

## DOCUMENT 14–IV, d (Online Companion)

### Snow's preliminary report on his investigation into the "grand experiment" underway in South London (October 1854)<sup>1</sup>

I have now completed the inquiry of which I gave some account in a letter published in the *Medical Times and Gazette* of 2 September. I have called at every house in which a death from cholera had occurred and been registered during the first seven weeks of the present epidemic, in all the subdistricts to which the supply of the Lambeth Water Company extends. In the cases of persons removed to a workhouse or any other place after the attack, I have extended the inquiry to the house in which the attack commenced. In a few cases the address of persons removed to a workhouse was not known; in a few other instances the individuals were of such an itinerant character that it was impossible to ascertain where the illness might have been contracted. These cases are placed, with a few others which could not be found, in the column of the accompanying table for deaths where the water supply was not ascertained.

There were very few instances in which I could at once get the information I required. Even when the water rates are paid by the residents, they can seldom remember the name of the water company till they have looked for the receipt. In the case of working people who pay weekly rents, the rates are invariably paid by the landlord or his agent, who often lives at a distance, and the residents know nothing about the matter. It would, therefore, have been impossible for me to complete the inquiry if I had not found that I could distinguish the water of the two companies with perfect certainty by a chemical test.

The test I used is founded on the great difference in the quantity of chloride of sodium contained in the two kinds of water. On adding solution of nitrate of silver to a gallon of the water of the Lambeth Company, obtained at Thames Ditton, beyond the reach of the sewage of London, only 2.28 grains of chloride of silver are obtained, indicating the presence of 0.95 grains of chloride of sodium in the water. On treating the water of the Southwark and Vauxhall Company in the same manner, 91 grains of chloride of silver are obtained, showing the presence of 37.9 grains of common salt per gallon. Indeed, the difference in appearance on adding nitrate of silver to the two kinds of water is so great, that they can be at once distinguished without any further trouble. This test is not liable to any fallacy. The Lambeth water may become impure by remaining in a butt without cover, but the quantity of chlorides is not increased; and, on the other hand, the

<sup>1</sup> "On the communication of cholera by impure Thames water," *Medical Times and Gazette* 9 (7 October 1854): 365-66, [ltr. to ed., 2 October 1854]. <http://johnsnow.matrix.msu.edu/work.php?id=15-78-50>.

water of the Southwark Company may become perfectly free from organic impurity by spontaneous putrefaction, but the quantity of chloride of sodium remains unaltered. The common salt is, I believe, part of that which has passed through the kidneys and bowels of the two millions and a quarter of inhabitants of London. I do not, of course, attribute any ill effects to this common salt, and I found it of great use in conducting the inquiry. When the resident could not give clear and conclusive evidence about the Water Company, I obtained some of the water in a small phial, and wrote the address on the cover, when I could examine it after coming home.

The number of deaths from cholera down to 26 August, in the **subdistricts which are partly supplied** by the Lambeth Water Company, was 642. Of these I found that the water supplied to the house in which the attack took place was, in 509 instances, that of the Southwark and Vauxhall Water Company; in 93 cases it was that of the Lambeth Company; and in the remaining 40 instances it was from other sources, or the supply was not ascertained.

I **hope shortly to learn** the number of houses in each subdistrict supplied by each of the water companies respectively, when the effect of the impure water in propagating cholera will be shown in a very striking manner, and with great detail. In the mean time, in order to be able to compare the mortality from cholera among the customers of each company, with the entire number of houses supplied by each of them respectively, I thought it desirable to extend the inquiry to Rotherhithe, Bermondsey, Camberwell, and certain parts of Southwark, which are supplied by the Southwark and Vauxhall Company alone. I was unable by myself to execute this part of the inquiry before the commencement of the winter session [for medical schools, when the hospitals resumed elective surgeries], but I was fortunate enough to obtain the assistance of a medical man, Mr. John Joseph Whiting, LAC [licentiate, Apothecaries Company], who took great pains with this part of the inquiry.

The inquiry thus extended reached over the whole of the districts on the south side of the Thames, except those of Greenwich and Lewisham. As regards most of the subdistricts to which the water of the Lambeth Company does not extend, the personal inquiry reached only to the first four weeks of the epidemic, viz., to 5 August, and the remaining cases are calculated to have been supplied by the company, or to have obtained water from ditches, etc., in the same proportions as those occurring previously. The subdistricts in which the numbers are partly made up by calculation, are marked with an asterisk in the accompanying table.

In the instances placed in the column for pump-wells and springs the houses were not supplied by either water company. There are a few houses in the suburbs which have a pump-well in addition to the water

company's supply, but I have not indicated this in the table. I shall, however, state the circumstance in the list of deaths from cholera, which I intend to have reprinted from the Weekly Returns of the Registrar-General. The cases in which water was obtained direct from the Thames by pailsful or from the river Wandle, the Surrey Canal, or ditches, are included in a separate column.

The accompanying table shows that, during the first seven [365/366] weeks of the present epidemic, 1224 fatal attacks of cholera occurred in houses supplied with the impure water of the Southwark and

DISTRICTS AND SUB-DISTRICTS.	Population in 1851.	Deaths from Cholera in the Seven Weeks ending August 26.	Supply of Water in the House of Attack.				
			Southwark and Vauxhall.	Lambeth.	Pump-wells & Springs.	River Thames, Ditches, &c.	Not ascertained.
<b>ST. SAVIOUR, SOUTHWARK.</b>							
Christchurch .. ..	16,022	25	11	13	..	..	1
*St. Saviour .. ..	19,709	125	115	..	..	10	..
<b>ST. OLAVE, SOUTHWARK.</b>							
*St. Olave .. ..	8,015	53	44	..	..	3	6
*St. John, Horsleydown ..	11,360	51	46	..	..	3	2
<b>BERMONDSEY.</b>							
*St. James .. ..	18,809	123	102	..	..	21	..
*St. Mary Magdalen .. ..	13,934	87	83	..	..	4	..
*Leather Market .. ..	15,295	81	81	..	..	..	..
<b>ST. GEORGE, SOUTHWARK.</b>							
Kent-road .. ..	13,126	57	52	5	..	..	..
Borough-road .. ..	15,862	71	61	7	..	..	3
London-road .. ..	17,836	29	21	8	..	..	..
<b>NEWINGTON.</b>							
Trinity .. ..	20,922	53	52	6	..	..	..
St. Peter, Walworth .. ..	29,861	90	84	4	..	..	2
St. Mary .. ..	14,033	21	19	1	1	..	..
<b>LAMBETH.</b>							
Waterloo-road, 1st. .. ..	14,088	10	8	2	..	..	..
Waterloo-road, 2nd. .. ..	13,348	36	25	8	1	2	..
Lambeth Church, 1st. .. ..	13,409	18	6	9	..	1	..
Lambeth Church, 2nd. .. ..	26,784	53	34	13	1	..	5
Kennington, 1st. .. ..	24,261	71	63	5	3	..	..
Kennington, 2nd. .. ..	18,848	38	34	3	1	..	..
Brixton .. ..	14,610	9	5	2	..	..	2
Norwood .. ..	3,977	8	..	2	1	5	..
<b>WANDSWORTH.</b>							
*Clapham .. ..	16,290	24	19	..	5	..	..
*Battersea .. ..	10,560	54	36	..	4	8	6
*Wandsworth .. ..	9,611	11	3	..	2	6	..
Putney .. ..	5,280	1	..	..	..	..	1
Streatham .. ..	9,023	6	..	1	5	..	..
<b>CAMBERWELL.</b>							
Dulwich .. ..	1,632	..	..	..	..	..	..
*Camberwell .. ..	17,742	96	72	..	24	..	..
*Peckham .. ..	19,444	59	45	..	..	..	14
St. George .. ..	13,849	42	34	4	..	..	4
<b>ROTHERHITHE.</b>							
*Rotherhithe .. ..	17,805	103	69	..	..	34	..
<b>Total .. ..</b>	<b>482,435</b>	<b>1,510</b>	<b>1,224</b>	<b>93</b>	<b>48</b>	<b>97</b>	<b>48</b>

**subdistricts which are partly supplied:**  
Marked in orange in the table. However, these subdistricts are not synonymous with the intermixed area since the Lambeth Company's presence in them varied from their entirely to just a nubbin.

**hope shortly to learn:**  
It wasn't until the summer of 1856, however, that the General Board of Health's Medical Council published a report from which Snow was able to establish the number of subdistrict customers supplied by the two water companies and resolve the denominator problem that had prevented him from analyzing the "grand experiment" portion of his 1854 South London investigations.

Vauxhall Water Company, obtained at Battersea Fields, and that only 93 fatal attacks occurred in houses having the improved water supply from Thames Ditton. The entire number of houses supplied by the Southwark and Vauxhall Company, according to a return made to the General Board of Health in 1850, was 34,217, and the number supplied by the Lambeth Company, according to the same return, was 23,396. The number of houses supplied by both Companies has increased with the extension of the metropolis, but it is pretty certain that the proportion continues nearly the same, and for the sake of comparison, the number of houses may be supposed to remain the same also. Now,  $34,217 \div 1224 = 28$ , and  $23,396 \div 93 = 251$ . So that while a death from cholera had occurred in 1 house in every 28 supplied by the Southwark and Vauxhall Company, a fatal attack of cholera had occurred in only 1 out of 251 of the houses supplied by the Lambeth Company. The mortality, in short, to 26 August, was just nine times as great in the houses supplied by the former Company as in those supplied by the latter.

There is another way in which the beneficial influence of the improved water on the progress of cholera may be shown. On referring to the population table of the late census, it will be found that the districts and subdistricts which are partly supplied with water by the Lambeth Company contained 41,984 houses, inhabited and uninhabited; and that the population amounted to 271,987. At the end of last year, the Lambeth Company supplied 25,583 houses, the population of which must have been about 165,000. But 93 deaths from cholera, the number which occurred in the population so supplied in these districts, is a proportion very little exceeding the mortality which had occurred at that time in the most elevated and favoured districts of the metropolis, and much less than had happened in the west districts of London. It should be recollected, also, that a great portion of the population in the south districts are very poor, and are surrounded by all the conditions which have been generally supposed to favour cholera.

During the first four weeks of the present epidemic, 563 persons died of cholera in London. Of these it has been ascertained, by a personal inquiry at every one of the houses in which the attack took place, that no less than 268 of the fatal attacks took place in houses supplied with water by the Southwark and Vauxhall Company. A great part of the remaining deaths occurred in persons living or working among the shipping of the Thames, and who almost invariably draw their water direct from the river. During these four weeks there were but ten deaths from cholera in houses supplied with water by the Lambeth Water Company; although it has been shown above that they supply fully two-thirds as many houses as the other company. The cholera was consequently eighteen times as fatal among the population supplied with the water from Battersea Fields as among that

with the purer water from Thames Ditton during these four weeks, although this latter population is intimately mixed with the former.

It may, indeed, be confidently asserted, that if the Southwark and Vauxhall Water Company had been able to use the same expedition as the Lambeth Company in completing their new works and obtaining water free from sewage, the present epidemic of cholera would have been confined in a great measure to persons employed among the shipping, and to poor people, who get water by pailsful direct from the Thames or tidal ditches. It is quite obvious, that the mischief caused by the water of the Southwark Company is not confined to the cases occurring in the houses so supplied; for there are few people who take no food or drink except in their own houses; and persons, in all parts of London, have been attacked with cholera, after visiting the south districts of the town. The disease of course does not always stop with the cases produced directly by the water, but among poor people of not very cleanly habits; and where a whole family is confined to one or two small rooms, other cases follow the first in rapid succession. In many instances two or three deaths have occurred within a few days; and even where but a single death has occurred among poor people, I have seldom inquired without hearing of other cases more or less severe in the same house, and about the same time.

The cholera of 1849 was much more fatal in London than that of 1832; the present epidemic has been more fatal in the districts supplied exclusively by the Southwark and Vauxhall Company than that of 1849; and if the Lambeth Company had not changed their source of supply, the mortality in London would have much exceeded that of 1849. There is one circumstance, however, that ought to prevent any expression of blame or recrimination for the propagation of cholera in this way; it is this,—that the persons who have been most instrumental in causing the increase of cholera are precisely those who have made the greatest efforts to check it and who have been loudest in blaming what they considered the supineness of others. In 1832, there were few water-closets in London. The privies were chiefly emptied by nightmen, a race who have almost ceased to exist; or a portion of the contents of the cesspool flowed slowly, and after a time, into the sewers. By continued efforts to get rid of what were called the removable causes of disease, the excrement of the community has been washed every year more rapidly into the river from which two-thirds of the inhabitants, till lately, obtained their supply of water. While the fæces lay in the cesspools or sewers, giving off a small quantity of unpleasant gas having no power to propagate specific diseases, they were spoken of as dangerous and pestilential nuisances; but, when washed into the drinking-water of the community, they figured only in sanitary reports as so many grains of organic matter per gallon.

In 1832, the Borough of Southwark was supplied with water taken from the Thames near London Bridge and sent direct to the houses, without any intervening reservoir; and this was the part of London which suffered most from cholera at that time. The water company, some time afterwards, discontinued this source of supply, to join with a company obtaining water at Battersea Fields; but the increasing pollution of the Thames surpassed the efforts to get cleaner water, and the water at Battersea was soon worse than it had been at London Bridge. It is somewhat remarkable, that almost everything that has been done with a view to check the progress of cholera has had the effect of increasing it. Flushing the sewers, which was carried on in 1849, has certainly not been repeated during the present season; but increased quantities of water have been supplied at more frequent intervals, causing the water-butts to overflow for hours together, and having the effect of washing the evacuations of the cholera patients more quickly into the river, from whence they were distributed again to the community sooner than usual. The increased quantity of water sent out did not permit it to remain the usual time in the settling reservoirs. Owing to this increase of the supply, the water of the Southwark and Vauxhall Company has been more than usually dirty, and full of living things, during the last few weeks.

These circumstances prove very clearly, that a disease is not to be prevented except by a correct knowledge of its real cause; and that it is to the improvement of the science of medicine, by the study and observation of medical men, that society must look for the diminution of mortality; and not to the ill-directed efforts of benevolent individuals among the non-medical part of the community.

18 Sackville-street,  
2 October 1854.