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## INFLUENZA—PREVALENCE IN THE UNITED STATES.

The excess [1] annual mortality rate from influenza and pneumonia (all forms) in the group of 40-odd large cities included in the Weekly Health Index of the Bureau of the Census dropped to 59 per 100,000 for the week ended March 13, 1920. For the preceding week it was 185, and for the week of highest mortality (February 14) it was 1,319.

This continued decline in the mortality rate affords further ground for the belief, which was expressed in the Public Health Reports of last week, that the present epidemic wave is practically over, and suggests no definite indications of an immediate recrudescence such as was experienced in the 1918–19 epidemic period. A comparison of the excess annual mortality rates in the two epidemic waves by weeks for the group of cities is afforded in the following table:

TABLE I.—*Comparison of the excess [2] annual mortality rate per 100,000 from influenza and pneumonia (all forms), by weeks, during the 1920 epidemic with that for corresponding weeks in the 1918 epidemic in cities included in the Weekly Health Index of the Bureau of the Census, considered as a whole.*

| Week ended— | Excess over corresponding week of median year. | Week ended— | Excess over corresponding week of median year. |
|---|---|---|---|
| 1918. | | 1920. | |
| Sept. 14 | −6 | Jan. 3 | −56 |
| 21 | 76 | 10 | −55 |
| 28 | 326 | 17 | −27 |
| Oct. 5 | 1,028 | 24 | 184 |
| 12 | 2,557 | 31 | 741 |
| 19 | 4,592 | Feb. 7 | 1,241 |
| 26 | 4,695 | 14 | 1,319 |
| Nov. 2 | 3,332 | 21 | 867 |
| 9 | 1,832 | 28 | 422 |
| 16 | 989 | Mar. 6 | 185 |
| 23 | 620 | 13 | 59 |
| 30 | 526 | | |
| Dec. 7 | 617 | | |
| 14 | 792 | | |
| 21 | 801 | | |
| 28 | 629 | | |

[1] That is, the excess over the annual rate for the corresponding week in the median year of the period 1910-1916. See footnote to Table I for explanation of the method by which this "normal" rate was approximated.

[2] Excess over the mortality rate from the same causes in corresponding week of the median year in the period 1910-1916. The weekly rates for the median year have been approximated by plotting the rate for the median year for each month (thus affording a rough "normal" seasonal curve) for each city, and then by reading from the curve the indicated median rate at the midpoint for each week. The excess has been found by subtracting this median rate from the actual rate for the corresponding weeks in 1918 and 1920.

If the curves of excess rates by weeks in the two epidemic waves be fitted together at their peaks (Oct. 26, 1918, to correspond with Feb. 14, 1920) and the ratios be computed of the 1920 rates to those for the corresponding weeks in the 1918 wave, the more abrupt decline of the 1920 epidemic is clearly shown.[1]

The ratios follow:

*Weekly ratio of excess annual death rate from influenza and pneumonia (all forms), Jan. 11–Mar. 13, 1920, to that of corresponding week of 1918 epidemic wave, for certain cities as a group.*

| Week ended— | | Ratio. |
|---|---|---|
| 1918 | 1920 | |
| Sept. 28 | Jan. 17 | 0.086 |
| Oct. 5 | 24 | .232 |
| 12 | 31 | .311 |
| 19 | Feb. 7 | .282 |
| 26 | 14 | .293 |
| Nov. 2 | 21 | .277 |
| 9 | 28 | .260 |
| 16 | Mar. 6 | .243 |
| 23 | 13 | .184 |

Only a few of the cities show a rate which is definitely above the seasonal normal. Approximately half of them have reached a normal rate and 14 others are practically normal. The course of the epidemic in each city, as measured by excess mortality from influenza and pneumonia (all forms), is shown in the following table:

[1] In computing these ratios, account has been taken of the fact that the death rates from influenza and pneumonia (all forms) immediately prior to the beginning of the present epidemic have been below "normal" (using the seasonal rate for the median year of 1910–1916 as the normal), and a provisional adjustment to the 1920 "norm" has been made by adding 55 to the annual rate (as given in Table I) for each week of the epidemic period in 1920.

TABLE II.—*Excess of annual death rate per 100,000 from influenza and pneumonia (all forms) by weeks, Dec. 6, 1919, to Mar. 13, 1920, over that in corresponding week of median year (1910–1916) in certain large cities.*[1]

| City. | 1919. Week ended— | | | 1920. Week ended— | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | December— | | | January— | | | | | February— | | | | March— | |
| | 13 | 20 | 27 | 3 | 10 | 17 | 24 | 31 | 7 | 14 | 21 | 28 | 6 | 13 |
| Albany, N. Y. | 28 | 0 | 2 | −54 | −251 | −314 | −367 | 250 | 493 | 980 | 719 | 602 | 162 | 139 |
| Atlanta, Ga. | −[2]56 | −[2]36 | −[2]100 | −[2]85 | [2]209 | [2]33 | [2]30 | 149 | 574 | [2]1,482 | [2]1,998 | [2]1,381 | (3) | [2]317 |
| Baltimore, Md. | −47 | −41 | −97 | −106 | −204 | −96 | −180 | 101 | 604 | 1,745 | 1,457 | 613 | 265 | 138 |
| Birmingham, Ala. | −77 | −9 | −62 | −5 | −[2]1 | −[2]83 | 115 | 44 | 243 | 131 | 1,210 | 1,502 | 1,666 | 860 |
| Boston, Mass. | −101 | (3) | −122 | −131 | −113 | −114 | −1 | 266 | 753 | 1,399 | 1,137 | 600 | 223 | 9 |
| Buffalo, N. Y. | −108 | −124 | −48 | −69 | −102 | −134 | −3 | −27 | 522 | 1,334 | 1,372 | 847 | 377 | 173 |
| Cambridge, Mass. | −171 | −46 | −151 | −68 | 111 | 62 | 107 | 391 | 771 | 1,058 | 824 | 350 | −82 | −44 |
| Chicago, Ill. | −77 | −67 | −87 | −102 | −118 | −37 | 604 | 1,886 | 1,681 | 660 | 158 | −55 | −85 | −107 |
| Cincinnati, Ohio. | −51 | −12 | −4 | −8 | −71 | −108 | −54 | 41 | 199 | 497 | 734 | 959 | 637 | 152 |
| Cleveland, Ohio. | −71 | −36 | −[2]92 | 0 | −41 | −13 | −6 | 91 | 843 | 1,483 | 954 | 609 | 251 | 154 |
| Columbus, Ohio. | −26 | −57 | −151 | −103 | 130 | −6 | −27 | 322 | 1,156 | 2,519 | 1,309 | 883 | 203 | 83 |
| Dayton, Ohio. | 70 | 20 | −159 | 51 | −101 | 11 | 249 | 1,567 | 1,611 | 1,017 | 704 | 25 | −35 | 15 |
| Fall River, Mass. | −65 | −2 | −106 | −128 | 5 | 99 | −141 | −272 | −232 | 200 | 563 | 322 | 291 | 143 |
| Grand Rapids, Mich. | −3 | 60 | −33 | −15 | −105 | 2 | −79 | 77 | 1,047 | 1,285 | 1,095 | 396 | 262 | 13 |
| Indianapolis, Ind. | 39 | 46 | −[4]9 | −[2]168 | 62 | [2]11 | 101 | 587 | 1,419 | 2,004 | 1,071 | 654 | 500 | 111 |
| Jersey City, N. J. | 44 | −[2]214 | −35 | −90 | −64 | −67 | 98 | 755 | (3) | (3) | 989 | 317 | 169 | 88 |
| Kansas City, Mo. | 60 | (3) | −12 | −31 | −31 | 221 | 1,320 | 1,708 | 3,362 | 2,475 | 930 | 595 | 216 | 139 |
| Los Angeles, Calif. | −53 | −18 | −118 | −16 | −39 | −23 | −13 | 19 | 211 | 616 | 534 | 391 | 330 | 132 |
| Louisville, Ky. | −32 | −100 | −20 | −12 | −3 | −13 | −41 | 151 | 620 | 874 | 778 | 375 | 142 | 91 |
| Lowell, Mass. | −20 | −144 | −28 | −145 | −66 | −122 | −220 | 27 | 283 | 207 | 1,457 | 1,127 | 1,038 | 516 |
| Memphis, Tenn. | 146 | −6 | −24 | 193 | 81 | 74 | 41 | 10 | 419 | 1,836 | 1,733 | 1,224 | 1,082 | 472 |
| Milwaukee, Wis. | −[2]70 | 87 | 11 | 3 | 111 | −32 | 332 | 1,434 | 1,927 | 1,201 | 276 | 364 | −46 | −[2]80 |
| Minneapolis, Minn. | 59 | 10 | −20 | 88 | −41 | −84 | −106 | 629 | 2,065 | 1,494 | 538 | 11 | −44 | −[4]49 |
| Nashville, Tenn. | 149 | 9 | −126 | −130 | −47 | 169 | −55 | 193 | −17 | 613 | 1,638 | 2,280 | 1,007 | 703 |
| Newark, N. J. | −54 | −121 | −136 | −77 | −64 | −106 | 91 | 408 | 1,168 | 1,503 | 911 | 428 | 158 | 11 |
| New Haven, Conn. | −31 | −3 | −120 | 0 | −222 | −169 | 103 | 208 | 271 | 1,630 | 1,902 | 181 | 377 | 168 |
| New Orleans, La. | −25 | −101 | −9 | −36 | −67 | −50 | −35 | −92 | 141 | 492 | 860 | [4]157 | [4]30 | −[4]114 |
| New York City, N. Y. | −85 | −82 | −75 | −61 | −42 | −4 | 241 | 1,032 | 1,705 | 1,505 | 689 | 206 | 53 | −6 |
| Oakland, Calif. | −130 | −113 | −66 | −16 | −84 | 21 | 395 | 431 | 1,196 | 1,185 | 1,341 | 396 | 303 | (3) |
| Omaha, Nebr. | −93 | −76 | −89 | −117 | −151 | −70 | −95 | 1,007 | 1,488 | 1,512 | 616 | 507 | 261 | (3) |
| Philadelphia, Pa. | −56 | −25 | −122 | −76 | −116 | −64 | 29 | 163 | 567 | 1,384 | 1,551 | 822 | 362 | 177 |
| Pittsburgh, Pa. | −61 | −60 | −29 | 120 | 31 | 75 | 89 | 280 | 1,099 | 3,297 | 2,182 | 1,322 | 526 | 265 |
| Providence, R. I. | −63 | −9 | −8 | −127 | −34 | −33 | −143 | −32 | 457 | 1,421 | 1,498 | 803 | 408 | −25 |
| Richmond, Va. | −90 | −246 | −238 | −130 | −280 | −70 | −74 | 308 | 761 | 857 | 531 | 46 | −113 | −143 |
| Rochester, N. Y. | −12 | −60 | −96 | −41 | −38 | −87 | 11 | 235 | 778 | 824 | 334 | 176 | 36 | 95 |
| St. Louis, Mo. | −49 | −29 | −45 | 15 | 72 | −39 | 177 | 1,278 | 2,399 | 1,628 | 618 | 156 | −16 | −36 |
| St. Paul, Minn. | 102 | 24 | −5 | −12 | 79 | (3) | 364 | [4]893 | 1,465 | 1,125 | 376 | 131 | −55 | (3) |
| San Francisco, Calif. | −81 | −94 | −57 | −4 | −68 | 67 | 319 | 462 | 1,091 | 1,341 | 1,081 | 819 | 428 | 182 |
| Syracuse, N. Y. | −33 | −104 | 17 | 10 | 100 | 59 | 115 | 784 | 2,651 | 2,291 | 707 | 515 | 131 | −26 |
| Toledo, Ohio. | 15 | 36 | −70 | 19 | 24 | −17 | −12 | 156 | 865 | 780 | 776 | 299 | 80 | 42 |
| Washington, D. C. | 41 | 82 | −46 | 175 | 34 | 89 | 782 | 2,072 | 1,845 | 901 | 409 | 66 | −41 | −93 |
| Worcester, Mass. | 210 | −26 | −54 | −117 | 1 | −50 | −123 | 79 | 104 | 973 | 1,215 | 679 | 1,435 | 208 |

[1] The weekly rates for the median year in the period (1910–1916) have been approximated by plotting the rate for the median year for each month (thus affording a rough "normal" seasonal curve) for each city, and then by reading from the curve indicated median rate at the midpoint for each week. The excess has been found by subtracting this median rate from the actual rate for each week in 1920. When the difference is "minus" it is so indicated.

[2] For pneumonia only.

[3] No report.

[4] For influenza only.

The number of deaths from influenza and pneumonia (all forms) by weeks during the present epidemic for the cities included in the foregoing tabulation, as furnished by the vital statistics division of the Bureau of the Census, is given in the table following.

TABLE III.—*Deaths from influenza and pneumonia (all forms) in certain large cities, by weeks, in December, 1919, and in January, February, and March, 1920.*

| City. | 1919: Week ended— | | | 1920: Week ended— | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | December— | | | January— | | | | | February— | | | | March— | |
| | 13 | 20 | 27 | 3 | 10 | 17 | 24 | 31 | 7 | 14 | 21 | 28 | 6 | 13 |
| Albany, N. Y. | 5 | 5 | 6 | 6 | 3 | 2 | 3 | 14 | 19 | 29 | 23 | 20 | 10 | 9 |
| Atlanta, Ga. | [1] 8 | [1] 9 | [1] 6 | [1] 6 | [1] 17 | [1] 10 | [1] 10 | 15 | 32 | [1] 68 | [1] 89 | [1] 66 | (2) | [1] 26 |
| Baltimore, Md. | 28 | 32 | 28 | 30 | 20 | 35 | 24 | 59 | 122 | 268 | 231 | 123 | 80 | 65 |
| Birmingham, Ala. | 8 | 11 | 9 | 11 | [1] 11 | [1] 8 | 16 | 14 | 22 | 18 | 59 | 70 | 76 | 45 |
| Boston, Mass. | 21 | [3] 0 | 23 | 24 | 28 | 28 | 45 | 85 | 158 | 255 | 216 | 136 | 80 | 48 |
| Buffalo, N. Y. | 9 | 8 | 15 | 13 | 10 | 7 | 19 | 17 | 67 | 141 | 145 | 98 | 56 | 38 |
| Cambridge, Mass. | 1 | 4 | 2 | 4 | 8 | 7 | 8 | 14 | 22 | 28 | 23 | 13 | 4 | 5 |
| Chicago, Ill. | 80 | 92 | 93 | 98 | 107 | 153 | 472 | 1,109 | 1,005 | 494 | 243 | 136 | 120 | 108 |
| Cincinnati, Ohio. | 11 | 15 | 17 | 18 | 14 | 12 | 17 | 25 | 38 | 62 | 81 | 99 | 73 | 34 |
| Cleveland, Ohio. | 17 | 23 | [1] 14 | 28 | 21 | 25 | 26 | 41 | 158 | 258 | 177 | 125 | 71 | 57 |
| Columbus, Ohio. | 8 | 7 | 3 | 5 | 15 | 9 | 8 | 22 | 59 | 118 | 66 | 48 | 19 | 14 |
| Dayton, Ohio. | 6 | 5 | 1 | 7 | 4 | 7 | 13 | 46 | 47 | 32 | 24 | 7 | 5 | 6 |
| Denver, Colo. | 8 | 10 | 11 | 15 | 21 | 18 | 24 | 49 | 159 | 160 | 67 | 44 | 21 | 10 |
| Detroit, Mich. | (3) | (3) | (3) | (2) | (2) | (3) | (3) | 324 | 740 | 481 | 185 | 101 | 78 | 84 |
| Fall River, Mass. | 3 | 5 | 3 | 3 | 7 | 10 | 5 | 3 | 5 | 16 | 25 | 19 | 18 | 14 |
| Grand Rapids, Mich. | 2 | 4 | 2 | 3 | 1 | 4 | 2 | 6 | 31 | 37 | 32 | 14 | 11 | 5 |
| Indianapolis, Ind. | 11 | 12 | 13 | [1] 3 | 18 | [1] 16 | 21 | 36 | 92 | 124 | 72 | 49 | 41 | 20 |
| Jersey City, N. J. | 18 | [1] 3 | 19 | 12 | 14 | 14 | 24 | 64 | (2) | (2) | 78 | 37 | 28 | 23 |
| Kansas City, Mo. | 14 | (2) | 12 | 12 | 13 | 29 | 96 | 120 | 220 | 167 | 74 | 53 | 29 | 23 |
| Los Angeles, Calif. | 11 | 16 | 6 | 18 | 16 | 18 | 19 | 22 | 42 | 88 | 74 | 57 | 49 | 26 |
| Louisville, Ky. | 7 | 4 | 10 | 9 | 10 | 10 | 9 | 18 | 40 | 52 | 48 | 30 | 20 | 18 |
| Lowell, Mass. | 4 | 2 | 5 | 3 | 5 | 4 | 2 | 7 | 12 | 10 | 36 | 29 | 27 | 16 |
| Memphis, Tenn. | 12 | 8 | 8 | 15 | 12 | 12 | 11 | 10 | 22 | 64 | 61 | 46 | 42 | 24 |
| Milwaukee, Wis. | [1] 6 | 21 | 15 | 15 | 25 | [1] 13 | 45 | 141 | 184 | 121 | 41 | 31 | [1] 16 | [1] 14 |
| Minneapolis, Minn. | 14 | 11 | 10 | 20 | 12 | 10 | 9 | 63 | 168 | 125 | 53 | 13 | 8 | [3] 7 |
| Nashville, Tenn. | 10 | 7 | 4 | 4 | 6 | 11 | 6 | 12 | 8 | 23 | 47 | 62 | 33 | 26 |
| Newark, N. J. | 13 | 9 | 9 | 15 | 17 | 14 | 30 | 55 | 116 | 142 | 93 | 54 | 34 | 24 |
| New Haven, Conn. | 6 | 8 | 6 | 11 | 6 | 8 | 10 | 19 | 20 | 60 | 68 | 31 | 23 | 17 |
| New Orleans, La. | 16 | 11 | 20 | 18 | 27 | 27 | 27 | 32 | 36 | 62 | 89 | [3] 37 | [3] 27 | [3] 15 |
| New York City, N. Y. | 149 | 162 | 175 | 195 | 218 | 261 | 511 | 1,308 | 1,988 | 1,795 | 987 | 513 | 369 | 317 |
| Oakland, Calif. | 2 | 3 | 5 | 7 | 4 | 8 | 20 | 24 | 55 | 54 | 60 | 21 | 17 | (3) |
| Omaha, Nebr. | 5 | 6 | 12 | 5 | 4 | 7 | 13 | 45 | 62 | 63 | 32 | 28 | 19 | (3) |
| Philadelphia, Pa. | 51 | 69 | 43 | 64 | 55 | 75 | 108 | 153 | 289 | 564 | 620 | 373 | 217 | 153 |
| Pittsburgh, Pa. | 30 | 31 | 36 | 55 | 47 | 53 | 55 | 76 | 168 | 417 | 293 | 193 | 105 | 77 |
| Portland, Oreg. | [1] 5 | [1] 9 | [1] 5 | [1] 4 | [1] 13 | [1] 8 | [1] 9 | [1] 15 | 21 | 57 | 52 | 41 | 28 | (3) |
| Providence, R. I. | 6 | 10 | 11 | 6 | 12 | 13 | 8 | 14 | 39 | 88 | 92 | 57 | 37 | 15 |
| Richmond, Va. | 5 | 1 | 2 | 6 | 2 | 9 | 6 | 21 | 35 | 38 | 28 | 13 | 8 | 7 |
| Rochester, N. Y. | 7 | 5 | 4 | 8 | 13 | 7 | 12 | 23 | 50 | 52 | 27 | 19 | 12 | 15 |
| St. Louis, Mo. | 27 | 33 | 35 | 47 | 57 | 41 | 73 | 236 | 401 | 282 | 129 | 60 | 35 | 33 |
| St. Paul, Minn. | 1 | 8 | 7 | 7 | 4 | (2) | 26 | [3] 52 | 80 | 63 | 26 | 14 | 5 | (3) |
| San Francisco, Calif. | 11 | 11 | 15 | 20 | 14 | 26 | 48 | 59 | 115 | 137 | 113 | 89 | 54 | 32 |
| Seattle, Wash. | 9 | 7 | 7 | 9 | [1] 2 | 4 | 7 | 12 | 32 | 98 | 78 | 59 | 34 | 15 |
| Spokane, Wash. | 2 | 5 | 2 | 0 | 4 | 3 | 3 | 12 | 32 | 64 | 33 | 17 | 10 | [3] 3 |
| Syracuse, N. Y. | 4 | 2 | 6 | 6 | 9 | 8 | 10 | 31 | 89 | 78 | 29 | 23 | 11 | 6 |
| Toledo, Ohio. | 7 | 8 | 3 | 8 | 9 | 8 | 9 | 18 | 54 | 50 | 50 | 26 | 15 | 13 |
| Washington, D. C. | 19 | 23 | 14 | 32 | 22 | 27 | 81 | 181 | 164 | 92 | 55 | 30 | 23 | 20 |
| Worcester, Mass. | 13 | 6 | 6 | 5 | 10 | 9 | 7 | 14 | 15 | 44 | 52 | 34 | 59 | 18 |

[1] Deaths from pneumonia (all forms) only. [2] No reports. [3] Deaths from influenza only.

The number of cases of influenza in the different States as reported to the Public Health Service by State health departments is shown in Table IV. It will be noted that a decrease in the number of cases reported is shown for every State for which data are given. The fact that a considerable number of cases continue to be reported is probably due to delayed reports and to the relatively slow spread of the epidemic to isolated sections. In fact, it may be expected that even after the mortality rate from influenza and pneumonia in large urban centers has returned to normal, influenza cases will continue to be reported from many sections.

TABLE IV.—*Influenza case reports. Number of cases of influenza occurring in various States as reported to the Public Health Service by State health departments.*

[States omitted are those from which no reports have been received. Blank spaces indicate that no report was received for the week. These reports are preliminary and subject to change.]

| State. | Cases reported week ended— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | January. | | | February. | | | | March. | |
| | 17 | 24 | 31 | 7 | 14 | 21 | 28 | 6 | 13 |
| Alabama | ..... | 8 | 203 | 1,296 | 3,236 | 2,366 | 3,603 | 3,885 | 1,047 |
| Arkansas | 53 | 179 | 595 | 5,666 | 6,599 | 2,793 | 1,690 | 2,576 | 2,055 |
| California | 322 | 1,604 | 7,133 | 13,660 | 11,887 | 7,420 | 5,527 | 918 | 496 |
| Connecticut | 14 | 1,123 | 4,664 | 5,666 | 4,868 | 2,771 | 1,183 | 571 | 229 |
| Delaware | ..... | 5 | 21 | 86 | 78 | 43 | 36 | 50 | 33 |
| District of Columbia | 126 | 1,216 | 1,616 | 557 | 298 | 104 | 36 | 21 | 6 |
| Florida | 10 | 484 | 1,547 | 1,581 | 1,735 | 1,420 | 1,026 | 580 | 413 |
| Georgia | 27 | 95 | 617 | 3,256 | 5,411 | 7,809 | 8,210 | 3,677 | 3,087 |
| Idaho | 270 | 922 | 2,783 | 2,394 | ..... | ..... | ..... | ..... | ..... |
| Illinois | 3,251 | 14,805 | 29,156 | 30,330 | 23,037 | 7,237 | 3,062 | 1,344 | 453 |
| Indiana | 44 | 1,714 | ..... | 7,811 | 7,503 | 3,904 | 2,038 | 1,289 | 1,184 |
| Iowa | 30 | 644 | 3,960 | 5,070 | 1,981 | 869 | 170 | 86 | 96 |
| Kansas | 45 | 1,130 | 8,582 | 16,960 | 17,699 | 10,026 | 3,590 | 3,332 | 1,551 |
| Kentucky | 75 | 170 | 878 | 2,536 | 6,067 | 4,295 | 8,584 | 4,099 | ..... |
| Louisiana | 27 | 123 | 763 | 1,901 | 3,690 | 3,153 | 3,363 | 2,541 | 1,982 |
| Maine | 4 | ..... | 387 | 936 | 3,942 | 3,702 | 2,134 | 1,130 | 1,105 |
| Maryland [1] | ..... | ..... | ..... | 4,935 | 8,942 | 4,758 | 3,184 | 2,052 | 1,226 |
| Massachusetts | 54 | 490 | 3,730 | 9,731 | 12,389 | [2] 4,375 | [2] 2,395 | 1,144 | 490 |
| Michigan | ..... | ..... | ..... | 14,201 | 13,470 | 6,672 | 3,861 | ..... | ..... |
| Minnesota | ..... | ..... | 5,775 | 11,397 | 7,555 | 4,213 | 1,447 | 692 | 406 |
| Mississippi | ..... | ..... | ..... | [3] 2,761 | 4,014 | 3,332 | 2,475 | [2] 1,798 | 2,230 |
| Missouri | ..... | ..... | 4,043 | 5,359 | 1,696 | 456 | ..... | ..... | ..... |
| Montana | 1 | 67 | 1,022 | 1,847 | 1,650 | 1,400 | 348 | 514 | 206 |
| Nebraska | 1 | 154 | 1,815 | 3,998 | 6,048 | 3,272 | 2,492 | 2,007 | 834 |
| New Hampshire | ..... | ..... | 382 | 460 | 701 | 383 | 488 | ..... | ..... |
| New Jersey | 98 | 753 | 7,365 | 9,603 | 5,807 | 2,798 | 1,043 | 764 | 365 |
| New Mexico | 4 | 61 | 260 | 1,576 | 1,166 | 632 | 204 | 186 | 97 |
| New York (exclusive of New York City) | 61 | 555 | 4,755 | 11,616 | 13,259 | 11,304 | 5,330 | 4,030 | 2,434 |
| New York City | 384 | 5,690 | 30,456 | 21,388 | 8,091 | 3,030 | 1,069 | 489 | 381 |
| North Carolina | ..... | ..... | 3,356 | 12,892 | 25,571 | 18,439 | 8,398 | 3,800 | 1,605 |
| North Dakota | ..... | ..... | ..... | 946 | 497 | [3] 178 | ..... | ..... | ..... |
| Ohio | ..... | ..... | ..... | 10,479 | ..... | ..... | ..... | ..... | ..... |
| Oregon | ..... | ..... | ..... | 1,042 | 1,318 | 1,971 | [2] 495 | [2] 309 | ..... |
| Pennsylvania | ..... | ..... | ..... | 16,090 | 13,324 | 9,365 | [2] 1,723 | ..... | ..... |
| South Carolina | ..... | ..... | 1,661 | [3] 3,179 | 3,916 | 2,846 | 1,716 | 971 | 678 |
| South Dakota | 3 | 118 | ..... | 5,042 | 4,976 | 3,047 | 1,649 | 495 | 120 |
| Tennessee | ..... | ..... | ..... | 2,331 | [2] 1,432 | ..... | ..... | ..... | ..... |
| Texas | ..... | ..... | ..... | 11,265 | 6,788 | 1,035 | 588 | 134 | 55 |
| Utah | ..... | ..... | ..... | 1,489 | 228 | 96 | ..... | ..... | ..... |
| Vermont | ..... | 25 | 89 | 272 | 796 | 1,314 | 1,071 | 481 | 470 |
| Virginia | ..... | ..... | 3,097 | 6,318 | 2,934 | 1,512 | [3] 1,073 | ..... | ..... |
| Washington | ..... | 12 | 902 | 6,451 | 6,426 | 4,596 | 1,559 | 1,260 | 271 |
| West Virginia | ..... | ..... | 1,667 | 4,732 | 6,308 | [3] 1,848 | 780 | ..... | ..... |
| Wisconsin | 67 | 1,944 | 6,739 | 14,328 | 10,310 | 6,274 | 3,131 | 994 | 554 |
| Wyoming | ..... | ..... | 1,372 | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | 4,971 | 34,091 | 141,391 | 295,334 | 267,643 | 157,068 | 90,771 | 48,219 | 26,139 |
| Number of States reporting | 22 | 25 | 32 | 43 | 41 | 40 | 37 | 32 | 30 |

[1] Week ended Friday. [2] Five days only. [3] Six days only.

# A STUDY[1] OF THE RELATION OF DIET TO PELLAGRA INCIDENCE IN SEVEN TEXTILE-MILL COMMUNITIES OF SOUTH CAROLINA IN 1916.

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## I. INTRODUCTION.

From the earliest history of pellagra a more or less important rôle has been assigned to diet in its relation to the disease. This has been forcibly expressed by Lavinder (1915): "Ever since Casal's day students are convinced that pellagra is associated with a poor diet, and volumes of research and arguments have been offered on the subject. The Italians have done little more, Roussell somewhat sarcastically observed many years ago, than to ring changes on Casal's views. Yet they and all others must continue to study the relations between poor food and pellagra. For, among all the complexities and discordant things that surround this disease, this is the one outstanding *fact*[2] that most urgently needs explanation."

It was fundamentally with the view of finding the explanation of this *fact*, current theories being unacceptable, that a series of investigations of pellagra was begun in the spring of 1914 under the direction of one of the present writers (J. G.).

[1] From Field Investigations of Pellagra.

[2] Italics in original.

In a paper published June 26, 1914, Goldberger called attention to the significance of certain epidemiological observations which showed that at some institutions at which pellagra was either epidemic or had long been endemic among the inmates the nurses and attendants, drawn from the class economically identical with that most affected in the population at large, appeared uniformly to be immune, although living in the same environment and under the same conditions as did the inmates, and many of them also in frequent and intimate contact with cases of the disease. Neither contact nor insect transmission seemed capable of explaining this remarkable exemption of one of the two classes of residents. The suggestion was made that the explanation was to be found in a difference in the diet of the two groups, for it was observed that although the nurses and attendants appeared to receive exactly the same food as did the inmates, there was, nevertheless, a difference in the diet of the two groups, in that the nurses and attendants, being in a favorable position to choose from what was provided, selected the best for themselves. They were also free to supplement the institution diet in any manner they pleased. Furthermore, from a study of the dietaries of certain institutions in which pellagra prevailed, the impression was gained that cereals and vegetables formed a much greater proportion in these than they did in the dietaries of well-to-do people, that is, people who, as a class, are practically exempt from pellagra. Accordingly, the tentative suggestion was made that the prevention of the disease be attempted by improving the dietary of those among whom it is most prevalent by reducing the cereal and vegetable component and increasing the fresh animal foods (fresh meats, eggs, and milk) of the ration.

The indications on which this suggestion was based were strikingly confirmed by other findings. Preliminary to an experimental test of the preventability of the disease by diet (Goldberger, Waring, and Willets, 1915; Goldberger, 1916) at an orphanage at Jackson, Miss., a study of the epidemiology of the disease was made at this institution and the singular fact was quickly discovered that the disease was practically exclusively confined to those between 6 and 12 years of age. After a detailed inquiry the only significant difference that suggested itself as an explanation of the exemption of a considerable group of inmates under 6 years and of another over 12 years of age was a difference in the diet. In the diet of the affected group as contrasted with that of the exempt groups, there was noted a disproportionately small amount of lean meat or other animal protein food. Subsequent inquiry at other institutions developed analogous conditions, and, as a whole, in the light of the then recent advances in our knowledge of beriberi, these findings strongly suggested the idea that the disease was dependent for its development

on a diet that was for some reason faulty, and that this fault was in some way either prevented or corrected by including in the diet larger proportions of the fresh animal protein foods.

The indications for a possible method of prevention thus confirmed and more clearly defined, were put to a practical test at two orphanages and at an asylum for the insane. At orphanages "M. J." and "B. J.," for several years endemic foci of pellagra, the diet was modified in September, 1914, leaving hygienic and sanitary conditions unchanged. Following the change in diet, no recognizable evidence of a recurrence of the disease was observed at orphanage "M. J." in any of the pellagrins of 1914, 67 of whom remained under observation at least until the anniversary date of their attack. Nor were any new cases observed among the nonpellagrin residents of 1914, 99 of whom remained under observation for not less than a year. At orphanage "B. J.," subsequent to the change in diet, but a single case of a recurrence was observed among the pellagrins of 1914, 105 of whom remained under observation at least until the anniversary date of their attack. At the same time, not a single new case was observed among the nonpellagrin residents, 69 of whom remained under observation for not less than one year.

At the Georgia State Asylum, an endemic focus of the disease, the diet of two wards of pellagrins was modified—one in October and the other in December, 1914—leaving unchanged hygienic and sanitary conditions and the institution routine. Following this change in diet and up to October 1, 1915, the end of the period for which the report was made,[1] no recognizable evidence of a recurrence in any of the pellagrins in these wards was observed, although 72 (36 colored and 36 white females) remained continuously under observation throughout this period, or at least until the completion of the anniversary date of their 1914 attacks. Whereas during the corresponding period not less than 15 (47 per cent) of 32 control female pellagrins presented definite recurrences. This experiment clearly showed that pellagra may be prevented by an appropriate diet without appreciable alteration in the environment, hygienic or sanitary.

While the experiments designed to test the preventability of the disease by suitable additions to the diet were under way, another experiment was carried out to test the possibility of producing pellagra by means of a presumably faulty diet in which the foods which, for the reasons stated, might be assumed to have preventive or corrective power, were at a minimum. This experiment was carried out on convict volunteers at the Mississippi State Penitentiary

[1] These orphanage and asylum studies were continued to the end of 1916 and 1918, respectively, with results that coincided with those of the first year. A further report on this study will appear in due time. (J. G.)

Farm, near Jackson, Miss., between February 4 and November 1, 1915 (Goldberger and Wheeler, 1915; Goldberger, 1916; Goldberger and Wheeler, 1920). Of 11 men subsisting on a diet consisting of maize, wheat, rice, and pork fat with sweet potatoes, sugar, and some green vegetables, not less than 6 developed clearly marked evidence of pellagra at the end of 5½ to 6 months; while of a large number of controls living under poorer hygienic conditions and working harder, but subsisting on a different diet, none showed any evidence of the disease.

Thus, the results attained by the end of 1915 clearly showed the controlling influence of diet in both the prevention and the causation of the disease.[1] Accordingly, with the view of developing as broad a basis as possible for the eventual formulation of practical measures of control, it was planned during the winter of 1915–16 to supplement these (in part epidemiologic, but chiefly experimental) investigations by a study, in different types of industrial and rural communities, of the relation of factors of a dietary, sanitary, and economic character to the incidence of the disease.

For various reasons it was decided to begin with a study of conditions in cotton-mill villages, these villages representing one of the types of communities in which pellagra was believed to be more than ordinarily prevalent. The study was begun in the spring of 1916 and is still in progress. At this time we desire to report the results of the first year's work with respect to the relation of household diet to the incidence of pellagra. Some of these results have already been presented in a previous paper (Goldberger, Wheeler, and Sydenstricker, 1918).

## II. REVIEW OF THE STUDIES OF OTHER WORKERS.

Before going on with an account of our work, it seems desirable to review the studies of other workers in this field. An examination of the literature bearing on the relation of diet to pellagra would involve practically all of the very voluminous literature of the disease and would be beyond the scope of the present paper. We propose to confine ourselves, therefore, to a consideration of those recent studies which may be regarded as in some sense comparable to our own, particularly as it is planned to consider the etiology of the disease in a separate paper subsequent to the publication of the results of the series of studies of which the present is a part.

To Grimm (1913) would seem to belong the credit of the first attempt at a modern, comprehensive, unbiased, epidemiological study of pellagra. This study was carried out during the summers of 1911 and 1912 in various localities in Kentucky, South Carolina, and

[1] During 1916, Goldberger attempted without success to transmit the disease by a series of inoculations in human volunteers, with blood, naso-pharyngeal secretions, feces, urine, and desquamating epithelium.

Georgia. The method followed was to visit pellagrous communities and interview health officers and physicians, and with their assistance data were collected by interviewing pellagrins, securing reports of cases and deaths and reports of facts and conditions pertaining to the disease.

Grimm reports that upward of 200 physicians were interviewed and information relating to a total of 1,426 cases was obtained. He himself visited 290 pellagrous houses and personally interviewed 323 pellagrins. He found that the collection of accurate and detailed data on the subject of food used by pellagrins previous to the onset of the disease presented insurmountable difficulties. The systematic collection of information concerning the items of food most commonly used, kinds, sources, quantity, and quality had to be abandoned, as it was found that this information could be obtained in too few instances. "In many cases it was impossible to get even a meager account of what had been eaten, as the memory and powers of observation of these people seemed extremely defective when the character of their diet was inquired into, * * *." The character of the data secured did not, in Dr. Grimm's opinion, warrant any conclusions. So far as his observations went, however, no constant difference was found to have existed between the diets of the pellagrous and the nonpellagrous members of the families. In the closing remarks of the report of this pioneer investigation, Grimm states that from his observations "the relationship between food and pellagra seems to be a real one," but gives no indication of the evidence on which this opinion is based.

In June, 1912, a commission (Thompson-McFadden), consisting of J. F. Siler, P. E. Garrison, and W. J. MacNeal, began an elaborately planned study in South Carolina, which has resulted in adding materially to our knowledge of the disease. We shall, in the present connection, concern ourselves only with the part of their investigations dealing with diet.

The study of the first year (Siler and Garrison, July, 1913), extending from June 1 to October 15, 1912, carried out in Spartanburg County, S. C., was of a preliminary character. Their data were based on information obtained from statements of patients, physicians, storekeepers, millers, and others. "In order to determine the relative frequency with which the more important foodstuffs were used, patients and their families were closely questioned as to how often certain articles of food would appear on the family table, and with regard to the patient's particular fondness for any particular dish." This information was of a general nature and dealt with the habitual dietary of pellagrins and their families. The tabulated data submitted by them for the year studied represent, it would seem, the habitual dietary of the pellagrins occurring in three groups of the

population of the county studied, namely, mill village, urban, and rural. Among the foods considered, it is interesting to note the finding that fresh beef was not a staple article of diet of any of these groups during the summer months. On the other hand, they report that fresh fowl was used quite extensively during the summer months in all three groups. The actual percentages of those using fowl, either daily or habitually, are reported to have been as follows: Urban cases, 66 per cent; rural cases, 65 per cent, and mill village cases, 41 per cent. With respect to milk, it is reported that 72 per cent of the mill village cases, 67 per cent of the rural cases, and 54 per cent of the urban cases used this food either daily or habitually. The interesting observation is also recorded that, in the locality studied, in contrast to northern Italy, wheat flour is the principal breadstuff.

Summarizing the results of this study, the commission states that "observations upon the habitual use of the more common foodstuffs failed to discover any points of difference between pellagrins and non-pellagrins in the county." It does not appear, however, that the data presented relate to any but pellagrins, and so it is not clear on what this statement is based. They state further (S., G., and MacN., 1914a) that careful consideration was given to the possible relation of an insufficient diet to the occurrence of pellagra, and that they are inclined to ascribe considerable importance to it, not as the sole or essential cause of pellagra, but as a predisposing factor. They state that the foods rich in animal protein, namely, meat, milk, and eggs, although apparently used in abundance by a few individual pellagrins in their series were, nevertheless, conspicuous by their deficiency in many of the cases.

In evaluating the significance of this study one will have to take into consideration (1) the very general character of the data which apparently related only to the diet of pellagrins, and (2) the absence of any evidence of appreciation of the importance of the seasonal factor in relating diet to the incidence of the disease.

This study was continued by the commission during 1913, when they undertook "a careful investigation of the dietary habits, not only of pellagrins and their families, but also of all the remaining population of the same class living under the same conditions, in certain selected industrial communities." Data were secured for each family by personal interview with a member of the family. The investigators recorded the diet served in the family as a whole, and each member of the household was considered as belonging to the dietary group of his family. In obtaining the data, a record was made of the frequency of use in the family of various foods, recognizing 7 classes of frequency: "First, daily use, which is self-explanatory; second, habitual use, meaning as often as twice a week on the average; third, part time daily, which means daily use during certain

seasons of the year; fourth, part time, habitually, or habitual use during certain seasons; fifth, rarely, which means used less frequently than twice a week; sixth, part time rarely, and, seventh, never."

In analyzing these data the population as represented first by the family as the unit and then by the individual as the unit was divided into several groups distinguished from each other by the frequency with which the particular food was used in the family, and then the relative number of cases of pellagra in the different groups was compared. As the data related to family and not to the individual use of various foods, the analyses, using the individual as a unit, do not seem to us to have been permissible as involving danger of a confusion of ideas, of which, indeed, there is repeated evidence throughout the report of this interesting study. Thus, in discussing the relationship of the frequency of use of fresh meat to pellagra they state that "in the total population of the six villages the pellagra morbidity is actually highest in the group of 82 persons who used fresh meat daily," when all that could properly have been meant was that the morbidity was highest in the group *of households* (composed of 82 persons) who used fresh meat daily.

They analyzed their data in relation to corn meal, fresh meat, canned goods, milk, and eggs, and state that they found that the theory that pellagra is caused by the excessive use of corn meal, or that it is caused by a deficiency of fresh meat in the diet, was not supported. On the contrary, it appeared to them quite certain that in the population studied, *those avoiding fresh meat contracted this disease the least.*[1] Similarly, the frequent, even daily use of fresh eggs afforded no relative protection from pellagra. With respect to canned goods they state that their study failed to discover any evidence that the use of canned goods causes pellagra. From the analyses presented on the use of milk it seemed to them "evident that in the whole population those persons using milk daily contracted pellagra the least." "In every one of the six villages [studied], the group using milk daily showed a lower incidence than the average for that village, and the group never using milk showed a higher incidence than the average. The correlation is quite inconsistent in the groups using milk habitually and rarely. The tendency toward correlation between the occurrence of new cases of pellagra and the deficiency of milk in the diet is nevertheless distinctly evident, on the whole, and suggests that the use of milk (including buttermilk) as a food has some value in the prevention of pellagra." Summarizing this study, the commission states (S., G., and MacN., 1914b) that a "house-to-house canvass of the homes of over 5,000 people living in six endemic foci of pellagra

[1] Italics are ours. It is interesting to note in this connection that they state that the lowest morbidity from pellagra was observed by them in the two of the six villages in which the local market sold fresh meat throughout the year.

failed to disclose any definite relation of the disease to any element of the dietary."

In evaluating the significance of this, as of their preliminary investigation, account must be taken of the fact (1) that the data are again of a very general character; (2) that there is no evidence of appreciation on the part of these workers of the importance of the seasonal factor in relating diet to the incidence of the disease; (3) that the data relate to family, not to individual use of foods; (4) that the term "pellagrin" is not defined, leaving one in doubt whether, in some of their analyses, this includes only active cases or whether, as seems not improbable, it also includes some quiescent cases; and (5) that an error, the magnitude of which it is impossible to estimate from the data published, probably entered as the result of the relative incompleteness, for the purpose of such study, of the pellagra incidence data that is certain to arise unless cases are systematically and continuously sought for by personal canvass (see also criticism by Vedder, 1916, p. 152). Finally, some account should perhaps also be taken of their methods of statistical interpretation, best illustrated in connection with the analysis relating to the use of milk. Here, in considering the distribution of families according to the frequency of use of this food, they point out (S., G., and MacN., 1914c, p. 357) that the groups using milk "habitually, rarely, and never" were well represented, and that the percentage table (Table 82) suggests "that pellagra was, on the whole, somewhat less common in families using milk daily."

The table they cite (Table 82) actually shows that the rate of incidence for those families using milk rarely (13.6 per cent) was practically identical with those using it daily (13.5 per cent), and was therefore much lower than those using it habitually (22.5 per cent), the rate for the latter group being but little below that for the group using it never. This would seem to indicate that if the table under discussion suggests anything, it suggests that pellagra was, on the whole, somewhat less common in families using milk daily and rarely than in those using it habitually, etc., a paradox which would seem to point quite clearly to the need of extreme reserve in attaching significance to such indications if, indeed, any significance whatever can be attached to them.

A consideration of the relation of pellagra to diet was included in a study by Jobling and Petersen (1916 and 1917) of the epidemiology of the disease in Nashville, Tenn., during 1915 and 1916. During the first year's work, which was commenced August 1, 1915, "inquiries were made of the patients and of their friends as to whether there had been any definite change in the general character of food consumed during the two years previous to the onset of the disease, and whether there had been times during this period when they had not

had sufficient food". Of 320 white people, 14.4 per cent, and of 101 colored, 11.8 per cent are reported to have stated that there had been times during the two years preceding their first attack when they had not had sufficient food. These statements, it is pointed out, had reference to a deficiency of all foods, not of any particular constituent. In only five instances, they report, were they able to obtain information that there had been a definite change in diet for the worse during the two years previous to the onset of the disease. In the remaining instance the patients and their friends are reported to have asserted that the food consumed had been the same or better in both quality and quantity than they had been accustomed to previously.

With reference to prótein, Jobling and Petersen state that of the 421 patients considered, 66.8 per cent gave histories which indicated that they had been getting considerably more than 40 grams a day. They refer to the possibility that the deficiency in protein may be in quality, not in quantity. This, they state, was possible in certain cases; but in the majority of the patients they considered the diet sufficiently varied to make it improbable.

In discussing the results of their study they state that "the inhabitants of the South consume excessive amounts of carbohydrates, and fats," but no data on which this statement is founded are presented. In considering the theory of a vitamine deficiency advanced by Funk, and his suggestion that the disease might be prevented by the addition of vitamine-containing substances, such as potatoes, milk, butter, fruit, etc., they state that people in their section eat a great deal of potatoes, fruits, and other green foods, both cooked and raw, during the spring and summer. "It seems strange," they remark, "if this theory is correct, that pellagra should be rare in winter when green foods are scarce, and so frequent in the spring and summer when green foods and fruits are plentiful and cheap." It is evident that these workers have overlooked the significance of the strikingly similar seasonal behavior of endemic scurvy in relation to the availability of green foods and fruits—known preventives of the disease.

In weighing the significance of this study it will be noted (1) that the dietary data are of a most general character, and (2) that, seemingly, it is the judgment of the pellagrin, or that of his family, with respect to the pellagrin's diet, that constitutes the basic data, rather than quantitative statements or actual records of food supplies or of food consumption for a specific period or season of the year.

The second year's study was an amplification of the first. Apparently the method of inquiry of the patient or of his family with respect to the pellagrin's diet was continued. In the second year's study it is stated that the pellagrins fell into two groups: One with active symptoms, acute skin changes, etc., "and one with chronic symptoms, in which the characteristic atrophy of the skin of the

hands or feet, with occasional diarrhea, or in which evidence of degenerative changes in the central nervous system are apparent, cases in which the disease process is more or less quiescent." In a certain number of cases, constituting in effect a third group, this information, it is stated, was not clearly obtained. Of the white cases, 42 per cent of the males and 33 per cent of the females are reported to have had active lesions, and 47 per cent of the males and 60 per cent of the females were classed as "more or less quiescent" cases. Their examiners, "from questions and observations, reported that a deficiency in quantity probably existed in 15 per cent of the whites and in 28 per cent of the colored cases." Of 576 white pellagrins "90 per cent positively denied any deterioration in either the quantity or quality of the diet in the years immediately preceding the first attack (which seemingly may have been several years before the date of the survey), and only 18 per cent of the colored cases had changed their diet in a manner that would indicate a lowering of its value."

Furthermore, "in order to obtain an accurate idea of the balancing of the diet" statements were obtained "as to the variety of the foods consumed, their quantity, and an average daily menu." "In this way" they are able, they state, "to approximate in a fairly satisfactory way the food value and the quality." How the quantity of the food consumed was actually determined is not described, but would seem to have been by the simple statement of the patient or of a member of the family. What period this statement of food consumption covered or the average daily menu represented, is likewise not entirely clear; presumably it was either (1) for "the years immediately preceding the first attack" (which, in some instances, must have been several years anterior to the date of the survey), or (2) for the current period at the time of the survey. In either event the assumption of accuracy in such data would imply, in view of Grimm's experience, unusual powers of observation and surprisingly good memories in these people; furthermore, if these were statements of current consumption, approximately 50 per cent of the menus were those of "more or less quiescent" cases—cases, that is, that from the point of view of diet may be considered as possibly subsisting on a diet favoring convalescence or recovery from the disease (see also p. 661).

A classification of pellagrins on the basis of certain diets designated as high, medium, and low protein, and one on the basis of "partaking regularly" of certain protein foods, namely, eggs, meat, milk, and legumes, are given. No definition of the phrase, "partaking regularly" is presented. From the chart in which the latter analyses are presented it would seem that between 40 and 50 per cent of the white female pellagrins and between about 25 and 45 per cent of the white male pellagrins claimed to have partaken regularly of milk. Of meat, apparently some 40 to 50 per cent of white female pellagrins

and some 40 to 60 per cent of the white male pellagrins claimed to have partaken regularly; while of the colored pellagrins some 35 to 65 per cent of the females and 50 to 70 per cent of the males claimed to have partaken regularly of this food.

In estimating the significance of the reported results of this study, note will be taken of the facts (1) that the data are of a very general character, apparently uncontrolled statements of patients or friends covering an undefined period of the "years" immediately preceding the first attack, which itself may have occurred several years before the date of the survey, and (2) that the statements of the quantity of the foods consumed appear to have been made from memory by the patient or member of the family represented, and it would seem, represented either an undefined period preceding the first attack (in some instances, a year or more anterior to the date of the survey) or an undefined current period at the time of the survey; in the latter event approximately 50 per cent of the menus would represent the diet of more or less quiescent (conceivably convalescent or recovered) cases.

In closing our review of these interesting studies it may be worth noting that in all of them the primary purpose seems to have been the discovery of the cause of the disease; in contrast, our own investigations have, from the outset in the spring of 1914, had as their immediate objective the determination of some method of prevention and control. Such light as we have been able to throw on the question of etiology has been, in the main, incidental. This mode of attack appeared to us preferable because of a number of considerations, chief among which were (1) the lack of conclusiveness of all previous studies and (2) the promise of practically very valuable results by an indirect mode of attack, suggested by the many striking epidemiologic analogies to endemic scurvy and beriberi for which, it will be recalled, methods of prevention and control were developed long before their etiology was determined.

### III. PLAN AND METHODS OF PRESENT STUDY.

In planning the study, with one phase of which the present communication deals, it was our purpose to make as accurate observations as possible relating to the diet, the economic conditions, and the sanitary environment of a population in which pellagra was endemic, and to correlate the results with the incidence of the disease in this population. In such study, account must be taken of many factors which might seriously influence the character of the results. The importance of such factors as racial customs and habits in affecting diet, and season and locality in affecting food availability, is readily appreciated.

More elusive, yet of equal fundamental importance, is the character of the etiological conception of the disease, the relations of which it is

proposed to study. Thus, vital differences of method are involved in the study of certain important correlations according as to whether the disease is conceived of as of microbial (infectious) or of dietary origin, and as to whether it is conceived of as a disease, the periodic exacerbations or recurrences of which are or are not due to periodically repeated externally acting causes.

Accordingly, as will appear, in planning our study and in selecting methods of analyzing our data, we sought, as far as possible, to eliminate or minimize the effect of disturbing or confusing factors. In spite of this, however, the indications afforded by our data must be interpreted with caution.

*Locality.*—Seven cotton-mill villages situated in the northwestern part of South Carolina were selected for study. Four (*At.*, *In.*, *Sn.*, and *Wy.*) are in Spartanburg County, two (*Sa.* and *Ny.*) in Oconee County, and one (*Rc.*) in Chester County. In selecting these localities we were influenced, in some measure, by the fact that they had previously been studied more or less intensively by the Thompson-McFadden Commission, with whose results we thought our own would therefore be more directly comparable than if our work were done elsewhere. A further consideration was that all these places were readily reached from the city of Spartanburg where the United States Public Health Service had already established a hospital and laboratory for the clinical and biochemical study of pellagra.

*Population.*—The selected villages, quite typical of such communities, were of about average size; none had over 800 or less than 500 inhabitants. Each constituted a distinct, more or less isolated community, surrounding or immediately adjacent to cotton-cloth manufacturing plants, and each was composed practically exclusively of the mill employees and their families. With the exception of a few negro families which were not considered, all were white, and, with hardly a single exception, of Anglo-Saxon stock, born in this country of American-born parents.

The families of the mill officials, store managers, and negro employees were not considered. The exclusion of these families had the drawback of correspondingly reducing the total number of families available for study. The number thus excluded, however, was relatively small, and thus unimportant. It had the compensating advantage of leaving for study a group exceptionally homogeneous with respect to racial stock, dietary custom, and also, we thought, to economic status. Subsequent experience, however, has shown that this last premise was not entirely justified.[1]

[1] As compared with certain other classes of the general population, all of the mill-workers' families in the seven villages studied were on a distinctly low economic level; in this sense, therefore, they may be considered homogeneous with respect to economic status. Among them, however, and thus within their own range of income, quite marked differences in economic status were found to exist. These differences, considered in relation to differences in food supplies and in pellagra incidence, will be presented in a later paper.

*Pellagra incidence.*—For the study of the relation of household diet to pellagra, it is of fundamental importance to determine as completely as possible the household incidence of the disease. In order to supply this vital need we adopted the expedient of a house-to-house canvass. The search for cases was begun about the middle of April, 1916, and carried on by one of us (G. A. W.) every two weeks to the end of that year. So far as we are aware, this is the first time that this expedient has been applied systematically and continuously on so large a scale and over so long a period to the study of this disease.

At each canvass every family was visited and an effort was made to see and question all individuals in or about the house. At first considerable reluctance was displayed by some of the people in speaking of any condition which they believed or suspected to be pellagrous; but, as we became better known to the village people, this reserve in large measure disappeared, so that from time to time cases were brought to our attention which might otherwise have escaped us.

In order to see as many as possible of those at work in the mill (i. e., not at home at the time of the canvass), the time of the canvass was so varied as to utilize more or less of the lunch hour and Saturday half-holidays in different villages and in different sections of the same village in rotation. At each visit inquiries were made as to the health of absent members of the household and as to the existence of any suspicious illness or condition in the village, particularly in members of neighboring households. Reports regarded as suggestive were investigated; at times trips to the mill were made for this purpose.

Information with respect to the occurrence of cases of pellagra was also sought from local physicians. Although we believe we enjoyed the full cooperation of the local medical profession, the number of cases coming to our attention in this way formed a very small proportion of the total recorded by us. This is interesting as indicating that but a small percentage of cases occurring in any season come to the attention of a physician.

*Criteria of pellagra.*—Only patients with a clearly defined, bilaterally-symmetrical dermatitis were recorded as having pellagra. In the course of the canvass, cases with manifestations more or less suggestive of the disease were encountered from time to time but, in the absence of a clearly marked bilaterally-symmetrical eruption, were recorded at most as "suspects" and are excluded from present consideration. We think it important to invite attention to what, for the purpose of this study, constituted pellagra. The criterion adopted is in harmony with conventional clinical requirements; but we believe that it operated to exclude some cases without or with only poorly defined eruption that might properly have been included.

Practically, this was of importance only with respect to those instances that escaped notation as "suspects." Households of which such individuals were members, unless they also included "suspects" or cases with eruption, would, as a consequence, appear in our records as nonpellagrous and thus in some degree constitute a disturbing element in the study of the diet of this class of households.

The classification adopted is not without importance in another connection. We (J. G. and G. A. W.) have been increasingly impressed by the suspicion that, as conventionally defined, pellagra probably includes at least two commonly related (what for want of a better term may be designated as) syndromes; namely, (1) the syndrome that is comprehended by the phrase "pellagra sine pellagra," and (2) the dermatitis, or pellagra without or with only very slight other manifestations. According to this idea both syndromes are dependent primarily on a faulty diet; but the factor, complex of factors, or balance (whatever it may prove to be) constituting the fault responsible for one is essentially distinct though probably very closely related to that responsible for the other.[1] The chief basis for this suspicion is the fact, many times observed by clinicians, that, on the one hand, the syndrome without eruption frequently occurs and recurs and, each season, may persist for months without recognizable eruption, and, on the other, that the eruption frequently occurs without or with only very slight other manifestations. The major portion of all of our cases belongs in this latter class.

In relating pellagra incidence to dietary conditions all active cases were considered without regard as to whether they were first or recurrent attacks. So-called inactive or quiescent cases—that is, individuals who had had the disease in a previous year, but during 1916 presented no eruption or evidence sufficient to be classed as "suspects"—were placed in the group of nonpellagrins. For if it is conceived that diet plays a rôle in pellagra in some sense analogous to that played by it in scurvy or in beriberi, then it must be recognized that the assumption of "once a pellagrin always a pellagrin," implied by considering "inactive" cases as pellagra, may be as erroneous as would be a similar conception in relation to beriberi or scurvy. In other words, the freedom from recurrence in pellagra must be recognized as possibly due to the same cause as that responsible for the like phenomenon in beriberi or in scurvy, namely, a change in diet. It follows, therefore, that to attempt to relate the diet of the household of such an individual to pellagra, as would, in effect, be done if quiescent were classed with active cases, carries with it possibilities of error and confusion such as would arise if we

[1] Of interest in this connection is the suggestion advanced by Goldberger and Wheeler (1920) that the site of the initial skin lesion in pellagra is bound up with a specific quality of the diet and that the latter differs in some essential detail with differences in localization of the initial dermatitis.

were to attempt to associate with beriberi or scurvy the diet of one who once had had one or other of these diseases but who now presented but residuals, stigmata, or sequelæ of such attack.

*Onset of attack.*—The date of the appearance of the eruption was assumed to mark the onset of the attack. This date could be fixed fairly accurately in most adults, but was frequently rather difficult of determination in children, for it often happened that in them the existence of an eruption was not recognized until attention was called to it in the course of the canvass. In such instances the date could frequently be placed as within the period of the immediately preceding two weeks by the fact of the absence of the eruption at the date of the preceding examination; or, in the event of the individual not having been seen at the immediately preceding visit, the date could, as a rule, be placed as falling within the preceding four weeks. A definite date, however, so far as possible, was always assigned, even in such instances. In selecting it the appearance and stage of the eruption, with such other circumstances as the history of the case might bring out, were used as a guide. In general it may be said that in the vast majority of our cases the date of "onset" is probably correct within less than a week, and in practically all cases it may be said that the eruption appeared "not later than" this date. It is possible that some of the cases recorded as occurring late in the year were really relapses, the eruption in the early part of the year having escaped our observation.

It is recognized that in assuming that the appearance of the eruption marks the onset of the attack of pellagra a certain error is involved. In many of our cases a definite history of symptoms antedating the eruption was obtained; in much the greater proportion, however (children for the most part), such history either could not be elicited or it was so vague as to be of no value in fixing the date of onset. In the latter event the assumption that the first appearance of the eruption marks the onset of the disease was, therefore, practically unavoidable. For the sake of uniformity and in order to eliminate any possible bias, this rule was adopted and applied in all cases. It follows, therefore, that our "date of onset" should be interpreted as indicating that the attack began "not later than" that date.

*Assignment of cases to households.*—As a considerable proportion of the population of any mill village is of a transient character, and as much of the pellagra occurs in this class, some rule was necessary for assigning cases to households and villages.

From the point of view that diet is the primary controlling factor in the causation of the disease, it may be assumed that a minimum of several months is required in a previously normal person before the disease manifests itself in recognizable form. During such a

period an individual (boarder) may have lived in a number of households in succession in the same or different villages, the diet in all of which may have been equally contributory to the eventual development of the disease. On the other hand it is conceivable that, at the time of the development of the dermatitis, the individual may be living in a household the diet of which is not or is no longer pellagra producing, i. e., a diet which is not responsible for the attack, and which indeed, given a sufficient time, may favor recovery from the attack.

Our studies had taught us that in the average case very definite clinical improvement may be observed after about 10 days or 2 weeks on an appropriate diet. It seemed to us reasonable to assume, therefore, that, in most cases at least, the progress of an incipient case to full development (of the eruption) would be halted and the dermatitis prevented from appearing after, say, 30 days of a suitable diet and, as a corollary, that the fact of a case developing might be interpreted as indicating that the diet during at least the earlier part of the immediately preceding period of 30 days had been of a relatively poor quality and might be studied in relation to the disease as a pellagra-producing diet.[1] Accordingly a case was assigned to a household only if the individual had been a member of that household for not less than 30 days immediately preceding the beginning of the attack. In practically all instances, however, the pellagrins had been members of their respective households all their lives and may be assumed to have been living under the conditions of the same household, so far as diet was concerned, during the entire spring of 1916 or longer.

*Season.*—In order that dietary data may properly be related to pellagra incidence, it is clearly necessary that they be representative of the season immediately anterior to the greatest incidence of the disease; that is, the season when, more than at any other time, the diet, if it has any relation to the incidence of the disease, may be expected to be distinctively pellagra producing, just as it may reasonably be expected that the diet at the season immediately anterior to and coincident with the rapid decline in incidence and the clinical improvement of active cases, is distinctively pellagra preventing. Curiously enough, in no previous study of which we have knowledge has this vitally important seasonal factor been given due recognition, and we venture to suggest this, along with the very general character of the data and the inclusion of "inactive" or "quiescent" cases, as among the most important contributing elements in the failure of previous American workers to discover any definite

[1] We have here a source of possible confusion and error in that it is conceivable (indeed probable) that a diet just sufficient for maintenance may still be somewhat lacking in that which is necessary to prevent the progress of an incipient case (especially when well along in its development) to a confirmed attack.

significant relationship between diet and the incidence of the disease.[1]

Such statistics of pellagra morbidity as were available indicated that the height of the seasonal curve of pellagra incidence in the southern States began in the late spring and reached its peak in June. In accordance with the principle enunciated in the preceding paragraph, it seemed permissible to assume that the distinctively pellagra-producing dietary season began sometime in the late winter or early spring and continued up to or possibly somewhat into June. The period actually selected for which dietary observations were made by us extended from April 16 to June 15. Cooperating to fix the limits of this period was the circumstance that we found it impracticable to organize and begin the collection of dietary data sooner than April 16, nor could the available personnel complete the collection of the desired data before June 15. The accompanying graph (Fig. 1) shows the relative position of this period with respect to the monthly incidence of pellagra as subsequently actually found in the seven villages studied in 1916.

It will be seen that the selected period coincides with the steepest portion of the up-curve of pellagra incidence. It may be noted also that the incidence of the disease dropped very sharply in July, suggesting that the diet of an increasing number of families may be regarded as having been pellagra preventing for some time during the month of June. The possibility must, therefore, be kept in mind that the portion of the selected period extending into June may no longer have been fully representative of the pellagra-producing dietary season.

*Dietary data.*—Our data with respect to diet relate to households and do not indicate any difference that might have existed, and in all probability did exist, in the diets of the individual members. The ideal procedure, it might seem, would be to secure a record of individual consumption. This has been the procedure frequently adopted in previous studies. The practical difficulty, however, of securing an accurate statement of individual consumption from a sufficiently large number of individuals for a period sufficiently long to be fairly representative of the pellagra-producing dietary period seemed to us so great as to preclude its adoption. Of necessity, therefore, we adopted the household as the unit, assuming that with a knowledge of the diet of a considerable number of them the outstanding characteristics of the diet of groups of households would be suggested, in a general way at least, when classified according to the occurrence or nonoccurrence of pellagra, economic status, or other basis.

[1] In the study of the individual case this seasonal factor in relation to that individual attack is all too commonly overlooked. In relating the diet of the individual to a particular attack, attention should primarily be given to the diet of the period of two or three months immediately preceding the onset of the attack.

As it was manifestly impracticable to secure a record of the complete food supply of each household for the entire period selected as the pellagra-producing season, it was necessary to content ourselves with a record for such portions of the selected period as might

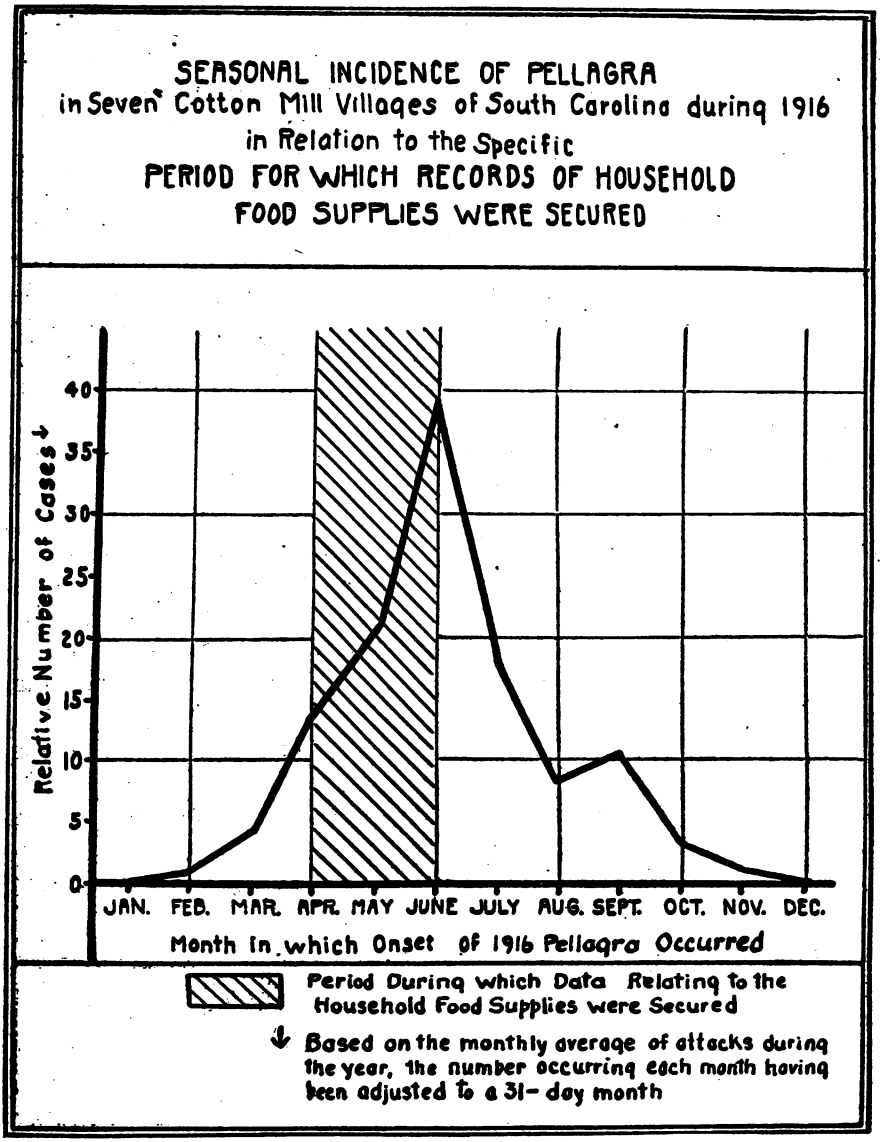


Fig. 1.

properly be assumed to be fairly representative of the whole, and for which an accurate record would be practicable. For these reasons and because nearly all of the households purchased the great bulk of their food supplies at semimonthly or more frequent intervals, a

15-day sample or cross-section period for which a record of the diet of each household was to be secured was decided upon as meeting the exigencies of the situation.

Information with respect to diet was secured by arranging with the principal stores at which the families dealt, for a record to be kept for us of every purchase of food by mill workers and members of mill workers' households during a specified 15-day period. Immediately at the close of such period trained enumerators, under the immediate direction and supervision of one of us (E. S.), were sent to the village to ascertain the composition of each household with respect to the age and sex of the individuals included during the period, to secure information relative to the economic status of the family, and to determine the quantity and value of the articles of food obtained from sources other than the stores where purchase records were secured. Such articles included those produced at home or given to the household, those purchased from neighbors, from farmers and hucksters, and from all other sources. With the exception of fresh milk and, to some extent, butter, eggs, and fresh meats, very few of the articles of food came from sources other than the stores. The great majority of the households dealt almost altogether at the stores at which purchase records were kept.

As it was not feasible with the limited personnel available to cover all seven villages in the same 15-day period, the record of the food supply was secured in successive periods, as follows: For village *Sa.*, April 16–30; villages *At.* and *Sn.*, May 1–15; villages *Ny.* and *In.*, May 16–30; and villages, *Rc.* and *Wy.*, June 1–15.

With rare exceptions such information as it was necessary to obtain from the households was given willingly and frankly by the informants. Care was taken to secure the information from the housewife or other responsible member. The simple household economy prevailing in the households aided the enumerator in securing replies to the definite queries made, which gave very distinct impressions of accuracy in all except a comparatively few instances. The questionnaires or schedules, as soon as they were filled out and completed from the purchase records, were scrutinized carefully, and missing data, apparent inconsistencies, and indefinite entries were in all cases rectified as far as possible by further visits to the households within a few days. All completed schedules on which the data for any reason appeared to be of doubtful accuracy were discarded. Thus, where the informant was uncertain as to the amount of an article or articles of food, or where it appeared that the informant was unable to make accurate statements, the condition was noted by the enumerator and the schedule for the household discarded. Likewise, a schedule for which the store record was for some reason incomplete would be discarded. In a few instances where the data were incomplete or indefinite in relation to one or two articles of food,

the schedule was utilized for the other items. In general, however, the practice was to select for final consideration only those completed schedules which appeared to be reasonably accurate from every point of view.

As has been stated, our dietary data are assumed to be samples of the food supply of the pellagra-producing season, so that the limitations upon the representativeness of samples in general apply in a measure to these data. The principal limitation lies, of course, in the fact that the record of the use of a given article of food during the 15-day period may not be fairly representative of its use during the entire season of which the 15 days' record is assumed to be a sample. The importance of this limitation is greatly minimized, however, for several reasons. One is that the food supply of the population studied was made up largely of a few principal articles of food which were purchased regularly and by practically every household. These staple foods constituted what may be termed the "basic" portion of the diet of all or nearly all households. Other foods entered into their diet as variables, appearing in the diet of some households and not at all or in much less degree in others. It is with respect to these foods that the "sampling" method might have proved inadequate; but certain conditions existed which, we believe, largely eliminated the possibility of serious error.

The most important of these variable foods were milk, meat, fruit, and vegetables. Milk appeared in the food supply of a household either regularly or hardly at all for the reason that being almost altogether home-produced or purchased from a cow-owning neighbor the supply within certain limits was fairly constant for the milk-consuming households. Meat, particularly fresh meat, was used at fairly regular, though in different households at varying, intervals during the season when available. With respect to fruit and fresh vegetables it is to be noted that practically the total supply of these was purchased from stores, the period being too early for home-produced foods from the summer gardens and the spring gardens yielding but small quantities of onions, lettuce, and greens, and these for only a minority of the households.

The statement of the average quantity of the foods constituting the household supply seems to us therefore to be fairly representative of the importance (quantitatively) of the individual food at that season.

Some irregularities in the data for households when considered without regard to locality necessarily were caused by the gradual change in the availability of certain foods during the two months from April 16–June 15. For example, in the households surveyed for the period June 1–June 15, fresh vegetables were a more important article of diet than in the households surveyed for the period April 16–30. The contrary was true of eggs, the supply of these becoming

smaller and their prices increasing in the latter part of May and in June.

It is to be emphasized that our dietary data are not records of consumption but, rather, records of household food supply for a 15-day sample period. Since, however, but few of the households purchased in quantities large enough to constitute a supply for more than a 15-day period, the data, for practical purposes, may be considered as records of consumption plus refuse and waste. The exceptional households were usually the small ones, and the articles purchased in quantities larger than the ordinary were staples, principally flour and cornmeal and occasionally lard and sirup. This should be held in mind, for, although we attempted to minimize irregularities from this source by using averages of as large groups as possible as a basis for comparison, it is probable that in some instances they have not altogether been eliminated.

In the computation of these data, the supply of any article or group of articles of food obtained by a household or group of households has been expressed in quantity per adult male unit, the Atwater (Atwater, 1915, p. 33) scale of food requirements for the sexes at different ages being used for the purpose. The factors selected were on the basis of adults "at moderately active muscular work."[1]

The results of recent studies suggest that some modifications of this scale should be made, particularly with respect to males between the ages of 12 and 16. Such modifications, however, would not have affected materially the results presented in this report except that because of the age distribution of the population in the various groups of households considered, the tendency of the modifications would have been to make the contrasts between the groups somewhat more sharp. Such contrasts as our analyses bring out are, therefore, all the more significant.

In analyzing our data our aim has been to ascertain (1) such outstanding differences as might exist between the diets of households in which no pellegra was observed and the diets of those in which one or more cases occurred, and (2) to test the significance of the differences thus found by determining the variation, if any, in pellegra incidence among households having varying supplies of certain single foods and groups of foods.

[1] The following was the scale used:

| Age. | Equivalent "adult male units." | | Age. | Equivalent "adult male units." | |
|---|---|---|---|---|---|
| | Male. | Female. | | Male. | Female. |
| Adult (over 16) | 1.00 | 0.80 | 10–11 | 0.60 | 0.60 |
| 15–16 | .90 | .80 | 6–9 | .50 | .50 |
| 13–14 | .80 | .70 | 2–5 | .40 | .40 |
| 12 | .70 | .60 | Under 2 | .30 | .30 |

## IV. COMPARISON OF DIETS.

(*a*) *Nonpellagrous versus pellagrous households.*—With the view of ascertaining in what respect, if any, the diet of households in which no pellagra was observed differed from that of households in which one or more cases of the disease occurred, we began with a general comparison of the average diet of the nonpellagrous with that of the pellagrous households of the villages studied. This is presented in Table I.[1]

TABLE I.—*Approximate average daily supply of various foods during a 15-day period, between Apr. 16 and June 15, 1916, compared for nonpellagrous households and households in which pellagra occurred during the year 1916 in 7 cotton-mill villages of South Carolina.*

| Article of food. | Average supply per adult male unit in grams per day. | | Ratio of supply of pellagrous to non-pellagrous households. |
|---|---|---|---|
| | Households not affected with pellagra.[2] | Households affected with pellagra.[3] | |
| Meats: | | | |
| Fresh | 26.7 | 15.2 | 0.57 |
| Cured (lean) | 23.4 | 16.3 | .70 |
| Canned | 14.2 | 14.2 | 1.00 |
| Eggs | 43.5 | 40.2 | .92 |
| Milk: | | | |
| Fresh | 517.6 | 223.5 | .43 |
| Preserved | 2.9 | 1.5 | .52 |
| Butter | 31.7 | 22.3 | .70 |
| Cheese | 2.5 | .5 | .20 |
| Pork (salt) | 51.0 | 64.0 | 1.26 |
| Lard and lard substitutes | 48.0 | 41.7 | .87 |
| Peas and beans: | | | |
| Dried | 32.0 | 34.4 | 1.07 |
| Canned [4] | 5.0 | 1.7 | .34 |
| Wheat flour | 420.4 | 363.6 | .86 |
| Wheat bread, cakes, and crackers | 14.2 | 12.4 | .87 |
| Corn meal | 152.8 | 158.8 | 1.04 |
| Grits | 5.3 | 11.2 | 2.11 |
| Corn (canned) | 6.1 | 10.4 | 1.70 |
| Rice | 5.2 | 4.1 | .77 |
| String beans: | | | |
| Green | 12.3 | 4.1 | .33 |
| Canned | 5.1 | 2.0 | .39 |
| Other vegetables: | | | |
| Green | 51.0 | 42.3 | .83 |
| Canned | 36.2 | 31.7 | .88 |
| Fruits: | | | |
| Fresh | 29.7 | 18.0 | .61 |
| Dried | 9.6 | 6.2 | .65 |
| Canned | 18.9 | 16.6 | .88 |
| Potatoes: | | | |
| Irish | 71.9 | 99.3 | 1.38 |
| Sweet (fresh) | 5.9 | 2.8 | .47 |
| Sweet (canned) | 5.5 | 2.3 | .42 |
| Sugar | 47.1 | 35.3 | .75 |
| Sirup | 18.5 | 18.4 | .99 |
| Jellies and jams | 7.7 | 9.9 | 1.29 |
| All other foods (cost in cents) | 3.6 | 3.1 | .86 |

[1] An explanation of the articles and groups of articles of food in this and succeeding tables is presented in the Appendix.

[2] 692 households composed of 2,769.3 adult male units. Data were available for the following number of adult male units for the articles of food specified: Fresh meats, 2,760.2; canned meats, 2,771.8; fresh milk, 2,694.2; butter, 2,775.3; Irish and fresh sweet potatoes, 2,764.7; salt pork, 2,742.6; lard, 2,765.1; green vegetables, 2,764.9; dried fruits, 2,756.0; canned fruits, 2,760.1.

[3] 51 households composed of 288.9 adult male units. Data were available for the following number of adult male units for the articles of food specified: Canned meats, 286.4; fresh milk, 256.7; butter, 274.2.

[4] Exclusive of canned string beans.

A glance at this table at once discloses decidedly suggestive differences in the food supply of the two groups of households, the average supply of most articles of food being decidedly lower in the diet of the pellagrous households than in that of the nonpellagrous. The significance of these differences is obscured and the value of this general comparison is materially affected by certain circumstances, not previously considered, relating to the character of the data presented in the foregoing table. Thus, some households for which we secured food records moved away soon thereafter and so passed from observation. Such might appear to have been free from pellagra, when, in reality, one or more cases may have developed shortly after passing from observation. This, obviously, might also be true of individual members of those households that remained under observation. The moving of individual members of households was very slight in the case of boarders who were not members of the families. The fact, however, that among boarders who remained, as well as among the members of families which had boarders (not members of families) and which had an income from this source, practically no pellagra occurred, would appear to reduce this possible element of error in pellagra incidence to a negligible quantity.

Again, by restricting the diagnosis of pellagra to cases presenting a definite eruption, cases with poorly defined eruption, and cases clinically pellagra but without eruption were, as previously stated, not included as such, but, when noted, were designated simply as "suspects" so that some of the households appearing in our records as nonpellagrous should perhaps more truly have been classed as pellagrous. Another element of error which, like the preceding, would lead to the inclusion of some, probably very few, households as nonpellagrous, that were in reality pellagrous, arises from the fact that some few cases may have been, and probably were, unavoidably missed.

Finally, and perhaps most important of all, there is to be noted the circumstance that in a few of the households classed as pellagrous the pellagra occurred later in the year, that is, at a considerable time after the "sample" period. In these it is manifestly possible that the diet records were not representative of the conditions in the period immediately preceding the onset of the attack. Accordingly, in order to minimize these possible sources of error we have included in the comparisons about to be presented only those nonpellagrous households which continued under observation from April 15 to October 1, 1916, and in which no one with suspicious symptoms was observed, and only those pellagrous households in which one or more cases of pellagra with clearly defined, bilaterally symmetrical dermatitis occurred before August 1, 1916.

(*b*) *Nonpellagrous households of highest income versus pellagrous households, each with at least two cases.*—In order to bring out possibly

significant differences in the diets of nonpellagrous and those of pellagrous households as definitely as possible, not only must the various possible sources of error affecting the data be eliminated, or at least minimized, but so far as may be, the diets to be compared should be those of households of as markedly contrasting pellagra incidence as the available data afford. With this in mind, the comparison that next suggested itself was that between the food supply of nonpellagrous households of the highest income class and that of pellagrous households in each of which at least two cases of the disease were observed.

By restricting the group of nonpellagrous households in this comparison to those of the highest income not only have we a group in which no pellagra was actually observed, but it is also one in which, by reason of the economic factor, the chance of the occurrence of the disease in the first place may be considered to have been relatively at a minimum. It is a group, therefore, that actually is more nearly free from pellagra, or the chance of its occurrence, than any other included in our study, and, accordingly, the diet of the group may be regarded as being more surely pellagra preventive, or having a wider margin of safety, than that of any other of our household groups.

Similarly, by restricting the group of pellagrous households to those having at least two cases each, the possible error arising from considering as associated with pellagra the diet of borderland households or that of a household in which a case developed as the result of individual dietary eccentricity is believed to be minimized, as the chance of two cases arising in a household under such circumstances may be regarded as negligible. The average food supply of this group of pellagrous households may therefore be regarded as more closely approximating a pellagra-producing diet than that of any other of our groups.

In comparing the food supplies of these two groups, then, we are comparing a sample of what may be regarded as a relatively highly preventive diet with a sample closely approximating a surely pellagra-producing one. The comparison is presented in Table II. By reference to this table it will be seen that here, as in the general comparison between the diet of all our nonpellagrous and that of all our pellagrous households, shown in Table I, the food supply of the nonpellagrous appears decidedly more liberal than that of the pellagrous households.

In this connection it must be noted that while the nonpellagrous households in the present comparison are all of the highest income class (from $14 to about $20 per adult male unit per 15-day period), the pellagrous households all fall in the lower ranges of income—in fact, fully three-fourths of them belong in the lowest income class studied by us (less than $6 per adult male unit per 15-day period).

While, therefore, it may be, and, as we shall see, actually is the case, that the greater liberality in the food supply of the nonpellagrous households is (in some measure at least) significantly related to their freedom from pellagra, before this may be properly assumed the influence of the marked difference in economic status of the households of the two groups must be eliminated, for it may well be that the greater liberality in supply of the nonpellagrous groups is simply a reflection of their decidedly better economic status.

TABLE II.—*Approximate average daily supply of various foods during a 15-day period between Apr. 16 and June 15, 1916, compared for nonpellagrous households with highest incomes and households in which 2 or more cases of pellagra occurred during the period March–July, 1916, in seven cotton-mill villages of South Carolina.*

| Article of food. | Average supply per adult male unit, in grams per day. | | Ratio of supply of pellagrous to nonpellagrous households. |
|---|---|---|---|
| | Higher-income households not affected with pellagra.[1] | Households affected with pellagra.[2] | |
| Meats: | | | |
| Fresh | 48.9 | 16.3 | 0.33 |
| Cured (lean) | 54.0 | 8.1 | .15 |
| Canned | 25.1 | 15.7 | .63 |
| Eggs | 69.5 | 31.1 | .45 |
| Milk: | | | |
| Fresh | 379.3 | 126.9 | .33 |
| Preserved | 4.5 | 1.8 | .40 |
| Butter | 27.2 | 11.2 | .41 |
| Cheese | 3.6 | .2 | .06 |
| Pork (salt) | 38.6 | 65.2 | 1.69 |
| Lard and lard substitutes | 52.8 | 34.7 | .66 |
| Peas and beans: | | | |
| Dried | 31.1 | 34.1 | 1.10 |
| Canned [3] | 12.1 | 1.6 | .13 |
| Wheat flour | 445.4 | 351.5 | .79 |
| Wheat bread, cakes, and crackers | 18.1 | 9.4 | .52 |
| Corn meal | 127.1 | 144.3 | 1.14 |
| Grits | 9.4 | 5.2 | .55 |
| Corn (canned) | 11.5 | 6.3 | .55 |
| Rice | 4.5 | 5.5 | 1.22 |
| String beans: | | | |
| Green | 31.7 | 3.4 | .11 |
| Canned | 9.1 | 0.0 | .00 |
| Other vegetables: | | | |
| Green | 90.6 | 57.4 | .63 |
| Canned | 56.2 | 19.9 | .35 |
| Fruits: | | | |
| Fresh | 42.3 | 10.1 | .24 |
| Dried | 9.7 | 9.5 | .98 |
| Canned | 37.4 | 15.7 | .42 |
| Potatoes: | | | |
| Irish | 48.9 | 53.1 | 1.00 |
| Sweet (Fresh) | 7.9 | 3.9 | .49 |
| Sweet (Canned) | 7.9 | 3.1 | .39 |
| Sugar | 55.6 | 32.0 | .58 |
| Sirup | 7.9 | 22.6 | 2.86 |
| Jellies and jams | 10.9 | 6.0 | .55 |
| All other foods (cost in cents) | 1.7 | .9 | .53 |

[1] 60 households composed of 209.4 adult male units.
[2] 22 households composed of 117.5 adult male units.
[3] Exclusive of canned string beans.

(*c*) *Nonpellagrous households of lowest income versus pellagrous households, each with at least two cases.*—In order to eliminate the influence of the economic factor from consideration, the nonpellagrous

households must be of the same, or at least of no higher economic class than those of the pellagrous group, with the diet of which that of the former is to be compared. This requirement is believed to be fulfilled by comparing with the diet of those of our pellagrous households in each of which at least two cases occurred, the diet of the nonpellagrous households of the lowest income class. For, as has already been pointed out, all of the households of the former group belong in our lower income classes—fully three-fourths, indeed, falling in the lowest—the same class, that is, as that in which this nonpellagrous group belongs. The two groups may therefore be regarded as rather close together economically, or, if anything, it is the pellagrous group that has a slight advantage. Consequently, any greater liberality in the food supply that the nonpellagrous may be found to have can not be attributed to a better income status.

This comparison is presented in Table III, examination of which shows that here again, as in the preceding comparisons, the nonpellagrous appear to have a distinctly more liberal food supply than do the pellagrous households.

In connection with a detailed examination of the differences suggested by this comparison it will, we believe, be helpful to consider also the average food supply of the pellagrous households of our lowest income class. This group differs from the group of pellagrous households with at least two cases each in this, that some of the former households have but one case, that is, possibly borderland households, and all of the group are in the lowest income class. It may be assumed, therefore, that the average food supply of this group does not represent quite as close an approximation to a pellagra-producing diet as that of the group in each household of which at least two cases of pellagra occurred. In other words, we expected to find that the diet of this group would be somewhat less removed from that of the nonpellagrous households than was that of the pellagrous households each with at least two cases. The difference actually found, however, was, as will be seen, rather slight. Accordingly, for purposes of further study we have brought together in Table IV the diet of these 3 groups and, in order to facilitate comparison between them, also that of the nonpellagrous households of highest income. The diets of the pellagrous households here presented are, so far as known by the authors, the first in the literature giving a detailed quantitative statement of the approximate average supply for a sample period of the season immediately anterior to or coincident with the sharp rise in the seasonal incidence of the disease.

For the sake of simplicity of reference, the diets will be designated as No. 1, No. 2, No. 3, and No. 4, and the corresponding household groups will be similarly distinguished. Diets No. 1 and No. 2 are those of the nonpellagrous, No. 3 and No. 4 of the pellagrous house-

holds. Of the diets of the nonpellagrous groups, No. 1 is that of households of the highest of our income classes, while No. 2 is that of households belonging to the lowest class. Of the diets of the pellagrous groups, No. 3 is that of households having one or more cases each, while diet No. 4 is that of households with a minimum of two

TABLE III.—*Approximate average daily supply of various foods during a 15-day period between Apr. 16 and June 15, 1916, compared for nonpellagrous households with lowest incomes and households in which 2 or more cases of pellagra occurred during the period March–July, 1916, in seven cotton-mill villages in South Carolina.*

| Article of food. | Average supply per adult male unit, in grams per day. | | Ratio of supply of pellagrous to nonpellagrous households. |
|---|---|---|---|
| | Nonpellagrous with lowest incomes.[1] | Pellagrous, multiple cases, majority with lowest incomes.[2] | |
| Meats: | | | |
| Fresh | 19.9 | 16.3 | 0.82 |
| Cured (lean) | 11.8 | 8.1 | .69 |
| Canned | 10.6 | 15.7 | 1.48 |
| Eggs | 38.9 | 31.1 | .80 |
| Milk: | | | |
| Fresh | 554.0 | 126.9 | .22 |
| Preserved | 2.3 | 1.8 | .78 |
| Butter | 30.2 | 11.2 | .37 |
| Cheese | 2.0 | .2 | .10 |
| Pork (salt) | 50.7 | 65.2 | 1.27 |
| Lard and substitutes | 37.1 | 34.7 | .94 |
| Peas and beans: | | | |
| Dried | 31.4 | 34.1 | 1.09 |
| Canned [3] | 1.8 | 1.6 | .89 |
| Wheat: | | | |
| Flour | 398.6 | 351.5 | .88 |
| Bread, cakes, crackers | 10.3 | 9.4 | .91 |
| Corn meal | 164.9 | 144.3 | .88 |
| Grits | 6.6 | 5.2 | .76 |
| Corn (canned) | 3.5 | 6.3 | 1.73 |
| Rice | 5.4 | 5.5 | 1.02 |
| String beans: | | | |
| Green | 6.6 | 3.4 | .52 |
| Canned | 4.1 | 0.0 | .00 |
| Other vegetables: | | | |
| Green | 33.9 | 57.4 | 1.70 |
| Canned | 32.9 | 19.9 | .61 |
| Fruits: | | | |
| Fresh | 21.1 | 10.1 | .48 |
| Dried | 9.7 | 9.5 | .98 |
| Canned | 14.5 | 15.7 | 1.08 |
| Potatoes: | | | |
| Irish | 63.7 | 53.1 | .80 |
| Sweet (fresh) | 3.9 | 3.9 | 1.00 |
| Sweet (canned) | 3.1 | 3.1 | 1.00 |
| Sugar | 38.6 | 32.0 | .83 |
| Sirup | 8.6 | 22.6 | 2.63 |
| Jellies and jams | 4.2 | 6.0 | 1.43 |
| All other foods | 1.5 | .9 | .73 |

[1] 184 households composed of 730.7 adult male units.
[2] 22 households composed of 117.5 adult male units.
[3] Exclusive of canned string beans.

cases each. As has already been stated, economically the group with diet No. 3 is of the same low class as that with diet No. 2, and of the households constituting group No. 4 fully three-fourths are not only of the same class as are groups No. 2 and No. 3, but actually constitute part of Group No. 3.

An examination of Tables IV and V and the accompanying graph (Fig. 2) discloses the same gross differences in supply that have previously been referred to. The large number of single articles,

TABLE IV.—*Approximate average daily supply of various articles of food for groups of nonpellagrous and of pellagrous households in seven cotton-mill villages of South Carolina during a 15-day period between Apr. 16 and June 15, 1916.*

| Article of food. | Average daily supply, in grams, per adult male unit. | | | |
|---|---|---|---|---|
| | Nonpellagrous households whose half month's income per adult male unit was $14 and over.[1] | Households whose half month's income per adult male unit was less than $6. | | Households in which at least 2 cases of pellagra occurred.[4] |
| | | Not affected with pellagra.[2] | Affected with pellagra.[3] | |
| | (1) | (2) | (3) | (4) |
| Meats: | | | | |
| Fresh | 48.9 | 19.9 | 9.4 | 16.3 |
| Cured (lean) | 54.0 | 11.8 | 11.1 | 8.1 |
| Canned | 25.1 | 10.6 | 17.5 | 15.7 |
| Eggs | 69.5 | 38.9 | 30.6 | 31.1 |
| Milk (fresh) | 379.3 | 554.0 | 187.2 | 126.9 |
| Milk (preserved) | 4.5 | 2.3 | 2.8 | 1.8 |
| Butter | 27.2 | 30.2 | 16.0 | 11.2 |
| Cheese | 3.6 | 2.0 | .2 | .2 |
| Pork (salt) | 38.6 | 50.7 | 69.5 | 65.2 |
| Lard and lard substitutes | 52.8 | 37.1 | 32.0 | 34.7 |
| Peas and beans: | | | | |
| Dried | 31.1 | 31.4 | 31.4 | 34.1 |
| Canned [5] | 12.1 | 1.8 | 3.3 | 1.6 |
| Flour, wheat | 445.4 | 398.6 | 323.1 | 351.5 |
| Wheat bread, cakes, and crackers | 18.1 | 10.3 | 13.1 | 9.4 |
| Corn meal | 127.1 | 164.9 | 149.8 | 144.3 |
| Grits | 9.4 | 6.6 | 3.3 | 5.2 |
| Corn (canned) | 11.5 | 3.5 | 4.8 | 6.3 |
| Rice | 4.5 | 5.4 | 4.2 | 5.5 |
| Beans (string): | | | | |
| Green | 31.7 | 6.6 | 3.5 | 3.4 |
| Canned | 9.1 | 4.1 | 1.3 | 0.0 |
| Other vegetables: | | | | |
| Green | 90.6 | 33.9 | 32.3 | 57.4 |
| Canned | 56.2 | 32.9 | 27.8 | 19.9 |
| Fruits: | | | | |
| Fresh | 42.3 | 21.1 | 9.7 | 10.1 |
| Dried | 9.7 | 9.7 | 9.7 | 9.5 |
| Canned | 37.4 | 14.5 | 16.6 | 15.7 |
| Potatoes: | | | | |
| Irish | 48.9 | 63.7 | 71.0 | 53.1 |
| Sweet (fresh) | 7.9 | 3.9 | 1.7 | 3.9 |
| Sweet (canned) | 7.9 | 3.1 | 1.4 | 3.1 |
| Sugar | 55.6 | 38.6 | 37.1 | 32.0 |
| Sirup | 7.9 | 8.6 | 15.1 | 22.6 |
| Jellies and jams | 10.9 | 4.2 | 7.5 | 6.0 |
| All other foods (cost in cents) | 1.7 | 1.5 | 1.2 | .9 |

[1] 60 households composed of 209.4 adult male units.
[2] 184 households composed of 730.7 adult male units. Data were available for the following number of adult male units for the articles of food specified: Fresh milk, 713.1; green vegetables, 726.3; dried fruits, 726.6.
[3] 29 households composed of 134.6 adult male units. Data were available for only 117.1 adult male units with respect to fresh milk and butter.
[4] 22 households composed of 117.5 adult male units.
[5] Exclusive of canned string beans.

many of them seemingly unimportant quantitatively, constituting the several diets, makes a determination in this manner of anything but very gross outstanding differences difficult or impossible. The

difficulty is increased, moreover, by the use, seemingly, of increased quantities of one article in one diet in the place of a related one in another, as, for instance, the substitution of salt pork for lard and of sirup for sugar.

TABLE V.—*Relative average daily supply of various articles of food for groups of nonpellagrous and of pellagrous households in seven cotton-mill villages of South Carolina during a 15-day period between Apr. 16 and June 15, 1916.*

[See also Table IV and Fig. 2.]

| Articles of food. | Relative average daily supply per adult male unit. [Base: Arithmetic average for nonpellagrous households with highest incomes=100.] | | | |
|---|---|---|---|---|
| | Nonpellagrous households whose half-month's income per adult male unit was $14 and over. | Households whose half-month's income per adult male unit was less than $6. | | Households in which at least two cases of pellagra occurred. |
| | | Not affected with pellagra. | Affected with pellagra. | |
| | (1) | (2) | (3) | (4) |
| Canned string beans | 100 | 45 | 14 | 0 |
| Cheese | 100 | 56 | 6 | 6 |
| Beans, string, green | 100 | 21 | 11 | 11 |
| Peas and beans, other canned | 100 | 15 | 27 | 13 |
| Meats, cured, lean | 100 | 22 | 21 | 15 |
| Fruits, fresh | 100 | 50 | 23 | 24 |
| Milk, fresh | 100 | 146 | 49 | 33 |
| Meats, fresh | 100 | 49 | 19 | 33 |
| Vegetables, other, canned [1] | 100 | 59 | 49 | 35 |
| Potatoes, sweet, canned | 100 | 39 | 18 | 39 |
| Milk, preserved | 100 | 51 | 62 | 40 |
| Butter | 100 | 111 | 59 | 41 |
| Fruits, canned | 100 | 39 | 44 | 42 |
| Eggs | 100 | 56 | 44 | 45 |
| Potatoes, sweet, fresh | 100 | 49 | 22 | 49 |
| Wheat bread, cakes and crackers | 100 | 57 | 72 | 52 |
| Jellies and jams | 100 | 39 | 69 | 55 |
| Corn, canned | 100 | 30 | 42 | 55 |
| Grits | 100 | 70 | 35 | 56 |
| Sugar | 100 | 71 | 67 | 58 |
| Vegetables, other, green | 100 | 37 | 36 | 63 |
| Meats, canned | 100 | 42 | 70 | 63 |
| Lard, and lard substitutes | 100 | 70 | 61 | 66 |
| Wheat flour | 100 | 89 | 73 | 79 |
| Fruits, dried | 100 | 100 | 100 | 98 |
| Potatoes, Irish | 100 | 130 | 145 | 109 |
| Peas and beans, dried | 100 | 101 | 101 | 110 |
| Corn meal | 100 | 130 | 118 | 114 |
| Rice | 100 | 112 | 93 | 122 |
| Pork, salt | 100 | 132 | 180 | 169 |
| Sirup | 100 | 109 | 191 | 286 |
| All other foods (cost in cents) | 100 | 88 | 71 | 53 |

[1] Exclusive of canned corn—principally tomatoes.

In order to minimize the obscuring and confusing effect of these factors, foods that, in the existing state of knowledge, seemed closely related, have been combined into groups and the fuel value of each group has been used as an index [1] of their relative importance in the respec-

[1] It is to be understood, of course, that this is far from being completely satisfactory. But that it is sufficiently accurate for the present purpose is shown by the fact that when the protein value of the groups is similarly used as the index, the indications are the same, as may be seen by comparing Table VI with Table XXI. The ideal would be an index that would take into account and give due weight to all essential dietary factors.

tive diets. The resulting groups and the fuel value of the supply of each group of households are shown in Table VI and Figure 3. It is to be noted that the computations of the caloric value of the

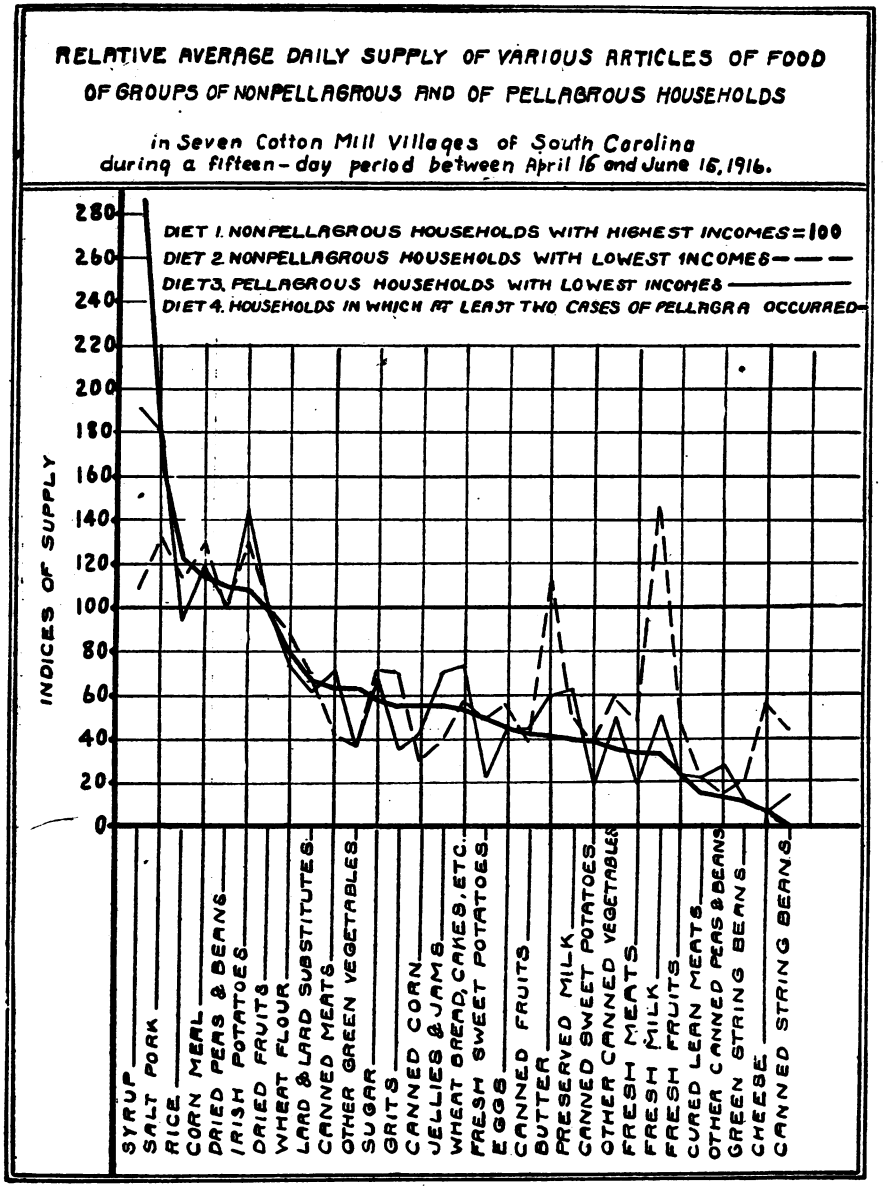


FIG. 2.

groups of foods are to be regarded as partaking somewhat of the nature of estimates, since, in certain instances, they are unavoidably based on the fuel values of certain articles assumed to be representa-

tive of the group, and since, in a few instances, they are averages after taking into consideration the relative importance (from the point of view of quantity) of the foods composing the group. In

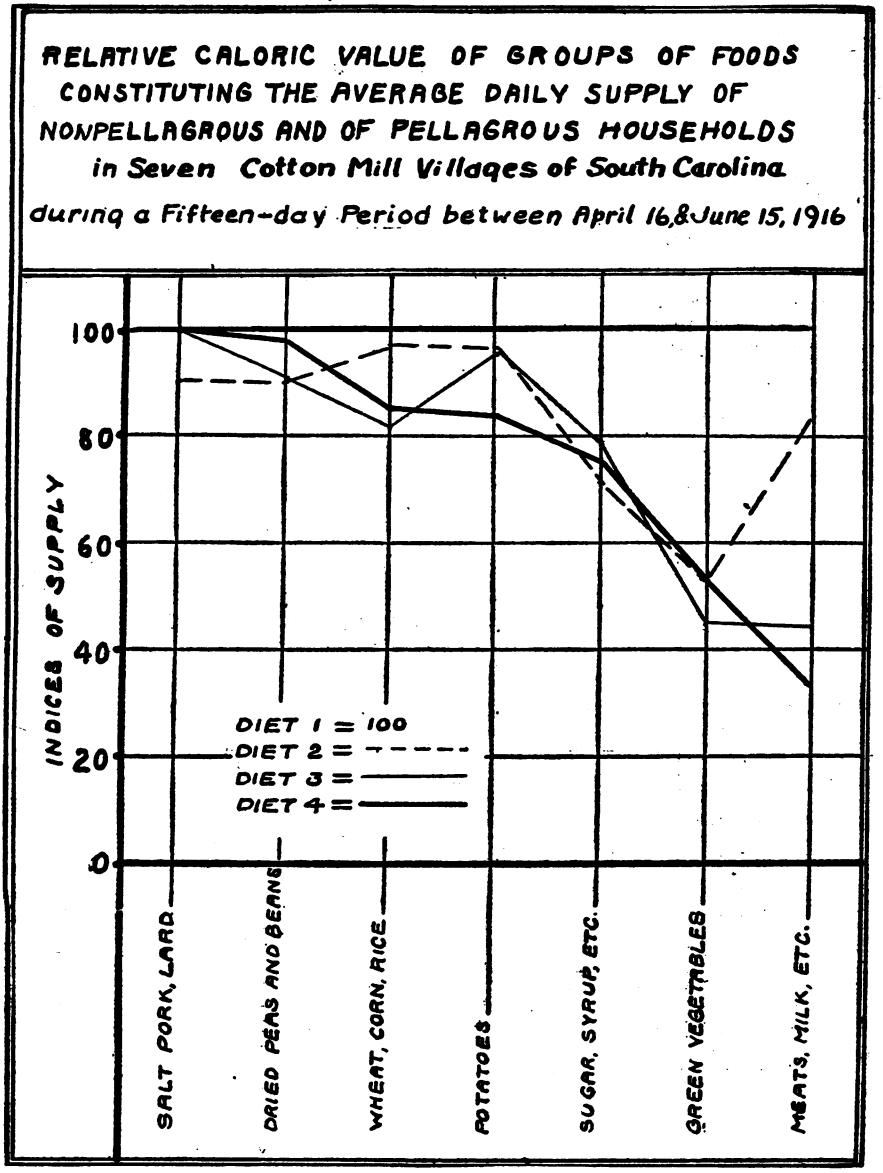


FIG. 3.

one instance assumed equivalents (jellies and jams) were used as the base, inasmuch as the percentage composition of the articles actually appearing in the supplies of the households considered were not

available. No chemical analysis of the food supply was attempted. All our computations are based on Bulletin 28, United States Department of Agriculture (Atwater and Bryant, "The Chemical Composition of American Food Materials"). An allowance in accordance with the figures in this publication was made for "refuse," but no deduction except where specified was made for edible waste occurring in the household. In spite of these important qualifications it is believed that our figures are fairly close approximations to actual average values, and will serve satisfactorily for purposes of comparing the relative importance of the corresponding groups of foods in the respective diets.

TABLE VI.—*Approximate caloric value of various groups of foods*[1] *constituting the average daily supply of specified groups of pellagrous and of nonpellagrous households in seven cotton-mill villages of South Carolina during a 15-day period between Apr. 16 and June 15, 1916.*

[See Fig. 3.]

| Groups of foods. | Average calories per adult male unit daily. | | | |
|---|---|---|---|---|
| | Nonpellagrous households whose half-month's income per adult male unit was $14 and over. | Households whose half-month's income per adult male unit was less than $6. | | Households in which at least two cases of pellagra occurred. |
| | | Not affected with pellagra. | Affected with pellagra. | |
| | (1) | (2) | (3) | (4) |
| Meats (exclusive of salt pork), eggs, milk, butter, cheese. | 762 | 639 | 338 | 270 |
| Salt pork, lard, and lard substitutes | 741 | 673 | 748 | 745 |
| Dried and canned peas and beans (exclusive of canned string beans) | 126 | 113 | 115 | 123 |
| Wheaten flour, bread, cakes and crackers, corn meal, grits, canned corn, rice) | 2,162 | 2,082 | 1,752 | 1,849 |
| Green and canned vegetables (exclusive of canned corn), green and canned string beans, fruits of all kinds | 131 | 71 | 60 | 69 |
| Irish and sweet potatoes | 55 | 53 | 53 | 46 |
| Sugar, sirup, jellies, and jams | 290 | 205 | 222 | 217 |
| Calories from all foods | 4,267 | 3,836 | 3,288 | 3,310 |
| Total calories, after allowing 10 per cent for waste. | 3,840 | 3,452 | 2,959 | 2,979 |

[1] Foods as purchased less nonedible portion. The computation of edible portion and the caloric value thereof is according to analyses published in Bulletin 28 (revised edition), U. S. Department of Agriculture (Atwater and Bryant: "The Chemical Composition of American Food Materials.") Because of the form in which it was necessary to obtain the data, the computations are only approximately correct, not absolutely exact.

Proceeding now to an examination of these diets, and considering first of all the total fuel supply represented by each, we find that the diets of the pellagrous groups (No. 3 and No. 4) with approximately 3,290 and 3,310 gross calories, respectively, are essentially identical in this regard, but clearly below that of either of the diets (No. 1 and No. 2) of the nonpellagrous groups, thus confirming the gross indications, previously noted, that the nonpellagrous enjoyed a more liberal food supply than did the pellagrous.

The difference in potential energy value between the diets of the nonpellagrous and the pellagrous groups is probably not quite as great as the figures in the table would indicate. For there is some reason to believe that the fuel supply of the nonpellagrous is somewhat exaggerated as the result of an error arising from the fact, already referred to, that in the case of the smaller households which almost without exception were in the nonpellagrous group, the customary purchases of such articles as flour and meal tended in these households to be somewhat in excess of actual consumption during our 15-day sample period. So that the average supply of these articles, as it appears, is probably somewhat too high.

In passing, it may be of interest to note that as between the nonpellagrous groups the diet of the group of poorer households (No. 2) appears to provide somewhat less energy than that of the group (No. 1) of the highest income class, a difference which appears to be a reflection, in the main, if not altogether, of the difference in economic status of the two groups. The relation of diet to economic status will be considered in a separate communication.

By reference to Table VI it may be seen that the marked similarity of the diets of the groups of pellagrous households (No. 3 and No. 4) with respect to total fuel value holds good in a general way also with respect to the calories furnished by each of the 7 groups into which the articles of food enumerated in Table IV have been combined, with the possible exception of the group including the meats, milk, and eggs, etc., with which diet of group No. 3 seems somewhat more liberally supplied. On comparing with diet No. 1 it is found (see Fig. 3) that the lower fuel values of diets No. 3 and No. 4 are due mainly to a smaller supply in three classes of foods,[1] namely, (1) meats, milk, etc.; (2) green vegetables, including fruits; and (3) sugar, sirup, etc. If consideration were given only to the contrast between diets No. 3 and No. 4 on the one hand and No. 1 on the other, the interpretation would seem to be suggested that the freedom from pellagra enjoyed by the nonpellagrous households with diet No. 1 was associated with a more liberal supply of some one or some combination of the foods in the groups in which the pellagrous households with diets No. 3 and No. 4 were notbly short.

As has previously been suggested, however, the relative shortage in supply of the pellagrous groups No. 3 and No. 4 may be partly at least a reflection of a lower income status. This view is supported by the fact that if Fig. 3 be further examined we find that the diet (No. 2) of the nonpellagrous households of lowest income at once closely resembles diets No. 3 and No. 4 of the pellagrous groups and differs from the diet (No. 1) of the nonpellagrous households of

[1] A fourth class (the cereals) for reasons already stated in the note on page (668) is not as important as might seem to be the case; see also note 1, page 681.

highest income in substantially the same degree as do diets No. 3 and No. 4 with respect to the supply from all groups of foods but one: this one is the group comprising the animal protein foods, namely, the lean meats, milk, butter, cheese, and eggs, the supply from which in diet No. 2 is notably greater than in diets No. 3 and No. 4 and but little less than that in No. 1. Clearly, then, the freedom from pellagra of the nonpellagrous households can be considered as significantly associated with a more liberal supply from but this one group of foods.[1]

## V. RELATION OF PELLAGRA INCIDENCE TO VARIATIONS IN SUPPLY OF "ANIMAL PROTEIN" FOODS.

It now becomes important to test the association so clearly indicated in the foregoing in order that its significance may more satisfactorily be evaluated. Accordingly, we have analyzed our data with respect to the relation of pellagra incidence to variation in the supply of the single foods of this group. In this analysis, as in the preceding comparisons, the household, not the individual, has been considered as the unit with respect to food supply as well as with respect to pellagra incidence.

It is to be noted that for the purpose of this analysis (with respect to single foods) a pellagrous household is one in which one or more cases of pellagra occurred *at any time* during 1916.[2] As has previously been pointed out, this definition carries with it a possible source of error, in that the disease may have occurred so long after the record of diet was secured that this may have been properly representative. Such relationship as does appear must therefore be regarded as all the more significant.

*Milk.*—In the study of the relation of varying supplies of milk to pellagra incidence, buttermilk and whole milk were added together without distinction, and 1 pound of preserved milk (almost exclusively evaporated milk) was considered equivalent to 1 quart of fresh milk. It should be noted, also, (1) that home-churned buttermilk was the predominating form in which milk was used by the households (the ratio being about 3 of buttermilk to 1 of whole milk), and preserved milk was used in only small quantities and by a very small proportion of the households; (2) that the use of home-made or country-made butter was fairly concomitant with the use of buttermilk. For practical purposes, therefore, "milk" may be considered as fresh whole milk, since it was used either whole or in the

[1] Both nonpellagrous groups appear to have a slightly more liberal supply from the cereal group (wheat, corn, rice). This, we believe, is very largely if not entirely due to the practice of certain (small) households of purchasing flour and corn meal in relatively large quantities, these households being almost without exception in the nonpellagrous group.

[2] In our preliminary report we restricted our pellagrous households in this analysis as in the preceding comparisons to those in which pellagra occurred between March 1 and August 1, so that the figures there given are not quite the same as those here to be presented. The indications, are however, in no way affected.

form of buttermilk and butter. The proportion represented by preserved milk was so small that it may be considered as a practically negligible element. It may be noted further that our "sample" was more accurately representative with respect to regularity in use of milk during the season in question than with respect to regularity in use of other of the variable articles of food, for the reason that households using milk were either owners of cows or purchased milk regularly from cow-owning neighbors or nearby farmers.[1]

In order to eliminate as far as possible households which were exceptional in this respect, those whose cows had become fresh within less than a month previous to the enumerator's visit and were at that time giving abnormally large quantities of milk were not considered. The few instances where it was definitely established that milk had been consumed by pellagrins for therapeutic reasons and had not been an article of household diet, have, however, not been excluded, but are indicated in the table to be presented. The results of our study in relation to milk are shown in Table VII and Figure 4.

TABLE VII.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, classified according to the household milk supply per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household milk supply in quarts per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 727 | 56 | 7.7 |
| Less than 1.0 | 154 | 28 | 18.0 |
| 1.0–6.9 | 262 | [a] 16 | 6.2 |
| 7.0–12.9 | 163 | [f] 8 | 4.9 |
| 13.0–18.9 | 90 | 4 | 4.4 |
| 19.0 and over | 58 | 0 | .0 |

[a] Includes one household using milk at the time of canvass by advice of family physician attending pellagrin, but not using milk previously so far as it could be ascertained.

By reference to these it will be seen that the incidence of pellagra declined markedly as the milk supply of the households increased, and that among households having a supply of less than one quart per adult male unit for the 15-day period (approximately 65 grams per day), the incidence was three times as great as in households which had larger supplies of milk.[2] The significance of this indica-

[1] It is probable that the informants' statements of quantity of milk supply tended toward slight exaggeration, especially in the case of cow-owning households. Inexact measurements of milk produced (e. g., a "gallon" of milk as stated was probably a gallon bucket not quite full at milking time), the habit of stating quantities in round numbers, coupled with a not unnatural disposition, to exaggerate the yield of a home-owned cow, undoubtedly resulted in overstatements, rather than understatements, of the household milk supply.

[2] It may be worth noting, however, that pellagra was observed in households with a milk supply, as reported, averaging approximately one quart per adult male unit per day. As pointed out in the preceding footnote, there is a probability that this amount is somewhat overstated. We have no information, moreover, as to the distribution of the milk among individual members of the households other than the general but frequently made observation that wide variations in the amount consumed by individuals do occur.

tion becomes clearer when it is recalled that the presence of a large milk supply in a household was not a mere reflection of a better economic status and therefore of an ability to buy other possibly preventive articles of diet since, as may be seen by reference to Table IV, nonpellagrous households (No. 2) with lowest incomes had an

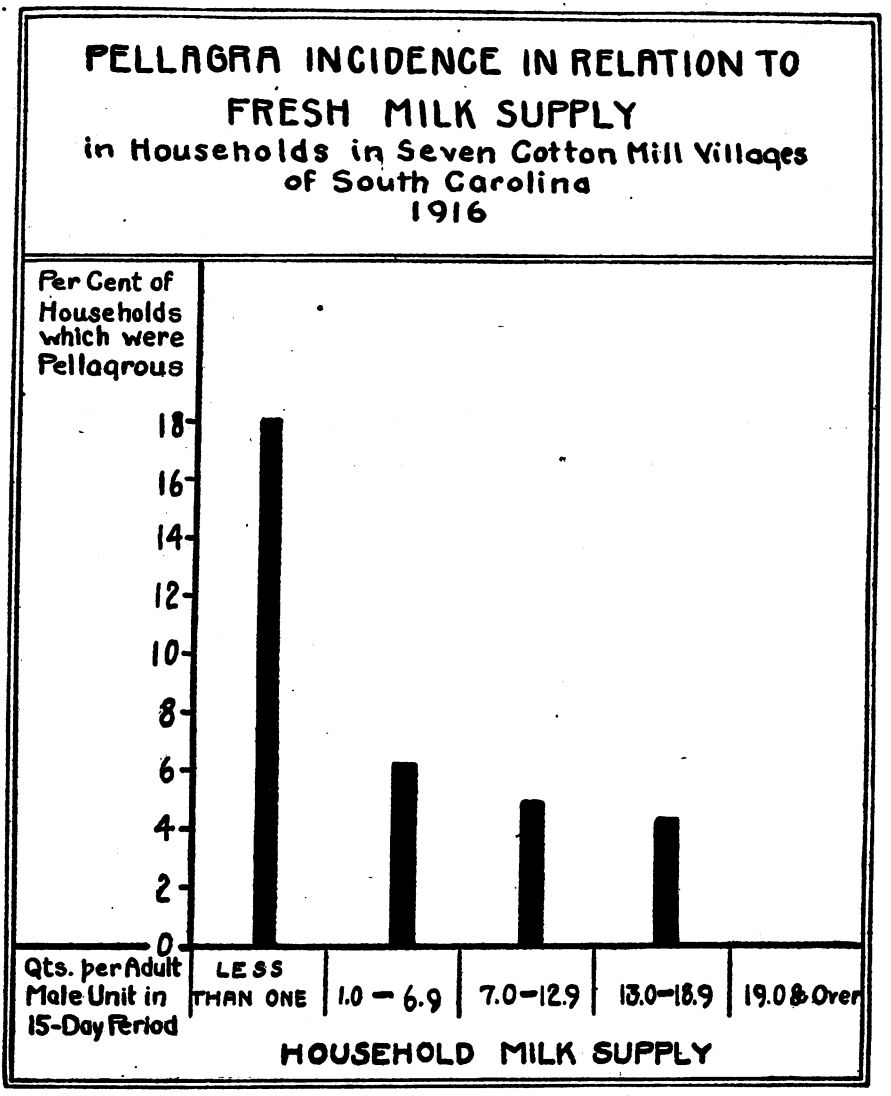


FIG. 4.

even larger average supply of milk than did those with highest incomes (No. 1).

Further evidence that pellagra was relatively rare among households having a liberal supply of fresh milk is afforded in a classification of households according to the ownership of milk-giving cows,

TABLE VIII.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, classified according to the ownership of milk-giving cows during the spring of 1916.*

| Household milk supply from home-owned cows. | Total number of households. | Number of households affected with pellagra. | | Per cent of households affected with pellagra. | |
|---|---|---|---|---|---|
| | | With *one* or more cases. | With *two* or more cases. | With *one* or more cases. | With *two* or more cases. |
| Owning cow which supplied milk during the 3 months previous to canvass[1] | 147 | 4 | [2]1 | 2.7 | 0.7 |
| Not owning such cow | 598 | 58 | 22 | 9.7 | 3.7 |

[1] In the case of one household a home-owned cow was giving milk at the time of purchase, but for several months prior to the onset of the pellagra attack no cow was owned by the household. No further cases developed in this household.
[2] This household sold at least half (probably a greater proportion) of the milk.

shown in Table VIII. The incidence of pellagra among households having milk from such a source was less than 3 per cent as against nearly 10 per cent in households without a supply from such a source. The contrast in incidence of two or more cases in a single household is even more striking. The significance of this indication is enhanced when we note that in the group of no-cow-owning families some enjoyed a liberal supply of milk by purchase.

In connection with the foregoing, Bouchard's observation (Bouchard, 1862, p. 186), over half a century old, is of great interest. He closes a discussion of the relation of occupation to pellagra with a statement of what he justly characterized as a "remarkable fact," namely, "Shepherds are almost all pellagrous (in the endemic area of southwestern France); cowherds are hardly ever such. They have the same occupation, the same manner of life, but the cowherd nourishes himself in large part with milk." Quite characteristically, however, a milk diet had been accused by some previous observers as the cause of the disease (Roussel, 1845, p. 161).

TABLE IX.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, classified according to the household fresh-meat supply per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of fresh meats in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 741 | 61 | 8.2 |
| Less than 1.0 | 495 | 54 | 10.9 |
| 1.0–1.9 | 131 | 4 | 3.1 |
| 2.0–2.9 | 61 | 2 | 3.3 |
| 3.0–3.9 | 36 | 1 | 2.8 |
| 4.0 and over | 18 | 0 | .0 |

*Fresh meats.*—In the present analysis the item "fresh meats" includes the same varieties as were included in this item in the

tables already presented. The incidence of pellagra in relation to varying supplies of fresh meat is shown in Table IX and Figure 5. It will be observed that as the fresh meat supply increased, the incidence

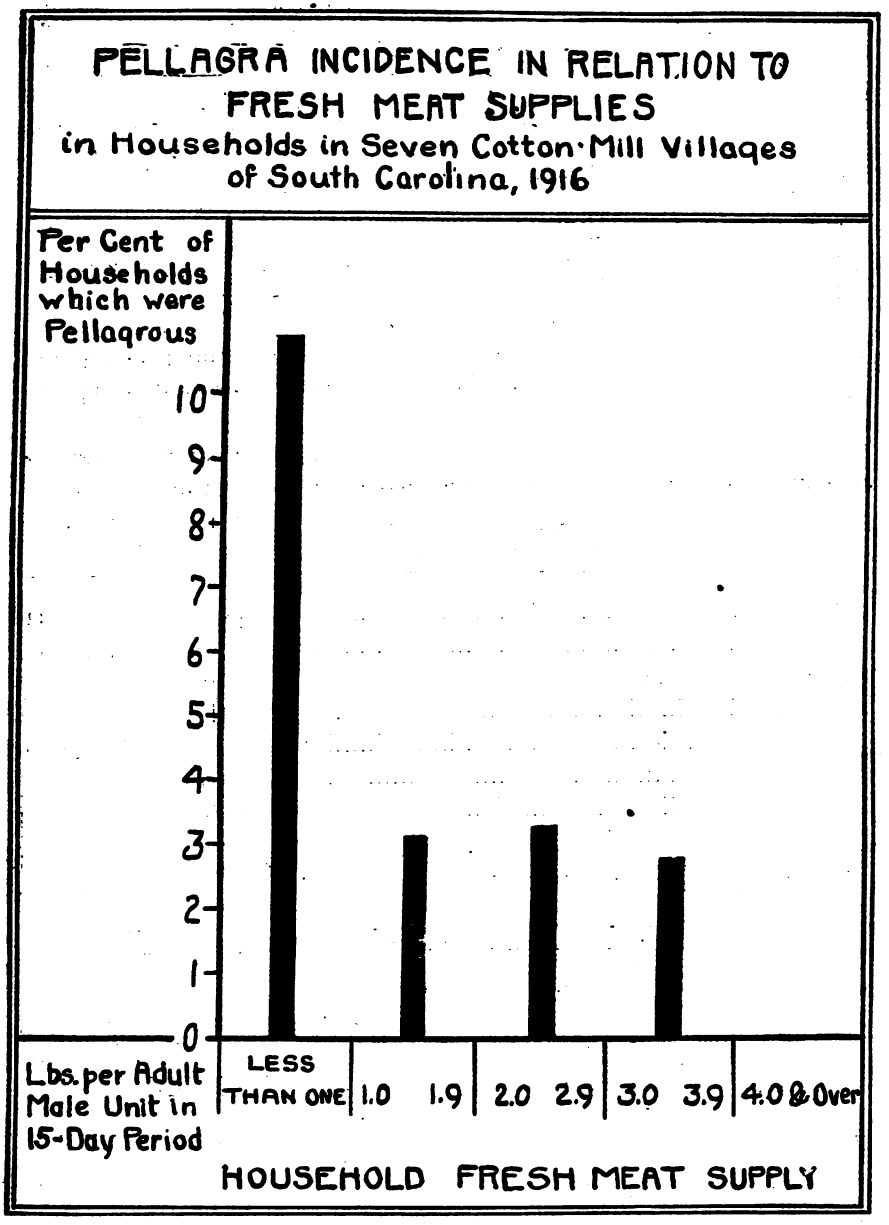


FIG. 5.

of pellagra declined in almost as marked a manner as in the case of milk; the incidence among households having a fresh-meat supply of less than 1 pound per adult male unit per 15-day period (approxi-

mately 30 grams per day) was more than three times as great as in households with a larger supply.

Inasmuch, however, as the average supply of fresh meat per household was considerably higher, and a large supply appeared more frequently among households with the highest than among those with the lowest incomes (Table IV), the possibility is suggested that a relatively large supply of fresh meat may have been merely a reflection of better economic status, and thus of the ability to purchase other possibly preventive articles of diet. The data were further analyzed, therefore, in order to determine whether the variation in the fresh-meat supply within household groups of different economic conditions showed a relation to pellagra incidence similar to that just observed.

TABLE X.—*Pellagra incidence during 1916 among households of cotton-mill workers of different incomes in seven villages of South Carolina, classified according to the household fresh-meat supply, per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of fresh meats in pounds per adult male unit, for a 15-day period. | Family income during a 15-day period per adult male unit. | | |
|---|---|---|---|
| | Under $6. | $6 to $9.99. | $10 and over. |
| Total number of households: | | | |
| Less than 0.5 | 124 | 159 | 81 |
| 0.5–0.9 | 27 | 51 | 35 |
| 1.0–1.9 | 35 | 68 | 45 |
| 2.0 and over | 26 | 41 | 48 |
| Number of households affected with pellagra: | | | |
| Less than 0.5 | 19 | 20 | 2 |
| 0.5–0.9 | 3 | 6 | 1 |
| 1.0–1.9 | 3 | 2 | 1 |
| 2.0 and over | 1 | 2 | 0 |
| Per cent of households affected with pellagra: | | | |
| Less than 0.5 | 15.3 | 12.6 | 2.5 |
| 0.5–0.9 | 11.1 | 11.8 | 2.9 |
| 1.0–1.9 | 8.6 | 2.9 | 2.2 |
| 2.0 and over | 3.8 | 4.9 | 0.0 |

For this purpose the households were divided into three income classes, and each in turn subdivided into groups of households with varying meat supply and then the incidence of pellagra was computed for each of these groups. The results appear in Table X. While the subdivision of the households in each income class necessitates the consideration of rather small numbers, nevertheless it seems fairly clearly indicated that, while there is a decline in incidence with increased income, the supply of fresh meat remaining the same, there is quite a sharp and fairly regular decline in pellagra incidence as the supply of fresh meat increases in the lower two of the three income classes, no definite effect being appreciable in that of the highest income. If the use of fresh meat were merely a concomitant of high income, the tendency to a diminution of the incidence rate with an increase in the fresh-meat supply in households of the same income class should practically disappear. The fact, however, that a clearly marked tendency to a decline in incidence with increase in supply is

present among households whose half-month's incomes were between $6 and $10 as well as among those with less than $6 appears to confirm and strengthen the previous indication that pellagra incidence was materially lower when the average daily household supply of fresh meat was more than approximately 30 grams per adult male unit per day.

TABLE XI.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, whose supply of fresh meats was less than 1 pound per adult male unit per 15-day period, classified according to the household supply of milk, per adult male unit, for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of milk in quarts per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 464 | 46 | 10.0 |
| Less than 1.0 | 103 | 23 | 22.3 |
| 1.0–3.9 | 63 | 5 | 7.9 |
| 4.0–6.9 | 90 | 7 | 7.8 |
| 7.0–12.9 | 102 | 7 | 6.9 |
| 13.0–18.9 | 67 | 4 | 6.0 |
| 19.0 and over | 39 | 0 | 0.0 |

TABLE XII.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, whose supply of fresh milk was less than 7 quarts per adult male unit per 15-day period, classified according to the household supply of fresh meats per adult male unit, for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of fresh meats in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 435 | 45 | 10.3 |
| Less than 1.0 | 282 | 40 | 14.2 |
| 1.0–2.9 | 114 | 4 | 3.5 |
| 3.0 and over | 39 | 1 | 2.6 |

*Milk or fresh meats.*—Our analyses having indicated in a definite manner that pellagra occurred less frequently or not at all in households having a daily minimum average supply of approximately a pint of milk or of 30 grams of fresh meat per adult male unit, it becomes important to ascertain whether these associations are independent each of the other. Accordingly we have attempted to determine this by observing the variation in the pellagra rate for households having but a small supply of the one when grouped according to variations in supply of the other. This analysis is shown in Tables XI and XII and Figures 6 and 7. The households having a supply of fresh meat exceeding 1 pound per adult male unit per 15-day period (approximately 30 grams daily) are discarded in the former table, and those having a supply of milk of over 7 quarts per

adult male unit per 15-day period (approximately 1 pint daily) are discarded in the latter.[1] The results of this analysis clearly indicate that an increasing supply of each of these foods, independently

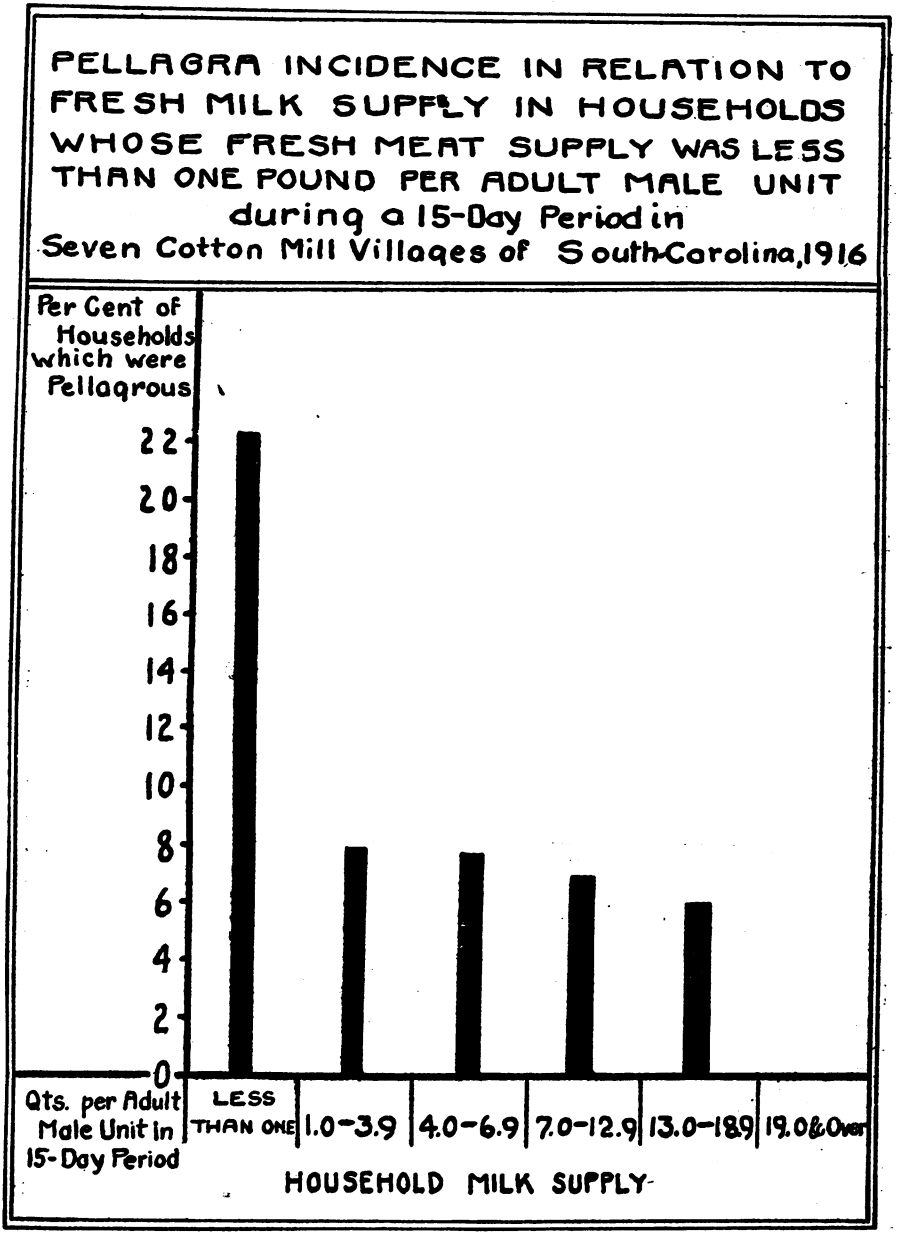


FIG. 6.

of the other, was definitely associated with a decreasing pellagra incidence.

[1] The mass of our data was too small to permit of restricting this analysis to households with a still smaller milk supply.

*Other "animal protein" foods.*—Analyses with respect to the other individual foods of the "animal protein" group were attempted but proved unsatisfactory by reason of the insufficient mass of the

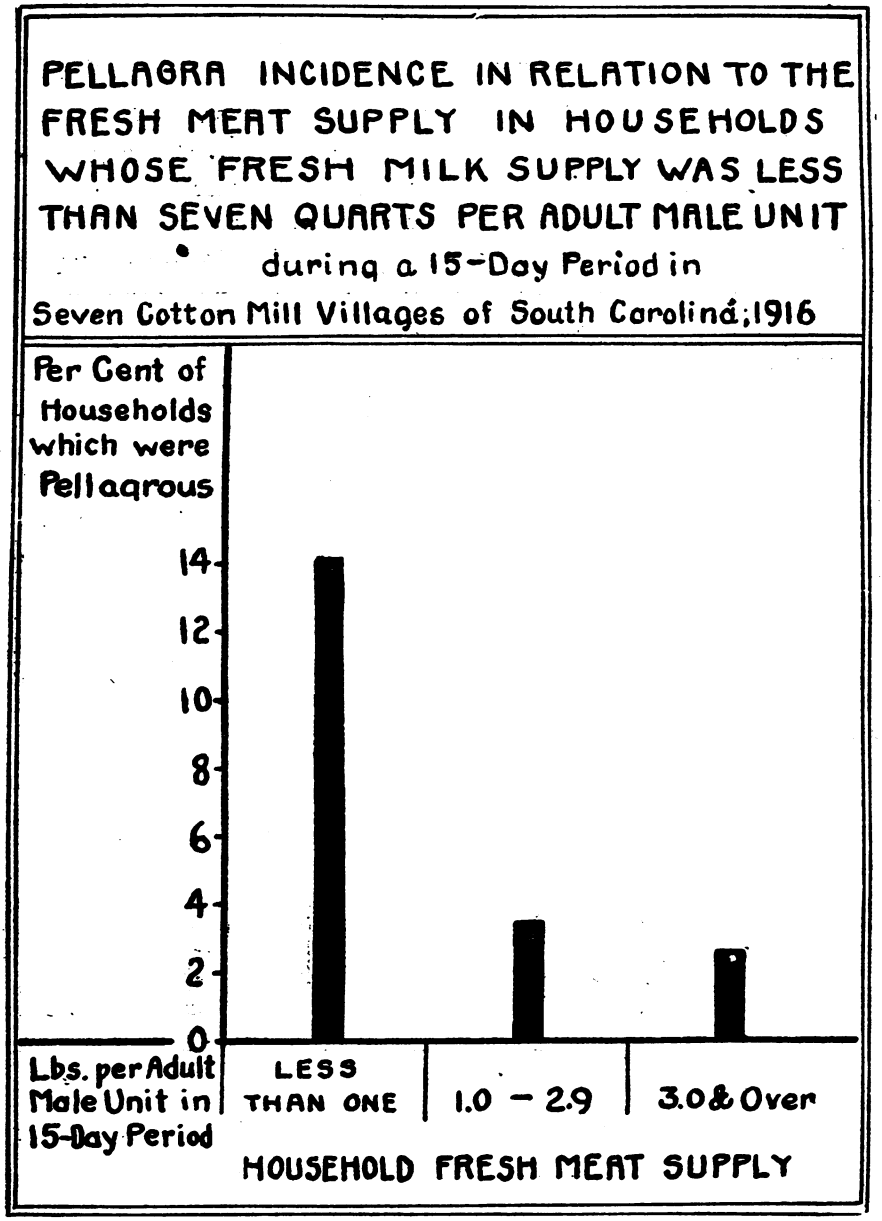


FIG. 7.

available data. It is to be noted, however, that the indications afforded by the analysis presented with respect to fresh milk should be regarded as, in a general way, also representative of butter, for, as has already been mentioned, fresh milk appeared in the diet of the

mill people in the form, for the most part, of home-churned buttermilk and butter.

## VI. FOODS OF THE GROUPS ASSOCIATED WITH INCREASED PELLAGRA INCIDENCE.

As has been seen (Table VI and Fig. 3) the diet of our group of non-pellagrous households of the lowest income (No. 2) closely resembles the diets of our pellagrous groups with respect to the supply from all but one of the classes of foods, namely, the "animal protein" foods, a liberal supply of which is associated with a relative or absolute freedom from the disease. Conversely, a reduced or minimal supply of the foods of this group *in relation to the type of diet under consideration* may be considered as associated with an increased pellagra incidence.[a] Or, viewed in another way, one may regard the portion of these diets (i. e., the diets here considered) exclusive of the "animal protein" group as approximating a pellagra-producing diet.[b] Analyses were therefore made of the relation to pellagra incidence of variations in supply of a number of the more conspicuous (quantitatively) foods included in what may be regarded as the pellagra-producing combination.

*Corn meal.*—In Table XII are shown the results of an analysis of our data in relation to corn meal. As might have been anticipated from the indications afforded by the statistics of average quantities shown in Tables IV and V and by the frequency figures in Tables XIX and XX, no consistent correlation is apparent. This is of great interest when the etiological rôle that has for so long been attributed by Italian students of the disease to spoiled maize is recalled. It is quite exceptional for mill-village stores to have on sale at one time more than one grade of meal; and so all households in any one village using this cereal are supplied with the same quality of this product. If, therefore, spoiled corn is, as Lombroso and his pupils have taught, the cause of pellagra, then it would seem reasonable to expect some indication of an increasing incidence with an increase in supply.

TABLE XIII.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, classified according to the household corn [c] meal supply [d] per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of corn meal in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 742 | 61 | 8.2 |
| 0-3.9 | 304 | 20 | 6.6 |
| 4.0-7.9 | 260 | 24 | 9.2 |
| 8.0-11.9 | 117 | 13 | 11.1 |
| 12.0 and over | 61 | 4 | 6.6 |

[a] Maize.

[b] Includes grits.

[c] This is not to be interpreted as meaning that a restricted supply of the "animal protein" foods is necessarily the cause of pellagra or that only foods of this group are pellagra preventive.

[d] This was one of the indications followed in formulating the experimental diet used in the Rankin Farm (Mississippi) prison experiment (Goldberger and Wheeler, 1915 and 1920; also Goldberger, 1916).

This our tables do not show to be the case; on the contrary it appears (Tables IV, XIX, and XX) that this cereal was used quite as liberally in the nonpellagrous as in the pellagrous households. Our results can not, therefore, be interpreted as affording any support to the etiological theory which up to within the past few years had all but universally been the accepted one. This lack of indication would seem to be in harmony with the results of the controlled feeding experiment of Goldberger and Wheeler (1915 and 1920), in which at least 6 of 11 convicts subsisting on a diet containing corn of good quality developed pellagra.

TABLE XIV.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, classified according to the household wheat flour supply per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of wheat flour in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 748 | 61 | 8.2 |
| 0-3.9 | 61 | 7 | 11.5 |
| 4.0-7.9 | 46 | 4 | 8.7 |
| 8.0-11.9 | 182 | 15 | 8.2 |
| 12.0-15.9 | 199 | 16 | 8.0 |
| 16.0 and over | 260 | 19 | 7.3 |

TABLE XV.—*Pellagra incidence during 1916 among households of cotton-mill workers in seven villages of South Carolina, whose supply of fresh meats was less than 1 pound, and of fresh milk less than 4 quarts, per adult male unit per 15-day period, classified according to the household supply of wheat flour per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of wheat flour in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 175 | 29 | 16.6 |
| 0-3.9 | 15 | 5 | 33.3 |
| 4.0-7.9 | 8 | 0 | 0 |
| 8.0-11.9 | 44 | 8 | 18.2 |
| 12.0-15.9 | 49 | 6 | 12.2 |
| 16.0 and over | 59 | 10 | 17.0 |

*Wheat flour.*—The results with respect to wheat flour are shown in Tables XIV and XV. In the first of these tables there appears a suggestion of an inverse correlation in pellagra incidence, but when this was tested by eliminating the households having supplies of milk and fresh meat in significant quantities the results, as shown in the second of these tables (Table XV), are irregular and the suggested correlation disappears. This, however, may be due to the rather small mass of data that is thus left for study. Definite determination of this point must be left to further study.

TABLE XVI.—*Pellagra incidence during 1916 among households of cotton mill workers in seven villages of South Carolina, classified according to the household supply of dried peas and beans per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of dried peas and beans in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 747 | 61 | 8.2 |
| Less than 0.5 | 255 | 18 | 7.1 |
| 0.5–0.9 | 150 | 12 | 8.0 |
| 1.0–1.9 | 199 | 18 | 9.0 |
| 2.0 and over | 143 | 13 | 9.1 |

TABLE XVII.—*Pellagra incidence during 1916 among households of cotton mill workers of the lowest income class [1] in seven villages of South Carolina, classified according to the household supply of dried peas and beans per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of dried peas and beans in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 216 | 27 | 12.5 |
| Less than 0.5 | 77 | 9 | 11.7 |
| 0.5–0.9 | 43 | 7 | 16.3 |
| 1.0–1.9 | 49 | 4 | 8.2 |
| 2.0 and over | 47 | 7 | 14.9 |

[1] All the households considered had a total cash income of less than $6 per adult male unit in the family during the half month for which dietary records were secured.

TABLE XVIII.—*Pellagra incidence during 1916 among households of cotton mill workers whose supply of fresh meats was less than 1 pound and of fresh milk was less than 4 quarts per adult male unit per 15-day period, classified according to the household supply of dried peas and beans per adult male unit for a 15-day period between Apr. 16 and June 15, 1916.*

| Household supply of dried peas and beans in pounds per adult male unit, for a 15-day period. | Total number of households. | Number of households affected with pellagra. | Per cent of households affected with pellagra. |
|---|---|---|---|
| All amounts | 169 | 28 | 16.6 |
| Less than 0.5 | 44 | 6 | 13.6 |
| 0.5–0.9 | 29 | 4 | 13.8 |
| 1.0–1.9 | 46 | 9 | 19.6 |
| 2.0 and over | 50 | 9 | 18.0 |

*Dried legumes.*—With respect to dried legumes,[1] the results of our analyses are presented in Tables XVI, XVII, and XVIII. Although a slight suggestion of a direct correlation appears in Table XVI and again in Table XVIII it is altogether absent from Table XVII; so that, on the whole, we have here no significant variations in incidence with variation in supply. This is in harmony with the indications afforded by the statistics of average quantities presented in Tables IV and V and by the frequency of supply in various amounts shown in

[1] The dried legumes principally used were "white" beans, "pink" beans, and field, or cowpeas. Beans were used in considerably larger quantities than peas.

Tables XIX and XX, namely, that the use of dried legumes appeared to be quite similar in the case of nonpellagrous and of pellagrous households. The present study therefore fails to confirm deductions from epidemiologic observations made by one of us (J. G.) about five years ago with respect to the apparently important preventive value of the common varieties of dried beans and peas.

TABLE XIX.—*Percentages of households having supplies of various articles of food in different quantities per adult male unit per day, in seven cotton-mill villages of South Carolina, during a 15-day period between Apr. 16 and June 15, 1916, compared for nonpellagrous households and for households in which one or more cases occurred in March–July, 1916, all households being in the lowest income class.*

| Article of food and group of household. | Average daily supply per adult male unit. | Per cent of households whose average daily supply per adult male unit was— | | | |
|---|---|---|---|---|---|
| | | None. | None or less than one-third average of all households. | One-third but less than average of all households. | Average or more than average of all households. |
| Fresh meats: | *Grams.* | | | | |
| All households | 26.6 | | | | |
| Nonpellagrous | 19.9 | 47.8 | 52.2 | 16.7 | 30.6 |
| Pellagrous | 9.4 | 64.3 | 67.9 | 17.9 | 14.3 |
| Cured lean meats: | | | | | |
| All households | 22.8 | | | | |
| Nonpellagrous | 11.8 | 58.6 | 62.5 | 12.8 | 24.4 |
| Pellagrous | 11.1 | 53.6 | 53.6 | 39.3 | 7.1 |
| Canned meats: | | | | | |
| All households | 14.0 | | | | |
| Nonpellagrous | 10.6 | 49.2 | 54.6 | 17.5 | 27.9 |
| Pellagrous | 17.5 | 33.3 | 33.3 | 33.3 | 33.3 |
| Eggs: | | | | | |
| All households | 43.1 | | | | |
| Nonpellagrous | 38.7 | 31.8 | 41.7 | 26.4 | 31.9 |
| Pellagrous | 30.6 | 17.9 | 39.3 | 35.7 | 25.0 |
| Fresh milk: | | | | | |
| All households | 493.4 | | | | |
| Nonpellagrous | 554.0 | 19.1 | 27.0 | 32.0 | 41.0 |
| Pellagrous | 187.2 | 42.3 | 65.4 | 23.1 | 11.5 |
| Preserved milk. | | | | | |
| All households | 2.8 | | | | |
| Nonpellagrous | 2.3 | 85.2 | 85.2 | 1.1 | 13.7 |
| Pellagrous | 2.8 | 64.3 | 64.3 | 3.6 | 32.1 |
| Butter: | | | | | |
| All households | 30.8 | | | | |
| Nonpellagrous | 30.2 | 20.7 | 33.5 | 28.5 | 38.0 |
| Pellagrous | 16.0 | 20.0 | 52.0 | 36.0 | 12.0 |
| Cheese: | | | | | |
| All households | 2.3 | | | | |
| Nonpellagrous | 2.0 | 74.7 | 74.7 | 3.3 | 22.0 |
| Pellagrous | 0.2 | 92.8 | 92.8 | 3.6 | 3.6 |
| Salt pork: | | | | | |
| All households | 52.3 | | | | |
| Nonpellagrous | 50.7 | 4.5 | 7.8 | 49.7 | 42.5 |
| Pellagrous | 69.5 | 3.6 | 7.1 | 42.9 | 50.0 |
| Lard and lard substitutes: | | | | | |
| All households | 47.3 | | | | |
| Nonpellagrous | 37.1 | 10.9 | 19.7 | 44.8 | 35.5 |
| Pellagrous | 32.0 | 10.7 | 17.9 | 50.0 | 32.1 |
| Dried peas and beans: | | | | | |
| All households | 32.3 | | | | |
| Nonpellagrous | 31.4 | 28.4 | 33.3 | 27.3 | 39.4 |
| Pellagrous | 31.4 | 17.9 | 28.6 | 32.2 | 39.3 |
| Canned peas and beans: | | | | | |
| All households | 4.2 | | | | |
| Nonpellagrous | 1.8 | 89.6 | 89.6 | 0.0 | 10.4 |
| Pellagrous | 3.3 | 85.7 | 85.7 | 0.0 | 14.3 |
| Wheat flour: | | | | | |
| All households | 415.9 | | | | |
| Nonpellagrous | 398.6 | 7.7 | 9.3 | 49.7 | 41.0 |
| Pellagrous | 323.1 | 7.1 | 14.3 | 53.6 | 32.1 |

TABLE XIX.—*Percentages of households having supplies of various articles of food in different quantities per adult male unit per day, in seven cotton-mill villages of South Carolina, during a 15-day period between Apr. 16 and June 15, 1916, compared for nonpellagrous households and for households in which one or more cases occurred in March–July, 1916, all households being in the lowest income class*—Continued.

| Article of food and group of household. | Average daily supply per adult male unit. | Per cent of households whose average daily supply per adult male unit was— | | | |
|---|---|---|---|---|---|
| | | None. | None or less than one-third average of all households. | One-third but less than average of all households. | Average or more than average of all households. |
| Wheat bread, cakes, and crackers: | *Grams.* | | | | |
| All households | 14.1 | | | | |
| Nonpellagrous | 10.3 | 42.2 | 54.6 | 18.6 | 26.8 |
| Pellagrous | 13.1 | 46.4 | 50.0 | 17.9 | 32.1 |
| Corn meal: | | | | | |
| All households | 153.7 | | | | |
| Nonpellagrous | 164.9 | 18.7 | 21.4 | 28.6 | 50.0 |
| Pellagrous | 149.8 | 10.7 | 17.9 | 35.7 | 46.4 |
| Grits: | | | | | |
| All households | 5.9 | | | | |
| Nonpellagrous | 6.6 | 89.6 | 89.6 | 0.5 | 9.8 |
| Pellagrous | 3.3 | 89.3 | 89.3 | 0.0 | 10.7 |
| Rice: | | | | | |
| All households | 5.1 | | | | |
| Nonpellagrous | 5.4 | 71.6 | 72.1 | 0.0 | 27.9 |
| Pellagrous | 4.2 | 75.0 | 75.0 | 0.0 | 25.0 |
| Green string beans: | | | | | |
| All households | 11.6 | | | | |
| Nonpellagrous | 6.6 | 85.2 | 91.8 | 6.0 | 2.2 |
| Pellagrous | 3.5 | 89.3 | 96.4 | 3.6 | 0.0 |
| Canned string beans: | | | | | |
| All households | 4.5 | | | | |
| Nonpellagrous | 4.1 | 86.8 | 86.8 | 0.0 | 13.2 |
| Pellagrous | 1.3 | 96.4 | 96.4 | 0.0 | 3.6 |
| Green vegetables (bought): | | | | | |
| All households | 50.1 | | | | |
| Nonpellagrous | 33.9 | 29.4 | 35.6 | 31.1 | 33.3 |
| Pellagrous | 32.3 | 21.4 | 42.9 | 32.1 | 25.0 |
| Other canned vegetables: | | | | | |
| All households | 35.6 | | | | |
| Nonpellagrous | 32.9 | 35.5 | 41.0 | 20.8 | 38.2 |
| Pellagrous | 27.8 | 39.3 | 46.4 | 17.9 | 35.7 |
| Fresh fruits: | | | | | |
| All households | 28.4 | | | | |
| Nonpellagrous | 21.1 | 49.2 | 52.5 | 22.1 | 25.4 |
| Pellagrous | 9.7 | 50.0 | 67.9 | 17.8 | 14.3 |
| Dried fruits: | | | | | |
| All households | 9.2 | | | | |
| Nonpellagrous | 9.7 | 44.0 | 44.0 | 2.2 | 53.8 |
| Pellagrous | 9.7 | 46.4 | 46.4 | 0.0 | 53.6 |
| Canned fruits: | | | | | |
| All households | 18.7 | | | | |
| Nonpellagrous | 14.5 | 67.2 | 67.7 | 8.7 | 23.5 |
| Pellagrous | 16.6 | 64.3 | 64.3 | 7.1 | 28.6 |
| Irish potatoes: | | | | | |
| All households | 74.4 | | | | |
| Nonpellagrous | 63.7 | 42.6 | 46.4 | 14.8 | 38.8 |
| Pellagrous | 71.0 | 39.3 | 50.0 | 7.1 | 42.9 |
| Fresh sweet potatoes: | | | | | |
| All households | 6.3 | | | | |
| Nonpellagrous | 3.9 | 96.7 | 96.7 | 0.0 | 3.3 |
| Pellagrous | 1.7 | 96.5 | 96.5 | 0.0 | 3.5 |
| Canned sweet potatoes: | | | | | |
| All households | 3.9 | | | | |
| Nonpellagrous | 3.1 | 91.2 | 91.2 | 0.0 | 8.8 |
| Pellagrous | 1.4 | 85.7 | 85.7 | 0.0 | 14.3 |
| Sugar: | | | | | |
| All households | 46.2 | | | | |
| Nonpellagrous | 39.6 | 15.3 | 24.0 | 50.3 | 27.7 |
| Pellagrous | 37.1 | 14.3 | 21.4 | 39.3 | 39.3 |
| Sirup: | | | | | |
| All households | 16.3 | | | | |
| Nonpellagrous | 8.6 | 63.4 | 63.4 | 2.7 | 33.9 |
| Pellagrous | 15.1 | 64.3 | 64.3 | 3.6 | 32.1 |
| Jellies and jams: | | | | | |
| All households | 7.9 | | | | |
| Nonpellagrous | 4.2 | 66.9 | 66.9 | 8.8 | 24.3 |
| Pellagrous | 7.5 | 53.6 | 57.2 | 21.4 | 21.4 |

TABLE XX.—*Percentages of households having supplies of various articles of food in different quantities per adult male unit per day in seven cotton-mill villages of South Carolina during a 15-day period between Apr. 16 and June 15, 1916, compared for nonpellagrous households with highest incomes, and for households in which two or more cases occurred in March–July, 1916.*

| Article of food and group of households. | Average daily supply per adult male unit. | Per cent of households whose average daily supply per adult male unit was— | | | |
|---|---|---|---|---|---|
| | | None. | None or less than one-third average of all households. | One-third but less than average of all households. | Average or more than average of all households. |
| Fresh meats: | *Grams.* | | | | |
| All households | **26.6** | | | | |
| Nonpellagrous (highest incomes) | 48.9 | 25.4 | 25.4 | 11.1 | 63.5 |
| Pellagrous (with two or more cases) | 16.3 | 59.1 | 63.6 | 13.6 | 22.7 |
| Cured lean meats: | | | | | |
| All households | **22.8** | | | | |
| Nonpellagrous (highest incomes) | 54.0 | 23.8 | 31.8 | 6.3 | 61.9 |
| Pellagrous (with two or more cases) | 8.1 | 54.6 | 59.1 | 27.3 | 18.2 |
| Canned meats: | | | | | |
| All households | **14.0** | | | | |
| Nonpellagrous (highest incomes) | 25.1 | 49.2 | 52.7 | 6.3 | 41.3 |
| Pellagrous (with two or more cases) | 15.7 | 45.5. | 45.5 | 22.7 | 31.8 |
| Eggs: | | | | | |
| All households | **43.1** | | | | |
| Nonpellagrous (highest incomes) | 69.5 | 3.2 | 6.3 | 25.4 | 68.3 |
| Pellagrous (with two or more cases) | 31.1 | 18.2 | 31.8 | 31.8 | 36.4 |
| Fresh milk: | | | | | |
| All households | **493.4** | | | | |
| Nonpellagrous (highest incomes) | 379.3 | 17.5 | 23.8 | 50.8 | 25.4 |
| Pellagrous (with two or more cases) | 126.9 | 50.0 | 70.0 | 15.0 | 15.0 |
| Preserved milk: | | | | | |
| All households | **2.8** | | | | |
| Nonpellagrous (highest incomes) | 4.5 | 74.6 | 74.6 | 0.0 | 25.4 |
| Pellagrous (with two or more cases) | 1.8 | 77.3 | 77.3 | 0.0 | 22.7 |
| Butter: | | | | | |
| All households | **30.8** | | | | |
| Nonpellagrous (highest incomes) | 27.2 | 14.3 | 25.4 | 25.4 | 49.2 |
| Pellagrous (with two or more cases) | 11.2 | 25.0 | 50.0 | 40.0 | 10.0 |
| Cheese: | | | | | |
| All households | **2.3** | | | | |
| Nonpellagrous (highest incomes) | 3.6 | 76.2 | 76.2 | 0.0 | 23.8 |
| Pellagrous (with two or more cases) | .2 | 95.5 | 95.5 | 0.0 | 4.5 |
| Salt pork: | | | | | |
| All households | **52.3** | | | | |
| Nonpellagrous (highest incomes) | 38.6 | 17.5 | 23.8 | 31.8 | 44.5 |
| Pellagrous (with two or more cases) | 65.2 | 4.5 | 4.5 | 36.4 | 59.1 |
| Lard and lard substitutes: | | | | | |
| All households | **47.3** | | | | |
| Nonpellagrous (with highest incomes) | 52.8 | 14.3 | 17.5 | 25.4 | 57.2 |
| Pellagrous (with two or more cases) | 34.7 | 9.1 | 18.2 | 68.2 | 13.6 |
| Dried peas and beans: | | | | | |
| All households | **32.3** | | | | |
| Nonpellagrous (highest incomes) | 31.1 | 31.8 | 33.3 | 23.8 | 42.9 |
| Pellagrous (with two or more cases) | 34.1 | 9.1 | 22.7 | 31.8 | 45.5 |
| Canned peas and beans: | | | | | |
| All households | **4.2** | | | | |
| Nonpellagrous (highest incomes) | 12.1 | 71.4 | 71.4 | 1.6 | 27.0 |
| Pellagrous (with two or more cases) | 1.6 | 90.9 | 90.9 | 0.0 | 9.1 |
| Wheat flour: | | | | | |
| All households | **415.9** | | | | |
| Nonpellagrous (highest incomes) | 445.4 | 9.5 | 9.5 | 44.5 | 46.0 |
| Pellagrous (with two or more cases) | 351.5 | 4.5 | 13.6 | 45.5 | 40.9 |
| Wheat bread, cakes, and crackers: | | | | | |
| All households | **14.1** | | | | |
| Nonpellagrous (highest incomes) | 18.1 | 39.7 | 42.9 | 14.3 | 42.9 |
| Pellagrous (with two or more cases) | 9.4 | 36.4 | 50.0 | 18.2 | 31.8 |
| Corn meal: | | | | | |
| All households | **153.7** | | | | |
| Nonpellagrous (highest incomes) | 127.1 | 31.8 | 31.8 | 30.2 | 38.1 |
| Pellagrous (with two or more cases) | 144.3 | 9.1 | 18.2 | 45.5 | 36.4 |
| Grits: | | | | | |
| All households | **5.9** | | | | |
| Nonpellagrous (highest incomes) | 9.4 | 81.0 | 81.0 | 1.6 | 17.5 |
| Pellagrous (with two or more cases) | 5.2 | 95.5 | 95.5 | 0.0 | 4.5 |
| Rice: | | | | | |
| All households | **5.1** | | | | |
| Nonpellagrous (highest incomes) | 4.5 | 60.3 | 60.3 | 1.6 | 38.1 |
| Pellagrous (with two or more cases) | 5.5 | 72.7 | 72.7 | 0.0 | 27.3 |

TABLE XX.—*Percentages of households having supplies of various articles of food in different quantites per adult male unit per day in seven cotton-mill villages of South Carolina during a 15-day period between Apr. 16 and June 15, 1916, compared for nonpellagrous households with highest incomes, and for households in which two or more cases occurred in March–July, 1916*—Continued.

| Article of food and group of household. | Average daily supply per adult male unit. | Per cent of households whose average daily supply per adult male unit was— | | | |
|---|---|---|---|---|---|
| | | None. | None or less than one-third average of all households. | One-third but less than average of all households. | Average or more than average of all households. |
| Green string beans: | *Grams.* | | | | |
| All households | 11.6 | | | | |
| Nonpellagrous (highest incomes) | 31.7 | 47.6 | 73.0 | 23.8 | 3.2 |
| Pellagrous (with two or more cases) | 3.4 | 86.4 | 95.5 | 4.5 | 0.0 |
| Canned string beans: | | | | | |
| All households | 4.5 | | | | |
| Nonpellagrous (highest incomes) | 9.1 | 85.7 | 85.7 | 0.0 | 14.3 |
| Pellagrous (with two or more cases) | 0.0 | 100.0 | 100.0 | 0.0 | 0.0 |
| Green vegetables (bought): | | | | | |
| All households | 50.1 | | | | |
| Nonpellagrous (highest incomes) | 90.6 | 27.0 | 33.0 | 28.6 | 38.1 |
| Pellagrous (with two or more cases) | 57.4 | 9.1 | 45.5 | 18.2 | 36.4 |
| Other canned vegetables: | | | | | |
| All households | 35.6 | | | | |
| Nonpellagrous (highest incomes) | 67.7 | 19.1 | 22.2 | 12.7 | 65.1 |
| Pellagrous (with two or more cases) | 26.2 | 31.8 | 31.8 | 27.3 | 40.9 |
| Fresh fruits: | | | | | |
| All households | 28.4 | | | | |
| Nonpellagrous (highest incomes) | 43.2 | 36.5 | 42.9 | 19.1 | 38.1 |
| Pellagrous (with two or more cases) | 10.1 | 50.0 | 63.6 | 22.7 | 13.6 |
| Dried fruits: | | | | | |
| All households | 9.2 | | | | |
| Nonpellagrous (highest incomes) | 9.7 | 65.1 | 65.1 | 6.3 | 28.6 |
| Pellagrous (with two or more cases) | 9.5 | 54.6 | 54.6 | 4.5 | 40.9 |
| Canned fruits: | | | | | |
| All households | 18.7 | | | | |
| Nonpellagrous (highest incomes) | 37.4 | 36.5 | 39.7 | 7.9 | 52.4 |
| Pellagrous (with two or more cases) | 15.7 | 68.2 | 68.2 | 9.1 | 22.7 |
| Irish potatoes: | | | | | |
| All households | 74.4 | | | | |
| Nonpellagrous (highest incomes) | 48.9 | 49.2 | 50.8 | 12.7 | 36.5 |
| Pellagrous (with two or more cases) | 53.1 | 45.5 | 50.0 | 18.2 | 31.8 |
| Fresh sweet potatoes: | | | | | |
| All households | 6.3 | | | | |
| Nonpellagrous (highest incomes) | 7.9 | 93.6 | 93.6 | 0.0 | 6.4 |
| Pellagrous (with two or more cases) | 3.9 | 95.2 | 95.2 | 0.0 | 4.8 |
| Canned sweet potatoes: | | | | | |
| All households | 3.9 | | | | |
| Nonpellagrous (highest incomes) | 7.9 | 85.7 | 85.7 | 0.0 | 14.3 |
| Pellagrous (with two or more cases) | 3.1 | 80.9 | 80.9 | 0.0 | 9.1 |
| Sugar: | | | | | |
| All households | 46.2 | | | | |
| Nonpellagrous (highest incomes) | 55.6 | 14.3 | 20.6 | 22.2 | 57.2 |
| Pellagrous (with two or more cases) | 32.0 | 22.7 | 22.7 | 40.9 | 36.4 |
| Sirup: | | | | | |
| All households | 16.3 | | | | |
| Nonpellagrous (highest incomes) | 17.9 | 73.0 | 73.0 | 3.2 | 23.8 |
| Pellagrous (with two or more cases) | 22.6 | 50.0 | 50.0 | 4.5 | 45.5 |
| Jellies and jams: | | | | | |
| All households | 7.9 | | | | |
| Nonpellagrous (highest incomes) | 10.9 | 44.5 | 47.6 | 3.2 | 49.2 |
| Pellagrous (with two or more cases) | 6.0 | 45.5 | 45.5 | 27.3 | 27.3 |

It is important to note, however, that in the light of various recent studies (Daniels and Nichols, 1917; Daniels and Laughlin, 1918; McCollum, 1917; and Osborne and Mendel, 1917) this does not necessarily apply to other species and probably still less to the immature or green stage, namely, the green string bean. Indeed, our observations, indicating as they do that the abundant seasonal supply of the

green string bean is associated with the marked seasonal decline in incidence of the disease, suggest the possibility of a distinctly preventive rôle for this vegetable. It is hoped that the large mass of data collected during 1917 now being analyzed may afford more definite indications on this point.

*Other foods.*—Similar single-food analyses were also attempted with respect to potatoes, fruit, and fresh vegetables without significant indications. No weight can be attached to this, however, by reason of the fact that but a small mass of data was available for the study relating to these foods.

## VII. DIETARY FACTORS.

We have thus far studied the food supply constituting the diets of nonpellagrous and those of pellagrous households with the view, primarily, of discovering outstanding differences of a general character, and we have seen that the only difference between them to which significance could properly be attached related to a more liberal supply of the "animal protein" foods which the nonpellagrous enjoyed. It becomes important now to examine the more intimate make-up of these diets with a view to ascertaining in more detail the essential differences between them.

*Calories.*—Attention has already been called (p. 679) to the caloric value (Table VI) of the diets under discussion. The average energy value of the edible portion of the food supply of the pellagrous households may be taken as approximately 3,300 calories, which is somewhat less than that of the nonpellagrous households of comparable economic status.

These figures represent an estimate of the energy supplied, not that consumed. To determine the latter, some deduction for waste should be made. What this actually was we found it impracticable to attempt to determine, but judging from such general observations as we were able to make we believe that this was on the whole rather small and related mainly to the bread foods (corn meal and wheat flour). The careful dietary studies of the United States Department of Agriculture have shown that in private families the waste may range from practically zero to as high as 8 or 10 per cent (W. O. Atwater Farmers' Bulletin, No. 142, p. 46). A deduction from our figures of 10 per cent for waste may therefore be considered as a fairly liberal allowance. Deducting this, we find that the average energy value of the diet of the pellagrous households was about 2,970 calories, which will at once be recognized as conforming remarkably well to accepted standards,[1] and so the fuel supply of the diet would seem in itself not to be an *essential* factor in relation to the incidence of the disease,

[1] Lusk, 1917, p. 347; Chittenden, 1907, p. 233.

although the fact that the average fuel supply of the nonpellagrous households of like income status tended to be somewhat larger would suggest that this factor may not be altogether without significance.

*Protein.*—The approximate protein content of the total average food supply per adult male unit per day has been computed for each of the four groups compared in the foregoing. The same limitations as to accuracy noted with respect to potential fuel value apply here. The results presented in Table XXI are therefore estimates of the average total number of grams of protein per adult male unit per day in the edible portion of the food supply of the sample period. Except for a small allowance that should be made for waste, this very nearly represents the average quantity of protein consumed. Although these quantities can not be regarded as exact, we believe that, like the caloric values, they are sufficiently close approximations for the present purpose. By reference to Table XXI we find that diet No. 1 supplies approximately 128; No. 2, 105; No. 3, 84; and No. 4, 85 grams of protein. From this it is evident that the protein supply of the two groups of pellagrous households (No. 3 and No. 4) is identical, and at the same time it is somewhat smaller than that of the groups of nonpellagrous households.

TABLE XXI.—*Approximate protein value of edible portion of foods* [1] *of various groups constituting the average daily supply during a 15-day period between Apr. 16 and June 15, 1916, of specified groups of nonpellagrous households and households in which pellagra occurred during March–July, 1916, in 7 cotton-mill villages of South Carolina.*

| Group of foods. | Number of grams of protein in the average daily food supply per adult male unit of— | | | |
|---|---|---|---|---|
| | Nonpellagrous households. | | Pellagrous households. | |
| | With highest incomes. (1) | With lowest incomes. (2) | With lowest incomes. (3) | With 2 or more cases of pellagra. (4) |
| Meats (exclusive of salt pork), eggs, milk, butter, cheese | 47 | 31 | 18 | 16 |
| Salt pork, lard, and lard substitutes | 3 | 4 | 6 | 5 |
| Dried and canned peas and beans (exclusive of canned string beans) | 8 | 7 | 7 | 8 |
| Wheaten flour, bread, cakes and crackers, corn meal, grits, canned corn, rice | 64 | 60 | 50 | 53 |
| Green and canned vegetables (exclusive of canned corn), green and canned string beans, fruits of all kinds | 4 | 2 | 1 | 2 |
| Irish and sweet potatoes | 1 | 1 | 1 | 1 |
| Sugar, sirup, jellies, and jams | (2) | (2) | (2) | (2) |
| All foods | 128 | 105 | 84 | 85 |
| Calories from protein | 525 | 430 | 344 | 349 |
| Per cent of total calories from protein | 12 | 11 | 10 | 10.5 |

[1] Foods as purchased, less nonedible portion. No deduction has been made for waste of edible portion. The computations of the edible portion and of the protein content are according to the analyses published in Bulletin 28 (revised edition) of the U. S. Department of Agriculture (Atwater and Bryant: The Chemical Composition of American Food Materials). Because of the form in which it was necessary to obtain the records of food supplies from the stores and households, the computations are only approximately correct and not absolutely exact.

[2] Less than 1 gram.

With the exception of the nonpellagrous households of the highest income (No. 1), the protein supply in all these diets is considerably lower than the older American standards (Atwater) call for. Nevertheless, even after allowing for waste, the supply of the pellagrous households exceeds somewhat the allowance of 60 grams considered by Chittenden (1907, p. 272) as being more than sufficient to meet the true needs of the body, and very much exceeds the quantity (25 grams) found by Hindehede (1913, p. 134) to be sufficient. In this connection it may be noted (Table XXI) that the proportion of the total caloric supply derived from protein is practically the same in all four diets under consideration. These facts would suggest, therefore, that the quantity of protein supplied is in itself not an *essential* factor in relation to the incidence of pellagra, although as with the caloric supply the greater average supply of protein in nonpellagrous households would suggest that this may not be without significance.

TABLE XXII.—*Proportion of total protein supply obtained from various groups of foods constituting the average daily supply during a 15-day period between Apr. 16 and June 15, 1916, of specified groups of nonpellagrous households and households in which pellagra occurred during the period March–July, 1916, in 7 cotton-mill villages of South Carolina.*

(See Table XXI.)

| Source of protein supply. | Per cent of total protein in the average daily food supply of— | | | |
|---|---|---|---|---|
| | Nonpellagrous households. | | Pellagrous households. | |
| | With highest income. (1) | With lowest income. (2) | With lowest income. (3) | With 2 or more cases of pellagra. (4) |
| Total protein | 100.0 | 100.0 | 100.0 | 100.0 |
| Meats, eggs, milk, butter, cheese | 36.7 | 29.5 | 21.3 | 18.6 |
| Salt pork, lard, etc | 2.5 | 3.9 | 6.6 | 6.1 |
| Dried and canned peas and beans | 6.2 | 6.8 | 8.7 | 9.1 |
| Flour, bread, corn meal, etc | 50.7 | 56.8 | 59.6 | 62.1 |
| Vegetables and fruits | 3.1 | 1.6 | 1.8 | 2.1 |
| Potatoes | .9 | 1.2 | 1.6 | 1.2 |
| Sugar, sirup, etc | .2 | .2 | .5 | .7 |
| From animal food | 39.2 | 33.3 | 27.9 | 24.7 |
| From cereals and dry legumes | 56.9 | 63.6 | 68.3 | 71.2 |
| Other sources | 4.2 | 3.0 | 3.9 | 4.0 |

In view of the importance attaching to the biologic quality of the protein, particularly emphasized by the recent studies of McCollum and by those of Osborne and Mendel, we have examined the sources of the protein supply of each of the diets here considered and find (Table XXII) that in diet No. 1, approximately 39 per cent, in No. 2 approximately 33 per cent, in No. 3 approximately 28 per cent, and in No. 4 approximately 25 per cent is derived from animal foods.

On the other hand, diet No. 1 derives approximately 57 per cent of its protein from cereals (wheat, maize, rice), and the common dried (including the canned) beans and peas, diet No. 2 derived approximately 64 per cent, diet No. 3 approximately 68 per cent; and diet No. 4 approximately 71 per cent of its protein from these sources. In other words, the protein supply of the nonpellagrous households tends to include, on the one hand, a larger proportion derived from animal foods, and, on the other, a somewhat smaller proportion from cereals and dried legumes than does that of pellagrous households.

In the light of such recent work as that of Osborne and Mendel (Mendel, 1915), and of McCollum (1917) and his associates, these facts would suggest that the protein mixture (amino-acid supply) in the diets of the nonpellagrous households is likely to be of a somewhat better character (physiologitally adequate) than in the diet of the pellagrous groups. This likelihood is increased by the tendency to a larger intake of protein in the former than in the latter.

*Carbohydrate and fat.*—Inasmuch as the protein supply in the diets of the two groups of pellagrous households is quantitatively essentially identical, the total calories being the same, the supply of carbohydrate and fat considered together is, of course, likewise identical. By deducting from the total calorie supply of each of the diets the respective calories from protein, we find that the combined supply of carbohydrate and fat, expressed in calories, is for diet No. 1 approximately 3,740, for No. 2 approximately 3,400, for diet No. 3 approximately 2,940, and for No. 4 approximately 2,960. The average supply of carbohydrate and fat combined is, therefore, somewhat less in the diet of the pellagrous than in that of the nonpellagrous households. As may already have been inferred, however, the proportion of the total calories furnished by these constituents is much the same for all four diets under consideration.

Our data are not in a form to permit of satisfactory computation of the exact proportion of the total calories furnished by carbohydrate apart from fat. We may, however, by a study of Table VI arrive at a fairly satisfactory approximation to it. With the exception of but a negligible quantity the carbohydrate is derived from the foods of other than animal origin, which latter are the principal sources of fat in the diets. Therefore, by deducting the calories derived from (1) the animal protein and (2) the salt pork and lard group from the total calories of the respective diets, we find that diet No. 1 derives approximately 2,765; No. 2, approximately 2,525; No. 3, approximately 2,200; and No. 4, approximately 2,300 calories, or 65, 66, 61, and 61 per cent, respectively, of the total number of calories of the corresponding diets are derived from carbohydrate sources, preponderatingly carbohydrate themselves. The diets of the nonpellagrous households would, therefore, appear actually

somewhat more liberally supplied with carbohydrate than those of the pellagrous households. If allowance is made, however, for the probable error, previously referred to, arising from the character of the data in relation to flour and maize meal which tends to make the supply of these foods appear somewhat larger than they probably actually were in the diets of the nonpellagrous households, the difference in carbohydrate supply is somewhat reduced and, perhaps, largely disappears. In any event these data would not seem to bear out the suggestion repeatedly encountered in the literature (Albera, Gherardini, Strambio) and recently particularly emphasized by Deeks (1912 and 1916), that the production of pellagra is dependent on the excessive consumption of carbohydrate.

*Sources of fat supply.*—It is of interest and importance to consider the sources of the fat supply in these diets. As might have been anticipated from what has gone before, both the nonpellagrous groups enjoy a larger supply from such sources as milk and butter than do the pellagrous. The most important other sources are salt pork and lard, but no significant difference between the diets of pellagrous and nonpellagrous households in the supply from these is discernible.

*Vitamines.*—In the present state of knowledge we have no means of directly measuring the content of a diet in the factors now commonly designated as vitamines. It is possible, however, to compare the relative richness of diets in vitamines on the basis of the relative supply of the foods known to carry these but recently definitely recognized essential food factors.

Since it appears from a study of Table VI (Fig. 3) and from the facts already considered, that the supply in the diets of nonpellagrous and in those of pellagrous households of the South Carolina mill villages studied is substantially the same with respect to all groups of foods except the "animal proteins," of which the nonpellagrous enjoy a notably more liberal supply, it would seem to follow that the diets of the nonpellagrous households are correspondingly richer in the vitamines carried by the foods of this group.

Of the three vitamines at present definitely recognized, this group of foods is believed to be particularly rich in that designated by McCollum as the "fat-soluble A," so that such disparity in vitamine supply as exists between the diets of the nonpellagrous and those of the pellagrous households is particularly marked with respect to the fat-soluble factor.

*Inorganic constituents.*—With respect to the ash constituents, one may compare the diets on much the same basis as that for vitamines. So far as concerns the sources of supply (quantitatively or otherwise) of essential minerals the outstanding differences between the nonpellagrous and the pellagrous households again relates to the group

of animal protein foods of which, in this connection, milk is the most important. Milk being generally recognized as a most valuable source of mineral elements in a diet, this would seem quite clearly to indicate that during the season represented by our data, the mineral make-up of the diets of the nonpellagrous households will tend to be superior to or, at least, is less likely to be deficient as a whole or in any of its elements than that of the pellagrous households.

## VIII. DISCUSSION.

From the data that have been presented it would seem clear that basically the diet of the nonpellagrous and that of the pellagrous households (of comparable economic status) in the communities and at the season studied are much the same, the only outstanding difference being a more liberal supply of the foods of the animal protein group in the diet of the nonpellagrous households. The difference between these diets would seem, therefore, to be one of degree, not of kind. A recognition of this is of great practical importance, for, in the first place, it clearly follows that a mere qualitative statement of the diet, such as most previous workers in this field have contented themselves with may be very misleading, and, further, that a comparison of diets on the basis of data of such character may fail to reveal existing differences of considerable degree and importance, and this all the more when no account is taken of any definite season either in relation to the incidence of the disease or to that in relation to its onset in the individual. These considerations will help to explain many of the seemingly contradictory observations recorded in the literature of the subject, and further will help to make clear how worse than futile are likely to be arguments based on general, more or less hurried, and, therefore, superficial inquiries or surveys.

The significance of the indicated association of a more liberal supply of the animal proteins with a relative or absolute freedom from pellagra is very greatly enhanced by the demonstration of a marked inverse correlation between (1) the supply of milk, (2) the supply of fresh meat, and the incidence of the disease. These results, it may be noted, coincide with those previously reported from the series of studies of which the present is a part, and thus constitute additional evidence of the controlling influence of diet in the prevention and the causation of the disease. It is of interest to note in this connection that, beginning in 1735 with the first pellagrologist, Casal,[1] one finds in the literature repeated mention of an absence or shortage of fresh meat or animal food in the diet of those most subject to pellagra.

In this regard Strambio's comment on Albera's suggestions for the prevention of pellagra is highly significant: "But," says Strambio (1796, p. 133) "to use milk, butter, and fresh cheese in the place of

[1] Cited by Lavinder, 1915.

oil may indeed be practicable in other places, but in the northern part of my country these are wholly lacking."

Accepting the indications of the preventive value of milk and of fresh meat, the question arises as to what element or elements in these foods to credit with their preventive action. The addition of either milk or meat to a diet means, of course, an increase in the content of the diet of the following known dietary factors: (1) Protein of a high biological quality; (2) antiscorbutic, antineuritic, and "fat soluble" vitamines; and (3) ash constituents. The question now becomes, Which of these is to be credited with the preventive action associated with a meat or milk supplement?

With respect to protein, the evidence which has already been considered seems to us to indicate that from the point of view of quantity alone a deficiency in this factor can not be considered as essential to the development of pellagra; considering protein as a combination of amino-acids, however, the possibility of a deficiency in some one or more of these, already suggested by Voegtlin in 1914, can not be excluded, a possibility that must be seriously considered in view of the principal sources of the protein and of the tendency to a relatively low level of intake observable in the diets of the pellagrous households.

It would seem then that while the addition or increase in quantity of milk or meat in a diet can not be interpreted as operating to prevent pellagra simply through a quantitative increase in protein as such, it is possible that such an addition or increase is effective by making good a possibly inadequate intake of some amino-acid or acids; in other words, a high protein diet may be effective, not because there is any actual need for a large quantity of protein as such, but because a larger intake is more likely to assure an adequate supply of all essential amino-acids.

In the course of our study no clinical evidence of a lack of the antiscorbutic or the antineuritic vitamines was observed. This would suggest that at least no gross deficiency in these occurred, an interpretation that is strengthened with respect to the antineuritic vitamine, when we note that all diets were fairly liberally supplied with the foods believed to be rich in this factor. The preventive action of a meat or milk supplement, therefore, would hardly seem to be due, in any important degree at least, to an increase in quantity of these factors.[1] It is more difficult to judge of the rôle of the "fat soluble A" essential, by reason of the meagerness of our knowledge of the symptoms produced by a deficiency in this factor. We observed no in-

[1] The failure to prevent the occurrence of the disease in some individuals consuming a liberal daily supplement of Soy beans and a failure to prevent the disease in two instances after a daily consumption over a considerable period of seven ounces of California black-eyed peas (Goldberger and Tanner; unpublished data) would seem quite conclusively to exclude the antineuritic vitamine, in which these legumes are believed to be rich, from consideration as an essential factor.

flammation of the eye, such as has been observed to occur in rats on diets low in this vitamine, nor was there observed in children affected with the disease a retardation of growth or development analogous to that observed in rats when subsisting on a diet deficient in this dietary essential. If the findings in rats may be applied to the human this would suggest that a deficiency in the "fat soluble" vitamine is not an essential factor in the production of the disease.

While this, as will be seen, is almost certainly the case it would be premature to draw this conclusion from the considerations mentioned. If, as seems probable, a deficiency in the "fat soluble A" may be expected to show itself in the human (child) as it does in the rat by a retardation of growth, the apparent absence of any notable evidence of stunting in pellagrous children can nevertheless not be interpreted as conclusively showing that a deficiency in this factor is not essential in relation to the production of pellagra. For it must be recalled that the rate of growth in the human is relatively small. Retardation to be recognizable by ordinary observation—that is, without careful weight and height measurements—would therefore have to be marked, and this could not be expected to occur except after a continuous period of deprivation of considerable length.

As under natural conditions the diet of human beings is considerably affected by seasonal changes in availability and price, and as there is in pellagra a well-marked seasonal rhythm, it is manifestly possible that the retardation occurring during one period of the year (the period of deprivation, let us say) may, in large part, if not fully, be made up during the succeeding more favorable season. Thus the effects in the child of a deficiency in this or any other growth-promoting factor might readily escape recognition or become appreciable only after the lapse of a considerable number of years, when the cumulative effects of repeated periods of deprivation, with more or less incomplete recoveries, might become sufficiently marked. The possibility that an increase in the "fat soluble A" contained in a meat or milk supplement may be an essential preventive factor would seem, however, to be eliminated by the recent observation by Goldberger and Tanner (unpublished data) of the failure to prevent the occurrence of the disease in two individuals who, daily, during a period of four to five months before developing the eruption, consumed the fat soluble vitamine contained in three ounces of creamery butter.

Another possibly preventive factor that must be considered relates to the ash constituents. Whether an improvement in any of these is essential to the prevention of the disease and is effected by an adequate meat or milk addition the facts before us do not permit of determination; the possibility that it may be can not therefore be excluded.

From the foregoing considerations it would seem that the preventive power of a milk or fresh meat supplement may be due to the effect of a correction of a deficiency in supply (*a*) of some amino-acid or acids; (*b*) of the mineral elements; or (*c*) of some combination of these. There remains also the possibility of some as yet unrecognized factor (vitamine?) that is thus supplied and which alone, or in combination with some one or more of the factors just indicated, operates to prevent the disease.

The analogy between the occasional occurrence of pellagra in nursing infants and the same phenomenon in scurvy is very suggestive in this regard. Opposed to this possibility is McCollum's insistence (1) that but two factors of this nature are essential in mammalian nutrition, and (2) his failure to produce in rats a condition resembling pellagra in man or the pellagra-like symptoms reported by Chittenden and Underhill in the dog. (McCollum, Simmonds, and Parsons, 1919.) The force of these objections disappears, however, when the recent work (Chick, Hume, and Skelton, 1918; Cohen and Mendel, 1918; Hess and Unger, 1918; Harden and Zilva, 1918a and 1918b; and Drummond, 1919) demonstrating the occurrence of a third, a "water soluble C" or antiscorbutic factor is recalled. Evidently we have the possibility that the rat is as unsuitable an experimental animal for pellagra as it is proven to be for scurvy.

Until the essential dietary factor or factors concerned in the prevention of the disease are determined, it would seem warranted to urge for prophylactic purposes an increased consumption of the foods rich in (1) protein (particularly protein of high biological quality), and (2) mineral matter. Besides milk and fresh meat, which our study would seem to indicate provide the essential preventive factor or factors,[1] cheese, fresh green vegetables and fruit may be mentioned as helping to fulfill these requirements.

## IX. SUMMARY AND CONCLUSIONS.

1. To supplement the studies, chiefly experimental, of 1914 and 1915, a study was begun in the spring of 1916, in seven cotton mill villages of South Carolina of the relation of factors of a dietary, economic, and sanitary character to the incidence of pellagra. In the present communication the results of the first year's work with respect to the relation of household diet to pellagra incidence is reported.

2. The selected communities were typical cotton-mill "villages" and were of about average size; none had over 800 or less than 500

[1] It is not to be assumed that a pellagra-preventive diet—that is, a diet that is not pellagra-producing—is necessarily biologically satisfactory in all respects; we believe that quite the contrary may be the case. In other words, a diet may be seriously defective in a number of respects and yet be adequate so far as pellagra-prevention is concerned.

inhabitants. Only the families of white mill operatives were included in the study.

3. Pellagra incidence was determined by a systematic bi-weekly house-to-house search for cases carried on continuously from April 15, 1916, to the end of that year.

4. Only patients with a clearly defined bilaterally symmetrical eruption were recorded as having pellagra. It is suggested that, clinically, pellagra includes at least two commonly associated but etiologically essentially distinct, though closely related, syndromes.

5. Only active cases, without regard to whether they were first or recurrent attacks, were considered; the date of the appearance of the eruption was assumed to mark the onset of the attack.

6. Data relating to household diet were secured by obtaining records of sale from the principal stores, for a 15-day sample period during the season immediately anterior to or coincident with the sharp seasonal rise in incidence of the disease.

7. Comparisons of diets of nonpellagrous with those of pellagrous households revealed that the nonpellagrous enjoyed a more restricted supply of the foods of the "animal protein" group (lean meat, milk, including butter, cheese, and eggs).

8. Increasing supplies of milk or of fresh meat were found associated, one independently of the other, with a decreasing pellagra incidence.

9. No consistent correlation was found between varying supplies of either (1) maize meal, (2) wheat flour, or (3) the common dried legumes, and pellagra incidence. The results of the present study offered no support for the Zeist theory of the etiology of pellagra.

10. The potential energy in the average food supply of pellagrous households, though somewhat less than in that of nonpellagrous households, nevertheless conformed closely to accepted standards so that the fuel supply of the diet would seem in itself not to be an *essential* factor in relation to the incidence of the disease.

11. The quantity of protein in the average food supply of the pellagrous households was somewhat smaller than in that of the supply of nonpellagrous households of comparable economic status; but even after allowing for waste this exceeded somewhat the allowance considered by Chittenden as ample for physiological needs, so that a deficiency in total protein would seem not to be an *essential* factor in relation to the incidence of the disease.

12. The protein supply of the pellagrous households tended to include, on the one hand, a somewhat smaller proportion derived from animal foods and, on the other, a somewhat larger proportion from cereals and the common mature beans and peas, which would suggest that the protein mixture (amino-acid supply) in the diets of the nonpellagrous households is more likely to be physiologically adequate than that in the diets of the pellagrous groups.

13. The proportion of calories derived from carbohydrate and fat combined is essentially identical in the supply both of pellagrous and of nonpellagrous households. The supply of carbohydrate is, if anything, somewhat smaller in the diets of the pellagrous than in those of the nonpellagrous households, so that the production of pellagra would seem not to be dependent on the excessive consumption of this nutrient.

14. The diets of the pellagrous households have a smaller average supply of the recognized vitamines than do those of the nonpellagrous, the disparity in supply being particularly marked with respect to the "fat soluble A" factor.

15. The mineral makeup of the diets of the nonpellagrous households will tend to be superior to, or, at least, is less likely to be deficient either as a whole or in any of its elements than that of the pellagrous households.

16. The indications afforded by this study suggest that the pellagra-preventive power of a milk or a meat supplement is due to the effect of a correction in the type of diet studied, of a deficiency in supply either (1) of some amino-acid or acids, (2) of the ash or of some of its constituents, (3) of some as yet unknown essential (vitamine?), or (4) of all or of a combination or combinations of some of these. Conversely, they suggest that the pellagra-producing dietary fault is the result of some one or of a combination or combinations of two or more of the following factors: (1) A physiologically defective protein (animo-acid) supply; (2) a defective or inadequate mineral supply; (3) a deficiency in an as yet unknown dietary essential (vitamine?). The somewhat lower plane of supply, both of potential energy and of protein, in the diets of the pellagrous households, though apparently not an essential factor, may, nevertheless, be contributory by favoring the occurrence of a deficiency in intake of some one or more of the essential dietary factors, particularly with diets having only a narrow margin of safety.

17. The indications afforded by this study clearly point to an increase in the availability of milk, particularly by increasing cow ownership, and of fresh meat, by all-year-round meat markets as important practical measures of prevention and control in communities of the character studied.

*Addendum:* After our manuscript had gone to press there came to hand a copy of the "Report of a Committee of Enquiry Regarding the Prevalence of Pellagra among Turkish Prisoners of War" in Egypt (published February, 1919). Among the conclusions reached, the following are of most interest in the present connection:

I. "There is no evidence of the presence of any bacterial infection standing in etiological relation to pellagra."

II. "There is no evidence of infection by any protozoal, spirochetal, or ultramicroscopic organism standing in etiological relation to pellagra."

III. "Pellagra is due to a deficiency in protein, as gauged by its biological value."

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## APPENDIX.

### EXPLANATION OF ARTICLES AND GROUPS OF ARTICLES OF FOOD PRESENTED IN TABLES I, ET SEQ.

In order to lessen the detail of the tables presenting comparisons of the average supply of various groups of households, certain broad groupings of articles of food have been made which are defined in the following.

*Fresh meats* include all meats not cured, salted, or canned. The great bulk of "fresh meats" was beef. Occasionally sausage (made of beef and pork), poultry, fish, and fresh pork occurred in the household food supplies. All of the beef and pork purchased by the households during the 15-day periods were slaughtered locally and sold without much regard to cut, except with the following general distinctions: Beef was sold as "steak," "roast," and "stew meat," and pork was sold altogether in the form of sausage (mixed with beef), very little pork being slaughtered at the time of the year during which the data were collected. The prices at which steak, roast, and stew meat were sold were fairly generally in the following ratio: Steak 100, roast 75, and stew meat 50. "Stew meat" included rib meat, brisket, and all of the beef not sold as roast or steak. For these reasons this meat rather than steak or roast was more commonly purchased by the poorer households. All poultry were home or locally produced and killed at home. Fish was a local product in two villages which were near streams and, relatively, were unimportant components of the fresh meat groups.

*Cured lean meats* include all cured and salted meats, except salt pork, and consisted principally of bologna sausage, occasionally pork, shoulders and ham, and, rarely, breakfast bacon. All these articles were packers' products.

*Canned meats* include a considerable variety of kinds and brands manufactured by well-known packing and canning establishments. Salmon was by far the most important article in this group. For each household purchasing during the 15-day period "Vienna" sausage, "pork" sausage, roast beef, chipped beef, and oysters, two purchased sardines, three purchased tripe and corned beef, four purchased potted meats, and thirty used salmon.

*Eggs* were all country eggs, no cold storage eggs being sold.

*Fresh milk* includes sweet whole milk and buttermilk, the greater proportion being buttermilk. In every instance the buttermilk was from churnings made in the mill workers' households or in the households of near-by farmers, the practice being to leave a considerable residue of the butter in the milk because of unimproved methods of butter-making. The sweet milk in all cases was purchased whole or was from home-owned cows. In some households it was skimmed lightly to obtain cream for coffee. Practically all of the cows in this section were of mixed breed, with the Jersey perhaps predominating. In computing the weight of milk the specific gravity was assumed to be about 1.03.

*Preserved milk* includes evaporated milk and, in a very few cases, condensed milk, of the commonly known brands.

*Butter* in all instances was homemade or country made, all being produced locally; no butter substitutes were purchased.

*Cheese* in all instances was "American" pale cheese; none was home or locally produced.

*Dried peas and beans* include several varieties of each. Beans were principally "pink" beans (*Phaseolus vulgaris*), less frequently "white" beans, and infrequently lima beans. Peas were of the general variety known in this section as "field" peas, for the most part commonly known as "blackeyed peas." Apparently the varieties of either beans or peas were used rather indiscriminately. Beans were purchased by approximately twice as many households as were peas.

*Canned peas and beans* include the commonly known brands of English peas and "pork and beans." Of the two, beans were more frequently bought, the peas being rarely used. (Canned string beans are given as a separate article of food in the accompanying tables.)

*Wheat flour* in all instances was standard patent flour. None of it was locally milled. It was sold as "plain" flour or as "self-rising" flour, the latter being a "prepared flour" (of which several brands were available) which required no baking powders in biscuit making. Where "plain" flour was purchased, a preparation known as "Horseford's bread preparations" was usually purchased.

*Wheat bread, cakes and crackers* include only bakery products. The bread was made from standard patent flour. Crackers were the common "soda crackers." In this group are included a miscellaneous variety of small sweet cakes or cookies sold loose or in 5-cent cartons and manufactured by well-known biscuit companies. Cakes and crackers were purchased only occasionally for household use.

*Corn meal.* All maize meal used during the period for which records were secured and, so far as could be ascertained, during the winter of 1915–1916 and the entire spring of 1916, was of local production and milling or of the generally adjacent section. None of it was highly milled, much of it only slightly bolted, and most of it was the so-called "water-ground meal" (i. e., ground in water-power mills). In this connection it may be noted that merchants selling to mill workers stated that there was a marked preference on the part of mill workers for the locally milled meal, partly because it was believed to have a better taste and to spoil less quickly, and partly because of a rather general belief that "shipped-in" meals were a cause of pellagra.

*Grits* (coarsely-ground maize) was not locally produced, and was of the variety generally available at groceries.

*Canned corn* was corn cut off the cob and canned by well-known manufacturers. A considerable proportion of the canned corn was not "sweet" or "garden" corn, but the ordinary variety of "field" corn.

*Rice* was the white polished variety commonly purchasable at groceries.

*Salt pork.* With the exception of a very few households which had salt pork left from home slaughtering of the preceding fall and winter, all of the salt pork was shipped from national packing centers. This salt pork was of two kinds, the "fat back" and "sow belly," cut from the back and the belly of the hog, and the "streaked meat" or "rib meat," cut from under the ribs. The fat back and sow belly contained no lean, but in the rib meat there was a small "streak" of lean. The latter was slightly higher in price and was used to a much less extent than the former. Salt pork is cooked and eaten with greens and green string beans and dried peas and beans, and also fried. When fried, the grease is mixed with flour (occasionally a little milk is added) to make a gravy which is eaten with home-made biscuits and bread, and the remainder of the meat or crackling is eaten as bacon. Much of the grease from frying is used in cooking, and to that extent displaces lard or lard substitutes.

*Lard and lard substitutes* include the so-called "leaf lards" and the "compound lard" manufactured and sold generally. It was found impracticable to differentiate in many instances between lard and

lard substitutes in the purchase records and family statements. From such information as was secured it appeared that lard substitutes were used much more generally than lard, the approximate ratio being 3 or 4 to one.

*Green string beans* were beginning to be available in the stores during the periods for which data were obtained, only a very few households getting them from home gardens or from other sources. These beans were eaten unshelled. In this group are included a very few households having green English peas.

*Canned string beans* were the brands commonly purchasable at groceries.

*Green vegetables* include cabbage, onions, and turnip and mustard greens, purchased at stores. Of the articles named, cabbage was the preponderating one, onions being infrequently used and then only in small quantities, while greens were rarely purchased. These articles were shipped in from other sections of the South.

In some households home gardens were beginning to yield a little lettuce, greens, onions, and cabbage. The amounts were not large, although a fair proportion of the households were "getting a mess" occasionally. The data were not secured in such a form as to permit of the inclusion of home-grown green vegetables in the tabulations, and will be referred to in another connection.

The bought vegetables (or "store" vegetables) may be said to constitute the supply which was available throughout the winter and spring of the year; while the home-produced green vegetables may be said to constitute the supply which began to be available for a proportion of the households in small quantities in the late spring and to an increasing extent after about June 15.

*Canned vegetables* include all canned vegetables except legumes and potatoes. Practically all of the canned vegetables used were tomatoes, kraut, and beets, the frequency of their purchase being in the ratio of about 1 of beets to 3 of kraut and 15, or more, of tomatoes. These vegetables were of the brands generally purchasable at groceries.

*Fresh fruits* include bananas, apples, oranges, and lemons. Of these, bananas and apples were the predominating varieties, oranges and lemons being used infrequently. Bananas were consumed principally by mill-working members of the households between meals or at midday lunches, while apples entered more largely into the general household diet.

*Dried fruits* include only apples and peaches, both being of the "evaporated" variety. The two fruits were used to an approximately equal extent.

*Canned fruits* include principally peaches and a few blackberries and apples. With rare exceptions these articles were purchased at stores and were of the commonly known brands.

*Irish potatoes* were purchased in all instances from stores, and, in all except a small proportion of households, were of the preceding season's crop. Spring potatoes began to be sold about May 15, but their price was nearly double that of the fall crop.

*Fresh or raw sweet potatoes* were purchased in all instances from stores. They were only occasionally available during the periods for which data were secured, and had been scarce during the winter months.

*Canned sweet potatoes* were from canneries in adjacent sections, principally North Carolina.

*Sugar* included only the common white granulated variety.

*Sirup* included only "corn sirup," the most popular brand being the "Karo corn sirup."

*Jellies and jams* include, with few exceptions, the cheaper varieties commonly purchasable at groceries. The exceptions were home-made jellies and "preserves" which were used by a very small proportion of the households. The jellies purchased at stores were apple jelly with various flavors.

*All other foods* include principally coffee, tea, baking powder, soda, "bread preparation," and condiments. Their combined average cost was approximately 1 per cent of the total average cost of the purchased household food supply.

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## DEATHS DURING WEEK ENDED MAR. 6, 1920.

[From the "Weekly Health Index," Mar. 9, 1920, issued by the Bureau of the Census, Department of Commerce.]

*Deaths from all causes in certain large cities of the United States during the week ended Mar. 6, 1920, infant mortality (per cent), annual death rates, and comparison with corresponding week of preceding years.*

| City. | Population July 1, 1918, estimated. | Week ended Mar. 6, 1920. | | Average annual death rate per 1,000.[2] | Per cent of deaths under 1 year. | |
|---|---|---|---|---|---|---|
| | | Total deaths. | Death rate.[1] | | Week ended Mar. 6, 1920. | Previous year or years.[2] |
| Albany, N. Y. | 112,565 | 38 | 17.6 | C 19.9 | 13.2 | C 23.3 |
| Atlanta, Ga. | 201,732 | 105 | 27.1 | C 16.5 | 14.3 | C 14.1 |
| Baltimore, Md. | [3] 669,981 | 272 | 21.2 | A 20.2 | 16.5 | A 15.6 |
| Birmingham, Ala. | 197,670 | 123 | 32.4 | A 17.9 | 19.5 | A 12.8 |
| Boston, Mass. | 785,245 | 294 | 19.5 | A 18.9 | 11.6 | A 14.5 |
| Buffalo, N. Y. | 473,229 | 199 | 21.9 | C 17.1 | 16.6 | C 20.6 |
| Cambridge, Mass. | 111,432 | 37 | 17.3 | A 14.5 | 10.8 | A 14.6 |
| Chicago, Ill. | 2,596,681 | 796 | 16.0 | A 17.5 | 15.7 | A 20.4 |
| Cincinnati, Ohio | [4] 401,158 | 200 | 26.0 | C 20.0 | 12.0 | C 12.5 |
| Cleveland, Ohio. | 810,306 | 240 | 15.4 | C 12.1 | 17.9 | C 12.2 |
| Columbus, Ohio. | 225,296 | 83 | 19.2 | C 18.1 | 13.3 | C 15.4 |
| Dayton, Ohio. | 130,655 | 63 | 25.1 | C 22.3 | 6.3 | C 8.9 |
| Denver, Colo. | ..... | 83 | ..... | ..... | 7.2 | ..... |
| Detroit, Mich. | ..... | 303 | ..... | ..... | 21.8 | ..... |

[1] Annual rates per 1,000 estimated population.
[2] "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive. "C" indicates data for the corresponding week of the year 1917.
[3] Population estimated as of July 1, 1919.
[4] 1920 enumeration; subject to revision.

## DEATHS DURING WEEK ENDED MAR. 6, 1920—Continued.

*Deaths from all causes in certain large cities of the United States during the week ended Mar. 6, 1920, infant mortality (per cent), annual death rates, and comparison with corresponding week of preceding years*—Continued.

| City. | Population July 1, 1918, estimated. | Week ended Mar. 6, 1920. | | Average annual death rate per 1,000.[2] | Per cent of deaths under 1 year. | |
|---|---|---|---|---|---|---|
| | | Total deaths. | Death rate.[1] | | Week ended Mar. 6, 1920. | Previous year or years.[2] |
| Fall River, Mass | 128,392 | 63 | 25.6 | C 19.9 | 17.5 | C 20.4 |
| Grand Rapids, Mich | 135,450 | 41 | 15.8 | C 8.5 | 12.2 | C 13.6 |
| Indianapolis, Ind | 290,389 | 99 | 17.8 | C 16.9 | 13.1 | C 11.7 |
| Jersey City, N. J | 318,770 | 93 | 15.2 | C 16.2 | 15.1 | C 11.1 |
| Kansas City, Mo | 313,785 | 105 | 17.4 | C 14.3 | 15.2 | C 10.5 |
| Los Angeles, Calif | 568,495 | 219 | 20.1 | A 13.9 | 8.7 | A 7.6 |
| Louisville, Ky | 242,707 | 96 | 20.6 | C 16.8 | 11.5 | C 7.7 |
| Lowell, Mass | 109,081 | 68 | 32.5 | A 19.0 | 23.5 | A 20.3 |
| Memphis, Tenn | ..... | 107 | ..... | C 21.6 | 10.3 | C 9.4 |
| Milwaukee, Wis | 453,481 | 101 | 11.6 | A 15.2 | 25.7 | A 25.4 |
| Minneapolis, Minn | 383,442 | 105 | 14.3 | C 11.6 | 13.3 | C 12.9 |
| Nashville, Tenn | 119,215 | 57 | 24.9 | C 17.5 | 8.8 | C 17.5 |
| Newark, N. J | 428,684 | 141 | 17.2 | C 17.4 | 20.6 | C 14.7 |
| New Haven, Conn | 154,865 | 69 | 23.2 | C 12.1 | 18.8 | C 11.1 |
| New Orleans, La | 382,273 | 205 | 28.0 | A 21.2 | 6.8 | A 9.7 |
| New York, N. Y | 5,215,879 | 1,712 | 17.1 | C 17.0 | 15.1 | C 14.7 |
| Oakland, Calif | 214,206 | 67 | 16.3 | A 12.9 | 13.4 | A 8.5 |
| Omaha, Nebr | 180,264 | 53 | 15.3 | C 12.7 | 20.8 | C 15.9 |
| Philadelphia, Pa | 1,761,371 | 731 | 21.6 | [3] 17.9 | 13.0 | [3] 13.1 |
| Pittsburgh, Pa | 593,303 | 246 | 21.6 | C 17.2 | 12.6 | C 21.4 |
| Portland, Oreg | ..... | 88 | ..... | ..... | 5.7 | C 9.5 |
| Providence, R. I | 263,613 | 112 | 22.2 | C 15.4 | 15.2 | C 14.1 |
| Richmond, Va | 160,719 | 59 | 19.1 | C 22.1 | 25.4 | C 8.8 |
| Rochester, N. Y | 264,856 | 82 | 16.1 | C 15.4 | 23.2 | C 17.9 |
| St. Louis, Mo | 779,951 | 206 | 13.8 | C 19.9 | 6.8 | C 12.1 |
| St. Paul, Minn | 257,699 | 58 | 11.7 | C 10.1 | 12.1 | C 14.0 |
| San Francisco, Calif | 478,530 | 168 | 18.3 | C 16.8 | 7.7 | C 8.4 |
| Seattle, Wash | ..... | 107 | ..... | ..... | 4.7 | A 11.4 |
| Spokane, Wash | ..... | 40 | ..... | ..... | 7.5 | C 10.7 |
| Syracuse, N. Y | 161,404 | 51 | 16.5 | C 13.9 | 15.7 | C 11.6 |
| Toledo, Ohio | 262,234 | 83 | 16.5 | A 17.2 | 10.8 | A 14.4 |
| Washington, D. C | [4] 437,414 | 141 | 16.8 | A 19.5 | 11.3 | A 10.2 |
| Worcester, Mass | 173,650 | 88 | 26.4 | C 18.0 | 11.4 | C 8.3 |

[1] Annual rates per 1,000 estimated population.
[2] "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive. "C" indicates data for the corresponding week of the year 1917
[3] Data are based on statistics of 1915, 1916, and 1917.
[4] 1920 enumeration, subject to revision.

*Summary of information received by telegraph from industrial insurance companies for week ended Mar. 6, 1920.*

| | |
|---|---|
| Policies in force | 42,773,976 |
| Number of death claims | 14,598 |
| Death claims per 1,000 policies in force, annual rate | 17.8 |

# 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 STATE SUMMARIES.

### Telegraphic Reports for Week Ended Mar. 13, 1920.

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

ALABAMA.

| | Cases. |
|---|---|
| Chicken pox | 18 |
| Diphtheria | 10 |
| Influenza | 1,047 |
| Measles | 43 |
| Pneumonia (all forms) | 52 |
| Scarlet fever | 9 |
| Smallpox | 32 |
| Tuberculosis (pulmonary) | 16 |
| Typhoid fever | 3 |
| Whooping cough | 20 |

ARKANSAS.

| | |
|---|---|
| Cerebrospinal meningitis | 2 |
| Chicken pox | 26 |
| Diphtheria | 8 |
| Hookworm | 1 |
| Influenza | 2,055 |
| Malaria | 63 |
| Measles | 61 |
| Ophthalmia neonatorum | 1 |
| Pellagra | 7 |
| Pneumonia | 68 |
| Poliomyelitis | 1 |
| Scarlet fever | 2 |
| Smallpox | 22 |
| Trachoma | 2 |
| Tuberculosis | 7 |
| Typhoid fever | 14 |
| Whooping cough | 61 |

CALIFORNIA.

| | |
|---|---|
| Cerebrospinal meningitis—Oakland | 1 |
| Influenza | 496 |
| Leprosy—Sacramento | 1 |
| Smallpox: | |
| Los Angeles County | 17 |
| Scattering | 57 |
| Typhoid fever | 5 |

CONNECTICUT.

| | Cases. |
|---|---|
| Cerebrospinal meningitis: | |
| Bridgeport | 1 |
| New Haven | 1 |
| New London | 1 |
| Chicken pox | 24 |
| Conjunctivitis | 2 |
| Diphtheria: | |
| Hartford County—Hartford | 9 |
| New Haven County—New Haven | 13 |
| Scattering | 47 |
| Influenza: | |
| Fairfield County | 27 |
| Hartford County | 56 |
| Litchfield County | 11 |
| Middlesex County | 9 |
| New Haven County | 24 |
| New London County | 51 |
| Windham County | 51 |
| Measles: | |
| Fairfield County— | |
| Bridgeport | 7 |
| Stamford | 9 |
| Hartford County— | |
| Hartford | 13 |
| Plainville | 32 |
| Litchfield County—Winchester | 16 |
| New Haven County—New Haven | 33 |
| New London County—New London | 101 |
| Scattering | 68 |
| Mumps | 35 |
| Pneumonia | 31 |
| Scarlet fever: | |
| New Haven County— | |
| New Haven | 8 |
| Waterbury | 35 |
| Scattering | 45 |
| Tuberculosis | 55 |
| Typhoid fever | 1 |
| Whooping cough | 50 |

| DELAWARE. | Cases. |
|---|---|
| Diphtheria | 6 |
| Influenza: | |
| Milford | 13 |
| Odessa | 7 |
| Scattering | 13 |
| Malaria | 1 |
| Measles | 92 |
| Mumps | 5 |
| Pneumonia | 14 |
| Scarlet fever | 5 |
| Tuberculosis | 2 |
| Typhoid fever | 1 |
| Whooping cough | 4 |

| FLORIDA. | |
|---|---|
| Diphtheria | 1 |
| Dysentery | 3 |
| Influenza | 413 |
| Malaria | 6 |
| Pneumonia | 25 |
| Scarlet fever | 6 |
| Smallpox | 3 |
| Typhoid fever | 2 |

| GEORGIA. | |
|---|---|
| Cerebrospinal meningitis | 1 |
| Chicken pox | 38 |
| Conjunctivitis (acute infectious) | 1 |
| Diphtheria | 8 |
| German measles | 1 |
| Hookworm | 11 |
| Influenza | 3,087 |
| Malaria | 18 |
| Measles | 68 |
| Mumps | 16 |
| Pneumonia | 126 |
| Scarlet fever | 5 |
| Septic sore throat | 12 |
| Smallpox | 61 |
| Tuberculosis (all forms) | 12 |
| Typhoid fever | 3 |
| Whooping cough | 3 |

| ILLINOIS. | |
|---|---|
| Cerebrospinal meningitis: | |
| Cook County—Maine Township | 1 |
| Maywood | 1 |
| Sesser | 1 |
| Diphtheria: | |
| Chicago | 101 |
| Scattering | 20 |
| Influenza: | |
| Chicago | 117 |
| Scattering | 336 |
| Lethargic encephalitis: | |
| Chicago | 7 |
| Clinton | 1 |
| Decatur | 1 |
| Quincy Soldiers' and Sailors' Home | 1 |
| Pneumonia: | |
| Chicago | 144 |
| Scattering | 12 |
| Scarlet fever: | |
| Chicago | 245 |
| McHenry County—Seneca Township | 8 |

| ILLINOIS—continued. | Cases. |
|---|---|
| Scarlet fever—Continued. | |
| Rockford | 7 |
| Woodstock | 8 |
| Scattering | 114 |
| Smallpox | 41 |
| Typhoid fever | 9 |

| INDIANA. | |
|---|---|
| Diphtheria: | |
| Lake County | 15 |
| Marion County | 8 |
| Scattering | 15 |
| Influenza: | |
| Decatur County | 80 |
| Greene County | 82 |
| Parke County | 54 |
| Randolph County | 200 |
| Shelby County | 205 |
| Sullivan County | 104 |
| Switzerland County | 100 |
| Scattering | 259 |
| Measles: | |
| Bartholomew County | 96 |
| Cass County | 36 |
| Clark County | 40 |
| Dearborn County | 27 |
| Delaware County | 33 |
| Hendricks County | 41 |
| Marion County | 166 |
| Randolph County | 27 |
| Switzerland County | 50 |
| Tippecanoe County | 32 |
| Vigo County | 23 |
| Wayne County | 16 |
| White County | 16 |
| Rabies in animal: | |
| Bartholomew County | 1 |
| Scarlet fever: | |
| Carroll County | 7 |
| Cass County | 21 |
| Elkhart County | 27 |
| Lake County | 10 |
| Marion County | 24 |
| Randolph County | 9 |
| Scattering | 79 |
| Smallpox: | |
| Cass County | 8 |
| Clay County | 19 |
| Clinton County | 8 |
| Fountain County | 12 |
| Jennings County | 7 |
| Marion County | 22 |
| Posey County | 8 |
| White County | 16 |
| Scattering | 66 |

| IOWA. | |
|---|---|
| Chicken pox | 1 |
| Diphtheria | 10 |
| Influenza: | |
| Clayton County | 7 |
| Davis County | 13 |
| Iowa County | 16 |
| Shelby County | 39 |
| Seymour | 10 |
| Scattering | 11 |

IOWA—continued.

| | Cases. |
|---|---|
| Measles: | |
| Lyon | 10 |
| Scattering | 11 |
| Mumps | 2 |
| Scarlet fever: | |
| Des Moines | 9 |
| Scattering | 52 |
| Smallpox: | |
| Blairstown | 15 |
| Cedar Rapids | 7 |
| Davenport | 16 |
| Gilmore | 16 |
| Scattering | 41 |
| Whooping cough | 1 |

KANSAS.

| | |
|---|---|
| Diphtheria | 44 |
| Influenza | 1,551 |
| Scarlet fever | 51 |
| Smallpox | 98 |

LOUISIANA.

| | |
|---|---|
| Cerebrospinal meningitis | 4 |
| Diphtheria | 6 |
| Influenza | 1,982 |
| Pneumonia | 35 |
| Scarlet fever | 4 |
| Smallpox | 41 |
| Typhoid fever | 6 |

MAINE.

| | |
|---|---|
| Chicken pox | 16 |
| Diphtheria | 9 |
| Influenza: | |
| Mapleton | 27 |
| Millinocket | 27 |
| Paris | 44 |
| Peru | 26 |
| South Berwick | 30 |
| Standish | 20 |
| Stonington | 300 |
| Thomaston | 75 |
| Vinal Haven | 91 |
| Wilton | 65 |
| Scattering | 400 |
| Measles: | |
| North Berwick | 12 |
| South Berwick | 9 |
| Scattering | 6 |
| Mumps | 23 |
| Ophthalmia neonatorum | 1 |
| Pneumonia | 37 |
| Scarlet fever | 28 |
| Smallpox | 6 |
| Tuberculosis | 13 |
| Typhoid fever | 8 |
| Whooping cough | 10 |

MARYLAND.[1]

| | |
|---|---|
| Chicken pox | 50 |
| Diphtheria | 47 |
| German measles | 3 |
| Influenza | 1,206 |
| Lethargic encephalitis | 1 |
| Measles | 323 |

MARYLAND—continued.

| | Cases. |
|---|---|
| Meningitis | 3 |
| Mumps | 22 |
| Pneumonia (all forms) | 178 |
| Poliomyelitis | 1 |
| Scarlet fever | 88 |
| Smallpox | 7 |
| Tuberculosis | 127 |
| Typhoid fever | 6 |
| Whooping cough | 29 |

MASSACHUSETTS.

| | |
|---|---|
| Cerebrospinal meningitis | 8 |
| Chickenpox | 93 |
| Conjunctivitis (suppurative) | 13 |
| Diphtheria | 102 |
| German measles | 13 |
| Influenza | 490 |
| Measles | 552 |
| Mumps | 216 |
| Ophthalmia neonatorum | 21 |
| Pneumonia (lobar) | 139 |
| Scarlet fever | 242 |
| Septic sore throat | 3 |
| Trachoma | 1 |
| Tuberculosis (all forms) | 169 |
| Typhoid fever | 7 |
| Whooping cough | 255 |

MINNESOTA.

| | |
|---|---|
| Cerebrospinal meningitis | 2 |
| Smallpox | 7 |

MONTANA.

| | |
|---|---|
| Diphtheria | |
| Influenza | 206 |
| Pneumonia (lobar) | 5 |
| Scarlet fever | 18 |
| Smallpox | 32 |

NEBRASKA.

| | |
|---|---|
| Cerebrospinal meningitis: | |
| Ceresco | 1 |
| Chickenpox | 14 |
| Diphtheria: | |
| Nelson | 14 |
| Scattering | 2 |
| Influenza | 834 |
| Measles: | |
| Lincoln | 31 |
| Omaha | 41 |
| Scattering | 19 |
| Mumps | 4 |
| Scarlet fever: | |
| Omaha | 27 |
| Scattering | 49 |
| Smallpox: | |
| Cedar Bluffs | 7 |
| Ceresco | 7 |
| Douglas | 7 |
| Franklin County | 11 |
| Omaha | 9 |
| Palmer | 13 |
| Wapoo | 7 |
| Scattering | 71 |
| Typhoid fever | 1 |
| Whooping cough | 19 |

[1] Week ended Friday.

| NEW JERSEY. | Cases. |
|---|---|
| Influenza | 365 |
| Pneumonia | 226 |
| **NEW MEXICO.** | |
| Chicken pox | 12 |
| Diphtheria: | |
| Quay County | 10 |
| Scattering | 8 |
| Influenza | 97 |
| Pneumonia | 35 |
| Poliomyelitis | 1 |
| Scarlet fever | 7 |
| Smallpox | 7 |
| Tuberculosis | 33 |
| Typhoid fever | 3 |
| Whooping cough | 2 |
| **NEW YORK.** | |
| (Exclusive of New York City.) | |
| Cerebrospinal meningitis—Oyster Bay | 1 |
| Diphtheria | 85 |
| Influenza | 2,434 |
| Measles | 684 |
| Pneumonia | 333 |
| Poliomyelitis—Rochester | 1 |
| Scarlet fever | 177 |
| Smallpox | 1 |
| Typhoid fever | 7 |
| Whooping cough | 180 |
| **NORTH CAROLINA.** | |
| Cerebrospinal meningitis | 4 |
| Chicken pox | 10 |
| Diphtheria | 24 |
| German measles | 2 |
| Measles | 67 |
| Pneumonia (all forms) | 133 |
| Poliomyelitis | 1 |
| Scarlet fever | 24 |
| Septic sore throat | 3 |
| Smallpox | 78 |
| Whooping cough | 107 |
| **OHIO.** | |
| Scarlet fever: | |
| Akron | 33 |
| Chesapeake | 11 |
| Cincinnati | 73 |
| Cuyahoga Falls | 19 |
| Dayton | 11 |
| Lawrence County—Fayette Township | 4 |
| Marion County—Big Island Township | 11 |
| Summit County—Springfield Township | 19 |
| Smallpox: | |
| Alger | 12 |
| Cuyahoga Falls | 4 |
| **SOUTH DAKOTA.** | |
| Chicken pox | 11 |
| Diphtheria | 4 |
| Influenza | 120 |
| Measles | 41 |
| Pneumonia | 12 |
| Scarlet fever | 23 |
| Smallpox | 15 |
| Trachoma | 15 |
| Whooping cough | 6 |

| VERMONT. | Cases |
|---|---|
| Chicken pox | 34 |
| Diphtheria | 6 |
| Influenza | 470 |
| Measles | 90 |
| Mumps | 111 |
| Pneumonia | 42 |
| Scarlet fever | 13 |
| Whooping cough | 40 |
| **VIRGINIA.** | |
| Cerebrospinal meningitis: | |
| Amelia County | 1 |
| Buchanan County | 2 |
| Hanover County | 1 |
| Smallpox: | |
| Lee County, several. | |
| Grayson County, several. | |
| Portsmouth County, several. | |
| Shenandoah County | 6 |
| Warren County | 1 |
| **WASHINGTON.** | |
| Chicken pox | 43 |
| Diphtheria | 9 |
| Influenza | 271 |
| Measles | 213 |
| Mumps | 34 |
| Pneumonia | 17 |
| Scarlet fever | 63 |
| Smallpox | 147 |
| Tuberculosis | 18 |
| Typhoid fever | 3 |
| Whooping cough | 41 |
| **WEST VIRGINIA.** | |
| Diphtheria | 14 |
| Measles: | |
| Parkersburg | 8 |
| Wheeling | 43 |
| Scattering | 13 |
| Scarlet fever | 8 |
| Smallpox: | |
| Salem | 10 |
| Scattering | 9 |
| Typhoid fever | 2 |
| **WISCONSIN.** | |
| Milwaukee: | |
| Cerebrospinal meningitis | 1 |
| Chicken pox | 58 |
| Diphtheria | 28 |
| Influenza | 7 |
| Measles | 69 |
| Rubella | 4 |
| Scarlet fever | 32 |
| Smallpox | 11 |
| Tuberculosis | 18 |
| Whooping cough | 71 |
| Scattering: | |
| Cerebrospinal meningitis | 3 |
| Chicken pox | 30 |
| Diphtheria | 20 |
| Influenza | 547 |
| Measles | 325 |
| Scarlet fever | 103 |
| Smallpox | 128 |
| Tuberculosis | 8 |
| Whooping cough | 68 |

## Kentucky Report for Week Ended Feb. 28, 1920.

| Cerebrospinal meningitis: | Cases. |
|---|---|
| Hardin County | 1 |
| Ohio County | 1 |
| Owen County | 2 |
| Chicken pox | 36 |
| Diphtheria | 29 |
| Dysentery | 9 |
| Erysipelas | 1 |
| Influenza: | |
| Ballard County | 350 |
| Bell County | 328 |
| Boyd County | 161 |
| Caldwell County | 288 |
| Carlisle County | 149 |
| Carter County | 144 |
| Christian County | 172 |
| Clarke County | 213 |
| Clay County | 239 |
| Daviess County | 189 |
| Fleming County | 170 |
| Grant County | 371 |
| Graves County | 184 |
| Hancock County | 164 |
| Harrison County | 323 |
| Henderson County | 119 |
| Henry County | 173 |
| Jefferson County | 174 |
| Kenton County | 121 |
| Knox County | 107 |
| Lawrence County | 279 |
| Logan County | 268 |
| Mason County | 238 |
| Muhlenburg County | 356 |
| Owen County | 120 |
| Scott County | 163 |
| Shelby County | 114 |
| Wayne County | 107 |
| Scattering | 2,800 |
| Malaria | 3 |
| Measles: | |
| Campbell County | 53 |
| Carlisle County | 12 |
| Clarke County | 12 |
| Clay County | 17 |
| Cumberland County | 10 |
| Fleming County | 37 |
| Graves County | 13 |
| Harrison County | 12 |

| Measles—Continued. | Cases. |
|---|---|
| Kenton County | 34 |
| Laurel County | 12 |
| McCracken County | 24 |
| Marion County | 9 |
| Simpson County | 8 |
| Todd County | 9 |
| Scattering | 66 |
| Mumps | 19 |
| Ophthalmia neonatorum: | |
| Hardin County | 1 |
| Pellagra | 1 |
| Pneumonia: | |
| Ballard County | 24 |
| Boyd County | 29 |
| Caldwell County | 15 |
| Clarke County | 14 |
| Clay County | 32 |
| Fleming County | 9 |
| Graves County | 11 |
| Hardin County | 10 |
| Harrison County | 16 |
| Jefferson County | 21 |
| Kenton County | 12 |
| Lawrence County | 16 |
| Scattering | 209 |
| Scarlet fever: | |
| Hancock County | 6 |
| Jefferson County | 9 |
| Kenton County | 6 |
| Scattering | 25 |
| Septic sore throat | 11 |
| Smallpox: | |
| Ballard County | 7 |
| Carlisle County | 5 |
| Knox County | 6 |
| Muhlenburg County | 5 |
| Pike County | 10 |
| Wayne County | 9 |
| Webster County | 9 |
| Whitley County | 5 |
| Scattering | 35 |
| Tonsillitis | 4 |
| Trachoma | 3 |
| Tuberculosis | 54 |
| Typhoid fever | 34 |
| Whooping cough | 56 |

## Kentucky Report for Week Ended Mar. 6, 1920.

| Cerebrospinal meningitis: | Cases. |
|---|---|
| Daviess County | 1 |
| Graves County | 1 |
| Jefferson County | 1 |
| Chicken pox | 16 |
| Diphtheria: | |
| Jefferson County | 19 |
| Scattering | 10 |
| Dysentery | 1 |
| Erysipelas | 3 |
| Influenza: | |
| Breckenridge County | 137 |
| Carroll County | 125 |
| Daviess County | 135 |

| Influenza—Continued. | Cases. |
|---|---|
| Fleming County | 260 |
| Hickman County | 103 |
| Hopkins County | 200 |
| Jefferson County | 184 |
| Knox County | 153 |
| Muhlenburg County | 171 |
| Owen County | 272 |
| Shelby County | 114 |
| Todd County | 176 |
| Scattering | 2,069 |
| Measles: | |
| Campbell County | 29 |
| Fleming County | 34 |

## Kentucky Report for Week Ended Mar. 6, 1920—Continued

| Measles—Continued. | Cases. |
|---|---|
| Jefferson County | 18 |
| Kenton County | 53 |
| Shelby County | 10 |
| Scattering | 144 |
| Mumps | 3 |
| Paratyphoid | 1 |
| Pneumonia: | |
| Boyd County | 7 |
| Breckenridge County | 18 |
| Carter County | 7 |
| Daviess County | 8 |
| Fleming County | 9 |
| Jefferson County | 57 |
| Kenton County | 7 |
| Knox County | 13 |
| McLean County | 10 |
| Scattering | 100 |

| Scarlet fever: | Cases. |
|---|---|
| Jefferson County | 16 |
| Scattering | 21 |
| Septic sore throat | 4 |
| Smallpox: | |
| Crittenden County | 5 |
| Pendleton County | 7 |
| Scattering | 18 |
| Tonsillitis | 7 |
| Trachoma | 7 |
| Tuberculosis: | |
| Jefferson County | 15 |
| Scattering | 9 |
| Typhoid fever | 15 |
| Whooping cough | 42 |

## SUMMARY OF CASES REPORTED MONTHLY, BY STATES.

Tables showing, by counties, the reported cases of cerebrospinal meningitis, malaria, pellagra, poliomyelitis, smallpox, and typhoid fever are published under the names of these diseases. (See names of these and other diseases in the table of contents.)

The following monthly State reports include only those which were received during the current week. These reports appear each week as received.

| State. | Cerebrospinal meningitis. | Diphtheria. | Influenza. | Malaria. | Measles. | Pellagra. | Poliomyelitis. | Scarlet fever. | Smallpox. | Typhoid fever. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1920. | | | | | | | | | | |
| District of Columbia (January) | ..... | 106 | 2,980 | ..... | 52 | ..... | ..... | 82 | 2 | 6 |
| District of Columbia (February) | 3 | 61 | 1,004 | ..... | 68 | ..... | ..... | 78 | 9 | ..... |
| Massachusetts (February) | 21 | 642 | 28,340 | ..... | 2,968 | ..... | 4 | 1,077 | ..... | 23 |
| New York (January) | 35 | 2,574 | 39,431 | ..... | 10,928 | ..... | 2 | 1,630 | 39 | 117 |
| Pennsylvania (January) | 16 | 1,711 | ..... | ..... | 8,905 | ..... | 5 | 2,018 | 14 | 173 |
| Vermont (February) | ..... | 13 | 3,584 | ..... | 403 | ..... | ..... | 65 | ..... | 9 |

## ANTHRAX.

### Massachusetts and New York Reports—January and February, 1920.

During the month of January, 1920, eight cases of anthrax were reported in the State of New York. During February, 1920, one case was reported in Massachusetts.

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Chicago, Ill. | 1 | 1 | San Francisco, Calif. | 1 | ..... |
| Danville, Ill. | 1 | ..... | Wilmington, Del. | 1 | ..... |
| New York, N. Y. | 1 | ..... | | | |

## CEREBROSPINAL MENINGITIS.

### State Reports for January and February, 1920.

| Place. | New cases reported. |
|---|---|
| District of Columbia (February) | 3 |
| Massachusetts (February): | |
| Barnstable County— | |
| Falmouth (town) | 1 |
| Berkshire County— | |
| Pittsfield | 1 |
| Bristol County— | |
| Attleboro | 1 |
| Fall River | 1 |
| New Bedford | 4 |
| Essex County— | |
| Lawrence | 1 |
| Hampden County— | |
| Springfield | 1 |
| Middlesex County— | |
| Cambridge | 2 |
| Malden | 1 |
| Norfolk County— | |
| Brookline (town) | 1 |
| Weymouth (town) | 1 |
| Plymouth County— | |
| Brockton | 1 |
| Suffolk County— | |
| Boston | 5 |
| Total | 21 |
| New York (January): | |
| Cayuga County— | |
| Owasco (town) | 1 |
| Chemung County— | |
| Elmira | 1 |
| New York (January)—Continued. | |
| Erie County— | |
| Buffalo | 2 |
| Monroe County— | |
| Rochester | 1 |
| Nassau County— | |
| Mineola | 1 |
| New York City | 24 |
| Onondaga County— | |
| East Syracuse | 1 |
| Orange County— | |
| Newburgh | 1 |
| Suffolk County— | |
| Riverhead (town) | 1 |
| Westchester County— | |
| White Plains | 1 |
| Mount Kisco | 1 |
| Total | 35 |
| Pennsylvania (January): | |
| Allegheny County | 2 |
| Chester County | 1 |
| Fayette County | 2 |
| Franklin County | 1 |
| Mercer County | 1 |
| Philadelphia County | 5 |
| Somerset County | 1 |
| Union County | 1 |
| Washington County | 1 |
| York County | 1 |
| Total | 16 |

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. |
|---|---|---|
| Atlanta, Ga. | | 1 |
| Baltimore, Md. | 2 | 1 |
| Birmingham, Ala. | 1 | |
| Buffalo, N. Y. | | 2 |
| Cambridge, Mass. | 1 | 1 |
| Chicago, Ill. | 1 | |
| Dallas, Tex. | 1 | |
| Elizabeth, N. J. | | 1 |
| Evanston, Ill. | 1 | |
| Flint, Mich. | | 1 |
| Greensboro, N. C. | | 2 |
| Highland Park, Mich. | 1 | 1 |
| Kansas City, Mo. | 1 | |
| Lackawanna, N. Y. | 1 | |
| Lynn, Mass. | 1 | |
| Milwaukee, Wis. | 1 | |
| Newark, N. J. | 1 | 1 |
| New Bedford, Mass. | 3 | 1 |
| New Haven, Conn. | 1 | 2 |
| New York, N. Y. | 9 | 1 |
| Omaha, Nebr. | 2 | 3 |
| Philadelphia, Pa. | 2 | 2 |
| Pittsfield, Mass. | 1 | |
| Pontiac, Mich. | | 1 |
| Port Chester, N. Y. | 1 | |
| Providence, R. I. | | 1 |
| St. Louis, Mo. | 1 | |
| San Francisco, Calif. | 1 | |
| Savannah, Ga. | 1 | 1 |
| Springfield, Mass. | 1 | 1 |

## DIPHTHERIA.

See Telegraphic weekly reports from States, p. 715; Monthly summaries by States, p. 720; and Weekly reports from cities, p. 729.

## LETHARGIC ENCEPHALITIS.

### Yonkers, N. Y.—Week Ended Feb. 28, 1920.

During the week ended February 28, 1920, there were reported two cases and two deaths from lethargic encephalitis at Yonkers, N. Y.

## MALARIA.

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Birmingham, Ala. | 1 | ..... | Savannah, Ga. | 1 | ..... |
| Dallas, Tex. | 1 | 1 | Tuscaloosa, Ala. | 1 | ..... |
| North Little Rock, Ark. | 2 | ..... | | | |

## MEASLES.

See Telegraphic weekly reports from States, p. 715; Monthly summaries by States, p. 720; and Weekly reports from cities, p. 729.

## PELLAGRA.

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Birmingham, Ala. | ..... | 1 | Raleigh, N. C. | ..... | 1 |
| Dallas, Tex. | ..... | 1 | Savannah, Ga. | ..... | 1 |
| Fort Worth, Tex. | ..... | 1 | Winston-Salem, N. C. | 1 | 1 |
| Memphis, Tenn. | ..... | 3 | | | |

## PLAGUE (RODENT).

### New Orleans, La.

The medical officer in charge of plague suppressive measures at New Orleans, La., reports the capture of an infected rat from a vessel from a foreign port under the following circumstances:

The vessel arrived at the port of New Orleans February 4, 1920, and measures were promptly taken to prevent the passage of rats between it and the wharf by the breasting off of the vessel and the rat guarding of communicating lines. This practice is a routine one at New Orleans against all vessels lying alongside the wharves in the river, and it is believed that in this instance the measures taken were adequate to assure the prevention of rodent travel between the ship and the wharf. The referred-to vessel was fumigated on February 12, some 49 rats being killed by this procedure. Upon examination of their carcasses at the laboratory one of the rats, Mus Alexandrinus, was found to be infected with plague of a resolving type.

This vessel left Calcutta, a known plague-infected port, on November 15 for Liverpool, and sailed from the latter port on January 16 for New Orleans. From a study of all the factors involved, it appears that the infected rat probably gained access to the vessel at Calcutta, but because of the resolving type of the disease, the absence of fleas, and further unknown conditions, there was no resultant spread of the disease in the ship's rodent population. It is interesting to note, however, that three months elapsed between the sailing of the vessel from Calcutta and its arrival at New Orleans.

## PNEUMONIA (ALL FORMS).

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. |
|---|---|---|
| Aberdeen, Wash | 5 | |
| Akron, Ohio | 2 | |
| Alameda, Calif | 4 | |
| Albany, N. Y | 28 | |
| Alexandria, Va | | 1 |
| Alliance, Ohio | | 1 |
| Alpena, Mich | 1 | |
| Alton, Ill | 2 | |
| Amesbury, Mass | 2 | 2 |
| Anderson, Ind | | 17 |
| Ann Arbor, Mich | | 2 |
| Anniston, Ala | 8 | |
| Ansonia, Conn | 3 | 1 |
| Arlington, Mass | | 4 |
| Ashland, Ky | 17 | |
| Ashtabula, Ohio | | 1 |
| Atlanta, Ga | 10 | 25 |
| Atlantic City, N. J | 23 | 10 |
| Attleboro, Mass | | 2 |
| Aurora, Ill | 3 | |
| Austin, Tex | | 10 |
| Baltimore, Md | 184 | 87 |
| Barberton, Ohio | | 3 |
| Battle Creek, Mich | 2 | |
| Bayonne, N. J | 3 | |
| Beaumont, Tex | | 4 |
| Bedford, Ind | | 3 |
| Bellingham, Wash | 1 | |
| Berkeley, Calif | 3 | 1 |
| Berlin, N. H | | 1 |
| Biddeford, Me | | 6 |
| Billings, Mont | | 3 |
| Binghamton, N. Y | 29 | 24 |
| Birmingham, Ala | | 39 |
| Bloomfield, N. J | 2 | |
| Bloomington, Ill | | 5 |
| Bloomington, Ind | | 4 |
| Bluefield, W. Va | 3 | 1 |
| Boston, Mass | 56 | 63 |
| Brazil, Ind | 1 | 4 |
| Bridgeport, Conn | | 19 |
| Bristol, Conn | 4 | 1 |
| Brockton, Mass | 11 | 10 |
| Brunswick, Ga | 5 | |
| Buffalo, N. Y | 127 | 62 |
| Burlington, Iowa | | 2 |
| Burlington, Vt | 3 | 3 |
| Butte, Mont | 3 | 5 |
| Cairo, Ill | 8 | 7 |
| Cambridge, Mass | 12 | 10 |
| Canton, Ohio | | 6 |
| Cape Girardeau, Mo | 4 | 2 |
| Cedar Rapids, Iowa | | 7 |
| Chanute, Kans | | 1 |
| Charleston, S. C | 61 | 43 |
| Chattanooga, Tenn | | 13 |
| Chelsea, Mass | 4 | 5 |
| Cheyenne, Wyo | 1 | 1 |
| Chicago, Ill | 240 | 70 |
| Chicopee, Mass | 1 | 13 |
| Chillicothe, Ohio | 2 | 1 |
| Cincinnati, Ohio | | 41 |
| Cleveland, Ohio | 68 | 71 |
| Clinton, Mass | 3 | 4 |
| Coffeyville, Kans | 2 | 2 |
| Cohoes, N. Y | 10 | 2 |
| Columbia, S. C | 10 | |
| Columbus, Ohio | | 13 |
| Concord, N. H | | 3 |
| Corpus Christi, Tex | 4 | 2 |
| Cortland, N. Y | 6 | 2 |
| Covington, Ky | 5 | 18 |
| Cranston, R. I | 1 | |
| Cumberland, Md | 36 | 5 |
| Dallas, Tex | 6 | 4 |
| Danville, Ill | 5 | 3 |
| Dayton, Ohio | 5 | 5 |
| Decatur, Ill | 2 | 2 |
| Dedham, Mass | | 2 |
| Denver, Colo | | 27 |
| Detroit, Mich | 44 | 78 |
| Dover, N. H | | 1 |
| Dubuque, Iowa | 1 | 2 |
| Duluth, Minn | 1 | 1 |
| Durham, N. C | 13 | 6 |
| East Chicago, Ind | | 1 |
| Easthampton, Mass | 6 | 3 |
| East Orange, N. J | 6 | 2 |
| East St. Louis, Ill | 6 | 4 |
| Elgin, Ill | 2 | 2 |
| Elizabeth, N. J | 9 | 13 |
| Elkhart, Ind | 1 | 2 |
| El Paso, Tex | | 11 |
| Elwood, Ind | | 4 |
| Englewood, N. J | 1 | |
| Eureka, Calif | | 1 |
| Evanston, Ill | 2 | |
| Everett, Mass | | 6 |
| Fall River, Mass | 11 | 10 |
| Findlay, Ohio | 2 | 1 |
| Flint, Mich | | 6 |
| Fort Scott, Kans | 5 | 2 |
| Fort Worth, Tex | 12 | 12 |
| Framingham, Mass | 5 | 4 |
| Freeport, Ill | | 2 |
| Fremont, Nebr | | 1 |
| Fremont, Ohio | 4 | |
| Galesburg, Ill | | 4 |
| Galveston, Tex | | 3 |
| Gardner, Mass | 3 | 2 |
| Gary, Ind | | 9 |
| Geneva, N. Y | | 3 |
| Gloucester, N. J | 4 | |
| Grand Rapids, Mich | 26 | 7 |
| Great Falls, Mont | 10 | 3 |
| Greeley, Colo | | 1 |
| Greenfield, Mass | | 2 |
| Greensboro, N. C | | 21 |
| Greenwich, Conn | 1 | |
| Hackensack, N. J | 4 | |
| Hammond, Ind | | 6 |
| Harrison, N. J | 2 | |
| Haverhill, Mass | 6 | 8 |
| Highland Park, Mich | 11 | 3 |
| Hoboken, N. J | 2 | 7 |
| Holland, Mich | 3 | |
| Holyoke, Mass | 4 | 11 |
| Hudson, N. Y | | 1 |
| Huntington, Ind | | 3 |
| Huntington, W. Va | | 20 |
| Independence, Mo | | 1 |
| Indianapolis, Ind | | 23 |
| Ironton, Ohio | 3 | |
| Ironwood, Mich | 3 | 2 |
| Irvington, N. J | 4 | |
| Ishpeming, Mich | 4 | 2 |
| Ithaca, N. Y | 3 | |
| Jacksonville, Ill | | 2 |
| Jamestown, N. Y | 16 | 6 |
| Jefferson City, Mo | | 6 |
| Jersey City, N. J | 9 | |
| Joplin, Mo | 1 | |
| Kalamazoo, Mich | 13 | 10 |
| Kansas City, Kans | 12 | |
| Kansas City, Mo | 7 | 33 |
| Kearny, N. J | 4 | 4 |
| Keene, N. H | 5 | |
| Kewanee, Ill | | 3 |
| Kokomo, Ind | | 1 |
| Lackawanna, N. Y | 15 | 2 |
| La Fayette, Ind | | 2 |
| Lake Charles, La | 18 | 1 |
| Lancaster, Ohio | | 1 |
| La Salle, Ill | 2 | |
| Lawrence, Kans | 2 | |
| Lawrence, Mass | 9 | 3 |
| Lexington, Ky | | 15 |
| Lima, Ohio | | 7 |

## PNEUMONIA (ALL FORMS)—Continued.

### City Reports for Week Ended Feb. 28, 1920—Continued.

| Place. | Cases. | Deaths. |
|---|---|---|
| Lincoln, Nebr. | 4 | 2 |
| Lincoln, R. I. | 1 | |
| Little Rock, Ark. | 15 | |
| Lockport, N. Y. | 1 | 2 |
| Logansport, Ind. | | 2 |
| Long Beach, Calif. | 9 | 1 |
| Long Branch, N. J. | 2 | 2 |
| Lorain, Ohio. | | 1 |
| Los Angeles, Calif. | 74 | 49 |
| Louisville, Ky. | 28 | 25 |
| Lowell, Mass. | 23 | 22 |
| Ludington, Mich. | 1 | 2 |
| Lynchburg, Va. | | 4 |
| Lynn, Mass. | 12 | 11 |
| Malden, Mass. | 2 | 5 |
| Manchester, Conn. | | 2 |
| Manchester, N. H. | 6 | 6 |
| Mankato, Minn. | | 1 |
| Marion, Ind. | 1 | 5 |
| Marquette, Mich. | 2 | 1 |
| Martins Ferry, Ohio. | 3 | 1 |
| Mason City, Iowa. | | 4 |
| Medford, Mass. | | 6 |
| Melrose, Mass. | 1 | 3 |
| Memphis, Tenn. | | 49 |
| Meriden, Conn. | 3 | 1 |
| Middletown, N. Y. | 7 | 2 |
| Middletown, Ohio. | | 2 |
| Milwaukee, Wis. | | 29 |
| Minneapolis, Minn. | | 5 |
| Missoula, Mont. | | 2 |
| Mobile, Ala. | 3 | 8 |
| Monmouth, Ill. | | 1 |
| Montclair, N. J. | 2 | 3 |
| Montgomery, Ala. | 9 | 9 |
| Morgantown, W. Va. | 4 | 1 |
| Moundsville, W. Va. | | 2 |
| Muncie, Ind. | | 6 |
| Muscatine, Iowa. | 8 | 8 |
| Nashua, N. H. | 8 | 1 |
| Nashville, Tenn. | 3 | 17 |
| Newark, N. J. | 87 | 20 |
| New Bedford, Mass. | 13 | 49 |
| New Britain, Conn. | 8 | 4 |
| Newburgh, N. Y. | 4 | 9 |
| Newburyport, Mass. | | 3 |
| Newcastle, Ind. | | 1 |
| New Haven, Conn. | | 17 |
| New London, Conn. | 6 | 5 |
| New Orleans, La. | 18 | 39 |
| Newton, Mass. | 1 | 5 |
| New York, N. Y. | 391 | 362 |
| Niagara Falls, N. Y. | 18 | 7 |
| Norfolk, Va. | 10 | 33 |
| North Adams, Mass. | | 1 |
| Northampton, Mass. | 1 | 1 |
| North Attleboro, Mass. | 3 | 2 |
| North Tonawanda, N. Y. | 6 | 3 |
| Norwalk, Conn. | | 4 |
| Nowick, Conn. | 1 | 4 |
| Norwood, Ohio. | | 2 |
| Oakland, Calif. | | 2 |
| Oak Park, Ill. | 2 | 1 |
| Oklahoma City, Okla. | | 4 |
| Omaha, Nebr. | | 24 |
| Orange, N. J. | 8 | 4 |
| Paducah, Ky. | 5 | |
| Parkersburg, W. Va. | | 2 |
| Parsons, Kans. | 1 | |
| Pasadena, Calif. | 4 | 4 |
| Passaic, N. J. | 9 | 6 |
| Paterson, N. J. | 21 | |
| Pawtucket, R. I. | | 4 |
| Peoria, Ill. | | 12 |
| Perth Amboy, N. J. | 2 | 5 |
| Petersburg, Va. | | 4 |
| Philadelphia, Pa. | 367 | 261 |
| Phillipsburg, N. J. | | 3 |
| Pine Bluff, Ark. | 4 | |
| Piqua, Ohio. | | 2 |
| Pittsfield, Mass. | 1 | 7 |
| Plainfield, N. J. | 7 | 1 |
| Plattsburg, N. Y. | | 1 |
| Plymouth, Mass. | | 1 |
| Pontiac, Mich. | 5 | |
| Port Chester, N. Y. | 5 | 3 |
| Port Huron, Mich. | 3 | 5 |
| Portland, Me. | 5 | 13 |
| Portland, Oreg. | | 13 |
| Portsmouth, N. H. | 1 | |
| Portsmouth, Ohio. | | 10 |
| Poughkeepsie, N. Y. | 4 | 1 |
| Providence, R. I. | | 38 |
| Pueblo, Colo. | | 7 |
| Quincy, Ill. | 5 | 4 |
| Quincy, Mass. | 3 | 5 |
| Raleigh, N. C. | 9 | 12 |
| Redlands, Calif. | | 2 |
| Reno, Nev. | 2 | 3 |
| Richmond, Ind. | 1 | 2 |
| Richmond, Va. | | 8 |
| Riverside, Calif. | 3 | |
| Roanoke, Va. | 7 | |
| Rochester, N. Y. | 25 | 11 |
| Rockford, Ill. | | 3 |
| Rock Island, Ill. | 3 | 1 |
| Rocky Mount, N. C. | | 3 |
| Rome, Ga. | 3 | |
| Rome, N. Y. | 1 | |
| Sacramento, Calif. | 8 | 6 |
| St. Joseph, Mo. | 4 | 25 |
| St. Paul, Minn. | | 7 |
| Salem, Mass. | 10 | 3 |
| Salt Lake City, Utah. | | 9 |
| San Angelo, Tex. | | 7 |
| San Bernardino, Calif. | 1 | |
| San Diego, Calif. | 9 | 6 |
| Sandusky, Ohio. | 2 | 1 |
| Sanford, Me. | 9 | 3 |
| San Francisco, Calif. | 25 | 6 |
| Saratoga Springs, N. Y. | 13 | 4 |
| Saugus, Mass. | 1 | |
| Sault Ste. Marie, Mich. | 5 | 2 |
| Savannah, Ga. | | 7 |
| Schenectady, N. Y. | 14 | 5 |
| Sioux Falls, S. Dak. | 4 | 3 |
| Somerville, Mass. | 4 | 3 |
| South Bend, Ind. | 2 | 2 |
| Southbridge, Mass. | 2 | |
| Spartanburg, S. C. | 2 | |
| Springfield, Ill. | | 13 |
| Springfield, Mass. | 14 | 4 |
| Springfield, Mo. | | 6 |
| Springfield, Ohio. | 1 | 8 |
| Staunton, Va. | | 5 |
| Stillwater, Minn. | 2 | |
| Stockton, Calif. | | 9 |
| Superior, Wis. | | 1 |
| Syracuse, N. Y. | 5 | 18 |
| Tacoma, Wash. | 52 | |
| Taunton, Mass. | 2 | 3 |
| Terre Haute, Ind. | | 20 |
| Toledo, Ohio. | | 16 |
| Topeka, Kans. | 3 | 3 |
| Traverse City, Mich. | 3 | 3 |
| Trenton, N. J. | 22 | 13 |
| Troy, N. Y. | 21 | 14 |
| Waco, Tex. | | 7 |
| Wakefield, Mass. | 6 | 3 |
| Walla Walla, Wash. | 1 | |
| Waltham, Mass. | 1 | 5 |
| Washington, D. C. | | 21 |
| Waterbury, Conn. | 2 | |
| Watertown, N. Y. | 16 | 6 |
| Wausau, Wis. | | 10 |
| West New York, N. J. | | 2 |

## PNEUMONIA (ALL FORMS)—Continued.

### City Reports for Week Ended Feb, 28, 1920—Continued.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| West Orange, N. J. | 2 | | Winona, Minn. | | 2 |
| Wheeling, W. Va. | 2 | 4 | Winthrop, Mass. | | 2 |
| Wichita, Kans. | 4 | 8 | Woburn, Mass. | | 3 |
| Willimantic, Conn. | 1 | 3 | Worcester, Mass. | 18 | 25 |
| Wilmington, Del. | | 20 | Yonkers, N. Y. | | 9 |
| Wilmington, N. C. | 18 | 24 | Youngstown, Ohio | | 20 |
| Winchester, Mass. | 2 | 2 | Zanesville, Ohio | | 5 |

## POLIOMYELITIS (INFANTILE PARALYSIS).

### State Reports for January and February, 1920.

| Place. | New cases reported. | Place. | New cases reported. |
|---|---|---|---|
| Massachusetts (February): | | New York (January): | |
| Bristol County— | | Oswego County— | |
| Fall River | 1 | Oswego | 1 |
| Essex County— | | New York City | 1 |
| Lynn | 1 | Total | 2 |
| Middlesex County— | | | |
| Belmont (town) | 1 | Pennsylvania (January): | |
| Lowell | 1 | Allegheny County | 2 |
| Total | 4 | Philadelphia County | 3 |
| | | Total | 5 |

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Louisville, Ky. | | 1 | New York, N. Y | 1 | |
| Minneapolis, Minn. | 1 | 1 | Philadelphia, Pa | 1 | |
| Newark, N. J. | 1 | | | | |

## RABIES IN ANIMALS.

### Akron, Ohio, and Fall River, Mass.

During the week ended February 28, 1920, one case of rabies in animals was reported at Akron, Ohio, and two cases were reported at Fall River, Mass.

## SCARLET FEVER.

See Telegraphic weekly reports from States, p. 715; Monthly summaries by States, p. 720; and Weekly reports from cities, p. 729.

## SMALLPOX.

### State Reports for January and February, 1920—Vaccination Histories.

| Place. | New cases reported. | Deaths. | Vaccination history of cases. | | | |
|---|---|---|---|---|---|---|
| | | | Vaccinated within 7 years preceding attack. | Last vaccinated more than 7 years preceding attack. | Never successfully vaccinated. | History not obtained or uncertain. |
| District of Columbia (January) | 2 | | | | 2 | |
| District of Columbia (February) | 9 | | | | 9 | |
| New York (January): | | | | | | |
| Cayuga County— | | | | | | |
| Auburn | 1 | | | | | 1 |
| Erie County— | | | | | | |
| Buffalo | 20 | | | | | 20 |
| Lackawanna | 1 | | | | | 1 |
| West Seneca (town) | 1 | | | | 1 | |
| Franklin County— | | | | | | |
| Moira (town) | 1 | | | | 1 | |
| Genesee County— | | | | | | |
| Bergen (town) | 2 | | | | 2 | |
| Oakfield | 1 | | | | | 1 |
| Monroe County— | | | | | | |
| Rochester | 1 | | | | 1 | |
| Ogden (town) | 1 | | | | 1 | |
| Parma (town) | 3 | | | 2 | 1 | |
| Sweden (town) | 3 | | | | 1 | 2 |
| Brockport | 3 | | | | 3 | |
| Steuben County— | | | | | | |
| Hammondsport | 1 | | | | 1 | |
| Total | 39 | | | 2 | 12 | 25 |

### Pennsylvania Report for January, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Pennsylvania: | | | Pennsylvania—Continued. | | |
| Allegheny County | 2 | | Philadelphia County | 5 | |
| Crawford County | 1 | | Washington County | 1 | |
| Erie County | 2 | | Westmoreland County | 1 | |
| Huntingdon County | 1 | | | | |
| McKean County | 1 | | Total | 14 | |

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Akron, Ohio | 8 | | Cincinnati, Ohio | 1 | |
| Ann Arbor, Mich | 2 | | Cleveland, Ohio | 1 | |
| Appleton, Wis | 4 | | Clinton, Iowa | 1 | |
| Atlanta, Ga | 10 | | Council Bluffs, Iowa | 2 | |
| Baltimore, Md | 2 | | Dallas, Tex | 36 | |
| Bodford, Ind | 1 | | Danville, Va | 3 | |
| Bellingham, Wash | 7 | | Dayton, Ohio | 6 | |
| Birmingham, Ala | 12 | | Denver, Colo | 25 | |
| Bluefield, W. Va | 5 | | Detroit, Mich | 18 | |
| Boise, Idaho | 11 | | Dubuque, Iowa | 10 | |
| Buffalo, N. Y | 1 | | Duluth, Minn | 3 | |
| Cairo, Ill | 1 | | Eau Claire, Wis | 1 | |
| Canton, Ohio | 7 | | El Paso, Tex | 1 | |
| Cape Girardeau, Mo | 7 | | Elwood, Ind | 2 | |
| Cedar Rapids, Iowa | 6 | | Everett, Wash | 3 | |
| Charleston, S. C | 5 | | Fargo, N. Dak | 3 | |
| Charleston, W. Va | 1 | | Flint, Mich | 11 | |
| Cheyenne, Wyo | 1 | | Fond du Lac, Wis | 2 | |
| Chicago, Ill | 4 | | Fort Worth, Tex | 13 | |

## SMALLPOX—Continued.

### City Reports for Week Ended Feb. 28, 1920—Continued.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Fostoria, Ohio | 1 | | Omaha, Nebr | 16 | |
| Galesburg, Ill | 6 | | Oshkosh, Wis | 2 | |
| Granite City, Ill | 1 | | Paducah, Ky | 4 | |
| Great Falls, Mont | 2 | | Peoria, Ill | 1 | |
| Green Bay, Wis | 5 | | Pine Bluff, Ark | 1 | |
| Hammond, Ind | 1 | | Portland, Oreg | 53 | |
| Huntington, Ind | 2 | | Portsmouth, Ohio | 1 | |
| Hutchinson, Kans | 2 | | Pueblo, Colo | 3 | |
| Indianapolis, Ind | 6 | | Redlands, Calif | 1 | |
| Jacksonville, Ill | 2 | | Red Wing, Minn | 1 | |
| Janesville, Wis | 5 | | Reno, Nev | 2 | |
| Kalamazoo, Mich | 6 | | Rocky Mount, N. C | 1 | |
| Kansas City, Kans | 1 | | St. Cloud, Minn | 3 | |
| Kansas City, Mo | 23 | | St. Joseph, Mo | 13 | |
| Kenosha, Wis | 6 | | St. Louis, Mo | 6 | |
| Kewanee, Ill | 2 | | St. Paul, Minn | 11 | |
| Knoxville, Tenn | 1 | | Salt Lake City, Utah | 16 | |
| Kokomo, Ind | 26 | | San Diego, Calif | 3 | |
| Lima, Ohio | 1 | | San Francisco, Calif | 9 | |
| Lincoln, Nebr | 28 | | Seattle, Wash | 17 | |
| Logansport, Ind | 3 | | Sheboygan, Wis | 1 | |
| Long Beach, Calif | 8 | | South Bend, Ind | 7 | |
| Los Angeles, Calif | 10 | | Spartanburg, S. C | 2 | |
| Louisville, Ky | 2 | | Spokane, Wash | 31 | |
| Marinette, Wis | 3 | | Springfield, Ohio | 3 | |
| Marion, Ind | 2 | | Steubenville, Ohio | 2 | |
| Marion, Ohio | 4 | | Superior, Wis | 6 | |
| Marquette, Mich | 1 | | Tacoma, Wash | 4 | |
| Marshalltown, Iowa | 19 | | Terre Haute, Ind | 1 | |
| Memphis, Tenn | 5 | | Topeka, Kans | 5 | |
| Milwaukee, Wis | 17 | | Trinidad, Colo | 1 | |
| Minneapolis, Minn | 49 | | Vancouver, Wash | 8 | |
| Missoula, Mont | 1 | | Waco, Tex | 1 | |
| Mobile, Ala | 4 | | Walla Walla, Wash | 12 | |
| Monmouth, Ill | 2 | | Washington, D. C | 3 | |
| New Castle, Ind | 1 | | Wausau, Wis | 3 | |
| New Orleans, La | 35 | 5 | Wichita, Kans | 16 | |
| New York, N. Y | 1 | | Wilmington, N. C | 2 | |
| Oakland, Calif | 2 | | Winona, Minn | 1 | |
| Oak Park, Ill | 1 | | Yakima Wash | 5 | |
| Ogden, Utah | 16 | | Youngstown, Ohio | 11 | |
| Oklahoma City, Okla | 1 | | | | |

## TETANUS.

### New York, N. Y.—Week Ended Feb. 28, 1920.

During the week ended February 28, 1920, one death from tetanus was reported in New York, N. Y.

## TUBERCULOSIS.

See Telegraphic weekly reports from States, p. 715, and Weekly reports from cities, p. 729.

## TYPHOID FEVER.

### State Reports for January and February, 1920.

| Place. | New cases reported. |
|---|---|
| District of Columbia (January) | 6 |
| Massachusetts (February): | |
| Bristol County— | |
| New Bedford | 2 |
| Essex County— | |
| Lawrence | 1 |
| Lynn | 1 |
| Methuen | 1 |
| Franklin County— | |
| Orange (town) | 3 |
| Hampden County— | |
| Springfield | 2 |
| Hampshire County— | |
| Northampton | 4 |
| Middlesex County— | |
| Arlington (town) | 1 |
| Belmont (town) | 1 |
| Everett | 1 |
| Lowell | 2 |
| Suffolk County— | |
| Boston | 2 |
| Worcester County— | |
| Holden (town) | 1 |
| Worcester | 1 |
| Total | 23 |
| New York (January): | |
| Albany County— | |
| Cohoes | 1 |
| Coeymans (town) | 1 |
| Ravena | 1 |
| Allegany County— | |
| Caneadea (town) | 1 |
| Wellsville | 4 |
| Broome County— | |
| Binghampton | 1 |
| Endicott | 2 |
| Johnson City | 2 |
| Cattaraugus County— | |
| Olean | 1 |
| Chatauqua County— | |
| Jamestown | 1 |
| Chenango County— | |
| Oxford | 1 |
| Clinton County— | |
| Chazy (town) | 1 |
| Columbia County— | |
| Hudson | 1 |
| Kinderhook | 1 |
| Delaware County— | |
| Hancock (town) | 2 |
| Dutchess County— | |
| Poughkeepsie | 1 |
| H. R. S. Hospital | 1 |
| Erie County— | |
| Buffalo | 4 |
| Lackawanna | 4 |
| Tonawanda | 1 |
| Elma (town) | 1 |
| Angola | 1 |
| Lancaster | 1 |
| Fulton County— | |
| Gloversville | 1 |
| Genesee County— | |
| Leroy | 1 |
| Greene County— | |
| Catskill | 1 |
| Herkimer County— | |
| Frankfort | 2 |
| Livingston County— | |
| Caledonia (town) | 1 |
| Caledonia | 7 |
| Mount Morris | 2 |
| Monroe County— | |
| Pittsford | 1 |
| New York City | 47 |

| Place. | New cases reported. |
|---|---|
| New York (January)—Continued. | |
| Niagara County— | |
| Lockport | 1 |
| Niagara Falls | 1 |
| North Tonawanda | 1 |
| Onondaga County— | |
| Liverpool | 1 |
| Ontario County— | |
| Shortsville | 2 |
| Orleans County— | |
| Murray (town) | 1 |
| St. Lawrence County— | |
| Hopkinton (town) | 1 |
| Massena | 1 |
| Saratoga County— | |
| Saratoga Springs | 1 |
| Schenectady County— | |
| Schenectady | 1 |
| Suffolk County— | |
| King's Park S. Hospital | 1 |
| Sullivan County— | |
| Rockland (town) | 1 |
| Ulster County— | |
| Kingston | 1 |
| Rosendale | 1 |
| Westchester County— | |
| Tuckahoe | 2 |
| Rye | 1 |
| Total | 117 |
| Pennsylvania (January): | |
| Allegheny County | 38 |
| Armstrong County | 10 |
| Beaver County | 7 |
| Bedford County | 4 |
| Blair County | 3 |
| Bucks County | 8 |
| Cambria County | 3 |
| Center County | 3 |
| Chester County | 5 |
| Clinton County | 1 |
| Columbia County | 1 |
| Crawford County | 1 |
| Cumberland County | 2 |
| Dauphin County | 1 |
| Delaware County | 4 |
| Erie County | 4 |
| Fayette County | 11 |
| Franklin County | 2 |
| Greene County | 3 |
| Huntingdon County | 1 |
| Indiana County | 1 |
| Lancaster County | 2 |
| Lawrence County | 4 |
| Lebanon County | 1 |
| Lehigh County | 4 |
| Luzerne County | 1 |
| Montgomery County | 1 |
| Northampton County | 1 |
| Northumberland County | 1 |
| Philadelphia County | 23 |
| Snyder County | 1 |
| Somerset County | 1 |
| Susquehanna County | 2 |
| Venango County | 3 |
| Washington County | 11 |
| York County | 4 |
| Total | 173 |
| Vermont (February): | |
| Addison County | 2 |
| Chittenden County | 1 |
| Franklin County | 3 |
| Orange County | 1 |
| Orleans County | 1 |
| Rutland County | 1 |
| Total | 9 |

## TYPHOID FEVER—Continued.

### City Reports for Week Ended Feb. 28, 1920.

| Place. | Cases. | Deaths. | Place. | Cases. | Deaths. |
|---|---|---|---|---|---|
| Atlantic City, N. J. | 5 | ... | New London, Conn. | 1 | ... |
| Baltimore, Md. | 2 | ... | New Orleans, La. | 1 | ... |
| Binghamton, N. Y. | 1 | ... | New York, N. Y. | 1 | ... |
| Charleston, W. Va. | 1 | ... | Oakland, Calif. | ... | 1 |
| Chicago, Ill. | 2 | ... | Oklahoma City, Okla. | ... | 1 |
| Detroit, Mich. | 3 | 1 | Peoria, Ill. | 2 | ... |
| Duluth, Minn. | ... | 1 | Philadelphia, Pa. | 3 | 1 |
| Flint, Mich. | ... | 1 | Portland, Me. | 1 | ... |
| Huntington, W. Va. | 2 | ... | Portland, Oreg. | 1 | ... |
| Indianapolis, Ind. | 2 | 3 | Portsmouth, Ohio. | 1 | ... |
| Ironton, Ohio. | 4 | ... | Richmond, Va. | 1 | ... |
| Lawrence, Mass. | 1 | ... | Sacramento, Calif. | 1 | ... |
| Lincoln, Nebr. | ... | 1 | St. Cloud, Minn. | 1 | ... |
| Los Angeles, Calif. | 2 | ... | Salt Lake City, Utah | ... | 1 |
| Louisville, Ky. | 2 | ... | Springfield, Mass. | 1 | ... |
| Lowell, Mass. | 2 | ... | Topeka, Kans. | 1 | ... |
| Mankato, Minn. | 1 | ... | Trenton, N. J. | 1 | ... |
| Minneapolis, Minn. | 1 | ... | Troy, N. Y. | 1 | ... |
| Nashville, Tenn. | 1 | ... | Virginia, Minn. | 1 | ... |
| Newark, N. J. | 1 | 1 | Waterbury, Conn. | 1 | ... |
| New Bedford, Mass. | 1 | ... | Wilmington, N. C. | 1 | ... |

## DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

### City Reports for Week Ended Feb. 28, 1920.

| City. | Population as of July 1, 1917 (estimated by U. S. Census Bureau). | Total deaths from all causes. | Diphtheria. | | Measles. | | Scarlet fever. | | Tuberculosis. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Aberdeen, S. Dak. | 15,926 | 5 | ... | ... | 2 | ... | ... | ... | ... | ... |
| Adams, Mass. | 14,406 | 3 | ... | ... | ... | ... | ... | ... | 1 | ... |
| Akron, Ohio. | 93,604 | 65 | 11 | ... | 93 | ... | 72 | ... | 3 | ... |
| Alameda, Calif. | 28,433 | 9 | 1 | ... | 42 | ... | 8 | ... | 1 | ... |
| Albany, N. Y. | 106,632 | 4 | ... | ... | ... | ... | 19 | ... | 5 | ... |
| Alexandria, Va. | 17,959 | 2 | ... | ... | ... | ... | ... | ... | ... | ... |
| Alliance, Ohio. | 19,581 | 4 | ... | ... | 10 | ... | 1 | ... | ... | ... |
| Alpena, Mich. | 13,365 | ... | ... | ... | 5 | ... | ... | ... | ... | ... |
| Alton, Ill. | 23,783 | 7 | 1 | ... | 10 | ... | 2 | ... | 1 | 1 |
| Amesbury, Mass. | 10,200 | 4 | ... | ... | 2 | ... | ... | ... | ... | ... |
| Anaconda, Mont. | 10,631 | 0 | ... | ... | ... | ... | ... | ... | ... | ... |
| Anderson, Ind. | 24,250 | 29 | ... | ... | ... | ... | ... | ... | ... | 2 |
| Ann Arbor, Mich. | 15,041 | 11 | ... | ... | 23 | ... | 1 | ... | ... | ... |
| Anniston, Ala. | 14,326 | ... | 1 | ... | ... | ... | ... | ... | 1 | ... |
| Ansonia, Conn. | 16,954 | 6 | 1 | ... | 12 | ... | ... | ... | ... | 2 |
| Appleton, Wis. | 18,005 | ... | 1 | ... | 2 | ... | 2 | ... | 1 | ... |
| Arlington, Mass. | 13,073 | 8 | ... | ... | 9 | ... | 1 | ... | ... | ... |
| Asbury Park, N. J. | 14,629 | 2 | ... | ... | 3 | ... | ... | ... | ... | ... |
| Ashland, Ky. | 12,195 | 5 | ... | ... | ... | ... | ... | ... | ... | ... |
| Ashtabula, Ohio. | 22,008 | 12 | ... | ... | ... | ... | ... | ... | ... | 1 |
| Atlanta, Ga. | 196,144 | 140 | 4 | 1 | 30 | ... | 1 | ... | 2 | 8 |
| Atlantic City, N. J. | 59,515 | 21 | 7 | 1 | 70 | 2 | ... | ... | 1 | 1 |
| Attleboro, Mass. | 19,776 | 6 | 1 | ... | ... | ... | 1 | ... | 2 | ... |
| Auburn, Me. | 16,607 | ... | ... | ... | ... | ... | 1 | ... | ... | ... |
| Aurora, Ill. | 34,795 | 13 | ... | ... | ... | ... | ... | ... | ... | ... |
| Austin, Tex. | 35,612 | 33 | 2 | 1 | ... | ... | ... | ... | ... | ... |
| Baltimore, Md. | 594,637 | 336 | 37 | ... | 169 | ... | 59 | ... | 22 | 28 |
| Barberton, Ohio. | 14,187 | 6 | ... | ... | 10 | ... | 1 | ... | 1 | ... |
| Barre, Vt. | 12,401 | ... | ... | ... | 3 | ... | ... | ... | ... | ... |
| Battle Creek, Mich. | 30,159 | ... | ... | ... | 26 | ... | 19 | ... | ... | ... |
| Bayonne, N. J. | 72,204 | ... | 4 | ... | 6 | ... | ... | ... | 5 | ... |
| Beatrice, Nebr. | 10,437 | 0 | ... | ... | ... | ... | ... | ... | ... | ... |
| Beaumont, Tex. | 28,851 | 12 | ... | ... | ... | ... | ... | ... | ... | ... |
| Bedford, Ind. | 10,613 | 5 | ... | ... | ... | ... | ... | ... | ... | ... |
| Belleville, N. J. | 12,797 | ... | ... | ... | 11 | ... | ... | ... | ... | ... |
| Bellingham, Wash. | 34,362 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... |
| Beloit, Wis. | 18,547 | ... | ... | ... | ... | ... | 5 | ... | ... | ... |
| Benton Harbor, Mich. | 11,099 | ... | ... | ... | 1 | ... | ... | ... | ... | ... |
| Berlin, N. H. | 13,892 | 4 | ... | ... | ... | ... | 1 | ... | 2 | ... |

## DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

### City Reports for Week Ended Feb. 28, 1920—Continued.

| City. | Population as of July 1, 1917 (estimated by U. S. Census Bureau). | Total deaths from all causes. | Diphtheria. | | Measles. | | Scarlet fever. | | Tuberculosis. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Beverly, Mass. | 22,128 | 4 | | | | | 4 | | | |
| Biddeford, Me. | 17,760 | | | | 4 | | 1 | | | |
| Billings, Mont. | 15,123 | 7 | | | 2 | | | | 3 | |
| Binghamton, N. Y. | 54,864 | 50 | 1 | | 4 | | | | 3 | 1 |
| Birmingham, Ala. | 189,716 | 123 | 1 | | 7 | | 5 | | 3 | 7 |
| Bloomfield, N. J. | 19,013 | 3 | | | 5 | | 1 | | 1 | |
| Bloomington, Ill. | 27,462 | 14 | 1 | | | | 5 | | 2 | |
| Bloomington, Ind. | 11,661 | 8 | | | 1 | | | | | |
| Bluefield, W. Va. | 16,123 | 1 | 2 | | | | 1 | | | |
| Boise, Idaho | 35,951 | 4 | 1 | | 1 | | 1 | | | |
| Boston, Mass. | 767,813 | 364 | 44 | 2 | 248 | 1 | 44 | 2 | 72 | 28 |
| Brazil, Ind. | 10,472 | 8 | | | 1 | | | | | 1 |
| Bridgeport, Conn. | 124,724 | 62 | 11 | 1 | 3 | | 2 | | 1 | 2 |
| Bristol, Conn. | 16,318 | 7 | | | | | | | | |
| Brockton, Mass. | 69,152 | 32 | | | 9 | 2 | 2 | | 1 | 2 |
| Brookline, Mass. | 33,526 | 6 | | | 2 | | 4 | | | |
| Brunswick, Ga. | 10,984 | 5 | | | | | | | | |
| Buffalo, N. Y. | 475,781 | 254 | 49 | 5 | 54 | | 14 | | 19 | 15 |
| Burlington, Iowa | 25,144 | | | | | | 1 | | | |
| Burlington, Vt. | 21,802 | 11 | | | | | | | 2 | |
| Butte, Mont. | 44,057 | 34 | | | | | 3 | | | 7 |
| Cairo, Ill. | 15,995 | 16 | 3 | | | | | | | 3 |
| Cambridge, Mass. | 114,293 | 45 | 7 | | 14 | | 2 | | 8 | 2 |
| Canton, Ohio. | 62,566 | 21 | | | 3 | | 1 | | | 1 |
| Cape Girardeau, Mo. | 11,146 | 7 | | | | | 4 | | | |
| Cedar Rapids, Iowa. | 38,033 | 21 | 1 | | | | | | | |
| Centralia, Ill. | 11,838 | 2 | | | 1 | | 1 | | | |
| Chanute, Kans. | 12,968 | 15 | | | 1 | | 1 | | | |
| Charleston, S. C. | 61,041 | 70 | | | 1 | | | | 1 | 3 |
| Charleston, W. Va. | 31,660 | | 1 | | 1 | | | | 1 | |
| Charlotte, N. C. | 40,759 | 18 | 1 | | | | 1 | | 3 | 2 |
| Chattanooga, Tenn. | 61,575 | 35 | | | | | | | | 5 |
| Chelsea, Mass. | 48,405 | 22 | 3 | | 2 | | 8 | | | 2 |
| Cheyenne, Wyo. | [1] 11,320 | 3 | | | 3 | | 3 | | | |
| Chicago, Ill. | 2,547,201 | 733 | 138 | 9 | 223 | | 294 | 4 | 167 | 49 |
| Chicopee, Mass. | 29,950 | 26 | | | 6 | | 2 | | 2 | |
| Chillicothe, Ohio. | 15,625 | 4 | 2 | | 1 | | | | | |
| Cincinnati, Ohio. | 414,248 | 245 | 8 | 2 | | 7 | 59 | 1 | 10 | 14 |
| Cleveland, Ohio. | 692,259 | 321 | 23 | 3 | 178 | 4 | 59 | 1 | 28 | 21 |
| Clinton, Iowa. | 27,678 | | 1 | | | | 2 | | | |
| Clinton, Mass. | [1] 13,075 | 13 | 2 | 1 | | | 1 | | | 1 |
| Coffeyville, Kans. | 18,331 | 3 | | | 5 | | 1 | | 2 | |
| Cohoes, N. Y. | 25,292 | 10 | | | 1 | | | | | |
| Columbia, S. C. | 35,165 | | 1 | | | | | | 1 | |
| Columbus, Ohio. | 220,135 | 120 | | | 81 | | 19 | | 6 | |
| Concord, N. H. | 22,858 | 17 | | | 40 | | 1 | | | |
| Corpus Christi, Tex. | 10,789 | 8 | | | 1 | | | | | |
| Cortland, N. Y. | 13,321 | 10 | | | | | 3 | | | |
| Coshocton, Ohio. | 11,887 | | | | 2 | | | | | |
| Council Bluffs, Iowa. | 31,838 | 14 | | | 1 | | 11 | | | |
| Covington, Ky. | 59,623 | 45 | 4 | 1 | 32 | 1 | 5 | | 2 | 3 |
| Cranston, R. I. | 26,773 | 3 | | | | | 4 | | | |
| Cumberland, Md. | 26,686 | 19 | | | | | | | 1 | |
| Dallas, Tex. | 129,738 | 48 | 10 | | 6 | | | | 11 | 2 |
| Danbury, Conn. | 22,931 | | | | 9 | | 1 | | | |
| Danvers, Mass. | 10,037 | | | | | | 3 | | | |
| Danville, Ill. | 32,969 | 17 | | | 30 | | | | | 1 |
| Dayton, Ohio. | 128,939 | 46 | 1 | | 51 | | 6 | | 1 | 1 |
| Decatur, Ill. | 41,483 | 10 | 1 | | 21 | 1 | | | | 1 |
| Dedham, Mass. | 10,618 | 4 | 1 | | 3 | | | | | |
| Denver, Colo. | 268,439 | 123 | 9 | | 44 | | 8 | 1 | | 15 |
| Detroit, Mich. | 619,648 | 331 | 77 | 8 | 134 | 3 | 90 | 1 | 44 | 18 |
| Dover, N. H. | 13,276 | 9 | | | | | | | | |
| Dubuque, Iowa. | 40,096 | | | | 3 | | 2 | | | |
| Duluth, Minn. | 97,077 | 22 | 2 | 1 | | | 3 | | 10 | 2 |
| Durham, N. C. | 26,160 | 15 | | | | | | | 1 | |
| East Chicago, Ind. | 30,286 | 10 | | | | | | | | |
| East Cleveland, Ohio. | 13,864 | | | | 22 | | 1 | | | |
| Easthampton, Mass. | 10,656 | | | | 3 | | 2 | | | |
| East Orange, N. J. | 43,761 | 7 | 3 | | 39 | | 2 | | | 1 |

[1] Population Apr. 15, 1919.

## DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

### City Reports for Week Ended Feb. 28, 1920—Continued.

| City. | Population as of July 1, 1917 (estimated by U. S. Census Bureau). | Total deaths from all causes. | Diphtheria. | | Measles. | | Scarlet fever. | | Tuberculosis. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| East Providence, R. I. | 18,485 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| East St. Louis, Ill. | 77,312 | 14 | 1 | 1 | 26 | ..... | 1 | ..... | 2 | ..... |
| Eau Claire, Wis. | 18,887 | ..... | 1 | ..... | 14 | ..... | 2 | ..... | ..... | ..... |
| Elgin, Ill. | 28,362 | 9 | 1 | 1 | 1 | ..... | 1 | ..... | ..... | ..... |
| Elizabeth, N. J. | 88,830 | ..... | 1 | ..... | 107 | ..... | 21 | ..... | 5 | 1 |
| Elkhart, Ind. | 22,273 | 6 | ..... | ..... | ..... | ..... | 4 | ..... | ..... | ..... |
| El Paso, Tex. | 69,149 | 54 | 3 | 2 | 27 | ..... | 2 | ..... | ..... | 6 |
| Elwood, Ind. | 11,028 | 16 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Englewood, N. J. | 12,603 | ..... | ..... | ..... | 3 | ..... | ..... | ..... | ..... | ..... |
| Eureka, Calif. | 15,142 | 6 | 1 | ..... | ..... | ..... | 1 | ..... | 1 | 1 |
| Evanston, Ill. | 29,304 | 11 | ..... | ..... | ..... | ..... | 14 | ..... | ..... | ..... |
| Everett, Mass. | 40,160 | 16 | 2 | 1 | ..... | ..... | ..... | ..... | ..... | 1 |
| Everett, Wash. | 37,205 | ..... | ..... | ..... | 2 | ..... | ..... | ..... | ..... | ..... |
| Fairmont, W. Va. | 16,111 | ..... | 4 | ..... | ..... | ..... | 2 | ..... | ..... | ..... |
| Fall River, Mass. | 129,828 | 40 | 8 | 2 | 11 | 1 | 5 | ..... | 7 | 1 |
| Fargo, N. Dak. | 17,872 | 16 | ..... | ..... | ..... | ..... | 10 | ..... | 1 | ..... |
| Findlay, Ohio. | [1] 14,858 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Flint, Mich. | 57,386 | 31 | 12 | 1 | ..... | ..... | 10 | 1 | ..... | ..... |
| Fort Scott, Kans. | 10,564 | 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fort Worth, Tex. | 109,597 | 35 | 2 | ..... | 2 | ..... | 1 | ..... | 1 | ..... |
| Fostoria, Ohio. | 10,959 | 9 | ..... | ..... | 28 | ..... | ..... | ..... | ..... | ..... |
| Framingham, Mass. | 14,149 | 12 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Freeport, Ill. | 19,844 | 7 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fremont, Nebr. | 10,080 | 6 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 |
| Fremont, Ohio. | 11,034 | 6 | ..... | ..... | 8 | ..... | 1 | ..... | ..... | ..... |
| Galesburg, Ill. | 24,629 | 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Galveston, Tex. | 42,650 | 19 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Gardner, Mass. | 17,574 | 11 | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 1 |
| Gary, Ind. | 56,000 | 20 | 1 | ..... | ..... | ..... | 5 | ..... | 2 | ..... |
| Geneva, N. Y. | 15,915 | 5 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Gloucester City, N. J. | 11,375 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Grand Rapids, Mich. | 132,861 | 66 | 3 | ..... | 82 | ..... | 1 | ..... | 1 | 2 |
| Granite City, Ill. | 15,890 | 3 | 2 | ..... | 11 | ..... | 1 | ..... | ..... | ..... |
| Great Falls, Mont. | [1] 13,948 | 20 | ..... | ..... | 1 | ..... | 1 | ..... | 1 | ..... |
| Greeley, Colo. | 11,942 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Green Bay, Wis. | 30,017 | ..... | ..... | ..... | 4 | ..... | 3 | ..... | ..... | ..... |
| Greenfield, Mass. | 12,251 | 11 | ..... | ..... | 10 | ..... | 6 | 1 | ..... | ..... |
| Greensboro, N. C. | 20,171 | 35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Greenwich, Conn. | 19,594 | 6 | 15 | ..... | 2 | ..... | ..... | ..... | ..... | ..... |
| Hackensack, N. J. | 17,412 | 2 | 4 | ..... | 5 | ..... | 1 | ..... | 1 | ..... |
| Hammond, Ind. | 27,016 | 20 | 1 | ..... | 36 | ..... | 8 | 1 | 1 | ..... |
| Harrison, N. J. | 17,345 | ..... | ..... | ..... | 1 | ..... | 1 | ..... | 1 | ..... |
| Haverhill, Mass. | 49,180 | 32 | 4 | ..... | 4 | ..... | 3 | ..... | 2 | 2 |
| Hibbing, Minn. | 17,550 | ..... | 1 | ..... | 5 | ..... | ..... | ..... | ..... | ..... |
| Highland Park, Mich. | 33,859 | 8 | 4 | ..... | 29 | ..... | 3 | 1 | 1 | ..... |
| Hoboken, N. J. | 78,324 | 26 | 2 | 1 | 14 | ..... | 4 | 1 | 5 | 1 |
| Holland, Mich. | 12,459 | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Holyoke, Mass. | 66,503 | 37 | ..... | ..... | 12 | ..... | ..... | ..... | 5 | 2 |
| Hudson, N. Y. | 12,898 | 6 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Huntington, Ind. | 10,982 | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Huntington, W. Va. | 47,686 | 25 | 1 | ..... | ..... | ..... | 3 | ..... | ..... | 1 |
| Hutchinson, Kans. | 21,461 | ..... | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... |
| Independence, Mo. | 11,964 | 3 | 1 | ..... | ..... | ..... | 4 | ..... | ..... | ..... |
| Indianapolis, Ind. | 283,622 | 133 | 5 | ..... | 87 | ..... | 19 | ..... | 12 | 7 |
| Ironton, Ohio. | 14,079 | 12 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Ironwood, Mich. | 15,095 | 11 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 |
| Irvington, N. J. | 16,710 | ..... | 1 | ..... | 14 | ..... | ..... | ..... | ..... | ..... |
| Ishpeming, Mich. | [1] 12,448 | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Ithaca, N. Y. | 16,017 | 9 | ..... | ..... | ..... | ..... | 5 | ..... | 1 | 2 |
| Jacksonville, Ill. | 15,506 | 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Jamestown, N. Y. | 37,431 | 19 | ..... | ..... | 5 | ..... | 1 | ..... | 5 | ..... |
| Janesville, Wis. | 14,411 | 6 | ..... | ..... | 4 | ..... | 3 | ..... | ..... | ..... |
| Jefferson City, Mo. | 13,712 | 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Jersey City, N. J. | 312,557 | ..... | 10 | ..... | 38 | ..... | 3 | ..... | 9 | ..... |
| Joplin, Mo. | 33,400 | 5 | ..... | ..... | 2 | ..... | ..... | ..... | 1 | ..... |
| Kalamazoo, Mich. | 50,408 | 33 | 2 | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Kansas City, Kans. | 102,096 | ..... | 6 | ..... | 50 | ..... | 3 | ..... | 2 | ..... |
| Kansas City, Mo. | 305,816 | 111 | 7 | ..... | 55 | 3 | 12 | ..... | 4 | 3 |
| Kearny, N. J. | 24,325 | 11 | ..... | ..... | 8 | ..... | 1 | ..... | 1 | 2 |
| Kenosha, Wis. | 32,833 | ..... | 1 | ..... | ..... | ..... | 3 | ..... | ..... | ..... |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Kewanee, Ill | 13,607 | 11 | | | | | | | | |
| Knoxville, Tenn | 59,112 | | 2 | | 86 | | 1 | | 4 | 4 |
| Kokomo, Ind | 21,929 | 8 | | | 13 | | 6 | | | |
| Lackawanna, N. Y | 16,219 | 3 | | | 3 | | | | 2 | |
| La Crosse, Wis | 31,835 | | | | 9 | | 3 | | | |
| La Fayette, Ind | 21,481 | 7 | 1 | | 6 | | 3 | | | |
| Lake Charles, La | 14,930 | 4 | | | | | | | | |
| Lancaster, Ohio | 16,086 | | | | | | | | | 1 |
| La Salle, Ill | 12,332 | 7 | | | | | | | | 1 |
| Lawrence, Kans | 13,477 | 2 | | | 1 | | | | 2 | |
| Lawrence, Mass | 102,923 | 47 | 2 | 1 | 4 | | 3 | | 5 | 1 |
| Leavenworth, Kans | [1] 19,363 | 15 | 1 | | | | | | | |
| Leominster, Mass | 21,365 | 8 | 1 | | | | 4 | 1 | 1 | |
| Lexington, Ky | 41,997 | 40 | 1 | | 5 | | | | | 8 |
| Lima, Ohio | 37,145 | 22 | 2 | | 1 | | 4 | | | |
| Lincoln, Nebr | 46,957 | 19 | 4 | | 40 | | 9 | | | 3 |
| Little Rock, Ark | 58,716 | | 3 | | | | | | 12 | |
| Lockport, N. Y | 20,028 | 9 | 1 | 1 | | | 3 | | | 2 |
| Logansport, Ind | 21,338 | 5 | | | 24 | | 11 | 1 | | 1 |
| Long Beach, Calif | 29,163 | 19 | | | 5 | | 6 | | 1 | 1 |
| Long Branch, N. J | 15,733 | 5 | | | 8 | | 1 | | | 1 |
| Lorain, Ohio | 38,266 | | | | | | 1 | | | |
| Los Angeles, Calif | 535,485 | 219 | 35 | | 52 | | 19 | | 40 | 19 |
| Louisville, Ky | 240,808 | 82 | 9 | | 2 | | 11 | | 19 | 5 |
| Lowell, Mass | 114,366 | 55 | 4 | 1 | 1 | | 9 | | 1 | 2 |
| Ludington, Mich | 10,566 | 5 | | | 1 | | | | | |
| Lynchburg, Va | 33,497 | 22 | 1 | | | | | | 1 | |
| Lynn, Mass | 104,534 | 58 | 8 | 1 | | | 19 | | 4 | 3 |
| Madison, Wis | 31,315 | | 1 | | 6 | | 2 | | | |
| Malden, Mass | 52,243 | 25 | | 1 | 8 | | 6 | | | 2 |
| Manchester, Conn | 15,859 | 3 | | | | | 2 | | | |
| Manchester, N. H | 79,607 | 30 | 2 | 1 | 7 | | 5 | | 7 | 4 |
| Manitowoc, Wis | 13,931 | | | | | | 7 | | | |
| Mankato, Minn | [1] 10,365 | 5 | | | 4 | | 1 | | 1 | |
| Marinette, Wis | [1] 14,610 | | 2 | | | | | | | |
| Marion, Ind | 19,923 | 17 | 1 | | 36 | 1 | 4 | | | 2 |
| Marion, Ohio | 24,129 | | 2 | | | | | | 1 | |
| Marquette, Mich | 12,555 | 13 | | | | | 6 | | | |
| Marshalltown, Iowa | 14,519 | | | | | | 1 | | | |
| Mason City, Iowa | 14,938 | 8 | | | | | | | | |
| Mattoon, Ill | 12,764 | | | | 26 | | | | | |
| Medford, Mass | 26,681 | 12 | 2 | | 6 | | 3 | | | |
| Melrose, Mass | 17,724 | 8 | | | 7 | | 3 | | | 1 |
| Memphis, Tenn | 151,877 | 141 | 7 | | 2 | | 2 | | 5 | 5 |
| Meriden, Conn | 29,431 | | | | 1 | | 2 | | 1 | |
| Methuen, Mass | 14,320 | 4 | | | 1 | | 1 | | 1 | |
| Middletown, N. Y | 15,890 | | 1 | | 1 | | 12 | | | |
| Middletown, Ohio | 16,384 | 4 | | | | | | | | 1 |
| Milwaukee, Wis | 445,008 | 118 | 17 | | 60 | | 22 | | 18 | 11 |
| Minneapolis, Minn | 373,448 | 93 | 16 | 1 | 28 | 3 | 13 | | 15 | 7 |
| Mishawaka, Ind | 17,082 | 4 | | | | | 1 | | | |
| Missoula, Mont | 19,075 | 5 | | | | | | | | |
| Mobile, Ala | 59,201 | 28 | 1 | | | | | | | 1 |
| Monmouth, Ill | 10,346 | 6 | | | | | 1 | | | |
| Montclair, N. J | 27,087 | 10 | | | 2 | | 3 | | 1 | |
| Montgomery, Ala | 44,039 | 31 | | | 1 | | | | | |
| Morgantown, W. Va | 14,444 | 4 | 2 | | 1 | | | | 1 | 1 |
| Morristown, N. J | 13,410 | 2 | | | | | | | | |
| Moundsville, W. Va | 11,513 | | | | 14 | | | | | |
| Muncie, Ind | 25,653 | 21 | 6 | | 74 | | 2 | | | |
| Muscatine, Iowa | 17,713 | 15 | | | | | | | | |
| Nashua, N. H | 27,541 | 7 | | | | | 3 | | | |
| Nashville, Tenn | 118,136 | 103 | 9 | | 3 | | 12 | | 2 | 5 |
| Newark, N. J | 418,789 | 142 | 21 | 1 | 201 | 1 | 23 | | 31 | 14 |
| New Bedford, Mass | 121,622 | 73 | 1 | | 13 | | 8 | | 5 | 2 |
| New Britain, Conn | 55,385 | 25 | 2 | | 1 | | 4 | | 3 | 1 |
| New Brunswick, N. J | 25,855 | | | | | | | | 2 | |
| Newburgh, N. Y | 29,893 | 30 | | | | | 1 | | | 2 |
| Newburyport, Mass | 15,291 | 7 | | 1 | | | | | | |
| New Castle, Ind | 14,144 | 7 | | | | | | | | |
| New Haven, Conn | 152,275 | 73 | 10 | | 34 | 3 | 5 | 1 | 7 | 4 |

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## DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| New London, Conn | 21,190 | | | | 12 | | | | | |
| New Orleans, La | 377,010 | 219 | 10 | 1 | 6 | | 9 | | 42 | 23 |
| New Philadelphia, Ohio | 10,133 | | | | 3 | | | | | |
| Newton, Mass | 44,345 | 21 | | | 10 | | 3 | | 1 | 1 |
| New York, N. Y | 5,737,492 | 1,823 | 243 | 30 | 1,690 | 36 | 125 | 5 | 473 | 147 |
| Niagara Falls, N. Y | 38,466 | 25 | 2 | | 113 | 1 | 1 | | 2 | 1 |
| Norfolk, Va | 91,148 | | 2 | | | | 3 | | 3 | 8 |
| North Adams, Mass | [1] 22,019 | 4 | | | | | | | | 1 |
| Northampton, Mass | 20,006 | 2 | | | 2 | | | | 1 | 1 |
| North Attleboro, Mass | 11,248 | 5 | | | | | | | | 1 |
| North Little Rock, Ark | 15,515 | | | | 4 | | | | | |
| North Tonowanda, N. Y | 14,060 | 8 | 2 | 1 | | | 1 | | 4 | |
| Norwalk, Conn | 27,332 | 7 | | | | | | | | |
| Norwich, Conn | 21,923 | 13 | | | 3 | | | | | 1 |
| Norwood, Ohio | 23,269 | 7 | 1 | | 15 | | 9 | | | |
| Oakland, Calif | 206,405 | 71 | 4 | 1 | 46 | 2 | 9 | | | 1 |
| Oak Park, Ill | 27,816 | 9 | | | | | 9 | 1 | | |
| Ogden Utah | 32,343 | 15 | | | | | | | | |
| Oklahoma City, Okla | 97,588 | 36 | 3 | 1 | 34 | | 4 | | 2 | 2 |
| Omaha, Nebr | 177,777 | 55 | 4 | | 27 | | 40 | | | 2 |
| Orange, Conn | 14,393 | 19 | 2 | | 2 | | 1 | | 2 | 2 |
| Oshkosh, Wis | 36,549 | | 1 | | 34 | | | | 1 | |
| Paducah, Ky | 25,178 | | | | 24 | | 2 | | | |
| Parkersburg, W. Va | 21,059 | 9 | 1 | | 1 | | | | | |
| Pasadena, Calif | 49,620 | 16 | 1 | | | | 7 | | 3 | 1 |
| Passaic, N. J | 74,478 | 18 | 1 | | 1 | | | | 3 | 3 |
| Paterson, N. J | 140,512 | | 10 | | 88 | | 2 | | 3 | |
| Pawtucket, R. I | 60,666 | 19 | 1 | | | | 3 | | | 1 |
| Peekskill, N. Y | 19,034 | 4 | | | | | | | | |
| Peoria, Ill | 72,184 | 34 | 4 | | | | 5 | | | 1 |
| Perth Amboy, N. J | 42,646 | 14 | 2 | | 1 | | 2 | | | 2 |
| Petersburg, Va | 25,817 | 17 | 1 | | | | | | 5 | 2 |
| Philadelphia, Pa | 1,735,514 | 975 | 65 | 11 | 513 | 4 | 81 | 8 | 97 | 66 |
| Phillipsburg, N. J | 15,879 | 9 | | | | | | | | |
| Pine Bluff, Ark | 17,777 | | 2 | | | | | | | |
| Piqua, Ohio | 14,275 | 6 | | | 8 | | | | | |
| Pittsfield, Mass | 39,678 | 21 | | | | | 1 | 1 | 1 | |
| Plainfield, N. J | 24,330 | 6 | 1 | | 7 | | 2 | | 1 | |
| Plattsburg, N. Y | 13,111 | 2 | | | | | | | | |
| Plymouth, Mass | 14,001 | 3 | | | | | | | | |
| Pontiac, Mich | 18,006 | | 5 | | 5 | | | | | 1 |
| Port Chester, N. Y | 16,727 | 8 | 3 | 1 | | | | | | |
| Port Huron, Mich | [1] 18,863 | 15 | 6 | 1 | 24 | | 1 | | | |
| Portland, Me | 64,720 | 50 | | | | | 5 | | | 3 |
| Portland, Oreg | 308,399 | 115 | 3 | | 9 | | 15 | | 6 | 4 |
| Portsmouth, N. H | 11,730 | | 1 | | 2 | | | | | |
| Portsmouth, Ohio | 29,356 | 25 | | | | | | | | |
| Poughkeepsie, N. Y | 30,786 | 10 | 2 | | | | | | | 1 |
| Providence, R. I | 259,895 | 142 | 43 | 2 | 27 | 1 | 11 | 1 | | 7 |
| Pueblo, Colo | 56,084 | | 2 | | | | | | | 2 |
| Quincy, Ill | 36,832 | 12 | 1 | | | | 2 | | | |
| Quincy, Mass | 39,022 | 10 | 3 | | | | 3 | | 4 | |
| Racine, Wis | 47,465 | | | | 1 | | | | | |
| Rahway, N. J | 10,361 | 6 | | | | | | | | |
| Raleigh, N. C | 20,274 | 24 | | | 2 | | | | | 3 |
| Redlands, Calif | 14,573 | 5 | | | 2 | | | | | |
| Reno, Nev | 15,514 | 5 | | | 15 | | | | | |
| Richmond, Ind | 25,080 | 10 | | 1 | 19 | | 1 | | 1 | 1 |
| Richmond, Va | 158,702 | 61 | 4 | | 57 | | 6 | | 28 | 8 |
| Riverside, Calif | 20,496 | 7 | 2 | | | | | | 1 | 1 |
| Roanoke, Va | 46,282 | | 3 | | 2 | | | | | 1 |
| Rochester, N. Y | 264,714 | 86 | 30 | 2 | 166 | | 19 | 2 | | 4 |
| Rockford, Ill | 55,739 | 16 | 2 | | | | 5 | | | 1 |
| Rock Island, Ill | 29,452 | 6 | 1 | | | | | | 3 | 1 |
| Rocky Mount, N. C | 12,673 | 12 | | | | | | | | |
| Rome, Ga | 15,607 | | 1 | | | | | | 2 | |
| Rome, N. Y | 24,259 | | | | | | 1 | | | |
| Sacramento, Calif | 68,984 | 27 | 3 | | 30 | | | | 3 | 2 |
| St. Cloud, Minn | 12,013 | | | | | | | | 1 | |
| St. Joseph, Mo | 86,498 | 70 | 1 | 1 | | | 1 | | | 1 |
| St. Louis, Mo | 768,630 | 256 | 79 | 7 | 479 | 11 | 13 | 1 | 56 | 18 |

[1] Population Apr. 15, 1910.

## DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

### City Reports for Week Ended Feb. 28, 1920—Continued.

| City. | Population as of July 1, 1917 (estimated by U. S. Census Bureau). | Total deaths from all causes. | Diphtheria. | | Measles. | | Scarlet fever. | | Tuberculosis. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| St. Paul, Minn. | 252,465 | 65 | 10 | ..... | 22 | ..... | 13 | ..... | 3 | 4 |
| Salem, Mass. | 49,346 | ..... | 2 | ..... | ..... | ..... | 1 | ..... | 2 | ..... |
| Salt Lake City, Utah. | 121,623 | 47 | 1 | ..... | 1 | ..... | 1 | ..... | 1 | 1 |
| San Angelo, Tex. | [1] 10,321 | 26 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 6 |
| San Bernardino, Calif. | 17,616 | 6 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| San Diego, Calif. | 56,412 | 36 | 2 | ..... | 4 | ..... | 8 | ..... | 4 | 4 |
| Sandusky, Ohio. | 20,226 | 6 | ..... | ..... | 5 | ..... | ..... | ..... | 1 | ..... |
| Sanford, Me. | 11,217 | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| San Francisco, Calif. | 471,023 | 211 | 28 | 3 | 256 | 1 | 7 | ..... | 30 | 10 |
| Saratoga Springs, N. Y. | 13,839 | 12 | ..... | ..... | 1 | ..... | ..... | ..... | 1 | 1 |
| Saugus, Mass. | 10,210 | ..... | ..... | ..... | ..... | ..... | 3 | ..... | ..... | ..... |
| Sault Ste. Marie, Mich. | 14,130 | 10 | ..... | ..... | 11 | ..... | ..... | ..... | ..... | ..... |
| Savannah, Ga. | 69,250 | 75 | ..... | ..... | ..... | ..... | 1 | 1 | 2 | 4 |
| Schenectady, N. Y. | 103,774 | 35 | 1 | ..... | 20 | ..... | ..... | ..... | 3 | ..... |
| Seattle, Wash. | 366,445 | ..... | 8 | ..... | 110 | ..... | 19 | ..... | ..... | ..... |
| Sheboygan, Wis. | 28,907 | ..... | 2 | ..... | 25 | ..... | 6 | ..... | ..... | ..... |
| Sioux City, Iowa. | 58,568 | ..... | 2 | ..... | ..... | ..... | 5 | ..... | ..... | ..... |
| Sioux Falls, S. Dak. | 16,887 | 17 | ..... | ..... | 2 | ..... | 3 | ..... | ..... | ..... |
| Somerville, Mass. | 88,618 | 36 | 5 | 2 | 15 | ..... | 5 | ..... | ..... | 2 |
| South Bend, Ind. | 70,967 | 18 | ..... | ..... | 1 | ..... | 4 | ..... | 4 | 2 |
| Southbridge, Mass. | 14,465 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Spartanburg, S. C. | 21,985 | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Spokane, Wash. | 157,656 | ..... | 1 | ..... | 37 | ..... | 3 | ..... | ..... | ..... |
| Springfield, Ill. | 62,623 | 33 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 2 |
| Springfield, Mass. | 108,668 | 61 | 3 | ..... | 24 | ..... | 10 | 1 | 2 | 3 |
| Springfield, Mo. | 41,169 | 16 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Springfield, Ohio. | 52,296 | 29 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 3 |
| Staunton, Va. | 11,823 | 13 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Steubenville, Ohio. | 28,259 | 23 | 2 | ..... | 1 | ..... | ..... | ..... | 2 | ..... |
| Stillwater, Minn. | [1] 10,198 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Stockton, Calif. | 36,209 | 13 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... |
| Superior, Wis. | 47,167 | 10 | ..... | ..... | 47 | ..... | 1 | ..... | ..... | ..... |
| Syracuse, N. Y. | 158,559 | 60 | 4 | ..... | 3 | ..... | 18 | 1 | 4 | 2 |
| Tacoma, Wash. | 117,446 | ..... | 1 | ..... | 11 | ..... | 1 | ..... | ..... | ..... |
| Taunton, Mass. | 36,610 | 19 | ..... | ..... | ..... | ..... | 3 | ..... | 2 | 3 |
| Terre Haute, Ind. | 67,361 | 53 | 1 | ..... | 23 | ..... | 1 | ..... | ..... | 1 |
| Toledo, Ohio. | 202,010 | 98 | 6 | ..... | 283 | 5 | 35 | ..... | 7 | 9 |
| Topeka, Kans. | 49,538 | 27 | ..... | ..... | 1 | ..... | 1 | ..... | 1 | ..... |
| Traverse City, Mich. | 14,099 | 3 | ..... | ..... | 2 | ..... | 2 | ..... | 1 | ..... |
| Trenton, N. J. | 113,974 | 67 | 1 | ..... | 3 | 1 | 4 | 1 | 5 | 4 |
| Troy, N. Y. | 78,094 | 39 | ..... | ..... | 1 | ..... | ..... | ..... | 5 | 3 |
| Tuscaloosa, Ala. | 10,824 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 |
| Vancouver, Wash. | 13,805 | 1 | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... |
| Waco, Tex. | 34,015 | 16 | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... |
| Wakefield, Mass. | 12,947 | 5 | 1 | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Walla Walla, Wash. | 26,067 | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... |
| Waltham, Mass. | 31,011 | 14 | 12 | 1 | ..... | ..... | ..... | ..... | ..... | 1 |
| Washington, D. C. | 369,282 | 147 | 9 | ..... | 18 | ..... | 28 | 1 | 21 | 10 |
| Waterbury, Conn. | 89,201 | ..... | 8 | ..... | 4 | ..... | 30 | 2 | 2 | 1 |
| Watertown, N. Y. | 20,404 | ..... | 4 | ..... | ..... | ..... | 3 | ..... | ..... | ..... |
| Wausau, Wis. | 19,666 | 16 | ..... | ..... | 63 | ..... | ..... | ..... | 1 | 1 |
| Westfield, Mass. | 18,769 | 7 | 1 | ..... | 4 | ..... | ..... | ..... | 1 | ..... |
| West Hoboken, N. J. | 44,386 | 3 | 2 | ..... | 2 | ..... | ..... | ..... | 1 | ..... |
| West New York, N. J. | 19,613 | 7 | 1 | 2 | 21 | ..... | ..... | ..... | 2 | 1 |
| West Orange, N. J. | 13,964 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Wheeling, W. Va. | 43,657 | 30 | 2 | ..... | 38 | ..... | ..... | ..... | ..... | 1 |
| Wichita, Kans. | 73,597 | 54 | 1 | ..... | 2 | ..... | 2 | ..... | ..... | 1 |
| Willimantic, Conn. | 12,902 | 7 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wilmington, Del. | 95,369 | 53 | 1 | ..... | 21 | ..... | 1 | 1 | ..... | 4 |
| Wilmington, N. C. | 30,400 | 40 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 5 |
| Winchester, Mass. | 10,812 | 5 | 1 | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Windham, Conn. (town). | 14,404 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Winona, Minn. | [1] 18,583 | 8 | ..... | ..... | 8 | ..... | ..... | ..... | 2 | 1 |
| Winston-Salem, N. C. | 33,136 | 35 | 4 | ..... | ..... | ..... | ..... | ..... | 4 | 1 |
| Winthrop, Mass. | 13,105 | 2 | ..... | ..... | 10 | ..... | 1 | ..... | ..... | ..... |
| Woburn, Mass. | 16,076 | 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 |
| Worcester, Mass. | 166,106 | 82 | 7 | ..... | 2 | ..... | 22 | ..... | 5 | 3 |
| Yakima, Wash. | 22,058 | ..... | 3 | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Yonkers, N. Y. | 103,066 | 33 | 1 | ..... | 11 | ..... | 2 | 1 | 1 | 3 |
| Youngstown, Ohio. | 112,282 | 52 | 1 | ..... | 4 | ..... | 20 | ..... | 2 | 2 |
| Zanesville, Ohio. | 31,320 | 20 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... |

[1] Population Apr. 15, 1910.

# FOREIGN AND INSULAR.

## CUBA.

### Communicable Diseases—Habana.

Communicable diseases have been notified at Habana as follows:

| Place. | Feb. 11-20, 1920. | | Remaining under treatment Feb. 20, 1920. |
|---|---|---|---|
| | New cases. | Deaths. | |
| Bronchopneumonia | 34 | 14 | ..... |
| Cerebrospinal meningitis | 6 | 3 | [1] 3 |
| Chicken pox | 13 | ..... | 6 |
| Diphtheria | 2 | ..... | 2 |
| Influenza | 119 | 11 | 65 |
| Leprosy | ..... | ..... | [2] 10 |
| Malaria | 11 | ..... | [3] 33 |
| Measles | 59 | ..... | 65 |
| Paratyphoid fever | 1 | ..... | 1 |
| Pneumonia | 3 | 1 | ..... |
| Scarlet fever | 5 | 1 | 5 |
| Smallpox | 1 | ..... | 8 |
| Typhoid fever | 6 | 1 | [4] 24 |

[1] From abroad. [2] 9 cases transferred. [3] From the interior, 15. [4] From the interior, 10.

## POLAND.

### Typhus Fever—November, 1919.

The Bulletin of the International Office of Public Hygiene for January, 1920, shows the occurrence during the month of November, 1919, in present Poland, including the Province of Posen, and exclusive of the districts of Vilna, Brest-Litovsk, and Volhynia, of 11,264 cases, with 942 deaths, of typhus fever among the civil population. Of these numbers, 5,716 cases with 616 deaths were reported for Galicia. At Warsaw, during the month under report, 107 cases were notified, as against 129 cases in October.

## SWITZERLAND.

### Influenza.

The Sanitary Bulletin of the Federal Service of Switzerland, under date of January 24, 1920, quoted in the Bulletin of the International Office of Public Hygiene, January, 1920, shows the occurrence of an outbreak of influenza in several cantons of Switzerland, with a reported incidence according to cantons, during the week ended January 17, 1920, as follows: *Basel City*, 69 cases; *Geneva*, 131, as against 188 in the preceding week; *Tecino*, 393 cases; *Thurgau*, 40 cases; *Vaud*, 573 cases.

### Influenza—Zurich.

During the week ended January 31, 1920, 328 new cases of influenza were notified at Zurich, Switzerland. Places of social entertainment were ordered closed on account of the prevalence of influenza.

## VIRGIN ISLANDS.

### Contagious Diseases—January, 1920.

The occurrence of contagious diseases in the Virgin Islands during the month of January, 1920, was reported as follows:

| | Cases. | Remarks. |
|---|---|---|
| In St. Thomas and St. John: | | |
| Chancroid | 15 | 8 imported. |
| Dysentery (unclassified) | 2 | St. John. |
| Erysipelas | 1 | |
| Gonorrhea | 28 | 16 imported, 1 St. John, 2 St. Croix |
| Malaria | 4 | 2 St. John: 2 Tortola. |
| Syphilis | 11 | |
| Trachoma | 1 | St. John. |
| Tuberculosis (pulmonary) | 2 | |
| Uncinariasis | 1 | Transient. |
| Whooping cough | 9 | |
| In St. Croix: | | |
| Chancroid | 1 | |
| Dysentery (entamebic) | 2 | |
| Filariasis | 25 | |
| Gonorrhea | 2 | |
| Syphilis | 6 | |
| Trachoma | 25 | |
| Tuberculosis (pulmonary) | 3 | |

## INFLUENZA.

The following information was taken from reports received during the week ended March 19, 1920:

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Algeria: | | | | |
| Algiers | Jan. 1-31 | 43 | 34 | |
| Australia: | | | | |
| South Australia, State | Jan. 4-31 | | | Present. |
| Belgium: | | | | |
| Ghent | Feb. 1-7 | | | Do. |
| Brazil: | | | | |
| Porto Alegre | Dec. 1-31 | | 6 | |
| Rio de Janeiro | Nov. 30-Dec. 27 | | 38 | |
| Bulgaria: | | | | |
| Sofia | Jan. 25-31 | | | Do. |
| Canada: | | | | |
| British Columbia— | | | | |
| Victoria | Feb. 8-28 | | 6 | |
| New Brunswick— | | | | |
| St. Johns | Feb. 22-28 | | 45 | |
| Nova Scotia— | | | | |
| Halifax | do | 54 | | |
| Sydney | do | 26 | | |
| Ontario— | | | | |
| Fernie | Feb. 15-28 | | 3 | |
| Hamilton | Feb. 29-Mar. 6 | 495 | | |
| Port Hawkesbury | Feb. 22-28 | | | Do. |
| Sarnia | Feb. 29-Mar. 6 | 57 | 4 | |
| Summerside | Feb. 28-Mar. 6 | | | Do. |
| Toronto | Feb. 22-28 | | 71 | |
| Windsor | do | | 2 | |
| Quebec— | | | | |
| Quebec | do | 325 | 1 | |

## INFLUENZA—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Canada—continued. | | | | |
| Saskatchewan— | | | | |
| Regina | Feb. 22-28 | 82 | 5 | |
| Saskatoon | do | 39 | 6 | |
| Ceylon: | | | | |
| Colombo | Dec. 14-27 | | 22 | Nov. 1-30, 1919: Deaths, 40, in 33 towns. |
| Do | Dec. 28-Jan. 17 | | 35 | |
| Costa Rica: | | | | |
| Port Limon | Feb. 16-22 | | 6 | |
| Dominican Republic: | | | | |
| Santo Domingo | Jan. 25-Feb. 14 | 3 | | |
| Egypt: | | | | |
| Alexandria | Jan. 22-Feb. 4 | 114 | 19 | |
| France: | | | | |
| Havre | Jan. 26-Feb. 15 | 15 | 23 | |
| Great Britain: | | | | |
| England and Wales | Feb. 1-7 | | 98 | 96 great towns. Population, aggregate, 16,577,344. |
| Do | Feb. 8-14 | | 109 | Do. |
| London | Feb. 1-7 | | 20 | Including Greater London and Outer Ring, 52 deaths. |
| Do | Feb. 8-14 | | 25 | Including Greater London and Outer Ring, 43 deaths. |
| Scotland | Feb. 1-14 | | 2 | In 16 principal towns. Population, 2,416,900. With complications, 10 deaths. |
| Honduras: | | | | |
| Tegucigalpa | Feb. 8-14 | | 1 | |
| India: | | | | |
| Karachi | Jan. 18-24 | 68 | 68 | |
| Rangoon | Jan. 4-10 | | 16 | |
| Japan: | | | | |
| Aichi Prefecture | Dec. 16-31 | 3,160 | 109 | Population stated to be 2,000,000. |
| Nagoya City | do | 884 | 57 | |
| Do | Feb. 1-7 | | 45 | |
| Nagasaki | Jan. 26-Feb. 1 | | | Present. |
| Mexico: | | | | |
| Chihuahua | Feb. 1-15 | 65 | 2 | |
| Matamoros | Feb. 23-29 | | | Do. |
| Saltillo | Feb. 23-28 | 144 | 4 | |
| Vera Cruz | Feb. 23-29 | | 1 | |
| Norway: | | | | |
| Christiania | Feb. 8-14 | | 3 | |
| Spain: | | | | |
| Barcelona | Jan. 22-Feb. 3 | | | Do. |
| Malaga | Jan. 1-31 | | 62 | |
| Valencia | Feb. 8-14 | 3 | 3 | |
| Sweden: | | | | |
| Goteborg | Jan. 4-Feb. 7 | 16 | 7 | |
| Malmo | Jan. 11-Feb. 7 | 762 | 7 | |
| Stockholm | Jan. 25-31 | 1 | | |
| Switzerland: | | | | |
| Canton— | | | | |
| Basel | Dec. 28-Feb. 7 | 4,350 | 30 | City and Canton. |
| Geneva | Jan. 11-17 | 131 | | |
| Tecino | do | 393 | | |
| Thurgau | do | 40 | | |
| Vaud | do | 573 | | |
| Zurich | Jan. 25-31 | 358 | | |

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

## Reports Received During Week Ended Mar. 19, 1920.[1]

### CHOLERA.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| India | | | | Dec. 6-20, 1919: Deaths, 5,447. |
| Madras | Jan. 18-21 | 1 | | |
| Philippine Islands: | | | | |
| Provinces | | | | Jan. 25-31, 1920: Cases, 37; deaths, 17. |
| Albay | Jan. 25-31 | 2 | 2 | |
| Ambos Camarines | do | 26 | 6 | |
| Antique | do | 9 | 9 | |
| Provinces | | | | Feb. 1-7, 1920: Cases, 120; deaths, 82. |
| Albay | Feb. 1-7 | 1 | 1 | |
| Ambos Camarines | do | 56 | 43 | |
| Antique | do | 28 | 16 | |
| Batangas | do | 6 | 5 | |
| Palawan | do | 26 | 17 | |
| Rizal | do | 3 | | |
| Siam: | | | | |
| Bangkok | Dec. 28-Jan. 3 | 27 | 3 | |
| Straits Settlements: | | | | |
| Singapore | Jan. 4-10 | 1 | | |

### PLAGUE.

| | | | | |
|---|---|---|---|---|
| Brazil: | | | | |
| Rio de Janeiro | Nov. 29-Dec. 27 | 2 | | Nov. 2-25, 1919: Cases, 7; deaths, 2. |
| Ceylon: | | | | |
| Colombo | Dec. 28-Jan. 10 | 15 | 4 | |
| Egypt | | | | Jan. 1-Feb. 5, 1920: Cases, 24; deaths, 14. |
| Assiout Province | Jan. 26-Feb. 4 | 8 | 8 | |
| India | | | | Jan. 4-10, 1920: Cases, 3,890; deaths, 2,879. |
| Bombay | Jan. 4-10 | 1 | | |
| Madras Presidency | Jan. 18-24 | 471 | 321 | |
| Rangoon | Jan. 4-10 | 8 | 8 | |
| Java: | | | | |
| East Java | | | | Dec. 25-31, 1919: Cases, 6; deaths, 6. |
| Surabaya | Dec. 25-31 | 6 | 6 | |
| Mesopotamia: | | | | |
| Bagdad | Jan. 3-9 | 1 | 1 | |
| Straits Settlements: | | | | |
| Singapore | Jan. 4-10 | 2 | | |

### SMALLPOX.

| | | | | |
|---|---|---|---|---|
| Belgium: | | | | |
| Brussels | Dec. 28-Jan. 3 | | 1 | |
| Bolivia: | | | | |
| La Paz | Jan. 25-31 | 4 | 4 | |
| Brazil: | | | | |
| Para | Feb. 8-14 | | 2 | |
| Pernambuco | Dec. 21-28 | 94 | 5 | |
| Do | Dec. 29-Jan. 11 | 82 | 4 | |
| Rio de Janeiro | Nov. 29-Dec. 27 | 57 | 14 | |
| Canada: | | | | |
| Nova Scotia— | | | | |
| Sydney | Feb. 22-28 | 2 | | |
| Ontario | | | | Feb. 15-21, 1920: Cases, 187; deaths, 2. In 28 counties, 48 localities. Feb. 22-28, 1920: Cases, 141; deaths, 2. In 23 counties, 38 localities. |
| North Bay | Feb. 29-Mar. 6 | 1 | | |
| Ottawa | Feb. 22-28 | 3 | | |
| Toronto | do | 38 | | |
| Quebec— | | | | |
| Quebec | do | 4 | | |
| Ceylon: | | | | |
| Colombo | Dec. 28-Jan. 3 | 1 | 1 | |
| Colombia: | | | | |
| Barranquilla | Feb. 1-14 | | 2 | About 200 cases. |
| Egypt: | | | | |
| Alexandria | Jan. 22-28 | 23 | 10 | |
| Cairo | Dec. 17-23 | 4 | | |
| Port Said | do | 3 | | |
| Finland | | | | Dec. 15-31, 1920: Cases, 10. |
| Province— | | | | |
| Tavastehus | Dec. 15-31 | 1 | | Rural. |
| Vasa | do | 2 | | Do. |
| Viborg | do | 7 | | Do. |
| Germany | | | | Oct. 26-Dec. 6, 1919: Cases, 135. |

[1] From medical officers of the Public Health Service, American consuls, and other sources.

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received During Week Ended Mar. 19, 1920—Continued.

#### SMALLPOX—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Greece: | | | | |
| Saloniki | Jan. 12-Feb. 1 | 19 | 14 | Langaza, Jan. 26-Feb. 1, 1920: Cases, 2. |
| India | | | | Dec. 6-20, 1919: Cases, 944. |
| Bombay | Jan. 4-10 | 7 | 2 | |
| Karachi | Jan. 18-24 | 4 | 4 | |
| Madras | do | 4 | 1 | |
| Rangoon | Jan. 4-10 | 7 | 4 | |
| Italy: | | | | |
| Palermo | Feb. 3-9 | 4 | | |
| Java: | | | | |
| West Java | | | | Jan. 2-8, 1920: Cases, 78; deaths, 10. |
| Batavia | Jan. 2-9 | 1 | | |
| Mexico: | | | | |
| San Luis Potosi | Feb. 22-29 | | 5 | |
| Newfoundland: | | | | |
| St. Johns | Feb. 21-27 | 1 | | At two other localities. |
| Portugal: | | | | |
| Oporto | Dec. 28-Jan. 3 | 1 | 1 | |
| Spain: | | | | |
| Barcelona | Jan. 28-Feb. 3 | | 4 | |
| Valencia | Feb. 8-14 | 18 | 3 | |
| Union of South Africa: | | | | |
| Johannesburg | Dec. 1-31 | 3 | | |

#### TYPHUS FEVER.

| | | | | |
|---|---|---|---|---|
| Algeria: | | | | |
| Algiers | Jan. 1-31 | 1 | 1 | |
| Austria | | | | Oct. 12-Nov. 22, 1919: Cases, 10. |
| Bolivia: | | | | |
| La Paz | Jan. 25-31 | 9 | 2 | |
| Bulgaria: | | | | |
| Vratza | do | | | Present. Present also in vicinity. |
| Chile: | | | | |
| Valparaiso | Jan. 19-Feb. 8 | 110 | 36 | |
| Egypt: | | | | |
| Alexandria | Jan. 22-Feb. 4 | 22 | 6 | |
| Cairo | Dec. 17-23 | 5 | 3 | |
| Germany | | | | Oct. 26-Dec. 2, 1919: Cases, 3; in repatriated soldiers. |
| Greece: | | | | |
| Saloniki | Jan. 12-Feb. 1 | 4 | 1 | In vicinity, at Vertekep, 4 cases Zagoritzani, 1. |
| Italy: | | | | |
| Brindisi | Dec. 22-28 | 1 | | |
| Trieste | Jan. 27-Feb. 2 | 4 | 2 | |
| Mexico: | | | | |
| San Luis Potosi | Feb. 23-29 | | | Present. |
| Poland | | | | Nov. 1-30, 1919: Cases, 11,264; deaths, 942. Including Province of Posen. |
| Galicia (Province) | Nov. 1-30 | 5,716 | 616 | |
| Warsaw | do | 107 | 19 | Oct. 1-31, 1919: Cases, 129; deaths, 21. |
| Portugal: | | | | |
| Oporto | Dec. 21-27 | 1 | | |
| Spain: | | | | |
| Bilbao | Dec. 22-31 | | 1 | |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920.

#### CHOLERA.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| China: | | | | |
| Amoy | Nov. 4-17 | | 2 | |
| Chosen (Korea) | | | | Oct. 20-Nov. 16, 1919: Cases, 3,525; deaths, 3,144. Aug. 15-Nov. 16, 1919: Cases, 15,192; deaths, 9,823. |
| Chemulpo | Oct. 1-31 | 6 | 4 | |
| Fusan | do | 34 | 29 | |
| Provinces— | | | | |
| Keiki | Aug. 15-Nov. 16 | 224 | 135 | |
| Kogen | do | 64 | 38 | |
| Kokai | do | 4,015 | 2,770 | |
| North Chusei | do | 1 | 1 | |
| North Heian | do | 3,196 | 2,434 | |
| North Kankyo | do | 497 | 275 | |
| North Keisho | do | 63 | 35 | |
| North Zenra | do | 1,326 | 692 | |
| South Chusei | do | 930 | 599 | |
| South Heian | do | 3,031 | 1,858 | |
| South Kankyo | do | 870 | 551 | |
| South Keisho | do | 318 | 156 | |
| South Zenra | do | 657 | 288 | |
| Greece: | | | | |
| Saloniki | Oct. 10 | 1 | | |
| India | | | | Oct. 19-Nov. 29, 1919: Deaths, 15,698. |
| Bombay | Nov. 2-8 | 1 | 1 | |
| Calcutta | Oct. 26-Dec. 27 | 181 | 166 | |
| Do | Dec. 28-Jan. 3 | 11 | 9 | |
| Madras | Nov. 23-Dec. 27 | 14 | 5 | |
| Do | Dec. 28-Jan. 10 | 6 | 5 | |
| Rangoon | Nov. 30-Dec. 27 | 12 | 9 | |
| Do | Dec. 28-Jan. 3 | 1 | 1 | |
| Indo-China: | | | | |
| Saigon | Oct. 27-Nov. 23 | 5 | 4 | |
| Japan: | | | | |
| Kobe | Nov. 24-30 | 2 | | |
| Taiwan | | | | For entire island: Oct. 22-Nov. 30, 1919: Cases, 651; deaths, 385. |
| Tokyo | Nov. 10-20 | 1 | 1 | |
| Java: | | | | |
| East Java | | | | Oct. 5-11, 1919: One case, 1 death. At Pasoerocan. |
| West Java | | | | Nov. 5, Dec. 25, 1919: Cases, 17. |
| Batavia | Nov. 5-Dec. 25 | 17 | | |
| Philippine Islands: | | | | |
| Manila | Nov. 2-Dec. 27 | 20 | 10 | |
| Provinces | | | | Nov. 2-Dec. 27, 1919: Cases, 1,574; deaths, 1,151. |
| Albay | Nov. 2-Dec. 27 | 339 | 240 | |
| Ambos Camarines | Nov. 2-Dec. 20 | 66 | 34 | |
| Antique | Nov. 2-Dec. 27 | 160 | 113 | |
| Batangas | do | 39 | 28 | |
| Bohol | do | 34 | 27 | |
| Cagayan | Nov. 3-15 | 35 | 20 | |
| Capiz | Nov. 2-8 | 6 | 5 | |
| Cavite | Nov. 2-Dec. 6 | 25 | 16 | |
| Cebu | Nov. 2-Dec. 20 | 23 | 14 | |
| Davao | Nov. 9-15 | 6 | 4 | |
| Ilocos Notre | Nov. 2-29 | 42 | 40 | |
| Ilocos Sur | Nov. 2-22 | 18 | 15 | |
| Iloilo | Nov. 2-Dec. 20 | 55 | 33 | |
| Isabela | Nov. 2-Dec. 13 | 167 | 77 | |
| Laguna | Nov. 2-Dec. 20 | 23 | 17 | |
| Mindoro | Nov. 2-Dec. 6 | 81 | 30 | |
| Mountain | Nov. 2-Dec. 13 | 6 | 4 | |
| Occidental Negros | Nov. 2-Dec. 27 | 100 | 53 | |
| Pangasinan | Nov. 20-Dec. 20 | 60 | 46 | |
| Rizal | do | 41 | 15 | |
| Sorsogon | Nov. 2-Dec. 13 | 208 | 139 | |
| Tarlac | Nov. 2-22 | 11 | 11 | |
| Tayabas | Nov. 2-Dec. 27 | 60 | 35 | |
| Union | Nov. 9-15 | 5 | 5 | |
| Provinces | | | | Dec. 28, 1919-Jan. 24, 1920: Cases, 478; deaths, 313. |
| Albay | Dec. 28-Jan. 24 | 27 | 14 | |
| Ambos Camarines | do | 74 | 50 | |
| Antique | do | 164 | 107 | |
| Batangas | Dec. 28-Jan. 17 | 13 | 7 | |
| Cavite | Jan. 11-17 | 1 | 1 | |
| Iloilo | Dec. 28-Jan. 3 | 9 | 2 | |
| Isabela | Jan. 11-17 | 6 | 3 | |
| Laguna | Dec. 28-Jan. 3 | 2 | 2 | |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920—Continued.

#### CHOLERA—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Philippine Islands—Contd. | | | | |
| Provinces—Continued. | | | | |
| Mindoro | Jan. 4–24 | 24 | 11 | |
| Mountain | Dec. 28–Jan. 10 | 11 | 6 | |
| Occidental Negros | Jan. 4–17 | 21 | 19 | |
| Palawan | Jan. 11–24 | 7 | 2 | |
| Pangasinan | Dec. 28–Jan. 3 | 1 | | |
| Samar | Jan. 4–24 | 44 | 30 | |
| Sorsogon | do | 51 | 40 | |
| Tayabas | do | 23 | 19 | |
| Poland: | | | | |
| Garwolin | | | | Present in November, 1919. |
| Kowal | | | | Do. |
| Stryi | | | | Do. |
| Russia: | | | | |
| Novorossisk | Nov. 8–11 | 3 | | |
| Odessa | Oct. 25–Nov. 7 | 93 | | |
| Siam: | | | | |
| Bankok | Dec. 7–27 | 163 | 57 | Oct. 5–Dec. 15, 1919: Deaths, 1,080. |
| Straits Settlements: | | | | |
| Singapore | Oct. 5–Dec. 27 | 15 | 14 | |
| Do | Dec. 28–Jan. 3 | 1 | | |
| Sumatra: | | | | |
| Deli | Oct. 1–31 | 1 | 1 | |

#### PLAGUE.

| | | | | |
|---|---|---|---|---|
| Argentina: | | | | |
| Rosario | Dec. 1–31 | | 7 | |
| Brazil: | | | | |
| Bahia | Nov. 9–15 | 1 | 1 | |
| Porto Alegre | Nov. 1–30 | | 3 | |
| Rio de Janeiro | Jan. 11–17 | 1 | | |
| British East Africa: | | | | |
| Kisumu | Sept. 28–Nov. 1 | 6 | 6 | Dec. 14–20, 1919: Present in vicinity. |
| Ceylon: | | | | |
| Colombo | Oct. 26–Dec. 27 | 36 | 35 | |
| Chile: | | | | |
| Antofagasta | Dec. 8–14 | 1 | | |
| China: | | | | |
| Hongkong | Dec. 7–13 | 1 | | |
| Ecuador: | | | | |
| Guayaquil | Nov. 1–31 | 2 | | |
| Do | Jan. 1–31 | 8 | | |
| Egypt | | | | Jan. 1–Dec. 25, 1919: Cases, 867; deaths, 469. |
| Cities— | | | | |
| Alexandria | Dec. 3 | 1 | 1 | From vessel Rachid Pacha. |
| Province— | | | | |
| Assiout | Nov. 15–21 | 30 | 17 | |
| Do | Jan. 13 | 1 | 1 | |
| Greece: | | | | |
| Saloniki | Oct. 6–Dec. 21 | 19 | 7 | |
| Hawaii: | | | | |
| Kaloha | Feb. 23 | 1 | 1 | |
| India | | | | Oct. 19–Dec. 27, 1919: Cases, 31,542; deaths, 23,443. Dec. 28, 1919–Jan. 3, 1920: Cases, 2,811; deaths, 2,260. |
| Bombay | Oct. 19–Dec. 27 | 6 | 6 | |
| Karachi | Nov. 9–29 | 3 | 2 | |
| Do | Jan. 11–17 | 2 | | |
| Madras Presidency | Nov. 9–Dec. 27 | 1,068 | 704 | |
| Do | Dec. 28–Jan. 3 | 106 | 74 | |
| Rangoon | Nov. 2–Dec. 27 | 29 | 27 | Oct. 19–Nov. 1, 1919: Cases, 10; deaths, 7. |
| Do | Dec. 28–Jan. 3 | 7 | 7 | |
| Indo-China: | | | | |
| Saigon | Oct. 27–Dec. 7 | 11 | 9 | |
| Java: | | | | |
| East Java | | | | Sept. 28–Dec. 16, 1919: Cases, 1,494; deaths, 1,493. Surabaya Residency. |
| Peru: | | | | |
| Callao | Nov. 1–30 | | 3 | |
| Paita | Dec. 29–Jan. 17 | 23 | 17 | |
| Salaverry (Trujillo) | Nov. 23–Dec. 21 | 9 | 1 | Present in surrounding country. |
| Do | Dec. 29–Jan. 24 | 17 | 5 | And in vicinity. |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920—Continued.

#### PLAGUE—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Senegal: | | | | |
| Dakar | Nov. 1-30 | | 146 | Including Dakar and vicinity. |
| Siam: | | | | |
| Bangkok | Dec. 14-20 | 4 | 2 | |
| Straits Settlements: | | | | |
| Singapore | Oct. 26-Dec. 27 | 7 | 6 | |
| Syria: | | | | |
| Beirut | Dec. 22 | 29 | | |
| Turkey: | | | | |
| Constantinople | Nov. 14-Dec. 20 | 11 | | Present Dec. 11, 1919. Nov. 14-20, 1919: Present in vicinity. |
| On vessel: | | | | |
| S. S. Kaisar-i-Hind | Nov. 28 | 3 | | At Port Said, Egypt. From Bombay, Nov. 15, for London. |

#### SMALLPOX.

| | | | | |
|---|---|---|---|---|
| Algeria: | | | | |
| Department— | | | | |
| Algiers | Nov. 11-Dec. 31 | 65 | | |
| Do | Jan. 1-20 | 55 | | |
| Constantine | Nov. 11-Dec. 31 | 15 | | |
| Do | Jan. 1-20 | 32 | | |
| Oran | Nov. 11-Dec. 31 | 90 | | |
| Do | Jan. 1-10 | 25 | | |
| South Territory | do | 5 | | |
| Arabia: | | | | |
| Aden | Dec. 24-30 | 1 | 1 | |
| Do | Jan. 6-20 | | 3 | |
| Bolivia: | | | | |
| La Paz | June 29-Dec. 27 | | 216 | Dec. 29, 1918-June 28, 1919: Cases, 86; deaths, 44. Dec. 14-20, 1919: Cases, 7; deaths, 5. |
| Do | Dec. 28-Jan. 24 | 13 | 18 | |
| Brazil: | | | | |
| Bahia | Oct. 26-Nov. 22 | 1,704 | 1,022 | |
| Do | Dec. 28-Jan. 17 | 311 | 237 | |
| Pernambuco | Nov. 10-16 | 29 | 4 | |
| Rio de Janeiro | Sept. 28-Nov. 25 | 372 | 105 | |
| Do | Dec. 28-Jan. 17 | | 13 | |
| Santos | Nov. 24-30 | | 1 | |
| Canada: | | | | |
| British Columbia— | | | | |
| Vancouver | Nov. 30-Dec. 6 | 1 | | |
| Do | Jan. 4-17 | 1 | | |
| Manitoba— | | | | |
| Winnipeg | Jan. 11-17 | 2 | | |
| Nova Scotia— | | | | |
| Halifax | Dec. 21-27 | 2 | | |
| Do | Jan. 4-Feb. 14 | 4 | | |
| Sydney | Dec. 7-13 | 1 | | |
| Do | Dec. 28-Feb. 14 | 14 | | |
| Counties— | | | | |
| Cumberland | Dec. 14-20 | | | Present. |
| Inverness | do | | | Do. |
| Pictou | do | | | Do. |
| Ontario | | | | Nov. 1-29, 1919: Cases, 1,673. Nov. 30-Dec. 6, 1919: Cases, 338, in 45 localities, exclusive of Dysart and Toronto. Dec. 1-31, 1919: Cases, 1,414; deaths, 2. Dec. 28, 1919-Feb. 14, 1920: Cases, 1,519; deaths, 26. |
| Fort William and Port Arthur | Jan. 25-Feb. 14 | 5 | | |
| Gloucester County | | | | Oct.-Nov., 1919; Cases, 3. |
| Hamilton | Dec. 14-20 | 3 | | |
| Do | Jan. 4-Feb. 21 | 23 | | |
| Kingston | Dec. 21-27 | 1 | | |
| Do | Dec. 28-Feb. 14 | 6 | | |
| North Bay | Jan. 11-17 | 3 | | |
| Ottawa | Dec. 14-20 | 1 | | |
| Do | Dec. 28-Feb. 14 | 13 | | |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920—Continued.

#### SMALLPOX—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Canada—Continued. | | | | |
| Ontario—Continued. | | | | |
| Peterborough | Dec. 21–27 | 3 | | |
| Do | Dec. 28–Jan. 31 | 27 | | |
| Prescott | Jan. 4–10 | 1 | | |
| Sault Ste. Marie | Dec. 7–27 | 1 | | |
| Do | Dec. 28–Jan. 3 | 1 | | |
| Toronto | Dec. 7–27 | 727 | | |
| Do | Dec. 28–Feb. 7 | 735 | 5 | |
| Windsor | Dec. 14–27 | 2 | | |
| Prince Edward Island— | | | | |
| Summerside | Feb. 14–20 | 3 | | In one family. |
| Quebec— | | | | |
| Bonaventure and Gaspe Counties | Jan. 1–31 | 7 | | |
| Montreal | Dec. 7–27 | 3 | | |
| Do | Jan. 18–Feb. 20 | 6 | | |
| Quebec | Dec. 7–27 | 4 | | |
| Do | Jan. 4–31 | 9 | | |
| Saskatchewan— | | | | |
| Moosejaw | Dec. 28–Jan. 31 | | | |
| Saskatoon | Dec. 14–20 | 1 | | |
| Ceylon: | | | | |
| Colombo | Nov. 16–Dec. 13 | 10 | 9 | |
| China: | | | | |
| Amoy | Nov. 4–Dec. 22 | | | Present. Dec. 22: Four deaths. |
| Do | Dec. 30–Jan. 5 | 1 | | |
| Canton | Nov. 2–Dec. 27 | | | Present. |
| Do | Dec. 28–Jan. 10 | | | Do. |
| Chungsha | Jan. 4–10 | 5 | | |
| Chungking | do | | | Do. |
| Do | Dec. 28–Jan. 10 | | | Do. |
| Foochow | Nov. 16–Dec. 27 | | | Do. |
| Do | Dec. 28–Jan. 24 | | | Do. |
| Mukden | Jan. 18–24 | | | Do. |
| Nanking | Dec. 6–27 | | | Do. |
| Do | Dec. 28–Jan. 24 | | | Do. |
| Shanghai | Dec. 22–28 | 2 | | |
| Chosen (Korea): | | | | |
| Chemulpo | Dec. 1–31 | 1 | 1 | |
| Fusan | Oct. 1–Dec. 31 | 12 | 1 | |
| Seoul | do | 19 | 4 | |
| Colombia: | | | | |
| Barranquilla | Nov. 16–Dec. 20 | 50 | 2 | |
| Do | Jan. 11–31 | | 1 | Stated to be epidemic, Jan. 18–24, 1920. |
| Cuba: | | | | |
| Habana | Jan. 31 | 4 | | Children living in same house. |
| Egypt: | | | | |
| Alexandria | Nov. 12–Dec. 16 | 23 | 12 | |
| Do | Jan. 1–7 | 9 | 5 | |
| Cairo | Oct. 1–Dec. 16 | 60 | 31 | |
| Port Said | do | 10 | 6 | |
| Finland: | | | | |
| Provinces— | | | | |
| Nyland | July 16–31 | 1 | | |
| Tavastehus | do | 1 | | |
| Viborg | do | 23 | | |
| Finland | | | | Oct. 15–31, 1919: Cases, 6. |
| Provinces— | | | | |
| Nyland | Oct. 15–31 | 4 | | Helsingfors. |
| Tavastehus | do | 1 | | Rural district. |
| Viborg | do | 1 | | Do. |
| Finland | | | | Nov. 1–30, 1919: Cases, 45. |
| Provinces— | | | | |
| Abo Och Borneborg | Nov. 1–15 | 1 | | |
| Nyland | Nov. 16–Dec. 15 | 24 | | |
| St. Michael | Dec. 1–15 | 7 | | |
| Tavastehus | do | 5 | | |
| Vasa | do | 11 | | |
| Viborg | Nov. 16–30 | 6 | | |
| France: | | | | |
| Paris | Jan. 1–10 | 1 | 2 | |
| Germany | | | | Oct. 5–15, 1919: Cases, 32. In addition to previously reported cases; Sept. 28–Oct. 4, 1919: Cases, 26. |
| Prussia | Oct. 29–Nov. 29 | 1,100 | 323 | |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920—Continued.

SMALLPOX—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Greece: | | | | |
| Saloniki | Nov. 10-Dec. 28 | 26 | 26 | |
| Do | Dec. 29-Jan. 11 | 18 | 15 | In vicinity: Drama, 1 case; Zagoritzani, 9 cases, 1 death; Serres, 1 case. |
| India | | | | Oct. 19-Nov. 29, 1919: Deaths, 1,909. |
| Bombay | Oct. 12-Dec. 20 | 46 | 11 | |
| Do | Dec. 28-Jan. 3 | 2 | 3 | |
| Calcutta | Oct. 26-Dec. 27 | 186 | 260 | |
| Do | Dec. 28-Jan. 3 | 124 | 106 | |
| Karachi | Dec. 21-27 | 6 | 2 | |
| Madras | Nov. 2-Dec. 27 | 31 | 13 | |
| Do | Dec. 28-Jan. 3 | 3 | 1 | |
| Rangoon | Oct. 19-Dec. 27 | 51 | 18 | |
| Do | Dec. 28-Jan. 3 | 4 | 2 | |
| Indo-China: | | | | |
| Saigon | Oct. 27-Nov. 23 | 2 | | |
| Italy: | | | | |
| Genoa | Jan. 5-11 | 1 | | Province: Nov. 17-Dec. 28, 1919: Cases, 15; deaths, 3, Jan. 12-18, 1920: Cases, 13. |
| Leghorn | Jan. 4-10 | 1 | | |
| Messina | Nov. 10-Dec. 28 | 55 | 8 | Province of Messina: Dec. 14-28, 1919: Cases, 68. Jan. 5-25, 1920: Cases, 85; 1 death. |
| Do | Dec. 29-Jan. 25 | 19 | 3 | |
| Milan | Oct. 1-Nov. 30 | 12 | 2 | |
| Naples | Dec. 28-Jan. 25 | 8 | 12 | |
| Palermo | Dec. 27-Feb. 1 | 8 | 3 | |
| San Fratello | Dec. 1-28 | 49 | 5 | |
| Do | Dec. 29-Jan. 18 | 22 | 1 | |
| Trieste | Jan. 3-10 | 2 | | |
| Turin | Dec. 28-Jan. 4 | 1 | | |
| Japan: | | | | |
| Kobe | Dec. 15-21 | 1 | | |
| Taiwan | Nov. 1-31 | 38 | 7 | Entire island. |
| Do | Jan. 1-10 | 9 | 7 | |
| Java: | | | | |
| East Java | | | | Sept. 28-Dec. 18, 1919: Cases, 34. |
| Residency— | | | | |
| Surabaya | Oct. 25-Dec. 18 | 26 | | |
| West Java | | | | Oct. 17-Dec. 25, 1919: Cases, 659; deaths, 151. |
| Batavia | Oct. 17-Dec. 12 | 49 | 22 | |
| Mexico: | | | | |
| Acapulco | Nov. 9-15 | 2 | | |
| Chihuahua | Dec. 21-27 | 3 | 3 | |
| Do | Jan. 11-Feb. 15 | | 1 | |
| Ciudad Juarez | Jan. 11-Feb. 7 | | 2 | |
| Guadalajara | Dec. 1-31 | 1 | | |
| Do | Jan. 1-31 | 1 | | |
| Mexico City | Nov. 16-Dec. 20 | 11 | | |
| San Luis Potosi | Dec. 14-20 | | 1 | |
| Do | Jan. 18-24 | | 1 | |
| Tehuantepec | Dec. 25-31 | 6 | | |
| Do | Jan. 1-31 | 34 | | |
| Newfoundland: | | | | |
| St. Johns | Dec. 20-26 | 3 | | Dec. 13-26, at outports, 6 cases. Present at 8 other localities. |
| Do | Dec. 27-Feb. 20 | 11 | | Outports, Dec. 27, 1919-Feb. 20, 1920: Cases, 22. Present at other localities. |
| Panama: | | | | |
| Colon | Dec. 15-21 | 1 | | |
| Portugal: | | | | |
| Lisbon | Nov. 30-Dec. 27 | | 55 | |
| Do | Dec. 28-Jan. 31 | | 68 | |
| Oporto | Dec. 7-20 | 5 | 5 | |
| Portuguese East Africa: | | | | |
| Lourenco Marques | Nov. 23-Dec. 20 | 9 | | Present in 5 districts Nov. 9-Dec. 20, 1919, with 56 reported cases. |
| Districts— | | | | |
| Gaza | Dec. 7-13 | | | Present. |
| Inhambane | do | | | Do. |
| Mozambique | do | | | Do. |
| Quelimane | do | | | Do. |
| Tete | do | | | Do. |
| Towns— | | | | |
| Inhambane | Dec. 7-27 | 7 | | |
| Mozambique | do | 2 | | |
| Quelimane | do | 4 | | |
| Tete | do | 1 | | |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920—Continued.

#### SMALLPOX—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Spain: | | | | |
| Barcelona | Nov. 6-Dec. 27 | ..... | 26 | |
| Do | Dec. 28-Jan. 28 | ..... | 22 | |
| Bilbao | Nov. 1-Dec. 20 | ..... | 4 | |
| Cadiz | Oct. 1-Nov. 30 | ..... | 6 | |
| Valencia | Nov. 10-Dec. 27 | 39 | 9 | |
| Do | Dec. 28-Jan. 24 | 38 | 3 | |
| Vigo | Nov. 18-Dec. 27 | 14 | ..... | |
| Do | Dec. 28-Jan. 3 | 2 | 2 | Jan. 11-17, 1920: Present in vicinity. |
| Sumatra: | | | | |
| Medan | Oct. 1-31 | 8 | ..... | |
| Tunis: | | | | |
| Tunis | Dec. 23-29 | 1 | ..... | |
| Do | Jan. 19-Feb. 8 | 4 | 2 | |
| Turkey: | | | | |
| Constantinople | Nov. 9-Dec. 14 | 27 | ..... | |
| Union of South Africa: | | | | |
| Johannesburg | Oct. 1-Nov. 30 | 18 | ..... | |
| On vessel: | | | | |
| S. S. Roggeveen | ..... | 1 | ..... | Vessel from Java; at Noumea, New Caledonia. Case left at Noumea. Vessel arrived at Sydney, Jan. 2, 1920. |
| S. S. Sarcoxie | Dec. 23 | 1 | ..... | At Ponta Delgada, Azores, from Rotterdam for New York. |
| S. S. Vestnorge | Jan. 15 | 1 | ..... | Mild. At Kingston, Jamaica, from Philadelphia, via Norfolk. |

#### TYPHUS FEVER.

| | | | | |
|---|---|---|---|---|
| Algeria: | | | | |
| Departments— | | | | |
| Algiers | Dec. 11-31 | 2 | ..... | |
| Do | Jan. 11-20 | 1 | ..... | |
| Constantine | Nov. 11-Dec. 31 | 2 | ..... | |
| Do | Jan. 1-20 | 3 | ..... | |
| Oran | Nov. 21-Dec. 11 | 5 | ..... | |
| Austria | ..... | ..... | ..... | Sept. 7-Nov. 22, 1919: Cases, 17. |
| Vienna | Sept. 7-14 | 5 | ..... | |
| Belgium: | | | | |
| Ghent | Jan. 25-31 | ..... | 2 | |
| Bolivia: | | | | |
| La Paz | June 29-Dec. 20 | 30 | 31 | Dec. 29, 1918-June 28, 1919: Deaths, 52. |
| Do | Jan. 4-24 | 6 | 2 | |
| Bulgaria: | | | | |
| Sofia | Dec. 21-31 | 1 | 1 | |
| Do | Jan. 1-10 | 2 | ..... | |
| Varna | Feb. 18 | 110 | ..... | |
| Canada: | | | | |
| Ontario Province | ..... | ..... | ..... | Dec. 1-31, 1919: One case. |
| Chile: | | | | |
| Antofagasta | Nov. 17-Dec. 14 | 14 | ..... | |
| Santiago | ..... | ..... | ..... | Jan. 12-Sept. 30, 1919: Cases, 5,153; deaths, 1,023. Outbreak in October, 1918. |
| Valparaiso | Nov. 9-Dec. 27 | 955 | 114 | Dec. 1-13, 1919: Cases, 700; deaths, 18. |
| Do | Dec. 28-Jan. 18 | 125 | 30 | |
| China: | | | | |
| Antung | Nov. 3-Dec. 14 | 2 | ..... | |
| Czechoslovakia: | | | | |
| Prague | Dec. 21-27 | 1 | ..... | |
| Egypt: | | | | |
| Alexandria | Nov. 12-Dec. 16 | 6 | 1 | |
| Do | Jan. 1-7 | 5 | ..... | |
| Cairo | Oct. 1-Dec. 16 | 108 | 43 | |
| Port Said | Oct. 1-Dec. 16 | 3 | 1 | |
| Esthonia | ..... | ..... | ..... | Feb. 16, 1920: Cases, 7,500 to 8,000. Estimated mortality, 40 per cent. |
| Narva | Feb. 16 | 2,500 | ..... | |
| Reval | ....do | 2,500 | ..... | |
| Finland: | | | | |
| Province— | | | | |
| Viborg | July 16-31 | 2 | ..... | |

## CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

### Reports Received from Dec. 27, 1919, to Mar. 12, 1920—Continued.

#### TYPHUS FEVER—Continued.

| Place. | Date. | Cases. | Deaths. | Remarks. |
|---|---|---|---|---|
| Germany | | | | Oct. 5–Dec. 6, 1919: Cases, 10—civil population, 3; military, 4. Repatriated soldiers, 3. |
| Great Britain: | | | | |
| Belfast | Dec. 28–Jan. 3 | 1 | 1 | |
| Glasgow | Nov. 30–Dec. 6 | 2 | | |
| Greece: | | | | |
| Cavalla | Nov. 17–Dec. 28 | 4 | | |
| Drama | Nov. 24–Dec. 28 | 6 | | |
| Saloniki | Oct. 6–Dec. 21 | | 43 | |
| Do | Dec. 28–Jan. 11 | 7 | | |
| Thassos Island | Dec. 22–28 | 1 | | |
| Zihna | do | 1 | | |
| Hungary | | | | Aug. 25–Sept. 14, 1919: Cases, 6. |
| Italy: | | | | |
| Naples | Jan. 19–25 | 2 | 1 | |
| Trieste | Dec. 14–27 | 3 | | |
| Do | Dec. 28–Jan. 3 | 1 | | |
| Venice | Nov. 17–Dec. 21 | 6 | 1 | |
| Japan: | | | | |
| Nagasaki | Dec. 1–28 | 4 | 2 | |
| Do | Jan. 12–18 | 1 | 1 | |
| Mexico: | | | | |
| Chihuahua | Dec. 21–27 | 2 | | |
| Do | Jan. 11–17 | | 1 | |
| Mexico City | Nov. 16–Dec. 27 | 129 | | |
| Do | Dec. 28–Feb. 7 | 132 | | |
| Saltillo | Nov. 1–30 | 2 | 1 | |
| San Luis Potosi | Dec. 14–27 | | | Present. |
| Do | Dec. 28–Feb. 14 | | | Do. |
| Paraguay: | | | | |
| Asuncion | Nov. 30–Dec. 6 | 1 | | |
| Peru: | | | | |
| Callao | Nov. 1–30 | | 1 | |
| Cerro de Pasco | Dec. 7–13 | 1 | | |
| Portugal: | | | | |
| Lisbon | Dec. 6–12 | | 2 | |
| Spain: | | | | |
| Barcelona | Nov. 20–26 | 7 | | |
| Corunna | Nov. 24–Dec. 7 | 2 | | |
| Tunis: | | | | |
| Tunis | Dec. 14–20 | 1 | | |
| Do | Dec. 29–Feb. 8 | 3 | 1 | |
| Turkey: | | | | |
| Constantinople | Nov. 14–Dec. 27 | 49 | | |

#### YELLOW FEVER.

| | | | | |
|---|---|---|---|---|
| Brazil: | | | | |
| Bahia | Oct. 26–Nov. 8 | 1 | 2 | |
| Mexico: | | | | |
| Campeche | Dec. 20 | 1 | | |
| Merida | Dec. 7–27 | 4 | 2 | The cases were sent from Opichen, vicinity of Muna. One death in case from Muna. Total to Dec. 27: Cases, 47; deaths, 21. |
| Do | Dec. 28–Jan. 31 | 1 | | |