

DESCRIPTIVE STUDY REGARDING COVID-19 INCIDENCE IN THE ROMANIAN AREA AND SOME EUROPEAN COUNTRIES

ОПИСОВЕ ДОСЛІДЖЕННЯ ЩОДО ЗАХВОРЮВАНOSTІ НА COVID-19 У РУМУНСЬКІЙ ЗОНІ ТА ДЕЯКИХ КРАЇНАХ ЄВРОПИ

This study aims to determine which part of our country has the highest incidence of COVID-19 and whether growth is related to urban agglomeration or middle age. On February 18, 2022, a number of cases of infection were reported on the website of the Ministry of the Interior in each district of Romania. We went to the website of the National Institute of Statistics of Romania to get information about the Romanian population by district, and then calculated the percentage of infection among the entire population.

Patients who have successfully recovered from acute pneumonia COVID-19 have been shown to require long-term follow-up to quantify the effects of the disease. They will also need special rehabilitation programs depending on their long-term and short-term consequences, as well as methods of disease prevention. In Romania, on June 10, 2020, public records on the situation with the coronavirus pandemic began to be published on the website of the Ministry of the Interior. In our country, the mortality rate from SARS-CoV-2 is higher among men, and I have concluded that people between the ages of 70 and 79 have a high risk of dying from SARS-CoV-2 infection.

In this article, we concluded that the 4 most populous counties in Romania (Bucharest, Timis, Cluj, Brasov) are also the most infected, which means that the spread of SARS-CoV-2 is more common in human settlements. In contrast, Iasi County, Romania's second largest county, faced an infection rate of only 10.68%, despite a population of about 1 million. This difference may be due to the lack of COVID-19 testing or the refusal of the public to test for COVID-19. Percentages associated with COVID-19 infection in Romanian oblasts range from 5.87% in Gorj County and 22.84% in Ilfov County. Of the 42 districts, less than 10% of infections were registered in 26, and more than 10% of infections were registered in 16.

This difference may be due to the lack of COVID-19 testing or the refusal of the public to test for COVID-19.

Key words: COVID-19 incidence rate, Romanian counties, infection rate, population.

Ця дослідження має на меті визначити, в якій частині нашої країни спостерігається найвищий рівень захворюваності на COVID-19 і

чи пов'язане зростання з міською агломерацією або середнім віком населення. На сайті Міністерства внутрішніх справ 18 лютого 2022 року було повідомлено про певну кількість випадків зараження в кожному окрузі Румунії. Ми звернулися до сайту Національного інституту статистики Румунії, щоб отримати інформацію про румунське населення по округах, а потім розрахували відсоток зараження серед усього населення.

Доведено що пацієнти, які успішно одужали від гострої пневмонії COVID-19, потребують тривалого спостереження для кількісної оцінки наслідків захворювання. Їм також знадобляться спеціальні реабілітаційні програми залежно від їх довгострокових і короткострокових наслідків, а також методи запобігання захворюванню. У Румунії з 10 червня 2020 року на сайті Міністерства внутрішніх справ почали публікувати публічні записи про ситуацію з пандемією коронавірусу. У нашій країні смертність від зараження вірусом SARS-CoV-2 вища серед чоловіків і Я дійшов висновку, що люди у віці від 70 до 79 років мають високий ризик смерті через інфекцію SARS-CoV-2.

В даній статті ми дійшли висновку, що 4 найбільш густонаселені округи Румунії (Бухарест, Тіміш, Клуж, Брашов) також є найбільш інфікованими, тож це означає, що поширення SARS-CoV-2 частіше відбувається в населених пунктах. На противагу, повіт Ясси, другий за величиною округ в Румунії, зіткнувся з відсотком зараження лише 10,68%, незважаючи на населення, яке становить близько 1 мільйона жителів. Ця різниця може бути пов'язана з відсутністю тестів на COVID-19 або відмовою населення від тестування на COVID-19. Відсоткові значення, пов'язані з інфекцією COVID-19 в румунських областях, сягають від 5,87% в повіті Горж і досягають 22,84% в повіті Ілфов. З 42 округів у 26 зареєстровано менше 10% випадків зараження, а в 16 зареєстровано понад 10% випадків інфекції.

Ця різниця може бути пов'язана з відсутністю тестів на COVID-19 або відмовою населення від тестування на COVID-19.

Ключові слова: рівень захворюваності на COVID-19, округи Румунії, відсоток зараження, населення.

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Introduction. Acute respiratory syndrome coronavirus 2 is a new type of coronavirus that appeared in 2019 and causes coronavirus disease 2019 (COVID-19), (del Rio, C., 2019). Patients who have successfully recovered from acute COVID-19 pneumonia will need long-term follow-up to quantificate the consequences of the disease. They will also need specific rehabilitation programs depending on their long and short-term sequelae as well as methods to prevent the disease. In Romania, public records about the situation of the coronavirus pandemic started to be published on the website of the Ministry of Internal Affairs on June 10, 2020. In our country, mortality

associated with SARS-CoV-2 virus infection is higher among males and I have concluded that people aged between 70 to 79 years are at a high risk of death due to SARS-CoV-2 infection.

The second most exposed category includes people over the age of 80, followed by the category 60-69 years. People who have other comorbidities represent 95.38% of total deaths, having a 20 times higher risk of death compared to others.

I have concluded that 4 of the most populated counties in Romania (Bucuresti, Timis, Cluj, Brasov) are also the most infected counties, so it means that SARS-CoV-2 spreading is more likely to happen in

populated areas. In opposition, Iasi county, the second largest county in Romania faced only a 10.68% percentage of infections, despite the population that is about 1 million inhabitants.

That difference can come from the lack of COVID-19 tests or the population refusal to test against COVID-19.

Material and method. During SARS-CoV-2 pandemic, until February 18, 2022, a number of 62.323

people deceased due to SARS-CoV-2 infection in Romania. This study aims to determine in which area of our country has been the highest incidence of COVID-19 and if the growing is correlated with urban agglomeration or mean age of the population. On the Ministry of Internal Affairs site, on February, 18 2022, was reported a certain number of infection cases in each county of Romania. We consulted National

Table 1

Percentage of COVID-19 infection in Romanian counties

№	County	Total population *	Total number of COVID-19 cases **	Percentage of infection cases from total population
1.	ALBA	369.331	49.636	13.43%
2.	ARAD	470.093	63.323	13.47%
3.	ARGES	626.489	69.552	11.10%
4.	BACAU	746.566	57.994	7.76%
5.	BIHOR	614.001	76.803	12.50%
6.	BISTRITA-NASAUD	325.944	28.153	8.63%
7.	BOTOSANI	454.026	34.075	7.50%
8.	BRASOV	638.707	99.587	15.59%
9.	BRAILA	342.663	29.108	8.49%
10.	BUZAU	458.854	37.081	8.08%
11.	CARAS-SEVERIN	269.551	27.277	10.11%
12.	CALARASI	303.288	23.938	7.89%
13.	CLUJ	739.575	140.918	19.05%
14.	CONSTANTA	758.186	106.715	14.07%
15.	COVASNA	224.009	17.983	8.02%
16.	DAMBOVITA	512.740	48.909	9.53%
17.	DOLJ	679.151	65.306	9.61%
18.	GALATI	627.629	58.940	9.39%
19.	GIURGIU	274.848	26.117	9.50%
20.	GORJ	349.870	20.542	5.87%
21.	HARGHITA	333.674	20.662	6.19%
22.	HUNEDOARA	453.431	52.624	11.60%
23.	IALOMITA	281.000	25.371	9.02%
24.	IASI	956.216	102.137	10.68%
25.	ILFOV	472.343	107.894	22.84%
26.	MARAMURES	515.971	47.922	9.28%
27.	MEHEDINTI	272.760	20.201	7.40%
28.	MURES	585.494	57.820	9.87%
29.	NEAMT	559.047	43.843	7.84%
30.	OLT	422.745	35.385	8.37%
31.	PRAHOVA	779.437	89.926	11.53%
32.	SATU-MARE	385.190	30.946	8.03%
33.	SALAJ	241.167	25.165	10.43%
34.	SIBIU	468.483	69.287	14.78%
35.	SUCEAVA	763.762	56.020	7.33%
36.	TELEORMAN	363.189	31.133	8.57%
37.	TIMIS	756.668	136.829	18.08%
38.	TULCEA	239.981	19.729	8.22%
39.	VASLUI	506.165	34.272	6.77%
40.	VALCEA	397.878	37.997	9.54%
41.	VRANCEA	378.247	24.649	6.51%
42.	BUCURESTI	2.161.347	478.509	22.13%

* reported on NIS Romania february, 18 2022, 2 p.m.

** reported on MIA site – COVID-19 information, Strategic Communication Group, february 18, 1 p.m. (<https://www.mai.gov.ro/info/rmare-covid-19-grupul-de-comunicare-strategica-18-februarie-ora-13-00-2/>)

Institute of Statistics site in Romania for informations regarding the Romanian population on counties and then calculated the percentage of infection among total population as shown in *Table 1*.

Results. Regarding territorial distribution, the highest life expectancy in 2020, in Romania, was registered in Valcea County (81.22 years old), followed by Bucharest (78.44 years old), and by the counties Cluj (77.53 years), Brasov (77.43 years), Sibiu (76.98 years) and Timis (76.93 years); Valcea was the only county with a life expectancy of over

80 years. Lower life expectancy was recorded in Tulcea (73.29 years old), Giurgiu (74.0 years old), Calarasi (74.26 years old), Satu Mare (74.29 years old) and Ialomitia (74.6 years old). Judging by gender, the highest life expectancy is among females: Valcea 77.94 years in males/84.52 years in females, Bucharest: 75.23 years old for males/81.29 years in females. The lowest life expectancy is recorded among males in Tulcea: 69.2 years in males/77.86 in females, and Giurgiu: 70.41 years in males/ 77.88 years in females.

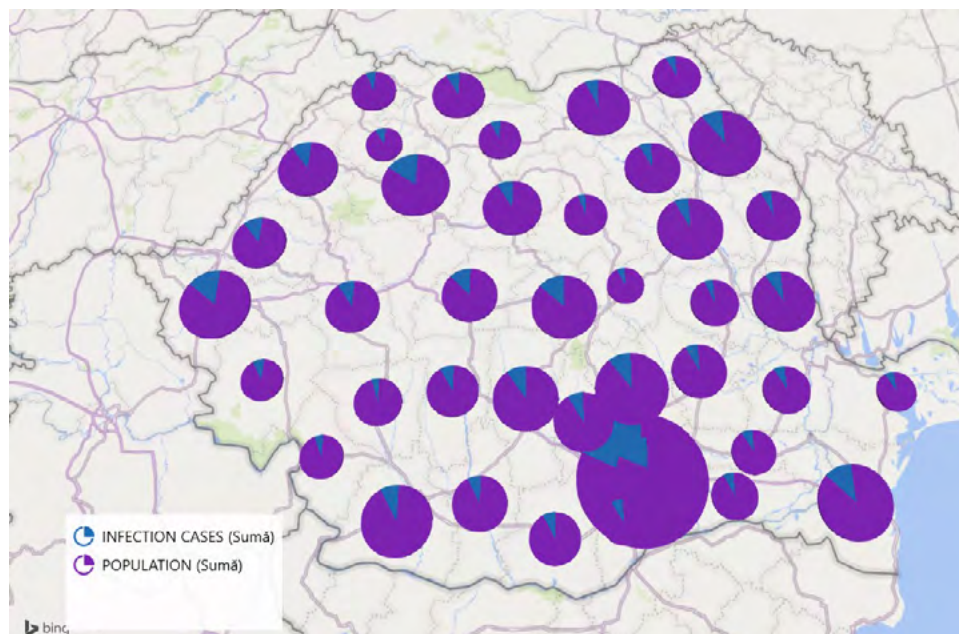


Figure 1. Representation of infection number among total population

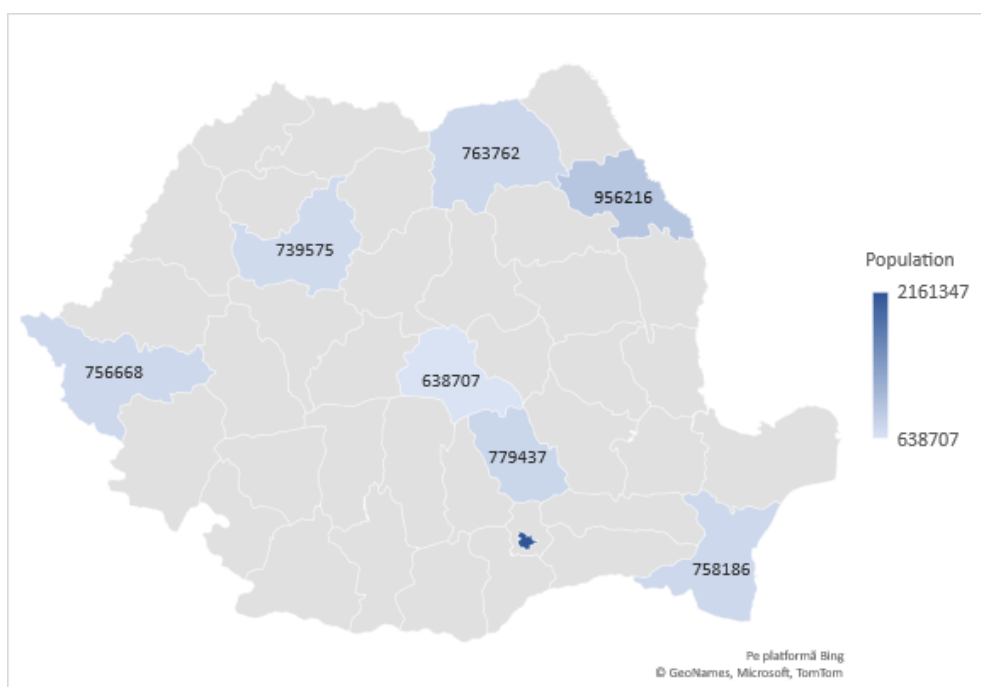


Figure 2. First 8 counties in Romania regarding total population

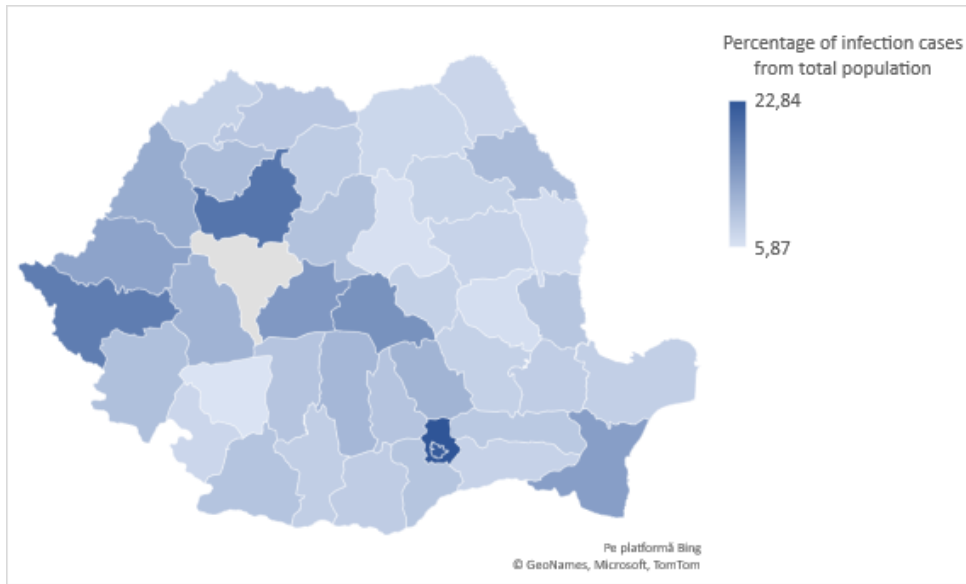
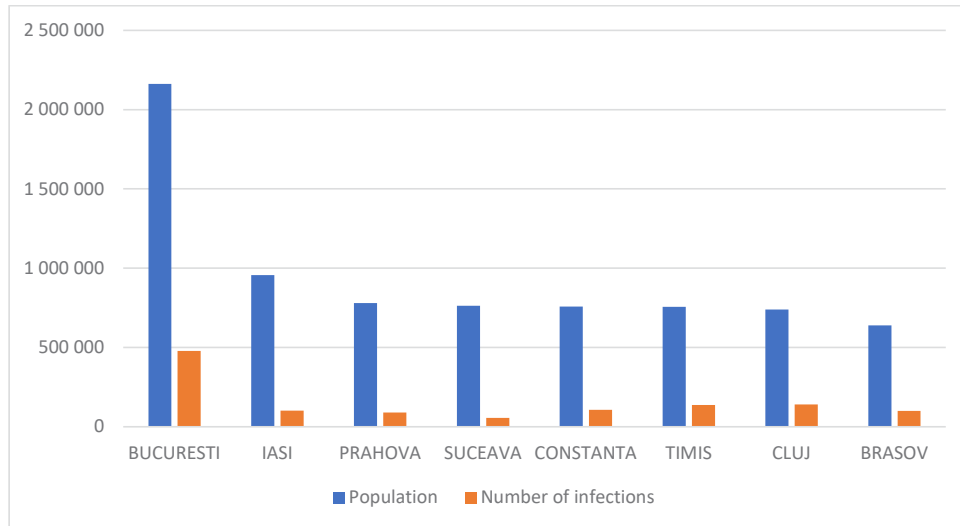
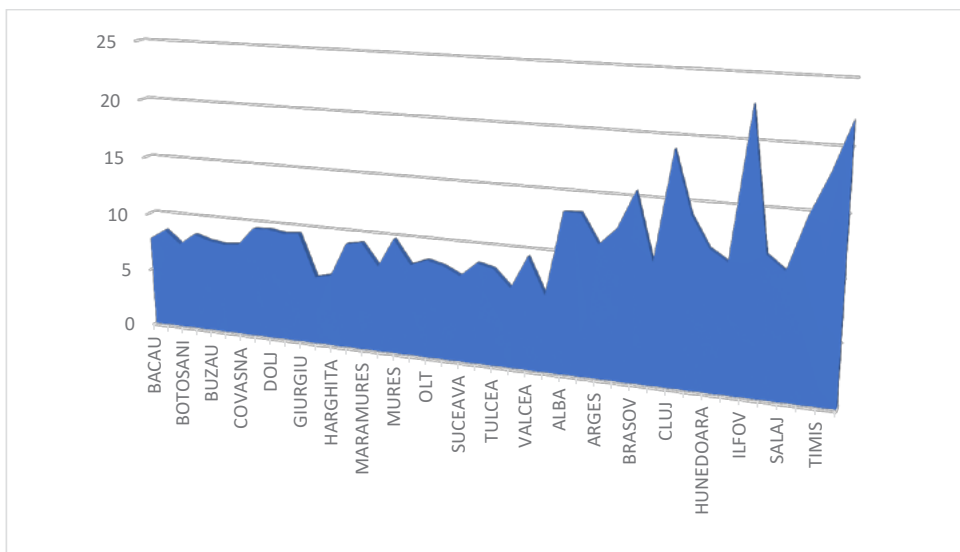


Figure 3. Percentage of infection cases from total population



Graphic 1. The share of COVID-19 infections among populated areas



Graphic 2. Distribution of COVID-19 cases by counties

Table 2

**Romania and the countries with the highest average age of the population.
The link between mean age and the share of infections**

№	Country	Total population*	Number of COVID-19 cases **	Mean age of the population	Percentage of infection cases
1.	Romania	19.261.714	2.655.933	42.8	13,78%
2.	Italy	60.316.642	12.469.975	47.2	26,67%
3.	Germany	83.783.942	13.667.353	45.9	16,31%
4.	Portugal	10.196.709	3.187.389	45.5	31,25%
5.	Greece	10.340.505	2.298.926	45.2	22,23%
6.	Bulgary	6.864.100	1.067.648	44.8	15,55%
7.	Spain	46.784.467	10.809.222	44.3	23,10%
8.	Croatia	4.064.328	1.041.212	44.2	25,61%

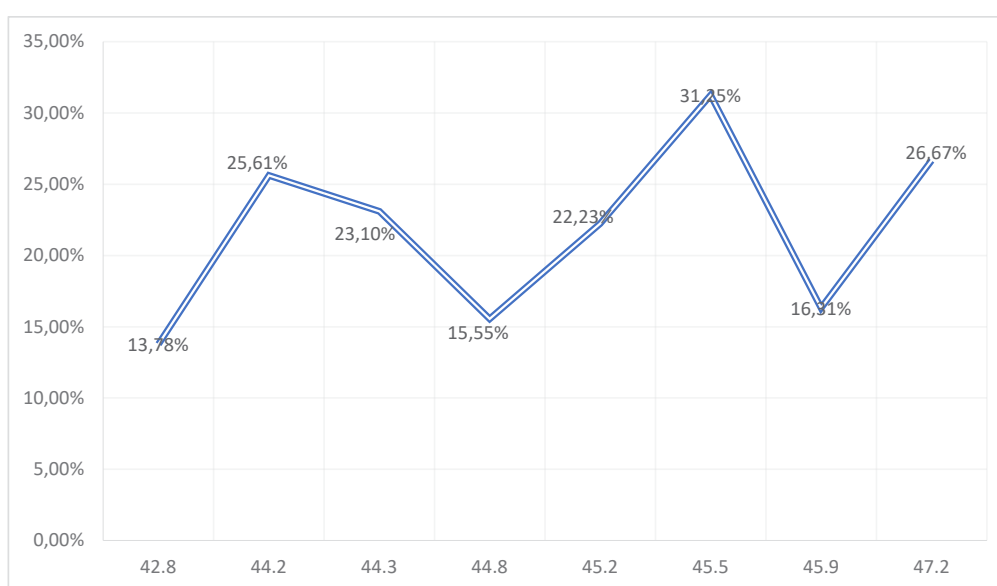
* reported on <https://www.worldometers.info/> site, accessed on february, 22, 2022, 9 a.m.

** reported on WHO site, accessed on february, 22, 2022, 9:10 a.m., <https://news.google.com/covid19/map?hl=enUS&mid=/m/06c1y&gl=US&ceid=US:en>

According to *Table 1*, first 5 counties in Romania that faced high numbers of COVID-19 infections were Ilfov, Bucuresti, Cluj, Timis and Brasov. According to NIS of Romania, 4 of them are also the cities with the highest life expectancy in Romania. The counties with a low number of infections were Suceava, Vaslui, Vrancea, Harghita and Gorj.

The territorial distribution of the standardized mortality rate in Romania is not uniform. In 2020, the lowest mortality rates were registered in Valcea county (8.5‰), Bucharest (11.2‰), Timiș (11.8‰), Cluj (12.0‰), Brașov (12.4‰).

A high rate was registered in the counties: Giurgiu (15.9‰), Tulcea (15.6‰), Călărași (15.4‰),



Graph 3. The link between mean age and percentage of infections in Romania and in the countries with the highest average age in Europe

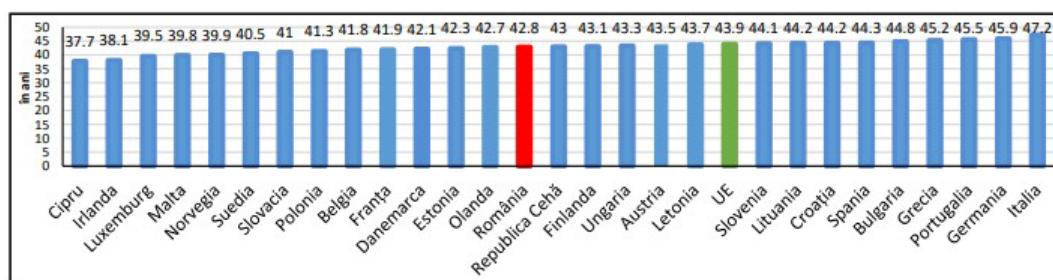


Figure 4. Mean age of the population in different countries from Europe, year 2020.

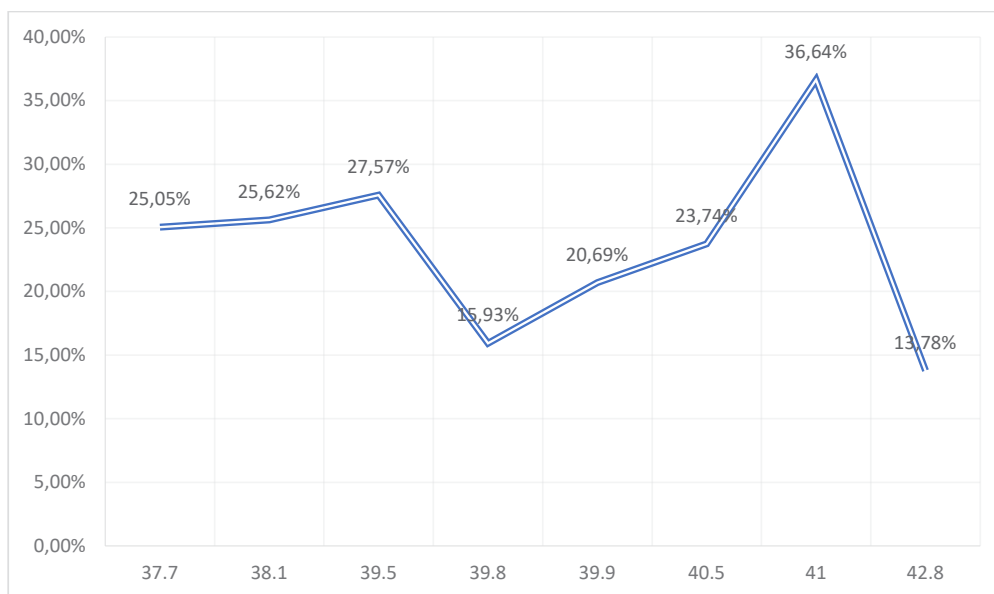
Source: Eurostat

**Romania and the countries with the lowest average age of the population.
The link between mean age and the share of infections**

№	Country	Total population*	Number of COVID-19 cases **	Mean age of the population	Percentage of infection cases
1.	Romania	19.261.714	2.655.933	42.8	13,78%
2.	Cyprus	1.221.980	306.219	37.7	25,05%
3.	Ireland	4.937.786	1.265.124	38.1	25,62%
4.	Luxembourg	643.247	177.372	39.5	27,57%
5.	Malta	443.480	70.665	39.8	15,93%
6.	Norway	5.491.842	1.136.409	39.9	20,69%
7.	Sweden	10.203.794	2.422.856	40.5	23,74%
8.	Slovakia	5.459.642	2.000.643	41	36,64%

* reported on <https://www.worldometers.info/> site, accessed on february, 22, 2022, 9 a.m.

** reported on WHO site, accessed on february, 22, 2022, 9:10 a.m., <https://news.google.com/covid19/map?hl=enUS&mid=/m/06c1y&gl=US&ceid=US:en>



Graphic 4. The link between mean age and percentage of infections in Romania and in the countries with the lowest average age in Europe

Satu-Mare (15.3%), Olt (15.1%). In the year 2020 – 31 counties had higher rates than the average, and 11 counties lower rates than the average.

Figure 1 shows a graphic representation of infections number among total population by counties. I have concluded that 4 of the most populated counties in Romania (Bucuresti, Timis, Cluj, Brasov) are also the most infected counties, so it means that SARS-CoV-2 spreading is more common to happen in populated areas. In opposition, Iasi County, the second largest county in Romania faced only a 10.68% percentage of infections, despite the population that is about 1 million inhabitants. That difference can come from the lack of COVID-19 tests or the population refusal to test against COVID-19.

Figure 3 is a graphical representation of the percentage values associated with COVID-19 infection in the Romanian area. There are extreme values, going from 5.87% in Gorj county and reaching 22.84% in

Ilfov county. The most affected areas are the most populated counties.

Graphic 2 shows peak values of COVID infections in Romanian counties. From 42 counties, 26 registered below 10% infection cases, while 16 registered more than 10% infection cases.

The mean age of the EU population in 2020 (according to Eurostat) is 43.9 years, while in Romania it is 42.8 years. Compared to the EU, in Romania, the average age of the population is below the European average which means that the population is slightly younger than the EU population average. The average age of the population is highest in Italy, Germany, Portugal, Greece, Bulgaria, Spain, Croatia, and the lowest average age was in Cyprus, Ireland, Luxembourg, Malta, Norway, Sweden, Slovakia.

The Graphic 3 and 4 represents a correlation between mean age and percentage of COVID-19 infection in Romania and 7 European countries that have

the highest and lowest average age. We expected a directly proportional relationship between them but we have concluded that there is no connection between age average of the population and number of infections, meaning that number of infection is not influenced by the age of population.

Conclusions. 4 from the first 5 counties in Romania that faced high numbers of COVID-19 infections are also the cities with the highest life expectancy in Romania and the lowest mortality rates.

I have concluded that 4 of the most populated counties in Romania (Bucuresti, Timis, Cluj, Brasov) are also the most infected counties, so it means that SARS-CoV-2 spreading is more likely to happen in populated areas. In oposition, Iasi county, the second largest county in Romania faced only a 10.68% percentage of infections, despite the population that is about 1 million inhabitants.

That difference can come from the lack of COVID-19 tests or the population refusal to test against COVID-19.

The percentage values associated with COVID-19 infection in the Romanian area are going from 5.87% in Gorj county and reaching 22.84% in Ilfov county. From 42 counties, 26 registered bellow 10% infection cases, while 16 registered more than 10% infection cases.

We expected a directly proportional relationship between average age and COVID-19 percentage by country but we have concluded that there is no connection between age average of the population and number of infections, meaning that number of infection is not influenced by the age of population.

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