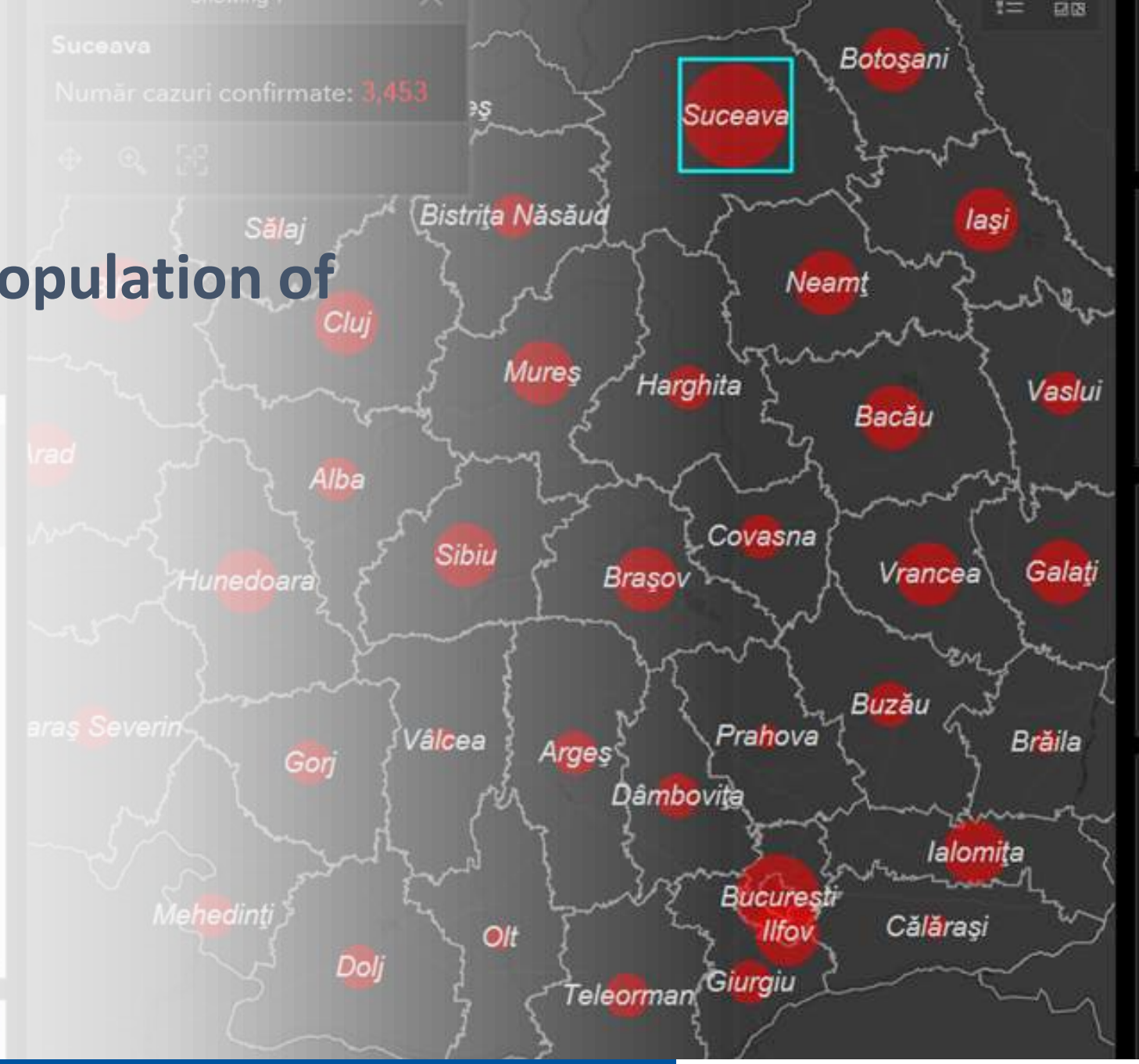
novel coronavirus Immunization Study in the population of Suceava municipality

Research report drafted by MedLife

Study period: May 18 - 27, 2020

Romania



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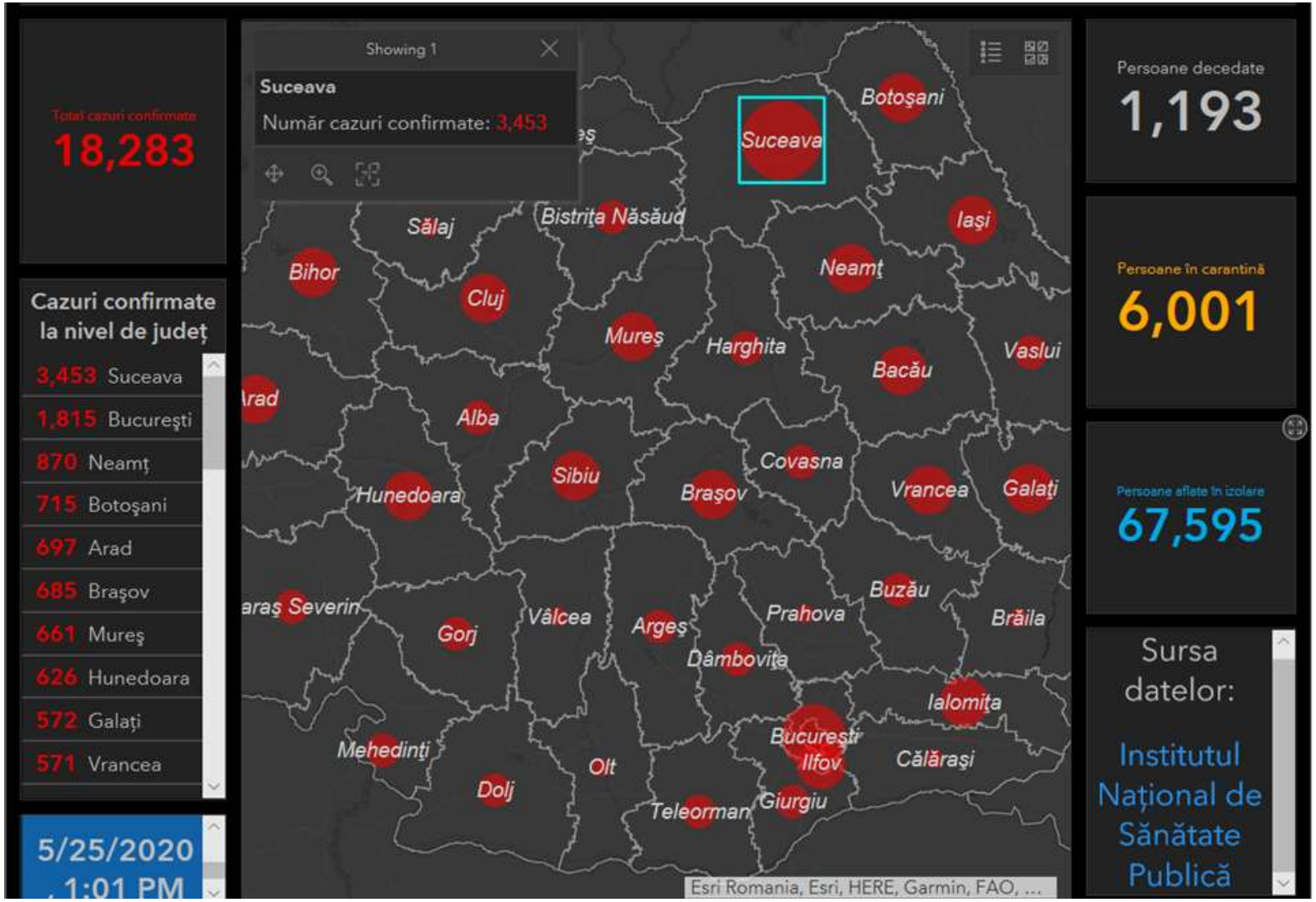
AGENDA

1. **STUDY BACKGROUND** — A short presentation of the situation in Suceava aimed at introducing the background of this research
2. **PURPOSE OF THE RESEARCH** — The primary and secondary questions that triggered the need for this study
3. **METHODOLOGY APPROACH** — Methodological framework used to answer the research questions
4. **RESEARCH RESULTS** — Results breakdown and main conclusions derived from them
5. **ANNEXES** — COVID-19 Statistics

1. BACKGROUND

A short presentation of the situation in Suceava aimed at introducing the background of this research



By May 24, 2020, over 18,000 cases of people infected with SARS-CoV-2 virus have been laboratory-confirmed in Romania, the variance at county level depending on the number of cases per 1000 population being very wide.

Top 10 counties

with the highest number of cases per 1000 people

Suceava is the epicentre of the outbreak in Romania, leading the ranking with the highest number of cases, both in terms of absolute value (3,438) and per one thousand people (5.42).

	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
ROMANIA	18,035	0.94	6.6%
Suceava	3,438	5.42	5.8%
Neamț	871	1.85	5.5%
Botoșani	710	1.72	6.3%
Vrancea	570	1.67	6.5%
Arad	695	1.61	11.1%
Hunedoara	626	1.50	11.2%
Ialomița	352	1.28	5.7%
Brașov	685	1.25	6.9%
Sibiu	483	1.22	8.1%
Mureș	661	1.20	9.4%

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Suceava, case study for increasing the efficacy of prevention measures during the post-emergency state period in Romania

- In the absence of other arguments (such as genetic factors), the population's very low rates of compliance to the recommendations and measures provided in the emergency ordinances, in conjunction with the inefficient measures taken by legal entities (e.g. hospitals), could explain the situation in Suceava.

- Thus, Suceava becomes a case study and, by extension, an opportunity for analysis meant to provide the authorities with recommendations, rules and measures guidelines for the post-emergency state period, so that the number of infections may show the expected downward trend.

Top 10 counties

with the highest death rate

- However the death rate among those infected with the SARS-CoV-2 virus in Suceava is below the national average (5.8% vs. 6.6%).

- The counties of Galati, Hunedoara, Arad and Mures also deserve special attention from the authorities, due to their large number of cases and high death rate.

	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
ROMANIA	18,035	0.94	6.6%
Galați	571	1.06	14.4%
Satu Mare	61	0.18	13.1%
Sălaj	85	0.38	12.9%
Vaslui	157	0.40	11.5%
Mehedinți	105	0.40	11.4%
Hunedoara	626	1.50	11.2%
Arad	695	1.61	11.1%
Bacău	490	0.80	10.8%
Timiș	498	0.73	10.2%
Mureș	661	1.20	9.4%

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PURPOSE OF THE RESEARCH

The primary and secondary questions that triggered the need for this study

2.

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Key question

What is the rate of natural immunization to SARS-CoV-2 among the population of Suceava municipality?

Secondary questions

1 What are the demographic characteristics of the people immunized against the novel coronavirus?

2 Which demographic groups are most open to the testing for COVID-19?

3 What are the demographic groups with the lowest interest in the testing for COVID-19 (*)?

(*) *The reasons for the non-participation in the program do not include financial reasons, as MedLife has fully subsidized this initiative, the only effort required from the population being to put in the time to go to the medical unit where the testing was conducted.*

To answer the aforementioned questions, MedLife conducted the first study in Romania aiming primarily to measure the rate of immunization against SARS-CoV-2 via laboratory tests aimed at detecting specific antibodies on a sample of n = 512 people living in Suceava.

3. METHODOLOGY APPROACH

Methodological framework used to answer the research questions

METHODOLOGICAL COORDINATES OF THE IMMUNIZATION STUDY 1/3

Study period: May 18 – 27, 2020

Target population: population of Suceava over 25 years old

Investigation unit: individual

Sample size: 512 people

Sampling frame size: 2,475 people

Subjects were recruited in 3 stages as follows:

- **Stage 1** - communication campaigns whereby MedLife informed the population of Suceava about this initiative (purpose, enrolment modality in the testing program).
- **Stage 2** - set-up of the sampling frame, i.e. database with people living in Suceava, who have agreed to participate in the program and to be further contacted by MedLife staff to establish an appointment.
- **Stage 3** - extraction of the sample complying with the demographic characteristics of the general population of Suceava (gender, age, education)

METHODOLOGICAL COORDINATES OF THE IMMUNIZATION STUDY 2/3

The data was analysed in 2 stages, as follows:

O **Stage 1 - collection of samples** from the volunteers selected during the previous step and conduct laboratory tests, namely RT-PCR molecular assays, considered the gold standard for identifying the SARS-CoV-2 virus, and serological assays using the chemiluminescence method

The RT-PCR molecular assay:

- for the RNA extraction we used the Roche Magna 96 automatic extractor, together with the MagNA Pure 96 DNA and the Viral NA kit; for amplification, we used the qRT-PCR - Allplex SARS-CoV-2 kit from Seegene.

- **Principle of the method:** qRT-PCR - PCR with reverse transcription that allows the amplification of 3 targets from the viral genome for a specific detection with a high sensitivity **(namely N, E, RdRp)**

IgG antibody serological testing:

- **Manufacturer:** Abbott Ireland Diagnostic Division, Ireland

- **Principle of the method:** qualitative assay of the SARS-CoV-2 anti-nucleocapsid IgG antibodies by a two-stage automatic immunological reaction via a Chemiluminescence Microparticle Immunoassay (CMIA).
- **Analyser:** Abbott Architect i2000

O **Stage 2 - statistical processing** of the results which consisted in estimating the percentage of those who developed COVID-19 specific antibodies and profiling the groups of interest (immunized vs. total)

METHODOLOGICAL COORDINATES OF THE IMMUNIZATION STUDY 3/3

Limitations - similar to the research conducted by all countries during this period

- The limitations of this research are similar to the limitations of the serological surveys measuring the population's immunization levels conducted during this period by other countries (e.g. USA, UK, France, Sweden, etc.). The premise is that the total population and the population willing to be tested are similar in terms of measured laboratory parameters (percentage of those with positive PCR, percentage of immunized people).
- For more details, please follow the link https://www.propublica.org/article/what-antibody-studies-can-tell-you-and-more-importantly-what-they-cant
- The sampling framework includes 2500 people aged 25 and over, living in Suceava.
- Members of the Suceava community interested in the testing were provided with telephone numbers to contact the MedLife team to set up an appointment for the collection of biological samples.
- People were selected from the volunteer group so that the sample analysed may be representative for the Suceava residents, in compliance with the demographic structures and characteristics (gender, age, education) of the general population.
- The methodological approach implemented in Suceava municipality allowed the monitoring in time of the evolution of the immunized people, and the performing of analyses comparative with the results of similar studies carried out in other cities, counties, regions or countries.

4. CONCLUSIONS

Results breakdown and main conclusions derived from them

Main conclusions

- **20%** of Suceava's population aged 25 and over was naturally immunized for COVID-19;
- The natural immunization rate is **29%** in the 45 - 54 years age group, and **3 times lower** among younger people aged between 25 and 34 years old;
- **Age** is the main demographic characteristic that differentiates between the percentage of those who have developed specific antibodies against the novel coronavirus;
- **Social class** is also an important differentiating factor for the percentage of people who have been immunized as a result of infection with the novel coronavirus; among those immunized, there are fewer high-income people with higher education, but there are also entrepreneurs, directors or managers;
- People with **higher education are more open** and interested in the testing program, but also **less exposed** to the risk of infection.

Main conclusions

- Although the number of officially reported COVID-19 cases has started to go down, the risk of further outbreaks persists, especially as the restrictions imposed during the emergency state have been lifted.
- In order to maintain the downward trend, it is crucial for both individuals and legal entities to adopt and maintain a responsible conduct in order to limit the risk of contracting the infection or infecting the people around with the novel coronavirus.
- The research results brings to the fore the subject of education, which, thus, becomes a main candidate for the first positions on Romania’s list of priorities.

Coordinates of the epidemiological study:	
Research area:	SUCEAVA MUNICIPALITY
Testing period (PCR, IgG):	May 18 - 27, 2020
Tested population:	women and men who are at least 25 years old
Communication channels used for sample recruitment:	Online, radio
Statistics of Suceava Municipality	
Households	36.269
Population by domicile	116.404
% Population by domicile aged 25+	72%
Population by domicile aged 25+	83.743
Laboratory test results:	
Positive PCR	3.7%
Positive PCR and negative IGG	0.4%
IgG positive	20%

- Approx. 3,100 Suceava residents over 25 had a positive PCR at the time of the study;
- Out of those, 1 in 10 people diagnosed with COVID-19 was recently infected, less than 20 days before the testing period;
- 20% of the target population, i.e. approx. 16,500 people, was naturally immunized following the SARS-CoV-2 infection.

Detailed conclusions (cont.)

The percentage of the population in Suceava who was naturally immunized for COVID-19 is 20%.
The epidemiological study conducted by MedLife in Suceava Municipality, the largest COVID-19 outbreak in Romania, reveals that 20% of the inhabitants over 25 years old have been infected with SARS-CoV-2 and developed specific antibodies against the novel coronavirus.

The research results show that herd immunity will not be achieved for a while, taking into account the very large difference between the percentage obtained and the 60-70% threshold, which should be reached to obtain herd immunity.

Detailed conclusions (cont.)

Age is by far the main demographic characteristic that differentiates between levels of immunization against SARS-CoV-2.
The percentage of immunized people varies greatly from one age group to another. The most exposed were people between 45 and 54 years old. The laboratory tests indicated the presence of specific antibodies for 29% of this group. On the other end, we have young people aged between 25 and 34 years old, with a 3 times lower natural immunization level.

A factor affecting the difference between the immunization rate among age categories is the level of education - the lower level of education, the higher the percentage of those immunized. The percentage of people naturally immunized against COVID-19 with (post) graduate education is higher in the 25-44 age group vs. that of the 45+ age group.

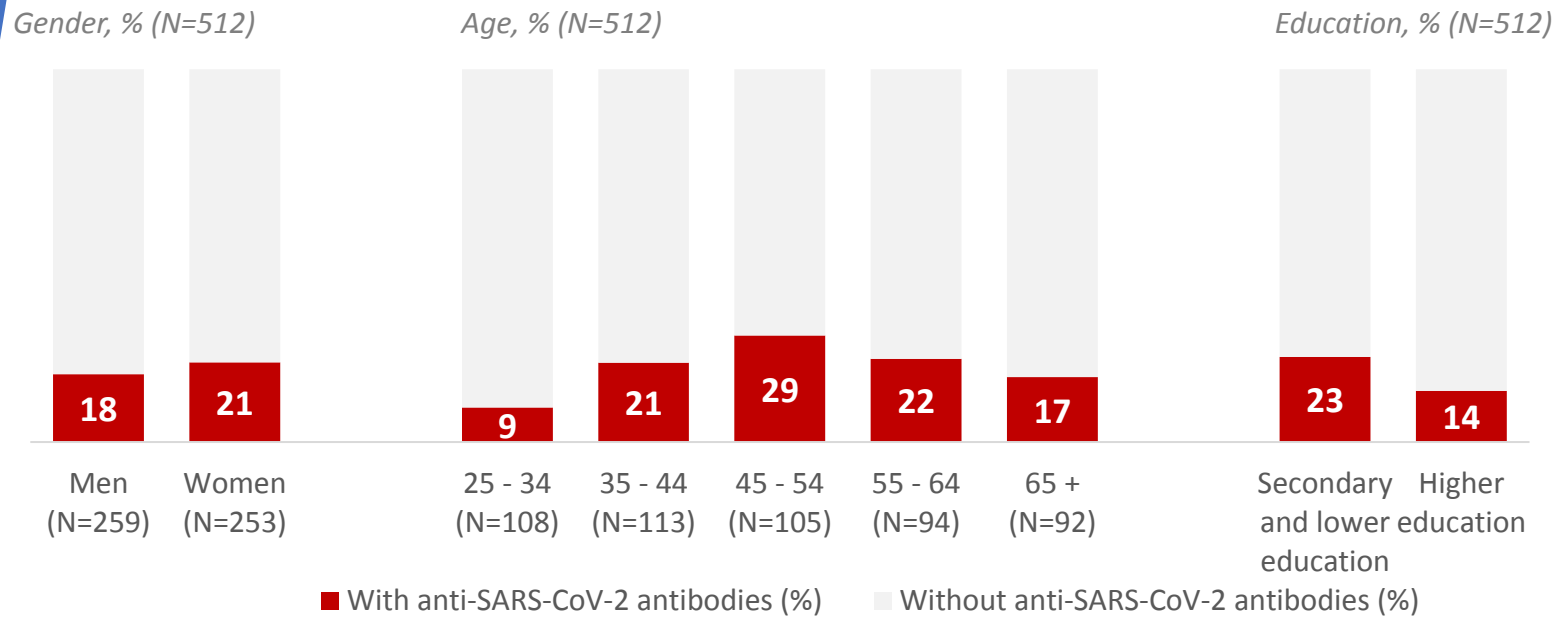
Detailed conclusions (cont.)

Social class is also a predictor of the level of natural immunity against the novel coronavirus.
Thus, employees with higher education, but also entrepreneurs or people with management responsibilities, have a significantly lower risk of infection compared to the rest of the population, due to a combination of factors that are most likely related to both their work environment and work conditions, as well as to the compliance with the prevention measures recommended or imposed by specialists and authorities (hygiene, social distancing, mobility)

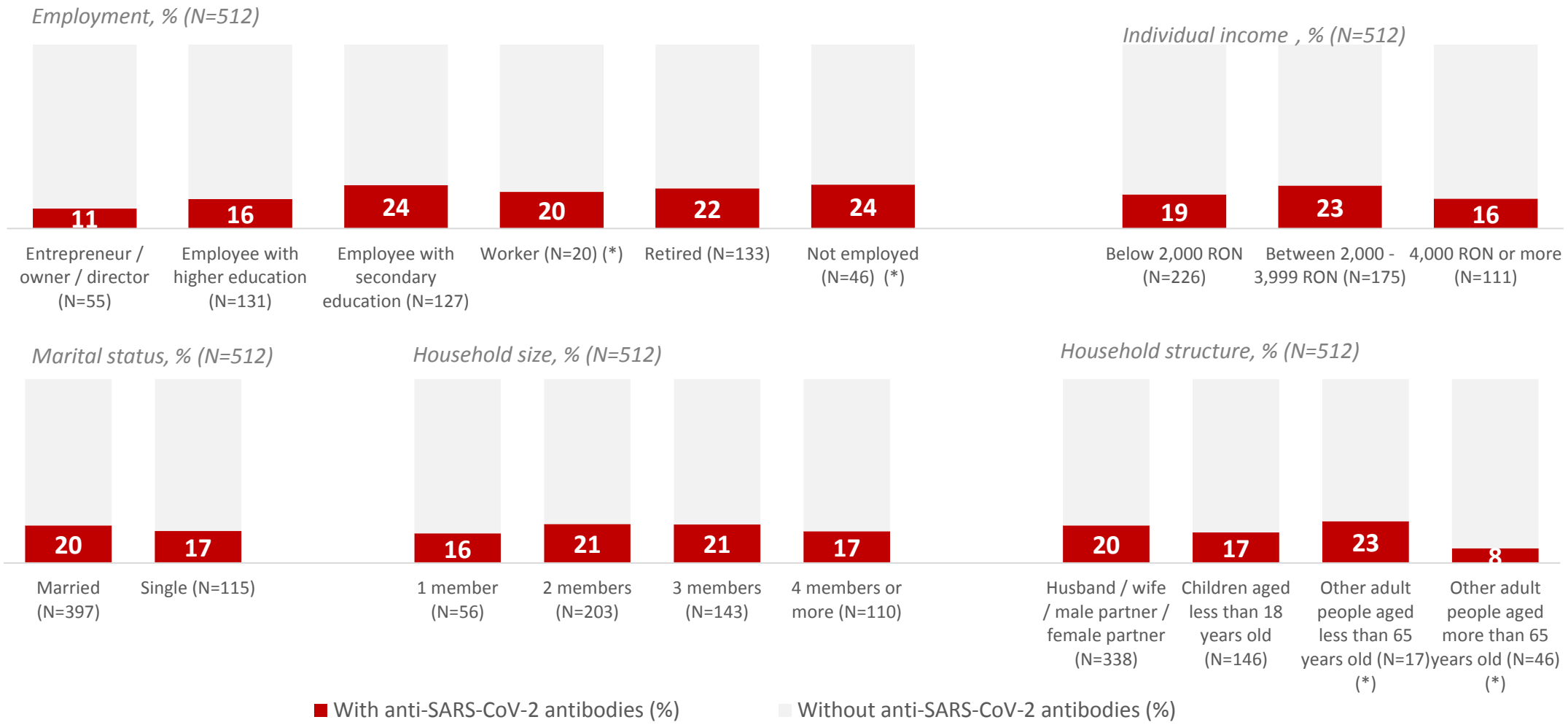
Not only the infection rate, but also the interest shown for the testing program, is linked to the level of education. As a consequence, the percentage of people with higher education among those who responded positively to the testing invitation is clearly higher than the percentage registered at the level of the general population.

20% of the tested people over 25 years old from Suceava developed anti-SARS-CoV-2 antibodies

The highest level of natural immunization is recorded among people between 45 and 54 years old.
Younger people (25-34) and those with higher education stand out as having the lowest rates of immunization against SARS-CoV-2.

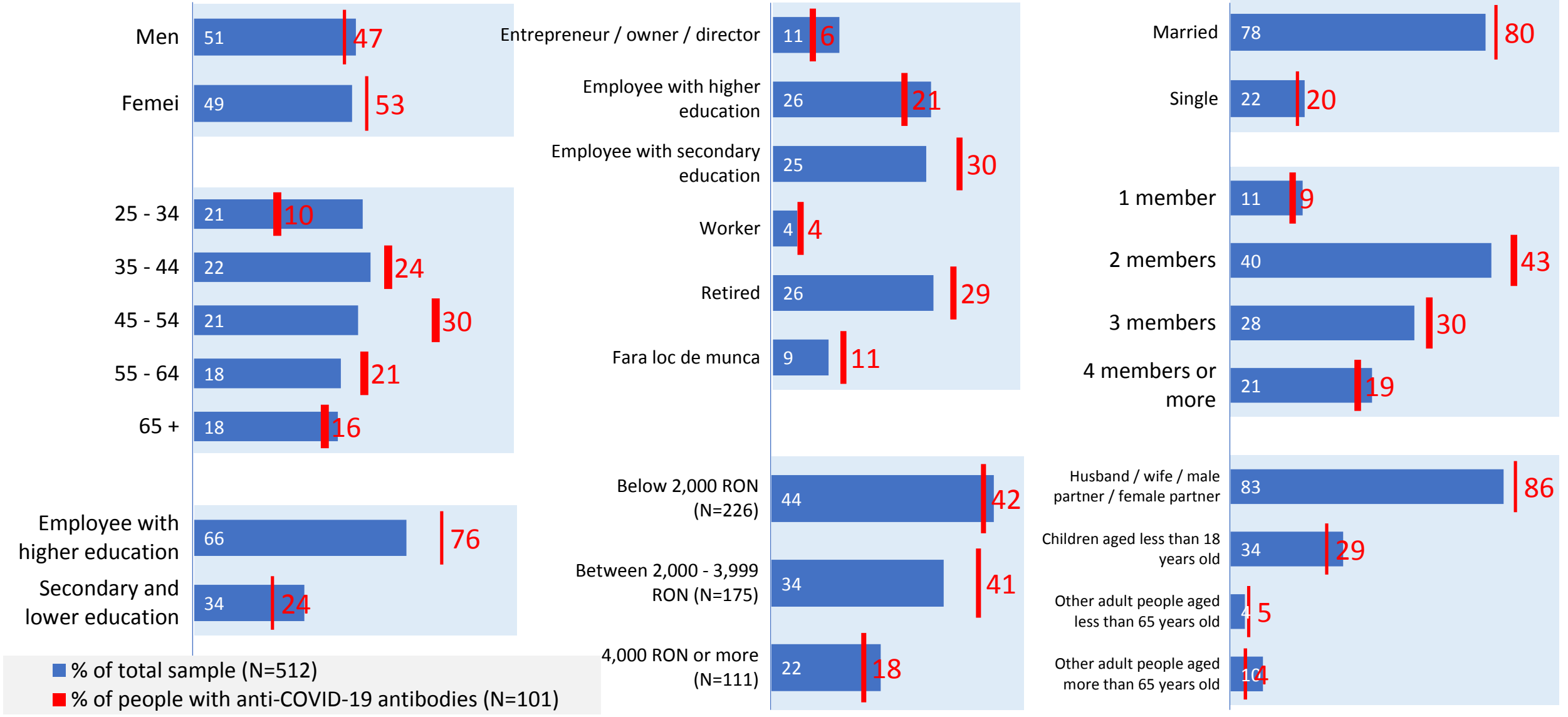


People with higher education, but also entrepreneurs and people with management responsibilities, had a significantly lower infection rate compared to the rest of the population.

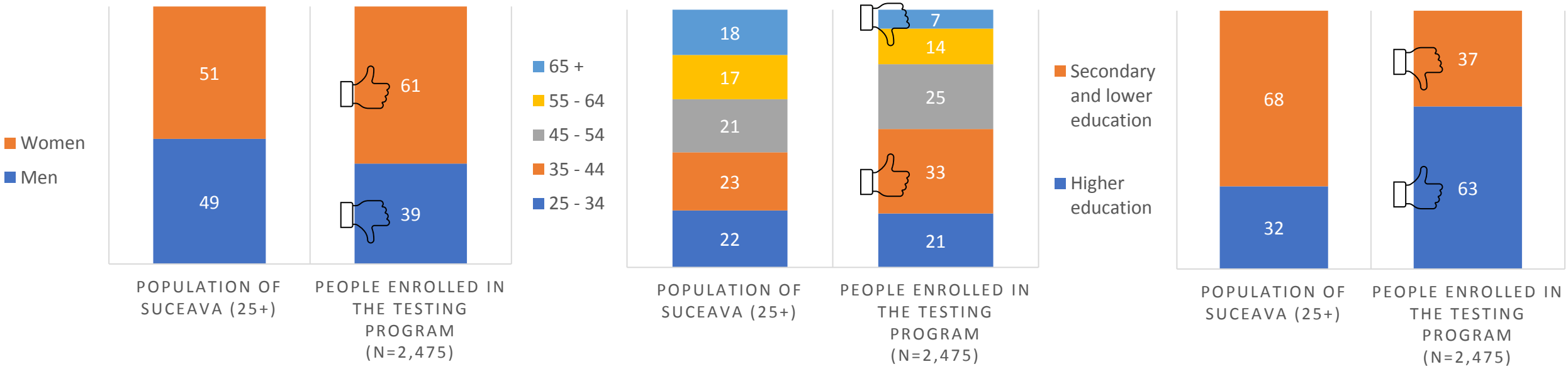


(*) Immunization levels for these groups should be interpreted with caution as the number of cases analysed is very small (below 50)

Demographic profile of immunized individuals



A visible high interest in the free-of-charge MedLife program for the detection of anti-SARS-CoV-2 antibodies was shown by people **with higher education and aged between 35 and 44 years old.** Compared to men, **women** were more motivated to be tested for COVID-19.



On the other hand, people **over 64, with secondary and lower education**, have shown the lowest interest in the program.

5. ANNEXES

COVID-19 Statistics

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#1 COVID-19 Statistics

Confirmed COVID-19 Cases Romania in Global and European Context

Territory	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
USA	1,686,436	5.10	5.9%
SPAIN	282,852	6.05	10.2%
ITALY	229,858	3.80	14.3%
UK	259,559	3.83	14.2%
BELGIUM	57,092	4.93	16.3%
FRANCE	182,584	2.80	15.5%
ROMANIA	**18,035**	**0.94**	**6.6%**

Taken from Biziday.ro (Last update: 24.05)| https://epidemic-stats.com/ (Last update: 25.05 00:07 GMT) | https://www.worldometers.info/ro/ | https://covid19.geo-spatial.org/?map=decese

Confirmed COVID-19 cases in Romania by county (1/4)

Territory	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
ROMANIA	**18,035**	**0.94**	**6.6%**
Top 10 counties in Romania with the most cases per 1000 people			
Suceava	3,438	5.42	5.8%
Neamț	871	1.85	5.5%
Botoșani	710	1.72	6.3%
Vrancea	570	1.67	6.5%
Arad	695	1.61	11.1%
Hunedoara	626	1.50	11.2%
Ialomița	352	1.28	5.7%
Brașov	685	1.25	6.9%
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Confirmed COVID-19 cases in Romania by county (2/4)

Territory	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
ROMANIA	**18,035**	**0.94**	**6.6%**
Ilfov	451	1.16	3.1%
Bistrița-Năsăud	320	1.12	7.8%
Covasna	230	1.09	3.9%
Galați	571	1.06	14.4%
Bihor	546	0.95	3.5%
Alba	318	0.93	5.7%
Bucharest	1,758	0.93	4.6%
Bacău	490	0.80	10.8%
Cluj	538	0.78	2.8%
Giurgiu	211	0.75	1.9%
Timiș	498	0.73	10.2%

Taken from Biziday.ro (Last update: 24.05)| https://epidemic-stats.com/ (Last update: 25.05 00:07 GMT) | https://www.worldometers.info/ro/ | https://covid19.geo-spatial.org/?map=decese

Confirmed COVID-19 cases in Romania by county (3/4)

Territory	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
ROMANIA	**18,035**	**0.94**	**6.6%**
Tulcea	141	0.66	0.7%
Iași	477	0.62	6.3%
Dâmbovița	258	0.50	3.9%
Vaslui	157	0.40	11.5%
Mehedinți	105	0.40	11.4%
Constanța	269	0.39	5.9%
Sălaj	85	0.38	12.9%
Argeș	235	0.38	9.4%
Caraș-Severin	112	0.38	5.4%
Harghita	115	0.37	0.0%
Buzău	158	0.35	0.0%

Taken from Biziday.ro (Last update: 24.05)| https://epidemic-stats.com/ (Last update: 25.05 00:07 GMT) | https://www.worldometers.info/ro/ | https://covid19.geo-spatial.org/?map=decese

Confirmed COVID-19 cases in Romania by county (4/4)

Territory	Cases	Cases per 1000 people	Death rate
GLOBAL	5,513,975	1.41	6.3%
ROMANIA	**18,035**	**0.94**	**6.6%**
Last 10 counties in Romania with the least cases per 1000 people			
Teleorman	130	0.34	6.9%
Gorj	117	0.34	6.0%
Dolj	195	0.30	2.6%
Călărași	80	0.26	3.8%
Maramureș	94	0.20	4.3%
Satu Mare	61	0.18	13.1%
Olt	75	0.17	2.7%
Prahova	96	0.13	7.3%
Vâlcea	28	0.08	7.1%
Brăila	25	0.08	0.0%

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The study was conducted by MedLife at the MedLife central laboratory in Bucharest.

- **Laboratory team coordinator:** Dr. Roxana Vasilescu, primary physician in laboratory medicine, Head of Laboratory MedLife Grivita.

Technical staff involved in the **serological testing:** chief chemist - Irina Stoica, chief chemist - Elvira Teianu, chief biologist - Elena Pasarica, biologist - George Militaru, biochemist - Andrada Popescu, biochemist - Suzana Marin, biochemist - Anca Niculae, and chemist - Emilia Popescu; and

Technical staff involved in **RT-PCR testing**: chief biologist, doctor of medical sciences, department coordinator of the Molecular Biology Department - Dumitru Jardan, Teletin Diana, chief biologist - Palade Andi, specialist biologist - Graur Marian, biologist - Stanciulescu Adelina, and biologist - Samu Maria.

- **Scientific support provided by:** Dr. Mihai Varciu, primary physician in endocrinology, doctor in medicine, lecturer at Transilvania University Brasov, Medical Director at MedLife Brasov.

- In terms of methodology and sampling, the study was supervised by Andi Dumitrescu, consultant and market research expert with over 20 years of experience. Mr. Dumitrescu led the GfK Romania campaign, which in the last 20 years has been the leader of the market research industry.

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