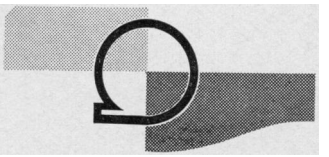


# New York City Department of Health's Weekly Vital Statistics Report

LOUIS WEINER

THE NEW YORK CITY Health Code requires that whenever a death, birth, or fetal death occurs anywhere within the city limits a report must be made, to the health department office in the borough where the event occurred, on a certificate form prescribed by the health department. These certificates not only are useful legal documents; they also contain much information which can aid in the administration of the health programs of the community and in the research and evaluation related to these programs. The usual method of getting this information is to prepare tabulating cards from the certificates. Tabulations of various sorts can then be prepared directly from the cards or from magnetic tape containing the information from the cards.

Most communities prepare annual vital statistics reports. Some prepare monthly or quarterly reports as well, but not many communities prepare weekly reports. To be useful, a weekly report must be available shortly after the close of a week. Also, the number of deaths and births should be sufficiently large that the rates calculated from them will be stable enough to be meaningful. New York City meets both of these specifications. With a population of about 8 million, the city's weekly deaths and births are numerous enough to give reliable rates.

*Mr. Weiner is acting director of the bureau of records and statistics of the New York City Department of Health.*

### Tabulating Data on Deaths

The death certificates filed with the New York City Department of Health on any day are coded, and tabulating cards are punched from them on the following business day. Thus, on the afternoon of the first business day of the week—usually a Monday—tabulations can be prepared for the death certificates received during the 7-day period ending at midnight of the previous Friday.

The health code requires that the remains of persons dying in the city be buried, cremated, or transported out of the city within 4 days following death. A funeral director cannot dispose of a body according to any of these methods, however, without a permit from the health department. The only way to obtain such a permit is to present a properly filled out certificate of death and receive in exchange the permit to bury, cremate, or transport the remains out of the city.

The death certificates received in the five borough offices on any day are brought by messenger to the nosology section of the statistical division in the central office of the health department the morning of the next business day. The certificates are coded in the nosology sec-

tion and are given to the tabulating division so that tabulating cards may be punched.

The weekly report on deaths is prepared Monday afternoon from the cards that have been punched for the death certificates filed during the previous week. Thus, the tabulation does not represent the deaths which occurred during the stated 7-day period, but the deaths for which death certificates were filed during that period. About two-thirds of the certificates represent deaths which occurred during the week. The other one-third occurred earlier. Usually the difference in the death rates based on deaths occurring and deaths reported during any one week is negligible. There is a difference in these rates, however, when a holiday—secular or religious—falls on a Friday, the last day of the statistical week. On such days, relatively few certificates are brought in to exchange for burial permits. Certificates not filed on a holiday Friday will be filed a day or so later. The result is a deficit in the number of certificates filed in the first week and an excess of the same magnitude in the second.

Tabulating cards also are punched for cases of those diseases which, according to the health code, must be reported to the department of health. From the cards punched for cases reported during the 7 days ending with Friday, several communicable disease tabulations are prepared.

The weekly report is prepared in order to acquaint persons interested in public health with the trend of the vital statistics in the community and to permit the recognition of anything unusual which may require special action by the public health administrators.

At one time the opinion was prevalent that reports of absences due to illness probably would indicate an incipient unusual episode, such as an outbreak of upper respiratory disease, more quickly than would the weekly death rate. The health department gave this hypothesis a trial. For a few years, the bureau of preventable diseases collected weekly data on absences and visits to company physicians or dispensaries from several large employers of labor. In no instance did these data signal an outbreak sooner than the death rate chart. A combination of an increase in the general death rate and in the deaths ascribed to pneumonia usually indicates that an upper respiratory outbreak is beginning. As a rule, an increase in absenteeism comes a week later. A possible explanation is that the most likely candidates for dying during outbreaks of upper respiratory disease—the elderly ill—are not sufficiently represented in the labor force and that the younger persons do not fall ill as quickly.

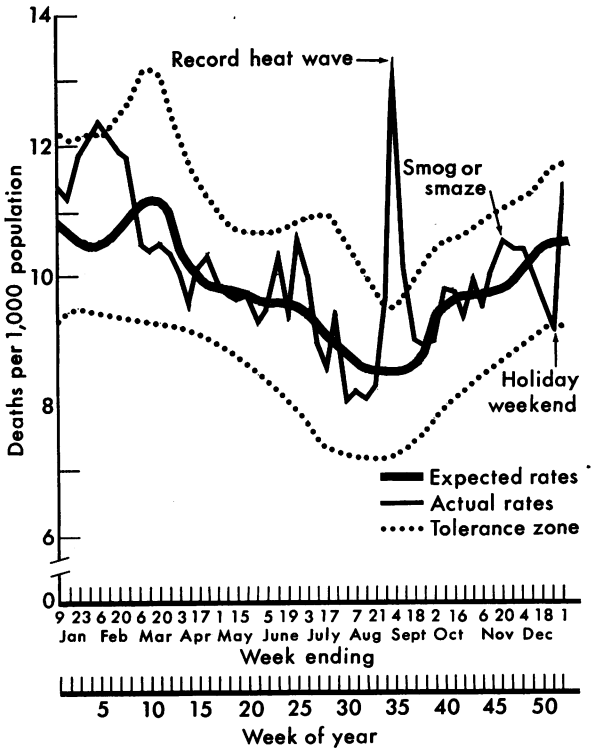
### Weekly Report of Health Department

In New York City, the health department has prepared weekly reports for almost 100 years. The present report consists of two mimeographed pages. The first page shows the number of live births, deaths from all causes, infant deaths, neonatal deaths, and deaths from five different causes—from the puerperal causes (conditions associated with childbirth), tuberculosis, the pneumonias, all types of accidents, and from motor vehicle accidents. These numbers, along with rates on an annual basis are shown for each of the last 4 weeks, for the 4 weeks combined, for the current year to date, and for the corresponding periods for each of the 2 previous years. Also shown on the first page of the weekly report are the reported cases and deaths from five communicable diseases for the periods just described.

The second page of the weekly report consists of a chart which shows the expected death rate for each of the 52 weeks of the year, the upper and lower limits of a 95 percent tolerance zone about this line, and the observed death rates for the current year. For the first 6 months of the year, the 52 weeks shown begin with the first week in the previous July—usually the 27th week of the year—and continue to the 26th week of the current year, at the end of June. In July, the chart is changed to show all weeks of the current year—from the beginning of January to the end of December.

The expected death rate for any one week is the mean of the 5-week moving average of the rates for that week for the previous 5 years. Twenty-five weekly rates thus determine the expected rate for any given week. Excluded from the calculations are the rates for periods when unusual episodes seem to have occurred. These episodes are those in which one or more rates fall outside the tolerance zone. Weeks in which

**Figure 1. 1948 death rates per 1,000 from all causes, by weeks, New York City**




upper respiratory disease outbreaks occur and weeks in which on several days the temperature reaches 90° F. or more may result in such episodes.

When calculating the expected death rate for each week, the standard deviation of the 25 numbers contributing to the rate is also calculated. The upper limit of the tolerance zone is obtained by adding twice the standard deviation to the expected rate; subtraction of twice the standard deviation gives the lower limit.

It may not be amiss to examine the shape of the graph of expected weekly death rates. This graph approximates a sine curve. The highest rates, about 12 per 1,000, are expected in the winter, and the lowest rates, 10 per 1,000, are expected at the end of the summer or the beginning of fall. The shape of this curve for New York City has not always been like the current one. Before 1910—about the year the pasteurization of milk was becoming widespread—this curve was bimodal. There were two peaks, one in the winter, at a level of about 18 to 20 per 1,000, and another in July and August at a somewhat higher level, about 21 per 1,000. This latter peak occurred because during hot weather the number of deaths from diarrheal diseases increased among children under 5 years of age. In the summer months, it was not unusual for deaths of children under 5 years to outnumber the deaths at all other ages combined.

### Other Health Department Tabulations

In addition to the two-page weekly report, the statistical division prepares five tables of reportable communicable diseases. One shows the number of cases of communicable disease conditions reported in the city during the week, by borough of the patient's residence. There is also a table for each of the larger four boroughs showing reported cases by each patient's health center district of residence. These tables are distributed to health officers, other health department officials, the libraries and departments of preventive medicine of medical schools and schools of public health in the city, and to other persons and agencies expressing interest.

Every week the statistical division prepares a tabulation which shows the number of deaths from each of the 50 causes of death in the International Statistical Classification Abridged List.

### Weekly Mortality Rates for Various Years

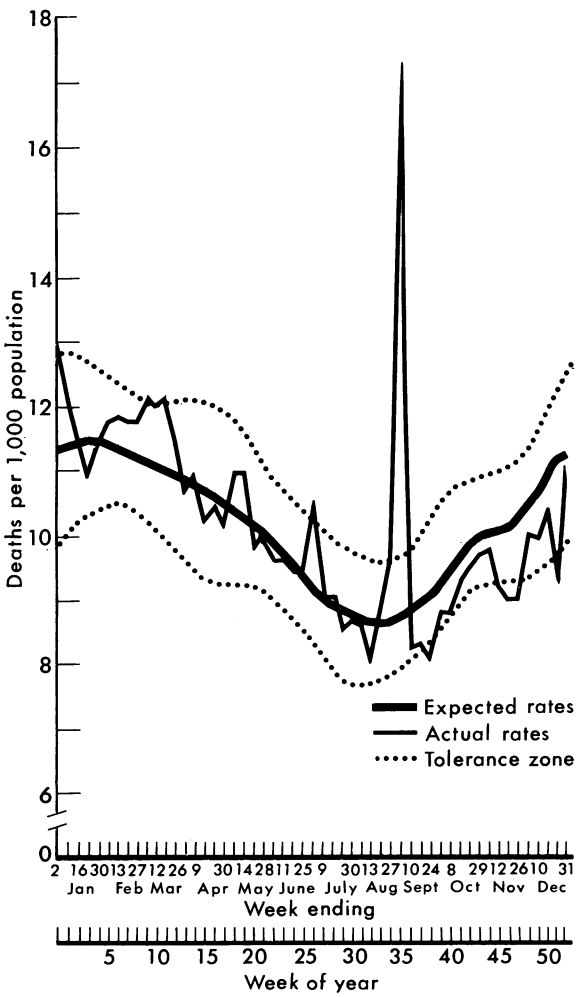
The health department began distribution of a chart of weekly mortality rates as part of the weekly report several years ago. Information can be conveyed more quickly by a graph than a table; moreover, the course of the death rate for each week of the year to date can be seen at a glance. It is interesting how the weekly death rates are influenced by epidemiologic and various climatic incidents—and even by the vagaries of the calendar.

*Rates for 1948.* Figure 1, the chart for 1948, reflects evidences of a fairly mild upper respiratory disease episode in February and March. It lasted 9 weeks, during 3 of which the death rates just about exceeded the upper limit of the tolerance zone. The number of deaths which occurred in this 2-month period was considerably greater than expected. Evidently some of the deaths would have occurred shortly anyway—in the months of April, May, and June—since the numbers of deaths reported during these 3 months were smaller than expected.

The death rates follow a similar pattern after a sudden explosive increase resulting from a heat wave. Generally, the elderly sick, whose expectation of life is rather short, account for the bulk of the excess deaths. There were so many deaths during the heat wave of late August and early September 1948 that for the 17 weeks remaining in the year the death rates were considerably lower than expected.

Actually, there were two heat wave episodes in 1948—one during the week ending July 2 and a more serious one at the end of August. The 1-week steeple at the time of the first one is the characteristic shape of the high death rates associated with heat waves. The second episode continued for 7 days—the last 4 days of the week ending August 27 and the first 3 days of the following week. Of the estimated 1,450 excess deaths which occurred during these 2 weeks, about one-fourth occurred in the first week and three-fourths in the second, or a ratio of 1 to 3. Figure 1, however, shows that the rate during the first week corresponds to fewer than 200 excess deaths, while the excess in the second week was 1,300, a ratio of about 1 to 7. This distortion occurred because a relatively small part of an increase in deaths occurring during the last 2 days of a week is reflected in the deaths reported that week. Such a distortion is also called a "reporting aberration," just as is the underreporting in a week in which Friday is a holiday.

**Figure 2. New York City's expected and actual death rates for 1953, by weeks**

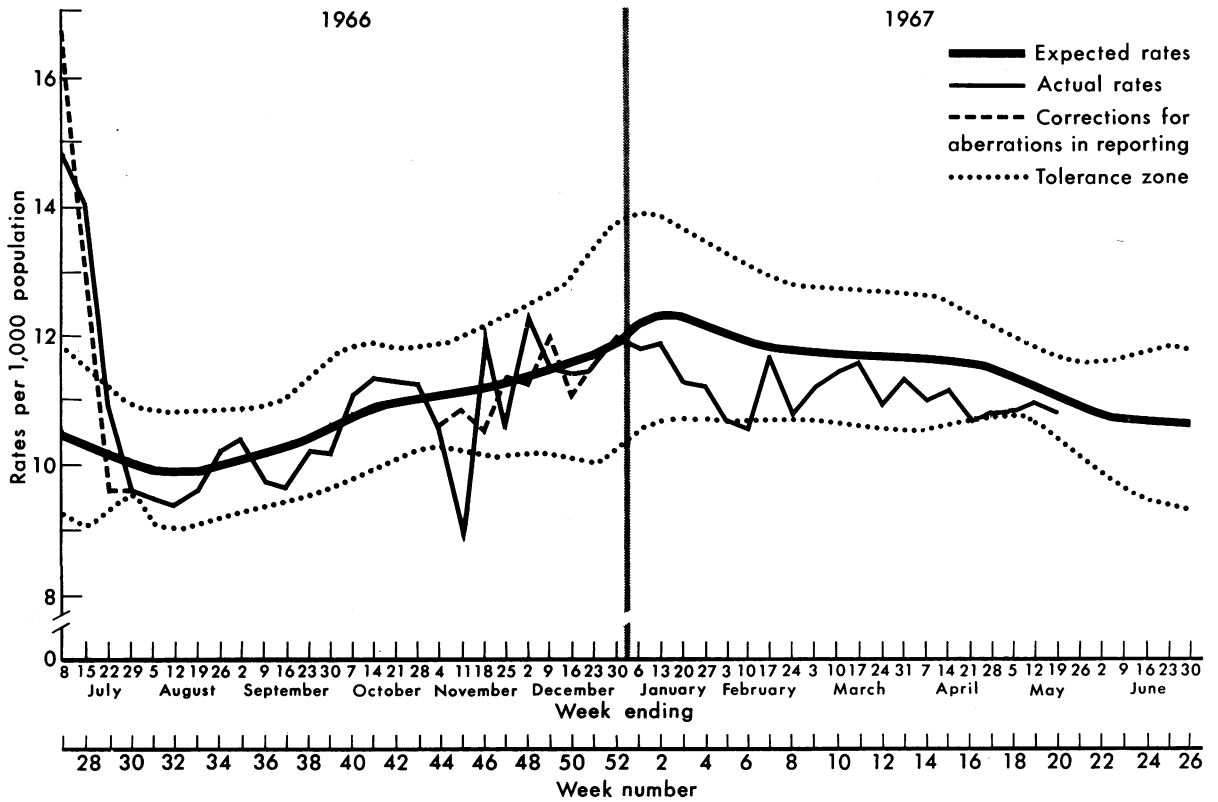



This particular aberration so distorted the facts that the statistical division decided to prepare tabulations showing deaths by day of occurrence. These tabulations, which were begun in 1949, are prepared about 6 weeks after the close of a month. For the past several years, at the request of air pollution investigators, the bureau of records and statistics has prepared preliminary tables of deaths by day of occurrence on a daily basis. More than 90 percent of the deaths occurring on any one day are available for tabulation about a week after death. This permits calculation of a death rate for a week of occurrence to correct for aberrations.

*Rates for 1953.* Figure 2, showing the weekly death rates for 1953, illustrates several different types of unusual happenings. A typical upper respiratory disease episode in January and February was followed by a period of death rates below the expected level. A heat wave more severe than that of the late summer of 1948 took place, but in a year when more air conditioning was in use. The effects of a temperature inversion in November are seen, as well as an aberration in reporting resulting from a weekend holiday—Christmas on Friday.

*Rates for 1957.* Two interesting episodes occurred during 1957. In June and July, two heat waves occurred, only 5 weeks apart. Evidently when the time interval between two heat waves is short, the first one will have the greater mortality associated with it. Another item of interest is the Asian influenza epidemic in October and November and its aftereffects. The death rates following the end of the influenza outbreak in late November did not fall below the expected levels. Apparently, most of

**Figure 3. 1966–67 weekly crude death rates per 1,000 from all causes, New York City, based on deaths reported each week**




the excess deaths during the epidemic were not of persons with short life expectancies.

*Rates for 1962.* The weekly chart for 1962 plagued the statistical division for some time. The trend of the observed death rates for that year paralleled the expected rates fairly well. The level of the observed rates, however, was such that they stayed consistently in the upper half of the tolerance zone. The estimated population used for the calculation of rates was held constant for the 4 years 1960 through 1963. There were indications that this constancy was in accord with the facts. What was overlooked, however, was the probability that the population was aging.

The proportion of the city population aged 65 years and over had been 10.4 percent in 1960 and 7.7 percent in 1950. If an arithmetic progression between these two census values is assumed, there was an increase of 0.27 percent each year, or 0.675 percent in 2½ years. Why 2½ years? In calculating the expected death rate, the rates of the previous 5 years are used. On the average, this expected rate is equivalent to a rate based on the population 2½ years before the current year. The 1962 expected rates thus were based on a population in which the proportion of persons aged 65 years or more was 0.675 percent less than the 1962 proportion. If the age-specific death rate at 65 and over is 45 per 1,000 population, the expected crude death rate at all ages, based on the younger population, would be 0.00675 times 45, or 0.3 point too low.

The expected rates for 1963, 1964, and 1965, therefore, were all increased by 0.3 point. The 1963 and 1964 observed rates fluctuated about the increased expected rate line as they should have. The rates for 1965 behaved as expected at the beginning of the year, but those for the last part of the year showed a tendency to concentrate in the lower half of the tolerance zone. This tendency led to the belief that possibly the proportion of persons 65 years old and older

was no longer increasing, and the statistical division discontinued the correction in the expected rates in 1966.

*Rates for 1967.* The graph for the first 20 weeks of 1967 (fig. 3) wrinkled many statistical brows. The rate of every one of the first 20 weeks of 1967—ending with Friday, May 19—fell in the lower half of the tolerance zone. It is unlikely that this was a chance occurrence. One of three possible explanations may account for the noted result; or perhaps all three explanations are valid in some degree.

1. Possibly the 1967 population estimate was too high. To make the graph of expected rates fit the observed rates, it is necessary to subtract 0.6 to 0.8 point from every expected rate or to add one of these amounts to every observed rate. The second procedure can be accomplished by reducing the population estimate by about 400,000 to 560,000. It is difficult, however, to justify a hypothesis which assumes that exactly at the beginning of 1967 the population of New York City decreased by half a million people.

2. Another possible explanation is that the proportion of older persons in the population has become smaller. The persons 65 years and over in 1966 comprised about 11 percent of the total population so that their contribution to the crude death rate was 0.11 times 45, or 4.95 points. To reduce this contribution to 4.4 or 4.2, this group's proportion of the population would need to fall below 10 percent. Again, such a drop in 1 year is difficult to believe.

3. The third and most plausible explanation is that New York City has been remarkably free of any disease-producing organisms so that its population has not been subjected to the usual winter and early spring high death rates. This hypothesis should not be difficult to accept if by the end of May 1967 the observed death rate returns to a path fluctuating about the expected line.

[*Addendum,* March 5, 1968: Actually the observed weekly death rates did fluctuate about the expected rate line during the entire summer of 1967. The observed rate first went higher than the expected rate in 1967 for the week ending June 2. For this week and the next 16 weeks through September 22, the observed rate kept fluctuating about the line of expected rates. For the 7-week period beginning with the week ending September 29, the observed rate resumed the below-expected pattern exhibited at the beginning of 1967. Then it went above the expected rate, probably heralding the influenza episode which became apparent about the middle of December. L.W.]

## Unpublished Data

Many of the data that the statistical division prepares are not published. For instance, the tabulations by day of death show not only the total number of deaths which occur on any day, but also the number by seven age groups, subdivided into whites and nonwhites. Also shown for each day of death is the number of deaths for each of 17 groups of causes by seven age groups, for whites and nonwhites. The cause groups were selected to permit study of the effects of air pollution.

As the vital statistics reporting system operates in New York City, data which do not appear in routine tabulations can be obtained fairly quickly. For example, we obtained special data quickly on cor pulmonale, a condition which is part of rubric 434.4 of the International Statistical Classification and is included under "unspecified diseases of heart." A need arose to know the frequency with which cor pulmonale (a condition not given weight in the assignment of cause of death) appeared on death certificates and how often it was considered the underlying cause of death. The coders of cause of death were asked to list all death certificates on which this condition was mentioned and to indicate whether it was considered to be the underlying cause. After 2 weeks, the data on this list, together with the total number of certificates examined during the period, supplied the information necessary for obtaining the desired frequencies.

At present, not all the items on the death certificate are punched on the card. In the not too distant future, everything on the certificate will be automatically read into a card or magnetic tape, and computer programs will be available for machine coding of some items which now require too much time of our trained coders. The statistical division will then probably receive many more special requests for various types of information retrieval.