INTERMITTENT AIR POLLUTION EPISODE IN NEW YORK CITY, 1962

Leonard Greenburg, M.D., Carl Erhardt, Sc.D., Franklyn Field, O.D., Joseph I. Reed, M.S., and Nathan S. Seriff, M.D.

THE CHRONIC effects of exposure to varying levels of air pollution on human beings must of necessity be documented over long periods of time. Occasionally, however, there arise opportunities to investigate the short-term impact of unusually high levels of air pollution. Such a period of intense air pollution occurred in New York City in November 1953 and was related to an increase in mortality (*1*) and to a rise in the number of visits to emergency clinics for upper respiratory and cardiac conditions (*2*).

More frequent, however, are periods when air pollution concentrations are intermittently high. Little is known of the impact on health of such raised levels of atmospheric contamination which may be encountered for but a few hours or a few days.

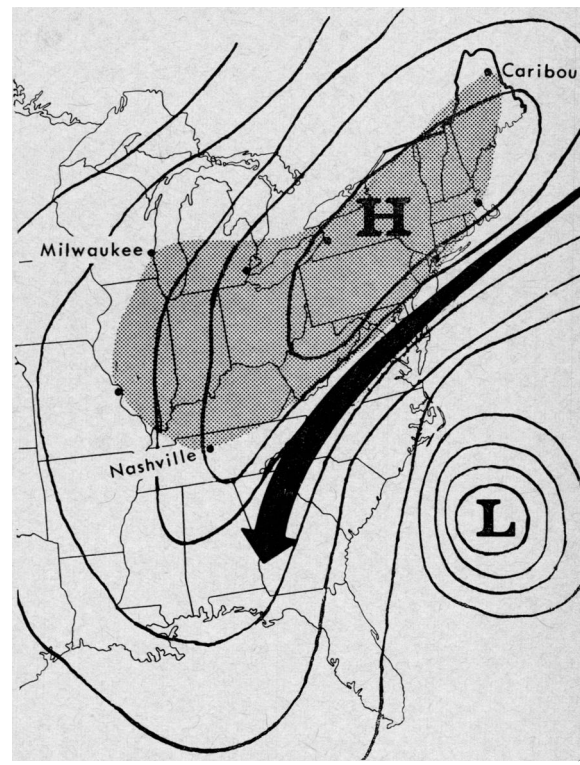
During the months of November and December 1962, an opportunity presented itself to study the effect of such higher-than-normal levels of intermittent air pollution in New York City.

On November 27, 1962, an alert for high air pollution potential was issued for the area bounded by Buffalo, N.Y., Charleston, W. Va., Boston, Mass., and Caribou, Maine, by the Meteorology Section, Division of Air Pollution, Robert A. Taft Sanitary Engineering Center. This alert was extended to include New York City on November 29 (fig. 1).

The weather map for the period indicates two major features: an anticyclone extending from New England's coastal waters southwestward into the Gulf of Mexico and an intensifying low-pressure storm center off the southeast Atlantic coast (fig. 1). The resulting pattern produced a strong pressure gradient with fresh north to northeast winds along the mid-Atlantic coast (table 1).

An analysis of the meteorology for New York

Figure 1. Surface weather chart for November 27, 1962, and area of high air pollution potential (shaded) for November 29, 1962



Four of the authors are at Albert Einstein College of Medicine, Yeshiva University, New York City. Dr. Greenburg is professor of preventive and environmental medicine, and Dr. Field and Mr. Reed are instructors. Dr. Seriff is instructor in the department of medicine. Dr. Erhardt is director, bureau of records and statistics, New York City Department of Health. *The study is supported by Grant AP 00118-03 from the Public Health Service.*

City from November 27 through December 4, 1962, disclosed mostly clear skies, which were conducive to maximum daytime heating and also to nocturnal radiation, brief periods of light wind, and the formation of ground-level temperature inversions. The inversions which formed during the evening hours were dissipated by noon of each following day by the combined effects of strong daylight heating and brisk winds. The afternoon of November 30 was an exception, and the surface temperature inversion persisted throughout this day.

Table 1. Average daily winds, New York City, November 25–December 6, 1962

Date	International Airport (mph)	La Guardia Airport (mph)	Central Park (mph)
November:			
25	NE 6.6	NE 8.8	N 8.1
26	NNE 12.2	NE 13.7	N 13.9
27	NNE 10.5	NNE 11.1	N 12.6
28	N 9.7	NE 9.8	N 11.2
29	N 8.1	NE 5.8	N 7.3
30	N 3.3	ENE 2.3	N 4.0
December:			
1	N 6.1	ENE 3.7	S 3.8
2	NNE 8.2	NE 8.7	N 8.8
3	NNE 6.1	NE 7.7	N 5.3
4	NNE 10.0	NE 11.1	NE 9.7
5	N 13.3	NNE 12.8	N 11.5
6	ENE 19.0	ENE 18.8	NE 15.5

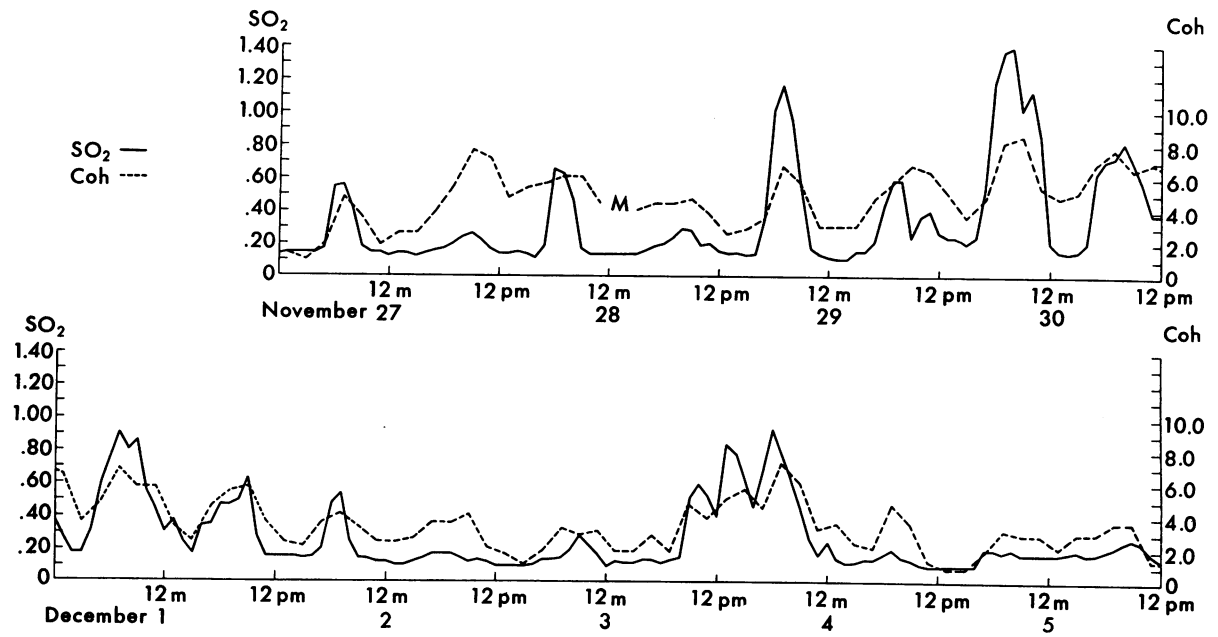
During the intervals of maximum air-mass stability and light winds, both the smokeshade and sulfur dioxide measurements at the New York City Department of Air Pollution Control Laboratory showed the expected increases. The maximum smokeshade (8.6 Coh) and sulfur dioxide (1.40 ppm) were registered on the morning of November 30 (fig. 2). It is evident from figure 2 that air pollution concentrations which reached high levels during the morning hours from November 27 to December 4 were not sustained for any length of time during the day.

To determine whether or not health was affected by the increase in air pollution, daily mortality and morbidity data were analyzed, employing statistical procedures similar to those used in previous studies (*1*, *2*).

The daily number of deaths for the period November 24 to December 14 was obtained from the New York City Department of Health (fig. 3). On November 30, an airline disaster caused 25 deaths, and the figure has been corrected to take this incident into account.

Using a 3-day lag from the onset of the air pollution as in previous studies, average daily

Figure 2. Hourly sulfur dioxide and smokeshade readings, New York City, November 27–December 5, 1962



deaths for the critical period of December 1–7 were compared with the prior week and the subsequent week in 1960, 1961, and 1962. The resulting findings show no significant increase in mortality during this period of intermittently increased air pollution.

Time period	*1960*	*1961*	*1962*
Nov. 24–30	235. 7	246. 9	244. 0
Dec. 1–7	249. 0	249. 4	253. 9
Dec. 8–14	260. 7	243. 1	251. 9

It is interesting that on the day following the maximum concentrations of air pollution, the mortality in New York City rose to the unusually high level of 295 deaths on December 1 (fig. 3). No explanation has been found to account for this sudden increase.

Morbidity data included daily visits for upper respiratory infections, cardiac conditions, and asthma to the following facilities: five emergency clinics in the major city hospitals, four

Figure 3. Daily mortality in New York City, November–December 1962

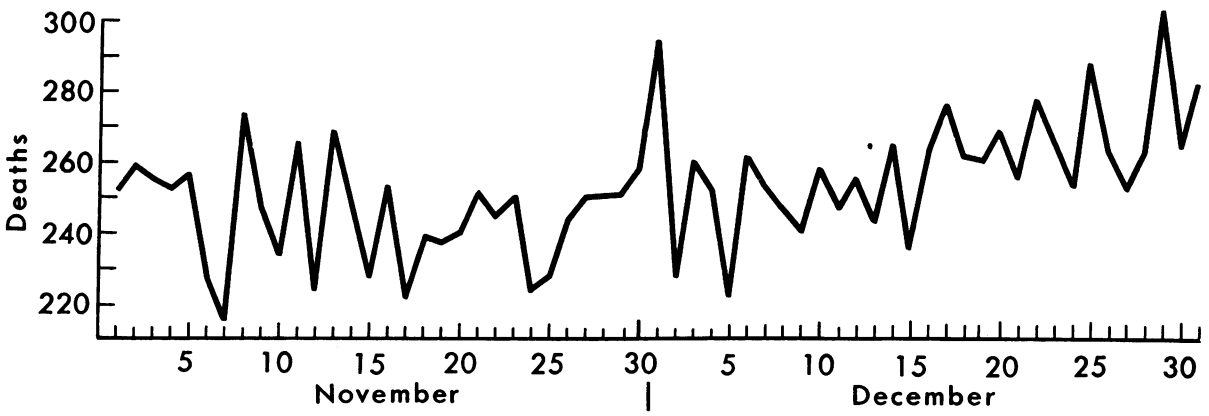


Table 2. Average daily number of clinic visits by cause, New York City, November 24–December 14, 1962

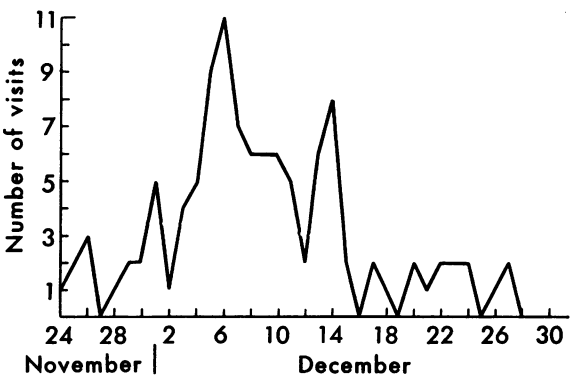
Cause and time period	Bellevue	Metropolitan	Harlem	Coney Island	City Hospital, Elmhurst [1]	Chase Manhattan	Blue Shield	Old-age homes [2]
Upper respiratory infection:								
Nov. 24–30	60. 7	77. 1	101. 1	19. 7	8. 6	28. 4	394. 1	1. 6
Dec. 1–7	62. 3	67. 7	85. 0	16. 6	9. 9	27. 2	491. 6	[3] 6. 0
Dec. 8–14	57. 3	79. 9	72. 4	16. 6	7. 6	28. 2	475. 9	5. 6
Asthma:								
Nov. 24–30	16. 9	25. 4	55. 9	4. 6	. 9	0	29. 4	0
Dec. 1–7	15. 3	24. 7	53. 0	3. 3	1. 6	0	45. 2	0
Dec. 8–14	13. 6	23. 0	54. 3	2. 4	1. 1	0	28. 0	0
Cardiac condition:								
Nov. 24–30	4. 4	3. 1	5. 7	4. 6	2. 3	. 8	19. 6	1. 3
Dec. 1–7	6. 4	3. 0	8. 1	6. 7	1. 6	1. 0	26. 4	1. 0
Dec. 8–14	6. 6	4. 0	6. 1	4. 3	. 9	1. 0	22. 4	1. 4
Other:								
Nov. 24–30	144. 9	96. 6	91. 7	53. 1	14. 3	78. 6	712. 0	2. 7
Dec. 1–7	133. 6	71. 3	79. 0	61. 3	15. 9	75. 4	866. 9	5. 0
Dec. 8–14	126. 1	67. 1	73. 4	85. 1	13. 9	70. 4	774. 6	3. 6

[1] Long Island City and Astoria residents only.
[2] Madonna Residence, Mary Manning Walsh Home, Home for Aged and Infirm Hebrews, and Brooklyn Hebrew Home.
[3] $p < .01$.

old-age homes, and an employee clinic at the Chase Manhattan Bank, and visits recorded by the Blue Shield Health Insurance Plan.

The average daily visits at each of the installations were compared with the period prior to and subsequent to December 1–7 (table 2). No significant change or increase was found in the records of any facilities with the exception of the four old-age homes. A significant rise ($p < .01$) in upper respiratory complaints was found in the four old-age homes (table 2, fig. 4). The total increase is not attributable to an excess in a single home but is the result of a similar rise in upper respiratory complaints at all homes.

Figure 4. Daily number of visits in four old-age homes for respiratory infections, New York City, November 24–December 30, 1962



Summary

A meteorological pattern from November 27 through December 4, 1962, brought periods of stable weather to New York City which provided an opportunity to study the effects of intermittent air pollution on health. Air pollution reached high levels during this period, but the concentrations were not sustained throughout the days, mainly because of brisk winds and the dissipation of ground level inversions during the afternoon. On November 30, 1962, the inversion persisted through the entire day.

No significant increase was found in daily mortality for New York City or in the visits for upper respiratory complaints, asthma, and cardiac conditions to emergency clinics at five major city hospitals and the Chase Manhattan Bank clinic, or in visits recorded by the Blue Shield Health Insurance Plan. However, during this period visits for upper respiratory infections increased significantly ($p < .01$) at four old-age homes.

REFERENCES

(*1*) Greenburg, L., Jacobs, M. B., Drolette, B. M., Field, F., and Braverman, M. M.: Report of an air pollution incident in New York City, November 1953. Public Health Rep 77: 7–16, January 1962.

(*2*) Greenburg, L., Field, F., Reed, J. I., and Erhardt, C. L.: Air pollution and morbidity in New York City. JAMA 182: 161–164, Oct. 13, 1962.

Review of Animal Diseases of the World

A review of the epidemiology of and control methods for the important animal diseases of the world by Dr. James H. Steele, chief of the Veterinary Public Health Section, Communicable Disease Center, has been published by the Food and Agriculture Organization of the United Nations. "Animal Disease and Human Health" is the third in the Basic Study series being prepared by FAO and other international organizations as part of the information and education program of the Freedom from Hunger Campaign. Copies of the booklet are available for 50 cents each from Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.