Multimedia

London's smallpox maps

During the 1870s and 1880s, London was gripped by a series of epidemics of a virulent, and often fatal, form of smallpox. Similar outbreaks had occurred at the end of the 18th century, at the time when Edward Jenner was doing his first experiments with vaccination, but had died down; in the early part of the 19th century, smallpox was generally thought of as a rare and mild disease. Doctors were therefore wholly unprepared for the virulence of the variola virus variant that was introduced into the city in 1871. At that time, only two small hospitals existed in London taking smallpox patients, and these only accepted those who could pay. The Metropolitan Asylums Board, established by an act of Parliament in 1867, set about planning and building specialist isolation hospitals throughout the capital. Hospital ships were later established on the Thames; all hospitals and ships accepted patients with smallpox free of charge.

However, the location of these hospitals, and even their role in controlling the epidemics, remained controversial. Many residents of the areas around existing and proposed hospitals, particularly those from the higher social classes, thought that the mere presence of a smallpox hospital would increase the local prevalence of the disease. In 1881, a Royal Commission into infectious diseases was set up to look into hospital provision and decide whether any should be closed. Part of the Commission's work was production of four large maps of smallpox in London during the epidemics. These were created from Ordnance Survey maps and covered three epidemics and one interepidemic period during the 1870s. Each map was marked with the location of all known cases of smallpox and smallpox hospitals that were open at the time; each hospital and the cases treated there were shown in the same colour. A fifth similar but slightly smaller map was added to the series later in the 1880s.

London's smallpox maps eventually came into the possession of the London Metropolitan Archives. They were in poor condition, and their size made them difficult to handle or even to store. In 2013, the London Metropolitan Archives obtained a grant from the Wellcome Trust to repair, conserve, and digitise them. This work is now almost complete, and the project was presented at two well attended seminars held in June and November, 2014. "The four large maps measure 5×3·2 m, and we know that they cost over UK£500 to produce, which was an enormous sum in the 1880s", explained archivist Philippa Smith at the second seminar. "Now their preservation is complete, we want them and the rich information associated with them to be widely available for research."

The first and still perhaps best known use of maps in epidemiology was John Snow's mapping of a cholera outbreak in London in 1854. This map led to the tracing of the epidemic to a single water pump and, indirectly, to proof that cholera was a water-borne disease. Ever since then, maps have frequently proved useful for monitoring and controlling of outbreaks of infectious disease. During the late 19th and early 20th centuries, the focus of infectious disease research moved from Europe to Africa and Asia. Newly established hospitals for tropical disease and military doctors, among others, produced many very useful maps of disease outbreaks. Something of a lull in public health mapping occurred after World War 2, but mapping re-emerged in the 1990s in a different, digital form. "Today, mobile phones and maps produced from satellite imagery play a large part in mapping disease outbreaks", says Chris Grundy of the London School of Hygiene and Tropical Medicine.

Grundy and his colleague Heidi Larson have identified striking similarities between 19th-century and contemporary attitudes to infectious diseases, and have shown that these attitudes affect the way that the diseases spread. Now, as then, virulent infectious diseases with no certain cure are treated by vaccination—if a vaccine is actually available—and isolation and quarantine. The so-called antivaccination movement was at least as strong in England towards the end of the 19th century as it is today, and the London epidemics would very likely have been less severe if vaccination had been more widely accepted. "Behaviour arising from fear and stigma, such as avoidance of hospitals, is as prevalent in modern epidemics like SARS and now Ebola as it was during the London smallpox epidemics", says Grundy.

The London Metropolitan Archives also hold data on all the patients marked on the map, and detailed case histories for many of them. Howard Benge, Development Officer at the Archives, described one of these at the seminar—a distressing example of a 19-month-old boy whose father had been advised not to have him vaccinated, and who died of the disease. "It will be possible to link all this information to the spots on the map, to build up a detailed picture of the epidemic at a case-by-case level, and even to link in other socioeconomic information." "This detail should make the maps even more useful for research, but data protection and privacy laws would make it impossible to do anything similar with a map produced today", added Grundy.

Clare Sansom

Dr Klaus Boller/Science Photo Library