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Reduction in grain pollen indicates population decline, but not necessarily Black Death mortality

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Izdebski et al.[1] recently employed a new dataset of pollen information to argue that the plague outbreak of 1347–1352, often referred to as the 'Black Death', exhibited heterogenous levels of mortality across geographical regions of Europe. The authors contend that this contradicts growing acceptance in the literature that the Black Death killed roughly 50% of the populations it entered and that this is the first empirical demonstration of heterogeneity in spatial mortality using systematically comparable indicators.

Izdebski et al.[1] analysed the presence of cereal pollen from 261 radiocarbon-dated sediment cores across 19 present-day countries in different periods before and after the Black Death. The heterogenous spatial distribution of these pollen decreases is, according to the authors, solid evidence for the heterogenous spatial distribution of Black Death mortality.

I agree with the overall argument that Black Death mortality was likely spatially variable and note that this is both in line with what previous historical literature has already suggested[2–4], and also logical given the multiplicity of confounding and interacting ecological, environmental, genetic, social, economic, cultural and health-related factors. However, I disagree that the palaeoecological data of Izdebski et al. can convincingly demonstrate this empirically. While a reduction in grain pollen might indeed be a convincing indicator for a decline in population in a particular area, it is not inevitable that this is connected to mortality (at least not directly). Rather I suggest that the spatially variable extents of pollen decreases could also reflect (1) differing levels of outward migration from an area and (2) different extents of the spatial organization of the landscape, linked to structural institutional, economic and agricultural changes.

It is now well accepted that medieval people were highly mobile and the Black Death might have even facilitated higher levels of migration in its aftermath. There are many posited reasons for this, such as the transition to pastoral farming, but also specifically rural-to-urban migration stemming from potential loosening of coercive restrictions, the opportunity to fill vacancies in depleted cities and micro-demographic factors, such as adaptations to the average ages of marriage[4–7]. It is important to note, furthermore, that none of these factors were inevitably seen everywhere to the same extent, therefore leading to the conclusion that levels of migration likely were not seen to the same extent everywhere. Given that Izdebski et al.[1] use differential levels of grain pollen as a proxy for population loss, and that populations could be lost directly by mortality and also indirectly through outward migration, it is vital that we distinguish between population loss via either method. However, this might be difficult since the basic evidence needed to empirically reconstruct pre- and post-Black Death migration across space—let alone separate and distinguish from mortality factors—does not clearly exist[8]. Izdebski and colleagues recognize that different forms of migration were seen in the aftermath of the Black Death but do not elaborate on how this process might have affected the results.

The notion that decreased grain pollen is an indicator of high mortality caused by the plague, since it reflects the contraction or even abandonment of arable cultivation, is potentially also confounded by alternative factors linked to the rearrangement of the working landscape, linked in turn to structural economic or agricultural change. Of course, the spatial reorganization of the landscape might also be linked causally to Black Death mortality but it is best to demonstrate this rather than assume. To give an example, 'central Italy' is identified in the article[1] as being one of the places that experienced high plague mortality, reflected in its large reduction in cereal pollen indicators and high reforestation said to confirm field abandonment. Although this could be linked with spatial differences in mortality impact, it might also be the case that these findings were connected to structural rearrangements of agriculture. In many parts of central Italy after the Black Death, scattered parcels of cultivated land across wide areas gave way to increasingly consolidated agrarian enterprises centred around a coherent farm (poderi)[9]. This process was entrenched further by the increasing dominance of tenurial structures such as mezzadria (sharecropping), based around often onerous and exploitative new relationships between urban capital providers and rural producers[2]. Therefore, dominance of these new contracts was also inherently woven into political economy factors and not just demographic ones[10]. Central Italy is used as an illuminating example but the broader issue of structural rearrangement of the farmed landscape can be relevant for many areas of Europe in the fourteenth century.

Put simply, the findings of reduced grain pollen in some rural areas of central Italy might be a product of farming being spatially reoriented towards different areas. Of course, these tenurial and agricultural changes still might be connected to the Black Death in some way but it has (for Izdebski and colleagues' argument to hold) to be demonstrated that this was directly related to specific levels of mortality and not another indirect consequence of the Black Death. To be clear, I do not argue against any general notion that central Italy suffered high plague losses during the Black Death but instead against the assertion that increases and decreases in grain pollen are straightforward and unproblematic indicators to demonstrate this. When taken together and interacting with the migration issue explained above, these issues are magnified further.

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Competing interests

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