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MULTIDIMENSIONAL COMPARATIVE ANALYSIS OF THE NUMBER OF DEATHS IN EUROPE BETWEEN 2018-2021 IN TERMS OF ECONOMIC SECURITY

Abstract

The study concerned a multidimensional comparative analysis of the number of deaths in 30 European countries between 2018-2021, also by age groups and type of vaccination in Poland in 2021 in terms of the impact of the COVID-19 pandemic and economic security. The data for the research was obtained from the websites of Eurostat and the Central Statistical Office. They were grouped and sorted from largest to smallest. In order to achieve the aim of the study, the death indices were calculated and analyzed. The obtained test results are included in bar charts. The article ends with a summary and final conclusions.

Keywords: human deaths, multidimensional comparative analyzes, security, economic security, COVID-19.

Introduction

The main goal of the study is to conduct a multidimensional comparative analysis of the number of human deaths in 30 European countries, including Poland, between 2018-2021, caused by the COVID-19 infectious disease pandemic - in terms of the maintenance of economic security. The subject of the research is 30 European countries and the object of the research is the number of human deaths between 2018-

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2021. The following hypothesis was formulated in the study: the use of a multidimensional comparative analysis will allow to group countries into those that were more and less affected by the effects of the COVID-19 pandemic in terms of the number of human deaths in 2021.

Conclusions from the research: In 2021, an increase in deaths was recorded to the level of 4 304 226, i.e. by 406 728 more than in 2019 and by 369 700 more than in 2018. In 11 of the 30 analyzed European countries in 2021, the death index exceeded 1% while in the remaining 19 countries it was below 1%[1]. In those countries with an index of deaths above 1%, there was an increase in mortality, significant from the point of view of each of the countries considered - caused by the COVID-19 pandemic.

Originality: The detection of similarities and differences after the use of multidimensional comparative analyses of the number of deaths in the European countries under consideration should be a premise for making decisions based on the strength and type of the observed trends related to the increase or decrease in the number of deaths in terms of funds allocation for the maintenance of the economic security of countries in terms of the sustainment of an appropriate level of the population allowing for economic development.

Introduction and literature review

The research on the number of human deaths in the initial stage of the COVID-19 pandemic indicated (March 2020) that the number of deaths in European countries in total in the analyzed time period fluctuated around a statistical error of around 0.005 pp.[2]. This article is a continuation of the research conducted at the initial stage of and during the COVID-19 impact at the beginning of 2021[3] and it is an attempt to verify the research hypothesis proposed at the beginning.

The first COVID-19 infectious disease case was recorded in Wuhan, China in December 2019[4]. On March 11, 2020, this disease was declared

[1] Data on deaths from the 1st week to the 43rd week of 2021.

[2] B. Kozicki, S. Mitkow, *Analysis of Human Deaths in Regard to Covid-19 Pandemic in European Countries*, „European Research Studies Journal", 2020, Vol. XXIII, Special Iss. 3, pp. 213-227.

[3] B. Kozicki, S. Mitkow, B. Pawlisiak, *Bezpieczeństwo ekonomiczne a liczba zgonów w Europie w latach 2018-2020,* „Nowoczesne Systemy Zarządzania", 2021, no. 2, DOI: https://doi.org/10.37055/nsz/140416.

[4] N. Zhu, D. Zhang, W. Wang, X. Li, B. Yang, J. Song [et al.], *A Novel Coronavirus from Patients with Pneumonia in China*, „New England Journal of Medicine", 2020, no. 382, pp. 727-733.

a pandemic by the World Health Organization[5]. It caused a slowdown in many sectors of the economy, including air transport mainly. Many restrictions have been introduced, e.g. the necessity to wear face masks, disinfect hands, a ban on travelling and others[6].

COVID-19 has affected the economic security of European countries. The analysis of the literature shows the multifaceted nature of the term security and the fact that in such dynamically changing times it is difficult to interpret it explicitly[7]. According to the Dictionary of the Polish Language, it is a condition of non-threat, peace and certainty[8]. Security is also referred to the state of stability, a sense of certainty and a guarantee of its maintenance, and should be considered in three dimensions: state, process and primary need[9]. In the literature, economic security "means the certainty of the survival and development of the economic system of the state and international economic organizations along with their instruments, ensuring that these entities maintain an appropriate position in international economic relations and an adequate standard of living of the population"[10].

The pandemic has compromised the safety of citizens and their status, not only health, but also economic. It also influenced the security of the state, thus affecting its economy and international contacts. The analysis of the mortality of people in the analyzed countries shows best how much damage the COVID-19 pandemic caused in terms of the economic security of people and countries[11].

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[5] E. Satomi [et al.], *Alocação justa de recuros de saúde escassos diante da pandemia de COVID-19 Considerações éticas*, "Einstein", 2020, no. 18(2), pp. 1-5, DOI: 10.31744 /Einstein_Journal/ 2020AE5775.

[6] K. Wygoda, D. Wasiak, *Law in "Times of Crisis" and Social Justice - General Remarks in the Era of Covid -19,* "Przegląd Prawa Konstytucyjnego", 2020, no. 6(58), DOI 10.15804/ppk.2020.06.19, p. 235, H. Manurung, *Russia – ASEAN relations during COVID-19 pandemic*, 2020, ResearchGate, https://www.researchgate.net (11.01.2022); *Koronawirus – ograniczenia dotyczące działalności gospodarczej na razie bez zmian*, PARP, https://www.parp.gov.pl (24.03.2021).

[7] M. Jurgilewicz, N. Malec, J. Piwowarski, B. Kozicki, *Forecasting the Reserve Money of the Central Bank of Poland in the Aspects of Economy Security,* "Journal of Security and Sustainability Issues", 2021, Vol. 11, pp. 525-536. https://doi.org/10.47459/jssi.2021.11.48; J. Piwowarski, B. Kozicki, M. Jurgilewicz, N. Malec, *Managing the Financial Security of Organizations During the Covid-19 Pandemic – Multivariate Analysis,* "Journal of Security and Sustainability", Iss. 2021, Vol. 11, pp. 537-546. https://doi.org/10.47459/jssi.2021.11.49.

[8] *Słownik języka polskiego*, ed. M. Szymczak, Warszawa 1981, p. 147.

[9] B. Wiśniewski, *System bezpieczeństwa państwa. Konteksty teoretyczne i praktyczne*, Szczytno 2013, p. 37.

[10] A. Nurzyńska, *Bezpieczeństwo usług w międzynarodowym transporcie lotniczym przewozów pasażerskich*, Katowice 2016, p. 22.

[11] R. Uliasz, *Wolność działalności gospodarczej a pandemia COVID-19. Uwagi w kontekście konstytucyjnego zakazu naruszania istoty wolności i praw (art. 31 ust. 3 zd. 2*

Literature indicates that the pandemic in Europe is pushing up excessive mortality rates[12]. On January 2, 2022, 1 650 831 deaths were recorded in Europe[13]. According to The Economist, the total death toll of the pandemic could be even higher for several reasons[14]:

- official statistics in many countries exclude victims who were not tested positive for coronavirus prior to death - which could be the large majority in places with little testing capacity;
- hospitals and registry offices may not process death certificates for days or even weeks which results in delays in updating data;
- the pandemic made it difficult for doctors to treat other conditions and discouraged people from going to the hospital which could have indirectly resulted in an increase in deaths from diseases other than COVID-19.

According to the information from the portal "Polityka Zdrowotna" ("Health Policy"), Poland is one of the most affected countries by COVID-19 in the EU in 2021[15]. In terms of the number of human deaths, it has the second average percentage of excess deaths in Europe during the entire pandemic[16].

In order to verify the research hypothesis proposed at the beginning, the variables under consideration were grouped and indices were calculated, analyzed and evaluated[17]. Dynamics indices on a constant basis of the number of deaths in respective European countries between 2018-2021 were also calculated and the results were ranked and summarized in a bar chart.

In the literature, multidimensional comparative analyses are groups of statistical methods that simultaneously analyze at least two variables

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Konstytucji RP), „Przegląd Prawa Konstytucyjnego", 2021, no. 5(63), DOI 10.15804/ppk.2021.05.13, p. 175.

[12] *Nadmierna śmiertelność w UE na fali wznoszącej. Są najnowsze dane Eurostatu*, Forsal.pl, https://forsal.pl, 17.12.2021 (11.01.2022); Ch. Giattino, H. Ritchie, M. Roser, E. Ortiz-Ospina, J. Hasell, *Excess mortality during the Coronavirus pandemic COVID-19),* "Statistics and Research", 3.01.2022, Our World in Data, https://ourworldindata.org (12.01.2022).

[13] C. Stewart, *Cumulative number of coronavirus (COVID-19) deaths in Europe*, "Statista", https://www-statista-com.translate.goog (12.01.2022).

[14] Eurostat, *Weekly death statistics*, European Commission, https://ec.europa.eu/eurostat (12.01.2022).

[15] J. Kadzikiewicz, *Polska jednym z najbardziej dotkniętych COVID-19 krajów UE w 2021 r.*, „Polityka Zdrowotna", https://www.politykazdrowotna.com, 17.06.2021 (11.01.2022).

[16] K. Jabłonowski, *Nadmiarowe zgony w Europie: jak zmienia się pozycja Polski*, „Konkret 24", https://konkret24.tvn24.pl, 20.12.2021 (11.01.2022).

[17] S.M. Kot, J. Jakubowski, A. Sokołowski, *Statystyka*, Warszawa 2011; S. Mitkow, J. Tomaszewski, B. Kozicki, *Bezpieczeństwo militarne a potencjał osobowy Sił Zbrojnych RP*, Warszawa 2021.

describing each examined object (phenomenon)[18]. During multidimensional comparative analyses, the analyzed variables were compared in time and space, so as to observe the similarities of the studied objects (analyzed human deaths in respective European countries dynamically).

Multidimensional comparative analysis of the number of human deaths in Europe between 2018-2021

The study began with the comparison of the number of deaths in a total of 30 European countries in the identical periods from week 1 to week 43 between 2018-2021 on a categorized bar chart (Fig. 1).

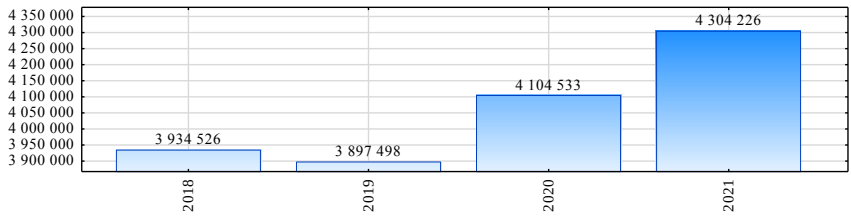

Fig. 1. Bar chart of human deaths in a total of 30 European countries in the identical periods from week 1 to week 43 between 2018-2021

Source: own study based on data obtained from the website: https://ec.europa.eu/, (08.01.2021).

The data presented in Figure 1 show that during the impact of the infectious disease COVID-19 pandemic, an increase in the number of deaths in the identical time periods from the 1st to the 43rd week between 2020-2021 was observed in a total of 30 analyzed European countries between 2020-2021 compared to the identical period: 2018-2019. In 2020, the number of deaths increased to 4 104 533, i.e. 204,035 more than in 2019 and 170 007 more than in 2018. In 2021, the increase in the number of deaths to the level of 4 304 226 was recorded, i.e. 406 728 more than in 2019 and 369 700 more than in 2018.

The standard deviation of the number of deaths from the arithmetic mean in 30 European countries in total in the identical time periods - weeks - from 1st to 43rd between 2018-2021 was 4 453. On the other hand, when considering the ranking of the standard deviation of the number of deaths in the analyzed identical time periods, it was as follows:

[18] M. Łuniewska, W. Tarczyński, *Metody wielowymiarowej analizy porównawczej na rynku kapitałowym*, Warszawa 2006, p. 9; T. Panek, J. Zwierzchowski, *Statystyczne metody wielowymiarowej analizy porównawczej. Teoria i zastosowania*, Warszawa 2013, pp. 15-16.

1) 2021 – 4 635 deaths;
2) 2020 – 4 553 deaths;
3) 2018 – 4 347 deaths;
4) 2019 – 4 267 deaths.

The conducted ranking of the standard deviation shows that the highest deviations from the arithmetic mean of human deaths in 30 European countries in total in the identical time periods from week 1 to week 43 between 2018-2021 were recorded during the period of the impact of the infectious disease COVID-19.

The next stage of the research is the analysis of the number of deaths (Fig. 2-3) in the 30 analyzed European countries in the identical time periods from the 1st to the 43rd week between 2018-2021 and their ranking from the lowest number of deaths in 2021.

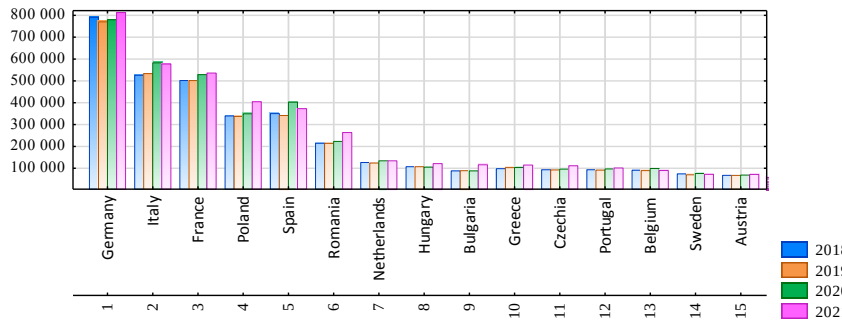

Fig. 2. Bar chart of the number of human deaths in 30 European countries in the identical time periods from week 1 to week 43 between 2018-2021 (scale from 60,000 to 82,000)

Source: own study based on data obtained from the website: https://ec.europa.eu/, (08.01.2021).

The data compiled in Figure 2 (data scale from 60 000 to 82 000 deaths) show that in thirteen European countries the number of deaths in 2021 was higher than that recorded in 2018. The lower level was recorded in two countries: Belgium (–1494) and Sweden (–1931). The ranking of the number of deaths in 30 European countries in the identical time periods from week 1 to week 43 in 2021 and the arithmetic mean of deaths in the same time period between 2018-2021 were as follows:

1. Germany: 813 519 deaths; arithmetic mean (2018-2021): 789 083 deaths;
2. Italy: 577 562 deaths; arithmetic mean (2018-2021): 555 237 deaths;
3. France: 536 162 deaths; arithmetic mean (2018-2021): 517 146 deaths;
4. Poland: 404 790 deaths; arithmetic mean (2018-2021): 358 098 deaths;

5. Spain: 373 333 deaths; arithmetic mean (2018-2021): 367 292 deaths;
6. Romania: 263 791 deaths; arithmetic mean (2018-2021): 229 109 deaths;
7. Netherlands: 134 358 deaths; arithmetic mean (2018-2021): 129 998 deaths;
8. Hungary: 121 707 deaths; arithmetic mean (2018-2021): 110 439 deaths;
9. Bulgaria: 116 252 deaths; arithmetic mean (2018-2021): 95 410 deaths;
10. Greece: 115 131 deaths; arithmetic mean (2018-2021): 105 120 deaths;
11. Czechia: 111 436 deaths; arithmetic mean (2018-2021): 98 445 deaths;
12. Portugal: 101 662 deaths; arithmetic mean (2018-2021): 96 000 deaths;
13. Belgium: 89 787 deaths; arithmetic mean (2018-2021): 92 381 deaths;
14. Sweden: 72 294 deaths; arithmetic mean (2018-2021): 73 387 deaths;
15. Austria: 71 580 deaths; arithmetic mean (2018-2021): 68 927 deaths.

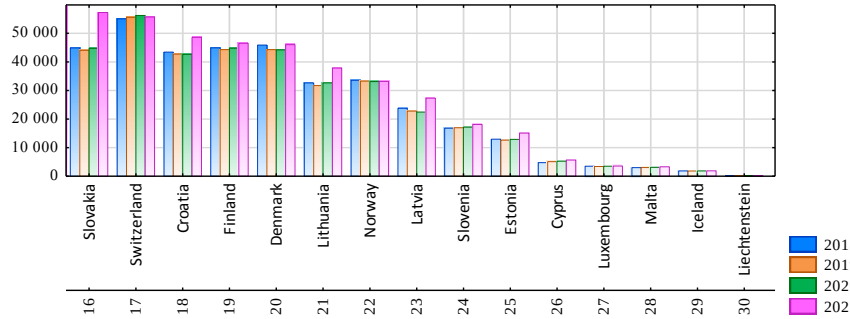

Fig. 3. Bar chart of the number of human deaths in 30 European countries in the identical time periods from week 1 to week 43 between 2018-2021 (scale from 0 to 60,000)

Source: own study based on data obtained from the website: https://ec.europa.eu/, (08.01.2021).

The analysis of the data presented in Figure 3 (data scale from 0 to 60 000 human deaths) shows that in thirteen European countries the number of deaths in 2021 was higher than that recorded in 2018. The lower level was recorded in two countries: Norway (–362) and Lichtenstein (–7). The ranking of the number of human deaths in 30 European countries in the identical time periods from week 1 to week 43 in 2021 and the arithmetic mean of deaths in the same time period between 2018-2021 were as follows:

16. Slovakia: 57 335 deaths; arithmetic mean (2018-2021): 47 781 deaths;
17. Switzerland: 55 785 deaths; arithmetic mean (2018-2021): 55 708 deaths;
18. Croatia: 48 650 deaths; arithmetic mean (2018-2021) 44 403 deaths;

19. Finland: 46 535 deaths; arithmetic mean (2018-2021): 45 159 deaths;
20. Denmark: 46 099 deaths; arithmetic mean (2018-2021): 45 145 deaths;
21. Lithuania: 37 861 deaths; arithmetic mean (2018-2021): 33 765 deaths;
22. Norway: 33 250 deaths; arithmetic mean (2018-2021): 33 335 deaths;
23. Latvia: 27 328 deaths; średnia arytmetyczna (2018-2021): 24 099 deaths;
24. Slovenia: 18 144 deaths; arithmetic mean (2018-2021): 17 295 deaths;
25. Estonia: 15 127 deaths; arithmetic mean (2018-2021): 13 430 deaths;
26. Cyprus: 5 715 deaths; arithmetic mean (2018-2021): 5 232 deaths;
27. Luxemburg: 3 596 deaths; arithmetic mean (2018-2021): 3 538 deaths;
28. Malta: 3 326 deaths; arithmetic mean (2018-2021): 3 147 deaths;
29. Iceland: 1 899 deaths; arithmetic mean (2018-2021) 1 873 deaths;
30. Liechtenstein: 212 deaths; arithmetic mean (2018-2021): 218 deaths.

Next, the analysis of the difference in the number of human deaths in respective 30 European countries in the identical time periods from week 1 to week 43 between 2021 and the arithmetic mean of the number of deaths in the identical time periods from week 1 to week 43 of 2018-2020 was conducted.

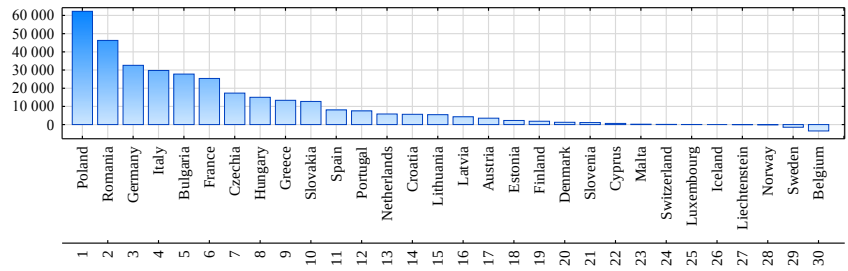

Fig. 4. Bar chart of the difference in the number of human deaths in 30 European countries in the identical time periods from week 1 to week 43 between 2021 and the arithmetic mean of the number of deaths in the identical time periods from week 1 to week 43 of 2018-2020

Source: own study based on data obtained from the website: https://ec.europa.eu/, (08.01.2021).

The ranking of the highest number of deaths between 2021 and the arithmetic mean of 2018-2020 in the identical time periods from the 1st to the 43rd week in 30 respective European countries was as follows: 1. Poland: 62 256 deaths; 2. Romania: 46 243 deaths; 3. Germany: 32 581 deaths; 4. Italy: 29 767 deaths; 5. Bulgaria: 27 790 deaths; 6. France: 25 355 deaths; 7. Czechia: 17 321 deaths; 8. Hungary: 15 024 deaths; 9. Greece: 13 348 deaths; 10. Slovakia: 12 739 deaths; 11. Spain: 8 054 deaths; 12. Portugal: 7

550 deaths; 13. Netherland: 5 813 deaths; 14. Croatia: 5 662 deaths; 15. Lithuania: 5 461 deaths; 16. Latvia: 4 306 deaths; 17. Austria: 3 538 deaths; 18. Estonia: 2 263 deaths; 19. Finland: 1 835 deaths; 20. Denmark: 1 272 deaths; 21. Slovenia: 1 132 deaths; 22. Cyprus: 644 deaths; 23. Malta: 239 deaths; 24. Switzerland: 103 deaths; 25. Luxemburg: 78 deaths; 26. Iceland: 35 deaths; 27. Liechtenstein: –7 deaths; 28. Norway: –113 deaths; 29. Sweden: –1,458 deaths and 30. Belgium –3,458 deaths.

The further stage of the research is the analysis of the dynamics indices in Figure 5 on a constant basis of the number of deaths in respective 30 European countries in the identical time periods from the 1st to the 43rd week between 2018-2021.

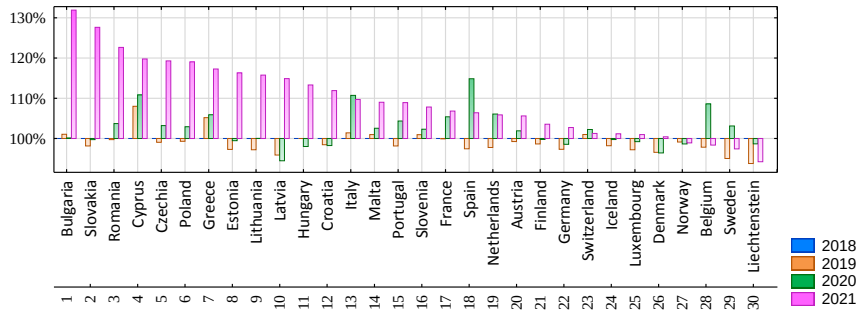

Fig. 5. Bar chart of dynamics indices on a constant basis of human deaths in respective 30 European countries in the identical time periods from week 1 to week 43 between 2018-2021 (constant: the number of deaths in respective European countries in the identical time periods from 1st to the 43rd week in 2018)

Source: own study based on data obtained from the website: https://ec.europa.eu/, (08.01.2021).

The observations of the data in Figure 5 show that in the 30 analyzed European countries between 2018-2021, in the identical time periods from week 1 to week 43, in 2021 there was an increase in the number of deaths in 26 countries. The ranking of the increase in the number of deaths in 2021 compared to the recorded number of deaths in each of the 30 analyzed European countries in 2018 as a dynamics index on a constant basis is as follows: 1. Bulgaria 131.94%; 2. Slovakia 127.65%; 3. Romania 122.65%; 4. Cyprus 119.79%; 5. Czechia 119.30%; 6. Poland 119.06%; 7. Greece 117.29%; 8. Estonia 116.32%; 9. Lithuania 115.77%; 10. Latvia 114.89%; 11. Hungary 113.32%; 12. Croatia 111.92%; 13. Italy 109.70%; 14. Malta 109.01%; 15. Portugal 108.92%; 16. Slovenia 107.82%; 17. France 106.83%; 18. Spain 106.40%; 19. Netherlands 105.87%; 20. Austria 105.61%; 21. Finland 103.55%; 22. Germany 102.74%; 23.

Switzerland 101.27%; 24. Iceland 101.17%; 25. Luxemburg 100.98%; 26. Denamrk 100.43%; 27. Norway 98.92%; 28. Belgium 98.36%; 29. Sweden 97.42%; 30. Liechtenstein 94.22%.

The arithmetic mean of the analyzed dynamics indices on a constant basis in 2021 in the 30 analyzed European countries is at the level of 109.64%, and the median is 108.37%. The standard deviation from the arithmetic mean reached the level of 9.34%.

An important issue being observed is the increase in the number of deaths in 2020 compared to 2018 in the following European countries with the use of data ranking (dynamics index with on a constant basis above 103%) by: 1. Spain: 14.87% of deaths; 2. Cyprus: 10.84% of deaths; 3. Italy: 10.72% of deaths; 4. Belgium: 08.61% of deaths; 5. Netherlands: 06.09% of deaths; 6. Greece: 05.90% of deaths; 7. France: 05.40% deaths; 8. Portugal: 04.35% of deaths; 9. Romania: 03.72% of deaths; 10. Czechia: 03.22% of deaths; 11. Sweden: 03.11% of deaths.

The next stage of the research will be the analysis of the indices of the number of deaths as a percentage (Fig. 6)

$$\text{death index} = \frac{\textit{number of deaths in each of 30 European countries in n year}}{\text{population of each of 30 European countries in n year}} \cdot 100\%$$

in 30 analyzed countries in Europe in 2021.

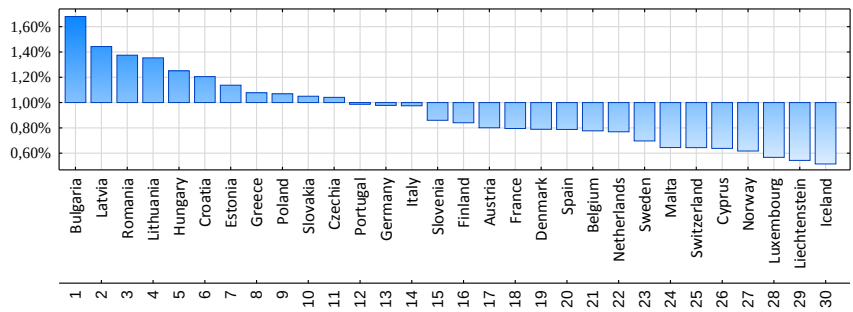

Fig. 6. Chart of indices of the number of deaths as a percentage in 30 analyzed countries in Europe in 2021 (X2 axis - ranking of death indices in 30 countries from largest to smallest in 2021); data from 43 identical weeks

Source: own study based on data obtained from the website: https://ec.europa.eu/, (08.01.2021).

The research shows that in 11 out of 30 analyzed European countries in 2021 the death rate index exceeded 1%, while in the remaining 19 countries it was below 1%.

In those countries with an index of deaths above 1%, there has been an increase in mortality that is relevant for each of the countries considered - triggered by the COVID-19 pandemic.

The ranking of countries with the death rate above 1% is as follows: 1. Bulgaria 1.68%; 2. Latvia 1.44%; 3. Romania 1.37%; 4. Lithuania 1.35%; 5. Hungary 1.25%; 6. Croatia 1.21%; 7. Estonia 1.14%; 8. Greece 1.08%; 9. Poland 1.07%; 10. Slovakia 1.05% and 11. Czechia 1.04%.

The ranking of countries, where the death rate was below 1%, is as follows: 1. Portugal 0.99%; 2. Germany 0.98%; 3. Italy 0.97%; 4. Slovenia 0.86%; 5. Finland 0.84%; 6. Austria 0.80%; 7. France 0.80%; 8. Denmark 0.79%; 9. Spain 0.79%; 10. Belgium 0.78%; 11. Netherlands 0.77%; 12. Sweden 0.70%; 13. Malta 0.64%; 14. Switzerland 0.64%; 15. Cyprus 0.64%; 16. Norway 0.62%; 17. Luxembourg 0.57%; 18. Liechtenstein 0.54% and 19. Iceland 0.51%.

It should be emphasized that the data on the number of deaths in 2021 in respective European countries is not complete and covers 43 weeks out of 52 available. This means that the death indices calculated in the study in 2021 in respective European countries will be higher in each of them.

The next stage of the research is the analysis of the number of deaths caused by the COVID-19 pandemic in Poland.

A comparative analysis of the number of deaths from COVID-19 in 2021 in Poland

In the period from the 1st to the 43rd week, 536 162 people died in 2021 in Poland. And from January 1 to December 28, 2021, 58 979 people died due to COVID-19. In summary, every eleventh death in Poland was caused by COVID-19 disease, including another possible intercurrent disease. Due to the lack of exact equal time periods of identical data, it should be assumed that the number of people who died in Poland from the coronavirus will be well below 10% of all registered deaths in 2021.

Figure 7 shows the number of deaths from COVID-19 in Poland from January 1 to December 28, 2021 by age.

The largest increase in the number of deaths in Poland in 2021 is in the age range from 61 to 93 years old. The arithmetic mean of deaths in Poland was 578, while the median was 185 deaths. The minimum number of deaths by age group is 1 in four age groups: 2; 4; 8 and 16, and the maximum is 2044 in the 73-year-old age group. In total, 32 005 men and 26 840 women died from COVID-19 in Poland in the analyzed time period. However, in 135 people of the studied population, the gender was not specified.

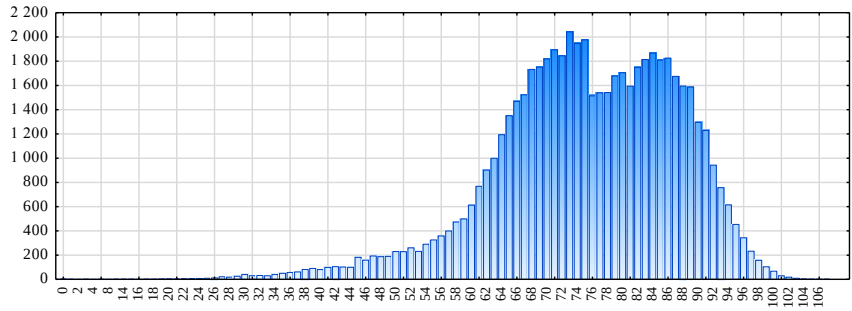

Fig. 7. Bar chart of the number of deaths caused by COVID-19 in Poland from January 1 to December 28 in 2021 by age

Source: own study based on data obtained from the website: https://dane.gov.pl, (08.01.2021).

According to the data obtained from the website of the Central Statistical Office, only 14 726 people died from the infectious disease COVID-19 without other intercurrent diseases, which is 24.97% of all deaths caused by COVID-19 and intercurrent diseases, and 2.75% of all deaths in Poland in 2021 from week 1 to week 43. On the other hand, 44 254 people died from intercurrent diseases with COVID-19 from January 1 to December 28.

The last stage of the research was the analysis of the number of human deaths from COVID-19 in Poland from January 1 to December 28 in 2021, divided into those vaccinated with four types of vaccines and no vaccinations.

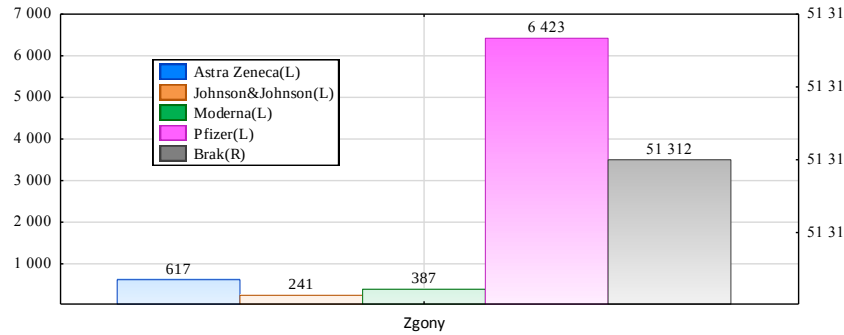

Fig. 8. Bar chart of the number of human deaths from COVID-19 in Poland from January 1 to December 28 in 2021, divided into vaccinated with four types of vaccines and no vaccinations

Source: own study based on data obtained from the website: https://dane.gov.pl, (08.01.2021).

The research shows that about 87% of deaths in Poland in the period from January 1 to December 28, 2021 due to the infectious disease COVID-19 are unvaccinated people (51 312). On the other hand, 6 423 people vaccinated with Pfizer died, which accounts for 10.89% of all deaths caused by the infectious disease COVID-19. The deaths of those vaccinated with the remaining vaccines are summarized below: Astra Zeneca - 617; Moderna - 387 and Johnson & Johnson - 241.

Conclusions

The research shows that in the identical time periods from the 1st to the 43rd week in 2020, the number of deaths increased to 4 104 533, i.e. by 204 035 more than in 2019 and by 170 007 more than in 2018. However, in the identical time periods from the 1st to the 43rd week, in 2021 an increase in deaths was recorded to the level of 4 304 226, i.e. by 406 728 more than in 2019 and by 369 700 more than in 2018.

In 26 European countries, the number of deaths in the identical period from week 1 to week 43 in 2021 was higher than that recorded in 2018. The lower level was recorded only in four countries: Sweden (–1931), Belgium (–1494), Norway (–362) and Lichtenstein (–7).

In respective analyzed European countries between 2018-2021, in the identical time periods from week 1 to week 43, in 2021 there was an increase in the number of deaths in 26 respective European countries. The highest increase was recorded in Bulgaria, where the dynamics index on a constant basis was at the level of 131.94%, then in Slovakia with the recorded dynamics index on a constant basis 127.65% and in Romania with the dynamics index on a constant basis amounting to 122.65%.

In the ranking of the highest number of deaths between 2021 and the arithmetic mean of 2018-2021 in the identical time periods from the 1st to the 43rd week in 30 respective European countries, the first three places were taken by: 1. Poland: 62 256 deaths; 2. Romania: 46 243 deaths; 3. Germany: 32 581 deaths.

In 11 of the 30 analyzed European countries in 2021, the death index exceeded 1%, while in the remaining 19 countries it was below 1%. In those countries with an index of deaths above 1%, there was an increase in mortality significant from the point of view of each of the countries considered – caused by the COVID-19 pandemic. The ranking of countries with the death rate above 1% is as follows: 1. Bulgaria 1.68%; 2. Latvia 1.44%; 3. Romania 1.37%; 4. Lithuania 1.35%; 5. Hungary 1.25%; 6. Croatia 1.21%; 7. Estonia 1.14%; 8. Greece 1.08%; 9. Poland 1.07%; 10. Slovakia 1.05% and 11. Czechia 1.04%.

The ranking of countries with the death index below 1% is as follows: 1. Portugal 0.99%; 2. Germany 0.98%; 3. Italy 0.97%; 4. Slovenia 0.86%; 5. Finland 0.84%; 6. Austria 0.80%; 7. France 0.80%; 8. Denmark 0.79%; 9. Spain 0.79%; 10. Belgium 0.78%; 11. Netherlands 0.77%; 12. Sweden 0.70%; 13. Malta 0.64%; 14. Switzerland 0.64%; 15. Cyprus 0.64%; 16. Norway 0.62%; 17. Luxembourg 0.57%; 18. Liechtenstein 0.54% and 19. Iceland 0.51%.

It should be emphasized that the data on the number of deaths in 2021 in respective European countries is not complete and covers 43 weeks out of 52 available. This means that the death indices calculated in the study in 2021 in respective European countries will be higher in each of them.

From January 1 to December 28, 2021, 58 979 people died due to COVID-19. In summary, every eleventh death in Poland was caused by COVID-19 disease, including another possible intercurrent disease. Due to the lack of precise equal time periods of identical data, it should be assumed that the number of people who died in Poland will be significantly below 10% of all recorded deaths in 2021.

The greatest increase in the number of deaths is in the age range from 61 to 93 years old. According to the data obtained from the website of the Central Statistical Office, only 14 726 people died from the infectious disease COVID-19 without other intercurrent diseases, which is 24.97% of all deaths caused by COVID-19 and intercurrent diseases, and 275% of all deaths in Poland in 2021 from week 1 to week 43. On the other hand, 44 254 people died from intercurrent diseases with COVID-19 from January 1 to December 28.

About 87% of deaths in Poland in the period from January 1 to December 28, 2021 due to the infectious disease COVID-19 are unvaccinated people (51 312). The number of deaths vaccinated with Pfizer is 6 423 people, which accounts for 10.89% of all deaths caused by the infectious disease COVID-19. The remaining 2.11% were vaccinated with other vaccines: Astra Zeneca - 617; Moderna - 387; Johnson & Johnson - 241.

The obtained evaluation of the performed analyzes, including the improvement of the level of death indices in 2021, is a premise for further research on the reasons for obtaining such results. Further research related to human deaths in Europe can be focused on the development of a mathematical model to predict them for the future in the context of the impact of random factors that may cause an increase or decrease in deaths dynamically. Human resources are the hardly re-

newable asset and it is important for the proper functioning of various economic sectors considered in terms of the maintenance of the economic security of states[19].

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Wielowymiarowa analiza porównawcza liczby zgonów w Europie w latach 2018-2021 w zakresie bezpieczeństwa gospodarczego

Streszczenie

W opracowaniu przeprowadzono wielowymiarową analizę porównawczą liczby zgonów w 30 państwach Europy w latach 2018-2021, a także według grup wiekowych i rodzaju szczepień w Polsce w 2021 roku w aspekcie oddziaływania pandemii COVID-19 i bezpieczeństwa ekonomicznego. Dane do badań pozyskano ze strony internetowej Eurostatu i Głównego Urzędu Statystycznego. Zostały one poddane grupowaniu i porządkowaniu od największych do najmniejszych. Do realizacji celu pracy wyliczono i poddano analizie indeksy zgonów. Uzyskane wyniki badań zawarto na wykresach słupkowych. Artykuł kończy się podsumowaniem i wnioskami końcowymi.

Słowa kluczowe: zgony ludzi, wielowymiarowe analizy porównawcze, bezpieczeństwo, bezpieczeństwo ekonomiczne, COVID-19.