

Disease outbreaks in Portugal in the first half of the twentieth century: Historical and epidemiological approach. II - Smallpox

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Abstract

Following a statistical study of various epidemics in the first half of the twentieth century in Portugal (bubonic plague, epidemic typhus, smallpox and influenza), the author analyzes in this paper the epidemiologic issue of smallpox.

The following epidemiometric parameters are analyzed: how the epidemics evolved over time, distribution of deaths by gender, age groups, months of the year and affected districts and regions.

Key words: epidemics, Portugal, twentieth century, smallpox.

"The number of deaths registered in Portugal due to smallpox is shameful."

— *Fernando da Silva Correia, 1938.*¹

INTRODUCTION

Given the incipient knowledge on epidemic diseases in Portugal during the first half of the last century, we decided to investigate this problem. Although the official information available for this period does not include various parameters that are important for analysis, particularly in regard to morbidity, the fact that is that this statistical material – with the exception of the pneumonic influenza, (or "Spanish flu") of 1918 – has not provoked interest among academics of the subject.

In a previous work, we analyzed the epidemiology of the typhoid fever epidemic in our country,² and this time, we investigate the smallpox epidemic in the first half of the 20th century. Separately, we will also deal with the other two morbidities that then took on epidemic nature: bubonic plague and pneumonic influenza.^{3,4}

MATERIAL AND METHODS

To achieve our objective, we use the official published statistics.⁵⁻¹⁴

The frequent change in responsibilities of the ministers and institutions that have published the official statistics over the years partially explains the lack of uniformity criteria for the material provided, and even its partial or complete absence in certain years: for 1911, 1912 and 1928 no statistics whatsoever were published, and for other years, the data are only partial.

In terms of methodology, where recommended we complement our statistical analysis with the χ^2 test or with the calculation of 95% limits of confidence (LC).¹⁵

RESULTS

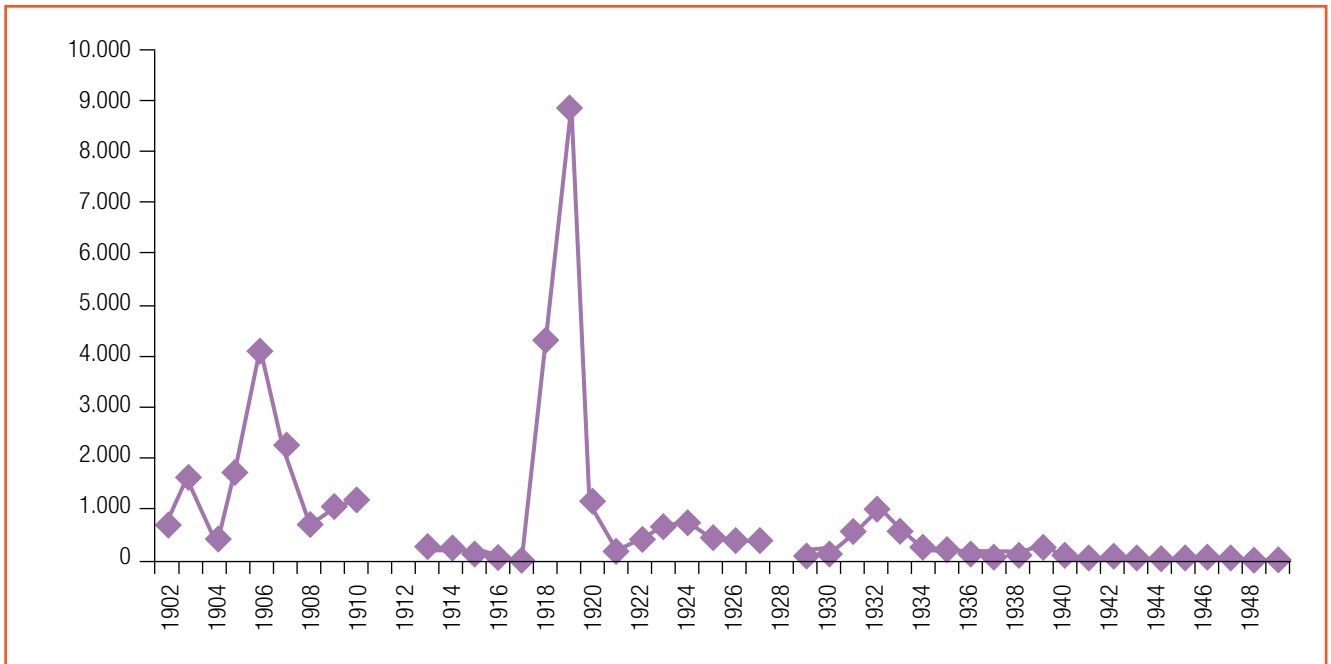
In relation to the Ilhas Adjacentes (Azores and Madeira), cases of death by smallpox are very scant for the decade 1915-1924, the period when the disease was most active. In the Azores, the following deaths were registered: 1921: 1 case; 1923: 1 case; 1924: 3 cases. As for Madeira, 54 deaths were reported in 1920 and 57 in 1921. Thus, the analysis that follows reports only on mainland Portugal.

Mortality by year. In mainland Portugal, there was a small epidemic outbreak of smallpox in 1906 and another one more significant at the end of 1918 and beginning of 1919 – *Fig. 1*. If in our analysis we restrict ourselves only to the decade 1915-1924, a decade in which the biggest outbreak of the century occurred, (*Table I*), we will have a total of 16,612 deaths, of which 13,202 (79.5% – LC: 78.6-80.1) occurred between 1918 and 1919.

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Deaths by smallpox registered in mainland Portugal in 1902-1949.

FIG. 1

Mortality by gender. Of those 13,202 cases, 7,026 were male (53.2% – LC: 52.4-54.1) and 6,176 female (46.8% – LC: 45,9-47,6). The differences between genders were not statistically significant $p > 0.05$.

Mortality by age. The overall mortality by age is overwhelmingly predominant in the younger age group, from 0-9 years of age (Fig. 2), with 76.0% (LC: 75.2-76.7) of the deaths registered (Table II).

Mortality by month. Table III and Fig. 3 clearly show that the colder months (December to January) were those with the higher number of mortalities.

Mortality by district. As shown in Table IV, the districts of Lisbon and Porto were the ones with the highest numbers of deaths – 22.4% (LC: 21.7-23.2) and 19.3% (LC: 18.6-19.9), respectively. Bragança appeared as the district with the lowest frequency of deaths by smallpox – 0.2% (LC: 0.2-0.3).

Mortality by greater regions. In relation to total deaths by greater region, the North, Center and Lisbon and Vale do Tejo all had very similar values: 3486 deaths (26.4% –

LC: 25.7-27.2), 3879 (29.4% – LC: 28.6-30.2) and 3725 (28.2% – LC: 27.5-29.0), respectively. Only the

TABLE I

Deaths by smallpox registered in mainland Portugal in the decade 1915-1924, by year and gender

Year	Gender		Total		
	Male	Female	n	%	LC*
1915	75	63	138	0,8	0,7-1,0
1916	31	28	59	0,4	0,3-0,5
1917	10	8	18	0,1	0,1-0,2
1918	2.287	2.051	4.338	26,1	25,5-26,8
1919	4.739	4.125	8.864	53,4	52,6-54,1
1920	615	539	1.154	6,9	6,6-7,3
1921	111	98	209	1,3	1,1-1,4
1922	234	191	425	2,6	2,3-2,8
1923	356	303	659	4,0	3,7-4,3
1924	400	348	748	4,5	4,2-4,8
Total	8.858	7.754	16.612	100,0	—

*LC: limits of confidence 95%.

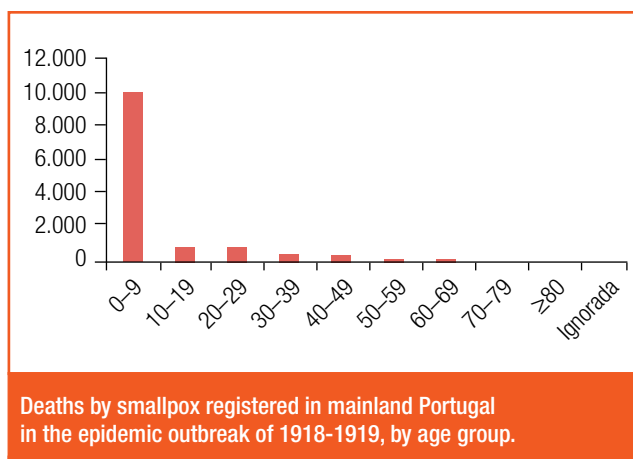


FIG. 2

South had lower values: 2112 deaths (16.0% – LC: 15.4-16.6).

DISCUSSION

Smallpox has been known in China since the 13th century BC,¹⁶ and the mummified face of Pharaoh Ramses V shows skin lesions that are thought to have been due to this virus.¹⁷ Introduced in Europe largely through the Arab invasions,¹⁸ it became widespread on our Continent, with outbreaks resulting in high morbidity and mortality. Important historical figures, such as the Emperor Jose of Germany, King Luis XV of France, Tsar Pedro II of Russia, etc., were victims of smallpox.¹⁷ Carried to the Americas around 1520, within a short space of time, it had led to the deaths of around 3,500,000 Mexican Indians.¹⁹ In 1584, Father Diego de Angelo wrote to the King of Spain: “(...) The difficulty comes from the lands left empty by the death of the Indians, because where there were a thousand Indians there are now no more than a hundred (...)”²⁰

Since the empirical treatments with blood-letting and purges,²¹ including the contradictory “red treatments” (the patients had to remain in closed rooms, with red-colored curtains, and had to take medications that induced profuse sweating) and “refreshing treatments”, of Sydenham (patients had to remain in well-lit, airy places, and take refreshing drinks), the results in the combat of smallpox were never effective until finally, the prophylactic solution came in the form of vaccination.²²

Also known in Portugal as “bexigas”, smallpox swept the Country, affecting high numbers of people.

TABLE II

Deaths by smallpox registered in mainland Portugal in the epidemic outbreak of 1918-1919, by age group

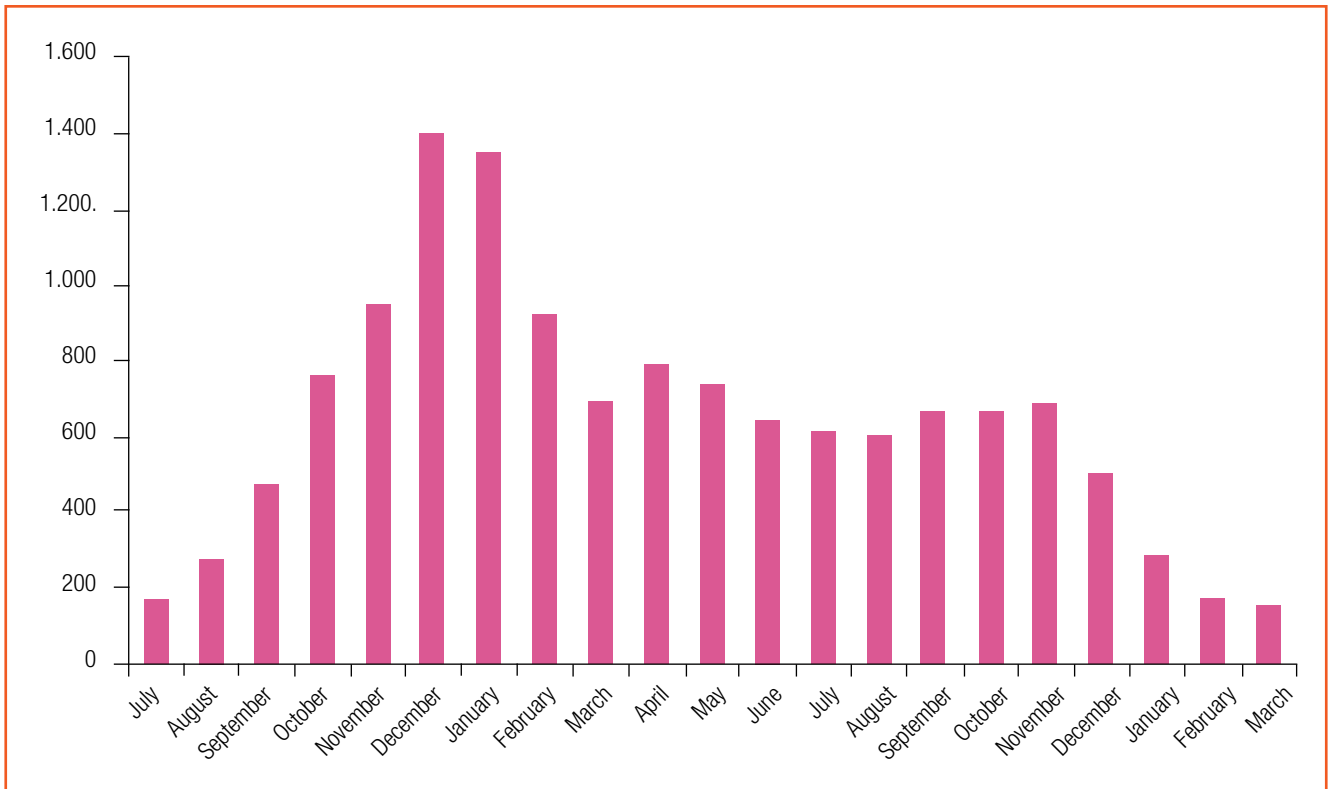
Age groups Years	Deaths		
	n	%	LC*
0-9	10.029	76,0	75,2-76,7
10-19	925	7,0	6,6-7,5
20-29	861	6,5	6,1-7,0
30-39	500	3,8	3,5-4,1
40-49	411	3,1	2,8-3,4
50-59	237	1,8	1,6-2,0
60-69	138	1,0	0,9-1,2
70-79	52	0,4	0,3-0,5
≥80	12	0,1	0,1-0,2
Ignored	37	0,3	0,2-0,4
Total	13.202	100,0	—

*LC: limits of confidence 95%.

TABLE III

Deaths by smallpox registered in mainland Portugal in the epidemic outbreak of 1918-1919, by month

Months	Deaths	
	1918	1919
January	8	1.344
February	14	923
March	33	687
April	66	793
May	92	736
June	99	640
July	167	611
August	273	604
September	474	671
October	756	661
November	947	691
December	1.409	503
Total	4.338	8.864



Deaths by smallpox registered in Mainland Portugal in 1918-1920, by months with higher prevalence.

FIG. 3

Recorded in Medieval times, in Portugal, as “bostelas” (pustules), the first accurate report only came in 1423, in Coimbra and Alcáçovas.¹⁸ Afterwards, recurrences followed regularly throughout the territory, but the documentation in this regard is not abundant. It only came to be the motive of more recent reports among Portuguese physicians from the 18th Century on, with the polemic introduction of the smallpox inoculation (Lisbon, 1768) and Jenner’s vaccine (Lisbon, 1799) to the country—roguishly, “(...) affirmed that after the vaccination [with Jenner’s cow-pox virus] cow horns and hairs can emerge in the vaccinated person, who starts to moo like one. (...)”¹⁸: it was the so-called “minotaurization” or evolution to Minotaur... Objectively, only after the systemic application of the vaccine that deaths by smallpox began to decrease, yet even in 1938, in Portugal Sanitário, Fernando da Silva Correia wrote: “(...) The number of deaths registered in Portugal due to smallpox is shameful. (...) It is rare to find a year when less than 500 people died from smallpox (...)”¹⁹ As is known, following

intensive vaccination against smallpox, the WHO managed, in 1976, to completely eradicate this worldwide epidemic virus.²³

Popularly, it is believed that Saint Sebastião gave protection from smallpox – at least for children: “(...) São Sebastião protects the children from “bexigas”. The mother, or a person from the family, surrounded the Saint’s neck with a cotton thread or a thin tape which was then placed on the child’s neck. The thread or tape had the power and virtue to ward off ‘bexigas’. (...)”²⁴ Even today, there are still traditions linked to this belief, *verbi gratia* in Barbacena: “(...) thousands of São Sebastião cakes, also known as Bexigas cakes, are sold this on this Sunday at the festivals of S. Sebastião, in the parish of Barbacena, in the nearby district of Elvas. (...) The story goes back to the time of the Count of Barbacena, in 1816. At that time, there was a smallpox epidemic among children. The disease was called “Bexigas” at that time (...). The Count ordered the cakes to be baked on a wood fire, for the children. The children were cured, and since then, they have

TABLE IV

Deaths by smallpox registered in mainland Portugal in the epidemic outbreak of 1918-1919, by district

Districts	1918	1919	Total		
	n	n	n	%	LC
Aveiro	115	873	988	7,5	7,0-7,9
Beja	237	145	382	2,9	2,6-3,2
Braga	33	333	366	2,8	2,5-3,1
Bragança	5	27	32	0,2	0,2-0,3
Castelo Branco	59	380	439	3,3	3,0-3,6
Coimbra	113	777	890	6,7	6,3-7,2
Évora	185	119	304	2,3	2,1-2,6
Faro	705	354	1.059	8,0	7,6-8,5
Guarda	61	484	545	4,1	3,8-4,5
Leiria	129	407	536	4,1	3,7-4,4
Lisboa	1.422	1.540	2.962	22,4	21,7-23,2
Portalegre	260	107	367	2,8	2,5-3,1
Porto	465	2.077	2.542	19,3	18,6-19,9
Santarém	379	384	763	5,8	5,4-6,2
Viana do Castelo	49	101	150	1,1	1,0-1,3
Vila Real	62	334	396	3,0	3,0-3,3
Viseu	59	422	481	3,6	3,3-4,0
Total	4.338	8.864	13.202	100,0	—

been made on a large scale. (...)”²⁵

Global mortality. In relation to the global values that we present – 16,612 deaths/year in the decade 1915-1924 (*Table I*) –, the first aspect that should be highlighted is that the official statistics record only the deaths, i.e. the information we have relates only to the mortality of the disease, and we are not supplied with data concerning morbidity. An idea, albeit indirect, of the morbidity could be obtained from the lethality index. Silva Correia¹ reports that “(...) mortality [by smallpox] in relation to the number of victims appears to be 9% (...)”, but we believe this low figure is a clear under-evaluation – c. f., for example, Juan Ignacio Carmona: “(...) minimum lethality of 15-20% of infected individuals, reaching up to 40 to 50%. (...)”²⁶ In cases of “minor smallpox” only, the lethality is around 1%¹⁶ (the so-called “minor” or varioloid forms were mostly the result of vaccination or previous infection).¹⁸ Given the low levels of vaccination

in our country, “major smallpox”, the more severe form, should not include, here, “minor smallpox”. Incidentally, it was Silva Correia himself who, in 1938, stated that “(...) the renitence of the people to vaccination is renowned, as a clear indicator of the national hindsight (...), and it is estimated that 21.5% of all blind people in Portugal lose their sight as a result of this disease. (...)”¹

Mortality by year. As seen in *Fig. 1* and *Table I*, mortality by smallpox was rife in 1918 and even more widespread in 1919. Effectively, various sanitary, social, political, and economic factors, and the low agricultural productivity, marked by a decrease in imports of cereals, etc., led, in this period, to a situation of widespread famine in the country, causing low defenses of the organism, which provided fertile ground for the appearance of these epidemics.²⁻⁴

Mortality by gender. As seen in other countries, and here too, there were no significant differences in mortality between genders (*Table I*).

Mortality by age. The greater susceptibility of children to viral infections in general is unanimously recognized (due to the immaturity of their immune systems),

hence the importance of exanthematic diseases of childhood (measles, rubella, smallpox, etc), which only go into remission with prophylaxis by vaccines. The same is seen with smallpox, for which mortality occurs mainly among children in the first decade of life (*Fig. 2 and Table II*), this fact coincides with what is also seen in other countries.²⁷ Furthermore, after the epidemic smallpox outbreaks, it entered the endemic phase (*Fig. 1*), whereas adults had already, in the majority of cases, had prior contact with the virus, or had received vaccination, and were therefore protected and developed only clinical symptoms of “minor smallpox”.

Mortality by month. It was widely recognized that mortality by this morbus was more accentuated during the winter months (*Fig. 3 and Table III*), due to the greater proximity between people in enclosed spaces (the disease is not only infectious but also contagious).

Mortality by district. Lisbon and Porto clearly lead the highest overall mortality by smallpox, owing to the fact that they are urban areas (Table IV), with higher population densities – “(...) Infectious bacterial and viral diseases that pass directly from human to human with no intermediate host are therefore the diseases of civilization par excellence. (...)”²³

Mortality by greater region. Besides the overall mortality by greater region, already expressed above, it is important to also bear in mind the calculation of average incidence per 100.000 inhabitants, which showed the following order of relevance, in increasing order of importance (resident population reported in the 1920 census): North 101.9 deaths/100.000 inhab./year; Center: 103.3; South: 137.2; Lisbon and Vale do Tejo: 147.2. For the country as a whole, the incidence of deaths by smallpox is 117.4/100.000/inhab./year.

CONCLUSIONS

In the last century, mainland Portugal was among the European countries with the highest mortality by epidemic outbreaks.²⁻⁴ In regard to smallpox, this fact, as mentioned above, occurred largely due to the low adhesion to smallpox vaccination. Therefore, it is important to emphasize that for socioeconomic, political and health reasons – “(...) the causes for our sanitary delay are interlinked and there are far more guilty people than is generally believed (...)”¹ – various conditions combine which lead not only to one epidemic, that of pneumonic influenza (the one that is generally mentioned by the epidemiologists and historians) but rather, to three simultaneous epidemics, giving potential to the high mortality observed: pneumonic influenza, epidemic typhoid fever and smallpox.²⁻⁴

At present, with its eradication at global level, smallpox is just part of the compendium of the History of Medicine, however, it is worth emphasizing that another virus of the same genus of smallpox, Monkeypox, whether in Africa (its possible continent of origin), or after its introduction to the USA, has seen a certain upsurge in humans, due to a possible loss of immunological defenses crossing between the two viruses: “(...) Monkeypox is the most important orthopoxvirus infection in human beings since the eradication of smallpox in the 1970s. (...)”²⁸ Furthermore, the potential use of the Monkeypox in bioterrorism is currently a growing concern of the health and military authorities. ■

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