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INFLUENZA MORTALITY IN THE UNITED STATES, 1936 [1]

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One of the chief characteristics of an influenza epidemic is the suddenness of its outbreak and the rapidity with which it spreads over a large area. Any unusual increase in the number of reported cases of influenza in a locality is, therefore, usually viewed with alarm.

Six of the 17 years since the summer of 1919 have failed to show more than the seasonal expectancy of deaths from influenza and pneumonia. During the other 11 years recognizable outbreaks of influenza have occurred. Mortality in about 95 cities scattered throughout the United States shows that the 11 epidemics since the pandemic of 1918 have varied in size from a total excess mortality rate of 99.3 per 100,000 from influenza and pneumonia in 1919–20 to 5.4 per 100,000 in the winter of 1934–35.

Influenza epidemics occur most frequently in January and February. Of the 11 epidemics since the summer of 1919, 1 reached its peak of mortality in December, 3 in January, 4 in February, 2 in March, and 1 in May.

Various sections of the country are by no means equally affected during the course of an influenza epidemic. In the epidemic of 1919–20, for example, the excess mortality from influenza and pneumonia in the Mountain States was almost twice what it was in the Middle Atlantic area. In some of the smaller outbreaks large areas have entirely escaped the epidemic; thus in the winter of 1931–32 the East South Central and Mountain and Pacific areas show no increase in influenza and pneumonia mortality, the epidemic being largely confined to the East Coast. There is some evidence that isolated outbreaks of influenza occur which, because of their limited extent, do not appear in the curve of mortality for all cities.

It is characteristic of influenza epidemics that they originate in one section of the country and spread to adjacent areas. In the 11 epidemics since the summer of 1919, 2 have started on the East Coast, 2 in the East Central, 3 in the West Central, and 4 in the Pacific and Mountain areas. The direction of spread has also varied in different epidemics. The epidemic of 1925–26 started on the West Coast and

[1] From the Office of Statistical Investigations, U. S. Public Health Service. Acknowledgment is made to Dr. W. M. Gafafer for advice in the preparation of this report. Previous papers on influenza may be found in the Public Health Reports for February 21, 1930 (Reprint No. 1355) and November 29, 1935 (Reprint No. 1720).

took a southerly course from west to east, while that of the winter of 1931–32 traveled from the mountain section eastward across the northern States.

Mortality from influenza and pneumonia combined in the 95 cities in the United States for 1934–36 is shown in Figure 1, the solid line representing the rates for 1935–36 and the broken line those for the corresponding weeks of 1934–35, which is a fairly representative year. The curve for the winter of 1935–36 shows two periods of relatively high mortality, from December 29 to January 18 and from February 9 to May 2. The small epidemic of the winter of 1934–35 occurred in the same weeks of the year as the first part of the epidemic of the winter of 1935–36. Since the middle of last May, mortality

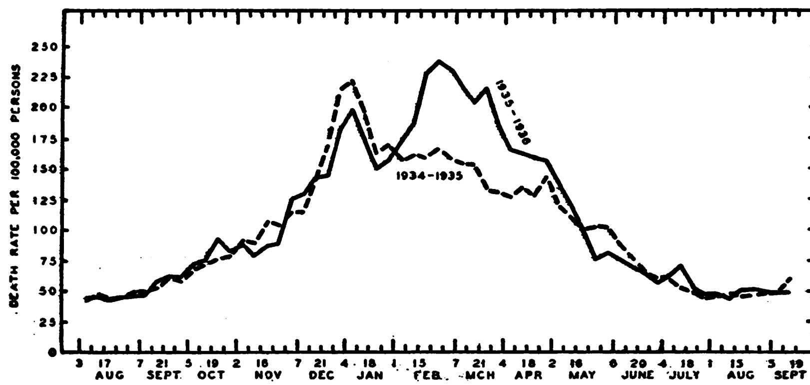

FIGURE 1.—Weekly death rates per 100,000 population (annual basis) for influenza and pneumonia in about 95 large cities in the United States, from the week ending August 10, 1935, to September 19, 1936, and for corresponding weeks of the preceding year.

from influenza and pneumonia in the 95 cities has been as low as it was in the corresponding weeks of last year.

The epidemic of the past winter started in the West South Central section of the country early in December 1935, and spread through the Southern States to the eastern coast. In both the West and East South Central areas mortality from influenza and pneumonia continued well above the normal expectancy from December 1935 until the first part of May 1936. It did not at any time during the winter, however, reach extreme proportions in any section, and the Mountain and Pacific areas showed only very slight evidences of any increase in mortality.

Mortality during the summer of 1936 for each geographic region of the United States is shown in table 1. In 7 of the 9 regions the rates for the summer of 1936 are not significantly different from those of last year, but in the East and West South Central areas, where the epidemic of last winter was the most severe, influenza and pneumonia mortality has continued somewhat above normal. In the East South

Central section, the higher mortality continued from the middle of July to the first of September. In the West South Central area the higher mortality continued only through June, but there was another slight increase during August. Although these increases in mortality during the summer months are apparent in both areas, the excesses over last year are of a minor order. There is no significant increase in the rates for the last week for which data are available, that is, the week ending September 19.

TABLE 1.—*Mortality from influenza and pneumonia in about 95 cities in different geographic sections of the United States, for the summers of 1935 and 1936*

Section and year	Average of 16 weeks, May 31–Sept. 19	Week ending— June 6	June 13	June 20	June 27	July 4	July 11	July 18	July 25	August 1	August 8	August 15	August 22	August 29	September 5	September 12	September 19
	Annual death rate per 100,000 population																
All cities:																	
1936	56	80	74	68	63	56	60	69	52	46	46	42	49	50	48	47	51
1935	57	100	85	75	65	59	59	51	47	42	44	46	43	45	46	47	58
New England:																	
1936	61	98	112	57	81	74	88	71	59	64	29	55	31	33	31	42	50
1935	58	116	95	86	48	47	52	74	48	31	28	53	48	50	47	50	57
Middle Atlantic:																	
1936	48	72	64	60	41	47	42	67	44	35	41	36	44	52	44	41	43
1935	55	112	90	72	64	55	55	48	46	35	48	40	42	43	42	43	46
East North Central:																	
1936	48	67	66	63	61	50	60	66	46	36	44	27	37	36	39	36	35
1935	52	84	77	64	64	61	52	40	36	46	35	41	40	39	40	52	66
West North Central:																	
1936	61	101	64	49	58	64	109	69	46	63	30	61	61	38	46	49	66
1935	63	135	75	73	63	52	69	81	61	49	52	20	61	40	40	43	92
South Atlantic:																	
1936	76	103	89	107	87	54	85	99	70	48	60	50	50	83	70	63	95
1935	67	117	111	105	70	66	58	43	49	60	53	76	41	58	49	51	70
East South Central:																	
1936	83	114	107	154	88	67	40	100	107	60	47	114	134	67	40	47	47
1935	53	60	87	114	87	34	74	47	53	41	20	60	20	27	61	54	13
West South Central:																	
1936	105	139	149	116	156	100	96	70	73	89	110	70	109	110	103	96	99
1935	89	89	113	99	89	158	126	99	104	56	69	76	80	66	86	60	59
Mountain:																	
1936	83	97	53	97	159	133	27	44	53	115	97	62	53	97	79	97	62
1935	80	137	103	111	111	77	60	60	85	51	86	51	34	94	85	9	120
Pacific:																	
1936	49	63	50	41	45	52	54	41	57	45	39	45	57	34	54	45	59
1935	44	48	36	50	52	31	50	45	37	39	45	54	29	53	47	48	39

Reported cases of influenza in 44 States and New York City roughly parallel the curve of mortality for 1935–36. In the 18 weeks from December 29 to May 2 there were 121,011 cases of influenza reported, an excess of 78,213 cases over the number reported in the corresponding weeks of 1934, a year of low influenza incidence. In the East and West South Central areas, cases were reported in excess of the average as late as the end of May.

Throughout the period of the epidemic of 1936, California was reporting more than the average number of cases of influenza for preceding years, but the curve of mortality for the Pacific section was only slightly higher than normal. By May 2 the number of reported cases in California had dropped to normal. However, during the 5 weeks from May 31 to July 4, California reported 2,177 cases of influenza as against an expectancy of 124, or an excess of 2,053 cases. A summer rise, such as this, is unusual. However, there was no corresponding rise in mortality and since July 4 and through September 19, California as well as the Pacific area has been reporting only an average number of cases for that season of the year.

That an epidemic of influenza may occur this winter is possible, but mortality from influenza does not indicate that such an epidemic is in progress in any section of the country at the present time.

AUDIOMETRIC STUDIES ON SCHOOL CHILDREN [1]

I. The Consistency and Significance of Tests Made with a 4–A Audiometer

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INTRODUCTION

This is the first of a series of papers in which will be presented the results of an investigation on the hearing of school children begun in 1931 by the Office of Child Hygiene of the United States Public Health Service. As conceived, this investigation has the following aims: First, to evaluate critically the methods employed in studies of deafness in children. Second, to determine the degree and progression of hearing impairment and the clinical and other factors associated with it. Third, to formulate a program which, it is hoped, will permit a conclusive contribution toward the solution of the problem of prevention of deafness.

The initial step in the investigation consisted of a general survey of the hearing of an unselected group of approximately 14,000 Washington, D. C., school children. These children were given, in immediate succession, two tests with a Western Electric Co. 4–A audiometer. Those individuals, approximately 700 in number, who showed a hearing loss of 9 or more S. U. (sensation units) in either ear were further tested, for air- and bone-conduction acuity, with a 2–A audiometer, and at the same time received a fairly complete otolaryngological examination. In addition, an equal number of children of the same age, sex, and school grade as the above-mentioned group of 700 children, but whose hearing loss was not greater than 6 S. U., also were tested with a 2–A audiometer and received an ear, nose, and throat examination. Two years later, during the school year 1933–34, approximately 500 children of this group of 1,400 were given a second otolaryngological examination and a second 2–A audiometer test. Future plans for the investigation include continued periodic clinical examinations of these and other school children.

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[1] From the Office of Child Hygiene Investigations.

[2] The author wishes to acknowledge the valuable work of B. L. Jarmon, M. D., who made the audiometric and clinical examinations.

The present paper contains the results of a study of the consistency and significance of tests made with a 4–A audiometer. The development of this instrument and the efforts of Fowler (8, 9, 10, 11), Fletcher (7, 8, 10), Newhart (15, 16, 17), the American Federation of Organizations for the Hard of Hearing (1), and others have emphasized to otologists and to public-health and school authorities the importance of examining the hearing of school children. The immediate and practical objectives of such studies are to detect hearing impairment in children and, on the basis of these findings, to give to the hard-of-hearing child the benefits of special medical and educational care.

There are two essential advantages derived from the use of the 4–A audiometer: (*a*) rapid group testing and (*b*) uniform scoring of results. Because of the practical utility of this instrument numerous surveys have been conducted in this country since the first was reported by Fowler and Fletcher (8) in 1926.[3] These authors stated that 14.4 percent of the New York school children whom they tested had impaired hearing. They regard the hearing impaired when the test reveals a hearing loss of 9 S. U. or more. Although in a later paper they advised that a loss of 6 S. U. should be considered significant, 9 S. U. generally is accepted as the lower limit of impairment. Fowler and Fletcher also suggested that children who showed impairment at the first test should be retested before being placed definitely in the category of those needing special attention. It has been noted that the second test usually reduces the number of children with "impaired" hearing by 50 percent or more. And even of these, a certain percentage is found to have normal hearing when further examined.

TABLE 1.—*Percentage of school children with impaired hearing as reported by several investigators*

Author	Number of children examined	Percentage of children with hearing impairment [1] as shown by—		
		First test	Second test	Third test
Fowler and Fletcher (8)	4,112	(?)	14.4	(?)
Fowler and Fletcher (10)	1,171	17.6	4.9	(?)
Rodin (21)	6,222	17.0	8.5	(?)
Rodin (22)	36,191	17.7	9.5	(?)
Laurer (14)	4,419	(?)	11.3	(?)
Burnap (3)	1,525	[2] 9.0	[2] 7.5	(?)
Freund (12)	9,741	24.4	7.7	5.2
Rossell (23)	6,781	(?)	11.6	(?)
Partridge and MacLean (18)	399	8.7	5.5	[3] 4.
Rowe and Drury (24)	2,078	[4] 28.0	[5] 13.3	(?)

[1] Hearing loss≥9 S. U., unless otherwise indicated.
[2] Hearing loss≥6 S. U.
[3] Retested in a sound-proof room.
[4] Hearing loss≥3 S. U.
[5] Retested with a 2-A audiometer.

[3] For a comprehensive review of the methods and results of hearing surveys made prior to 1926, *cf.* C. C. Bunch: Methods of testing the hearing in infants and young children. Jour. Pediat., 5: 535 (1934).

Since 1926 the examination of children at regular intervals with a 4–A audiometer has become an established practice in the schools of a number of cities and large towns. The results of a number of surveys are summarized here in table 1. This table shows clearly the reduction in the incidence of hearing impairment disclosed by a second test. When the children were examined a third time a further reduction was obtained. Also it is seen that the percentage of children with impaired hearing varies considerably from one observer to another. In fact Newhart (16), from the replies to a questionnaire sent to known users of the 4–A audiometer in 1929, stated that this percentage varies from 1.33 in Denver to 13 in Cambridge.

Besides reports on the incidence of impairment, attempts have been made to find what factors are related to various degrees of hearing acuity. Laurer (14) observed that the incidence of impairment was higher in children of the lower grades. Similar observations have been reported by Sterling and Bell (27), who examined the hearing of some 1,800 children of Hagerstown, Md., and Washington, D. C. Their results are not strictly comparable with those of the studies mentioned above, as only the hearing loss of the better ear was reported. They found that the greatest amount of hearing loss occurred in children who were poorest in their school work. They noted also that there were more children with normal hearing in the older age groups than in the younger, but that the incidence of a significant loss of hearing was higher in the older children.

The investigations of Rowe and Drury (24) on children different with respect to social and economic background showed that, conditions of the ear being equal, the acuity of hearing depends upon the nutritional state of the individual. Rowe (25) believes that "the children who pass the test have demonstrated, first, that they have average hearing capacity; second, that they have an average nutritional level; and, third, that they have an average mental acuity."

These findings suggest that the 4–A audiometer is not an instrument of precision and that the results of tests made with this instrument are influenced by factors which probably are not directly related to the function of hearing. It is pertinent, therefore, to measure the degree of variability of the hearing tests made with this instrument and to determine some of the factors which contribute to the variability. Such is the purpose of the study here reported.

MATERIAL

The data here utilized include the following:

1. Records of hearing tests made with a Western Electric Co. 4–A audiometer on approximately 14,000 children. All tests were conducted in a schoolroom, 40 children at a time. Each child was given two successive tests, occupying a different seat in the school-

room and using different earphones for the first and second tests. These records were supplemented by information regarding age, sex, school grade, and intelligence quotient.

2. Records of tests of both air- and bone-conduction acuity, measured with a Western Electric Co. 2–A audiometer, made on (*a*) about 700 children of the previous group whose 4–A test showed a hearing loss of 9 S. U. or more and (*b*) an equal number of children of the same age, sex, and school grade whose 4–A test showed a hearing loss not greater than 6 S. U.

VARIATIONS IN THE RESULTS OF REPEATED TESTS WITH A 4–A AUDIOMETER

The distributions of the best scores made by the children on the first and second tests, respectively, are presented in table 2. For the first test, a hearing loss equal to or greater than 9 S. U. is found in 6.55 ± 0.15 percent of the children; for the second test, the same loss is observed in only 5.36 ± 0.14 percent of the subjects. This improvement in the best scores of the group is statistically significant, the difference in incidence being about six times [4] its probable error. The stated percentages are somewhat lower than those found by the authors cited in table 1, yet they fall well within the range of those reported by Newhart (16).

TABLE 2.—*Distribution of ears according to hearing loss measured with a 4–A audiometer*

Hearing loss in S. U.	First test		Second test	
	Absolute number	Percentage	Absolute number	Percentage
−3	14,127	50.52	15,303	54.76
0	6,429	22.98	6,291	22.51
3	3,307	11.83	2,954	10.57
6	2,269	8.11	1,901	6.80
9	998	3.57	829	2.97
12	462	1.65	351	1.26
15	151	.54	132	.47
18	95	.34	60	.22
21	24	.09	30	.11
24	27	.10	23	.08
27	12	.04	6	.02
30	63	.23	65	.23
Total	27,964	100.00	27,915	100.00

Since the two tests were made in immediate succession, the better average score obtained in the second test cannot be attributed logically to an improvement in hearing, nor is it reasonable to assume that there was a significant change of environmental conditions

[4] This is based on the assumption that the two distributions are independent. They are not. Therefore the ratio of difference to the probable error of difference will be even larger when the proper corrections are made.

between the two tests. It is apparent, therefore, that the only acceptable conclusion is that the difference between the two average scores is to be ascribed to variations or errors due, in part, to the subjects and, in part, to the technique of measurement.

In order to measure the extent of these variations, the difference between the best score of the first test and the best score of the second test (score of second test minus score of the first test) was calculated for each ear of each child. The statistical constants for the resulting distribution [5] of these differences are given in table 3. In agreement with the findings in table 2, the sign of the arithmetic mean indicates that, on the average, the scores have improved at the second trial. The immediately pertinent fact, however, which emerges from a study of this distribution is the degree of the variability, or, inversely, the consistency of response to the two tests. As a measure of the variation, the following constants are used: Standard deviation, mean deviation, and percentage of cases showing an arithmetic difference of 3 S. U. or less. The range of variation marked out by one standard deviation above and below the mean is thus found to be almost 8 S. U. This means that a difference between two tests even of 8 S. U. cannot be regarded as exceptional. On the average, each ear shows a difference of almost 3 S. U. on successive tests, and as many as 20 percent present a difference greater than 3 S. U. An opinion as to whether the above variability is large or small cannot be given as yet because of the lack of comparative data.

TABLE 3.—*Statistical constants for the distribution of individual differences between scores of first and second tests (score of second test minus score of first test)*

Constant	Value
Number or ears	27,921.
Mean of differences	-0.380 ± 0.005 S. U.
Standard deviation of differences	3.993 ± 0.004 S. U.
Mean deviation of differences	2.672 S. U.
β_1	0.031.
β_2	5.818.
Percent of ears with difference equal to or less than 3 S. U.	80.00.

Two factors which might be regarded as having contributed to the different scores obtained in the two tests are the subject's fatigue and sudden changes in environmental noise. With regard to the first, it should be noted that the symmetrical shape of the curve of differences between scores seems to contradict such a view. If the children were fatigued after the first test, the curve of differences would be

[5] The distribution curve is of the symmetrical, "cocked-hat" type, definitely leptokurtic (i. e., relatively more peaked about the mode than the normal curve) and with slight negative skewness. That it is not a "normal" curve is evident, since β_2 is significantly greater than 3 and the ratio of standard deviation to the mean deviation is less than 0.8.

asymmetrical and skewed toward the positive side. Regarding the second factor, it may be argued that the differences in the two scores would be greater in the children with good hearing than in those with some impairment. Actually this is not so, as is seen in the following tabulation, which shows the hearing loss in the first test and the percent of children whose second test differed from the first by a maximum of 3 S. U. The frequency of ears for which the scores in the two tests differed at the most by 3 S. U. decreases as the hearing loss increases. Thus, children with better hearing, who are more likely to be affected by extraneous noise, show less variation than those with poorer hearing.

Hearing loss, first test, in S.U.	Percentage of ears with differences equal to or less than 3 S.U.
−3	91.27
0	85.61
3	60.00
6	46.05
9+	37.21

In this and many similar examinations of hearing no attempt was made to exclude the participation of one ear when testing the other. Such an omission is of little practical consequence when the two ears possess equal hearing acuity; but when they are different, no measure of the acuity of the poorer ear can be obtained except by masking the better one (2).[6] Direct comparison between the variability of the better ear and that of the poorer ear of each child is presented in table 4. The standard deviation and mean deviation of the differences between scores observed for the better ears are markedly and significantly less than they are for the poorer ears. Correspondingly, the percentage of children who showed a difference equal to or less than 3 S. U. is higher when the subjects are grouped according to the ears giving the better scores. While on the average the poorer ear improves its score on the second trial, the better one does not. In view of the fact that other conditions presumably remain equal, these results point to the conclusion that the improvement shown by the poorer ear is essentially due to the subject's ability to utilize the better ear in hearing with the poorer ear. If this is true, the difference between the observed variability of the poorer and that of the better ear represents the measure of variation in the ability to utilize the better ear. *In order to elim-*

[6] The Committee on Methods of Testing Hearing by Bone Conduction of the American Otological Society, at the meeting held in Detroit, May 28, 1936, has emphasized, in its report, that masking is necessary if clinical tests of hearing are to have any diagnostic or scientific value.

inate this additional source of variability all further analysis will be made by using the best score of the better ear only.

TABLE 4.—*Differences between scores of first and second tests (score of second test minus score of first test)*

	Mean of differences	Standard deviation of differences	Mean deviation of differences	Percent of children with differences equal to or less than 3 S.U.
Poorer ear	−1.212±0.024	4.202±0.017	3.191	73.08
Better ear	+.507± .020	3.486± .014	2.207	84.28

SEX DIFFERENCES IN VARIABILITY

The distribution of the differences between first and second test is practically the same for boys and girls. The statistical constants are presented in table 5. The mean of the differences is slightly higher in the girls, but this divergence is only probably significant, being about two times its probable error. The remaining constants differ by insignificant amounts.

TABLE 5.—*Differences between scores of first and second tests in boys and girls (score of second test minus score of first test)*

Sex	Number of children	Mean of differences	Standard deviation of differences	Mean deviation of differences	Percent of children with differences equal to or less than 3 S.U.
Boys	7,302	0.467±0.028	3.509±0.020	2.201	84.16
Girls	6,657	.550± .029	3.459± .020	2.212	84.42

AGE, SCHOOL GRADE, INTELLIGENCE QUOTIENT, AND VARIABILITY

The findings of Laurer (14), Sterling and Bell (27), and Rowe and Drury (24), regarding the relationship of hearing loss, measured with a 4–A audiometer, to social and economic status of children, their age, school grade, and school work, raises the question of whether or not this apparent relationship may be due to the influence of these factors on the consistency of responses to the test.

In table 6 are presented the indexes of variability for the several age groups. The standard deviations and the mean deviations decrease with increase in age. For the age group 14 years and over, the standard deviation of the differences between the scores of the first and second tests is 18 percent less than that for the 7–9 year old group, and the mean deviation is 29 percent less. At the same time, the percentage of children who showed a difference equal to or less than 3 S. U. between scores increases from 76 for the 7–9 year group to 87 for the group 14 years and over. It is worthy of note that, while this age trend is consistent, the difference between the standard deviation of the 7–9 year group and that of the 10–11 year group is only probably significant. The same is true for differences between the standard deviation of the third and that of the fourth age group, but between that of the 10–11 year group and of the 12–13 year old group the difference is definitely significant.

TABLE 6.—*Age and differences between scores of first and second tests (score of second test minus score of first test)*

Age (in years)	No. of children	Standard deviation of differences	Mean deviation of differences	Percent of children with differences equal to or less than 3 S. U.
7–9	1,686	3.948±0.046	2.709	76.22
10–11	2,535	3.918± .037	2.618	80.08
12–13	3,841	3.329± .026	2.116	86.07
14 and over	5,897	3.236± .019	1.936	87.25

It is pertinent in this analysis to attempt to differentiate between chronological age and mental age. As expected, changes in the variability of response to repeated 4–A tests are associated with school grade. From the data presented in table 7, it may be noted that the standard deviation and mean deviation for the high-school children are, respectively, 20 percent and 31 percent lower than those found for the elementary school children. For the former group, the percentage of children whose scores in the two tests differed by not more than 3 S. U. is 88; for the latter, 78. Before an interpretation of these results can be attempted it is necessary to learn whether the primary factor involved is age or school grade, i. e., whether the decrease in variability is associated with increased education, with physical and mental maturity, or with both. The statistical constants calculated for each age and school group are presented in table 8.

TABLE 7.—*School grade and differences between scores of first and second tests (score of second test minus score of first test)*

School grade	No. of children	Standard deviation of differences	Mean deviation of differences	Percent of children with differences equal to or less than 3 S. U.
Elementary school, 3–6 grades	4,595	3.967±0.028	2.680	78.35
Junior high school, 7–8 grades	4,293	3.430± .025	2.091	86.58
High school, 9–12 grades	5,060	3.189± .021	1.848	87.87

TABLE 8.—*Differences between scores of first and second tests according to age and school grade (score of second test minus score of first test)*

Grade	Standard deviation of differences				Mean deviation of differences				Percent of children with differences equal to or less than 3 S.U.			
	7-9	10-11	12-13	14+	7-9	10-11	12-13	14+	7-9	10-11	12-13	14+
Elementary school, 3-6 grades	3.92	3.97	4.08	......	2.68	2.62	2.78	......	76.53	79.70	79.37	......
Junior high school, 7-8 grades	......	3.61	3.18	3.24	......	2.53	2.01	2.13	......	83.20	87.39	86.05
High school, 9-12 grades	......	......	2.47	3.23	......	......	1.44	1.87	......	......	90.88	87.75

The results are definite. For each age group the variability decreases with advance in the grade group, but for each grade group the trend of the constants in relation to increasing age is irregular. As is also seen in the preceding tables, the most marked difference in variability is observed between the children who are below 12 years of age in elementary grades, and the children who are 12 years old and above, in the higher grades.

In view of these findings, it is of interest to determine whether or not the differences in the responses to intelligence tests are related to the variability in the scores made with a 4–A audiometer. This information is available for only 7,449 children, most of whom are in the junior and senior high school grades. The intelligence quotients found for these children have been grouped in the following broad categories: (*a*) Children with intelligence quotients less than 90, corresponding to Pintner's (19) backward class; (*b*) children with intelligence quotients between 90 and 119, normal and bright children; and (*c*) very bright and superior children, with an intelligence quotient equal to 120 and above. In table 9 are presented the constants of hearing variability for these three groups. There is very little difference between the normal and backward children, but there is a marked and significant decrease in variability of the superior group of children when compared with either of the other groups.

TABLE 9.—*Intelligence quotient and difference between first and second tests (score of second test minus score of first test)*

Intelligence quotient	Number of children	Standard deviation of differences	Mean deviation of differences	Percent of children with differences equal to or less than 3 S.U.
Backward child, I. Q. 60-89	860	3.142±0.051	1.809	86.28
Normal child, I. Q. 90-119	5,666	3.126±0.020	1.813	88.35
Superior child I. Q. 120+	923	2.808±0.044	1.541	91.22

The significance of these findings appears to be that the 4–A audiometer measures abilities other than that of hearing, and that tests with this instrument give reasonably consistent results only when they are conducted on children already past the elementary school grades and of high intelligence. A consideration of the nature of the test made with this instrument confirms the validity of this view. The test consists in listening to and noting the numbers spoken at a constant rate of speed by an adult. Conditions of hearing and attention being equal, the responses to the test will be dependent upon ability to understand speech, familiarity with numbers, and the individual reaction time to the mental stimulus. The findings presented show that these elements are of importance in determining the consistency of response. On the basis of these results, the observations of the authors mentioned above are better understood and explained. It does not seem likely that the alleged hearing impairment found when children are tested with this instrument causes inferior school work, retardation in school, etc.; it is rather that these conditions influence the results of tests. Practical experience in the individual testing of hearing with an instrument such as the 2–A audiometer indicates, furthermore, that while it costs much time and labor to obtain a reliable and consistent response from a mentally dull person, the incidence and degree of hearing impairment is probably no higher than in intelligent persons.

SIGNIFICANCE OF HEARING LOSS, MEASURED WITH A 4–A AUDIOMETER IN TERMS OF DECREASED ACUITY FOR PURE TONES

The use of a certain limit, such as 9 S.U., as a dividing line between good and impaired hearing appears to be based mostly on theoretical expectations and on observations made on selected individuals under laboratory conditions. The conditions under which the examination of children is usually conducted differ, however, from those found in the physics or otological laboratory. The significance of the degree of hearing loss which is revealed by a 4–A test may be evaluated empirically by studying the relationship between hearing loss, as measured by the 4–A audiometer, and the threshold of acuity for pure tones as measured by the 2–A audiometer. Records for air conduction made with a 2–A audiometer on some 1,400 of the above-mentioned children have been utilized for this purpose. These records have been grouped according to the best score made by each ear in either of the two 4–A tests. For each degree of hearing loss, the mean threshold for 256, 512, 1024, and 2048 d. v. (double vibrations), respectively, has been calculated. The results are shown in table 10. It is to be noted that, on the average, as the hearing loss increases, the limen of each of these auditory frequencies is also raised. This decrease in acuity for pure tones in not regular, however, nor is it proportional to the increase in hearing loss. The fact that there is not a linear or any other simple functional relationship between the two variables is shown more clearly in figure 1. Here, for each of the four auditory frequencies, the mean threshold of those ears with a hearing loss of −3 S.U. is taken as 0, and the ordinate presents the scale of increase in limen from this mean, measured in decibels with the 2–A audiometer. On the abscissa is represented the degree of hearing loss found by means of the 4–A audiometer. For example, in table 10 it is found that, for children with a hearing loss of 12 S.U. as measured with the 4–A audiometer, the mean threshold at 512 d. v. is 18.63 db (decibels). This is an increase of only 6.40 db. above the mean threshold found for children with −3 S.U. hearing loss. Thus the graphic representation shows that, for children with a hearing loss of 12 S.U., the increase in mean limen for this particular auditory frequency is only 6.40 db. (18.63 db.−12.23 db.).

TABLE 10.—*Mean threshold measured with 2–A audiometer for each degree of hearing loss*

Hearing loss in sensation units (4-A audiometer)	Mean threshold in decibels — Auditory frequencies in double vibrations				Hearing loss in sensation units (4-A audiometer)	Mean threshold in decibels — Auditory frequencies in double vibrations			
	256	512	1,024	2,048		256	512	1,024	2,048
−3	8.08	12.23	8.41	4.56	15	24.06	28.44	26.41	24.22
0	10.39	14.27	10.64	7.51	18	28.89	34.17	31.11	28.33
3	10.56	14.67	11.14	7.86	21	28.13	37.50	38.13	44.38
6	11.46	15.51	11.75	8.68	24	32.50	36.25	39.38	40.63
9	12.61	16.92	13.58	11.25	27	33.75	40.00	40.00	55.00
12	13.81	18.63	16.61	14.41	30	49.33	54.25	53.17	51.58

From figure 1 it is seen that the relationship between raised threshold and increase in hearing loss is practically the same for each of the four auditory frequencies; the small number of ears with a hearing loss above 18 and below 30 S.U. may account for the differences observed in this region. The most important fact brought out in the figure is, however, that the increase in mean threshold for the pure tones is very slight until the hearing loss reaches 15 S.U. That is, ears with a hearing loss from 0 to 12 S.U. show only a slight increase in mean threshold in relation to increased hearing loss. On the other hand, those with a hearing loss of 15 S.U. have a mean limen one and one-half to two times as high as those with 12 S.U. hearing loss. Due to the conditions of testing, the slight loss of acuity for pure tones shown by the children with hearing loss up to 12 S.U. has little if any pathologic significance, as can be deduced from the observations of Crowe et al. (6) (*cf.* also Polvogt (20) and Ciocco (4, 5)). The abrupt increase in the mean threshold found between 12 and 15 S.U. hearing loss seems clearly to confirm this conclusion.

It is not surprising, therefore, that a careful clinical examination fails in many cases to reveal any hearing impairment, even though the child has a hearing loss of 9 S.U. or more. This is obviously due to the fact that 9 S.U. is not the appropriate dividing point between good and impaired hearing, at least when the 4–A tests are made under conditions such as those of this survey. Consequently, the reports on the incidence of hearing impairment in childhood should be accepted with reservation. Moreover, the data presented here

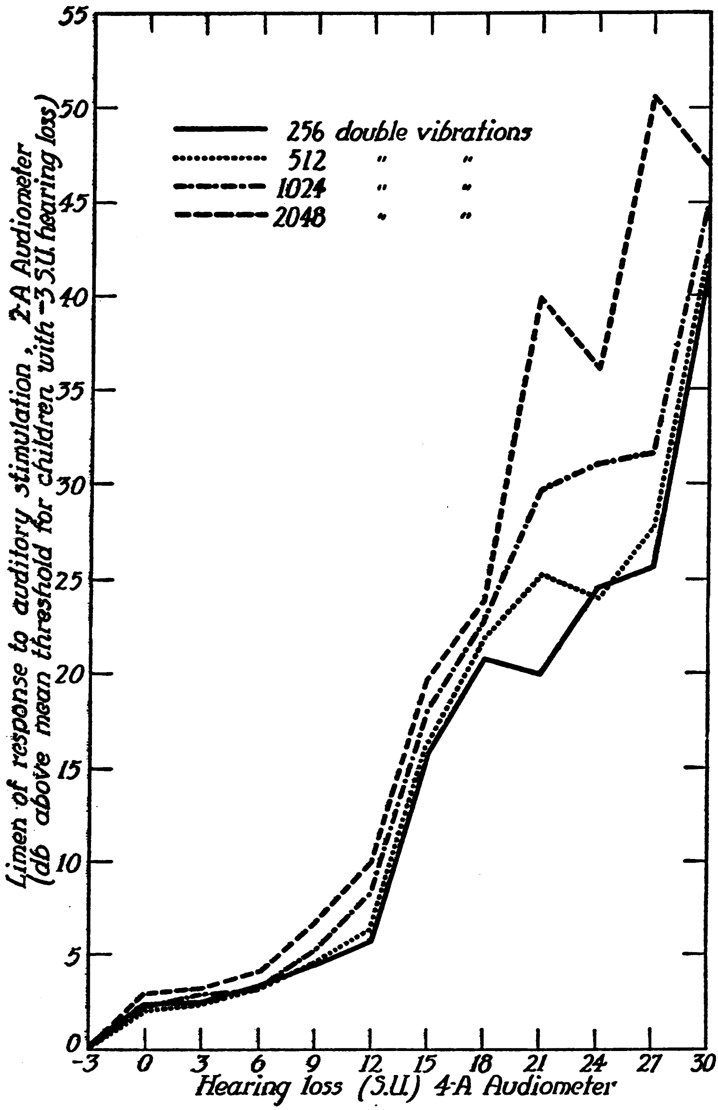

FIGURE 1.—Relationship between hearing acuity measured with a 2–A audiometer and hearing loss measured with a 4–A audiometer.

appear to indicate that a hearing loss of 12 S.U. is still within the "normal" range of individual variation. But, before this or any other figure can be finally accepted, it is necessary to obtain more precise knowledge regarding the precision and reliability of tests made with a 4–A audiometer.

SUMMARY AND DISCUSSION

A statistical analysis of the differences between the scores of two successive tests made with a 4–A audiometer on about 14,000 Washington (D. C.) school children shows the following facts:

1. The distribution curve of the differences between tests is symmetrical and leptokurtic. The normal range of variation (mean $\pm$ σ) is almost 8 S.U. The mean difference between tests is approximately 3 S.U. Twenty percent of the children showed a difference greater than 3 S.U. between the first and second test.

2. Children with the best hearing show the least variation in successive tests, the degree of variation increasing with increase in hearing loss. Also, the variability is significantly lowered if only the better hearing ear is used.

3. Boys and girls are, on the average, equally consistent in successive tests.

4. Repeated tests on children in junior and senior high school grades are significantly and markedly less variable than those on children in the elementary school grades. The apparent influence of age on the variability of the test is found, on detailed analysis, to be due primarily to the relationship between age and school grade.

5. Children whose intelligence quotients are 120 or higher give significantly less variable responses than children with intelligence quotients between 90–119 or children with intelligence quotients less than 90. The children of the last two groups are, on the average, equally consistent.

A study of some 1,400 children on the relationship between hearing acuity for pure tones, as measured with a 2–A audiometer, and hearing loss, as measured with a 4–A audiometer, reveals the following facts:

1. Decrease in acuity for the four most important tones in the conversational range is not proportional to increase in hearing loss as determined by the 4–A audiometer, nor is there apparently a linear or other simple functional relationship between the two variables.

2. The mean threshold of response to the pure tones is only slightly raised when the loss of hearing, as measured by the 4–A instrument, increases from 0 to 12 S. U. Increase in loss of hearing from 12 to 15 S. U. as determined by the 4–A audiometer is, however, accompanied by a marked elevation in the threshold for pure tones. From these and other findings it appears that a 4–A audiometer record of 12 S. U. or less does not indicate significant pathology. A score of 15 S. U. loss may be regarded, however, as being abnormal.

Specific conclusions drawn from the items here summarized have been discussed above in appropriate sections. Taken altogether, however, these facts point specifically to the definite limitations of hearing surveys made with the 4–A audiometer. At the present time, most hearing surveys made with the 4–A audiometer are inadequate because the records obtained are not comparable with those obtained in the clinic and because it is the general rule to give complete clinical tests only to children with a certain degree of hearing loss. The procedure of not giving the complete examination to all children eliminates those children with good hearing at the time of the test. If these children should be found with impaired hearing some time later, the previous test can contribute nothing except the probable time of onset of the disease.

From quite another standpoint, it is pertinent also to recall the opinion of G. E. Shambaugh (26) regarding these surveys:

> " * * * too much emphasis has been placed on the point that if these examinations are regularly performed on young children by detecting the onset of the deafness in its earliest stage, much can be done toward preventing that type of chronic progressive deafness which in adults develops into a serious handicap. This is not a fair statement of the proposition. Diseases of the ear in children are of several types; the first is congenital deafness. This, of course, we cannot correct, improve, or retard. Then there is nerve degeneration, toxic in origin and dependent on infections. Detection of this does not give us any clue that will assist in treatment. The treatment of the suppurative diseases of the middle ear does not influence the defect in the hearing to any great extent, a fact of which we are all aware. Then comes the tubotympanic processes, most common of all ear troubles in children. It is a common error to suppose that these processes so common in childhood are responsible for those cases of progressive deafness which in middle life produce a serious handicap. The tybotympanic disease of childhood is rarely prolonged as an active process into middle life. The chronic progressive deafness of adults may, of course, develop in a person in whose childhood there has been some tubotympanic process, but this does not mean that it is dependent on this for its cause."

Shambaugh's opinion regarding the prognosis of tubotympanic deafness in childhood is not universally accepted, nor has it been proved that all the cases of nerve degeneration found in children are infectious in origin. These are questions of vital importance which can be solved only by further studies on children. Thus it appears that the very important problem of prevention of deafness should be reexamined with much greater care, since, though millions of children have been tested, the mode of onset of the supposedly curable forms of deafness is still unknown. It is not intended by this criticism to deny the utility of the surveys which have made children, their parents and teachers "hearing conscious." On the other hand, it must be emphasized that surveys are not an end in themselves. The primary objective of these surveys should be, from the public-health standpoint at least, the initiation of an adequate program for the prevention of deafness, and this can be accomplished only by careful and complete clinical examinations.

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DEATHS DURING WEEK ENDED SEPTEMBER 19, 1936

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

	Week ended Sept. 19, 1936	Corresponding week, 1935
Data from 86 large cities of the United States:		
Total deaths	7,142	7,402
Deaths per 1,000 population, annual basis	10.0	10.3
Deaths under 1 year of age	512	507
Deaths under 1 year of age per 1,000 estimated live births	46	47
Deaths per 1,000 population, annual basis, first 38 weeks of year	12.3	11.5
Data from industrial insurance companies:		
Policies in force	68,465,466	67,580,404
Number of death claims	11,391	10,872
Death claims per 1,000 policies in force, annual rate	8.7	8.4
Death claims per 1,000 policies, first 38 weeks of year, annual rate	10.0	9.8

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

Reports for Weeks Ended Sept. 26, 1936, and Sept. 28, 1935

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Sept. 26, 1936, and Sept. 28, 1935

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935
New England States:								
Maine	1	3	1		32		1	0
New Hampshire					5		0	0
Vermont					6	8	0	0
Massachusetts	8	6			25	12	1	1
Rhode Island		1			6	2	0	1
Connecticut		3		3	4	9	1	0
Middle Atlantic States:								
New York	26	27	[1] 11	[1] 15	39	62	6	8
New Jersey	5	15	5	7	16	57	0	2
Pennsylvania	28	39			30	28	3	7
East North Central States:								
Ohio	23	40	3	19	20	16	3	2
Indiana	10	68	10	22	2	4	1	1
Illinois	14	60	3	9	12	14	5	4
Michigan	13	31		5	10	20	1	2
Wisconsin	2		12	28	14	38	1	1
West North Central States:								
Minnesota	8	2	1		10	7	1	0
Iowa	2	19			2	1	1	1
Missouri	3	52	58	28	1	18	1	1
North Dakota		2	16		2	4	0	0
South Dakota	1				2		0	0
Nebraska	3	8		1	1	6	0	0
Kansas	7	16			2	5	0	0
South Atlantic States:								
Delaware				1	3	6	0	0
Maryland [2, 3]	13	14	3	3	6	7	3	1
District of Columbia	14	17		1	4	1	0	3
Virginia [3]	30	38			5	4	6	2
West Virginia	14	45	2	26	2	6	2	1
North Carolina [4]	81	66	5	5	4	9	1	0
South Carolina [4]	23	24	130	176		1	0	0
Georgia [3, 4]	47	35					2	0
Florida [4]	8	9	2		1	3	3	0
East South Central States:								
Kentucky	14	50	1	2	9	44	6	4
Tennessee	43	47	11	39	2	18	1	2
Alabama [4]	48	44	3	9		8	2	2
Mississippi [3]	22	31					1	0

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Sept. 26, 1936, and Sept. 28, 1935—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935
West South Central States:								
Arkansas	4	13	3	10			0	1
Louisiana	16	22	3	5	1	3	0	1
Oklahoma [5]	4	23	8	27		1	0	1
Texas [4]	31	72	19	30		10	0	0
Mountain States:								
Montana	2	5	8	6		5	1	0
Idaho		1	2				0	0
Wyoming		1			2	8	0	0
Colorado	3	10			2	6	5	0
New Mexico	1	4	1	2	20		0	0
Arizona	2	2	9	18	8	2	0	0
Utah [3]					1	1	0	0
Pacific States:								
Washington	2	1	1		7	13	0	0
Oregon	1		13	18	2	118	2	1
California [4]	22	29	29	24	32	87	1	2
Total	509	995	373	539	352	672	62	52
First 39 weeks of year	17,773	22,422	143,202	106,475	272,221	698,966	6,302	4,545

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935
New England States:								
Maine	6	14	7	3	0	0	2	2
New Hampshire	0	4	6	1	0	0	0	0
Vermont	0	7	4	6	0	0	0	0
Massachusetts	1	88	50	59	0	0	3	3
Rhode Island	0	32	13	10	0	0	0	0
Connecticut	3	33	10	13	0	0	1	5
Middle Atlantic States:								
New York	16	150	130	173	0	0	25	26
New Jersey	2	51	16	35	0	0	16	12
Pennsylvania	1	15	110	188	0	0	22	34
East North Central States:								
Ohio	27	7	99	157	0	0	30	35
Indiana	7	1	60	86	0	0	8	14
Illinois	75	14	107	217	5	1	29	33
Michigan	9	30	88	51	1	0	11	20
Wisconsin	4	4	76	145	0	1	2	5
West North Central States:								
Minnesota	3	2	19	83	0	0	3	6
Iowa	7	3	12	41	2	0	2	7
Missouri	2	2	12	59	0	0	17	10
North Dakota	2	0	7	12	4	4	2	1
South Dakota	1	0	6	10	0	1	2	0
Nebraska	3	1	14	21	0	4	1	0
Kansas	4	4	31	27	0	8	5	10
South Atlantic States:								
Delaware	0	0	0	9	0	0	1	2
Maryland [2 3]	5	13	12	28	0	0	16	17
District of Columbia	1	7	4	14	0	0	2	2
Virginia [3]	3	10	15	34	0	0	26	20
West Virginia	4	0	30	81	0	0	24	25
North Carolina [4]	1	15	45	66	0	0	31	24
South Carolina [4]	0	1	8	10	0	0	20	11
Georgia [3 4]	11	0	15	23	0	0	21	26
Florida [4]	0	1	2	4	0	0	5	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Sept. 26, 1936, and Sept. 28, 1935—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935	Week ended Sept. 26, 1936	Week ended Sept. 28, 1935
East South Central States:								
Kentucky	1	19	27	76	1	0	26	62
Tennessee	23	3	27	55	0	0	35	33
Alabama [4]	6	1	13	14	0	0	32	20
Mississippi [2]	3	0	15	20	0	0	17	7
West South Central States:								
Arkansas	1	4	6	18	0	1	10	13
Louisiana	1	1	1	5	0	0	23	27
Oklahoma [5]	0	0	10	8	0	0	12	18
Texas [4]	2	1	15	31	0	1	24	47
Mountain States:								
Montana	1	0	29	31	4	0	10	2
Idaho	0	0	9	27	0	0	4	10
Wyoming	0	0	4	11	0	5	1	0
Colorado	9	1	15	24	0	5	10	4
New Mexico	4	0	6	6	0	0	23	20
Arizona	0	1	5	8	0	0	0	0
Utah [2]	0	0	7	28	0	0	0	3
Pacific States:								
Washington	5	0	19	35	3	2	4	5
Oregon	5	3	15	37	0	0	2	4
California [4]	18	26	93	110	0	0	13	24
Total	277	569	1,324	2,210	20	33	573	650
First 39 weeks of year	2,559	8,507	190,016	189,034	6,254	5,484	10,441	13,451

[1] New York City only.
[2] Week ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended Sept. 26, 1936, 3 cases, as follows: Maryland, 1; Virginia, 1; Georgia, 1.
[4] Typhus fever, week ended Sept. 26, 1936, 58 cases, as follows: North Carolina, 1; South Carolina, 2, Georgia, 38; Florida, 1; Alabama, 5; Texas, 9; California, 2.
[5] Exclusive of Oklahoma City and Tulsa.

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	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
July 1936										
Kentucky	31	13	5	7	50	------	7	50	0	106
August 1936										
Hawaii Territory	1	3	2	------	3	------	0	1	0	4
Idaho	------	1	------	------	12	------	4	19	3	7
Kansas	2	24	1	3	10	1	3	132	2	52
Kentucky	19	26	12	8	41	------	22	34	1	195
Louisiana	7	39	71	213	14	13	3	27	0	114
Montana	9	5	8	1	1	------	2	36	66	22
New Hampshire	------	------	------	------	------	------	0	2	0	2
Oregon	2	2	20	17	20	------	4	39	2	12
South Dakota	1	2	8	------	19	------	8	31	9	7
Vermont	------	1	------	------	5	------	------	11	0	0
Virginia	12	49	95	93	102	18	18	48	0	98
Washington	1	4	13	1	48	------	14	57	8	7
Wisconsin	2	6	32	------	62	------	2	251	2	7

July 1936

	Cases
Kentucky:	
Mumps	177
Whooping cough	42

August 1936

	Cases
Anthrax:	
Kansas	1
South Dakota	1
Chicken pox:	
Hawaii Territory	19
Idaho	10
Kansas	6
Montana	18
Oregon	24
South Dakota	7
Vermont	20
Virginia	17
Washington	35
Wisconsin	247
Dysentery:	
Hawaii Territory (amoebic)	2
Kansas (amoebic)	2
Kansas (bacillary)	7
Louisiana (amoebic)	9
Oregon (amoebic)	1
Virginia (diarrhea included)	1,225
Wisconsin (amoebic)	1
Epidemic encephalitis:	
Kansas	4
Louisiana	2
Montana	13
Oregon	2
Washington	2
Wisconsin	1
German measles:	
Kansas	3
Vermont	7
Washington	14
Wisconsin	22
Hookworm disease:	
Louisiana	4
Impetigo contagiosa:	
Kansas	1
Montana	1
Oregon	13

August 1936—Continued

	Cases
Leprosy:	
Hawaii Territory	1
Mumps:	
Hawaii Territory	43
Idaho	13
Kansas	48
Kentucky	12
Montana	87
Oregon	23
South Dakota	8
Vermont	20
Virginia	53
Washington	50
Wisconsin	149
Ophthalmia neonatorum:	
Louisiana	4
Virginia	1
Wisconsin	2
Paratyphoid fever:	
Louisiana	3
Oregon	2
Virginia	11
Washington	1
Rabies in animals:	
Louisiana	21
Oregon	3
Washington	8
Rabies in man:	
South Dakota	1
Rocky Mountain spotted fever:	
Idaho	1
Montana	3
Oregon	3
Virginia	20
Scabies:	
Oregon	6
Septic sore throat:	
Kansas	2
Louisiana	3
Montana	3
Oregon	8
Virginia	27
Washington	1
Wisconsin	13

August 1936—Continued

	Cases
Tetanus:	
Louisiana	1
South Dakota	1
Virginia	5
Trachoma:	
Oregon	1
South Dakota	2
Virginia	1
Wisconsin	1
Tularaemia:	
Kansas	2
Louisiana	2
Oregon	2
Virginia	6
Wisconsin	2
Typhus fever:	
Hawaii Territory	6
Louisiana	4
Virginia	1
Undulant fever:	
Kansas	10
Louisiana	4
South Dakota	1
Vermont	4
Virginia	5
Washington	5
Wisconsin	5
Vincent's infection:	
Kansas	16
Oregon	15
Washington	1
Whooping cough:	
Hawaii Territory	14
Idaho	6
Kansas	61
Kentucky	77
Louisiana	23
Montana	61
Oregon	143
South Dakota	5
Vermont	96
Virginia	144
Washington	46
Wisconsin	486

WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 19, 1936

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. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

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								
Maine:											
Portland	0	------	0	1	1	0	0	1	0	1	20
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	6
Manchester	0	------	0	0	0	0	0	0	0	0	15
Nashua	0	------	------	0	------	1	0	------	0	0	------
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	0	3
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	0	2	9	14	0	15	0	80	170
Fall River	0	------	0	0	1	0	0	0	0	0	29
Springfield	0	------	0	0	1	2	0	1	0	2	27
Worcester	1	------	0	2	1	0	0	2	0	16	37
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	1	0	15
Providence	0	------	0	0	2	4	0	1	1	11	64
Connecticut:											
Bridgeport	0	------	0	0	2	1	0	0	0	2	24
Hartford	0	------	0	0	1	1	0	1	0	8	43
New Haven	0	2	0	0	3	0	0	0	0	3	38
New York:											
Buffalo	1	------	0	1	5	11	0	4	0	11	118
New York	10	2	1	21	63	25	0	82	10	110	1,173
Rochester	0	------	0	0	4	0	0	0	3	3	51
Syracuse	0	------	0	0	0	1	0	0	0	21	42
New Jersey:											
Camden	1	1	0	0	0	0	0	0	3	1	30
Newark	0	------	0	0	1	2	0	8	0	20	74
Trenton	0	------	0	0	1	1	0	5	2	2	37
Pennsylvania:											
Philadelphia	1	3	1	2	12	12	0	28	9	128	387
Pittsburgh	2	2	1	0	11	24	0	10	2	35	145
Reading	0	------	0	0	0	2	0	0	0	12	21
Scranton	3	------	------	0	------	1	0	------	0	0	------
Ohio:											
Cincinnati	3	------	0	0	5	2	0	7	0	5	126
Cleveland	2	1	1	1	8	13	0	11	1	53	159
Columbus	1	------	0	0	1	4	0	2	47	20	85
Toledo	1	------	0	3	3	4	0	4	0	14	66
Indiana:											
Anderson	0	------	1	0	0	2	0	1	0	0	9
Fort Wayne	1	------	0	0	0	3	0	1	0	1	28
Indianapolis	1	------	0	0	7	9	0	1	1	7	84
Muncie	0	------	0	0	0	0	0	0	0	0	9
South Bend	0	------	0	0	2	1	0	1	0	0	15
Terre Haute	0	------	0	0	0	2	0	0	0	0	16
llinois:											
Alton	0	------	0	0	0	0	0	0	0	0	3
Chicago	4	2	1	6	21	28	0	33	2	74	617
Elgin	0	------	0	0	3	0	0	0	0	2	11
Moline	0	------	0	0	1	0	0	0	0	2	11
Springfield	0	------	0	2	2	2	0	0	0	5	13
Michigan:											
Detroit	4	------	0	5	8	17	0	20	1	108	224
Flint	0	------	0	0	0	2	0	1	1	8	16
Grand Rapids	0	------	0	0	0	8	0	0	0	9	22
Wisconsin:											
Kenosha	0	------	0	1	0	0	0	0	0	0	5
Madison	0	------	0	0	0	0	0	0	0	8	20
Milwaukee	0	1	1	1	2	16	0	1	0	42	83
Racine	0	------	0	0	0	2	0	1	0	0	11
Superior	0	------	0	0	0	3	0	0	0	13	5
Minnesota:											
Duluth	0	------	0	0	1	2	0	2	0	7	18
Minneapolis	1	------	1	2	5	8	0	0	0	18	93
St. Paul	0	------	0	3	3	1	0	3	0	20	42
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	0	0	------	0	0	------
Des Moines	1	------	------	1	------	1	0	------	2	0	24

City reports for week ended Sept. 19, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths all causes
		Cases	Deaths								
Iowa—Continued.											
Sioux City	0			0		1	2		0	2	
Waterloo	1			0		1	0		0	7	
Missouri:											
Kansas City	1		0	0	6	3	0	5	1	0	78
St. Joseph											
St. Louis	1		0	0	8	7	0	5	2	18	178
North Dakota:											
Fargo	0		0	0	0	0	0	0	0	0	7
Grand Forks	0			0		0	0		0	0	
Minot	0		0	0	0	0	0	0	0	0	2
South Dakota:											
Aberdeen	0			1		0	0		0	0	
Sioux Falls	0		0	0	0	0	0	0	0	0	14
Nebraska:											
Omaha	2		0	1	2	1	0	2	1	1	53
Kansas:											
Lawrence	0		0	0	1	1	0	0	0	0	4
Topeka	0		0	0	2	1	0	0	1	0	11
Wichita	0		0	0	2	1	0	0	1	0	12
Delaware:											
Wilmington	0		0	1	1	0	0	0	0	4	24
Maryland:											
Baltimore	1	1	0	5	12	7	0	10	2	125	196
Cumberland	0		0	0	0	0	0	1	0	0	12
Frederick	0		0	0	0	0	0	0	0	0	2
District of Col.:											
Washington	5		0	0	10	8	0	8	0	37	133
Virginia:											
Lynchburg	0		0	1	2	0	0	1	0	8	12
Norfolk	2		0	0	1	1	0	0	1	2	19
Richmond	0		0	0	4	2	0	3	1	1	50
Roanoke	2		0	0	0	0	0	0	1	3	13
West Virginia:											
Charleston	0		0	1	0	0	0	0	1	0	7
Huntington	0			0		2	0		0	0	
Wheeling	0		0	1	1	2	0	0	0	1	11
North Carolina:											
Gastonia	0			0		1	0		0	0	
Raleigh											
Wilmington	0		0	0	0	0	0	0	0	1	13
Winston-Salem	0		0	0	2	3	0	0	0	0	11
South Carolina:											
Charleston	2	1	0	0	3	0	0	0	2	0	20
Columbia											
Florence	0		0	0	1	0	0	0	0	0	20
Greenville	1		0	0	0	0	0	0	0	0	6
Georgia:											
Atlanta	5	9	2	0	5	1	0	6	1	0	70
Brunswick	0		0	0	0	0	0	0	0	0	6
Savannah	3		0	0	4	0	0	6	1	0	32
Florida:											
Miami	0	2	1	0	2	0	0	0	0	0	27
Tampa	0	2	1	0	0	0	0	2	0	3	19
Kentucky:											
Ashland	0			0		1	0		2	0	18
Covington	0		0	0	0	0	0	0	0	0	12
Lexington	0		0	0	0	0	0	1	1	0	19
Louisville											
Tennessee:											
Knoxville	3		0	0	2	1	0	2	0	0	25
Memphis	5		0	1	2	4	0	3	0	3	57
Nashville	1		0	0	0	3	0	2	3	0	47
Alabama:											
Birmingham	0	1	0	0	4	0	0	2	3	1	67
Mobile	1		0	0	1	0	0	2	0	0	24
Montgomery	2			0		0	0		0	0	
Arkansas:											
Fort Smith	1			0		0	0		0	0	
Little Rock	0		0	0	3	0	0	1	0	0	6
Louisiana:											
Lake Charles	0		0	0	1	1	0	1	0	0	4
New Orleans	4	1	1	0	6	1	0	15	0	0	146
Shreveport	1		0	0	7	0	0	3	1	0	46
Oklahoma:											
Oklahoma City	1		0	0	0	0	0	0	2	0	44
Tulsa	1			1		0	0		0	0	

City reports for week ended Sept. 19, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths all causes
		Cases	Deaths								
Texas:											
Dallas	2	1	1	0	2	0	0	1	0	4	55
Fort Worth	0	------	0	0	0	0	1	0	0	0	33
Galveston	0	------	0	0	1	0	0	1	0	0	12
Houston	2	------	0	0	5	2	0	8	1	2	85
San Antonio	1	------	1	0	2	0	0	3	1	0	42
Montana:											
Billings	0	------	0	0	1	0	0	0	0	0	6
Great Falls	0	------	0	0	1	0	1	0	0	1	6
Helena	0	------	0	1	0	0	0	0	1	0	8
Missoula	0	------	0	0	0	0	0	0	0	1	4
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	9
Colorado:											
Colorado Springs	0	------	0	0	1	0	0	0	1	0	12
Denver	1	------	1	1	2	8	0	5	1	43	79
Pueblo	0	------	0	0	0	4	0	1	1	0	10
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	1	0	0	17
Utah:											
Salt Lake City	1	------	0	1	2	2	0	1	0	1	21
Nevada:											
Reno	------	------	------	------	------	------	------	------	------	------	------
Washington:											
Seattle	0	------	0	3	------	2	0	------	1	5	------
Spokane	0	------	0	1	2	4	2	1	0	1	24
Tacoma	0	------	0	0	1	1	0	2	0	0	31
Oregon:											
Portland	1	1	0	1	3	5	0	4	1	6	72
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	10	16	0	6	13	9	0	18	1	33	277
Sacramento	2	------	0	1	2	3	0	3	0	36	20
San Francisco	1	1	0	1	10	13	0	6	0	8	149

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				**Maryland:**			
Worcester	0	1	0	Baltimore	1	0	2
New York:				**Virginia:**			
Buffalo	0	1	0	Lynchburg	0	0	1
New York	1	1	4	**Georgia:**			
Rochester	1	0	2	Atlanta	1	0	1
Pensylvania:				**Tennessee:**			
Philadelphia	3	0	1	Knoxville	0	0	2
Reading	1	0	0	Memphis	0	1	1
Ohio:				Nashville	0	0	1
Cleveland	1	0	0	**Alabama:**			
Toledo	0	0	3	Birmingham	1	0	2
Indiana:				**Louisiana:**			
Indianapolis	0	0	1	New Orleans	1	1	0
Illinois:				Shreveport	0	0	1
Alton	0	0	1	**Texas:**			
Chicago	2	2	23	Houston	0	1	0
Michigan:				**Colorado:**			
Detroit	0	0	5	Denver	0	0	1
Wisconsin:				**Oregon:**			
Kenosha	0	0	1	Portland	0	1	0
Minnesota:				**California:**			
Minneapolis	0	0	1	Los Angeles	1	0	3
Iowa:							
Des Moines	0	0	1				
Missouri:							
Kansas City	0	0	1				
St. Louis	0	0	2				

Epidemic encephalitis.—Cases: Portland, Maine, 1; Philadelphia, 1; Davenport, 1; Albuquerque, 1.

Pellagra.—Cases: Winston-Salem, 1; Atlanta, 1; Savannah, 4; Memphis, 1; Montgomery, 6; New Orleans, 1; San Francisco, 1.

Rabies in man.—Deaths: Ashland, Ky., 1.

Typhus fever.—Cases: New York, 1; Chicago, 1; Wilmington, N. C., 1; Charleston, S. C., 1; Atlanta, 1; Tampa, 2; Birmingham, 1; Montgomery, 2; Los Angeles, 1.

FOREIGN AND INSULAR

CANADA

Manitoba—Poliomyelitis.—During the week ended September 26, 1936, 64 new cases of poliomyelitis had been reported in Manitoba, Canada, making a total of 220 cases of this disease since the outbreak. In Winnipeg, a total of 39 cases of poliomyelitis had occurred since June.

GERMANY

Vital statistics—First quarter 1936.—Following are vital statistics for Germany for the first quarter of 1936.

Number of marriages	115,076	Total deaths	205,587
Number of marriages per 1,000 population	6.9	Deaths per 1,000 population	12.3
Number of live births	328,498	Deaths under 1 year of age	22,035
Number of live births per 1,000 population	19.6	Deaths under 1 year of age per 100 live births	7.0
Number of stillbirths	9,114		

GREAT BRITAIN

England and Wales—Infectious diseases—13 weeks ended June 27, 1936.—During the 13 weeks ended June 27, 1936, cases of certain infectious diseases were reported in England and Wales, as follows:

Disease	Cases	Disease	Cases
Diphtheria	11,614	Puerperal pyrexia	1,520
Ophthalmia neonatorum	1,248	Scarlet fever	24,068
Pneumonia	10,946	Typhoid fever	330
Puerperal fever	528		

England and Wales—Vital statistics—Second quarter 1936.—During the quarter ended June 30, 1936, 157,700 live births and 119,557 deaths were registered in England and Wales. The following vital statistics are taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar General of England and Wales. The figures are provisional.

Birth and death rates in England and Wales, quarter ended June 30, 1936

Annual rates per 1,000 population:		Annual rates per 1,000 population—Con.	
Live births	15.6	Deaths from—con.	
Stillbirths	.64	Diphtheria	.06
Deaths, all causes	11.8	Influenza	.12
Deaths under 1 year of age	[1] 54	Measles	.11
Deaths from:		Scarlet fever	.01
Diarrhea and enteritis (under 2 years of age)	[1] 5.0	Violence	.51
		Whooping cough	.06

[1] Per 1,000 live births.

ITALY

Communicable diseases—4 weeks ended July 19, 1936.—During the 4 weeks ended July 19, 1936, cases of certain communicable diseases were reported in Italy as follows:

Disease	June 22-28		June 29-July 5		July 6-12		July 13-19	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	15	15	23	21	23	21	19	18
Cerebrospinal meningitis	8	6	14	14	14	12	12	11
Chicken pox	410	190	391	179	210	121	185	108
Diphtheria and croup	319	182	324	176	290	161	282	172
Dysentery	13	12	25	16	23	16	39	26
Hookworm disease	35	17	17	12	22	15	28	10
Lethargic encephalitis	1	1	1	1	5	5		
Measles	1,886	360	1,820	352	1,394	288	1,155	278
Mumps	269	97	261	111	219	100	201	98
Paratyphoid fever	68	51	85	60	89	64	124	95
Poliomyelitis	84	53	91	64	96	65	99	73
Puerperal fever	30	30	29	28	27	26	25	20
Scarlet fever	220	103	211	115	189	96	147	87
Typhoid fever	343	212	404	245	518	297	609	349
Undulant fever	94	67	95	71	88	54	93	63
Whooping cough	784	214	827	234	838	235	663	213

STRAITS SETTLEMENTS

Vital statistics—1935.—The following table shows the births and deaths reported in the Straits Settlements during the year 1935, together with the number of deaths reported from certain notifiable diseases.

Population	1,117,023
Number of births	46,649
Births per 1,000 population	41.76
Number of deaths	28,050
Deaths per 1,000 population	25.11
Infant mortality per 1,000 live births	165.28
Deaths from—	
Beriberi	916
Cancer	310
Diarrhea and enteritis	1,308
Dysentery	411
Heart diseases	630
Hookworm disease	41
Influenza	362
Leprosy	144
Malaria	1,698
Pneumonia	2,541
Smallpox	21
Syphilis	325
Tuberculosis	2,267
Typhoid fever	177

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 September 25, 1936, pages 1348-1361. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued October 30, 1936, and thereafter, at least for the time being, in the issue published on the last Friday of each month.

Cholera

India (French)—Pondichery Territory.—During the week ended August 15, 1936, 1 case of cholera was reported in Pondichery Territory, India (French).

Plague

Algeria—Oran Department.—During the week ended September 19, 1936, 1 suspected case of plague was reported in Oran Department, Algeria.

Brazil.—According to information dated August 31, 1936, plague has been reported since January in Brazil as follows: Bahia State, 46 cases, 14 deaths; Ceara State, 106 cases, 45 deaths; Pernambuco State, 45 cases, 10 deaths; Piauhy State, 4 cases, 2 deaths.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Sector.—Three rats found September 28, 1936, in Paauhau Sector, Hamakua District, Island of Hawaii, Hawaii Territory, have been proved plague infected.

Peru.—During the month of August 1936, plague was reported in Peru as follows: Libertad Department, 1 case, 1 death; Lima Department, 2 cases, 1 death; Piura Department, 3 suspected cases. Plague-infected rats were also reported found in Callao, Peru.

Typhus Fever

Chile.—During the period June 27 to August 1, 1936, typhus fever was reported in Chile as follows: Aconcagua, 3 cases, 1 death; Arauco, 2 deaths; Bio Bio, 47 cases, 15 deaths; Cautin, 21 cases, 3 deaths; Chiloe, 1 case, 1 death; Colchagua, 15 cases, 3 deaths; Concepcion, 38 cases, 5 deaths; Coquimbo, 4 cases, 1 death; Maule, 3 cases; Nuble, 27 cases, 3 deaths; O'Higgins, 1 case; Santiago, 104 cases, 15 deaths; Valdivia, 1 case.

Finland.—During the period August 16–31, 1936, 1 case of typhus fever was reported in Finland.

Yellow Fever

Colombia.—Deaths from yellow fever have been reported in Colombia as follows: August 7, Puerto Wilches, 1; July 4 to August 9, Restrepo, 3; August 1–6, San Vincente de Chucuri, 4.

Dahomey—Bembereke.—During the period September 11–20, 1936, 1 suspected case of yellow fever was reported at Bembereke, Dahomey.

French Guinea—Macenta.—During the period September 11–20, 1936, 1 suspected case of yellow fever was reported in Macenta, French Guinea.

Nigeria—Owerri Province—Aba.—On September 19, 1936, 1 suspected case of yellow fever was reported in Aba, Owerri Province, Nigeria.

Sudan (French)—Koulikoro.—On September 18, 1936, 1 case of yellow fever was reported near Koulikoro, Sudan (French).