

# John Snow's Contribution to Modern Epidemiology

William L. Welbourn, Jr.  
STAT 6560 – Graphical Methods  
Utah State University

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# Background

- A distinguished British anesthesiologist, whose life was rather short lived (1813 – 1858)
- Among accomplishments administered chloroform to Queen Victoria at the birth of two of her children
- His investigation of the 1854 cholera outbreak in London, pioneered the field of Epidemiology
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# Outline

- 1 Who is John Snow?
- 2 Cholera**
- 3 1854 London Outbreak
- 4 Conclusion

# The Illness

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# Origin

- In the 19<sup>th</sup> century, two theories surrounded the notion of the origin of cholera: *miasma theory* and *germ theory*
- Miasma theory – diseases arise spontaneously from swamps and decomposed material... Theory was rejected by Snow
- Germ theory – disease is caused by activities of microorganisms, prevailing within the body... Theory was accepted by Snow

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# Communication

- Snow utilized case studies as a medium to study the disease
- Some conclusions of Snow in case study of John Barnes:
  - Hypothesized the incubation period of the disease to be three days
  - Physical contact with an infected victim could lead to the onset of disease
- Subsequent case studies helped Snow learn of other ways of communication

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# Broad Street, Golden Square

- Six week period, beginning August 19, 1854
- More than 575 deaths
- “... Mortality in this limited area probably equals any that was ever caused in this country, even by the plague.”  
[Sno36]

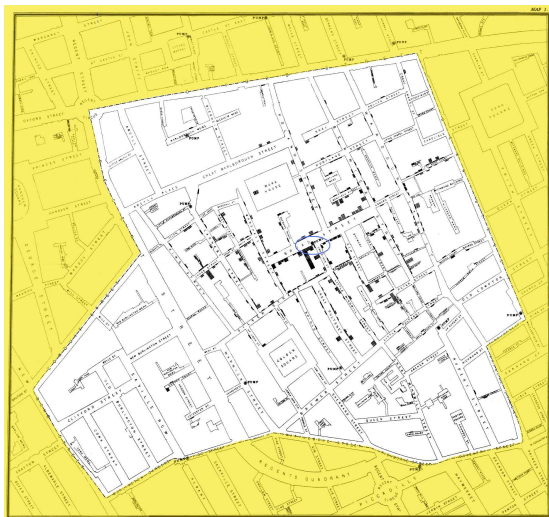
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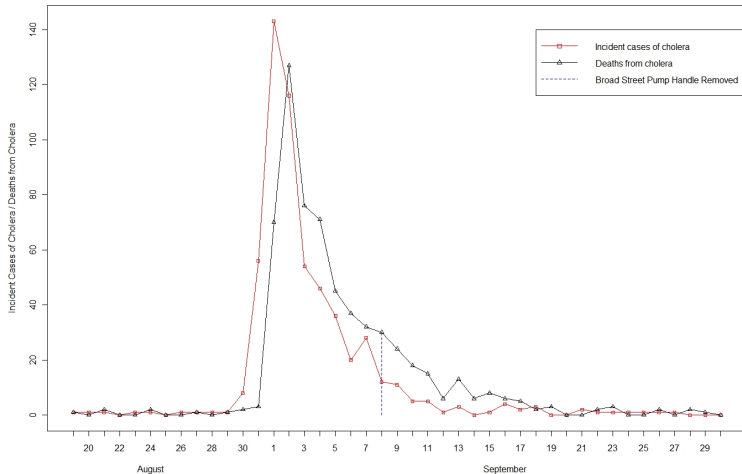
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# John Snow's Rendition of the CF Cheffins Map [Fre99]



# The Epidemic

Temporal Distribution of Cholera Incidence/Death



# Snow's Hypotheses

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# Snow's Testing Procedure

- Tested the water of the Broad Street Pump on September 3<sup>rd</sup>, and on several occasions over the two subsequent days
- Obtained a list of registered cholera deaths from the General Register Office
- Conducted interviews of survivors, to the extent of victims drinking from the water of the Broad Street Pump

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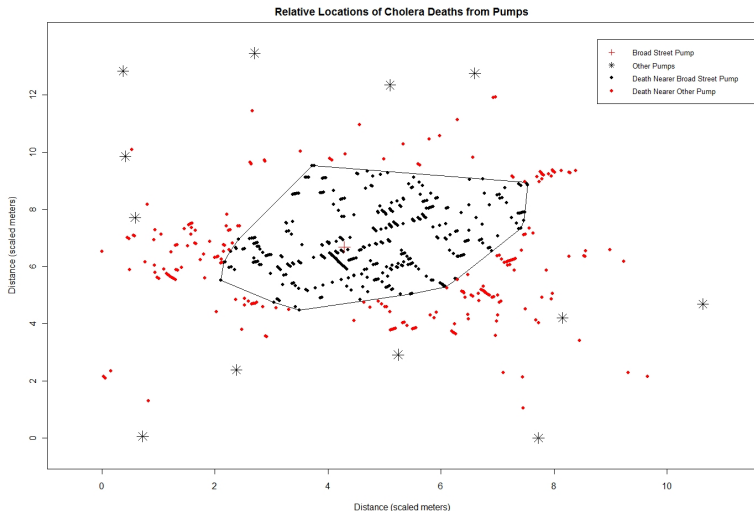
# Snow's Action to Control the Epidemic

- Utilized his map and empirical evidence, to convince the Board of Guardians remove the handle of the Broad Street Pump
- A mere 48 fatal attacks occurred, following the removal of the handle of the Broad Street Pump, indicative that the water feeding the Broad Street Pump could be the source of the cholera epidemic

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# Relative Locations of Deaths/Pumps



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- John Snow's actions during the August/September 1854 London cholera epidemic, were truly that of an Epidemiologist
  - Snow *proposed* several *hypotheses*, including how the disease is spread, and the source of the disease.
  - He then *examined* the General Register's list of registered deaths from cholera, and examined the drinking habits of both infected and non-infected persons
  - Utilized **graphical** and empirical evidence to persuade the Board of Guardians *remove* the handle of the Broad Street Pump
- Epidemiology: "The study of the *distribution and determinants* of health-related states or events in specified populations, and the application of this study to *control* of health problems" [Las00]

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