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By Joana Maria Pujadas-Mora and Enrique Perdiguero-Gil

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Advancing Precision in Childhood Causes of Death

Wording and Source Discrepancies in Palma (Spain), 1836–1930

Joana Maria Pujadas-Mora
Open University of Catalonia & Center for Demographic Studies

Enrique Perdiguero-Gil
Miguel Hernández University of Elche

ABSTRACT

Assessing the precision of causes of death is essential for gaining a clearer understanding of past disease incidence and its evolution. This study introduces a novel lexicographical approach to examining childhood mortality in the port city of Palma between 1836 and 1930, drawing on three sources that recorded individual causes of death: burial registers, parish books, and the civil register. In this sense, we estimate the number of words used in diagnoses to trace how efforts toward greater precision and standardization evolved over time. These are reflected in the increasing use of diagnostic qualifiers and the near disappearance of lengthy, undetermined diagnostic descriptions — particularly in cases of congenital diseases, which are a significant group within ICD10h related to infant mortality. To further explore the meaning of diagnoses, we use medical and general dictionaries, focusing on the labels teething, fever, and diarrhoea to better understand diagnostic discrepancies between burial and parish records. These discrepancies appear to stem largely from the higher incidence of death certificates without a stated cause in parish books — likely due to the requirement in burial registers to include the name of the certifying physician. In the case of teething, we observe a notable association with digestive system diseases, as well as with fever itself. Finally, it is worth noting that diarrhoea came to be understood more as a symptom than as an independent disease as a result of new ways of conceptualising disease that developed during the 19th century.

Keywords: Infant mortality, Child mortality, Causes of death, Diagnostic precision, Lexicographical analysis

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1 INTRODUCTION

The epidemiological profiles of past societies in the 19th and 20th centuries can be studied by collecting and analysing individual causes of death recorded in parish and civil registers. This process requires a significant investment of time and resources to build representative samples, yet it yields rich details that allow for an in-depth evaluation of health changes over time. This richness, however, contrasts with the highly aggregated epidemiological data published in state statistical bulletins, which usually use the International Classification of Diseases (ICD) to present the data (Moriyama et al., 2011). While the ICD has been periodically updated, these revisions hinder long-term comparisons — an essential aspect of understanding mortality decline within the framework of the first demographic transition. In this regard, the ICD10h coding scheme, developed by the SHiP network team led by Professor Janssens[1] provides an ideal tool for comparing mortality trends across both time and space. It enables the processing of large numbers of historical disease descriptions from various European linguistic regions, while ensuring compatibility with modern disease patterns as it is built upon the contemporary ICD10 system. Another key feature of the scheme is its focus on coding words rather than diseases, minimizing interpretative bias in historical records (Janssens, 2021; Janssens & Devos, 2022).

The reconstruction of epidemiological patterns from individual-level cause-of-death data relies on the accuracy of recorded causes, the dissemination and social adaptation of medical-scientific knowledge, and the influence of disease classifications and nomenclatures (Anderton & Leonard, 2004; Bernabeu Mestre, 1992). Assessing the precision of these records is essential for gaining a clearer picture of past disease incidence and change, ultimately advancing in the understanding of current epidemiological patterns (Mackenbach, 2021; Reid et al., 2015). However, research on the reliability of cause-of-death records requires a lexicographical approach to understand their coetaneous meaning (Barona, 1993). In this regard, few studies on epidemiological patterns in infant mortality have partially drawn on medical dictionaries (*e.g.,* Hiltunen Maltesdotter & Edvinsson, 2025; Janssens & Devos, 2022; Raftakis, 2021).

In this context, the paper aims to analyse how causes of death were diagnosed, focusing on their wording and variations in registration practices. It offers a novel perspective on the evolution of medical knowledge and the interpretation of disease over time by drawing on both medical and general dictionaries, alongside a wide range of sources that report causes of death simultaneously — an approach not previously explored for this region and rarely applied to other geographical contexts. This approach is theoretically situated within the study of the determinants of the demographic and epidemiological transitions, as well as the shifting patterns of disease from past to present (Mackenbach, 2021; van de Walle, 1986). The study is grounded in a case study of infant and child mortality in the port city of Palma (Spain) between 1836 and 1930 — a crucial period in the demographic transition, as these age groups were directly responsible for the significant gains in life expectancy. Furthermore, this process coincided with a shift in the way childhood was perceived by both society and medicine (Bernabeu-Mestre et al., 2007).

2 THE CITY OF PALMA AS AN ECONOMIC AND SANITARY HUB

Port cities constitute essential objects of epidemiological research, as they historically functioned as primary nodes for the introduction and dissemination of diseases, as the SHiP network has prominently highlighted[2], while simultaneously serving as hubs of economic dynamism. In the case of Palma, its commercial relevance was particularly pronounced, facilitating both mainland and international trade. This economic activity was underpinned by commercial agriculture and industrial production — principally textiles and footwear — operating within a putting-out system, small workshops and factories attached to mercantile capital (Escartín, 2001; Manera, 2001). From a demographic perspective, Palma had over 40,000 inhabitants in 1842, making it the tenth most populous provincial capital in Spain out of the 50 existing at the time. By 1900, its population had grown to over 60,000,

1 May this article serve as our tribute to Professor Janssens for her outstanding contributions to historical demography, particularly in her works on the study of health history. Her dedication and scholarship have profoundly shaped the field, leaving a lasting legacy that will continue to inspire researchers for years to come. We extend our deepest gratitude and admiration.

2 For more information on the SHiP network, visit https://www.ru.nl/en/departments/radboud-institute-for-culture-and-history/ship.

placing it twelfth nationally — a position it retained in 1930 with more than 88,000 residents. Despite this marked demographic growth, Palma exhibited the highest life expectancy in Spain, reaching 42.5 years in 1900 and rising to 53.2 years by 1930, a trend largely attributable to persistently low infant and child mortality rates (Pujadas-Mora, 2009, 2024). These figures make Palma a valuable case study and a natural laboratory for understanding the determinants of the demographic and epidemiological transitions, allowing us to observe the distinctive factors that set the region apart and positioned it as a pioneer in these processes.

In terms of healthcare provision, the Balearic Islands — of which Palma is the capital — had a higher density of qualified physicians than the national average: slightly more than one doctor per 12 km², compared to one per 16 km² in the rest of Spain (Gallego, 2009). Despite this, the province had lacked a university since 1829, and higher education would not be re-established on the islands until 1978. As a result, aspiring doctors were required to pursue their training on the mainland, typically at leading institutions such as the University of Barcelona, known for its longstanding reputation, expertise, and international standing in medical education (Canaleta, 2013).

In contrast, the number of medical associations in the Balearic Islands was remarkably high compared to other Spanish regions. These associations, largely concentrated in Palma, played a key role in the dissemination of medical knowledge, serving as a substitute intellectual infrastructure in a province that lacked a university, as referred to before (Granjel, 2006). Throughout the period under study, different medical institutions were active in Palma — though not always simultaneously — including the Mallorcan Phrenological Society, the Medical-Military Academy of Mallorca, and the Mallorcan Surgical Academy. From the second half of the 19th century onward, two major institutions emerged as the primary authorities setting medical and professional standards well into the 20th century: the Royal Academy of Medicine and Surgery of Palma and the Medical-Pharmaceutical College (the precursor to the current Medical College). Both institutions were grounded in the exchange and dissemination of medical knowledge, whether through regular meetings for the discussion of clinical cases or through publications such as the *Revista Balear de Ciencias Médicas* (Balearic Journal of Medical Sciences), the official journal of the Medical-Pharmaceutical College. This journal not only published the scientific vanguard of the region but also served as a conduit for introducing medical innovations from abroad. It was widely exchanged with other medical journals across Spain, as well as with counterparts in Europe and the Americas (Rodríguez Tejerina, 1981). Its pages also reported on medical papers presented at national and international congresses (Prats & Pujadas-Mora, 2008). All of this suggests that the medical professionals of Palma were well attuned to contemporary scientific developments, thanks to the dynamic circulation of knowledge fostered by the city's professional associations, as outlined above. Moreover, the participation of Mallorcan physicians in international circuits of medical knowledge is also evidenced by documented commissions to study emerging therapies firsthand — such as the case of doctors sent to the Pasteur Institute in Paris to learn about the newly developed antidiphtheric serum (Pujadas-Mora, 2009).

In 19th-century Spain, within the framework of emerging liberal states, the provision of medical services was predominantly considered an individual responsibility. In contrast, public health — an area increasingly regulated and promoted by the state — sought to prevent threats to collective well-being, particularly epidemics. It also encompassed charitable health care aimed at those unable to afford private medical attention. In Palma, such care was provided by the Hospital Provincial (Muñoz Machado, 1975, pp. 32–33). Moreover, institutions delegated by the state — namely, municipal and provincial councils — were also only responsible for enforcing sanitary measures in times of epidemic risk, but also for providing ongoing health-related and charitable services to their populations. In the case of Mallorca, this translated into the widespread presence of municipal medical doctors across the island from the second half of the 19th century, including in the capital, Palma. This early and comprehensive implementation placed Mallorca ahead of many other Spanish regions in the development of local medical services (Pujadas-Mora & Salas Vives, 2014). These public services were further complemented by the charitable care offered in religious convents run by religious orders. From the early decades of the 19th century, these institutions demonstrated a pronounced commitment to community health (Moll, 2005). From the 20th century onwards, there was also a notable proliferation of private clinics closely associated with certain medical dynasties (Canaleta, 2013).

3 SOURCES AND METHODS

To address our research objectives, we will use two individual-level death record sources — parish and burial registers — for the period 1836 to 1881, during which they were compiled concurrently, along with a third source, the civil register, for the years 1881 to 1930. Burial registers began in 1821 with the opening of a new cemetery outside the town centre, following the hygienic/public health principles established in Spain since the late 18th century. From that point onward, burials were no longer permitted within the city, let alone inside churches. These records were intended to include the deceased's name, age, parents, parish of residence, time and cause of death certified by a medical doctor, and, additionally, whether a will was made, along with its date and the executor's name[3]. Notably, in the case of parish registers — which date back to the *Rituale Romanum* (1614) or even before — the inclusion of the cause of death was not mandatory until the Royal Order of December 1, 1837 (Bernabeu Mestre, 1992).

While earlier parish records occasionally noted causes of death, it was the Royal Order that established their mandatory inclusion in death certificates "The illness that caused the death, according to the doctor's certification, without which the corpse cannot be buried". It was one of the state administration's attempts to rationalize the parish register of vital events, following the repeated failures to secularize it (Muro et al., 1996). However, unlike burial registers, it remains unclear whether the medical certification requirement was consistently enforced, as parish death certificates did not include the certifying doctor's name, unlike burial records (Pujadas-Mora, 2009).

The comparison of both sources reveals that burial registers contain more death entries than religious registers for the period 1836–1881, with an average difference of 5%. For individuals who died at ages three or four, however, the discrepancy can reach up to 10% at certain points (Pujadas-Mora, 2009). This can be attributed to the fact that, during epidemics, cemetery records were maintained with greater diligence due to the strict control over burials as part of epidemic containment efforts. Furthermore, the centralized nature of burial registers — where different books were overseen by a single individual — contrasted with the decentralized parish system, in which each parish maintained its own register and had its own registrar. Likewise, we begin using data from the civil register in 1882, as the earliest years show limited reliability — a pattern also observed in other Spanish regions (Brel Chacón, 1998). From that point onward, the civil register became the most comprehensive source, leading most studies on epidemiological patterns to prioritize its use (Ramiro Fariñas, 1998; Robles González, 2002; Sanz Gimeno, 1997).

In this sense, our analysed data contains 14,917 deaths between birth and age one and 23,354 deaths between ages one and four. Each cause of death was coded using the ICD10h coding system, resulting in 358 codes for infant deaths and 450 codes for child deaths. These codes were then grouped into causal categories, according to the system referenced (Janssens, 2021). For infant mortality, these groups are as follows: air-borne diseases (5,306 deaths), congenital and birth disorders (1,866), convulsions (32), external causes (30), ill-defined and unknown (1,004), other infectious (307), other non-infectious (2,839), stated to be 'unknown' (517), teething (2,221), and water-food borne diseases and weakness (339). For child mortality (ages 1–4), the classification is: air-borne diseases (5,642 deaths), convulsions (307), external causes (109), ill-defined and unknown (1,299), other (4,586), other air-borne diseases (935), other infectious (510), respiratory (3,606), stated to be 'unknown' (593), tuberculosis (547), water-food borne diseases (5,095), and weakness (125).

To clarify the contemporary meanings of expressions such as teething, fever, and diarrhoea — commonly found as causes of death in burial books and parish registers — we consulted the principal medical dictionaries published in Spain from the early 19th century to the 1930s as a direct approach to understanding the circulation of medical knowledge at the time. Although it is unclear whether certifying physicians directly used medical dictionaries, they nonetheless provide an authoritative and contemporaneous account of how diseases were understood and described at the time. Therefore, they remain valid and valuable references for interpreting the causes of death recorded in historical documents, as they reflect the medical framework within which such terms were likely conceptualized. The dictionaries used in this study are compiled in the resource *Tesoro Lexicográfico Médico* (TELEME, Medical Lexicographical Treasury), which brings together eight dictionaries of medical terminology — one from the 18th century and seven from the 19th century (Gutiérrez Rodilla & Pascual, 2022).

3 Article 10º of the proclamation of the constitutional town council of Palma, dated 29th of March, 1821; AMP, FP851: *sobre la habilitación de Cementerio Rural*.

Additionally, to capture a broader, less specialized interpretation of disease-related terms, we have used the dictionaries of the *Real Academia Española* (Royal Spanish Academy) gathered in the *Nuevo Tesoro Lexicográfico de la Lengua Española* (New Lexicographical Treasure of the Spanish Language).

4 EVALUATING THE PRECISION OF CAUSES OF DEATH IN CHILDHOOD

To assess the precision of recorded causes on children's death certificates, as noted above, we propose two analytical strategies: examining the wording and identifying discrepancies in the diagnoses of causes of death. The wording of diseases is a relevant factor in the development of modern medical language as a result of the evolution of medical knowledge and practice (WHO, 2022). Thus, we take as a reference the number of words used in diagnoses to trace how the quest for greater precision and standardisation has evolved along with the historical shift from symptom-based causes to signs of injury, dysfunction or aetiology, especially of an infectious nature (Beemer, 2009). This approach focuses on the linguistic formulation of diagnoses, rather than their contemporary meaning. To explore the meaning of diagnoses, we employ a lexicographic analysis of three causes of death, two of which — teething and fever — are classified by the ICD10h as ill-defined diseases. Between 1836 and 1930, teething accounted for approximately 800 deaths, while fever was recorded as the cause of death in around 1,500 cases. Additionally, we examine diarrhoea, one of the most significant causes of mortality among water-borne diseases, given its importance within the Mediterranean epidemiological pattern, which accounted for more than 600 deaths during the same period.

4.1 WORDING OF CAUSES OF DEATH BY COUNTING WORDS

In Palma, between 1836 and 1930, an average of 60% of recorded causes of death in infant mortality were described with a single word, compared to nearly 70% in child mortality (see Figure 1a and 1b). However, the proportion of causes of death recorded with two words increased over time. In the case of infant mortality, this trend shows a continuous rise throughout the study period, becoming particularly evident after 1900, when it grew from 20% to 40% of all recorded causes. For child mortality, the share of two-word diagnoses reached 30% by the end of the series. A significant factor in this shift was the increasing use of qualifiers, which provided additional details about the progression of diseases, their anatomical location, or descriptions of pathological processes, etc. This was especially notable in the registration of airborne and non-infectious diseases, as we will discuss later.

In the case of infant mortality, three-word causes of death held little significance, primarily concentrated in the early years of the study. This is largely due to their frequent association with congenital and birth-related disorders, often encapsulated in the recurring diagnosis of *no ser viable* (not being viable) (see Figure 1a). However, within this same category, four-word causes had greater prominence, driven by the recurrent use of expressions such as *no ser del tiempo* (not being of time) and the persistence of ambiguous descriptions like 'irritation/inflammation in the womb', which would lose significance after 1870. For child mortality, also from the 1870s onward, there was a significant rise in three-word causes of death, peaking around 1910. This trend may, in part, be attributed to the increasing use of qualifiers (e.g., chronic pulmonary tuberculosis, acute capillary bronchitis). However, the continued presence of vague terms — such as stomach disease, heart disease, chest complaint, gastric intestinal irritation, or serous stroke — also contributed to this pattern, particularly until the late 19th century (see Figure 1b). In the case of child mortality, multiple causes of death were slightly more frequent than in infant mortality, though their overall proportion remained relatively low. Many of these cases fell into the category of three-word causes, as they often involved two causes of death linked by a preposition (e.g., *diarrea por enteritis* (diarrhoea due to enteritis)) or a conjunction (e.g., measles and diphtheria).

Diagnoses related to water-food borne or airborne causes tend to be the most concise, with over 60% of infant mortality cases and just over 50% of child mortality cases described in a single word. Additionally, 40% and 35% of these cases, respectively, are summarized in just two words (see Figure 2a and 2b). Among these two-word diagnoses, qualifiers such as acute/chronic, intestinal/gastric, cerebral, serous, or capillary are common. In contrast, congenital and birth disorders in infant mortality typically require three to eight words, as previously noted. It is also noteworthy that under the 'other non-infectious' group of causes of death we will find, especially during the 19th century, expressions such as: disease/irritation/inflammation in a particular region or organ. Specific examples

would be 'disease of the head' (*enfermedad de la cabeza*), 'disease of the lung' (*enfermedad en el pulmón*), 'inflammation of the left arm' (*inflamación en el brazo izquierdo*), 'inflammation of the right thigh' (*inflamación del muslo derecho*), etc. These formulations are vague as they only present the symptomatology, which would also indicate a lack of precision in diagnosing the disease that led to death. For infant mortality, these long diagnostics account for 59% of four-word diagnoses, 26% of five-word diagnoses, and 70% of six-word diagnoses (see Figure 2a). In child mortality, they represent 47% of three-word diagnoses, 81% of four-word diagnoses, and 62% of five-word diagnoses (see Figure 2b). In the same vein, it is worth highlighting ill-defined causes in five-word diagnoses, such as the phrase 'common class disease' — a vague and non-specific diagnosis found in infant mortality cases.

Figure 1a *Number of words by diagnostic label in Palma's infant deaths, 1836–1930*

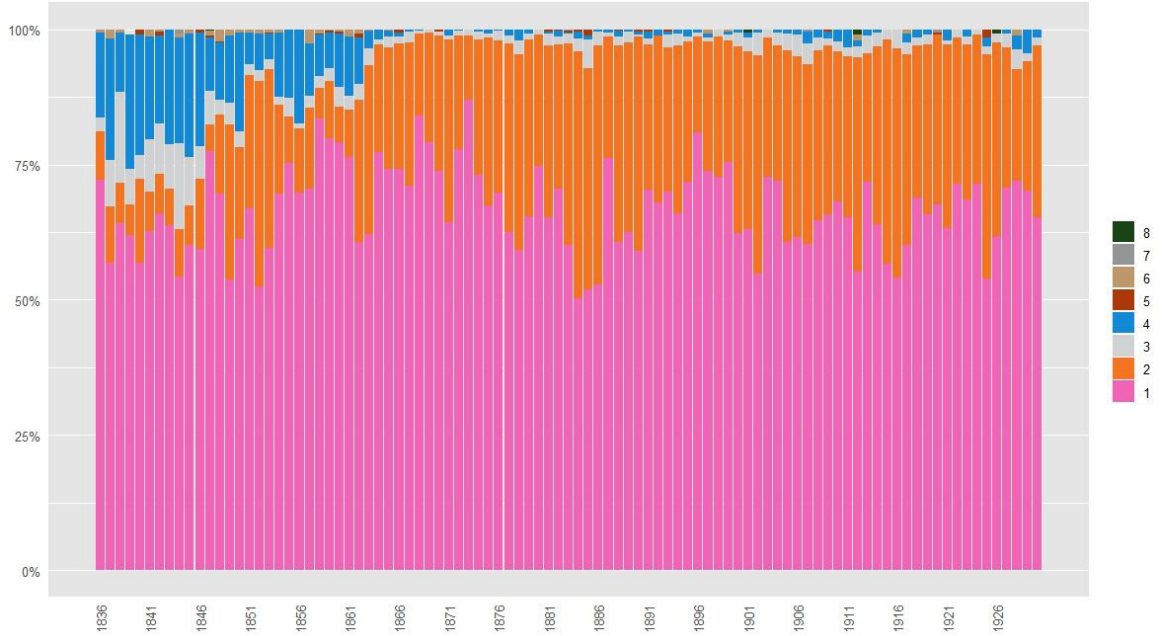


Figure 1b *Number of words by diagnostic label in Palma's child deaths, 1836–1930*

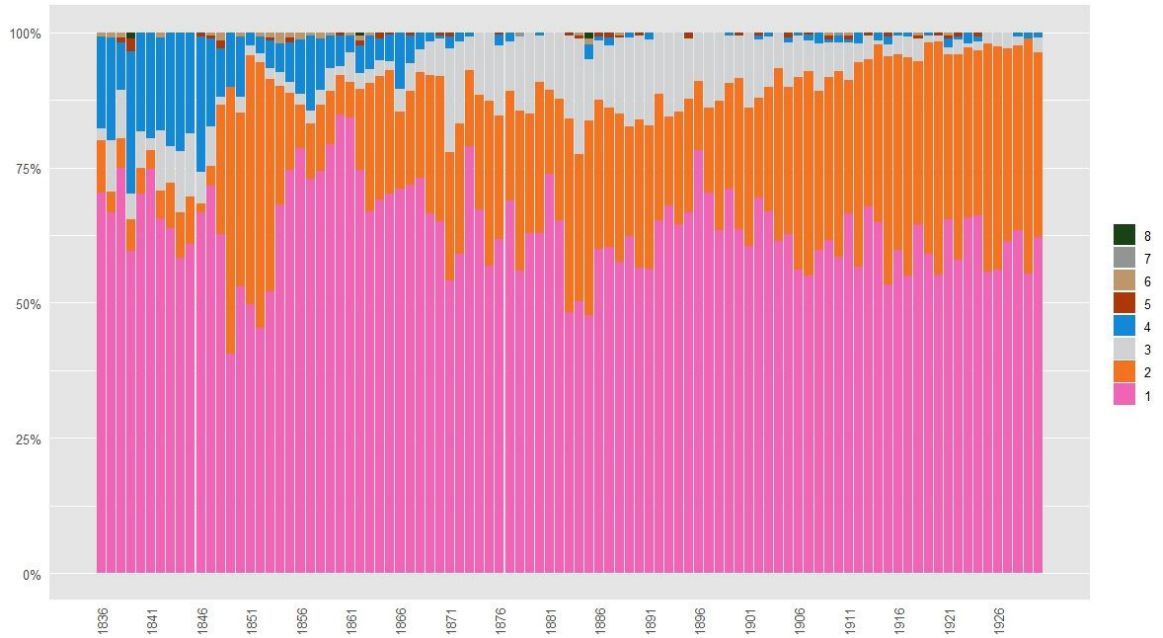


Figure 2a *Number of words for causal group in Palma's infant deaths, 1836–1930*

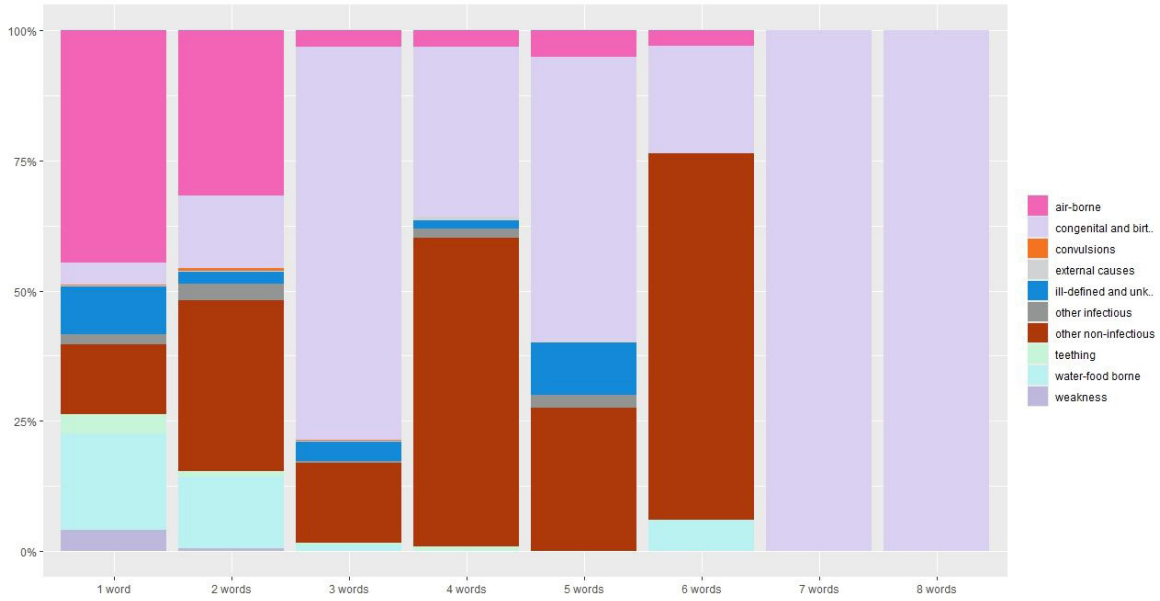
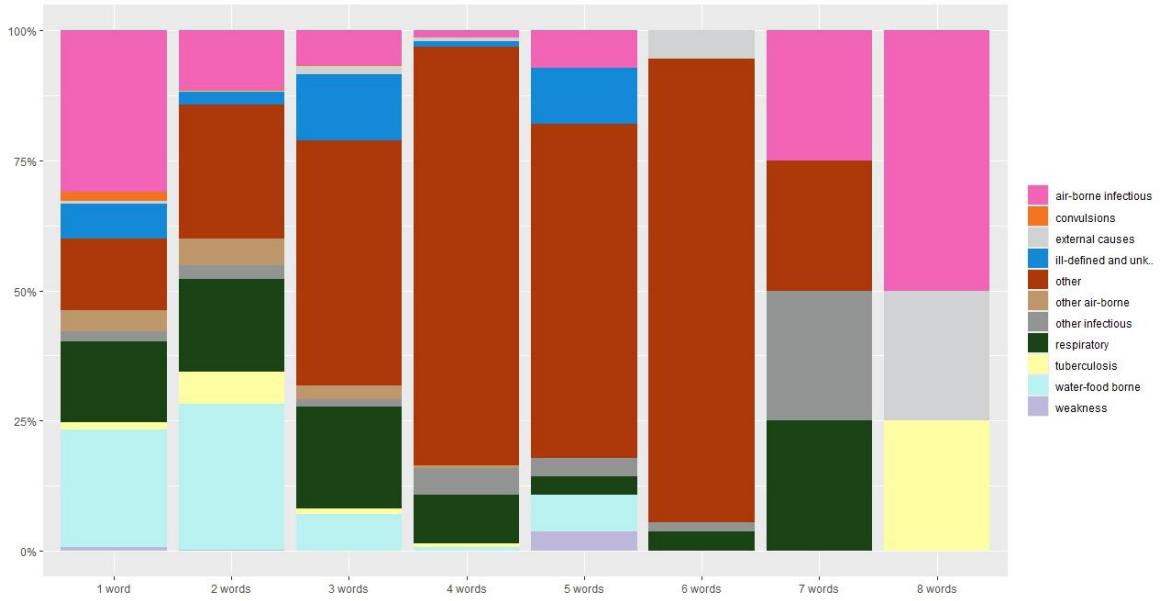


Figure 2b *Number of words for causal group in Palma's child deaths, 1836–1930*



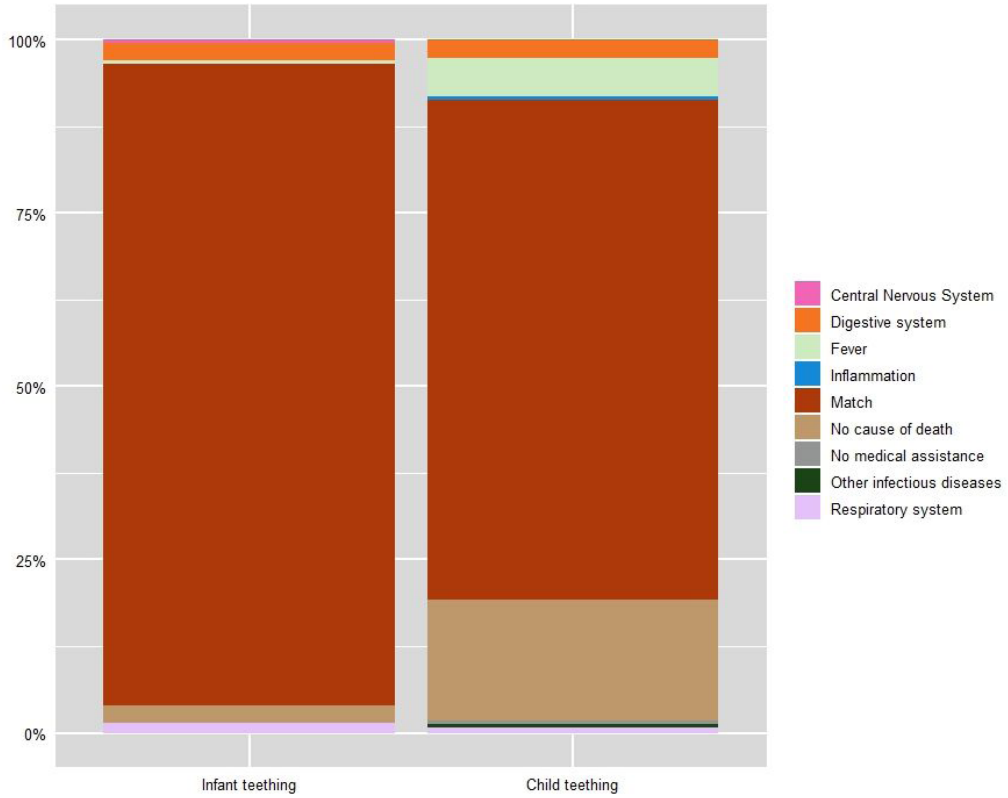
4.2 DISCREPANCIES IN RECORDING PRACTICES

The study of discrepancies in causes of death from different sources has a long-standing tradition in medicine, aimed at improving treatments and ensuring the quality of mortality statistics (Smith Sehdev & Hutchins, 2001). In this regard, we propose a historical perspective on this methodology by comparing burial registers and parish registers — two sources that record individual deaths but differ in nature and purpose — allowing us to examine the evolution of cause-of-death descriptions over time, specifically from 1836 to 1881, using three specific diseases: two ill-defined (teething and fever) and one infectious of gastric nature (diarrhoea), as mentioned before.

4.2.1 TEETHING

In the early 19th century, Ballano's medical dictionary (1805–1807), a highly influential reference, explicitly stated that teething could lead to death. However, later medical dictionaries consistently defined teething as a physiological process and the period during which teeth emerge — aligning with both general dictionaries and those of the Royal Spanish Academy. Yet, by the end of the century, Larra y Cerezo's dictionary (1894) once again emphasized the potential dangers of teething, although it does not explicitly state that it can result in death. This may help explain why it remains a persistent cause of death.

Figure 3 *Percentage of teething records in burial books that match or do not match the same cause of death in parish registers for childhood deaths in Palma, 1836–1881*



Note: We have chosen to classify the diagnoses of causes of death by organ systems in order to unpack their possible meanings, given the low specificity of many recorded causes.

When comparing deaths recorded as teething (*dentición*) during the first year of life in burial books, we find that in more than 90% of cases, this same diagnosis appeared in parish registers (see Figure 3). However, in the case of child mortality, this percentage dropped to just over 70%, as children in this age group were likely already being diagnosed with the specific diseases that caused their deaths, rather than being recorded with a cause of death that merely referred to the period in which it occurred. These correspondences also reflect notable synonymy, including expressions such as *dentadura* (which is also translated as teething), *enfermedad de los dientes* (disease of the teeth), *de las muelas* (of the molars), *difícil dentición* (difficult teething), or *dentición laboriosa (*laborious teething), among others.

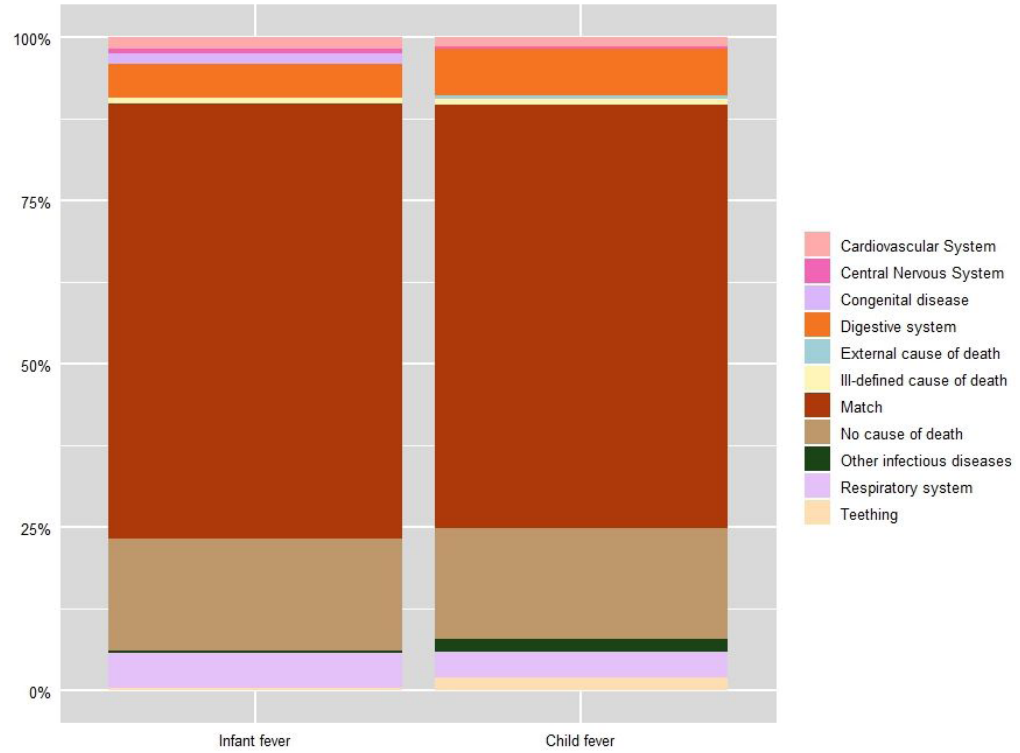
The discrepancy between both sources is due to the higher proportion of entries without a recorded cause of death in parish registers — over 17% for child mortality compared to just over 2% for infant mortality. As previously mentioned, the mandatory medical certification of the cause of death from the outset in burial records had a positive impact on reducing the number of deaths recorded without an apparent cause (Pujadas-Mora, 2024). This may also have led to a more frequent use of diagnostic labels that did not necessarily correspond to well-defined diseases but served to avoid leaving the cause of death unspecified. Furthermore, it is also important to consider that this diagnostic label was consistently used by doctors themselves. Perhaps, doctors and the responsible persons of parish registers found it practical for communicating with parents of the deceased, given their acculturation of this diagnostic label to adapt it to their own experience and knowledge, as many fatal diseases coincided with the teething period (Perdiguero, 1993). The fact that teething was an ill-defined cause of death helps explain why other similarly imprecise diagnoses, such as *calentura* (fever), also appear in parish registers. In the case of infant mortality, fever accounted for just over 5% of recorded deaths. Moreover, the strong seasonality of teething — concentrated mainly in the summer months (calculations not shown) — suggests that in more than 2% of cases, both for infant and child mortality, deaths were recorded in parish registers under a diagnosis related to the digestive system, whether infectious or not. Moreover, there was a belief that the diarrhoeal processes that occurred during the teething months should not be treated, as the expulsion of the drool was considered healthy. Purgatives were even used to force it out. It is important to note that this behaviour was guided by the recommendations of academic medicine in previous decades (Perdiguero, 1993). While some cases were also described under respiratory or other infectious diseases in parish registers, their overall representation remained minimal.

4.2.2 FEVER

The diagnosis of fever (*calentura*) in burial records matched that in sacramental registers in more than 60% of cases, both in infant and child mortality. However, in both groups, a significant percentage of deaths — 17% — had no assigned cause (see Figure 4). In this regard, the physician Fernando Weyler (1808–1879), author of a medical topography of the Balearic Islands (1854), highlighted the challenges of diagnosing fever "they do not present themselves with such decisive characteristics as to permit their prompt and exact classification" (p. 236). He further noted that "the only way to understand what happens in the fevers of Majorca is to analyze them individually" (p. 237). Weyler classified fevers into five types: inflammatory, gastric, intermittent, pernicious, and a final group that included ataxic, adynamic, nervous, and typhoid fevers. This classification likely stemmed from the nosography of Philippe Pinel (1745–1826), which had a significant influence across Europe. In Pinel's system, fever formed one of the most important disease categories (López Piñero, 1961, 1983). The use of these terms, which appear in a more concise form in the consulted medical dictionaries, reflects the evolving meaning of the term fever over time. Pinel structured his nosography around lesional signs, moving away from symptoms as a classificatory criterion.

These considerations help explain the discrepancies in causes of death between the two sources, particularly for diseases related to the digestive system — both infectious and non-infectious — which account for more than 5% of cases. They are comparable in magnitude to those found in respiratory diseases for infant mortality and slightly lower for child mortality. It is also worth noting that for both infant and child mortality — though more prominently in the latter — there is a correspondence between teething (recorded in parish books) and fever (noted in burial records). However, both terms are ill-defined, suggesting that the disease responsible for death was not known. Furthermore, the correspondence between fever and congenital diseases in cases of infant mortality highlights the challenges of accurate diagnosis at this early stage of life.

Figure 4 *Percentage of fever records in burial books that match or do not match the same cause of death in parish registers for childhood deaths in Palma, 1836–1881*



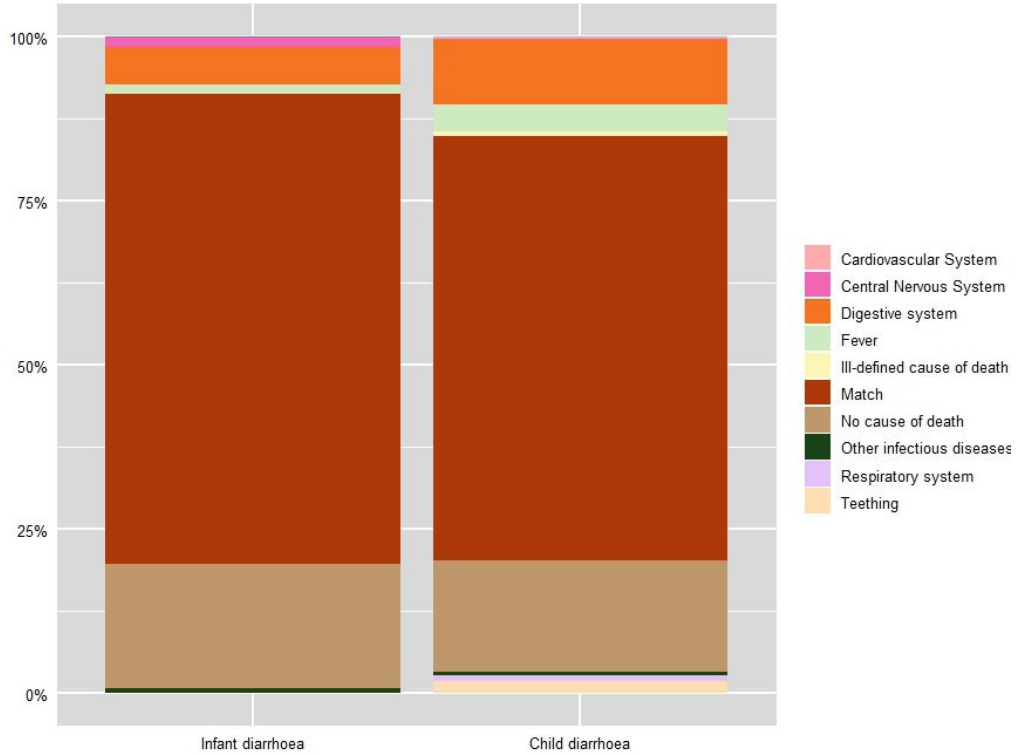
Note: We have chosen to classify the diagnoses of causes of death by organ systems in order to unpack their possible meanings, given the low specificity of many recorded causes.

4.2.3 DIARRHOEA

In the case of diarrhoea, the coincidence between the two sources was over 70% for infant mortality and 65% for child mortality (see Figure 5). In fact, diarrhoea is a condition that is less likely to be misinterpreted. Medical dictionaries from the analysed period consistently define it, logically, as the frequent passage of fluid stools from the anus. However, it is important to note that diarrhoea, often with stools of varying appearances, was frequently considered the direct cause of death. As the 19th century progressed, medical dictionary authors, after defining diarrhoea, clarified that it was, indeed, a symptom of various underlying diseases. Some dictionaries even recognized diarrhoea as indicative of conditions such as hepatic disorders, typhus, cancer, intestinal tuberculosis, enteritis, cholera, or intestinal parasitosis (Cuesta, 1884, pp. 51–52; Larra, 1894, pp. 311–312). This shift in understanding, considering diarrhoea as a symptom rather than an independent disease, may offer a possible explanation for some of the discrepancies observed, which we will address further. Rather than listing diarrhoea as the cause of death, it would have been attributed to the underlying disease responsible for it.

In the parish registers, the most significant discrepancies came from cases with no assigned cause (18.98% and 17.03%, respectively). The other most relevant group of discrepancies is concentrated in diseases of the digestive system with diarrhoea which appear in parish registers with very vague expressions such as disease of the stomach, inflammation of the belly or irritation of the belly. In the case of child mortality, the presence of 'fever' is also significant (4.05%), a poorly defined disease that could be explained by the ease of recording this generic cause instead of diarrhoea. For this reason, Weyler (1854) stated that, although dysentery "offers a very distinctive symptom, which does not exist in diarrhoea, which is the presence of blood in the evacuations, nevertheless, both diseases are often confused under the single concept of dysentery" (p. 231). In this sense, we have found in the parish books expressions of causes of death registered as 'courses of blood and vomiting'. However, the percentage of convergence between diarrhoea and dysentery as a cause of death was very low. Moreover, Weyler added that "diarrhoea is more common than dysentery, causes little havoc and is usually of short duration" (p. 231). Additionally, it can be observed that diarrhoea was linked to pulmonary tuberculosis (Caballero, 1886, p. 252; Larra, 1894, p. 312). Furthermore, as noted earlier in the discussion of wording, expressions related to chronology (e.g., chronic/acute) begin to emerge to describe diarrhoea, signalling the growing emphasis on pathochrony. This marks a shift away from the more localized perspectives on the disease.

Figure 5 *Percentage of diarrhoea records in burial books that match or do not match the same cause of death in parish registers for childhood deaths in Palma, 1836–1881*



Note: We have chosen to classify the diagnoses of causes of death by organ systems in order to unpack their possible meanings, given the low specificity of many recorded causes.

As previously documented in the diseases analysed above, we observe again how this condition is linked to teething. Notably, Cuesta (1884, p. 52) distinguishes a 'diarrhoea of teething', attributing it to an excess of blood flow to the intestine resulting from inflammation (though not explicitly termed as such) in the oral cavity. However, he does not suggest that this could be the cause of death. By the end of the century, Larra (1894, p. 312) similarly notes that diarrhoea can be caused by teething. Thus, several medical authors in the dictionaries consulted associated diarrhoea with teething — a form of diarrhoea that, as noted earlier, was considered beneficial by some segments of the population.

5 CONCLUSION

The shift towards shorter cause-of-death descriptions reflects a broader trend away from vague terms and ill-defined diseases. This transition coincided with a growing emphasis on using specific qualifiers to refine diagnoses, especially in the context of infectious diseases. As medical knowledge advanced, the need for more precise and accurate descriptions became increasingly apparent, contributing to a more standardized approach in documenting causes of death, as demonstrated by the case of Palma (Spain) during the early stages of the demographic transition. In fact, our analysis of the wording and variations in the registration of causes of death reveals that these shifts were the product of a reconceptualization of pathology. At the same time, significant changes in the disease environment — driven by the demolition of city walls, the expansion of municipal sanitation services, the hiring of public physicians, the development of water and sewage infrastructure, and even shifts in the virulence of certain diseases — contributed to a transforming epidemiological pattern. However, the accuracy in determining causes of death — understood as medical judgments — was primarily due to a deeper understanding of disease made possible by those advances in medicine, as well as the fact that recording these causes eventually became the sole responsibility of physicians.

An alternative approach to tracing the evolution in the accuracy of recorded causes of death involves analyzing discrepancies between burial records and parish registers. Most of them can be attributed to the fact that a large number of deaths in the parish records were not assigned any cause. This likely reflects stricter adherence to the requirement of recording medically certified causes of death in the burial books, where such documentation was mandatory from the outset. In contrast, parish registers — having operated for centuries prior — were only later subjected to this obligation. Other discrepancies arise from different spellings or terms that can be considered equivalent according to the terminology of the time. In some cases, though relatively few, parish records began to include terminology for causes of death that reflects an evolving understanding of disease. These are causes that are no longer based solely on symptoms — or at least are informed by nosographies that seek to incorporate other classificatory criteria, such as those derived from pathological anatomy. However, there remains some uncertainty about who was responsible for recording the causes of death in these records, since, unlike the burial books, the name of the certifying physician was not included — something that might have prevented causes being recorded without a diagnosis, even if it meant resorting to ill-defined categories. Likewise, the association of stroke with descriptions such as diarrhoea or fever is difficult to explain, although such cases are relatively rare.

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