

Cholera: A Story of Epidemiology

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Cholera, before and after



Figure 1: c1831: Venetian, aged 23, depicted before and after contracting CHOLERA

What is Cholera?

- Fun fact: Montreal and Quebec City were the *FIRST* places in North America that cholera landed, coming by ship from Ireland in June 1832
- *Cholera is an infectious disease that causes severe watery diarrhea, which can lead to dehydration and even death if untreated. It is caused by eating food or drinking water contaminated with a bacterium called Vibrio cholerae.[1] – {WebMD}*
- That is *today's* description of Cholera. However, people used to believe otherwise...

What people used to believe. . .

- Back until late 1800s, people believe that Cholera was by direct person-to-person contact
- Especially, *miasma*:
 - a vaporous exhalation
 - a heavy vaporous emanation or atmosphere
 - an unpleasant or unhealthy smell or vapour
- Miasma theory was popular back then – diseases were caused by miasma

Cholera deaths

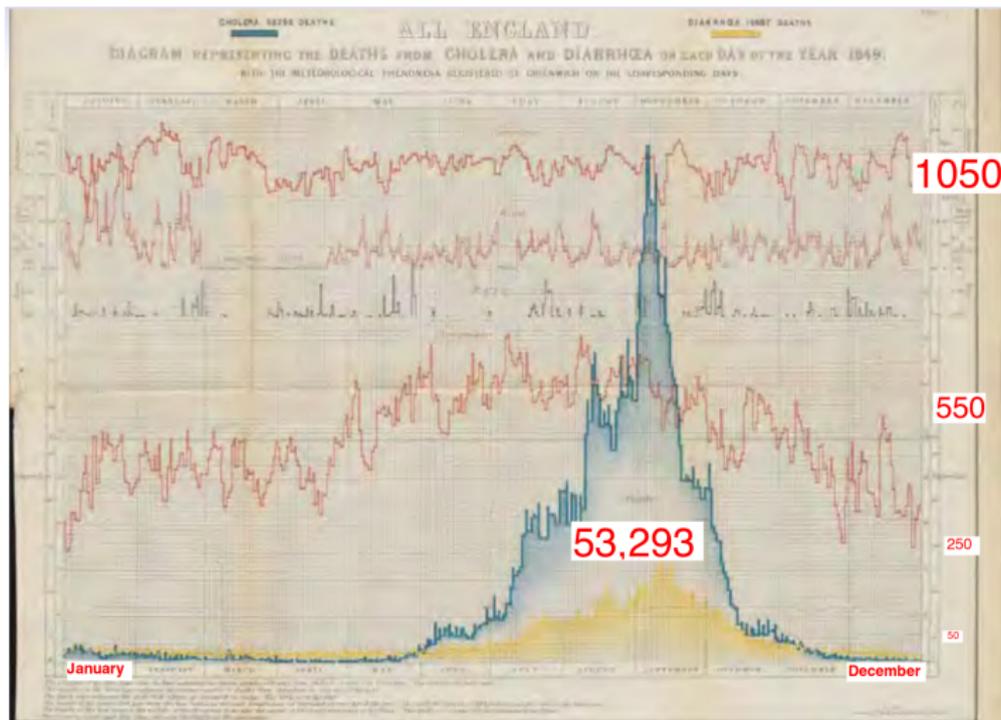


Figure 2: Daily Numbers of Deaths from Cholera in England in 1849

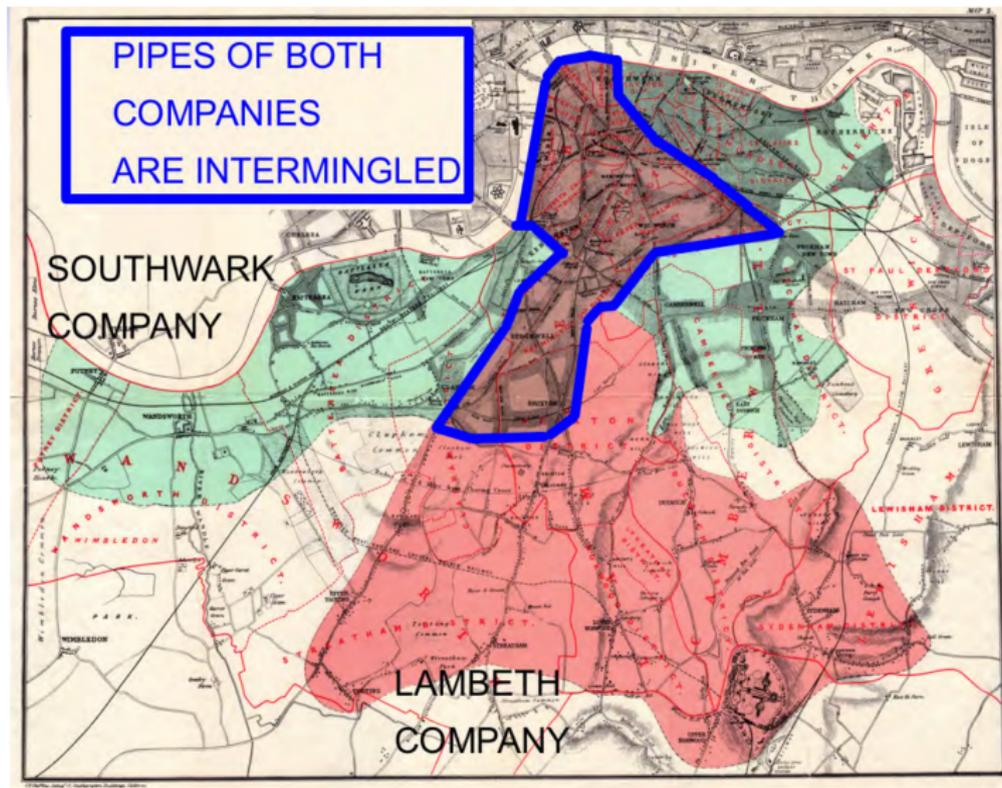
Miasma?

- Possible relations with temperature, rainfall, barometric pressure and wind direction?
- Probably not – a London physician named John Snow, who once introduced anaesthesia to Britain, believes that:
 - Cholera multiplies in the gut
 - then passed on by the fecal-oral route, and through water
 - therefore he suggested to wash food and hands (with clean water), boil soiled cholera clothes, and boil the drinking water
- The Government Statistics Office took 2.5 years to make database from first epidemic breakout, link them to the census data, and produce a huge report full of stunning colour graphs and tables
- In the meantime Snow awaited the next epidemic to gather more evidence for his theory

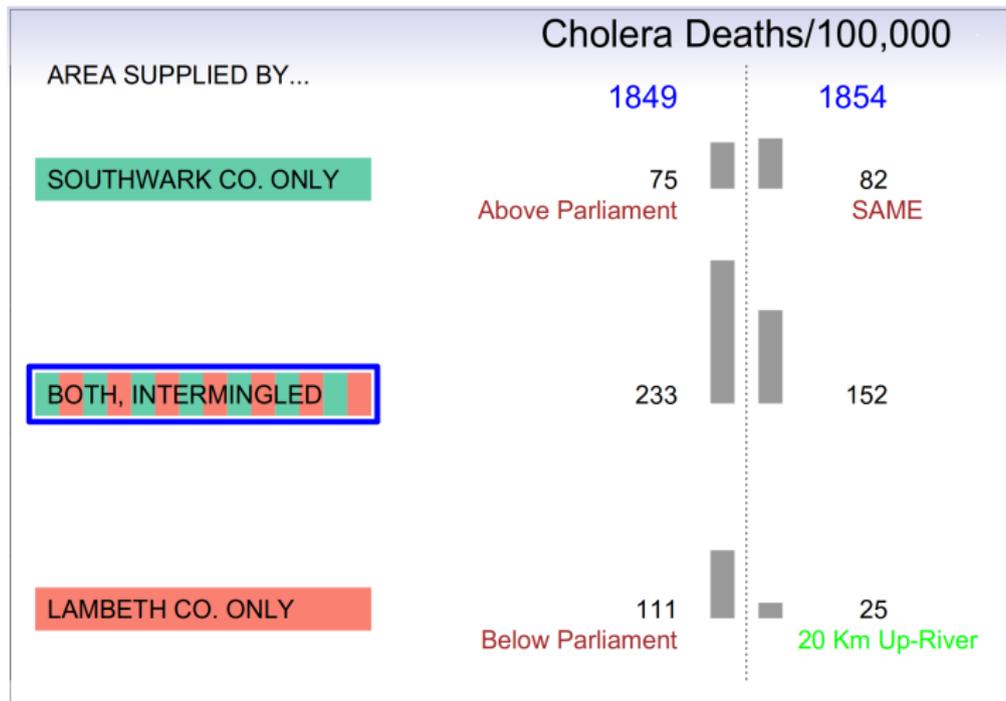
John Snow

- Most of London the water companies divided up the territory so they were not in competition
- In south London there were 2 companies that had been in active competition for customers and that in many streets, pipes from these 2 companies went down the same street
- But since they both drew their water from downtown London, this didn't help Snow to tease things apart
- not until the Government gave the Water companies a deadline to move their intake to above the tidal portion of the river
- The Lambeth company moved its intake upriver starting in 1852
- This gives John Snow a chance to observe in the next epidemic

Water Companies in South London



The second Cholera Epidemic in South London (1854)



Deaths in first 4 weeks (1854)

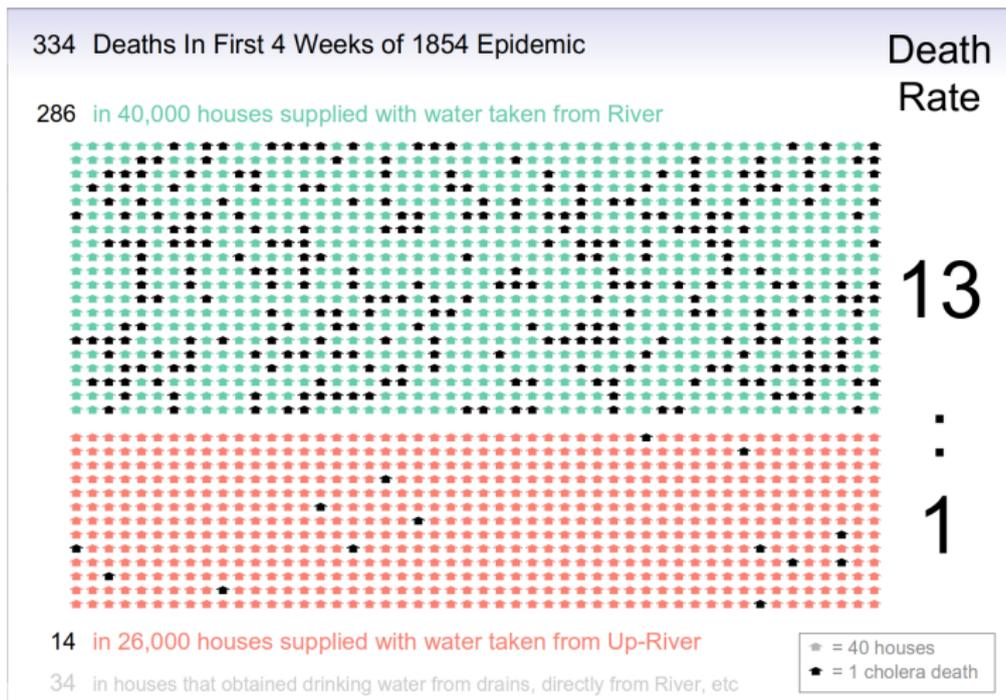


Figure 3: Meanwhile, starting night of Thursday Aug. 31, in Soho district

What Snow knows. . .

- The water from the pump tastes okay, but that does not mean it's safe from Cholera
- At the time, Snow did not have any proof the water from the pump was contaminated
- The evidence was eventually provided next year by a curate from local church
 - The pump was just outside the house where an infant died
 - patients normally die within a day or two of onset
 - but the infant had been sick for 4 days
 - the soiled diapers were steeped in a pail; water from pail was poured into cesspool
 - The engineer excavated and found the cesspool blocked, and the brickwork defective and leaking contents into the drain
 - The drain was defective and leaking material into the well that fed the pump

Video from BBC

BBC Cholera 13:35; 42:26

Open Challenge?

Now here is an interesting part I would like to add – I know most of you guys have more or less a passion for data science, and here is your google interview question:

- How should we collect data and what models should we choose to figure out reason for a disease?

References

Most material from Dr. Hanley

To be added