

DOCUMENT 14 (Online Companion)

Overview of the topics covered documents numbered 14

Snow's South London study had three phases: (1) preparation, including determining the approximate boundaries of the intermixed area; (2) inquiries into cholera deaths during the surge period—the first seven weeks—of the 1854 epidemic; and (3) analysis and publication of his findings.

(1) The preparation phase lasted from the winter of 1853/54 until early August 1854. It began when Snow saw a table in the ***Weekly Return of 19 November 1853*** which showed considerably higher cholera mortality in South London districts supplied solely by the Southwark & Vauxhall Water Company (S&V), compared to mortality in aggregate districts supplied by both the S&V and Lambeth companies. In short, he saw the makings of a comparative mortality study similar to what he had done on several occasions since 1849.

The following week, however, Snow realized that an analyzable natural experiment also existed in South London. A table in the ***Weekly Return of 26 November 1853*** stated that over 300,000 people resided in districts where the two water companies actively competed, termed an intermixed area. A chance intersection of two events—the Lambeth Company had moved its main intake station on the River Thames beyond the tidal reach before the arrival of the cholera epidemic of 1853, whereas Southwark & Vauxhall was not scheduled to do so until 1855—meant that a potential “**grand experiment**” to test Snow's theory existed in this intermixed area if the cholera epidemic resumed the following year. That is, certain houses in particular neighborhoods received piped Thames water contaminated by metropolitan sewage, whereas others received purer water drawn above the Teddington lock. If Snow was right, cholera mortality among the former should far exceed that among the latter.

Snow used the 1845 **map of water districts** prepared by the Health of Towns Commission to chart the boundary of intermixed supply where he would need to conduct inquiries into the source of water at each house where someone might die of cholera. We know he was familiar with this map because he

Weekly Return of 19 November 1853: See the shaded portion of table 1853–11–19 in Supplementary Figures (Online Companion).

Weekly Return of 26 November 1853: See the shaded portion of table 1853–11–26 in Supplementary Figures (Online Companion).

“grand experiment”: See Document 14–III (a) in the Online Companion.

map of water districts: One of two 1845 Health of Towns Commission maps in Supplementary Figures (Online Companion).

his paper: Document 13 (Online Companion).

featured it in **his paper** on “the mode of propagation of cholera” at a meeting of the Epidemiological Society in 1851).

(2) The cholera epidemic did resume in July 1854. By mid-August, *Weekly Returns* revealed a resumption of the cholera mortality disparity from 1853 in districts served by the two water companies. Snow immediately began making inquiries in four subdistricts within the intermixed area. Toward the end of the month he shared **his preliminary findings** with William Farr at the Office of the Register General: Cholera deaths in houses served by S&V far exceeded those supplied by the Lambeth Company. Snow also presented his plan to extend his investigation into the remainder of the intermixed area for cholera deaths during the first seven weeks of the epidemic—the surge period before normal person-to-person propagation began obscuring the impact of impure water as the cause of the disease.

Then Farr had no choice but to rain on Snow’s parade. For the time being, at least, Snow was not be able to determine accurate ratios of cholera mortality within the intermixed area, a series of contiguous subdistricts. When Snow had finished his inquiries, he would need to divide the number of deaths (the numerator) per company in each subdistrict, by the total number of houses supplied by that company in that subdistrict (the denominator). Such specificity was essential. If, for example, one company served twice as many houses in a particular subdistrict as the competing company, then a doubling of cholera mortality was statistically insignificant. And so forth. But neither Parliament nor the General Board of Health had ever requested subdistrict level data on the number of customers they supplied. Snow realized suddenly that completing the “grand experiment” depended on resolving an **unexpected denominator problem**. It was possible, of course, that the two water companies would respond positively to a request for the necessary information from the General Register Office. Even so, it was unlikely to happen any time soon.

The two men agreed on a fallback option. It was public knowledge how many total houses each water company served. Therefore, Snow would expand the investigation to include cholera mortality in the entire watershed of both companies. He

his preliminary findings: Document 14–IV (b) in the Online Companion.

an unexpected denominator problem: Document 14–IV (c) in the Online Companion.

would personally complete inquiries in the intermixed area and the districts served solely by the Lambeth Company for every cholera death registered during the first seven weeks of the epidemic. In addition, he would hire someone to cover solely-supplied S&V districts for the same period. Farr agreed to instruct all subdistrict registrars to collect information about house water supply from 27 August until the end of the epidemic.

(3) Snow completed his inquiries before the beginning of the medical school session on 1 October 1854, when his anesthesia commitments took priority. Analysis of the “grand experiment” portion of the South London study was on hold, indefinitely, until the Lambeth and S&V companies provided the required denominator data. Nonetheless, Snow thought it worthwhile to publish a **preliminary report**. It included the numerator data for the intermixed area that he had personally collected, as well as what he and John Joseph Whiting (the apothecary Snow hired to assist him) had discovered about cholera mortality in the remainder of the South London districts supplied by the Lambeth and S&V water companies. Whiting, however, was only able to complete inquiries in the S&V districts for the first four weeks of the epidemic before he left the metropolis; Snow had to calculate probable mortality for the fifth through the seventh weeks.

Shortly after submitting the preliminary report to a medical journal for publication, Snow wrote an **extended account** of the South London study, prepared additional tables, and (as he had done previously with an account of his investigations into the Broad Street outbreak) sent it to Churchill’s publishing house to be typeset for a forthcoming, new edition of *On the Mode of Communication of Cholera*. He also gave a cartographer the information he had gathered about the boundaries of the intermixed area for a **map** that Cheffins Lithographers would prepare for inclusion in *On the Mode*.

Eventually, the General Board of Health, not Snow, received the desired denominator data about subdistrict water supply in South London and published its own report in May 1856. Snow **criticized** the report’s ex post facto investigative methods but was able to incorporate the denominator data to complete **an analysis** of the “grand experiment.”

preliminary report: Document 14–IV (d) in the Online Companion.

extended account: Document 14–IV (e) in the Online Companion.

map: See 1855–01: John Snow, Map 2 in Supplementary Figures (Online Companion); in addition, there is a smaller version in Document 14–III (a) in the Online Companion.

criticized: Document 14–IV (f) in the Online Companion.

an analysis: Document 14–IV (g) in the Online Companion.