
The Ninth Wave of COVID-19

Submitted 02/09/22, 1st revision 23/09/22, 2nd revision 06/10/22, accepted 30/10/22

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Abstract:

Purpose: The aim of this article is presenting the course of COVID-19 pandemics in Poland on the basis of statistical data showing infections rate and deaths in the population.

Design/Methodology/Approach: The analysis of statistical data is the research method used in this article. Statistical analysis is a science which aim is collecting all detailed research of single data samples from a particular collection of elements, which enables the process of taking samples. Data concerning pandemics, presented on ministerial WebPages, depicts the scale of the problem. Statistical analysis can be of descriptive or conclusion character. Descriptive analysis will be used for the needs of this article.

Findings: Due to editorial limitations, the article includes fragments of research results which present the scale of the problem. This is the basic criterion for the selection of materials used in the article. Some data presented in the table, concerning infections and deaths show that there is a kind of regular return of the virus called waves by the specialists. Subsequently occurring waves caused certain decisions related to protection and treatment of the population. However the beginning of pandemics in Poland had rather mild form, but next waves brought more tragic results despite of government efforts.

Practical implications: Performed data analysis makes it possible to evaluate infections and deaths state in particular periods. Restrictions and lockdown implemented in Poland significantly impacted the course of pandemics. Analyzing the gathered data it is possible to consider the necessity of next limitations or restrictions. The Ministry of Health wonders what is the way of counteracting different kinds and modifications of the virus. Will the reminding vaccination dose limit infections? – the time will show. However, alleviating the course of the disease is clearly visible, which is positively assessed by scientists.

Originality/value: The pandemics itself is untypical, even though the world struggles with various health threats throughout its history. The fight with mass diseases is of unique character from the viewpoint of medical knowledge and the possibility of saving human beings. Historical and scientific documents uncover different kinds of analyses and descriptions of various situations. Performed research is a part of general scientific accomplishments of different medical, social and economic environments. Presented examples constitute scientific value with the possibility of insight into complete data subjected to analysis and evaluation.

Keywords: Pandemics, coronavirus.

JEL codes: H12, I18.

Paper type: A research article.

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1. Introduction

The title ninth wave functions as ‘scientifically unjustified phenomenon of one wave bigger than the eight previous ones occurrence (www.tavernaskipperow.pl). Generally, waves in the sea are a normal phenomena and the problem really begins when there are no waves.

Theoretically, with a constant strength of wind the wave, after some time, achieves its maximum and after that it will extinguish. Then there will be another one and another... Joining this ninth wave with COVID-19 is done on purpose from the point of view of our current experience in this field. It was to be different – pandemics, controlling pandemics and the end of pandemics.

However, we still struggle with subsequent waves and we cannot be sure if it is the end, or there will be the next wave. Will it be mild or will it shake the world as it had been at the beginning. There was to be only one invented vaccine. Then it occurred that we have to take another, reminding one. Maybe we will have to take subsequent vaccines systematically, just as it is in case of vaccine against influenza.

In the marine practice, the ninth wave is often very dangerous or even fatal for seamen. In the first part of pandemics, statistics presented quite mild situation concerning infections and deaths, which unfortunately occurred to be more tragic in next periods. Performed research shows fragments of data concerning particular waves of pandemics. At this point, there comes a question if it is the process of extinguishing pandemics or if there is another ninth wave.

European Medical Association on the 7th July 2022 informed that in many European countries there was the seventh wave of coronavirus pandemics. Two very infectious variants of omicron BA.4 and BA.5 are responsible for that situation (pulsmedycyny.pl). As of 1st August 2022 the number of infections related to the sixth wave of coronavirus pandemics decreased in Europe, but increased on different continents. In Europe the largest number of infections for one million of citizens is noted in Greece, Austria and Cyprus (pulsmedycyny.pl).

In absolute figures the largest number of infections is noted in Japan (197 thousand), the USA (130 thousand), South Korea (80 thousand) and Germany (75 thousand). According to data from statistical portal Worldometer, 99,9% out of almost 47 million of active cases of infections are characterized with mild symptoms, whereas less than 0,1% are serious or critical conditions (pulsmedycyny.pl).

Thus, the question arises ‘Is it a slow extinguishing of the pandemics, or are we waiting for something that will destroy and kill us?’ Currently used vaccines still provide some kind of protection and prevent from hospitalization and death, but they are less effective towards new sub-variants of the virus (pulsmedycyny.pl).

The aim of this research is presenting data from the particular waves, current state evaluation and drawing conclusions from performed studies. Fragments of data are included in the article, in order to present pandemic situation in Poland in comparison with world examples. The objective of this research is comparing situation in Poland and all over the world and draw conclusions from activities realized by appropriate institutions and entities within the struggle with COVID-19.

2. Materials and Methods

The history has shown that human population was decimated with large epidemics and pandemics. Despite the fast development of medicine, the world, especially in XX and XXI centuries was not able to protect from disasters caused by bacteria and viruses. Analysis of historical sources shows us that in years 165-180AD epidemics of smallpox or measles in Roman Empire killed 5 million of people – about 2000 people died daily (Bugaj, 2008).

The next great smallpox epidemics (541-542, 1346-1352, 1707, 1665), yellow fever epidemics (1800), cholera epidemics (1831) killed millions of people. XX and XXI century has also been difficult for the world population. Subsequent pandemics and epidemics – 1918 – the ‘Spanish’ flu pandemics, 1963 – chickenpox, 2003 – SARS epidemics, 2003-2009 epidemics of bird flu, 2009 – 2010 A/H1N1 flu pandemics, 2012 – MERS epidemics, or 2014-2016 Ebola epidemics appeared locally and caused deaths of millions of people (encyclopedia.pwn.pl). Notwithstanding large expenditures for medical research and significant progress in medicine, it was impossible to avoid these tragedies.

World Health Organization has been updating the list of the greatest global threats for public health since 2015. This list has been created by 30 microbiologists, zoologists and experts on public health from all over the world. It includes diseases caused by the most dangerous viruses, with special attention to the ones for which there has not yet been vaccines or drugs (www.medonet.pl).

In 2018 WHO added a mysterious disease X to its list. WHO warned from the beginning that this disease, due to its great epidemic potentials and insufficient remedial measures will kill a lot of human beings. Disease X is a representation of all threats that are waiting for us on the part of an unknown pathogens or new kinds of already existing viruses and bacteria.

In February 2020, M. Koopmans – a WHO specialists in virology stated in a medical magazine ‘Cell’, that ‘no matter if epidemics is going to be withhold, or not, coronavirus matches the first real pandemic challenge which id disease X listed on priory diseases of WHO which we have to be prepared for in our globalised society’. However, the pace of virus spread has not been forecasted and the ways to protect from the virus epidemics have not been thought over. Experiences with SARS, MERS and swine flu or Ebola were ignored and no appropriate conclusions were

drawn in connection with future behavior and protection. It concerns not only Poland, but also different countries all over the world, since pandemics influences all of us in a serious way. The problem is not only connected with prevention, diagnosis and treatment, but also the world's economic functioning in conditions of health threat and the possibility to disease spread due to globalization.

Analysis of literature has been performed for the needs of this research. It allowed to gain knowledge on phenomena of pandemics, reasons and methods of fighting pandemics. Coronavirus SARS-CoV-2 is a virus from the group of coronaviruses (coronaviridae) which may cause virus pneumonia in people. Some people think that coronavirus itself is not a disease. It is a factor causing a disease.

Coronaviruses are also met by animals and cause different diseases (of respiratory system, digestive system, liver and nervous system). These viruses often undergo mutations (British or Finnish variants, Brazilian or South African mutations) (www.medonet.pl) and are capable of infecting new species. Research proved that all recognized coronaviruses infecting people are viruses causing symptoms connected with respiratory tract, very rarely of other systems or organs.

Coronavirus SARS-CoV-2 is a virus responsible for the current epidemics of respiratory system infections which started in Wuhan in China and was identified there for the first time in December 2019. The name COVID-19 has been declared by WHO and is still an official name. 'CO' stands for corona, 'VI' – for virus and 'D' for disease, and number 19 indicates the year when it started (Corona-Virus-Disease-2019) (www.mp.pl). The difference between COVID-19 and coronavirus consists in the fact that coronavirus ads a factor causing disease, and COVID-19 is a disease also referred to a group of symptoms caused by this factor.

There is still no certainty when the pandemics of coronavirus SARS-CoV-2 began. Officially, first cases were noticed at the beginning of December, but Italian and French sportsmen showed typical for COVID-19 symptoms already after return from Wuhan in October (www.mp.pl).

The Olympics took place between 18th and 27th October in Wuhan and there were more than 9 thousand sportspeople from 109 countries. At the beginning the Chinese suggested that these were Americans who brought coronavirus to China. Genetic code SARS-CoV-2, however, suggest that pathogen comes from bats living in this part of Asia (www.mp.pl).

The beginnings of pandemics in Poland were similar to different countries. On the 4th March 2020 there was the first patient in Zielona Góra who suffered from coronavirus SARS-CoV-2. According to the authorities, all procedures worked well. The patient was taken to hospital, and all people who had had contact with him were quarantined. The man whose test was positive came from Germany. It was so called 'patient zero'. (www.medicover.pl).

Then there were next patients, and a subsequent tragic information was connected with fatality caused by coronavirus. It was a woman, aged 56 who died on 12th March 2020 in a hospital in Poznań (www.medicover.pl).

Table 1. *Statistics of daily infections and fatalities*

Date	Number of infections	Number of fatalities
31.03.2020	256	2
30.04.2020	306	20
31.05.2020	219	3
30.06.2020	239	19
31.07.2020	657	7
31.08.2020	502	6
30.09.2020	1.552	30
31.10.2020	21.897	280
30.11.2020	5.136	121
31.12.2020	13.464	535
31.01.2021	4.711	98
28.02.2021	10.101	113
31.03.2021	32.891	653
30.04.2021	6.789	429
31.05.2021	579	7
30.06.2021	101	16
31.07.2021	153	2
31.08.2021	154	5
30.09.2021	1.205	22
31.10.2021	9.806	115
30.11.2021	19.100	528
31.12.2021	14.326	639
31.01.2022	33.477	231
28.02.2022	8.897	1
31.03.2022	5.740	133
30.04.2022	856	17
31.05.2022	346	7
30.06.2022	545	0
31.07.2022	3.684	0

Source: <https://www.google.com/search?q=koronawirus+statystyki+polska&client>

Peak moments were in autumn 2020 – 580 fatalities on 26th November 2020 and in spring 2021 – 804 fatalities on 14th April 2021 and then in winter – 639 fatalities on 31st December 2022. The above data (table 1) show only statistical daily infections and fatalities. If they were summed up it would be 6 166 million of infections and 117,030 fatalities till 27th August 2022.

The first wave in spring and summer 2020 had rather mild character with comparison to what was to happen later. Infections were - 1000 people daily and fatalities – 50 people daily. Implementing restrictions and lockdown significantly limited spreading the disease.

The second wave started in September 2020 and this one had much more tragic course. The peak of daily infections was on 11th November 2020 – 21 713 ,and the peak of fatalities was on 26th November 2020 – 580 people.

However, the worst was to come. Even though vaccination began, the third wave started in March 2021, and in this period the highest number of infections was on 31st March 2021 – 32 891 people and the highest number of fatalities was on 14th April 2021 – 804 people. It was, unquestionably, the hardest period of pandemics in Poland due to a number of infections and fatalities caused by coronavirus.

The fourth wave began in October 2021 with high number of infections, however, vaccinations already had influence on the course of the disease and there were less fatalities due to this fact.. The highest number of daily infections was on 1st December 2021 – 29 076 people and on 29th December 2021 there was the highest number of fatalities – 793 people.

The fifth wave started in February 2022 and already on 3rd February 2022 the highest number of infections was noted in Poland – 54 475 people and the highest number of fatalities was noted on 16th February – 372 people.

The subsequent, sixth wave began in summer 2022. The peak of infections was on 2nd August 2022 – 5 645. Fatalities remain on the level of less than 10 people daily.

Coronavirus variant called Omicron is still dominant all over the world, constituting 90 % of the sequence reported to GISAD base in the previous month – a base collecting global data on coronavirus genome. There is still a high level of two very infectious sub-variants BA.4 and BA.5.

- Sub-variant BA.4 constituted 52% of all sequences in GISAD in the second week of July;
- Sub-variant BA.5 constituted 11%.

The peak of the sixth wave was forecasted for the middle of August. According to professor Fala it is going to happen later, in September. Reason? Return of children to schools. Patients who currently suffer from COVID-19 complain about sore throat, hoarseness, runny nose and problems with sinuses. Serious pneumonia is rarer these days than it was in case of previous infections with SARS-Cov-2.

However, they still happen. There is serious lungs infection. The disease also sometimes attacks heart and kidneys. SARS-CoV-2 is not a seasonal virus.

However, similarly to the previous summer seasons, it was thought that the number of infections would be lower. Moreover, Poles, after two years of coexisting with a new coronavirus achieved so called herd immunity.

There are, however, repeated infections of people who have already suffered from coronavirus. For example, on the 20th August 2020 the Ministry of Health informed about 766 new cases of infections. 84 among them are repeated infections and 682 are new infections. Nobody died and 10 people recovered (www.medonet.pl).

Today, the most likely scenario is the next wave of pandemics, however, in November or December. Therefore, there are questions if it is the last wave or there are going to be next ones. What will be the course of this seventh wave and the next ones? Analyzing the results of particular waves, significant increases of infections and fatalities should be indicated in particular periods. Are we going to be subjected to next restrictions and lockdown?

As for 28th August 2022 there are 22,5 million people who are completely vaccine. It is 59,4% of the population. At least 22,7 million of people are vaccine with one dose , which is 60 % of population. Currently, there is an action of vaccinating all citizens. What will be the effects of vaccinations on herd immunity and citizens' infections?

Ukrainians staying in Poland due to military actions in their country are an additional problem. Vast number of Ukrainians are not vaccinated against COVID-19. Will they vaccinate themselves? What will be the possible consequence on the next wave of pandemics?

3. Results

Performed research was aimed at presenting an increasing or decreasing tendency of infections and fatalities in Poland in the period of pandemics. The article depicts final statistical results (for the end of each month), at the same time quoting examples of the highest values in particular waves.

The holistic analysis of performed data, on the basis of activities realized to mitigate disease spread, may present effectiveness of conducted operations. It may also be the foundation for decision making in the future. The Ministry of Health already today announces the possibility to introduce restrictions in the autumn-winter period. Additional limitations do not seem necessary for the time being. Even though there is an increase of infections, there is no increase of serious diseases, requiring hospitalization. Similar situation is noticed in case of fatalities.

4. Discussion

The title ninth wave has to be at least twice as high than the previous ones. The fundamental problem connected with this fatal wave is not only in its seriousness,

but in unpredictability –such wave appears in an unpredictable place and comes from unpredictable direction. There have already been sudden high numbers of infections and fatalities during the pandemics. Was it the ninth wave, or everything is waiting for us in the future?

In absolute numbers, the highest number of infections is noted in Japan, the USA, South Korea and Germany (the end of July 2022). In the last 7 days of July 2022 the highest number of infections for one million of citizens, according to Our World in Data (pulsmedycyny.pl) was noted in:

- Micronesia (37 thousand);
- Brunei (24 thousand);
- Costa Rica (23 thousand);
- Greece (13 thousand);
- Australia (12 thousand);
- Japan (10 thousand);
- South Korea (11 thousand);
- New Zealand (10,5 thousand);
- Singapore (10,5 thousand).

More than two billion of vaccines out of 12,3 billion are the reminding doses. Two thirds of world population received at least one dose of the vaccine, and nowadays 7,75 million of vaccines are taken every day. Almost one fourth of people in countries with low incomes received at least one dose.

The highest number of doses for 100 citizens were taken in Cuba (348), Chile (313), Qatar (270), Singapore (260), Uruguay (254), on Malta (252) in Cambodia (250). This data can be compared with data collected in Poland. Specialists' opinions on the course and today's state of pandemics can be quoted.

According to virologist W. Gut (pulsmedycyny.pl) nothing has changed recently in case of COVID-19. This disease simply exists and we should take it into consideration. He also added that this disease would not cause problems within health care system and would not cause mass hospitalizations and fatalities in Poland. Ph.D. P. Grzesiowski in the interview for 'Puls Medycyny' said (pulsmedycyny.pl) that Greece, Italy, Portugal, France are only some of touristic countries popular among Poles where the increase of infections with SARS-CoV-2 is observed.

In places where wide testing was not stopped, the subsequent wave of COVID-19 connected with new variants of Omicron can be noticed. It might result in the increase of infections in September. A. Szuster-Ciesielska (pulsmedycyny.pl) thinks that lately appearing Omicron is characterized with evolution strength which was unnoticed before. There are already some of its variants, for example BA.5 is

considered as spreading in the fastest pace and escaping from the immune system reaction both after infection and after vaccination. At the end of this discussion there should be a question asked if the ninth wave has already finished or will it come?

5. Conclusions

To sum up, it can be stated that performed research convey data for analysis of infections and fatalities in particular waves of pandemics in Poland. It should be joined with operations performed for the security of population and conditions in the country and in the whole world which favor development of virus.

Globalization caused that in the contemporary world people and goods relocation is very simple which, on the other hand, can influence the spread of the next variants of virus. Though, it is important to maintain contact with specialists from all over the world and make use of their comments and indications while designing protective actions and planning disease treatment.

Histories of world pandemics teach us that population is capable to stop the disease in the final effect, but we never know when will be the next one and how strong it is going to be.

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