Fog and Deaths in London, December 1952

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DURING the first half of December 1952, the London area experienced periods of fog, one of which was of an intensity rarely reached in recent times. This fog was widespread and persisted for a considerable continuous period, from December 5 through December 8.

Its onset was determined by the meteorological factors of almost complete absence of wind or air movement and low temperature, which produced what is technically described as an "inversion" whereby the normal upward air circulation by convection currents was arrested. Hence at ground level and for many feet above, there was no air movement, and smoke, sulfur oxides, and other air contaminants increased to concentrations much above those normal for the winter season.

Atmospheric Pollution and Temperatures

In addition to the many monthly assessments of atmospheric pollution made at several observation stations, which, of course, yield only monthly averages and hence do not show the daily variations, the chemical branch of the London County Council public health department maintains daily observations of smoke and sulfur dioxide at three places: London County Hall; Northern Outfall Works, Beckton; and Southern Outfall Works, Crossness. The figures for the determinations at London County Hall for the period November 16 through December 27, 1952, are shown in table 1.

As a basis of comparison, it should be stated that the summer (June) daily average concentration of smoke is about 0.12 milligram per cubic meter of air; of sulfur dioxide, about 0.07 part per million. It will be seen from the table that the degree of atmospheric pollution in winter is considerably greater, as would be expected. The figures for November 1952 are generally of the order usual at that time of year, but a sharp rise in pollution occurred on December 5. Maximum averages were reached over the weekend, ending at 10 a. m., Monday, December 8; the average concentration of smoke was 4.46 milligrams per cubic meter of air, and of sulfur dioxide, 1,339 parts per million. These are exceptionally high figures, indeed the highest which have been traced in our records, those for sulfur dioxide dating back to 1932. For the 6-day period from December 5 through 10 the atmospheric condition was continuously bad, as will be seen from table 1.

The mean daily temperatures recorded at Kew Observatory for the same period, together with the departures from the average experience of the past 80 years, are shown in table 2. On December 5 there was a striking fall in the temperature, and low temperatures continued until the fog lifted.

Daily average concentrations of atmospheric contaminants and daily temperature departures from 80-year average, London, November 16 through December 27, 1952.

Dr. Scott, who has served as medical officer of health in Fulham, Barnsley, and Shipley in England, became medical officer of health of the London County Council in 1952. He succeeded Sir Allan Daley, whose deputy he had been since 1945. Dr. Scott submitted the report appearing here to the council's public health committee on January 27, 1953.

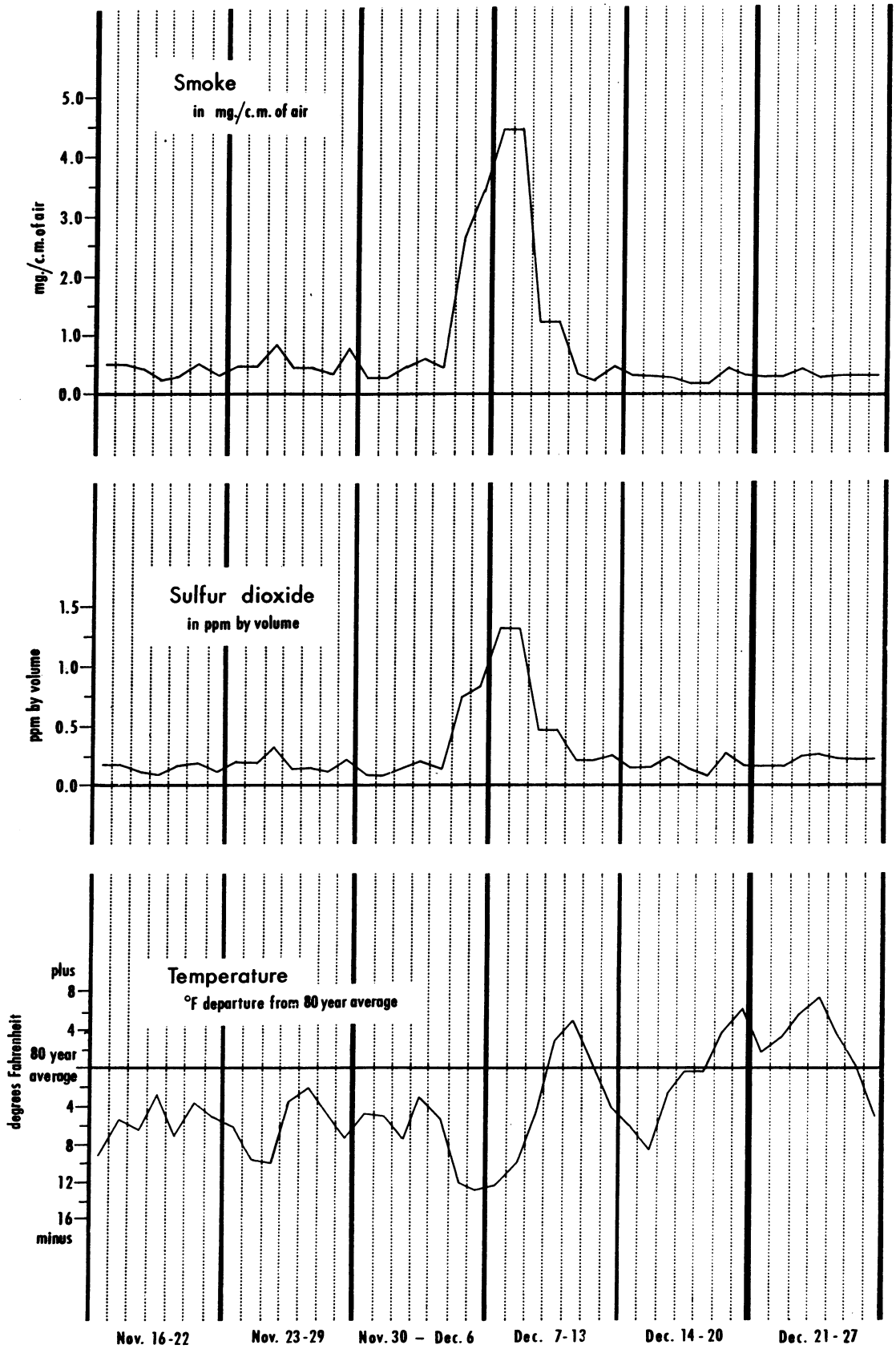
Smoke
in mg./c.m. of air
mg./c.m. of air
5.0
4.0
3.0
2.0
1.0
0.0
Sulfur dioxide
in ppm by volume
ppm by volume
1.5
1.0
0.5
0.0
Temperature
°F departure from 80 year average
degrees Fahrenheit
plus
8
4
80 year
average
4
8
12
16
minus
Nov. 16-22
Nov. 23-29
Nov. 30 – Dec. 6
Dec. 7-13
Dec. 14-20
Dec. 21-27

Table 1. Daily average concentrations of smoke and sulfur dioxide, according to observations at London County Hall, November 16–December 27, 1952

Day and date, November 1952	Smoke [1]	Sulfur dioxide [2]	Day and date, November–December 1952	Smoke [1]	Sulfur dioxide [2]	Day and date, December 1952	Smoke [1]	Sulfur dioxide [2]
Sun., 16	[3] 0.53	[3] 0.179	Sun., 30	[3] .30	[3] .090	Sun., 14	.32	.155
Mon., 17			Mon., 1			Mon., 15		
Tues., 18	.44	.133	Tues., 2	.49	.155	Tues., 16	.30	.245
Wed., 19	.28	.090	Wed., 3	.61	.220	Wed., 17	.20	.152
Thurs., 20	.35	.168	Thurs., 4	.49	.144	Thurs., 18	.20	.087
Fri., 21	.54	.192	Fri., 5	.64	.751	Fri., 19	.48	.271
Sat., 22	.35	.114	Sat., 6	.45	.855	Sat., 20	.35	.173
Sun., 23	[3] .50	[3] .193	Sun., 7	[3] 4.46	[3] 1.339	Sun., 21	.33	.170
Mon., 24			Mon., 8			Mon., 22		
Tues., 25	.84	.330	Tues., 9	[3] 1.22	[3] .472	Tues., 23	.46	.248
Wed., 26	.45	.140	Wed., 10			Wed., 24	.30	.253
Thurs., 27	.45	.144	Thurs., 11	.32	.224	Thurs., 25	.34	.231
Fri., 28	.35	.116	Fri., 12	.29	.225	Fri., 26	.34	.231
Sat., 29	.81	.233	Sat., 13	.50	.263	Sat., 27	.34	.231

[1] Expressed as milligrams of black suspended matter per cubic meter of air. [2] Expressed as parts per million by volume. [3] Average for the time period included.

Increase in Deaths

The deaths registered weekly in the administrative county of London from November 16, 1952, to January 10, 1953, were as follows:

Week ending	*Registered deaths*
Nov. 22, 1952	753
Nov. 29, 1952	853
Dec. 6, 1952	945
Dec. 13, 1952	2,484
Dec. 20, 1952	1,523
Dec. 27, 1952	1,029
Jan. 3, 1953	1,372
Jan. 10, 1953	1,216

For the weeks ending November 22 and 29 and December 6, the number of registered deaths was normal for the time of year, although during the vagaries of the winter weather it is usual to find as many as 1,100 registered deaths in occasional weeks. But for the week ending on December 13 the number of registered deaths rose to a figure far above the normal winter maximum and, although somewhat less for the weeks thereafter, the number continued abnormally high. (The apparent drop for the week ending December

Table 2. Meteorological observations at Kew Observatory, November 16–December 27, 1952

Day and date, November 1952	Mean daily temperature (° F.)	Departure from 80-year average (° F.)	Day and date, November–December 1952	Mean daily temperature (° F.)	Departure from 80-year average (° F.)	Day and date, December 1952	Mean daily temperature (° F.)	Departure from 80-year average (° F.)
Sun., 16	35.4	−9.1	Sun., 30	37.4	−4.8	Sun., 14	35.2	−6.0
Mon., 17	37.8	−5.5	Mon., 1	36.9	−5.2	Mon., 15	32.0	−8.8
Tues., 18	36.3	−6.8	Tues., 2	34.2	−7.7	Tues., 16	38.3	−2.8
Wed., 19	40.6	−2.9	Wed., 3	39.0	−3.3	Wed., 17	40.8	−.3
Thurs., 20	36.5	−7.0	Thurs., 4	36.5	−5.4	Thurs., 18	40.5	−.3
Fri., 21	39.2	−3.7	Fri., 5	29.5	−12.1	Fri., 19	43.9	+3.8
Sat., 22	37.9	−5.1	Sat., 6	28.9	−12.8	Sat., 20	45.5	+6.2
Sun., 23	36.7	−6.3	Sun., 7	28.9	−12.3	Sun., 21	41.5	+1.9
Mon., 24	33.3	−9.7	Mon., 8	31.5	−10.0	Mon., 22	43.0	+3.3
Tues., 25	32.7	−9.9	Tues., 9	36.0	−4.5	Tues., 23	44.8	+5.9
Wed., 26	38.5	−3.5	Wed., 10	43.3	+2.7	Wed., 24	46.9	+7.3
Thurs., 27	39.7	−2.0	Thurs., 11	45.1	+5.0	Thurs., 25	43.2	+3.9
Fri., 28	37.4	−5.1	Fri., 12	40.1	−.1	Fri., 26	40.3	+.2
Sat., 29	35.1	−7.4	Sat., 13	37.2	−4.2	Sat., 27	35.4	−5.1

Fog Over London

"A report on the London fog of December 1952 has now reached the London County Council and it makes grim reading. In the past hundred years only the peak week of the influenza pandemic in November 1918 produced more deaths over the expected normal than did the man-made fog of 2 months ago. Even the cholera epidemic of 1866 could not quite equal it.

"Analysis of the deaths registered shows that extremes of life were more affected than the middle groups and that the increase in deaths was associated almost entirely with disorders of the respiratory or circulatory systems. The January 31, 1953, issue of *The Lancet* contains an interesting account by a general practitioner of the effects of the fog on his Beckenham practice. Upper respiratory toxic irritation appears to have been common and affected the active as well as the older and less fit whilst lower respiratory affection occurred amongst the more elderly and those with a previous history of chronic chest trouble. Dr. Fry notes that the majority of these illnesses started fairly abruptly on the third or fourth day of the fog.

"This combined picture of mortality and morbidity is similar to that presenting itself at Donora and in the Meuse Valley. It is the picture presented by the London fog of 1948 and it is a reiteration of what the medical officers of health of Glasgow, Leeds, Manchester, and other industrial cities have been reporting in greater or lesser degree from time to time for several generations. In other words, the London fog of December 1952 was no strange new phenomenon. It was no acute epidemic caused by a hitherto unrecognised virus nor was it a visitation of some known pathogen against which we had no defence. It was simply the occurrence of a well-known meteorological phenomenon in an area where the toxic products of combustion are vomited in excess into the air and as a result the upper and lower respiratory systems of the local inhabitants were irritated and death occurred amongst those with pre-existing cardiovascular and respiratory disease.

"This is in parallel with typhoid at Croydon and Malden and paratyphoid at Bournemouth and Aberystwyth. What does it matter if in the one the vehicle was air and in the others water, milk, and ice cream? The result was the same. Epidemic illness of a preventable nature occurred. . . ."

—Excerpt from an editorial appearing in *The Medical Officer*, London, February 14, 1953, p. 73.

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Other London fog reports appearing recently in *The Lancet*, include: "December Fog in London and the Emergency Bed Service," by G. F. Abercrombie, January 31, 1953, pp. 234–235; "Effects of a Severe Fog on a General Practice," by J. Fry, January 31, 1953, pp. 235–236; "Mortality in the London Fog Incident, 1952," by W. P. D. Logan, February 14, 1953, pp. 336–338.

27 is due to the usual delay in registration over Christmas and not to a decline in deaths.)

The general death rate for the week following this fog and cold was slightly greater than that associated with the severe fog of 1873 and was comparable with the rates experienced at the peak mortality of major epidemics, as shown in table 3.

It is apparent that although the death rates immediately following the fogs of 1873 and 1952 were almost the same, the increase was much greater in 1952. The increase in 1952 was larger even than that attributable to cholera in the week of highest mortality in the summer of 1866.

Deaths by Age and Cause

Analysis of the deaths registered weekly from November 16 through December 27, 1952, shown in table 4, indicates that the sudden increase in mortality, although more pronounced among infants and the elderly, was not confined to persons of any particular age. Among infants aged 4 through 52 weeks and among persons over 55 years, three times as many deaths were

Table 3. Registered deaths per million inhabitants in the administrative county of London during specified weeks

Week ending	Deaths	Normal for period and season	Excess over normal
Aug. 4, 1866 (cholera)	876	450	426
Dec. 20, 1873 (fog)	713	470	243
Nov. 9, 1918 (influenza)	1,085	300	785
Dec. 13, 1952 (fog)	745	300	445

registered in the week ending December 13 as could be expected from the figures for the previous 3 weeks, and among persons of all other ages, rather over twice as many.

The causes associated with the excess deaths were confined almost entirely to disorders of the circulatory or respiratory systems (see table 5). Compared with the average per week for the previous 3 weeks, deaths from bronchitis in the week ending December 13 were 10 times as many; from pulmonary tuberculosis, 4½ times as many; and from other respiratory diseases, nearly 6 times as many. Deaths from cancer of the lung rose rather less, to nearly twice as many; those from disorders of the heart and circulatory system were nearly three times as many. Deaths from any other defined cause showed no significant increase with the exception of gastroenteritis, deaths from which increased considerably among children under 1 year old; it is, however, quite possible that these cases of gastroenteritis were secondary to an upper respiratory infection.

This sudden high mortality did not alter the normal pattern of deaths from the different causes at different ages except insofar as it was an increase confined to respiratory and circulatory diseases; at no age were any excess deaths registered from causes which are not normally characteristic of that age during winter. Deaths from influenza, although they rose markedly in the week after the fog, rapidly fell back to a normal winter level and at their highest were well below the numbers to be expected in a developing epidemic.

Detailed comparison of the deaths following the fogs of 1952 and 1873 is not possible owing to considerable changes in the methods of classifying causes of death. But it is clear that the effects were broadly similar. In 1873 as in 1952, it was the respiratory and circulatory diseases which showed the greatest jumps in mortality; and in 1873, although the death rates increased at all ages, the increase was much greater among the very young and the old. An accurate comparison between the se-

Table 4. Registered deaths in administrative county of London, by age group, week ending November 22 through week ending December 27, 1952

Age	Number of deaths for week ending						Average number of deaths per week for weeks ending November 22, 29, and December 6	Percentage of average of first 3 weeks for week ending		
	November 22	November 29	December 6	December 13	December 20	December 27		December 13	December 20	December 27
Weeks										
0–4	13	22	16	28	19	12	17.0	165	112	71
4–52	5	9	12	26	15	11	8.7	300	173	127
Years										
1–4	11	5	6	7	13	7	7.3	96	177	96
5–14	4	3	4	6	6	2	3.7	164	164	55
15–24	4	3	9	7	14	7	5.3	131	263	131
25–34	14	7	16	28	17	11	12.3	227	138	89
35–44	28	22	36	64	29	34	28.7	224	102	119
45–54	85	61	80	204	96	83	75.3	271	127	110
55–64	118	152	157	448	251	167	142.3	315	176	117
65–74	229	226	254	717	444	258	236.3	303	188	109
75 and over	242	343	355	949	619	437	313.3	303	198	139
All ages	753	853	945	2,484	1,523	1,029	850.3	292	179	121

Table 5. Registered deaths in administrative county of London, by certain causes, week ending November 22 through week ending December 27, 1952

Cause	Number of deaths for week ending						Average number of deaths per week for weeks ending November 22, 29, and December 6	Percentage of average of first 3 weeks for week ending		
	November 22	November 29	December 6	December 13	December 20	December 27		December 13	December 20	December 27
Pulmonary tuberculosis	18	19	14	77	37	21	17. 0	453	218	124
Lung cancer	38	27	45	69	32	36	36. 7	188	87	98
Heart disease	225	272	273	707	389	272	256. 7	275	152	106
High blood pressure	12	17	19	47	36	21	16. 0	294	225	131
Other diseases of circulatory system	27	23	26	46	31	32	25. 3	182	123	127
Influenza	1	7	2	24	9	6	3. 3	720	270	180
Pneumonia	31	28	45	168	125	91	34. 7	486	363	264
Bronchitis	46	73	76	704	396	184	65. 0	1, 083	609	283
Other respiratory diseases	10	8	9	52	21	13	9. 0	578	233	144
Ill-defined causes	19	26	25	79	35	37	23. 3	339	150	159
All other causes	326	353	411	511	412	316	363. 3	140	113	87
All causes	753	853	945	2, 484	1, 523	1, 029	850. 3	292	179	121

verity of the 1873 and 1952 fogs cannot be made since no recordings of the condition of the atmosphere are available for 1873. But some idea of their relative intensities can be obtained since it so happens that in both years the fog occurred while the Smithfield show was being held, and in both years deaths of animals in the show were recorded. The *London Times* of December 12, 1873, reported that about a third of the animals had to be removed; that some were saved by being carried quickly into the clearer air of the country but a considerable number had to be slaughtered; and that asphyxiation of animals occurred in London cowhouses and in the metropolitan market on December 11. In 1952, the breathing difficulties experienced by otherwise healthy animals owing to the foggy atmosphere received wide publicity.

Summary

During the week following the fog and very low temperatures of December 5, 6, 7, and 8, 1952, abnormally large numbers of persons at all ages died from causes connected with difficulty of breathing. This was very similar to what had happened immediately after a comparable fog in 1873, but the rise in deaths in 1952 was much greater and was, in fact, as great as that during the worst week of the last cholera epidemic.