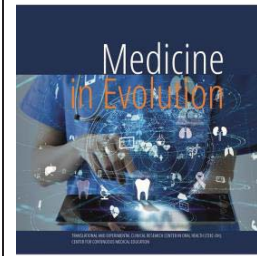


SARS-CoV2 pandemic in Arad



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Abstract

The SARS_CoV_2 pandemic is a lesson about biological threats, which put health systems under extreme stress. In Arad County it affected 16.4% of the population (n = 67,434 Covid_19 cases), the fatality rate being 2.71%. Four waves manifested between 01.03.2020 -31.03.2022 causing 1,828 deaths. The age distribution of the cases indicates an increased prevalence at 30-59 years and increased death rates at 60-80 years. The relative risk RR of death from Covid_19 in males compared to females is 1.3216 (P <0.0001). RR of death in rural versus urban is 1.3955 (P <0.0001); 52.51% of deaths occurred in males, 57.76% in rural areas and 86.54% in patients over 60 years. The sequencing of deaths according to waves and the odds ratio of deaths in wave 4 compared to waves 1-3 was 1.6527 (P <0.0001), 46.82% of deaths being recorded in wave 4 of the pandemic, predominantly caused by the Delta variant.

Keywords: Covid 19, Relative risk, Odds ratio

INTRODUCTION

An airborne pandemic is a challenge for the best health systems, even for those with complex infrastructure. Romania has proven multiple vulnerabilities, due to the initial inability to generalize the PCR molecular diagnosis, low number of beds for intensive care of critically ill patients, institutional communication, etc. Arad County presents additional risks for infection and death, because: the population ageing, the elderly living either in nursing homes or in extended families, with children and grandchildren who are sources of infection, being neither autonomous nor independent; increased prevalence of chronic diseases such as hypertension, diabetes, neoplasms, obesity; the health infrastructure is insufficiently modernized and the vaccination rate is 50%.

Aim and objectives

We analyzed the distribution of SARS_CoV_2 infection cases in the population of Arad County, from the beginning of the pandemic until 31.03.2022, to identify the highest prevalence rate, frequency in areas of residence and by gender, the most affected age groups both by infections as well as death rates.

MATERIAL AND METHODS

In this descriptive, retrospective study to determine the prevalence of SARS_CoV_2 infection during the pandemic, deaths and outbreaks during this time, with the determination of the risk of death by gender, age category, residence and viral subtype. The data were sectorized in relation to the evolution of the pandemic, in 4 waves, between 01.03.2020 - 30.06.2020, between 01.07.2020 - 31.12.2020, between 01.01.2021 - 31.07.2021 and between 01.08.2021 - 31.03.2022. As methods of statistical analysis we used the quantification between exposure and result, as a measure of association between two variables, by establishing the Relative risk and the Odds ratio.

RESULTS

There were 67,434 cases, in ascending series, with 706 cases in the first wave, followed by 13,403 cases, respectively 9,669 and 43,656 in waves 2- 3-4 [1]. Figure 1 shows the cases, deaths and their linear trendlines. In table 1 are all cases, all deaths and fatality rates in all four waves. In total, the fatality rate reached 2.71%.

Table 1. Number of cases, deaths and fatality rates Covid_19 related

category	cases	deaths	fatality rate
first wave	706	79	11.1898
second wave	13403	498	3.715586
third wave	9669	395	4.085221
fourth wave	43656	856	1.960784
total	67434	1828	2.710799

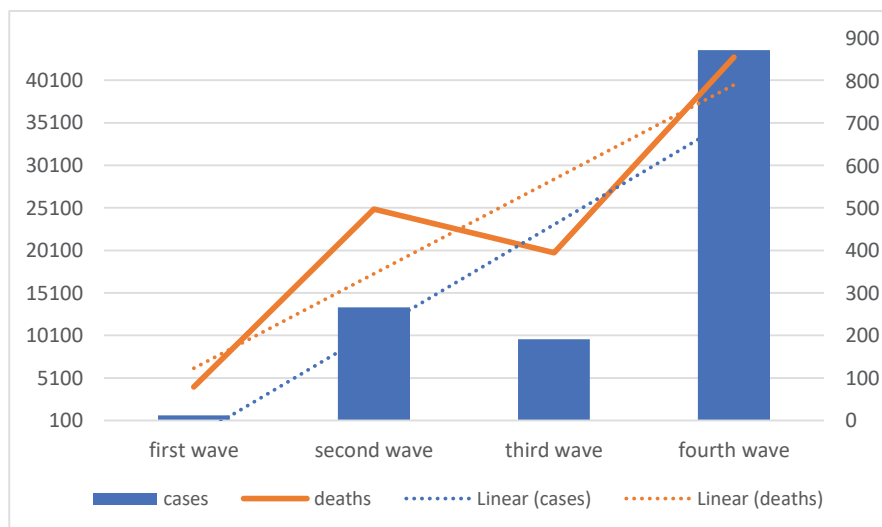


Figure 1. Covid-19 cases, deaths and their trendlines

The percentage of SARS_CoV_2 infections was 16.4% of Arad County population in pandemic, which places Arad County on the 13th place in the ranking of counties; 17.57% of all cases were hospitalized. The gross mortality rate, representing deaths caused by SARS_CoV_2 infection relative to the population at risk per 100 inhabitants, for the pandemic period, was 0.4%. The age distribution of cases indicates an increased prevalence of infection in the 30-59 age group and increased death rates in the 60-80 age group and above, Table 2.

Table 2. Age category distribution for cases, prevalence and death rates

Item	0-9 years	10-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80 years and more
Cases	2377	5141	6828	11250	12825	11186	9310	5827	2693
Deaths	0	0	5	15	66	160	482	594	506
Population	40970	44235	44490	56199	66081	55772	54595	33640	18586
prevalence %	5.8	11.62	15.35	20.02	19.41	20.06	17.05	17.32	14.49
death rate %	0	0	0.01	0.03	0.1	0.29	0.88	1.77	2.72

The distribution of cases by gender was 54% in favor of women, 66% of cases were registered in urban areas and 52.28% of cases were registered between 30-59 years old. However, the situation was different for deaths: 52.51% of deaths occurred in males, 57.76% of deaths were registered in rural areas and 86.54% of deaths occurred in patients over 60 years, table 3.

Table 3. Distribution of Covid_19 cases by gender and area of residence

	F	M	total	Urban	Rural
cases	36604	30833	67437	44254	23183
deaths	868	960	1828	1056	772

The relative risk (RR) of Covid_19 related death in males compared to females was 1.3216. Deaths depending on the residence put at risk the patient from the rural area in Arad County - RR 1.3955, table 4.

Table 4. Relative risks of death by gender and residence

item	RR	95% CI	z statistic	Significance level
RR deces M versus F	1.3216	1.207 to 1.4471	6.027	P < 0.0001
RR deces R versus U	1.3955	1.2736 to 1.5291	7.143	P < 0.0001

Depending on the sequencing of deaths by waves, the Odds ratio OR in wave 4 compared to wave 1-3 was 1.6527, table 5, 46.82% of deaths being recorded in wave 4 of the pandemic, predominantly caused by the Delta variant.

Table 5. Odds ratio for deaths in fourth wave compared to 1-3 waves

Odds ratio for deaths in fourth wave compared to those of 1-3 waves	1.6527
95% CI	1.5056 to 1.8143
z statistic	10.559
Significance level	P < 0.0001

The filiation of cases in infectious diseases is difficult to establish especially in airborne infections but the existence of some outbreaks can be documented, even if not exhaustively. Of 109 documented outbreaks, 61% occurred in residential centers for the elderly, Table 6, source Arad Public Health Department.

Table 6. Documented Covid_19 outbreaks

Source	outbreaks
Community	12
Industrial	14
nursing home	67
Hospitals	16
Total	109

DISCUSSIONS

The highest prevalence rate, both for illness and death: 01.08.2021 - 31.03.2022, wave 4, when Delta (The Delta variant being first detected in India in May 2021) and Omicron (identified in numerous countries in November, 2021) subtypes predominated, characterized by increased virulence, in the case of Delta strains and by increased transmissibility, in the case of Omicron strains [2]. Delta contains the D614G mutation, plus many additional ones not seen in other variants of concern, which is thought to increase infectivity, and may help the virus to evade destruction by immune cells [3].

The number of infections is higher in urban areas but the risk of death is higher in rural areas. Urban areas are, in fact, the place where the most cases of infection is coagulated due to human overcrowding. On the other hand, the rural environment shows less addressability to the diagnostic and treatment procedures, which may be an explanation for the increased mortality; other countries experienced also the same differences, where the case rates and mortality rates were positively correlated with pre-existing social vulnerability [4].

The number of infections is higher in females but the relative risk of death is higher in males. Male gender appears to be a formidable risk factor for both the severity of the disease and prolonged hospitalization and death worldwide [5].

The most frequently affected age groups are those who are socio-professionally active, but the age groups with the highest death rates are those over 60 years of age, results that can be found in other research [6]. This study identified the highest Covid_19 prevalence rates, frequency of cases in relation to residence and gender, the most affected age groups by both

infection and death rates, including the link between dominant wave 4 strains in relation to the death rate and prevalence.

CONCLUSIONS

The measures required as a result of these results have to be centred on protecting the categories at risk of death, respectively the elderly in residential centers and families composed of multiple generations, especially in rural areas. Last but not least, the medical staff, professionally exposed, is at increased risk of the disease, in the absence of complete and available protective equipment.

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