

For Administrative Use

CDC HEPATITIS SURVEILLANCE REPORT

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Special Note

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Information contained in this report is derived from State Health Departments, Epidemic Intelligence Service Officers, the National Office of Vital Statistics, and other pertinent sources. Much of it is preliminary and is intended primarily for the use of those with responsibility for hepatitis control activities. Anyone desiring to quote parts of this report is urged to consult the original investigator for confirmation and interpretation.

I. SUMMARY

The national incidence of hepatitis has continued during the second quarter 1960 at a level far above any year since 1955. All regions reflect this increase with predominance present in most western states, Alabama, Delaware, Kentucky, Tennessee, and West Virginia. Although by the end of June we are approaching the seasonal hepatitis low, monthly morbidity is double last year's total for the same month. Current data strongly suggest that the 1960-61 hepatitis season will be a major one.

Three hepatitis epidemics, a report of infectious hepatitis investigations in Indiana and a breakdown of North Carolina hepatitis cases are summarized.

A comparative review of serum and infectious hepatitis mortality is included.

II. CURRENT HEPATITIS MORBIDITY TRENDS

A total of 9,917 cases was reported to the National Office of Vital Statistics during the second quarter ending July 2. This number represents a 101.9 percent increase over the same quarter last year and 155.9 percent over 1958. Second quarter cases exceed the first quarter total which is unusual in terms of past years experience. This reversal has occurred only one other time since national hepatitis reporting began, in 1958, the year preceding the last major hepatitis high.

Figure 1, titled "Hepatitis Cases Reported in the United States by Month," compares current monthly morbidity with national experience in the past. Sufficient data have accumulated to establish that the seasonal peak by month for the 1959-60 hepatitis year occurred in March. Review of the data by week of report, however, shows that the seasonal peak occurred in the second quarter, during the week ending April 9 (937 cases). This is eight weeks later than the 1959 peak and explains the greater number of cases accumulated in the second quarter total. It is too early on the basis of reported cases by month to predict whether, by the quarter's end, we have reached the seasonal low which typically occurs in June or July.

Study of reported hepatitis cases for the first half of 1960 in terms of the past 7 years' experience indicates that the 1960 current number is exceeded only by the last major hepatitis year in 1954 and the year following. It exceeds the 1953 total which immediately preceded the last national high. Annual hepatitis morbidity has been observed to describe a cyclic pattern in which peaks occur irregularly every 5 to 10 years. Although the 1960 total could represent an abortive national high, more likely we are now at a position corresponding to 1953 and we can anticipate a major increase in morbidity during the 1960-61 hepatitis season.

The total national increase of reported hepatitis is reflected in all of the regions. Table 1 shows that only the Middle Atlantic and Mountain States failed to show an increase of greater than 50% over the corresponding quarter last year. Most remarkable are the increases reported from the East North Central, South Atlantic and East South Central Regions which were 117.3, 259.8, and 246.6 percent, respectively. The Mountain States, one of the two regions with a more moderate increase this year had a much greater 1959 increase, out of proportion to the rest of the country.

A more accurate index of this increase is illustrated by Table 2 which shows attack rates by the major geographic divisions. Here 3 regions are seen to be strikingly high. They are the East South Central, Mountain, and Pacific States which have rates greater than 35/100,000 when adjusted to an annual basis. New England and the Middle Atlantic States have comparatively low rates.

Hepatitis attack rates by State during the second quarter 1960 and preceding 2 years are shown on the maps in Figure 2. Overall comparison shows a progressive increase with a current predominance of hepatitis in the western part of the nation and in Alabama, Tennessee, Kentucky, West Virginia and Delaware. Figure 3, showing rates by state for the first quarter 1960 and two preceding years, permits first and second quarter comparison. Although some decrease in rate is noted in the west for the second quarter in Idaho, the Dakotas, New Mexico, and Nevada, the east has remained quite stable with a major change appearing only in Delaware where a marked increase occurred. Most striking is the lack of significant decrease in first and second quarter rates which was the pattern in 1959 and 1958.

III. EPIDEMIC REPORTS

Summaries of 3 epidemics are included in this hepatitis report. All occurred during the first 6 months of 1960. In addition, a summary of infectious hepatitis investigations in Indiana, January through April, and a breakdown of hepatitis in North Carolina during the first half of 1960 by age and race are included. We are extremely grateful to the State Health Departments who contributed data. Much remains to be learned about the endemic and epidemic occurrence of both infectious and serum hepatitis. It is strongly urged that summaries of studies conducted by State or local health departments be submitted to the Hepatitis Surveillance Unit for inclusion.

Florida - Dr. James O. Bond, Director, Bureau of Preventable Diseases, Florida State Board of Health, has submitted the following summaries of two epidemics investigated by Dr. James F. Molloy, EIS Officer assigned to that Bureau, and Mr. Harvey Burnette.

1) Duval County: A total of 175 hepatitis cases has been reported from Duval County during the first 6 months of 1960; 53 cases occurred in Jacksonville. No cases were reported during the same period one year ago.

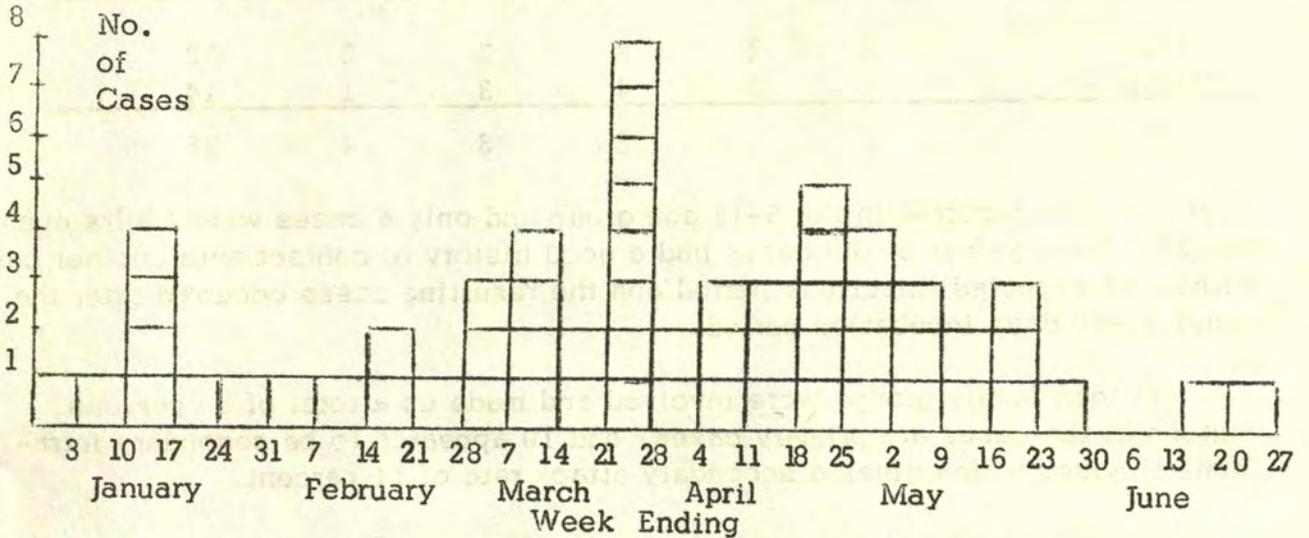
Both person to person contact and at least one common source of infection have been incriminated as sources of infection for the cases. The common source outbreak involved 10 persons, all members of a Sunday school class who ate a progressive Christmas supper last December 17, 1959. Onset of these illnesses occurred between January 3 and January 24. All cases were adults and this unusual age distribution, in addition to the clustering of onset dates, called attention to the fact that this was not an epidemic due to person to person spread. Ten other individuals also present at the supper were interviewed and blood tested for abnormal liver function tests; however, no anicteric cases were discovered.

The other cases occurring over a six-month period have not all been individually investigated. However, a sample group of 29 cases were interviewed carefully and no evidence for a common source of infection was found. On the other hand, 21 of the 29 could tell of contact with a known case, thus implicating person to person spread as the primary mode of infection. The table below presents the age, race, and sex distribution of the Duval County hepatitis cases and the following figure shows the date of onset of cases occurring in Jacksonville. Attack rates for white and Negro populations are 124.5 and 22.8 per 100,000 respectively.

Duval County, Florida, Reported Hepatitis
January 1 to June 30, 1960

Race	Age Group								Total
	0-4	5-9	10-14	15-19	20-29	30-39	40+	Unk.	
W M	2	23	15	7	8	3	1	7	76
W F	3	24	17	5	11	14	6	3	83
White	5	52	32	12	19	22	7	10	159
N M	-	1	4	-	3	1	1	1	11
N F	1	-	-	-	3	-	-	1	5
Negro	1	1	4	-	6	1	1	2	16
Total	6	53	36	12	25	23	3	12	175

Jacksonville Hepatitis Cases by Week of Onset



2) Hillsborough County: Eighty cases of hepatitis were reported from Hillsborough County including Tampa during the first 5 months of 1960; 14 cases occurred over a similar period last year. A concentration of cases had occurred in one particular housing project and these were designated for detailed study.

Peak incidence occurred during the week of May 7 - 14 and was made up principally of cases in the housing project. Seventy-seven occurred in the white population for an attack rate of 23 per 100,000 and 3 occurred in Negroes for a rate of 4.6 per 100,000. Thirty-six (45%) occurred in the 5-14 age group. The cases were equally divided between sexes. The epidemic curve and age distribution, as well as patient interviewing, all follow the pattern of contact spread outbreaks.

In the housing project, a federal project for white, low-income families, the population was predominantly Latin. The children attended one of two schools. Neither children nor adults often left the confines of this area, and most of the children tended to play or congregate in relatively fixed groups with little intermingling between groups.

Twenty-six cases occurred in this housing project during the first half of the year. The following table gives the age and sex distribution of these cases.

Age Group:	0-4	5-9	10-14	15-19	20+	All Ages
Male	2	2	2	3	3	12
Female	0	6	4	3	1	14
Total	2	8	6	6	4	26

Over half (14) occurred in the 5-14 age group and only 4 cases were adults over age 20. Twenty-four of the cases had a good history of contact with another case within the expected infectious period and the resulting cases occurred after the usual 10-40 days incubation period.

Fifteen family groups were involved and made up a total of 93 persons. Sixteen of the cases are primary cases, and 10 appeared to be secondary intra-familial cases which gives a secondary attack rate of 11 percent.

The table below shows cases by month of onset. The gradual buildup reaching a high peak in May is a prominent feature of this outbreak.

Month:	Jan.	Feb.	March	April	May
Cases:	0	1	2	4	18

Additional cases had onset in June; the number, although not completely reported, is less than the May total. Immune globulin was made available to family contacts of cases in the dose of 1 cc for persons under 100 lbs., and 2 cc for those averaging more. Three received immune globulin after the onset of illness, three were given immune globulin one day before the onset of illness, and one received immune globulin six days before onset of illness. In all these instances, the patients had delayed receiving immunization for some time after the onset of the first family case. Forty-nine persons received immune globulin without resultant illness. Twenty-three family members did not get immune globulin and in this group 3 cases occurred.

3) Tennessee - Dr. C. B. Tucker, Director, Preventable Diseases, Tennessee Department of Public Health, has given permission to include the following investigation of a probable common source infectious hepatitis outbreak performed by Wade W. Sherwood, M.D., EIS physician assigned to that department. This epidemic occurred in a small subdivision in Hawkins County, Tennessee.

Most houses received water from a privately owned public water supply which did not meet the standards of the Tennessee Department of Public Health.

Early in January, cases of infectious hepatitis were diagnosed in this community. Through January 23, 1960, ten hepatitis cases, all icteric, had been reported. Nine of these cases had onsets between December 23 and January 9. The tenth case, with onset January 16, was the younger brother of a patient whose hepatitis began January 2. Therefore, nine hepatitis cases occurred within a twelve day period which indicates that all were exposed at nearly the same time, the spread over twelve days being due to the usual variation in incubation period.

All cases lived in houses receiving water from well #1 of the subdivision water system. No cases were known in nearby houses which had other water supplies, nor did any cases appear in schoolmates of subdivision children. All these facts indicated that water from well #1 of the water system carried infective amounts of infectious hepatitis virus for a brief period between December 1 and December 15.

Samples from this well submitted to the Tennessee Department of Public Health Laboratory contained coliform organisms with remarkable consistency, indicating rather constant fecal contamination. This well, inadequately protected, was less than fifty feet from a pit privy and less than one hundred feet from a sinkhole into which drained a septic tank and a pig pen.

A four-year-old girl who was diagnosed by her physician in October as a case of infectious hepatitis frequently visited her grandmother, whose privy was, as above noted, close to the incriminated well. If this girl had been a convalescent carrier of the infectious hepatitis virus in early December or late November, she could have infected the well.

Indiana - The following summary of infectious hepatitis investigations through April 1960 was received from Dr. A. L. Marshall, Jr., Director, Division of Communicable Disease Control, Indiana State Board of Health. The investigations were performed by Dr. John Googins, State Epidemiologist.

Indiana experienced an increase of reported cases of infectious hepatitis during the first four months of 1960 as compared to the same period in 1959. Through April, five small outbreaks were investigated by the Indiana State Board of Health.

The outbreaks observed were all similar in certain respects. All were associated with schools, four of which were rural schools. One of the schools was located in a small county seat town. The schools involved were grade schools and

most of the cases were limited to the first four grades. The number of detected cases in any one school was few. The most cases occurring in any school was 26 out of 277 pupils. Although the peak incidence of infectious hepatitis occurred in these schools following January 1, 1960, investigation revealed that cases had been detected in fall and early winter months of 1959 also. Most of the cases detected had been characterized by jaundice and were mild.

Investigation of these outbreaks did not reveal that a common contaminated vehicle was responsible for spread. It seems more likely that transmission occurred through personal contact within the environment of the school. The latter concept is supported by the finding of cases during the early part of the school year preceding peak incidence.

With one exception the outbreaks investigated occurred in areas which have been free of outbreaks of infectious hepatitis within recent years. The one exception occurred in a county which had a widespread outbreak in 1953. At that time many cases were detected in the western half of the county during the winter and spring of 1953. The school which experienced the small outbreak this year was not involved in 1953 even though it is in the same geographical area of the earlier outbreak.

North Carolina - Dr. Jacob Koomen, Assistant Director, Division of Epidemiology, North Carolina State Board of Health, has provided data on hepatitis morbidity in that State during the first six months of 1960. There have been 165 cases with onset in 1960 as compared with 37 cases for the same period 1959. The occurrence by race and age of the 165 cases reported through July 2, 1960 was given as follows:

<u>Race</u>	<u>Age Group</u>			<u>Unknown</u>	<u>Total</u>
	<u>0 - 4</u>	<u>5 - 19</u>	<u>Over 20</u>		
Indian	1	8	3		12
Negro	1	10	13	1	25
White	5	35	38		128
<u>Total</u>	<u>7</u>	<u>103</u>	<u>54</u>	<u>1</u>	<u>165</u>

Attack rates for each race per 100,000 population are: Indian, 34.28; Negro, 2.14; and White, 3.85.

Age specific attack rates for the total population are: 0 - 4 age group, 1.25; 5 - 19 age group, 7.85; and 20 or over age group, 2.03.

IV. REVIEW - HEPATITIS MORTALITY

The late Dr. Morris Greenberg, Director, Bureau of Preventable Diseases, the City of New York Department of Health, in a letter to the Hepatitis Surveillance Unit took exception to a statement found in the last CDC Hepatitis Surveillance Report regarding the level of serum hepatitis mortality. To quote from a part of his letter of May 9, 1960: ". . . the statement is made that hepatitis B is a form of hepatitis known to have a case fatality ratio of up to 30% or more. I believe that this statement, as it stands, is false. Some explanatory statement should go with it. . .

"Infectious hepatitis usually attacks young, vigorous people. Serum hepatitis results usually from transfusions which are given to individuals who are, as a rule, quite ill from one or a variety of diseases. How much of the latter factor influences the fatal outcome I do not know, but I have no doubt that the influence is considerable."

This very pertinent comment by Dr. Greenberg prompted a review of past serum hepatitis outbreaks to learn what is known regarding age, general health, and morbidity and mortality in order to establish how these factors influence the case fatality rate. Also an attempt has been made to compare serum and infectious hepatitis morbidity in similar age groups.

Mortality Associated with Yellow Fever Vaccine Containing Human Serum:

In the 1940's over 50,000 cases of hepatitis B followed inoculation of large population groups with yellow fever vaccine containing human sera. Fox ^{1/} in 1942 reported an outbreak in Brazil in which two vaccine lots were responsible for the majority of 1,072 cases. The following table gives the morbidity and mortality associated with these two lots, other lots, and non-vaccinated groups.

<u>Vaccine Lot No.</u>	<u>No. Vaccinated</u>	<u>No. Icteric</u>	<u>Percent Icteric</u>	<u>Number Fatal</u>	<u>Fatalities Per 100 Cases</u>
489	9,604	736	7.66	19	2.58
498	9,587	150	1.56	3	2.00
Other Lots	37,978	93	0.106	2	2.15
Not Vaccinated	-	70		0	0
Total		1,072		24	

The death rate for the combined cases associated with the two infectious vaccine lots was 2.48 percent. A strikingly increased proportion of severe illness and morbidity was found in the older age groups which is shown in a table below adapted from Fox.

Severity as Measured by Duration of Illness

Age	<u>Less than 21 days</u>		<u>22 - 49 days</u>		<u>50 - 90 days</u>		<u>More than 90 days</u>		<u>Total</u>
	No.	%	No.	%	No.	%	No.	%	
0 - 19	144	46.0	113	36.1	36	11.5	20	6.4	313
20 - 39	75	19.3	174	44.7	89	22.9	51	13.1	389
40+	31	15.0	72	34.8	68	32.9	36	17.4	207
All Ages	250	27.5	359	39.5	193	21.2	107	11.8	909

During World War II Findlay ^{2/} reported 689 cases of serum hepatitis among personnel of the British Armed Forces following yellow fever inoculation and also found increasing severity with advancing age.

Also during World War II, Sawyer ^{3/} described an epidemic among army personnel in the western region of the United States receiving yellow fever vaccine. Of the 2,954,600 army personnel who received the vaccine, 10,284 icteric cases of hepatitis occurred. Some vaccine lots accounted for no cases while others were associated with rates as high as 5.7 cases per 100 doses. There were 31 deaths among the 10,284 cases, giving a case fatality rate of 0.3 percent. This very low mortality rate occurred in army personnel composed primarily of the young adult age group who by recent physical examination had no significant underlying disease. It is significant that Fox and Sawyer, in two different outbreaks of serum hepatitis associated with yellow fever vaccine, one in a Brazilian population which includes all age groups, and the latter in a group of young U. S. Army personnel, recorded a case fatality rate of 2.5 percent and 0.3 percent respectively. It is interesting to speculate that the nearly ten-fold difference can be explained, at least partially, on the basis that the Brazilian epidemic included older people and probably also some with underlying disease and a less favorable nutritional status.

Mortality Associated with Measles Convalescent Serum: In contrast to these mortality rates, in a memorandum on homologous serum jaundice prepared by the Medical Officers of the Ministry of Health, England, ^{4/} the occurrence of this illness was associated with a fatality rate of 22 percent. In this instance, the disease followed the administration of measles convalescent serum to 109 children. Thirty-seven children developed jaundice (34%) and eight died. Of this group, 108 were under 20 years of age and no obvious underlying disease was present except for 8 who were confined to mental institutions. Here is a much higher mortality rate, approximately 10 times that of the Brazilian outbreak, and 100 times that of the American Army outbreak.

Morbidity Associated with the Use of Blood and Plasma: Turning to morbidity and mortality attending the use of whole blood and plasma, the following table is a summary of selected reports showing hepatitis morbidity in terms of incidence per unit and per recipient.

<u>Whole Blood</u>			
<u>Author</u>	<u>Year Published</u>	<u>Cases/100 Units</u>	<u>Cases/100 Recipients</u>
<u>5/</u> Allen	1954	0.11	0.37
<u>6/</u> Bang	1959		2.3
<u>7/</u> Haessig	1953	0.4	1.3
Jennings	1957	1.15	4.16
Katz	1957	1.15	4.16
<u>10/</u> Lehane	1949	0.35	0.8
<u>11/</u> Madsen	1954	0.41	1.1
<u>12/</u> McGraw	1949	0.13	0.26
<u>13/</u> Kunin	1959	0.31	-
<u>14/</u> Sayman	1958	0.63	3.0
<u>15/</u> Sborov	1953	0.6	3.6
<u>16/</u> Scheinberg	1957	0.45	-
<u>17/</u> Straus	1953	1.0	3.0
	Range	0.11 - 1.15	0.26 - 4.16

PLASMA

<u>Author</u>	<u>Year Published</u>	<u>Cases/100 Units</u>	<u>Cases/100 Recipients</u>
<u>15/</u> Sborov	1953	1.2	21.9
<u>16/</u> Scheinberg	1957	1.2	-
<u>13/</u> Spurling	1946	-	2.5 - 7.3
<u>19/</u> Steel	1950	-	2.5 - 21.9
	Range	1.2	2.5 - 21.9

Serum hepatitis incidence per unit whole blood varies from 0.11 to 1.15 percent and is 1.2 percent for plasma. The incidence by recipient varies from 0.26 to 4.16 percent for blood and from 2.5 to 21.9 percent for plasma.

The next table shows mortality associated with whole blood and plasma transfusions.

<u>Author</u>	<u>Year Published</u>	<u>Blood Product</u>	<u>Cases</u>	<u>Deaths</u>	<u>Mortality per 100 Cases</u>
<u>20/</u> Ratnoff	1949	Blood and plasma	40	11	27.5
<u>16/</u> Scheinberg	1957	Blood and plasma	-	4	36
<u>18/</u> Steel	1950	Blood, plasma, serum	25	9	36

Unfortunately, only three authors recorded deaths with mortality rates of 36, 34, and 27.5 percent. Numbers are small; nevertheless, they are associated with rates much higher than followed the use of infected yellow fever vaccine.

19/
Steel gave the following age distribution in his series of 25 cases.

<u>Age</u>	<u>Number</u>	<u>Percent</u>
0 - 9	2	8.0
17 - 20	3	12.0
20+	20	30.0
Total	25	100

Significantly, 80 percent of the cases were over 20 years of age, and of the 9 deaths, 5 were patients debilitated by disease, 4 were in "fair condition," and only 1 was judged to be in good health prior to onset of illness. It was Steel's impression that mortality is higher in serum hepatitis because of the severity of the underlying disease process and the poor general condition of the patient at the time of virus introduction. He also found that the severity of the underlying disease process correlated with the prognosis after a person contracted serum hepatitis; those with more severe initial disease had increased hepatitis morbidity and mortality. Nutrition, age, underlying diseases, and surgical procedure, therefore, apparently play a prominent role. Although present, these factors were certainly favorable in the outbreaks associated with yellow fever vaccine with a much lower case fatality rate.

Discussion: Reported mortality rates for infectious hepatitis usually range in the neighborhood of 0.2 percent^{21, 22, 23/} and there is very little deviation from this figure in reported outbreaks. Actually, many major outbreaks have occurred without any reported mortality, although few are given adequate long term follow-up to rule out late deaths due to chronic disease. This 0.2 percent rate is nearly identical to the rate observed in the outbreak of serum hepatitis that followed the inoculation of U. S. troops with yellow fever vaccine in 1942. In most epidemic or endemic occurrences of infectious hepatitis the greatest proportion of cases occur in the 5 - 19 age group and this population more closely resembles those infected with serum hepatitis in the army with regard to age and general health. There is also a correlation between increased age in infectious hepatitis and severity which is brought out in an epidemic reported by Horstmann.^{24/} Only 15 percent of her cases occurred in individuals over 16 years of age, 69 percent of the hospitalized cases were over 16.

Therefore, in comparable age groups with no underlying disease process, the mortality rate for infectious and serum hepatitis in some epidemics appears to be similar. Since most of the serum hepatitis cases occur in the older age group and are compounded upon underlying disease processes, one, therefore, expects an extremely high mortality.

A final factor of importance which must be considered is the effect of virus dose in the material inoculated. Yellow fever vaccine buffered with infected human serum in a total volume of 1 cc was associated with low mortality rates varying from 0.3 to 2.5 percent. However, in the outbreak associated with measles convalescent serum, the mortality rate was 22 percent and associated with the injection of 5 to 10 cc of serum. The difference in mortality rates between the vaccine and hyper-immune serum may well reflect differences in the number of virus particles causing infection. Serum hepatitis following a transfusion of blood or plasma has the highest mortality rate (27 to 35%) and is associated with the greatest volume of potentially virus containing material.

Summary: This discussion hopefully emphasizes how little actually is known about hepatitis morbidity and mortality. Careful clinical and epidemiological study and long term follow-up of both epidemic and endemic occurrences of serum and infectious hepatitis are needed if we are to obtain accurate, useful information. Particularly absent are satisfactory denominator data on exposed persons by age that would allow accurate age specific rates to be calculated. It is urged that such studies be undertaken whenever the opportunity presents itself. The Hepatitis Surveillance Unit offers to furnish epidemiological assistance or consultation to any proposed study.

(This report was prepared by James O. Mason, M.D., Chief, Hepatitis Surveillance Unit, Surveillance Section, with the assistance of Ida L. Sherman, Statistics Section, CDC)

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Fig. 1 HEPATITIS MORBIDITY BY MONTH
UNITED STATES, 1953-1960

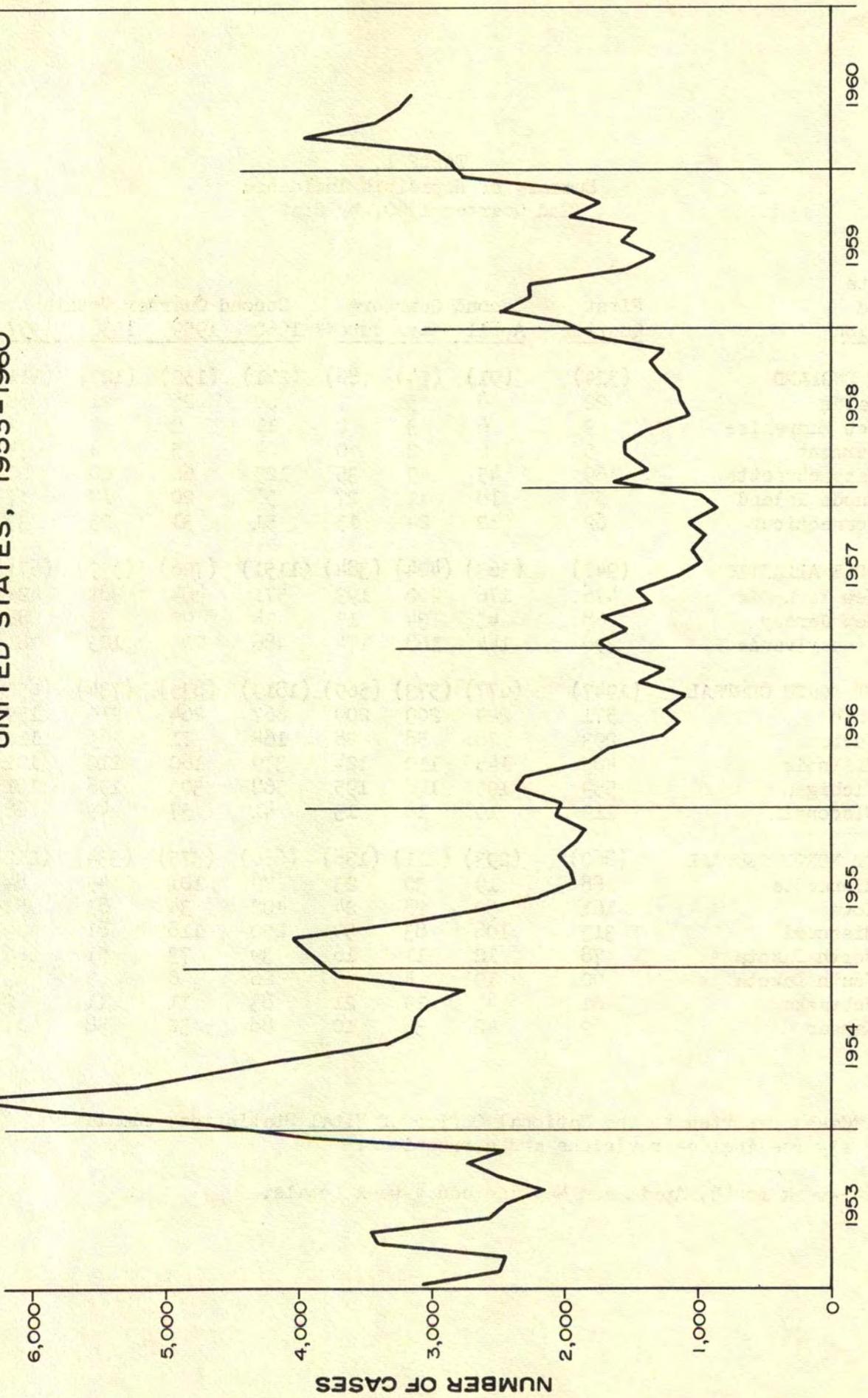


TABLE 1
Summary of Hepatitis Incidence
2nd Quarter 1960, by State

State and Region	First Quarter	Second Quarter*			Second Quarter Totals				Cum. 1960
		April	May	June**	1960	1959	1958	1957	
NEW ENGLAND	(324)	(91)	(94)	(86)	(271)	(152)	(127)	(211)	(595)
Maine	22	8	5	7	20	28	21	68	42
New Hampshire	9	6	3	2	11	2	0	2	20
Vermont	5	2	2	0	4	5	4	34	9
Massachusetts	169	45	49	35	129	66	60	57	298
Rhode Island	57	18	11	27	56	20	17	17	113
Connecticut	62	12	24	15	51	31	25	33	113
MIDDLE ATLANTIC	(942)	(363)	(404)	(384)	(1151)	(796)	(539)	(671)	(2093)
New York	476	176	202	193	571	484	381	424	1047
New Jersey	68	43	34	17	94	92	33	86	162
Pennsylvania	398	144	168	174	486	220	125	161	884
EAST NORTH CENTRAL	(1947)	(677)	(573)	(569)	(1819)	(835)	(734)	(652)	(3766)
Ohio	571	249	209	209	667	264	210	159	1238
Indiana	293	78	58	28	164	71	69	112	457
Illinois	405	145	110	124	379	160	210	122	784
Michigan	559	195	178	195	568	303	196	191	1127
Wisconsin	119	10	18	13	41	37	49	68	160
WEST NORTH CENTRAL	(860)	(293)	(211)	(156)	(660)	(375)	(334)	(212)	(1520)
Minnesota	88	19	30	23	72	101	45	84	160
Iowa	161	50	28	24	102	34	83	51	263
Missouri	313	108	83	59	250	118	81	29	563
North Dakota	78	12	11	16	39	73	51	22	117
South Dakota	90	19	4	3	26	6	5	13	116
Nebraska	61	43	19	21	83	11	11	2	144
Kansas	69	42	36	10	88	32	58	11	157

*Cases reported to the National Office of Vital Statistics; cumulative figures include revisions and corrections.

**5-week month, April and May include 4-week totals.

Table 1 (Continued)

State and Region	First	Second Quarter			Second Quarter Totals				Cum.
	Quarter	April	May	June	1960	1959	1958	1957	1960
SOUTH ATLANTIC	(1134)	(420)	(405)	(391)	(1216)	(338)	(245)	(312)	(2350)
Delaware	56	22	30	37	89	23	23	1	145
Maryland	119	35	38	38	111	82	31	36	230
D. C.	10	1	2	6	9	2	5	0	19
Virginia	281	44	60	87	191	71	54	129	472
West Virginia	239	58	95	64	217	29	24	17	456
North Carolina	59	52	26	45	123	23	10	23	182
South Carolina	30	1	6	5	12	5	12	9	42
Georgia	106	23	18	16	57	31	25	33	163
Florida	234	184	130	93	407	72	61	64	641
EAST SOUTH CENTRAL	(1531)	(535)	(504)	(403)	(1442)	(416)	(320)	(494)	(2973)
Kentucky	654	221	170	121	512	160	134	259	1166
Tennessee	481	160	194	135	489	110	84	138	970
Alabama	293	110	114	107	331	120	81	70	624
Mississippi	103	44	26	40	110	26	21	27	213
WEST SOUTH CENTRAL	(709)	(326)	(309)	(260)	(895)	(448)	(290)	(313)	(1604)
Arkansas	33	13	18	7	38	27	40	23	71
Louisiana	28	8	17	18	43	57	1	15	71
Oklahoma	117	42	30	29	101	56	41	32	218
Texas	531	263	244	206	713	308	208	243	1244
MOUNTAIN	(876)	(231)	(265)	(250)	(746)	(618)	(469)	(335)	(1622)
Montana	44	2	9	6	17	55	125	55	61
Idaho	126	27	27	26	80	46	28	22	206
Wyoming	6	2	4	1	7	6	0	25	13
Colorado	252	100	120	97	317	217	56	47	569
New Mexico	152	38	18	23	79	101	91	122	231
Arizona	200	40	57	80	177	145	103	52	377
Utah	80	19	30	16	65	47	44	10	145
Nevada	16	3	0	1	4	1	22	2	20
PACIFIC	(1470)	(523)	(529)	(665)	(1717)	(934)	(818)	(778)	(3187)
Alaska	75	30	11	17	58	6	17	25	133
Washington	173	62	48	101	211	114	126	81	384
Oregon	279	103	93	82	278	157	108	125	557
California	910	324	370	455	1149	647	546	535	2059
Hawaii	33	4	7	10	21	10	21	12	54
UNITED STATES	9793	3459	3294	3164	9917	4912	3876	3978	19,710

Table 2
Hepatitis Case Rates Per 100,000 Population
by Major Geographic Regions
Second Quarter 1960

Region	Estimated Population*	Number of Cases	Rate 2nd Quarter 1960	Rate Adj. to an Annual Base
UNITED STATES	176,365,000	9,917	5.6	22.5
New England	10,155,000	271	2.7	10.7
Middle Atlantic	33,748,000	1,151	3.4	13.6
East North Central	36,513,000	1,819	5.0	19.9
West North Central	15,375,000	660	4.3	17.2
South Atlantic	25,828,000	1,216	4.7	18.8
East South Central	12,004,000	1,442	12.0	48.1
West South Central	16,700,000	895	5.4	21.4
Mountain	6,624,000	746	11.3	45.0
Pacific	19,419,000	1,717	8.8	35.4

*Estimated population July 1, 1959, U. S. Bureau of the Census. Current population Estimates Series P-25:210, Dec. 27, 1959.

Fig. 2 HEPATITIS MORBIDITY BY STATE
RATE PER 100,000 POPULATION

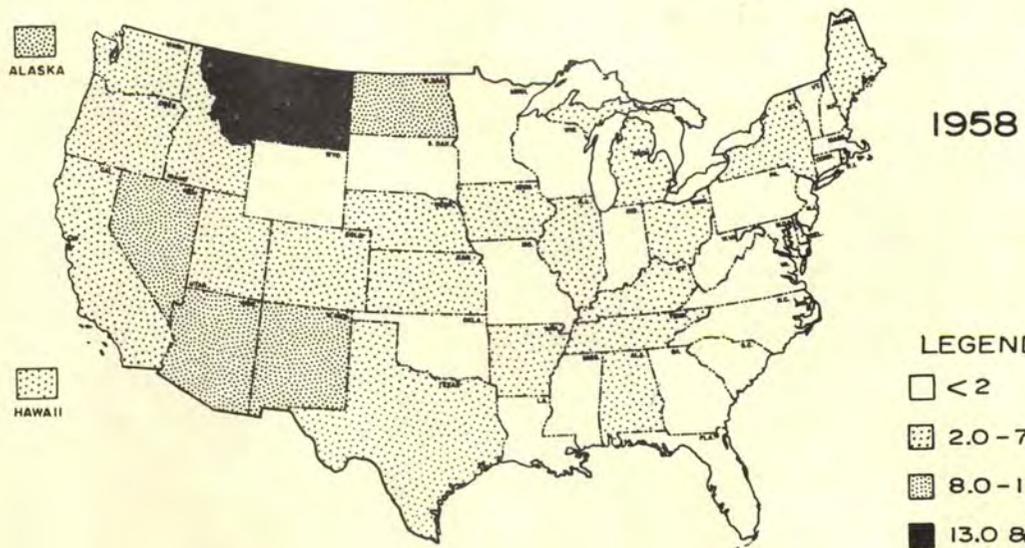
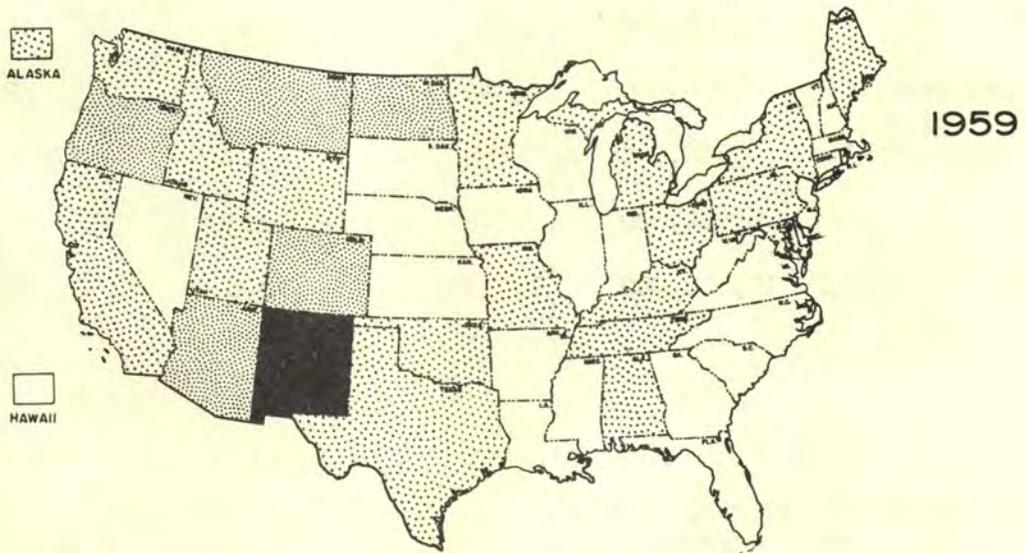
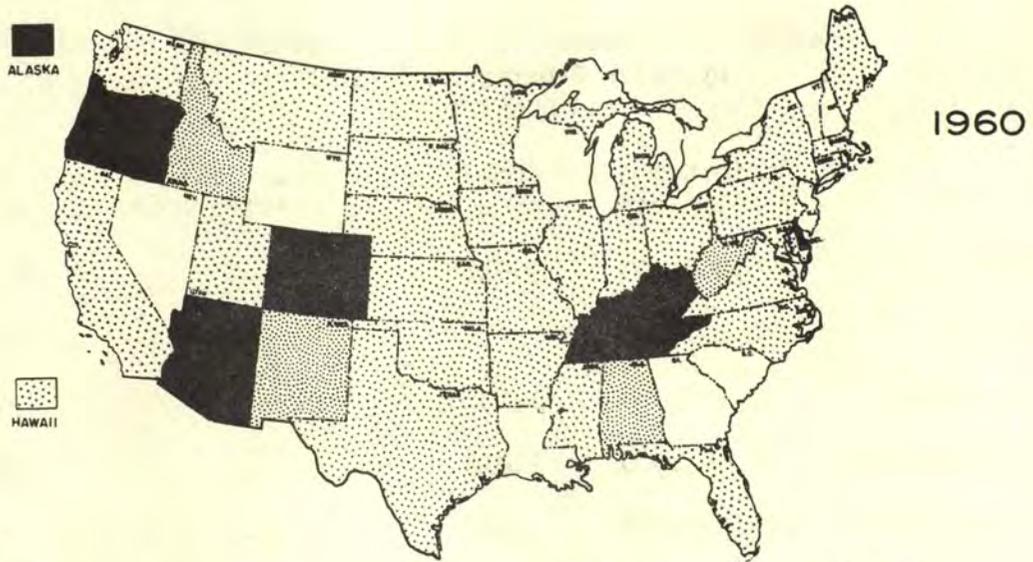


Fig. 3 HEPATITIS MORBIDITY BY STATE
RATE PER 100,000 POPULATION

