Public Health Reports

Vol. 55 • JULY 5, 1940 • *No. 27*

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

May 19–June 15, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended June 15, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—For the 4 weeks ended June 15 there were 2,685 cases of influenza reported, as compared with 3,236, 2,120, and 2,206 for the corresponding period in 1939, 1938, and 1937, respectively. While the disease was less prevalent than it was in 1939, it was about 20 percent above the preceding 5-year median figure for this period. The South Atlantic, East South Central, and Mountain regions reported excesses over the normal seasonal expectancy, but in all other regions the situation was quite favorable.

Poliomyelitis.—The reported number of cases of poliomyelitis increased from 66 for the preceding 4-week period to 179 for the current 4-week period. Of the total cases, the State of Washington reported 77 and California reported 44 cases. While an increase was apparent in practically all sections of the country, no more than 4 cases were reported from any other State. During the preceding 5 years there had been no cases of this disease reported from Washington during this period, and the average number reported from California was 23 cases. An increase of this disease is normally expected at this season of the year, but owing to the increases in the Mountain States the incidence for the country as a whole is slightly above the 1935–39 median incidence for this period.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria continued at a comparatively low level, 677 cases being reported during the 4 weeks ended June 15, as compared with 1,022, 1,260, and 1,367 for the correspond-

ing period in 1939, 1938, and 1937, respectively. A few more cases than might normally be expected were reported from the Mountain region, but in all other regions the incidence was relatively low. In all regions except the New England and Mountain the current incidence is the lowest recorded for this period in the 12 years for which these data are available.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period May 19–June 15, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	677	1,022	1,367	2,685	3,236	2,206	42,424	48,249	48,249	98	140	363
New England	22	12	46	10	6	12	7,291	8,099	7,475	6	10	15
Middle Atlantic	144	208	266	38	36	39	10,115	8,382	18,292	23	58	64
East North Central	153	213	297	258	304	314	7,686	4,797	12,999	19	15	51
West North Central	51	60	89	35	138	157	2,766	3,225	3,225	4	3	12
South Atlantic	119	173	181	977	1,396	451	2,456	6,366	4,157	17	15	95
East South Central	47	71	92	225	230	160	1,265	810	1,182	9	15	40
West South Central	99	137	166	674	705	705	4,314	2,637	1,424	14	12	26
Mountain	61	43	48	229	221	158	2,671	1,991	1,991	2	7	7
Pacific	81	105	132	239	200	309	3,860	11,942	7,555	4	5	19
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	179	217	164	13,172	10,046	17,305	243	1,057	839	572	875	875
New England	2	2	5	719	767	1,377	0	0	0	20	28	24
Middle Atlantic	10	10	10	4,768	2,816	4,913	0	46	0	68	71	74
East North Central	9	9	12	5,109	3,904	5,506	79	230	166	69	102	91
West North Central	7	4	4	747	808	1,925	90	331	412	49	40	45
South Atlantic	7	119	16	529	386	518	4	22	4	102	204	204
East South Central	9	6	8	342	219	192	23	147	5	69	87	115
West South Central	6	10	20	172	171	267	26	114	62	125	167	167
Mountain	6	19	3	197	321	387	17	39	109	25	29	30
Pacific	123	38	24	589	654	914	4	128	128	45	147	57

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

Measles.—The number of cases (42,424) of measles reported for the country as a whole was also relatively low. While the Middle Atlantic, East North Central, and Mountain regions reported excesses in the numbers of cases over the corresponding period in 1939, only 2 regions (the West South Central and Mountain) reported any definite increase over the 1935–39 median figure for this period.

Meningococcus meningitis.—The incidence of meningococcus meningitis (98 cases) was the lowest recorded for this period in the 12 years for which these data are available. Each section of the country shared in the favorable situation of this disease that now exists. During the preceding 4-week period there were 19 cases reported from New Mexico. A correction appeared in the PUBLIC HEALTH REPORTS of June 14, page 1093, changing that figure to 1 case.

Scarlet fever.—A decrease in scarlet fever of approximately 6,000 cases occurred during the 4 weeks ended June 15, as compared with the preceding 4-week period. A comparison with previous years indicated that the disease was more prevalent than it was last year at this time, but the number of cases (13,172) was only about 75 percent of the 1935–39 median figure for this period. In the South Central regions the incidence was somewhat above the seasonal expectancy; in the South Atlantic region the number of cases was about normal, while all other regions reported significant decreases from the seasonal average.

Smallpox.—For smallpox the comparison with previous years was quite favorable, the current incidence (243 cases) being the lowest on record for this period. Only one region, the East South Central, reported an excess of cases over the estimated expectancy, the cases (23) being more than four times the 1935–39 median figure in that region. In 1939 the incidence of smallpox was unusually high in the South Central regions during this period.

Typhoid fever.—Typhoid fever is still maintaining its favorable low level, as compared with previous years, the total number of cases (572) being only about 65 percent of the incidence in 1939, which figure also represents the 1935–39 median incidence for this period. In the North Atlantic, West North Central, and Mountain regions the incidence was about normal for this season of the year, but all other regions reported very definite declines from the normal seasonal expectancy.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended June 15, based on data received from the Bureau of the Census, was 10.9 per 1,000 inhabitants (annual basis). The average rate for this period in the 5 preceding years was 11.0.

STUDIES IN CHILDBIRTH MORTALITY[1]

II. AGE AND PARITY AS FACTORS IN PUERPERAL FATALITY[2]

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The childbearing period for women extends roughly between the ages of 15 and 45 years. During this period the reproductive performance of individual women varies widely. Thus, during one year

[1] From the Division of Public Health Methods, National Institute of Health, U. S. Public Health Service, and the Division of Maternity, Infancy, and Child Hygiene, New York State Department of Health. The valuable assistance rendered by Miss S. Elizabeth Sheerar is gratefully acknowledged.

[2] Presented before the Biometric Section of the American Statistical Association at the 101st Annual Meeting in Philadelphia, December 28, 1939.

in the country may be found women of the same age who are giving birth for the first time and for the twenty-fifth time. Groups of women of varying realized fertility are, obviously, differentiated by a multiplicity of factors ranging from the purely biological ones of sterility and partial sterility to the psychological and socio-economic factors involved in the differences in modes of life. The extent to which these factors are individually related to survival of mother and offspring may not easily be measured. However, the collective effect of all the factors as expressed in variations in the risk of death to mother and infant according to order of birth may be determined. Thus it was shown in a previous study (*1*) that the neonatal mortality and stillbirth rates are high for first births and for births of high orders and low for the intermediary orders of birth. Similarly, the rates are high for infants of very young and old mothers, and relatively low for infants of mothers in their twenties. It was also shown that these variations are independent of the correlation between order of birth and age of mother, for the differences in the rates according to one of these factors persisted when the effect of the other factor had been eliminated.

Our knowledge concerning the relation of age and parity to maternal mortality is meager. Little has been added on this subject since Coghlan's famous study in 1899 on childbirth in New South Wales (*2*) in which the risk of death to the mother was shown in relation to parity for all ages, and in relation to age in two groups, primipara and multipara. It is the object of the present paper to study in greater detail the relationship of parity and age of mother to childbirth mortality (mother and infant).

MATERIAL AND METHOD

This is the second of a series of studies on childbirth mortality. A description of the material and method was given in the preceding paper (*3*) and only a brief account will be given here. The studies are based on over a quarter of a million deliveries occurring in New York State (exclusive of New York City) in the 3-year period 1936–38. The data were derived from birth and death certificates received by the New York State Department of Health. The names of all women who died from a puerperal cause were searched in the index of births to determine whether a live or a stillbirth certificate was registered. Searches were also made in order to match the birth and death certificates of all infants who died under one month of age. The information from each of the matched certificates was brought together on a single punch card.

Women whose death was associated with abortion, miscarriage, ectopic pregnancy, and those who died undelivered were excluded since no birth certificate is filed for these conditions. There remain

only the deaths of mothers delivered of an offspring of viable age.[3] The risk of death to the mother which is associated with such deliveries was defined as "puerperal fatality." This risk was measured by a "puerperal fatality rate" defined as the number of deaths of mothers who were delivered either of a live birth or of a stillbirth per 10,000 total deliveries (including those of stillbirths).

During the 3-year period 1936–38, 255,727 women were delivered of 258,525 infants.[4] Of these infants 7,177 were stillborn and 7,550 died neonatally (under one month of age). During the same period 1,122 deaths of women were registered in which the primary cause of death was classified as puerperal. A thorough search in the vital statistics files produced birth and stillbirth certificates for 689 deliveries. From the statements on the death certificate, it was possible to establish with reasonable accuracy that for the remaining 433 women, pregnancy terminated either in an abortion or a miscarriage, that it was ectopic, or that the woman died undelivered. The puerperal fatality rate, as previously defined, was 26.9 per 10,000 deliveries.

ORDER OF BIRTH

Expectant mothers are generally considered in two main groups, primipara and multipara. Such classification is not entirely satisfactory for the purpose of describing the mortality of mother and infant. It is true that the rate of loss of both mother and infant is higher among first births than among subsequent births taken as a group. However, the rates of mortality do not continue to decline with increasing order of birth. For example, the neonatal mortality and the stillbirth rates of births of orders 5 and over are much higher than those of first births (*1*). Similarly the maternal mortality rate for women of high parity exceeds that of primipara (*2*). It is largely because the multipara are numerically weighted heavily by second and third births, for which the rate is lowest, that their rate is lower than that of the primipara.

The variation in infant and maternal mortality by order of birth assumes greater significance in view of the increasing proportion of first births which results from the decline in the birth rate. In New York State (exclusive of New York City) the proportion of first births increased from 28.8 percent in 1917 to 36.0 in 1936. The change in the composition of the population by order of birth is so rapid that when the 3-year period 1936–38 is compared with the first year of the series (1936), first births increased from 36.0 to 37.4 percent of all births. Correspondingly, births of orders 3 to 7 have declined from 34.8 percent in 1936 to 33.0 for the total 3-year period 1936–38.

[3] The term "an offspring of viable age" is used to denote a fetus which advanced at least to the fifth month of utero-gestation and which was registered either as a live birth or as a stillbirth.

[4] There were 2,754 pairs of twins and 22 sets of triplets.

In view of the differential mortality by order of birth, it appears that the groups with less favorable mortality rates are forming an increasingly larger proportion of the deliveries. Moreover, if the neonatal mortality rate gives an indication of the innate vitality of the infants, then the decline in the birth rate may be accompanied by a change in the vitality of the population.

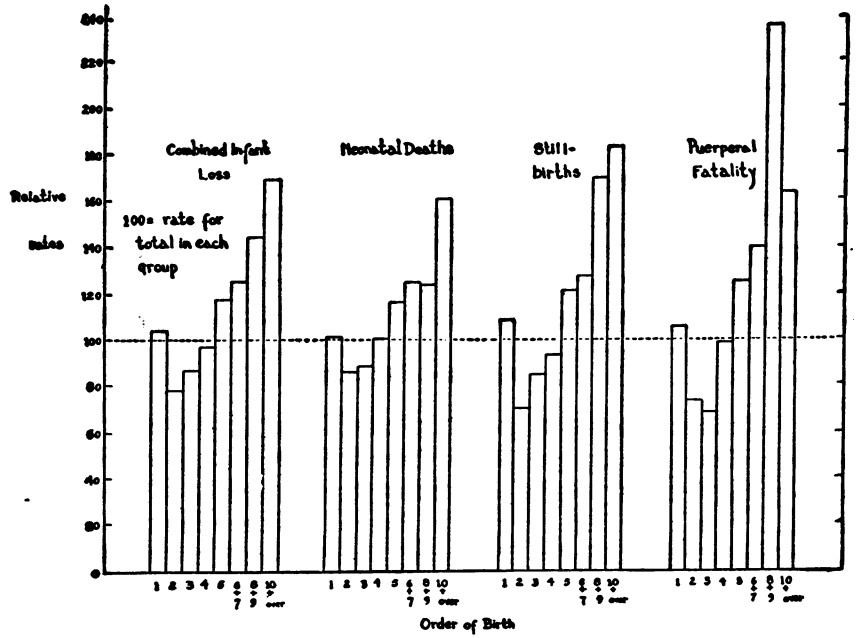

FIGURE 1.—Relative rates for combined infant loss (late fetal and neonatal mortality), neonatal mortality, stillbirths, and puerperal fatality by order of birth (rate for total in each group=100), New York State (exclusive of New York City), 1936-38.

TABLE 1.—*Puerperal fatality, stillbirth and neonatal mortality rates by order of birth, New York State (exclusive of New York City), 1936-38*

Order of birth	Total deliveries	Total births	Live births	Neonatal deaths	Stillbirths	Puerperal deaths	Rates			
							Combined infant loss [1]	Neonatal mortality [2]	Stillbirths [1]	Puerperal fatality [3]
1	96,954	96,954	94,032	2,876	2,922	273	59.8	30.6	30.1	28.2
2	63,227	63,974	62,728	1,625	1,246	125	44.9	25.9	19.5	19.8
3	35,117	35,794	34,949	933	845	65	49.7	26.7	23.6	18.5
4	20,954	21,396	20,839	633	557	56	55.6	30.4	26.0	26.7
5	12,904	13,198	12,752	447	446	44	67.7	35.1	33.8	34.1
6 and 7	14,527	14,892	14,365	540	527	55	71.6	37.6	35.4	37.9
8 and 9	6,784	6,934	6,607	246	327	43	82.6	37.2	47.2	63.4
10 and over	5,202	5,324	5,052	244	272	23	96.9	48.3	51.1	44.2
Not stated	58	59	24	6	35	5				
Total	255,727	258,525	251,348	7,550	7,177	689	57.0	30.0	27.8	26.9

[1] Stillbirth rates and rates for combined infant loss per 1,000 total births (including stillbirths).
[2] Neonatal mortality rates per 1,000 live births.
[3] Puerperal fatality rates per 10,000 total deliveries.

Puerperal fatality and infant loss by order of birth.—Table 1 presents, according to order of birth, the distribution of live births, stillbirths, neonatal deaths, and puerperal deaths and their respective rates. Figure 1 shows the relative rates, i. e., in each group the rates by order of birth are shown in relation to the total rate which is taken as a base (=100). Such rates permit the comparison of the variation by order of birth between the stillbirth rate, the neonatal mortality rate, and the puerperal fatality rate, regardless of the difference in the absolute values of these rates. The actual rate for each of the former is over 10 times as high as for puerperal fatality.

The rate for combined infant loss (late fetal and neonatal mortality) was high for first births (59.8 per 1,000 total births), was at a minimum for second births (44.9), and thereafter increased continuously with order of birth. The rate for first births was higher by 33 percent than that of second births, while the rate for the highest orders of birth was more than twice as high as the minimum rate. The increase in the rate for first births as well as for the higher orders of birth in relation to the minimum rate was more pronounced for stillbirth than for neonatal mortality. Thus, the stillbirth and neonatal mortality rates of the first born were nearly equal. For births of orders 2 to 7 the neonatal mortality was higher than the stillbirth rate, while for births of orders 8 and over the reverse was true, the stillbirth rate being higher than the neonatal mortality rate.

The puerperal fatality rate was also high for mothers who were delivered of their first child (28.2 per 10,000 deliveries). The rate was lowest for mothers of third births (18.5) and highest for mothers who were delivered of their eighth and ninth child (63.4). The puerperal fatality rate and the rates for infant loss were lower for births of orders 2 to 4 than they were for first births. Beginning with the fifth order of birth the rates exceeded those of first births. The puerperal fatality and stillbirth rates were higher for primipara than for multipara taken as a group, the respective rates being 28.2 and 25.9 for puerperal fatality and 30.1 and 26.1 for stillbirths. In the case of neonatal mortality the rate was nearly as high for births of orders 2 and over (29.7) as for first births (30.6). The apparent advantage of the multipara, taken as a group, results from the fact that they consist for the most part of births of orders 2 to 4.

In figure 1 may be noted the similarity in the behavior of the puerperal fatality and the rate of infant loss by order of birth. The similarity is most pronounced when the relative stillbirth rates are compared with the relative puerperal fatality rates.

Causes of death.—The primary causes of puerperal deaths fall into four main groups: Toxemias (158 deaths), septicemia (157), accidents of childbirth (142), and hemorrhage (137). The remaining deaths are accounted for by puerperal embolism and thrombosis (53 deaths) and

accidents of pregnancy (40). The distribution of the 689 maternal deaths by order of birth and cause of death, and the cause-specific puerperal fatality rates per 100,000 deliveries are shown in table 2. The causes were taken from the statements on the death certificates. The classification is that of the Division of Vital Statistics of the New York State Department of Health according to the International List of Causes of Death (1929 revision) and the Manual of Joint Causes of Death.

TABLE 2.—*Distribution of puerperal deaths by cause of death and by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Total puerperal deaths	Accidents of pregnancy (141)[1]	Puerperal hemorrhage			Puerperal septicemia (145)	Toxemias of pregnancy			Puerperal embolism and thrombosis (148)	Accidents of childbirth			Other and unspecified (150)
			Placenta praevia (144a)	Other (144b)	Total (144)		Eclampsia (146)	Other (147)	Total (146-7)		Cesarian section (149a)	Other (149b)	Total (149)	
1	273	9	4	35	39	73	53	19	72	22	28	30	58	----
2	125	6	8	27	35	25	17	4	21	7	16	14	30	1
3	65	6	5	5	10	15	11	2	13	7	4	10	14	----
4	56	7	3	9	12	13	8	1	9	5	2	8	10	----
5	44	2	4	5	9	6	13	5	18	3	1	5	6	----
6 and 7	55	2	8	12	20	8	8	2	10	5	2	8	10	----
8 and over	66	8	6	6	12	14	8	5	13	4	2	12	14	1
Not stated	5	----	----	----	----	3	1	1	2	----	----	----	----	----
Total	689	40	38	99	137	157	119	39	158	53	55	87	142	2
	RATES[2]													
1	231.6	9.3	4.1	36.1	40.2	75.3	54.6	19.6	74.2	22.7	28.9	30.9	59.8	----
2	197.7	9.5	12.7	42.7	55.4	39.5	26.9	6.3	33.2	11.1	25.3	22.1	47.4	1.6
3	185.1	17.1	14.2	14.2	28.5	42.7	31.3	5.7	37.0	19.9	11.4	28.5	39.9	----
4	267.2	33.4	14.3	43.0	57.3	62.0	38.2	4.8	43.0	23.9	9.5	38.2	47.7	----
5	341.0	15.5	31.0	38.7	69.7	46.5	100.7	38.7	139.5	23.2	7.7	38.7	46.5	----
6 and 7	378.6	13.8	55.1	82.6	137.7	55.1	55.1	13.8	68.8	34.4	13.8	55.1	68.8	----
8 and over	550.6	66.7	50.1	50.1	100.1	116.8	66.7	41.7	108.5	33.4	16.7	100.1	116.8	8.3
Total	269.4	15.6	14.9	38.7	53.6	61.4	46.5	15.3	61.8	20.7	21.5	34.0	55.5	.8

[1] Figures in parentheses are International List numbers (1929 revision).
[2] Puerperal fatality rates per 100,000 deliveries.

It may be noted that the increase of puerperal fatality with parity was present for all causes of death. The higher rates for primipara were noted for septicemia, toxemia, puerperal embolism and thrombosis, and accidents of childbirth. The rates for hemorrhage and accidents of pregnancy were at a minimum for first births. This was particularly true for placenta praevia which registered a very low rate for the primipara. This is in agreement with the findings of Penrose (*4*) that the average parity of women with this condition is higher than that of a control group of mothers.

While the increase in puerperal fatality of the higher orders of birth was noted for all causes of death, there were some differences in the relative importance of the various causes by order of birth. The percentage distribution of the deaths by cause are shown below in

the three groups of first births, births of orders 2 to 4, and births of orders 5 and over.

Percentage distribution by cause

Order of birth	Total deaths (100 per cent)	Accidents of pregnancy	Hemorrhage	Septicemia	Toxemia	Embolism and thrombosis	Accidents of childbirth
1	273	3.3	14.3	26.7	26.4	8.1	21.2
2-4	246	7.7	23.2	21.5	17.5	7.7	22.0
5 and over	165	7.3	24.8	17.0	24.8	7.3	18.2

It is seen from this table that there are no extreme fluctuations between these three groups. It is thus indicated that the difference in the puerperal fatality between the favorable middle group and either of the other two groups is not markedly concentrated in one or two of the causes. The main difference is noted for toxemias which comprised a considerably larger proportion of the deaths of the vulnerable groups than of the deaths in the intermediary birth orders. It is also interesting to note that septicemia was relatively less frequent as a cause of death the higher the birth order. Also worthy of note is the fact that deaths from hemorrhage form a far smaller proportion among primipara than among multipara.

TABLE 3.—*Puerperal fatality rates according to survival of offspring and order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Total puerperal deaths	Puerperal deaths associated with—				Puerperal fatality rates [1] associated with delivery of—				
		Livebirths			Stillbirths	Livebirths			Stillbirths	Stillbirth and neonatal deaths (combined)
		Total	Survivors	Neonatal deaths		Total	Survivors	Neonatal deaths		
1	273	200	171	29	73	21.3	18.8	100.8	249.8	175.9
2	125	93	81	12	32	14.8	13.3	73.8	256.8	153.3
3	65	41	34	7	24	11.7	10.0	75.0	284.0	174.4
4	56	36	32	4	20	17.3	15.8	63.2	359.0	201.7
5	44	28	23	5	16	22.0	18.7	111.9	358.7	235.2
6 and 7	55	39	28	11	16	27.1	20.3	203.7	303.6	253.0
8 and 9	43	22	17	5	21	33.3	26.7	203.3	642.2	453.8
10 and over	23	15	11	4	8	29.7	22.9	163.9	294.1	232.6
Not stated	5	5	4	1						
Total	689	479	401	78	210	19.1	16.4	103.3	292.6	195.6

[1] Puerperal fatality rates per 10,000 births (not deliveries).

Puerperal fatality according to survival of offspring.—As is known, there is a strong association between death of mother and loss of offspring. The puerperal fatality increases sharply when the infant is either stillborn or dies neonatally. The similarity in the behavior of the puerperal fatality rate and the rate for infant loss by order of

birth may suggest that the variation in puerperal fatality is a mere reflection of the fact that among the first births and the births of high order there are more deliveries associated with infant loss than among the intermediary orders of birth. That such is not the case is demonstrated by the fact that the variations in puerperal fatality by order of birth persist also for all deliveries in which the infant survived the first month of life. This may be seen from table 3 which presents the puerperal fatality rate by order of birth separately for mothers of surviving infants, of neonatal deaths, and of stillbirths. The rates in this table are based on births (number of infants, not deliveries) in order to avoid the complicating factors of twins in which one survived and the other was either a stillbirth or a neonatal death. The death of a mother in such a case was counted in the stillbirth or neonatal death group. Rates based on births differ only slightly from those based on deliveries since plural births form only about 1 percent of all deliveries.

It may be observed that the higher rates of the high orders of birth were present irrespective of outcome of pregnancy. However, the rate among the mothers of first births was higher than among the mothers of the intermediary orders of birth only when the infant was born alive. For mothers of stillbirths the rate was lowest for primipara. The rates were higher for first than for the intermediary orders of birth both among mothers of survivors as well as of neonatal deaths.

Premature birth.—Over 5 percent of the deliveries terminated prematurely. The rate for combined infant loss was 18 times as high among the premature as among the full-term infants. Puerperal fatality was 7 times as high when pregnancy terminated prematurely.

Table 4 presents the distribution of the births, infant losses, and puerperal deaths by order of birth for full-term and premature deliveries.

The incidence of premature deliveries by order of birth again followed a U-shaped curve. Premature deliveries were more frequent among first births than among births of orders 2 to 5. Among births of orders 6 and over they were relatively more frequent than among first births. The incidence was lowest among second births.

The rate of infant loss among the premature increased continuously with order of birth. It was lowest for first births. Among the full-term infants the rate for first births was higher than that of births of orders 2 to 4, with a minimum rate recorded for second births. More than 2 out of every 3 premature infants of birth orders 10 and over were lost. Similarly, in puerperal fatality the disadvantages to the primiparous women were more pronounced for the full-term deliveries than for the premature. Only second births had lower puerperal fatality rates than first births when delivery was premature, while in the full-term group the puerperal fatality rate did not exceed

that of first births until the sixth and seventh delivery. Both in puerperal fatality and in infant loss the rate for first births was higher than the total rate in the full-term group, and lower than the total rate among the premature.

TABLE 4.—*Incidence of premature birth, combined loss of premature and full-term infants, and puerperal fatality associated with premature and full-term deliveries by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Deliveries		Births		Combined infant loss		Puerperal deaths associated with—		Rates				
									Incidence of premature deliveries[2]	Combined infant loss		Puerperal fatality associated with[3]—	
	Full-term	Premature	Full-term	Premature	Full-term births	Premature births	Full-term deliveries	Premature deliveries		Full-term births[4]	Premature births[4]	Full-term deliveries	Premature deliveries
1	91,086	5,868	91,086	5,868	3,000	2,798	203	66	60.5	32.9	476.8	22.3	112.5
2	60,356	2,871	60,806	3,168	1,230	1,641	94	30	45.4	20.2	518.0	15.6	104.5
3	33,507	1,610	33,984	1,810	821	957	44	21	45.8	24.2	528.7	13.1	130.4
4	19,936	1,018	20,263	1,133	556	634	35	20	48.6	27.4	559.6	17.6	196.5
5	12,212	692	12,438	760	407	456	27	17	53.6	32.7	639.5	22.1	245.7
6 and 7	13,658	869	13,941	951	474	593	37	17	59.8	34.0	623.6	27.1	195.6
8 and 9	6,366	418	6,477	457	271	302	28	14	61.6	41.8	660.8	44.0	334.9
10 and over	4,839	363	4,927	397	242	274	14	9	60.8	49.1	690.2	28.9	247.9
Not stated	40	18	41	18	23	18	5						
Total	242,000	13,727	243,963	14,562	7,024	7,703	487	[1] 194	53.7	28.8	529.0	20.1	141.3

[1] There were 8 other puerperal deaths for which period of gestation was not stated.
[2] Per 1,000 total deliveries in each specified category.
[3] Per 1,000 total full-term births in each specified category.
[4] Per 1,000 total premature births in each specified category.
[5] Per 10,000 deliveries in each specified category.

THE AGE FACTOR

The analysis of childbirth mortality (mother and infant) by mother's age presents a picture somewhat similar to that by order of birth. The main difference is the fact that the increase in mortality at the older ages is more pronounced in loss of mothers than in the loss of offspring and that, whereas the infants of the very young mothers suffer relatively high neonatal mortality and stillbirth rates, the puerperal fatality for these women is at a minimum.

Table 5 presents the distribution, by age of mother, of live births, stillbirths, neonatal and puerperal deaths, and their respective rates. Figure 2 shows the relative rates, i. e., in each group the rates by age of mother are shown in relation to the total rate which is taken as a base (=100).

The stillbirth and neonatal mortality rates were relatively high for infants of the youngest mothers. The stillbirth rate was at a minimum when the mother was in the 20–24 year age group; the neonatal mortality rate was lowest for infants of mothers aged 25–29 years. Both rates were high when the mother was over 40. The

puerperal fatality rate was lowest for the youngest mothers and increased continuously with age.

TABLE 5.—*Puerperal fatality, stillbirth and neonatal mortality rates by age of mother, New York State (exclusive of New York City), 1936–38*

Age of mother	Total deliveries	Total births	Live births	Neonatal deaths	Stillbirths	Puerperal deaths	Rates			
							Combined infant loss [1]	Neonatal mortality [2]	Stillbirths [1]	Puerperal fatality [3]
Under 20	22,624	22,751	22,176	841	575	35	62.2	37.9	25.3	15.5
20–24	77,920	78,589	76,949	2,179	1,640	130	48.6	28.3	20.9	16.7
25–29	72,545	73,361	71,609	1,846	1,752	170	49.0	25.8	23.9	23.4
30–34	47,750	48,422	46,936	1,400	1,486	157	59.6	29.8	30.7	32.9
35–39	25,597	25,990	24,890	892	1,100	128	76.6	35.8	42.3	50.0
40 and over	9,237	9,358	8,774	389	584	69	104.0	44.3	62.4	74.7
Not stated	54	54	14	3	40					
Total	255,727	258,525	251,348	7,550	7,177	689	57.0	30.0	27.8	26.9

[1] Stillbirth rate and rate for combined infant loss per 1,000 total births (including stillbirths).
[2] Neonatal mortality rate per 1,000 live births.
[3] Puerperal fatality rate per 10,000 total deliveries (including those of stillbirths).

Mothers aged 20–24 years had 31 percent of the live births, but only 23 percent of the stillbirths and 19 percent of the puerperal deaths. Mothers in their twenties accounted for 59 percent of the live births, 47 percent of the stillbirths, and 44 percent of the puerperal deaths.

From figures 1 and 2 it is seen that, while the puerperal fatality, the stillbirth, and the neonatal mortality rates were very similar in their variation by order of birth, there were notable differences in the behavior of the three rates by age of mother. The neonatal mortality rate presented a rather smooth U-shaped curve. The rate for infants of the oldest mothers was nearly the same as that of infants of the youngest mothers. The stillbirth rate increased much more rapidly with advancing age of mother, but also exhibited a slightly higher rate for the youngest mothers. In puerperal fatality the rate for the youngest mothers was least and the increase in the rate with advancing age was more pronounced than even that of the stillbirth rate. Thus it would appear that the age factor is more closely related to puerperal fatality than to the stillbirth rate and that the latter is in turn more affected by age of mother than the neonatal mortality rate.

Causes of puerperal death.—Table 6 presents the distribution of puerperal deaths by age and by cause of death and specific fatality rates per 100,000 deliveries. The increase in the rate with advancing age was noted to a considerable degree for each group of causes. The increase was more pronounced for some causes than for others. It was most rapid for placenta praevia, which had a very low rate for the youngest mothers and increased continuously to a rate of 54.1 per 100,000 deliveries for the oldest mothers. This again agrees with

the findings of Penrose *(4)*. The relative importance of the causes of death is different in the various age groups. The two most frequent causes among mothers under 30 years of age were septicemia and toxemia. As the mother's age increased, deaths from septicemia formed relatively smaller proportions of the total deaths and the

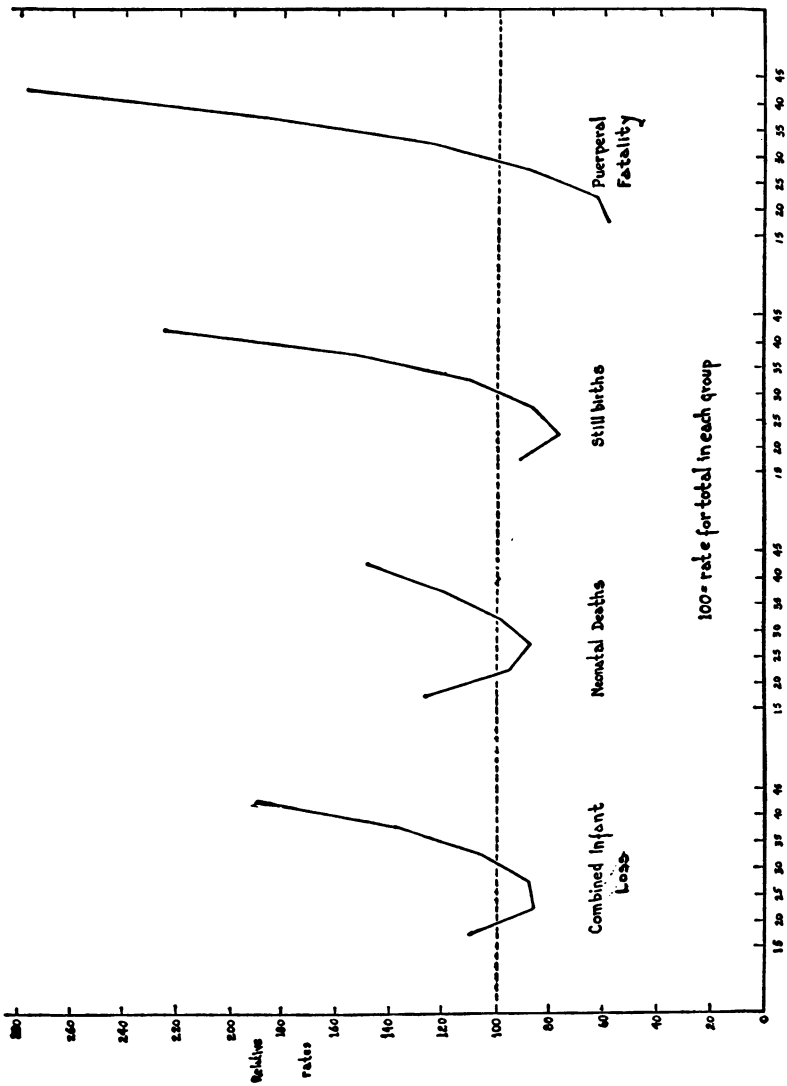

FIGURE 2.—Relative rates for combined infant loss (late fetal and neonatal mortality), neonatal mortality, stillbirths, and puerperal fatality by age of mother (rate for total in each group=100), New York State (exclusive of New York City), 1936-38.

other two groups of causes, hemorrhage and accidents of childbirth, assumed increasingly more important roles. The result is that for mothers aged 35 and over the rates for hemorrhage, toxemia, and accidents of childbirth were nearly equal, while the rate for septicemia was lower than either of these.

The variation in puerperal fatality by age for mothers of surviving infants, of neonatal deaths, and of stillbirths is shown in table 7.

TABLE 6.—*Distribution of puerperal deaths by cause of death and by age of mother, New York State (exclusive of New York City), 1936–38*

Age of mother	Total puerperal deaths	Accidents of pregnancy (141)[1]	Puerperal hemorrhage			Puerperal septicemia (145)	Toxemia of pregnancy			Puerperal embolism and thrombosis (148)	Accidents of childbirth			Other and unspecified (150)
			Placenta previa (144a)	Other (144b)	Total (144)		Eclampsia (146)	Other (147)	Total (146-7)		Cesarian section (149a)	Other (149b)	Total (149)	
Under 20	35	1	------	7	7	11	8	1	9	1	1	5	6	------
20–24	130	7	2	16	18	40	27	10	37	5	7	16	23	------
25–29	170	9	10	23	33	41	28	7	35	18	10	23	33	1
30–34	157	9	8	26	34	36	24	5	29	13	18	18	36	------
35–39	128	5	13	18	31	19	21	12	33	9	14	16	30	1
40 and over	69	9	5	9	14	10	11	4	15	7	5	9	14	------
Total	689	40	38	99	137	157	119	39	158	53	55	87	142	2
	RATES[2]													
Under 20	154.7	4.4	------	30.9	30.9	48.6	35.4	4.4	39.8	4.4	4.4	22.1	26.5	------
20–24	166.8	9.0	2.6	20.5	23.1	51.3	34.7	12.8	47.5	6.4	9.0	20.5	29.5	------
25–29	234.3	12.4	13.8	31.7	45.5	56.5	38.6	9.6	48.2	24.8	13.8	31.7	45.5	1.4
30–34	328.8	18.8	16.8	54.5	71.2	75.4	50.3	10.5	60.7	27.2	37.7	37.7	75.4	------
35–39	500.1	19.5	50.8	70.3	121.1	74.2	82.0	46.9	128.9	35.2	54.7	62.5	117.2	3.9
40 and over	747.0	97.4	54.1	97.4	151.6	108.3	119.1	43.3	162.4	75.8	54.1	97.4	151.6	------
Total	269.4	15.6	14.9	38.7	53.6	61.4	46.5	15.3	61.8	20.7	21.5	34.0	55.5	.8

[1] Figures in parentheses are International List numbers (1929 revision).
[2] Per 100,000 deliveries.

TABLE 7.—*Puerperal fatality rates by age of mother and survival of offspring, New York State (exclusive of New York City), 1936–38*

Age of mother	Total puerperal deaths	Puerperal deaths associated with—				Puerperal fatality rates[1] associated with delivery of—				
		Live births			Stillbirths	Live births			Stillbirths	Stillbirths and neonatal deaths (combined)
		Total	Survivors	Neonatal deaths		Total	Survivors	Neonatal deaths		
Under 20	35	27	24	3	8	12.2	11.2	35.7	139.1	77.7
20–24	130	93	75	18	37	12.1	10.0	82.6	225.6	144.0
25–29	170	132	112	20	38	18.4	16.1	108.3	216.9	161.2
30–34	157	105	91	14	52	22.4	20.0	100.0	349.9	228.7
35–39	128	77	62	15	51	30.9	25.8	168.2	463.6	331.3
40 and over	69	45	37	8	24	51.3	44.1	205.7	411.0	328.9
Total	689	479	401	78	210	19.1	16.4	103.3	292.6	195.6

[1] Per 10,000 births in each specified category.

The increase in puerperal fatality with age was present irrespective of outcome of pregnancy. When the infant was lost either through stillbirth or neonatal mortality, the puerperal fatality rate for the youngest mothers was considerably lower than for mothers aged

20–24 years. However, the youngest mothers of infants surviving the neonatal period suffered puerperal fatality rates which were somewhat higher than those in the next higher age group.

Premature birth.—Table 8 presents data on premature deliveries by age of mother. Premature deliveries were least frequent among mothers aged 25–29 years (45.0 per 1,000 total deliveries). They were nearly as frequent among the youngest (72.3) as among the oldest mothers (78.4). The rate for combined infant loss was also relatively high when the mother was under 20 years of age, both among full-term and among premature births; it was at a minimum for infants of mothers aged 20–24 years. The puerperal fatality rate of the youngest mothers was extremely low in comparison to the mothers in the next higher age group when pregnancy terminated prematurely. For full-term infants the rate was the same in the first two age groups. The increase in puerperal fatality with age was relatively more rapid for premature than for full-term deliveries.

TABLE 8.—*Incidence of premature birth, combined loss of premature and full-term infants, and puerperal fatality associated with premature and full-term deliveries by age of mother, New York State (exclusive of New York City), 1936–38*

Age of mother	Deliveries		Births		Combined infant loss		Puerperal deaths associated with—		Rates				
									Incidence of premature deliveries[2]	Combined infant loss		Puerperal fatality associated with[4]—	
	Full-term	Premature	Full-term	Premature	Full-term births	Premature births	Full-term deliveries	Premature deliveries		Full-term births[3]	Premature births[4]	Full-term deliveries	Premature deliveries
Under 20	20,988	1,636	21,061	1,690	563	853	25	9	72.3	26.7	504.7	11.9	55.0
20–24	73,947	3,973	74,379	4,210	1,770	2,049	88	39	51.0	23.8	486.7	11.9	98.2
25–29	69,283	3,262	69,873	3,488	1,780	1,818	128	42	45.0	25.5	521.2	18.5	128.8
30–34	45,258	2,492	45,749	2,673	1,411	1,475	115	40	52.2	30.8	551.8	25.4	160.5
35–39	23,980	1,617	24,268	1,722	979	1,013	85	42	63.2	40.3	588.3	35.4	259.7
40 and over	8,513	724	8,602	756	499	474	40	22	78.4	58.0	627.0	54.0	303.9
Not stated	31	23	31	23	22	21							
Total	242,000	13,727	243,963	14,562	7,024	7,703	487	[1] 194	53.7	28.8	529.0	20.1	141.3

[1] There were 8 other puerperal deaths for which period of gestation was not stated.
[2] Per 1,000 total deliveries in each specified category.
[3] Per 1,000 total full-term births in each specified category.
[4] Per 1,000 total premature births in each specified category.
[5] Per 10,000 deliveries in each specified category.

ORDER OF BIRTH AND AGE OF MOTHER

The age and order of birth factors are strongly correlated. The youngest mothers are generally of lower parity and the births of high order are in most cases those to older mothers. There remains, therefore, the question as to whether the high rates of puerperal fatality and of infant loss associated with the higher orders of birth and with older mothers are related to one or the other or both of

these factors. This question may be answered by considering the variation in the rates by one of these factors when the other is held constant. Thus, for example, the variation in the rate by age of mother for first births is related to the factors associated with age alone, whereas the differences in the rate by order of birth for all mothers in a given age group are related to factors associated only with parity. This separation of the two factors is accomplished by table 9, which presents the distribution of the total births and the rates for combined infant loss and for puerperal fatality by order of birth and age of mother.

TABLE 9.—*Puerperal fatality rates (per 10,000 total deliveries) and rates of combined infant loss (per 1,000 total births) by order of birth and age of mother, New York State (exclusive of New York City), 1936–38*

Order of birth	Age of mother							
	Under 20	20–24	25–29	30–34	35–39	40 and over	Not stated	Total
	Total births (including stillbirths)							
1	18,431	41,561	24,588	9,282	2,624	459	9	96,954
2	3,725	22,853	21,179	11,684	3,884	644	5	63,974
3	522	9,231	12,228	8,823	4,090	898	2	35,794
4	59	3,428	7,071	6,170	3,647	1,017	4	21,396
5	8	1,067	4,078	4,215	2,864	965	1	13,198
6 and 7	4	408	3,351	5,101	4,208	1,819	1	14,892
8 and 9	--	32	737	2,233	2,529	1,402	1	6,934
10 and over	--	5	117	906	2,140	2,154	2	5,324
Not stated	2	4	12	8	4	--	29	59
	Rates for combined infant loss [2]							
1	61.6	52.0	58.9	79.9	92.2	137.3	--	59.8
2	60.4	42.1	39.2	47.3	63.6	77.6	--	44.9
3	82.4	45.1	43.3	49.3	67.0	89.1	--	49.7
4	[1] 164.2	47.5	44.1	54.6	70.2	109.1	--	55.6
5	--	69.4	50.8	61.4	86.6	105.7	--	67.7
6 and 7	--	92.1	59.4	66.8	74.9	94.6	--	71.6
8 and 9	--		67.8	66.3	87.0	109.8	--	82.6
10 and over	--		136.8	74.0	88.3	111.9	--	96.9
	Puerperal fatality rates (per 10,000 total deliveries)							
1	16.8	21.4	27.2	57.1	95.3	174.3	--	28.2
2	11.0	12.0	20.1	31.1	36.3	31.3	--	19.8
3	--	5.5	23.3	20.7	24.8	44.8	--	18.5
4 and 5	--	18.4	15.6	22.7	51.4	96.8	--	29.5
6 and 7	--	--	33.7	24.1	43.8	78.4	--	37.9
8 and over	--	--	48.1	42.5	59.3	62.9	--	55.1
2 and over	9.5	11.0	21.3	26.5	44.4	69.5	--	25.9

[1] Based on less than 100 births.
[2] Stillbirths and neonatal deaths per 1,000 total births.

When the rates are followed along any of the rows, the order of birth is held constant and whatever differences appear are related only to the age factor. Similarly when the rates are followed along any column, the age of mother is the same and the variation is associated with order of birth.

It may be noted that the U-shaped pattern of the curve for combined infant loss was present in all the rows as well as in all the col-

umns. For example, for births of second order the rate was high (60.4) for births to the youngest mothers, at a minimum (39.2) for infants of mothers aged 25–29, and thereafter increased with age of mother to a maximum (77.6) for infants of the oldest mothers. Again for mothers aged 25–29 years the rate for combined infant loss was high (58.9) for first births, a minimum (39.2) for second births, and thereafter increased with order of birth to a maximum (136.8) for births of the highest order.

In the case of puerperal fatality the variation in the rate was again present in every row and in every column. For mothers of the same age puerperal fatality was always higher for the primipara than for mothers who were delivered of the intermediary orders of birth, and were high again for mothers of high parity. For mothers of the same parity the rates generally increased with advancing age. For example, for mothers aged 35–39 years the puerperal fatality rate was high for first births (95.3), at a minimum for third births (24.8), and increased with higher orders of birth. Again the puerperal fatality of the primipara was at a minimum (16.8) for the youngest mothers and at a maximum (174.3) for the oldest mothers. This last group, the elderly primipara, suffered the highest puerperal fatality rates. Mothers who were over 40 years of age when they were delivered of their first child suffered a puerperal fatality rate which was ten times as high as that of the youngest primipara, and it was over twice as high as the rate of mothers in the same age group who were delivered of the highest orders of birth. The increase with age of mother for the other orders of birth was not as high as among the primipara, but it was very considerable. Thus when all the multipara were taken as a group the puerperal fatality rate increased continuously from 9.5 for the youngest mothers to 69.5 for the oldest. The variation in the rate of infant loss and of puerperal fatality by order of birth and age of mother is shown graphically in figures 3, 4, 5, and 6. Figure 3 presents the variation of the rate for combined infant loss by order of birth in the various classifications by age of mother. Figure 4 shows the differences in the rate by age of mother for the various birth orders. Similarly, figure 5 shows puerperal fatality by order of birth in the various age groups of mothers and figure 6 presents the variation of the puerperal fatality rate with age of mother for the various orders of birth.

In order to eliminate the effect of the association between survival of mother and offspring on the variation in puerperal fatality, table 10 is presented. It shows the puerperal fatality rates by order of birth and age of mother for mothers whose infants survived the first month of life.

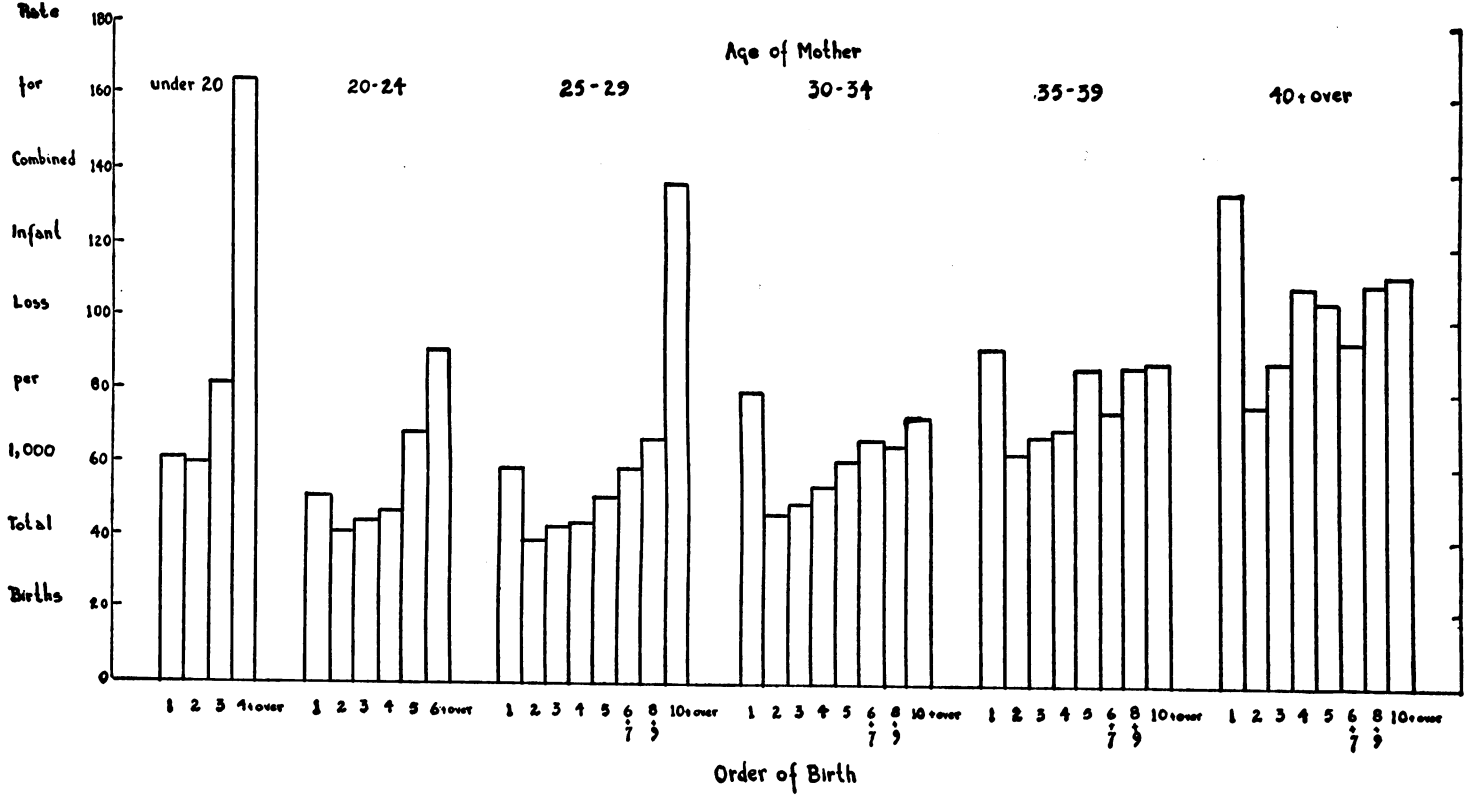

FIGURE 3.—Rates for combined infant loss (late fetal and neonatal mortality) by order of birth in the various subdivisions of the births by age of mother, New York State (exclusive of New York City), 1936-38.

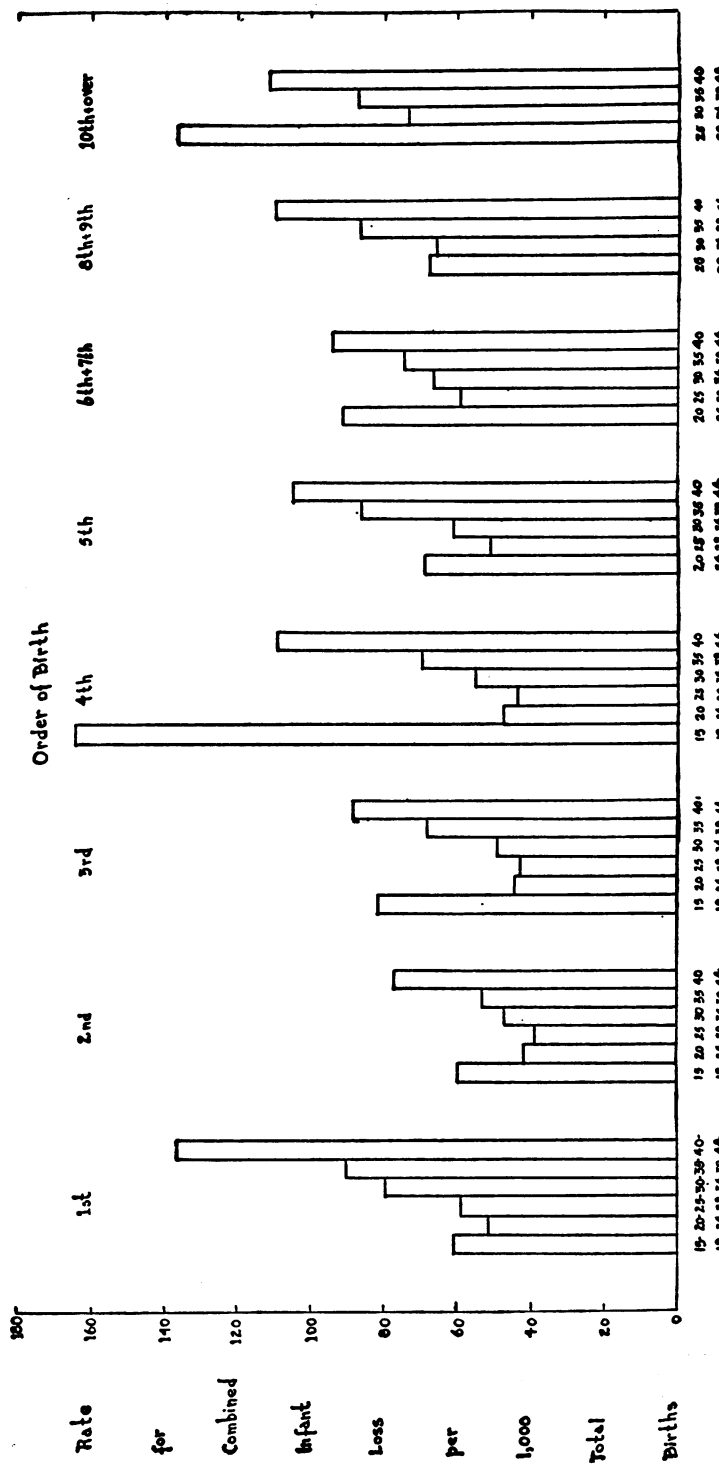

FIGURE 4.—Rates for combined infant loss (late fetal and neonatal mortality) by age of mother in the various subdivisions of the births by order of birth, New York State (exclusive of New York City), 1936-38.

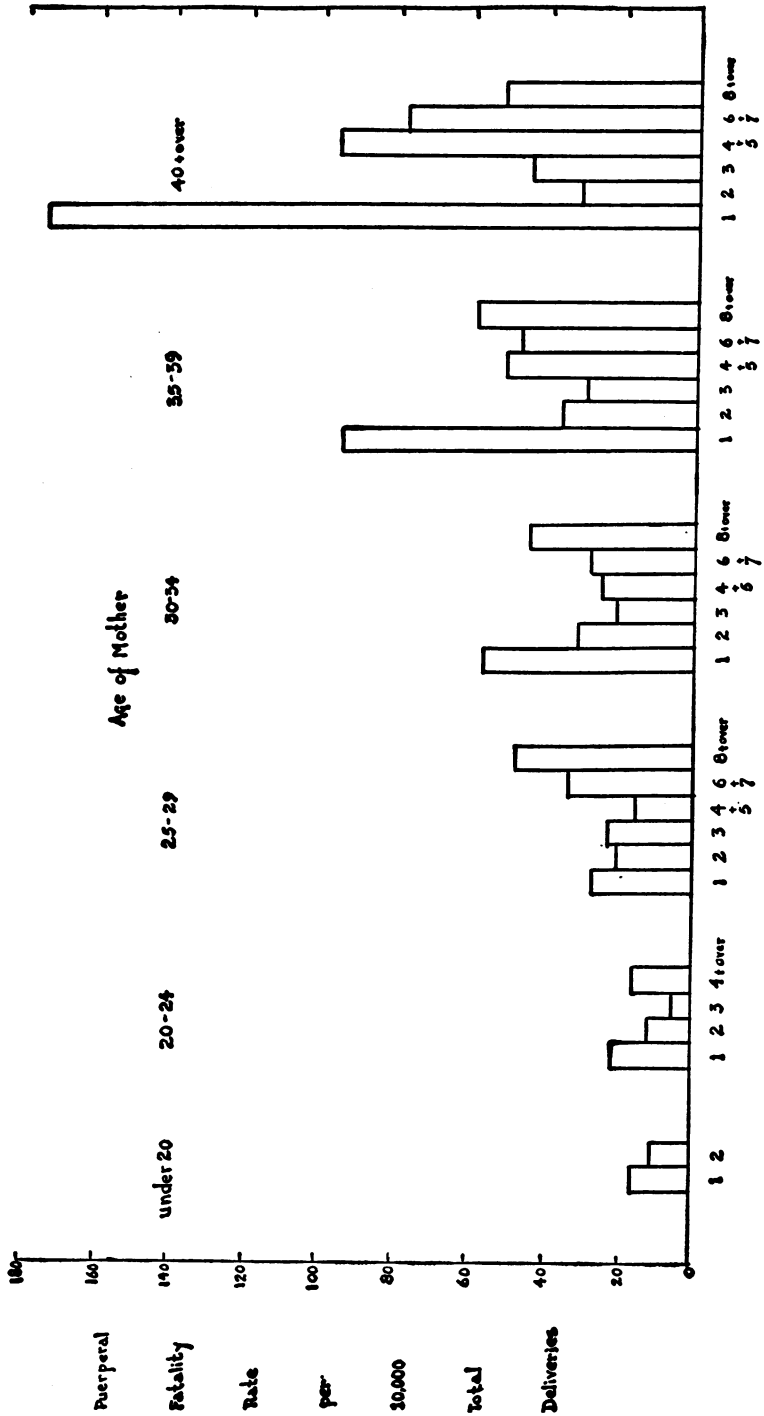

FIGURE 5.—Puerperal fatality rates by order of birth in the various subdivisions of the deliveries by age of mother, New York State (exclusive of New York City), 1936-38.

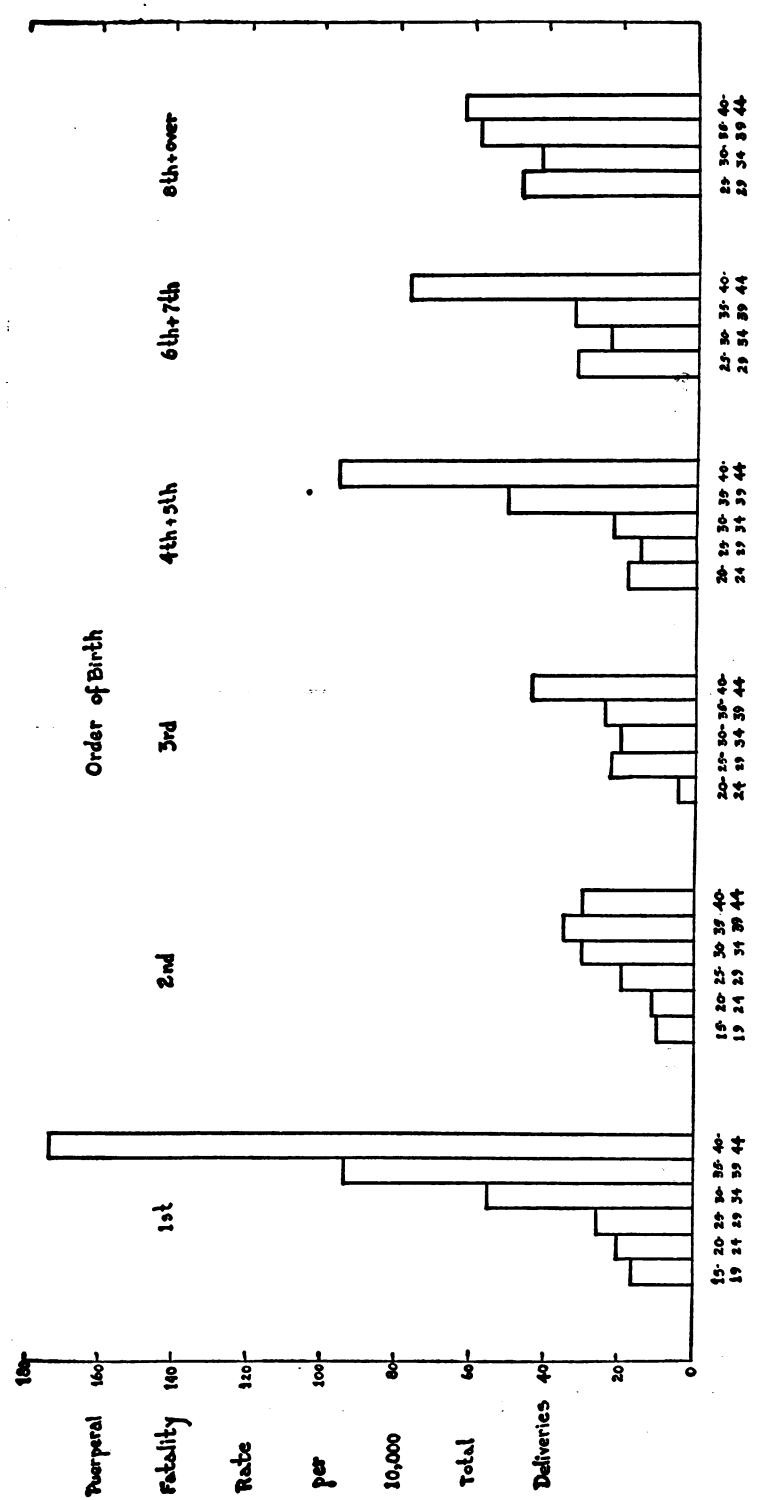

FIGURE 6.—Puerperal fatality rates by age of mother in the various subdivisions of the deliveries by order of birth, New York State (exclusive of New York City), 1936-38.

It will be noted that the trend of the rates in each row and in each column is the same as in table 9, thus indicating that the variations in puerperal fatality by age and parity are independent of the loss of offspring.

TABLE 10.—*Puerperal fatality rates (per 10,000 total births) among mothers whose infants survived the first month of life, by age and by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Age of mother						Total
	Under 20	20–24	25–29	30–34	35–39	40 and over	
1	12.7	12.4	20.7	41.0	54.6	101.0	18.8
2	5.7	8.2	14.3	20.7	22.0	16.8	13.3
3	----------	4.5	14.5	8.3	10.5	24.4	10.0
4 and 5	----------	7.0	11.3	13.3	25.0	67.8	16.9
6 and 7	----------	----------	15.9	10.5	25.7	48.6	20.3
8 and over	----------	----------	----------	23.9	25.8	31.6	25.1
2 and over	5.0	7.1	13.5	14.9	22.2	41.3	14.8

From the data from which the preceding tables were constructed it was also possible to determine the probability of losing (through stillbirth, neonatal mortality, and puerperal fatality) infant only, mother only, and both mother and infant.[6] These probabilities in terms of chances in 10,000 deliveries are presented in table 11 by order of birth and age of mother.

The total probability of losing the infant alone was 558.2 per 10,000 births, that of losing the mother only was 15.7, and the probability of losing both mother and infant was 11.3 per 10,000 deliveries. The variations by order of birth and by age of mother followed trends similar to the ones described above for the puerperal fatality rate and the rate for combined infant loss. The highest probabilities for losing the infant, the mother, and both mother and infant were for the elderly primipara.

AGE OF FATHER

In a previous study (*1*) it was shown that the neonatal mortality rate was related to age of father. This variation was again of the U-shaped pattern and was present in every age group of mother. A later study (*5*) based on nearly 11,000,000 births occurring in 1931–35 in the United States Birth Registration Area revealed that a similar relationship exists between the stillbirth rate and age of father. It might be implied from this relationship between age of father and survival of offspring that as men grow older there is a gradual decline in the vitality of the offspring which they produce, and that there are

[6] These probabilities were obtained directly from the frequencies. Thus the probability of losing both mother and infant was derived by dividing the number of the deliveries in which the mother died and the infant was either stillborn or died neonatally by the total number of deliveries, etc.

qualitative variations in fertility with age similar to the *quantitative* variations in fertility observed for males (*6*). It was therefore thought advisable to study the relationship between puerperal fatality and age of husband. It was reasoned that if the variations of the stillbirth and neonatal mortality rates by age of father were due *solely* to a diminution in the vitality of the fetus, then it may not be expected that any definite association exists between puerperal fatality and age of husband. However, puerperal fatality exhibited a definite relationship to age of husband, which was again of the U-shaped pattern. The variations were of lower magnitude than those found for infant loss, but they were definite.

TABLE 11.—*Probabilities (chances in 10,000 deliveries) of losing through stillbirths, neonatal deaths, and puerperal deaths, either or both mother and infant, by order of birth and age of mother, New York State (exclusive of New York City), 1936–38*

Order of birth	Age of mother						Total
	Under 20	20–24	25–29	30–34	35–39	40 and over	
	Probabilities of losing infant only						
1	611.5	510.6	581.2	780.0	876.5	1,285.4	587.5
2	598.7	417.5	386.2	460.5	620.5	760.9	441.6
3	823.8	449.6	422.8	480.6	655.3	868.6	487.8
4 and 5	1,641.7	516.1	461.0	562.3	744.9	1,039.4	588.3
6 and 7	----------	921.3	575.9	652.8	729.6	912.6	697.7
8 and over	----------	----------	726.0	665.8	841.7	1,077.1	857.4
Total	617.6	478.8	482.4	581.3	740.7	1,005.6	558.2
	Probabilities of losing mother only						
1	11.9	11.8	19.5	37.7	49.5	87.1	17.6
2	5.5	8.0	13.8	19.8	20.7	15.7	12.8
3	----------	4.4	14.2	8.1	9.9	22.4	9.7
4 and 5	----------	6.9	11.0	12.8	23.4	61.1	16.2
6 and 7	----------	----------	15.3	10.1	24.4	44.8	19.3
8 and over	----------	----------	----------	22.9	24.1	28.6	23.4
Total	10.6	9.6	15.4	19.1	24.2	40.1	15.7
	Probabilities of losing both mother and infant						
1	4.9	9.6	7.7	19.4	45.7	87.1	10.5
2	5.5	4.0	6.2	11.2	15.5	15.7	7.0
3	----------	1.1	9.1	12.6	14.9	22.4	8.8
4 and 5	----------	11.5	4.6	9.9	28.0	35.7	13.3
6 and 7	----------	----------	18.4	14.1	19.5	33.6	18.6
8 and over	----------	----------	48.1	19.6	35.1	34.3	31.7
Total	4.9	7.1	8.0	13.8	25.8	34.6	11.3

Table 12 presents the rates for combined infant loss and for puerperal fatality by the ages of both parents.[6] The variation of the rate for combined infant loss by age of father in the various subdivisions by age of mother is shown in figure 7. Similarly the variation of the stillbirth rate with age of father based on nearly 11,000,000 births in

[6] The table is based on legitimate births.

TABLE 12.—*Puerperal fatality rates per 10,000 total legitimate births and rates for combined infant loss per 1,000 total legitimate births by age of mother and age of father, New York State (exclusive of New York City), 1936–38*

Age of father	Age of mother						Total [1]
	Under 20	20–24	25–29	30–34	35–39	40 and over	
	Total legitimate births (including stillbirths)						
Under 20	1,589	431	19	2	2	----	2,043
20–24	12,686	26,153	3,146	223	35	3	42,249
25–29	4,766	35,187	29,951	3,821	358	18	74,103
30–34	965	10,549	26,799	20,102	2,407	161	60,985
35–39	293	2,769	9,073	15,528	10,326	916	38,906
40 and over	192	1,289	3,640	8,399	12,660	8,172	34,353
	Rates for combined infant loss						
Under 20	71.7	46.4	[2] 105.3	----	----	----	66.6
20–24	53.9	49.3	56.6	80.7	[2] 114.3	----	51.5
25–29	61.7	44.8	46.4	65.7	78.2	[2] 222.2	47.9
30–34	59.1	48.0	47.0	53.0	67.3	87.0	50.3
35–39	61.4	50.9	50.0	61.3	70.9	85.2	61.0
40 and over	72.9	54.3	57.7	62.6	81.6	104.4	78.8
	Puerperal fatality rates (per 10,000 total deliveries)						
Under 20	25.3	[3] 23.3	----	----	----	----	24.6
20–24	15.1	17.0	----	[3] 45.7	----	----	15.3
25–29	8.4	14.3	23.3	42.4	[3] 57.0	----	19.2
30–34	[3] 10.4	19.1	23.0	25.7	75.8	----	25.0
35–39	----	25.5	26.8	31.4	38.3	[3] 132.6	33.9
40 and over	----	7.9	36.2	48.3	53.8	70.7	52.6

[1] Includes 9 with age not stated.
[2] Based on less than 100 births.
[3] Based on less than 1,000 deliveries.

the United States Birth Registration Area, 1931–35, is reproduced from a previous paper (*5*) and shown in figure 8.

Figure 9 presents the variation in the puerperal fatality rate by age of husband in the various age groups of wife. It may be observed that both the rate of infant loss and that for puerperal fatality were generally high for young fathers, were at a minimum for fathers aged 25–34, and high again for older fathers. This variation is independent of the correlation between age of husband and wife, since it is present in nearly every age group of wife.

This relationship between puerperal fatality and age of husband is not a consequence of the association between infant loss and age of father, since the same pattern of the rates with age of husband exists also when all the mothers of stillbirths and neonatal deaths have been excluded.

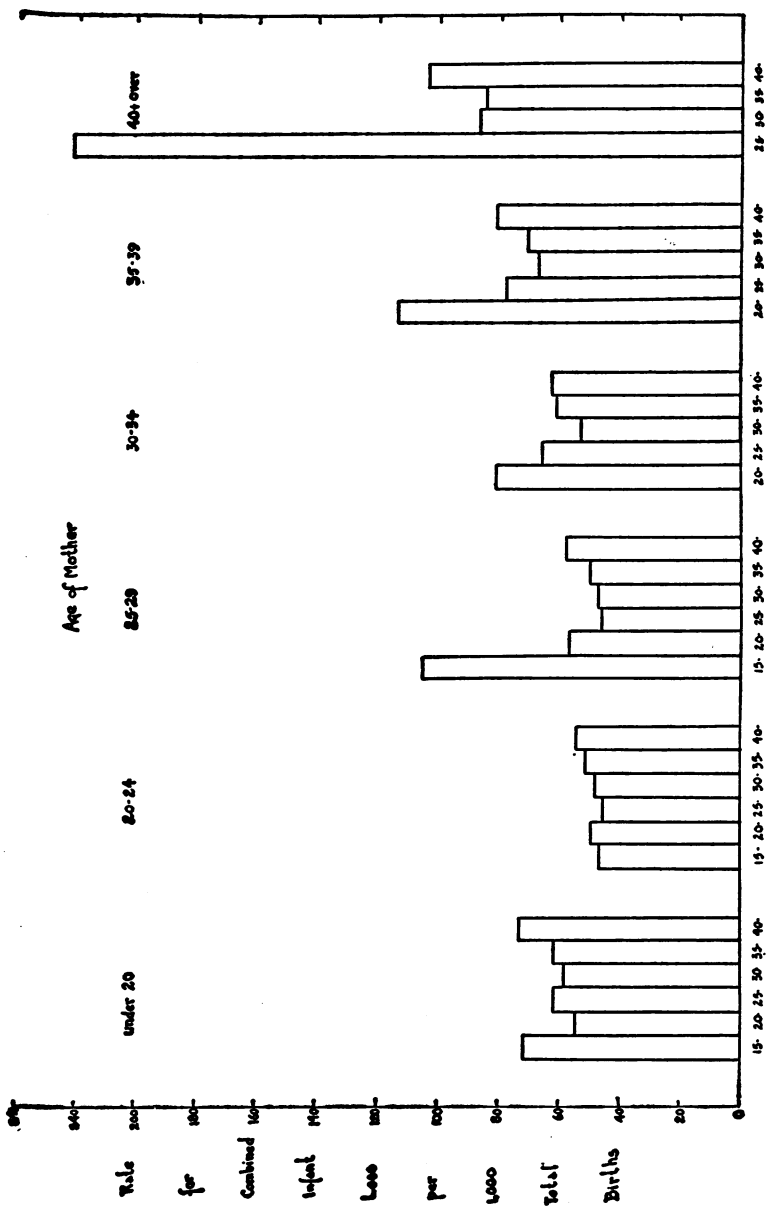

FIGURE 7.—Rates for combined infant loss (late fetal and neonatal mortality) by age of father in the various subdivisions of the births by age of mother, New York State (exclusive of New York City), 1930–35.

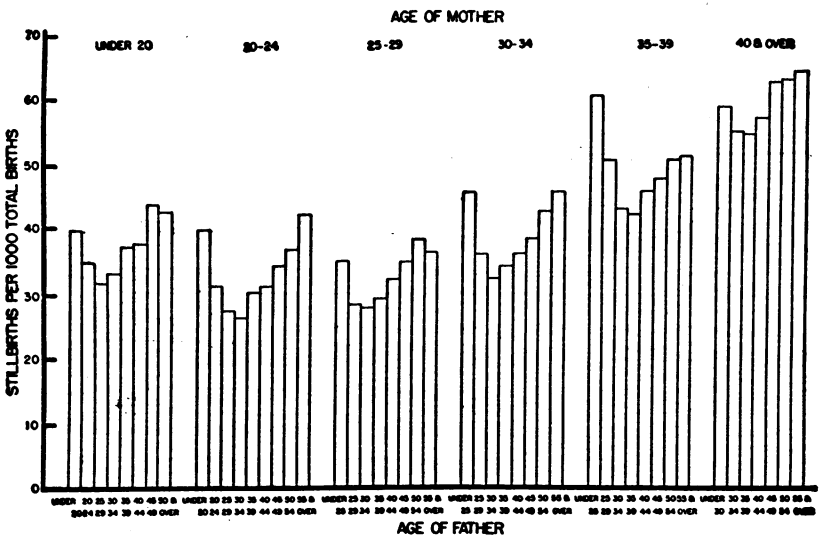

FIGURE 8.—Stillbirth rates by age of father in the various subdivisions of the births by age of mother, U. S. Birth Registration Area, 1931–35.

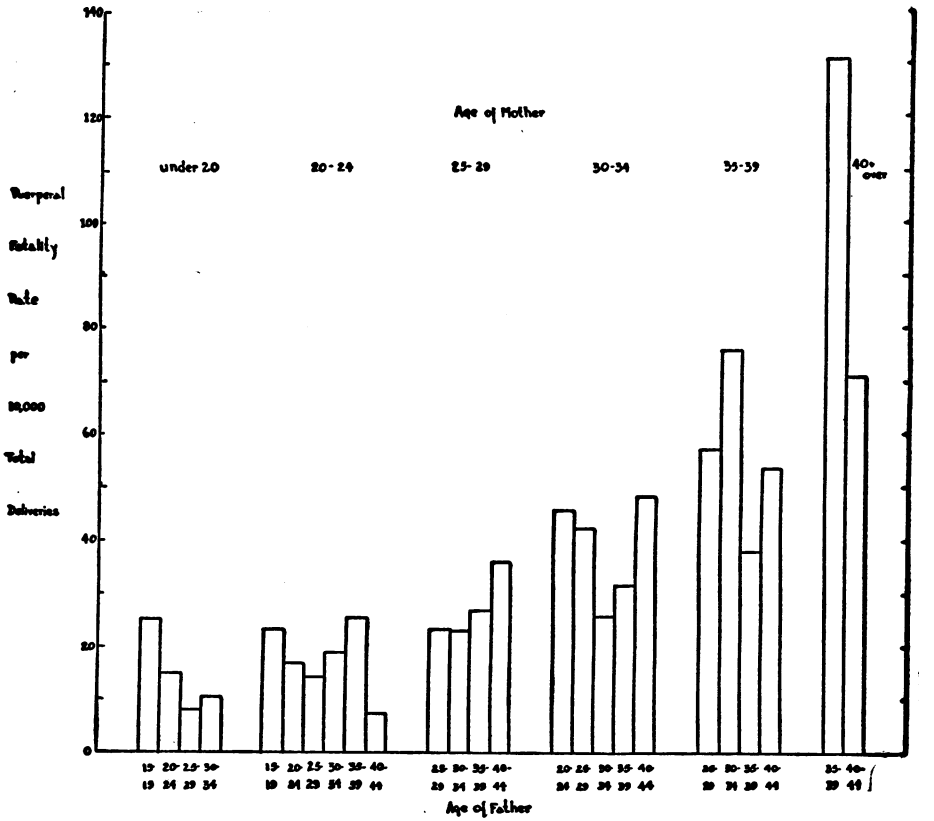

FIGURE 9.—Puerperal fatality rates by age of father (of the infant) in the various subdivisions of the births by age of mother, New York State (exclusive of New York City), 1936–38.

It is also unlikely that these variations are due to parity, since the same variation with age of husband is exhibited in puerperal fatality among primipara only.[7]

No simple explanation for the relationship between puerperal fatality and age of husband is apparent. It is difficult to see how the age of the husband could affect the mortality of his wife. This question requires much more detailed study on a much larger number of births.

SUMMARY

This is the second of a series of studies on childbirth mortality (mother and infant) based on the vital statistics records of over a quarter of a million deliveries occurring in New York State (exclusive of New York City) in the 3-year period 1936–38. The maternal death certificate was matched with the birth or stillbirth certificate of the infant. Similarly the death certificate of every infant who died under one month of age was matched with the birth certificate of the same infant. The information from each of the matched certificates was brought together on the same punch card.

Women whose death was associated with miscarriages, abortions, ectopic pregnancies, and those who died undelivered were excluded. These studies are concerned with the risk to the mother which is associated with the delivery of an offspring of viable age. The risk is defined as "puerperal fatality" and is measured by a "puerperal fatality rate" defined as the number of deaths of women who were delivered either of a live birth or of a stillbirth per 10,000 total deliveries.

This second paper deals with the relation of order of birth and age of mother to puerperal fatality and loss of offspring and records the following findings:

1. The puerperal fatality rate was high for mothers who were delivered of their first child (28.2 per 10,000 deliveries), was lowest for mothers of third births (18.5), and highest for mothers who were delivered of their eighth and ninth child (63.4).

2. The rate for combined infant loss (late fetal and neonatal mortality) was also relatively high for first births (59.8 per 1,000 total births), was at a minimum for second births (44.9), and thereafter increased with order of birth to a maximum (96.9) for births of highest orders. The relative stillbirth rates by order of birth were very similar to the relative puerperal fatality rates.

3. The increase in puerperal fatality by order of birth is not concentrated in one or two causes but embraces all causes of death.

[7] Tables separate for mothers of surviving infants and for primipara were prepared but are not presented here. It may also be desirable to construct tables by single ages rather than by 5-year age groups in order to eliminate whatever correlation there may be between the ages of husband and wife within a given 5-year age group. This, however, could not be done for technical reasons.

However, septicemia formed a smaller proportion of all deaths among the higher orders of births, while toxemias were relatively more frequent among first births and births of higher orders than among the intermediary birth orders. Deaths from hemorrhage formed a far smaller proportion of the total among primipara than among multipara.

4. The variation of puerperal fatality with parity was not a result of the association between infant loss and order of birth. The puerperal fatality increased with advancing parity also among mothers whose infants survived the first month of life.

5. Over 5 percent of the deliveries terminated prematurely. The rate for combined infant loss was 18 times as high among the premature as among the full-term infants. Puerperal fatality was 7 times as high when pregnancy terminated prematurely as when delivery was at term. The variation in the rates with order of birth was present in both the full-term and premature groups.

6. The rate for combined infant loss was relatively high for infants of the youngest mothers; it was lowest for infants of mothers in their twenties and increased thereafter with age of mother. Puerperal fatality was at a minimum for the youngest mothers and increased very sharply with advancing age of mother.

7. The puerperal fatality rate and the rate of infant loss were found to be independently related to the two factors of order of birth and age of mother.

8. The puerperal fatality rate as well as the rate for infant loss was found to be related to the age of father. The rates were relatively high when the father was young; they were lowest when the father was aged 25–34, and high again when the father was older. This variation is independent of the correlation between the ages of husband and wife. Similarly, the variation in puerperal fatality by age of husband is not an expression of the relation between age of father and infant loss.

REFERENCES

(1) Yerushalmy, J.: Neonatal mortality by order of birth and age of parents. Am. J. Hyg., 28: 244–270 (1938).
(2) Coghlan, T. A.: Childbirth in New South Wales, a study in statistics. William Applegate Gullick, Government Printer, Sydney, Australia (1899).
(3) Yerushalmy, J., Kramer, M., and Gardiner, E. M.: Studies in childbirth mortality. I. Puerperal fatality and loss of offspring. Pub. Health Rep., 55: 1010–1027 (1940).
(4) Penrose, L. S.: Maternal age and parity in placenta praevia. J. Obst. and Gynaec. Brit. Emp., 46: 645–672 (1939).
(5) Yerushalmy, J.: Age of father and survival of offspring. Human Biol., 11: 342–356 (1939).
(6) Pearl, R.: Biological factors in fertility. Annals of the Am. Assoc. of Pol. and Soc. Sci., 188: 14–25 (1936).

A RAPID THICK FILM BLOOD STAIN

By Louis Michelson, *Medical Technician*, and Aimee Wilcox, *Assistant Technologist, National Institute of Health, United States Public Health Service*

A combined Wright-Giemsa rapid staining method for blood parasites, particularly malaria parasites, is described here. This stain has the advantage of reducing thick film staining and washing time from 50 to 11 minutes. American manufactured dyes are used, thus reducing the cost of thick film staining for those who have used foreign-made dyes. The stain has been tried repeatedly on the three species of human malaria parasites in thick and thin films and on trypanosomes in the thin film with very satisfactory results. If directions are followed, it is eminently satisfactory for diagnostic purposes and quite superior to many of the Giemsa stains which are obtainable for this purpose.

A. PREPARATION OF WRIGHT-GIEMSA SOLUTION FROM GIEMSA POWDER AND WRIGHT'S SOLUTION

Place 100 cc. of glycerine, C. P., anhydrous, in a bottle of 1 liter capacity which has a tightly-fitted screw cap or stopper. Weigh accurately 1.515 gm. Giemsa powder (National Aniline Dye Co., N Ge–3) and suspend in glycerine. Fit stopper tightly, cover entire bottle neck with a double thickness of wrapping paper, and secure with large elastic bands. (These precautions are taken to prevent moisture from being absorbed by the Giemsa-glycerine mixture during the heating period in the water bath.)

Heat the bottle of Giemsa-glycerine mixture in the water bath at 55°–60° C. for 2 hours, mixing well with a glass stirring rod at half-hour intervals. At each stirring, remove bottle from water bath. After 2 hours, remove from water bath and allow to cool Then add 100 cc. of unfiltered Wright's Stain Solution (B) to the bottle of Giemsa-glycerine solution. Mix well by vigorous shaking and let stand overnight. On the next morning add 800 cc. of unfiltered Wright's Stain Solution (B) to the above mixture. Shake vigorously. Filter into a small bottle the amount of stain needed for a few days' staining. Stain requires no aging and can be used immediately.

B. PREPARATION OF WRIGHT'S STAIN SOLUTION FROM POWDER (NATIONAL ANILINE DYE CO.)

Place 1,000 cc. of methyl alcohol, acetone free, neutral, and preferably redistilled, in a bottle of 1 liter capacity which has a tightly-fitted screw cap or stopper. Weigh accurately 2 gm. Wright's powder and dissolve in the methyl alcohol. Wrap the bottle in paper and store in a dark place protected from ammonia fumes for at least 1 month.

At frequent intervals while stain is aging shake bottle vigorously. At the end of 1 month, test for staining properties. The Wright's Stain Solution must give satisfactory blood-cell staining before it can be used in the preparation of this Wright-Giemsa stain.

IMPORTANT.—All ingredients must be of reagent quality, preferably from freshly opened bottles. All glassware must be chemically clean and perfectly dry.

Rapid method for thick films:

1. Dilute stock stain 1:10 with distilled water buffered to pH 7.0. Mix well in a graduate or other container.
2. Stand blood films on end in an empty staining dish. Rapidly deliver over them enough diluted stain to reach about 1 inch above the film. Stain for 10 minutes.
3. To wash the films, first rapidly flood off the scum from the top of the stain with neutral distilled water, then remove the smears and place them in clear neutral distilled water for 1 minute.
4. Air dry and examine with oil immersion objective.

Thin films may be stained by practically the same process. However, before staining they should be fixed with methyl alcohol for 1 minute, placed on the side or end in a staining dish and the stain poured over them while the films are still wet with alcohol. This last step aids in assuring a smear which is free of precipitate and scum. For washing thin films flood off the scum from the top of stain and then dip each slide two or three times in clear neutral distilled water. Prolonged washing lessens staining detail. This method gives satisfactory results for differential blood counts.

This stain may be used by a prolonged method also for staining thick films.

1. Dilute stock stain 1:40 with neutral distilled water. Mix well.
2. Pour the stain over the slides in the staining dish. Stain for 45 minutes.
3. Flood off scum from top of stain and stand slides in neutral distilled water for *1 minute.*
4. Air dry. Examine.

Thin films may be stained by the prolonged method if the same precautions mentioned under the rapid method are observed.

LYMPHOCYTIC CHORIOMENINGITIS

GRAY MICE, *MUS MUSCULUS,* A RESERVOIR FOR THE INFECTION

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In a previous communication Armstrong and Sweet (*1*) reported two proven cases (No. 1 and No. 2) of lymphocytic choriomeningitis

which were encountered in Washington, D. C. Gray mice trapped in the homes of both patients were demonstrated to be active carriers of the virus.

The purpose of this communication is to report two additional cases of lymphocytic choriomeningitis from the District of Columbia, with recovery of the virus from gray mice trapped in each home, and to present evidence of the extent of the infection among mice trapped in the city of Washington.

CASE REPORTS

Case 3.—W. M., aged 32, roofer, had been well except for a "mild head cold" a few days prior to onset of an unremitting frontal and temporal headache on April 9, 1939. The headache became progressively more severe and he was admitted to the Gallinger Municipal Hospital on April 10, 1939, on which day he vomited twice.

The patient denied all illnesses except those of childhood.

Physical examination on admission showed a well-developed and nourished man lying in bed and holding his head in both hands. He appeared quite ill. His pulse rate was 102 and his respiration 24 per minute; systolic blood pressure was 120 mm. of mercury and diastolic 80 mm. The pupils were dilated and the neck was markedly rigid. Kernig's sign, on both sides, and Brudzinski's sign were positive. Other reflexes were generally hyperactive. Lumbar puncture on admission revealed a clear fluid under slightly increased pressure; there were 190 cells of which 50 percent were polymorphonuclear leucocytes and 50 percent lymphocytes. Successive lumbar punctures in which 15 to 25 cc. of fluid were removed at each tap revealed:

Date	*Number of cells*	*Percent lymphocytes*
April 11	210	90
April 12	293	90
April 17	500	90
April 21	375	90
April 26	80	90

The spinal fluid removed on April 11 contained protein 140 mg., chlorides 692 mg., and sugar 50 mg. percent. The colloidal gold and Kahn reactions were negative. No organisms were formed on smear or culture of any of the fluids. The patient's leucocyte count on admission was 9,800 per cubic millimeter of blood; 76 percent of the cells were polymorphonuclear leucocytes, 23 percent lymphocytes, and 1 percent monocytes. The blood Kahn was negative. The urine was normal.

The patient's temperature, which was 102° F. on admission, gradually fell and reached normal on the fifth day. The headache, stiff neck, and positive neurological signs gradually lessened and disappeared in about 10 days. He was discharged on April 28, 1939, apparently well. The patient was readmitted to Gallinger Hospital on May 5, 1939. He stated that 3 days after his discharge his headache had returned, was worse on standing, and had persisted to the time of readmission.

The physical examination, blood count, urine analysis, and spinal tap failed to reveal any abnormality. He was discharged in 6 days as improved. It was felt that his symptoms were due to a post lumbar puncture syndrome.

On September 28, 1939, he was again readmitted complaining of headache and pain in his legs and back. Physical and neurological examinations revealed no

significant findings. Fifty cc. of spinal fluid were withdrawn which showed two lymphocytes, and negative clinical, colloidal gold, and Kahn reactions. At this time it was felt that the patient's illness was due to a psychoneurosis related to his social background. There has been no further recurrence of symptoms to February 12, 1940.

A sample of spinal fluid, drawn on April 12, 1939, was iced and conveyed to the National Institute of Health where it was inoculated into 5 white mice and 1 guinea pig. All the mice developed symptoms and either died or were sacrificed on the seventh or eighth day after inoculation. The pathology was characteristic of choriomeningitis and the virus proved to be immunologically similar to our original strain of choriomeningitis virus. The guinea pig developed symptoms and its blood, drawn on the sixth day after inoculation, conveyed the infection to white mice.

The patient's spinal fluid, withdrawn on April 21 and May 2, 1939, was also inoculated into animals, but no symptoms developed and subsequent inoculation with the virus indicated a lack of immunity in the inoculated animals. The patient's serum, drawn on April 21, 1939, failed to protect mice against the virus, while a sample drawn on May 8, 1939, possessed moderate protective properties.

Case 4.—C. F., aged 27, dishwasher at a local hospital, was admitted to Emergency Hospital, Washington, D. C., on September 13, 1939, complaining of a severe persistent headache of 2 days' duration. Fever had been present for 1 day. She had vomited once on the morning of admission. There was no relevant information in her past history.

The patient was a well-developed and well-nourished colored female with an appearance of illness. Her temperature was 102.4° F., pulse rate 96, respiration 18 per minute, systolic blood pressure 100 mm. and diastolic 65 mm. of mercury. The physical examination, including neurological, was negative.

When admitted the patient's erythrocytes numbered 6,350,000 per cubic millimeter of blood. The leucocytes numbered 13,400, of which 69 percent were polymorphonuclear cells, 25 percent lymphocytes, and 2 percent monocytes. The blood Wassermann and Kahn were negative. The urine was normal.

The patient's headache persisted and her maximum temperature (rectal) varied between 98.4° and 102° F. until September 16, 1939, when it returned to normal and her headache disappeared. She felt well and her temperature was normal until the afternoon of September 18 when the headache returned and she became nauseated and vomited. The following day the headache, nausea, and vomiting were worse, the temperature rose to 101.6° F. (oral), and she appeared critically ill.

On September 20 her neck was stiff. This was the first and only positive physical finding at any time. A spinal tap performed on September 20 failed to relieve the headache. The fluid was slightly cloudy and under increased pressure. The cells, lymphocytes and large phagocytes numbered 2,070 per cubic millimeter of fluid. The globulin content was 1 plus and tryptophane test was negative. The colloidal gold reading was 12210000. The Wassermann was negative. Spinal tap on September 21 revealed a slightly turbid fluid under increased pressure. The cell count was 1,270 per cubic millimeter of fluid, all lymphocytes. No organisms were revealed by cultural or microscopic studies. On September 22 the vomiting began to subside and ceased the following day. The spinal tap was repeated on September 22; the fluid was clear and there were 1,187 cells per cubic millimeter of fluid, all lymphocytes. The sugar and chloride contents were 79 and 577.5 milligrams percent, respectively.

The temperature remained near 101° F. until September 22 when neoprontosil, 10 cc., intramuscularly every 4 hours was begun. The temperature rose from 102° to 104° F. where it remained until the medication was discontinued on September

24, 1939, after which it fell to normal within 12 hours. The headache and stiff neck gradually subsided and the patient was symptom-free on September 28, 1939.

X-ray of the chest on September 23 was normal. White blood cell counts were normal after September 6, 1939.

Agglutination tests for *Br. abortus*, *B. typhosus*, and *B. paratyphosus* A and B were all negative. She was discharged on October 10, 1939, apparently well.

The spinal fluid drawn on September 20 was delivered to the National Institute of Health where animals were inoculated. The virus of choriomeningitis was recovered in both white mice and guinea pigs. The patient's blood drawn on October 4 was moderately protective for white mice when mixed with the virus prior to inoculation. A second specimen drawn on February 13 was strongly protective.

VIRUS FOUND IN MICE FROM INFECTED HOMES

One mouse was trapped in the home of Case 3 and we were successful in isolating a strain of choriomeningitis from an emulsion of its spleen, liver, and kidney. This home was near the middle of a block of row houses from which 18 grey mice were trapped, 14 of which proved to be active carriers of the virus; infected mice were found from every home of the block where the trapping was successful.

Three gray mice were examined from the home of Case 4, 2 of which proved to be active carriers of the virus. Nine mice in all were trapped from the block of row houses wherein Case 4 lived and strains of choriomeningitis virus were recovered from 5 of them. Eight gray mice were trapped from the row of houses directly across the street from Case 4 but we were not successful in recovering virus from any of them. It thus appears that an open street is not readily traversed by gray mice.

VIRUS STUDIES ON MICE FROM HOMES HAVING NO HUMAN CASES

More than 400 mice were trapped in homes from various parts of Washington, including those above mentioned, of which 365 survived examination. Of this number 303 were submitted to the following test for the presence of virus: The mice were etherized and one kidney and a portion of the liver and spleen from each mouse were preserved in glycerin; similar portions were emulsified in buffered saline (pH 7.6) and 0.03 cc. of the emulsion was inoculated intracerebrally into 4 white mice. Where illness resulted the symptoms and time of death were recorded and a representative sample of 46 brains from ill mice were submitted to Surgeon R. D. Lillie who reported the pathological lesions of choriomeningitis as present in 44 of them. In two instances the lesions suggested secondary infections.

The final diagnosis of choriomeningitis infection was made, however, by the intracerebral inoculation of 4 normal mice and 4 mice which had been previously immunized to our original strain of choriomeningitis virus. The inoculation dose employed was 0.03 cc.

of a 1:500 suspension of mouse brain. In every instance where choriomeningitis was considered to have been recovered from the gray mice the controls died while 2 or more of the immune mice survived.

Choriomeningitis virus was recovered from 64 of a total of 303 gray mice, or approximately 1 out of every 5 mice examined from the District of Columbia was a carrier of the virus. The mice examined were trapped from 76 different homes while the infected mice came from 34 dwellings. Thus it appears that 44 percent of the mouse-infested homes studied were harboring mice infected with choriomeningitis. From these 34 infected homes a total of 122 mice was examined, 64, or 52.4 percent, of which were active carriers of the virus.

The method employed in the above studies might be criticized in that white mice were employed as an indicator of infection, since stocks of white mice have on several occasions been found to be spontaneously infected with choriomeningitis virus (*2, 3, 4*).

We feel that this criticism is not valid for these studies, however, for the following reasons:

1. The same strain of stock mice was employed in the study of other viruses but in no instance did we encounter choriomeningitis.

2. It was striking how mice trapped from certain homes were repeatedly found infected while from other households they were consistently negative, a situation which scarcely would have prevailed had we been dealing with a random infection of our stock mice.

3. The gray mice, in a number of instances, were found to present lesions such as a pleural exudate, fatty liver, and enlarged spleen, which enabled us to predict and later to verify the presence of the virus.

Immunity in gray mice.—In order to eliminate all possible criticism of the employment of white mice as an indicator of the presence of virus, a further test was undertaken. This study was aimed at determining the immunity of gray mice to choriomeningitis, a procedure in which white mice were not employed. Sixty-two gray mice were, therefore, trapped from 22 homes where infected mice had been found previously. These mice were next inoculated intracerebrally with 10 to 15 M. L. D. of our original strain of choriomeningitis virus. Of these 62 mice, 41 survived, while 21 died, indicating immunity in 66 percent. As a control to this group, 47 gray mice trapped in locations where only noninfected mice had been found were similarly inoculated, of which only 5, or 10.6 percent, survived, while 12 white mice, employed as additional controls, all died. The 22 homes in which mice infected with choriomeningitis were trapped, which supplied the 62 gray mice for this test, had supplied 83 mice which were previously tested for the presence of virus, of which 37, or 47 percent, were found to be carriers. The two methods are, therefore, confirmatory. The

somewhat higher immunity as compared to active infection (66:47) is what might be expected and suggests that a portion of the mice had probably freed themselves of readily demonstrable infection but retained their immunity.

SIGNIFICANCE OF CHORIOMENINGITIS IN GRAY MICE

The 4 cases of human choriomeningitis recognized in the District of Columbia during the past year were widely separated and without contact with each other. One was located in northeast, 1 in southeast, and 2 in northwest Washington, but all came from homes harboring infected gray mice.

Now, if we recall that of 76 mouse-infested homes investigated there were 34 which harbored choriomeningitis-infected mice, while 42 harbored noninfected mice, and if we recall that all 4 of our cases were associated with the group of homes harboring infected mice, it would appear that the findings are probably of statistical significance. This would appear especially probable when we consider the large but undetermined proportion of homes which harbor no mice at all and which likewise had no recognized human cases of choriomeningitis.

INFECTED MICE A PROBABLE SOURCE FOR HUMAN INFECTION

There has been no history of contact with a previous case recorded for any proven cases of choriomeningitis so far reported; neither have secondary cases been reported among contacts with any of the established cases. Thus there is a lack of epidemiological evidence pointing toward the human case as an effective source of the infection. On the other hand, several cases of the disease have developed among laboratory personnel who were associated with infected white mice (*5*, *6*, *7*). Moreover, experimental evidence indicates that normal mice are not readily infected either by feeding of the virus or by exposure in the same cage with experimentally infected mice. In view of the apparently low susceptibility of mice to such exposure, it would be remarkable if the four cases we have investigated should in every instance have infected the household mice, especially since the cases were all removed to the hospital within a few days of onset.

The wider extent of the infection among mice as compared to men in the District of Columbia also suggests mice as the reservoir of the infection. There are also certain field observations pointing in the same direction. For instance, Findlay, Alcock, and Stern (*3*) record the development of symptoms in an individual soon after he had cleaned a shed overrun by mice. Wooley, Armstrong, and Onstott (*8*), moreover, noted the relatively higher incidence of protective antibodies among persons of the lower economic stratum of society, and our four cases were all from this group. These observations are

in harmony with an assumed infection from mice, but are hard to reconcile with a person to person method of spread.

PERSISTENCE OF THE INFECTION IN MICE

As noted above, mice are not readily infected by feeding of the virus or by exposure to artificially infected mice, and when so infected tend to free themselves of the virus within a short time. On the other hand, Traub (*9*) has shown that an infected mother may convey the infection to her offspring and that such congenitally infected mice carry the infection for months. These findings have been confirmed by Haas at the National Institute of Health who has also shown that such congenitally infected mice are much more effective transmitters of the infection to other mice than are artificially inoculated animals. Our finding of 52 percent of the mice from the homes harboring infected mice to be carriers of virus, in a study extending over several months, suggests a persistent type of infection such as results from the congenital type of spread.

The evidence, therefore, strongly points to gray mice as an effective reservoir for the virus of choriomeningitis.

The method of transfer of the virus to man, however, has not been definitely established, although infection through dust or possibly by way of the gastrointestinal tract seems possible.[1]

SUMMARY

1. Two additional proven cases of choriomeningitis are reported from the District of Columbia, making a total of 4, all from homes harboring gray mice which proved to be active carriers of the virus of this disease.[2]

2. A total of 303 gray mice trapped from 76 different homes in different sections of Washington, D. C., were examined and 64 of them were found to be active carriers of choriomeningitis virus.

3. The 64 infected mice were from 34 different homes from which a total of 122 mice was examined. Thus 52 percent of the mice from these homes were harboring choriomeningitis virus.

[1] For a more complete discussion of this phase of the subject see "Studies on choriomeningitis and poliomyelitis" by Armstrong in the Transactions and Studies of the College of Physicians of Philadelphia, April 1940.

[2] A fifth case recently reported from Lancaster, Pa., is summarized below:

Case 5. Virus infected gray mouse trapped in home of a case of choriomeningitis at Lancaster, Pa.—W. F., aged 16, patient of Dr. Gregory Sarkisian. Spinal fluid from the patient, forwarded to the National Institute of Health by Dr. Louisa E. Keasbey, pathologist, Lancaster General Hospital, on December 21, 1939, was found by animal inoculation to contain the virus of lymphocytic choriomeningitis. Blood from the patient, drawn on March 2, 1940, contained highly potent specific antibodies as demonstrated by the serum-virus protection test in white mice.

Choriomeningitis virus, immunologically identical with our original strain, was recovered from a pooled emulsion of liver, spleen, and kidney of a single mouse, *Mus musculus*, trapped in the patient's home on March 3, 1940. This is the fifth consecutive case of choriomeningitis found associated with infected gray mice in the home.

4. A total of 62 mice from 22 homes harboring infected mice were inoculated intracerebrally with 10 to 15 M. L. D. of choriomeningitis virus, of which 41, or 66 percent, proved to be immune.

5. Gray mice are believed to be an effective reservoir for the virus of choriomeningitis from which man may become infected.

REFERENCES

(1) Armstrong, Charles, and Sweet, L. K.: Lymphocytic choriomeningitis. Report of two cases with recovery of the virus from gray mice (*Mus musculus*) trapped in the two infected households. Pub. Health Rep., **54**: 673–684 (1939).
(2) Traub, E.: A filterable virus from white mice. J. Immunol., **29**: 69 (1935).
(3) Findlay, G. M., Alcock, N. S., and Stern, R. O.: The virus etiology of one form of lymphocytic meningitis. Lancet, **230**: 650–655 (1936).
(4) Lépine, P., and Sautter, V.: Existence en France du virus murine de la choriomeningite lymphocytaire. C. R. des Seances de l'Academie des Sciences, **202**: 1624–1626 (1936).
(5) Scott, T. McNair, and Rivers, T. M.: Meningitis in man caused by a filterable virus. J. Exp. Med., **63**: 397–414 (1936).
(6) Lépine, P., and Sautter, V.: Contamination de la laboratoire avec le virus de la choriomeningite lymphocytaire. Ann. Inst. Pasteur, **61**: 519–526 (1938).
(7) Unpublished case. National Institute of Health, Washington, D. C., 1939.
(8) Wooley, J. G., Armstrong, C., and Onstott, R. N.: The occurrence in the sera of man and monkeys of protective antibodies against the virus of lymphocytic choriomeningitis as determined by the serum virus protection test in mice. Pub. Health Rep., **52**: 1105–1114 (1937).
(9) Traub, E.: Factors influencing the persistence of choriomeningitis virus in the blood of mice after clinical recovery. J. Exp. Med., **68**: 229–250 (1938).

COURT DECISION ON PUBLIC HEALTH

Provision of milk ordinance prohibiting sale of milk which has had cream line increased by artificial means construed.—(Washington Supreme Court; *Arden Farms Co.* v. *City of Seattle et al.*, 99 P.2d 415; decided February 17, 1940.) The plaintiff company sold, in the city of Seattle, milk which contained 5 percent butterfat. In standardizing this milk, the company added pasteurized cream that was also homogenized so that the product was a combination of whole pasteurized milk and homogenized pasteurized cream. An ordinance of Seattle, in section 7 (m), prohibited the sale of "milk which has had the cream line increased by any artificial means," and the city health commissioner directed that the company discontinue the sale of the said 5 percent milk for the reason that the process by which the product was produced was an artificial one and that, therefore, the cream line was increased by artificial means in violation of the ordinance. Thereupon the company brought an action permanently to enjoin the city and the health commissioner from interfering with its sale of the product.

The trial court decided against the plaintiff but the supreme court reversed the decree and remanded the cause with direction to grant the relief prayed for. The appellate court said that it was plain that

the trial court disregarded the provision in the ordinance which defined homogenized milk and homogenized cream to include milk or cream which has been subjected to the mechanical process of homogenization. "Manifestly," said the court, "the trial court accepted as controlling Webster's general definition of the term 'artificial,' and incorrectly concluded that the actual process of homogenization is artificial. In sequence followed the erroneous holding that the term 'artificial' in section 7 (m) of the ordinance refers specifically to homogenized cream." The court stated that, while the dictionary defined "artificial" as "made or contrived by art; produced or modified by human skill and labor, in opposition to natural," it was patent that if the city council had desired to prevent the deepening of the cream line by the addition of homogenized cream, which is cream mechanically processed, it should have employed the word "mechanical" instead of the word "artificial." "We cannot," observed the court, "agree with the contention that as 'artificial' is that which is opposed to 'natural,' therefore, homogenized cream is 'artificial' cream, or the cream line of the milk was increased by 'artificial' means in adding to the milk homogenized cream." The view taken by the appellate court was that section 7 (m) was intended to prevent the addition of foreign substances to milk to increase its cream line and apparent richness.

DEATHS DURING WEEK ENDED JUNE 22, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 22, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,646	7,454
Average for 3 prior years	7,527	
Total deaths, first 25 weeks of year	223,854	221,984
Deaths under 1 year of age	523	454
Average for 3 prior years	476	
Deaths under 1 year of age, first 25 weeks of year	12,738	13,053
Data from industrial insurance companies:		
Policies in force	65,214,936	67,201,091
Number of death claims	11,352	12,204
Death claims per 1,000 policies in force, annual rate	9.1	9.5
Death claims per 1,000 policies, first 25 weeks of year, annual rate	10.3	11.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 29, 1940

Summary

The incidence of each of the 9 communicable diseases reported weekly by the State health officers remained low during the current week. As compared with the preceding week, increases were recorded only for meningococcus meningitis and poliomyelitis, and all except influenza were below the 5-year (1935–39) median expectancy.

The number of cases of poliomyelitis increased from 51 to 79, of which 36 cases occurred in California (15 last week), 12 in Washington State (9 last week), 5 in Wisconsin, 4 in Iowa, and 3 each in Illinois, Kansas, and Texas.

Of 17 cases of Rocky Mountain spotted fever, 11 cases were reported in the eastern States; and of 27 cases of endemic typhus fever, 8 were reported in Georgia and 6 each in Alabama and Texas.

The numbers of cases reported for the first half-year of 1940 and 1939 and the 5-year medians are as follows:

26 weeks	Diphtheria	Influenza	Measles	Meningococcus meningitis	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever	Whooping cough
1940	7,772	166,672	207,940	949	774	112,937	1,763	2,646	83,686
1939	10,227	149,475	334,515	1,173	793	110,798	8,273	3,803	101,777
5-year median	12,185	139,683	334,515	8,630	793	157,273	7,370	8,803	106,757

For the current week, the Bureau of the Census reports 7,522 deaths in 88 major cities of the United States, as compared with 7,646 for the preceding week, and with a 3-year (1937–39) average of 7,493 for the corresponding week.

The cumulative totals for the first 26 weeks of 1940 and 1939, and of the 3-year weekly averages, are as follows:

	1940	1939	Total, 3-year weekly averages
First 26 weeks	231,376	229,355	231,441

Telegraphic morbidity reports from State health officers for the week ended June 29, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939	
NEW. ENG.												
Maine	0	1	0	-------	1	1	157	51	81	0	0	0
New Hampshire	0	0	0	-------	-------	-------	6	13	17	0	0	0
Vermont	0	0	0	-------	-------	-------	6	158	56	0	0	0
Massachusetts	1	4	5	-------	-------	-------	1,257	504	460	0	0	0
Rhode Island	0	0	1	-------	-------	-------	77	60	37	1	0	0
Connecticut	0	1	1	-------	-------	1	15	236	49	0	0	0
MID. ATL.												
New York	16	10	31	[1] 5	[1] 1	[1] 2	686	869	1,476	3	3	6
New Jersey [2]	9	5	7	6	-------	2	714	27	364	0	1	1
Pennsylvania	0	7	22	-------	-------	-------	260	85	988	1	8	8
E. NO. CEN.												
Ohio	3	22	22	11	7	7	24	58	540	1	2	2
Indiana [2]	0	9	9	3	12	8	14	10	44	0	0	1
Illinois [2]	12	24	24	18	2	8	185	28	182	0	1	1
Michigan [2]	1	9	9	-------	1	-------	728	162	218	1	0	1
Wisconsin	0	1	2	45	7	14	793	313	313	1	4	2
W. NO. CEN.												
Minnesota	4	5	3	1	1	1	61	103	103	0	0	1
Iowa	1	7	2	2	2	-------	61	64	41	0	2	2
Missouri	3	6	6	-------	-------	8	16	18	20	0	1	1
North Dakota	0	1	1	-------	-------	-------	4	9	9	0	1	0
South Dakota	0	0	0	2	-------	-------	3	23	0	0	1	0
Nebraska	1	0	1	-------	-------	-------	6	11	11	0	1	0
Kansas	3	2	2	3	-------	1	122	20	20	1	0	0
SO. ATL.												
Delaware	0	0	0	-------	-------	-------	2	2	4	0	0	0
Maryland [2 3]	0	1	5	1	-------	-------	21	47	61	0	0	1
Dist. of Col. [2]	0	4	5	-------	-------	-------	1	77	42	1	0	0
Virginia [2 4]	6	5	5	11	14	-------	136	115	115	3	1	4
West Virginia [2]	2	5	7	4	7	11	38	15	30	0	0	2
North Carolina [2]	1	4	9	-------	-------	-------	57	174	134	2	3	3
South Carolina [4]	10	6	3	80	114	59	13	9	16	0	0	0
Georgia [4]	2	9	7	-------	111	-------	21	16	0	0	0	0
Florida [4]	1	5	5	-------	-------	-------	22	18	8	0	0	0
E. SO. CEN.												
Kentucky	4	3	3	5	9	3	77	2	25	3	1	5
Tennessee	3	1	3	7	2	4	21	7	14	0	0	2
Alabama [4]	6	3	5	-------	5	7	62	47	47	0	0	2
Mississippi [3 4]	0	8	5	-------	-------	-------	-------	-------	-------	1	0	0
W. SO. CEN.												
Arkansas	2	2	4	-------	6	6	17	8	8	0	1	0
Louisiana [4]	5	4	5	10	4	7	5	18	5	0	0	1
Oklahoma	0	5	5	7	9	9	16	35	23	1	0	0
Texas [4]	9	11	20	89	32	59	245	127	100	0	1	1
MOUNTAIN												
Montana	0	0	1	-------	3	2	31	52	49	0	0	0
Idaho [2]	0	2	0	-------	-------	1	10	17	8	0	0	0
Wyoming [2]	1	0	0	-------	-------	-------	6	33	2	0	0	0
Colorado [4]	15	25	10	-------	8	-------	37	41	48	0	0	0
New Mexico	2	1	1	1	1	1	46	15	18	0	1	0
Arizona	1	2	2	30	24	9	74	8	12	0	0	1
Utah [2]	0	0	0	-------	1	-------	126	34	34	0	0	0
PACIFIC												
Washington	0	0	0	-------	-------	-------	61	540	133	1	0	1
Oregon	8	2	2	3	10	10	75	60	40	0	0	0
California	11	25	25	62	13	14	204	787	665	3	1	5
Total	143	247	290	406	407	358	6,619	5,126	6,968	24	34	61
26 weeks	7,772	10,227	12,185	166,672	149,475	139,683	207,940	334,515	334,515	949	1,173	3,630

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 29, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median 1935–39
	June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939	
NEW ENG.												
Maine	0	1	0	6	14	11	0	0	0	1	3	2
New Hampshire	0	0	0	1	0	1	0	0	0	0	0	0
Vermont	0	0	0	3	4	4	0	0	0	0	0	0
Massachusetts	0	1	1	76	60	130	0	0	0	5	2	1
Rhode Island	0	0	0	1	7	10	0	0	0	0	0	0
Connecticut	0	0	0	38	14	24	0	6	0	0	2	2
MID. ATL.												
New York	1	3	3	219	154	235	0	0	0	6	11	11
New Jersey [3]	0	0	0	108	58	58	0	0	0	4	4	4
Pennsylvania	0	0	1	133	55	241	0	0	0	13	5	13
E. NO. CEN.												
Ohio	1	1	1	82	161	152	0	7	1	15	6	8
Indiana [3]	0	0	0	21	26	37	0	7	7	0	3	3
Illinois [3]	3	2	2	263	93	183	3	14	21	6	9	9
Michigan [3]	1	2	1	104	149	149	0	2	0	3	3	4
Wisconsin	5	0	0	60	45	113	4	1	2	1	2	0
W. NO. CEN.												
Minnesota	2	0	0	25	19	49	2	3	7	0	3	0
Iowa	4	0	0	13	17	31	8	12	12	3	6	1
Missouri	0	0	0	20	27	27	5	13	11	5	13	16
North Dakota	0	0	0	6	2	5	0	0	3	1	0	0
South Dakota	0	0	0	2	15	11	1	7	4	0	0	0
Nebraska	1	0	0	8	3	8	0	1	2	2	0	0
Kansas	3	0	0	19	34	34	1	0	7	2	5	5
SO. ATL.												
Delaware	0	0	0	4	3	3	0	0	0	1	2	2
Maryland [2] [3]	0	0	0	11	6	19	0	0	0	1	1	3
Dist. of Col. [3]	1	0	0	11	2	6	0	0	0	0	0	0
Virginia [3] [4]	1	0	1	7	3	4	0	0	0	5	12	8
West Virginia [3]	0	0	0	14	12	13	0	0	0	3	11	6
North Carolina [3]	0	3	3	11	12	14	0	0	0	6	8	20
South Carolina [4]	0	29	1	2	5	1	1	1	0	6	16	20
Georgia [4]	0	4	3	1	11	6	0	0	0	13	30	30
Florida [4]	0	0	0	1	2	2	0	0	0	2	2	2
E. SO. CEN.												
Kentucky	0	0	1	26	15	15	0	0	0	9	12	13
Tennessee	0	1	1	18	12	6	1	2	1	13	15	18
Alabama [4]	0	1	5	11	15	7	4	0	0	4	7	14
Mississippi [3] [4]	1	0	0	1	1	5	0	0	0	8	7	16
W. SO. CEN.												
Arkansas	0	1	0	5	2	2	1	3	0	10	13	17
Louisiana [4]	0	0	3	5	5	6	0	0	0	15	22	21
Oklahoma	0	1	0	15	9	7	3	6	3	3	24	9
Texas [4]	3	9	2	11	18	32	0	5	2	15	21	35
MOUNTAIN												
Montana	0	1	0	6	2	9	0	2	2	0	0	1
Idaho [3]	2	0	0	2	2	2	0	0	3	1	5	3
Wyoming [3]	0	0	0	0	6	7	0	2	1	1	0	0
Colorado [4]	0	1	0	13	45	17	4	0	0	1	0	2
New Mexico	1	1	0	7	10	6	0	0	1	0	7	7
Arizona	0	1	0	3	9	7	0	2	0	1	2	4
Utah [3]	1	1	0	0	4	11	0	6	0	0	2	0
PACIFIC												
Washington	12	0	0	13	6	13	0	0	3	1	1	3
Oregon	0	0	0	2	6	20	0	0	5	5	0	2
California	36	16	7	75	97	97	0	7	7	4	8	8
Total	79	80	80	1,483	1,277	2,139	38	109	152	195	305	359
26 weeks	774	793	793	112,937	110,798	157,273	1,763	8,273	7,370	2,646	3,803	3,803

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 29, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough		Division and State	Whooping cough	
	Week ended			Week ended	
	June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939
NEW ENG.			SO. ATL.—continued		
Maine	25	28	North Carolina [2]	112	253
New Hampshire	2	0	South Carolina [4]	24	44
Vermont	23	44	Georgia [4]	13	28
Massachusetts	144	102	Florida [4]	3	7
Rhode Island	6	18	E. SO. CEN.		
Connecticut	29	73	Kentucky	61	11
MID. ATL.			Tennessee	37	104
New York	262	396	Alabama [4]	15	55
New Jersey [3]	50	299	Mississippi [3 4]	----	----
Pennsylvania	315	316	W. SO. CEN.		
E. NO. CEN.			Arkansas	22	14
Ohio	318	334	Louisiana [4]	33	6
Indiana [3]	20	80	Oklahoma	42	4
Illinois [3]	79	302	Texas [4]	279	194
Michigan [3]	197	208	MOUNTAIN		
Wisconsin	78	171	Montana	1	9
W. NO. CEN.			Idaho [3]	25	6
Minnesota	30	35	Wyoming [3]	5	2
Iowa	35	50	Colorado [5]	21	31
Missouri	0	62	New Mexico	25	18
North Dakota	10	7	Arizona	34	26
South Dakota	12	4	Utah [3]	164	69
Nebraska	15	5	PACIFIC		
Kansas	44	14	Washington	61	7
SO. ATL.			Oregon	25	27
Delaware	5	3	California	346	126
Maryland [2 3]	151	57	Total	3,370	3,749
Dist. of Col. [3]	1	29			
Virginia [3 4]	71	40	26 weeks	83,686	101,777
West Virginia [3]	100	21			

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended June 29, 1940, 17 cases, as follows: New Jersey, 1; Indiana, 2; Illinois, 1; Maryland, 4; District of Columbia, 1; Virginia, 1; North Carolina, 1; Idaho, 1; Wyoming, 5.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended June 29, 1940, 27 cases, as follows: Virginia, 1; South Carolina, 1; Georgia, 8; Florida, 1; Alabama, 6; Mississippi, 2; Louisiana, 2; Texas, 6.
[5] Colorado tick fever, week ended June 29, 1940, Colorado, 7 cases.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 15, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	123	39	20	3,787	384	1,213	14	377	39	1,193	-------
Current week [1]	66	25	14	3,522	294	1,036	0	344	25	1,137	-------
Maine:											
Portland	0	------	0	73	2	0	0	0	0	1	36
New Hampshire:											
Concord	0	------	0	0	0	0	0	1	0	0	8
Manchester	0	------	0	0	0	0	0	0	0	0	16
Nashua	0	------	0	0	0	0	0	0	0	0	2
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	0	4
Burlington	0	------	0	1	0	0	0	0	0	4	10
Rutland	0	------	0	0	0	0	0	0	0	0	13
Massachusetts:											
Boston	0	------	1	279	10	48	0	12	2	69	206
Fall River	0	------	0	122	0	0	0	1	1	6	18
Springfield	0	------	0	7	1	4	0	0	0	6	24
Worcester	2	------	0	332	3	2	0	1	0	0	49
Rhode Island:											
Pawtucket	0	------	0	2	0	1	0	0	0	2	19
Providence	0	------	0	136	4	2	0	2	0	8	58
Connecticut:											
Bridgeport	0	------	0	1	1	0	0	2	0	1	29
Hartford	0	------	0	1	2	8	0	0	0	0	36
New Haven	0	------	0	1	0	6	0	0	0	5	24
New York:											
Buffalo	0	------	0	0	5	22	0	6	0	11	110
New York	15	1	0	546	46	223	0	74	2	97	1,443
Rochester	0	------	0	8	3	6	0	1	1	7	52
Syracuse	0	------	0	0	3	8	0	1	0	6	49
New Jersey:											
Camden	1	------	0	31	1	5	0	1	0	0	28
Newark	0	------	0	375	2	12	0	6	0	10	81
Trenton	0	------	0	0	1	5	0	5	0	0	38
Pennsylvania:											
Philadelphia	3	------	0	205	7	68	0	23	5	20	443
Pittsburgh	2	1	0	6	13	8	0	9	0	19	148
Reading	1	------	0	3	0	0	0	0	0	17	18
Scranton	0	------	-------	0	------	1	0	------	0	0	-------
Ohio:											
Cincinnati	2	2	0	4	7	5	0	6	0	21	117
Cleveland	0	5	1	9	9	30	0	4	0	48	158
Columbus	2	1	1	0	5	5	0	2	0	19	87
Toledo	0	1	0	3	2	20	0	3	0	21	57
Indiana:											
Anderson	1	------	0	1	1	1	0	1	0	0	13
Fort Wayne	0	------	0	4	2	3	0	0	0	6	28
Indianapolis	0	------	0	4	8	8	0	4	0	8	130
Muncie	0	------	0	1	1	0	0	0	0	2	10
South Bend	0	------	0	2	0	0	0	0	0	0	16
Terre Haute	0	------	1	0	1	0	0	0	0	0	16
Illinois:											
Alton	0	------	0	0	0	2	0	0	0	1	2
Chicago	15	2	2	151	27	317	0	37	0	34	680
Elgin	0	------	0	1	2	0	0	0	0	4	9
Moline	0	------	0	3	0	0	0	0	0	0	8
Springfield	1	1	0	1	3	0	0	0	0	4	18
Michigan:											
Detroit	1	------	0	340	12	73	0	10	1	142	248
Flint	0	------	1	2	0	8	0	0	0	1	30
Grand Rapids	0	------	0	12	1	8	0	1	0	24	30
Wisconsin:											
Kenosha	0	------	0	22	0	1	0	0	0	0	8
Madison	0	------	0	62	2	1	0	0	0	7	10
Milwaukee	0	------	0	350	2	22	0	4	0	6	93
Racine	0	------	0	11	1	2	0	0	0	0	8
Superior	1	------	0	39	0	0	0	0	0	0	6

[1] Figures for Pueblo estimated; report not received.

City reports for week ended June 15, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	4	1	3	0	0	0	0	24
Minneapolis	0	------	1	2	3	17	0	2	0	2	90
St. Paul	0	------	0	3	2	4	0	1	0	7	62
Iowa:											
Cedar Rapids	0	------	--------	21	-------	1	0	-------	1	1	--------
Davenport	0	------	--------	1	-------	3	0	-------	0	2	--------
Des Moines	0	------	0	9	0	6	1	0	0	0	22
Sioux City	0	------	--------	2	-------	2	0	-------	0	0	--------
Waterloo	3	------	--------	3	-------	0	0	-------	0	2	--------
Missouri:											
Kansas City	0	------	0	10	4	5	0	7	0	1	97
St. Joseph	0	------	0	0	2	0	0	2	0	1	20
St. Louis	1	------	0	1	9	7	0	6	0	11	201
North Dakota:											
Fargo	0	------	0	0	0	1	0	0	0	1	9
Grand Forks	0	------	--------	0	-------	0	0	-------	0	1	--------
Minot	0	------	0	0	0	0	0	0	0	0	3
South Dakota:											
Aberdeen	0	------	--------	0	-------	0	0	-------	0	0	--------
Sioux Falls	0	------	0	0	0	2	0	0	0	0	7
Nebraska:											
Lincoln	0	------	--------	4	-------	3	0	-------	0	2	--------
Omaha	0	------	0	6	0	1	0	1	0	2	55
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	2	3
Topeka	0	------	0	20	1	0	0	1	0	2	14
Wichita	1	------	0	1	1	0	0	0	0	4	22
Delaware:											
Wilmington	0	------	0	0	5	0	0	0	0	5	36
Maryland:											
Baltimore	0	------	0	2	4	7	0	6	1	116	178
Cumberland	0	------	0	0	0	0	0	0	0	0	9
Frederick	0	------	0	0	1	0	0	0	0	0	5
Dist. of Col.:											
Washington	0	------	0	6	5	12	0	15	1	5	172
Virginia:											
Lynchburg	0	------	0	2	0	2	0	0	0	5	11
Norfolk	0	------	0	20	2	5	0	1	1	6	24
Richmond	0	------	0	2	1	2	0	1	1	4	50
Roanoke	0	------	0	22	0	0	0	0	0	1	12
West Virginia:											
Charleston	0	1	0	0	0	1	0	0	0	1	11
Huntington	2	------	--------	1	-------	2	0	-------	0	0	--------
Wheeling	0	------	0	1	1	0	0	0	0	0	20
North Carolina:											
Gastonia	0	------	--------	0	-------	0	0	-------	0	0	--------
Raleigh	0	------	0	1	2	0	0	0	0	0	7
Wilmington	0	------	0	0	1	1	0	0	0	0	10
Winston-Salem	1	------	0	0	0	0	0	0	0	3	18
South Carolina:											
Charleston	0	1	0	0	1	0	0	0	0	0	13
Florence	0	------	0	0	1	0	0	1	0	0	9
Greenville	0	------	0	0	2	0	0	1	0	1	19
Georgia:											
Atlanta	0	------	0	8	3	0	0	4	0	9	95
Brunswick	0	------	0	0	1	0	0	1	0	0	6
Savannah	0	------	1	1	1	0	0	1	0	0	26
Florida:											
Miami	0	------	0	3	0	0	0	1	0	0	30
Tampa	0	------	0	9	0	0	0	1	0	3	27
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	8	7
Covington	0	------	0	4	1	2	0	0	0	3	13
Lexington	0	------	0	40	0	0	0	0	0	10	15
Tennessee:											
Knoxville	0	------	0	5	2	3	0	2	0	0	23
Memphis	0	------	1	18	4	4	0	6	0	16	76
Nashville	0	------	1	15	3	1	0	2	0	0	43
Alabama:											
Birmingham	0	------	0	2	3	2	0	7	0	4	64
Mobile	0	------	0	1	1	0	0	0	0	0	20
Montgomery	0	------	--------	0	-------	0	0	-------	0	2	--------
Arkansas:											
Fort Smith	0	------	--------	0	-------	0	0	-------	0	2	--------
Little Rock	0	------	0	0	3	1	0	3	0	1	--------

City reports for week ended June 15, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
New Orleans	0	------	0	0	12	5	0	9	2	76	123
Shreveport	0	------	0	0	1	0	0	1	0	0	31
Oklahoma:											
Oklahoma City	1	------	1	0	4	1	0	0	0	0	39
Tulsa	0	------	--------	0	-------	0	0	-------	0	9	--------
Texas:											
Dallas	0	------	0	62	3	1	0	3	1	9	76
Fort Worth	1	------	0	3	2	0	0	1	0	9	25
Galveston	0	------	0	0	2	0	0	0	0	0	18
Houston	1	------	0	4	2	0	0	5	2	7	87
San Antonio	2	------	1	1	3	0	0	4	1	2	75
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	10
Great Falls	0	------	0	18	1	3	0	0	0	0	6
Helena	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	0	0	0	0	0	3
Idaho:											
Boise	0	------	0	4	2	0	0	0	0	1	4
Colorado:											
Colorado Springs	0	------	0	3	0	0	0	1	0	0	10
Denver	4	------	0	11	8	6	0	3	0	1	72
Pueblo	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	--------
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	11
Utah:											
Salt Lake City	0	------	0	106	2	2	0	2	0	72	39
Washington:											
Seattle	0	------	0	73	1	2	0	6	1	15	95
Spokane	0	------	0	1	3	3	0	0	2	3	37
Tacoma	0	------	0	2	0	4	0	0	0	0	28
Oregon:											
Portland	0	------	0	22	4	3	0	2	0	10	90
Salem	0	------	--------	0	-------	1	0	-------	0	0	--------
California:											
Los Angeles	0	8	2	11	0	21	0	15	1	87	266
Sacramento	8	------	0	4	2	0	0	2	0	24	42
San Francisco	2	2	0	6	7	8	0	12	0	40	151

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Louisiana:			
Buffalo	1	0	0	New Orleans	1	1	0
New York	1	1	0	Texas:			
Indiana:				Houston	1	0	0
Indianapolis	1	0	0	Washington:			
Illinois:				Tacoma	0	0	2
Chicago	1	0	0	California:			
Kansas:				Los Angeles	0	0	6
Wichita	0	0	1				
West Virginia:							
Huntington	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Bridgeport, 1; New York, 3; Newark, 1.
Pellagra.—Cases: Charleston, S. C., 1; Atlanta, 4; Savannah, 5; Birmingham, 1.
Typhus fever.—Cases: New York, 1; Savannah, 1; New Orleans, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 25, 1940.—During the week ended May 25, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2	5					7
Chickenpox	1	13	7	126	300	44	9	2	96	598
Diphtheria			1	20	1	5				27
Dysentery				1	1				1	3
Influenza		1			22				26	49
Lethargic encephalitis				1	1					2
Measles		3	3	131	378	318	223	3	135	1,194
Mumps				21	301	11	10		32	375
Pneumonia		2			12	3			6	23
Poliomyelitis					1					1
Scarlet fever		6	1	159	113	14	20	18	7	338
Tuberculosis	1	8	7	44	38	1	1			100
Typhoid and paratyphoid fever				20	2	1	2			25
Whooping cough		18	22	174	104	31	29		7	385

Vital statistics—Fourth quarter 1939 and year 1939.—The Bureau of Statistics of the Dominion of Canada has published the following preliminary statistics for the fourth quarter of 1939. The rates are computed on an annual basis. There were 18.5 live births per 1,000 population during the fourth quarter of 1939 as compared with 19.3 during the fourth quarter of 1938. The death rate was 9.2 per 1,000 population for the fourth quarter of 1939 and 9.4 for the corresponding quarter of 1938. The infant mortality rate for the fourth quarter of 1939 was 59 per 1,000 live births and 63 per 1,000 live births for the same quarter of 1938. The maternal death rate was 4.2 per 1,000 live births for the fourth quarter of 1939 and 3.9 for the fourth quarter of 1938.

The accompanying tables give the numbers of births, deaths, and marriages, by Provinces, for the fourth quarter of 1939 and the year 1939, and deaths by causes in Canada for the fourth quarter of 1939, and the corresponding quarter of 1938, and for the years 1939 and 1938:

Number of births, deaths, and marriages, fourth quarter 1939

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	52,618	26,166	3,092	222	35,265
Prince Edward Island	463	278	27	3	256
Nova Scotia	2,583	1,326	152	10	1,778
New Brunswick	2,516	1,240	222	8	1,262
Quebec	18,076	7,764	1,326	79	8,371
Ontario	14,602	9,085	681	64	11,120
Manitoba	3,144	1,505	152	10	2,980
Saskatchewan	4,269	1,568	233	15	3,752
Alberta	3,928	1,461	175	21	3,180
British Columbia	3,037	1,939	124	12	2,566

[1] Exclusive of Yukon and the Northwest Territories.

Deaths by cause, fourth quarter 1939

Cause of death	Canada [1] (fourth quarter)		Province								
	1938	1939	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	506	555	5	26	32	135	233	22	29	30	43
Cancer	3,066	3,125	34	176	132	779	1,144	205	198	206	251
Cerebral hemorrhage, cerebral embolism and thrombosis	525	499	6	39	38	91	210	24	29	25	37
Diarrhea and enteritis	609	518	11	9	44	273	99	21	28	19	14
Diphtheria	144	99	------	1	6	73	1	6	9	3	------
Diseases of the arteries	2,556	2,714	18	136	111	494	1,297	165	147	137	209
Diseases of the heart	4,530	4,707	58	227	188	1,140	1,935	262	261	263	373
Homicides	21	29	------	1	2	2	5	1	5	4	9
Influenza	515	496	3	16	18	222	125	22	33	41	16
Measles	37	33	------	------	1	19	8	------	1	3	1
Nephritis	1,619	1,594	18	68	54	737	443	63	66	56	89
Pneumonia	1,922	1,527	28	88	96	445	532	79	100	68	91
Poliomyelitis	18	16	------	2	------	6	5	3	------	------	------
Puerperal causes	213	222	3	10	8	79	64	10	15	21	12
Scarlet fever	53	40	1	1	------	22	10	1	2	2	1
Smallpox	2	------	------	------	------	------	------	------	------	------	------
Suicides	217	233	1	7	6	30	87	22	17	28	35
Tuberculosis	1,407	1,308	15	85	73	590	218	85	42	53	147
Typhoid fever	51	47	------	------	2	30	4	3	7	1	------
Violence	1,023	1,065	7	58	49	232	399	69	59	69	123
Other specified causes	------	7,029	66	356	333	2,229	2,243	421	488	409	484
Unspecified or ill-defined causes	------	144	2	5	40	57	16	5	5	12	2
Whooping cough	105	166	2	15	7	79	7	16	27	11	2

[1] Exclusive of Yukon and the Northwest Territories.

Number of births, deaths, and marriages, year 1939

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	228,621	108,739	13,891	965	103,567
Prince Edward Island	2,105	1,115	166	17	638
Nova Scotia	11,700	6,273	751	48	4,994
New Brunswick	11,228	5,064	885	54	3,722
Quebec	79,503	33,376	6,209	368	28,899
Ontario	63,945	37,503	2,980	276	34,657
Manitoba	13,583	6,157	752	47	7,676
Saskatchewan	17,930	5,990	915	58	7,284
Alberta	16,323	5,754	751	59	7,335
British Columbia	12,304	7,507	482	38	7,862

[1] Exclusive of Yukon and the Northwest Territories.

Deaths, by cause, year 1939, comparative

Cause of death	Canada [1]		Province								
	1938	1939	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	1,545	1,580	7	82	92	390	682	63	63	81	120
Cancer	12,038	12,388	106	728	498	3,206	4,566	850	745	645	1,044
Cerebral hemorrhage, cerebral embolism and thrombosis	2,016	2,054	30	185	178	420	814	78	133	95	121
Diarrhea and enteritis	2,590	2,360	26	56	156	1,360	389	126	114	89	44
Diphtheria	434	335	----	15	33	218	13	13	36	7	----
Diseases of the arteries	9,970	10,864	78	566	429	2,108	5,185	623	527	550	798
Diseases of the heart	17,373	18,537	186	992	702	4,468	7,697	1,053	989	996	1,454
Homicides	127	122	1	6	4	16	37	4	16	13	25
Influenza	2,362	3,944	48	352	182	1,492	1,190	176	196	213	95
Measles	250	197	----	3	14	119	44	4	6	6	1
Nephritis	6,492	6,536	86	331	200	2,994	1,887	226	248	214	350
Pneumonia	7,432	6,578	102	456	406	1,970	2,171	367	377	357	372
Poliomyelitis	83	56	1	3	1	14	23	5	1	5	3
Puerperal causes	957	965	17	48	54	368	276	47	58	59	38
Scarlet fever	202	165	1	3	6	66	53	5	12	17	2
Smallpox	3	1	----	----	----	----	----	----	----	----	1
Suicides	948	973	6	35	20	153	354	84	90	102	129
Tuberculosis	6,126	5,960	61	425	286	2,680	1,084	367	232	275	550
Typhoid fever	207	180	1	3	11	109	19	16	10	7	4
Violence	4,585	4,474	31	262	190	1,073	1,637	275	269	269	468
Other specified causes	----	29,341	297	1,624	1,417	9,702	9,250	1,714	1,807	1,681	1,849
Unspecified or ill-defined causes	----	592	27	40	148	224	57	20	14	40	22
Whooping cough	496	537	3	58	37	226	75	41	47	33	17

[1] Exclusive of Yukon and the Northwest Territories.

JAMAICA

Communicable diseases—4 weeks ended June 8, 1940.—During the 4 weeks ended June 8, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	3	14	Poliomyelitis	----	1
Diphtheria	2	3	Puerperal sepsis	----	1
Dysentery	10	11	Tuberculosis	28	100
Leprosy	----	3	Typhoid fever	13	51

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of June 28,1940, pages 1188-1191. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Typhus Fever

Irish Free State—Donegal County.—During the week ended June 1, 1940, 1 case of typhus fever was reported in Donegal County, Irish Free State.

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