

POLIOMYELITIS SURVEILLANCE REPORT

NO. 115 THIRD YEAR JUNE 28, 1957

U.S. Department of Health, Education and Welfare
Public Health Service Bureau of State Services
Communicable Disease Center
Poliomyelitis Surveillance Unit
50 Seventh Street, N.E.
Atlanta, Georgia

SPECIAL NOTE

The information in this report represents a factual summary of preliminary data reported to the Poliomyelitis Surveillance Unit from State Health Departments, Epidemic Intelligence Service Officers, participating laboratories and other pertinent sources. It is understood that the contents of these reports will not be released to the press, except by the Office of the Surgeon General, Public Health Service, U. S. Department of Health, Education and Welfare. State Health Officers, of course, are free to release any information they may wish concerning data from their state.

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I. Current Poliomyelitis Morbidity Trends

A total of 134 poliomyelitis cases was reported to the National Office of Vital Statistics for the 25th week of 1957, ending June 22, representing a substantial increase over the 89 cases reported the preceding week. During the corresponding 25th week of last year, 180 cases were reported; in 1947 and 1945, however, only 74 and 116 cases respectively were reported for the 25th week.

Figure 1 presents national poliomyelitis incidence by weeks since April, 1957, with similar weekly figures for April to July of the years 1952 through 1956.

Incidence by states and regions for the past six weeks is presented in Table 1, with six-week totals for the comparable period of the previous four years. Increased incidence over the previous weeks was noted in the South East, South Central, and South West regions. Of particular note in these regions were increases in South Carolina, Tennessee, Mississippi and Arkansas. Further preliminary data telephoned from these states, is summarized below:

SOUTH CAROLINA:

NOVS Reports, Week Ending June 15 - 5 cases
June 22 - 10 "

Dr. G. E. McDaniel, Director, Division of Disease Control, South Carolina State Board of Health, reports that the 10 cases reported last week include 4 paralytic, 5 non-paralytic, and one unspecified. Incidence continued to be geographically widespread with the 10 cases reported from 7 different counties. Of the 10 cases, six were infants ranging from 1 to 2½ years of age, one was a 9 year old, and three were adults. One individual, a 2½ year-old white female with non-paralytic polio, had previously received 3 inoculations of polio vaccine; the other 9 had not been vaccinated. Types I and II poliovirus have been isolated from South Carolina cases reported earlier this year.

TENNESSEE:

NOVS Reports, Week Ending June 15 - 1 case
" " " " June 22 - 9 cases

Dr. C. B. Tucker, State Epidemiologist, Tennessee State Department of Public Health, has reported that 5 of last week's 9 cases were reported from five different counties. However, the remaining 4 cases occurred in Chattanooga. In addition, 3 additional cases have been reported from Chattanooga as of June 26, bringing to 7 the total reported during the past 10 days. Of these 7 Chattanooga cases, 4 were paralytic, non-vaccinated cases, and 3 were non-paralytic, all in vaccinated individuals (one with 2 shots, and two in one family with three shots each). A

cumulative total of 26 cases has been reported in Tennessee through the 25th week of 1957 compared with 20 reported by this time last year. Of this year's total of 26 cases, 12 were paralytic (including 2 vaccinated, 9 non-vaccinated, and 1 unspecified vaccination history) and 14 were non-paralytic.

MISSISSIPPI:

NOVS Reports, Week Ending June 15 - 1 case
" " " " June 22 - 12 cases

Dr. A.L. Gray, State Epidemiologist, Mississippi State Board of Health, has reported that because of several late notifications 12 of 13 cases occurring during June were reported to NOVS during last week. Of the total of 40 cases reported in 1957, the only suggestion of geographic concentration has been in Bolivar County where 8 cases occurred between May 16 and June 17. Included in these eight were 2 paralytic cases, both non-vaccinated and 6 non-paralytic, of which four were triply-vaccinated, one had a single inoculation, and one was unvaccinated. The eight were geographically scattered throughout the county's 70,000 population, and no cases have been reported since June 17.

ARKANSAS:

NOVS Reports, Week Ending June 15 - 0 cases
" " " " June 22 - 6 "

Dr. A.M. Washburn, Director, Division of Communicable Disease Control, Arkansas State Board of Health, has reported that the 6 Arkansas cases occurred in 6 separate counties. Of the 6, 3 were paralytic (including non-vaccinated infants 2 and 15 mos. of age, and a triply-vaccinated 7-year-old whose third shot had been given in March '57), and 3 were non-paralytic (also including one triply-vaccinated 4 year-old). A cumulative total of 23 cases (including 9 paralytic) has been reported in Arkansas this year, compared with 19 at this time in 1956.

II. An Evaluation of Poliomyelitis Vaccine in California in 1956

Preliminary data concerning polio vaccine evaluation in California during 1956 have been reviewed for the period January through May 1956. in PSU Report No. 83, July 13, 1956, for April through August in PSU Report No. 97, October 19, 1956, and for June through August in "Surveillance of Poliomyelitis in the United States in 1956", Public Health Reports, 72, p. 381, May, 1957.

Robert Magoffin, M.D., and Sylvia Hay, Public Health Analyst, of the Bureau of Acute Communicable Diseases, California State Department of Public Health, have prepared a final report, "An Evaluation of Poliomyelitis Vaccine in California, in 1956", which

was distributed as an attachment to California Polio Surveillance Release #18, April 23, 1957.

Relatively complete data have been compiled concerning vaccine usage during the entire period from October 1955 to September 1956, permitting estimation of vaccinated and non-vaccinated population sizes on a month-by-month basis. While these population estimates "are obviously subject to considerable error, the documented vaccinated population base is sufficiently large to buffer the influence of errors in the estimation of commercial vaccine usage . . ." Calculation of monthly paralytic and non-paralytic polio attack rates in the unvaccinated population was thus possible, and on this basis the number of paralytic and non-paralytic cases "expected" each month in the vaccinated population was compared with the number "observed".

These analyses of vaccine effectiveness are based on uncontrolled field observations and do not have the precision and validity of controlled trials. However, this final report, comprising the entire year from October 1955 to September 1956, utilizes the most precise methodology possible under the circumstances and is of considerable interest. PSU is therefore enclosing, as an attachment to this Report, a condensation of this study, including only three of the Tables (PSU Tables A, B, and C). Requests for a copy of the complete original report should be addressed to Dr. Robert Magoffin, Poliomyelitis Control Section, Bureau of Acute Communicable Diseases, State of California Department of Public Health, 2151 Berkeley Way, Berkeley 4, California.

III. British Poliomyelitis Incidence

The British Medical Journal and The Lancet have published data concerning the high polio incidence this year in England and Wales.

For the first quarter of 1957, the total of 516 polio notifications is higher than any first-quarter total recorded during the years 1947 to 1956. However, during these years there has been no correlation of first quarter with final total national incidence. Thus, in 1947, the first quarter total of 125 cases was the lowest during 1947-56, but the 1947 final total of 9,254 was the highest during this period. Similarly the 1950 first quarter total of 417 cases was the second highest during 1947-56, and yet the final 1950 total of 2,176 was the lowest of the 10 year period.

For each of the weeks ending May 4, May 11, and May 18, polio notifications by paralytic status are listed below, together with the cumulative totals for 1957. It may be noted that the cumulative 1957 total through the 19th week was 825; this may be compared with 480 at this time last year. The highest corresponding figure during 1948-56 was 649 (in 1950).

ACUTE POLIOMYELITIS INCIDENCE IN ENGLAND AND WALES

<u>Week Ending</u>	<u>Paralytic</u>	<u>Non-paralytic</u>	<u>Weekly Total</u>	<u>1957 Cumulative Total</u>
May 4 (18th Week)	35	25	60	756
May 11 (19th Week)	39	30	69	825
May 18 (20th Week)	48	18	66	891

IV. Routine Poliomyelitis Surveillance

During the week June 20-26, the Polio Surveillance Unit received reports of six poliomyelitis cases occurring within 30 days of a polio vaccine inoculation in 1957. Of these six cases, three were paralytic and three were non-paralytic. The three paralytic cases are listed in detail in Table 2. Conn-61 is a correlated* case associated with a million cc lot (Lilly 683454) distributed to 37 States and Territories during March. Two additional paralytic cases have been reported in association with this lot, one not-correlated and one with data incomplete.

V. 1957 Polio Surveillance Program - Monthly Listing of Polio Cases

In Table 3 are listed the 40 States and Territories which up to this time have indicated their desire to participate in the 1957 Monthly Listing of Polio Cases. The new forms (PHS 4.117 - Revision of the 1956 Age Distribution Analysis Form) are being sent as promptly as possible upon request by State Polio Reporting Officers. Your continued interest and participation is sincerely appreciated. PSU will continue to report at regular intervals, pertinent nationwide data concerning general epidemiologic trends in poliomyelitis.

VI. Surveillance of Arthropod-Borne Encephalitis

The Surveillance Section of CDC has prepared a report entitled Surveillance of Arthropod-Borne Encephalitis in the United States - 1956 which is currently being distributed. Regular reports on current encephalitis surveillance and investigations programs will again be issued starting in late July. Interested persons who do not routinely receive these reports or who wish to receive the 1956 Summary Report should address an inquiry directly to Dr. Walter Murray, Assistant Chief, Surveillance Section, Communicable Disease Center, 50 Seventh Street, N.E., Atlanta 23, Georgia.

Dr. James Bond, Epidemiologist, Florida State Board of Health, has reported to Dr. Murray the occurrence of 94 horse cases and one confirmed human case of Eastern Equine Encephalomyelitis as of June 1, 1957. The majority of the horse cases occurred in the Central Florida

* Site of first paralysis includes site of last vaccine inoculation.

Lake Counties in May. Eastern Equine Encephalitis virus has been isolated from the brains of two horses by the Florida State Health Department Laboratories.

CDC Virus and Rickettsia Laboratories, Montgomery, Alabama, has received sera from 4 of 5 human cases of encephalitis of undetermined etiology from Mobile County, Alabama, reported to NOVS by the Alabama State Health Department.

(This report was prepared by Dr. Lauri David Thrupp and Miss Helen Forester with assistance from the Statistics Section, CDC)

LDT
(700)

V. 1957 EEE Surveillance Program - Weekly Report of Police Cases

In Table 1 are listed the 10 States and Territories which up to this time have indicated their desire to participate in the 1957 EEE Surveillance Program of Police Cases. The new forms (LH-117 - Revision of the 1956 Age Distribution Analysis Form) are being sent as promptly as possible upon request to State Police Reporting Officers. Your continued interest and participation is sincerely appreciated. We will continue to report on regular intervals, pertinent nationwide data concerning general epidemiologic trends in poliomyelitis.

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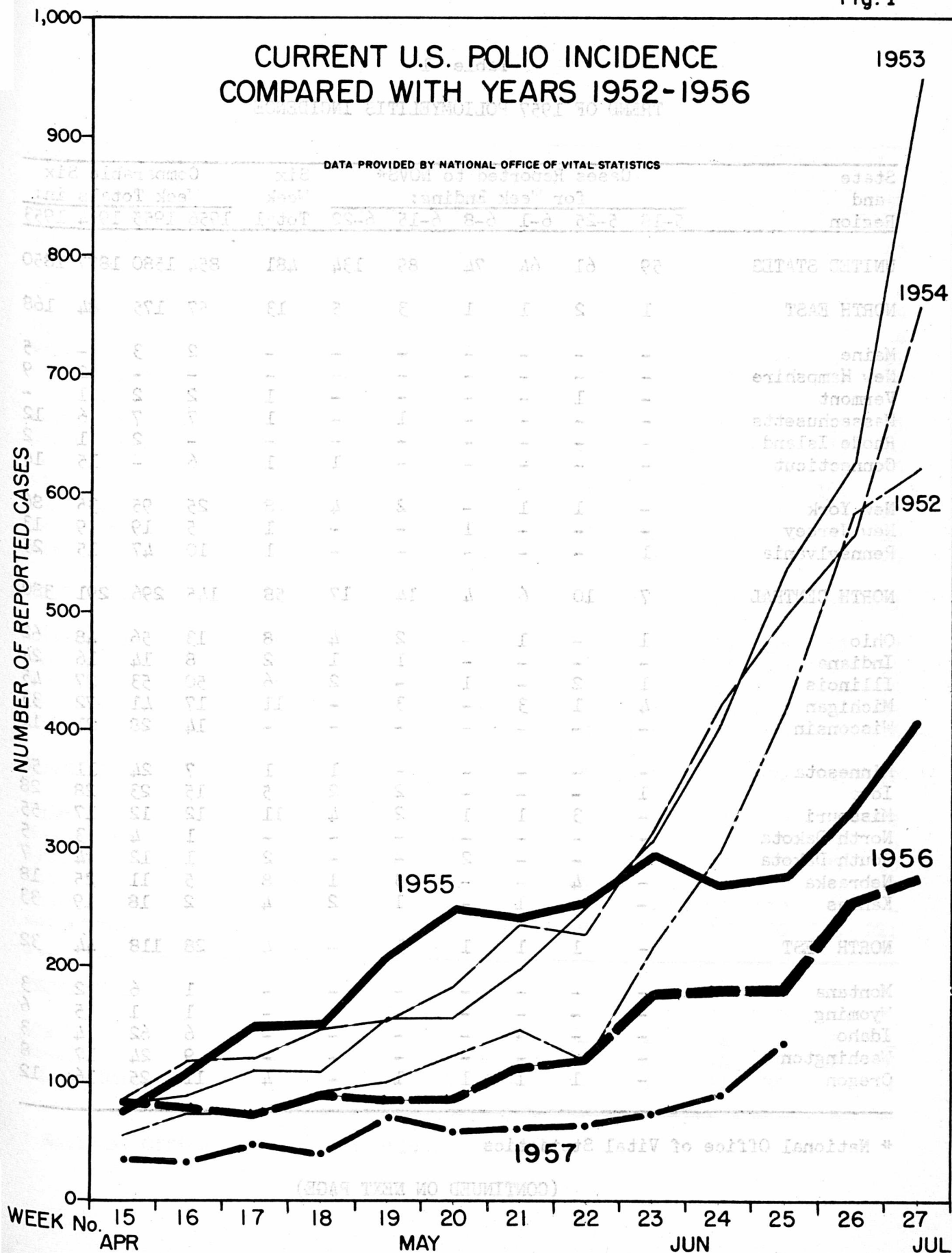
Dr. James Bond, Epidemiologist, Florida State Board of Health, has reported to Dr. Murray the occurrence of 94 horse cases and one continued human case of Eastern Equine Encephalitis as of June 1, 1957. The majority of the horse cases occurred in the Central Florida State of first paralytic inclusion 4th of last vaccine inoculation.

Fig. 1

CURRENT U.S. POLIO INCIDENCE COMPARED WITH YEARS 1952-1956

DATA PROVIDED BY NATIONAL OFFICE OF VITAL STATISTICS

NUMBER OF REPORTED CASES



WEEK No. 15
APR

MAY

JUN

JUL

Table 1

TREND OF 1957 POLIOMYELITIS INCIDENCE

State and Region	Cases Reported to NOVS* for Week Ending:						Six Week Total	Comparable Six Week Totals in:			
	5-18	5-25	6-1	6-8	6-15	6-22		1956	1955	1954	1953
UNITED STATES	59	61	64	74	89	134	481	854	1580	1877	1850
NORTH EAST	1	2	1	1	3	5	13	57	175	84	168
Maine	-	-	-	-	-	-	-	2	3	-	5
New Hampshire	-	-	-	-	-	-	-	-	-	2	9
Vermont	-	1	-	-	-	-	1	2	2	1	-
Massachusetts	-	-	-	-	1	-	1	7	7	6	12
Rhode Island	-	-	-	-	-	-	-	-	2	1	2
Connecticut	-	-	-	-	-	1	1	6	-	15	16
New York	-	1	1	-	2	4	8	25	95	35	86
New Jersey	-	-	-	1	-	-	1	5	19	9	13
Pennsylvania	1	-	-	-	-	-	1	10	47	15	25
NORTH CENTRAL	7	10	6	4	14	17	58	145	296	291	380
Ohio	1	-	1	-	2	4	8	13	56	48	62
Indiana	-	-	-	-	1	1	2	8	14	16	24
Illinois	1	2	-	1	-	2	6	50	53	27	45
Michigan	4	1	3	-	3	-	11	17	41	72	33
Wisconsin	-	-	-	-	-	-	-	14	28	21	14
Minnesota	-	-	-	-	-	1	1	7	24	11	56
Iowa	1	-	-	-	2	2	5	15	23	28	28
Missouri	-	3	1	1	2	4	11	12	12	17	55
North Dakota	-	-	-	-	-	-	-	1	4	3	5
South Dakota	-	-	-	2	-	-	2	1	12	4	7
Nebraska	-	4	-	-	3	1	8	5	11	25	18
Kansas	-	-	1	-	1	2	4	2	18	19	33
NORTH WEST	-	1	1	1	1	-	4	28	118	44	32
Montana	-	-	-	-	-	-	-	1	6	2	3
Wyoming	-	-	-	-	-	-	-	1	1	5	6
Idaho	-	-	-	-	-	-	-	6	62	4	3
Washington	-	-	-	-	-	-	-	9	24	17	8
Oregon	-	1	1	1	1	-	4	11	25	16	12

* National Office of Vital Statistics

(CONTINUED ON NEXT PAGE)

Table 1 (Continued)

State and Region	Cases Reported to NOVS* for Week Ending:						Six Week Total	Comparable Six Week Totals in:			
	5-18	5-25	6-1	6-8	6-15	6-22		1956	1955	1954	1953
SOUTH EAST	5	10	5	16	17	34	87	119	295	416	445
Delaware	-	-	-	-	-	-	-	2	13	1	-
Maryland	-	-	-	-	-	4	4	7	23	4	9
D. C.	-	-	-	-	-	-	-	-	4	2	4
Virginia	-	1	2	1	-	3	7	11	24	18	21
West Virginia	-	-	-	1	1	-	2	5	10	12	22
North Carolina	1	3	-	2	2	4	12	11	16	19	75
South Carolina	-	2	2	3	5	10	22	10	20	35	10
Georgia	1	1	-	-	3	2	7	6	29	70	56
Florida	2	1	-	6	2	1	12	41	80	161	46
Kentucky	-	-	1	-	3	1	5	13	28	18	27
Tennessee	1	-	-	1	1	9	12	8	17	23	49
Alabama	-	2	-	2	-	-	4	5	31	53	126
SOUTH CENTRAL	30	19	42	32	39	55	217	300	424	658	553
Mississippi	1	-	3	3	1	12	20	15	36	68	67
Arkansas	5	-	2	-	-	6	13	3	23	42	34
Louisiana	1	1	4	5	6	4	21	65	63	86	78
Oklahoma	-	-	1	4	2	5	12	20	17	52	58
Texas	23	18	32	20	30	28	151	197	285	410	316
SOUTH WEST	16	19	9	20	15	23	102	205	272	384	272
Colorado	1	2	1	2	-	-	6	4	30	18	18
New Mexico	1	1	-	2	1	4	9	7	6	7	8
Arizona	-	-	2	1	-	-	3	11	12	23	20
Utah	-	4	-	-	1	NR	5	3	5	7	5
Nevada	-	-	-	-	-	-	-	1	19	9	-
California	14	12	6	15	13	19	79	179	200	320	221
TERRITORIES											
Alaska	-	-	-	-	-	-	-	4	2	10	4
Hawaii	-	-	-	-	-	-	-	4	9	46	8
Puerto Rico	-	-	-	1	-	-	1	11	38	-	4

* National Office of Vital Statistics.

Table 2

PARALYTIC POLIOMYELITIS OCCURRING WITHIN 30 DAYS OF LAST VACCINE INOCULATION

Cases Reported to PSU June 19 through June 26, 1957

PSU Case No.	County	Ini- tials	Age	Sex	Date Inoc.	Date 1st Symp.	Date 1st Para.	Site Inoc.	Site 1st Para.	Mfr.	Lot No.	Remarks
Conn-61	New Haven	JLaB	6	F	7-18-56 8-15-56 4-1-57	4-8	4-27	? ? RA	RA	? ? L	? ? 683454	No spinal done.
Conn-62	Hartford	RTW	33	M	3-2-57	3-5	3-18	LA	LA	L	683462	CSF: 2 WBC, 30 mg protein. Stool negative. Antibody titer stable.
Ga-24	Spalding	MH	6	M	5-11-57 6-14-57	6-14	?	? ?	Legs	? ?	? ?	Spinal fluid; 44 cells, 75% L.

Table 3

1957 POLIO SURVEILLANCE PROGRAM

As of June 27, the Following States and Territories
have indicated their desire to participate in the
Monthly Listing of All Polio Cases

Alabama
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Dist. of Columbia
Georgia
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Michigan
Mississippi
Missouri

Montana
Nebraska
New Hampshire
New Mexico
New York State
North Dakota
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Hawaii
New York City

AN EVALUATION OF POLIOMYELITIS VACCINE IN CALIFORNIA IN 1956 *

"This report presents a summary of observations on the safety and effectiveness of poliomyelitis vaccine in California from October 1955 through September 1956. . . .

STUDY METHODS

"'Observed' and 'Expected' cases and rates. The continuous change in the size of the vaccinated and non-vaccinated populations together with the changing seasonal risk of infection in both groups, precluded the direct comparison of attack-rates for any extended time as was done in the Summer of 1955. Hence, this study is constructed on a month by month comparison of the poliomyelitis experience in vaccinated and non-vaccinated populations based upon estimates of the average number of person "at risk" in each group during each month (i.e., person-months at risk). The number of vaccinated cases reported ('observed cases'), may be compared each month with the number which would have been expected ('expected cases'), if the same attack rate had prevailed in the vaccinated as in the non-vaccinated population. Observed and expected cases may be accumulated over a period of months and expressed as observed and expected rates per 100,000 person-months or person-years accumulated for the same period. It should be noted that this procedure adjusts for artificial differences which accrue when accumulative incidence rates are computed for unequal and changing populations during a period of changing risk. Hence, although identical during any one month, the expected rate for the vaccinated population may differ somewhat from the non-vaccinated rate when several months are accumulated.

"Population Estimates. Since the preponderance of vaccinations in California during this study period were in children under 15 years of age, observations were centered in this age group. Inoculations in the public programs reported by local health departments provided a primary base for vaccinated population estimates. Estimates of commercial vaccine usage were derived from the reports of inoculations by private physicians together with the invoices of all commercial vaccine sales in California. From these two records, the distribution of commercial vaccine into first, second and third injections could be made and the completeness of reporting determined. Accumulative reports of commercial vaccine usage in most months accounted for 40-45 percent or less of the accumulated vaccine sales through the preceding month. To be conservative, the reported inoculations were assumed to represent 50 percent of actual commercial usage. During the last three months of the study period, following the discontinuance of physicians reports, commercial usage was based upon vaccine sales records and a projection of the usage trends established in preceding months.

* Abstracted from:

California State Department of Public Health
Attachment to Poliomyelitis Surveillance Release #18, April 23, 1957
Prepared by Robert Magoffin, M.D. and Sylvia Hay, Public Health
Analyst, Bureau of Acute Communicable Diseases.

"The non-vaccinated population was derived by subtracting the number vaccinated from the total population aged 0-14 in California as determined by the State Department of Finance. . . .

"The validity of the vaccinated population estimates used in this study was checked by a survey of approximately 3,500 households representative of the entire state conducted in May and June of 1956. This survey indicated that as of Mid-June 42% of children under age 15 had received one or more inoculations of Salk vaccine. At the end of June the estimate based on vaccine usage was 43%.

"In the tables relating to vaccine effectiveness, cases with onset 15 days or less after the first inoculation have been omitted. Since the incubation period for poliomyelitis may range from 7-21 days, and is commonly 10-14 days, it is apparent that cases with onset within 15 days after inoculation were infected before there was opportunity for antibody response and should not be counted against the effectiveness of the vaccine. To adjust for the omission of these cases, the first 15 days following vaccination are excluded from the calculation of person-months at risk in the vaccinated population. Thus, the experience of vaccinated persons during the first 15 days following the first inoculation does not count either for or against the vaccine effectiveness. . . . For the sake of simplicity, in estimating the effectiveness of second and third inoculations no adjustment has been made for cases occurring within the first few days after these inoculations.

SUMMARY OF OBSERVATIONS

"Non-vaccinated cases and rates. Reported cases of poliomyelitis and monthly attack-rates for non-vaccinated children under age 15 are shown in the first part of Table A. The rates for non-vaccinated children "provide the basis for computing the expected occurrence of polio among vaccinated children of similar age and during the same month", shown in the second part of Table A. "Among non-vaccinated children, a total of 1146 cases, 821 (72%) paralytic, was reported during the 12-month period. Monthly paralytic attack-rates ranged from 1.0 to 5.1 cases per 100,000 person-months. For the entire period, the total attack-rate was 43 cases per 100,000 person-years and the paralytic attack rate was 31 cases per 100,000 person-years."

Vaccine Associated Cases . . . In Table B are shown the 24 paralytic and 10 non-paralytic cases of poliomyelitis which occurred within 15 days following a first inoculation of vaccine. "Assessment of vaccine safety, however, must take into account the normal coincidental occurrence of polio during this interval. During the year covered by this study, approximately 1,775,000 children received their first inoculation and thus were subject to the chance of coincidentally contracting poliomyelitis within 15 days. . . ." Of the 34 cases which

occurred within 15 days of first inoculations, the number observed each month "conformed almost exactly to the number expected based on the current attack-rate in non-vaccinated children", as shown in Table B. "From these data then, there is no evidence that vaccination resulted in either an increase or decrease in the number of cases within 15 days after first inoculation. As discussed above, these cases and the person-months at risk under 15 days are excluded from tables relating to vaccine effectiveness."

Possible Provocation of Paralysis . . . In vaccinated cases, the site of occurrence of first paralysis was analyzed "in relation to the site of the most recent inoculation prior to onset. Of the total of 242 vaccinated cases observed during the year. . . 44 were paralytic cases occurring within 30 days of last inoculation. . . Among these 44 cases, there were only 5 instances of 'correlated paralysis' . . . compared with a single case occurring during this interval" in which paralysis involved instead the opposite uninoculated extremity. "Among 76 paralytic cases with onset more than 30 days after last inoculation, 12 had paralysis in the inoculated and 7 in the opposite extremity" It is doubtful whether this small number of 'correlated cases', widely scattered in time interval from the last inoculation, should be construed as evidence that any localizing effect on paralysis may have occurred in some of these cases. Whatever, the proper interpretation in these few cases, the outstanding fact from these data is that there was an excess of less than 10 cases occurring in relation to 3,500,000 inoculations in nearly 2,000,000 children, on which to postulate a localizing effect of the vaccine on paralysis."

"Vaccine effectiveness estimates. Estimates of the effectiveness of one, two and three inoculations in reducing the incidence of poliomyelitis among vaccinated children are summarized for the entire 12-month study period in Table C. In view of the various sources of possible error inherent in this type of uncontrolled field evaluation, these percentage estimates should not be interpreted as exact measures of the vaccine effectiveness. The extent of variation which might possibly occur due to chance factors alone is indicated by the calculated 'lower limits' of effectiveness as noted in Table C. Further indications of the range of variations inherent in the procedure" may be seen in Tables not reproduced in this PSU Report "detailing the observed and expected cases and the accumulative effectiveness estimates for each month of the study period. During the early months with small numbers of accumulated cases and greater changes in the populations, the percentage estimates have little meaning. With continued observation a more consistent pattern of effectiveness emerges".....

"With these qualifications in mind, the following are suggested as a reasonable summation of vaccination effectiveness in reducing paralytic incidence observed among vaccinated children in California in 1956:

Single inoculations	65%
Two inoculations	80%
Three inoculations	90%

"There is no significant differences between these estimates and those made in 1955. Based on much smaller numbers, the data last year indicated a 60 percent reduction with one inoculation and 85 percent with two inoculations. If any reduction in vaccine effectiveness resulted from changes in safety testing and manufacturing procedures, it was not of sufficient magnitude to be measurable by this type of epidemiologic field evaluation.

"Effectiveness in Non-Paralytic Polio. The observations of vaccine effectiveness in reducing non-paralytic incidence are more variable and difficult to interpret". . . However, as the population with two inoculations enlarged and the number of vaccinated cases increased, "a small but fairly consistent decrease in reported non-paralytic incidence was observed. . . ."

. . . . "At least two factors may be suggested to account for this apparent lack of consistent effectiveness in reducing non-paralytic polio:

- (1) The inclusion of cases clinically diagnosed as non-paralytic polio which are in fact due to other agents.
- (2) The shift of some cases from a paralytic to a non-paralytic classification due to a modifying effect of vaccination on paralysis.

. . . . "It will be of interest to observe whether or not a more consistent reduction in non-paralytic incidence occurs as more persons complete the recommended series of three inoculations.

"Changes in Age Distribution. Indirect evidence of vaccine effectiveness are indicated by changes in the usual age distribution of paralytic polio in California". . . In comparing 1955 and 1956 age-specific rates with 5 year mean rates for 1948-1952, "fluctuations in the relative rates from year to year at all ages are apparent. . . In both 1955 and 1956 the shape of the curves depart from the mean most noticeably . . . between the ages of 5 and 10. In 1955 a sharp dip occurred only at age 7 . . . This correlated well with the concentration of vaccinations in 7-year-old children . . . in the 1955 NFIP Program . . . In 1956, the low point of the curve moved to age 8, and the depression in rates was extended in both directions to include ages 6 through 10. With the decline in incidence in the 5-9 age group, the peak rates in California were in children under age 5, in both 1955 and 1956.

. . . "The proportion of paralytic cases contributed by the 5-9 age group declined during the Summer of 1955 and has remained low since that time. The proportion of cases in children under age 5 remained high through 1955 and the Spring of 1956, but began to decline during the Summer of 1956. The decreasing proportion of cases in these two age groups has been absorbed by slight increases in the adult age groups.

"These changes may reasonably be assumed to reflect the influence of vaccination on the epidemiology of poliomyelitis". . . However "comprehensive assessment of the impact of vaccination on the epidemiology of poliomyelitis may well require several more years of experience with the vaccine."

Table A
NON-VACCINATED AND VACCINATED POLIO CASES AND EFFECTIVENESS OF POLIO VACCINE
CHILDREN, AGE 0 - 14

California, By Month, October 1955 to September 1956

Month of Onset	NON-VACCINATED CASES AND RATES				VACCINATED CASES, ONE OR MORE INOCULATIONS												
	Estimated Person-Months At Risk	Cases (and Rates per 100,000)			Estimated Person-Months At Risk ¹	Expected ² Cases			Observed ³ Cases			Cumulative Ratio Observed/Expected			Cumulative Estimated % Effectiveness		
		Total	Paral.	N.P.		Tot	Par	NP	Tot	Par	NP	Tot	Par	NP	Tot	Par	NP
1955																	
October	3,333,363	160(4.8)	110(3.3)	50(1.5)	409,355	20	14	6	7	-	7	7/20	0/14	7/6	*	*	*
November	3,275,164	123(3.7)	95(2.9)	28(0.9)	461,539	17	13	4	7	4	3	14/37	4/27	10/10	62	85	*
December	3,192,174	80(2.5)	51(1.6)	29(0.9)	557,658	14	9	5	6	3	3	20/51	7/36	13/15	61	81	*
1956																	
January	3,036,284	79(2.6)	61(2.0)	18(0.6)	659,421	17	13	4	5	1	4	25/68	8/49	17/19	63	84	*
February	2,822,030	48(1.7)	36(1.3)	12(0.4)	901,344	16	12	4	7	2	5	32/84	10/61	22/23	62	84	*
March	2,686,284	41(1.5)	27(1.0)	14(0.5)	1,119,831	17	11	6	9	6	3	41/101	16/72	25/29	59	78	14
April	2,602,059	35(1.3)	33(1.3)	2(0.1)	1,204,741	17	16	1	8	2	6	49/118	18/88	31/30	58	80	0
May	2,474,376	69(2.8)	42(1.7)	27(1.1)	1,320,185	37	22	15	7	5	2	56/155	23/110	33/45	64	79	27
June	2,320,376	98(4.2)	75(3.2)	23(1.0)	1,492,071	63	48	15	11	7	4	67/218	30/158	37/60	69	81	38
July	2,156,684	169(7.8)	110(5.1)	59(2.7)	1,660,028	130	85	45	35	17	18	102/348	47/243	55/105	71	81	48
August	1,969,665	131(6.7)	95(4.8)	36(1.8)	1,850,117	122	89	33	40	19	21	142/470	66/332	76/138	70	80	45
September	1,815,806	113(6.2)	86(4.7)	27(1.5)	2,063,491	128	97	31	66	30	36	208/598	96/429	112/169	65	78	34

¹ Excludes the first 15 days following first inoculation. (See Table B).

² Derived from the vaccinated person-months at risk and the attack rate during the month in non-vaccinated children.

³ Excludes cases with onset less than 15 days after first inoculation. (See Table B).

* Percents not calculated on less than 25 expected cases.

Table B

COMPARISON BETWEEN EXPECTED AND OBSERVED
CASES WITH ONSET 15 DAYS OR LESS AFTER FIRST INOCULATION

CHILDREN AGE 0-14

California, October 1955 - September 1956

Month of Onset	Estimated Person-Months at Risk	Expected Cases			Observed Cases			Cumulative Ratio Observed/Expected		
		Tot	Par	NP	Tot	Par	NP	Tot	Par	NP
1955										
October	26,092	1	1	-	1	-	1	1/1	0/1	1/0
November	48,060	1	1	-	1	-	1	2/2	0/2	2/0
December	50,882	1	1	-	1	-	1	3/3	0/3	3/0
1956										
January	120,962	3	2	1	2	2	-	5/6	2/5	3/1
February	109,244	1	1	-	1	1	-	6/7	3/6	3/1
March	42,455	-	-	-	1	1	-	7/7	4/6	3/1
April	57,722	1	1	-	1	1	-	8/8	5/7	3/1
May	85,943	2	1	1	3	3	-	11/10	8/8	3/2
June	83,978	4	3	1	7	6	1	18/14	14/11	4/3
July	95,044	8	5	3	9	5	4	27/22	19/16	8/6
August	106,687	7	5	2	3	2	1	30/29	21/21	9/8
September	61,884	4	3	1	4	3	1	34/33	24/24	10/9

Table C

EFFECTIVENESS OF POLIO VACCINE AMONG CHILDREN AGE 0-14
BY NUMBER OF INOCULATIONS

California, October 1955 - September 1956

Number of Inoculations	Estimated Person-Years at Risk	Cases						Rate Per 100,000						Estimated % Effectiveness ²		
		Expected			Observed ¹			Expected			Observed					
		Tot	Par	NP	Tot	Par	NP	Tot	Par	NP	Tot	Par	NP	Tot	Par	NP
One	248,668	115	84	31	63	27	36	46.2	33.8	12.5	25.3	10.9	14.5	45*	68*	0
Two	793,869	422	303	119	128	64	64	53.2	38.2	15.0	16.1	8.1	8.1	70*	79*	46*
Three	99,111	57	42	15	17	5	12	57.5	42.4	15.1	17.2	5.0	12.1	70*	88*	20
One or More	1,141,648	598	429	169	208	96	112	52.4	37.6	14.8	18.2	8.4	9.8	65*	78*	36*

¹ Includes cases with onset more than 15 days after first inoculation.

² The Lower Limits of Effectiveness, calculated at the 95% confidence level according to the method used by Francis, et.al., American Journal of Public Health, May 1955, Appendix, page 62, are as follows:

Paralytic: one inoculation.....53%
two inoculations.....73%
three inoculations.....73%
one or more inoculations.73%

Non-paralytic: one inoculation.....Negative
two inoculations.....31%
three inoculations.....Negative
one or more inoculations.18%

* Significant at .1% level.

