

## Mapping cholera with John Snow

Lesson Map: <http://esriaustralia.com.au/education/SpatialActivity20>

### Engage

*The start of spatial epidemiology.*

- Epidemiology is the study of the distribution of diseases and other health related factors.
- Epidemiology began in 1796, when a New York surgeon Dr Valentine Seaman attempted to map the outbreak of yellow fever in downtown Manhattan. He believed the outbreak was the cause of a street drain, but as we know now, mosquitos transfer this deadly disease.
- Around 50 years later in 1854, John Snow (a local physician) successfully mapped the distribution of cholera deaths in Britain. Cholera is a diarrhoeal disease that can lead to death within a few days if not treated.
- Before John Snow mapped the disease, it was believed it spread through 'bad air', meaning that the air was polluted from rotting organic waste. This was called the 'miasma theory'.
- John Snow disproved this theory by creating his infamous cholera map.

### Explore

*London cholera deaths.*

- Click on the Lesson Map URL above to open the map. In the 'details' pane, under 'content', tick the checkbox 'All Recorded deaths from Cholera'. The orange symbols represent all of the deaths in one area of London.
- Click on 'Other water pumps' and 'Broad Street Water Pump'. Look at the location of the pumps in comparison to the deaths.
- ? What do you notice about the spatial distribution of pumps and deaths? *[A higher portion of deaths occurred around the Broad Street pump]*

Download student worksheet [here](#).

Time  
15 minutes

#### Activity

Investigate cholera in a 21<sup>st</sup> century version of John Snows original map.

#### Learning Outcome

Students will be able to:

- Explain the spatial distribution of cholera deaths.
- Observe the connection between water pumps and deaths.
- Identify outliers in this pattern and theorise reasons why.

#### ACARA Curriculum Link

[Year 11 Geography: Natural and ecological hazards](#)

[ACHGE022 | ACHGE024 |](#)

#### Teacher Feedback:

To share your feedback on this, or any Spatial Activity, please contact [education@esriaustralia.com.au](mailto:education@esriaustralia.com.au)

## Explain

*Why are there more deaths around the Broad Street pump?*

- Uncheck the box 'All recorded deaths from Cholera'.
- Check the box 'Recorded deaths from Cholera (coloured according to the closest pump)'. Click on the 'Legend' tab to see the colour codes.
- ? What do you notice about the deaths related to the Broad Street pump (red)?  
*[There are many more deaths relating to this pump as opposed to other pumps]*
- ? There are many outliers in the Cholera map (deaths that occurred very far from the Broad Street pump). What are some reasons these people may caught the disease if it didn't spread from 'bad air'. *[There are many reasons for this. Firstly, both the major companies that supplied water to the area sourced it from Thames, which was a very polluted source. Secondly, many of these people drank from the Broad Street pump on their way into town or to work].*

## Extend

*A deeper look.*

- ? Turn of all other layers, apart from 'All Recorded deaths from Cholera'. Look at the infrastructure located near Broad Street. What is nearby? *[Workhouse and brewery]*
- ? 500 people worked at the workhouse however there was only 5 reported deaths. Why might this be? *[The workhouse had its own pump]*
- ? How many people died at the brewery? *[None]*
- ? Why did no one die at the brewery despite the fact many people drank there?  
*[The alcohol killed the bacteria in the water]*

## Next Steps:

*Request a free ArcGIS Online Account for your school:*

Australian schools can request a free ArcGIS Online account as part of Esri Australia's Classroom GIS Initiative. A school subscription provides additional map layers, content, features and privacy.

Learn more about ArcGIS Online, and apply for your ArcGIS Online School subscription at <http://esriaustralia.com.au/education>