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Original article

COVID-19 AND REGIONAL HEALTH INEQUALITIES IN BULGARIA

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ABSTRACT:

Purpose: The study aims to analyze regional health and socioeconomic inequalities in Bulgaria.

Methods: An ecological epidemiological study was conducted. The 28 regions in Bulgaria were compared according to death rates due to COVID-19, the share of people 65+, availability of physicians, hospital beds for active and intensive care per 10,000 people, and the average annual salary of employed people /2021/. Data were statistically processed with SPSS v.26, the Pearson coefficient was used.

Results: The death rates due to COVID-19 in Bulgaria vary widely, and the regions with the highest rates in 2021 are Kyustendil /642.44$^0/_{0000}$/, Vidin /591.15$^0/_{0000}$/, Montana /533.98$^0/_{0000}$/, Gabrovo /533.48$^0/_{0000}$/ and Vratsa /531.90$^0/_{0000}$/. All five regions have ageing rates higher than the national average of the availability of physicians per population - lower than the average, respectively 36.6$^0/_{000}$, 35.5$^0/_{000}$, 34.9$^0/_{000}$, 37.6$^0/_{000}$ and 38.1$^0/_{000}$. Among the areas with high levels of death rates, Vidin stands out with very low availability of hospital beds for active and intensive treatment - 37.8 $^0/_{000}$, but Gabrovo and Montana have higher. A moderate correlation was found between the death rate due to COVID-19 and the ageing of the population, but for other factors, no correlation was established.

Conclusions: Reducing regional health inequalities in Bulgaria is one of the possible ways to control and reduce the death rate in the country, especially due to COVID-19.

Keywords: inequalities, COVID-19, Bulgaria, ageing, hospital care,

INTRODUCTION

The Covid-19 pandemic has been a period of severe testing for health systems around the world. The reality that the pandemic has shown us is that inequality not only creates enormous suffering but also contributes to the death of people. [1]. In recent years, people have died not only because they are infected with infectious diseases but also because they did not receive vaccines on time, they died from other diseases because they could not afford medical care. [2] Inequality is not an abstract issue; it has significant real-world consequences. [3, 4] This has made the Covid-19 pandemic deadlier and longer. [5] According to Oxfam International, inequalities are lethal and contribute to the death of at least 21,300 people every day - or one person every four seconds. [6] This is an extremely modest estimate of the deaths from hunger, lack of access to health care and climate degradation in poor countries, as well as gender-based violence faced by women in much of the developing world. [7]

According to the definition of health inequalities, they are inequalities in access to the health care system, to adequate health care, and overall gaps in the quality of health care due to ethnicity, race, culture, age, gender, and socioeconomic status. [8] The pandemic caused by SARS-CoV-2 has tested the health system and made health inequalities even more visible.

The problems in Bulgaria were similar to those in other countries - no health system was prepared to respond to such a pandemic. [9, 10] A major problem was the shortage of medical personnel - doctors, nurses, and orderlies, and many of them were infected, and some lost the battle with the disease. [11] An additional aggravating factor in the country was the deepening demographic crisis in Bulgaria, expressed in the deterioration of several demographic indicators, especially the death rates. [12, 13] According to this indicator, our country occupied one of the leading places even before the onset of the pandemic, and in 2021, Bulgaria was the country with the highest level of death rate in the world - 21.7 ‰. [14] The structure of mortality by causes observed in recent years is changing, as in 2021, COVID-19 occupies the second position as a cause of death (18.5%) after circulatory sys-

tem diseases (53.7%).

Bulgaria is one of the countries with the highest level of ageing in terms of the share of people over 65 / 22% for 2021/ - in seventh place in the world ranking. The ageing of the population in Bulgaria is one of the most serious demographic problems these days.

According to the country's administrative organization, Bulgaria is divided into 28 regions, which differ significantly in socioeconomic development and several demographic and health indicators. The levels of mortality and ageing in different regions of Bulgaria have considerably diverse values.

The **purpose** of the study is to analyze regional inequalities in the country by examining the relationship between death rates due to COVID-19 in different areas with the ageing of the population, the availability of physicians, hospital beds for active and intensive care and the average annual salary of employed people.

MATERIALS AND METHODS:

An ecological epidemiological study was conducted. The 28 regions in Bulgaria were compared according to death rates due to COVID-19, the relative share of persons over 65 years of age, availability of physicians and hospital beds for active treatment per 10,000 people of the population, the average annual salary of employed people /2021/. According to the data of the National Statistical Institute (NSI), the regional indicators for the districts in the country were analyzed, the absolute numbers were regrouped, and the population's ageing indicator - the share of people 65+- was calculated. Analysis and calculations were performed with MS Excel 2019. Data were statistically processed with SPSS v.26. To establish the relationship between the analyzed indicators, the Pearson correlation coefficient was used.

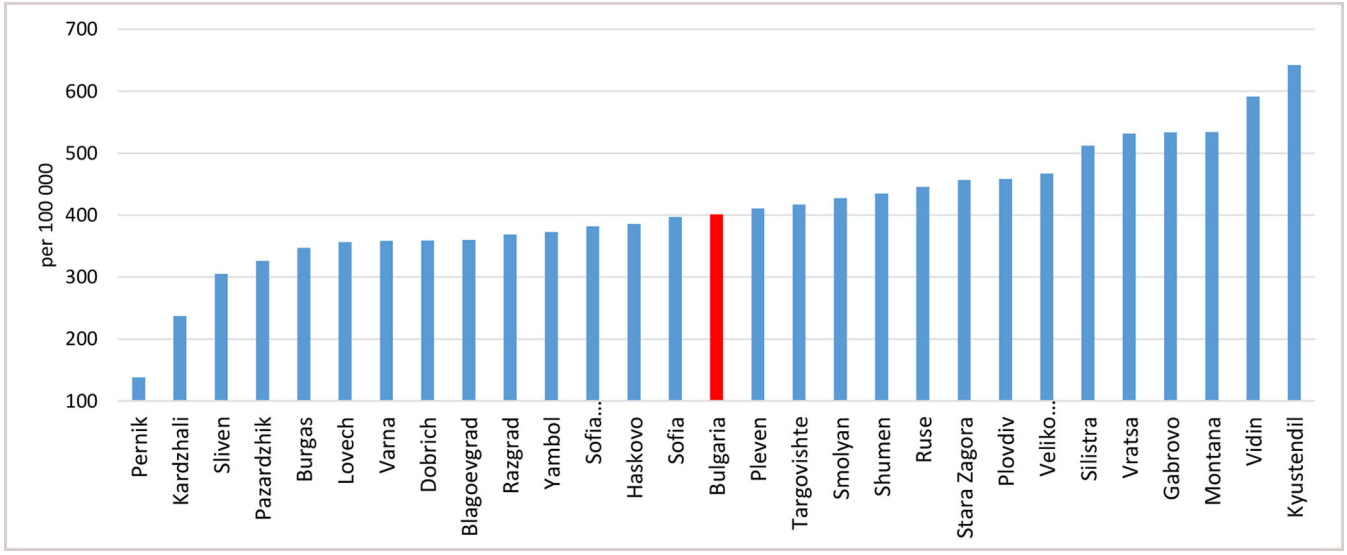
RESULTS:

According to the World Health Organization, in Bulgaria, from Jan 3, 2020, to Jun 21, 2023, there were 1,308,683 confirmed cases of COVID-19 with 38,412 deaths, and the death rate due to COVID-19 is 552.57 per 100,000. This level of mortality significantly differs from the mortality rates in Europe, even from Bulgaria's neighbouring Balkan countries: Romania - 352,96$^{0}/_{0000}$, Serbia - 260,69$^{0}/_{0000}$, Turkey - 120,25$^{0}/_{0000}$ and Greece - 346,02$^{0}/_{0000}$.

The analysis of the country's COVID-19 mortality by district in 2021 found that death rates varied widely, from 138.39 to 642.44 per 100,000 population, a difference of almost five times. (fig. 1.) At an average level for the country of 401.12$^{0}/_{0000}$, the districts in Bulgaria with the highest death rates due to Covid-19 in 2021 are:

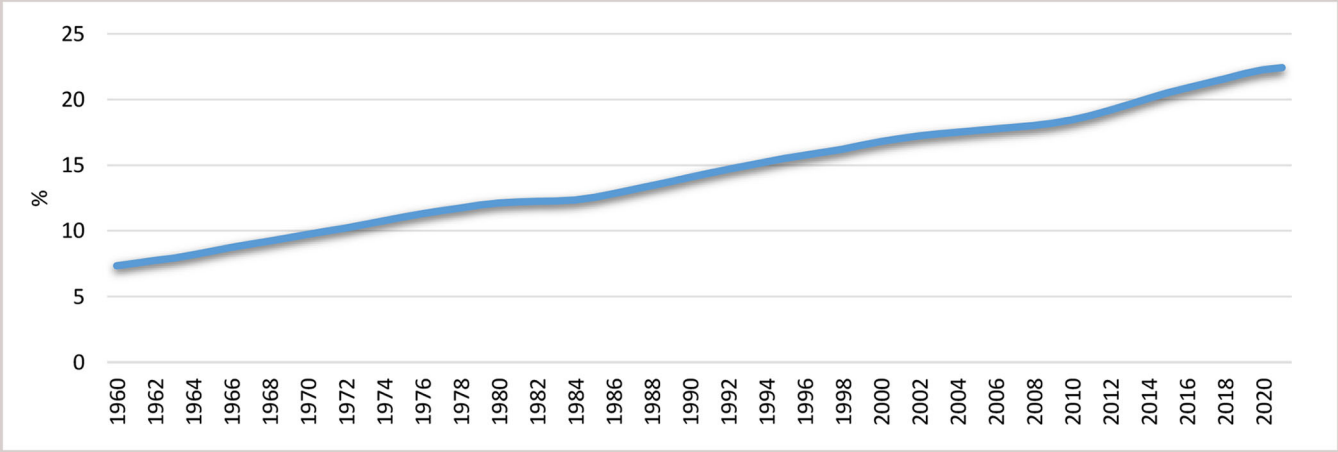
- Kyustendil /642.44$^{0}/_{0000}$/
- Vidin / 591.15$^{0}/_{0000}$/
- Montana / 533.98$^{0}/_{0000}$/
- Gabrovo / 533.48$^{0}/_{0000}$/
- Vratsa / 531.90$^{0}/_{0000}$/

Fig. 1. Death rates due to Ñîv³d-19, 2021, Bulgaria. [15]



The first factor for the large interregional differences that we will investigate in our study is the level of population ageing. The tendency for the ageing of the Bulgarian population began at the end of the last century, reaching very high levels in recent years - more than 20% of the country's total population is over 65 years old.

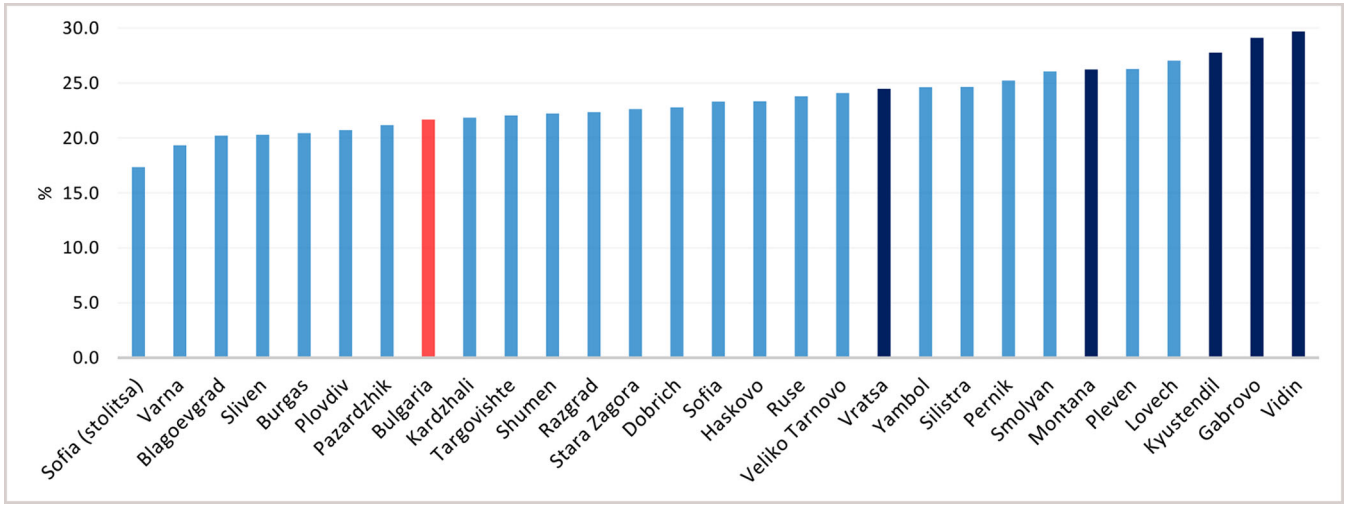
Fig. 2. The share of the population over 65 years of age (% of the total population), Bulgaria, 1960-2021.



The analysis of the indicator by region shows huge differences - from 17.33% for Sofia (capital) to 29.69% for the Vidin region. All five areas with a high death rate due to COVID-19 have ageing rates higher than the national average (21.67%):

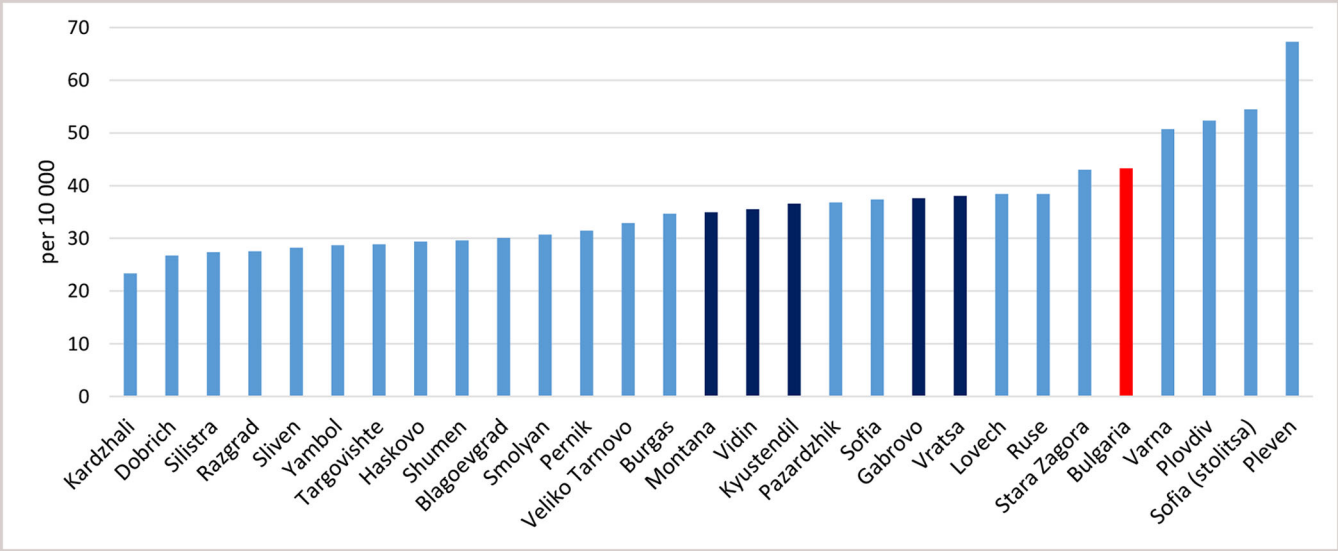
- Kyustendil - 27.77%
- Vidin - 29.69%
- Montana - 26.23%
- Gabrovo - 29.11%
- Vratsa - 24.47%

Fig. 3. The share of the population over 65 years of age (% of the total population) by region, Bulgaria, 2021.



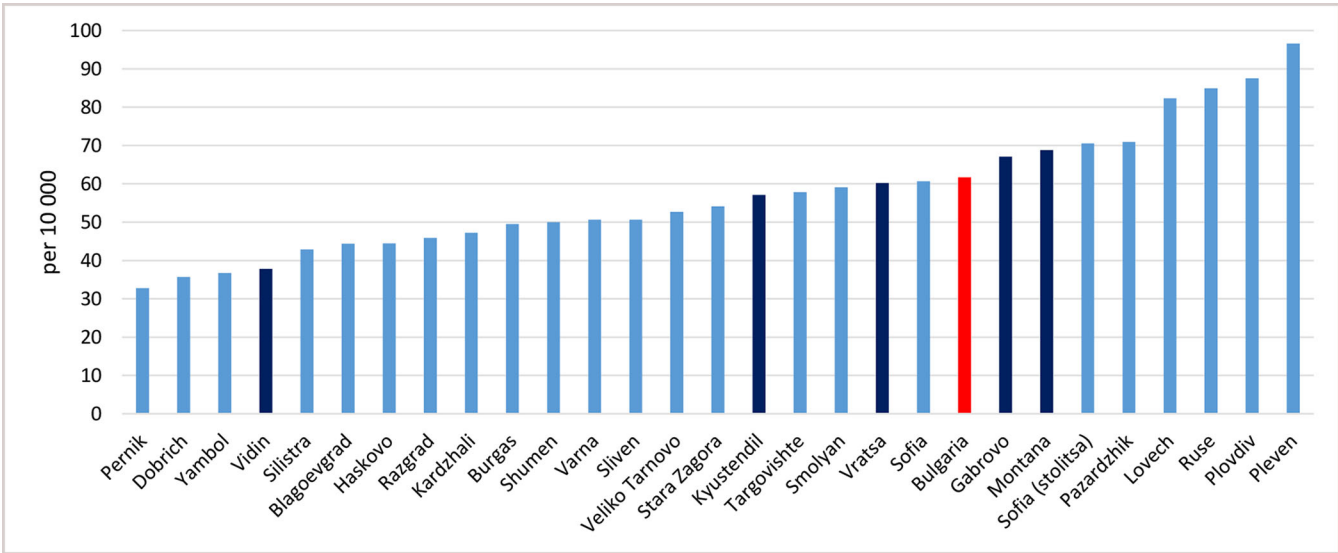
The second factor that we analyze in the study is the availability of physicians per 10,000 people in the population, which is an important indicator characterizing the accessibility of health care. According to this indicator, Bulgaria is in one of the leading positions in Europe with 42.77$^{0}/_{000}$. Only Austria, Germany, Spain, and Lithuania have higher levels of this index. [16] At the same time, this is also the indicator that makes the inter-district health inequalities even more significant - the lowest availability in Kardzhali district – 23.35$^{0}/_{000}$ and almost three times higher in Pleven district – 67.28$^{0}/_{000}$. The study found that the areas with the highest death rate due to COVID-19 have lower availability of physicians than the national average, respectively 36.6 $^{0}/_{000}$, 35.5 $^{0}/_{000}$, 34.9 $^{0}/_{000}$, 37.6 $^{0}/_{000}$ and 38.1$^{0}/_{000}$.

Fig. 4. Physicians per 10,000 population, by region, Bulgaria, 2021.



Another factor that has been investigated is the availability of hospital beds for active and intensive care. According to this indicator, our country is again in the leading position with 77,41‰ (hospital beds per 10,000 people of the population), while in Europe, only Austria and Belgium are the countries with higher levels of this indicator. [16] The analysis showed significant inter-regional differences, with Pernik on one side with 32.8 hospital beds for active and intensive treatment and Pleven on the other with 96.6 ‰. Among the areas with a high level of the death rate due to COVID-19, Vidin stands out with very low availability - 37.8 ‰, but Gabrovo and Montana make an impression here, which have a high value of the indicator, higher than the average for the country, respectively 67.1 and 68.8 ‰.

Fig. 5. Hospital beds for active and intensive care per 10,000 population, by region, Bulgaria, 2021.



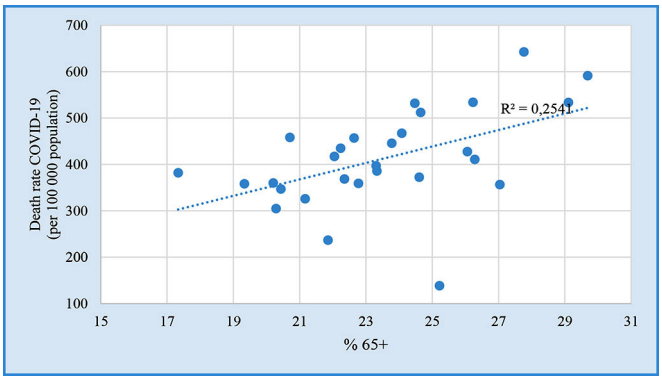
In order to establish the inter-regional inequalities related to the level of socioeconomic development, the average annual salary of the employed people was used. According to NSI data for 2021, those working in the Blagoevgrad region received the lowest average salary - BGN 12,226, and the highest in Sofia, the capital - BGN 25,724. The comparison by regions shows that Kyustendil, Vidin and Montana are among the regions with a very low average salary - 12,719, 12,855 and 13,983 BGN, respectively, but Gabrovo and Vratsa are regions with significantly higher wages - 15,771 and 17,324 BGN.

After the statistical processing of the results, the conclusions are that the relative share of persons aged 65+ in the districts has a significant impact on mortality from COVID-19 ($r = 0.504$, $p<0.05$). The strength of a linear relationship between the variables is moderate – nearly 26%

of the changes in death rates COVID-19 because of changes in the share of the population over 65 years of age.

When analyzing mortality from COVID-19 in a regional aspect, it was tested the relationship with the other three variables - availability of physicians (r = 0.611, p>0.05), hospital beds for active and intensive care (r = 0.220, p>0.05) and average annual salary of employed people (r = -0.070, p>0.05). It was proven that there is no statistically significant correlation between the studied variables, and the differences in death rates due to COVID-19 do not depend on these three variables.

Fig. 6. Correlation (scatter) diagram.



DISCUSSION:

The four factors analyzed in the study - the level of population ageing, the availability of physicians and hospital beds for active and intensive treatment, and the average annual salary of the employed people, are factors that directly or indirectly have a huge impact on public health. The study demonstrates significant inter-regional differences, both in mortality from COVID-19 and in the studied indicators. Regional health and socioeconomic inequalities are key factors in improving the level of health in the country.

Statistical analysis showed a moderate correlation between death rates due to COVID-19 and the proportion of people over 65 years of age, but no correlation was demonstrated for the other variables. This statistical result is not surprising since Bulgaria as a whole is a country with a high provision of both medical personnel and hospital treatment facilities. Even the areas with the lowest levels of availability of physicians and hospital beds have significant resources to provide medical care to the population.

Hospital care in Bulgaria is characterized by overcapacity, which in some areas does not meet the real needs of the population for hospital treatment. There is a concentration of inpatient care facilities in large cities, especially those with medical universities, and a lack of capacity to meet basic inpatient care needs in smaller regional centres.

CONCLUSION/S/:

Reducing regional health inequalities in Bulgaria is one of the possible ways to control and reduce the mortality rates in the country, especially the death rate due to COVID-19.

Regional health, economic and demographic inequalities exist not only in developing countries but also in developed ones. They are the object of studies, comparisons and analysis, with a view to their improvement and ensuring a quality and dignified life for the entire population. They create the need for a long-term health policy that will improve the health status of the population and the effective functioning of the health system.

Reducing health inequalities between different socioeconomic groups and between different regions and countries is one of the current issues facing the global health community. One of the Sustainable Development Goals 2030 - Goal 10: Reducing inequality between and within countries is strongly related to this very important public health issue, and it is focused precisely in this direction.

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