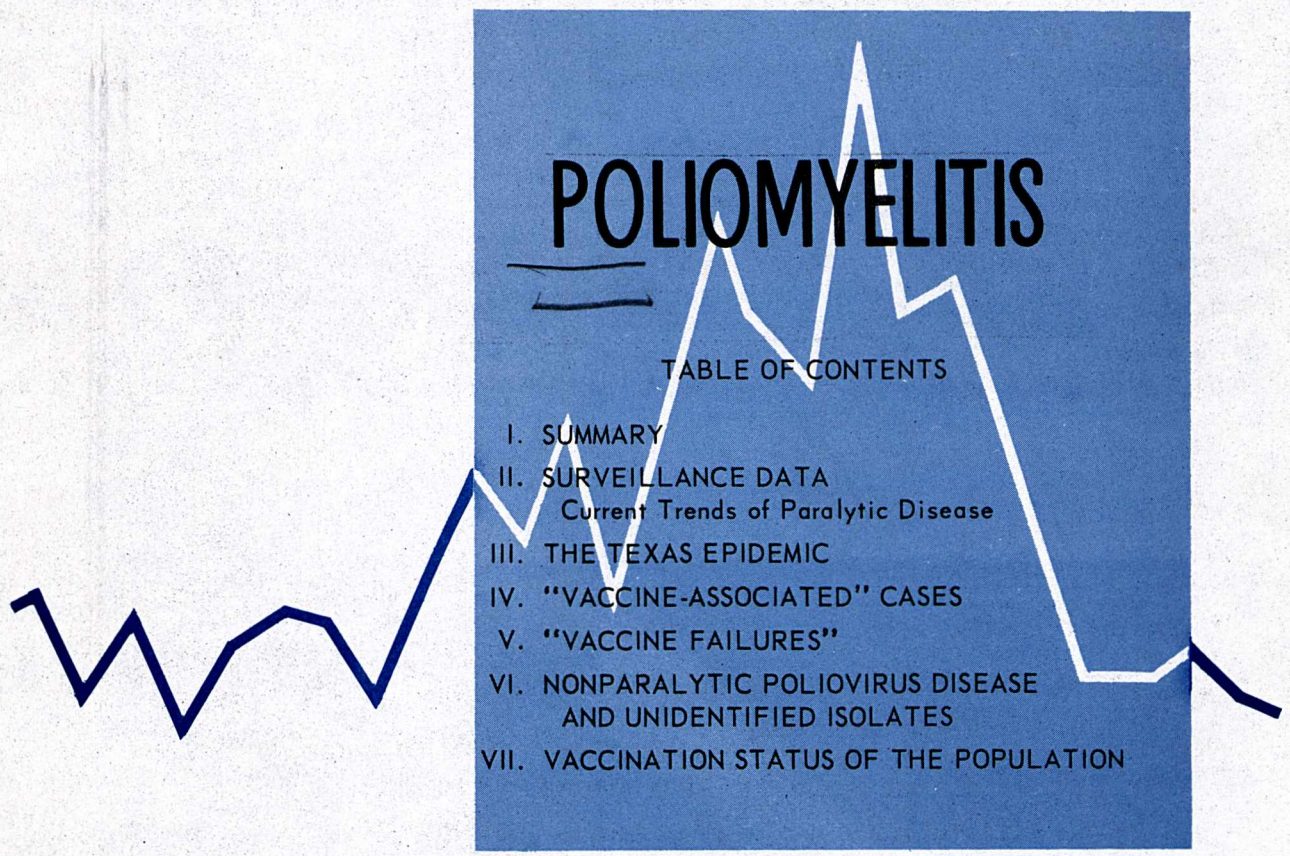
ANNUAL POLIOMYELITIS SUMMARY - 1966

JULY 31, 1967

NATIONAL COMMUNICABLE DISEASE CENTER

NEUROTROPIC VIRAL DISEASES

SURVEILLANCE



POLIOMYELITIS

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

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

This issue of the Neurotropic Viral Diseases Surveillance Report contains the final summary of the experience with poliovirus in the United States for the year 1966, as reported to the Epidemiology Program, National Communicable Disease Center. For the year, the "best available paralytic poliomyelitis count" was 102 cases. This total is the third lowest figure ever recorded. However, it is 41 more than the total paralytic cases reported in 1965, and 11 more than the total for 1964 as well. This is the first year since 1959 in which the annual total of reported cases exceeds that of the preceding year.

Sixty-six of the 102 cases occurred during a poliomyelitis epidemic in southern Texas. This outbreak, the largest in the United States in three years, occurred predominantly in unimmunized preschool children of lower socioeconomic background. Two cases of paralytic poliomyelitis had onset of disease in other States, but were thought to have acquired their disease while in the epidemic areas of Texas or Mexico.

Over 75 percent of the cases of paralytic poliomyelitis were in children less than five years of age. Approximately three-quarters of the patients had received no prior poliovaccine immunization. In 1966, seven deaths were attributed to poliomyelitis.

II. SURVEILLANCE OF PARALYTIC DISEASE IN 1966

Since 1958 the "best available paralytic poliomyelitis count" has been defined as those cases with known residual paralysis at 60 days plus those cases reported initially as paralytic poliomyelitis, but on which no 60-day final report has been received. Therefore, the initial telegraphic reports contained in the Morbidity and Mortality Weekly Reports (MMWR) have been supplemented by poliomyelitis surveillance case records, which are submitted twice, once at the onset of illness, and then again 60 days after onset.

The Neurotropic Viral Diseases Unit received 125 preliminary poliomyelitis surveillance case records in 1966. This total of 125 includes 23 cases not previously reported telegraphically to the MMWR. Included in these 23 were 6 cases of paralytic illness; the remaining 17 were cases of non-paralytic poliovirus infection.

Poliomyelitis Morbidity

A final classification of the 125 preliminary case records received in 1966, by etiologic viral type and clinical classification, is presented in Table 1.

Table 1

PARALYTIC AND NON-PARALYTIC POLIOMYELITIS - 1966

Final Classification of 125 Preliminary Case Records
By Nature of Paralytic Involvement and Poliovirus Type

Nature of Paralytic Involvement	Etiologic Virus Type				TOTAL
	1	2	3	Mixed/Unk.*	
Paralytic with residual	60	13	6	23	102
Paralytic without residual	4	1	1	4	10
Non-paralytic (aseptic meningitis syndrome)	7	2	3	1	13
TOTAL	71	16	10	28	125

*This column includes 19 cases, occurring in the epidemic area of Texas, which are presumably attributable to Type 1 poliovirus on epidemiologic grounds.

In an examination of this classification, it should be kept in mind that reporting of non-paralytic poliovirus infections is sporadic. It is to be expected that many more such infections occurred than were diagnosed, and that many more were diagnosed than were reported.

Follow-up reports establishing final classification and clinical status 60 days or longer after onset of illness were received on 123 of the 125 preliminary case records. For 1966, the "best available paralytic poliomyelitis count" of 102 cases includes 100 cases with known residual paralysis at 60 days, plus 2 cases with no follow-up reports. (See Table 2).

Table 2

PARALYTIC POLIOMYELITIS - 1966

Final Classification of 102 cases
By Extent of 60-day Residual and Poliovirus Type

Extent of 60-day Residual	Etiologic Virus Type				TOTAL
	1	2	3	Mixed/Unk.*	
Death	3	0	2	2	7
Severely disabled	11	1	0	1	13
Significantly disabled	31	9	2	14	56
Minor involvement	14	3	2	5	24
Paralytic without follow-up report	1	0	0	1	2
TOTAL	60	13	6	23	102

*This column, in all subsequent tables of paralytic cases in this report, includes 15 cases, occurring in the epidemic area of Texas, which are presumably attributable to Type 1 poliovirus on epidemiologic grounds.

Following a trend seen since 1964, poliovirus Type 2 continues to account for a relatively high proportion of the paralytic cases. In 1966, 13 cases of paralytic disease had laboratory evidence of infection with Type 2 poliovirus. Twelve patients had Type 2 poliovirus isolated from their stool specimens, while in one, Type 2 poliovirus was isolated from the patient's brother. Table 3 presents the virus types of isolates obtained from the paralytic cases as reported to the National Communicable Disease Center in the past nine years.

Those paralytic cases attributable to Type 2 poliovirus, moreover, occur in an unusual age distribution, with six of the 13 cases occurring in persons over 20 years of age. (See Table 4). All six of these adults had their Type 2 isolates characterized as "vaccine-like" by the NCDC Enterovirus Laboratory. Three of these six had a history of close contact with a recent recipient of oral poliovirus vaccine, and are discussed under "vaccine-associated cases in contacts of vaccinees." (Section IV B). However, the three remaining adult cases attributable to Type 2 poliovirus had a "vaccine-like" virus type isolated from their stool, even though a history of recent contact with a vaccine recipient could not be obtained.

Table 3

PARALYTIC POLIOMYELITIS 1958-1966

Results of Viral Isolation Attempts on Specimens Submitted by Year

Year	Best Available Paralytic Case Count	Cases with Specimens Submitted		Cases with Poliovirus - Isolated		Virus Type Isolated						
						Number of Isolates				Percent		
		Number	Percent	Number	Percent	1	2	3	Unk.	1	2	3
1958	3301	1479	44.8	1131	34.3	898	29	194	10	79.4	2.5	17.2
1959	5472	2775	50.7	2142	39.1	1881	10	228	23	87.8	0.5	10.6
1960	2218	1072	48.3	825	37.2	603	1	219	2	73.1	0.1	26.5
1961	829	481	58.0	382	46.1	231	6	145	0	60.5	1.6	37.9
1962	691	472	68.3	408	59.0	300	8	100	0	73.5	2.0	24.5
1963	336	242	72.0	197	58.6	160	6	31	0	81.2	3.0	15.7
1964	91	77	84.6	51	56.0	21	6	24	0	41.1	11.8	47.0
1965	61	50	81.9	38	62.3	19	8	11	1	50.0	21.1	28.9
1966	102	82	80.3	74	72.5	55	13	6	1	74.3	17.6	8.1

Seven of the 13 Type 2 paralytic poliomyelitis cases occurred in individuals under 20 years of age. (See Table 4.) One of these seven cases was in an infant who had recently received oral poliovirus vaccine (OPV), and is discussed below. (See Section IV A.) Two of the remaining cases did not have a history of recent contact with oral poliovirus vaccine, either by direct administration or by contact with a vaccinee, yet had their isolates characterized as "vaccine-like", bringing the total number of "vaccine-like" isolates of Type 2 poliovirus to eight. Four cases have not had strain characterization studies performed. One isolate was "intermediate"; but no Type 2 poliovirus isolated from cases of paralytic disease were "wild type."

A description of the paralytic poliomyelitis cases by age and virus type is found in Table 4.

Table 4

PARALYTIC POLIOMYELITIS - 1966

102 Cases by Age and Virus Type

Age Group	Etiologic Virus Type				TOTAL
	1	2	3	Mixed/Unk.	
0-4	51	5	4	19	79
5-9	6	1	1	2	10
10-14	0	1	0	2	3
15-19	1	0	0	0	1
20-29	0	3	0	0	3
30-39	2	2	1	0	5
40+	0	1	0	0	1
TOTAL	60	13	6	23	102

The age distribution of the 1966 paralytic poliomyelitis cases caused by Types 1 and 3 is comparable to that in previous years, although more cases occurring in the 0-4 age group were reported. Approximately 75 percent of all paralytic cases were under five years of age, compared with 50 percent in this age group in previous years, as shown in the following graph. (See Figure 1)

Ninety-seven of the 102 paralytic cases occurred in Caucasians (a nationwide incidence of .056/100,000); 5 occurred in Negroes (incidence = .023/100,000). Table 5 shows a breakdown of the 102 cases by age group and sex. Note that in 1966, both in children and adults, more males than females were reported to have paralytic disease.

Table 5

PARALYTIC POLIOMYELITIS - 1966
102 Cases by Age Group and Sex

Age Group	Male	Female	Total
0-4	50	29	79
5-9	5	5	10
10-14	1	2	3
15-19	1	0	1
20-29	2	1	3
30-39	5	0	5
40+	1	0	1
TOTAL	65	37	102

Seven deaths occurred in 1966, one in an adult and six in children. Two of the seven fatal cases had a history of recent immunization with OPV; none had a history of contact with a recently vaccinated individual. None had been adequately immunized. A line listing of the 1966 poliomyelitis deaths is given in Table 6.

Table 6

POLIOMYELITIS DEATHS - 1966
Descriptive Line Listing of Seven Fatalities

State	Age	Sex	IPV	OPV Type	OPV Date	Onset	Virus Type	Strain Characteristic
Mont.	18 mos.	M	None	Tri	2/2/66	4/2	Type 3	"Vaccine-like"
N.C.	4 mos.	F	None	Mono Mono	1-10/1/66 3-11/3/66	12/1	Type 3	"Vaccine-like"
P.R.	4 yrs.	M	None	None		8/29	Unknown	Unknown
Texas	8 mos.	M	None	None		6/1	Type 1*	No specimen
Texas	3 yrs.	F	None	None		6/13	Type 1	Not tested
Texas	7 yrs.	M	None	None		10/5	Type 1	Not tested
Wash.	32 yrs.	M		None		5/14	Type 1**	No specimen

*Attributed to poliovirus Type 1 on epidemiologic grounds alone; case occurred in epidemic area of Texas.

**Attributed to poliovirus Type 1 on serologic grounds.

Figure 1.

PARALYTIC POLIOMYELITIS 1964 — 1966

CASES BY YEAR

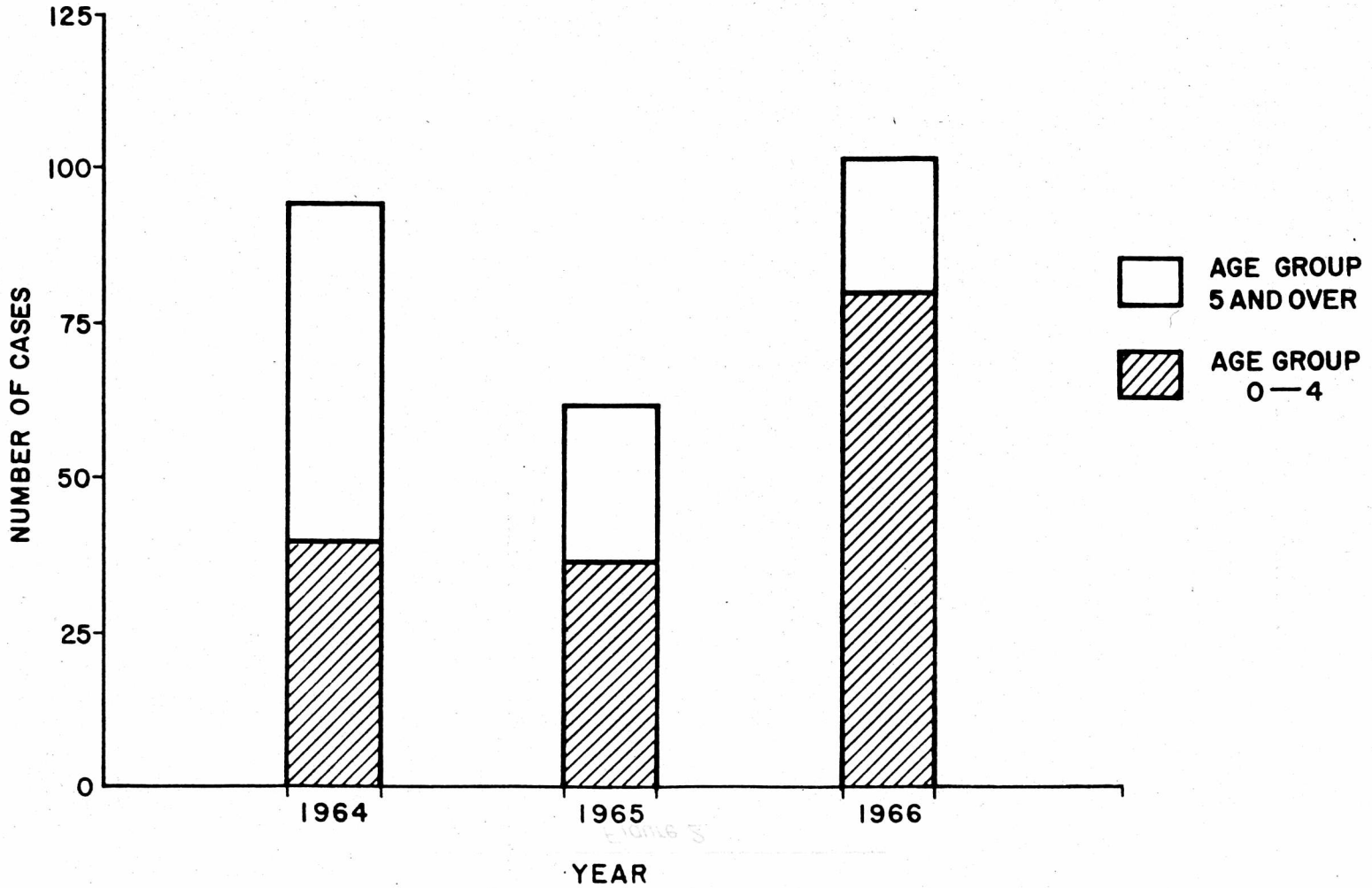


Figure 2.

PARALYTIC POLIOMYELITIS, 1966

102 CASES BY COUNTY, UNITED STATES

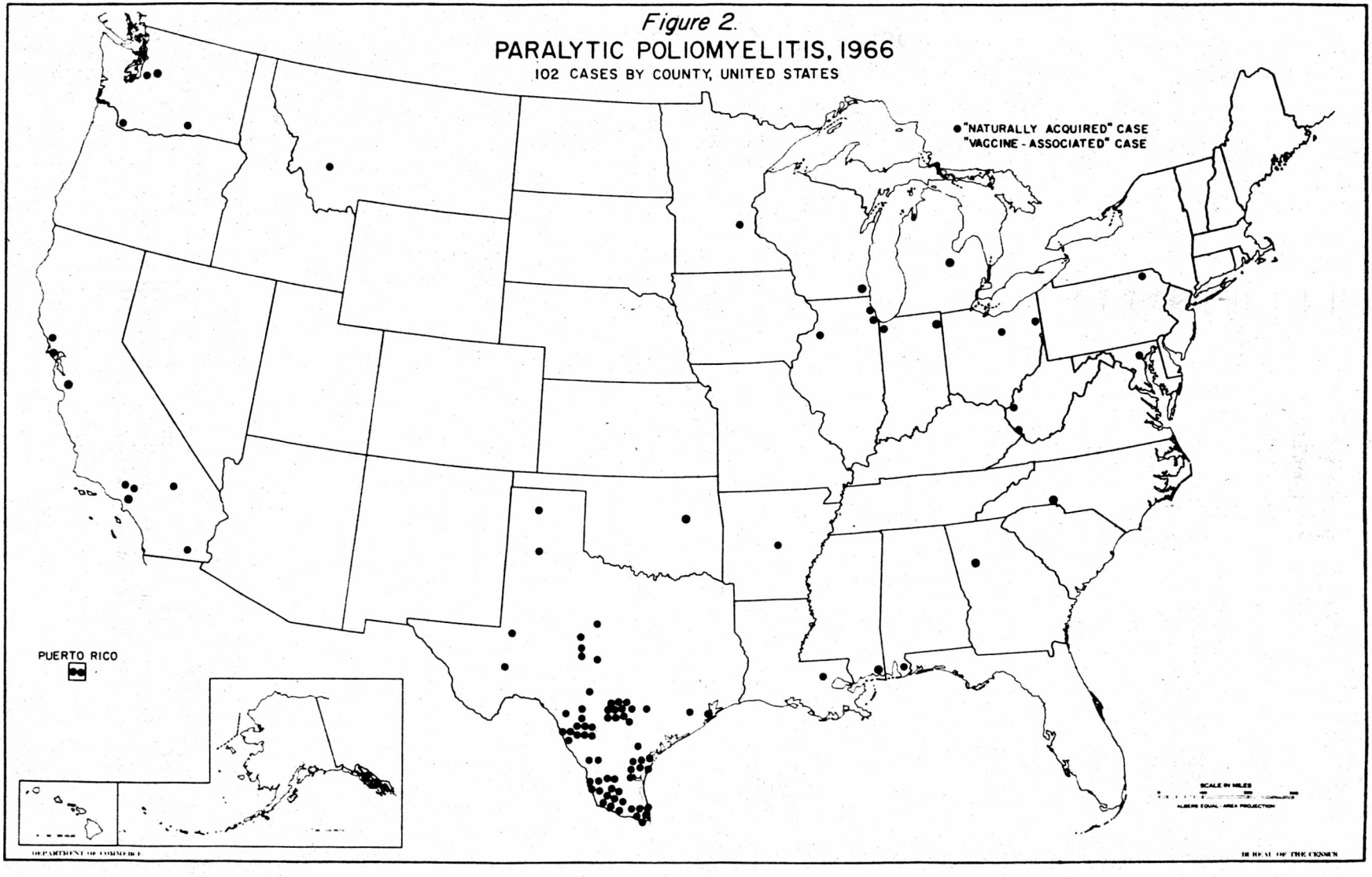


Figure 3.

PARALYTIC POLIOMYELITIS, 1961 — 1966
CASES BY DATE OF ONSET

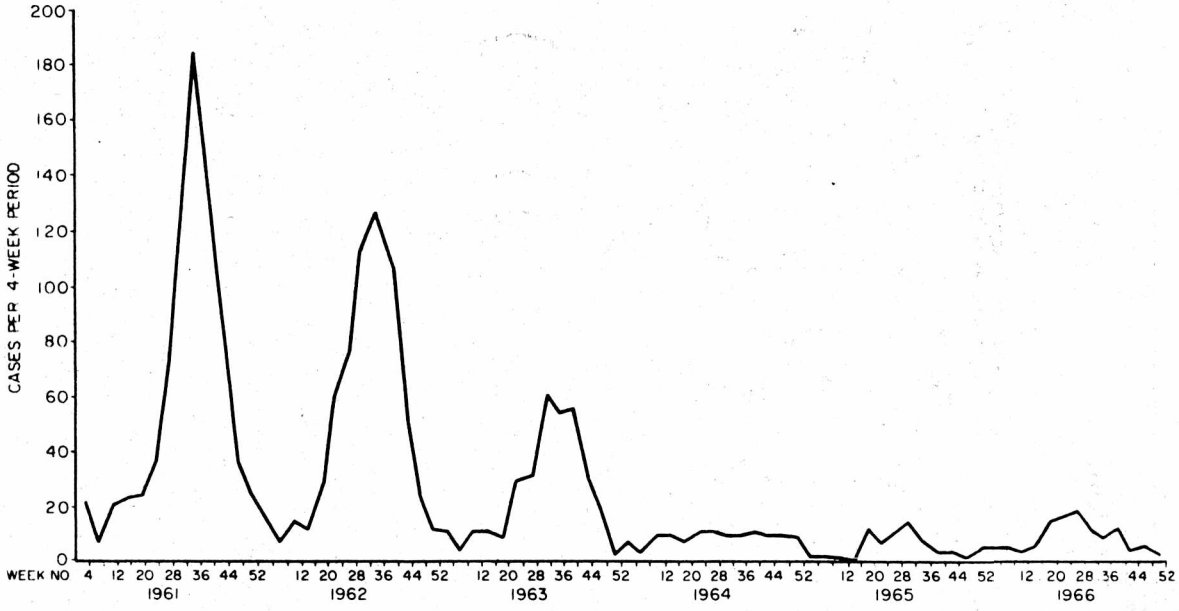
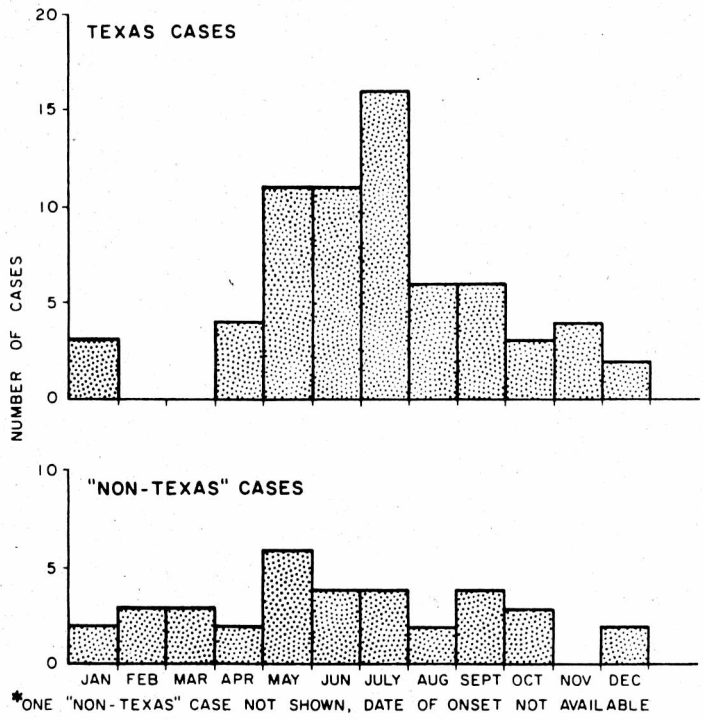


Figure 4

PARALYTIC POLIOMYELITIS-1966
101 CASES BY MONTH OF ONSET*



*ONE "NON-TEXAS" CASE NOT SHOWN, DATE OF ONSET NOT AVAILABLE

The distribution of paralytic poliomyelitis cases by county is seen in Figure 2. On this map, the epidemic area in Texas (28 counties with 66 cases) is evident. However, the 36 "non-Texas" cases are scattered throughout 20 States.

During 1966 an increased incidence of disease during the summer months was again evident. It should be noted that this has occurred in all years but 1964. (See Figure 3).

The 1966 summer peak is due primarily to the cases occurring in Texas. The cases occurring throughout the rest of the United States are scattered through the year with no evident summer peak. (See Figure 4).

Seventy-five of the 102 paralytic cases had received no poliovaccine. The immunization histories of those cases reported from States other than Texas are summarized in Table 7. Texas cases are described in a subsequent part of the report. Twenty-two of the 36 "non-Texas" cases had received no poliovaccine, and of the remaining 14, only five were considered "adequately immunized." Of these, two had received four doses of IPV, and three had received three doses of MOPV.

Table 7

PARALYTIC POLIOMYELITIS

Cases Outside of Texas - 1966

Immunization History	Total No. of Cases Given Designated Immunization	No. of Cases Given "Adequate" Immunization	Definition of "Adequate" Immunization
No Vaccine	21	0	
IPV alone	3	1	Given 4 IPV
IPV + Mono OPV	2	1*	
Mono OPV	6	3	Given 3 Mono OPV
Tri OPV	4	0	Given 2 Tri OPV
Tri OPV + Mono OPV	0	0	Given 1 Tri + 3 Mono OPV
TOTAL	36	5	

*Adequately immunized with IPV only.

III. THE TEXAS EPIDEMIC

A. General Description

Beginning in April 1966, increasing numbers of cases of paralytic poliomyelitis were reported from Texas. These reached a peak in July, but continued to appear throughout the late summer and fall. During the entire year, including three cases in January, a total of 66 cases were reported, including three deaths. Early in the year, these cases were predominantly located along the Rio Grande Valley, but during the course of the epidemic a total of 28 counties reported cases of paralytic illness.

All but 3 of these 66 cases were under 6 years of age; 3 of the children were less than 6 months old. Forty-one of the patients were males and 25 were females. Sixty-three of the 66 cases were Caucasian, 3 were non-white. Cases occurred primarily in areas of lower socioeconomic status and among families with Spanish surname. In four instances, there were two cases occurring in the same household: 1) siblings from Cameron County with onset dates within one day; 2) siblings from Concho County with onset dates five days apart; 3) siblings from Zavala County with onset dates seven days apart; and 4) siblings from Starr County with onset dates nine days apart. Two children (cousins) living on the same farm in Zavala County had onsets one day apart. In Hidalgo County, two infants who lived in the same block, and whose mothers visited frequently, had identical dates of onset.

B. Laboratory Studies

Laboratory evidence to support a diagnosis of Type 1 poliovirus infection was obtained in 48 of the 66 paralytic cases reported from Texas. Of the 48, 45 had Type 1 poliovirus isolated from the stool; the remaining 3 had serologic confirmation alone. Type 2 poliovirus was isolated from 2 patients, and Type 3 poliovirus from one patient. The remaining 15 patients had insufficient laboratory tests.

C. Immunization History

As shown in Table 8, 53 of the 66 Texas cases had never received any polio-vaccine, 13 had received at least one dose, but only 2 were considered adequately immunized. One of these, a 4-year old, had received one dose each of monovalent Type 1, 2, and 3 poliovirus vaccine three years previously, in 1963. The other, a 3-year old, received one dose each of monovalent Type 1, 2, and 3 poliovirus vaccine in 1964 and a reinforcing dose of trivalent vaccine in 1965. (See Section V B).

Table 8

POLIOMYELITIS EPIDEMIC - TEXAS 1966

Immunization Histories of 66 Paralytic Cases

Immunization History	Total No. of Cases Given Designated Immunization	No. of Cases Given "Adequate" Immunization	Definition of "Adequate" Immunization
No Vaccine	53	0	
IPV alone	4	0	Given 4 IPV
Mono OPV	3	1	Given 3 Mono OPV
Tri OPV	5	0	Given 2 Tri OPV
Tri OPV + Mono OPV	1	1	Given 1 Tri + 3 Mono OPV
TOTAL	66	2	

Two unvaccinated Texas cases had personal contact with children in the same household who had recently received oral vaccine. In accord with earlier decisions of the Surgeon General's Advisory Committee on Oral Poliomyelitis Vaccine, these cases are excluded from the category of "vaccine-associated" cases described below, because of their occurrence in an epidemic area. Only one of these two had adequate specimens obtained; the virus isolated was characterized as "wild type."

Polio immunization surveys had been conducted in four south Texas communities prior to the outbreak. These provide a relative indication of immunization status of the population. Results of these surveys are summarized in Table 9. These figures show that in Brownsville the lower socioeconomic groups comprise the least well immunized population. This correlation was less evident in the other three communities.

Table 9

POLIOMYELITIS EPIDEMIC - TEXAS 1966
Percentage of Adequately Immunized Children* in Four Communities

TOWN	COUNTY	DATE OF SURVEY	PERCENT ADEQUATELY IMMUNIZED			
			Socioeconomic Class			Overall
			Upper	Middle	Lower	Avg.
Brownsville	Cameron	7/65	83.3	53.8	37.8	58.3
Harlingen	Cameron	11/65	78.6	70.5	70.8	73.3
San Benito	Cameron	11/65	-	-	-	46.0
Laredo	Webb	3/66	71.0	-	61.0	66.0

*Percent of children between 6 months and 4 years of age with 3 doses OPV. (Survey conducted by the Cameron County Health Department and a team from NCDC).

D. Control Measures

In 1966, approximately 700,000 doses of trivalent oral poliovirus vaccine were distributed by the Texas State Department of Health; 275,000 doses went to the 28 counties that reported cases of paralytic poliomyelitis during the year. No monovalent vaccine was utilized in mass campaigns. Physicians from the State Department of Health met with representatives of 50 county health departments from south Texas. Immunization programs were discussed and the local health departments were urged to insure adequate protection for their population. In addition, the Texas Medical Association suggested to local medical societies in affected areas that mass campaigns be conducted.

E. History of Contact with Mexico

Approximately 150,000 border crossings occur daily along the length of the Rio Grande River as individuals cross between Mexico and the United States. Because of this large interchange, the similarity of the Latin American populations in southern Texas and northern Mexico, and the reported occurrence of a poliomyelitis epidemic in northern Mexico, the Texas cases were questioned regarding a history of contact with Mexico. Of the 51 patients interviewed, 14 had visited Mexico during the month prior to onset of illness. Seven additional cases had had contact during the previous month with persons, all adults, who had recently visited Mexico or who worked there daily. However, the remaining 30 cases had neither visited Mexico nor had had contact with recent visitors to Mexico.

IV. VACCINE-ASSOCIATED CASES

From 1962 to 1964, all cases of paralytic poliomyelitis which occurred within 30 days after receiving oral poliovirus vaccine were reviewed in detail by the Surgeon General's Advisory Committee on Oral Poliomyelitis Vaccine. Those cases meeting the following criteria were placed in a category termed "compatible with the possibility of having been induced by the vaccine:"

1. An onset of illness between 4 and 30 days following feeding of the specific vaccine in question, and with an onset of paralysis not sooner than 6 days after the feeding.

2. Significant residual lower-motor-neuron paralysis.

3. Laboratory data not inconsistent with respect to multiplication of the vaccine virus fed.

4. No evidence of upper-motor-neuron disease, definite sensory loss or progression, or recurrence of paralytic illness one month or more after onset.

At the time of the last meeting of this Committee in July 1964, 87 cases were considered, of which 57 were judged to be "compatible" with vaccine association. Since this time, the Neurotropic Viral Diseases Unit has continued to use the above mentioned criteria in determining whether or not a case is "compatible" with vaccine association. The cases fulfilling the criteria have come to be known as "vaccine-associated" cases; however, the cases reported since July 1964 have not been formally reviewed by a committee.

In the past three years, laboratory techniques have been available to assist in differentiation between "wild" and "vaccine-like" strains of virus isolates. These techniques, based on in-vitro markers, have been used to study the strain characteristics of the virus isolated from "vaccine-associated" cases whenever possible.

A. "Vaccine-Associated" Cases in Vaccinees

In 1966, five persons acquired a paralytic illness at intervals of 9 to 28 days after receiving oral poliovirus vaccine. The cases ranged in age from two months to two years. One illness followed the administration of a single dose of monovalent Type 1 vaccine, and Type 1 poliovirus characterized as "vaccine-like" was isolated from the stool. Another case in a 4-month old infant followed the administration of monovalent Type 3 vaccine and was fatal. The remaining 3 cases followed the feeding of trivalent vaccine; one had Type 2 poliovirus isolated from the stool while the remaining 2 had no isolates obtained. A line listing of these 5 cases is given in Table 10.

From the time oral poliovaccine began to be generally used in 1961 to July 1964, 57 cases of paralytic disease were considered to be "compatible with the possibility of having been induced by the vaccine." When an analysis of these cases was made, it became apparent that individuals over the age of 15 years were at a higher risk of acquiring paralytic illness following receipt of live attenuated vaccine. As a result, the Special Advisory Committee on Oral Poliomyelitis Vaccine recommended in July 1964 that the use of oral polio vaccines for the immunization "of individuals over school age (about 18 years) should generally be recommended only in those situations in which unusual exposure to poliomyelitis might be anticipated . . . . "

Table 10

PARALYTIC DISEASE IN VACCINE RECIPIENTS - 1966

Descriptive Line Listing of "Vaccine-Associated" Cases in Vaccinees

State	Age/Sex	Date of Onset	Prior Doses IPV	Prior Doses OPV	Type of Vaccine Admin'd.	Interval Between Admin.& Onset	Isolate	Strain Character.	Residual
Ind.	16m/ M	7/2	0	0	Tri	14 days	None	-	Severe disability
Miss.	2y/ M	1/21	0	0	Tri	9 days	No specimen	-	Severe disability
N.C.	5m/ F	12/1	0	0	Mono 3	28 days	Type 3	"Vaccine-like"	Death
Okla.	2y/ M	3/1	1	0	Mono 1	9 days	Type 1	"Vaccine-like"	Significant disability
Wis.	2m/ F	6/24	0	0	Tri	13 days	Type 2	"Intermediate"	Significant disability

Five further "vaccine-associated" cases were reported in 1964. Three of these followed MOPV Type 3, one followed monovalent Type 1 and one followed trivalent vaccine. This last case occurred in a 4-month old female who subsequently had a "non-vaccine-like" Type 1 poliovirus isolate identified in her stool. All of these cases had occurred prior to the date of the above recommendation. However, only six "vaccine-associated" cases in vaccine recipients have been reported to have occurred following oral vaccine administration in the last two years. Three have been reported to have occurred following the feeding of monovalent vaccine, and three following trivalent vaccine.

B. "Vaccine-Associated" Cases in Contacts of Vaccinees

In the past two years, rare instances of paralytic illness have been reported in family contacts or close community contacts of recent recipients of oral poliovirus vaccine. Because of the possibility that these illnesses have resulted from spread of vaccine virus to close contacts of vaccinees, the meaning of the term, "vaccine-associated" cases has been extended to include cases which occur under these circumstances. The term, "vaccine-associated cases in contacts of vaccinees", will be used to describe those instances in which spread of vaccine virus from a direct recipient may have occurred. In defining these cases, an onset of illness between 4 and 60 days following feeding of the specific vaccine in question to the contact of the case is accepted.

In 1966, four cases of paralytic illness occurring in family or other close community contacts of vaccine recipients were reported. Three of these four cases occurred in individuals between 20 and 30 years of age; all three were attributable to poliovirus Type 2. The fourth case, attributable to poliovirus Type 1, occurred in a 2-year old child. The interval between administration of vaccine to the recipient and onset of illness in the contact of the vaccinee varied between 14 and 24 days. Two of these cases followed the administration of trivalent vaccine, one followed monovalent Type 1, and one followed monovalent Type 2. All virus isolates from this group were characterized as "vaccine-like" by strain differentiation studies. A line listing of these cases is found in Table 11.

Available information on paralytic disease occurring in contacts of vaccinees has been reviewed to include 1965. A total of 12 such cases were reported in these two years. Three cases have been reported to have followed receipt of monovalent vaccine in a contact: of these,two followed the administration of Type 2 vaccine, and one followed Type 1. Nine cases occurred in contacts of those receiving trivalent vaccine: 4 were attributed to Type 3 poliovirus, 4 to Type 2; and in one case both Type 1 and 3 were isolated.

From 18 "vaccine-associated" cases, both in vaccine recipients and in close contacts, reported in the last two years, to date, a total of 13 isolates have had strain characterization studies completed. Twelve have been shown to be "vaccine-like" in character, while one was characterized as "wild type."

V. VACCINE FAILURES

A. Inactivated Poliomyelitis Vaccine

At the present time, an "IPV vaccine failure" is defined as any case of paralytic disease attributed to poliovirus infection occurring after an adequate IPV immunization series (i.e., occurring after 4 or more doses of inactivated poliovirus vaccine). In 1966, two such cases occurring after a fourth dose of vaccine, were reported. One patient, a 6-year old female, had received her fourth dose of IPV three years previously. She had also received two doses of monovalent live

Table 11

PARALYTIC DISEASE IN FAMILY AND COMMUNITY CONTACTS OF VACCINE RECIPIENTS - 1966

State	Age/Sex	Onset	Prior Doses IPV	Prior Doses OPV	Secondary Contact	Vaccine Administered	Interval Between Admin./Onset	Isolate	Strain Character.	Residual
Calif.	27 M	9/10	0	0	Nephew	Tri	23 days	Type 2*	"Vaccine like"	Significant disability
Calif.	21 F	5/17	0	0	Son	Mono 2	14 days	Type 2	"Vaccine like"	Significant disability
Ga.	2 M	3/19	0	Mono 2	Neighbor	Mono 1	21 days	Type 1	"Vaccine like"	Significant disability
Wash.	30 M	2/11	0	0	Son	Tri	24 days	Type 2	"Vaccine like"	Significant disability

*Type 2 - "Vaccine-like", isolated from stool specimen from patient's brother (father of vaccine recipient).

attenuated poliovirus vaccine, Type 2 and 3, four years previously in 1962. Following an illness allegedly resembling poliomyelitis, the patient was left with significant paralytic disability 60 days after onset. However, numerous stool specimens and serologic testing for complement-fixing antibodies failed to give laboratory support to the diagnosis.

The second reported case was in a 7-1/2 year old male who had received 4 doses of IPV three years previously. A four fold neutralizing antibody rise to poliovirus Type 1 was demonstrated during the course of his illness. He was left with minor residual at 60 days.

Over the past 3 years there have been 18 instances of "IPV vaccine-failure" reported to NCDC. Fifteen of these cases for whom the dates of vaccine administration are known, had onset of illness from less than one to nine years following their last dose of inactivated vaccine, as shown in Figure 5. In 10 of these 18 cases, an etiologic type could be determined; in six, Type 3 poliovirus was implicated; four were attributed to Type 1.

B. Oral Poliovirus Vaccine -- Monovalent

In 1966, four patients who had a prior history of immunization with three doses of monovalent oral poliovirus vaccine developed paralytic illness. Until this year, however, there had not been reported any instance of paralytic disease following three doses of monovalent and one dose of trivalent vaccine. In 1966 such a case was reported.

A 3-year old male in the epidemic area of Texas had received three doses of monovalent poliovirus vaccine (Type 1 in June 1964, Type 2 in July 1964, and Type 3 in August 1964) and one reinforcing dose of trivalent vaccine (in November 1965). On September 15, 1966, he became ill with a paralytic illness which left him with a significant disability at 60 days. During the course of his illness, complement fixing antibodies to Type 1 poliovirus rose from a titer of 1:16 to 1:128. Titers to Types 2 and 3 poliovirus were stable at <1:8. No stool specimen was obtained.

From 1964-1966, 15 cases of paralytic illness following an "adequate" course of monovalent OPV have been reported. All but one had received only 3 doses of monovalent vaccine, without a subsequent reinforcing dose of trivalent vaccine. It is noteworthy, however, that five of these cases must also be considered IPV failures, since they had received four or more doses of IPV as well.

C. Oral Poliovirus Vaccine -- Trivalent

In 1966 there were no reported instances of paralytic disease after immunization with two doses of trivalent vaccine. It is of special note that there have been no cases of trivalent oral poliovaccine failure reported since trivalent vaccine began to be used in this country in 1962.

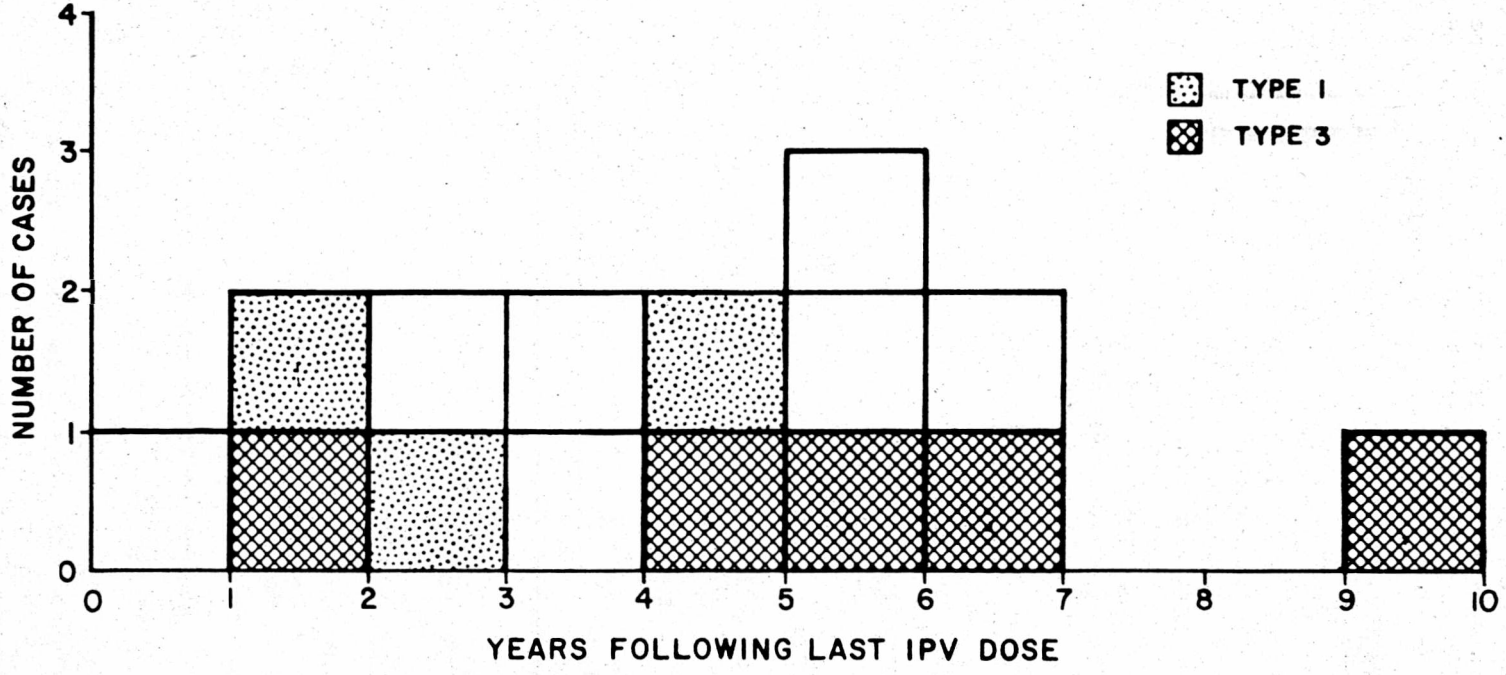
VI. PARALYTIC POLIOMYELITIS WITHOUT RESIDUAL PARALYSIS

Reporting of poliomyelitis cases without residual paralysis at 60 days is erratic. Few reliable generalizations concerning the incidence of such disease may be made from an analysis of the information available.

In 1966 only 10 cases of paralytic illness attributed to poliovirus infection, but without residual paralysis at 60 days, were reported to NCDC. Seven of these occurred in Texas (4 known to be Type 1, 3 were of unknown type). Among the remaining three cases is one case attributable to Type 2, one attributable to Type 3, and one without adequate specimens.

Figure 5.

IPV VACCINE–FAILURES* 1964–1966
BY YEARS AFTER LAST VACCINE DOSE



* 15 CASES OF PARALYTIC DISEASE, FOLLOWING FOUR OR MORE DOSES OF IPV, WITH KNOWN DATE OF VACCINE ADMINISTRATION.

Thirteen cases of aseptic meningitis associated with polioviruses (non-paralytic poliomyelitis) were reported. Seven cases were acquired in the epidemic area of Texas, six of which had Type 1 poliovirus isolated from their stool specimen. Of the remaining six cases, one was associated with Type 1, two with Type 2, and three with Type 3 polioviruses. Strain characterization studies performed on the two Type 2 isolates showed one to be "vaccine-like" and one to be "intermediate."

Incidental Isolations

As part of a laboratory-oriented Enterovirus Surveillance Program, occasional reports of "incidental" isolations of poliovirus are received. For the purpose of this report, "incidental" poliovirus isolates will be defined as those obtained from individuals with no illness or from patients whose illness is not attributed to poliovirus infection. "Incidental" isolates of poliovirus were reported to the Neurotropic Viral Diseases Unit from 18 individuals in 1966. Three specimens had Type 1 poliovirus isolated, 8 had Type 2 isolated, 4 had Type 3, and 3 had mixed types. Nine of these 18 individuals, however, are known to have a history of recent exposure to oral poliovaccine.

VII. VACCINATION STATUS OF THE POPULATION

A. Vaccine Distribution

In 1966, distribution of oral trivalent poliovirus vaccine increased over the amount distributed in 1965, as shown in Table 12. Note that the amount of monovalent vaccine distributed has consistently declined while the distribution of trivalent vaccine has increased.

Table 12

POLIOVACCINE, 1963-1966
Number of Doses Sold or Distributed Annually

Inactivated Poliomyelitis Vaccine	1963	1964	1965	1966
	18,964,523	8,817,316	7,426,277	5,499,000
Oral Poliovirus Vaccine (Total)	131,370,325	107,151,275	29,091,304	28,114,239
Type 1	38,740,710	24,894,570	4,651,015	1,426,035
Type 2	34,227,895	29,807,214	3,352,754	1,314,645
Type 3	54,205,910	28,418,166	3,708,360	1,373,905
Trivalent	4,195,810*	24,031,335*	17,379,175*	23,999,654

*Figures published for the first time this year by permission of the manufacturers.

Based on the number of doses of each vaccine type distributed, an estimate of the overall risk of acquiring paralytic disease after taking oral poliovirus vaccine, either in the recipient or a secondary contact can be calculated. Over the last two years, this risk has averaged about one in every 3 million doses of vaccine distributed.

B. 1966 Immunization Survey

The nationwide results of the 1966 Immunization Survey pertinent to poliomyelitis are presented in Table 13. More detailed presentation of data describing immunization levels of poliomyelitis are presented elsewhere.[1]

This year all age groups from 1 to 20 showed slightly lower levels of immunization than in 1965. This small difference appears consistently in all areas of the country surveyed. Levels of immunity were found to be particularly low in such groups as the nonwhite populations in central cities, where, this year, 19.9 percent of those age 1-4 were totally un-immunized; only 56.5 percent has received as many as three doses of either vaccine.

Only in children under one year of age is this decline in vaccination level apparently reversed. In this age group approximately 60 percent had received at least one dose of either vaccine. (See Table 14)

[1]Results of the September 1966 United States Immunization Survey, prepared by Statistics Section, Epidemiology Program, National Communicable Disease Center.

Table 13

POLIOVACCINE IMMUNIZATION STATUS -- 1965-66
National Immunization Survey
Percent of Population with Doses as Specified by Age Group under 20 Years

Age Group	Year	Population (1,000s)	Adequately Immunized: 3 OPV & 3 IPV	Adequately Immunized: 3 OPV < 3 IPV	Adequately Immunized: < 3 OPV 3 IPV	Adequately Immunized: Total	Partially Immunized: 1-2 OPV 0-2 IPV*	Partially Immunized: 0 OPV* 1-2 IPV*	No Immunization: 0 OPV 0 IPV
1-4	1965	16,498	24.3	24.3	25.3	73.9	11.3	5.0	9.9
	1966	16,091	17.2	31.5	21.5	70.2	13.4	5.0	11.3
5-9	1965	20,360	47.3	14.4	28.3	89.9	5.0	2.1	3.0
	1966	20,430	43.8	21.0	23.3	88.2	6.4	2.6	2.9
10-14	1965	19,099	49.5	13.4	29.2	92.1	4.0	1.8	2.1
	1966	19,694	46.7	18.0	25.3	90.0	5.3	2.4	2.3
15-19	1965	16,655	43.9	13.0	31.5	88.3	4.0	4.0	3.7
	1966	17,250	42.3	16.2	27.9	86.4	4.8	4.7	4.1

*Also includes persons with unknown immunization status and unknown number of doses or injections.

Table 14

POLIOVACCINE IMMUNIZATION STATUS -- 1965-66
National Immunization Survey
Percentage of Infants under 1 Year with some Immunization

	Percent with 1 or more Doses or Injections*	
	1965	1966
Oral Poliovirus Vaccine	36.6)	41.6)
	)- 59.6	)- 60.1
Inactivated Poliomyelitis Vaccine	23.0)	18.5)

*Infants reported as having an unknown number of doses or injections are considered to have at least one dose or injection.

STATE EPIDEMIOLOGIST

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 evolution of this report are gratefully acknowledged.

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