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FREQUENCY OF DENTAL SERVICES AMONG 9,000 FAMILIES, BASED ON NATION-WIDE PERIODIC CANVASSES, 1928–31*

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CONTENTS

Modern dentistry is a recent development. Extraction was practically the only cure for toothache until the latter part of the eighteenth century. The entire development of modern dentistry occurred in the nineteenth century,[1] and mainly in the latter half of that period (*19*).

At present there are approximately 75,000 dentists in the United States. Like physicians, they tend to be concentrated in large cities in greater percentages than is true of the general population, but not so much as medical and surgeon specialists and hospitals (*27*).

Such studies as are available on dental needs indicate widespread decay of the teeth of children (*20, 25*) and of adults of various ages and

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This is the thirteenth of a series of papers on sickness and medical care in this group of families (*1-12*). The survey of these families was organized and conducted by the Committee on the Costs of Medical Care; the tabulation was done under a cooperative arrangement with the committee and the Public Health Service. Committee publications based on the results deal primarily with costs, and Public Health Service publications deal primarily with the incidence of illness and the extent and kind of medical care, without regard to cost. As costs are meaningless without some knowledge of the extent and nature of the service received, there is inevitably some overlapping. The committee staff, particularly Dr. I. S. Falk, and Miss Margaret Klem, cooperated in the tabulation of the data.

Special thanks are due to Dr. Mary Gover, who assisted in the analysis, to Mrs. Lily Vanzee Welch, who was in immediate charge of tabulating the data, to Drs. W. M. Gafafer and Henry Klein for a critical reading of the manuscript and for valuable suggestions, and to other members of the statistical staff of the Public Health Service for advice and assistance in the preparation of the study.

[1] There are evidences that as early as 500 B. C. the Egyptians and Hindus attempted to replace lost teeth with wood or ivory substitutes attached to adjacent teeth; however, these crude procedures have little relation to modern dentistry.

occupations (*16, 18, 28*). However, the present study is not concerned with dental needs. Its purpose is to show the distribution of dental service in the various elements of the general population—that is, the per capita volume of specific dental services that is received annually by various classes of the population. Specifically, the paper includes such data as the volume of dental service of specific types received by rural as compared with urban dwellers; by low income as compared with well-to-do families; by laborers as compared with professional classes; by children as compared with adults; and by women as compared with men. A recent survey in Detroit (*15*) included data of this kind, but with fewer details than are available for the present study.

Without data on the relative dental needs of these various classes of persons, it is impossible to indicate to what extent the variation in service received reflects variation in dental needs and to what extent it reflects other factors, such as ability to purchase service or availability of dental facilities. However, with respect to many of the kinds of dental work, the variations in the volume of service suggest that dental care received is more closely correlated with ability to pay than with dental needs.

I. SOURCE AND CHARACTER OF DATA

In the study of illness and medical care among canvassed white families in 130 localities in 18 States [2] that was made by the Committee on the Costs of Medical Care (*17*) and the United States Public Health Service, the nature of all dental service received during the year of the study was recorded along with other facts about medical care and illness. This record of dental care, with details as to whether it consisted of fillings, extractions, crowns, bridges, plates or other types of work, affords data on the frequency of these services during the 12 months covered by periodic canvasses.

The composition and characteristics of the group of 8,758 families kept under observation for 12 consecutive months in the years 1928–31 have been considered in some detail in the first report in the series (*1*). These families, including a total of 39,185 individuals, resided in 18 States representing all geographic sections. Every size of community was included, from metropolitan districts to small industrial and agricultural towns and rural unincorporated areas. With respect to income, the distribution was reasonably similar to the estimated distribution of the general population of the United States at the time of the survey.

[2] The 18 States sampled and the number of canvassed families were as follows: California (890), Colorado (386), Connecticut (100), District of Columbia (99), Georgia (544), Illinois (463), Indiana (494), Kansas (301), Massachusetts (287), Michigan (329), Minnesota (224), New York (1,710), Ohio (1,148), Tennessee (212), Virginia (412), Washington (551), West Virginia (318), Wisconsin (290). Further details about the distribution of the canvassed population are included in a preceding paper (*1*).

Type of dental service.—Dental care in this study is recorded in two ways—(*a*) as *cases*, and (*b*) as *types of service*.

A dental case represents the receipt by an individual of service requiring one or more consecutive visits to a dentist. The service rendered may include only prophylaxis or a dental examination with no other work; on the other hand, it may include fillings, extractions, and bridge work. The same individual may count as more than one case in the 12-month period covered. Although the dental case is rather indefinite, it serves as a rough index of the amount of dental care received.

The types of service represent a break-down of the cases into specific kinds of dental work. The data on fillings, extractions, and crowns are tabulated as the total numbers of these respective services. For example, a dental case may consist of three fillings, two extractions, and one crown; in tabulating specific services this one case counts as six services, i. e., three fillings, two extractions, and one crown. However, such services as prophylaxis, X-ray, orthodontia, plates, bridges, and examinations were not and usually could not be recorded in a quantitative way; therefore, in these types of work the volume of service is expressed as the number of dental cases which involved a particular kind of service, regardless of other services that may have been included in the same case.

II. FREQUENCY OF DENTAL SERVICES IN THE WHOLE SURVEYED GROUP

Among the total of 38,544 person-years of observation there were 10,116 dental cases; with an adjustment for age distribution, this gives an annual rate of 269 cases per 1,000 population. The corresponding rate for males was 227 and for females 307 cases per 1,000. A dental case, it will be remembered, represents a series of one or more visits to a dentist, including as many calls as were made to complete the particular dental services that were undertaken.

Table 1 and figure 1 show annual rates of dental cases per 1,000 persons of specific ages for each sex. There is little dental service for children under 3 years of age; the curve (both sexes) rises rapidly after 3 years to 331 cases per 1,000 children 8–9 years old, a level which is roughly maintained until about 35 years of age, with a gradual decline thereafter.

Up to 10 years of age the differences between the sexes with respect to the frequency of dental cases are small, but above this age females receive consistently more dental service than males, the excess in dental cases being 50 percent or more for the various age groups from 20 to 55 years.[3]

[3] While women were usually the informants and may have reported their own dental work more completely than that of other members of the household, it does not appear probable that the error would be anything like the magnitude of these differences. Moreover, it will be seen later that the excess of service for females extends to all types of dental care, including bridges, plates, and other extensive services that could hardly be unknown to the housewife.

TABLE 1.—*Frequency of all dental cases* [1] *among males and females of specific ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Age	Annual dental cases [1] per 1,000 population			Number of dental cases			Population (years of life)		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
All ages: [2]									
Adjusted [3]	268.8	226.6	307.1						
Crude	262.5	223.3	300.4	[3] 10,116	[3] 4,220	[3] 5,896	[3] 38,544	[3] 18,896	[3] 19,627
Under 1	.7	1.5		1	1		1,362	673	669
1	5.6	4.3	7.0	5	2	3	889	460	428
2	19.2	17.9	20.6	20	10	10	1,044	558	486
3	60.6	63.5	57.7	65	34	31	1,072	535	537
4	111.7	79.0	145.4	128	46	82	1,146	582	564
5	179.2	157.7	198.7	210	88	122	1,172	558	614
6	252.2	254.8	249.6	292	145	147	1,158	569	589
7	291.2	279.7	304.0	341	172	169	1,171	615	556
8–9	330.6	350.7	311.6	732	378	354	2,214	1,078	1,136
10–11	332.3	[4] 309.4	[4] 332.2	658	322	336	1,980	1,003	977
12–13	310.8			542	266	276	1,744	868	876
14–15	337.3			516	248	268	1,530	781	749
16–17	331.0	[5] 303.2	[5] 352.6	429	209	220	1,296	673	623
18–19	299.6			320	130	190	1,068	503	565
20–24	311.0	238.3	364.1	659	213	446	2,119	894	1,225
25–34	329.8	230.6	403.3	1,860	554	1,306	5,640	2,402	3,238
35–44	309.8	245.1	375.1	1,837	730	1,107	5,930	2,979	2,951
45–54	287.7	227.6	361.2	964	420	544	3,351	1,845	1,506
55–64	232.9	221.4	246.6	343	178	165	1,473	804	669
65 and over	120.2	112.1	126.6	120	49	71	998	437	561

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.
[3] Adjusted by the *direct* method as described in footnote to table 2.
[4] Ages 10–14.
[5] Ages 15–19.

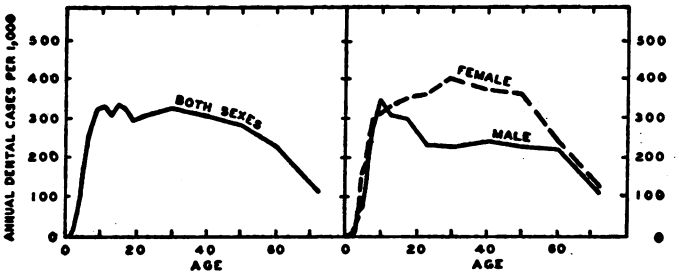

FIGURE 1.—Frequency of all dental cases among males and females of specific ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31.

Since this study includes no measure of dental needs, there is no way to determine whether the excess of dental service for women was due to an excess in dental needs as compared with men or to more adequate care for the same needs. However, a recent study (*20*) indicates that, at least in the school ages, the dental needs of girls exceed those of boys.

Specific kinds of service are of more interest than dental cases. In table 2 rates are shown for each of nine types of dental care; as already outlined, the volume of these services represents a summation of the specific services reported in each case.

TABLE 2.—*Frequency of certain dental services among persons of specific ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Age	Fillings	Extractions	All prophylaxis	Examination or prophylaxis only	X-ray	Orthodontia	Crowns	Bridges	Plates	Population (years of life)
	Annual rate per 1,000 population									
All ages:[1]										
Adjusted rate[2]	446.7	286.2	105.2	25.8	27.1	5.7	17.4	17.6	12.5	----
Crude rate	437.2	273.1	100.6	26.1	24.2	6.3	15.7	15.3	9.8	[1] 38,544
Under 1	----	----	----	----	----	----	----	----	----	1,362
1	9.0	2.3	2.3	1.1	----	----	----	----	----	889
2	6.7	7.7	4.8	7.7	----	----	----	----	----	1,044
3	84.0	31.7	22.4	14.0	.5	----	----	----	----	1,072
4	205.9	61.1	27.9	14.0	1.3	.4	----	----	----	1,146
5	254.3	153.6	40.1	23.9	----	----	----	----	----	1,172
6	373.1	206.4	62.2	31.1	4.7	11.2	----	----	----	1,158
7	422.7	294.6	81.1	31.6	----	----	1.1	.2	----	1,171
8	365.4	314.8	87.0	34.8	8.1	17.2	----	----	----	1,207
9	462.8	297.9	109.2	46.7	----	----	----	----	----	1,007
10	456.8	259.1	125.3	42.4	8.6	18.2	----	----	----	1,077
11	590.3	211.5	128.5	----	----	----	----	----	----	903
12	559.6	174.9	121.3	41.3	12.6	21.8	3.9	1.3	.4	915
13	737.0	112.2	139.9	----	----	----	----	----	----	829
14	716.8	111.4	126.8	47.1	17.0	22.9	----	----	----	844
15	795.9	128.3	167.6	----	----	----	----	----	----	686
16–17	756.9	160.5	143.5	34.7	20.1	16.2	12.8	8.9	1.8	1,296
18–19	761.2	180.7	142.3	25.3	27.1	6.5	----	----	----	1,068
20–24	623.9	230.8	134.0	27.4	33.5	5.2	22.2	19.3	6.1	2,119
25–29	682.9	352.5	113.2	20.1	36.9	1.2	31.4	31.0	11.7	2,491
30–34	506.5	434.7	137.8	28.3	45.1	1.6	----	----	----	3,149
35–44	466.6	450.9	120.7	24.6	43.3	1.7	29.9	31.4	17.5	5,930
45–54	358.4	410.9	121.7	23.6	41.8	2.7	33.1	28.9	30.7	3,351
55–64	227.4	376.1	95.0	22.4	39.4	.7	14.9	27.8	36.7	1,473
65 and over	76.1	178.4	39.1	10.0	10.0	1.0	2.0	10.0	27.1	998
	Number of services									
All ages[1]	16,851	10,525	3,877	1,006	932	242	607	589	378	----

[1] "All ages" includes a few of unknown age.

[2] Rates for all ages are adjusted by the direct method to the age distribution of the white population of the registration States in 1930 as a standard population; this population is given for specific ages in table 1 of a preceding paper (4). The adjustment method involves the weighting of the age specific rates (in 5- and 10-year groups only) for the canvassed population according to the age distribution of the standard population. The details of the process are given under the heading of "corrected death rates" in Pearl (*26*) pp. 269–271.

Considering the whole observed population, 447 dental fillings were placed and 286 teeth extracted during the course of the year for each 1,000 individuals under observation. The third large item, prophylaxis, amounted to 105 cases per 1,000 persons. The other six categories of dental care all have small rates, although some of them represent a much larger outlay of time and money than many cases of the types mentioned above.

Age variation in specific services.—The variation with age in the receipt of the different dental services is of interest. These data are included in table 2 and are shown graphically in figure 2. After about 3 years of age the frequency of dental fillings increases rapidly to a maximum of 796 per 1,000 persons at 15 years, with a gradual decline thereafter; presumably a part of this decrease is due to the fact that

decay is often too extensive in adults to be repaired by simple fillings. Thus crowns and bridges are little used in the ages under 20 years, but their rates remain high up to 55 years. Similarly, extractions are frequent in the ages above 30 years. The definite but minor peak in extractions at about 8 years is obviously the loss of temporary teeth;

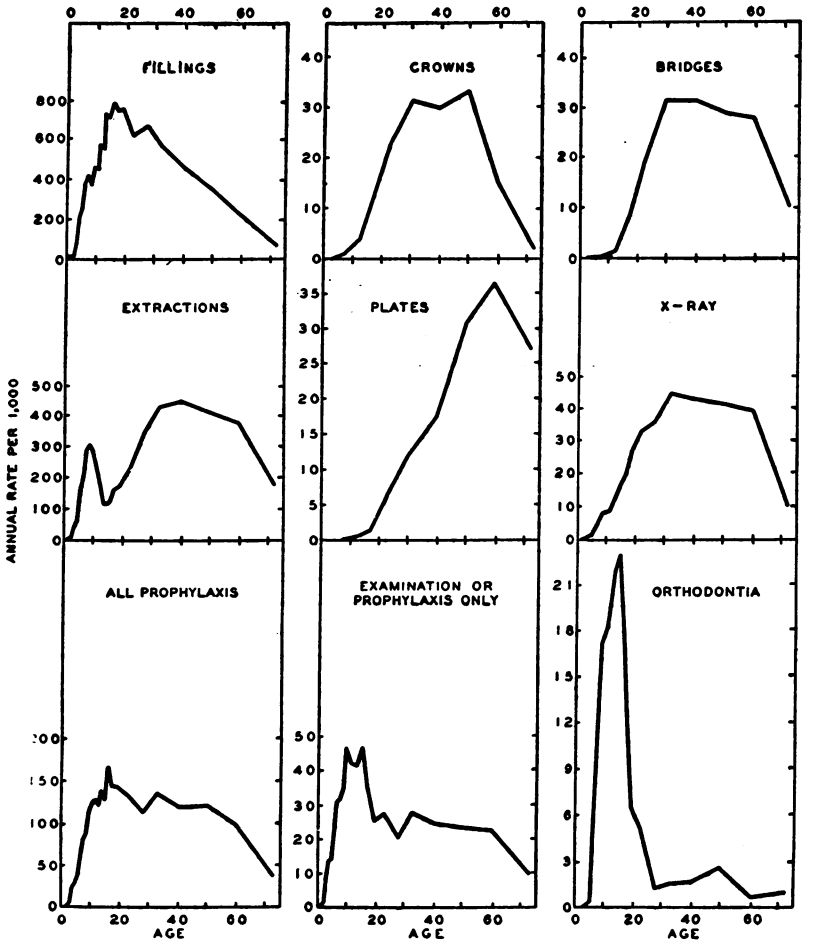

FIGURE 2.—Frequency of certain dental services at specific ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Scales are so made that the adjusted rate for all ages represents an interval on the vertical rate scale that corresponds to 30 years on the horizontal age scale.)

this peak would be much greater if it included the many deciduous teeth that are exfoliated or removed without the aid of a dentist, but the data of this study include only extractions by dentists. The annual purchase of plates is not large; it rises rapidly as age increases up to 65 years, but declines for the group over 65 years.

"X-ray" represents dental cases upon which any use of X-ray was made; the curve follows quite closely those for bridges and crowns

and apparently indicates that the use of X-ray is confined largely to cases of more advanced dental decay.

Prophylaxis is commonly done along with other services and its curve is, therefore, similar to the curve for all dental cases. The column headed "examination or prophylaxis only" represents instances where a dental examination was made but no repair work done, presumably in the majority of cases because no extensive decay was found. Dental care of this preventive type is considerably more extensive for children than for adults. Orthodontia, or the straightening of the teeth, is confined almost entirely to the ages 5 to 20 years.

The annual rates of fillings and extractions per 1,000 in the surveyed population may be contrasted with similar rates for the United States Army and Navy where dental care is provided free as a part of the

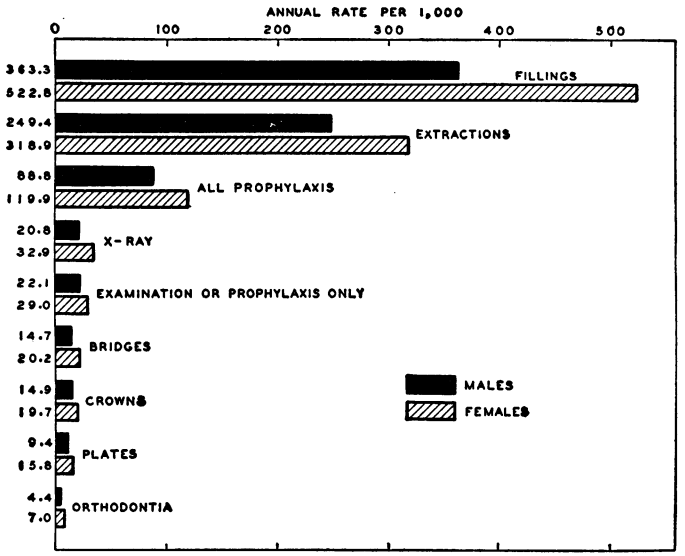

FIGURE 3.—Frequency of certain dental services among males and females—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Rates adjusted to the age distribution of the white population of the registration States in 1930.)

general medical service. However, the great majority of Army and Navy men are in the age group 20–29 years, so their rates should be compared with those of civilian males of those ages. Males of the ages 20–29 in the surveyed population had an annual rate of 502 fillings per 1,000, as compared with an average annual rate of 717 fillings for Army (*13*) personnel and 1,328 for Navy (*14*) personnel during the 3 years 1933–35.[4] Civilian males 20–29 years of age had 204 extrac-

[4] The large discrepancy between the rate of fillings in the Army and Navy seems to be at least partially accounted for by the relative supply of dental officers. In the Army during the period 1933–35 there were 880 men for every dental officer, but in the Navy there were only 580 men per dental officer. In addition, the Army dental officers appear to carry a considerably larger load of dental care for nonmilitary personnel (Civilian Conservation Corps, etc.) than is true in the Navy, so the discrepancy in the adequacy of dental personnel in the two services is even greater than the ratios of men to dental officers would indicate.

tions per 1,000 as compared with 360 for the Army and 255 for the Navy.

Age variation in dental services for each sex.—Considering all dental cases combined, it has been noted that women had more frequent dental care than men. Figure 3 shows rates for specific types of service for males and females. For every one of the nine types of dental care the rates are definitely higher for females than for males, the excess being approximately 50 percent or more for four of the services. While these rates are for all ages combined, adjustment has been made for differences in the age distributions of the two sexes.

TABLE 3.—*Frequency of certain dental services among males and females of specific ages (single years for children)—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Age	Fillings		Extractions		All prophylaxis		Population (years of life)	
	Male	Female	Male	Female	Male	Female		
	Annual rate per 1,000 population						Male	Female
All ages: [1]								
Adjusted rate [2]	363.3	522.8	249.4	318.9	88.8	119.9		
Crude rate	355.1	516.7	237.0	308.1	85.5	115.3	[1] 18,896	[1] 19,627
Under 1							673	669
1		18.7	4.3		2.2	2.3	460	428
2	9.0	4.1	3.6	12.3	7.2	2.1	559	486
3	93.5	74.5	33.6	29.8	26.2	18.6	535	537
4	140.9	273.1	34.4	88.7	15.5	40.8	582	564
5	236.6	270.4	159.5	148.2	35.8	44.0	558	614
6	325.1	419.3	223.2	190.1	54.5	69.6	569	589
7	414.6	431.7	258.5	334.5	71.5	91.7	615	556
8	368.1	362.9	377.0	260.1	95.6	79.4	665	642
9	532.2	390.7	358.7	234.8	130.6	87.0	513	494
10–11	463.6	573.2	247.3	227.2	115.7	138.2	1,003	977
12–13	593.3	694.1	123.3	166.7	135.9	124.4	868	876
14–15	674.8	833.1	119.1	118.8	133.2	157.5	781	749
16–17	716.2	801.0	164.9	155.7	147.1	139.7	673	623
18–19	648.1	861.9	163.0	196.5	129.2	154.0	503	565
20–24	484.3	725.7	168.9	275.9	102.9	156.7	894	1,225
25–29	517.9	794.2	235.1	431.7	84.9	158.1	1,004	1,487
30–34	370.5	723.0	304.0	539.1			1,398	1,751
35–44	349.1	685.2	344.1	558.8	101.7	139.9	2,979	2,951
45–54	246.1	496.0	372.9	457.5	88.3	162.7	1,845	1,506
55–64	211.4	246.6	383.1	367.7	98.3	91.2	804	669
65 and over	75.5	76.7	267.7	108.7	36.6	41.0	437	561
	Number of services							
All ages [1]	6,709	10,142	4,478	6,047	1,615	2,262		

[1] "All ages" includes a few of unknown age.
[2] Adjusted by the direct method as described in footnote to table 2.

Tables 3 and 4 and figure 4 show the same data for males and females of specific ages. For practically every type of service the rates for females of the ages 20 to 55 years are definitely higher than for males of corresponding ages. Below 15 years there are few significant differences between the rates for the two sexes; similarly, for the ages above 55 the differences are small. A few exceptions should be noted: (*a*)

Orthodontia among children over 10 years of age is definitely higher for females, as it is also among adults; (*b*) the peak in the extraction of temporary teeth is at least a year earlier for girls than for boys, in agreement with previous studies (*22*, *23*) which have indicated that girls lose their temporary teeth earlier than boys. This phenomenon recalls the fact that at various chronological ages the physiological development of girls is more advanced than boys, but the age of puberty is almost the only point where the difference is commonly noted.

TABLE 4.—*Frequency of certain dental services among males and females of specific ages (5- and 10-year age groups)—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Age	Crowns		Bridges		Plates		X-ray		Orthodontia		Examination or prophylaxis only		Population (years of life)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	Annual rate per 1,000 population													
All ages: [1]														
Adjusted rate [2]	15.0	19.7	14.7	20.2	9.4	15.8	20.8	32.9	4.4	7.0	22.1	20.0		
Crude rate	13.3	18.1	12.1	18.4	7.0	12.5	18.5	29.7	5.1	7.4	23.2	28.9	18,896	19,627
Under 5								.4			7.1	7.5	2,808	2,684
5–9	1.8	.3		.3			6.4	4.8	11.0	11.7	33.0	33.5	2,820	2,895
10–14	4.8	3.1	1.7	.9	.9		9.1	15.0	17.4	23.4	43.9	37.9	2,301	2,267
15–19	15.1	10.5	9.8	7.9	1.3	1.3	15.1	27.6	10.5	18.4	32.7	41.4	1,527	1,523
20–24	23.5	21.2	19.0	19.6	5.6	6.5	26.9	38.4	1.1	8.2	16.8	35.1	894	1,225
25–34	21.7	38.6	22.1	37.7	4.6	17.0	26.6	52.5	.4	2.2	14.1	32.4	1,004	1,487
35–44	26.5	33.2	22.2	40.7	12.8	22.4	36.9	49.8	1.3	2.0	22.5	26.8	1,398	1,751
45–54	25.5	42.5	21.7	37.9	20.1	43.8	27.6	59.1	1.6	4.0	17.9	30.5	2,979	2,951
55–64	14.9	14.9	33.6	20.9	28.6	46.3	41.0	37.4		1.5	19.9	25.4	1,845	1,506
65 and over		3.6	11.4	8.9	34.3	21.4	4.6	14.3	2.3		11.4	8.9	804	669
	Number of services													
All ages [1]	251	356	228	361	133	245	349	583	97	145	438	568		

[1] "All ages" includes a few of unknown age.
[2] Adjusted by the direct method as described in footnote to table 2.

Marital status.—Table 5 shows rates for dental services received by single and married persons of specific ages for each sex. The ages are confined to 20–34 years, because the numbers of single people above 35 and of married people below 20 years are small. Considering all dental cases combined, their frequency is rather consistently higher among single than married people for both males and females. The same is true of fillings, with a larger percentage excess of the single over the married. The variations in extractions are not consistent; among males the differences are not large, except at 30–34 years. However, among females in each of the three age groups the extraction rate for the married is much greater than for the single. Fewer fillings among the married would make for more extractions (*24*). Also,

the higher extraction rate may be related to pregnancy in that at this time minor decay may be neglected and extensive dental repair postponed; thus, extraction may be done instead of placing a crown or

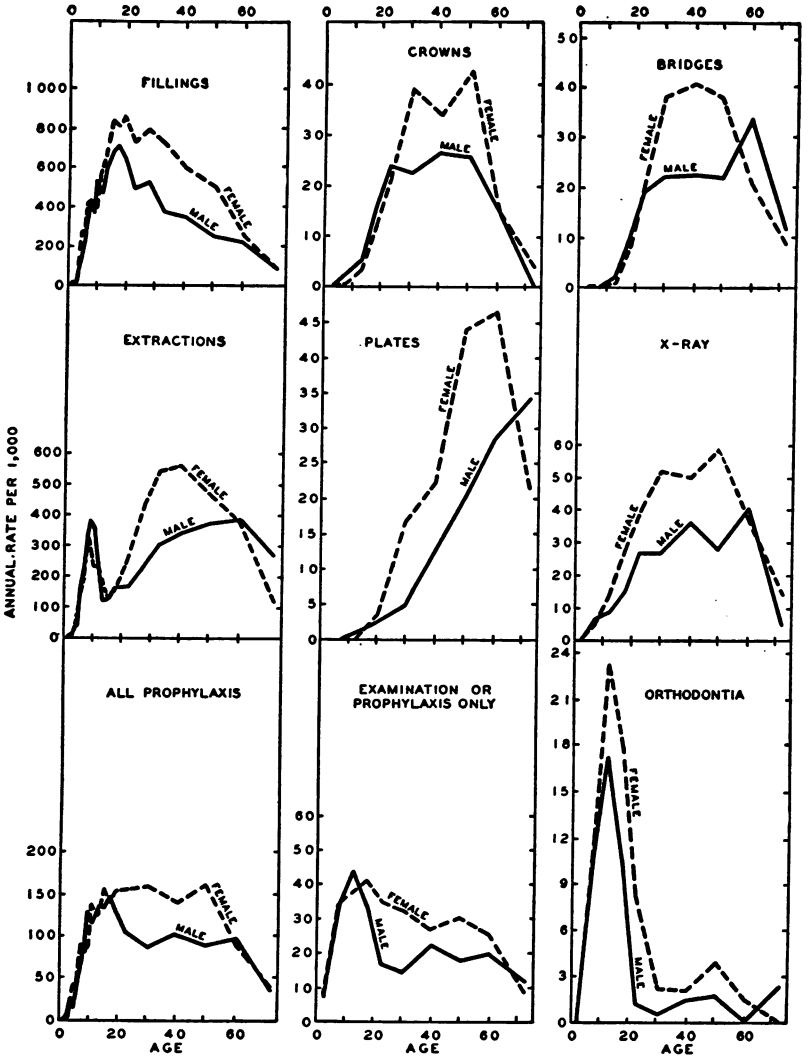

FIGURE 4.—Frequency of certain dental services among males and females of specific ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Scales are so made that the adjusted rate for all ages of both sexes represents an interval on the vertical rate scale that corresponds to 30 years on the horizontal age scale.)

bridge. It is generally believed that dental decay tends to be accelerated during pregnancy, although recent studies have questioned this belief (*21*).

TABLE 5.—*Frequency of all dental cases*[1] *and of certain dental services among single and married males and females of the ages 20–34 years—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Nature of dental service and marital status	Both sexes[2]				Male				Female			
	Total 20–34 years	20–24	25–29	33–40	Total 20–34 years	20–24	25–29	30–34	Total 20–34 years	20–24	25–29	30–34
	Annual dental cases[1] per 1,000 population											
All dental cases:[1]												
Single	353	338	388	463	269	272	289	211	440	415	382	641
Married	315	273	318	326	218	146	234	221	381	320	373	412
	Annual rate of specified dental services per 1,000 population											
Fillings:												
Single	703	683	698	826	572	551	671	533	839	835	723	1,031
Married	596	543	680	550	396	300	483	358	730	632	807	709
Extractions:												
Single	217	177	305	294	212	168	266	422	222	187	340	203
Married	394	307	360	445	261	172	229	297	484	356	445	566
Crowns and bridges:												
Single	65	51	113	60	62	50	121	33	67	53	105	78
Married	54	27	53	64	36	21	36	38	67	30	64	84
All prophylaxis:												
Single	179	167	170	266	119	121	127	89	242	219	209	391
Married	113	88	103	129	78	52	81	81	137	101	117	167
X-ray:												
Single	47	42	47	73	34	32	46	22	61	54	47	109
Married	36	18	35	43	24	9	21	28	45	22	44	55
	Population (years of life)											
Single	1,812	1,230	364	218	922	659	173	90	890	571	191	128
Married	5,869	874	2,103	2,892	2,364	233	828	1,303	3,505	641	1,275	1,589

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] "Both sexes" includes a few of unknown sex.

III. VARIATION IN THE FREQUENCY OF DENTAL SERVICES WITH ECONOMIC STATUS

For many years it has been tacitly assumed that physicians and clinics would treat patients, particularly those in danger of serious complications or death, regardless of ability to pay. Dental service has not been considered necessary to save life and it has not been assumed that the dental profession would provide free service for the poor or would graduate their scale of fees in accordance with the ability of the patient to pay. The public seems to buy dental care more or less as it buys luxuries, and one would expect large variations in the amount of such care bought by persons of different economic levels.

Occupation.—Table 6 and figure 5 show rates for all dental cases combined among men and women classified into broad occupational groups. Among professional men the frequency of dental service was more than four times what it was among unskilled laborers; the

TABLE 6.—*Frequency of all dental cases [1] in different occupational groups—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Sex and occupational group	All ages, 15–64			Age				
	Number of cases	Adjusted [2]	Crude	15–24	25–34	35–44	45–54	55–64
		Annual dental cases [1] per 1,000 population						
Males:								
Professional	313	488	473	241	445	496	473	557
Merchants and businessmen	464	365	353	256	304	348	399	373
Clerks and salesmen	382	262	261	256	269	292	216	190
Skilled and semiskilled labor	502	180	177	167	204	179	145	144
Unskilled labor	138	119	120	135	121	111	124	93
Farmers and farm laborers	148	157	154	123	191	205	113	88
Females:								
Professional	279	560	534	504	652	648	491	111
Clerks, saleswomen, and merchants	287	371	380	371	397	410	360	250
Skilled and unskilled labor	91	228	230	214	262	243	238	179
Town and city housewives	2,547	376	389	277	406	400	425	307
Farm housewives	278	202	206	268	302	195	111	91
		Population						
Males:								
Professional	662			29	164	234	165	70
Merchants and businessmen	1,316			39	293	463	371	150
Clerks and salesmen	1,464			262	428	463	227	84
Skilled and semiskilled labor	2,838			300	846	981	517	194
Unskilled labor	1,146			297	289	296	178	86
Farmers and farm laborers	958			138	173	302	231	114
Females:								
Professional	478			125	161	128	55	9
Clerks, saleswomen, and merchants	755			404	184	105	50	12
Skilled and unskilled labor	396			168	84	74	42	28
Town and city housewives	6,548			578	2,369	2,126	1,038	437
Farm housewives	1,349			123	374	471	271	110

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.

[2] Rates for the age group 15–64 years are adjusted for differences in age distribution within that span by the indirect method as described in footnote to table 9.

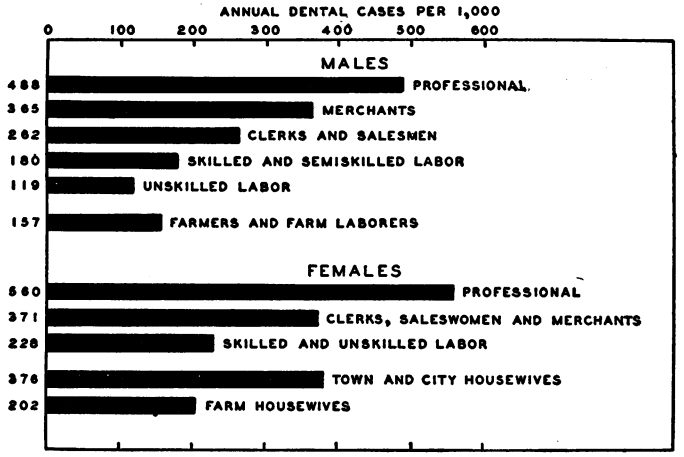

FIGURE 5.—Frequency of all dental cases among males and females 15–64 years of age engaged in different classes of occupations—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Rates adjusted to the age distribution of the white population 15–64 years of age in the registration States in 1930.)

other occupational groups fall logically between the professional and unskilled. Professional women also show a large excess of dental service over clerks and laboring women. Farmers and farm laborers have only about the same volume of dental service as laborers. Farm housewives, likewise, have less dental care than town and city housewives. It has been noted in other studies that agricultural workers have extensive dental caries (*29*).

Income.—Figure 6 shows for persons of different income levels the annual number of dental cases per 1,000 population. These rates have been adjusted for differences in age distribution that occur in the several income groups. Persons in families with $5,000 or more annual income had nearly five times as many dental services as those in families with less than $1,200, with the intervening classes falling

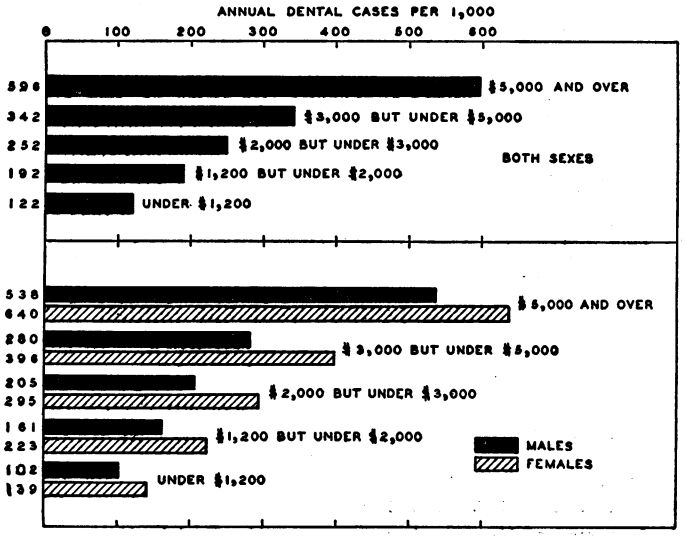

FIGURE 6.—Frequency of all dental cases among persons classified according to total annual family income—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Rates adjusted to the age distribution of the white population of the registration States in 1930.)

logically between these two extremes. This great variation may be contrasted with that in the frequency of surgical operations (*11*, *12*) in the same families; the high income group had only about twice as many operations as the families with less than $1,200.

In the lower part of figure 6 the data on dental cases are shown for males and females separately. Although the rates for women of every income group are higher than those for men of the corresponding group, the variation with income presents a similar picture in the two sexes; insofar as it differs, there is slightly less relative variation with income in the frequency of dental cases among females than among males.

Table 8 shows similar rates by income for persons living in metropolitan, urban, and rural areas. In cities of the various sizes there is a large and consistent increase in the frequency of dental cases as family income increases. Income is evidently an important factor in the frequency of dental care in all types of communities.[5]

Figure 7 shows for persons of specific ages the rates for dental cases in the different income levels (table 7). The increasing frequency of dental care with income is seen in every age group. The rates for families with incomes of $5,000 and over are definitely and consistently above every other group; it is possible that the economic barrier to dental service is not completely removed until family income is somewhere near this amount.

The volume of service of specific kinds is of interest in relation to income. Figure 8 shows 8 types of dental service among persons of all ages. Since the rates for the various services are of different orders of magnitude, they have been plotted to show relative variation; the bars in the chart represent the ratio of the rate in each income group to that in families with less than $1,200 annual income. Orthodontia shows by far the largest differences, the frequency of this process of straightening the teeth being nearly 50 times as great in the group with more than $5,000 as in the group with less than $1,200. Next in the order of relative variation is examination without other work or with prophylaxis only. As previously noted, this item indicates the frequency with which persons visit the dentist for check-up, presumably without needing any reparative work. It would, therefore, be expected to vary with income, since the poor would be less likely to visit the dentist without some known decay or symptom. Next comes prophylaxis—a service the absence of which does not result in any immediate pain or dental decay. The frequency of crowns and bridges varies more with income than fillings, presumably because of the greater expense attached to the more extensive work involved. X-ray represents a service which is used in connection with many kinds of dental work, as an aid in diagnosis or to check the character of reparative work. This service varies considerably with income, the magnitude of the variation being approximately the same as for crowns and bridges which represent the kinds of work which X-ray service usually accompanies. The other two services, extractions and plates, differ little with income.

Figure 9 shows rates for the six more frequent types of dental care by income and age (table 9). The variation with income is large and consistent for the four services that show differences with income. It has just been noted that the frequency of extractions and plates for

[5] Relatively little dental service is received from dental clinics. Considering persons of all ages, 7.0 percent of the dental cases were said to be clinic cases, all cases attended by a school dentist being included in that category. However, among persons of the school ages, 5–14 years, 17.4 percent of the cases were clinic cases.

TABLE 7.—*Frequency of all dental cases [1] among persons of specific ages in canvassed white families of different income levels in 18 States during 12 consecutive months, 1928–31*

Age	Annual dental cases [1] per 1,000 population					Population (years of life)				
	Under $1,200	$1,200 but under $2,000	$2,000 but under $3,000	$3,000 but under $5,000	$5,000 and over	Under $1,200	$1,200 but under $2,000	$2,000 but under $3,000	$3,000 but under $5,000	$5,000 and over
All ages: [2]										
Adjusted [3]—										
Both sexes	122	192	252	342	596	-------	-------	-------	-------	-------
Male	102	161	205	280	538	-------	-------	-------	-------	-------
Female	139	223	295	396	640	-------	-------	-------	-------	-------
Crude—										
Both sexes	114	184	247	344	608	5,820	13,419	9,491	4,911	4,689
Male	98	155	202	283	554	2,873	6,628	4,648	2,356	2,289
Female	130	213	290	401	661	2,942	6,784	4,837	2,553	2,398
Both sexes:										
Under 5	22	33	39	70	84	962	2,216	1,370	532	383
5–9	143	217	282	372	639	936	2,178	1,409	642	502
10–14	139	237	300	426	808	783	1,612	1,118	517	504
15–19	125	234	310	338	760	464	983	728	441	434
20–24	151	214	294	352	621	311	732	479	301	327
25–34	165	267	308	480	625	703	2,158	1,482	735	536
35–44	145	202	287	410	654	744	1,902	1,576	857	807
45–64	92	135	224	280	606	649	1,313	1,110	715	992
65 and over	32	46	90	164	358	247	283	189	140	162
Number of cases (all ages)	-------	-------	-------	-------	-------	663	2,475	2,342	1,690	2,852

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] "All ages" includes a few of unknown age.
[3] Adjusted by the indirect method as described in footnote to table 9.

TABLE 8.—*Frequency of all dental cases [1] among persons classified according to total annual family income in metropolitan, urban, and rural areas—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Annual family income	Annual dental cases [1] per 1,000 population (age adjusted) [2]			Population (years of life)		
	Cities of 100,000 or over	Cities 5,000–100,000	Towns under 5,000 and rural areas	Cities of 100,000 or over	Cities 5,000–100,000	Towns under 5,000 and rural areas
Under $1,200	214	112	107	772	1,236	3,812
$1,200 but under $2,000	214	184	179	4,675	2,873	5,871
$2,000 but under $3,000	259	253	241	4,166	2,490	2,835
$3,000 but under $5,000	348	350	320	2,334	1,314	1,263
$5,000 and over	571	666	459	2,389	1,805	495

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] Adjusted by the indirect method as described in footnote to table 9.

persons of all ages shows little variation with income; in this figure it is seen that there is no large difference at any age, except that fewer plates are procured by persons above 65 years in the lower income groups.

It is of interest to compare the rates of fillings for persons 20–29 years of age in families of different income levels with rates in the United States Navy where free service is furnished by a dental corps

[6] See discussion in footnote 4.

that seems to be reasonably adequate to meet dental needs.[6] The annual rate for Navy personnel of 1,328 fillings per 1,000 population

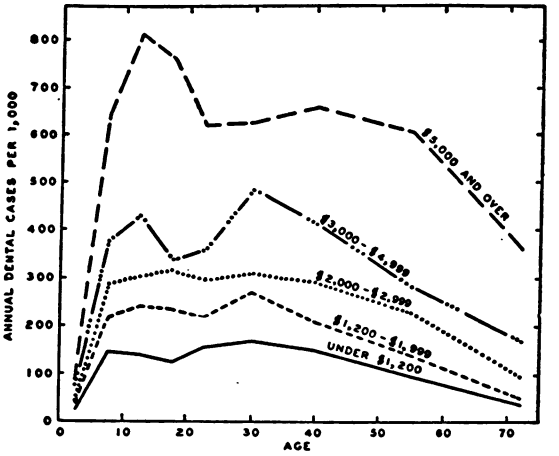

FIGURE 7.—Frequency of all dental cases among persons of specific ages classified according to total annual family income—8,758 canvassed white families in 18 States during 12 consecutive months, 1928-31.

(largely in the age group 20–29 years) is approached only in the civilian group with annual family incomes of $5,000 and over, which has

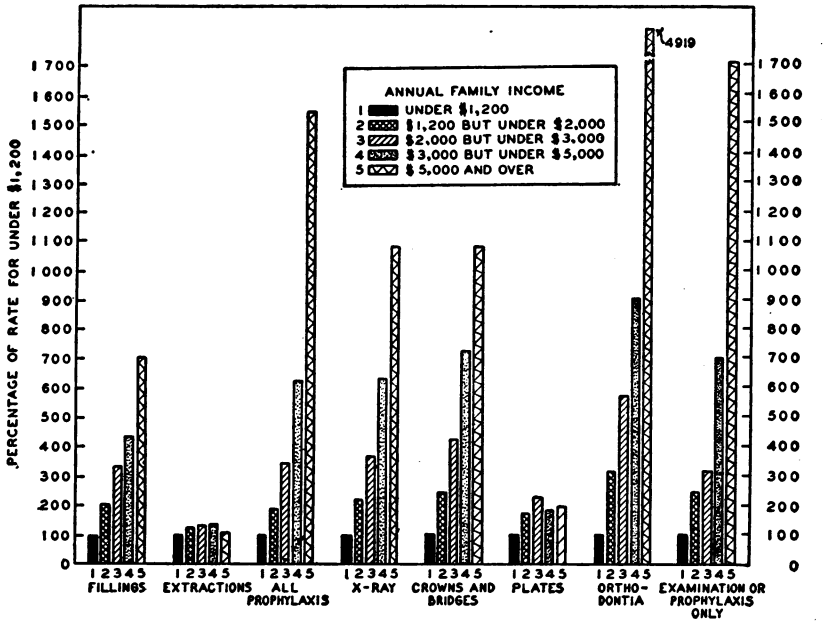

FIGURE 8.—Relative variation with family income in the frequency of certain dental services among persons of all ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928-31. (Percentages based on adjusted rates.)

a rate for the ages 20–29 years of 1,179 for males and 1,340 for females.

[6] See discussion in footnote 4.

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TABLE 9.—*Frequency of certain dental services among persons of specific ages in canvassed white families of different income levels in 18 States during 12 consecutive months, 1928–31*

Nature of service and annual family income	All ages[1]			Age								
	Number of services	Adjusted rate[2]	Crude rate	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–64	65 and over
		Annual rate per 1,000 population										
Fillings:												
Under $1,200	772	141.4	132.7	30.1	148.5	218.4	286.6	250.8	182.1	99.5	24.7	----------
$1,200 but under $2,000	3,766	289.4	280.7	48.7	269.1	457.2	576.8	349.7	431.9	228.2	104.3	3.5
$2,000 but under $3,000	4,435	474.3	467.3	75.2	418.0	689.6	875.0	707.7	694.3	430.8	240.5	31.7
$3,000 but under $5,000	3,068	617.8	624.7	135.3	568.5	698.3	938.8	760.8	971.4	748.0	330.1	57.1
$5,000 and over	4,700	996.7	1,002.3	75.7	896.4	1,384.9	1,336.4	1,241.6	1,216.4	1,138.8	868.9	376.5
Extractions:												
Under $1,200	1,196	233.6	205.5	18.7	193.4	131.5	101.3	189.7	257.5	451.6	359.0	129.5
$1,200 but under $2,000	3,661	298.0	272.8	17.1	254.8	189.2	179.0	209.0	471.3	469.0	358.0	74.2
$2,000 but under $3,000	2,806	308.9	295.7	25.5	278.2	207.5	173.1	254.7	348.9	529.2	413.5	153.4
$3,000 but under $5,000	1,531	311.7	311.7	37.6	299.1	176.0	195.0	299.0	406.8	396.7	467.1	485.7
$5,000 and over	1,229	253.8	262.1	7.8	227.1	158.7	122.1	195.7	393.7	330.9	384.1	172.8
All prophylaxis:												
Under $1,200	123	23.3	21.1	5.2	27.8	28.1	40.9	32.1	28.5	17.5	12.3	----------
$1,200 but under $2,000	557	44.8	41.5	5.0	37.2	64.5	76.3	49.2	58.9	43.6	25.9	10.6
$2,000 but under $3,000	734	81.0	77.3	10.2	59.6	98.4	101.7	133.6	116.1	88.8	57.7	26.5
$3,000 but under $5,000	710	145.4	144.6	26.3	104.4	197.3	154.2	166.1	236.7	169.2	104.9	57.1
$5,000 and over	1,723	359.6	367.5	47.0	334.7	488.1	500.0	370.0	389.9	412.6	362.9	135.8
Crowns and bridges:												
Under $1,200	34	7.6	5.8	----------	----------	----------	4.3	3.2	10.0	17.5	16.9	----------
$1,200 but under $2,000	212	18.9	15.8	----------	.9	5.6	15.3	23.2	43.6	23.1	21.3	10.6
$2,000 but under $3,000	276	32.3	29.1	----------	----------	9.8	28.9	45.9	52.6	59.0	44.1	5.3
$3,000 but under $5,000	265	55.3	54.0	----------	6.2	----------	31.7	86.4	123.8	99.2	57.3	21.4
$5,000 and over	395	82.2	84.2	----------	2.0	7.9	32.3	64.2	143.7	157.4	136.1	30.9
Plates:												
Under $1,200	29	6.9	5.0	----------	----------	----------	2.6	2.6	2.8	17.5	13.9	12.1
$1,200 but under $2,000	110	11.9	8.2	----------	----------	.6	2.9	2.9	13.4	17.3	27.4	14.1
$2,000 but under $3,000	115	15.9	12.1	----------	----------	.9	5.0	5.0	11.5	22.2	45.9	21.2
$3,000 but under $5,000	55	12.8	11.2	----------	----------	----------	1.3	1.3	13.6	21.0	26.6	50.0
$5,000 and over	64	13.3	13.7	----------	----------	----------	3.9	3.9	11.2	6.2	39.3	55.6

[1] "All ages" includes a few of unknown age.

[2] Rates for all ages are adjusted by the indirect method to the age distribution of the white population of the registration States in 1930. Briefly, this method involves the following steps: Age specific rates like those in tables 2, 3, or 4 (but in 5- and 10-year groups only) for the whole canvassed population are used as "standard rates" and multiplied by the canvassed population of specific ages for a given subgroup (for example, income under $1,200) to obtain expected numbers of cases for the computation of an expected rate for all ages; when this rate is related to the adjusted rate for the corresponding dental service in table 2 (adjustment there was by direct method), one obtains an "adjustment factor" which is of the nature of a percentage correction for differences in age distribution. This adjustment or correction factor is applied to the crude rate in the particular subgroup (for example, income under $1,200) to obtain the adjusted rate. The details of the process are given under the heading "standardized death rates" in Pearl (*26*), pp. 265–269.

TABLE 9.—*Frequency of certain dental services among persons of specific ages in canvassed white families of different income levels in 18 States during 12 consecutive months, 1928–31*—Continued

Nature of service and annual family income	All ages			Age								
	Number of services	Adjusted rate	Crude rate	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–64	65 and over
		Annual rate per 1,000 population										
X-ray:												
Under $1,200	30	6.4	5.1	----------	1.1	5.1	----------	6.4	11.4	10.7	9.2	----------
$1,200 but under $2,000	161	14.2	12.0	.5	2.3	4.3	10.2	16.4	29.2	22.1	15.2	3.5
$2,000 but under $3,000	204	23.9	21.5	----------	5.0	9.8	19.2	25.1	40.5	38.7	30.6	5.3
$3,000 but under $5,000	194	40.8	39.5	----------	10.9	29.0	36.3	59.8	70.7	60.7	44.8	----------
$5,000 and over	334	69.6	71.2	----------	21.9	35.7	57.6	82.6	93.3	114.0	101.8	49.4
Orthodontia:												
Under $1,200	4	.6	.7	----------	1.1	1.3	----------	3.2	----------	1.3	----------	----------
$1,200 but under $2,000	28	1.9	2.1	----------	3.2	5.6	2.0	2.7	2.3	.5	1.5	----------
$2,000 but under $3,000	35	3.4	3.7	----------	7.1	12.5	4.1	4.2	.7	1.9	1.8	----------
$3,000 but under $5,000	26	5.3	5.7	----------	15.6	13.5	22.7	----------	----------	----------	1.4	----------
$5,000 and over	144	29.0	30.7	----------	73.7	119.1	66.8	18.3	3.7	5.0	5.0	6.2
Examination or prophylaxis only:												
Under $1,200	31	5.3	5.3	2.1	9.6	5.1	8.6	6.4	5.7	6.7	1.5	----------
$1,200 but under $2,000	175	13.1	13.0	3.6	24.8	22.9	18.3	19.1	9.7	10.0	2.3	----------
$2,000 but under $3,000	163	17.0	17.2	2.9	28.4	21.5	16.5	29.2	16.2	18.4	10.8	15.9
$3,000 but under $5,000	188	37.5	38.3	16.9	42.1	71.6	34.0	19.9	53.1	37.3	26.6	21.4
$5,000 and over	439	91.2	93.6	41.8	113.5	166.7	147.5	67.3	89.5	74.3	77.6	18.5
	Population (years of life)											
Under $1,200	5,820	----------	----------	962	936	783	464	311	703	744	649	247
$1,200 but under $2,000	13,419	----------	----------	2,216	2,178	1,612	983	732	2,158	1,902	1,313	283
$2,000 but under $3,000	9,491	----------	----------	1,370	1,409	1,118	728	479	1,482	1,576	1,110	189
$3,000 but under $5,000	4,911	----------	----------	532	642	517	441	301	735	857	715	140
$5,000 and over	4,689	----------	----------	383	502	504	434	327	536	807	992	162

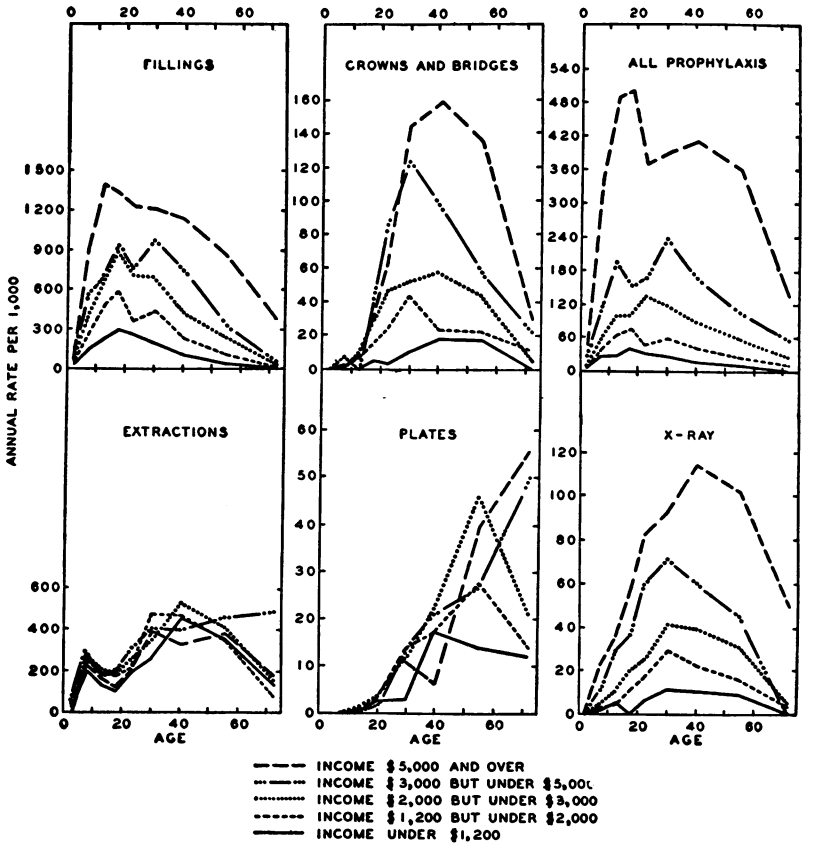

FIGURE 9.—Frequency of certain dental services among persons of specific ages classified according to total annual family income—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Scales are so made that the adjusted rate for all ages of all incomes represents an interval on the vertical rate scale that corresponds to 20 years on the horizontal age scale.)

IV. VARIATION IN THE FREQUENCY OF DENTAL SERVICES WITH SIZE OF CITY AND GEOGRAPHIC AREA

The frequency of certain types of medical care varies greatly as between large cities and rural areas; this is particularly true of surgical procedures (*11*, *12*). Operations are done largely in hospitals and are more frequent among residents of large cities where hospital facilities and surgeon-specialists are conveniently available. Dentists, however, are more widely distributed in the various types of communities; almost every town of 1,000 population has a dentist and dental care is geographically within reach of a higher percentage of rural residents than surgical and hospital care.

Table 10 shows the frequency of all dental cases among persons living in large cities (100,000 and over), small cities (5,000–100,000), towns under 5,000, and rural unincorporated areas. Considering all

TABLE 10.—*Frequency of all dental cases [1] among persons of specific ages in cities of different sizes and in rural areas—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Age	Annual dental cases [1] per 1,000 population				Population (years of life)			
	Cities of 100,000 or over	Cities 5,000–100,000	Towns under 5,000	Rural areas	Cities of 100,000 or over	Cities 5,000–100,000	Towns under 5,000	Rural areas
All ages: [2]								
Adjusted [3]	313	316	230	159				
Crude	307	304	221	155	14,351	9,694	7,585	6,914
Under 5	42	38	42	34	1,963	1,535	1,134	881
5–9	334	293	246	168	1,994	1,517	1,199	1,005
10–14	372	387	288	193	1,578	1,106	909	975
15–19	397	391	293	182	1,037	758	570	685
20–24	349	351	287	196	868	505	359	387
25–34	377	329	286	248	2,369	1,432	1,096	743
35–44	363	352	254	183	2,303	1,512	1,134	981
45–64	298	430	192	113	1,818	1,112	920	974
65 and over	125	280	95	16	337	186	231	244
Number of cases (all ages)					4,411	2,950	1,680	1,075

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] "All ages" includes a few of unknown age.
[3] Adjusted by the indirect method as described in footnote to table 9.

ages, no difference appears between the large and small cities, but the rate for rural areas is about one-half that of the two city groups, and the rate for towns under 5,000 is about three-fourths of that for the cities. This variation from city to rural area may be contrasted with that in different income levels where the lowest group (under $1,200) had only about one-fifth as many dental cases per 1,000 persons as the highest group ($5,000 or more). In the matter of the frequency of surgical operations (*11, 12*), on the other hand, it was found that the variation with income was not exceedingly greater than the variation from rural to urban areas.

Figure 10 shows for the four urban-rural classifications the frequency of all dental cases among persons of specific ages. For all except the oldest ages, where the numbers are fairly small, the two city groups have almost identical rates. The rural group has consistently low rates, with the curves for towns under 5,000 falling logically between those for rural areas and cities.

Table 11 shows for cities of different sizes the frequency of eight specific kinds of dental service. In every type of service except extractions there is a rather consistent rise in the rates for all ages as the size of city increases. However, if the relative increases with size of city are compared with those that occur with increasing income (table 9 and fig. 8), it will be seen that for each type of service the variation with size of city is uniformly and definitely less than the variation with income. There is little change with size of city or with income in the frequency of extractions or the procuring of plates.

Figure 11 shows for the six more frequent dental services (table 11) the rates for persons of specific ages in cities and rural communities. With the exception of extractions and plates the rates for each type of service in rural areas and small towns are consistently less than in either of the two classes of cities.

The variation in the receipt of dental services with size of city may

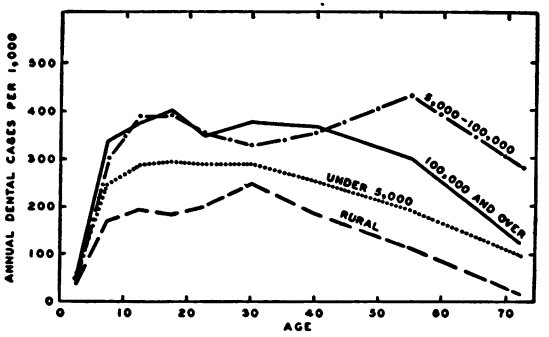

FIGURE 10.—Frequency of all dental cases among persons of specific ages in metropolitan, urban, and rural areas—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31.

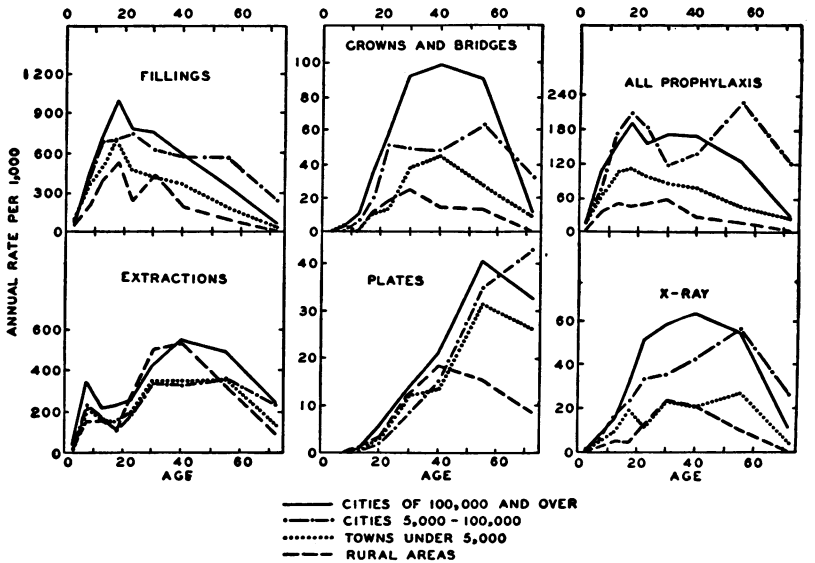

FIGURE 11.—Frequency of certain dental services among persons of specific ages in metropolitan, urban, and rural areas—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Scales are so made that the adjusted rate for all ages for all localities represents an interval on the vertical rate scale that corresponds to 20 years on the horizontal age scale.)

be considered for the different geographic sections. Table 12 shows rates for all dental cases by size of city for each of four geographic areas. The increase in the frequency of dental service with size of city is neither uniform nor consistent in the various sections, but the rates for the two city groups are usually greater than those for the small towns and rural areas.

TABLE 11.—*Frequency of certain dental services among persons of specific ages living in cities of different sizes and in rural areas—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Nature of service and size of city	All ages [1]			Age								
	Number of services	Adjusted rate [2]	Crude rate	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–64	65 and over
		Annual rate per 1,000 population										
Fillings:												
Cities of 100,000 or over	7,715	544.3	537.6	52.5	443.8	730.7	1,007.7	789.2	763.2	575.8	352.6	68.3
Cities 5,000 to 100,000	4,822	512.9	497.4	66.5	393.5	685.3	703.2	748.5	625.0	566.8	561.1	252.7
Towns under 5,000	2,613	358.5	344.5	80.3	376.1	493.9	698.3	468.0	416.1	358.9	194.6	26.0
Rural areas	1,701	249.4	246.0	51.1	198.0	403.1	531.4	235.1	438.8	180.4	94.5	----------
Extractions:												
Cities of 100,000 or over	4,864	349.2	338.9	35.7	353.1	219.3	232.4	259.2	425.9	548.0	490.1	243.3
Cities 5,000 to 100,000	2,182	241.0	225.1	10.4	224.1	160.9	114.8	176.2	340.1	328.0	356.1	231.2
Towns under 5,000	1,721	242.7	226.9	9.7	210.2	158.4	143.9	192.2	349.5	350.1	351.1	125.5
Rural areas	1,758	275.3	254.3	19.3	147.3	152.8	115.3	273.9	495.3	529.1	329.6	98.4
All prophylaxis:												
Cities of 100,000 or over	1,896	137.4	132.1	13.3	104.8	157.8	192.9	156.7	173.5	170.7	125.4	29.7
Cities 5,000 to 100,000	1,248	137.4	128.7	13.7	73.8	173.6	211.1	188.1	118.7	137.6	232.9	123.7
Towns under 5,000	521	73.6	68.7	12.3	65.1	106.7	112.3	97.5	85.8	78.5	46.7	26.0
Rural areas	212	31.8	30.7	2.3	29.9	48.2	42.3	46.5	55.2	26.5	18.5	----------
Crown and bridges:												
Cities of 100,000 or over	732	54.8	51.0	----------	2.0	10.8	35.7	57.6	92.4	98.6	89.7	11.9
Cities 5,000 to 100,000	270	32.3	27.9	----------	----------	6.3	19.8	51.5	50.3	47.6	63.9	32.3
Towns under 5,000	133	20.5	17.5	----------	2.5	----------	10.5	13.9	38.3	44.1	27.2	8.7
Rural areas	61	10.5	8.8	----------	----------	----------	11.7	18.1	25.6	14.3	12.3	----------
Plates:												
Cities of 100,000 or over	180	15.5	12.5	----------	----------	.6	5.3	5.3	13.5	20.8	40.7	32.6
Cities 5,000 to 100,000	84	11.8	8.7	----------	----------	----------	1.6	1.6	8.4	15.2	35.1	43.0
Towns under 5,000	66	11.4	8.7	----------	----------	----------	2.1	2.1	11.9	13.2	31.5	26.0
Rural areas	48	8.8	6.9	----------	----------	1.0	2.8	2.8	12.1	18.3	15.4	8.2
X-ray:												
Cities of 100,000 or over	514	38.7	35.8	----------	8.0	15.2	31.8	51.8	58.7	63.8	55.0	11.9
Cities 5,000 to 100,000	246	29.1	25.4	.7	4.6	16.3	23.7	33.7	35.6	43.0	56.7	26.9
Towns under 5,000	107	16.3	14.1	----------	5.8	8.8	19.3	11.1	23.7	21.2	27.2	4.3
Rural areas	65	10.9	9.4	----------	2.0	5.1	4.4	12.9	24.2	21.4	10.3	----------
Orthodontia:												
Cities of 100,000 or over	117	7.8	8.1	----------	17.1	26.0	22.2	8.1	.8	1.7	3.3	----------
Cities 5,000 to 100,000	90	8.5	9.3	----------	17.1	35.3	22.4	2.0	2.8	1.3	----------	5.4
Towns under 5,000	25	3.0	3.3	----------	3.3	9.9	7.0	2.8	1.8	2.7	2.2	----------
Rural areas	10	1.2	1.5	----------	1.0	4.1	----------	5.2	----------	1.0	2.1	----------

Examination or prophylaxis only:												
Cities of 100,000 or over	436	30.3	30.4	9.2	41.1	51.3	46.3	20.7	28.3	26.9	26.4	5.9
Cities 5,000 to 100,000	319	32.9	32.9	5.2	27.0	51.5	50.1	43.6	26.5	35.1	50.4	26.9
Towns under 5,000	185	24.4	24.4	7.9	34.2	41.8	33.3	39.0	26.5	22.9	6.5	13.0
Rural areas	66	9.2	9.5	5.7	25.9	11.3	11.7	10.3	6.7	5.1	2.1	----------
	Population (years of life)											
Cities of 100,000 or over	14,351	----------	----------	1,963	1,994	1,578	1,037	868	2,369	2,303	1,818	337
Cities 5,000 to 100,000	9,694	----------	----------	1,535	1,517	1,106	758	505	1,432	1,512	1,112	186
Towns under 5,000	7,585	----------	----------	1,134	1,199	909	570	359	1,096	1,134	920	231
Rural areas	6,914	----------	----------	881	1,005	975	685	387	743	981	974	244

[1] "All ages" includes a few of unknown age.
[2] Adjusted by the indirect method as described in footnote to table 9.

TABLE 12.—*Frequency of all dental cases [1] in metropolitan, urban, and rural areas in four geographic sections [2]—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Size of city	Annual dental cases [1] per 1,000 population (age adjusted [3])				Population (years of life)			
	Northeast	North Central	South	West	Northeast	North Central	South	West
Cities of 100,000 or over	355	272	276	389	2,901	6,651	1,949	2,850
Cities 5,000 to 100,000	506	277	189	468	1,861	3,851	2,965	1,017
Towns under 5,000	183	332	134	245	2,478	1,881	1,171	2,055
Rural areas	162	167	57	257	1,803	2,030	1,656	1,425

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] States included in the survey were as follows: *Northeast.*—New York, Massachusetts, Connecticut. *North Central.*—Illinois, Ohio, Michigan, Indiana, Wisconsin, Minnesota, Kansas. *South.*—District of Columbia, Virginia, West Virginia, Tennessee, Georgia. *West.*—Washington, California, Colorado.
[3] Adjusted by the indirect method as described in footnote to table 9.

TABLE 13.—*Frequency of certain dental services in urban and rural parts of four geographic sections [1]—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Nature of service	Northeast		North Central		South		West	
	Cities 5,000 and over	Under 5,000 and rural	Cities 5,000 and over	Under 5,000 and rural	Cities 5,000 and over	Under 5,000 and rural	Cities 5,000 and over	Under 5,000 and rural
	Annual rate per 1,000 population (age adjusted) [2]							
Fillings	696.4	288.1	487.7	378.1	371.0	141.9	647.9	380.3
Extractions	239.0	209.3	359.8	377.6	253.2	159.0	311.8	262.0
All prophylaxis	273.1	37.8	70.8	62.7	68.9	19.8	227.8	88.7
Crowns and bridges	69.2	6.2	34.8	22.5	31.6	10.5	63.6	24.6
Plates	8.7	8.7	16.4	12.9	10.9	4.9	17.8	13.2
X-ray	62.2	8.5	27.1	14.9	22.3	6.3	37.2	24.6
Orthodontia	16.9	3.9	4.1	1.2	3.7	.6	13.4	2.5
Examination or prophylaxis only	41.4	11.3	17.5	19.1	22.8	4.1	67.3	32.1
	Population (years of life)							
Population	4,762	4,281	10,502	3,911	4,914	2,827	3,867	3,480

[1] See note to table 12 for States included in each section.
[2] Adjusted by the indirect method as described in footnote to table 9.

TABLE 14.—*Frequency of all dental cases [1] among persons of specific ages in 4 geographic sections [2]—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Age	Annual dental cases [1] per 1,000 population				Population (years of life)			
	Northeast	North Central	South	West	Northeast	North Central	South	West
All ages: [3]								
Adjusted [4]	302	266	174	335				
Crude	293	259	168	330	9,043	14,413	7,741	7,347
Under 5	26	53	21	52	1,249	2,155	1,204	905
5–9	258	301	181	356	1,285	2,272	1,191	967
10–14	365	313	197	436	1,055	1,730	1,001	782
15–19	392	342	171	397	720	1,037	666	627
20–24	382	305	179	381	474	763	452	430
25–34	327	327	261	411	1,219	2,304	1,081	1,036
35–44	369	297	201	370	1,359	2,269	1,128	1,174
45–64	363	224	162	308	1,335	1,585	811	1,093
65 and over	148	75	115	139	305	267	174	252
Number of cases (all ages)					2,649	3,740	1,301	2,426

[1] A dental case is a series of one or more consecutive visits to a dentist in connection with one or more types of service.
[2] See note to table 12 for States included in each section.
[3] All ages includes a few of unknown age.
[4] Adjusted by the indirect method as described in footnote to table 9.

In table 13, which shows the specific kinds of services, the data have been arranged to compare for each geographic section the rates for cities over 5,000 in population with those for towns under 5,000 and rural areas. Large variations appear in the relative sizes of the rural and urban rates, but the rural are definitely and consistently lower than the urban for the several types of services and in the different geographic areas.

Table 14 shows rates for all dental cases among persons of specific ages in four geographic sections. The only consistent showing is that dental care is low among the surveyed families (white) in the South. Table 15 shows rates by geographic section and age for each type of dental care. However, with data of this kind comparisons of different geographic areas must be made with caution because of possible variation in the completeness of the recorded data for the different sections. Also, income and the proportion of persons living in cities in the different sections vary greatly and these factors have an important influence on the frequency of dental services.

TABLE 15.—*Frequency of certain dental services among persons of specific ages in 4 geographic sections* [1]*—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Nature of service and geographic area	All ages [2]			Age								
	Number of services	Adjusted rate [3]	Crude rate	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–64	65 and over
		Annual rate per 1,000 population										
Fillings:												
Northeast	4,437	509.5	490.7	43.2	348.6	549.8	779.2	748.9	630.8	659.3	532.6	141.0
North Central	6,474	457.7	449.2	74.7	418.1	665.3	905.5	673.7	630.2	410.7	224.6	37.5
South	2,171	285.6	280.5	38.2	220.8	353.7	388.9	311.9	562.4	309.4	165.2	40.2
West	3,769	521.3	513.0	88.4	487.1	854.2	926.6	725.6	633.2	502.6	306.5	63.5
Extractions:												
Northeast	1,936	225.1	214.1	15.2	183.7	166.8	152.8	227.9	285.5	270.8	405.2	75.4
North Central	4,971	364.6	344.9	35.7	352.5	213.3	214.1	326.3	503.5	596.7	424.0	224.7
South	1,548	219.4	200.0	5.8	146.1	126.9	91.6	143.8	337.7	341.3	363.7	126.4
West	2,070	288.9	281.7	12.1	240.9	185.4	153.1	155.8	361.0	483.0	387.0	289.7
All prophylaxis:												
Northeast	1,414	164.8	156.4	6.4	104.3	186.7	225.0	221.5	169.0	212.7	212.0	75.4
North Central	935	68.6	64.9	9.7	48.4	97.1	109.9	91.7	90.7	67.0	53.0	15.0
South	368	50.5	47.5	9.1	42.8	60.9	55.6	46.5	76.8	50.5	48.1	23.0
West	1,160	162.7	157.9	25.4	138.6	203.3	223.3	204.7	210.4	185.7	129.9	31.7
Crowns and bridges:												
Northeast	321	39.9	35.5	------	------	1.9	22.2	48.5	58.2	80.9	68.9	22.9
North Central	401	31.7	27.8	------	2.2	8.1	28.9	36.0	59.0	53.3	41.6	------
South	155	24.0	20.0	------	.8	3.0	10.5	26.5	49.0	42.6	37.0	5.7
West	319	46.4	43.4	------	1.0	6.4	20.7	55.8	88.8	71.5	75.9	15.9
Plates:												
Northeast	66	8.7	7.3	------	------	------	1.7	1.7	9.8	9.6	27.0	9.8
North Central	164	15.5	11.4	------	------	------	6.1	6.1	13.9	23.8	37.2	30.0
South	47	8.7	6.1	------	------	1.0	.9	.9	8.3	11.5	21.0	34.5
West	101	15.9	13.7	------	------	1.3	2.8	2.8	12.5	20.4	41.2	39.7
X-ray:												
Northeast	303	37.3	33.5	------	1.6	12.3	40.3	67.5	43.5	55.2	71.2	13.1
North Central	304	23.9	21.1	.5	4.4	7.5	19.3	31.5	43.8	42.7	23.3	------
South	108	16.4	13.9	------	4.2	12.0	4.5	8.9	28.7	19.5	33.3	17.2
West	217	31.5	29.5	------	15.5	21.7	20.7	25.6	47.3	53.7	35.7	11.9
Orthodontia:												
Northeast	108	11.0	11.9	------	17.1	36.0	31.9	14.8	2.5	5.1	5.2	3.3
North Central	51	3.2	3.5	------	6.2	12.1	6.7	3.9	1.7	------	1.3	------
South	22	2.5	2.8	------	6.7	9.0	4.5	------	.9	.9	------	------
West	61	7.9	8.3	------	21.7	32.0	17.5	2.3	------	1.7	.9	------
Examination or prophylaxis only:												
Northeast	249	27.5	27.5	5.6	31.9	43.6	44.4	25.3	25.4	25.7	28.5	16.4
North Central	261	18.0	18.1	4.6	24.7	28.3	24.1	17.0	15.2	18.5	18.3	7.5
South	124	15.8	16.0	5.8	26.0	29.0	22.5	11.1	14.8	11.5	8.6	5.7
West	372	50.4	50.6	17.7	64.1	80.6	65.4	65.1	55.0	47.7	34.8	7.9
	Population (years of life)											
Northeast	9,043	------	------	1,249	1,285	1,055	720	474	1,219	1,359	1,335	305
North Central	14,413	------	------	2,155	2,272	1,730	1,037	763	2,304	2,269	1,585	267
South	7,741	------	------	1,204	1,191	1,001	666	452	1,081	1,128	811	174
West	7,347	------	------	905	967	782	627	430	1,036	1,174	1,093	252

[1] See footnote to table 12 for States included in each section.
[2] "All ages" includes a few of unknown age.
[3] Adjusted by the indirect method as described in footnote to table 9.

V. SUMMARY

Data on the frequency of the receipt of dental services of various kinds during a 12-month period between 1928 and 1931 were obtained for 8,758 white families in 130 localities in 18 States. Each family was visited at intervals of from 2 to 4 months to secure the information.

The surveyed families include representation from nearly all geographic sections, from rural, urban, and metropolitan areas, from all income classes, and of both native- and foreign-born persons.

The data refer only to dental services received, with no indication of the total need for dental care. The records are tabulated in two ways: (*a*) As dental cases of all kinds, including one or more services received in one or more visits to a dentist, and (*b*) as total services of a given kind in terms of fillings, extractions, and the like, without regard to other services and without regard to the number of separate dental visits or cases.

In the whole surveyed group, there was an annual rate of 269 dental cases per 1,000 population; among males this rate was 227, and among females, 307.

In terms of specific services, there were annually for each 1,000 of the observed population 447 fillings, 286 extractions, 18 bridges, 17 crowns, 12 plates, and 105 cleanings of the teeth. For every one of the 9 types of dental care tabulated in the study, the frequency of services for all ages combined was considerably greater for females than for males (fig. 3).

Among persons of different ages, the frequency of fillings increases to a maximum between 15 and 19 years and decreases almost constantly after that age. The maxima for more extensive repair, represented by crowns and bridges, come later in life. The frequency of extractions has two peaks, at 8 years of age when the temporary teeth are being lost and at 35–44 years of age (fig. 2).

The frequency of the various types of dental care is definitely greater for females from about 20 to 55 years; before and after those ages the rates are about the same for the two sexes (fig. 4).

The frequency of dental service varies greatly with economic status. Considering all dental cases combined, the rate for persons in families with $5,000 or more annual income is nearly five times that in families with less than $1,200 income. The differences between income levels are large and consistent in the various age groups (fig. 7), for males and females (fig. 6), and in cities and rural areas. The variation in the frequency of service is large for every type of dental care except extractions and plates; the largest differences appear for prophylaxis, X-ray, crowns and bridges, and particularly orthodontia (fig. 8). The differences between income groups in the receipt of specific services are large and consistent for persons of the various ages (fig. 9).

The frequency of dental service is greater in cities than in rural areas. This is true for all dental cases and also for each of the specific types of service except extraction. The differences between rates in urban and rural places, however, are definitely smaller than the differences between the various income groups.

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THE EVOLUTION OF DISSEMINATED BACTERIAL INFECTION IN GUINEA PIGS

INFLUENCE OF TREATMENT WITH INSULIN AND PHLORIDZIN[1]

By MARK P. SCHULTZ, *Surgeon*, and EDITHE J. ROSE, *Associate Bacteriologist*, *United States Public Health Service*

The subcutaneous inoculation of guinea pigs with small doses of *Hemolytic streptococcus* strains isolated from members of this species afflicted with spontaneous streptococcic lymphadenitis usually results in the formation of abscesses at the inoculation sites, with lymphadenitis and lymphangitis in the drainage areas. During the course of such induced infection, however, bacterial invasion of the blood stream is likely to supervene, with consequent death of the animal in most such instances. In experiments demonstrating that the treatment of guinea pigs infected in this manner with insulin characteristically induces nonpurulent carditis (*1*), it was observed that in treated animals very few myocardial abscesses or other purulent cardiac lesions developed. This suggested that one effect of insulin treatment was to keep focal infection localized and prevent dissemination through the blood stream.

The purpose of the experiments described here was to determine the effects of insulin and phloridzin treatment upon the tendency of streptococcal infection to spread from a focus through the blood stream. The results suggest the possibility of clinical application of insulin therapy in the treatment of localized bacterial infections likely to terminate in septicemia.

METHODS

Animals.—Although the experiments were not all run concurrently, only animals from a single lot of male guinea pigs weighing between 350 and 450 grams were used.

[1] From the Division of Infectious Diseases, National Institute of Health, Washington, D. C.

Infection.—Subcutaneous inoculations of 0.1 cc. of 17-hour cultures of a group C strain (GPX) of *Hemolytic streptococcus* isolated from a guinea pig with spontaneous lymphadenitis were made in inguinal and axillary regions; a different region was selected for each successive injection. Abscesses up to 2 cm. in diameter developed at all injection sites. They occasionally broke down and discharged yellow pus.

Treatment.—The animals were weighed daily at 11 a. m., after which they were fed oats, hay, Purina Rabbit Chow, and cabbage ad libitum. In addition, the members of one insulin-treated group received 1.5 mg. of ascorbic acid subcutaneously in 0.5 percent solution three times a week. Protamine insulin [2] (40 units per cc.) was diluted 1:20 with physiological saline immediately before use. The daily dose of insulin was gradually raised during the course of the experiments from 4.75 to 6.75 units per kilogram of body weight. Preliminary trials indicated that the total daily dose could most advantageously be divided into three parts, preserving the following relative proportions (for a total daily dose of 6.75 units); 8 a. m., 1.25 units; 12 noon, 2.25 units; and 4 p. m., 3.25 units. In event of insulin convulsions, 5 cc. of 10 percent glucose solution were given intraperitoneally and the next dose of insulin was withheld from the affected animal.

Half the phloridzin-treated animals received 1 gm. of the glucoside in 2 cc. of olive oil subcutaneously weekly; the other half 0.08 gm. per kilogram body weight subcutaneously thrice daily in 0.8 cc. of a freshly prepared 2 percent sodium bicarbonate solution.

Pathological technique.—The hearts were fixed in Orth's solution, embedded in paraffin, sectioned, and stained with a modified Romanowsky stain.

RESULTS

Insulin treatment.—In two successive experiments [3] a total of 31 infected guinea pigs were treated with insulin. In the first experiment with 11 guinea pigs the daily insulin dose was gradually raised to 4.75 units per kilogram over a 10-day period preliminary to infection. In the second with 20 guinea pigs no preliminary insulin injections were made and half of the animals daily received 0.15 mg. of ascorbic acid subcutaneously. These variations in the method apparently did not affect the outcome in either experiment and the data, therefore, have been analyzed as a whole (table 1). All animals were infected at approximately 4-day intervals. Of the 31 guinea pigs, 17 died after from 4 to 23 days of infection; the remainder were killed on the 26th and 28th days. Purulent carditis was present in only two animals; these succumbed on the 9th and 12th days. In five untreated,

[2] Zinc protamine insulin was generously supplied by the Eli Lilly Company.

[3] These experiments, insofar as they relate to nonpurulent carditis, are described in: Induction of carditis by the treatment of infected guinea pigs with insulin. By Mark P. Schultz and Edythe J. Rose, Pub. Health Rep., 54: 527 (1939).

uninfected controls and in two groups of five each receiving, respectively, insulin and insulin plus ascorbic acid but without infection, the hearts were essentially negative. The uninfected controls all survived until the end of the experiment; all the uninfected, insulin-treated animals died during its course.

Phloridzin treatment.—Fifty guinea pigs were apportioned into six groups as follows:

Group A: Seven received phloridzin in oil, were infected.

Group B: Three received phloridzin in oil only.

Group C: Seven received phloridzin in aqueous solution, were infected.

Group D: Three received phloridzin in aqueous solution only.

Group E: Five controls received no treatment.

Group F: Twenty-five received no treatment, but were infected.

The results were apparently not influenced by the manner in which the phloridzin was administered (aqueous or oily medium). The members of groups B and D receiving phloridzin only, as well as the untreated controls in group E, survived until the experiment was terminated on the 28th day; their hearts were essentially negative. Those in groups A and C, receiving phloridzin, were infected on the first and fourth days only; thereafter the mortality was so high that it was thought advisable to reinfect the survivors. Twelve of the 14 animals in these two groups died in from 5 to 12 days after infection; 2, apparently moribund, were killed on the 12th day. Myocardial abscesses were found in all but 1 animal; 1 which died on the 7th day (table 1).

TABLE 1.—*Influence of treatment upon the occurrence of purulent carditis*

Day of experiment	1	4	5	6	7	8	9	10	11	12	13	14	15	19	24	25	26	27	28
Treatment:																			
None	---	1	---	---	1	---	1	1	---	---	---	---	---	1	---	1	---	2	[1] 17
Insulin	---	2	2	2	---	1	1	---	2	1	2	2	1	---	1	---	[1] 4	---	[1] 10
Phloridzin	---	---	1	2	1	---	4	4	[1] 2	---	---	---	---	---	---	---	---	---	---

[1] Indicates guinea pigs killed, other figures indicate the number dying on the several days of each experiment.
Figures in heavy faced type indicate animals with purulent carditis.

The 25 animals in group F which received no treatment but which were infected at approximately 4-day intervals were also observed for 28 days. As indicated in table 1, 8 animals died in that interval and purulent myocarditis was found in 6 of these. The hearts of those surviving until the end of the experiment on the 28th day were found to be essentially negative.

Comparison of results.—The relationship between the incidence of purulent myocarditis in infected guinea pigs and the form of treatment given is indicated in table 2. Purulent cardiac lesions were four times more common in infected controls than in guinea pigs

treated with insulin. Those treated with phloridzin, on the other hand, developed such lesions about 4 times as frequently as did those untreated.

Although none of the uninfected phloridzin-treated animals died, the death rate was very high in those which were infected (table 2). Of the insulin-treated animals, all those uninfected died during the course of the experiment, while only about half of those infected succumbed. The latter mortality rate is higher than that observed in the untreated, infected group, however, and is probably to be explained by the occurrence of fatal insulin convulsions; for (as noted above) there was evidence of spreading infection to account for death in only 2 of the 17 which died.

TABLE 2.—*Incidence of purulent carditis in infected guinea pigs*

Treatment	Number of guinea pigs	Purulent carditis present		Deaths	
		Number	Percent	Number	Percent
None	25	6	24	8	32
Insulin	31	2	6	17	55
Phloridzin	14	13	92	12	86

Affected hearts of the infected animals receiving insulin and of those left untreated were comparable with respect to purulent lesions. Gross myocardial abscesses were usually not present, and those discernible microscopically were frequently solitary and in most instances involved only a portion of the thickness of a ventricular or auricular wall. In contrast, myocardial abscesses in the phloridzin-treated group were often visible upon macroscopic examination, and upon microscopic examination found to be numerous and of large size, not infrequently occupying almost the entire thickness of a chamber wall.

The subcutaneous abscesses in animals receiving insulin were in all respects comparable to those in untreated animals. In phloridzin-treated guinea pigs, however, they were much larger and very edematous.

Organs aside from the heart were not examined microscopically. Purulent lesions were discovered elsewhere upon macroscopic examination only in those animals in which purulent myocarditis was also present. In four of the six untreated, infected guinea pigs with purulent myocarditis, there was extensive macroscopic involvement of other organs—retroperitoneal abscesses, fibrinopurulent pleurisy, peritonitis, and mediastinal abscesses. There was purulent perihepatitis in one of the two insulin-treated animals with purulent myocarditis. On the other hand, in the phloridzin-treated guinea pigs no inflammatory lesions were observed in any viscus except the heart.

Uninfected guinea pigs, receiving phloridzin or untreated, gained weight during the course of the experiment at an average rate of 3 grams a day; those treated with insulin of 5.8 grams a day. In infected animals succumbing, a terminal drop in weight was always observed; there was also considerable fluctuation in weight of such animals. In infected guinea pigs, untreated or receiving phloridzin, however, an increase in weight was rarely maintained. On the other hand, many of the insulin-treated, infected animals which survived until the end of the experiment gained in weight slightly.

DISCUSSION

The mechanisms whereby phloridzin treatment promotes the spread of infection from a focus to the blood stream and insulin treatment exerts a contrary influence is not elucidated in these experiments. In the former case, however, it is conceivable that the edema developing at the site of the focal inflammation would interfere with inflammatory processes promoting localization of the infection. In consequence of both forms of treatment the blood sugar level is depressed. The effects upon infection are therefore probably not mediated in this manner. It is possible that they are associated with the rates of carbohydrate metabolism, insulin accelerating it and phloridzin having an opposite effect.

It is improbable that these results are the expression of simple additive effects—a favorable, physiological stimulation of metabolic processes in the case of insulin and a depressing, unphysiological interference in that of phloridzin. While it is true, in both the presence and absence of infection, that the insulin-treated guinea pigs gained weight more regularly than those untreated, the mortality, likewise, was higher among them. On the other hand, in the absence of infection, phloridzin-treated animals all survived and gained weight as rapidly as untreated individuals.

The relatively higher mortality among uninfected than infected insulin-treated guinea pigs suggests that infection may have increased tolerance for insulin. In an experiment with rabbits (*1*), however, a contrary relationship was observed.

These results may justify a clinical trial of insulin in the treatment of localized infections in which the development of septicemia is anticipated. It should be noted, however, that the doses of insulin used in these experiments were relatively much higher than it would be advisable to employ clinically. It is possible that safely tolerable doses would not be effective. Relatively small amounts of insulin have been found adequate, however, in the treatment of acne (*2*, *3*), and healing has followed merely local application in "persistent septic cutaneous conditions" (*4*).

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CONCLUSION

In guinea pigs with group C *Hemolytic streptococcus* subcutaneous abscesses, treatment with phloridzin promotes dissemination of the infection through the blood stream while treatment with insulin apparently favors continued localization of the infection.

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DEATHS DURING WEEK ENDED APRIL 1, 1939

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

	Week ended Apr. 1, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	9,271	[1] 8,456
Average for 3 prior years	[1] 9,042	
Total deaths, first 13 weeks of year	123,277	116,413
Deaths under 1 year of age	552	[1] 565
Average for 3 prior years	[1] 595	
Deaths under 1 year of age, first 13 weeks of year	7,218	7,125
Data from industrial insurance companies:		
Policies in force	67,699,350	69,691,451
Number of death claims	17,021	13,370
Death claims per 1,000 policies in force, annual rate	13.1	10.0
Death claims per 1,000 policies, first 13 weeks of year, annual rate	11.3	10.1

[1] Data for 86 cities.

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

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median
NEW ENG.												
Maine	18	3	3	1	441	73	6	3	91	15	276	92
New Hampshire	0	0	0	0	----	----	----	----	30	3	29	35
Vermont	13	1	0	0	----	----	----	----	603	45	94	70
Massachusetts	2	2	1	4	----	----	----	----	1,116	949	283	736
Rhode Island	0	0	0	0	----	----	----	----	229	30	1	48
Connecticut	0	0	5	4	30	10	5	5	2,641	890	28	50
MID. ATL.												
New York	6	15	33	38	[1]15	[1]22	[1]13	[1]17	626	1,563	3,059	2,909
New Jersey	11	9	17	17	4	3	13	15	40	34	1,577	1,562
Pennsylvania	14	28	40	40	----	----	----	----	77	151	6,032	6,032
E. NO. CEN.												
Ohio	9	12	14	28	----	----	----	20	14	18	2,553	1,520
Indiana	24	16	21	11	103	69	5	41	34	23	1,181	370
Illinois	18	27	22	37	41	63	10	21	22	33	3,781	1,911
Michigan [2]	13	12	10	11	21	20	2	3	432	409	4,336	148
Wisconsin	2	1	0	3	937	533	22	49	1,155	657	2,958	1,429
W. NO. CEN.												
Minnesota	4	2	4	5	2	1	2	----	791	408	227	316
Iowa	20	10	2	6	409	202	8	6	468	231	194	194
Missouri	22	17	23	24	14	11	21	87	23	18	663	649
North Dakota	0	0	0	1	906	124	39	12	577	79	76	24
South Dakota	0	0	0	2	323	43	----	----	1,345	179	0	2
Nebraska	4	1	1	4	----	----	27	1	660	173	127	127
Kansas	8	3	6	6	89	32	6	6	120	43	513	345
SO. ATL.												
Delaware	0	0	0	2	----	----	----	----	0	0	25	25
Maryland [2]	3	1	8	8	37	12	16	16	1,533	497	115	292
Dist. of Col	40	5	3	6	24	3	1	1	1,350	167	17	72
Virginia	28	15	9	13	1,423	759	----	----	898	479	438	438
West Virginia	22	8	10	10	1,419	528	58	110	56	21	600	47
North Carolina	22	15	13	17	50	34	3	56	1,183	810	2,390	342
South Carolina [2]	5	2	3	3	2,311	846	170	303	87	32	241	49
Georgia [2]	7	4	4	4	1,461	880	----	----	322	194	406	0
Florida [2]	21	7	15	7	----	----	2	2	482	160	606	77

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	12	7	14	8	422	243	5	32	33	19	674	668
Tennessee	9	5	5	6	776	440	55	78	146	83	417	82
Alabama	18	10	5	10	1,721	978	45	144	297	169	961	441
Mississippi [3]	10	4	8	4	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	5	2	8	6	992	400	55	55	117	47	493	88
Louisiana [3]	27	11	5	9	46	19	9	22	365	151	7	67
Oklahoma	10	5	8	13	620	308	74	115	338	168	112	112
Texas [3]	25	30	22	43	1,893	2,285	360	614	249	301	436	436
MOUNTAIN												
Montana	0	0	0	0	515	55	------	39	1,788	191	20	39
Idaho	0	0	1	1	153	15	2	4	1,255	123	10	15
Wyoming	22	1	0	0	------	------	------	------	2,400	110	46	46
Colorado	82	17	2	5	96	20	------	------	1,435	298	166	166
New Mexico	62	5	0	3	222	18	1	6	420	34	96	81
Arizona	61	5	2	1	4,012	327	92	38	135	11	32	63
Utah [3]	0	0	6	0	1,013	102	------	------	1,013	102	360	33
PACIFIC												
Washington	0	0	5	2	------	------	1	2	1,983	643	9	153
Oregon [4]	10	2	7	1	691	139	42	42	268	54	38	103
California	17	21	30	28	101	123	50	73	2,159	2,632	616	823
Total	14	341	395	493	460	9,740	1,220	2,176	543	13,447	37,319	35,976
14 weeks	20	6,907	8,149	8,475	416	123,386	36,040	93,384	523	181,278	451,906	344,599

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	91	15	22	15
New Hampshire	0	0	0	0	0	0	0	0	71	7	24	11
Vermont	0	0	0	0	0	0	0	0	161	12	18	12
Massachusetts	0	0	0	2	0	0	0	0	214	182	405	274
Rhode Island	8	1	0	0	0	0	0	0	92	12	29	25
Connecticut	0	0	8	2	0	0	0	0	270	91	139	130
MID. ATL.												
New York	1.2	8	8	10	1.2	3	4	2	265	662	1,036	1,036
New Jersey	0	0	0	1	0	0	0	0	177	149	163	174
Pennsylvania	2	4	5	5	0.5	1	0	0	177	349	602	639
E. NO. CEN.												
Ohio	0	0	4	4	0.8	1	0	0	278	361	273	463
Indiana	0	0	2	5	0	0	0	0	284	191	124	204
Illinois	1.3	2	2	10	2	3	0	0	319	487	527	762
Michigan [3]	1.1	1	0	1	0	0	0	1	437	413	465	465
Wisconsin	7	4	1	2	0	0	0	0	424	241	120	351

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

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	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median
W. NO. CEN.												
Minnesota	1.9	1	0	1	0	0	0	0	99	51	144	166
Iowa	0	0	1	1	0	0	0	0	233	115	246	221
Missouri	0	0	1	4	0	0	1	0	111	86	227	117
North Dakota	7	1	1	0	0	0	0	0	88	12	17	45
South Dakota	0	0	0	0	0	0	0	0	135	18	9	10
Nebraska	0	0	0	1	0	0	0	0	130	34	19	42
Kansas	2.8	1	1	1	0	0	0	0	218	78	142	142
SO. ATL.												
Delaware	0	0	0	1	0	0	0	0	98	5	9	9
Maryland [2]	0	0	0	5	0	0	0	0	77	25	62	62
Dist. of Col	0	0	0	2	0	0	0	0	146	18	23	16
Virginia	6	3	2	5	0	0	0	0	92	49	33	33
West Virginia	2.7	1	3	3	2.7	1	0	0	73	27	49	56
North Carolina	3	2	1	4	0	0	0	1	54	37	27	29
South Carolina [3]	2.7	1	0	0	14	5	0	0	5	2	6	6
Georgia [3]	1.7	1	0	1	1.7	1	1	0	8	5	3	7
Florida [3]	0	0	4	1	3	1	0	2	21	7	8	7
E. SO. CEN.												
Kentucky	0	0	6	6	0	0	2	0	125	72	69	57
Tennessee	5	3	5	5	1.8	1	0	0	102	58	30	30
Alabama	4	2	7	7	0	0	0	0	16	9	9	10
Mississippi [2]	5	2	0	1	5	2	1	1	15	6	2	3
W. SO. CEN.												
Arkansas	2.5	1	1	0	5	2	0	0	25	10	4	5
Louisiana [3]	0	0	2	1	0	0	1	0	12	5	9	10
Oklahoma	0	0	1	2	0	0	1	0	44	22	13	33
Texas [3]	0	0	3	2	0	0	2	2	50	60	116	100
MOUNTAIN												
Montana	0	0	0	1	0	0	0	0	112	12	16	16
Idaho	0	0	1	0	10	1	0	0	173	17	10	11
Wyoming	0	0	0	0	0	0	0	0	349	16	17	17
Colorado	0	0	0	1	0	0	0	0	164	34	38	38
New Mexico	0	0	0	0	0	0	0	0	37	3	15	16
Arizona	0	0	1	0	12	1	0	0	135	11	8	23
Utah [3]	0	0	0	0	0	0	0	0	298	30	47	47
PACIFIC												
Washington	3	1	1	1	0	0	0	0	114	37	37	57
Oregon [4]	0	0	1	1	5	1	0	0	149	30	65	53
California	1.6	2	2	5	0	0	1	4	149	182	208	208
Total	1.5	37	65	139	1	24	14	17	173	4,355	5,703	6,992
14 weeks	2	719	1,226	1,826	0.6	211	293	293	208	73,326	85,084	95,374

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases	1934–38, median	Apr. 8, 1939, rate	Apr. 8, 1939, cases	Apr. 9, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	3	4	519	86	69
New Hampshire	0	0	0	0	0	0	0	0	10	1	1
Vermont	0	0	0	0	13	1	0	0	590	44	30
Massachusetts	0	0	0	0	2	2	0	1	242	206	105
Rhode Island	0	0	0	0	0	0	0	0	412	54	22
Connecticut	0	0	0	0	3	1	1	1	252	85	64
MID. ATL.											
New York	0	0	0	0	2	6	5	5	201	501	458
New Jersey	0	0	0	0	4	3	5	1	279	234	158
Pennsylvania	0	0	0	0	5	10	11	7	133	262	296
E. NO. CEN.											
Ohio	7	9	3	1	1	1	4	4	102	133	75
Indiana	22	15	74	5	0	0	6	0	56	38	12
Illinois	4	6	47	8	2	3	4	5	168	256	91
Michigan [1]	17	16	9	0	3	3	4	3	156	148	257
Wisconsin	7	4	2	9	2	1	0	1	490	279	131
W. NO. CEN.											
Minnesota	10	5	15	5	0	0	3	0	43	22	15
Iowa	81	40	50	30	2	1	1	1	20	10	20
Missouri	30	23	33	7	3	2	5	2	30	23	97
North Dakota	7	1	3	3	15	2	0	0	183	25	4
South Dakota	38	5	16	6	8	1	0	0	15	2	19
Nebraska	42	11	6	6	0	0	0	0	31	8	13
Kansas	6	2	18	20	0	0	1	1	53	19	92
SO. ATL.											
Delaware	0	0	0	0	0	0	1	1	216	11	9
Maryland [2]	0	0	0	0	9	3	3	3	77	25	59
Dist. of Col	0	0	0	0	0	0	1	1	267	33	13
Virginia	0	0	0	0	7	4	2	3	96	51	42
West Virginia	0	0	0	0	5	2	1	3	91	34	63
North Carolina	1	1	0	0	7	5	1	2	428	293	298
South Carolina [3]	3	1	0	0	8	3	0	1	265	97	51
Georgia [3]	0	0	0	0	2	1	3	2	48	29	25
Florida [3]	0	0	0	0	15	5	3	4	175	58	25
E. SO. CEN.											
Kentucky	2	1	8	1	5	3	0	2	23	13	28
Tennessee	0	0	2	0	4	2	3	6	23	13	42
Alabama	0	0	1	1	4	2	4	3	69	39	65
Mississippi [2]	3	1	1	0	3	1	2	2			
W. SO. CEN.											
Arkansas	0	0	9	1	7	3	4	2	82	33	69
Louisiana [3]	0	0	1	1	46	19	9	11	5	2	19
Oklahoma	48	24	13	3	0	0	1	1	8	4	182
Texas [3]	15	18	39	39	7	9	25	16	89	108	263
MOUNTAIN											
Montana	0	0	8	6	9	1	1	1	56	6	53
Idaho	41	4	4	1	10	1	0	0	20	2	11
Wyoming	0	0	5	5	0	0	0	0	0	0	25
Colorado	14	3	1	5	0	0	3	0	289	60	12
New Mexico	12	1	0	0	25	2	0	1	99	8	19
Arizona	37	3	1	0	49	4	0	0	74	6	61
Utah [3]	0	0	2	0	0	0	0	0	219	22	39
PACIFIC											
Washington	12	4	36	15	0	0	0	1	46	15	113
Oregon [4]	30	6	20	9	20	4	1	1	60	12	25
California	7	9	48	3	1	1	7	3	125	152	515
Total	8	213	475	261	5	115	128	130	144	3,562	4,155
14 weeks	15	5,115	7,639	3,636	5	1,642	1,694	1,694	168	58,313	58,168

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended April 8, 1939, 16 cases as follows: South Carolina, 2; Georgia, 6; Florida, 1; Louisiana, 1; Texas, 6.
[4] Rocky Mountain spotted fever, Oregon, 1 case.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
February 1939										
Alaska	0	0	4	----	----	----	0	5	0	0
Dist. of Columbia	3	37	80	----	69	----	0	81	0	3
March 1939										
Connecticut	2	4	332	----	2,727	----	0	457	0	2
Delaware	0	5	1	----	12	----	0	41	0	0
Texas	14	159	5,424	124	1,036	82	2	328	111	56
Vermont	0	2	541	----	154	----	0	50	0	0
West Virginia	7	33	919	----	45	----	0	181	1	21

February 1939

	Cases
Alaska:	
Chickenpox	32
Impetigo contagiosa	4
Septic sore throat	7
Whooping cough	32
District of Columbia:	
Anthrax	3
Chickenpox	53
Whooping cough	118

March 1939

	Cases
Chickenpox:	
Connecticut	595
Delaware	88
Texas	1,137
Vermont	132
West Virginia	276
Conjunctivitis:	
Connecticut	3
Dengue:	
Texas	5
Dysentery:	
Texas (bacillary)	27

March 1939—Continued

	Cases
Encephalitis, epidemic or lethargic:	
Connecticut	1
Texas	1
German measles:	
Connecticut	40
Vermont	4
Leprosy:	
Texas	1
Mumps:	
Connecticut	507
Delaware	166
Texas	240
Vermont	82
West Virginia	270
Ophthalmia neonatorum:	
Texas	2
Rabies in animals:	
Connecticut	2
Delaware	1
Texas	13
Relapsing fever:	
Texas	1
Septic sore throat:	
Connecticut	24
West Virginia	4

March 1939—Continued

	Cases
Tetanus:	
Connecticut	1
Trachoma:	
Texas	5
Trichinosis:	
Connecticut	3
Tularaemia:	
Texas	6
Typhus fever:	
Texas	30
Undulant fever:	
Connecticut	6
Texas	22
Vermont	1
West Virginia	2
Vincent's infection:	
Vermont	4
Whooping cough:	
Connecticut	427
Delaware	23
Texas	433
Vermont	199
West Virginia	146

WEEKLY REPORTS FROM CITIES

City reports for week ended April 1, 1939

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	171	343	94	8,494	879	2,563	25	399	21	1,431	----
Current week [1]	87	1,021	100	4,702	662	1,561	30	396	33	1,300	----
Maine:											
Portland	0	2	0	0	2	3	0	0	0	13	27
New Hampshire:											
Concord	0	----	0	0	1	0	0	0	0	0	9
Nashua	0	----	0	0	1	0	0	0	0	0	7
Vermont:											
Barre	0	----	0	0	0	0	0	1	0	0	2
Burlington	0	----	0	0	0	1	0	0	0	0	10
Rutland	0	----	0	0	1	0	0	0	0	0	4
Massachusetts:											
Boston	2	----	4	171	17	56	0	10	1	25	278
Fall River	0	----	1	0	3	0	0	5	0	0	35
Springfield	0	----	0	59	0	0	0	1	0	1	36
Worcester	0	----	0	0	10	23	0	1	0	37	69
Rhode Island:											
Pawtucket	0	----	0	0	0	0	0	0	0	0	25
Providence	1	1	0	6	5	17	0	1	1	97	72
Connecticut:											
Bridgeport	0	2	0	2	1	1	0	2	0	1	31
Hartford	0	----	0	141	7	6	0	1	0	7	44
New Haven	0	2	0	113	0	0	0	0	0	11	45
New York:											
Buffalo	0	----	2	250	11	55	0	8	0	57	166
New York	12	41	5	84	136	280	0	92	3	136	1,725
Rochester	0	1	0	83	2	34	0	1	1	9	77
Syracuse	0	----	0	110	8	13	0	0	0	26	70
New Jersey:											
Camden	0	----	0	0	2	1	0	0	0	1	26
Newark	0	1	0	8	4	49	0	4	0	55	86
Trenton	1	----	0	2	2	7	0	3	0	4	36
Pennsylvania:											
Philadelphia	2	3	2	44	13	42	0	18	2	93	479
Pittsburgh	1	4	3	3	20	37	0	2	1	40	187
Reading	1	----	0	1	3	0	0	2	0	3	30
Scranton	1	2	0	2	0	26	0	0	0	14	----
Ohio:											
Cincinnati	4	----	3	0	13	35	0	11	0	3	144
Cleveland	5	32	5	5	16	82	0	14	0	40	204
Columbus	0	6	6	2	7	5	0	8	0	4	117
Toledo	0	3	1	1	5	17	1	9	0	11	75
Indiana:											
Anderson	0	----	0	0	1	2	0	0	0	2	13
Fort Wayne	0	----	2	2	3	7	0	3	1	0	34
Indianapolis	3	----	1	1	19	39	10	6	0	18	107
Muncie	0	----	0	0	0	3	0	0	0	1	12
South Bend	0	----	0	0	1	3	0	1	0	2	18
Terre Haute	0	----	1	0	1	0	0	1	0	0	18
Illinois:											
Alton	0	----	0	0	0	0	0	0	0	0	6
Chicago	11	33	6	19	26	223	0	54	0	151	699
Elgin	0	----	0	0	2	5	0	0	0	11	10
Moline	1	1	0	0	3	0	1	0	0	1	10
Springfield	0	1	1	0	4	2	0	0	0	4	26
Michigan:											
Detroit	6	8	1	18	23	110	0	13	0	84	254
Flint	0	----	0	34	7	22	0	1	0	1	32
Grand Rapids	0	----	5	0	3	40	0	0	0	3	43
Wisconsin:											
Kenosha	0	----	0	1	0	6	0	0	0	18	8
Madison	0	----	0	1	1	1	0	0	0	13	13
Milwaukee	0	----	0	3	4	54	0	4	0	61	115
Racine	1	----	0	2	0	1	0	0	0	6	15
Superior	0	----	0	29	2	0	0	0	0	9	16

[1] Figures for Cumberland Md., estimated; report not received.

City reports for week ended April 1, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	1	4	2	5	0	1	0	0	26
Minneapolis	0	------	0	261	4	17	10	2	0	30	122
St. Paul	0	------	0	151	10	27	0	0	0	11	61
Iowa:											
Cedar Rapids	0	------	--------	0	-------	0	0	-------	0	1	--------
Davenport	0	------	--------	0	-------	6	6	-------	0	1	--------
Des Moines	0	------	0	0	0	19	0	0	0	0	45
Sioux City	0	------	--------	3	-------	6	0	-------	0	0	--------
Missouri:											
Kansas City	2	------	0	3	10	16	0	4	0	0	97
St. Joseph	0	------	0	0	3	1	0	1	0	0	14
St. Louis	2	4	1	2	16	28	1	7	0	20	265
North Dakota:											
Fargo	0	------	0	0	0	2	0	0	1	0	5
Grand Forks	0	------	--------	0	-------	0	0	-------	0	0	--------
Minot	1	------	0	1	0	1	0	0	0	0	15
South Dakota:											
Aberdeen	0	------	--------	8	-------	0	0	-------	0	0	--------
Sioux Falls	0	------	0	0	0	2	0	0	0	0	11
Nebraska:											
Lincoln	1	------	--------	146	-------	2	0	-------	0	4	--------
Omaha	0	------	0	11	7	5	1	0	0	4	54
Kansas:											
Lawrence	0	2	0	0	0	1	0	0	0	0	3
Topeka	0	------	0	1	10	4	0	0	0	0	38
Wichita	0	1	0	2	4	3	0	3	0	0	40
Delaware:											
Wilmington	0	------	0	0	7	6	0	0	0	0	38
Maryland:											
Baltimore	1	9	3	508	15	20	0	11	1	13	206
Cumberland	--------	------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Frederick	0	------	0	0	1	0	0	0	0	0	--------
Dist. of Col.:											
Washington	1	2	1	124	9	21	0	6	0	35	171
Virginia:											
Lynchburg	0	------	0	163	2	1	0	0	0	11	7
Norfolk	0	9	0	7	1	1	0	2	0	3	24
Richmond	1	------	1	41	4	1	0	1	0	3	46
Roanoke	0	------	0	0	1	0	0	1	0	0	21
West Virginia:											
Charleston	0	33	0	0	3	0	0	1	0	0	25
Huntington	0	------	--------	0	-------	0	0	-------	0	0	--------
Wheeling	0	1	0	0	2	0	0	0	0	17	19
North Carolina:											
Gastonia	0	------	--------	0	-------	0	0	-------	0	0	--------
Raleigh	0	------	0	1	0	3	0	2	0	0	13
Wilmington	1	------	0	2	1	0	0	0	3	6	15
Winston-Salem	0	------	0	114	2	0	0	4	0	1	15
South Carolina:											
Charleston	0	44	1	0	1	2	0	0	1	11	18
Florence	0	------	0	10	1	0	0	0	0	1	11
Greenville	0	------	0	0	3	0	0	2	0	5	18
Georgia:											
Atlanta	3	329	5	1	16	10	0	6	0	3	98
Brunswick	0	------	0	35	1	0	0	0	0	0	--------
Savannah	0	114	1	5	2	1	0	2	0	8	34
Florida:											
Miami	1	6	0	6	8	0	0	0	0	3	41
Tampa	0	2	2	115	3	0	0	1	0	0	29
Kentucky:											
Ashland	0	26	0	0	5	0	0	1	0	0	13
Covington	0	1	0	1	3	2	0	2	0	0	14
Lexington	0	------	0	3	3	3	0	1	0	3	18
Louisville	0	32	1	5	5	16	0	7	1	0	65
Tennessee:											
Knoxville	1	4	1	0	4	8	0	1	0	0	37
Memphis	0	35	4	1	5	28	0	2	0	26	80
Nashville	1	------	0	0	8	9	0	4	0	3	64
Alabama:											
Birmingham	1	94	3	2	7	3	0	2	1	0	61
Mobile	0	1	2	1	3	0	0	1	0	2	30
Montgomery	0	115	--------	1	--------	0	0	--------	0	2	--------

City reports for week ended April 1, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	8	----	1	----	0	0	----	0	0	----
Little Rock	0	----	0	1	2	1	0	0	0	0	----
Louisiana:											
Lake Charles	0	----	0	22	2	0	0	0	0	0	8
New Orleans	5	3	3	48	24	5	1	9	14	0	155
Shreveport	0	----	0	3	18	0	0	2	0	0	65
Oklahoma:											
Oklahoma City	0	12	1	0	4	0	2	2	0	0	51
Tulsa	0	----	----	74	----	3	0	----	0	0	----
Texas:											
Dallas	0	5	6	12	6	3	2	4	0	0	69
Fort Worth	0	33	4	3	8	1	1	1	0	0	43
Galveston	0	----	0	0	3	3	0	0	0	0	17
Houston	2	----	2	22	14	0	0	5	0	0	106
San Antonio	2	2	1	15	4	0	0	8	2	1	67
Montana:											
Billings	0	----	0	2	3	1	0	0	0	0	13
Great Falls	0	----	0	20	1	1	0	0	0	0	6
Helena	0	----	0	9	0	0	0	0	0	0	5
Missoula	0	----	0	25	4	0	0	0	0	0	13
Idaho:											
Boise	0	----	0	8	0	0	0	0	0	1	7
Colorado:											
Colorado Springs	0	----	0	16	0	5	0	3	0	1	9
Denver	4	----	5	64	5	8	0	7	0	33	84
Pueblo	0	----	0	109	0	0	0	0	0	9	5
New Mexico:											
Albuquerque	0	18	0	7	1	1	0	2	0	0	13
Utah:											
Salt Lake City	1	----	1	8	2	3	0	0	0	2	40
Washington:											
Seattle	1	----	2	130	5	7	0	0	0	3	104
Spokane	0	2	2	181	1	0	0	1	0	0	33
Tacoma	0	----	0	1	3	5	0	0	0	0	29
Oregon:											
Portland	1	2	0	0	6	9	7	0	0	0	74
Salem	0	----	----	0	----	0	0	----	0	0	----
California:											
Los Angeles	5	188	3	866	14	38	0	13	0	31	343
Sacramento	3	----	0	276	4	0	5	3	0	0	40
San Francisco	1	13	2	161	13	20	0	11	0	5	203

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Georgia:			
Springfield	1	1	0	Atlanta	1	0	0
New York:				Alabama:			
Buffalo	1	0	0	Mobile	0	1	0
New York	2	0	1	Louisiana:			
Ohio:				Shreveport	1	2	0
Cincinnati	1	0	0	Oregon:			
Wisconsin:				Portland	1	0	0
Madison	1	0	0	California:			
Milwaukee	1	0	0	Los Angeles	0	1	0
Missouri:							
Kansas City	1	0	0				
South Carolina:							
Charleston	0	0	4				

Encephalitis, epidemic or lethargic.—Cases: New York, 3; Topeka, 1; Portland, Oreg., 1.
Pellagra.—Cases: Toledo, 1; Winston-Salem, 1; Savannah, 2; Miami, 1; Fort Smith, 1; San Antonio, 1.
Rabies in man.—Deaths: Charleston, W. Va., 1.
Typhus fever.—Cases: New York, 1; Savannah, 1; Montgomery, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended March 18, 1939.—During the week ended March 18, 1939, 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				4						4
Chickenpox		4	2	133	166	38	20	7	75	445
Diphtheria			3	25		1	1			30
Dysentery				1					4	5
Influenza		1,441		111	1,322	13			19	2,906
Measles		30		219	969	15		31	2	1,266
Mumps				62	69	51	3	11	1	197
Pneumonia		17			48		1		7	73
Scarlet fever		4	28	60	170	29	18	30	15	354
Smallpox						8		3		11
Trachoma									1	1
Tuberculosis	2	3	4	88	64	2	32	2	6	203
Typhoid and paratyphoid fever				17	1	1	1	1		21
Whooping cough		15	10	96	223	7	21	5	57	434

CUBA

Habana—Communicable diseases—4 weeks ended March 11, 1939.—During the 4 weeks ended March 11, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	19		Tuberculosis	9	1
Malaria	7	1	Typhoid fever	39	3

SWEDEN

Notifiable diseases—February 1939.—During the month of February 1939, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Poliomyelitis	19
Diphtheria	3	Scarlet fever	4,383
Dysentery	14	Syphilis	11
Epidemic encephalitis	2	Typhoid fever	2
Gonorrhea	868	Undulant fever	19
Paratyphoid fever	2	Weil's disease	5

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for March 31, 1939, pages 547-559. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau.—A rat found on March 11, 1939, in Paauhau, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

Smallpox

Japan—Taiwan Island—Tainan Province.—Information dated April 6, 1939, states that 61 cases of smallpox have been reported in Tainan Province, Taiwan Island, Japan, up to March 31, 1939. No new cases have been reported since that date and the outbreak is believed to have been checked.

Syria—Aleppo.—During the week ended March 11, 1939, 1 case of smallpox was reported in Aleppo, Syria.

Yellow Fever

Brazil.—Deaths from yellow fever in Brazil have been reported as follows: Espirito Santo State—Alegre, March 12, 1; Cachoeiro de Itapemirim, March 13, 1; Muqui, March 11, 1; Sabino Pessoa, March 13, 1. Rio de Janeiro State—Santo Eduardo, March 17, 1.

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