Individual-Level Causes of Death in Portugal, 1834–1910. Their Potential and Pitfalls for Studying Health Inequalities

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HISTORICAL LIFE COURSE STUDIES

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Individual-Level Causes of Death in Portugal, 1834–1910

Their Potential and Pitfalls for Studying Health Inequalities

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ABSTRACT

This paper assesses the potential of Portugal's individual-level death certificates with stated causes of death by a physician (1834–1910), arguing that, despite assumptions of documentary scarcity, significant collections survive and can support the study of mortality and health inequalities. It outlines the historical trajectory of death registration with emphasis on liberal reforms initiated in 1837 which introduced physician-certified death certificates and burial tickets, intended to standardize cause-of-death reporting and generate data for public health administration. Implementation was uneven due to limited cemetery infrastructure, bureaucratic fragmentation, and popular resistance, but coverage expanded notably from the 1870s. Archival surveys reveal strong regional variation: some districts, including Porto, Lisbon, and Horta, achieved high coverage, while others show only partial or irregular adoption. Using Porto as a case study, the article presents the development of a new database (1869–1910) based on digitized certificates and burial tickets. Preliminary results demonstrate high representativeness, decreasing numbers of missing causes of death, and growing conformity with official nosologic classifications. Improvements are particularly visible in stillbirth reporting, child mortality diagnoses, and rural parishes. The database is being integrated with a historical GIS to support spatial analysis of mortality and living conditions. The article concludes that, despite gaps and losses, surviving certificates constitute a valuable and underused resource for investigating mortality patterns, public health policies, and socioeconomic inequalities in 19th-century Portugal.

Keywords: Individual level cause of death data, Portugal, Health inequalities, 19th Century

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1 INTRODUCTION

The study of official documents that record cause of death enables a clearer understanding of the historical evolution of public health policies and their impact on the living conditions of a given population. Research into individual-level data on health inequalities and causes of death in Portugal during the long 19th century is incipient. A range of factors may explain the hitherto general lack of scholarly interest in this important field: the central and local archives were rich but disorganized; the consolidation of the Liberal state throughout Portuguese national territory occurred slowly; the Church played a leading role in the registration of vital events and in the systematic elimination of nominative sources of information, such as "burial tickets." The academic community has, as a possible direct consequence of these factors, long resigned itself to the supposed absence of coherent territorially comprehensive documentary bodies that cover extended time series. However, the fact is that important documentary collections have survived in Portugal, particularly records for the city of Porto, as well as for Horta and Angra do Heroísmo in the Azores Islands. In recent years, Portugal has accelerated the processing and digitization of archival collections, gradually improving the quality and level of detail in archival descriptions. That offers promising prospects for future research.

The systematic registration of deaths in Portugal dates back to the Council of Trent (1545–1563), with the Portuguese Church being in charge of both the formulation and custody of registers. It was only with the fall of the monarchy in 1910 that compulsory civil registration was definitively implemented (1911), a move that was accompanied by the confiscation of ecclesiastical registers by the State. Individual death records are available for almost the entire territory, but the registration of cause of death was rare before the 19th century and remained infrequent, and of poor quality even in the second half of that century, as the *causa mortis* was typically interpreted by parish priests with no medical training. Despite the limitations, these registers are crucial for determining the total number of deaths in each Portuguese parish and for cross-referencing with other nominative death records, in particular civil records that more clearly specify cause of death.

The issuing of individual certificates with medically ascertained cause of death began in Lisbon in 1813. Burials were not permitted in the absence of such documentation. This was apparently the first time the Portuguese State assumed responsibility for systematically recording both the number of deaths and the diseases that caused them. As in other European cities of the time, such as Paris, these certificates served as the basis for the production of monthly necrology charts of deaths occurring in Lisbon (Alves, 2019, p. 116; Crespo, 1990, p. 119–122), although the practical impact of such recording appears to have been limited.[1] Various setbacks, including economic decline and the civil war (1832–1834), delayed the consolidation of the systematic registration measures. It was only in 1834, with the definitive establishment of liberalism, that public health became the object of significant and continuous reform.

Following European trends, "statistical liberalism" strengthened the Portuguese State by placing numerical knowledge at the centre of political decision-making. A *Leviathan* of statistical tables emerged, placing health and demography at the core of governance. In 1837, the Council of Public Health mandated that all burials were to take place in public cemeteries.[2] Thus, at least in theory, no one could be buried without a certificate (known as the *bilhete de enterramento*) that was signed by a doctor and that stated the cause of death according to a legally acceptable disease classification (Subtil, 2021, p. 140). The data was then used to compile the annual *Nosography Chart of the Kingdom of Portugal*, which was intended to inform public health policy. At that time the certifying physician was free to select the nosography used in a death certificate. However, the production of reliable public health data required a greater degree of uniformity in the terminology of cause of death. To that end, a royal order, issued in 1844, stipulated the use of a specific nosography, set out in the order, for the compilation of the Nosography Charts of the Kingdom of Portugal. In the event of a discrepancy between the nosography used by the physician in the death certificate and the "official" nosography, the latter was to prevail in the compliation of the Charts.[3] The nosography selected by the legislator

1 Some of the necrological tables can be found at the National Archives of Torre do Tombo (Lisbon), *Ministério do Reino* [Ministry of the Kingdom or Ministry for Internal Affairs], Public Health Affairs (1810–1833).

2 Regulamento do Conselho de Saúde [Health Council Regulation] (11 January 1837), Chapter VII, Article 19, no. 2, *Diário do Governo* Nº 9 (11011837), pp. 28–35.

3 Order of Conselho de Saúde Pública [Public Health Council] (31 december 1844), *Diário do Governo*, Nº 4 (04-01-1845), pp.14–15.

for this purpose was chosen not because of its modernity but because it was the one that was most generally used, which made it the most practical framework for physicians to apply and adapt.

The network of public cemeteries in Portugal was extremely limited at that time, a situation that remained unresolved until the late 1870s (Garnel, 2016, p. 78). From a legislative standpoint, however, Portugal was relatively advanced, and began requiring the medical certification of causes of death at the same time as England and Wales, where the General Register Office, also created in 1837, made such registration mandatory.

This legal requirement of medical certification of cause of death marked the beginning in Portugal of the long process of secularizing death and establishing new bureaucratic practices associated with it (Catroga, 1999; Crespo, 1990). This was also the case in several other European states. Emerging disciplines such as medical demography, developments in medicine and political arithmetic, the gradual territorial expansion of the State apparatus and the policing of public health all laid the foundations for what Michel Foucault famously theorized as "biopolitics" (Foucault, 1997, 2004). In the decades that followed, progress in Portugal was slow and faced considerable popular resistance, particularly after the publication of the Public Health Laws of 1846, which, together with other factors, nearly triggered another civil war (Alves, 2019).

This article is to a certain extent a position paper on the context of the production, territorial coverage and the intrinsic quality of individual death certificates that set out causes of death in Portugal between 1834 and 1910. Bearing in mind the complexity of the topic, the vast volume of central and regional documentation and the fragmented nature of the archival landscape, the present study offers a preliminary overview of the potential of the existing sources and some key analytical pathways for their application.

The authors assess the representativeness of individual death certificates that set out the causes of death in Portugal. In particular, they examine: the normative framework; the agents involved in the production of the certificates; the territorial coverage and the accuracy of the data. The main question posed is to what extent is it feasible to rely on individual-level data in the study of prevalent causes of mortality and health inequalities in 19th-century Portugal.

In response to this central question, the article is centred on three main objectives, with each objective being addressed in a specific section. The first objective is to analyse the normative framework for the gathering of information on causes of death in Portugal. This regulatory framework was the essential means by which the authorities systematically gathered data for the reliable classification of deaths. The authors focus in particular on who was responsible for this task (individuals, agents and institutions) and the methods and procedures that were employed. The principal legislative instruments and the formal requirements for recording the deceased's identity, socio-economic status and cause of death are also examined.

The following section (in accordance with the second objective) assesses the empirical material that is preserved in Portuguese archives. Without this material a rigorous study of causes of death would not be feasible. Based on the findings of an exploratory survey, the authors report on the documentary series that contain individual-level death certificates that specify the cause of death, identifying their chronological ranges and territorial coverage. In parallel to that, the study examines the principal challenges that were faced by the authorities in extending and universalising the system and which are reflected in correspondence between central government and regional authorities. The conclusion reached is that although documentary series are available from the 1840s onwards, it is only from the 1870s that the material enables systematic analyses of causes of death based on individual certificates.

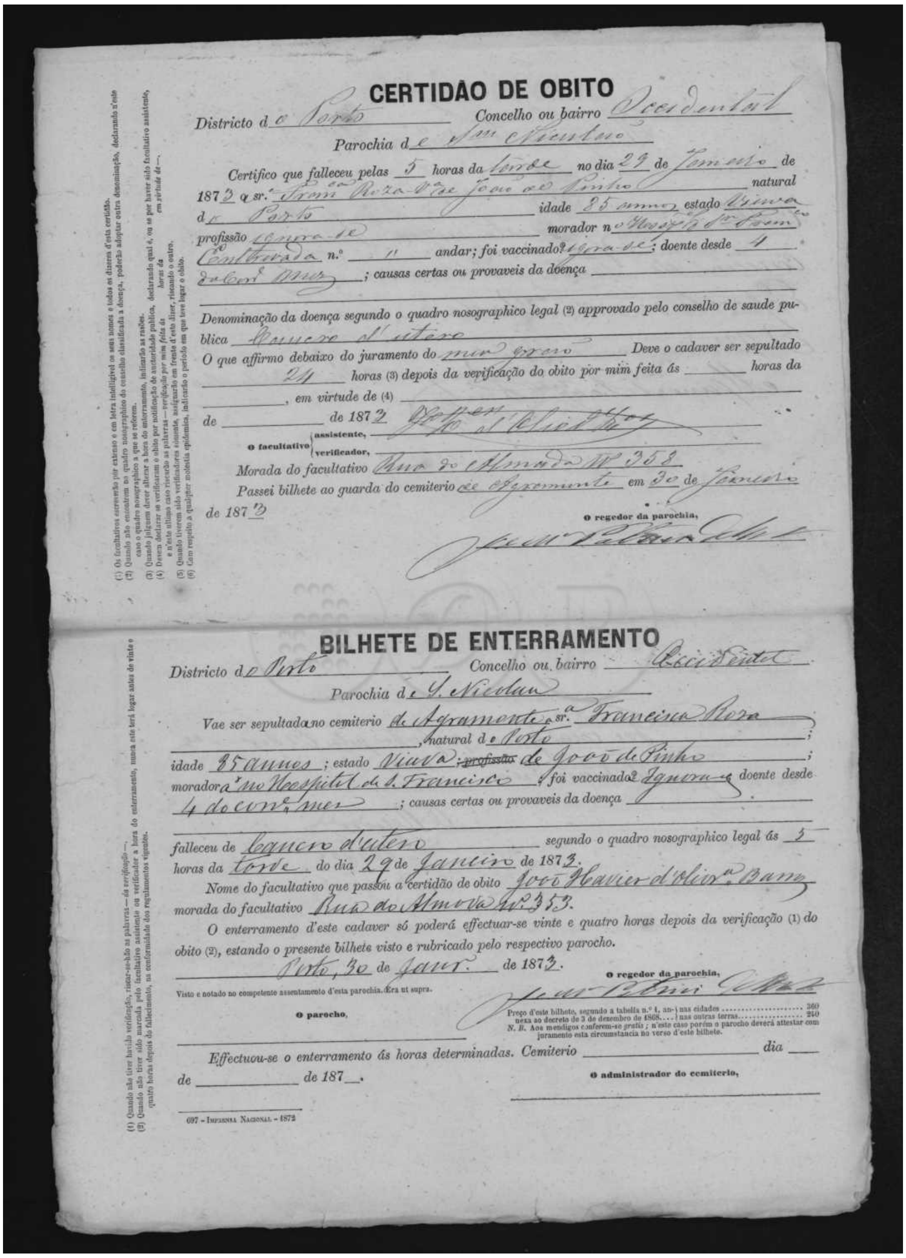
The third objective of the study is to evaluate the intrinsic quality of the individual records that include a stated cause of death. This evaluation relies, of necessity, on case studies. The analysis focuses on the city of Porto from 1869 onwards, with 1869 being the year in which the records apparently became systematic. The authors draw on the available data in order to evaluate: territorial coverage across the urban parishes; the ratio of hospital deaths; the consistency of disease reporting and overall diagnostic quality. To support the analysis, a database of deceased individuals was constructed, from the biographic, clinical and spatial information contained in the certificates. The database findings demonstrated that whilst there was almost full territorial coverage from the outset, improvement in the quality of the records occurred gradually, as is evidenced by the reduction of ill-defined causes of death, the increase in more precise identification of stillbirths and increasing compliance with official nosological classifications.

2 THE INSTITUTIONALIZATION OF INDIVIDUAL DEATH RECORDS IN PORTUGAL

Following the publication of the 1837 royal decree and the institutionalization of individual death certificates that included the cause of death, a new information set emerged. This section of the study outlines how the registration process was intended to function, identifies the actors involved and examines the changes the system underwent throughout the 19th century.

From 1837 onwards, local authorities began issuing two types of documents following an individual's demise: death certificates and burial tickets (Figure 1).[4] These documents were used for the registration of deaths, in turn providing data for the production of mortality statistics at the municipal, district, and national levels. The death certification had to be verified by a physician, who would ascertain the cause (ruling out possible criminal causation) and formally attest to the occurrence of death. The physician was required to report on: the deceased's vaccination status; any known or suspected diseases that may have contributed to the death and the cause of death according to the official legal nosology.

Figure 1 *Example of a death certificate and burial ticket (still attached)*



CERTIDAO DE OBITO

Districto do Porto Concelho ou bairro Occidental

Parochia de S. Nicolau

Certifico que falleceu pelas 5 horas da tarde no dia 29 de Janeiro de 1873 a sr.ª Fran.ca Roza V.va de João de Pinho natural do Porto idade 85 annos estado viuva profissão ignora-se morador no Hosp.al de S. Fran.co Cordoaria n.º ... andar; foi vaccinado? ignora-se; doente desde 4 de corr.e mez; causas certas ou provaveis da doença

Denominação da doença segundo o quadro nosographico legal (2) approvado pelo conselho de saude publica Cancro d'utero

O que affirmo debaixo do juramento do meu grau. Deve o cadaver ser sepultado 24 horas (3) depois da verificação do obito por mim feita ás horas da , em virtude de (4)

de de 1873

o facultativo assistente, verificador,

Morada do facultativo Rua do Almada N.º 353

Passei bilhete ao guarda do cemiterio de Agramonte em 30 de Janeiro de 1873

o regedor da parochia,

BILHETE DE ENTERRAMENTO

Districto do Porto Concelho ou bairro Occidental

Parochia de S. Nicolau

Vae ser sepultada no cemiterio de Agramonte a sr.ª Francisca Roza , natural do Porto; idade 85 annos; estado Viuva; ~~profissão~~ de João de Pinho; moradora no Hospital de S. Francisco; foi vaccinada? Ignora-se; doente desde 4 do corr.e mez; causas certas ou provaveis da doença

falleceu de Cancro d'utero segundo o quadro nosographico legal ás 5 horas da tarde do dia 29 de Janeiro de 1873.

Nome do facultativo que passou a certidão de obito João Xavier d'Oliv.ª Barros

morada do facultativo Rua do Almada N.º 353.

O enterramento d'este cadaver só poderá effectuar-se vinte e quatro horas depois da verificação (1) do obito (2), estando o presente bilhete visto e rubricado pelo respectivo parocho.

Porto, 30 de Jan.º de 1873.

o regedor da parochia,

Visto e notado no competente assentamento d'esta parochia. Era ut supra.

o parocho,

Preço d'este bilhete, segundo a tabella n.º 1, annexa ao decreto de 3 de dezembro de 1868... nas cidades 360, nas outras terras 240
N. B. Aos mendigos conferem-se gratis; n'este caso porém o parocho deverá attestar com juramento esta circumstancia no verso d'este bilhete.

Effectuou-se o enterramento ás horas determinadas. Cemiterio dia de de 187 .

o administrador do cemiterio,

(1) Quando não tiver havido verificação, riscar-se-hão as palavras — da verificação —.
(2) Quando não tiver sido marcada pelo facultativo assistente ou verificador a hora do enterramento, nunca este terá logar antes de vinte e quatro horas depois do fallecimento, na conformidade dos regulamentos vigentes.

697 - Imprensa Nacional - 1872

Source: PT/ADPRT/AC/GCPRT/A-A/076/0092.

4 Regulamento do Conselho de Saúde [Health Council Regulation] (11-01-1837).

The deceased's personal information was then inserted by a local civil official (the *regedor da paróquia*) with the relevant details being taken from the parish registers.[5] It was the regedor's responsibility to record the identification and parentage of the deceased, as well as their age, marital status, known address/place of death, and burial location.

The burial ticket had to be purchased from the regedor and was an essential prerequisite to burial. The price of these tickets varied over time. Payment was waived, when necessary, in order to enable cemetery burial of vagrants and indigents. The regedor would only authorize a no-cost burial after the parish priest had attested to the deceased's level of poverty. At the end of each month, the regedor was required to send a list of the issued burial tickets to the municipal administrator, accompanied by the physicians' certificates and the proceeds from the corresponding fees, which were then to be forwarded to the Health Council. The burial ticket was, for the most part, a copy of the death certificate. Produced simultaneously, the two documents nevertheless served distinct purposes and, consequently, followed different administrative channels post-issue (Figure 1). While the first attested to the death and provided relevant clinical data, also functioning as a notarial document, the second served as proof of payment and/or of burial in a specific cemetery. The former informed the Portuguese health authorities; the latter was used essentially as an accounting document.

Other historical sources exist in addition to the documents issued by the regedor. These documents, which contained information about the death of an individual, were produced by various institutions and authorities, namely general hospitals, psychiatric institutions, foundling homes, jails, penitentiaries, and police authorities. Some cemetery registers also contained information on the causes of death, but as the main purpose of the document in question was to identify the buried individual, the recording of the cause of death was arbitrary. In many instances, cause of death was treated as superfluous information by those who entered it on the records. For the purpose of this study, the authors focused on cemetery registers from the city of Porto. In the 19th century there were two main cemeteries in the city: Agramonte, which served the western parishes of the municipality, and Prado do Repouso, which served the eastern zone. While in the former the cause of death was recorded systematically, in the latter, the information was rarely if ever presented.[6]

In the 19th and early 20th centuries both death certificates and burial tickets underwent periodic formal changes almost every decade. Read together, these two documents provide a broad range of information about the deceased, including biographical data (name, parentage, place of origin, age, marital status, name of spouse, occupation, address), contextual information (date and time of death, place of death, place of burial, pre-death social and living conditions), and clinical data (vaccination status, identification and duration of illness, cause of death). The relevant entries on the certificate were accompanied by the signatures of the regedor da paróquia, the physician, and the parish priest.

Over time, the certificates and tickets became increasingly detailed, reflecting the growing concerns of health authorities to ensure the systematic collection of standardized and statistically usable information. Thus, later certificates went beyond setting out the identification of the deceased and the cause of death (taken from a list of causes that was printed on the back of the certificate) and provided more detailed clinical information (vaccination, the diseases that had afflicted the deceased, their duration) and an evaluation of living conditions (see Annex 1 for a more detailed view). Physicians were also required to indicate in what professional capacity they were determining the cause of death. There were two main possibilities. The certifying doctor might be acting as the deceased's assisting physician, i.e. the deceased's doctor during their lifetime who was therefore, at least in theory, aware of their illnesses prior to the time of death. Alternatively, the doctor might be acting in the capacity of "verifying" physician, ascertaining the identity of the deceased, who was not previously known to them, and gathering further information as necessary from inquiries made of the deceased's family and close acquaintances. Notwithstanding general government guidelines as to the collection of information, the certifying officials and physicians continued to have a degree of discretion in practice as to the details set out in each certificate. Additional

5 In Portugal, parishes (*paróquias*) were ecclesiastical divisions, whereas *freguesias* were the administrative divisions of town and villages. We use these terms interchangeably. In the case of non-Catholic individuals, the relevant information would have been obtained, where possible, from their own civil registration records. Until 1910, all Portuguese individuals were presumed to be Catholic and their birth/baptism, marriage, and death were thus recorded in the parish registers. The number of foreigners and religious minorities was minimal.

6 The collection of these registers can be found at the Porto Municipal Archive (https://gisaweb.cm-porto.pt/).

information was sometimes added by hand, often for administrative purposes, such as the name of the deceased's parents or spouse (details that did not appear on the printed forms until the 1880s) or annotations indicating the presentation of a poverty certificate and exemption from the burial ticket fee. On the other hand, certifying officers or physicians sometimes omitted information from certificates, presumably because they did not consider it important or if it was sensitive or difficult to obtain.

3 LOCATING INDIVIDUAL-LEVEL CERTIFICATES IN THE PORTUGUESE ARCHIVES

A preliminary survey of Portuguese historical archives, particularly through online catalogues and digitized collections, revealed that death certificates and burial tickets issued according to the regulations have survived across much of the national territory. These collections are primarily preserved in district archives (*governos civis*). There are 21 such archives, which were established in 1835. It was at these archives that matters of public health and welfare were administratively processed under the jurisdiction of the Ministry of the Kingdom (*Ministério do Reino*). Other collections are also stored in various municipal archives.[7] At present, only the extensive corpora held by the Porto district archive are available for online inspection. It includes records for the municipalities of Maia, Matosinhos, Paços de Ferreira, Póvoa de Varzim (1846), Porto (1849), Santo Tirso, Valongo, Vila Nova de Gaia, and Vila do Conde (since 1837). The precise temporal coverage for each municipality remains uncertain, as thousands of certificates are dispersed in 368 boxes.[8] Nonetheless, we know that the series, which begins in 1837, tends to be uninterrupted from 1869 onwards — at least for the municipality of Porto — and extends until 1910, potentially amounting to 180,000 records.

There is considerable variation in the current classification status of the Portuguese district archives, particularly in terms of civil government records. In some cases, the archive status and, particularly the organization of burial tickets (*bilhetes de enterramento*) is deficient and the descriptions lack detail, which hampers access. The authors conducted research missions in 2018 to the Évora (South) District Archive and in 2022 to the three regional archives of the Azores (Ponta Delgada, Horta, and Angra do Heroísmo). The research confirmed the existence of short series of death certificates, beginning in 1841, for several municipalities in the Évora district.[9] These series are fragmentary and lack chronological continuity. That contrasts with the situation in the Azores, where longer series are available, such as those for the parish of Sé in the city of Angra do Heroísmo (Terceira Island), covering the period 1868–1888.[10] There is a substantial collection for the Azores city of Horta (Faial Island) from 1840 to 1892 and for Ponta Delgada (São Miguel Island), encompassing numerous parishes from 1839 to 1892.[11, 12]

A further online search for municipal records of death certificates and burial tickets revealed that a significant number of municipal archives preserve such documentation. These include the archives of Sintra, Cascais, Lisbon, Grândola (Alentejo), Elvas (Alentejo), Torres Novas (Santarém) and Porto. A systematic survey of municipal archives (currently 308 in total) is necessary in order to advance this research. Given that, as we stated above, death certificates and burial tickets were processed through distinct bureaucratic pathways, there is a strong likelihood of information of a similar nature being located at multiple locations. The Porto Municipal Archive in particular holds a rich set of burial registers.

7 Burial tickets also served accounting purposes and were required to be signed by cemetery administrators, thus falling under the jurisdiction of the municipal council.

8 The collection is held at the Porto district archive, within the fonds of the Civil Government of Porto, section *Assistência e saúde pública*, subsection *Cemitérios, série Bilhetes de enterramento e certidões de óbito* (https://digitarq.arquivos.pt/documentDetails/5f06ed87ddde46f09965b3a19b4acfe1; visited on 31st July 2025).

9 Namely Arraiolos, Borba, Évora, Portel, Vila Viçosa, and Vimeiro. See Arquivo Distrital de Évora, *Governo Civil*, Assistência e Saúde Pública, Estatística obituária, box 33 (1841–1855) and 34 (1857–1872).

10 Biblioteca Pública e Arquivo Regional de Angra do Heroísmo (Terceira, Azores), Câmara Municipal de Angra do Heroísmo, *Cemitérios (1816–1893)*.

11 Biblioteca e Arquivo Regional da Horta (Faial, Azores), Governo Civil (uncatalogued records, 1840–1892).

12 Biblioteca Pública e Arquivo Regional de Ponta Delgada (São Miguel, Azores), Administração do concelho de Ponta Delgada, Regedorias de Paróquia, Registo Civil.

The literature and contemporary regulations also provide valuable insights into the degree of compliance with the applicable norms. The legislative act of 3 December 1868, issued to reform the public health system, acknowledged that an earlier decree of 3 January 1837, which had introduced death certificates and corresponding burial tickets into the Portuguese system, had not been fully implemented.[13] The civil governor of Beja stated in a classified (confidential) document that the new directives had been forwarded to the municipal administrators with the proviso that "in places where burial tickets had not yet been required, their introduction should proceed only gradually, so as not to cause alarm." He admitted that only three municipalities in the Beja district were complying with the existing regulations and, even then, only irregularly, due to "the mistrust with which the population viewed this form of [government] oversight."[14] Similarly, the civil governor of Porto instructed municipal administrators not to require burial tickets in areas where public cemeteries had not yet been established, "unless [...] such a measure was already in practice." He further insisted that the authorities should not be overly strict in assessing the eligibility for free tickets, particularly in smaller communities, as the burial tickets were "more a tool of policing than a source of revenue".[15]

It is apparent that the universalization of individual death certification in Portugal advanced significantly during the 1870s, coinciding with the rapid expansion of the public cemetery network (Garnel, 2016, p. 78). In fact, there had been earlier adoption of certification practices in several municipalities — many of them peripheral — occurring as early as the 1840s and 1850s.[16] One way of tracing the spread of burial tickets after 1869, and thereby estimating their territorial coverage, is to examine the revenue collected by central government from the sale of official printed burial forms. In theory, this information could be obtained by analysing the financial accounts of each administrative district. In practice such an undertaking is currently unfeasible. We must therefore rely on alternative forms of estimation, as described below. Certain summary tables, compiled by administrative districts and preserved in the archives of the Ministry of the Kingdom, set out accounts related to the sale of these burial forms. Out of these tables we selected for analysis those that detailed the total number of tickets issued, distinguishing between "consumed" (i.e., paid for) and "free" tickets. This data was then correlated to the number of deaths recorded in the respective municipality or district. The results cover only nine of Portugal's 21 districts for the period 1869–1886. Nevertheless, they reveal marked differences in coverage: minimal representativeness in the districts of Bragança, Viana do Castelo and Braga (ranging from 4.8% to 7.4%); medium coverage in Beja (41.6%); and high to very high coverage in Portalegre, Lisboa (Lisbon), Angra do Heroísmo, and Porto. In the district of Horta (Azores), coverage was virtually complete (98.1%), which is likely attributable to its small population — the lowest district population in the country.

Table 1 *Coverage of burial tickets by deaths, in Portuguese districts, 1869–1886*

District	Coverage (%)	Year
Angra do Heroísmo	68.2	1886
Beja	41.6	1873
Braga	7.4	1871
Bragança	4.8	1873
Horta	98.1	1869
Lisboa (Lisbon)	67.3	1869
Portalegre	64.8	1873
Porto	78.1	1873
Viana do Castelo	7.2	1871

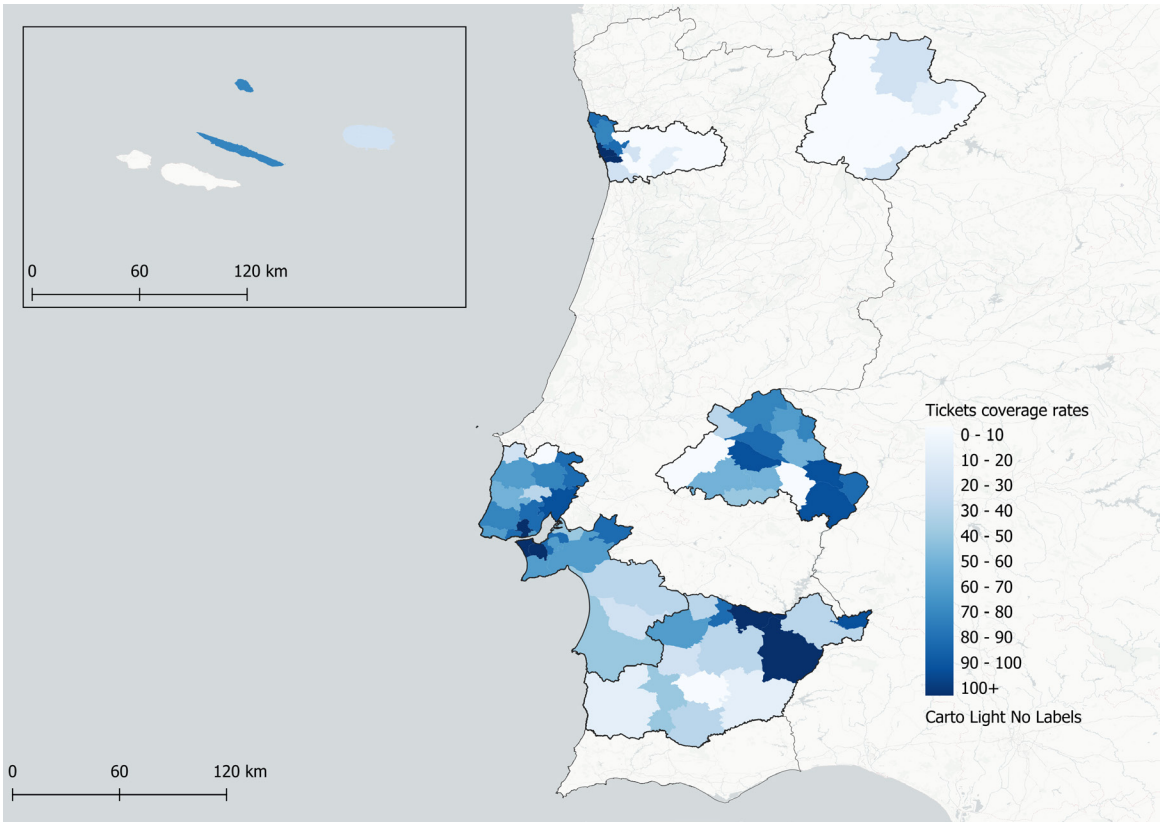
13 This discourse was reinforced through the classified correspondence sent to all civil governors in 1869. Cf. Arquivo Nacional da Torre do Tombo (henceforth ANTT), *Ministério do Reino*, Registo de correspondência expedida para várias entidades de Saúde Pública, book 1627, year of 1869.

14 ANTT, *Ministério do Reino*, bundle 2907 (1871), letter dated 1 July 1871.

15 Arquivo Distrital do Porto, *Governo Civil,* Diversas autoridades sobre saúde pública, box 983 (1869), letter dated 15 February 1869.

16 João de Pina Cabral and Rui Feijó show that in 1862, 67.5% of burials occurred in public cemeteries, ranging from only 6% in the district of Braga to more than 95% in the districts of Castelo Branco, Faro, Leiria, Lisbon and Santarém (Cabral & Feijó, 1985, p. 204).

Figure 2 *Coverage rates of burial tickets in different municipalities*



Territorial disparities within each district were also significant and deserve attention (Table 1). In Bragança, only two out of 12 municipalities had implemented the certificate system by the end of the period. In the Porto district, whilst only nine out of 22 municipalities used individual death certificates, the overall district coverage was high due to widespread use in the city of Porto itself. In Beja and especially in Portalegre — two rural and sparsely populated districts — the issuance of individual certificates was relatively widespread, particularly so in Portalegre. This demonstrates that the implementation of individual death certificates with cause-of-death declaration was not restricted to major cities and other urban areas. It owed much to the presence of public cemeteries in various rural parishes and to the commitment and administrative diligence shown by certain local authorities (Figure 2).

Concluding this section, it is important to add two final remarks. The first is that, by the early 1870s, the main cities in the country already exhibited substantial coverage of causes of death — a trend that had been occurring since the mid-19th century. We know that in 1872, the city of Lisbon had a coverage rate of 89% (including data from the hospital network), Braga had 62% in the same year and Porto (in 1873) achieved full representation.[17, 18, 19] Indeed, as the results presented in the following section show, the implementation of the decree of 3 December 1868 in the city of Porto was virtually immediate.

The second remark concerns the loss of large collections of individual death records throughout the country. Hundreds of aggregated cause-of-death tables have been preserved at Portuguese archives, most of them apparently based on individual certificates, however it seems that many of the underlying individual certificates were not preserved. It can be supposed that once the administrative tasks associated with health statistics had been completed, the conservation of the individual documents was a low priority, and the certificates were neglected or even discarded. Detailed research into individual death certification therefore requires exploration of alternative sources, particularly burial registers and other equivalent municipal documentation.

17 ANTT, *Ministério do Reino*, bundle 2906 (statistical table of the accounting of burial tickets for the district of Lisbon (1872) and bundle 2928 (Statistical table of the population of the district of Lisbon in 1872).

18 ANTT, *Ministério do Reino*, bundle 2905 (statistical table of the accounting of burial tickets for the district of Braga (1870) and bundle 2909 (Statistical table of the population of the district of Braga in 1870).

19 ANTT, *Ministério do Reino*, bundle 2920 (statistical table of the accounting of burial tickets for the district of Porto (1873) and bundle 2928 (statistical table of the population of the district of Porto in 1873).

4 DEVELOPMENT OF THE DATABASE: CONSTRUCTION, DESCRIPTION AND DATA QUALITY

In this section we apply the initial results of the collection and analysis of death certificates and burial tickets from the city of Porto in the years 1869, 1878, and 1890 as a tool to verify the quality of individual records in terms of territorial coverage, the designation of causes of death (nosologies) and other relevant aspects. We detail the main methodological steps and objectives that have guided the construction of the database, which is the first of its kind to be created in Portugal for the study of health inequalities and historical causes of death. The choice of Porto as a case study and as the basis for the construction of this database was motivated by two main factors: the importance and uniqueness of the municipality of Porto in the national context of the 19th and early 20th centuries, as well as the availability of several sources with digitized online images.

The population of the city of Porto increased significantly from approximately 60,000 inhabitants in 1850 to around 192,000 in 1911, but its relevance to the study of causes of death extends beyond mere demographic representativeness. As the second most important city in Portugal, Porto functioned as a major centre of attraction in the north of the country, with its sphere of influence extending into Spain, and particularly the Spanish region of Galicia. This dynamism was reflected in sustained migratory inflows, driven by industrialization and improved accessibility, notably through the expansion of the railway network.

By 1875 Porto, with approximately 105,000 inhabitants (Census of 1878), belonged to the group of medium-sized European cities. In demographic terms, it was broadly comparable to urban centres such as Rotterdam, Dresden, Florence, and Bordeaux, while remaining somewhat smaller than cities like Nantes or Cologne. This group of cities — generally ranging between c. 90,000 and 130,000 inhabitants — occupied an intermediate position within the European urban hierarchy. They were typically regional commercial, administrative, or former political centres, and stood clearly below the threshold of the largest European cities, which by the mid- to late 19th century tended to exceed approximately 150,000 inhabitants (Bairoch, 1988; Buringh, 2020).

In the second half of the 19th century, the city of Porto experienced major commercial expansion, driven by its trade with Brazil, connections with African colonies, and, above all, by the export of Port wine, an activity that attracted numerous British and other investors. A dynamic bourgeoisie consolidated its standing in the city. Benefitting in part from tax revenues derived from duties on wine, the municipality promoted an ambitious programme of public works. Among the most emblematic of such works were the Crystal Palace — *Palácio de Cristal* (1861), designed by the architect Thomas Dillen Jones; the Maria Pia railway bridge (1877), engineered by Gustave Eiffel; and the *Passeio Alegre* (1892), an imposing Romantic garden conceived by Émile David.

Despite this economic dynamism and the attention devoted by municipal authorities to public health and the development of medical and sanitary infrastructures, urban expansion failed to keep pace with demographic growth. That resulted in a marked increase in population density. The so-called *ilhas* (literally "islands") – rows of small dwellings built in the rear courtyards of larger buildings — became emblematic of a rapid process of industrialisation that pushed a considerable proportion of the population into conditions of acute precariousness. It is estimated that in 1885 approximately 16% of the population lived in such housing, lacking minimal standards of habitability and forming part of what has been described as the "hidden city" (Ramos, 2000, p. 394).

These socio-economic conditions provided fertile ground for rising mortality rates, notwithstanding the efforts of health authorities. Ricardo Jorge, a prominent physician and hygienist from Porto, referred to it as "the cemetery city", which had some of the highest mortality rates in the country and indeed Western Europe (Jorge, 1899, p. 323). Cholera was a recurring epidemic — most notably in 1855 and between 1884 and 1888 — alongside typhus and smallpox. Yet it was overall mortality, particularly due to the high prevalence of tuberculosis and dysentery, that chiefly accounted for the city's exceptionally elevated death rates.

The database currently being constructed will cover the period between 1869 and 1910, reflecting the availability of online digitized images of death certificates and burial tickets. The aim is to incorporate all the available death certificates/burial tickets that are held in the Porto District archive. A multiple-strategy approach has been adopted, drawing on analyzable intermediate datasets.

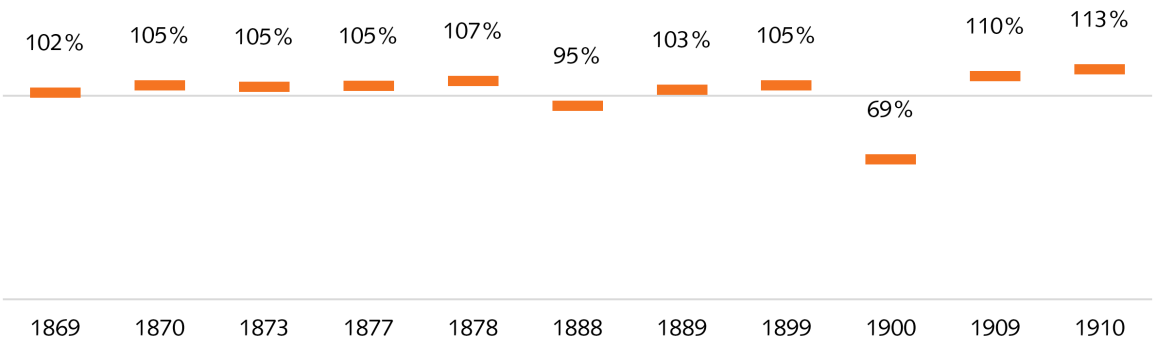
A decision was made to begin with the year 1869 (as it was the first year for which documentation was fully available) and then to proceed with the years 1878, 1890, 1900, and 1911, which coincided with national population censuses. That in turn enabled cross-referencing between sources. Following full transcription of the documents for the year 1869, the second phase was limited to the gathering of essential information, namely, the parish and date of death, sex, place of origin, age, address, indicated illnesses, cause of death, cemetery of burial and status of poverty. This data is sufficient for various types of analysis and as support for the creation of a historical GIS (HGIS) of deaths in the municipality of Porto.

The fact that the project is based on individual records rather than a posterior compilation of records in a tabular format poses a significant challenge in terms of representativeness of the deaths that occurred during the study period. To avoid constructing a biased dataset, it is necessary to compare the sources being processed with the number of deaths recorded in other historical sources such as parish registers, aggregated statistics and cemetery registers. It is important to bear in mind that some certificates may be missing from the online collection (due to destruction, loss, organizational error or digitization failures), and that some deaths may not have been registered or were registered in a parish other than the one where they actually occurred. Whilst comparison between absolute totals by source type requires caution, it does enable researchers to gauge the database's reliability as a reflection of mortality in Porto.[20]

To assess coverage a comparative exercise was performed for several years throughout the study period: 1869, 1870, 1873, 1877–1878, 1888–1889, 1899–1900, 1909, and 1910. For later years the online collection presents several gaps due to the absence of digitization or the non-existence of documents in the Porto District Archive. To balance these gaps, comparisons were made at a monthly basis for those years.

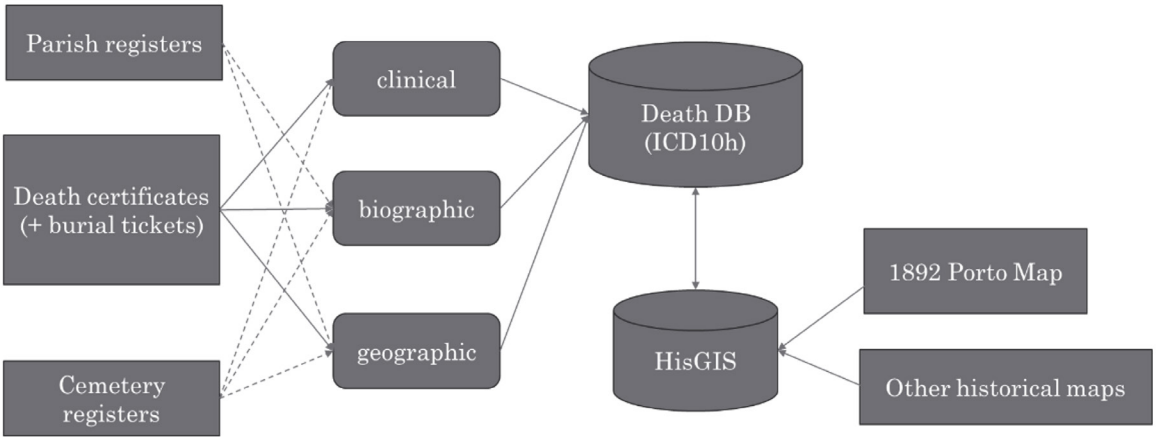
As seen in Figure 3, the coverage rates obtained are generally high, which validates the use of death certificates as a reliable source. In most years, the number of death certificates is slightly higher than the total number of deaths indicated in the parish registers. This difference may result from a combination of factors, such as the registration of deaths in parishes other than the ones in which the death actually occurred, under-registration, the exclusion of hospital deaths in parish records or the presence of non-Catholic deceased individuals. This aspect will be studied further in greater depth as more sources are processed and the database is expanded.

Figure 3 *Coverage rate of death certificates per year (regarding death in parish registers)*



20 Future plans include record linkage between death certificates and parish records, as well as the cemeteries' burial registry. An exercise was executed for the year 1869 to measure the capability to link certificates with individual deaths recorded in parish books and to assess representativeness. The exercise demonstrated that although gathering information from parish records can be time-consuming, the linkage process is straightforward and yields link results of over 95%. Information on individual deaths is corroborated and enriched with additional information pertaining in particular to family ties and socioeconomic status.

Figure 4 *Database schematics*



The database is based on the premise that each record corresponds to a single individual. While the main source consists of death records, this approach allows for greater flexibility in adding information from other structured individual sources such as parish registers, cemetery registers, and lists of the deceased that, albeit only partially, provide the same information. The combination of data from these sources, in addition to the death records themselves (and their respective burial tickets), enables the corroboration or correction of data and can enrich the database with more substantial data on socioeconomic status and family composition. The deaths database is then linked to an HGIS that allows for the spatial visualization of deaths according to the data provided by historical sources. Additionally, the HGIS uses a series of elements provided by the municipality of Porto, namely the map commissioned in 1892 from A. G. Telles Ferreira of the municipality and its land use, buildings, transport infrastructure, streets, and house numbering.[21] This HGIS is therefore an analytical tool that combines individual information with historical spatial data (Figure 4).

The workflow for the construction of the Porto death database is divided into three main phases: 1) exploration and inventory of sources, 2) transcription of primary data, and 3) data processing.

In the first phase, the work focuses primarily on understanding the archival sources, including their volume, distribution, and consistency, as well as on identifying complementary sources. Concurrently, since most (if not all) of the historical sources were generated for administrative purposes, it is crucial to understand the regulations that gave rise to the creation and circulation of these documents. This analysis also enables the researchers to obtain useful information on the physical location of the document sets that support the creation of the database. Visits to the Porto Municipal Archive and the Porto District Archive have provided the most relevant historical sources, alongside the national archives and the ministerial collections (Ministry of the Kingdom). Following the conclusion of this first phase, the scope and content of the database can be defined with greater precision.

In the second phase, data entry for the database is supported by a team of transcribers, transcribing the online images into excel tables. They follow a set of rules, described in a transcription handbook thereby reducing disparity and limiting the interpretation of values. A series of checks is in place to further improve the quality of data entry: value entry control (required formats and lengths or lists of allowed values for certain cells) and regular peer review and problem-solving sessions under the supervision of the project leaders. Lastly, an R script verifies the compliance of the transcription with the rules, identifying invalid values, which are then sorted by a main reviewer.

In the third phase, the main transcription file is cleaned and the values are normalized. Causes of death are also coded into ICD10h, the addresses are geocoded and linked to the HGIS under construction and the datasets for analysis are created. The cleaning and normalization are performed with R scripts, using mapping files, or dictionaries, to convert irregular data. Given that this database is being built over an extended period, the normalization process is executed in instances. The conclusion of each folder transcription triggers a new instance of cleaning, normalization, and coding, progressively enriching the mapping files.

21 This map is available by the Municipality of Porto on the following URL: https://www.cm-porto.pt/cartas-historicas-interativas-do-porto/cartas-historicas-interativas-do-porto

In parallel with the careful collection and coding of data, it is important to assess the reliability of the information contained in the processed sources by analyzing their production methods, their authors, and the evolution of the context in which they were produced. As we stated earlier, in terms of recording deaths, the regedor was responsible for identifying the death, while physicians had the fundamental role, in terms of public health policies, of determining the causes of death. The research findings indicate a high compliance rate with the administrative procedures for death on the part of the Porto regedores, and the analysis of cross-referencing with parish registers corroborates the information provided by them in the certificates and tickets, with rare discrepancies being detected.

When attesting to the causes of death, physicians were also supposed to follow specific procedures. They gradually became more elaborate over time and were aimed at the standardization and facilitation of statistical production on mortality. Assessing the quality of the collected causes of death requires an understanding of the practices of each physician involved, hence the importance of collecting their names, linking each death certification to a medical practitioner. In the city of Porto, there were over 100 physicians signing death certificates. They had very distinct profiles, which naturally resulted in some variability in their practices. There were private physicians, physicians employed in civil hospitals or military hospitals and doctors working in health administration as health subdelegates. Some appear only in the role of death certifiers (verifying physicians), although the majority signed as assisting physicians (i.e. doctors to whom the deceased was, or could have been, known during their lifetime). Some physicians validated hundreds of certificates annually, while others signed no more than a handful. Finally, the territorial distribution was quite imbalanced, with the most outlying parishes of the municipality having only two or three physicians, in contrast to the presence of dozens of certifying doctors in the urban center of Porto.

The application of the nomenclature of causes of death regulated by the 1843 nosological framework varied not only from one physician to another but also over time.[22] In general, about half of the certificates present causes that conform to the approved nosology, but in a third of the studied examples the physicians indicated non-regulated causes, probably originating from other nosologies.[23] The general pattern of progressive adjustment to the rules can be observed in the evolution of certification of causes of death. From 1869 to 1890, there was a significant drop in blank or incomplete certificates, as well as better adaptation of the nomenclature of identified causes to the designations defined by the statutory nosologic framework (Table 2).

Data from the Porto archives also reveals a steady qualitative improvement in information from civil and health authorities. The registration of stillbirths shows a dramatic improvement from 1869 to 1890, with the recorded stillbirth rate increasing from a mere 0.5% (which is clearly underregistered) to around 5% of the total annual births. Likewise, when observing the attribution of causes of infant and child deaths, an effort to improve diagnoses is visible in the first decade, with certificates without an indicated cause decreasing from 28.2% to just 2.6%. Finally, whilst improvements were noted in all parishes, they were particularly significant in the rural parishes of the municipality of Porto, namely Campanhã (a drop in blank certificates from 43.7% to 2.2%), Cedofeita (from 35.7% to 1.6%), Paranhos (from 34.2% to 5.4%), and Massarelos (from 19.6% to 1.4%). In terms of distinct socioeconomic groups, the difference in the number of blank certificates between those exempt from the burial ticket fee and the fee-payers also diminished from 7.1 to 1.2 percentage points. In 1890, virtually all of the certificates provide a cause of death.

Table 2 *Conformity with the official nosologies of 1843 and 1890*

	1869		1878		1890	
	N	%	N	%	N	%
Approved nomenclature	986	47.2	1588	58.4	2570	73.2
Irregular nomenclature	692	33.1	929	34.2	924	26.3
Cause of death not given	414	19.7	202	7.4	19	0.5

22 *Quadro nosographico das molestias, que podem ser causa de morte; adoptado pelo Conselho de Saude Publica do Reino* [Nosographic chart of diseases that can cause death; adopted by the Kingdom's Public Health Council], Lisboa, Typographia de M. J. Coelho, 1834.

23 The most common examples are: *tísica pulmonar* (pulmonary phtisis), *crupe* (croup), *pneumonia*, *congestão cerebral* (cerebral congestion) and *caquexia* (cachexia).

5 CONCLUDING REMARKS

The use for historical research of death certificates indicating individual causes of death in Portugal remains largely unexplored and this paper represents a first and tentative approach to the subject. Public health management in Portugal — particularly after the advent of liberalism in 1834 — was one of the areas of governance that mobilized the most resources both at the central government level and within municipal authorities. This is clearly reflected in the substantial documentary production associated with these processes. From a legislative standpoint, Portugal remained at the forefront of the implementation of individual death certification: requiring the cause of death to be verified by a physician; determining which causes would be included in the nosological official classification scheme; and mandating burial in public cemeteries. However, this modern legislation was still confronted with a territory that was bureaucratically fragmented, which significantly hindered the implementation of the procedures and supervision of the various agents and institutions involved.

The research documented in this paper demonstrates that, across the country, various collections have survived — some dating back to the 1840s — though temporal and geographic discontinuities are considerable. One of the greatest challenges for researchers aiming to understand health inequalities in Portugal through the medium of individual certificates will be to carry out a thorough survey of Portuguese archives in search of such documentation. Based on what is currently known, it appears feasible to study certain communities using limited chronological series, particularly after 1869, when the use of individual certificates specifying cause of death began to expand. The records presently being processed by the research team, covering the city of Porto, already demonstrate the existence of a large and coherent documentary corpus, the quality of which improved markedly over time.

At present, the research focuses on the causes of death among infants and children in the city of Porto, the factors of socioeconomic inequality and their impact on child mortality, and the relationship between mortality and spatial contexts. Some additional important steps have already been taken. First, the production of a poster on the institution of individual death records in Portugal and the official medical nomenclature has helped to illustrate the context of these sources and the recording of causes of death in Portugal between 1834 and 1910.[24] Secondly, a preliminary survey of sources — specially the extensive research already conducted within the fonds of the Ministry of the Kingdom (which the government authority that oversaw public health) — has clarified many of the issues discussed in this article and highlighted the potential of Portuguese individual death records for future research.

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APPENDIX

Table 1A *Evolution of the content of death certificates and burial tickets*

Period	Type of document	Producer	Contents
1830s–1840s	Death certificate (DC)	*Regedor da paróquia* [Village chief officer]	Fields in the form: Place of registry (parish and higher tiers) Time of death (hour, day, month, year) Name Birthplace Age Civil status Occupation Address Burial place *Regedor* signature Added information (not in form): Filiation Husband/wife name Other information
		Physician	Fields in the form: Cause of death Nosology used Physician signature
		Parish priest	Added information (not in form): Poor status Priest signature
	Burial ticket (BP)	*Regedor da paróquia*	*Same as death certificate plus:* Cause of death (copied from certificate) Nosology used (copied from certificate)
		Parish priest	Fields in the form: Priest signature (attesting revision and registry in parish death records) Added information (not in form): Poor status
		Cemetery guard/ administrator	Fields in the form: Cemetery Date of burial Cemetery guard/administrator signature
			Changes
1840s–1850s	DC	Physician	Used nosology disappears as field (as it becomes regulated by law and all physicians should follow the same)
	BP	*Regedor da paróquia*	Used nosology disappears as field (since it disappears from death certificate)

Period	Type of document	Producer	Contents
			Changes
1860s–1880s	DC	Physician	Fields added in the form: Vaccination status Duration of the disease Certain or probable causes of the disease Role of physician (assistant, verifier or both)
	BP	*Regedor da paróquia*	Fields added in the form, copied from certificate: Vaccination status Duration of the disease Certain or probable causes of the disease
			Changes
1880s–1890s	DC	Physician	Fields added in the form: Filiation Legitimacy Residence status (permanent/temporary) Sun exposure of house Hygienic conditions
	BP	*Regedor da paróquia*	Fields added in the form, copied from certificate: Filiation Legitimacy Residence status (permanent/temporary) Sun exposure of house Hygienic conditions
			Changes
1890s–1900s	DC & BP	-	Same content, only layout changes
			Changes
1900s–1910s	DC	Physician	Fields added in the form: Cause of death (main disease) Cause of death (terminal accident) Burial within legal deadline or not, and why? Observations