The 1866 cholera epidemic in Brussels: a spatio-temporal reconstruction

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Context

Belgium was struck by cholera seven times in the nineteenth century. The epidemic of 1866 was the worst, with 43,400 victims (Eggerickx and Poulain 1988, 1991). Cholera entered the country in March 1866 from different directions and claimed many victims until early December, peaking in the summer. The city of Brussels was hit particularly hard, with 3,469 cholera deaths (Falise 1979).

Cholera is a bacterial infectious disease with an incubation period of a few days. The main symptoms of cholera are severe vomiting, diarrhoea and a blue skin tone (Kiple 2003). Barely half of the patients survived. The disease is mainly spread by contaminated water. Until the late nineteenth century, people usually had to rely on (often polluted) wells and waterways for their drinking water. The real cause of cholera was unknown in 1866, even though the English doctor John Snow had pointed out the dangers of polluted water as early as the 1850s. A breakthrough only came in 1883, when the German Robert Koch discovered the cholera bacterium. Previously, it was thought that the disease was caused by so-called miasmas, foul smells from polluting waterways and street refuse (Oris 1991).

In this contribution, we examine who were the main victims of the epidemic in Brussels and show the course of the epidemic across the city from the first death to the last**.**

Sources and datasets

Specific information on the cholera epidemic of 1866 can be found in the city archives of Brussels, including lists of names of all the people who died of cholera, with personal details such as gender, age, place of birth, occupation and address. The publications of the Brussels doctor Eugène Janssens (1868), who had been in charge of the Brussels cause of death registration since 1862, also provide important information. By linking these data to some of our databases, such as the historical GIS Brussels (the digital map of nineteenth-century Brussels), POPPKAD (the database of the nineteenth-century Belgian cadastre) and LOKSTAT (the historical database of local statistics), we were able to reconstruct a fairly complete picture of the 1866 cholera epidemic in Brussels, from the first death on 26 May and the last death on 15 November (175 days, 25 weeks).

Profile of the victims: age and sex

The effects of the cholera epidemic in Brussels were strongly dependent on age and gender. The disease claimed many victims in the age groups 0 to 10 years and 20 to 49 years. However, the number of victims in a certain group can also be higher simply because more people belong to that age category. When we take into account the age structure (the number of inhabitants per age group) made available through the LOKSTAT database, a specific pattern emerges. The greatest mortality risks appear in the first years of life and in later life (aged 60+). The lowest risk was for teenagers. Men appeared to be the most vulnerable, except in the older age groups (60-79-year-olds). Still, looking at it from a chronological perspective, it appears that, compared to children and adults, most of the elderly died somewhat later in the epidemic.

Spatial distribution of the epidemic

To determine the specific spatial distribution of cholera, it is also important to take into account the composition and density of the population in the different streets and neighbourhoods. Unfortunately, the historical sources do not allow us to go down to that level of detail, but we do have the number of inhabitants per street. This means we can better examine the extent to which different neighbourhoods were affected. See map: https://www.queteletcenter.ugent.be/en/cholera-in-brussels/

The cholera epidemic manifested itself very selectively in spatial terms. Cholera wreaked havoc in the lower-lying working-class neighbourhoods in the south (Marolles), southwest (Vieux Marché) and north (harbour area and Notre-Dame-aux-Neiges) of the city. In addition, there were many deaths in the rural area to the east of the Chaussée d'Etterbeek, where likewise numerous workers were housed in small dwellings. Most of the higher-lying neighbourhoods, on the other hand, were relatively mildly affected. This is true of the commercial districts in the city centre, the residential areas around the Royal Park and the Leopold Quarter with its numerous embassies and consulates.

Spatio-temporal distribution of the epidemic

While it is clear that the epidemic hit working-class neighbourhoods the hardest, is difficult to determine in what manner the epidemic was dependent on social class at the individual level. The occupation of the deceased was mentioned on the death certificate, but this was obviously not the case for children and usually not for elderly people or women either. A good alternative to measure the wealth of the deceased is the cadastral income of the residence of the deceased (the so-called rental value). By linking the home address of the deceased to the POPPKAD database, we were able to trace the cadastral income of the cholera victims in Brussels, as we have the rental value of every house in Brussels for the years 1864-66.

These data can be displayed in a historical geographic information system which was set up in the context of the POPPKAD project. This means we can closely follow the course of the cholera epidemic, day after day, since the deadly outbreak in Brussels on 26 May 1866. The course of the epidemic is presented in the following time-lapse video: https://www.youtube.com/watch?v=D-xDez7S4ks&ab_channel=QueteletCenter

Overall, we find a concave relationship between space and time: the distance 'travelled' by cholera increased at first, but declined during the rest of the epidemic. We observe 4 stages. Examining the average distance covered by the epidemic from one week to another, we find that during the first month the distance rapidly increases as the epidemic spreads across the city. In the next stage, larger distances and more deaths are observed. In the third stage, large numbers of cases are spread over large distances, indicating either the presence of the epidemic everywhere or multiple clusters; these cover largely a coherent period from week 8 to 17, with weeks 8 to 11 being the most intense. In the final stage (the last 2 months), as the epidemic winds down, distance is limited and the number of deaths is again reduced.

Still, in some neighbourhoods, there is a negative relationship between space and time: The distance declines throughout the epidemic. This is the case in the harbour area for the elderly, in the east of the city for children, and in the south (Marolles) and north (Notre-Dame-aux-Neiges) for adults.

Follow-up study

Now that we know who and where the epidemic struck, it is also important to gain a good insight into its causes. Access to clean drinking water played a central role here. Incidentally, in 1858 Brussels became the first Belgian city to have a public water supply. The city council tried to get as many people as possible to connect to the network. To that end, several fountains and public water pumps were even closed or removed, much to the dismay of a large section of the (poor) Brussels residents who saw this move as robbing them of their only source of water. The question is therefore whether or not the stance of the Brussels city council made the cholera epidemic of 1866 worse. Using info on sewerage by street and access to drinking water by household, we will examine next its relation to the spatial-temporal distribution of cholera deaths to get a better understanding of the transmission routes of the epidemic.