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Assessing epidemic outbreaks in late medieval Catalonia (1348–1530): from communities to family units

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ABSTRACT

The present article aims to assess the epidemic sequence after the Black Death and up to around 1530 in Catalonia (northeastern Iberia). It specifically examines rich sources to assess its effects in the framework of European dominant scholarship on demographic and socioeconomic dynamics that are too often only centred on the lethal plague between 1348 and 1351. It resorts to a robust sample of urban and rural communities throughout Catalonia endowed with documentary sources that provide both direct evidence (institutional death counts and obituary books from the cities of Barcelona and Vic and various rural parishes) and indirect evidence (using will series as a proxy) complemented with municipal registers and narrative sources from different observatories throughout Catalan territory. It reconstructs the specific chronology, geography and changing features in terms of the duration and seasonality of epidemic crises in this area. Similarly, it offers local estimates of mortality directly due to some of the major outbreaks of plague and other diseases from 1362 to 1530 that improve on traditional approaches based on simple comparisons of total population figures at different moments. Finally, through the best documented cases, there are some preliminary insights into child and adult mortality trends in times of contagion, as well as their household-clustered impact. The observed frequency, distribution and approximate mortality rates of some epidemic episodes should contribute to resituate current hypotheses of the effects of demographic shocks arising from epidemics in premodern Europe.

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1. Introduction: bridging the gap between European debates and the discontinuous literature on epidemics in late medieval Catalonia

The resurgence of epidemics as a historical subject has rekindled interest in some of the most pivotal disease episodes of the premodern era, including those of the Late Middle Ages. However, this renewed focus presents two significant challenges. First,

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as stressed by recent works (mainly Slavin, 2021, 2024), it requires balancing the dominance of studies on the Black Death and its wide-ranging effects with the broader succession of subsequent outbreaks between the late 14th and early 16th centuries. Second, it highlights the difficulty of working with sources that illuminate this entire sequence, a crucial phase in the demographic evolution of the European population.

This article aims not only to stress the significance of epidemic cycles occurring between 1351 and around 1530 but also to delve deeper into the study of their uneven impact across different regions. Additionally, it seeks to examine how these epidemics affected family units, drawing preliminary insights from particularly well-documented cases. For this purpose, a robust sample of mortality trends within urban and rural communities in Catalonia (northeastern Iberia) during the above-mentioned chronology will be taken as a reference. Thanks to a combination of different types of sources ranging from direct evidence of deaths to registers that can be used as a proxy of mortality, we propose a reconstruction of epidemic crises in this area of the northwestern Mediterranean. Complementarily, we attempt several analyses at the micro-level. They provide localized mortality estimates from disease outbreaks using direct evidence of victims, surpassing traditional methods that rely solely on population comparisons over time. This approach enables a detailed assessment of epidemic patterns, including outbreak duration, geographic spread, and seasonality. Additionally, it offers insights into infant and adult mortality trends across epidemic cycles and explores methodological avenues for analysing household-clustered impact.

The early phase of the so-called Second Plague Pandemic, which began with the outbreak of the Black Death in the western Mediterranean in late 1347, has been the subject of extensive debate (Cohn, 2008; Alfani-Murphy, 2017). Among other research questions regarding the environmental context, the genomic sequence of *Yersinia pestis* or the geography and speed of the pandemic's emergence (Slavin, 2021; Spyrou et al., 2022; Green-Fancy, 2025), this article is framed within one of the main topics of debate: its demographic impact. As part of a broader ongoing project, the research discussed in this article only engages with some of the wide range of specific issues briefly outlined below.

It is generally agreed that real catastrophes like epidemic mortality crises (irrespective of the specific diseases or the etiology of epidemic crises) have shaped populations in different ways throughout history. In this regard, since the mid-20th century, there has been considerable acceptance among scholars of the idea that epidemics changed their features during the Late Middle Ages, losing intensity and thus contributing to a different mortality regime during the 16th century in which epidemic outbreaks involved less stress and more moderate death rates. However, by improving the representativeness of the samples and case studies, especially from northwestern Europe, this assumption has become far more nuanced. This evidence challenges the idea of a linear decrease in the severity, duration, and spread of infectious disease outbreaks. Moreover, there is no indication that between the 14th and 16th centuries diseases transitioned from broadly affecting entire populations to targeting more specific demographic groups (Curtis, 2021; Curtis & Roosen, 2017; Slavin, 2024).

Competing arguments have been made regarding whether disease waves were more frequent and devastating in urban centres or, alternatively, in rural settlements. For instance, several studies on England emphasize the significant mortality caused by 15th-

century plague outbreaks in both urban and rural areas (Gottfried, 1978, pp. 141–142). Nonetheless, more recent research centred on the so-called ‘*pestis secunda*’ (1356–1366) in the same territory suggests that it had a greater impact in towns than in the countryside, possibly due to worse health conditions in the former (Slavin, 2024, pp. 464–465). Similarly, scholarship on northern Italy asserts that, at least from the perspective of contemporary observers, rural outbreaks were considered negligible (Carmichael, 1983, p. 519). Conversely, strictly focusing on the Black Death and assuming it as rat-and-rat-flea-based plague, Benedictow (2021, pp. 847–861) asserts having an empirical basis to establish a ‘a rule of inverse correlation between population density and morbidity and mortality rates’, so epidemic diseases spread more quickly and lethally in the countryside or small-scale settlements. In our article we discuss some aspects concerning this.

By contrast, we do not yet have empirical data to fully engage in broader debates on the socioeconomic impacts of epidemics. However, these discussions remain within our research scope and will be briefly outlined to contextualize the significance of our intended contribution. First, the initial wave of the Second Plague Pandemic has been seen not only as a mortality event but also as a catalyst for broader demographic and economic shifts (Alfani, 2024, pp. 1935–1944). Despite lacking a more comprehensive perspective beyond the specific episode of 1347–51, it is linked to significant long-term transformations on a vast geographical scale, including changes in family structures, marriage patterns, and fertility and birth rates (Hajnal, 1965; Edwards & Ogilvie, 2022), along with evolving ways of living and personal perceptions (Klapisch-Zuber, 2008). Regarding the economic consequences of the Black Death (and generally excluding later waves), scholars have debated its role as an ‘equalizer’ in terms of wealth distribution and social mobility: some argue that the outbreaks contributed to reducing inequalities (Scheidel, 2017) or fostering social mobility dynamics (Alfani, 2022). Others go further, suggesting that the Black Death played a crucial role in the modernization of European society, the rise of capitalism (Benedictow, 2021, pp. 894–5; Belich, 2022, pp. 248–255), or even as a starting point for divergent economic trajectories on a global scale.¹

The devastating outbreak between 1347 and 1351—which, in fact, had already begun spreading across central and western Eurasia and North Africa in the late 1330s—has traditionally shaped extensive research on various aspects of late medieval society. Whether viewed as an exogenous or an endogenous shock, it has framed studies on European territories such as England (Bailey & Rigby, 2012; Campbell, 2016), France (Baratier, 1961; Galanaud, Galanaud & Giraudoux, 2015) and Italy (Herlihy, 1967; Caferro, 2018; Luongo, 2022). Many scholars, including those cited, identify the plague as a turning point, marking a milestone in areas such as wage trends, living standards for both rural and urban populations, seigneurial incomes, and feudal rents – all of which contributed to shifts in social inequality.

It is crucial to emphasize that many of these processes are often attributed as being direct short- or long-term consequences of the Black Death. However, the significance of subsequent waves—beginning with the outbreak of 1356–1366—has only been acknowledged by few scholars. For instance, Brenner (1982, p. 63) suggested that the persistence of plague may have hindered population recovery throughout the 15th century. More recently, G. Alfani (2022, pp. 23–25) similarly argued that epidemic cycles had a less straightforward impact on socioeconomic structures than traditionally assumed, with various institutional adaptations emerging in response to the deadly 1347–1351 episode.

Only in recent years has the precise sequence of outbreaks from the 1360s onward—and their effects on specific regions—begun to receive closer scrutiny. In England, ongoing research by P. Slavin (2024) has contributed to this reassessment, following observations of an underestimation of the ‘disruptive succession of environmental and epidemiological events’ between approximately 1348 and the early 1380s (Bailey, 2021, pp. 135–185). This work has complemented earlier studies that focused on restricted social groups, such as monastic communities (Hatcher et al., 2006). In short, viewing the 1348–1351 pandemic as the primary turning point for numerous historical phenomena has led to an excessive concentration of scholarship on this event, often at the expense of both earlier and later periods. Consequently, the precise chronology of plague and other disease waves in the 15th and early 16th centuries remains uncertain, as do their demographic impact and broader socioeconomic consequences.

The literature on late medieval mortality crises in Iberia shares several aspects of this large body of works on the impact of the Black Death and subsequent outbreaks in Western Europe (Pérez Moreda, 2020). Geographical asymmetries also prevail, and the deficits are evident beyond the predominant interest in the plague that broke out in 1348 and lasted into 1350 in some southern regions of the peninsula (Castán Lanasa, 2020). Even when focusing on Catalonia, existing research presents a fragmented picture. A mix of uneven local studies and broader investigations—often lacking continuity—has yielded divergent and imprecise results. As we will emphasize, this stands in stark contrast to the potential offered by the abundant and well-preserved documentary sources in this area of the northwestern Mediterranean.

Certainly, the limited advances compared to other European territories are to a large extent the result of a historiographical tradition whose roots can be traced back to the 19th century. Then, several works, following the positivist spirit of the historians of the time present in other countries like Italy or England, combined with a contemporaneous concern about the latest occurrences in southern Europe of bubonic plague, aimed to review the series of diseases registered mainly in Barcelona from the 14th century onwards. Their authors resorted to local chronicles, royal edicts or sparse municipal sources to find anecdotal evidence on these episodes (Villalba Guitarte, 1803; Viñas Cusí, 1907). Half a century later, thanks to publications (more often syntheses than primary research) by key authors on historical demography in Spain such as J. Nadal, in the case of Catalonia or, more precisely, the city of Barcelona, along with other Spanish regions (mostly from the 16th century onwards), was incorporated into the pioneering (but at the same time controversial) lists of the leading book by Biraben (Biraben, 1975–1976; Roosen & Curtis, 2018; Benedictow, 2019). Later, aside from partial studies on post-Black Death records in Vic and Girona (Bautier, 1990; Guilleré, 1995, 1993), no systematic efforts have been made to reconstruct plague mortality in the Catalan principality from the late 14th to the early 16th century. The only available reference work, Camps Clemente and Camps Surroca (1998), suffers from significant methodological and historical contextualization shortcomings. The gaps in research on this specific region—particularly regarding the 15th century – have become even more apparent in recent publications. The greatest contribution made to date focuses on pre-Black Death outbreaks in Catalonia, specifically those from the 1280s to 1348 (Maltas Montoro, 2022) and those mostly centred on later onslaughts in Barcelona, by Günzberg (1989, 2010).

To understand the scope and limitations of historiography on epidemics in Catalonia, it is useful to situate it within the broader framework of research on other territories of the Crown of Aragon, where studies on Valencia are relatively abundant (Rubio Vela, 1979, 1994–95; Iradiel, 2006), followed to a lesser extent by those on Majorca (Reixach Sala, 2023b; Santamaría Arández, 1973) and Aragon (Shirk, 1981). Likewise, it should be compared with the progress made decades ago on Navarre (Berthe, 1987; Monteano, 1999) and with more recent studies that have improved the understanding of Castile and Portugal, particularly for the 15th and 14th centuries, respectively (Ortego 2025; Silva 2021a, 2021b).

Paradoxically, the lack of knowledge about key aspects of the epidemic sequence in late medieval Catalonia has not prevented these phenomena from playing a significant role in the dominant hypotheses about various dynamics of the period, often constructed through comparison with broader European trends. This includes demographic processes such as population decline in urban centres and, especially, in rural areas—exemplified by the phenomenon of *masos rònecs* (abandoned family-based farmsteads) in northeastern Catalonia (Ferrer i Mallol, 2001; Richou Llimona, 2012, pp. 101–113; Mallorquí, 2020). These dynamics have frequently been linked to assumptions of massive migrations from countryside to towns, a seigneurial reaction, increasing peasant stratification, or rising social unrest, as well as innovative institutional responses (Feliu Montfort, 1999; Furió, 2017; Catalan Vidal, 2023, pp. 121–149; Álvarez-Nogal et al., 2020).

Overall, despite the various hypotheses explored in different directions, the existing literature does not provide a clear picture of the epidemic cycles that occurred relatively frequently in Catalonia from 1348 to the early 16th century. Since the core issue is not necessarily a lack of sources, we aim to bridge this gap by analysing an initial sample—one that could be expanded in the medium term—through new perspectives and successive levels of analysis. As outlined above, our objective is to establish a solid empirical foundation for future comprehensive research on the demographic and socioeconomic effects of late medieval epidemics. To this end, we extend our focus to the outbreak of 1530, which is considered the final milestone before a prolonged period of relative respite, preceding the dramatic epidemic episodes of the 17th century (Betrán Moya, 1996, p. 127).

2. The sample: cases and sources

The sample in this paper consists of a wide range of settlements throughout late medieval Catalonia. It encompasses some of the main towns, apart from Barcelona, Girona, Vic and Manresa, Tarragona, Lleida and Cervera (although these three only with respect to narrative and municipal sources), and small towns of reference with more than 1,000 inhabitants, such as Castelló d'Empúries and Sant Feliu de Guíxols, as well as smaller settlements with around 500 dwellers such as Guimerà and Santa Coloma de Queralt. It also includes rural communities with fewer than 200 or even 100 inhabitants (Table 1). From a territorial perspective, the sample is relatively well-balanced (Fariás Zurita & Orti Gost, 2003). While the northeastern region (referred to as 'Old Catalonia') is best represented due to its extensive collections of preserved notarial records, most of the rare early parish death registers come from the central and southwestern areas (Figure 1).

To identify mortality patterns during epidemic waves from 1348 to 1530, our research draws on two distinct sets of documentary sources. The first consists of direct evidence of deaths, including the exceptional death registers commissioned by the municipal



Table 1. Sample of towns, small towns and rural communities under study with estimates of total population (1360–1515).

	1360		1378		end 14th century		1496		1515	
	hearths	inhabitants	hearths	inhabitants	hearths	inhabitants	hearths	inhabitants	hearths	inhabitants
Barcelona	6568	29556	7295	32827	6695	30127	5794	26073	6613	29758
Lleida	2234	10053	1218	5481					1201	5404
Tarragona	1366	6147	860	3870			578	2601	749	3370
Girona	1860	8370	1470	6615	1342	6039	992	4464	1019	4585
Cervera	1212	5454	485	2182			436	1962	490	2205
Manresa	1031	4639	481	2164			305	1372	315	1417
Vic	622	2799	321	1444	449	2020	575	2587	545	2452
Castelló d'Empúries		2500*	no data	no data			391	1759	no data	no data
Sant Feliu de Guixols	250	1125	258	1161	265	1192	258	1161	240	1080
Calonge	153	688	100	450			95	427	106	477
Guimerà	152	684	174	783			92	414	103	463
Santa Coloma de Queralt	145	652	161	724			101	454,5	153	688
Guardia dels Prats	41	184	50	225			33	148,5	37	166
Vilabella	47	211	45	202			21	94,5	28	126
Albi, l'	119	535	63	283			91	409,5	98	441
Barberà de la Conca			88	396			21	94,5	75	337
Conesa	125	562	108	486			42	189	33	148
Vallmoll			64	288			62	279	66	297
Vila-rodon	167	751	105	472			59	265	76	342
Vallclara	no data	no data	28	126			no data		no data	
Cabra del Camp	57	256	50	225			57	256	51	229
Vilosell	no data	no data	61	274			no data		no data	
Torredembar-ra	36	162	28	126			51	229	75	337
Pont d'Armentera	34	153	27	121			19	85	23	103
Santa Perpetua de Gaià	37	166	25	112			10	45	30	135
Sant Boi de Llobregat	166	747	266	1197			147	661	179	805
Sant Esteve de Cervelló			120	540			26	117	25	112
Sant Pere de Riudebitlles	72	324	59	265			37	166	22	99
La Llacuna	18	81	15	67			56	252	63	283
Vilaverd	54	243	51	229			21	94	22	99
Torroja del Priorat	no data	no data	no data	no data			32	144	37	166
Granyena de Segarra	no data	no data	52	234			24	108	55	247
Tarres	18	81								

The approximate figures of inhabitants derive from the application of the usual rate of 4.5 people per hearth: Feliu Montfort (1999). Sources for data: Barcelona from Orti Gost (1999); Orti Gost in personal communication, which we appreciate; Sales i Favà (2021, pp. 19–21). Girona from Reixach Sala (2022, p. 571). Manresa from Orti Gost (1999, pp. 755, 777). Vic from Puigferrat Oliva (2021, pp. 51, 55, 58–59, 62–65). Cervera from Verdés Pijuan (2019); Sant Feliu de Guixols from Orti Gost (2018, p. 475). Castello d'Empúries (asterisk indicates that the figure is a simple proposal by the local scholarship due to the absence of records) from Reixach Sala (in press). For the rest, lists of hearths of 1360, 1378, 1496 and 1515, successively: Arxiu de la Corona d'Aragó, Real Patrimoni, Mestre Racional, Volums, general series, 2590; Redondo García (2002); Iglésies Fort and Feliu Montfort (1998).

government of Barcelona during epidemic outbreaks from 1457 onwards, as well as burial records or obituary books preserved in some places. The second includes collections of testamentary evidence, which, as we will emphasize, have already been used by several medievalists as a proxy for mortality crises.

The death counts (or bills of mortality) in Barcelona are the result of translating into a written record in the institutional diary of the municipality for the first time on 15 May 1457 the searches for corpses (known as ‘cerca de morts’) commissioned by the municipal authorities. These searches were introduced at least from an outbreak in 1429 (Viñas Cusí, 1907, p. 375). Some scholars compared them with the bills of mortality of 17th-century London (Smith, 1936). Generally speaking, an agent was ordered to go around the city’s parishes to be informed by priest of daily deaths, distinguishing the victims of plague from deaths due to other reasons. This mechanism with a systematic written record was repeated during the epidemic waves of 1475–1476, 1483, 1489–1490, 1494, 1497, 1501, 1507, 1515, 1520, and 1530, as well as in later outbreaks that fall beyond the scope of this study.² The exceptionality of the source brings it closer to the well-known death books (‘libri dei morti’) of certain northern Italian cities such as Milan, with similar records from 1452 (Cohn & Alfani, 2007; Carmichael, 2022).



Figure 1. Map of the places included in the analysed sample. Note: 1- L’Albi, 2- Barberà de la Conca, 3- Cabra del Camp, 4—Conesa, 5—Pont d’Armentera, 6—Granyena de Segarra, 7- Guàrdia dels Prats, 8—La Llacuna, 9—Sant Esteve de Cervelló, 10—Sant Pere de Riudebitlles, 11—Santa Perpètua de Gaià, 12- Tarrés, 13—Torroja del Priorat, 14—Vallclara, 15—Vallmoll, 16-Vilabella, 17- Vila-rodona, 18—Vilaverd, 19—Vilosell, 20—Torredembarra, 21—Sant Boi de Llobregat. Source: Authors’ own based on Table 1.

The other direct evidence on deaths available in late 14th-15th-century Catalonia consists of the earliest examples of parish registers dating back to 1330. Concretely, the first preserved example is from the rural parish of Granyena, close to Cervera, in Central Catalonia, and in the western area of the extensive bishopric of Vic. It is dated between 1330 and 1331. This and other records from the second half of the 14th and 15th centuries represent an early development within the broader European context, preceding the reforms of the Council of Trent (1545–1563). It was only after this council that parish priests were required to systematically record baptisms, deaths, and marriages in all communities (Simon Tarrés, 1989). Given the current state of research, it appears that these early death registers, predating the 16th century, were limited to certain Catalan bishoprics—namely Vic, Barcelona, and Tarragona—and were not maintained in the other five: Elna, Girona, Urgell, Lleida, and Tortosa. They were likely the result of initiatives promoted by diocesan synods, which also contributed to some degree of standardization, at least within each diocese. At their core, these records responded to the need for economic rationalization in parishes, particularly for tracking services provided by rectors and other clergy. These included assistance in administering the Eucharistic sacraments (such as the viaticum, along with the necessary accessories like crosses or candles), the celebration of anniversary masses, the ringing of bells, and the excavation of burial pits. While local variations exist in the completeness and format of these records, this variability does not affect the fundamental information used in our analysis: the date of burial and the name of the deceased, gender and classification as an adult or newborn. Regarding the latter, in the Premodern Crown of Aragon, the category of *albat*—in the absence of a fixed distinction between minors and adults concerning death and mortuary practices—is generally accepted to refer to children aged nought to seven years. However, this classification could extend up to 12–14 years, as those who had received Holy Communion might qualify for the more elaborate and costly funeral rites typically reserved for adults (Codina, 2002, p. 69; Obarrio Moreno, 2012).

The exceptional obituary registers preserved by the cathedral of Vic start only slightly later than the earliest records from the village of Granyena and provide a continuous series from 1348 to the end of the period under investigation. Notably, the series begins in August 1348, shortly after the outbreak of the Black Death in this region of Catalonia (possibly by May), and extends until 1854, with only a few gaps. For the period under study, aside from some scattered years with incomplete data, notable gaps appear in 1385–1387, 1409–1423, and 1443–1449. The concentration of these gaps in the first half of the 15th century is likely due to changes in the institution's organizational and archival structures rather than disruptions caused by major mortality crises. In fact, significant epidemic episodes are documented in Catalonia during these periods only in 1410, 1419–1422, and possibly 1449, suggesting that the recording capacity was not systematically overwhelmed by outbreaks (Supplementary material). The entries correspond to burials in the cathedral cemetery, organized chronologically by year, month, and day. They document both young people and adults, men and women alike, and including both laypeople and clergy. The nomenclature used to identify each individual may offer clues, allowing for some distinction between 'youth' and the broader adult population, particularly when individuals are recorded not only by name and surname but also as the 'son of' or 'daughter of'. In contrast to obituary books from smaller settlements, the funeral

records in Vic mention newborns or *albats* only sporadically. As a result, child mortality cannot be systematically analysed in this case.

In addition, although the episcopal city of Vic was a single parish of the cathedral, some people were buried in the cemeteries of a mendicant convent or those of five small hospitals and were not registered in the studied source (Bautier, 1990, 1995). At the same time, it is important to account for the presence of a small Jewish minority with its own designated burial sites. However, by the last third of the 14th century, this community comprised only a dozen or so heads of families. For several possible reasons—such as conversions, especially in 1391, or emigration from the city—they are no longer documented in the records of the following century (Llop i Jordana & Ollich i Castanyer, 2016-2017, p. 69).

In view of the above, by examining a sample of wills drawn up between 1356 and 1400, C. Guilleré and B. Gabry proved that burial outside the cathedral was only chosen by less than 5% of the individuals that elected the Franciscan convent in the same city of Vic (Guilleré, 1995, pp. 123-124; Gabry, 2002-3). Thus, it has been estimated that the cathedral cemetery, excluding those buried outside this site and an average figure of 15% of infant mortality, centralized (in other words, the source under examination captures) around 80% of the burials, therefore of deaths registered in Vic, at least until the end of the 15th century (Puigferrat Oliva, 2021).³ Moreover, despite the aforementioned gaps, the obituary records in the analysed source maintain consistent coverage. While they may not precisely reflect the absolute number of burials over time, the variations in burial counts can be considered a reliable indicator of mortality trends in this Catalan city.⁴

Complementing the records from Vic, two exceptional cases of obituary books exist for urban parishes in Barcelona: Santa Maria del Pi and Sant Just i Pastor. These two parishes were among the most populous and geographically extensive in the city, encompassing a diverse socio-economic population. Unlike the records that existed in other parishes, such as Santa Maria del Mar, which disappeared in the year 1936, they preserve discontinuous series from the periods 1372-beginning of the 16th century and 1388-beginning of the same century, respectively. Broadly speaking, these records document the deaths and funeral rituals of Christian inhabitants from all social strata within these parishes, including the poor and marginalized. The death registers of the mentioned parishes in Barcelona are organized into three distinct sections: 'cossos', which include adults and young people; 'albats', referring to children under the age of seven or, in some cases, up to 12 (as previously explained); and records of anointing or extreme unction for those who received this sacrament. From the earliest preserved register until the mid-15th century, each category maintained a separate section with its own chronological sequence of entries. However, from the mid-15th century onwards, all records were unified into a single chronological sequence (Hernando Delgado, 2014).

Finally, the rest of the registers of deaths with very similar features are preserved for several rural communities in central and southwestern Catalonia. As mentioned, they were mostly located within the archbishopric of Tarragona, the bishopric of Barcelona and the western part of the large bishopric of Vic.⁵ Admittedly, this collection is relatively scattered and contains discontinuities, with each community having records that span only a few decades. However, there are some notable exceptions. The villages of L'Albi and Pont d'Armentera, for instance, possess nearly complete series from approximately 1380 to the early 16th century. Additionally, the parish of Sant Boi del Llobregat, located

near Barcelona, maintains records from 1375 to the late 15th century, making it another significant case worth highlighting (Codina, 1999, 2000, 2001, 2002).

Turning to the other major source that allows us to approach the epidemic cycles, the wills, it is worth noting their diffusion in a diverse sample of large and medium-sized urban centres, as well as rural communities. As several authors have, these series of wills can be used as a useful proxy of mortality, despite several limitations (Cohn, 2003, pp. 178–209, 2010).⁶ At any rate, roughly speaking, a will is not a death certificate. Not every individual who signed such a document died shortly afterwards, even if they declared illness, so testamentary evidence must not be confused with an adult population mortality curve.⁷ It does attest, however, to the awareness of the proximity of the arrival of a contagion, so paroxysm took hold of the community. In so doing, most mortality crises are likely to emerge (Malta Montoro, 2022, pp. 254–303). Another feature of testamentary production in 14th–15th-century Catalonia (as well as nearby territories like Majorca or Valencia) that should be stressed is its gender and social representativity. In contrast to other parts of the medieval west and some scholars' assumptions (for instance: Benedictow, 2021, pp. 218–219), the writing of wills descended the social hierarchy, involving a relatively wide range of strata, from the nobility to peasants and even including some freedmen and poor women.⁸ Obviously, it was not common for minors under the *patria potestas* of their parents to make a will and, therefore, they are not fully represented in this source. However, some cases are documented, and at the same time, the trajectory of some minors can be traced through the successive wills of their parents.

In any case, in this article, we focus on the testamentary series preserved in two cities, two small towns and one village: Girona, Manresa, Castelló d'Empúries, Sant Feliu de Guíxols and Calonge. Girona, covering the period between 1348 and 1530, deals with this indisputable regional capital ranging from approximately 8,300 to 4,500 inhabitants from 1360 to the beginning of the 16th century (Reixach Sala, 2022, pp. 570–573). It is based on our own refined version of a partial inventory of the testaments preserved in its notary office (approximately five out of the eight or nine notaries working simultaneously in a shared office) although expanded with unpublished documentation outside this archival instrument. The case of Manresa, with a number of inhabitants that decreased considerably from more than 4,500 to less than 1,500 during the period under examination, has been approached from the systematic study by Adrià Mas Craviotto (2023) of 19 of the 21 volumes of the series of testamentary books ('*libri testamentorum*') that are preserved pertaining to the city notary's office, under the control of the cathedral see, between 1352 and 1462 (Torras Serra, 1993). The series from Castelló d'Empúries (1348–1500) and Calonge (1410–1530), two smaller towns with, respectively, 2,500–1,500 (Reixach Sala, *in press*) and 450–500 dwellers throughout the period examined, are the result of unprecedented research conducted in the respective notarial collections of these localities.⁹ Finally, the one from Sant Feliu, a dynamic coastal small town with around 1,200 inhabitants, is limited to the period 1360–1461, and is borrowed from Orti Gost and Verdés Pijuan (2016, p. 210).

In terms of the coverage of these series, it is logical that in smaller urban centres a higher percentage of the total amount of testamentary evidence actually produced is preserved and can be analysed. In this sense, in the case of Girona, the absence of an exhaustive catalogue of all the records of the approximately

nine or 10 notaries who acted simultaneously within with the city and contain wills is regretful (Guilleré, 2008).¹⁰ With respect to Castelló d'Empúries, the parallel activity of two notaries is detected and, in some stages of the sequence studied, the registers of only one of them remain (Adroer et al., 2004, pp. 25–36).¹¹ Conversely, in Sant Feliu de Guíxols and the smaller settlement of Calonge, the existence of a single notary's office increases the proportion of records kept, as other works show, almost completely in the case of the former (Orti Gost & Verdés Pijuan, 2016, p. 210).

A parallel variable for consideration is that the diverging patterns in the total number of inhabitants of each community condition the absolute figures in the respective curves of testamentary production. For instance, in places like Castelló d'Empúries or Manresa that suffered an undeniable demographic setback from the mid-14th century to the end of the following century, the number of wills, despite possible spikes, tended to decline throughout this period. By contrast, in towns like Girona, where there was also a relative decline in global population, the testamentary evidence suggests an upward trend during the second half of the 15th century, but this is due to greater fortune in the preservation of specific records of wills rather than to an increase in the potential number of testators (Table 1 and Figure 2). All in all, our sample includes 5,198 wills from the city of Girona (between 1348 and 1530), 2,838 from Manresa (1352–1462), 2,746 from Castelló (1345–1500), 1,604 from Sant Feliu (1360–1461), and 519 from Calonge (1410–1530).

On balance, we note that the set of sources used to provide both direct and indirect evidence of mortality crises caused by epidemics covers a very representative proportion of the Principality of Catalonia. As for the chronology, however, it is true that the direct evidence begins in the second half of 1348 with the obituary records of the cathedral of Vic, although the three large series corresponding to the city of Barcelona do not begin until later, specifically, the parish records of burials of two of its urban parishes in 1372 and 1388, while the death registers promoted by the municipal government of the city are kept only from the outbreak of 1457. It has already been emphasized that the exceptional records of the different rural communities correspond to discontinuous and not always coincident stages. As a result, compared with the indirect evidence of the testamentary documentation of different towns, it cannot be denied that the coverage in terms of direct evidence is less solid for the last third of the 14th century and the first half of the 15th century than for the second half of the latter century. This circumstance cannot be ignored when trying to assess the magnitude of the epidemic episodes between approximately 1400 and 1451, for which the sources provide much less quantitative data.

3. Tracing the epidemic sequence and describing outbreaks throughout Catalonia (1348–1530)

Keeping these strengths and weaknesses in mind, the first exercise consists of the reconstruction of the successive epidemic episodes between 1348 and c. 1530 based on the described combination of obituary registers together with several will series, also complemented with information gathered from municipal registers, narrative, and other heterogeneous sources (Supplementary material). From a methodological perspective, this cross-referencing of sources goes beyond merely quantifying deaths or testators

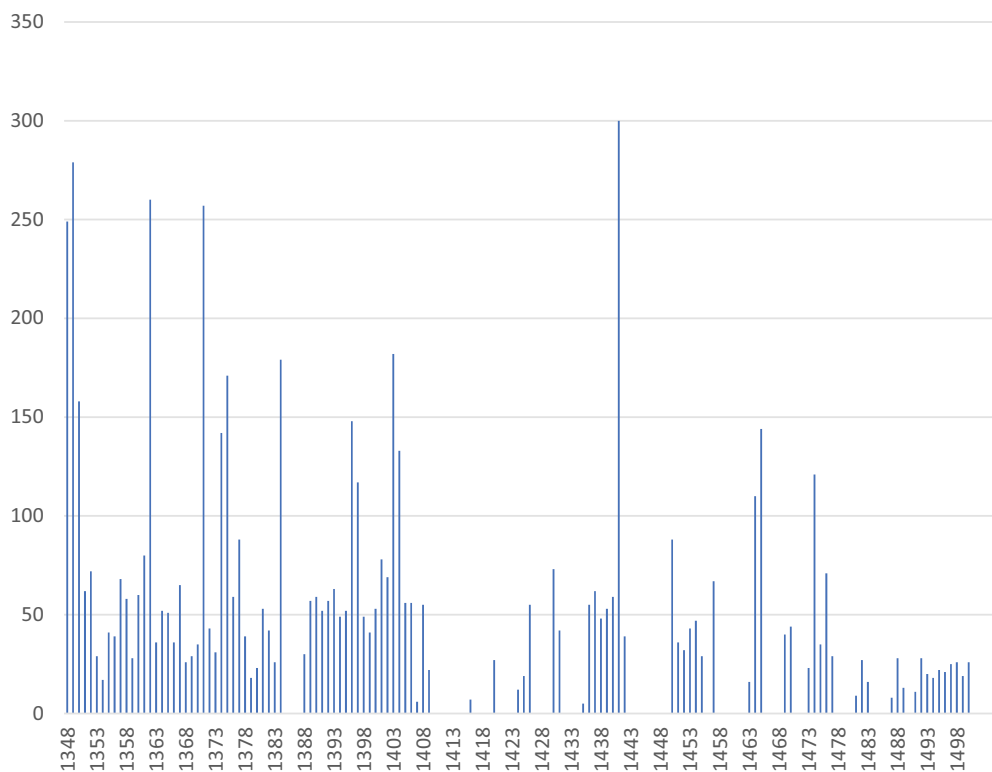


Figure 2. Burials (no. of burials per year) in the cemetery of the cathedral of Vic (1348–1500). Source: Arxiu Biblioteca Episcopal de Vic (ABEV), Arxiu del Capbreu, UD 245-273.

recorded in obituary registers or wills and the statistical calculations derived from them. Rather, the identification of extraordinary mortality phases caused by epidemics relies on explicit references in narrative sources and municipal records, alongside existing literature. These sources include chronicles and other texts that mention outbreaks, as well as records indicating local authorities' acknowledgment of contagion or details about the evolving health crisis. Only in some specific cases—outlined later—do spikes in burials or wills not align with the general pattern observed elsewhere in Catalonia. Moreover, while serial sources are less abundant for the late 14th and early 15th centuries, from 1457 onward, institutional death counts commissioned by the municipal government of Barcelona provide a precise chronology of epidemic waves. These records document the onset of extraordinary mortality based on daily mortality. In this regard, studies on Valencia indicate that when daily deaths rose from 5–7 to 10–12, the first alarm bells were sounded, and surpassing 25 daily deaths signalled an assumed demographic catastrophe (Iradiel Murugarren, 2006, pp. 171–173). Mortality data from Barcelona suggest a similar pattern, considering that during the first half of the 15th century the city had a comparable population size to Valencia, though it was smaller in the following half of the century.¹²

To construct this sequence, we use the aforementioned cities, towns, and smaller settlements as reference points, prioritizing direct evidence of mortality.¹³ When such

data is unavailable, we rely on testamentary records as a proxy. In key locations for tracing the spread of epidemics across Catalonia—such as Lleida and Tarragona—this type of documentation is lacking. However, in all the urban centres considered in the sample we can resort to municipal records ranging from local council proceedings to ordinances issued by their executives and letters exchanged (Miquel Milian & Reixach Sala, 2021). In these registers there is evidence of the chronology of contagion or the start of an outbreak mainly as a result of the institutional responses by urban governments to them. It consisted of ritual actions to ‘placate divine anger’ (prohibitions of blasphemy and other moral sins, rogatory and votive processions and the commission of prayers and pilgrims sent to Santiago de Compostela), and, from the 1420s–1430s in the specific case of Catalonia, pragmatic mechanisms to monitor local deaths, to limit the spread of disease (mainly controls on land and maritime mobility), and, finally, some compulsory preventive isolations (Roca, 2018; Agresta, 2020; Reixach, 2023a; Reixach, 2025a). These references should be treated with caution and are clearly less reliable than death or burial registers due to possible biases in information management, e.g. local authorities could try to hide the existence of deaths due to pestilence or infectious diseases or deny the complication of the health situation so as not to be forced to implement certain measures or to accept those from other communities that directly compromised the interests of their inhabitants. Nonetheless, we cannot underestimate municipal records when it comes to establishing the overall picture.

As stated, the reconstruction of the epidemic sequence aims to address three key issues: 1) possible differences in the exact chronology of these episodes even within a rather limited territory such as Catalonia, therefore the territorial extent of successive outbreaks depending on their more general or local scope; 2) possible differential impacts according to the population densities of each region or area, so major effects on walled urban centres compared to nucleated settlements or even sparsely populated areas; 3) possible age-selectivity of some specific onslaughts and the family connections of the victims of some of them. All these aspects are placed in a wider debate concerning other European regions summarized in the introduction.

3.1. Does chronology always align with geography?

The series of obituary registers in the cathedral of Vic, given its completeness and the central position of this town in Catalonia, can be considered pivotal. Its reconstruction for the period 1348–1500 in [Figure 2](#) is revealing when it comes to identifying mortality crises coinciding with epidemic outbreaks from the Black Death to the end of 15th century. The lethal event between 1348 and 1351 stands out, even if burials in the main cemetery of Vic are only registered from the month of August 1348 onwards, and all suggest that abnormal mortality due to the arrival of contagion started at least in the last part of May or the first week of June as in many other Catalan regions (Malta Montoro, 2022, p. 294). Vic experienced other relevant plague episodes and they are clearly reflected in the studied series: the high concentration of burials in the episodes of 1362, 1371, 1374, 1384, 1396–1397, 1403–1404, 1430, 1441, 1450–1451, 1464–1465, 1474 are also evident. The curbs observed in testamentary production in Girona and Manresa ([Figure 3](#)) are similar to those of the burials of the city of Vic.

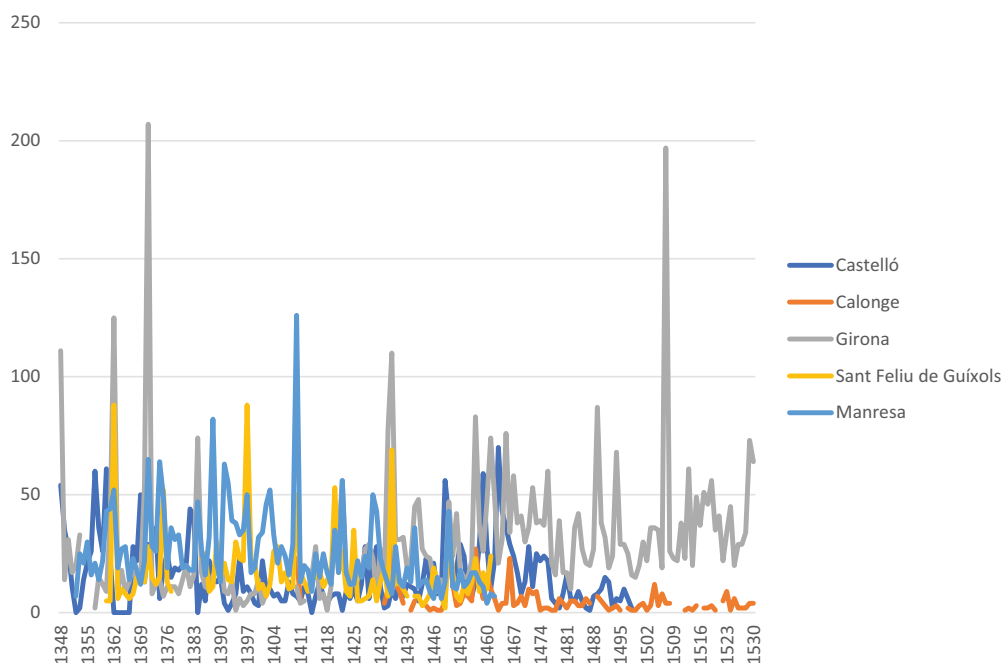


Figure 3. Testamentary evidence (no. of wills per year) from different towns in Catalonia (1348–1530). Sources: Girona from AHG, Notary office of Girona, Catalogue of Testaments Girona-01-05. Manresa from *Arxiu Històric de la Ciutat de Manresa*, *Arxiu de Protocols Notarials de Manresa*, vols. 464–699, Castelló d’Empúries from AHG, *Notarial records Castelló d’Empúries*, vols. 215–2300. Sant Feliu de Guíxols from Orti Gost and Verdés Pijuan (2016), p. 210. Calonge from AHG, *Notarial records Calonge*, vols. 219–253.

Principal divergences would first concern the complex biennium between 1374 and 1376. In this sense, several scholars had already identified, in addition to famine, a mortality peak between June and the Autumn of 1374 in and around Vic attributed to a local plague outbreak that was especially severe for children (Guilleré, 1995, pp. 126–134; Puigferrat 2000, pp. 89–90; Franklin-Lyons, 2022, pp. 171–176). Apart this abnormal increase in deaths in 1374 that can also be traced from the testamentary production in Manresa, there is no parallel evidence for other regions of Catalonia for that year. Already during the following spring and summer, those of 1375, mortalities appear in the city of Barcelona, according to several narrative sources and confirmed by the obituary books of the nearby village of Sant Boi de Llobregat. Royal records equally attest occurrences in many communities in central and southern Aragon,¹⁴ as well as chronicles and scholarship document epidemic onslaughts in Valencia (where it is considered a child mortality) and in Majorca (Rubio Vela, 1979, pp. 35–39; Reixach Sala, 2023a, p. 81, 2025b).

Following with the series of wills, concerning the 15th century, the episodes of 1435, 1457 and 1489 are much more salient in the testamentary sample from Girona compared to the obituary books of Vic and the wills of Manresa. In the latter case, testamentary evidence also reveals potential mortality crises that are absent from other sources. Notably, in 1388, municipal records – unparalleled among the observatories analysed – document severe epidemic mortality. Another episode occurred in 1391 coinciding with

significant important attacks on Jewish communities, though the specific causes of the abnormal number of wills remain unknown.

Finally, similar comparisons are possible with the small towns of Castelló d'Empúries and Sant Feliu de Guíxols and the rural community of Calonge (Figure 3). In this regard, beyond the different chronological scope of all three series, the principal contrasting point with respect to Girona is the extraordinary peak of testaments written in Castelló during 1465 and 1466. It was an epidemic year clearly documented in Barcelona and Vic but exaggeratedly within the Castelló series. This spike in wills is less likely to indicate a sudden, highly virulent epidemic outbreak at that precise moment and more likely to reflect the concentration of armed men between c. 1465-c. 1468 in l'Empordà, a region in northeastern Catalonia, during the first phase of the Catalan Civil War (Martínez Ferrando, 1936, pp. 74–84). This period saw the temporary displacement of rural populations to the town of Castelló—some of whom were explicitly wounded—as well as the drafting of wills by some members of the military contingents.¹⁵ In Castelló there is also an abnormal rise in the number of testaments in 1461 (and similarly in Calonge during that year and the previous one), although there is no evidence of an extensive outbreak throughout Catalonia except for sparse evidence from the city of Girona and one isolated small settlement near Tarragona. All the above shows the importance of crossing different documentary series (and in the case of our sample this is possible because we have a considerable number of observatories throughout the Catalan territory) to compensate for possible local deviations in the writing of wills that are not the result of panic scenarios due to the epidemic threat, but are framed in other types of situations.

Generally speaking, the obituary books of the rural communities of the archbishopric of Tarragona and the dioceses of Barcelona and Vic tend to complete the sequence by providing precise attestations of the geographical scope and duration of certain outbreaks. Only in some cases do sporadically preserved records at a particular site offer evidence of extraordinary mortality at specific times that are not captured by the other sources analysed. For example, the obituary books of l'Albi (in southwestern Catalonia) unveil a possible plague resurgence in autumn 1389 that is not reported by other settlements. Mostly, however, these records help demonstrate the prolonged duration of certain epidemic waves. Notably, the outbreak between 1418 and 1422 is evidenced in l'Albi and the nearby hamlet of Tarrés. Another wave, lasting from 1424 to 1430 (assuming it was always the same one and not two different ones of low intensity), contrasts with early reports from Barcelona in 1424, yet remains documented in 1430 in l'Albi, nearby villages, and the larger settlement of Santa Coloma de Queralt. To a lesser extent, a mortality crisis can be traced in rural communities of the archbishopric of Tarragona in 1464, persisting until 1468 in towns such as Lleida (Supplementary material).

3.2. Evidence on duration, spread and seasonality of most important epidemic cycles

Looking at the features of these successive mortality crises by combining the whole set of different sources we can compare their duration and seasonality or peak months within the years of an outbreak affectation (Supplementary material; Figures 2–3). We can start by focusing on the longer, more important outbreaks beginning with the

Black Death. It is widely accepted that the plague likely entered Catalonia from southern France, first affecting Perpignan in March and April 1348. Benedictow (2021, pp. 203–209) also suggests that Majorca may have played a role, proposing that the epidemic reached the island as early as December 1347 due to significant maritime trade with Sicily. Nevertheless, no documentary evidence currently supports this claim while the narrative sources and records emphasize contagion that spread between early February and mid-May and, with respect to the origin of the disease, point out connections with Roussillon more than with other Mediterranean islands (Santamaría, 1973; Reixach Sala, 2025b).

In any case, regardless of whether the plague originated in France or Majorca, its impact on Catalonia began between April and May through maritime routes at the major seaports and cities from Barcelona to Tarragona, Tortosa and Valencia, as well as, progressively, from May to June, in inland towns such as Girona, Vic, Lleida, Puigcerdà and la Seu d'Urgell and smaller settlements such as Cardona. In Western Catalonia, the first proof of a lethal impact date from July in Cervera, Tàrrrega and Verdú, and probably in Lleida. In general, the disease raged throughout Catalonia from May to July, and the extreme mortality subsided in August (Maltas Montoro, 2022, pp. 290–297).

The following general mortality peak is related to the outbreak between 1356 and 1366, as mentioned, generally known as 'pestitis secunda' in other European territories (Glénisson, 1968-1969; Slavin, 2024). As will be discussed later, narrative sources in the Crown of Aragon present it as child mortality ('mortaldat dels infants') due to its high impact on the child population during 1362 (Reixach Sala, 2025b). Beyond this aspect, the episode is documented around Catalonia with indications of the onset of infection very early in Barcelona compared to northern areas, and especially in the south of the Principality. While in the Catalan capital it is reported that many people were dying by the end of January and the beginning of February 1362, in Girona clear indications from notarial records start in April and in May in Vic. In all of these locations apart from Barcelona, contagion lasted between 3 and 5 months until October.

Similarly, the episode of 1371, generally acknowledged around Europe between 1369 and 1372 as the third episode of plague (Biraben, 1975–1976, vol. I p. 119), is named by Aragonese chronicles and other texts as the morality of the medians (due to its tendency to affect adolescents or young adults) and can also be traced throughout the Catalan geography during the summer months (Reixach Sala, 2025b). It also seems to have started earlier in the northeastern region, although this time reaching Barcelona a month sooner than Vic. Conversely, its duration was somewhat more diffuse; while the outbreak lasted until October in Girona, it was still in force in December in Vic. In addition, several references point to a contagion that continued in western Catalonia, for instance, in Lleida and Cervera, during the following year, 1372.

Another episode traditionally noted and cited by scholarship took place in the summer of 1384, for instance according to Günzberg (1989, pp. 23–25, 29), based on a reduced sample of testamentary evidence from the city of Barcelona. However, the documentary mentions in our dataset are much less solid than for the events of 1362 and 1371 and there are no clear indications of the possible growth of the disease. In light of the records of Vic and the testaments of Girona, it could have been between June and July in the latter city and, on the other hand, between August and November in the former. In Lleida,

municipal records indicate a period from May to August, suggesting—unlike the precedents of 1362 and 1371— a possible wave advancing from the western tip of the Principality. Additionally, this implies that if a general epidemic did occur in Catalonia in 1384, it was less concentrated in both space and time compared to previous outbreaks.

Similarly, between 1395 and 1397 (the latter reported by one single annalistic text as a year of ‘maximae mortalitates’: Flórez, 1774, pp. 342–344), several episodes succeeded in different parts of Catalonia. In 1395, especially at the end of the year, there are indications of extraordinary numbers of deaths compared to normal mortality trends in communities of the centre-west such as Cervera or l’Albi, while in the city of Barcelona, the parish registers indicate two peaks of mortality, probably due to disease: the winter of 1396 to 1397 and the summer of the latter year. Conversely, in Vic, the peaks of deaths occur both in the summer of 1396 and in the summer and early autumn of 1397. Overall, the period c. 1374–1390 was characterized by waves of fairly limited scope compared to the immediately previous stage. In addition, the timing and geographical spread of these waves varied more strongly, so the global epidemic sequence, even throughout Catalonia, gradually broke up into parallel tracks during the following decades.

Between 1401 and 1404, direct evidence such as the obituary records of Vic and Cervera, those of the two urban parishes of Barcelona or even those of Guimerà (in central-western Catalonia) show several stages of an extraordinary increase in mortality. Yet there are no clear convergences in the periods detected: in the Catalan capital and other places diseases seem to be more present in the summers of 1401 and 1402 (in Cervera particularly during the last months of summer and early autumn), while Vic’s registers highlight the autumns of 1401, 1403 and 1404 more clearly.

Thus, a truly widespread and intense epidemic outbreak did not occur until the spring-summer of 1410, despite an overall duration that may have stretched from the autumn of 1409 to Christmas 1410. Official records confirm its onset in March in Barcelona, yet obituary books from the same city already document a sharp rise in deaths as early as autumn 1409, a pattern also observed in Cervera. However, the most pronounced mortality peaks—like those recorded in several parishes of the archbishopric of Tarragona—occurred between April and May 1410, as well as at the end of summer, with some areas experiencing extended fatalities into the winter months. Unfortunately, we do not have records for Vic during these years to establish a possible, more general pattern. Documentary sources from different places refer to the disease in the summer of 1410 as ‘infirmittatis glandolas’ or bubonic disease, including mentions to ganglions and bleed corruptions (‘vexiges, vèrtoles i corrupcions de la sanch’) (Camps Clemente & Camps Surroca, 1998, pp. 155–156).

At this point it is important to recall the unequal chronological coverage of the documentary series that offer direct evidence of mortality, clearly more robust during the second half than during the first half of the 15th century. Nonetheless, from approximately 1410 and up to 1530, there are several mortality crises that, in light of the sources gathered, can be considered to have a practically generalized impact in Catalonia in the sense that they are recorded in all the examined observatories and in most of them, the available data suggest notable or extraordinary magnitudes in terms of heightened mortality. They are the following: those of 1441, 1450–1451, 1456–1457, 1464–1465, 1474–1476, 1489–1490, 1494–1495, 1507–1508, 1515, 1520–1522 and 1529–1530.

In parallel, it is possible to identify several onslaughts documented more or less simultaneously in Barcelona, in northeastern Catalonia and also at least in one other region (for example, those of Lleida in the West or Tarragona in the South). They are around 1420, 1430, 1435 (1434 specifically in the city of Tortosa) and 1483 (perhaps connected with a major local resurgence in Lleida in 1486–1487). Nonetheless, especially the first ones only reported in some places, according to direct evidence of burials and peaks of testamentary production (for instance, in Manresa), consisted of short re-growths during several successive years. Specifically, periods of higher frequency of repeated smaller spikes coincided from 1419 to 1420 (with some significant peaks of testamentary evidence in places like Sant Feliu de Guíxols), or even until 1422 in Girona, Manresa and Lleida, along with several rural settlements in southwestern Catalonia. Afterwards, spikes started already in 1424 in some occasional foci, although contagion was particularly generalized during the autumn of 1429 in Barcelona and the autumnal months of the following year in Vic.

The patterns of these outbreaks with respect to the seasons is another important aspect to explore, particularly for those with a well-defined chronology and stronger documentation. As shown by the debates this issue has sparked (Benedictow, 2010, pp. 396–463), seasonality is a crucial feature of epidemics, as it provides insights into their etiology and reveals several variables difficult to assess. For instance, the traditional distinction between a pneumonic phase in winter and a bubonic phase in warmer months that is characteristic of modern plague has often been retroactively applied to the late medieval period, though this interpretation has been challenged (Welford et al., 2009; Cohn, 2003, pp. 717–727). In addition, seasonality highlights the role of environmental conditions, which may have shaped distinct disease patterns in different regions or ecosystems. For instance, it raises the question of whether consistent plague seasons existed based on latitude, influenced by variations in temperature, humidity, and dryness throughout the year (Krauer, Viljugrein & Dean, 2021). Other scholars, such as Benedictow (2021, pp. 53–56, 89–93, 153–159), also interpret seasonal variations and climate-specific factors as key drivers of increased mobility, particularly in maritime transport. Consequently, in the Mediterranean basin, shipping activity extended over more months of the year compared to northern Europe, facilitating the movement of cereal cargoes—and with them, rodents and other potential vectors, mostly insects, of disease. This aligns with a prevailing historiographical paradigm on the spread of plague and other epidemics the reassessment of which is beyond the scope of our analysis.

Within this framework, we can simply examine the sample of epidemic cycles throughout the 15th century focusing on the seasons or months of the peaks of mortality, while acknowledging the limitations of direct evidence, particularly in the early decades. The epidemic episode of 1441 could have begun as soon as spring 1439 or spring-summer 1440 in Western Catalonia, according to the observatories of Lleida and Cervera. Conversely, regarding Girona and Vic, the episodes of extraordinary mortality attributed by coetaneous sources to ‘glànola’ (buboes), coinciding with a wave also identified as plague in other nearby European territories such as Italy (Del Panta, 1980, p. 118), lasted from spring or summer to the beginning of autumn 1441. It was a similar period for the outbreaks of 1450 and 1451 (with the exception of some increases in deaths in some specific places at the beginning of 1452), 1456–1457, 1507–1508 (the second year mainly in Lleida), 1515, 1520 (1521–1522 in Lleida) and 1530.¹⁶ This would support the seasonal

pattern of the plague that some authors argue was predominant in southern Europe (Benedictow, 2010, pp. 412–435).

Nonetheless, apart from the already-mentioned case of abnormal mortality in the autumns of 1429 and 1430 in different places, the assaults of disease lasted the whole winter between 1489 and 1490. Something similar happened between 1465 and 1466. And this is so despite official sources continuously referring, from September 1465 to July 1466, to a bubonic disease mentioning ‘glànoles’ and ‘vèrtoles’ with peaks of mortality registered in the city of Barcelona between December 1465 and March 1466 of around 500–700 deaths per month (falling to 260–470 between April and June 1466) surpassing the median threshold of 20 victims per day (Sans Travé, 1994, p. I, pp. 186–188). Again, according to the illustrative case of Barcelona, mortality also crossed the winter of 1475–1476, although daily death tolls were clearly lower than in other outbreaks with maximums of 10–15 deaths in late October-early November 1475, as well some sparse days in January, and of 15–22 in May–June 1476. Contagion is said to have come from Valencia and Majorca in June 1475 and mentions of buboes reappear (Schwartz & Carreras i Candi, 1893–1894, vol. 2, pp. 525–545; Sans Travé, 1994, p. I, pp. 186–188).¹⁷ The same thing occurred during 1494 and 1495. Indeed, with respect to the latter episode, the municipal registers of the small town of Cervera (also confirmed in 1494 by municipal sources in Lleida) attest the permanent menace of epidemics (generally referred to as pestilence and even plague on some occasions) from 1493 to September 1495.

Admitting the limits of temporal and spatial coverage of the cases analysed, a principal finding can be drawn from the above. Between the mid-14th to the early 16th century there is not a linear evolution from more general epidemic episodes to outbreaks with a smaller scope a shorter range. It is true that from the mid-1370s onwards, many disease cycles can be identified advancing in a somewhat disconnected manner in different areas or places of Catalonia. Nevertheless, throughout the 15th century and until at least 1530, some major onslaughts (1410, 1441, 1450–1451, 1456–1457, 1464–1465, 1494–1495, 1507–1508, 1515, 1520–1521 and 1530) which, following the indications in the sources such as mentions to ‘glànola’ (buboes), can be interpreted as plagues and are concentrated between late spring and early autumn, coherently with plague patterns registered in the Mediterranean basin unlike north of the Alps (Cohn, 2003, pp. 178–187). However, the waves of cold months in 1465–1466 and 1475–1476, despite a different seasonality, are described in similar terms.¹⁸ All these outbreaks were interspersed with others of more variable impact that lasted for between several months and three or 4 years.

The combination of a certain homogeneity with phases of evident disparity in chronology and seasonality suggests that we may not always be dealing with the same diseases. However, beyond mentions in some sources such as those above, it is not possible to penetrate into the exact etiology of each epidemic cycle. Furthermore, it is clear that from at least the last third of the 14th century or the early 15th century, the repeated outbreaks undoubtedly had some effect on the human population and the broader environmental context, in the sense that some degree of immunity may have developed among survivors or other response mechanisms emerged in a scenario where the plague may have become, at least to some extent, endemic. This is why the human factor probably increased its role in bacteriological development, making outbreaks more unpredictable. Certainly, the asymmetries in the duration and geographic scope of all the

episodes recorded between 1348 and 1530 lead us to assume that their impact in terms of mortality rates may also have been unequal, as assessed below.

4. Towards micro-analyses of differential impact

In order to assess the demographic effects of epidemic outbreaks in late medieval Catalonia, we must deal with the challenge of total population figures or estimates of population. It can be addressed through fiscal series. In the territory under scrutiny there are general lists of hearths for practically all the communities of the Principality from 1360, 1378 (although this account should be taken more cautiously and can in no case be compared with that of 1360 to deduce changes between the two moments) and, finally, a further two from 1496 and 1515. Unfortunately, the gap of the first half of the 15th century is common to all the territories of the Crown of Aragon due to the specific dynamics of politics and general taxation (Orti Gost, 1999). From the sample (Table 1) that includes the number of hearths of each community according to these general accounts (on some occasions it is possible to improve these figures with locally based direct taxes), we can estimate their approximate total number of inhabitants in different sections of the observed chronology. For this purpose, in the absence of a better ratio for the moment, the generally accepted (also in scholarship on northeastern Spain) coefficient of 4.5 people per hearth is applied (Feliu Montfort, 1999).¹⁹

4.1. Approaching mortality rates in major disease outbreaks

Thus, we can assess approximate ratios of deaths in relation to the total population at different times in some of the communities in our study. This involves resorting to direct evidence of mortality, obituary books and death counts. In this way, moreover, we avoid the usual procedure when trying to estimate the impact of certain epidemics, such as comparing the difference between population totals before or after a particular episode. This has traditionally been carried out for the Black Death, for instance, with regard to some villages in the Alpine region of Savoy (Benedictow, 2021, pp. 847–61), among other French regions (Klapisch-Zuber, 2008, p. 135). The main weakness of some of these calculations is that they omit the various demographic variables that influence the total number of inhabitants other than mortality, i.e. the birth rate itself or migratory flows, for example, between the countryside and the city, as has been demonstrated concerning some areas in the Low Countries (Roosen & Curtis, 2019; Roosen, 2022, pp. 167-70).²⁰

If we insist on direct evidence available, we can try to gauge the mortality caused by some of the outbreaks that followed the Black Death in several communities. We begin with taking as a reference the very approximate figures given in Catalonia for the Plague that erupted in the first trimester of 1348. Recent research by Maltas Montoro (2022, pp. 297–303) systemizes the preceding literature with estimates of the mortality rates in different urban and rural communities. It shows a great diversity of percentages. In the cities of Barcelona, Perpignan and Girona, mortality could range from 15% to 60% or 70% of the population. The estimates available for medium-sized towns like Vic, La Seu d'Urgell, Puigcerdà and Manresa indicate a range of population decline from 30% to 60%. The demographic losses deriving from the Black Death in small towns and rural parishes also vary from 30% to 70%. After all, the lack of absolute population figures prior

to 1360 complicates an exercise in which each author starts from somewhat different sources. The only clear finding is that of the variability of the mortality rates even in a single episode.

With the purpose of measuring the magnitude of later waves of plague and other diseases, we should return to the case of the city of Barcelona and its bills of mortality ('*cerca de morts*') commissioned by its municipal authorities (along with the representatives of the Deputy of the General of Catalonia) and registered from an epidemic episode that began in May 1457. When observing the total population figures derived from the general lists of hearths in the city for 1389, 1464, 1496, and 1515, it is possible to obtain the percentage that the sum of deaths attributed to plague recorded by institutional counts represented with respect to these figures (Table 2). As explained, the sources, both from the municipality of Barcelona and the Deputy of the General, explicitly list deaths due to epidemic, distinguishing them from other unknown reasons. Given the aforementioned scarcity of total population figures in Catalonia during the first half of the 15th century, the rates of the earliest cycles during the 1450s–1470s present one or two points of difference according to whether we take as reference the list of hearths of 1389, the one of 1464 (drafted during the civil war that broke out in Catalonia between 1462 and 1472) or the one of 1496.

Beyond these small variations, the succession of a few outbreaks with a demographic impact that approached or even exceeded 10% of the population is evident. The well-known episode of 1530 breaks all known records from the end of the 14th to the beginning of the 16th century with a population loss of around 20% of the total estimated population of the city (Betrán Moya, 1996, p. 90). However, there are two other events that stand out from the rest. First, the outbreak of bubonic disease ('*glànola*') between the summer of 1465 and that of the following year, with mortality rates between 15% and 17% in a context of civil war that undoubtedly worsened sanitary conditions. Following this one, there is a disease with unspecified symptoms²¹ affecting Barcelona and most of Catalonia between autumn 1489 and autumn 1490 that resulted in mortality rates of between 12% and 14%. More than a decade later, from February to June 1507, the plague ravaged the Catalan capital and the entire Iberian Peninsula giving rise to the denomination of plague year (Betrán Moya, 1996, p. 121; Ortego Rico, 2025, pp. 131–135) with a mortality rate of around 12%.

Turning now to the case of Vic, it is also possible to relate the number of burials in its cathedral cemetery to the estimates of the total population of the city. The latter are available for the ends of the chronological arc, the city of Vic had between 2,800 in 1360 and 2,600 inhabitants in 1496. There is also a local register for 1405 showing a possible demographic decrease at the beginning of the 15th century (Puigferrat Oliva, 2021). Once again, while mortality rates may vary depending on the chosen denominator, they remain consistently high (Table 3). As noted, records from the cathedral cemetery account for only about 80% of total deaths in the city. Therefore, any absolute comparisons should be approached with caution. For example, in the case of Vic the percentages never exceed 15% as opposed to those inferred from the institutional counts of Barcelona, but it is plausible that in some episodes the figures were much higher, especially if, in addition to the preserved records being complete, the source could reflect the 20% of burials, on average, not captured (Table 3). Between 1348 and 1476, the most devastating outbreaks—based on obituary records and available population estimates—were as follows: It is



Table 2. Approach to the demographic impact of the epidemic outbreaks from 1457 to 1530 in the city of Barcelona according to the 'cerca de morts' records of the municipal government and the Deputy of the General.

Period	No. of deaths attributed to plague by institutional counts	% demographic losses with respect to list of hearths of 1389 (30,127 inhabitants)	% demographic losses with respect to list of hearths of 1464 (26,784 inhabitants)	% demographic losses with respect to list of hearths of 1496 (27,450 inhabitants)	% demographic losses with respect to the list of hearths of 1515 (29,759 inhabitants)
1457/05/15–1457/11/18	3,090	-10.16			
1465/09/01–1466/07/31	4,742 ²²	-15.74	-17.70	-17.28	
1475/08/10–1476/10/03	2,116	-7.02	-7.9	-7.71	
1478/06/06–1478/07/16	51	-0.17	-0.19	-0.19	
1483/03/15–1483/09/24	1,397	-4.64	-5.22	-5.09	
1489/11/03–1490/09/15	3,755	-12.46	-14.02	-13.68	
1494/06/13–1494/10/04	579	-1.92	-2.16	-2.11	
1497/07/18–1497/10/19	66			-0.24	
1501/05/04–1501/11/30	2,619			-9.54	
1507/02–06	3,448			-12.56	
1515/06/04–1515/10/25	997				-3.35
1520/05/30–1520/09/10	1,519				-5.1
1530/03/10–1530/07/16	6,250				-21

Sources: Number of deaths from Schwartz and Carreras i Candi (1893–1894), vols. 2–3; and Ribas Puntí (1995). Population figures in 1389 (6,695 hearths), 1464 (5,952 hearths), 1496 (6,100 hearths) and 1515 (6,613 hearths), successively, from: Orti Gost in personal communication, which we appreciate; Miquel Milian (2020, p. 262); Sales, (2021, p. 20); Iglésies Fort and Feliu Montfort (1998, p. 26).

Table 3. Approach to the demographic impact of epidemic outbreaks from 1348 to 1476 in Vic according to burials in cathedral cemetery.

episode (year/s)	no. deaths (*incomplete source)	% demographic losses with respect to local tax registers of 1360 (2,799 inhabitants)	% demographic losses with respect to local tax registers of 1405 (2,020 inhabitants)	% demographic losses with respect to list of hearths of 1496 (2,587 inhabitants)
1348	249*	-8.9 (35.7%*)		
1362	260*	-9.29		
1371	257*	-9.18		
1384	189*	-6.75		
1396-7	265*	-9.47		
1403-4	315*	-11.25	-15.59	
1430	73*		-3.61	-2.82
1441	300		-14.85	-11.59
1450	88*		-4.36	-3.40
1457	67*		-3.32	-2.59
1464-5	254		-12.57	-9.82
1474	121*		-5.99	-4.68
1476	71*		-3.51	-2.74

Sources: ABEV, Arxiu del Capbreu, UD 245-273. Figures of number of inhabitants from Puigferrat Oliva (2021, pp. 51, 55, 58-59, 62-65).

important to note that these records do not fully cover some epidemic cycles. As previously mentioned, the cathedral of Vic's records do not include victims of the 1348 plague upon its arrival in inland Catalonia. If we assume that the epidemic reached the Vic area around May, we can make a rough estimate that, with a mortality rate equivalent to that of August over the previous 3 months (a total of nearly 1,000 victims), the impact on the total population would have been around 35.7%. Regardless of this possible theoretical estimate, the deadliest outbreak in Vic, with mortality rates exceeding 10%, occurred in 1441, an episode also observed across the Crown of Aragon and other European regions. This was followed by the well-documented outbreaks of 1362 and 1371 — referred to as the second and third plagues in other nearby areas—where recorded death rates fell below 10% but may would have exceeded this threshold if complete data were available. Other significant waves likely occurred between 1403-1404 and 1464-1465.

Although the correlation between estimates of deaths and the evolution of the total population is based on two different sources with their own limits and do not cover the entire chronology under study, in both cases, the comparison of the data for the cities of Barcelona and Vic provides us with an important initial observation: the plague outbreaks in the decades immediately after the Black Death resulted in a significant number of victims, with figures around 10%, comparable to the excess mortality rates calculated in English towns for the so-called 'pestis secundis' in 1362 (Slavin, 2024, pp. 464-465).

Nonetheless, episodes of the 15th century could lead to approximate rates that are not so distant (only 10% or 15% less) as traditionally assumed from the lower part of the estimate of 30-70% of the famous plague of 1348-1351 (and even so, always considering the weak heuristic foundations of these calculations). It specifically refers to waves attested in most of Catalonia or beyond, beginning with the one that extended between the first four years of the 15th century, with a reduction in Vic's total population of between 10% and 15% adding the burials recorded between 1403 and 1404. The following one consists of the temporally most concentrated outbreak of 1441, with around 15%

of losses in the number of dwellers of Vic. During the last third of the century, the episodes of 1464–1466, 1489–1490 and 1507 stand out. The former was clearly lethal in the city of Barcelona (with figures of mortality around 15%) and in Vic (with cumulative numbers for 1464 and 1465 exceeding 12%), although perhaps not so much according to the snapshot of will series in other more distant observatories such as Girona and the northeastern region in general, probably due to the division of the epidemic wave itself into different stages. By contrast, the episode of 1507, aside from the direct evidence for Barcelona, the peak of testamentary production in Girona is also undisputable and comparable to years of widespread epidemic like 1371 (Figure 3).

Unfortunately, the scattered collection of obituary books from several rural communities does not allow us to reinforce the evidence on the whole chronological sequence that can be approached from the cases of the cities of Barcelona and Vic. However, we can focus on the communities in the sample, the most populated settlements (from 700 to 1,100 dwellers during the period analysed) of Sant Boi de Llobregat, a few kilometres from Barcelona, Guimerà and Santa Coloma de Queralt, with around 500–700 inhabitants located in the centre-west of Catalonia, as well as the minor settlement of Barberà de la Conca. Similarly to previous analyses, we resort to estimates of total population numbers provided by the lists of hearths for 1378 and 1496 (Table 4). In so doing, firstly, the case of Sant Boi confirms the significant impact of the epidemics in 1465–6 and 1490 in Barcelona and its surroundings, indeed showing mortality rates exceeding the estimations in the capital city for the former episode and reaching very high percentages of more than 40% in the cycle around 1490. Rates are also highly relevant in the smaller community of Barberà de la Conca which point out, above all, the significance of the wave between 1456 and 1457, precisely when the municipal bills of mortality in Barcelona started to be recorded. In addition, it presents figures that imply demographic losses of between 30% and 50% in this rural settlement. In parallel, the case of Santa Coloma de Queralt supports the major impact of the outbreak of 1441 especially manifested by registers in Vic, and suggests that the more dispersed episodes occurring in several spikes around 1430 could have had similar effects in some specific parts of the Catalan geography.

From another standpoint, a general balance of the figures for the cities of Barcelona and Vic and the sample of smaller places with approximate mortality rates for several epidemics of the 15th century lead to another important finding that sheds light on the aforementioned debate in other areas of pre-modern Western Europe regarding the differential impact of plague and other diseases on population according to different kinds of settlement (Gottfried, 1978, pp. 141–142; Benedictow, 2021, pp. 847–861; Slavin, 2024, pp. 464–465). The data offers no indication that the proportion of victims relative to overall population estimates was higher in towns than in rural areas. In fact, some epidemic waves in the 15th century may have had a particularly severe demographic impact on certain rural settlements. And at the same time, based on the available data, some rural communities seem to have occasionally escaped epidemic episodes that wreaked havoc in cities like Vic or Barcelona. Building on the aforementioned scholarship, a broad range of hypotheses can be explored to explain this contrast. One possibility, as suggested by Benedictow (2021, pp. 847–861), is the correlation between lower population density and faster disease spread, which may help explain the high crude mortality rates observed in rural communities during the 15th-century crisis. Another factor to consider is the role of hygiene and differing sanitary conditions between urban and rural

Table 4. Approach to the demographic impact of mortality crises due to epidemics in some rural villages during the 15th century according to the number of hearths registered for 1378 and 1496.

Sant Boi de Llobregat (1410–90)					
Period	No. of absolute deaths by year	% demographic losses with respect to 1378 (1,197 inhabs.)	% demographic losses with respect to 1414–1425 (1,125 inhabs.)	% demographic losses with respect to 1496 (661 inhabs.)	
1410	51	–4.26	–4.53	–7.71	
1457	34	–2.84	–3.02	–5.14	
1465–6	252	–21.05	–22.4	–31.25	
1483	42	–3.51	–3.73	–6.35	
1490	333	–27.82	–29.6	–50.37	

Sources: Global figures of population, respectively from: Redondo García (2002); Monjas Manso (1998, p. 85); Iglésies Fort (1991). Arxiu del Bisbat de Sant Feliu de Llobregat, Parròquia de Sant Boi de Llobregat, vols. 641–20, 642–21, 641–30, 641–32, 641–33

Guimerà (1402–95)				
Period	No. of absolute deaths by year	% demographic losses with respect to 1378 (783 inhabs.)	% demographic losses with respect to 1496 (414 inhabs.)	
1402–3	39	–4.97	–9.41	
1443	22	–2.8	–5.31	
1452	24	–3.06	–5.79	
1463	27	–3.44	–6.52	
1495	38	–4.85	–9.17	

Source: Global figures of population, respectively from: Redondo García (2002); Iglésies Fort (1991). Arxiu Històric de l'Arquebisbat de Tarragona (AHAT), Guimerà, caixes núm. 29 i 50, Llibres d'òbits 1403–1408; Llibre d'òbits 1443–1480; Llibre d'òbits 1481–1520

Santa Coloma de Queralt (1430–41)				
Period	No. of absolute deaths by year	% demographic losses with respect to 1378 (724 inhabs.)	% demographic losses with respect to 1496 (454 inhabs.)	
1430	72	–9.94	–15.85	
1441	48	–6.62	–10.57	

Sources: Global figures of population, respectively from: Redondo García (2002); Iglésies Fort (1991). AHAT, Santa Coloma de Queralt, caixa núm 11. Llibre d'Òbits 1428–1451

Barberà de la Conca (1450–90)				
Period	No. of absolute deaths by year	% demographic losses with respect to 1378 (396 inhabs.)	% demographic losses with respect to 1378 (274 inhabs.)	
Probably summer 1450	24	–6.06	– 8.7	
1456–7	108	–27.27	–39.4	
1464	19	–4.79	–6.9	
1490	37	–9.3	–13.5	

Source: Global figures of population, respectively from: Redondo García (2002); Iglésies Fort (1991). AHAT, Barberà de la Conca, caixa núm. 12, Llibre d'Òbits 1447–1529

environments (Slavin, 2024, p. 465), though the actual extent of these differences, and especially regarding their implications in the spread of bacteria or other vectors of disease, remains unclear, at least in the territory under study. On balance, the key

challenge likely lies in accurately assessing mortality rates from total population estimates based on the number of hearths. To refine these calculations, it is crucial in the examined area to investigate potential differences in household sizes between towns and smaller settlements. For instance, if rural households were generally larger, as detected elsewhere (Herlihy & Klapisch-Zuber, 1985, pp. 283–298), the mortality rate would appear lower. This also highlights the need for family reconstruction studies to determine survival rates within households following epidemic outbreaks.

4.2. Initial observations on differences in adult and child mortality and household-clustering in epidemics

In this regard, a final exercise can be devoted to showing the potential of the sample under investigation to delve deeper into two important aspects of the epidemic cycles recorded between the mid-14th century and the beginning of the 16th century: the possible age biases in the mortality cycles of some of these episodes and the way in which they affected family units.²³ To do so, attention will be paid to obituary books of the two urban parishes under scrutiny in the city of Barcelona and those preserved in several parishes in the dioceses of Barcelona, Tarragona and Vic (concretely only those in which newborns are recorded and they are distinguished from adult deaths), complemented on very specific occasions by obituary registers from the latter's cathedral. This explains the reason why we place the dividing line between adult and infant mortality at approximately 12 years of age.

Thus, following the epidemic sequence built (Supplementary material), we detect certain episodes when the abnormal increase in deaths presents a diverging chronology if we compare adults to children. It is not possible at this stage of our research to provide accurate figures of the comparative degrees of deviation of adult and child mortality in the crises examined, so we will limit ourselves to noting the overall importance of child burials in some episodes and, in others, if both trends do not coincide, the order of the monthly peaks of deaths depending on whether they are of adults or children.

The first resurgences after the Black Death, those of 1362 and 1371, are described in the narrative sources of the period with some particularities in this regard: the episode of 1362 is denominated that of the mortality of the children, while that of 1371, the mortality of the denominated medians, thus especially afflicting young people or the pre-adult population (Günzberg, 2010, pp. 71–73; Reixach Sala, 2025b). In this regard, two key observations made by scholars are particularly relevant: first, the age structure of victims in relation to the specific diseases of these outbreaks and potential genetic variations in the bacteria responsible for them; and second, the role of acquired immunity in communities following the Black Death, which was conditioned by the number of survivors of the pandemic with no contact with the bacteria and the renewed natality in the 1350s giving rise to an increased proportion of children over the total population, a circumstance that, however, might have changed after the onslaughts of the 1360s and 1370s in part due to relevant losses within the fertile cohort (Cohn, 2003, pp. 734–735; Slavin, 2024, pp. 461–462, 473–476).

Unfortunately, direct evidence is not actually available for the episodes of 1362 and 1371 since the records from Vic offer only partial insight. Nevertheless, future analyses of mortality in this period in Catalonia based on complementary sources should take into

account the hypothesis that the repeated emphasis in sources on the youngest age group, followed by the next, the pre-adults, may reflect the natural ageing of the immunologically 'naïve' 'baby boom' generation born after 1348. However, as Cohn (2003, pp. 734–735) documents in several cases from central Italy, the high proportion of child victims did not decline in the early 1370s, although in a scenario possibly characterized by a much older population.

In this sense, the obituary records for the city of Vic unveil the relative importance of children among the people buried during the second semester of 1374, a time when scholars identify what is presumed a local plague outbreak in this area (Guilleré, 1995, pp. 126–134; Puigferrat Oliva, 2000, pp. 89–90). For later epidemic waves, the obituary books from the parishes of Santa Maria del Pi and Sant Just i Pastor in Barcelona offer insights into patterns of extraordinary mortality, particularly among adults compared to minors. Regardless of the chronological order of these peaks, this trend suggests the possibility of contagion among household members of different ages or those living under the same roof. For example, records from the parish of Santa Maria del Pi indicate a rise in adult deaths from December 1396 to February 1397, followed by another surge between June and October of the same year. In contrast, child mortality is only observed during the second phase of 1397. General figures of deaths for these years show no major differences in the number of dead infants and the number of dead adults: both groups each account for approximately 50% of the total mortality in a year.

In 1401 the proportion of child deaths is about 10 points higher than for adults. In the light of the registers from Sant Just i Pastor, if the epidemic ravaged the adult population from the spring to the winter, a larger proportion of child deaths was concentrated in November and December. Conversely, in 1414, infant mortality was more significant in the summer than in the autumn months when the figure increases for the adult segment, again a higher figure (64%) within the final balance of mortality for the year. In 1497, at least according to the records of Santa Maria del Pi (but not in Sant Just i Pastor), the concentration of adult victims could anticipate the summer cluster of children. In cases like 1410, these differences were slighter: only one-week between the beginning of the increase in adult daily deaths during the last week of March and the increase in the number of children during the first week of April. Apart from that, it is interesting to note that the cumulative mortality from January 1410 to June 1410 is higher for children (72%) than for adults (28%).

For the plague resurgences of 1483 and 1489–1490, diverging patterns of adult and child mortality in obituary books of Santa Maria del Pi are limited to time lags of a week or two. Finally, the more studied episodes of 1507, 1515, 1520 and 1530, also through the registers from Santa Maria del Pi in Barcelona (Betrán Moya, 1996, pp. 120–129), do not show significantly different chronologies between the abnormal mortality of adults compared to that of minors. Tentatively, a certain tendency towards a reduction in the differences between the adult and infant mortality calendar emerges in the epidemic cycles of the late 15th and early 16th centuries. This could be due to changes in the diseases that afflicted the territory studied, without ruling out other environmental or contextual changes. However, currently there is a lack of data to go beyond this mere observation. Comparisons with early modern episodes could be useful.²⁴ Once again, the key appears to be understanding fertility rates in towns and rural communities of Catalonia during the

period analysed, or at the very least, determining the average number of offspring. This would help assess whether child victims of pestilence and other diseases constituted a significant proportion of the total population relative to adults. On a micro level, this also requires examining individual outbreaks to determine whether all children or only a subset of a certain number of couples or families were affected.

Certainly, the phenomenon of diverging adult and infant mortalities must be related to the degree of involvement of plague and other diseases within the same family, a key point for scholarship dealing with mortality crises (Livi-Bacci, 1984). Such a circumstance was observed by some contemporaries, such as a clerk from Vic, who recorded that the 1371 outbreak initially affected young people and children but had a seemingly random impact on households – while some lost all their members, others were entirely spared (Reixach Sala, 2025b). However, these processes are exceedingly complex to detect since it requires systematic family reconstructions of the victims of the whole epidemic cycles (Zerner, 1979; Cohn & Alfani, 2007, pp. 187-200), a task for which so far some progress has only been made in small communities and very partially, again for the city of Vic, for several epidemic cycles of the late 14th and 15th centuries.²⁵ A relevant aspect of this investigation is the significant consolidation of family names in Catalonia by the 14th and 15th centuries, particularly in urban settings (To Figueras, 2002). When documentary records lack explicit references to filiation or kinship, family names often provide a reliable means of linking fathers, sons and other descendants, as family names were typically passed down the male line. For women, identification is based on the family name inherited from their father and, in some cases, the surname adopted from their husband after marriage. While the risk of homonymy increases in larger settlements, it remains minimal in rural communities. Additionally, in urban centres, identifiers such as socio-professional labels or fiscal residence records help clarify potential ambiguities.

Thus, assuming these circumstances of name linkage, it is possible to examine data to see the disease afflicting members of the same family unit (spouses, parents, children or even service personnel living under the same roof) for rural communities endowed with obituary books, concretely, La Llacuna and Sant Boi de Llobregat.²⁶ Firstly, in La Llacuna, a small settlement in the Western area of the diocese of Barcelona with around 250 inhabitants at that moment, there are several examples from two major outbreaks of the 15th century: those of 1466 and 1490.²⁷ During the former, at least 58 dwellers died, implying an important rate compared to the global population. The disease especially afflicted children, specifically, 45 newborns and minors with respect to the cited 58 inhabitants. The first children registered in the parish records are the three children of Simó d'Estallà, living in mas de Pollina. In fact, the father had already died in 1462 and also another eldest son in 1464. Another interesting case from the same place is the Quintana family. Although the outbreak of 1483 was not particularly felt in La Llacuna, three members of the family died (Joan Quintana's wife, himself and the wife of a Gabriel Quintana, who may have been a close relative) on the 14th day of September 1483. In the major episode of 1489–90, meanwhile, two newborns died, sons of what seems to be the aforementioned Gabriel Quintana, and in 1490 other newborns of the same family name.

Passing now to Sant Boi de Llobregat, close to the city of Barcelona, and with around 600–1,200 inhabitants throughout the studied chronology, there is information for several outbreaks.²⁸ Beginning with that of 1375, which also affected the Catalan capital that year

but was not clearly widespread throughout Catalonia, we note that several individuals of the same family group died. For instance, in the Mart and Godall family, deaths occurred on successive dates in 1375 during the outbreak. On 21 May, Guillem Mart died, and on 17 June, Berenguer Mart, while the couple Guillem and Romia Godall both died on 22 June. These deaths within a few days or weeks during the height of disease contagion also appear in the epidemic assault of 1410 with the death on 31 May of Nadal Cugullada and on 25 June of Joan Cugullada, along with the death of Salvadora, wife of Enric Sardanya, 2 days before her husband. The Puig family suffered even more victims. On 11 June, a young woman died, possibly a servant living in the house, and 2 days later a young orphan living in the house. Three days later a daughter of Jaume Puig died and on 24 July one of his sons perished.

With respect to 1465 and 1466, sources attest that several people with the same family name possibly suffered from the epidemic onslaught affecting some parts of Catalonia between autumn 1465 and summer 1466. For instance, three young children ('albats') of Gabriel Vendrell died successively on 11, 16 and 18 December 1465. During nearby dates, the deaths of four and three young descendants (also referred as 'albats') of another two dwellers of Sant Boi, Pere Arrufat and Jaume Bonet, are also registered.²⁹

The pivotal case of Vic, as explained, has great potential to deepen the dimension of the impact of epidemics dealt with in this section. In the current state of research we have examples of one of the most important outbreaks during the second half of the 15th century, that of 1465.³⁰ Several members of the Alberch and Ferrer families died. On 7 January, a nephew of a neighbour called Alberch died, and in May, on 7th and 10th, two daughters of Pere Joan Alberch and, after a week, on the 17th of the same month, Pere Joan himself. Following a similar pattern, in late autumn of the same year, Antoni, son of the notary Antoni Ferrer, died first on 10 November, followed two days later by the other son, Pere. A month later, on the 10 December, a slave of the same notary also likely fell victim to the ravaging disease.

5. Concluding remarks

Drawing on the wealth of documents in the archives of Catalonia with early direct evidence of the mortality crises recorded since the Black Death (or even before), it is possible to delve into several areas of the impact of the outbreaks documented between the mid-14th century and the beginning of the 16th century. Despite the attention traditionally focused exclusively on the great pandemic between 1348 and 1351, the diverging and still poorly understood effects of the later plague and other disease outbreaks, beyond ongoing research (on England, for instance: Slavin, 2024), may force refocusing broad debates on the results of the epidemic sequence throughout Late Medieval and Early Modern Europe.

By combining death counts, obituary records, and wills—supplemented with narrative sources and municipal registers from a broad range of observatories—we can trace the chronology and geography of epidemic cycles in Catalonia between 1348 and 1530. This approach marks a significant advancement in the scholarship on this northeastern Iberian region (Camps Clemente & Camps Surroca, 1998; Günzberg, 2010). Our findings highlight notable differences between epidemic episodes. A significant proportion, based on contemporary references to buboes, could be attributed, though not exclusively, to

bubonic plague. These cycles varied both in duration and territorial scope. Some, such as the second and third plague outbreaks of 1362 and 1371, as well as the major epidemics of 1410, 1441, 1507, and 1530, were widespread throughout Catalonia, mirroring patterns in western Europe. Others, such as the outbreaks of 1465–1466 and 1489–1490, present a less evident aetiology. Most outbreaks followed a seasonal pattern, peaking between May and early October, consistent with the trends observed in the Mediterranean basin and southern Europe—despite ongoing debates regarding disease transmission mechanisms in the early phases of the second plague pandemic (Cohn, 2003; Benedictow, 2010). However, some of the most severe waves, such as those of 1465–1466 and 1489–1490, extended beyond this seasonal window, persisting from autumn or winter (September or November) to the following summer. These cases exemplify the so-called trans-seasonal epidemics (Benedictow, 2010, pp. 398–419).

The demographic impact of these epidemics was highly variable, and while mortality rates can be estimated, they must be interpreted cautiously due to the inherent imprecision of total population figures, which rely on household size coefficients that remain uncertain. Nevertheless, in some years, recorded deaths exceeded 10%, and in several small communities, mortality rates sporadically surpassed this threshold reaching 30%. Some 15th-century epidemic resurgences, therefore, approached lethality levels comparable to the Black Death – the pandemic often assumed to be the only major outbreak of the late Middle Ages (Table 5). Despite the limitations of direct evidence – particularly for the first half of the 15th century – available data suggest that from the mid-15th century onward, plague and other disease waves struck with greater intensity and regularity. The outbreak of 1441 May have marked a turning point in certain areas. This shift is also evident in epidemic frequency: while only five outbreaks were recorded before 1440 (an average of one every 8 years), the second half of the century saw 11 outbreaks up to 1501, reducing the interval to approximately one every 5.5 years.

This possible trend in the frequency of disease cycles has significant implications for interpreting the long-term economic and social effects of the Black Death. It suggests that while some degree of demographic recovery may have been possible in the early 15th century – due to the absence of major shocks within a short timeframe—this recovery may have been abruptly halted by the resurgence of outbreaks from the mid-15th century onwards. This impact extends beyond population dynamics, as recurring epidemics also influenced wages, labour market supply, economic activity in both rural and urban manufacturing sectors, and levels of inequality. These processes are central to the broader historiographical debate in which our research is situated. However, as noted, they fall outside the scope of this article.

Regarding possible diverging paths in child and adult mortality, the examined episodes of the 15th century, when sources are available, suggest that in some cases the peaks of infant deaths preceded those of adults and in others the opposite was true. In any case, this phenomenon was likely linked to the spread of disease within the family or household environment, which in turn depended on the aetiology and bacteriological evolution of each epidemic outbreak. However, an essential starting point in understanding the dynamics of infant versus adult mortality is the age structure of a community at a given moment (Herlihy & Klapisch-Zuber, 1985, pp. 303–336). Moreover, as recent studies on the so-called ‘*pestis secunda*’ have shown (Slavin, 2024), this demographic

Table 5. Simplified sequence of epidemic cycles in Catalonia (1348–1530) with approximative mortality rates.

Epidemic cycle	Places where recorded (excluding cases with no or scarce evidence or no preserved sources)	Approximative mortality rates (% losses of inhabitants during the whole cycle in a single community)
1348/05–09	Barcelona, Girona, Vic, Tarragona, Manresa, Lleida, Cervera	–30–70 (See Maltas Montoro, 2022, pp. 297–307)
1362/01	Barcelona, Girona, Vic, Manresa	–9
1371/04–12	Barcelona, Girona, Vic, Tarragona, Manresa, Lleida, Cervera	–9
1374–5	Vic, Barcelona, Sant Boi de Llobregat	No data
1384/05–11	Girona, Vic, Manresa, Lleida	–7
1387/11–1389/11	Tarragona, Manresa, Tortosa and l'Albí	No data
1395/09–1397/11	Barcelona, Vic, Manresa and l'Albí	–9
1401/04–1404/11	Barcelona, Vic, Tarragona, Manresa, Guimerà	–12
1409/07–1410/12	Barcelona, Girona, Manresa, Cervera, Sant Boi de Llobregat, El Pont d'Armentera i Tarrés	–6
1418/08–1422/09	Barcelona, Girona, Tarragona, Manresa, Lleida, Cervera, Vallclara, l'Albí, Tarrés, Cubells	No data
1424–1430/09	Barcelona, Vic, Tarragona, Manresa, Lleida, l'Albí, Cabra del Camp, Vilabella, Santa Coloma de Queralt	–3
1434–1436/04	Girona, Lleida, Tortosa	No data
1439/06–1441/11	Barcelona, Girona, Vic, Manresa, Lleida, Cervera, Vallclara, Santa Coloma de Queralt	–12.5
1442/summer–1443/04	Tarragona, Guimerà	No data
1448/11–1452/07	Barcelona, Girona, Vic, Tarragona, Manresa, Lleida, Cervera, Vila-rodona, Barberà de la Conca, Cabra del Camp, Guimerà	–4
1456/02–1457/11	Barcelona, Girona, Vic, Lleida, Cervera, Sant Esteve de Cervelló, Sant Boi de Llobregat, Barberà de la Conca, Cabra del Camp, Vila-rodona and Vallclara	–10 (Barcelona) –3 (Vic)
1460/08–10	El Vilosell	No data
1463/10–1468/07	Barcelona, Vic, Lleida, Guimerà, El Vilosell, Vallclara, El Pont d'Armentera, Barberà de la Conca, Sant Esteve de Cervelló, Sant Boi de Llobregat, Cabra del Camp and Vila-rodona	–15 (Barcelona) –5 (Vic)
1471/03, 1472/09	Cervera, Sant Esteve de Cervelló	No data
1474/07–1476/10	Barcelona, Girona, Vic, Lleida, Cabra del Camp, Sant Martí de Maldà	–7 (Barcelona) –6 (Vic)
1478/06–1479/05	Barcelona, Girona, Lleida, Talarn	–0.1
1483/03–1487/08	Barcelona, Girona, Lleida, Cervera, Cabra del Camp	–5
1488/09–1490/11	Barcelona, Girona, Tarragona, Lleida, Cervera, Sant Martí de Maldà, Sant Boi de Llobregat, La Llacuna, Barberà de la Conca, Guàrdia dels Prats, Vilaverd	–13
1494/06–1495/11	Barcelona, Girona, Vic, Lleida, Cervera, Arbeca, Guimerà	–2
1497/05–10	Barcelona, Cervera	–0.2
1501/05–11	Barcelona, Cervera	–9.5
1506/12–1508/08	Barcelona, Girona, Tarragona, Lleida, Cervera, Sant Boi de Llobregat, Guàrdia dels Prats, Vallmoll	–12.6
1515/06–1516/05	Barcelona, Girona, Cervera	–3.5
1520/04–1522/10	Barcelona, Girona, Lleida, Cervera, Fraga, Flix, Tortosa, Soses, Torredembarra, Vilabella, Torroja del Priorat	–5.1
1529/01–1530/07	Barcelona, Girona, Lleida, Vallmoll, Torroja del Priorat, l'Albí, El Vilosell	–21

Source: Based on Supplementary material. A cycle is considered to span from the earliest to the latest recorded outbreak in any of the analysed settlements in Catalonia. Mortality rates based on Table 2–4 prioritizing the cases of the cities of Barcelona and Vic when available.

structure could shift significantly in the aftermath of a major epidemic, subsequently shaping the profile of potential victims in a future outbreak occurring shortly thereafter.

From another viewpoint, the comparison of the severity of epidemics in urban centres and rural communities also points out the importance of the changing characteristics of diseases and their transmission mechanisms. There are some episodes like those of 1439–1441, 1448–1452, 1474–1476 and 1489–1490 that unveil a certain tendency to a greater permanence of the disease in big cities like Barcelona (a trait also detected in other Mediterranean regions like 15th-century Sicily: Bresc, 1986, p. 84) that would connect with explanations attributed to differential health environments, apparently worse in towns (Kowaleski, 2014, pp. 579–595; Slavin, 2024, pp. 464–465). Conversely, other more intense episodes but limited in smaller places like those attested in rural communities like Sant Boi de Llobregat, Guimerà and Barberà de la Conca would support Benedictow's hypotheses of the inverse correlation between population density and morbidity (2021, pp. 847–861) centred on the rat-and-rat-flea-based paradigm.

Nonetheless, throughout the studied chronology, no clear trend shift is detected that would allow us to assert—following the argument of authors such as Cohn and Alfani (2007, p. 204), who distinguish different symptoms and, to some extent, variations in contagion patterns between the early plagues (1348–1400) and those of 1452–1523—that epidemic outbreaks were more widespread and had a more diffuse impact in one period, while in another, they were more localized and severe (Supplementary material). It is also important to consider key perspectives on the effects of mortality crises within a community, particularly their dependence again on average family size. This factor may influence possible correlations between household size, community vulnerability, and response capacity. In communities where average family size was lower, vulnerability was higher, leading to more deaths per household or a greater likelihood of fatalities, despite a lesser perception of the shock's severity. Conversely, in places with larger households, vulnerability decreased while the perceived impact increased (Livi-Bacci, 1984).

It is therefore crucial to further explore the exceptional sources available for the cities of Barcelona and Vic, as well as a significant set of rural communities, to assess the household-clustered impact of epidemics. By systematically reconstructing family histories, we can determine the extent to which deaths within the same family unit – often sharing the same household – were proportionally significant within the overall mortality of a given settlement. Additionally, geolocating these clusters of victims will allow us to examine the spread of contagion across the urban landscape (Galanaud et al., 2015). When combined with further advancements in detecting – and in some cases verifying through narrative or other sources – the age selectivity of certain outbreaks and their impact on the age of structure connected with nuptiality and fertility, we will be in a stronger position to contribute through the extraordinary observatory of northeastern Iberia, to scholarly discussions on the evolution of mortality regimes (Curtis, 2021). Ultimately, this research will also enhance our understanding of the economic impact of epidemics in Late Medieval Europe (in addition to the aforementioned bibliography, see Alfani, (2024, pp. 1935–1944).

Notes

1. We refer to the so-called Great Divergence between the west and east and the so-called Little Divergence between northern and southern Europe (Pamuk, 2007; Pleijt & van Zanden, 2016; Álvarez Nogal, Prados de la Escosura & Santiago-Caballero, 2020).
2. For a literature review on this procedure and more details, as well the example of the permanent commission of the estates gathered in parliamentary assemblies, the *Diputació del General*, that, in parallel to the municipal government, also commissioned death counts in 1457 and some later outbreaks: Reixach Sala (2023a, pp. 972–973). Although it was not transferred to the written record in the same systematic way as in Barcelona, the mechanism has also been documented from the beginning of the 15th century in Valencia and at later times from the middle of that century onwards in Saragossa and Majorca: Reixach Sala (2025a): note 31. Similarly in the year 1489 in Toledo: Ortego Rico (2025, p. 169).
3. For an assessment of the relatively low proportion of buried individuals being the object of an after-death inventory during the first half of the 15th century: Palarea Marimon (2024, pp. 891–893). The case of the cathedral of Vic can be compared with the sources preserved for several urban parishes of the city of Florence or other Tuscan and northern Italian towns, for instance: Henderson (1988); Cohn (2003, pp. 194–196) (with more references).
4. On the interest of focusing on mortality deviation rather than absolute mortality: Van Besouw and Curtis (2022, pp. 8–11).
5. Given the dispersion of these records, which had only been studied with specific tastings in some general works like Camps Clemente and Camps Surroca (1998), or others focused on very specific areas (Gual Vilà & Felip Sánchez, 1990), the corpus is currently being systematized in the PhD currently being written by Alberto Barber. It includes recent new findings in more places in central and south-western Catalonia compared to those listed in Table 1 and Figure 1 like Begues, Freixenet de Segarra, Montlleó, Montornès, Pujalt, Sant Andreu de Llavaneres, Sant Pere de Vilamajor, Sant Genís de Vilassar, Sant Esteve de Vilanova (in Vallès) and even bigger settlements like Verdú and the important town of Cervera, with unpublished death registers. This will lead to an enlargement of the current sample of scattered material from rural communities. It is also from this ongoing research by Barber that all the data we provide on the obituary registers of the city of Vic and the obituary books of two urban parishes in Barcelona are derived.
6. Despite the option of using the number of wills per year in terms of excess mortality estimates to the extent that these totals are indexed to a reference year as some authors do with other indirect sources on mortality such as the inheritances dues owed by unfree adult tenants (Slavin, 2024, p. 458), we resort to the procedure employed by Cohn himself simply accounting the number of wills per year or month: Cohn (2003, pp. 178–209).
7. Ongoing systematic comparisons between burial records and wills in places where both series are preserved, such as the city of Vic or some rural communities, should provide us with some quantitative approximation in this respect.
8. We can illustrate this with three will series under analysis, Manresa, Castelló d'Empúries and Calonge. Manresa's records include 2,838 wills from 1352 and 1462. Between 1352 and 1399, testators were fairly balanced by gender, with 47.35% men, 52.28% women, and 0.47% unidentified. A similar distribution is observed from 1400 onwards, with 52.45% men, 47.48% women, and a negligible 0.07% unidentified. In Castelló d'Empúries, the will registers from 1345 to 1501 contain 2,746 wills, with 53% of testators being men and 46.9% women. Notably, nearly half of the 1,283 female testators (46.2%) were widows. From a social perspective, the broad occupational structure of men identified with socio-professional labels (76.9% of them) is as follows. Beyond the privileged strata (around 18%) – comprising approximately clerics, noblemen (some associated with the court of the Counts of Empúries), and members of the town's urban elite—, the majority of recorded professionals worked in the textile sector (19%). Other significant occupations included agriculture and livestock farming (14.2%) – ranging from rich peasants to labourers—, leatherwork (11.2%), construction (4.5%), and various other crafts (7.14%). Additionally, among the testators there

are jurists, notaries, medical practitioners, as well as individuals engaged in maritime and transport-related occupations. Among the humblest individuals who wrote a will were a prostitute and a freedman and a freedwoman. Among men without a professional title, approximately 13% explicitly mentioned their father's identity when drafting their last wills. This suggests they were likely still minors or had not yet established independent households. The testators of Calonge comprise 55.88% men and 44.12% women, of whom 30.6% are widows. Regarding occupational structure, as a rural community, professional classifications are somewhat limited, with only 32% of men explicitly identified by occupation. However, while just 8.28% of inhabitants are directly linked to agrarian activities, this share could reasonably account for up to 70% of the total if we assume that many individuals without an occupational label belonged to the peasantry. Additionally, 6.9% of testators were involved in the textile sector, 5.9% in construction and other crafts, and 3.4% in maritime-related occupations. Several merchants, practitioners, notaries, clergymen, and some nobles, most of whom were dependent on the jurisdictional lord of the manor, also wrote up their wills. Notably, there was also a freedwoman who had previously belonged to a peasant.

9. Respectively, *Arxiu Històric de Girona* (henceforth AHG), Notarial records, Castelló d'Empúries vols. 215–2300; *Ibidem*, Calonge, vols. 219–253.
10. In this respect, abnormally few records of wills were kept in the first decade of the 15th century, between about 1403 and 1411. By contrast, the degree of coverage of other stages like the 1360s–1370s or from 1420 to the end of the century is very high.
11. This is especially the case of the period between 1404–1429 and 1435–1442.
12. For example, the first outbreak through the bills of mortality recorded in the institutional diary of the municipality of Barcelona, between May and November 1457, saw peak mortality from late June to early September, with 20–30 daily deaths attributed to plague, in addition to 5–10 from other causes. Similar figures emerged during the major outbreak between November 1489 and November 1490, with peak mortality occurring between May and mid-July of the latter year. During this period, daily deaths even exceeded 50–60 between late May and mid-June. In 1501, between May and November, deaths surged from early June to early August, though they generally remained below 40 per day, except for a single instance when this threshold was surpassed: Schwartz & Carreras i Candi, 1892, vol. 2, pp. 265–268, vol. 3, pp. 75–87, 171–179.
13. As previously mentioned, direct evidence from Cervera has been recently discovered, and preliminary estimates from the ongoing systematization of this data have already been used to supplement other sources.
14. Girona Llagostera (1923, p. 412) (docs. 384 (1375/07/26), 385 (1375/07/27)) and 413 (doc. 387 (1375/09/19)).
15. Examples can be found in AHG, Notarial records Castelló, vols. 728, 759, 660, 664, 1961 and 2270.
16. The monthly impact of the episodes of 1515, 1520 and 1530, compared to that of the winter of 1465–1466, can be seen in graphs already published in Biraben (1975–1976, vol. 1, pp. 209–211).
17. Moreover, other Aragonese sources, as well as contemporaries from Majorca (that could be the focus of contagion in April 1475) identified the disease as pestilence of 'glànoles': Pérez i Pastor (1991, pp. 157–158). Nonetheless, as described for Valencia, this outbreak led to more complex epidemiological mutations such as fevers, pneumonia and other diseases affecting the entire adult population: Iradiel Murugarren (2006, p. 168).
18. Useful to compare all the mentioned years with the well-studied case of Valencia (Rubio Vela, 1994–95 and Rubio Vela 1979) where several sources highlight episodes in close but not perfectly coinciding years such as 1401–1402, 1403, 1410–1411, 1414, 1420–1421, 1422, 1428–1429, 1439, 1450, 1459–1460, 1464, 1466–1467, 1475–1476, 1478, 1489–1490, and 1494. There are also certain parallelisms (but not really synchrony) with the generally established chronology for Western Europe by Biraben (1975–1976): clusters of 1400–1408,

- 1412–1419, 1420–1423, 1427–1432, 1438–1439, 1450–1454, and 1456–1458. Similarly, some coincidences can be identified with plague years in the Low Countries during the first half of the 15th century: 1401–1402, 1413–1416, 1425–1426 and 1438–1439 (Roosen & Curtis, 2019, p. 49).
19. An ongoing process precisely aims to trace the average dimensions and composition (number of children and other members) of households in Late Medieval Catalan communities, both in towns and rural settlements, through systematic analyses of will series. This should allow us to see the extent to which the coefficient of 4.5 people per hearth could vary at different junctures or stages during the period under study and, in this sense, to test hypotheses such as that in the aftermath of major demographic shocks, fertility might increase as households that lost children tried to replace them: Livi-Bacci (2000, pp. 41–42, 55–56).
 20. We do not refer to the relevant collection of studies that focus on the death rates among very specific collectives like clergymen or the members of convents and monasteries. Some of them, mostly based on England, are referenced, for example, in Klapisch-Zuber (2008, pp. 132, 137).
 21. Only sparse references can be found with respect to Sant Boi de Llobregat, close to Barcelona, where a newborn was buried indicating he was the first one to die because of a bubo: Codina (1990, p. 258).
 22. This figure is based on the bills of mortality commissioned by the General's deputies and recorded in Sans Travé (1994), vol. 1, 186–188. According to Ribas Puntí (1995, p. 213), who probably starts from data that Viñas extracts incompletely and with some error from the same diary of the Deputy of the General (Viñas Cusí, 1907, p. 381), the total number of deaths by plague in this period would be lower, 3,805, so that the percentage decrease with respect to the total number of inhabitants would be –12.64% taking into account the list of hearths of 1389 and –14.37 or –14.61% taking as a reference those of 1464 or 1496.
 23. Indeed, the second issue is crucial, linking directly to the long-awaited exploration of household composition. This analysis, based on will series, remains pending but is essential for understanding changes in average household size over the period under investigation.
 24. See in this sense the studies mentioned, for instance, by Slavin (2024, note 71).
 25. Literature on epidemics in Late Medieval Catalonia offers scattered examples of this but arising from unsystematic analyses. For instance, there are some mentions of family connections of deaths in Vic in episodes in the aftermath of the Black Death or in 1374 (Guilleré, 1995, pp. 124–125, 130–131; Puigferrat Oliva, 2000, p. 90). Only paying attention to the specific professional collectives of notaries in Barcelona, some indications were also made based on the obituary registers of Santa Maria del Pi and Sant Just i Pastor (Hernando Delgado, 2014, pp. 119–121, 137–204). More sparse references from rural communities in Camps Clemente and Camps Surroca (1998, pp. 113, 166–167, 323–338).
 26. Respectively: Arxiu del Bisbat de Sant Feliu de Llobregat, Parròquia de Santa Maria de La Llacuna, D1; Arxiu del Bisbat de Sant Feliu de Llobregat, Parròquia de Sant Boi de Llobregat, vols. 641.15–35.
 27. Arxiu Parroquial de Santa Maria de la Llacuna, D1 (1458–1567), s.f.
 28. Arxiu del Bisbat de Sant Feliu de Llobregat, Parròquia de Sant Boi de Llobregat, vols. 641.15–35.
 29. Specifically, in the latter case, two of them died on 1 September, while their brothers on 14 and 24 October. By contrast, the three children of Arrufat passed away over the course of days with a little more spacing from 21 November to 17 December.
 30. Respectively: Arxiu del Capbreu de Vic, vols. 257 and 263.

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