

# John snow the father of epidemiology history essay



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John Snow (1813-1858), the father of epidemiology, has a legacy that still exists today. His use of epidemiological methods helped identify the risks of certain diseases and has also helped establish what preventative actions should be taken in response to an outbreak. He was a great man that is known for his work involving anesthesia and cholera. In Snow's short lifetime, Oleckno claims (2008), " He is credited with writing over 100 books, pamphlets, essays, articles, and letters to the editor on a variety of medical topics"(p. 1691) including his very famous book, *On the Mode of Communication of Cholera*, which describes the cholera outbreak that took place in Soho in 1854 (Oleckno, 2008, p. 1691). Snow's studies have shaped the world's views on epidemiology as a science, and they have changed the way we confront public health problems that still exist today. Snow's experiments provided a perfect example of this science since epidemiology is concerned with who gets sick, and why they get sick. Research by Blank and Jameson (2007) proves that, " Snow's work still serves as an example of how prevention can be effective without an explicit understanding of the exact mechanism of underlying pathogenesis" (p. 3). Although his ideas were highly debatable at the time when it came to the spread of cholera, Snow still pressed on and eventually got his point across. Through his hard work and persistent determination, John Snow is seen as a pioneer who brought the use of anesthesia out of the dark ages, and a savior who contributed to rescuing London from the terrors that cholera produced (Oleckno, 2008, p 1692). Snow was born on March 15, 1813 to a working class family in York, England. As a young boy, Snow proved that he was very bright. He particularly excelled in mathematics. His mother recognized his intelligence and eagerness to learn, so she placed him in a private school <https://assignbuster.com/john-snow-the-father-of-epidemiology-history-essay/>

where he could shine. Snow had a desire to become a doctor, and when he was fourteen he attained an apprentice job alongside Dr. William Hardcastle, a pharmacist, in Newcastle-upon-Tyne (Old News, 2005, p. 8). Hardcastle exposed Snow to cholera patients during an outbreak in Killingworth in 1832, effectively giving him a medical understanding. In 1836, Snow entered the Hunterian School of Medicine in London. While in school, he also gained more clinical experience at the Westminster Hospital. In 1843 he received his bachelor of medicine, and in 1844 he graduated as a MD from The University of London (Simmons, 2002, p. 163). At this time, and for his lifetime, John Snow was described as a modest bachelor who was very healthy. He followed a strict vegetarian diet since the age of seventeen (Mawson, 2009, p. 498), and he abstained from drinking alcohol. On occasion, he would even publicly support temperance. John Snow lived in Soho, London on Frith Street.

After moving to Soho, Snow distinguished himself by making the first scientific studies on the effects of anesthetics. He focused most of his scientific experiments on the usage of ether and chloroform. According to Hempel (2007) Snow, “ Was looking for the perfect narcotic vapor; effective, easy to administer, and completely safe” (p. 97). Ether and chloroform are colorless, unstable, liquids that come from ethyl alcohol. They were formerly used as inhalant anesthetics. Chloroform however, was known to cause heart problems. John Snow is very interesting to me in the fact that he experimented with anesthetics on himself. He did this for nine years, and his goal was to identify a drug that had the properties and advantages of chloroform, but was similar to ether in not causing cardiac arrest (Mawson,

2009, p. 498). Snow studied the advantages and disadvantages of each of the narcotics, and eventually he developed an anesthetic inhaler with a mouthpiece. After putting the inhaler on his face, Snow would record the dosage he was about to give himself, and then release the gas he was testing. He would fall unconscious very quickly, and would remain knocked out for different periods of time depending on the drug and the amount he was using. When he would awake, Snow would record the amount of time he was unconscious for. These tests helped determine how much a patient could handle, especially when being operated on. Because Snow made the usage of these drugs more safe and effective, surgeons no longer risked killing their patients by using the wrong amount of a certain anesthetic. Also, in 1847, Snow published a textbook entitled, *On the Inhalation of the Vapour Ether in Surgical Operations*. This book classified Snow as an anesthesia expert in England. Snow's newly gained fame as becoming a pioneer in anesthetics led to his invitation to assist in delivering Queen Victoria's children, Prince Leopold and Princess Beatrice (Oleckno, 2008, p. 1691). The mask he had invented was used to administer chloroform to Queen Victoria. It aided her while she was giving birth to her last two children.

After his work in anesthetics, Snow moved on to investigating cholera. According to Codeco & Coelho (2006), " His work on cholera was fundamental in many ways: he proposed methods and ideas that are still part of the basic toolkit of modern epidemiology, such as time-spacial analysis and notions of source exposure and incubation periods" (p. 16). Even before John Snow decided to take on cholera, it overwhelmed civilization for many years prior. Cholera was present in India in the

seventeenth and eighteenth centuries. Cholera occurred in three main waves, each one its own pandemic. The first pandemic took place from 1817 to 1823. The second pandemic carried cholera to Europe, and then across the Atlantic Ocean to North America in 1826 and 1837. When the third pandemic began in 1846, John Snow decided to step in. Microbiology has proved that cholera is caused by the bacteria, *Vibrio cholerae*. This can enter the body from contaminated food, but mainly from contaminated water. The bacterium effects a person's digestive system; mainly the small intestine. It causes severe diarrhea and vomiting, which leads to dehydration. According to Ball (2009), " As the concentration of the water in the bloodstream decreases, the blood becomes thick and tarlike. The heart rate becomes irregular and dehydrated limbs begin to shrivel" (p. 106). If a cholera patient is not rehydrated with a saline solution, death can occur very quickly.

At the time, physicians knew little about the origins of cholera. The common belief was that cholera was caused by miasmas; bad odors that came into the atmosphere from foul smelling areas. Cholera was also thought to be a disease of the blood, not of the digestive system. John Snow, a member of the Cholera Inquiry Committee (Paneth, Vinten-Johansen, Brody, & Rip, 1999, p. 1545), had his own revolutionary ideas. He had done a lot of work with identifying the causes of contagious diseases in the past, and when it came to cholera, he felt that people were getting sick because there were tiny parasites in the water. According to Oleckno (2008), " Cholera was transmitted primarily through contaminated drinking water via the fecal- oral route and not through miasmas" (p. 1691). It had not been proved yet that miniature organisms could make people sick, and Snow was not widely

supported. Vachon (2005) reinforces this idea, claiming, “ This was not an original idea, but it was an unpopular one during the first half of the nineteenth century” (p. 1-2).

When cholera struck London in 1848, Snow decided to track the progress of the disease. He wanted to prove that his ideas about the cause of cholera were correct. In August of 1849 Snow published a pamphlet entitled, *On the Mode of Communication of Cholera*. This pamphlet proved his theory on the cause of cholera through the many examples given. Publishing a highly debatable essay like this was done at his own risk, but Snow felt that he had demonstrated a relatively reasonable argument in his pamphlet. He felt that the conditions in which cholera developed were spread throughout many neighborhoods. If these cholera epidemics were ever going to end, something would have to be done. Snow’s ideas expressed in, *On the Mode of Communication of Cholera* had little effect on what his colleagues had thought. Despite this setback, Snow pushed on, and stuck to his original ideas. He carried out more experiments from this time on proving that his ideas were correct.

Snow is best known for two experiments that he conducted in London. While the third pandemic of cholera was still raging through London in 1854, Snow began a project that he called his “ Grand Experiment.” Snow compared the cholera death rates in each household supplied by two rival water companies; the Southwark and Vauxhall Company and the Lambeth Company. According to Ball (2009), “ He demonstrated that six out of every seven cholera deaths occurred in houses that received water from the Southwark and Vauxhall Company, instead of the Lambeth Company (p. <https://assignbuster.com/john-snow-the-father-of-epidemiology-history-essay/>)

107). The question was, why were people who received their water from the Southwark and Vauxhall Company sick with cholera when both companies received their water from the Thames River? When it was discovered that the Southwark and Vauxhall Company drew their water from a more polluted area of the river, Snow's proposed connection between cholera and contaminated water began to make sense. People that drank water from this source were more likely to contract cholera than people drinking from other sources because of the dirty water that was being used. Oleckno claims that (2008), " Through painstaking investigation, Snow provided credible evidence that cholera was transmitted by sewage contaminated water years before the germ theory of disease was firmly established" (p. 1691). This experiment, in my opinion, was a big step for not only John Snow, but a major contribution to society. This new discovery would help convince the population that cholera was a waterborne bacterial disease, and would lead to better public sanitation.

Snow also conducted a localized study in the Golden Square of the Soho district, where he lived. This experiment is probably the most widely known of the two. The events that took place on Broad Street, now Broadwick Street, started with a five month old baby named Francis Lewis (Ball, 2009, p. 107). The child had developed cholera, and to this day no one knows how she contracted it. After Francis died, her mother washed her soiled sheets and clothes and emptied the dirty water into a cesspool in the front of their house. It didn't take long at all for the residence on Broad Street to contract the disease, and the number of deaths from cholera had risen to over five

hundred after only ten days. Snow now had to determine where the outbreak started.

According to The Lancet (2005),

Snow also faced considerable difficulties: he personally visited the homes of 658 people who had died of cholera; he had to abandon his anesthesia practice for weeks at a time to do his cholera investigations; and The Lancet and Parliament both pilloried him (p. 957).

Snow started first by knocking on all the doors in the Golden Square neighborhood. He visited every house, and while he was there he questioned the family's consumption of water. After Snow gathered all of this valuable information, he drew a map with a black spot representing every death where it occurred. This map emphasizes Snow's genius because the technique he used, now called disease- mapping, is a vital tool used in epidemiology. He noticed that at the center of his map was the Broad Street Pump. Snow had an idea that the pump was the cause of the outbreak, but because the deaths were inconsistent, he had no evidence to support his prediction. Ball (2009) says, " Broad Street water had a reputation for being colder and more carbonated than the water from surrounding pumps, so it had attracted a clientele from adjacent neighborhoods (p. 108). After Snow interviewed the people who had a family member die, he discovered that many people stopped to drink from this pump when they were on their way to school or work. Two observations after his investigation really stood out to Snow. One was that there had been no deaths among the workers at the Lion Brewery on Broad Street. When Snow learned that the workers received



liquor as a part of their wages, and barely drank water from the pump, the reason why there had been no casualties made sense. The second baffling observation was the death of a woman named Susanna Eley. Eley was a widow who moved from Broad Street to Hampstead (Ball, 2009, p. 108). After Eley died, Snow interviewed her surviving sons and discovered that she loved the taste of Broad Street water so much, that she had it delivered to her new house in Hampstead from the pump on Broad Street. This information was exactly what Snow needed. He now had evidence that the pump was in fact the source of the outbreak because an outside person had deceased after drinking the pump's water.

Now that he had an adequate amount of data and some solid evidence, Snow requested to talk to the Board of Guardians by St. James Parish to come up with a plan to deal with the cholera outbreak. After some persuasion, Snow convinced the local parish officials to remove the handle of the Broad Street pump, and on September 8, 1854 it was done. According to the MMWR (2004), " Snow's studies and the removal of the pump handle became a model for modern epidemiology." (p. 783). This gesture had little to do with ending the epidemic because the outbreak was nearly over. However, when he convinced the parish officials to remove the handle of the pump, this became a historic example of a public health intervention. After the pump was dug out, it was revealed that the well that served the pump ran near broad street sewage pipes and cesspools. Although it was never determined how the well became contaminated with the bacteria that spread cholera in the first place, it is assumed that the dirty water Sarah Lewis

dumped outside her house upon the death of her infant caused the entire incident (Ball, 2009, p. 108).

On June 16, 1858, John Snow, a legend, died at the age of forty five. On June 10, 1858, while finishing his book, *On Chloroform and Other Anesthetics*, Snow fell off his chair. He became paralyzed on his left side, and started vomiting blood (Hempel, 2007, p. 246). The cause of death appeared to be a stroke caused by chronic renal failure. He was buried at Brompton Cemetery in London, England. Today, there is still a replica of the Broad Street pump in Soho, London (Ball, 2009, p. 105). This tribute reminds us of Snow's legacy, and his perseverance in tackling cholera in the 1800's. Snow is still recognized today as a contributor to public health history because he proposed the waterborne theory of cholera and proved that it was right. He was known first for his continued efforts and work in anesthesiology, but his extensive experiments dealing with cholera led to a greater impact. Snow's constant persistence and desire to never give up, led people to finally believe what he was saying was true. His experiments also helped us deal with later outbreaks. The mapping and the field studies he did, now have their own modern names, proving their lasting impact. Medical cartography and shoe leather epidemiology are what these techniques are known as today. Although Snow's death was saddening, he did leave behind a great reputation for himself. According to Oleckno (2008), " Today there is a professional society, a college, a government building, a public health consulting firm, and a tavern bearing his name" (p. 1691). Snow's medical significance is still so apparent that in 2003, a medical magazine called *Hospital Doctor*, voted Snow as the greatest doctor in history. Cholera has

been eradicated in most of the developed countries in the world, and according to WHO (2005), “ In 2004 there were 36 reported cases of cholera in the Americas and 21 cases in Europe” (p. 957). Figuring out the mystery of cholera would be just as great as if we found a solution to AIDS today. Snow’s logic is considered to be very influential in the field of public health, and his methods have affected the way we solve public health issues today.