

CDC INFLUENZA SURVEILLANCE REPORT

NO. 42

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service Bureau of State Services
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SPECIAL NOTE

Information contained in this report is a summary of data reported to CDC by State Health Departments, Epidemic Intelligence Service Officers, collaborating influenza diagnostic laboratories, and other pertinent sources. Much of it is preliminary in nature and is intended for those involved in influenza control activities. Anyone desiring to quote this information is urged to contact the person or persons primarily responsible for the items reported in order that the exact interpretation of the report and the current status of the investigation be obtained. State Health Officers, of course, will judge the advisability of releasing any information from their own states.

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I. Summary of Information

This report presents a review of influenza for the seven month period since the last CDC Influenza Surveillance Report (No. 41, May 29, 1958) was distributed. The disease has occurred only sporadically since early April when the second wave of excess mortality due to influenza and pneumonia subsided. There is, however, evidence that the new Asian strain has entrenched itself in many parts of the world. To a large extent, indeed, the new strain appears to have replaced other Type A strains. Sporadic Type B infections, however, continue to be reported.

In Section II. Dr. Robert Serfling and Mr. Arthur Cohen of the Statistics Section present an extensive discussion of current influenza and pneumonia mortality. A new version of the regional excess mortality graphs (which appeared with most of the influenza reports in 1957-1958) appears as Figure I. in this report, accompanying the current mortality review. Deaths due to influenza and pneumonia remained near expected levels throughout the fall and early winter of 1958.

Additional notes on influenza in the United States during the last half of 1958 are included in Section III. References are made to some specific cities and areas which showed small increases of excess mortality above normal levels during the fall of 1958.

A review of the small number of reports of influenza outbreaks and isolations from individuals in other parts of the world is presented in the next section. In Section V. the current recommendations regarding influenza vaccination are presented, and studies of effectiveness of Asian influenza vaccine are briefly reviewed and referenced.

The final section presents an outline of the current status of the Public Health Service influenza surveillance program.

Unless there is a dramatic change in the influenza situation the next Influenza Surveillance Report will be prepared at the conclusion of the customary "influenza season" in the early spring of 1959.

(This report was prepared by Frederick L. Dunn, M.D.
Surveillance Section, CDC.)

II. Current Influenza and Pneumonia Mortality

R.E. Serfling and Arthur Cohen

Since early September, the annual low point in the seasonal rise and fall of pneumonia-influenza deaths, mortality in 108 United States cities has been very near normal levels for the fall and early winter period. Figure 1 shows expected numbers of deaths for the United States and each division. Generally, the number of deaths in each division has been near normal levels for the season. Incidence in the East South Central division has been slightly above the anticipated level and during September and October the number of deaths in the Pacific division was somewhat lower than expected. Table 1 presents weekly data for the past three weeks. Incidence appears to be near expected seasonal levels. The drop in the week ending December 27th is not unusual for a holiday period.

Calculation of Normal Incidence

The method used for calculating normal incidence is essentially the same as the procedure described in Influenza Surveillance Report Number 16, September 12, 1957. In the present calculations the trend of increasing annual numbers of combined pneumonia and influenza deaths during the period 1954-56 has again been represented in linear form. The epidemic year, 1957, was not included in the calculations. Therefore the present "normal levels" are based on a two-year extrapolation and hence are subject to greater error than the 1957-58 extrapolation. This was taken into account in calculating the "epidemic threshold", shown as a broken line in figure 1.

The principal innovation in this year's calculations was the use of a two-term Fourier series to describe seasonal variation. In last year's method an arbitrary smoothing process was employed.

With the present procedure normal incidence is determined directly from a single equation, which for the United States (108 cities) is

$$\overset{\Delta}{y} = 318.27 + 1.24 t - 73.39 \cos \theta + 51.36 \sin \theta - 4.18 \cos 2\theta - 19.20 \sin 2\theta.$$

In this equation:

$\overset{\Delta}{y}$ represents the expected four-week average number of deaths,

t represents time, measured in four-week units from the center of the 1955-1956 season,

θ represents a function of time.

The Fourier constants were estimated from the average three-year seasonal incidence, 1954-56 and the linear trend was simultaneously estimated from the entire series of 39 four-week periods beginning in September 1954 and running through August 1957.

The epidemic threshold is placed 1.65 standard deviations above the normal incidence levels. Two or three successive weeks above the epidemic threshold would indicate a significant departure from the pattern of trend and seasonal incidence characteristic of the base period.

The standard deviation has been calculated from the weekly residual variation with adjustment for the extrapolation by use of appropriate terms from the variance-covariance matrix. A single mid-year value was used for the entire year.

Epidemiological Characteristics of the Linear Trend

During the period 1954-56 the average annual increase in total number of pneumonia and influenza deaths in the 108 cities was seven percent. This is considerably larger than estimated annual increase of 2.3 percent in population*. Population growth alone does not therefore account for the reported increase in pneumonia and influenza deaths.

Unfortunately, the weekly data from the 108 cities are available only as totals and hence more detailed analysis cannot be made. However some clues may be sought through study of the monthly incidence of pneumonia and influenza published in the Monthly Vital Statistics Bulletin of the National Office of Vital Statistics and based on a 10% sample of death certificates. Since the latter data are a sample of the entire United States population, approximately 170,000,000 persons and the data from the 108 cities include only an urban population of approximately 50,000,000 conclusions drawn from the national data can only be considered as suggestive of similar relationships in the 108 cities. However this limited application may be useful since states and cities have data available for similar analyses of their urban areas. The following table shows that the overall increase is similar for both sets of data.

Total Pneumonia and Influenza Deaths

	108 Cities	United States
1954	14,628	40,911
1955	16,048	45,140
1956	16,812	47,103
Average annual increase, %	7.12	7.10
Average annual population increase, %	2.3	1.84

*The figure of 2.3 percent is given in the Weekly Morbidity and Mortality Report, National Office of Vital Statistics, Public Health Service, January 4, 1958. This report is based on 114 cities which include the 108 cities used in the pneumonia and influenza charts.

Figure 2 and table 2, showing monthly pneumonia and influenza incidence for the United States from 1952 through 1958 provide a background frame of reference. Following the epidemic in late 1952 and early 1953 incidence for both pneumonia and influenza mortality followed a regular seasonal pattern until the fall of 1958.⁷ The period from which current levels have been estimated, September 1954 through August 1958⁷ was marked by an increasing pneumonia death rate. This is brought out more clearly in figure 3 which shows annual totals. It will be observed that both the total number of pneumonia deaths and the pneumonia death rate increased each year. Influenza deaths, constituting only a small fraction of the total showed no definite trend, although a decrease in rate and numbers occurred in 1956.

Figure 4 and table 3, show age-specific death rates on a logarithmic ordinate. The epidemic year, 1957 is included for comparison. The most striking characteristic of the period 1954-56 is the regular increase in the pneumonia death rate among older persons. This is shown more clearly in figure 5 which presents the same data by broad age groups on an arithmetic scale. Different scales are used with different age groups in order to emphasize annual changes. The steady rise in the pneumonia death rate in the age group 65 and over is distinct. In this age group it is also interesting to note the relative increase in the epidemic year was less than in the age group 15-64. Referring back to figure 2 it may be noted that peak pneumonia mortality occurred in February of 1958. This accounts for the apparently small increase in the death rate at age 65 and over during the year 1957.

Influenza death rates during the period 1954-56 had no distinctive characteristic other than the marked decrease in 1956. Even so the effect of a decrease in influenza mortality on total pneumonia and influenza mortality is small.

This analysis therefore suggests that the principal cause of the rising incidence in total pneumonia and influenza deaths is an increase in the reported pneumonia death rate among older persons. A secondary cause is the general increase in population.

Table 1 Current Influenza and Pneumonia Deaths*
in 108 United States Cities

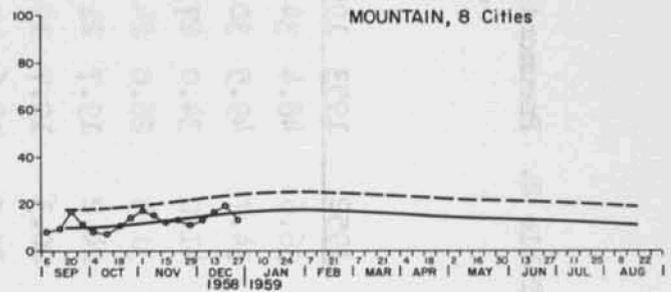
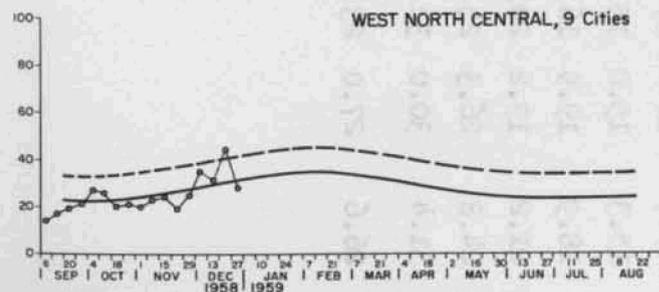
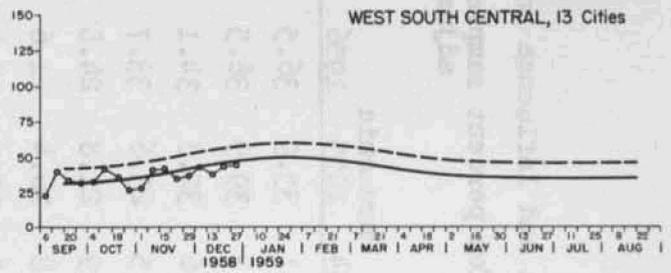
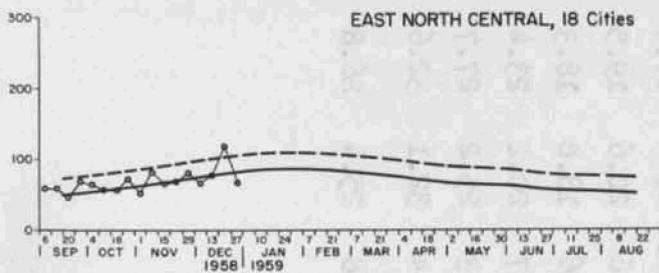
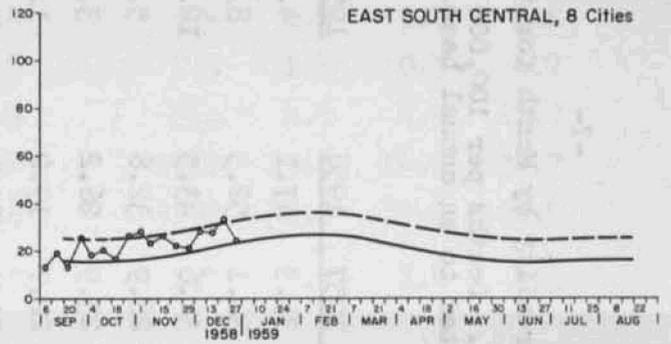
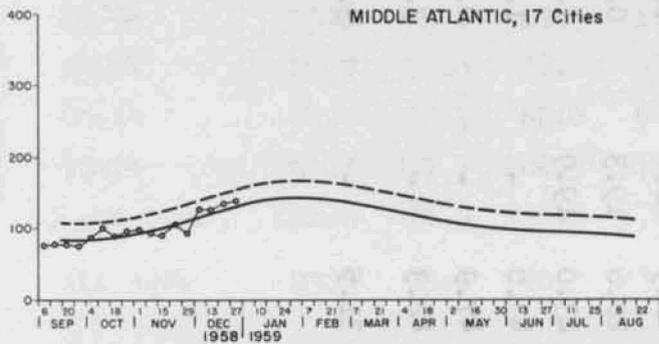
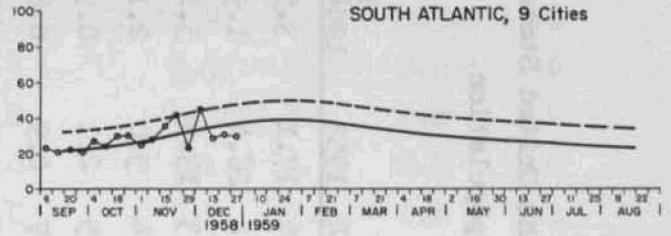
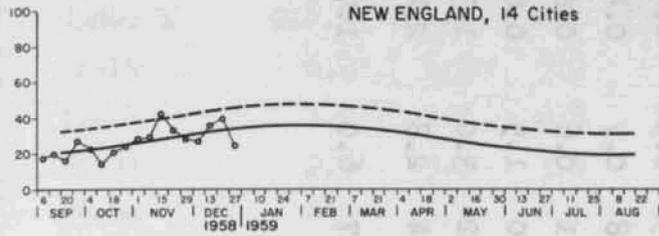
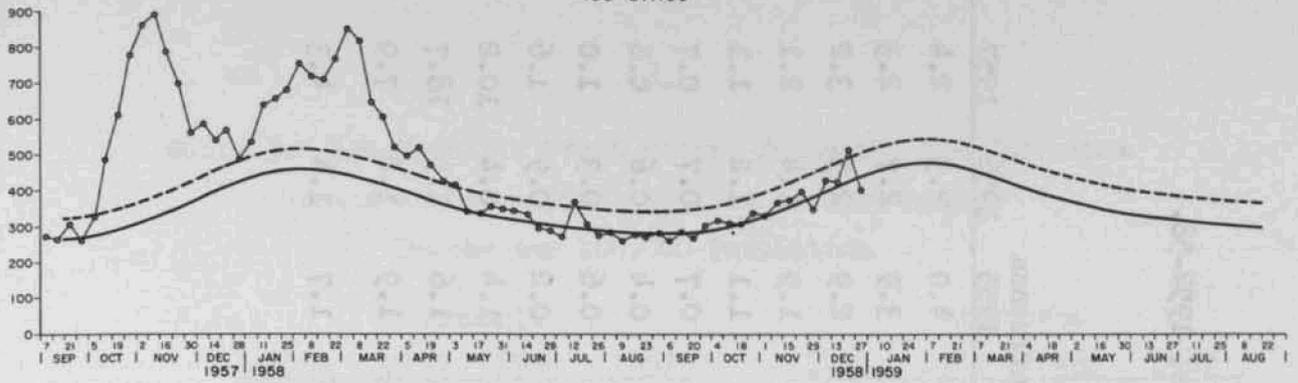
Division	Number of Cities		Deaths (including estimates**) during weeks ending:		
	In Study	Reporting this week	Dec. 13 (107 Cities)	Dec. 20 (107 Cities)	Dec. 27 (102 Cities)
All Divisions	108	102	423	514	401
New England	14	14	35	39	24
Mid. Atlantic	17	16	125	132	137
E. North Central	18	17	77	118	67
W. North Central	9	8	31	44	28
S. Atlantic	9	9	28	30	29
E. South Central	8	7	27	33	24
W. South Central	13	12	35	43	44
Mountain	8	7	16	19	13
Pacific	12	12	48	56	35

** The number of deaths given includes estimates for cities not reporting in a given week. The table is corrected for preceding weeks as late figures are received. The chart will be corrected only for gross discrepancies.

* Prepared by the Statistics Section, CDC.

WEEKLY PNEUMONIA and INFLUENZA DEATHS United States

108 Cities



--- EPIDEMIC THRESHOLD
— NORMAL INCIDENCE

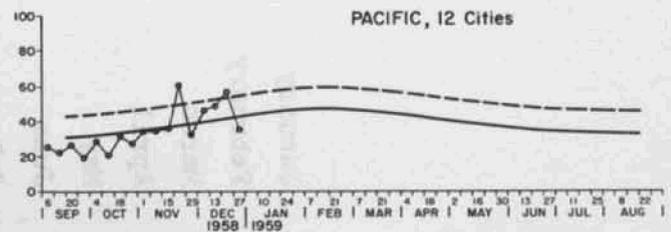


Table 2. Pneumonia and Influenza Mortality by Month for the United States, 1952-58.
 Ten percent sample. Deaths per 100,000 population,
 adjusted to an annual base.

	Pneumonia							Influenza						
	1952	1953	1954	1955	1956	1957	1958	1952	1953	1954	1955	1956	1957	1958
January	36.6	48.4	34.1	35.9	36.5	35.3	47.1	4.6	17.1	3.5	4.0	2.3	2.4	6.3
February	34.7	49.5	30.3	39.9	36.5	36.1	52.5	8.4	26.4	1.9	3.9	2.7	2.3	8.1
March	41.0	34.0	27.6	32.8	34.1	32.6	43.5	12.3	13.6	3.2	2.9	2.3	3.2	7.2
April	31.5	26.0	24.5	23.6	33.7	28.9	32.8	5.4	5.0	2.1	1.9	1.4	2.1	3.7
May	24.2	19.7	21.9	21.8	24.8	23.9	26.2	3.5	2.1	0.9	1.1	1.2	1.1	1.8
June	20.3	19.7	19.8	16.4	21.6	22.7	19.2	1.7	0.9	0.6	0.7	0.7	0.7	0.4
July	20.7	18.6	17.1	23.2	17.4	21.9	20.7	0.5	0.5	0.4	0.4	0.6	0.6	0.6
August	15.3	15.0	15.6	20.6	19.5	20.6	19.3	0.8	0.7	0.4	0.6	0.3	1.0	0.4
September	18.9	19.9	16.6	18.0	18.3	23.0	19.9	1.1	0.6	0.8	0.2	0.9	1.6	0.9
October	21.2	19.2	20.7	20.2	23.4	43.0	-	1.0	1.5	0.6	1.4	0.4	10.2	-
November	24.8	26.3	25.3	25.2	27.7	47.9	-	2.2	3.0	1.3	1.6	1.5	18.7	-
December	31.4	30.0	32.4	32.1	32.6	42.3	-	3.4	2.8	2.4	1.9	1.2	7.9	-
Annual Rate	26.6	27.0	23.8	25.4	26.8	31.5	-	3.7	6.0	1.7	1.7	1.4	4.3	-

Table 3. Age-Specific Death Rates, Pneumonia and Influenza
 United States, 1954-1957, Ten percent sample
 Deaths per 100,000 Population

	Pneumonia				Influenza			
	1954	1955	1956	1957	1954	1955	1956	1957
Under 1	214.4	214.9	236.8	238.1	10.8	11.3	5.5	15.8
1-14	6.0	6.3	5.9	7.4	0.5	0.5	0.2	1.0
15-24	1.9	2.7	2.8	3.8	0.0(5)	0.2	0.2	1.4
25-34	2.8	3.0	3.0	5.6	0.1	0.1	0.2	1.0
35-44	6.2	6.7	6.1	9.0	0.1	0.7	0.2	1.1
45-54	13.6	13.8	13.3	17.4	0.4	1.0	0.7	2.8
55-64	27.7	27.5	26.6	34.8	1.3	1.8	0.7	6.7
65-74	71.9	79.9	82.6	94.9	5.1	4.6	4.4	15.2
75-84	204.3	237.7	262.7	279.0	17.2	17.5	14.6	34.7
85 and over	626.0	686.9	738.7	878.8	47.2	48.3	56.2	120.0
All Ages	23.8	25.4	26.8	31.5	1.7	1.7	1.4	4.3

Fig. 2: MONTHLY PNEUMONIA and INFLUENZA DEATH RATES
 UNITED STATES, 1952 - 1958
 (10% Sample)

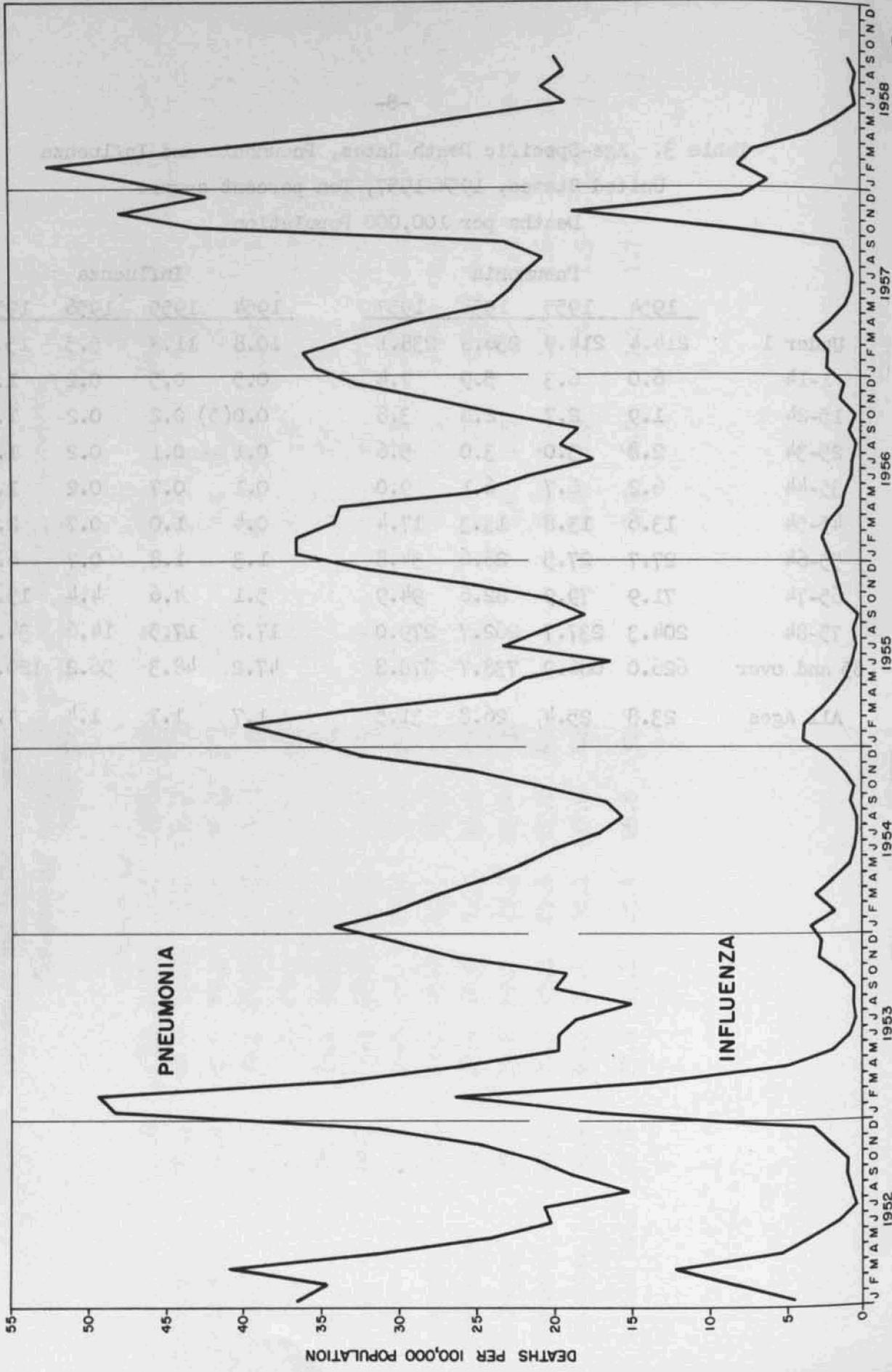


Fig. 3: ANNUAL TREND OF PNEUMONIA and INFLUENZA DEATHS
 UNITED STATES, 1954-1957
 (10 % Sample)

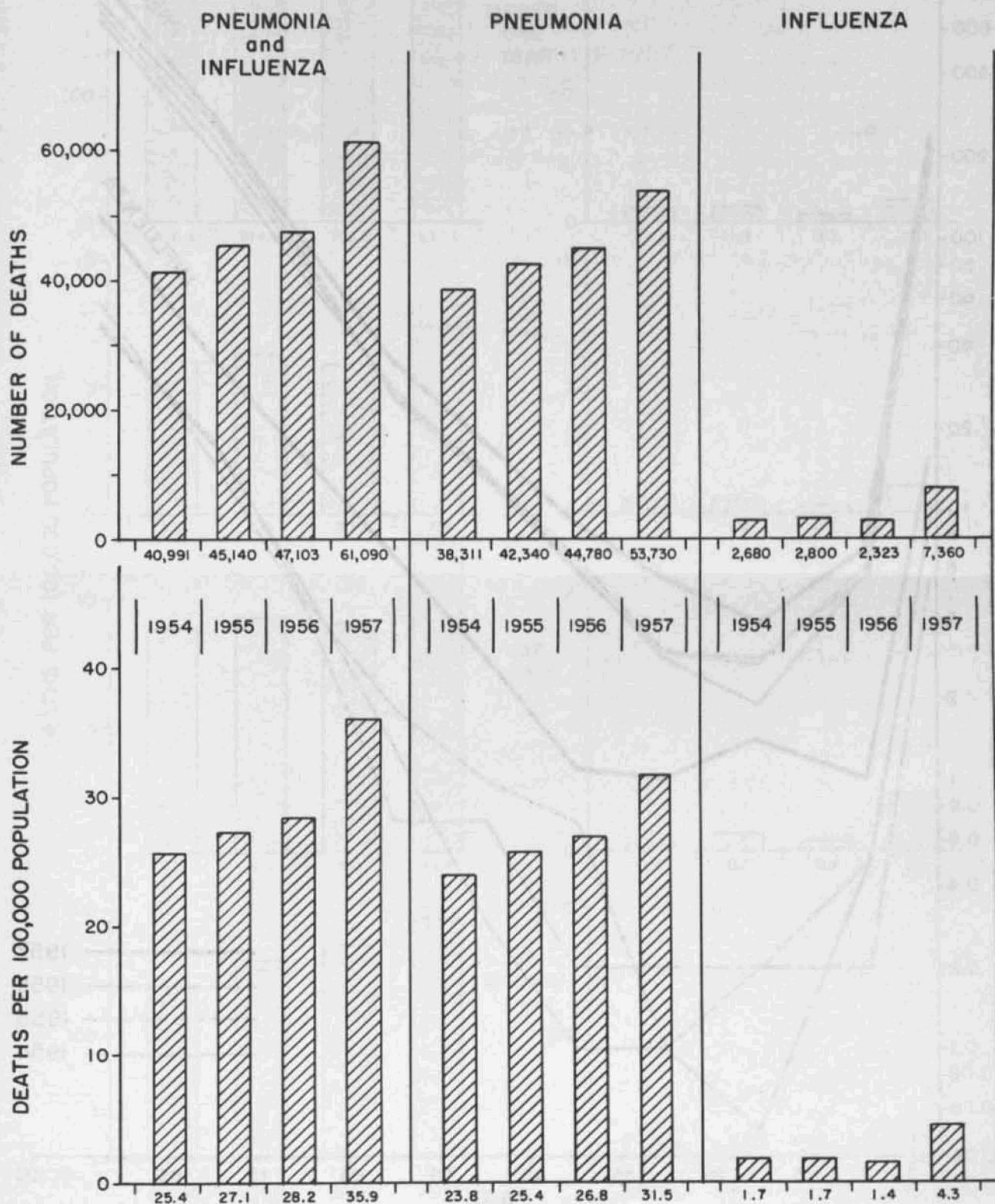
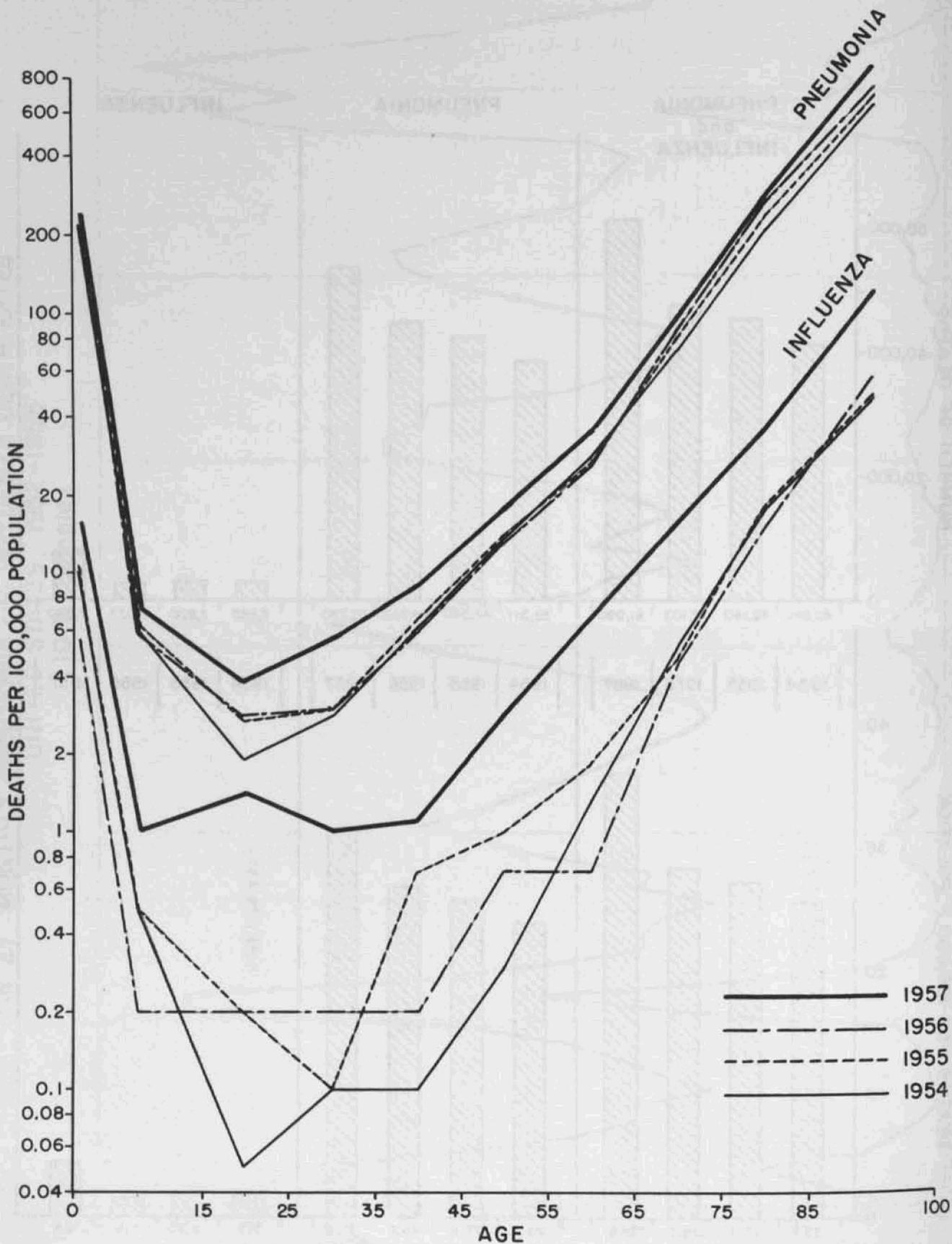
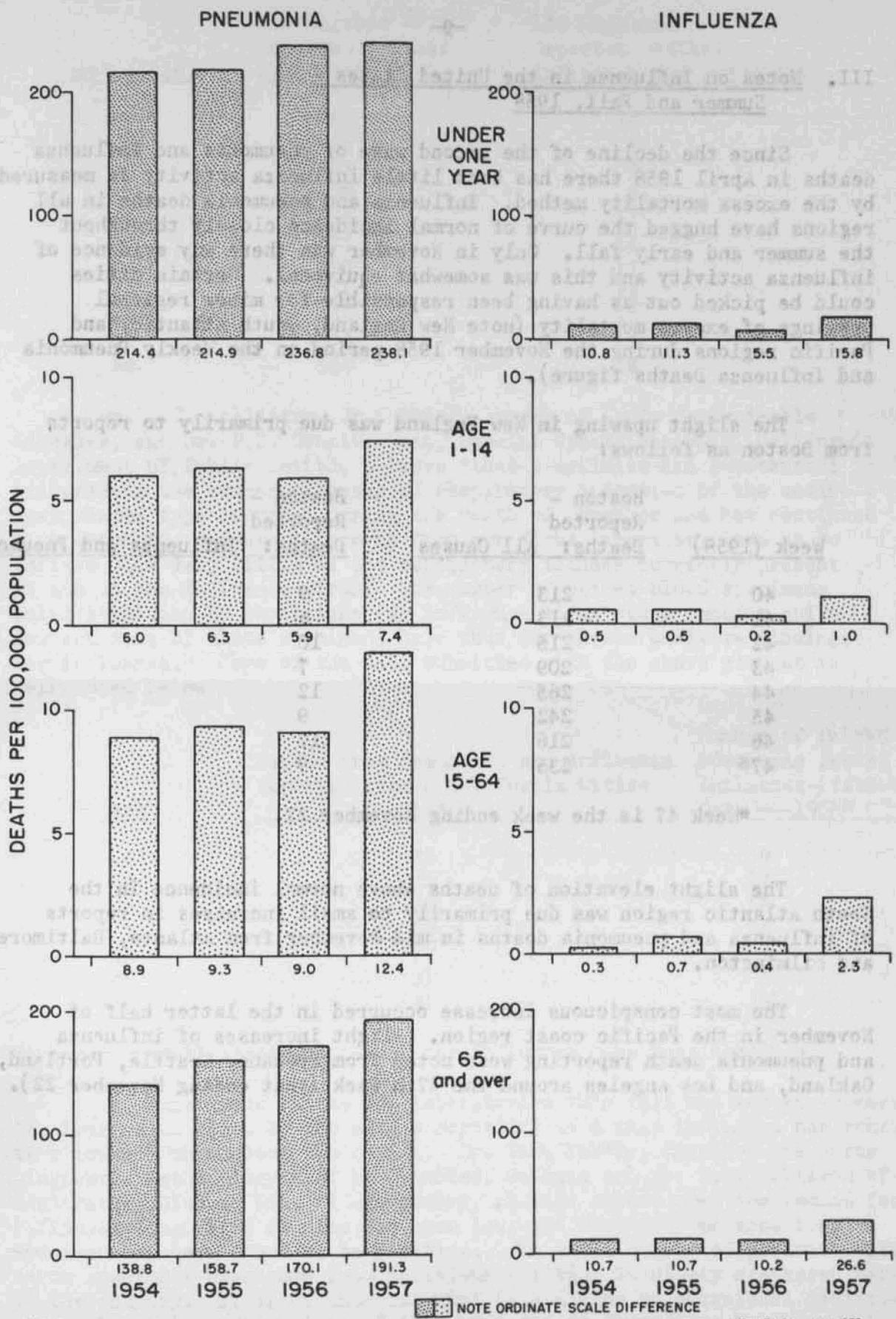


Fig. 4: AGE SPECIFIC DEATH RATES
 PNEUMONIA - INFLUENZA
 UNITED STATES, 1954-1957
 (10% Sample)



**Fig. 5: RELATIVE ANNUAL DEATH RATES BY AGE
UNITED STATES, 1954-1957
(10% Sample)**



III. Notes on Influenza in the United States -
Summer and Fall, 1958

Since the decline of the second wave of pneumonia and influenza deaths in April 1958 there has been little influenza activity as measured by the excess mortality method. Influenza and pneumonia deaths in all regions have hugged the curve of normal incidence closely throughout the summer and early fall. Only in November was there any evidence of influenza activity and this was somewhat equivocal. Certain cities could be picked out as having been responsible for minor regional upswings of excess mortality (note New England, South Atlantic, and Pacific regions during the November 1958 period on the Weekly Pneumonia and Influenza Deaths figure).

The slight upswing in New England was due primarily to reports from Boston as follows:

<u>Week (1958)</u>	<u>Boston - Reported Deaths: All Causes</u>	<u>Boston - Reported Deaths: Influenza and Pneumonia</u>
40	213	9
41	213	6
42	215	10
43	209	7
44	265	12
45	242	9
46	216	17
47*	235	9

*Week 47 is the week ending November 22.

The slight elevation of deaths above normal incidence in the South Atlantic region was due primarily to small increases in reports of influenza and pneumonia deaths in mid-November from Atlanta, Baltimore, and Wilmington.

The most conspicuous increase occurred in the latter half of November in the Pacific coast region. Slight increases of influenza and pneumonia death reporting were noted from Spokane, Seattle, Portland, Oakland, and Los Angeles around the 47th week (that ending November 22).

The rise of total and influenza and pneumonia deaths in Los Angeles was most conspicuous:

<u>Week (1958)</u>	<u>Los Angeles - Reported Deaths: All Causes</u>	<u>Los Angeles - Reported Deaths: Influenza and Pneumonia</u>
40	489	10
41	496	9
42	393	9
43	490	6
44	466	11
45	475	11
46	438	17
47	<u>531</u>	<u>26</u>
48	456	15
49	<u>570</u>	15
50	504	20

Dr. A.C. Hollister, Jr., Chief, Bureau of Acute Communicable Diseases, and Dr. P.H. Condit, Head, Special Operations Unit, California Department of Public Health, believe "that a definite and substantial increase in the number of cases of respiratory infection of the undifferentiated type occurred during the month of November and has continued into December. However, reports from our Virus Laboratory lead us to believe that very little of the respiratory illness currently present is due to the influenza virus. The number of paired blood specimens being submitted by physicians for influenza virus study remains quite low and none of these specimens have thus far showed positive findings for influenza." Some of the data submitted with the above comment is reproduced below:

<u>Week</u>	<u>Deaths from Pneumonia and Influenza Reported from 8 California Cities 1958</u>	<u>Number of Paired Blood Specimens Tested For Influenza--Statewide Data ---1958*</u>
44	25	9
45	21	27
46	26	18
47	<u>42</u>	24
48	<u>27</u>	9
49	31	5
50	31	15

*All specimens tested for influenza have been negative.

The experience of the CDC laboratories this fall has served to confirm the impression given by the excess mortality data that influenza has remained at a low ebb throughout the nation. Dr. S.S. Halter, Chief of the Virus Diagnostic Methodology Unit at Chamblee, Georgia and Dr. R.Q. Robinson of the Respiratory Disease Unit at Montgomery, Alabama report that the demand for influenza diagnostic studies has been low, and that only an occasional specimen has been found to be positive. The small number of positive paired serum specimens have come from individuals living in widely scattered parts of the country. It is of interest that in addition to occasional isolations or serological confirmations of the Asian strain there have been several probable type B infections, one recently in Juneau, Alaska.

IV. International Notes

Influenza has been quiescent in most parts of the world since March 1958 insofar as it has been possible to determine. Several localized outbreaks have occurred during the last half of 1958 in such countries as Paraguay, Malaya, and Switzerland, but there has been no major epidemic in any country or portion thereof for many months. During the fall-early winter period in the northern hemisphere there have been a few reports of increased incidence of influenza-like illness. In the United States, analysis of excess mortality due to influenza and pneumonia for the areas from which these reports have come does not suggest that the upswings could have been very great.

During March 1958 there was a recurrence of influenza in Hong Kong. Throat washings were examined at the International Influenza Center for the Americas in the CDC Virus and Rickettsia Section by Dr. R.Q. Robinson. He reported that two isolations of influenza virus were made from nine specimens. Both were similar to A/Asian/Japan/305/57. One strain was sensitive to non-specific inhibitor while the other was insensitive, a difference which had been noted frequently in studies of Asian influenza strains during the pandemic in 1957. Influenza in Hong Kong did not reach epidemic proportions at this time, and by April few cases were being reported.

In late July information was received by the National Office of Vital Statistics from the International Cooperation Administration of a noticeable increase in respiratory illness in Paraguay. Clinically the disease resembled influenza; duration of symptoms was 5 to 6 days; all age groups and entire families were affected. No laboratory confirmations have been reported, however, from this outbreak.

During September, according to a report from the World Health Organization, Geneva, there was a marked upswing of influenza reporting from several cantons in Switzerland. No laboratory confirmations of influenza have been reported as yet.

At the same time, in mid-September, on the other side of the world, a small outbreak of confirmed influenza occurred among military personnel stationed on Okinawa. The Division of Preventive Medicine, Bureau of Medicine and Surgery, U.S. Department of the Navy reported that the outbreak involved men of four different companies. Five men were ill in each of two companies, 12 in a third, and 31 in the fourth company. Duration of the mild febrile respiratory illness averaged about 5 days. There were no complications. The virus isolated appeared to be identical with A/Asian/Japan/305/57.

The Naval Medical Research Unit No. 2, located in Taipei, Formosa, also reported isolation of strains of influenza virus resembling the Asian strain during October. These isolations were made from Navy personnel and dependents on Formosa.

Rounding out this fragmentary listing of evidence for the persistence of the Asian strain is a wire service report from Kuala Lumpur, Malaya, of an Asian influenza outbreak of some 2500 cases in the first two weeks of November. It was reported that there had been laboratory confirmation that this outbreak was due to the Asian strain.

During the last six months of 1958, then, this Unit has learned of only a few scattered outbreaks of influenza, reported from widely separated countries. Other minor outbreaks have undoubtedly occurred and remain unreported, but it is very likely that no major epidemic of influenza has occurred in any part of the world. It is of interest that where laboratory confirmation has been available the influenza outbreaks and cases have been due to the Asian strain. In the United States, too, the Asian strain appears to have replaced other strains to a large extent.

V. Influenza Vaccination

In a statement released by the Public Health Service late in the summer of 1958 it was recommended that influenza vaccination be considered before and during the fall-winter influenza season for (1) special groups (such as employees of essential industrial and service organizations and hospital employees) where mass absenteeism from work would be a serious blow to the organization concerned and to those dependent upon its activities, and for (2) those individuals for whom the disease might be a health risk, such as the aged and the chronically ill. It was pointed out that there are ample supplies of polyvalent influenza vaccine, including the Asian strain, available commercially. The Public Health Service has recommended that two doses of vaccine be given at least six weeks apart, and, on the basis of available knowledge, it is thought wise for two doses to be given to all concerned regardless of whether or not influenza vaccine was given a year ago.

In regard to effectiveness of the present vaccine it is clear that the pre-1957 polyvalent vaccine was effective, and studies during 1957 confirmed at least reasonable effectiveness of monovalent Asian strain vaccine. There is every reason to believe that the new polyvalent vaccine should be a potent and safe immunizing agent.

Some studies of effectiveness of Asian influenza vaccines:

1. The Commission on Influenza of the Armed Forces Epidemiological Board has reported on field studies executed by four different groups of investigators concerning the effectiveness of Asian influenza vaccine. The degree of protection in four groups inoculated with 200 CCA units ranged from 42 - 60 percent. (Journal of the American Medical Association 165, Dec. 1957, pages 2055-58)

2. J.A. Bell et al, working with human volunteers found a similar degree of protection in vaccinated persons experimentally challenged with live Asian influenza virus. (Journal of Amer. Med. Assn. 165, Nov. 1957, pages 1366-73)

3. R.A. Jordan and T.D.Y. Chin studied the effectiveness of 200 CCA units of Asian strain vaccine in an employee and student population at the University of Kansas Medical Center in the fall of 1957 by using a questionnaire survey technique. Quoting from their summary:

"Among 640 vaccinated persons the rate of febrile respiratory illness was 140.6 cases per 1000, as opposed to a rate of 470 cases per 1000 among 651 unvaccinated individuals. In this group of illnesses the method of vaccination was estimated to be 70 percent effective. When all respiratory illnesses, both febrile and non-febrile, were totaled, the incidence was 133 cases in the 640 vaccinated individuals, or 207.8 per 1000; and, in the 651 unvaccinated persons, the incidence was 364 cases, or 559.1 per 1000. Thus, the total overall effectiveness of the vaccine against all respiratory illnesses was estimated to be 63 percent." (Journal of Kansas Med. Soc., LIX, March 1958, pg. 111-3)

4. H.B. Dull and others at CDC, in a large institutional study in Atlanta, as yet unpublished, have found the vaccine (at both the 200 and 500 CCA level, given once intramuscularly) to be about 60 percent effective in preventing the typical febrile influenza syndrome, though less effective in completely preventing clinical symptoms. (H.B. Dull et al, Epidemiology Branch, CDC, to be published 1959)

5. Gundelfinger et al, considering 3355 naval personnel at Great Lakes Naval Training Station, found an 83-90 percent reduction in febrile respiratory illness was associated with prior inoculation with monovalent Asian influenza vaccine containing 200 CCA units. However, a similar 21-46 percent reduction was associated with prior inoculation with a polyvalent influenza vaccine not containing the Asian strain. (New England J. Med. 259, Nov. 1958, pg. 1005-1009)

6. See also: G. Meiklejohn and A.J. Morris, Annals of Internal Medicine 49, Sept. 1958, pg. 529-535.

VI. Current Status of Public Health Service Influenza Surveillance Program

(From a memorandum to the State and Territorial Health Officers from Dr. David E. Price, Chief, BSS, PHS, October 1958).

The National Office of Vital Statistics will continue to collect and report morbidity and mortality data on influenza in the U.S. and its territories. The Communicable Disease Center will continue the operation

of its Influenza Surveillance Unit and will issue interpretative reports from time to time, summarizing all information available, not only from NOVS but also from laboratory reports, absentee records, special investigations by Epidemic Intelligence Service Officers and from other sources. When indicated pertinent information will be transmitted by letter or telegram to all State and Territorial health authorities.

All reports of outbreaks of influenza and confirming laboratory reports should be sent promptly to Dr. C.C. Dauer, Public Health Service, Washington 25, D.C.

1. These reports should be sent by or through the State health officers.
2. Outbreaks of influenza or influenza-like diseases should be reported. The narrative of the report should include estimated numbers of cases or percentages of selected groups, such as school children or employees; the time of onset of the outbreak; brief description of clinical characteristics; deaths attributable to the outbreak; and any other features of interest. Any unusually severe outbreak should be reported promptly by telegram or by telephone.
3. Assistance should be given collaborating laboratories in investigating any outbreaks of influenza and in collecting material for specific diagnosis.
4. The International Influenza Center for the Americas, located in the Virus and Rickettsia Section of the Communicable Disease Center in Montgomery, Alabama, under Dr. Morris Schaeffer, will study the strains of influenza viruses submitted by laboratories, with particular attention to the untypeable or atypical strains.
5. Reports on the progress of outbreaks should also be sent by State health officers to Dr. Dauer.