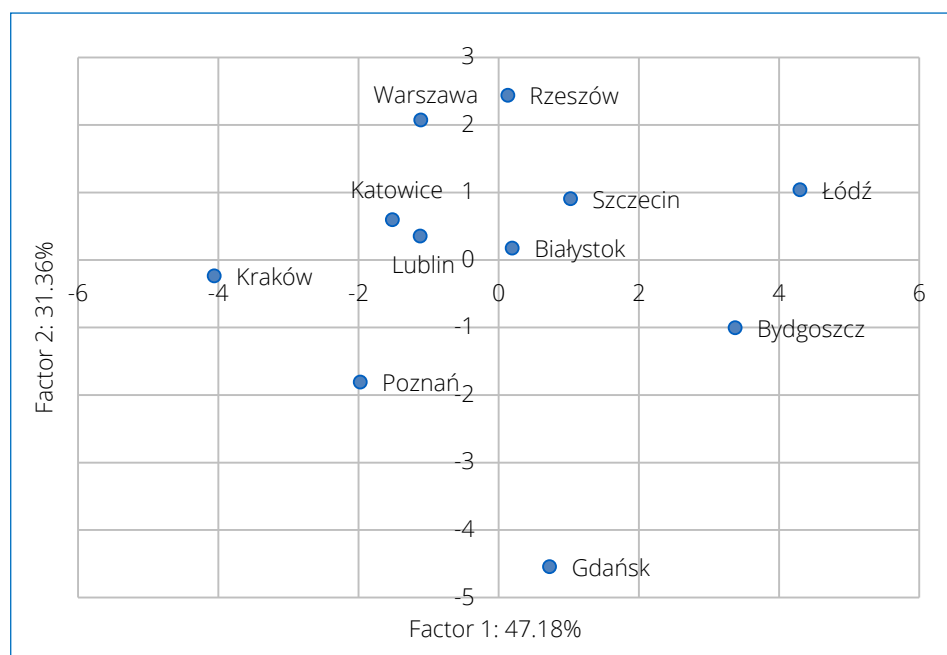
The second factor is charged mainly by variables: the percentage coverage of the total number of children by the number of places in city nurseries and the percentage share of places in city nurseries in relation to all available places. Therefore, the second factor determines the spatial accessibility (space) to city (public) nurseries.

As regards the third factor, the following variables turned out to be significant: the ratio of the daily nutritional fee in the city nursery to the average salary and the percentage share of places in non-public nurseries in relation to all available places. The third factor therefore relates to the financial availability of the services offered by nurseries. It should be emphasized that in the case of this factor (due to its variable components), the lower its level for individual cities, the greater the financial availability.

The results obtained are presented and discussed below in the coordinate system defined by the three principal components highlighted and described above.

CHART 2

Location of individual cities in terms of "spatial accessibility" and "demand" (factor 2 and 1)

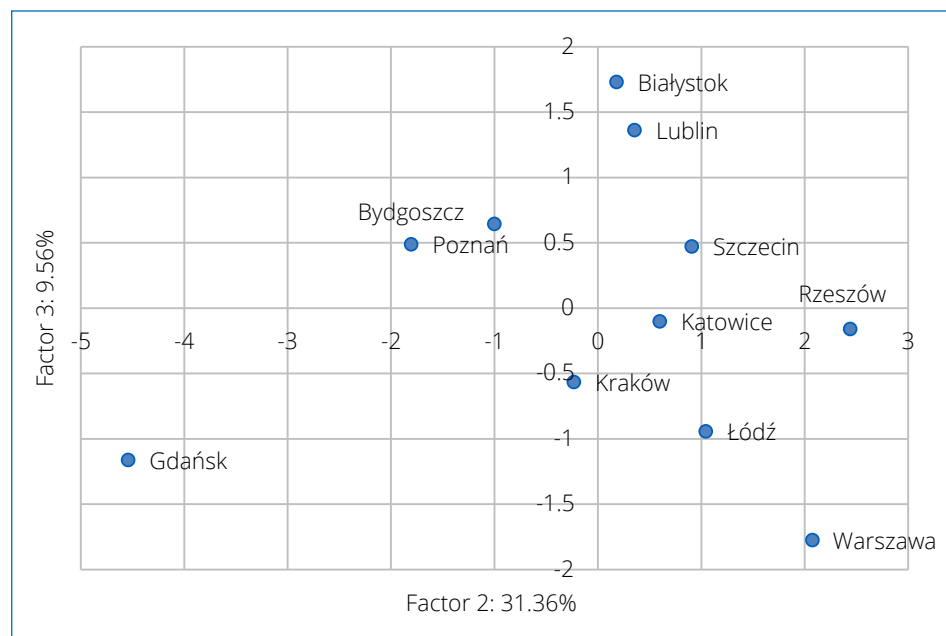


Source: own study.

Comparing “spatial accessibility” and “demand” (Chart 2) for a place in institutions for children up to 3 years of age, it should be noted that the high potential of both factors is present in only 4 cities. Rzeszów and Warsaw are characterized by high availability of places, while the demand for nursery services is greater in Rzeszów. Gdańsk is characterized by the lowest availability of places in nurseries and, at the same time, the demand is above the average there. In terms of demand, Łódź and Bydgoszcz dominate, while in Kraków the demand is relatively low, with an average level of availability.

CHART 3

Location of individual cities in terms of “financial accessibility” and “spatial accessibility” (factor 3 and 2)



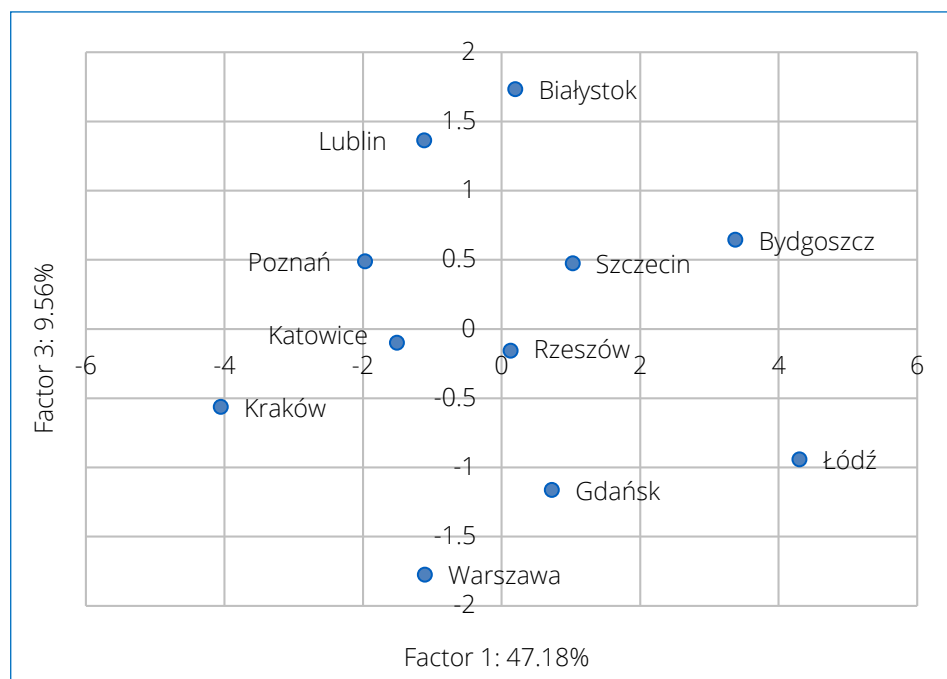
Source: own study.

In the case of the relationship between “cost availability” and “spatial accessibility” (Chart 3), Warsaw is characterized by the highest cost availability with high availability of places. Rzeszów should be distinguished due to the high availability of places with moderate cost availability. The lowest cost availability among the analyzed cities is found in Białystok and Lublin, while the level of

availability of places should be considered as average. In the case of Gdańsk, the city is distinguished by its relatively high availability of costs and, at the same time, very low availability of places in nurseries.

CHART 4

Location of individual cities in terms of “demand” and “financial availability” (factors 1 and 3)



Source: own study.

In analyzing the relationship between “financial availability” and “demand” (Chart 4), Łódź and Bydgoszcz show the highest demand for nursery services, with Łódź offering greater cost accessibility than Bydgoszcz. Kraków displays the lowest demand for nursery services, combined with moderate cost accessibility. Białystok and Lublin are marked by the lowest cost accessibility and a moderate demand level for these services. Rzeszów, Szczecin, Katowice, and Poznań exhibit average cost accessibility, with Szczecin showing above-average demand and Poznań and Katowice showing below-average demand for nursery services.

4. Conclusion

The population of the 11 studied cities represents 15.6% of the population of Poland. Due to the socio-economic potential, the analysis of such areas is particularly important. The use of various analytical tools allows to illustrate the effectiveness of the policies carried out in relation to local parameters, including financial and cultural ones.

The principal components method used in the analysis turned out to be a tool enabling the creation of unique measures and comparison of social behavior in relation to caring for children up to 3 years of age in UPM cities. Based on the study, it can be concluded that there are significant disproportions in both the demand and the spatial and financial availability; the hypothesis was positively verified. Thus, there is considerable scope for empirical changes that would improve childcare efficiency and increase the use of human capital.

Future research could be extended to include the assessment of the level of implementation of the tasks of LGUs in this area. On this basis, it would be possible to develop a strategy for caring for children up to 3 years of age in Polish metropolitan cities and to identify good practices. In addition, it would be worth analyzing the labor market in terms of absenteeism of parents bringing up children in this age group in UPM cities.

The study confirmed the imbalance between the demand and the supply of childcare services for children up to 3 years of age. It seems advisable to develop infrastructure in UPM cities or a strategy involving the stabilization of the policy of financial support for parents using commercial forms of this type of service.

The research work presented in this article has partially explained the problem of the imbalance between the demand and supply for childcare services up to the age of 3. Each city performs this task independently, directly and indirectly distributing the financial burden between its own budget and household budgets. Urban communities with a higher income level [www 4] and greater financial participation of the commune's budget in the costs of care deal with

this problem best. Demographic problems in virtually all UPM cities are indicated as the most important in the next few decades.

References

- Chłoń-Domińczak A., Magda I., 2013, *Opieka nad dziećmi do lat 3. w Polsce*, Warszawa.
- Esmaeili A., Shokoohi Z., 2011, *Assessing the Effect of Oil Price on World Food Prices: Application of Principal Component Analysis*, "Energy Policy", vol. 39(2), pp. 1022–1025.
- Fundacja im. Królowej Polski św. Jadwigi, 2016, *Badanie dostępności i jakości instytucjonalnej opieki nad dziećmi do lat 3 oraz stopnia upowszechnienia wychowania przedszkolnego dzieci w województwie małopolskim*, Małopolskie Obserwatorium Rozwoju Regionalnego, Kraków.
- GUS, 2017, *Pomoc społeczna i opieka nad dzieckiem i rodziną w 2016 roku*, Warszawa.
- GUS, 2021, *Struktura wynagrodzeń według zawodów w październiku 2020 r.*, *Informacja sygnałna*, Urząd Statystyczny w Bydgoszczy, Bydgoszcz.
- Hotelling H., 1933, *Analysis of a Complex of Statistical Variables into Principal Components*, "Journal of Educational Psychology", vol. 24.
- Hotelling H., *Relations between Two Sets of Variates*, "Biometrika", vol. 28(3/4).
- Obserwatorium Rozwoju Regionalnego, 2016, *Analiza dotycząca zapotrzebowania na tworzenie i utrzymanie nowych miejsc opieki nad dziećmi do lat 3*, Kielce.
- Przybylski M., 2020, *GUS: coraz lepsza dostępność miejsc opieki nad dziećmi do lat 3.*, Serwis Samorządowy PAP, <https://samorzad.pap.pl/kategoria/aktualnosci/gus-coraz-lepsza-dostepnosc-miejsc-opieki-nad-dziecmi-do-lat-3> [date of access: 23.10.2024].
- Vyas S., Kumaranayake L., 2006, *Constructing Socio-Economic Status Indices: How to Use Principal Components Analysis*, "Health Policy and Planning", vol. 21(6), pp. 459–468.
- Resolution No. XXIII / 797/20 of the City Council of Łódź of April 1, 2020.
- Ustawa z dnia 4 lutego 2011 r. o opiece nad dziećmi w wieku do lat 3., Dz.U. 2011 nr 45 poz. 235, z późn. zm.
- Ustawa z dnia 28 stycznia 2020 r. o opiece nad dziećmi w wieku do lat 3., Dz.U. 2020 poz. 326.
- www 1, GUS, Bank danych lokalnych, *Dzieci w wieku 0–3 lata objęte różnymi formami opieki instytucjonalnej*, <https://bdl.stat.gov.pl/BDL/dane/podgrup/tablica> [date of access: 23.10.2024].

- www 2, Łań M., *Bezpłatna opieka w żłobkach. Ruszają placówki z miejscami wykupionymi przez miasto*, Urząd m.st. Warszawy, <https://www.um.warszawa.pl/aktualnosci/bezp-atna-opieka-w-obkach-ruszaj-plac-wki-z-miejscami-wykupionymi-przez-miasto> [date of access: 23.10.2024].
- www 3, OECD, *Starting Strong*, <http://www.oecd.org/education/starting-strong-2017-9789264276116-en.htm> [date of access: 23.10.2024].
- www 4, GUS, *Produkt krajowy brutto i wartość dodana brutto w przekroju regionów w 2021 r.*, <https://stat.gov.pl/obszary-tematyczne/rachunki-narodowe/rachunki-regionalne/produkt-krajowy-brutto-i-wartosc-dodana-brutto-w-przekroju-regionow-w-2021-r-,7,6.html> [date of access: 23.10.2024].