REPORT NO. 77
JUNE 14, 1963

COMMUNICABLE DISEASE CENTER

INFLUENZA

SURVEILLANCE

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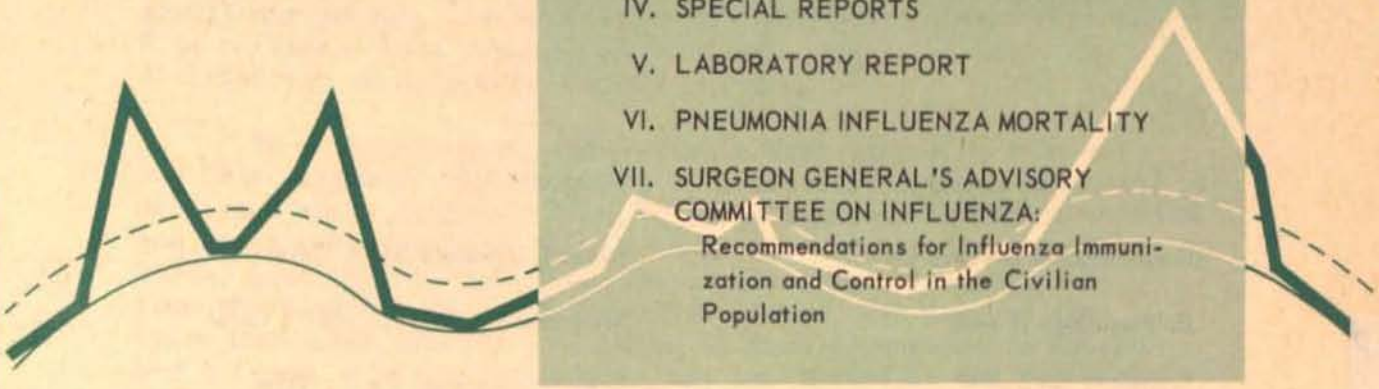

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

PREFACE

Summarized in this report is information received from State Health Departments, university investigators, virology laboratories and other pertinent sources, domestic and foreign. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to the Surveillance Report are most welcome. Please address to:
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I. SUMMARY:

Epidemics of influenza-like disease became widespread in several areas of the Eastern United States during January. The first confirmed outbreak of the season began early in the month in Robeson County in southern North Carolina. Adjacent counties in North Carolina and contiguous areas of South Carolina became progressively involved. By February 15, outbreaks of influenza-like illness had been reported from the District of Columbia and 15 States, including North Carolina, Maryland, Virginia, Delaware, Kansas, Illinois, Georgia, Maine, Vermont, South Carolina, New York, Massachusetts, Ohio, Kentucky, and West Virginia. Influenza A_2 virus had been confirmed by isolation or by serologic titer rise as the causative agent in outbreaks in the District of Columbis, North Carolina, Maryland, Kansas, New York, and at the Great Lakes Naval Training Station in Illinois.

During the month of January, the pattern of spread of disease confined itself to a northerly and southerly direction along the Atlantic Seaboard. The early confirmed outbreaks in Kansas City and Chicago areas occurred in rather specialized population groups, and it was not until February that community-wide outbreaks were seen in these areas. Figure 1 shows the distribution of outbreaks through February 15.

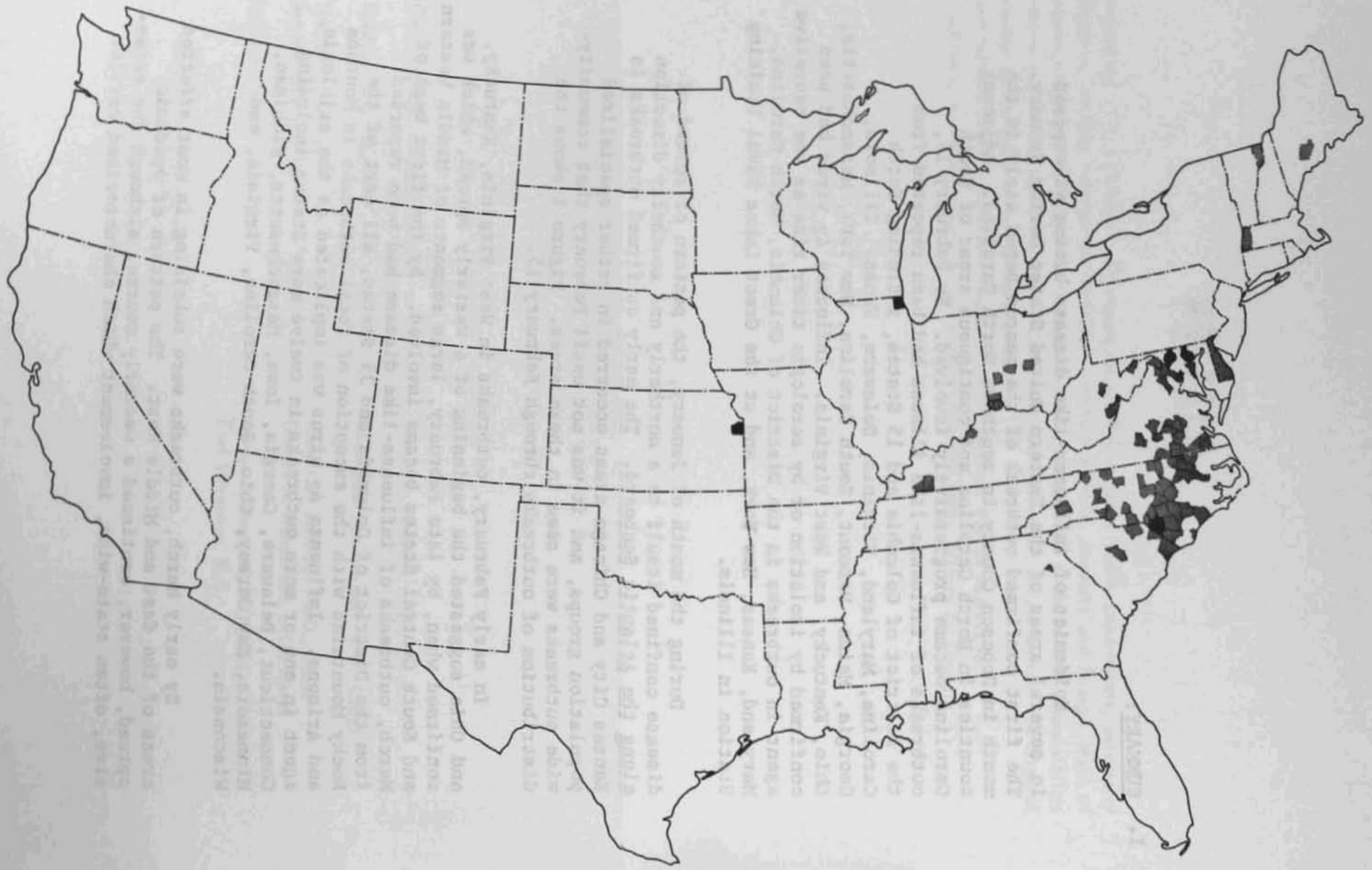
In early February, outbreaks in West Virginia, Kentucky, and Ohio suggested the beginning of a westerly spread, which was confirmed when, by late February, large segments of Middle Western and South Central States became involved. By the first week of March, outbreaks of influenza-like disease had been reported from the District of Columbia and 35 States, all east of the Rocky Mountains with the exception of focal outbreaks in Montana and Arizona. Influenza A_2 virus was implicated as the etiologic agent in one or more outbreaks in twelve more States including Connecticut, Delaware, Georgia, Iowa, Massachusetts, Michigan, Minnesota, New Jersey, Ohio, South Carolina, Virginia, and Wisconsin.

By early March, outbreaks were subsiding in most affected areas of the East and Middle West. The pattern of epidemic spread, however, continued a westerly course, although the extensive, often state-wide, involvement which characterized earlier

Figure I.

INFLUENZA AND INFLUENZA-LIKE DISEASE OUTBREAKS, U. S. A.

January I through February 15, 1963 - By County



outbreaks on the Eastern Seaboard was not frequently observed as the epidemic moved westward. Among the Mountain States, Colorado, Idaho, and Utah reported outbreaks for the first time, and the West Coast States of Alaska and California began to experience outbreaks. In mid-March, the State of Washington reported two focal outbreaks. A small focal outbreak also occurred in Wyoming about this time.

By late April, one or more outbreaks of influenza-like disease had been reported from the District of Columbia and 45 States. Only the States of Florida, Hawaii, Nebraska, Nevada, and New Mexico failed to report increased incidences of this syndrome. Influenza A_2 virus was implicated as the causative agent of one or more outbreaks in the District of Columbia and a total of 34 States, with the States of Arizona, Arkansas, California, Colorado, Indiana, Kentucky, Louisiana, Missouri, Montanta, North Dakota, Pennsylvania, Rhode Island, Tennessee, Utah, Vermont, Washington, and West Virginia, now added to the list.

With the exception of the State of Alaska, where widespread community epidemics occurred during the months of March and April, the West Coast States were notable for the lack of demonstrated community involvement. The State of California represents an interesting example of this phenomenon in which the presence of influenza A_2 virus was demonstrated over large areas of the State through serologic confirmation in sporadic cases, but in which outbreaks could be demonstrated largely only in institutional environments. In general, the force of the epidemic, in its capacity for large scale community involvement, tended to dissipate as the epidemic moved west. Figure 2 shows the distribution of outbreaks for the epidemic as a whole.

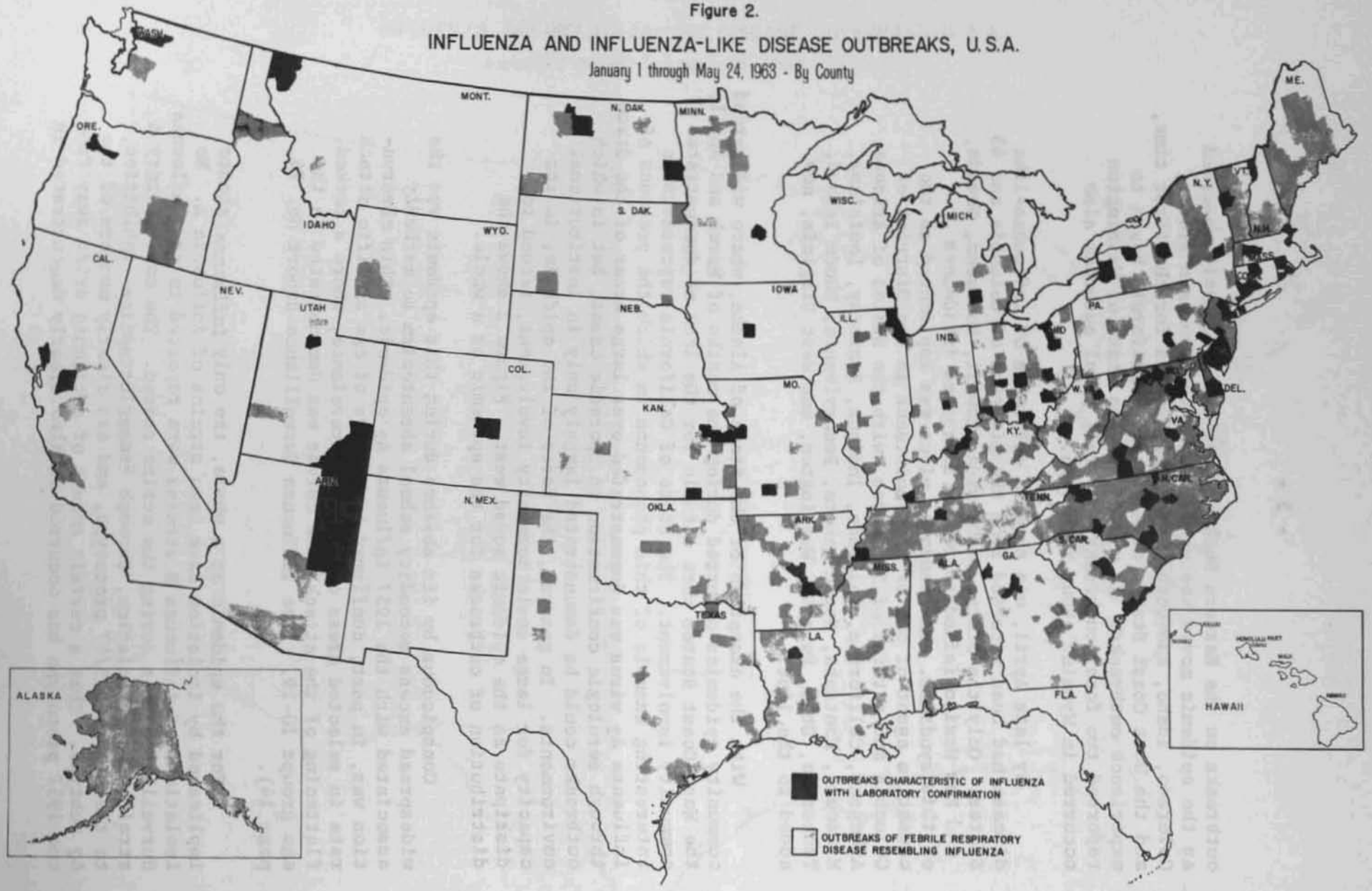
Conspicuous by its absence during this epidemic was the widespread excess secondary school absenteeism so markedly associated with the 1957 influenza A_2 epidemic. This observation was, in part, confirmed by surveys of age specific attack rate in selected areas of epidemic prevalence, where a marked flattening of the attack rate curves was demonstrated in the age groups 10-19. (See Influenza Surveillance Report No. 76, page 14).

For the epidemic as a whole, the only influenza agents implicated by isolation have been strains of influenza A. No isolations of influenza B strains were reported to the Influenza Surveillance Unit during the entire season. The contemporary A strains showed relation, through hemagglutination inhibition, to the A_2/Jap 305/57 prototype, and are clearly members of the A_2 subtype. That a certain amount of antigenic drift away from the 1957 prototype has occurred is also clearly demonstrated in

Figure 2.

INFLUENZA AND INFLUENZA-LIKE DISEASE OUTBREAKS, U.S.A.

January 1 through May 24, 1963 - By County



reciprocal cross hemagglutination inhibition tests using both ferret and rooster immune antisera. Studies at the Respirovirus Unit, Communicable Disease Center, would also indicate that this is a continuance of a drift noticed with the appearance of the A_2/Jap 170/62 prototype strain, in that certain contemporary U. S. isolates would appear to vary antigenically as much from A_2/Jap 170/62 as A_2/Jap 170/62 varies from A_2/Jap 305/57.

On May 27 the Surgeon General's Advisory Committee on Influenza met to consider recommendations for the coming year (See Part VII of this Influenza Surveillance Report). Of particular note was the agreement on the prediction that widespread outbreaks of influenza are not likely to occur during the coming winter season. Of further note was the decision to change the current civilian polyvalent vaccine from a four-strain to a six-strain material with the addition of one more contemporary strain each of A_2 and B. The total CCA unitage of the new vaccine will be 600 instead of the current 500, the total CCA unitage of the combined A_2 components remaining, as before, at 200, and the total unitage of the B components being increased by 100.

Also of interest was the increased disparity between the composition of the military vaccine (continuing the old four-strain 1000 CCA unit/ml composition for the coming season) and the new civilian vaccine.

The decision to incorporate a new A_2 strain into the civilian vaccine, though the new A_2/Jap 170/62 prototype reflects only variation within the subtype and not a major antigenic shift, would seem to reflect an underlying assumption that variations within a subtype may affect vaccine efficacy.

During the season there were few adequate studies of vaccine efficacy. However, studies, to be described later in this report, would tend to question the efficacy of the current vaccine in the specific populations considered. One of the studies, in particular, poses the question of whether influenza vaccine induced H.I. antibody is related to vaccine protection.

Pneumonia-influenza deaths in the 108 cities first exceeded the epidemic threshold in early January and reached a peak during the week ending March 16. Deaths fell to below threshold levels during the week ending April 13 and have remained so to the present.

II. EPIDEMIC REPORTS

Alaska:

Increased incidence of influenza-like illness was noted in all judicial districts of the State during March and early April. During the week of March 10, an explosive outbreak of influenza-like illness occurred at Fort Yukon, where an estimated 140 cases in a population of 700 were seen during a three-week period. Clinical symptoms included fever, malaise, cough, and myalgia, with bronchitis in infants. Age distribution of cases was from 4 months to 89 years. During the same period, an explosive outbreak occurred at Angoon with 88 cases seen in a population of 350 persons. During the week ending March 29, Nome reported 240 cases in a population of 1500. For the same period, Glenallen and Kotzebue reported increased incidence of respiratory disease. During the week ending April 5, Fairbanks experienced an outbreak with 275 cases, and over 250 cases were reported from the villages of Gambell and Savoonga on St. Lawrence Island. An outbreak occurred at the Mt. Edgecumbe School near Sitka during the week ending April 12, when an estimated 100 cases were reported. Many small Eskimo villages in the western part of the State also experienced explosive outbreaks during March and early April. No laboratory confirmation of influenza A_2 infection has been obtained in any of these outbreaks.

(Reported by E. O. Wicks, M.D., Division of Public Health, Alaska Department of Health and Welfare).

Arizona:

Outbreaks of influenza-like illness were reported from the San Carlos, Apache, and Papago Indian Reservations during a two-week period beginning about March 14. Public Health Service outpatient clinics at Sells, San Carlos, and White River reported at least 200 cases during this period. Illness was characterized by acute onset with fevers of 102-103° F. of 2-4 day duration. All age groups were affected.

(Reported by Dr. W. S. Baum, Area Medical Officer in Charge, Public Health Service, Division of Indian Health, Phoenix, Arizona).

California:

In addition to the institutional outbreaks of influenza-like illness reported from San Joaquin and Napa Counties during the latter part of March (See Influenza Surveillance Report No. 76), an outbreak of disease occurred in a boys' reformatory in Amador County during the last week of March and the first two weeks of April. Over 200 cases occurred in a total population of 850. Clinical features of the illness included rapid onset of fever of 104° - 105° F. coupled with mild respiratory symptomatology.

A small community outbreak was described in Merced County during the first week of April. An estimated 40-50 patients were hospitalized with an influenza-like syndrome, and many additional cases were noted in the surrounding community. This was the only true community outbreak noted in California during the current season.

An additional institutional outbreak occurred in a men's colony in San Luis Obispo County during April. The outbreak began about April 15 with peak incidence of disease about one week later. Over 400 cases in a total population of 1400 were observed. The illness was characterized by the sudden onset of fever, chills, prostration, headache, myalgia, and cough of 3-4 days' duration. Five cases of secondary pneumonia were documented, including a 64 year old male who died with massive bilaterial pneumonia.

In summarizing the California influenza picture for the 1962-63 season, although the illness is known to have occurred in most of California's major population centers, it was not sufficiently prevalent in the community at large to be called an epidemic in any of the local health jurisdictions. The only sharply demarcated outbreaks to be documented this season, except for the Merced County community experience, occurred in institutions. Few deaths occurred during these institutional outbreaks despite large numbers of exposed persons in high risk groups.

School absenteeism remained close to expected levels throughout the season although some increases in industrial absenteeism were noted. Pneumonia-influenza deaths for eight California cities first exceeded the epidemic threshold during the week ending March 23 and remained elevated through the week ending May 25. The total excess recorded, however, was only one-third of the total recorded during the 1960 A_2 epidemic in California.

California (continued)

Patients from 26 counties throughout the State have had influenza A_2 detected serologically by the Viral and Rickettsial Disease Laboratory. Approximately 22% of all paired sera examined for influenza were positive for A_2 infection from the week ending March 2 through the week ending May 25. The peak weeks were those ending April 13 (33% confirmed) and May 4 (39% confirmed). The yield of positive specimens among patients selected for study in the institutional outbreaks approximated 80% as compared with 18% for specimens submitted from the community.

A_2 influenza virus was recovered from throat washings of patients ill during institutional outbreaks in Napa County and Stockton.

(Reported by Dr. Philip K. Condit, Chief, Bureau of Communicable Diseases, California State Department of Health).

Colorado:

Since the report of epidemic influenza on a large military base in El Paso County (See Influenza Surveillance Report No. 76), further delayed information indicates the presence of influenza virus activity in at least six Colorado counties during March. Paired sera drawn from cases occurring between the end of February and the middle of March in Denver, Mesa, Rio Blanco, El Paso, Boulder, and Fremont Counties showed significant rises in A_2 antibody titer. In Denver, despite the serologic evidence of the presence of virus during this period, no increase in the incidence of influenza-like illness was reported to the county health department. The same lack of evidence of increased morbidity was noted in all other counties here noted except Fremont County, where a total of 715 persons in a population of 20,000 were reported as having an influenza-like illness. First cases were noted in early February and peak incidence occurred during the week of March 16.

(Reported by Dr. C. S. Mollohan, Chief, Epidemiology, Colorado Department of Public Health).

Florida:

Delayed reporting indicates that serologic evidence of infection with A_2 influenza was obtained in eight sporadic cases occurring in Dade County during the month of February. During the month of January 700 cases of influenza-like illness were reported to the State Board of Health as compared with 6,000 cases for the same period in 1962. During no time interval in the current season was any more than the usual incidence of respiratory disease noted.

(Reported by Dr. Clarence M. Sharp, Assistant State Health Officer, Florida State Board of Health).

Minnesota:

Delayed reporting indicates that a limited outbreak of influenza occurred among patients at the Veterans Administration Hospital, Fort Snelling, during early February. A total of 75 cases were reported with no evidence of spread to the surrounding community. Influenza A_2 virus was recovered from throat washings in two cases.

During March, increased incidence of influenza-like disease was noted in Hennepin, Swift, and Pennington Counties. In Swift County, school absenteeism rose as high as 32%. During this period an increased number of clinic visits for symptoms to the Cass Lake Indian Hospital was also noted.

In addition, a community outbreak was reported from one town in Beltrami County with onset about April 10. School absenteeism rose as high as 25%. From February through April, serologic evidence of influenza A_2 infection was obtained from cases in 23 of 87 counties in the State.

(Reported by Dr. D. S. Fleming, Director, Division of Disease Prevention and Control, Minnesota Department of Health).

Oregon:

An outbreak of influenza-like illness was noted at the Chemawa Indian School in Marion County, with peak incidence from April 6 to April 10. Sixty-two percent of the students reported ill with a syndrome characterized by fever and myalgia. Paired sera were collected from five patients, all of whom had polyvalent influenza vaccine during the preceding year. In all cases a 4-fold rise in influenza A_2 antibody titer could be demonstrated.

In addition, a widespread community outbreak of influenza-like illness was reported from Harney County. The peak of the epidemic occurred apparently in late April and early May. Approximately one-third of the population of the county was estimated to have been ill. One elementary school experienced 20% absenteeism.

(Reported by Dr. Grant Skinner, Director, Epidemiology Section, Oregon State Board of Health).

Washington:

An outbreak of febrile respiratory disease occurred at a mental institution in the northern part of the State, beginning in early March and peaking about March 21. The illness was generally characterized by fever and chills, malaise, coryza, sore throat, and chest discomfort. Sixty-five paired sera from patients were obtained, and a 4-fold rise in influenza A_2 antibody titer could be demonstrated in approximately one-half of the samples. One physician in a nearby community noted an increased number of visits to his office for an influenza syndrome concomitantly with the institutional outbreak. However, no increase in school absenteeism in the area was observed.

In addition, a single localized outbreak of influenza-like illness was reported from the Seattle-King County area in mid-March. Cases were confined to one kindergarten class in which approximately one-half of all the children became ill. Influenza A_2 virus was recovered from the teacher of the class who was also ill during the outbreak.

Although serologic evidence of influenza A_2 infection was obtained in sporadic cases, representing a number of areas in the State during March, most counties reported no more than the usual incidence of respiratory disease.

(Reported by Dr. E. A. Ager, Head, Communicable Disease Control, Washington State Department of Health).

III. INTERNATIONAL SUMMARY:

During the period January through May 1963, outbreaks of influenza-like illness were reported to WHO from numerous areas in Western Europe, as well as from Jamaica in the West Indies. A summary of these reports is given below:

Czechoslovakia:

Increased incidence of influenza-like illness was noted in certain areas of the country during March and April. School and military populations were particularly affected in a number of these areas. Two strains of virus were isolated during the period of outbreaks, one of which was identified as being closely related to B Johannesburg/33/58. Serologic evidence of infection with B group virus was also obtained in a number of regions.

Denmark:

Mild outbreaks of influenza-like disease were noted in several parts of the country during March and April. Serologic confirmation was obtained in some of these outbreaks as well as in several sporadic cases reported in Copenhagen. In addition, three A_2 isolates were obtained from a military population based in this area. The disease was described as mild and of short duration.

France:

A marked increase in the incidence of influenza-like disease was reported from the city of Lyons during the period January through March. Excessive absenteeism was observed in both adult and student populations. Serologic confirmation of influenza A_2 infection was obtained in at least 28 patients in Lyons during the outbreak.

Extensive outbreaks of a rather mild influenza-like illness were reported from the Paris area, beginning in early March. Laboratory confirmation was obtained in several cases. Scattered outbreaks and serologic confirmations of A_2 influenza infection were also reported from several Departments in Southeastern and Southwestern France during March.

Germany:

Several outbreaks of influenza-like disease were reported from Frankfurt-am-Main, beginning in early February. Most cases were said to have occurred in adults, with attack rates as high

Germany (continued)

as 30-40% reported in selected industrial populations. A_2 influenza virus was isolated from at least two cases and serologic confirmation was obtained in numerous others. Other outbreaks occurred during January and February in the Ruhr and in the north of Hess.

A single laboratory confirmed outbreak was reported from the town of Wernigerode in East Germany during the month of January.

Italy:

Outbreaks of influenza-like disease had been reported from 41 of Italy's 92 provinces by the end of February. Influenza A_2 virus was isolated or confirmed by serologic titer rise as the causative agent of outbreaks in the provinces of Genova, Rome, and Bari.

Jamaica:

An island-wide epidemic of influenza-like disease occurred in March, with the peak of the epidemic curve occurring during the last week of that month. Clinical illness was characterized by abrupt onset of fever, headache, myalgia, and cough of 4-5 days duration. Surveys undertaken in two parts of the island indicated an overall attack rate of 28%. Of particular interest in these surveys was the depression in the age specific attack rate curves for the age groups 10 through 19, paralleling the experience in the United States in this regard. Influenza A_2 virus was recovered from specimens collected in the Kingston area, and serologic evidence of influenza A_2 infection was obtained from paired sera collected in various parts of the island.

Netherlands:

A localized outbreak of laboratory confirmed Asian influenza was reported from a mental hospital near Utrecht during January, with some 20 cases recorded. Additional epidemic foci were observed in two military bases later in the month.

Norway:

An increased incidence of influenza-like illness, attributed to type A_2 influenza virus, was seen in Rogaland beginning in early February.

Portugal:

Clinically mild outbreaks of influenza-like disease were reported from communities in all sections of the country, beginning in late February. The epidemic began to decline in late March. Type A_2 influenza virus isolates and serologic confirmations were obtained in several cases. Attack rates appeared to be highest among school age children.

Sweden:

Outbreaks of influenza-like disease, involving primarily the central section of the country, were reported beginning in mid-February. Epidemics were generally described as mild with the exception of a few military outbreaks where high attack rates were noted. Virus isolates and serologic confirmations have been reported from several areas.

Switzerland:

The incidence of influenza-like disease was first noted to increase in early February and by the first week in March had involved almost all cantons - especially those in the eastern part of the country. The epidemic was clearly on the decline by the end of March. Influenza A_2 isolates were obtained at the Institute of Public Health in Basel and at the Hygiene Institute in Bern.

United Kingdom:

Outbreaks of relatively mild influenza-like disease were described during January and February - most of these being in Southern England where at least 5 Type A_2 isolates were obtained and many additional cases confirmed serologically. By early March, northern England appeared to be accounting for most of the outbreaks, while earlier epidemics in London and the southeast, as well as that in Glasgow, were clearly declining. Weekly deaths attributed to influenza rose above figures for the comparable period in 1962 during the week ending February 9 and reached a peak during the week ending March 16.

IV. SPECIAL REPORTS:

A. Baltimore City Fire Department Family Influenza Study

During January and February 1963, the City of Baltimore experienced a sharp outbreak of influenza, manifesting itself in the occurrence of significant primary and secondary school and industrial absenteeism, institutional outbreaks, and marked increase in clinic attendance for respiratory disease at one of the large city hospitals. (see Influenza Surveillance Reports Nos. 74 and 75). Further, total pneumonia-influenza deaths in Baltimore for the month of January reached a level indicative of epidemic influenza and approximated totals seen in the comparable months in 1958 and 1960, when major influenza A_2 epidemics also occurred in the area.

Investigation of selected clinical cases and spot surveys of symptomatology in various parts of the city revealed a remarkably constant clinical syndrome characterized by abrupt onset of fever, cough, and myalgia, with varying degrees of prostration, of 2-4 days duration. Influenza A_2 virus was isolated from throat washings and fourfold or greater rises in A_2 influenza antibody titer could be demonstrated in paired sera obtained from typical cases.

The City of Baltimore had witnessed two previous major epidemic prevalences of influenza A_2, and it was felt that an attempt to detail the descriptive epidemiology of this disease in an area with 5 years experience with strains of this subtype would be of value.

The personnel and families of the Baltimore City Fire Department were chosen as one intensive study group, since this population was readily accessible to survey technique and contained an adequate demoninator of families well scattered in all quadrants of the city. The group was felt to represent a citywide middle income sample, and thus possibly reflect epidemic pattern for the city as a whole at this socio-economic level.

That the clinical syndrome of influenza had affected Fire Department personnel became evident in mid-January, when absenteeism for respiratory disease among firemen reached major proportions. Clinical examination of typical cases revealed a syndrome entirely compatible with influenza and representative of the syndrome being seen among other population groups in the city at the same time. In addition, serologic evidence of infection with influenza A_2 virus was obtained from a few department personnel with compatible illness.

On February 28, when it had become evident that the outbreak had largely subsided, a survey form was submitted to all department personnel. On one side of the form was a formal solicitation to participate in the study, indicating that all responses, both affirmative and negative, were equally important. The following description of influenza was then given: "Flu is an illness which begins abruptly with fever, chills, weakness, and muscle aches. Headache and dry cough are frequently present. The worst stage of the illness is at the beginning and lasts 1-3 days. Cough and weakness may persist for 1-2 weeks afterwards." The reverse side of the form requested names, ages, and sexes of all members of the employee's family together with information regarding whether a member had had the syndrome described, the date of onset of first symptoms, and influenza vaccine status. All forms were returned by March 15.

Table 1 gives baseline data for the survey. A total population of 7801 was assessed through the distribution of 2100 forms to the index employees. Response was good as indicated by the high survey participation rate.

Table 1

Baseline Statistics

Department Total Strength January-March 1963	=	2100
Total Survey Forms Distributed	=	2100
Total Survey Forms Returned	=	1823
Percent Survey Participation	=	86.8
Total Population Assessed Through Survey	=	7801

Figure 3 gives the overall epidemic curve for the study families as obtained from the survey forms. The possibility of some truncation in the bars for the weeks ending December 29 and March 9 exists, insofar as families were requested to only indicate illness subsequent to December 25 and since a certain percentage of forms were completed by the families prior to the end of the week ending March 9.

Figure 3.

BALTIMORE FIRE DEPARTMENT
FAMILY INFLUENZA SURVEY
TOTAL CASES INFLUENZA BY WEEK OF ONSET, 1963

TOTAL POPULATION SURVEYED = 7801
TOTAL CASES = 1383
ATTACK RATE = 17.7 %

RATIO: TOTAL CASES DATE OF ONSET KNOWN = 1114 / TOTAL CASES..... = 1383 = 0.81

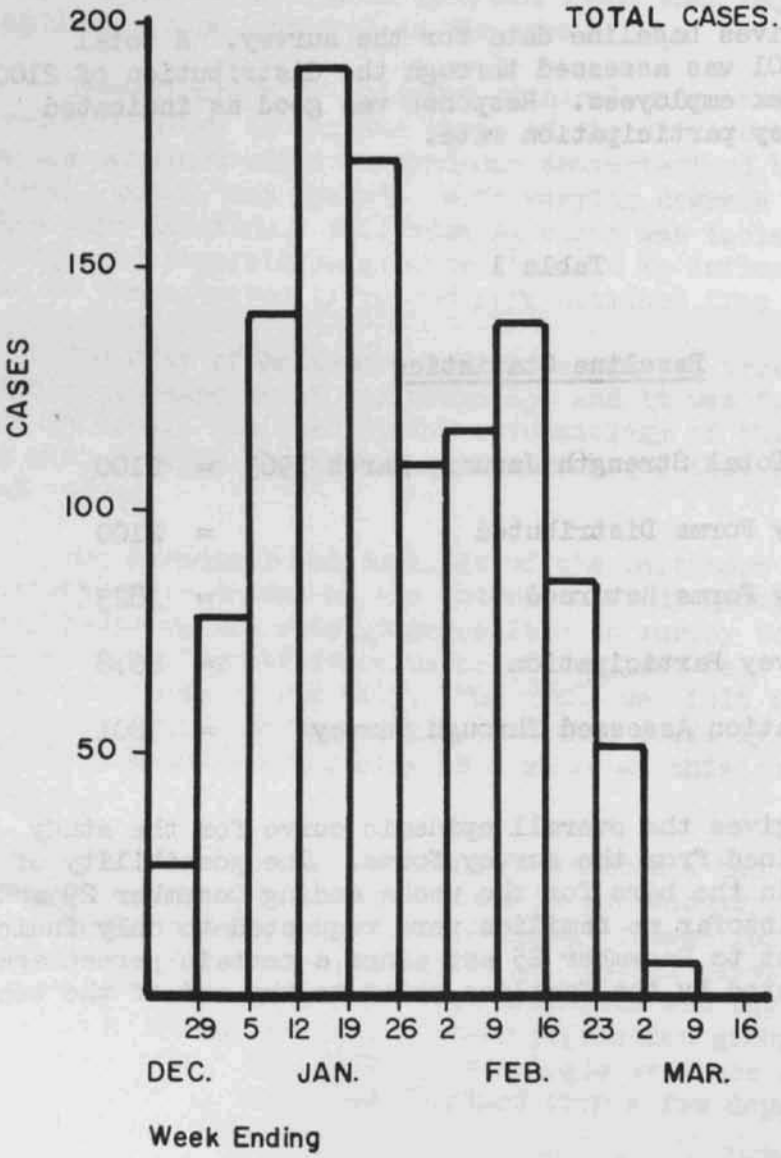


Figure 4.

CITY OF BALTIMORE, 1963- BY ZONE DESIGNATION

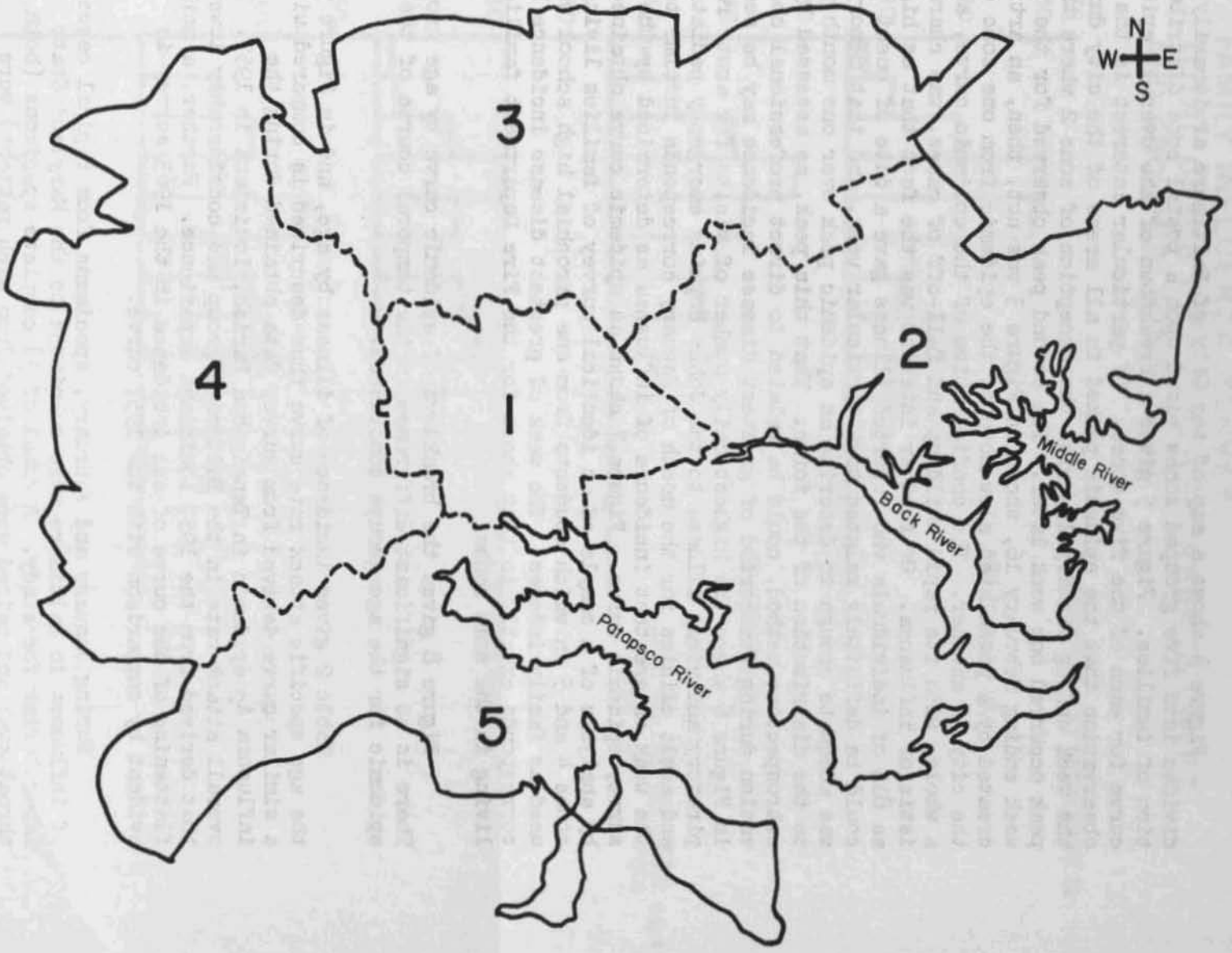


Figure 4 shows a map of the City of Baltimore arbitrarily divided into five grouped zones based upon a postal zone distribution of families. Figure 5 gives a breakdown of the overall epidemic curve for each of the five zones. Of particular interest is the observation that the epidemic peaked in all areas of the city during the week ending January 19, with the exception of zone 2 where the peak occurred one week later. The second peak observed for the week ending February 16, shown in Figure 3 was not, then, an artifact created by a postulated slow move of the epidemic from one zone of the city to another. The configuration of the epidemic curve, as a whole, with its rapid build-up and fall-off of cases, was characteristic of influenza. Of further interest was the fact that as high as 81% of individuals who reported illness gave a date of onset that could be definitely related to a particular week, and that memory span was adequate enough to describe an epidemic peak over one month prior to the distribution of the forms. That this peak, as assessed by the retrospective method, could be related to direct professional observation during the period of greatest disease incidence may be seen in Figure 6 where the highest daily number of visits for acute respiratory and viral illness to the Johns Hopkins emergency pediatric and adult clinics for the month of January corresponds in time to the week of greatest incidence of influenza as determined by the survey epidemic curve. Figure 7 shows an epidemic curve obtained by analysis of a sample of an identical survey of families living in zones 4 and 5 in which students from one parochial high school were used as family indexes. The week of greatest disease incidence here corresponds exactly to that shown for the Fire Department families living in the same zones.

Figure 8 gives the breakdown of epidemic curve by age group. There is no significant difference in the temporal course of the epidemic for the age groups considered.

Table 2 gives incidence of illness by age, and in Figure 9, the age specific attack rate curve thus described is compared with a similar curve derived from survey data obtained during the influenza A_2 epidemic in Tangipahoa Parish, Louisiana in 1957. The overall attack rate in the Baltimore group was considerably lower than that derived from the 1957 Louisiana experience. Further, a marked flattening of the curve of age incidence in the 1963 survey is evident by comparison with the 1957 curve.

During January and February, specimens from typical cases of influenza in Baltimore were submitted to the Maryland State Laboratories for study. A total of 38 complete specimens (both throat swab and paired sera obtained from each patient) were processed during this period and the results are given in Table 3. A high percentage confirmation of infection with A_2 influenza virus was obtained. Only three complete specimens were received from Fire Department personnel with typical illness. However, Table 4 shows that influenza A_2 infection could be demonstrated serologically in two of the cases with presumptive evidence of recent infection in the third.

Figure 5.

BALTIMORE CITY FIRE DEPARTMENT
FAMILY INFLUENZA SURVEY
TOTAL CASES INFLUENZA BY WEEK OF ONSET AND GROUPED ZONE 1963

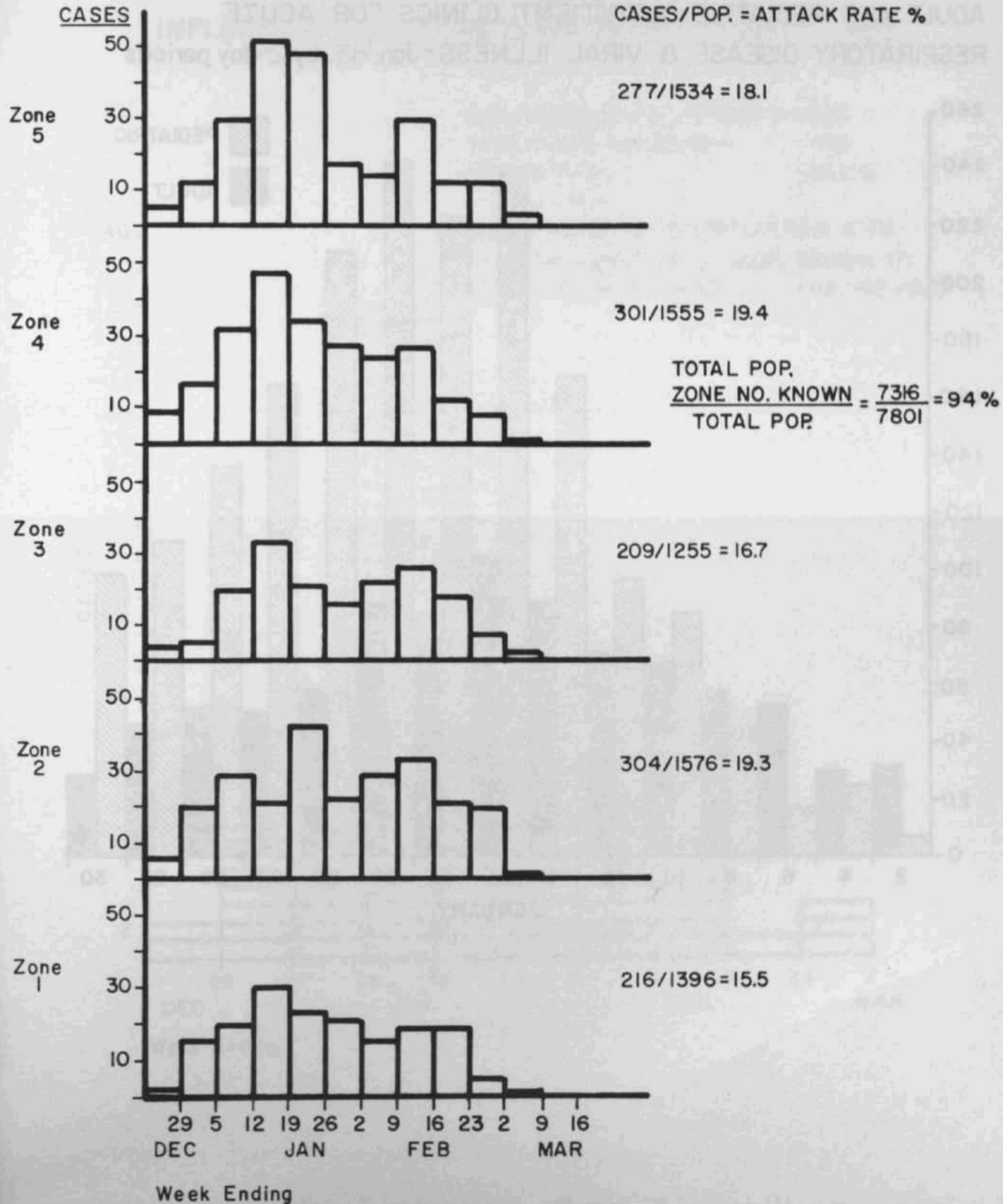


Figure 6

TOTAL PATIENTS SEEN JOHNS HOPKINS HOSPITAL EMERGENCY ADULT AND PEDIATRIC OUTPATIENT CLINICS FOR ACUTE RESPIRATORY DISEASE & VIRAL ILLNESS - Jan.'63, by 2-day periods

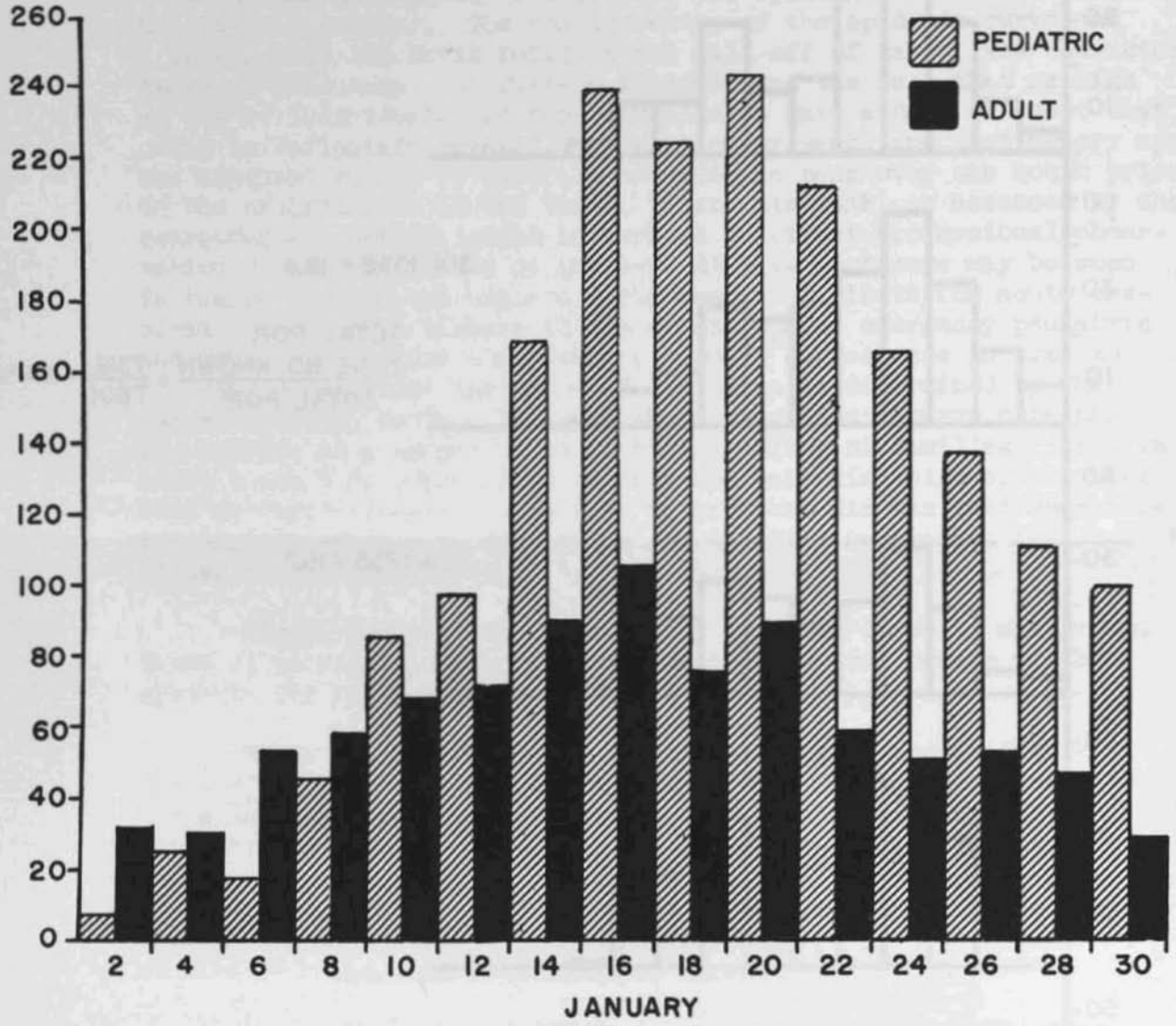


Figure 7.

BALTIMORE FAMILY SAMPLE SURVEY
MT. ST. JOSEPH SCHOOL FAMILIES.
INFLUENZA-LIKE ILLNESS BY WEEK OF ONSET, 1963

TOTAL POPULATION IN SAMPLE = 529
TOTAL CASES INFLUENZA = 142
ATTACK RATE = 26.8 %

RATIO: TOTAL CASES INFLUENZA WITH DATE OF ONSET OF ILLNESS KNOWN TO TOTAL CASES INFLUENZA = 118/142 = 0.83

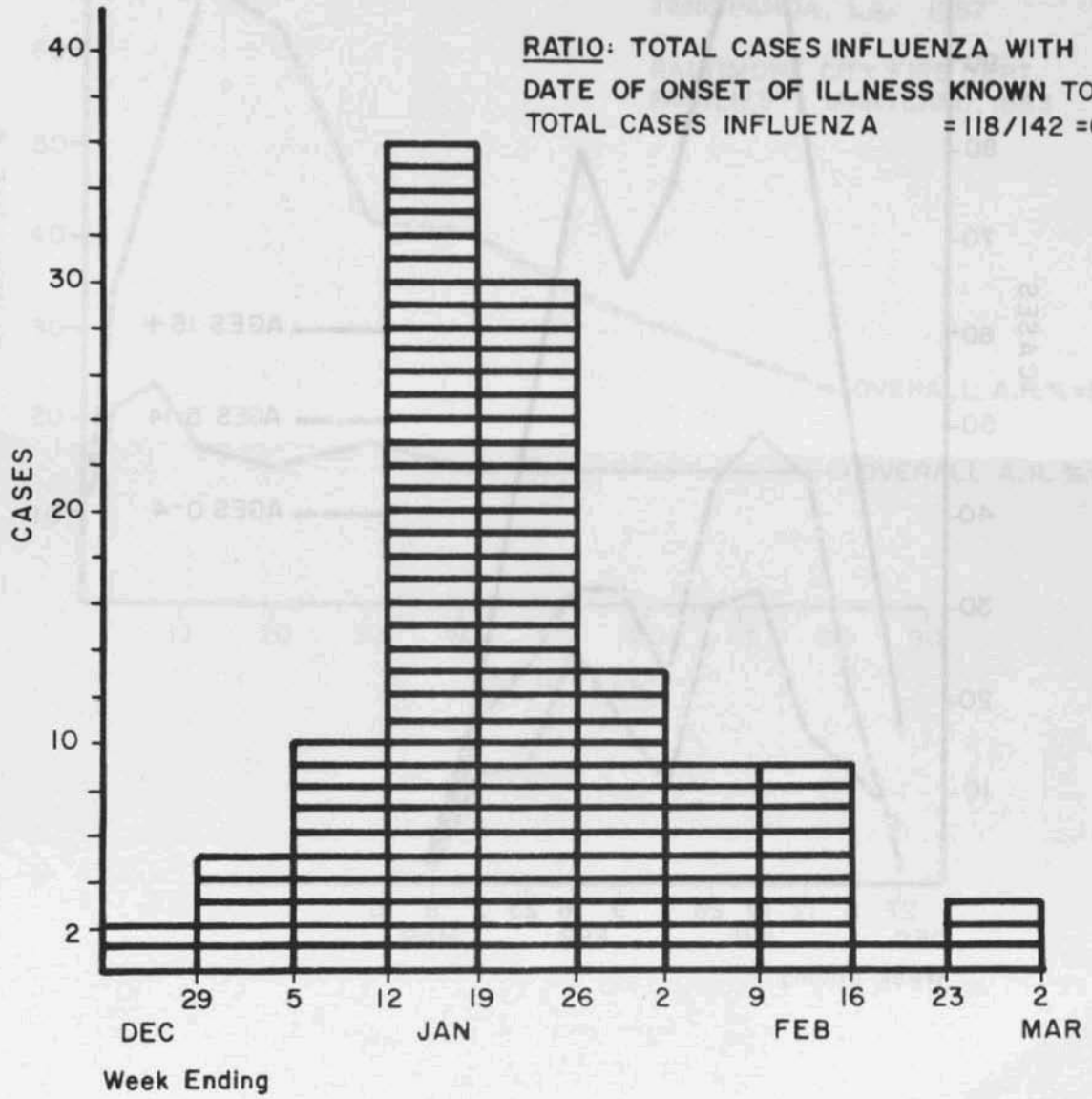


Figure 8.

BALTIMORE CITY FIRE DEPARTMENT
FAMILY INFLUENZA STUDY, 1963
EPIDEMIC CURVE BY AGE GROUPS

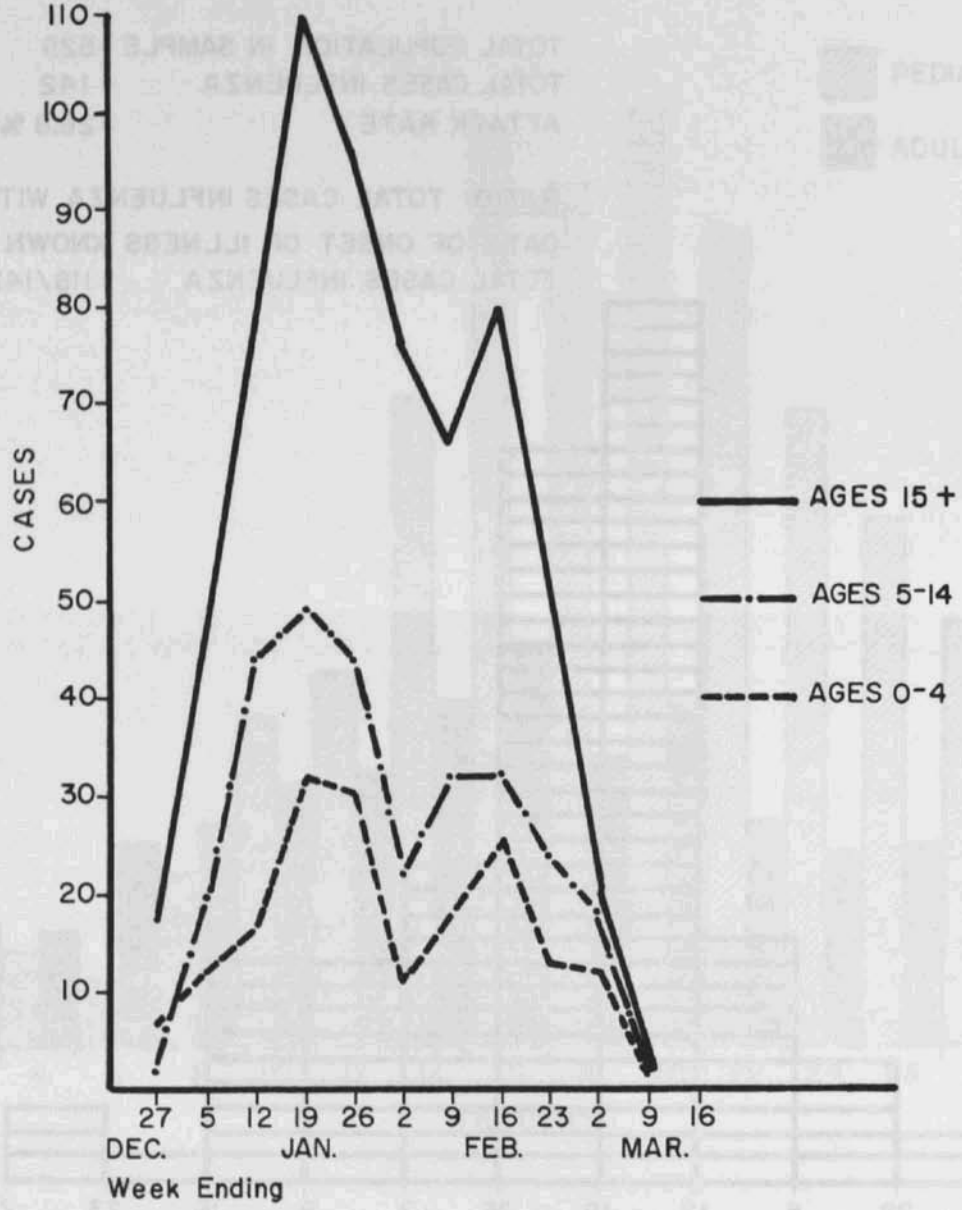


Figure 9.

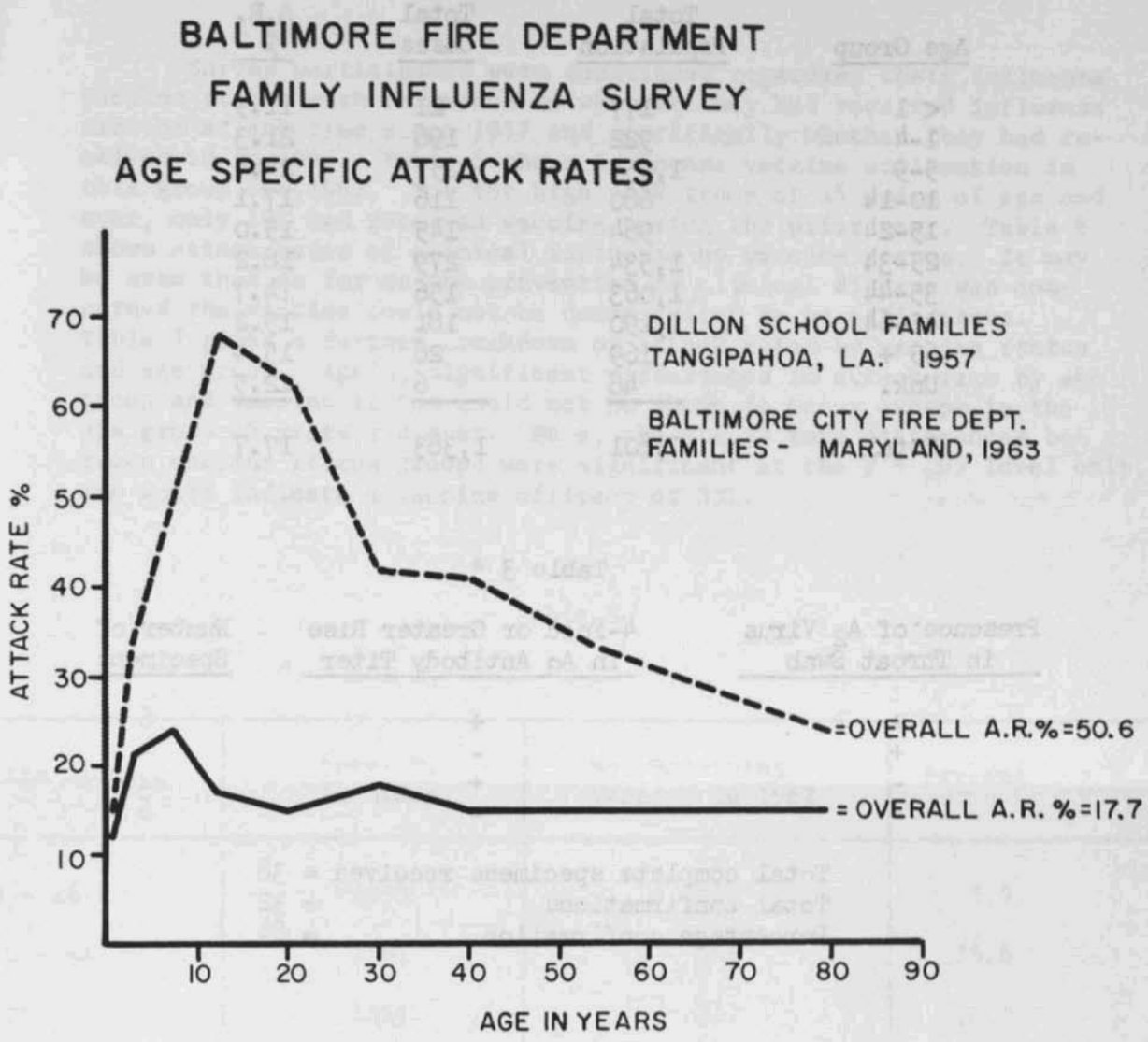

BALTIMORE FIRE DEPARTMENT
FAMILY INFLUENZA SURVEY
AGE SPECIFIC ATTACK RATES
DILLON SCHOOL FAMILIES
TANGIPAHOA, LA. 1957
BALTIMORE CITY FIRE DEPT.
FAMILIES - MARYLAND, 1963
=OVERALL A.R.%=50.6
= OVERALL A.R. %=17.7
ATTACK RATE %
70
60
50
40
30
20
10
10
20
30
40
50
60
70
80
90
AGE IN YEARS

Table 2

Age Group	Total Population	Total Cases	A.R. %
< 1	177	21	11.9
1-4	922	196	21.3
5-9	1,054	257	24.4
10-14	680	116	17.1
15-24	964	145	15.0
25-34	1,534	279	18.2
35-44	1,063	156	14.7
45-64	1,190	181	15.2
65 +	169	26	15.4
Unk.	48	6	12.5
Total	7,801	1,383	17.7

Table 3 *

Presence of A_2 Virus in Throat Swab	4-Fold or Greater Rise in A_2 Antibody Titer	Number of Specimens
+	+	6
+	-	4
-	+	22
-	-	6

Total complete specimens received = 38
Total confirmations = 32
Percentage confirmation = 84

Table 4 *

Number with complete specimens received from Fire Dept. personnel	= 3
A_2 Influenza virus isolations	= 0
4-fold or greater rises in A_2 antibody titer	= 2
Greater than 1:160 A_2 titers in both acute and convalescent sera	= 1

* Courtesy of Dr. M. Joseph, Virologist, Maryland State Department of Health Laboratories

Survey participants were questioned regarding their influenza vaccine status with reference to whether they had received influenza vaccine at any time since 1957 and specifically whether they had received it in 1962. Table 5 shows influenza vaccine utilization in this group for 1962. For the high risk group of 45 years of age and over, only 19% had received vaccine during the prior year. Table 6 shows attack rates of clinical influenza by vaccine status. It may be seen that as far as the prevention of clinical disease was concerned the vaccine could not be demonstrated to be officacious. Table 7 gives a further breakdown of attack rates by vaccine status and age group. Again, significant differences in attack rate by age group and vaccine status could not be shown to occur except in the age group 45 years and over. Here, the attack rate differences between vaccine status groups were significant at the P = .05 level only, and would indicate a vaccine efficacy of 33%.

Table 5

Age Group	Total No. in Group	No. Receiving Vaccine in 1962	Percent
0 - 14	2833	157	5.5
15 - 44	3561	556	15.6
45+	1359	257	18.9
Unknown	48	5	10.4
Total	7801	975	12.5

Table 6

Influenza Attack Rate by Vaccine Status

Vaccine Category	Total Population	Cases	Attack Rate (%)
No Vaccine in or Since 1957	5795	1062	18.3
Vaccine at Some Time 1957-1961 But Not in 1962	730	130	17.8
Vaccine in 1962	975	137	14.1
Unknown	298	54	18.1
Total	7801	1383	17.7

Table 7

Influenza Attack Rates by Vaccine Status and Age Group

Age Group	No Vaccine in or Since 1957			Vaccine in 1962		
	Pop.	Cases	A.R.%	Pop.	Cases	A.R.%
0-14	2392	489	20.4	157	30	19.1
15-44	2425	416	17.2	556	78	14.0
45 +	943	154	16.3	257	28	10.9
Not stated	35	3		5	1	
Total	5795	1062	18.3	975	137	14.1

(This preliminary report was prepared by the Influenza Surveillance Unit, CDC, and is based upon data acquired from a recent study undertaken by a team from the Communicable Disease Center under the auspices of Dr. John H. Janney, Acting Chief, Division of Epidemiology, Maryland State Department of Health, and Dr. Robert E. Farber, Commissioner of Health, Baltimore City Health Department).

IV. SPECIAL REPORTS: (continued)

B. Studies of Vaccine Efficacy: Ohio

(The following report has been provided in preliminary form by: Winslow J. Bashe, Jr., M.D.; Howard Stegmiller, B.S.; Domingo Leonida, M.D.; and Peter Greenwald, M.D.; Division of Communicable Diseases and the Division of Laboratories, Ohio Department of Health, Columbus, Ohio).

Introduction, Materials and Methods:

The data presented have been gathered from a study population consisting of 180 children residing in two State schools for the mentally retarded in central Ohio. These are the Orient and Columbus State Schools, each of which has a total population of approximately 2500. The study population represents a little over one-half of a larger group of children at the two institutions that has been under investigation since 1961. The study group is a selected population and is not representative of the schools' population as a whole. Both immunized and unimmunized control subjects were selected for admission to the study on the basis of the same criteria, however, and are therefore judged to be comparable. Specifically, all were between 6 and 18 years of age; all were ambulatory and relatively "educable"; that is, they were among the less severely retarded patients in the two institutions.

All subjects designated as immunized had received either two subcutaneous 1 ml. inoculations of commercial polyvalent influenza vaccine in 1961, and a subcutaneous booster of 1 ml. in December 1962, or had received subcutaneous inoculations of 1 ml. each in October and December 1962. Those designated as controls had never received polyvalent vaccine. Approximately one-third of the subjects in both immunized and control groups had received 400 CCA units of monovalent swine influenza vaccine in 1961, as part of a previous serologic study unrelated to the present evaluation of vaccine efficacy.

Serum specimens were obtained from all subjects in the study group, including controls, in mid-January, approximately one month after the last dose of polyvalent vaccine had been administered.

The occurrence of an outbreak of Asian influenza in this population beginning in late February, about 6 weeks after this bleeding, and about 10 weeks after vaccination, afforded a unique

opportunity to observe patterns of disease incidence as these related to prior vaccination status and pre-epidemic titer of influenza A_2 H.I. antibody.

Special arrangements for the surveillance of influenza-like disease in the institutions were made in mid-January when epidemic influenza first appeared in Ohio. Cases began appearing in the two schools late in February and continued through mid-March. At this point, it was elected to concentrate all further studies on two cottages in each institution where attack rates were high, and a large portion of children from the previously established study group were housed. Specifically, in each school, all children residing in each of the two cottages, who were members of the original study group (that is, had vaccination status known, and pre-epidemic serum collected) were included in the study population for evaluation of vaccine efficacy. This group comprised a total of 180 children, of whom 90 had been vaccinated, and 90 served as unvaccinated controls.

In the studies that followed, cases of clinical "influenza-like illness" were identified by the presence of acute respiratory disease, accompanied by oral temperature of 100°F. or greater. Laboratory confirmation of Type A_2 influenza as the etiologic agent in this outbreak was based largely on serologic evidence. Of 79 sets of paired sera collected from sick subjects at the two schools, 58 (or 73.5%) showed greater than 4-fold rises in H.I. antibody titer to the A_2 Japan 305/57 antigen. (All sera were pretreated with trypsin and potassium periodate and the antigen employed was titered to contain 8 hemagglutinating units per 0.5 ml.) Throat swabs for virus isolation were obtained from 12 children at Orient and from 19 at Columbus State School. Of these only one yielded an isolate. This came from the Columbus School and was identified as Type A_2 influenza.

Results:

Table 8 summarizes the composition of the study group with regard to illness and immunization status.

Table 8. Incidence of Influenza-like Disease According to Immunization Status, In Serologic Study Group, Columbus and Orient State Schools, Ohio - 1963

	Ill	Not Ill	Total
Immunized	34	56	90
Not Immunized	45	45	90
Total	79	101	180

Table 9 converts to attack rates the figures given in Table 8.

Table 9

Immunized			Unimmunized		
Total Subjects	Number Ill	Attack Rate (%)	Total Subjects	Number Ill	Attack Rate (%)
90	34	37.8%	90	45	50%

Analysis of these rates yields an effectiveness ratio of 24.5%.

Since these figures can be applied only to the study group, which is a selected population, the authors elected to obtain attack rates in a more representative group. They therefore obtained in each school, illness data and vaccination status on a random sample of children residing in the two cottages under study. This sample in each case, comprised about one-third of the total population of the two cottages. These results are given in Table 10.

Table 10. Attack Rates in Randomly Selected Population

Immunized			Unimmunized		
Total Subjects	Number Ill	Attack Rate (%)	Total Subjects	Number Ill	Attack Rate (%)
70	31	44.2%	133	73	54.8%

Analysis of these figures yields an effectiveness ratio of 17.5%, which does not differ markedly from that obtained in the selected study group.

The immunized and unimmunized groups were each analyzed with regard to distribution of pre-epidemic antibody titers and the relationship of these titers to disease incidence. The results of this analysis, for the unimmunized group, are given in Table 11.

Table 11. Influenza-like Disease in 90 Children Not Previously Immunized Related to Pre-Epidemic Influenza A_2 H.I. Antibody Titers. Orient and Columbus State Schools, Ohio. February-March 1963.

Pre-Epidemic* Titer	Number With Titer	Number Ill	Number with Laboratory Confirmed Illness**
<8	12	12	12
8	2	2	1
16	18	13	13
32	30	12	10
64	14	5	4
128	5	1	1
256	8	0	0
512	1	0	0
Total	90	45	41

* Recriprocal of Influenza A_2 Hemagglutination-Inhibition Antibody Titer; determined 1-2 months prior to the epidemic.

** Fourfold or greater rise in Influenza A_2 H.I. Titer in convalescent serum.

It is notable that in this population a very high incidence of clinical illness occurred in individuals with low pre-epidemic titers (less than 1:8-1:16); a moderate incidence persisted in those with titers of 1:32-1:64, whereas disease incidence fell off markedly when pre-epidemic titers 1:128 or higher were reached.

Comparable data for the previously immunized group are given in Table 12.

Table 12. Influenza-like Disease in 90 Previously Immunized Children Related to Pre-Epidemic Influenza A_2 H.I. Antibody Titers. Orient and Columbus State Schools, Ohio February-March 1963

Pre-epidemic Titer*	Number of Children With Titer	Number of These Who Became Ill	Number with Laboratory-Confirmed Illness**
< 8	-	-	-
8	2	1	1
16	1	0	0
32	4	2	2
64	18	11	8
128	33	10	5
256	19	6	0
512	13	4	1
Total	90	34	17

* Reciprocal of Influenza A_2 H.I. Antibody Titer; determined 1-2 months prior to the outbreak.

** Fourfold or greater rise in convalescent serum.

In this group, the distribution of pre-epidemic titers is much more heavily weighted in the direction of high titers--all but 7 of the entire group having levels of 1:64 or higher. However, in marked contrast to what was observed in the unimmunized group, the incidence of clinical disease does not fall abruptly to near zero when titers of 1:128 or higher are reached, but rather remains relatively constant--independent of pre-epidemic titer. It is also notable that when titers of 1:128 or higher are reached, although the incidence of clinical disease continues at a moderate rate, the occurrence of significant titer rises diminishes rather markedly.

The data in Tables 11 and 12 are combined to form Table 13. The distribution of pre-epidemic titers is now expressed differently, however. Incidence data are given for immunized and unimmunized groups, with these groups divided into cumulative segments, according to pre-epidemic antibody titer. Each horizontal line on the table gives incidence data for those subjects having pre-epidemic titers greater than or equal to, a stated value.

Table 13. Incidence of Influenza-like Disease According to Immunization Status and Pre-epidemic Influenza A_2 H.I. Antibody Titer

Immunized				Unimmunized			
Pre-epidemic Titers (Cumulative)	Total Subjects	Number Ill	Attack Rate (%)	Pre-epidemic Titers (Cumulative)	Total Subjects	Number Ill	Attack Rate (%)
$\geq$ 512	13	4	30.8	$\geq$ 512	1	0	0
$\geq$ 256	32	10	31.3	$\geq$ 256	9	0	0
$\geq$ 128	65	20	30.8	$\geq$ 128	14	1	7.1
$\geq$ 64	83	31	37.4	$\geq$ 64	28	6	21.4
$\geq$ 32	87	33	37.9	$\geq$ 32	58	18	31.1
$\geq$ 16	88	33	37.5	$\geq$ 16	76	31	40.8
$\geq$ 8	90	34	37.8	$\geq$ 8	78	33	42.3
All Titers	90	34	37.8	All Titers	90	45	50.0

It is evident from these figures that in the immunized group, attack rate of clinical disease does not change appreciably, whether one considers the entire population or only that small segment of it having pre-epidemic titers greater than or equal to 1:256 - or any other segment of intermediate size. In marked contrast, in the unimmunized group, there is a steady increase in attack rate, beginning with zero rates in the segment with pre-epidemic titers of $\geq$1:256, and rising steadily in successive segments, as more and more subjects with lower and lower pre-epidemic titers, are introduced.

The same material is presented graphically in Figure 10. The marked disparity in relationship between pre-epidemic titer and disease incidence - in immunized vs. unimmunized groups - is again seen.

A serologic survey was performed on a limited number of study subjects in an effort to assess the possible role of other respiratory viruses in causing clinical disease during this outbreak. The results of this survey are summarized in Table 14.

Table 14. C.F. Antibody Response to Selected Respiratory Virus Antigens in 45 Children with Influenza-like Disease. Orient State School, Orient, Ohio February-March 1963

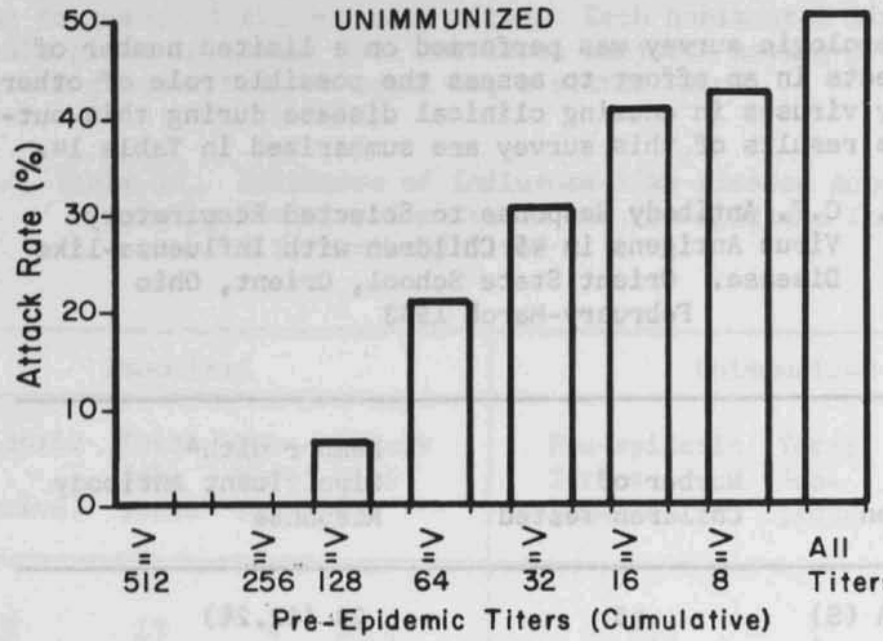
C.F. Antigen	Number of Children Tested	Number with* Significant Antibody Response
Influenza A (S)	45	28 (62.2%)
Influenza B (S)	45	0
Parainfluenza 1	45	0
Parainfluenza 2	45	0
Parainfluenza 3	45	1
Adenovirus	9	0
RSV	9	0

* Fourfold or greater rise in antibodies in convalescent serum.

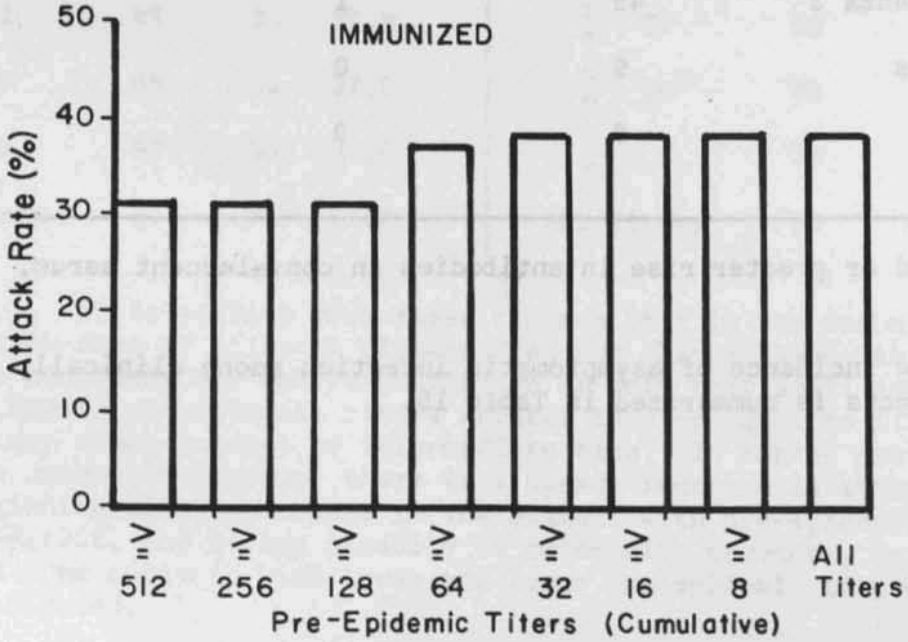
The incidence of asymptomatic infection among clinically well subjects is summarized in Table 15.

Figure 10.

Incidence of Influenza-like Disease According to Immunization Status and Pre-Epidemic Influenza A_2 HI Antibody Titer.



	≥ 512	≥ 256	≥ 128	≥ 64	≥ 32	≥ 16	≥ 8	All Titers
Total Subjects	1	9	14	28	58	76	78	90



	≥ 512	≥ 256	≥ 128	≥ 64	≥ 32	≥ 16	≥ 8	All Titers
Total Subjects	13	32	65	83	87	88	90	90

Table 15. Influenza A_2 H.I. Antibody Responses in 101 Children Who Did Not Become Ill During an Outbreak of Influenza-like Disease. Orient and Columbus State Schools, Ohio February-March 1963

Pre-Epidemic* Titer	Number of Children	Number with Significant Rise in Antibody Titer**
< 8	0	0
8	1	1
16	6	6
32	20	15
64	16	5
128	27	5
256	21	1
512	10	0
Total	101	33

* Reciprocal of Influenza A_2 H.I. Titer.

** Fourfold or greater rise in Influenza A_2 H.I. Titer in Post-epidemic Serum.

The overall attack rate of asymptomatic infection among well subjects is approximately 33%, compared to a serologic confirmation rate of 73.5% among clinically sick subjects. The "case-to-carrier" ratio in this population is 79/33 or 2.4 to 1. It is again notable that among subjects with pre-epidemic titers of 1:128 or higher, there is a marked fall in the incidence of significant titer rises.

Discussion:

The clearcut inverse relationship between level of pre-epidemic titer and incidence of clinical disease among previously unimmunized subjects strongly suggests that the clinical diagnosis of influenza - in the unimmunized group at least - was accurate in most cases in which it was made. The serologic confirmation of influenza infection in 41 of the 45 subjects in this group who were clinically ill provides further evidence that the clinical diagnosis was indeed reliable. In the previously immunized group, however, attack rate of clinical disease bore no relation to pre-epidemic antibody titer, and serologic confirmation of influenza infection was achieved in only 17 of the 34 subjects who became ill. It would seem rather unlikely that an unknown second infectious agent was circulating in the community at the same time as the influenza virus, causing a syndrome clinically indistinguishable from it, and affecting only those individuals who had previously been vaccinated against influenza. Even if such an agent did exist, and one were to postulate that vaccinated individuals were uniquely susceptible to it simply because they were immune to the other major respiratory virus circulating at the time, namely, influenza, one would still expect this second agent to have caused disease among unimmunized individuals with high pre-epidemic titers, who had naturally acquired protection against Asian influenza, but this apparently did not occur. It would appear more reasonable to propose that the great bulk of "influenza-like illness" occurring during the outbreak was, in fact, caused by the Asian influenza virus. The fact that this diagnosis could be confirmed serologically in only 17 of 34 sick subjects in the immunized group, compared to a "confirmation rate" of 41/45 in the unimmunized is explained by the marked preponderance of individuals with high pre-epidemic titers in the former group (all but 7 were $\geq$ 1:64). As has been observed by Jensen[1], and others, influenza H.I. antibody titers may reach a ceiling or normal maximum, subsequent to which they show no additional response to antigenic stimulation, whether it be by naturally occurring antigen or by vaccination.

Having rejected the hypothesis which involves a "second infectious agent", one can only state that the presence of vaccine-induced antibody in high titer was not associated with significant protection against natural challenge by the influenza virus, whereas comparable titers of naturally acquired antibody were associated with protection.

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[1] Jensen, K. E., et al., Immunization with Polyvalent Influenza Vaccines, JAMA 172: 1230-1237 (March 19) 1960.

Whether this disparity reflects some intrinsic defect in the vaccine, or whether subjects with naturally acquired immunity had had experience with some more current antigen since 1957, which was not included in the commercial vaccine (and which bore a closer resemblance to the current epidemic strain than did A_2 Japan 305/57) is not known. Further studies now in progress, employing neutralization antibody techniques, and comparing the reactions of selected paired sera to a variety of A_2 antigens, including the one isolated from the current epidemic, should clarify this question.

Summary and Conclusions:

Studies of vaccine efficacy were performed using commercial polyvalent influenza vaccine, in the usually prescribed dosage and schedule of administration in a population of institutionalized, mentally retarded children in Ohio. Cases were identified clinically by the presence of acute respiratory disease with oral temperature ≥ 100. Laboratory confirmation of influenza virus infection was achieved through analysis of pre- and post-epidemic antibody titers which were obtained on all subjects - including the 90 immunized and 90 unimmunized controls.

The following conclusions were drawn from the data obtained:

1. In the study population under consideration, and with reference to the epidemic strain of Asian influenza virus circulating in this population during February and March 1963, prior administration of commercial polyvalent influenza vaccine according to the usually prescribed regimen, did not provide significant protection to vaccinees as compared to unvaccinated control subjects.

2. Administration of vaccine produced H.I. antibody titers of 1:64 or greater (to the A_2 Japan 305/57 antigen) in over 90% of vaccinees. The level of vaccine-induced antibody could not be related to the attack rate of clinical disease however; whereas for unimmunized subjects, an inverse relationship between attack rate of disease and pre-epidemic titer of naturally acquired antibody could be demonstrated.

V. LABORATORY REPORT:

Roslyn Q. Robinson, Ph.D.
Chief, Respirovirus Unit and
International Influenza Center
for the Americas
Virology Section, Laboratory
Branch
Communicable Disease Center

Influenza viruses belonging to the A_2 sub-group were isolated from most areas of the United States during epidemics which started in January 1963. While detailed antigenic analyses have not been made on all viruses isolated, there is evidence of an antigenic change away from the A_2/Japan/305/57 prototype strain, although all viruses isolated are distinct members of the A_2 sub-group. While results of hemagglutination inhibition (HI) tests using specific antisera do not show this shift to be a dramatic one, results of tests using paired sera from current cases are more striking.

Table 16 presents results of HI tests using specific chicken antisera and certain selected current isolates as well as earlier prototype strains. It is clear that all A_2 viruses isolated since 1957 are interrelated and bear no relationship to Swine, A or A_1 strains. If one considers only those A_2 viruses where homologous antisera are available, it may be seen that the A_2/Japan/305/57 virus reacts to a titer 2 to 8-fold less than the homologous titer of sera prepared with more recent strains. However, when the reactivity of the more recently isolated viruses is compared to the homologous titer of the A_2/Japan/305/57 antiserum, the antigenic shift is less evident. It would appear that the antigenic disparity among A_2 viruses isolated to the present time consists of a more or less unidirectional change in that current viruses react with antibody stimulated by A_2/Japan/305/57, while the A_2/Japan/305/57 fails to detect the homologous titers stimulated by more recent viruses. Thus far there is no evidence to indicate that these differences are due to differences in antibody avidity. However, it must be pointed out that if a comparison is made between those viruses where homologous antisera are not available, and those with homologous antisera, antigenic variation is suggested among recently isolated strains. Further work is necessary before the significance of these observations may be understood.

Additional evidence of an antigenic change may be seen from the data presented in Table 17 where 21 cases of A_2 influenza were diagnosed by complement fixation test following negative HI tests with the A_2/Japan/305/57 antigen. It may be seen that a significant

increase in antibody titer was demonstrable by HI test only when a currently prevalent virus was used as antigen. It would also appear that the A_2/North Carolina/1/63 and the A_2/Japan/170/62 viruses are antigenically different as well, and the A_2/North Carolina/1/63 virus may be more representative of viruses prevalent during the past season. While results of this work are more striking than those obtained with specific chicken antisera, the same provisional conclusions might be drawn.

Table 16

Cross Reactions in HI Tests Using Type A Influenza Viruses

	Antigen											
Chicken Antiserum	Arizona/1/63	Arizona/6/63	Canada/2/62	N.Caro/1/63	Georgia/1/63	Japan/170/62	Yokosuka/5/62	Japan/305/57	Denver/1/57	FM1/47	PR8/34	Swine/1976/31
A_2/Ga/1/63	320	80	80	640	640	320	160	80	0	0	0	0
A2/Jap/170/62	80	80	160	160	160	160	80	80	0	0	0	0
A_2/Yok/5/62	20	160	160	320	160	320	320	160	0	0	0	0
A2/Jap/305/57	80	80	160	160	160	160	160	320	0	0	0	0
A_1/Den/1/57			0		0	0			160			
A_1/FM1/47			0		0	0				320		
A/PR8/34			0		0	0					320	
A/Swine/1976/31			0		0	0						80

Table 17

Response of A_2/Japan/305/57 HI-negative Serum Pairs in CF Tests and in HI Tests with Current Strains

State	Case	CF Test	HI Test	
			A_2/N.Carolina/1/63	A_2/Japan/170/62
Mississippi	204	8-128	0-0	0-0
	210	8-128	0-10	0-0
	213	0-16	0-0	0-0
	250	0-356	0-160	0-20
	259	0-32	0-20	0-0
	276	0-32	0-40	0-0
	277	0-32	0-20	0-20
	281	16-32	0-40	0-0
	284	0-64	0-10	0-0
Georgia	RS	0-128	0-160	0-0
	JTD	0-256	0-80	0-0
	JD	0-256	0-40	0-0
	JWB	8-256	0-20	0-10
	MHD	0-256	0-20	0-10
	PAYO	0-64	0-160	0-20
	BJH	0-64	0-40	0-20
	SRL	0-8	0-20	0-10
Arizona	FC	0-128	0-20	0-40
	NF	0-8	0-0	0-0
	CG	8-128	0-20	0-1
	RR	16-32	0-40	0-0

VI. PNEUMONIA INFLUENZA MORTALITY:

The 1963 Influenza A_2 epidemic resulted in an excess pneumonia-influenza death rate of 5.9 per 100,000 population for the entire United States during the three month period January - March. This rate was somewhat lower than the excess rate of 6.7 per 100,000 during the 1960 A_2 epidemic. For deaths from all causes the 1963 excess rate of 25.5 per 100,000 was considerably above the comparable rate of 15.0 in 1960.

The total number of excess deaths from pneumonia-influenza is estimated at 11,125 in comparison with 12,000 deaths during the 1960 epidemic. For all causes of death the excess number during the 1963 epidemic is estimated to be 53,000, a considerably larger number than the 27,000 excess deaths from all causes estimated to have occurred during the epidemic of 1960. However, as illustrated in Figure 11 there was a noticeable excess in deaths from all causes during December and January when excess pneumonia-influenza mortality was at low levels. Using the February ratio of excess deaths from all causes to pneumonia-influenza deaths as a basis for adjustment, the excess deaths from all causes during January would be reduced by 5,000 leaving a total of 48,000 excess deaths from all causes as the total associated with the influenza epidemic. The above estimates are all based on the 10% U. S. Mortality Sample.

In Figure 12 excess deaths reported by the 108 Cities are presented for 1960 and 1963. The period of highest excess mortality was noticeably later in 1963 than in 1960. Cumulative excess mortality, shown in the lower part of the figure, was similar to that for the entire United States, with excess pneumonia-influenza mortality lower, but excess mortality from all causes higher in 1963 than in 1960.

Excess deaths by cause and age group are presented in Table 18. In 1960, when compared to 1963, a larger percentage of the excess mortality (30.6 vs. 20.2) was ascribed to pneumonia-influenza. By age a somewhat larger percentage of excess deaths occurred in older persons in 1963 than in 1960. The number of excess deaths among persons under 65 years of age was significant in both years, 6796 in 1963 and 6003 in 1960. Nationally this would amount to approximately 18,000 deaths under age 65 in 1960 and 20,000 in 1963.

Figure 11.

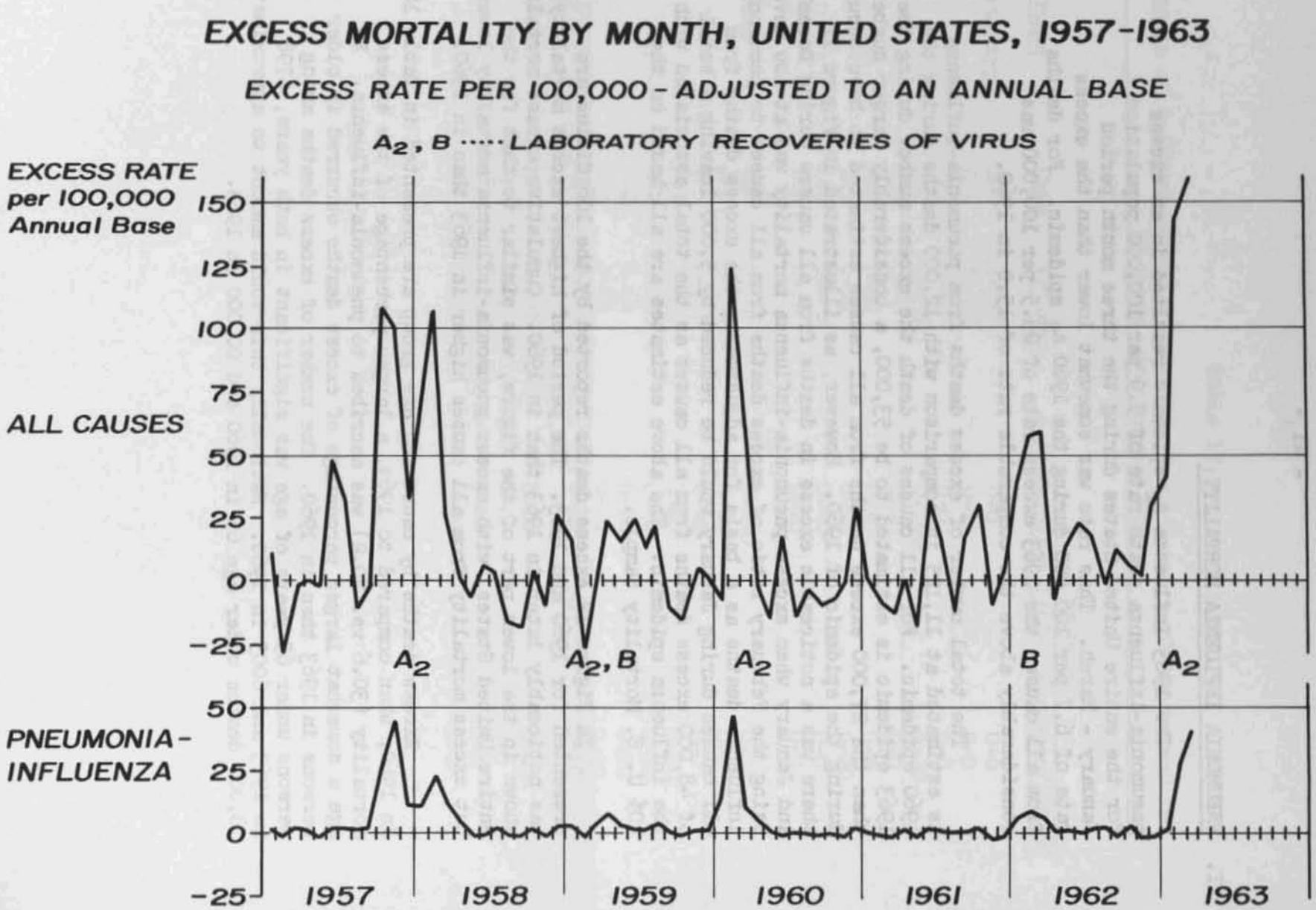
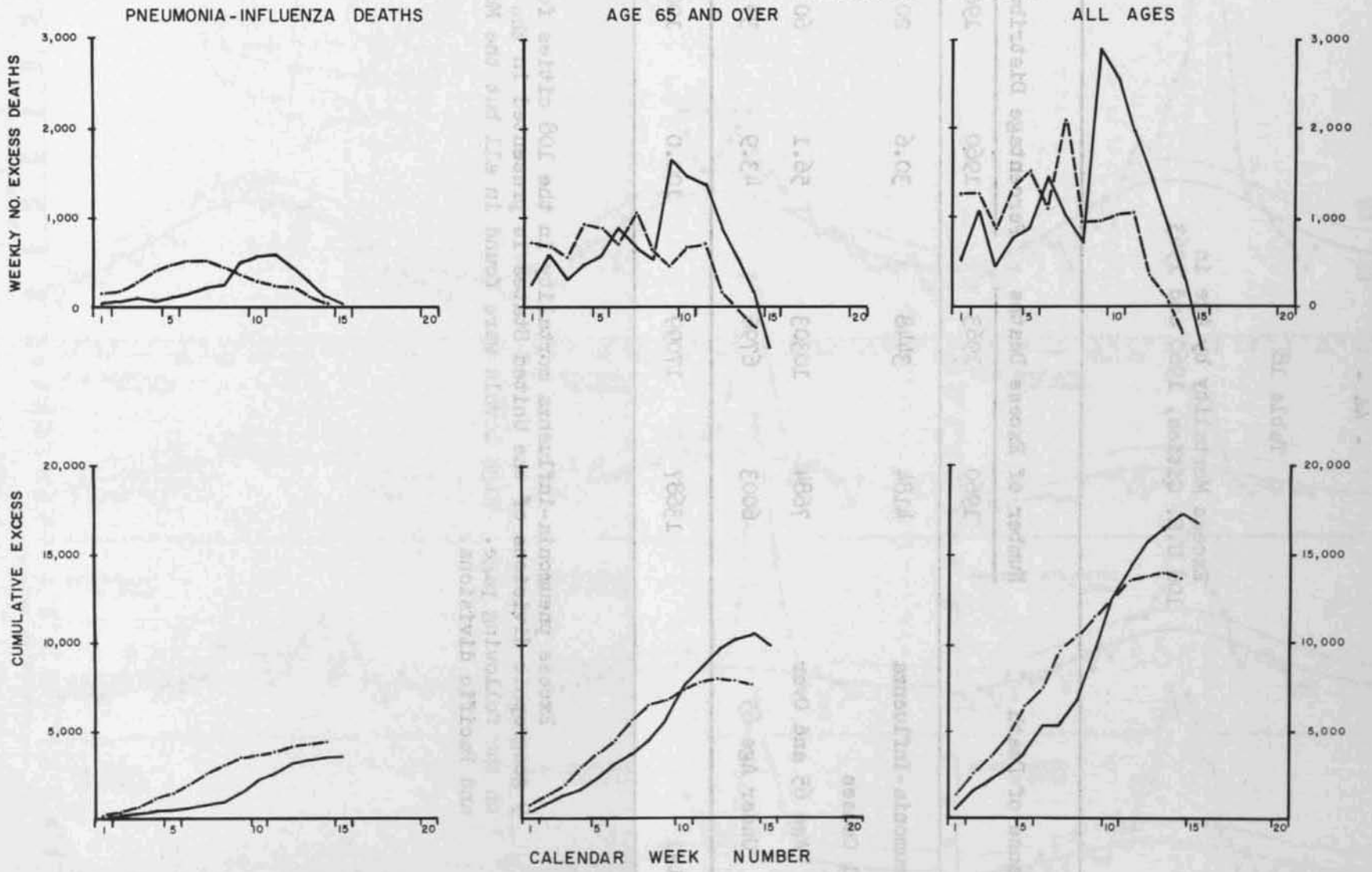

EXCESS MORTALITY BY MONTH, UNITED STATES, 1957-1963
EXCESS RATE PER 100,000 - ADJUSTED TO AN ANNUAL BASE
A2, B ····· LABORATORY RECOVERIES OF VIRUS
EXCESS RATE per 100,000 Annual Base
ALL CAUSES
PNEUMONIA-INFLUENZA
150
125
100
75
50
25
0
-25
50
25
0
-25
A2
A2, B
A2
B
A2
1957
1958
1959
1960
1961
1962
1963

Figure 12: EXCESS MORTALITY IN 108 U. S. CITIES

—1963 ----- 1960

ALL CAUSES OF DEATH



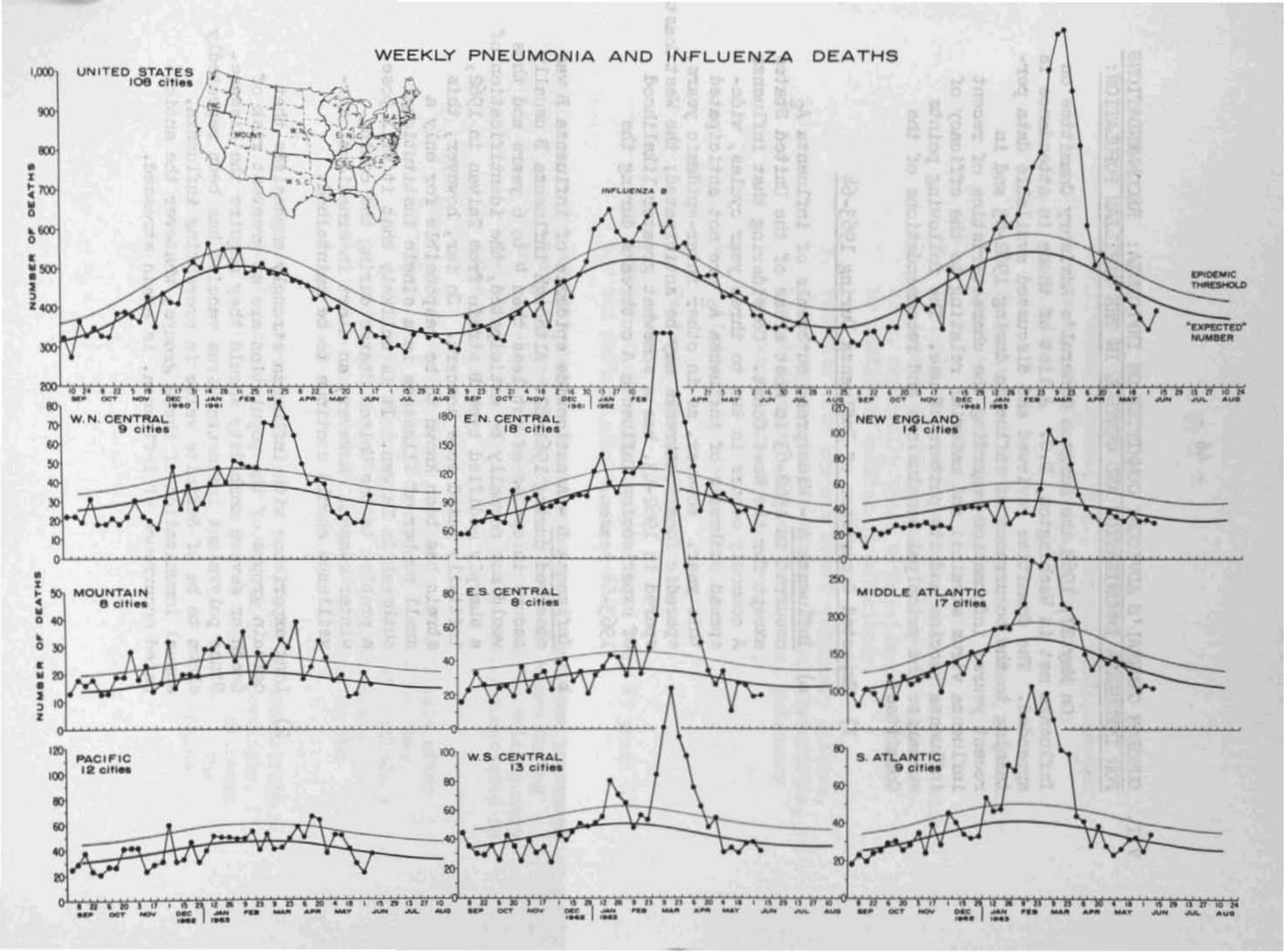
STATISTICS SECTION - EPIDEMIOLOGY BRANCH - CDC - PHS - DHEW

Table 18

Excess Mortality by Age in
108 U.S. Cities, 1960 and 1963

Cause of Death	Number of Excess Deaths		Percentage Distribution	
	1960	1963	1960	1963
Pneumonia-Influenza	4184	3448	30.6	20.2
All Causes				
Age 65 and Over	7684	10303	56.1	60.3
Under Age 65	6003	6796	43.9	39.7
Total	13687	17099	100.0	100.0

Excess pneumonia-influenza mortality in the 108 cities for 9 geographic divisions of the United States is presented in the Figure on the following page. High levels were found in all but the Mountain and Pacific divisions.


WEEKLY PNEUMONIA AND INFLUENZA DEATHS
UNITED STATES
108 cities
NUMBER OF DEATHS
INFLUENZA B
EPIDEMIC THRESHOLD
"EXPECTED" NUMBER
W.N. CENTRAL
9 cities
E.N. CENTRAL
18 cities
NEW ENGLAND
14 cities
MOUNTAIN
8 cities
E.S. CENTRAL
8 cities
MIDDLE ATLANTIC
17 cities
PACIFIC
12 cities
W.S. CENTRAL
13 cities
S. ATLANTIC
9 cities

VII. SURGEON GENERAL'S ADVISORY COMMITTEE ON INFLUENZA: RECOMMENDATIONS FOR INFLUENZA IMMUNIZATION AND CONTROL IN THE CIVILIAN POPULATION:

On May 27, 1963 the Surgeon General's Advisory Committee on Influenza met in Washington, D.C. A list of those in attendance is appended. The Committee reviewed and discussed available data pertaining to the occurrence of influenza during 1962-63 and in recent years; information regarding the characteristics of recent influenza virus strains; and material relating to the efficacy of influenza vaccine and its pattern of use. The following points summarize the principal conclusions and recommendations of the Committee:

1) Expected Occurrence of Influenza During 1963-64

   a) Influenza A - Widespread outbreaks of influenza A_2 occurred in 1962-63 in most areas of the United States except for the West Coast. Considering that influenza A commonly occurs in two to three year cycles, widespread outbreaks of influenza A_2 are not anticipated this year. However, as in other inter-epidemic years, sporadic focal outbreaks may be anticipated; the West Coast spared in 1962-63, has a somewhat greater likelihood of experiencing influenza A outbreaks during the 1963-64 season.

   b) Influenza B - A nationwide epidemic of influenza B was observed during 1961-62. Although influenza B usually occurs in cycles of not less than 4 to 6 years and thus would not normally be anticipated, the identification of a sharply modified type B strain from Taiwan in 1962, initially posed some concern. So far, however, this strain has been known to be responsible for only a small number of illnesses in a single institutional outbreak in Taiwan. It is unlikely that it will pose a problem to the United States during the coming winter season. However, an alert international surveillance should continue to be maintained.

2) Long experience with influenza strongly emphasizes that certain groups of the population are at greatest risk of death or severe morbidity should they acquire the disease. Since polyvalent influenza virus vaccine has been repeatedly shown to be of definite value in preventing influenza, annual immunization of these groups, whatever the anticipated occurrence of influenza, is again stressed.

a) Persons at all ages who suffer from chronic debilitating disease, e.g., chronic cardiovascular, pulmonary, renal or metabolic disorders; in particular:

1. Patients with rheumatic heart disease, especially those with mitral stenosis.

2. Patients with other cardiovascular disorders such as arteriosclerotic heart disease and hypertension, especially those with evidence of frank or incipient cardiac insufficiency.

3. Patients with chronic bronchopulmonary disease, for example, chronic asthma, chronic bronchitis, bronchiectasis, pulmonary fibrosis, pulmonary emphysema, pulmonary tuberculosis.

4. Patients with diabetes mellitus.

5. Patients with Addison's disease.

b) Persons in older age groups, those over 45 years of age and particularly those over 65.

c) Pregnant women - It is to be noted that some increased mortality was observed among pregnant women during the 1957-58 influenza A_2 epidemic both in this country and abroad. It has not, however, been demonstrated in subsequent years.

3) Immunization should begin as soon as practicable after September 1 and should be completed by mid-December. Since a two week delay in the development of antibodies may be expected, it is important that immunization be carried out before influenza is apt to occur in the immediate areas.

4) Recent isolates of both the A and B strains demonstrate a continued change in antigenic structure. Accordingly, it is noted that more recent strains of both the influenza A_2 and B strains have been added to the vaccine. The antigenic composition of the vaccine for the 1963-64 season is as follows:

Type	Strain	CCA Units per cc.
A	PR8	100
A_1	Ann Arbor 1/57	100
A_2	Japan 305/57	100
A_2	Japan 170/02	100
B	Great Lakes 1739/54	100
B	Maryland 1/59	100
		600

5) Dose and Schedule of Vaccination by Age

a) Adults and Children over 12

Those not immunized during or since 1957 should receive a 1.0 cc. (600 CCA units) dose subcutaneously as soon as practicable after September 1 and a second 1.0 cc. dose about two months later. The course of immunization should be completed by mid-December. Those given at least one dose of vaccine since 1957 should receive a single booster dose of 1.0 cc. subcutaneously.

b) Children 6 to 12 Years

Those not immunized during or since 1957 should receive a 0.5 cc. (300 CCA units) dose subcutaneously as soon as practicable after September 1 and a second 0.5 cc. dose about two months later. The course of immunization should be completed by mid-December. Those given at least one dose of vaccine since 1957 should receive a single booster dose of 0.5 cc. subcutaneously.

c) Children - Three Months Through 5 Years of Age

Those not previously immunized should receive 0.1 to 0.2 ml. (60 to 120 CCA units) of vaccine subcutaneously on two occasions, separated by one or two weeks. A third inoculation of the same strength should be given about two months later. The schedule of vaccination should be completed by mid-December. Those who have received at least one dose of vaccine previously should receive a single dose of 0.1 to 0.2 ml. subcutaneously. Since 20 percent or more in this age group may experience a febrile reaction to the vaccine, an antipyretic may be indicated.

6) As noted above, previously unimmunized persons ideally should receive a dose of polyvalent vaccine administered subcutaneously followed by a second dose about two months later. Recognizing that this preferred course of immunization cannot or will not always be possible, the Committee wishes to point out that even a single dose of vaccine can afford significant protection; a second dose given as early as two weeks following the first will enhance this protection.

7) It is urged that continued contact with the major professional medical societies and voluntary health agencies should be sought to assist in implementation of the program for routine annual immunization of those at high risk and in the older age groups. The attitude of the professional medical societies is crucial to the general acceptance of an influenza vaccination program.

8) Pharmaceutical companies engaged in the manufacture of the vaccine should be advised at the earliest possible time of the Committee's conclusions and recommendations.

9) A more intensive national and international surveillance program is to be encouraged. The importance of obtaining strains and epidemiological data from epidemics wherever they may occur on a current basis cannot be too strongly emphasized.

10) Continuing field studies to evaluate the efficacy of influenza vaccines in different population groups are an urgent need.

11) A continuing assessment by means of survey techniques of the immunization status, particularly of the high risk groups, is important.

In attendance at the meeting were:

*Dr. Colin MacLeod, Chairman
*Dr. Donald Henderson, Secretary
*Dr. Roderick Murray
*Dr. Morris Schaeffer
*Dr. Fred Davenport
Dr. Gordon Meiklejohn
Col. Edward Buescher
Dr. James Maynard
Dr. Carl Silverman
Dr. Robert Serfling
Dr. Joe Smadel
Dr. Anthony Morris

* Committee members, Dr. Roscoe Kandle and Dr. George Burch were unable to attend.

Key to all disease surveillance activities are those in each State who serve the function as State epidemiologists. Responsible for the collection, interpretation and transmission of data and epidemiological information from their individual States, the State epidemiologists perform a most vital role. Their major contributions to the evaluation of this report are gratefully acknowledged.

STATE	NAME
Alabama	Dr. W. H. Y. Smith
Alaska	Dr. Edwin O. Wicks
Arizona	Dr. Lloyd M. Farner
Arkansas	Dr. Wm. L. Bunch, Jr.
California	Dr. Philip K. Condit
Colorado	Dr. C. S. Mollohan
Connecticut	Dr. James C. Hart
Delaware	Dr. Floyd I. Hudson
D. C.	Dr. William E. Long
Florida	Dr. Clarence M. Sharp
Georgia	Dr. W. J. Murphy
Hawaii	Dr. James R. Enright
Idaho	Dr. John A. Mather
Illinois	Dr. Norman J. Rose
Indiana	Dr. A. L. Marshall, Jr.
Iowa	Dr. Ralph H. Heeren
Kansas	Dr. Don E. Wilcox
Kentucky	Dr. William H. McBeath
Louisiana	Dr. John M. Bruce
Maine	Mrs. Margaret H. Oakes
Maryland	Dr. John H. Janney
Massachusetts	Dr. Nicholas J. Fiumara
Michigan	Dr. George H. Agate
Minnesota	Dr. D. S. Fleming
Mississippi	Dr. Durward L. Blakey
Missouri	Dr. E. A. Belden
Montana	Dr. Mary E. Soules
Nebraska	Dr. E. A. Rogers
Nevada	Dr. B. A. Winne
New Hampshire	Dr. William Prince
New Jersey	Dr. W. J. Dougherty
New York State	Dr. Robert M. Albrecht
New York City	Dr. Harold T. Fuerst
New Mexico	Dr. Gerald Parkes
North Carolina	Dr. Jacob Koomen
North Dakota	Mr. Kenneth Mosser
Ohio	Dr. Winslow J. Bashe, Jr.
Oklahoma	Dr. F. R. Hassler
Oregon	Dr. Grant Skinner
Pennsylvania	Dr. W. D. Schrack, Jr.
Puerto Rico	Dr. Rafael A. Timothee
Rhode Island	Dr. James E. Bowes
South Carolina	Dr. G. E. McDaniel
South Dakota	Dr. G. J. Van Heuvelen
Tennessee	Dr. C. B. Tucker
Texas	Dr. Van C. Tipton
Utah	Dr. A. A. Jenkins
Vermont	Dr. Linus J. Leavens
Virginia	Dr. James B. Kenley
Washington	Dr. E. A. Ager
West Virginia	Dr. L. A. Dickerson
Wisconsin	Dr. Josef Preizler
Wyoming	Dr. Robert Alberts