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January 2021 and COVID-19 in Portugal: The Deadliest Month since 1919

Janeiro de 2021 e a COVID-19 em Portugal: O Mês Mais Mortal desde 1919

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ABSTRACT

The COVID-19 pandemic was the second pandemic of the 21st century and lasted 1150 days, from March 11, 2020, to May 5, 2023. It was one of the deadliest pandemics of the last century, alongside the 'Spanish flu' pandemic of 1918-1919. In Portugal, it was responsible for the deaths of 26 655 residents, with the year 2021 recording the highest mortality, with 11 991 deaths. In the first three years of the pandemic, all-cause mortality in Portugal exceeded 1200 deaths *per* 100 000 inhabitants, representing the highest values since 1957. The greatest impact of the pandemic occurred between December 2020 and February 2021, with 37 days of more than 4000 hospital admission beds occupied daily, 39 days of more than 600 intensive care unit beds occupied daily, and 20 days with more than 200 daily deaths. The month with the greatest impact was January 2021, with 5805 deaths due to COVID-19. The peak of hospital admissions occurred on January 31, 2021, with 6869 beds occupied, and the peak of mortality was on January 30, 2021, with 297 deaths. In absolute numbers, the monthly all-cause mortality in January 2021 in Portugal was the highest recorded since 1919.
Keywords: COVID-19/mortality; Hospitalization; Pandemics; Portugal

RESUMO

A pandemia de COVID-19 foi a segunda pandemia do século XXI, durou 1150 dias, de 11 de março de 2020 a 5 de maio de 2023 e foi uma das pandemias mais mortíferas, a par da pandemia de 'gripe espanhola' de 1918-1919. Em Portugal, foi responsável pela morte de 26 655 residentes, com 11 991 óbitos em 2021. Nos três primeiros anos da pandemia, a mortalidade por todas as causas em Portugal ultrapassou 1200 mortes por 100 000 habitantes, os valores mais altos desde 1957. O maior impacto da pandemia ocorreu entre dezembro de 2020 e fevereiro de 2021, com 37 dias com mais de 4000 camas de internamento hospitalar ocupadas diariamente, 39 dias com mais de 600 camas de unidades de Cuidados Intensivos ocupadas diariamente e 20 dias com mais de 200 mortes diárias. O mês com maior impacto foi janeiro de 2021, com 5805 mortes por COVID-19. O pico de internamentos hospitalares ocorreu em 31 de janeiro de 2021, com 6869 camas ocupadas, e o pico de mortalidade em 30 de janeiro de 2021, com 297 mortes. Em números absolutos, a mortalidade mensal por todas as causas em janeiro de 2021 em Portugal foi a mais alta registada desde 1919.
Palavras-chave: COVID-19; Hospitalização; Mortalidade; Pandemia; Portugal

In 2020, for the second time in the 21st century, the world experienced a pandemic. SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) led to a new disease, COVID-19 (COronaVIrus Disease identified in 2019), which unexpectedly extended for over three years, from March 11, 2020, to May 5, 2023.[1] It is estimated that by August 2024, approximately 27 million individuals will have died from COVID-19, including 5 million in 2020 and 10 million in 2021.[2] These numbers confirm that the COVID-19 pandemic was one of the deadliest since the beginning of the last century, alongside the 'Spanish flu' pandemic of 1918–1919.[2]

In Portugal, according to the Directorate-General of Health website - "Number of New Cases and Deaths *per* Day" - the first COVID-19-related death was recorded on March 16, 2020,[3] and by May 5, 2023, 26 655 people had died. Pandemic mortality exhibited a highly variable monthly distribution, reflecting the impact of different pandemic waves and the population's level of immunity.[4] Vaccination in Portugal began on December 27, 2020.[5]

The objective of this study was to assess annual and monthly mortality in Portugal from 1918 to 2024, with particular emphasis on the COVID-19 pandemic period. This included a daily assessment of the impact on the National Health Service (Serviço Nacional de Saúde) during the peak period, focusing on overall bed occupancy, intensive care unit capacity, and the number of deaths.

Data from the National Institute of Statistics[6] were analyzed concerning annual and monthly mortality and the resident population from 1918 to 2024 in mainland Portugal and the archipelagos of the Azores and Madeira. Data for the years 1926, 1927, and 1928 were unavailable. For the resident population, data from population censuses, vital statistics, and resident population estimates were used. Based on these data, a table [Appendix 1, which includes bibliographic references (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/23023/15727)] was constructed, detailing annual and monthly mortality from 1918 to 2024 and calculating annual mortality *per* 100 000 inhabitants. Regarding COVID-19 mortality in Portugal and the daily impact on the National Health Service (SNS), data from the Directorate-General of

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Health were analyzed.[3,7]

In Portugal, from March 11, 2020, to May 5, 2023, there were 26 655 deaths due to COVID-19. The year with the highest mortality was 2021, with 11 991 deaths, followed by 2020 and 2022, with 6986 and 6851 deaths, respectively.[3] January 2021 was by far the month with the highest mortality, with 5805 deaths (Table 1).

Regarding hospital resource allocation, the most critical period - during which more than 4000 beds were occupied daily - lasted 37 days, from January 11 to February 16, 2021. On 17 of those days, daily occupancy exceeded 6000 beds, 9 of which were in January 2021. The peak number of hospitalizations occurred on January 31, 2021, with 6869 beds occupied. For 39 days, from January 13 to February 21, 2021, more than 600 Intensive Care Unit (ICU) beds were occupied daily. The maximum number of ICU beds occupied was recorded on February 4, 2021, with 904 beds. More than 200 daily deaths attributed to COVID-19 were reported on 20 days between January 18 and February 7, 2021. There were eight days with more than 270 daily deaths, all in January 2021, with a maximum of 297 deaths recorded on January 30 (Table 2).[3,7]

The analysis of annual and monthly mortality from 1918 to 2024, adjusted *per* 100 000 inhabitants (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/23023/15727), confirms that, in this 107-year period, the months with an absolute number of all-cause deaths exceeding 15 000 were October 1918 (70 247 deaths), November 1918 (47 181 deaths), January 2021 (19 668 deaths), September 1918 (19 084), December 1918 (18 246 deaths), and August 1918 (15 379 deaths). Since 1919, the month with the highest absolute mortality was January 2021. The years with the highest mortality *per* 100 000 inhabitants since 1957 were 2021, 2022, and 2020, with the peak mortality of 1216 deaths *per* 100 000 inhabitants in 2021 (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/23023/15727).

These results highlight the impact of the COVID-19 pandemic on the National Health Service (SNS) in Portugal, with particular emphasis on January 2021. The impact of COVID-19 during January 2021 is further underscored by two significant data points: (i) this month also coincides with the progressive introduction of the alpha variant of SARS-CoV-2 in the country[8]; (ii) on January 15, 2021, the Portuguese Government implemented a nationwide lockdown in response to a dramatic surge in COVID-19 cases following the holiday season,[9] which initially allowed schools to remain open but subsequently mandated their closure one week later, on January 22, 2021.[10]

As expected, the years 2021, 2022, and 2020 are associated with annual mortality rates exceeding 1200 deaths *per* 100 000 inhabitants, representing the highest mortality levels in the past six decades, specifically since 1957.

In assessing the impact of the pandemic from 2020 to 2023, we cannot ignore the medical, scientific, and technological advancements that did not exist in previous years, including during past pandemics.

This retrospective and descriptive study, fully supported by official data, has some limitations. Mortality data for the years 1926 to 1928 could not be obtained, standardized mortality data were unavailable, nor were estimates of the number of residents in Portugal available for the year 2024. Nevertheless, the sample size minimizes any minor errors in the recorded values. During the pandemic period, it was

Table 1 – Monthly and yearly distribution of COVID-19 deaths among residents in Portugal from March 11, 2020, to May 5, 2023, with a total mortality of 26 655 individuals during the pandemic.[3]

	2020	2021	2022	2023
January	N/A	5805	1004	235
February	N/A	3557	1116	197
March (≥ 11/03/2020)	214	502	649	208
April	873	117	595	152
May (≤ 05/05/2023)	345	49	875	35
June	150	76	987	N/A
July	159	273	467	N/A
August	89	382	236	N/A
September	153	223	180	N/A
October	571	184	225	N/A
November	2033	303	232	N/A
December	2399	520	285	N/A
Annual total	**6986**	**11 991**	**6851**	**827**

N/A: not applicable

Table 2 – Daily distribution of the total number of occupied hospital beds in the SNS,[7] the number of beds occupied in Intensive Care Units,[7] and deaths due to COVID-19 in Portugal, from December 15, 2020, to February 28, 2021.[3]

December 15 to December 31, 2020				January 1 to January 31, 2021				February 1 to February 28, 2021			
Date	**Beds**	**ICU**	**Deaths**	**Date**	**Beds**	**ICU**	**Deaths**	**Date**	**Beds**	**ICU**	**Deaths**
15/12/2020	3181	486	86	01/01/2021	2858	492	81	01/02/2021	**6775**	542	**255**
16/12/2020	3142	494	78	02/01/2021	3044	500	73	02/02/2021	**6684**	**877**	**246**
17/12/2020	3061	484	74	03/01/2021	3171	510	85	03/02/2021	**6496**	**863**	**226**
18/12/2020	2973	485	88	04/01/2021	3260	512	89	04/02/2021	**6412**	**904**	**245**
19/12/2020	3027	483	68	05/01/2021	3293	513	93	05/02/2021	**6158**	**891**	**217**
20/12/2020	3158	502	65	06/01/2021	3333	514	99	06/02/2021	**6248**	**865**	195
21/12/2020	3095	508	64	07/01/2021	3451	536	117	07/02/2021	**6344**	**877**	**203**
22/12/2020	2990	511	85	08/01/2021	3555	540	112	08/02/2021	**6070**	**862**	195
23/12/2020	2853	505	70	09/01/2021	3770	558	105	09/02/2021	**5829**	**853**	153
24/12/2020	2754	504	68	10/01/2021	3983	567	130	10/02/2021	**5570**	**839**	164
25/12/2020	2790	513	78	11/01/2021	**4043**	599	156	11/02/2021	**5230**	**846**	146
26/12/2020	2870	504	65	12/01/2021	**4240**	596	152	12/02/2021	**4850**	**803**	154
27/12/2020	2967	503	62	13/01/2021	**4368**	**611**	144	13/02/2021	**4862**	**795**	134
28/12/2020	2930	486	72	14/01/2021	**4560**	**622**	156	14/02/2021	**4832**	**784**	89
29/12/2020	2896	487	75	15/01/2021	**4653**	**638**	174	15/02/2021	**4482**	**752**	114
30/12/2020	2840	482	75	16/01/2021	**4889**	**647**	156	16/02/2021	**4137**	**719**	126
31/12/2020	2806	483	69	17/01/2021	**5165**	**664**	171	17/02/2021	3819	**688**	98
				18/01/2021	**5291**	**670**	**210**	18/02/2021	3584	**669**	68
				19/01/2021	**5493**	**681**	**218**	19/02/2021	3284	**656**	72
				20/01/2021	**5630**	**702**	**222**	20/02/2021	3316	**638**	67
				21/01/2021	**5779**	**715**	**241**	21/02/2021	3322	**627**	63
				22/01/2021	**5962**	**720**	**264**	22/02/2021	3012	597	59
				23/01/2021	**6117**	**742**	**275**	23/02/2021	2767	567	49
				24/01/2021	**6420**	**767**	**268**	24/02/2021	2613	536	50
				25/01/2021	**6472**	**765**	**280**	25/02/2021	2404	522	58
				26/01/2021	**6603**	**783**	**291**	26/02/2021	2180	492	31
				27/01/2021	**6565**	**782**	**296**	27/02/2021	2165	484	42
				28/01/2021	**6627**	**806**	**276**	28/02/2021	2167	469	38
				29/01/2021	**6544**	**843**	**292**				
				30/01/2021	**6694**	**858**	**297**				
				31/01/2021	**6869**	**865**	**282**				

ICU: intensive care unit
in bold, the total number of beds > 4000/day, the number of ICU beds > 600/day, and the number of deaths > 200/day).

not possible to access data on the total number of beds in the SNS, either in inpatient wards or ICUs, nor the number of inpatient beds that were repurposed as ICU beds. Similarly, it was not possible to calculate the impact of non-pharmaceutical intervention measures or to determine the vaccination status of the deceased after February 2021, which marks the start of the second dose of the primary vaccination schedule in high-risk patients.

In conclusion, our study confirms the profound impact of the COVID-19 pandemic on the resident population in Portugal and on the resources of the National Health Service (SNS). Portugal recorded its highest mortality rates per 100 000 inhabitants in 2020, 2021, and 2022—levels not seen since 1957. In absolute terms, January 2021 marked the deadliest month since 1919.

AUTHOR CONTRIBUTIONS

All authors contributed to the study conception, design, data acquisition, analysis, writing and critical review of the manuscript.

DATA CONFIDENTIALITY

All the data used are official, public, anonymous, and aggregated.

COMPETING INTERESTS

FF: Received a grant from MSD as Principal Investigator of the SPHERE study (directly paid to the author's institution). Received payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from MSD, AstraZeneca, SANOFI, GSK, BIAL, GILEAD, HIPRA and NOVAVAX. Was a member of a Data Safety Monitoring Board or Advisory Board at MSD, AstraZeneca, GSK, SANOFI and HIPRA.

MR: Has no competing interests to state.

AD: Received consulting fees from HIPRA Human Health. Received payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from ViiV Healthcare, Gilead Sciences and Janssen. Was a member of a Data Safety Monitoring Board or Advisory Board at ViiV Healthcare, Gilead Sciences, MSD, Pfizer and Novavax.

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