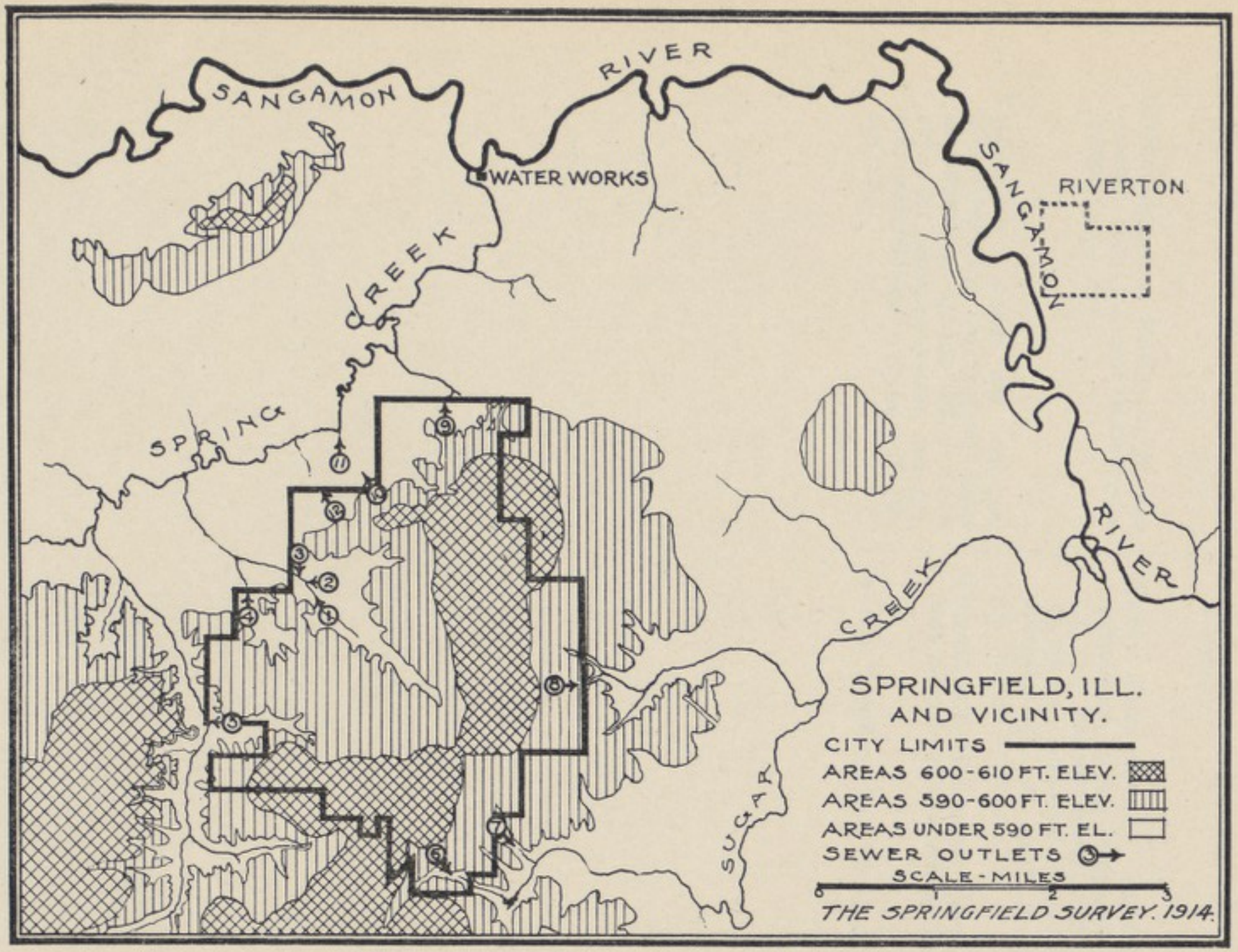

TOPOGRAPHY OF SPRINGFIELD AND VICINITY

The darker shading indicates the higher points of land. Other maps, showing streets, ward divisions, distribution of population, districts not served by sewers and water mains, wells and privies, and the drainage area of the Sangamon River above Springfield, are to be found on pages 6, 8, 73, 79, 80, and opposite pages 86 and 92

SE14

PUBLIC HEALTH IN SPRINGFIELD, ILLINOIS

A SURVEY BY THE DEPARTMENT OF SURVEYS AND EXHIBITS, RUSSELL SAGE FOUNDATION

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THE SPRINGFIELD SURVEY
PUBLIC HEALTH SECTION

DEPARTMENT OF SURVEYS AND EXHIBITS
RUSSELL SAGE FOUNDATION
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FOREWORD

The aim of the analysis of Springfield's vital statistics contained in this report has been sufficiently different from that of common practice to require a word of explanation and emphasis. It has seemed better to portray to Springfield its life and health losses in terms of its own people, rather than to compute rates of mortality based on all registered deaths and compare these rates with those occurring in other cities. To this end deaths of non-residents have been excluded from the tables and text except at places where the contrary is specifically stated. Springfield's losses thus stated convey to the citizens a more accurate and conservative picture of the city's public health problem, and are of themselves amply serious to justify any of the preventive procedures advocated in this report. The reader must be warned, however, against comparing the rates here given for Springfield with those published for other cities, unless it is specifically stated that the latter do not include deaths of non-residents. Otherwise such comparisons would show Springfield to an unfair advantage.

The present report is the result of field investigations carried on by the author in Springfield in the nine weeks between March 23 and May 26, 1914, supplemented by co-operative efforts by city and state officials and local volunteer workers. Without the generous co-operation of Dr. B. B. Griffith, superintendent of health, the enumeration of the wells and privies—a task requiring the services of the three sanitary inspectors for the better part of two months—would not have been possible. Sim-

ilarly, the survey owes the investigation of the dairy farms largely to the interest and energy of Dr. C. St. Clair Drake, executive secretary of the Illinois State Board of Health. Thanks are also due to the National Association for the Study and Prevention of Tuberculosis, whose field secretary, Dixon Van Blarcom, made the investigation of the local tuberculosis situation; to Dr. Edward Bartow and Prof. Paul Hansen of the State Water Survey and to city commissioners W. J. Spaulding and Frank Hamilton for much valuable information regarding the city water supply and sewer system; to the State Food Commission for access to its Springfield records; and to W. J. V. Deacon for his analysis of the city's mortality statistics for 1910 and 1913.

The author also wishes to make acknowledgment to Dr. George Thomas Palmer, former superintendent of health, and Paul L. Skoog, former acting superintendent of health, for generous contributions of information and time; and to Dr. Charles V. Chapin and Prof. Selskar M. Gunn for their courtesy in criticising parts of the manuscript. Finally, acknowledgment must be made of the very considerable assistance received from Springfield volunteer workers, and in particular to Mrs. Francis P. Ide, Mrs. H. L. Morrison, Miss Mary Johnson, and Miss Henrietta Converse. The names of many other volunteer workers will be found on the back page of this report.

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I

LIFE WASTAGE IN SPRINGFIELD

Health and life are primary human possessions whose infinite value flashes upon us only when we are in danger of losing them. Disease and death are sources of misery and economic loss. These statements seem almost too obvious to set down; yet their full force is constantly lost sight of and their fruitful application is neglected. And this despite the fact that with the great advances in sanitary science public health is becoming more and more purchasable.

Disease is a subtle and industrious enemy. It comes into the home by an unseen door; it knows no cessation of hostilities by night or day; and with every new mode of human activity it finds a new line of attack. It is this insinuating though unrelenting nature of disease that makes it inconspicuous and of underrated significance. Only by standing off and viewing the extent of the ravages worked by the disease cohorts in a considerable period of time may we discover their destructive reality and judge what forces must be marshalled against them for effective prevention.

To count the tally of a city's disease and death record is not of negative value, but should lay the foundation for constructive action. In making a public health survey of Springfield, our task, therefore, in general terms is to examine her death and sickness records and her sanitary conditions, and to determine what losses she is suffering and in what ways these losses may be prevented.

The most definite index of Springfield's health history is to be found, of course, in her death records. A common method of treating this material is to compare the number of deaths registered in a year with the number of inhabitants; in other words, to compute the death rate. This operation, and the comparison

of the city's death rate with those of other communities, is, however, fraught with opportunities for error.

In general practice, the number of deaths registered in a city includes all persons dying within the city limits, whether residents of that city or not. If the city is the hospital center for the surrounding country, it will consequently be charged with many deaths for which it has no responsibility, and an erroneous impression will be created. Similarly, if the city has an unusual proportion of infants or old persons, both of which classes have high death rates, its general death rate will be raised out of all proportion to its inherent healthfulness or unhealthfulness.

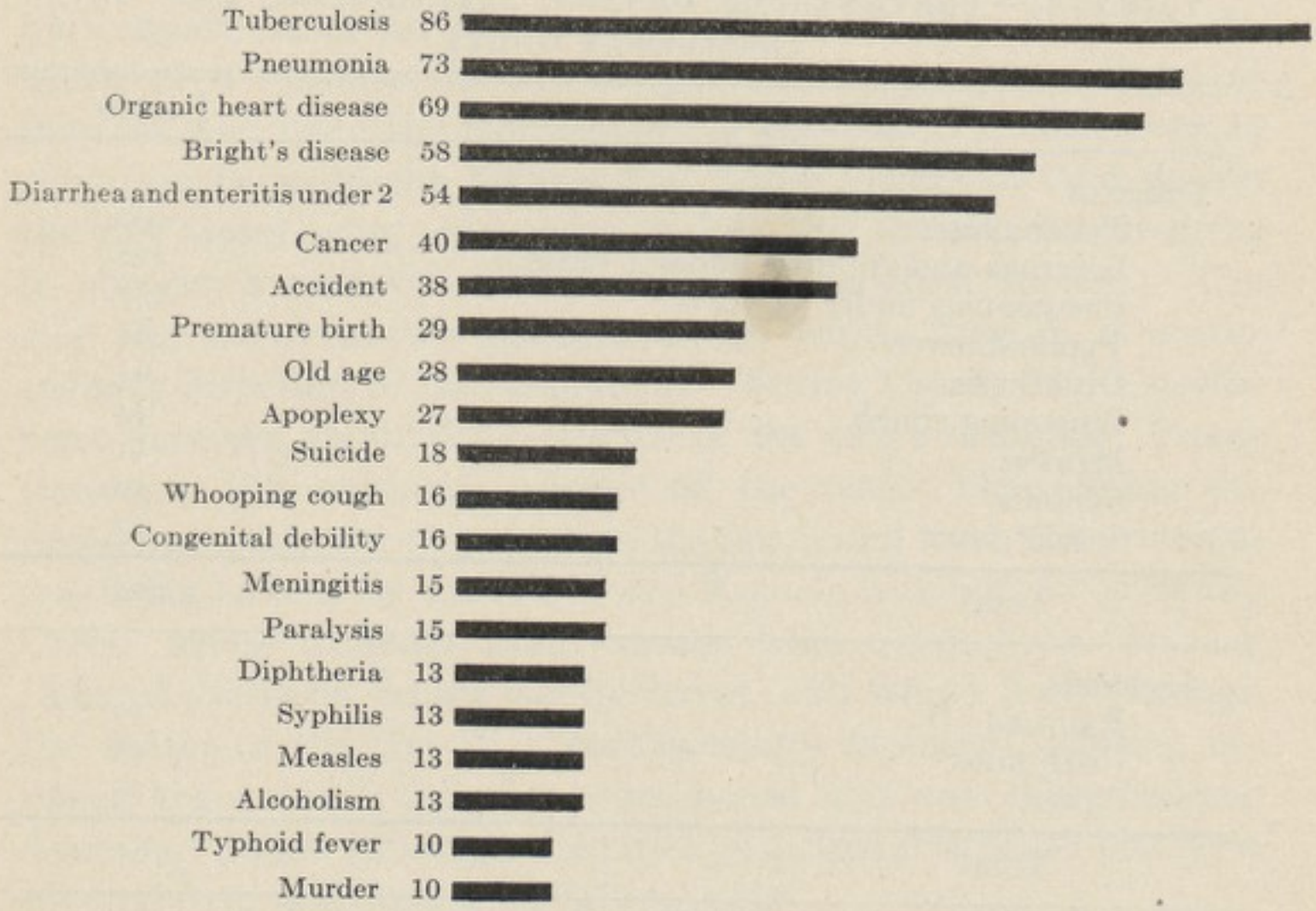
To illustrate the first condition: according to the report of the city health department 994 persons died in Springfield in 1913; of these, 185, or 18.6 per cent, were non-residents. Including the non-residents, the city's death rate was 17.6 per thousand inhabitants; excluding them, it drops to the more respectable figure of 14.3. A certain though smaller number of Springfield residents, on the other hand, died outside the city, their deaths being registered in other communities. No universal method of keeping track of these transfers between communities exists as yet, so that the number of deaths added to or subtracted from a city's record is in most instances indeterminate. For these reasons comparisons of general ("crude") death rates are of extremely doubtful value.*

In the present survey attention will be restricted to deaths of Springfield residents, the causes of these deaths, and their distribution throughout the city. On this basis the questions naturally arise as to what are the leading causes of death in Springfield and in what degree they are preventable. The diagram opposite gives the primary facts for a discussion of these questions.

Striking indeed is the fact that the leading cause in Springfield's death list, tuberculosis, is a preventable disease; and that the second, pneumonia,—whose active agent is also a micro-organism,—is to a considerable degree preventable. With the

*See Appendix B, p. 142, for an analysis of Springfield's death rate on the basis of residence and age. A general statement of the statistical methods used in this report appears in Appendix A, p. 139.

third and fourth causes, heart disease and Bright's disease, the health authorities can do little of a direct nature; but the fifth, diarrhea and enteritis among infants under two, offers great opportunities for life saving. Other opportunities for prevention may also be noted in the records of typhoid fever, syphilis, the contagious diseases of children, and a part of the accidents and premature births. Altogether, the number of preventable deaths constitute at least a fourth and quite possibly a third of all



LEADING CAUSES OF DEATH, SPRINGFIELD, 1913
Residents only

the deaths. Summarizing the city's record with respect to the principal preventable causes for the last six years, 1908–1913, the totals are impressive, as will be seen in Table 1.

This list is conservative. It omits deaths from pneumonia among old persons; deaths of infants certified under such titles as premature birth, marasmus, and inanition; deaths from meningitis and puerperal septicemia; and a number of other causes where modern medicine argues that some saving can be made. Yet the six-year total from preventable diseases reaches 1,218, a

figure that about equals an entire year's addition to the community through births. Nor is this loss among the old and halt; it is among the young and the productive. Tuberculosis, for example, responsible for 490 deaths during the period, strikes in between the ages of twenty-five and fifty. And it must be remembered also that for each person dying from these diseases there must be counted several cases of non-fatal illness.

TABLE I.—PREVENTABLE DEATHS, SPRINGFIELD, 1908–1913
(RESIDENTS ONLY)

	Deaths
Diseases	
Tuberculosis	490
Diarrhea and enteritis under 2 years	228
Pneumonias under 55 years	227
Typhoid fever	84
Diphtheria	61
Whooping cough	44
Measles	31
Syphilis	30
Scarlet fever	23
Total	1,218
Accidents	
Railroad	49
Coal mine	13
Other	125
Total	187

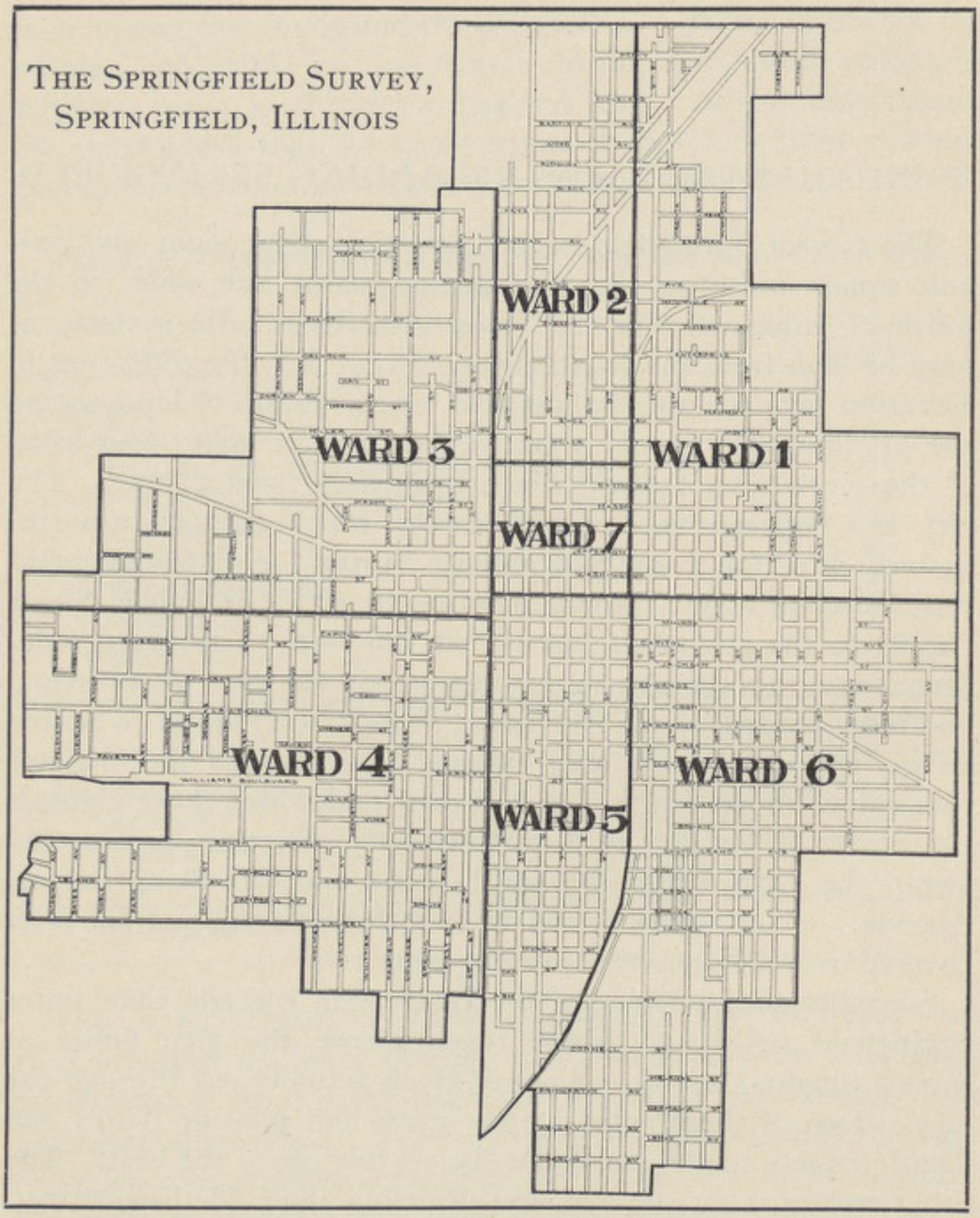
The multiplication of misery, suffering, and economic loss thus involved makes it evident that health and life wastage in Springfield is of a magnitude that demands the community's businesslike attention. Obviously the city should study the ways in which this wastage manifests itself and the ways in which it may be restricted. The more specific questions are: Where in Springfield do the preventable diseases manifest themselves? What conditions favor their spread? What is the city's equipment to cope with the problem? What new measures should be undertaken?

II

FUNDAMENTAL FACTS REGARDING SPRINGFIELD

The city of Springfield proper occupies about eight and one-half square miles on the level prairie about four miles to the south of a meander in the Sangamon River. Its surface, as may be seen from the frontispiece, is very flat, the difference in elevation between the highest and lowest points of land within the city limits being only about 70 feet, and for about four-fifths of the city's area the difference being less than 20 feet. The city lies between two parallel creeks which flow in a northeasterly direction to the Sangamon. Spring Creek, to the northwest, receives about three-fourths of the city's drainage; Sugar Creek, to the southeast, carries off the rest. The deepest depressions within the city occur to the north and west, the principal one being caused by the Old Town Branch, a tributary of Spring Creek, whose drainage area extends from beyond the Wabash railroad yards on South Tenth Street, and which flows through the center of the city in a northwesterly direction, passing between the capitol and the court house and out along Salome Avenue. This stream is the city's principal drain and has been covered over and converted into a sewer.

Six railroads, exclusive of the Interurban Electric Line, enter Springfield. Although these roads pierce the city limits at some 13 points, but three lines of track actually cut through the city. Two of these enter at the south and pass up Third and Tenth Streets to the north, finally veering off to the east. The other crosses in an east and west direction along Madison Street, a little to the north of the center of the city. The railroads are of social importance in influencing living conditions along their lines and in establishing lines of division between parts of the community. Thus the ward lines running north and south are based on the railroads, the territory between Third and Tenth



WARD MAP OF SPRINGFIELD, 1914

For a general description of the ward populations see page 9

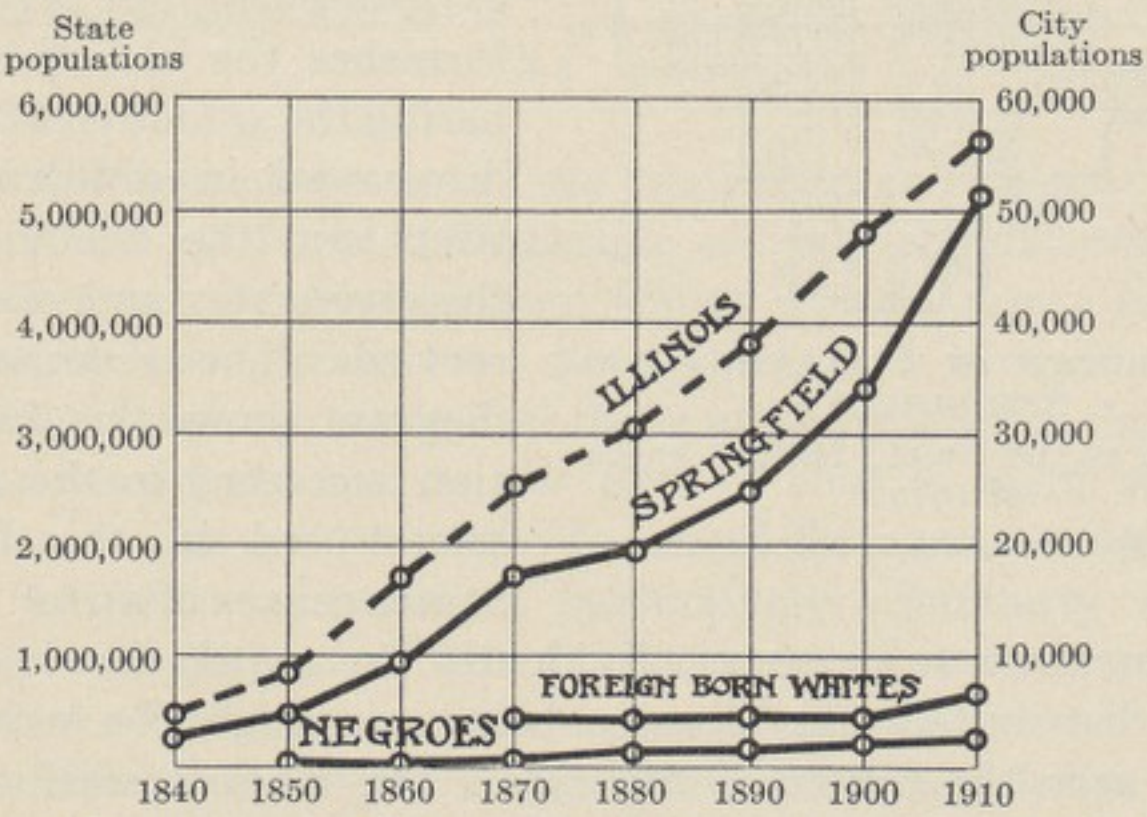
Streets forming three of the city's seven wards. The ward divisions are shown on page 6.

TABLE 2.—POPULATION BY COLOR AND NATIVITY, SPRINGFIELD, ILLINOIS, 1850–1910

Year	Total population	Negroes		Foreign-born whites	
		Number	Per cent	Number	Per cent
1850	4,533	171	3·77	..[a]	..[a]
1860	9,320	203	2.18	..[a]	..[a]
1870	17,364	808	4.65	4,456	25·7
1880	19,743	1,328	6.73	4,284	21.7
1890	24,963	1,806	7·24	4,796	19.2
1900	34,159	2,227	6.52	4,654	13.6
1910	51,678	2,961	5·73	6,900	13.4

[a] Information not available.

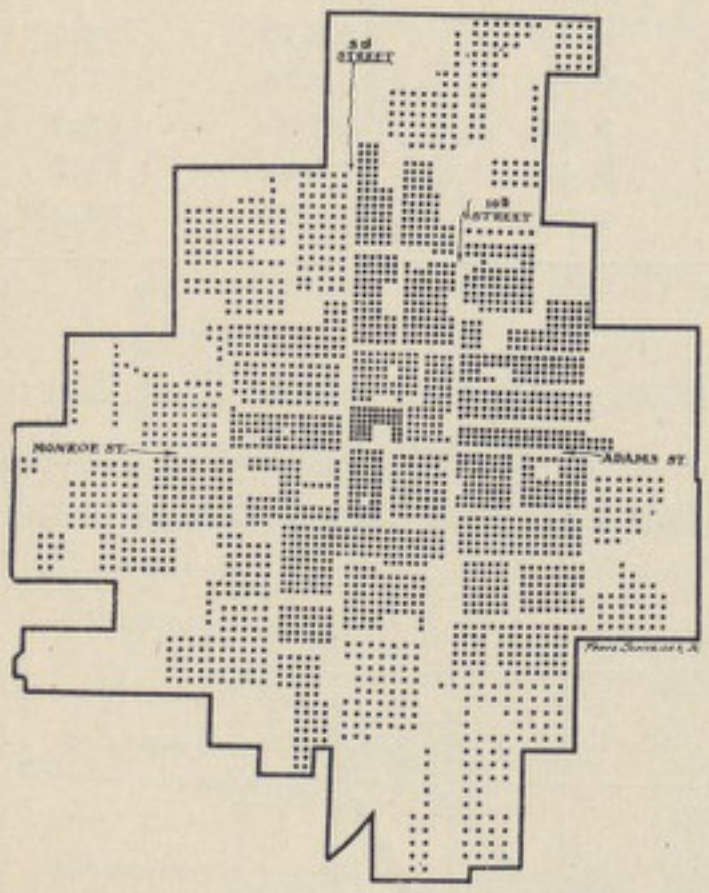
Springfield's growth in population on the whole has been normal, showing no extraordinary nor sudden increases or decreases; and for the most part has followed the same general



GROWTH OF POPULATION IN SPRINGFIELD AND STATE OF ILLINOIS, 1840–1910
Broken line represents state figures; solid lines those for the city

upward trend for the last 60 years as that of the state of Illinois. The details are set forth in the diagram shown above and in Table 2. The number of foreign-born whites has increased

but slightly since 1870, while their proportion of the whole has undergone an uninterrupted decrease. Similarly the number of Negroes has remained relatively small, while their proportion of the total has also in the last twenty years shown a decline. Race and color are not, therefore, the important factors in Springfield that they are in the southern and eastern parts of our country. The clustering of these elements in certain districts, which will be brought out in the examination of ward statistics, has, nevertheless, a distinctly important bearing on the city's public health problem.



DISTRIBUTION OF POPULATION IN SPRINGFIELD
According to the United States Census of 1910
Each spot represents 20 persons

The distribution of population is an important feature to be noted in this study of public health, not so much on account of possible overcrowding, which is at a minimum in a city of homes such as Springfield, but because it furnishes the basis for comparing the amounts of disease discovered in different districts and the adequacy of the city water and sewerage services. The accompanying diagram shows the distribution according to the 42 districts used in the United States census of 1910. Each spot represents 20 persons. Evidently the population is rather evenly distributed, the density being, as might be expected, greater near the center of the city. The densest section is in the neighborhood of the court house, probably on account of the number of lodging houses and apartments there.

The densities of population in the several wards, based first on gross and second on net, or built-up,* acreage, are indicated

* The net acreage here used excludes parks and blocks not built up for habitation.

in Table 3. The impression is much the same as that obtained from the map—fairly even distribution, with somewhat closer conditions in ward seven. The range of variation among the 42 enumeration districts of 1910 was from 3.6 to 26.4 persons per acre of gross area and from 6.4 to 28.9 persons per acre of net, or built-up, area. In considering these figures it should be remembered that the densities observed in the great cities run up into the hundreds.

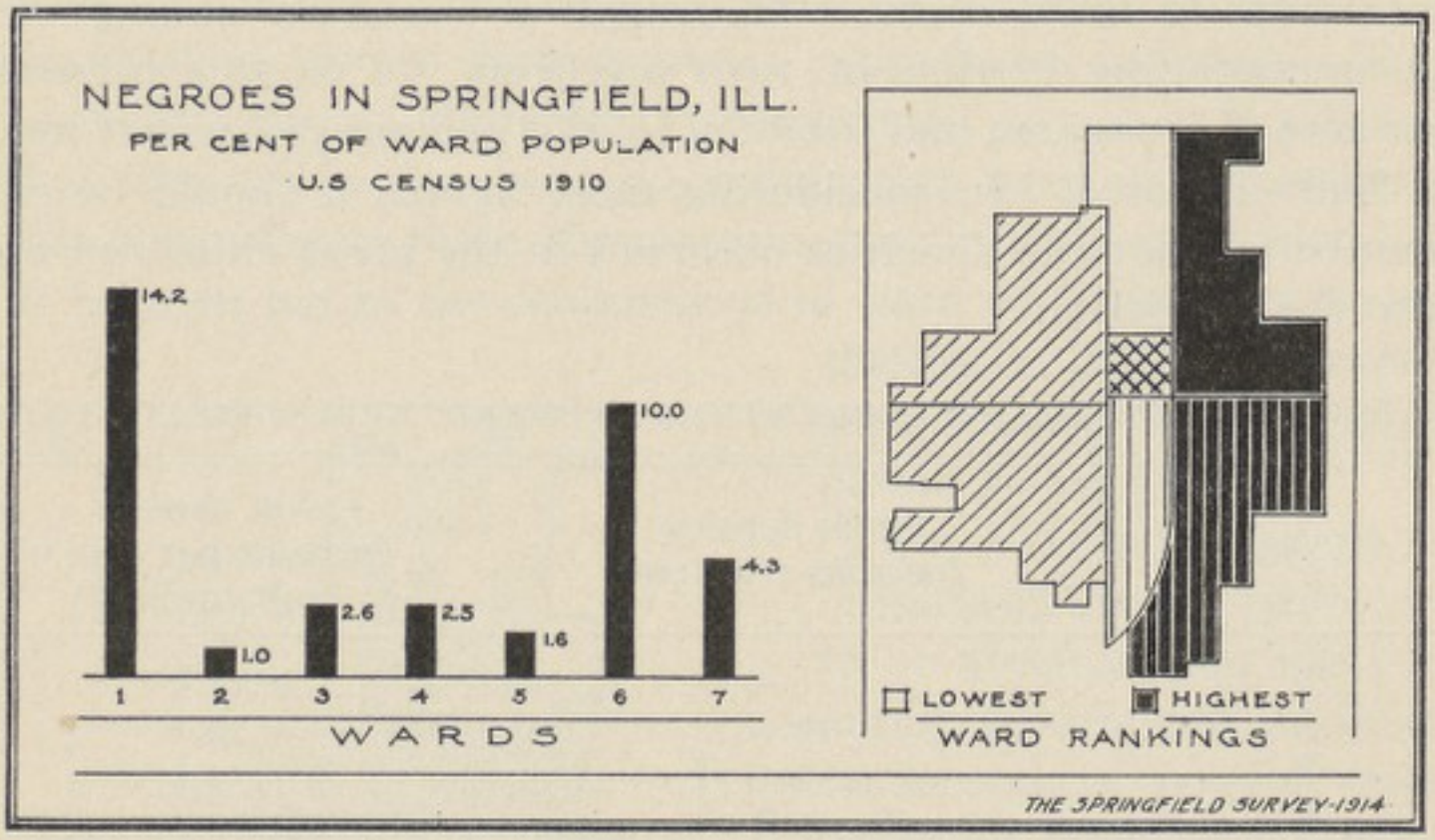
TABLE 3.—DENSITY OF POPULATION BY WARD, SPRINGFIELD, 1910

Ward	Gross density (persons per acre)	Net density (persons per acre of built-up land)
1	9.1	14.5
2	10.2	16.1
3	9.1	12.4
4	9.6	14.3
5	10.6	13.8
6	8.9	12.2
7	20.0	21.2
Whole city	9.7	13.9

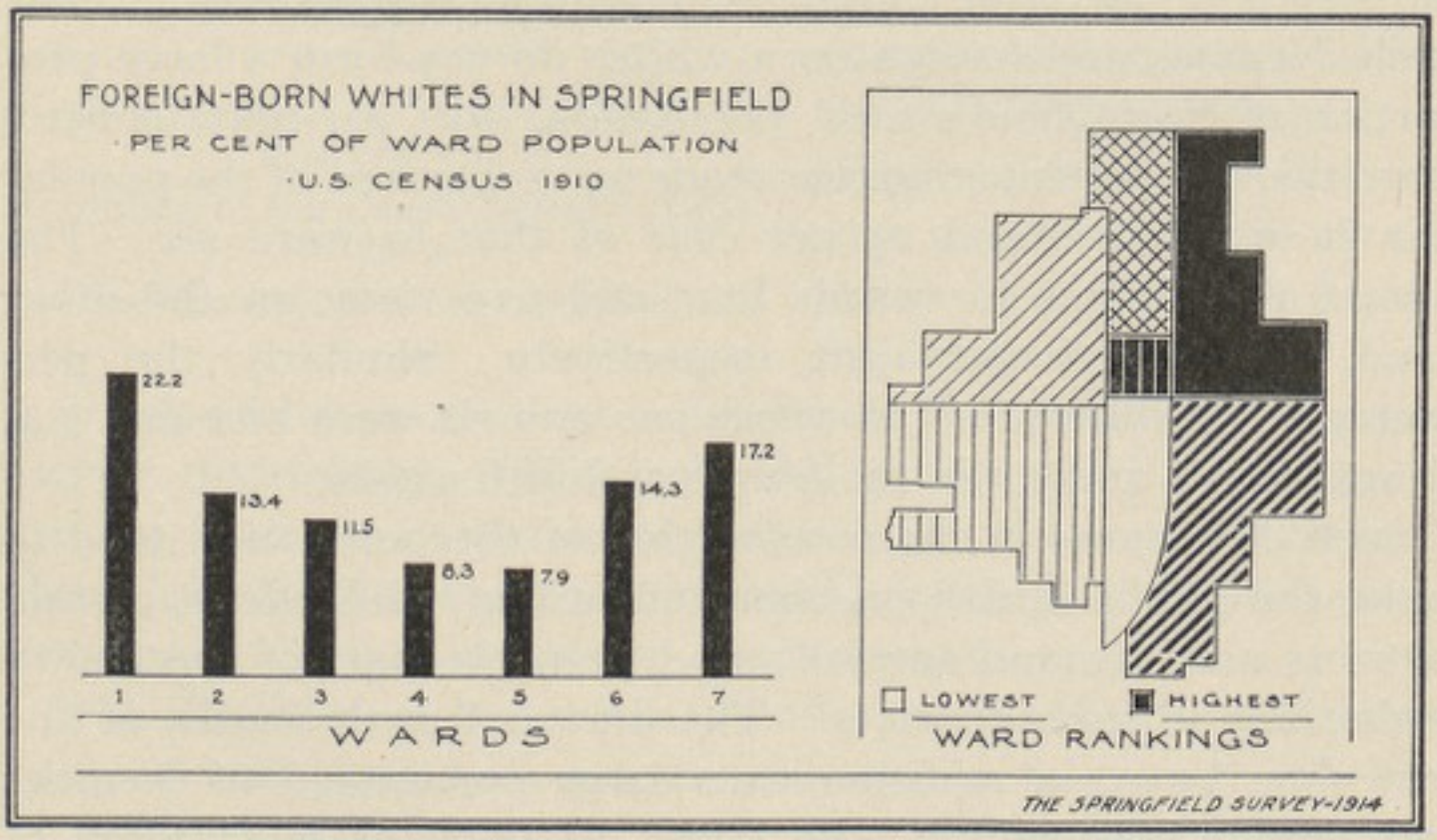
The different character of the population in different parts of the city is a matter of considerable sanitary significance. Thus while Negroes and foreign-born whites do not form a large proportion of Springfield's total population, 19.1 per cent in 1910, these two components together made up 36 per cent of the population in ward one, and 24 per cent of that in ward six. The comparable figures for wards four and five were, on the other hand, 11 and 10 per cent respectively. Similarly the percentages of "illiterates" in wards one and six were 11.2 and 7.4, as against 1.8 and 1.3 in the fourth and fifth wards.

Such differences in the composition of the population tend to make the public health problem increasingly difficult in certain districts and demand special activity on the part of the health authorities in such districts. The first and sixth wards, or the east side, have, in addition to a large percentage of Negroes and foreign-born whites, the larger proportions of children of school age; and the evidence also indicates that the birth rate is

higher in these sections. The eastern and northern parts of the city contain, in short, the younger, poorer, and more foreign



parts of the population and most of the Negroes, while the southwestern section is more purely native white, is older, and its people are more comfortably situated. Ward seven, embracing the district around the court house, is somewhat peculiar, having an excess of males, a markedly lower proportion of infants and



children of school age, and rather more than the average of foreign born and illiterates. These differences are illustrated in the accompanying diagrams.

III

INFANT MORTALITY

The perilous times of life are the extremities; the very young and the very old suffer by far the greater chance of death. Thus in the year 1910 there died in Springfield 140 to each thousand infants under one year of age, 67 to each thousand persons over sixty-five years of age, and only 7 to each thousand persons from twenty-five to forty-four years of age.* The babies' chance of dying was, in other words, 20 times as great as that of adults between the ages of twenty-five and forty-four. This high rate of mortality among infants, taken with the fact that there are of course more infants for an age period of given size than for an age period of similar length in any other element of the population, makes this one of the greatest contributing sources of death. Nearly a fifth of all deaths are among infants under one, and in the last six years 727 Springfield infants have been born only to die in their first year of life, a figure which in its aggregate is little short of appalling. The causes of this mortality have their inception in the period before birth and are intimately related to the care given the infant in its first few weeks and months of life. In the six-year period mentioned the principal causes certified were as follows:

TABLE 4.—DEATHS OF INFANTS UNDER ONE YEAR OF AGE, SPRINGFIELD, 1908–1913 (RESIDENTS ONLY)

Cause of death	Deaths
Premature birth	160
Pneumonias	80
Acute infections	75
Diarrhea and enteritis	179
All other causes	233
Total	727

* See Appendix B, p. 142, for a more complete statement of the mortality at the several age groups in Springfield.

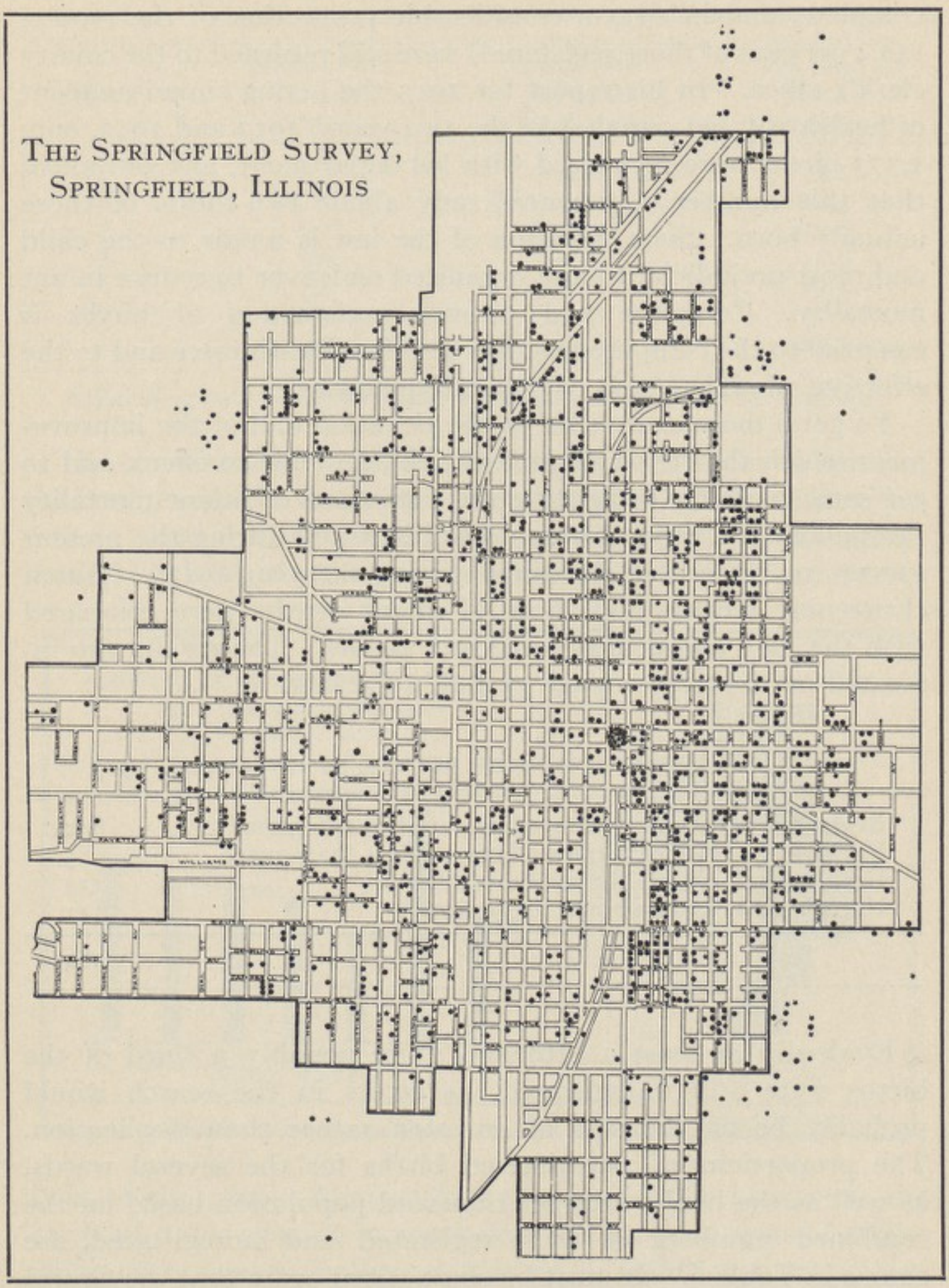
In examining this list with an eye to life saving, it may be conceded that a considerable proportion of the premature births are probably unavoidable, being due to constitutional defects. Prenatal educational and nursing work among mothers should, however, save many; but this is the newest field in baby saving, and the prospects of success cannot be spoken of with the same assurance as in the case of some of the other causes in the list.

The large group formed by the pneumonias and diarrhea and enteritis, for example, has in other cities yielded splendidly to preventive efforts, and there is every prospect that similar results could be obtained in Springfield. Deaths from these causes are commonly the result of ignorance of the proper care and feeding of the infants, and the problem of prevention is simply to reach uninformed mothers. Public health nurses and infant welfare stations are the usual means to this end. Such work is now commonly carried on by city health authorities and is attended by gratifying success. The acute infections, including whooping cough, syphilis, measles, and the like, fall naturally within the direct province of the health department, and should be restricted by the department's regular activities, especially when re-enforced by the employment of suitably trained public health nurses.

Altogether it is certain that a considerable proportion of the 727 infants could have, and should have, been saved; to estimate this proportion at a third of the total would probably be conservative.

The best index of the intensity of infant mortality is the ratio, in a given year, of deaths of infants under one year of age to births. An efficient registration of births is necessary, however, for the computation of this rate, and it is an unfortunate fact that this condition has not as yet been reached in Springfield. Previous to the city's reaching 50,000 population, the law required that birth returns be made to the county clerk's office; subsequent to that time (1912) the city health office, as is provided for by the law, required that reports be returned to it.

Registration of births with the city department thus became a legal obligation on the attending physician or other person having the birth in charge. The reporting, nevertheless, has been in-



BIRTHS IN SPRINGFIELD, 1913
Round dots indicate births registered at city or county offices
Stars indicate unregistered births located

complete, and in 1913 a considerable proportion of the reports (40.4 per cent of those registered) were still returned to the county clerk's office. In his report for 1913 the acting superintendent of health pointed out that in the two years, 1912 and 1913, only 1,373 births were registered with his department, and estimated that this number represented only about two-thirds of those actually born. Such violation of the law is unfair to the child and most prejudicial to any organized endeavor to reduce infant mortality. Complete and prompt registration of births is essential to the computation of true infant death rates and to the effective administration of preventive measures.

To get a more exact idea of the situation and of the improvement which the city authorities have been able to effect, and to get some basis for estimating the variations in infant mortality throughout the city, a search was instituted during the present survey for births not registered during the year 1913. Church christening records and those of infant deaths were compared with the city and county records of births. The results are indicated on the map on page 13 and in Table 5.

TABLE 5.—REGISTRATION OF BIRTHS, SPRINGFIELD, 1913

Registered at city or county offices, address adequate	890
Registered at city or county offices, address inadequate	15
Unregistered, exact address obtainable	234
Unregistered, exact address unobtainable	141
Total	1,280

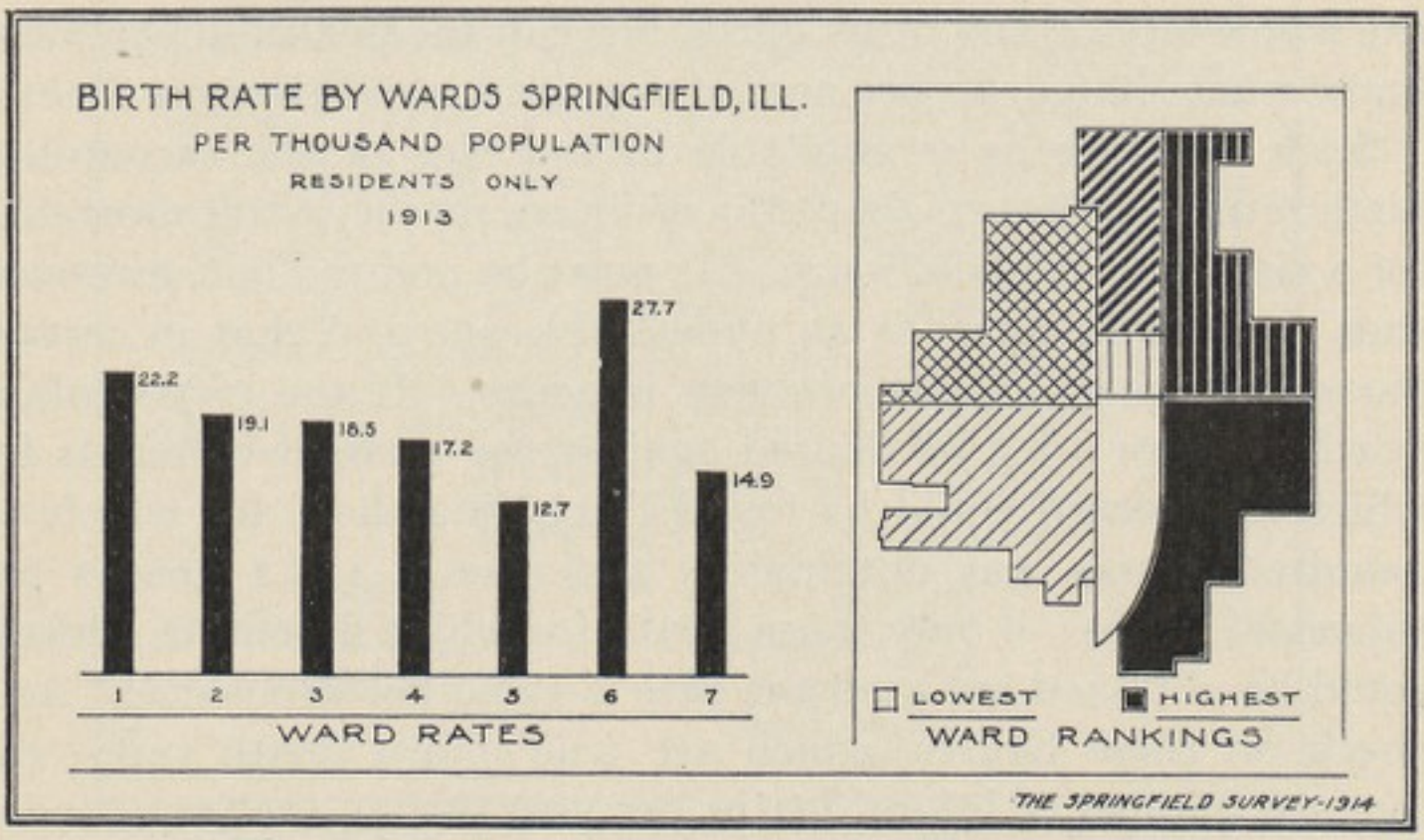
Evidently at least a fifth and quite possibly a third of the births were still unregistered, as errors in the search would probably be on the side of omission rather than duplication. The proportions of unregistered births for the several wards, as well as the birth rates per thousand population based on the combined numbers of those registered and unregistered, are shown in Table 6. It must be emphasized again that the figures are not to be regarded as representing the exact situation; they probably are still more or less an understatement of the actual facts.

TABLE 6.—BIRTH STATISTICS BY WARD, SPRINGFIELD, 1913[a]

Ward	Number of births located	Birth rate per 1,000 population	Per cent of births unregistered
1	203	22.2	24.1
2	126	19.1	18.3
3	172	18.5	16.9
4	184	17.2	24.5
5	79	12.7	20.3
6	310	27.7	20.0
7	50	14.9	20.0

[a] Including only births for which a definite address could be obtained.

The considerable proportion of unregistered births in some of the best residential districts, 25 per cent in ward four and 20 per cent in ward five, is one of the outstanding facts of this table. Faulty birth registration in Springfield is evidently not merely



a sin of the poor. Another fact of considerable interest is the low birth rates existing in wards five and seven, a state of affairs which checks up with their deficiency in children of school age and with the general character of their populations,—some of the best residence sections and the chief business district being in these wards.

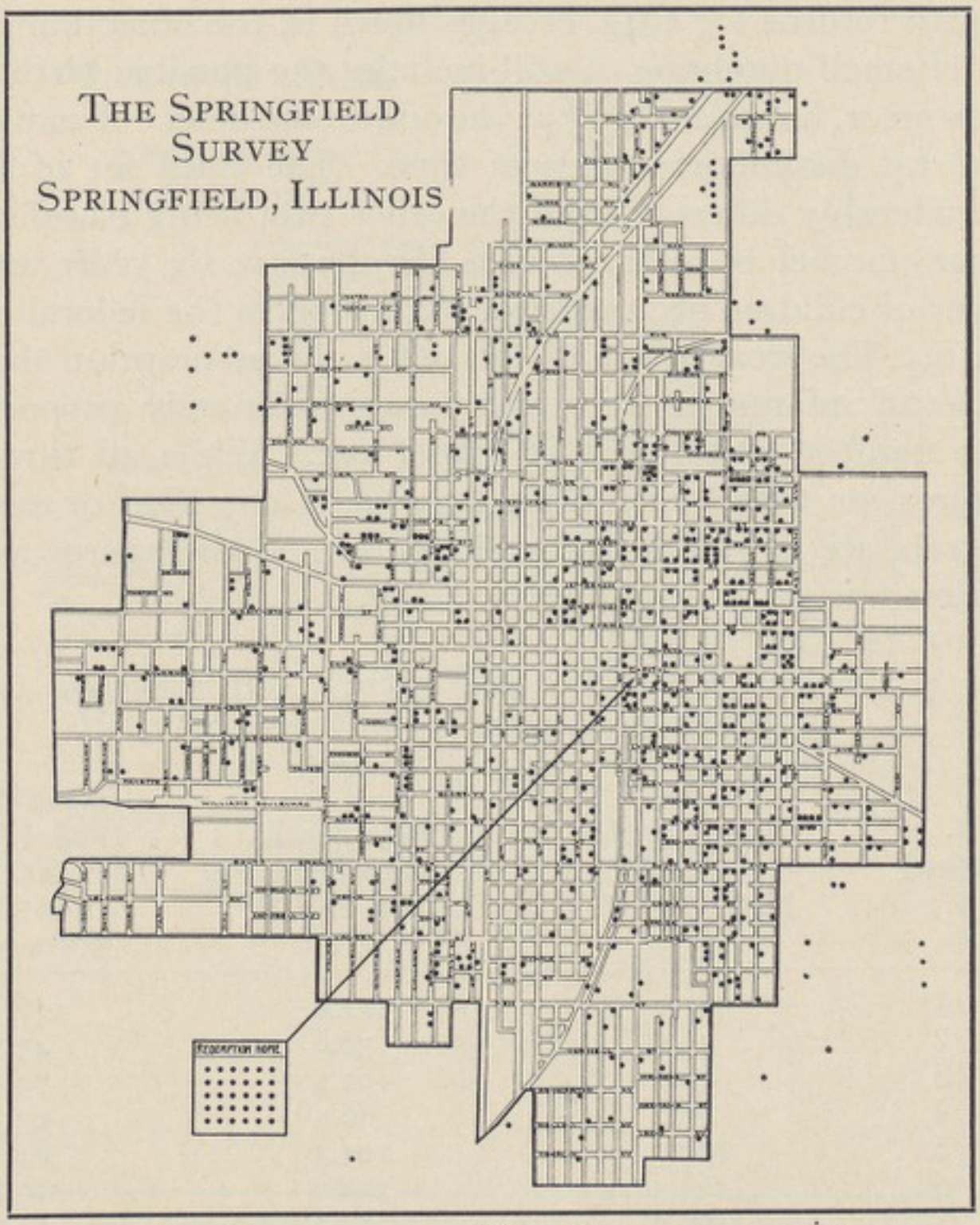
Steps for the improvement of birth registration were being taken by the superintendent of health at the time of the survey. A new appeal was sent to physicians and one doctor was prosecuted for non-reporting. It is to be hoped that these efforts will be continued in a vigorous manner, that they will receive the hearty co-operation of the public and medical profession, and that they will meet with success. One reason why Springfield must get her births fully and promptly reported is that the record may be highly important to the child in later life. It establishes parentage, legitimacy, and age,—facts which may be necessary in connection with school attendance, the securing of working papers, the right to marry or to vote, or in connection with entering one of the government services, or in securing an inheritance. Another reason why the birth report is necessary is that it is needed for the study of the city's infant mortality problem and for the administration of a program of prevention. Without it the infant death rate cannot be computed, either for the whole city or any of its parts, nor can the health department know where its nurses are needed nor can it send them in time.

Such evidence as is available in the face of the incomplete birth returns points to about the ordinary rate of infant mortality for a city of Springfield's size. It must be pointed out, however, that the ordinary rate is an undesirable one and that in certain parts of Springfield the problem is acute. If the city's infant death rate for 1913 be figured against the number of births for which any record could be found (including those for which no definite address was obtainable) the rate is 114.1 deaths per thousand births; if only those births for which a definite address could be obtained are used the rate is 129.9 per thousand. As a check on these figures, which are true infant death rates, the average number of infant deaths per year during the years 1908–1913 may be compared with the number of infants under one year of age,* the resulting rate being 127.4 deaths per thousand infants. These figures, which indicate that about one-tenth of Springfield's infants die in their first year of life, show that the city's infant hygiene problem does not assume quite those destructive proportions found in parts of the South and some con-

* Estimated to January 1, 1911.

gested metropolitan areas. In relation to Springfield's opportunities for life saving the problem is, however, of prime importance.

In studying the infant mortality in particular districts of the



DEATHS OF INFANTS UNDER ONE, SPRINGFIELD, 1908–1913

city, the difficulty due to lack of accurate birth returns is again met; but some very suggestive evidence can, nevertheless, be brought forward. In Table 7 three sets of figures have been prepared, each of some value as an indication of infant welfare in the several wards. The first set, true infant death rates for 1913,

is not quite conclusive because of the already mentioned deficiencies in birth reporting and because the numbers involved are somewhat small for statistical purposes. Some eccentricities, especially in the smaller wards, result. The second set, based on the average number of infant deaths for the last six years and the birth returns for 1913, escapes much of the objection on the score of small numbers; it still includes the possible birth registration error, however, and has the additional defect of comparing figures for dissimilar periods of time. The third set of figures is considerably different from the other two, being based on the average number of infant deaths for the last six years and the number of children of school age according to the federal census of 1910. The weak point in this set is the assumption that the number of infants in the wards is approximately proportional to the number of children of school age. While all three sets of figures are therefore subject to error of one kind or another, the errors are not of the same character and the figures may be considered as mutually supplementary.

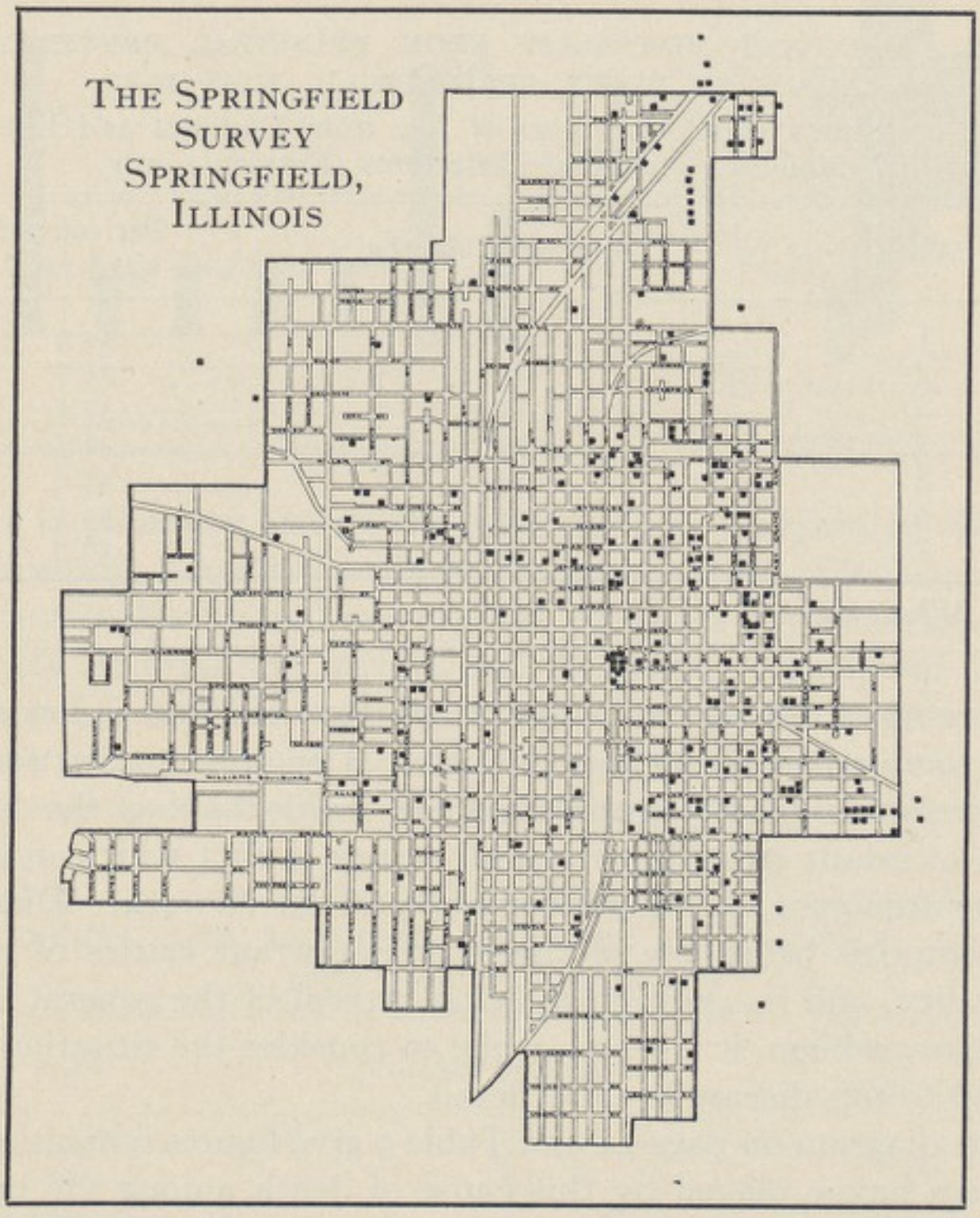
TABLE 7.—MORTALITY OF INFANTS UNDER ONE YEAR OF AGE BY WARD, SPRINGFIELD (RESIDENTS ONLY)

Ward	Infant deaths per 1,000 births,[b] 1913	Infant deaths 1908–13,[a] per 1,000 births[b] in 1913	Infant deaths 1908–13,[a] per 10,000 children[c] 6–20 years of age
1	187.2	142.0	116.3
2	47.6	56.8	43.3
3	87.2	101.7	74.5
4	65.2	86.1	63.3
5	202.5	101.3	64.5
6	164.5	128.0	129.8
7	160.0	83.3	72.7
Whole city	129.9	107.8	87.4

[a] Yearly average.
[b] Births for which a definite address was obtainable.
[c] Estimated as of January 1, 1911.

From an inspection of these figures it is evident that the rate of infant mortality in wards two and four is always low and that

in wards one and six always high. The indications regarding wards five and seven are conflicting, but it would appear that they, as well as ward three, usually hold positions somewhere between the other four.



DEATHS OF INFANTS UNDER TWO FROM DIARRHEA AND ENTERITIS, SPRINGFIELD, 1908–1913

Note the preponderance in the east part of the city. This is one of the principal preventable causes of infant mortality

The marked differences in the relative infant mortality in the wards are paralleled by a significant difference in the character of the diseases causing death. In those wards having the higher rates of mortality the preventable diseases are responsible for

a higher proportion of the deaths. Table 8, which gives the proportion of infant deaths due to diarrhea and enteritis, the pneumonias, and the acute infections during the last six years, brings out this fact.

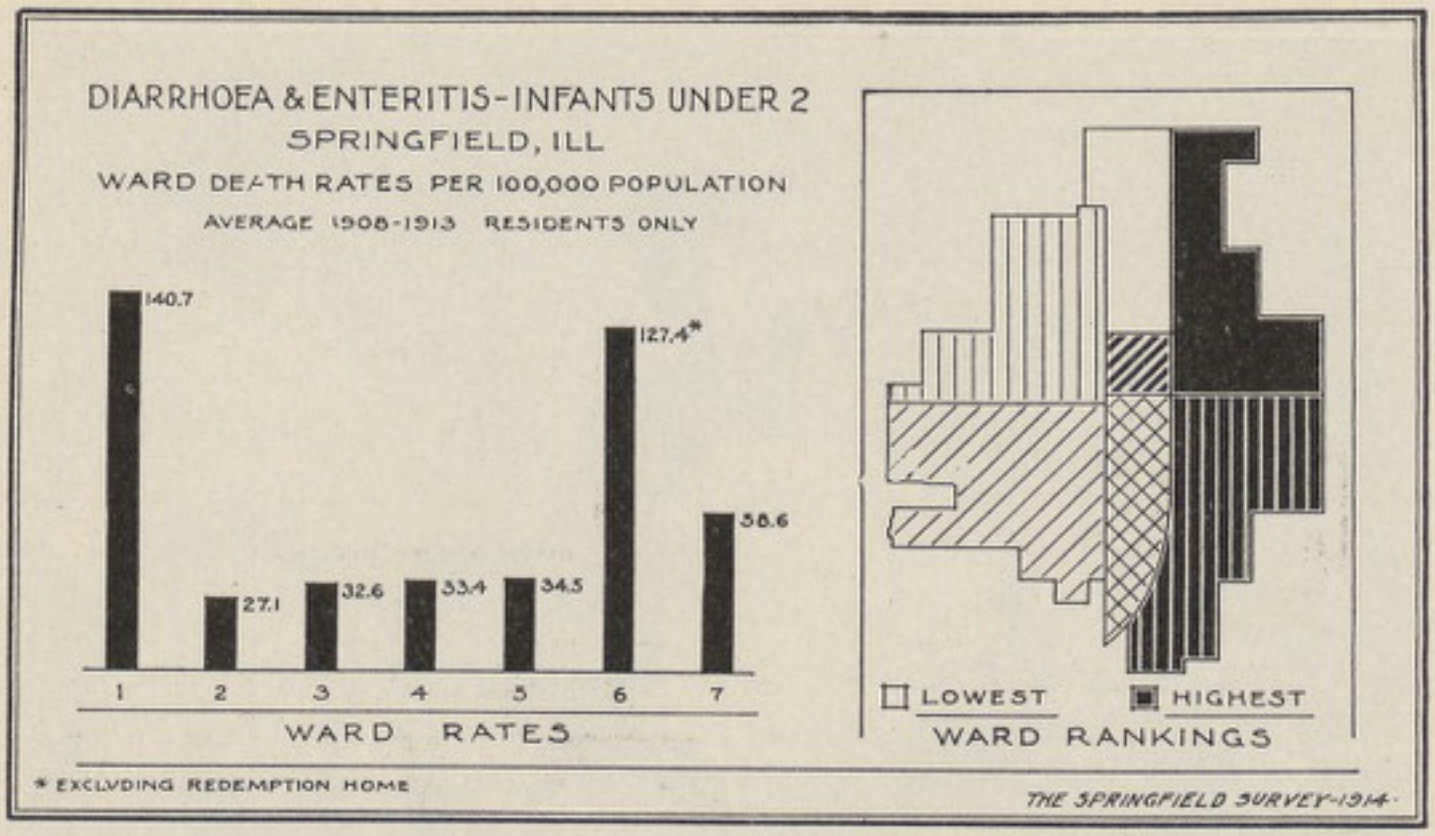
TABLE 8.—INFANT MORTALITY FROM PRINCIPAL PREVENTABLE CAUSES BY WARD, SPRINGFIELD, 1908–1913

Deaths of Infants under One Year of Age from Diarrhea and Enteritis, Pneumonias, and Acute Infections (Residents only)

Ward	Number of deaths	Per cent of ward total
1	94	54.3
2	15	34.9
3	39	37.1
4	29	30.5
5	21	43.8
6	122	51.3
7	14	56.0
Whole city	334	45.9

Here again the mortality for wards two and four is low while that for wards one and six is high. The opportunity for improvement is plainly greater in the wards having the higher rates of infant mortality from all causes, a fact which makes a strong argument for the initiation of preventive work. Diarrhea and enteritis being one of the most important causes of infant mortality, and its prevention being typical of the general infant hygiene problem, it is worth while to consider the situation with regard to this disease in some detail.

The diagram on page 21 and Table 9 give figures indicating the relative havoc played by this cause of death among the infants in Springfield's several wards. It will be noted that more than two-thirds of the entire mortality occurred in the first and sixth wards and that the rates computed on both bases show excesses in these districts. The sickness that gives rise to this mortality occurs chiefly in the hot months of the summer, and is probably due for the most part to infection by specific micro-organisms. Flies may carry these microbes or they may find their way into well water from privies. Another important factor in this mor-

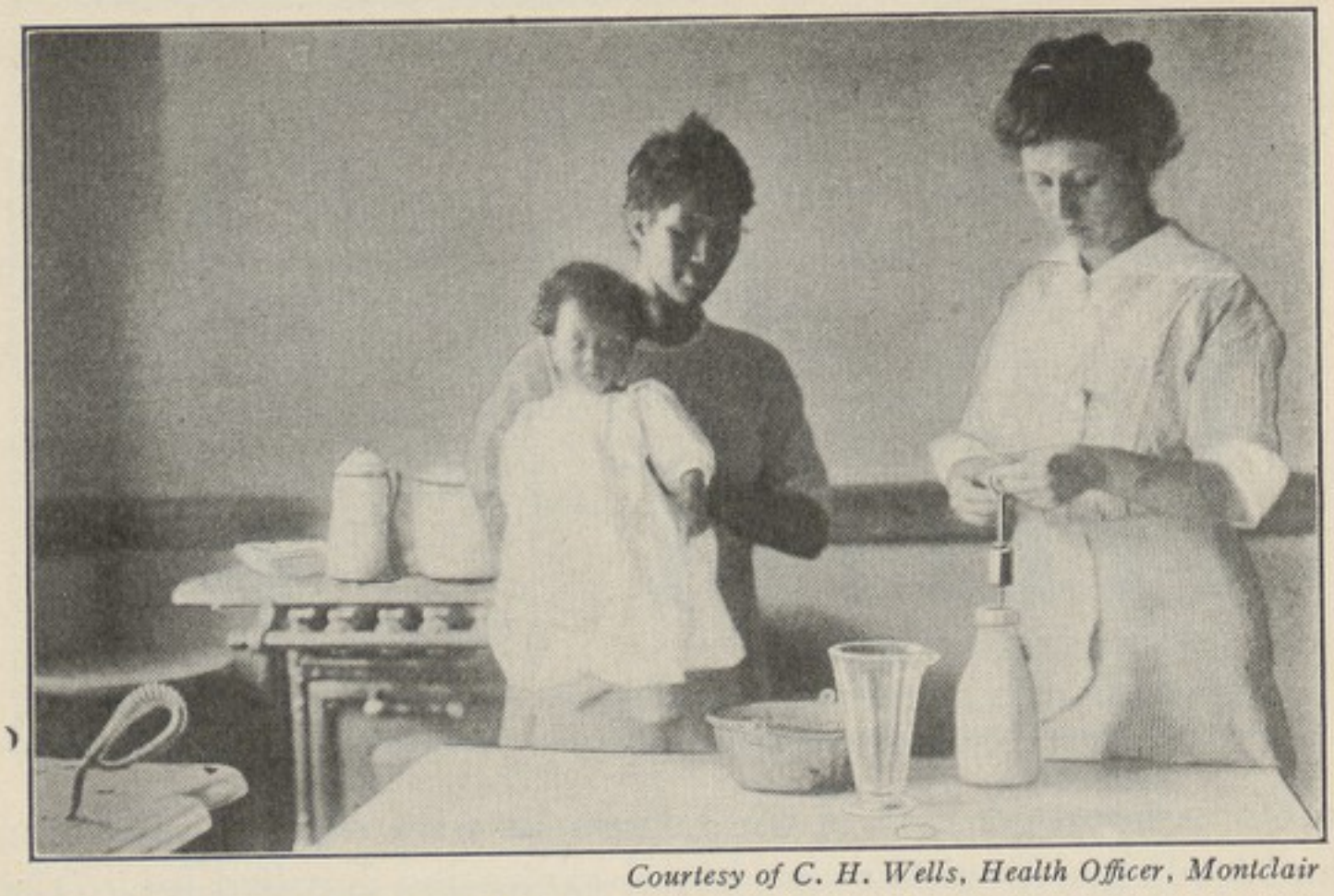


tality is improper care of the infants, as with regard to clothing and feeding. In either case better sanitation is called for. The city authorities should see that the people in these districts need not rely on wells and privies, and the health department should open infant welfare stations and send out public health nurses to instruct uninformed mothers in the essentials of baby hygiene. Substantial reductions in the mortality would certainly result.

TABLE 9.—DEATHS OF INFANTS UNDER ONE YEAR OF AGE FROM DIARRHEA AND ENTERITIS BY WARD, SPRINGFIELD, 1908–1913 (RESIDENTS ONLY)

Ward	Number of deaths	Per cent of ward total
1	58	33·5
2	6	14.0
3	14	13.3
4	15	15.8
5	10	20.8
6	67	28.2
7	9	36.0
Whole city	179	24.6

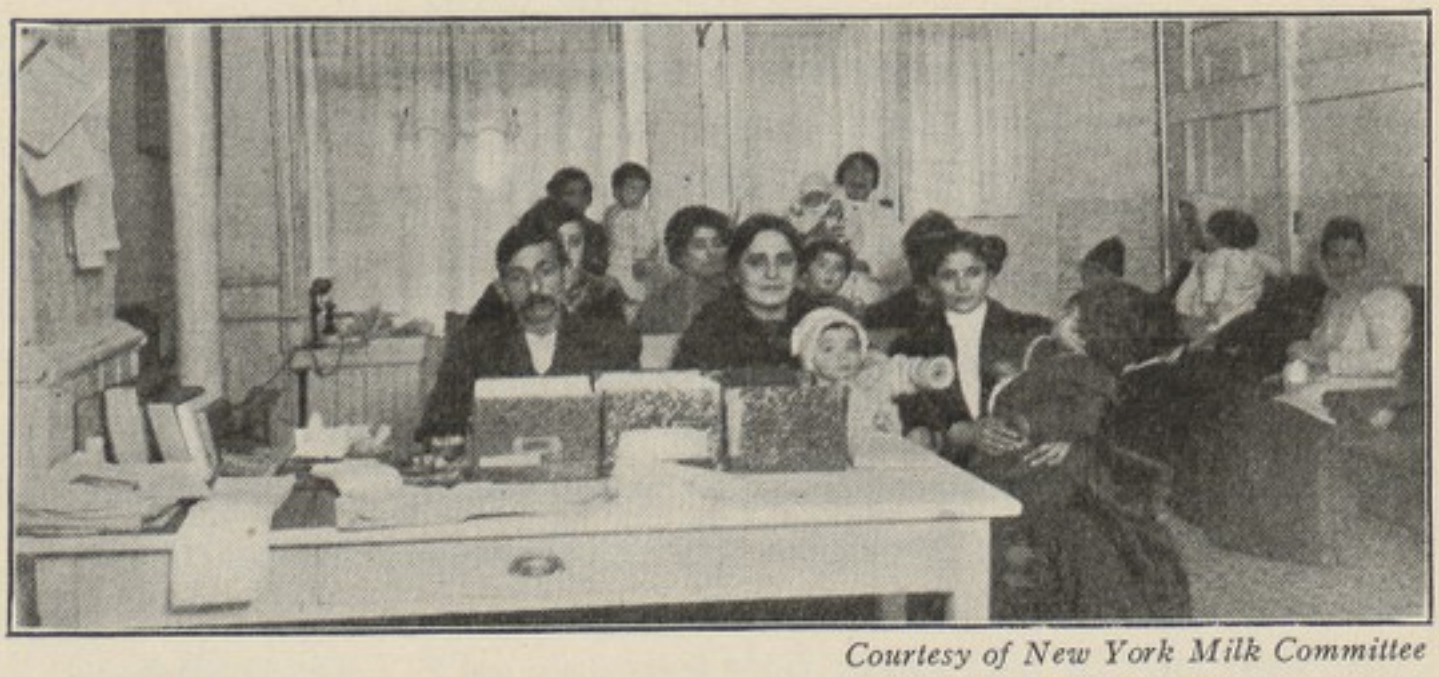
To sum up, out of every 100 infants born in Springfield about 10 die before becoming one year of age; in certain parts of the city,



Courtesy of C. H. Wells, Health Officer, Montclair

BABY-SAVING WORK IN MONTCLAIR, NEW JERSEY

A health department nurse instructing a mother in baby hygiene. Montclair is only a little over half as large as Springfield but finds the employment of such a nurse worth while. Similar work in Springfield would save many babies who now die



Courtesy of New York Milk Committee

AN INFANT WELFARE STATION IN NEW YORK

A doctor and nurses are in attendance and at stated hours parents may bring their babies for examination and may themselves receive advice regarding the care of their infants. Despite heavy losses, Springfield makes no attempt to prevent her unnecessary infant mortality

however, only about five die, while in certain other parts as many as 20 do not live to reach their first birthday. The problem centers chiefly in the first and sixth wards, in the eastern section, although there is reason to believe that substantial improvement can be accomplished in the third, fifth, and seventh wards. The wards to the east of Tenth Street, which in 1910 included 36.4 per cent of the population, were responsible for 45.6 per cent of the births located in 1913, and for 61.0 per cent of the infant deaths reported in that year. During the six years 1908–1913 these wards have been responsible for 57.5 per cent of the mortality. The infant deaths in these districts are due, furthermore, in a relatively high proportion of instances, to the diseases which modern sanitation has learned to prevent.

No escape is possible from the conclusion that a steady and considerable health and life wastage is constantly going on among Springfield's infants. If during the last six years the other wards had but equaled the record of ward two, only 383 infants under one year of age would have died instead of 727. This would represent a saving of about 57 babies a year, or a total of 344.* In other words, the lives of nearly half of these victims might have been saved by proper precautions.

To put an end to this terrible loss we may recommend to Springfield methods which have proved successful elsewhere, as follows:

1. Prompt and complete registration of births, already required by law but not secured up to the present year (1914). This will require the co-operation of the public, medical profession, and midwives.

2. Registration, examination, and regulation of midwives.

3. The employment of public health nurses who are qualified to visit homes and instruct mothers who would not ordinarily receive proper advice regarding the care of infants; this work to be carried on in connection with one or more infant welfare or consultation stations, where instruction and demonstrations may

* This statement is based on the average yearly number of infant deaths 1908–13 per 1,000 births in 1913,—the second column of rates in Table 7. This basis gives a more conservative estimate of the saving possible than the other two sets of rates in the table.

be given mothers and at which a doctor shall be in attendance at certain set hours and to which sick infants may be brought. This work should be carried on by the city health department.

4. The improvement of sanitary conditions in certain parts of the city, such as are discussed later in this report, and especially as affecting the breeding places of flies and the abolition of insanitary privies and dangerous wells.

5. The continuation and extension of the present efforts to improve the city's milk supply, as outlined later in this report.

Of the above, probably the most important steps that can be taken will be the employment of nurses and the opening of infant welfare stations. These agencies are relatively inexpensive and have been attended by splendid results in other cities. Ignorance is the babies' greatest enemy, and the measures outlined above are chiefly those of education.

IV

CONTAGIOUS DISEASES OF CHILDREN

Four wellknown contagious diseases, diphtheria, scarlet fever, whooping cough, and measles, are peculiarly children's scourges. These diseases practically limit themselves to children, cases among older persons being relatively rare. At the same time, if tuberculosis be excepted, these diseases are probably the most important contagions with which children, after escaping the hazards of infant life, have to contend. Others, such as infant paralysis and cerebro-spinal fever, show small totals when compared with the other four mentioned, nor is their control as well understood.

The four diseases first named are beyond peradventure contagious and their control has long been recognized as one of the chief functions of the health authorities. Their importance is great, both as represented by the amounts of sickness and death of which they are the immediate cause and by the injurious effects which they have on the kidneys, respiratory organs, and other parts of the body. Many of these last effects are overlooked at the time of the illness but make themselves felt in later life when the general vitality of the body begins to decrease. The numbers of deaths from these diseases in Springfield during the past six years, and the yearly death rates, appear in Table 10.

TABLE 10.—MORTALITY FROM CONTAGIOUS DISEASES OF CHILDREN, SPRINGFIELD, 1908–1913 (RESIDENTS ONLY)

Disease	Deaths	Yearly deaths per 100,000 population
Diphtheria	61	19.2
Whooping cough	44	13.9
Measles	31	9.8
Scarlet fever	23	7.3
Total	159	50.2

"While it may be truthfully contended that Springfield has no more cases of scarlet fever and diphtheria than most of the other medium-sized cities of the middle west, it is none the less true that we have too many such cases." These words appear in the October, 1909, bulletin of the Springfield health department and have continued to represent the situation fairly. Assuredly the four diseases are of importance when causing some 26 deaths a year. It should also be noted that in the last five years there have been reported a total of 1,441 cases of diphtheria and scarlet fever alone. If one attempts to visualize the suffering and loss attending this vast number of cases, and further realizes that modern science tells us how the diseases are spread and how they may be prevented, it will be evident that the city is here confronted with an opportunity for service of the most useful sort.

Additional light is thrown on the preventability of these diseases and the problem of their suppression in Springfield by a study of their distribution throughout the city. The facts are indicated in the accompanying maps and charts and in Table II.

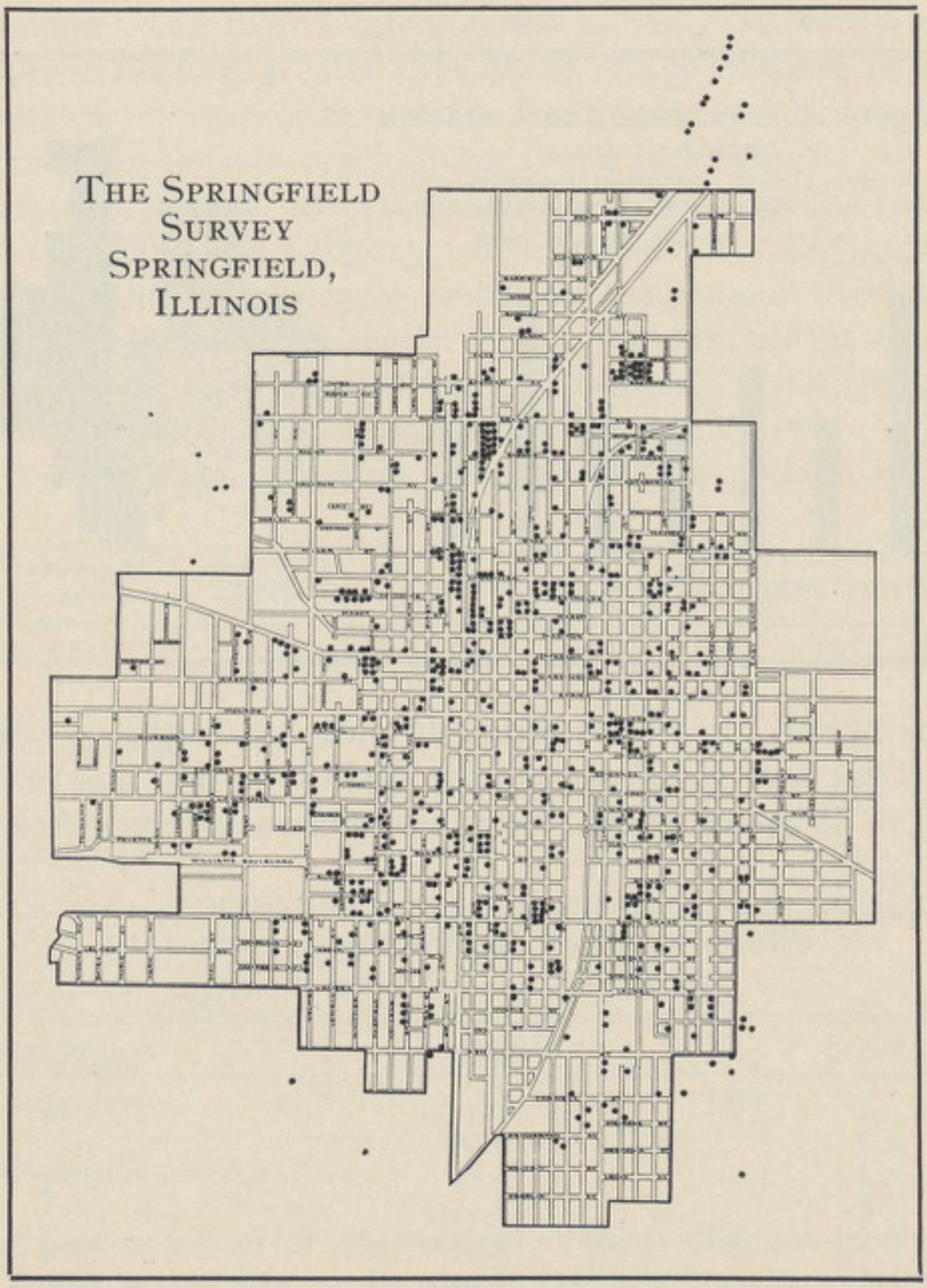
TABLE II.—MORTALITY FROM CONTAGIOUS DISEASES OF CHILDREN BY WARD, SPRINGFIELD, 1908–1913

Deaths and Death Rates from Diphtheria, Scarlet Fever, Whooping Cough, and Measles (Residents only)

Ward	Deaths	Yearly deaths per 100,000 population	Yearly deaths per 100,000 children 6–20 years of age
1	39	76.2	262.1
2	13	35.2	130.7
3	26	49.9	184.5
4	20	33.4	133.2
5	11	31.6	147.7
6	46	73.3	250.9
7	4	21.3	116.3
Whole city	159	50.2	191.3

The rates given in the last column of the table and in the diagram, being based on the number of children of school age in

the several wards, are the more significant. Examining these figures, it is evident that the variations are much the same as in

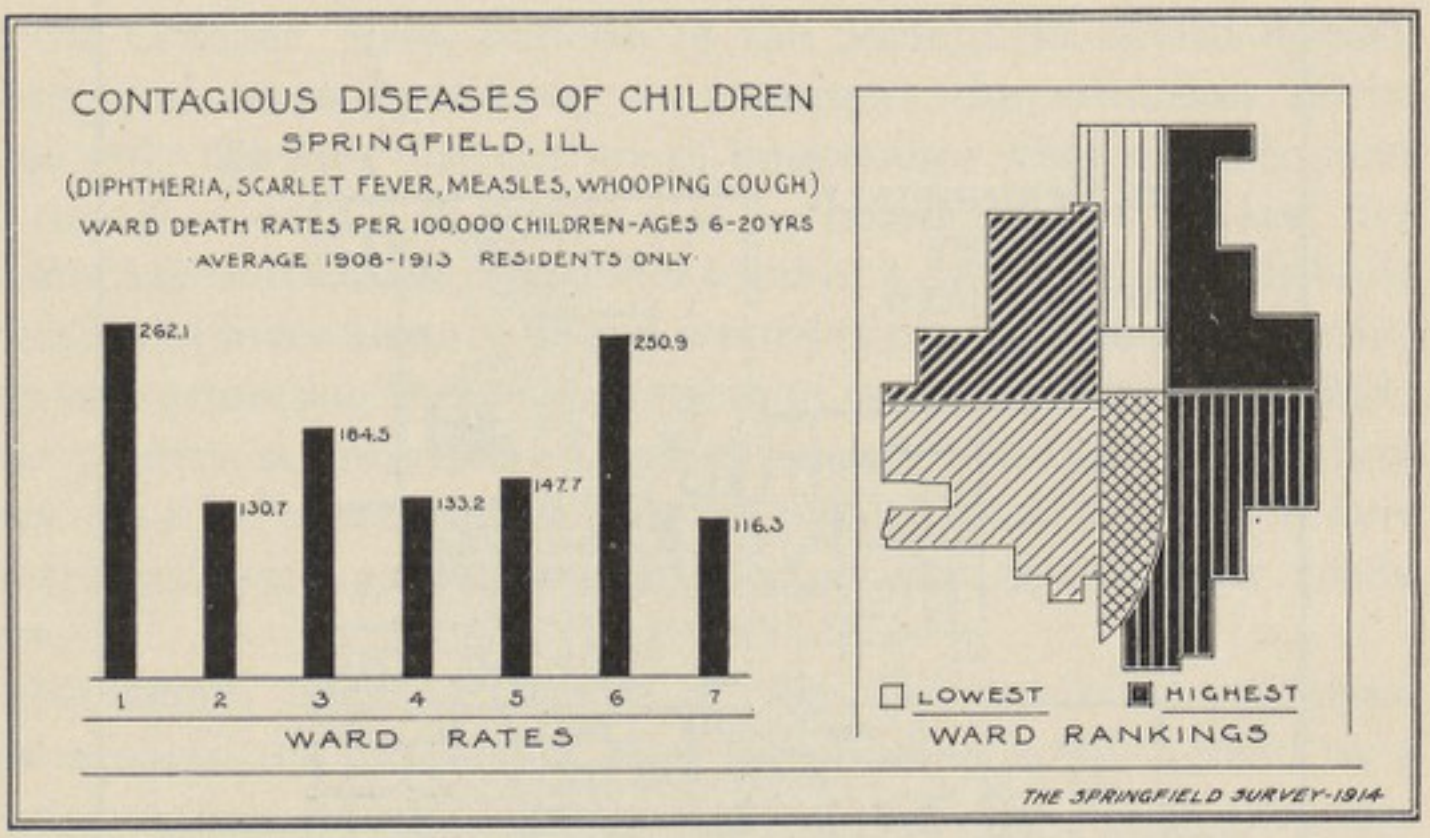


CASES OF SCARLET FEVER REPORTED TO THE HEALTH DEPARTMENT, SPRINGFIELD, 1909–1913

The marked "clumping" of cases is characteristic of the contagious diseases. The health department needs an epidemiologist to keep closer watch over the spread of these diseases and to prevent contact infection

the case of infant mortality. Wards one and six are again high, wards two and four again low, with wards three and five again

in intermediary positions. Ward seven makes a more favorable showing than before, having for these diseases the lowest rate of all.



The figures for case fatality, the ratio of deaths to cases reported for any given disease, for diphtheria and scarlet fever, given in Table 12, show much the same variations. Again the

TABLE 12.—CASE FATALITY FROM DIPHTHERIA AND SCARLET FEVER BY WARD, SPRINGFIELD, 1909–1913

Deaths per Hundred Cases Reported

Ward	Diphtheria	Scarlet fever
1	9.45	4.24
2	8.86	..
3	9.17	0.83
4	8.21	..
5	3.57	1.14
6	8.44	4.69
7	..	..
Whole city	8.01	1.72

east side ratios are excessive, although those for diphtheria in wards two, three, and four are also higher than should prevail. The city's general case fatality rate from this disease, 8 per cent

in the six-year period, while not an uncommon one, is too high as judged by the better standards of modern hygiene. Either treatment is bad, or, what is more likely, reporting of cases is incomplete. The high fatality ratios in the east wards, while thus not indicating greater prevalence of the diseases in those districts, do indicate objectionable conditions, and so re-enforce the conclusion to be drawn from the death rate figures.

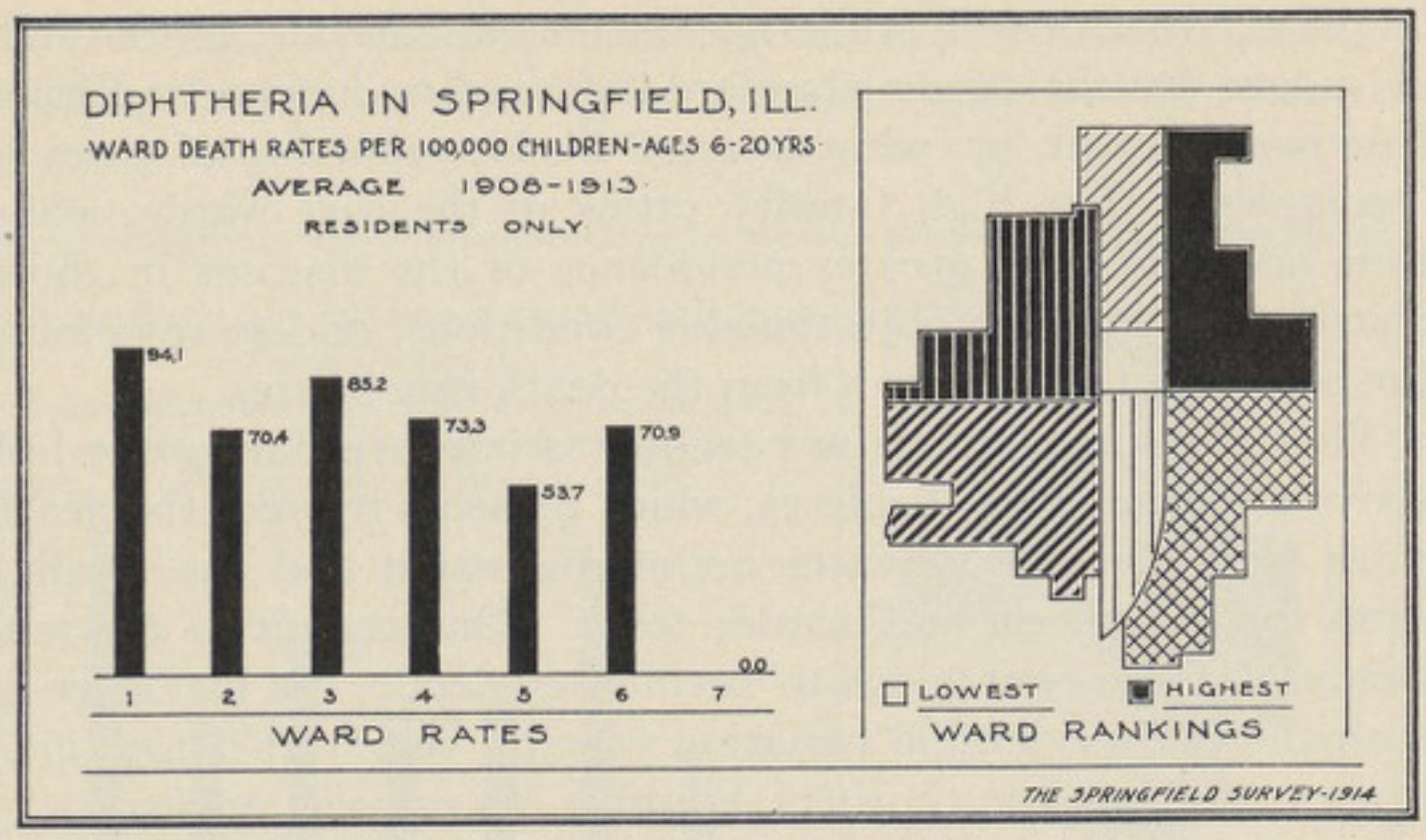
That the situation has not tended to improve during the last six years is shown by Table 13, which presents by year the death rates from the four diseases under discussion and the fatality rates for diphtheria and scarlet fever. On account of the tendency of these contagions to become epidemic, the incidence of each shows considerable variation year by year. It is the function of the health authorities, however, to prevent epidemics.

TABLE 13.—DEATH AND FATALITY RATES BY YEAR, CONTAGIOUS DISEASES OF CHILDREN, SPRINGFIELD (RESIDENTS ONLY)

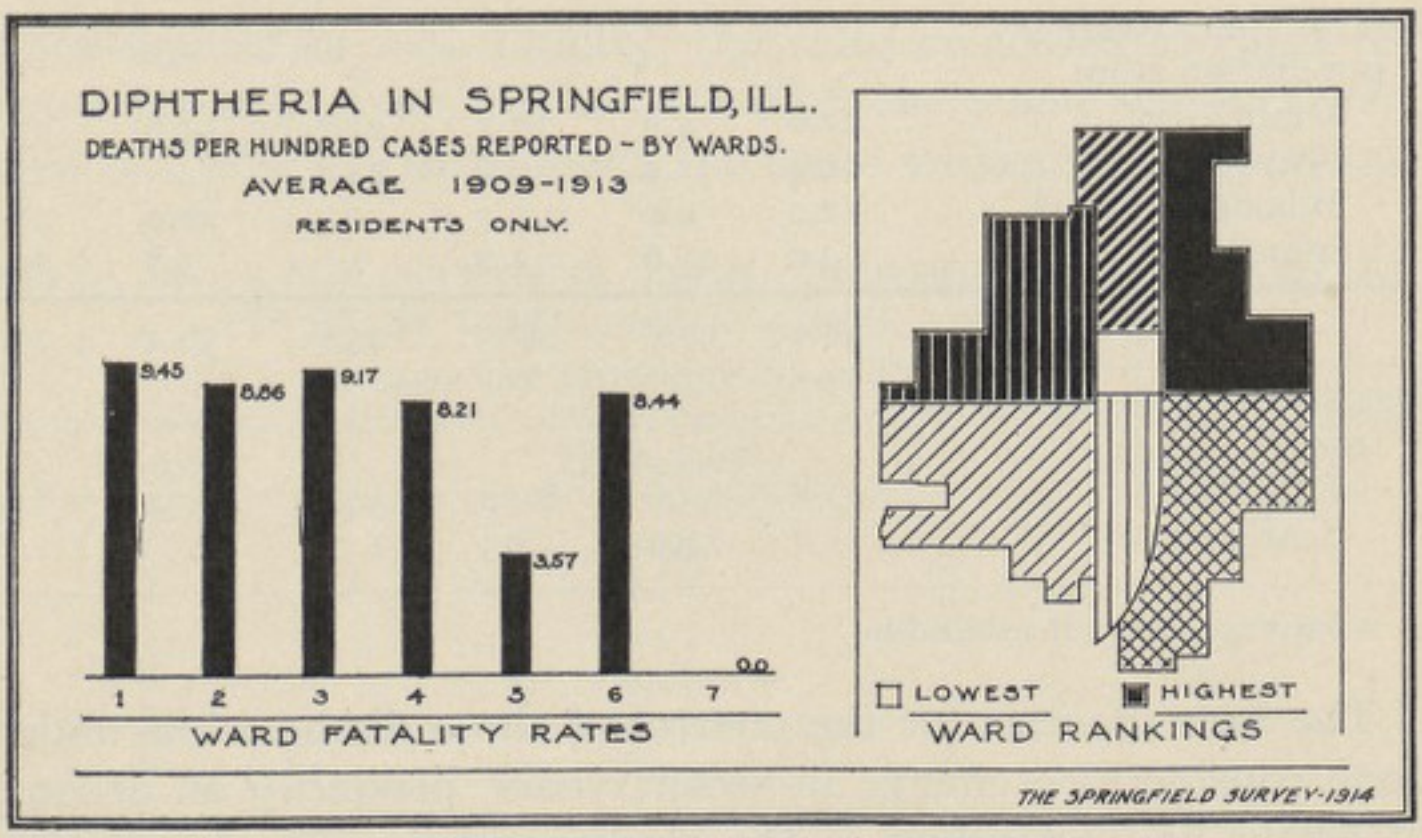
	1908	1909	1910	1911	1912	1913
Deaths per 100,000 population from						
Diphtheria	12.2	4.0	17.3	22.5	34.6	23.0
Scarlet fever	20.5	2.0	9.6	11.2	..	1.8
Whooping cough	12.2	4.0	7.7	9.3	20.0	28.3
Measles	2.0	27.6	3.9	..	1.8	23.0
Total	46.9	37.6	38.5	43.0	56.4	76.1
Deaths per 100 cases from						
Diphtheria	..[a]	1.96	6.29	13.48	9.74	8.23
Scarlet fever	..[a]	1.30	1.95	1.72	..	2.70

[a] Information not available.

The best practice for the control of these diseases has undergone considerable change in recent years, primarily on account of better understanding of the modes and sources of infection. Whereas great emphasis was formerly given to desquamation (peeling) and fumigation at the termination of the case, the importance of these points is now minimized and the emphasis is shifted to early recognition of cases, especially mild cases and "carriers" (persons who harbor the disease organisms but show



none of the usual symptoms), and to the prompt and efficient disinfection of the discharges which flow from infected persons. All four diseases are similar in that the throat and nose appear



to be the chief sources of infectious matter, the problem of prevention thus being to destroy the virus secreted in the nasal or mouth discharges or to otherwise prevent it from reaching new victims.

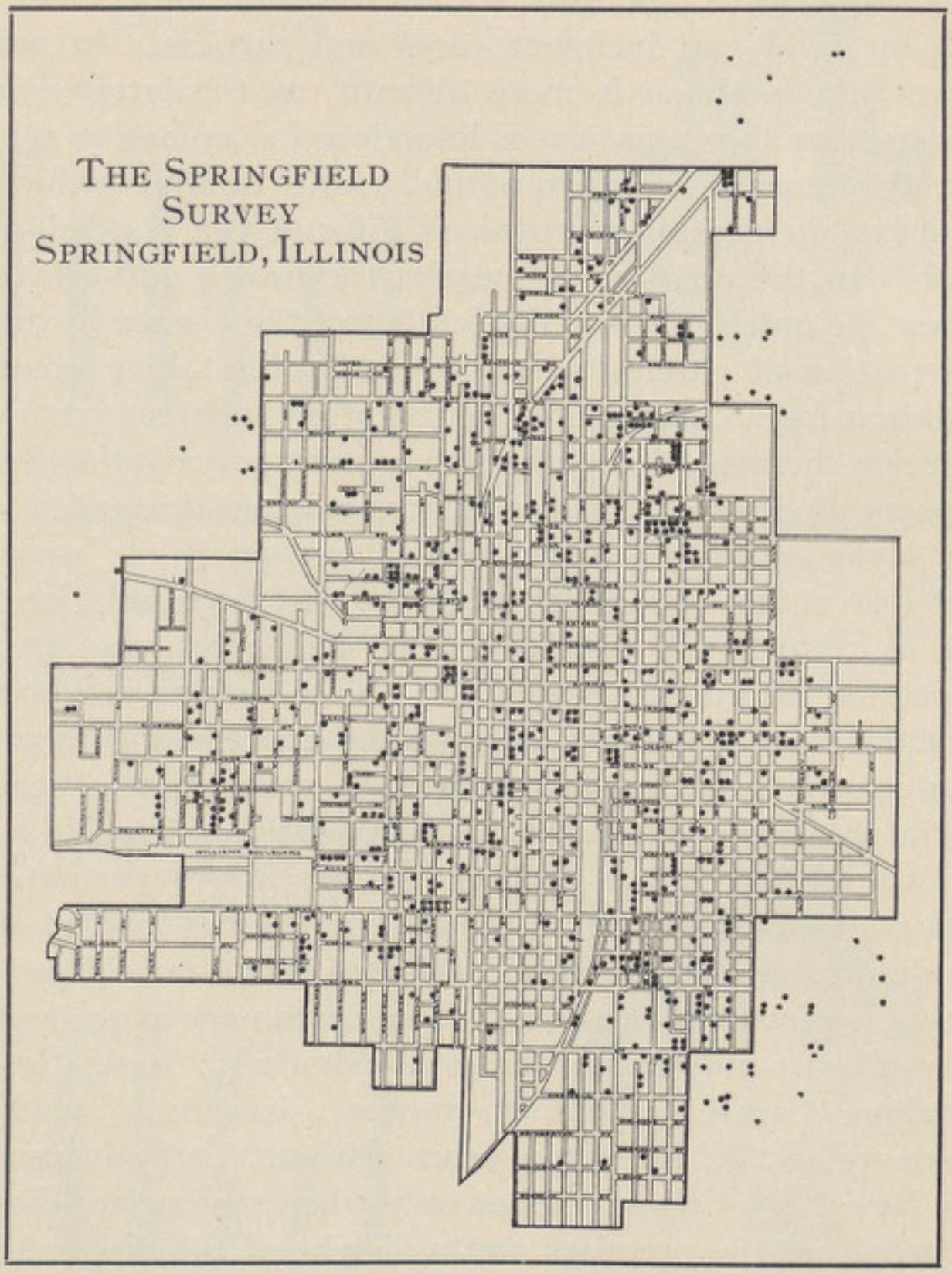
In diphtheria, whooping cough, and scarlet fever much can

be accomplished by isolating patients with the earliest possible approach to the first appearance of symptoms, and by searching among "contacts" (persons who have been in contact with cases) for mild and incipient cases and carriers. In measles, however, the problem is more difficult, as the latest evidence seems to show that a patient is infectious for as long as ten days before the appearance of symptoms, a state of affairs which goes far to explain the long-recognized difficulty in controlling the disease. In the presence of measles the health authorities can, however, do much to lessen the fatality of the disease by drawing the attention of parents to the necessity for taking great care of children for a considerable period after apparent recovery, a precaution the importance of which is commonly overlooked.

The additional health department operations demanded by the newer ideas include follow-up medical inspection of "contacts," better instruction of families as to the details of isolation, especially as regards the disinfection of discharges, and generous reinspection of quarantined cases. The savings incidental to the newer ideas include relief from the expense and annoyance of fumigation and, in a considerable proportion of cases, a material shortening of the period of quarantine. Thus in English hospitals, where the date of discharge of scarlet fever patients is regulated by the condition of the nose and throat instead of complete desquamation, the usual period of isolation is about three weeks, as against the five or six weeks customary in this country. The results are fully as satisfactory. Similarly, fumigation after contagious disease, except on request, has been omitted in Providence, R. I., for some years without bad consequences; while New York City fumigates only when the patient dies or is removed from the premises at the height of the disease. Such gains are, in the aggregate, large.

The procedures now employed in Springfield are such as have been common in American cities of similar size, and such as are dictated by the slender resources commonly placed at the disposal of our American health departments. Reports to the health department of infectious and contagious diseases are required by state law and city ordinance, telephone reports without written confirmation being accepted. Cases of diphtheria

and scarlet fever are quarantined by a sanitary inspector, who merely placards the front and rear doors and leaves the state



CASES OF DIPHTHERIA REPORTED TO THE HEALTH DEPARTMENT, SPRINGFIELD, 1909–1913

Cases of diphtheria are now released from quarantine by the attending physician. This is bad because there are usually a few physicians who will release cases too early and so expose other children to infection. Release by the health department only after negative cultures from the patient's throat and nose is much to be preferred

board of health pamphlets regarding the care of these diseases. Other members of the family must live apart or stay in quarantine

unless conditions assure satisfactory room isolation, in which case the breadwinner may continue at work and live at home. Notice of the case is sent to the library and the board of education, and the family is directed not to return milk bottles. Unless a complaint is received, the health department does nothing more until the attending physician notifies the department that the case is ready for release. The inspector then returns, takes down the card, and fumigates with formaldehyde.

In diphtheria the quarantine period is fourteen days, the case being thereafter released at the word of the attending physician. Cases are also released after ten days providing the attending physician will certify in writing that two cultures taken from the patient on separate days have proved negative. In scarlet fever the minimum period of isolation is twenty-one days, release being made thereafter on the word of the attending physician that desquamation is complete. In another two weeks the patient may return to school. In measles and whooping cough the patient is simply excluded from school, other children in the household being likewise excluded unless they have had the disease or the patient is isolated.

These procedures, as has been suggested, are such as are dictated by the older practice and lack of funds. A number of important suggestions for improvement can be made, the adoption of which would insure greater safety to the city's children. For one thing, every case should be reported promptly. While the reporting of diphtheria and scarlet fever has been relatively good, there is evidence that at times and in certain districts it has been distinctly not up to standard. Measles and whooping cough are reported hardly at all. Prompt and full reports of these diseases are the first requisite for the study and prevention of their spread, and the responsibility for securing such reports rests with the public and the medical profession. The concealment of a case of contagious disease in order to avoid the bother of isolation is most unfair to the rest of the community, and it is a mistaken kindness for a physician to lend himself to any such attempt. Concealment in such cases means trifling with the lives of others.

The manner in which isolation is at present initiated, main-

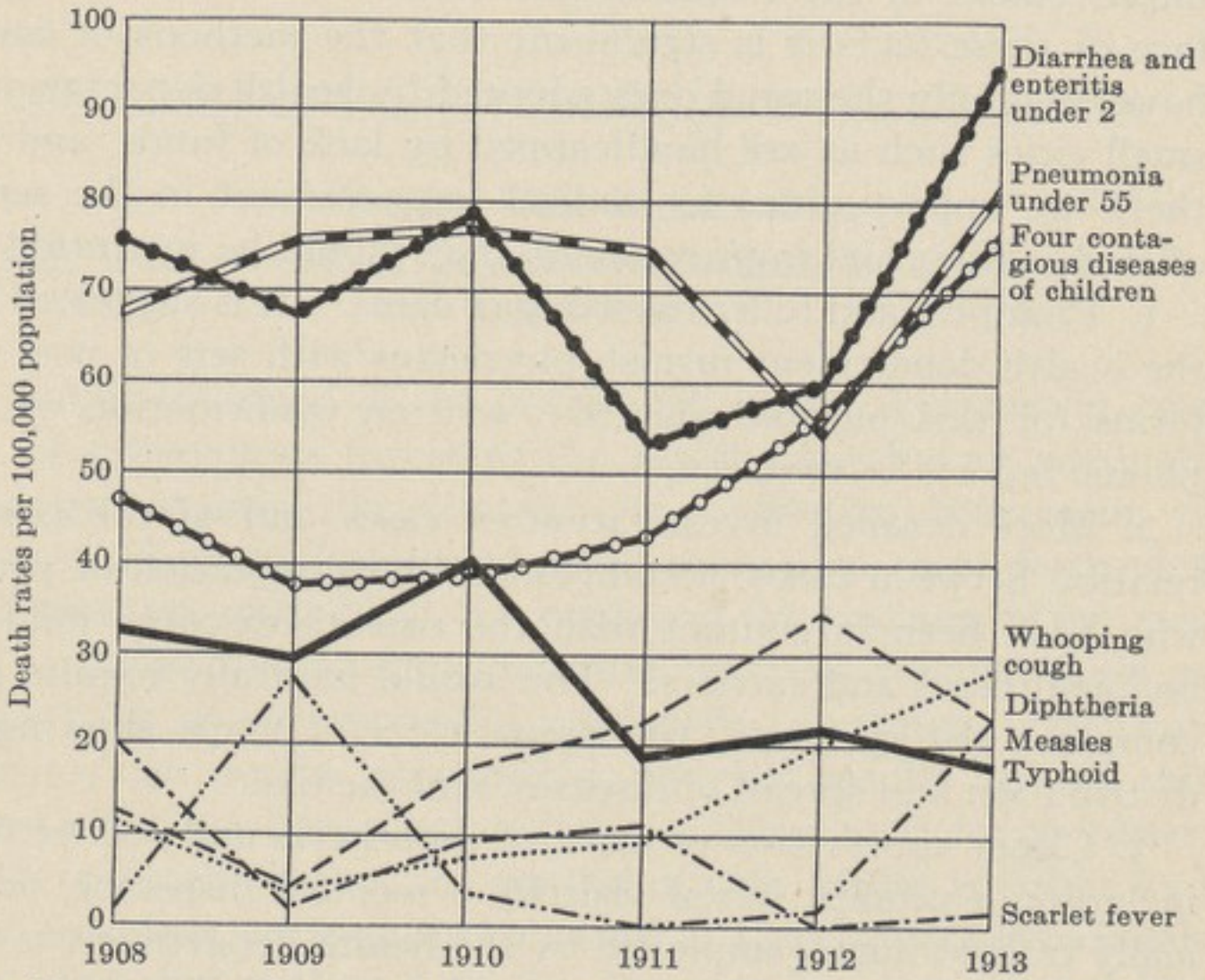
tained, and terminated can also be greatly improved. The present operations are directed largely against the house or at least the patient's inanimate environment, whereas it is now believed that the points to be concentrated on are the patient and his discharges. Thus the report of a case is now followed, as we have seen, by the visit of an inspector to placard the house. The inspector's chief forte is nuisance abatement work and he has no special knowledge of the modes of infection and the details of efficient bedside disinfection. The educational pamphlet which he leaves is a step toward instruction of the family, but something more is needed. The fumigation is probably a useless operation and a waste of time and money.

In the quarantine the most important points are overlooked; the family or attendant has not received adequate instruction in the details of bedside disinfection, and reinspections have not been made to see that such instructions are properly carried out and that the other requirements of quarantine are being maintained.

The arrangements for release are, furthermore, open to weighty objections, the decision as to when the case is ready being left to the attending physician. This feature is a bad one because there are always some physicians who are willing to release cases early and who get business on this basis. The recommendation to "Have Dr. So-and-so; he'll get you out of it easy," is a great friend of contagion. Release on inspection by the health department, on the other hand, makes for uniformity of practice and safety, and relieves the conscientious physician from pressure by mistaken or unscrupulous families.

It is also recommended that in release greater attention be paid to the condition of the nose and throat as compared with desquamation, and that in diphtheria the sole criterion for release be negative cultures from both throat and nose, at least two sets of cultures being taken on separate days. These cultures should be examined, furthermore, by an established laboratory having the endorsement of the health department, as the laboratory diagnosis of diphtheria is an operation requiring special training and practice. In this connection the city is fortunate in being the home of the state board of health diagnostic

laboratory, this making release by cultures easily practicable. The presence of the state laboratory also ensures a reliable supply of antitoxin ready at hand, and every effort should be made to take full advantage of this circumstance by seeing that sufferers from diphtheria receive the serum at the earliest possible



DEATH RATES FROM CERTAIN PREVENTABLE CAUSES BY YEAR, SPRINGFIELD, 1908–1913. Residents only

Typhoid fever is the only disease that really has shown an encouraging decline in the period. Scarlet fever has shown some diminution, but taken as a whole the four contagious diseases of children show a steady increase in the last five years. The need for improvement in the city health department's supervision of the communicable diseases is beyond question. The reader is referred to the chart on page 56 showing the death rate from tuberculosis by years

moment. The efficacy of the treatment is directly proportional to the earliness of administration and the health department should provide a physician who will stand ready to administer the antitoxin promptly among the poor on the call of any physician.

The local situation regarding the contagious diseases of chil-

dren may be summed up about as follows. Serious amounts of these diseases occur in the city, 159 children having died in the last six years while several thousand were made ill. Marked excesses occur in certain districts, notably that part of the city east of Tenth Street. The records of the last six years show no improvement in the situation, but rather the reverse. In the face of these facts it is significant that the methods of control have been only the usual ones adopted by health departments in small cities such as are handicapped by lack of funds, and that there are opportunities for radical improvement in the service offered. The chief improvements that should be instituted are:

1. Prompter and fuller reporting of cases. It is suggested that the health department furnish physicians with sets of post card forms for this purpose and that written confirmation of telephonic reports be required.

2. More detailed investigation of cases and of the possible relation between cases, accompanied by examination of persons who have been in contact with the case to discover mild and incipient cases and carriers. This would naturally require more complete history cards, the preparation of maps showing the distribution and spread of diseases, and the like.

3. Closer supervision of cases of diphtheria and scarlet fever, including a prompt initial visit by a medical inspector, or specially trained nurse, employed by the health department to issue detailed instructions as to the maintenance of the patient and the disinfection of his discharges; reinspections to follow at frequent intervals to see that instructions are being followed, with release only after a final inspection by a medical representative of the health department. In the case of diphtheria, release only after two successive negative cultures from the throat and nose.

4. The visitation of cases of measles and whooping cough to instruct the responsible parties as to the management of the patient and the disinfection of his discharges.

5. Transference of the present emphasis on fumigation at the termination of the case to bedside disinfection of discharges during the activity of the disease and general cleaning at its termination.

V

THE SPRINGFIELD TUBERCULOSIS SITUATION

DIXON VAN BLARCOM
Field Secretary National Association for the Study and Prevention of Tuberculosis

A public informed of the prevalence, nature, prevention, and cure of tuberculosis furnishes the surest basis for an adequate campaign against the disease. Any effective movement to suppress this preventable, and at the same time, most destroying of all diseases, must be as thorough and far-reaching as our system of public school education and must be conducted on as firm a basis as our successful mercantile enterprises. Halfway measures can not be depended on to yield results against this enemy which has been deep rooted in civilized races for centuries.

The responsibility for the control of this disease is public and for all practical purposes entirely local. That private individuals have generally awakened to the situation in advance of public officials does not relieve the latter of their responsibility. Tuberculosis is essentially a public health problem and should not be confused with poverty or pauperism.

The investigation on which this report is based was made during the first two weeks in April, 1914, and comments herein apply at that time. Opportunity was not afforded for an intensive study of the situation but information was secured which may serve as a safe basis for future activities.

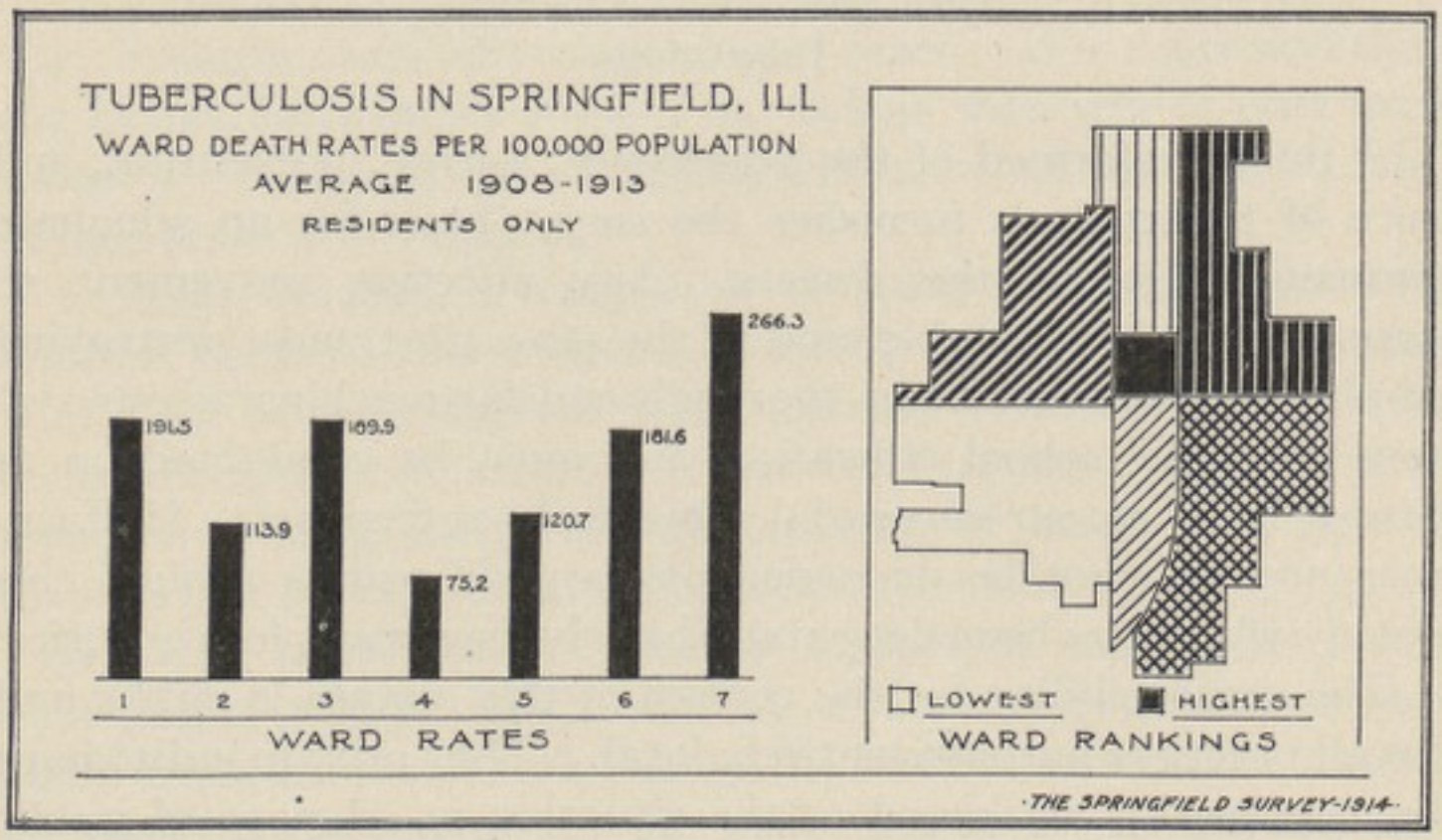
The main points considered are:

1. Extent of tuberculosis in Springfield.
2. Existing measures for its control.
3. Suggestions for an adequate campaign.
4. Where the responsibility lies.

1. EXTENT OF TUBERCULOSIS IN SPRINGFIELD

During the five-year period 1909–1913, 346 whites and 72 Negroes, or a total of 418 resident men, women, and children, died in Springfield from all forms of tuberculosis. This is an annual average of more than 83. The diagram below and the map on page 40 show the distribution of deaths from tuberculosis throughout the city.

The tuberculosis death rate per 100,000 population during this time was 137.3 for whites and 470.0 for Negroes, making the



rate for the whole city 156.3. This rate is about the average for the entire country during the same period.

The ratio of white to Negro population in the city is 16.4 to 1. The ratio of white to Negro deaths from tuberculosis is 4.8 to 1.

About 30 non-residents died from tuberculosis in the city during this period. On the other hand, about 30 persons died of tuberculosis within one year after leaving the city either for their health or for a new permanent residence. While it would be fair to charge the latter group of deaths to Springfield, only residents who died in the city have been included. The number of deaths from tuberculosis and the estimated populations are given in Table 14 by years, for whites, Negroes, and the whole

city. The corresponding death rates appear in the chart on page 56.

TABLE 14.—MORTALITY FROM TUBERCULOSIS, SPRINGFIELD, 1909–1913 (RESIDENTS ONLY)[a]

Year	Whites		Negroes		Total	
	Population	Deaths	Population	Deaths	Population	Deaths
1909	47,583	60	2,894	21	50,494	81
1910	48,992	88	2,979	10	51,989	98
1911	50,401	71	3,064	14	53,484	85
1912	51,810	53	3,149	15	54,979	68
1913	53,220	74	3,235	12	56,476	86
Total		346		72		418
Yearly average		69.2		14.4		83.6
Yearly deaths per 100,000 population		137.3		470.0		156.3

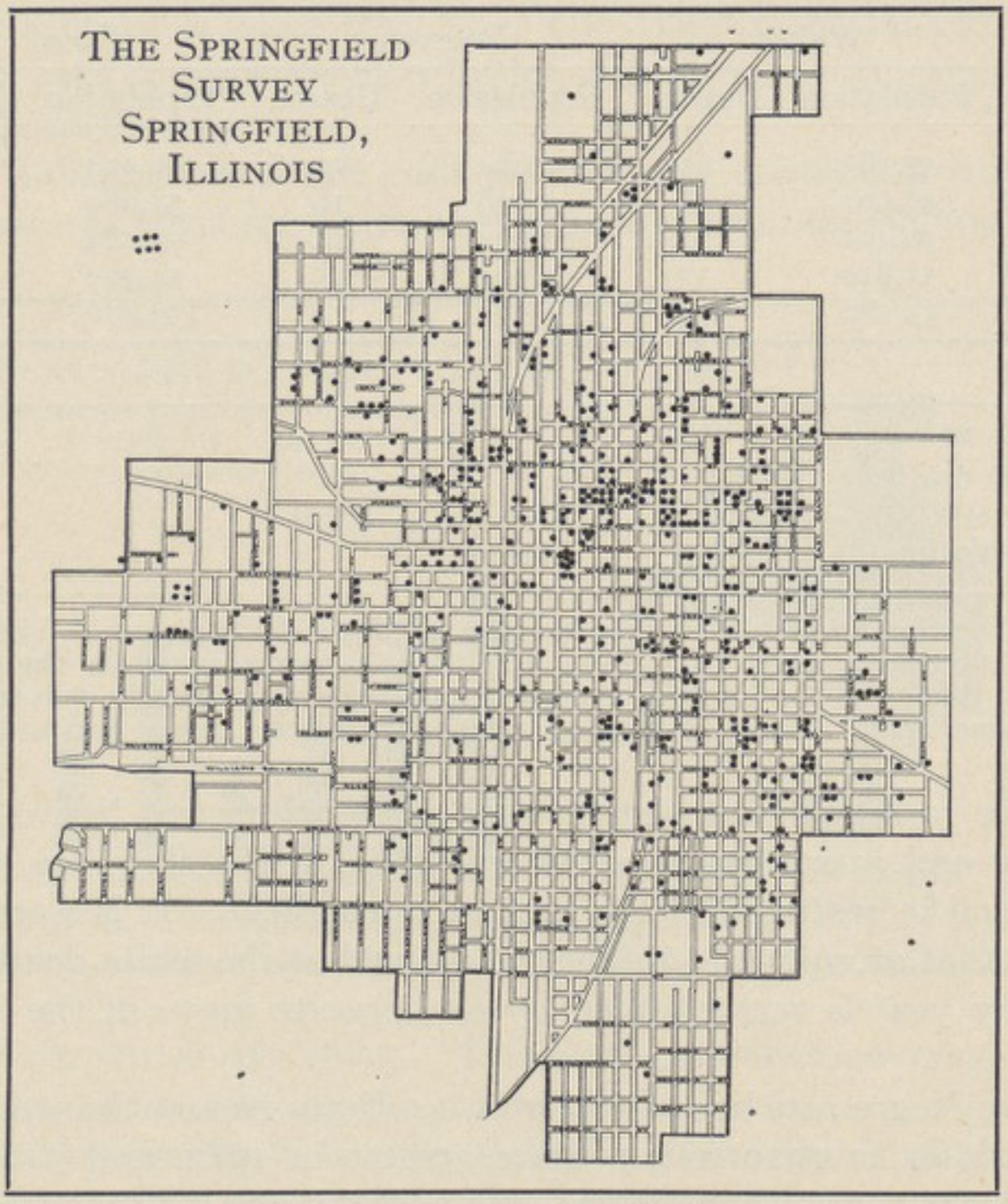
[a] The title "tuberculosis" here includes all forms of the disease. The population figures for 1910, 1911, 1912, and 1913 are as estimated by the United States Bureau of the Census; those for 1909 were computed by deducting on the same basis. The total population includes a few Chinese and Indians.

The variation from year to year of the white and Negro death rates, and in consequence the variation in the city rate, is not unusual in restricted areas such as Springfield. It is worthy of note that an upward or downward trend of the white death rate in any year is accompanied by an opposite move of the Negro rate.

The Negro rate has varied from 1.9 times greater than the rate for whites in 1910 to 4.7 times greater in 1912, and 5.8 times greater in 1909. For the five-year period it was 3.4 times greater. The Negro rate, which is much higher throughout the country than the rate for whites, is generally explained by the personal habits and insanitary manner of living of the Negro. He presents an acute problem which is accentuated by the possibility of his spreading the disease to persons other than of his own race.

Having considered the number of deaths caused by this preventable disease, the question naturally arises as to the probable number of living cases. No attempt is made to detail the misery

and suffering accompanying these cases, the poverty which often results where the breadwinner is incapacitated, and the large number of children, one or both of whose parents have died of tuberculosis, forced into orphan asylums.



DEATHS FROM TUBERCULOSIS, SPRINGFIELD, 1908–1913

Tuberculosis has killed 490 Springfield residents in the last six years. It is one of the most important of the preventable diseases but receives little or no attention from the health department

The number of living cases of tuberculosis in a community may be conservatively estimated at five times the number of deaths from the disease during the previous year. Cleveland, Ohio, and sections of New York state have proved this estimate none too high. Using the average number of Springfield deaths for

the last five years (69 whites and 14 Negroes) there are probably at least 345 white and 70 Negro living cases in the city continuously,—approximately 415 in all.

The application of this estimate to Springfield is warranted by facts obtained from the local physicians. Letters were sent to the physicians asking the number of tuberculosis cases under their supervision at present and during 1913. Replies were received from about three-fourths of those addressed, the results of the inquiry appearing in Table 15.

TABLE 15.—TUBERCULOSIS CASES TREATED BY 49 SPRINGFIELD PHYSICIANS, MAY, 1914

	Incipient cases	Advanced cases	Total
Under treatment "at present"	117	111	228
Under treatment "during 1913"	300	246	546

These figures do not include cases under the care of physicians not reporting, those persons who have no physician, and the probably very considerable number of incipient and moderately advanced cases who are unaware that they are afflicted. On the other hand, it is probable that some of the cases reported in the lower line of the table changed physicians during the year and consequently were reported more than once, and again both lists probably contain a negligible number of non-resident cases.

Further light is shed on the matter by the figures of sputum examinations made for the city and county physicians by the state board of health during the past four years. The figures are especially interesting because of the comment made on them by Dr. G. F. Sorgatz, state bacteriologist. They do not give an accurate idea of the prevalence of the disease, as some doctors make their own sputum examinations, and many cases do not need this diagnosis. And again, a negative sputum test is not proof of the absence of the disease.

During the four-year period, 1910–1913, 61 city physicians submitted 1,105 specimens for examination, of which 284 were positive and 821 negative; and 24 county physicians submitted

147 specimens, of which 27 were positive and 120 negative; making a total of 85 different physicians submitting 1,252 specimens, of which 311 were positive and 941 negative; that is, 311 specimens were found to contain the tubercle bacillus.

TABLE 16.—RESULTS OF SPUTUM EXAMINATIONS MADE IN THE BACTERIOLOGICAL LABORATORY OF THE ILLINOIS STATE BOARD OF HEALTH, DURING 1910–1913

		Specimens submitted by 61 Springfield physicians	Specimens submitted by 24 Sangamon County physicians	Total
1910	Positive	47	9	56
	Negative	162	39	201
1911	Positive	85	7	92
	Negative	223	34	257
1912	Positive	92	9	101
	Negative	242	16	258
1913	Positive	60	2	62
	Negative	194	31	225
For four years	Positive	284	27	311
	Negative	821	120	941
	Total	1,105	147	1,252

Dr. G. F. Sorgatz, who prepared the above figures, makes the following comment on them:

"Examination of this report shows that there were not as many specimens examined in the year 1913 as in the previous years. It will also be noted that the percentage of specimens with positive findings is less in 1913 than in any of the other years reported. These findings are similar to those of the specimens from the entire State of Illinois.

"The reason for this is explained by an examination of the case histories received with specimens. These histories show that the percentage of sputa from early cases, or from cases in which no diagnosis has been made, is increasing until it has become rather infrequent to receive a specimen from a case of more than a year's duration.

"The specimens themselves show that a change has taken place. A few years ago, it was not at all uncommon to find a sputum that contained from a hundred to a thousand tubercle bacilli in each microscopic field. Within

the past year, such a specimen has not been seen more than two or three times.

"These facts, together with personal observation of the handling of suspected cases, lead me to believe that the physicians of this vicinity are making the diagnosis, or attempting to do so in the early cases, and that they are instituting a method of treatment which prevents the early cases from becoming hopeless. That they are making good use of the laboratory of the Illinois State Board of Health is obvious, and we find that most of the physicians are not satisfied with a single negative examination, frequently sending in specimens, at intervals of a few days, until the diagnosis of tuberculosis can be confirmed or with reasonable certainty excluded."

Dr. W. G. Bain has submitted the following figures for sputum examinations made at St. John's Hospital for the two years May, 1912, to May, 1914. The figures differentiate between specimens taken from patients in the hospital and those sent in by outside physicians.

TABLE 17.—RESULTS OF SPUTUM EXAMINATIONS MADE AT ST. JOHN'S HOSPITAL, MAY, 1912, TO MAY, 1914

	Specimens from hospital cases	Specimens from outside cases	Total
Positive	46	19	65
Negative	249	53	302
Total	295	72	367

Even a conservative view of the foregoing facts, including the estimates based on the annual number of deaths, the reports of the physicians, and the sputum examinations, must convince the most skeptical of the wide prevalence of the disease in Springfield and the pressing necessity for controlling measures. It is gratifying to find evidence that diagnosis of the disease in its earlier stages is increasing, as early recognition greatly increases the chance of successful treatment.

2. EXISTING AGENCIES FOR THE CONTROL OF THE DISEASE

But what is being done in the city to check the inroads of this disease, and through what agencies?

A. The City

The municipality of Springfield, upon which rests the responsibility for the control of the disease, practically ignores the problem. The municipality's efforts in this direction may be summarized as follows:

Fumigates (at best of doubtful value) only on request; distributes a limited amount of literature; fails to enforce an anti-spitting ordinance.

B. The Springfield Tuberculosis Association

Fortunately for the citizens of the city, during the past few years the Springfield Tuberculosis Association has been conducting a campaign against the disease, which may be summed up at present as follows:

Maintains one visiting nurse (two in 1912 and part of 1913) who also does general nursing; operates one free dispensary; bears part of the expense of treatment of a few patients at the Open Air Colony; conducts a limited educational campaign.

A recent report of the association says regarding the nursing service:*

> During the year 1913, there were 2,389 calls made by the visiting nurses. Of these, 1,536 were made at the homes of the tuberculous; 734 were made in rendering assistance to those sick of other or general diseases and 119 were special calls made in the interest of patients.

Of the dispensary service the report says:

> During 1913, there have been 135 patients received at the Dispensary and at the present time the average attendance of clinics is about fifteen.

The report of the treasurer of the association, not included in the published annual report, for the calendar year 1913 shows that the total receipts from the sale of Red Cross seals, memberships, and so forth, amounted to $3,714.43. These funds were expended as follows: Nursing, $1,127.50; patients at Colony (from July 1), $1,149.20; patients at lodging houses, $411.35;

* From a report of the work of the Springfield Tuberculosis Association for the year 1913.

miscellaneous items, including rent, stenographer, and incidentals, $1,015.51; leaving cash balance of $10.87.

From July 1, 1913, to July 1, 1914, the association expended $2,108.55 in part payment for the care of 18 patients at the Open Air Colony and the county contributed the balance. Each patient was cared for on an average of fourteen weeks at an average cost to the association of about $8.40 per week.

The work of the association has reached the point where the policy of caring for a few patients at considerable cost might well be modified. It is a sound and well recognized principle of the tuberculosis campaign that the small sums which are raised by anti-tuberculosis societies may be spent to the best advantage in ways which will lead to more permanent and general relief of the situation by public authorities.

While the tendency to spend small sums for the immediate relief of a few patients in an institution is perhaps natural, a more farsighted policy would devote at least a part of this money to a campaign to secure from the city and county appropriations to build and maintain a permanent public tuberculosis hospital, to a thorough campaign of education, and to the immediate care of a greater number by means of increased nursing service and open-air schools.

The number of new cases received at the dispensary and those called on by the nurse; how these cases were discovered; the number of deaths and apparent cures; something of the home conditions of the patients; reference to the Negroes; together with a complete financial statement, are not included in the association's 1913 report, though they may normally be expected to appear in the report of an organization of this character.

C. Hospitals

The two general hospitals in Springfield are averse to accepting tuberculosis patients, according to the general custom of similar hospitals which have no special provision for them. The Springfield Hospital can not be criticised for strict adherence to this policy, but on the other hand St. John's Hospital deserves a word of praise for its liberal policy of accepting a number of these cases in the past.

The Open Air Colony, a private sanatorium of 24 beds for incipient cases, has cared for a few of the city's needy cases, the county and the Springfield Tuberculosis Association sharing the expense. The county almshouse has no adequate provision for the tuberculosis inmates, but it is understood that an appropriation has been made for a special pavilion which should be completed at once.

At the present time there is no public institution where the citizens of the city of Springfield and the county of Sangamon afflicted with tuberculosis may receive care and treatment. Such an institution with special provision for children is not only desirable but necessary.

D. Springfield's Physicians

The physicians of the city are showing an increasing and commendable disposition to co-operate in the campaign against tuberculosis, which is necessary for its success.

3. SUGGESTIONS FOR AN ADEQUATE CAMPAIGN

What more can be done to prevent this preventable disease?

The measures recommended in the following program for eliminating tuberculosis in Springfield have received general approval throughout the country. Some of them are already partly in force in the city.

A. An adequate campaign of education.
B. Institutional provision for adults and children.
C. Free dispensary service.
D. Adequate nursing service.
E. Reporting of cases and disinfection of premises.
F. Open-air schools.
G. Partial Reorganization of the Springfield Tuberculosis Association.

In general, every living case should be known to the health authorities and under proper supervision either in an institution or at home. Bovine tuberculosis undoubtedly has some influence on the prevalence of the disease, especially among children, which makes a strong argument for the improvement of the milk supply

and for pasteurization—measures which are discussed in the milk section of the present public health survey. For the safety of children in particular, milk should either come from cows demonstrated to be free from tuberculosis or should be pasteurized.

Bearing in mind that prevention of the disease should claim precedence over cure, let us take up in detail the measures outlined above.

A. An Adequate Campaign of Education

As education must of necessity mark not only the beginning but the progress of the campaign against tuberculosis, some educational methods are outlined.

The entire school population should be reached about once every two years through lectures, preferably by a nurse and in connection with a small exhibit which may be secured at a reasonable cost. The board of education might well adopt the plan followed in an increasing number of cities of making instruction concerning tuberculosis part of the regular curriculum.

Meetings of women's clubs, labor, fraternal, social and other organizations, and gatherings of all kinds offer opportunities for short talks.

Sunday night stereopticon lectures in the churches would reach effectively a large number of people. In this connection the special celebration of Tuberculosis Sunday is urged.

There are several good motion-picture reels on tuberculosis and other health subjects which may be shown in the motion-picture houses either at special performances or on the regular bill and preferably with a lecturer to explain the details of the story. Most of these reels can be secured through the regular exchanges at no additional cost to the motion-picture houses.

Local physicians should be invited to assist in giving the repeated talks which are necessary to the campaign.

Literature of a substantial and easily read nature should be distributed at the various lectures given. Pamphlets printed in large type with numerous illustrations are most effective, while cheap literature is a waste of money.

The Red Cross seal campaign offers unlimited opportunities

for the dissemination of information concerning tuberculosis and the campaign for its control.

An adequate educational campaign should include exposure of alleged "cures" for tuberculosis, of which "Nature's Creation,"* widely exploited in Springfield, may be taken as an example. It cannot be stated too emphatically that medicine in bottles will not cure tuberculosis. Fresh air, good food, and plenty of rest under proper supervision is the only remedy known.

B. Institutional Provision

The hospital is designed to prevent infection as well as to cure. Besides receiving expert care and treatment, the patient is taught the danger of spreading the disease and the precautions necessary to prevent his infecting those with whom he comes in contact.

A hospital for patients from the entire county is to be preferred to one that would accept patients only from the city. All patients should be received and treated on an equal basis, each patient paying in whole or in part for his treatment or not at all, according to his ability. It must be kept in mind that the hospital should furnish care and treatment for the sick of a character which will attract and hold them. Any discrimination or lack of reasonable provision for comfort which would tend to prevent full use of the institution by those afflicted must be studiously avoided. Again, it should be remembered that those patients who voluntarily isolate themselves in an institution and thereby decrease the chance of spreading infection, perform a service to

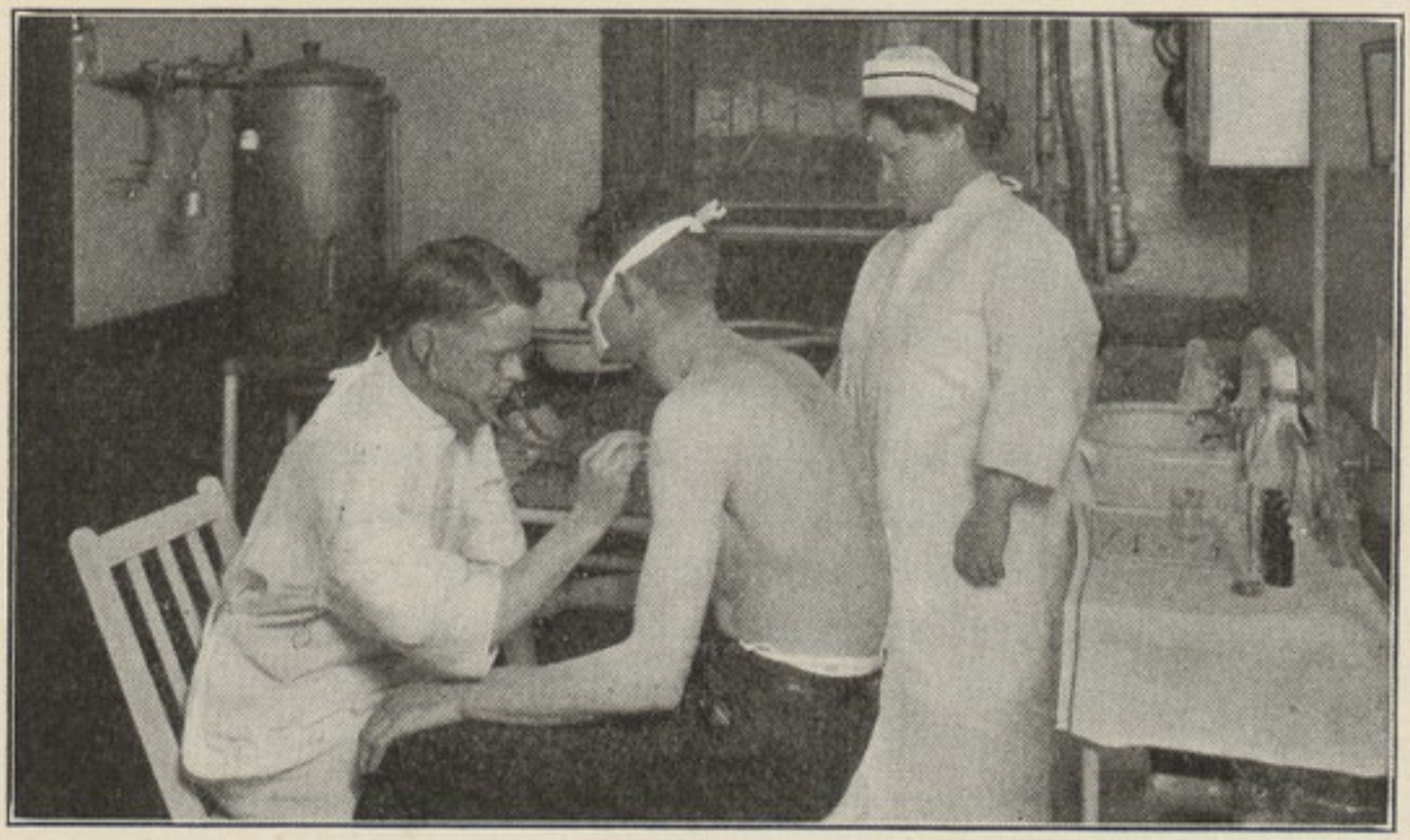
* In a pamphlet entitled Consumption Cure Fakes, reprinted from the *Journal of the American Medical Association*, February 4, 1911, this fraudulent "cure" is exposed at some length. Concerning testimonials the pamphlet says:

"No 'consumption cure' is complete without its testimonials. The worthlessness of such testimony, from a scientific standpoint, has repeatedly been shown, and this, too, without assuming that the letters are fraudulent. That many of the letters published by fake medical concerns are documentarily genuine there is no doubt; that is to say, the letters were actually written. How valueless they are is made evident by looking into the cases of the individuals giving them. On investigating 'consumption cure' testimonials, one of two things is practically always found: Either the writer of the testimonial did not have tuberculosis and recovered from his indisposition in spite of the nostrum, rather than because of it; or, the poor victim, in the first flush of optimism that comes whenever a new remedy is tried, deluded himself into believing that the stuff actually helped him."

the public which is no less than the benefit rendered to the patient by the public in caring for him.

A campaign to secure such a hospital, to be maintained by public funds, is the urgent need of the present situation and should be undertaken without delay.

An institution of 100 beds, with additional provision for children, is necessary to meet the needs of the county. It would cost from $750 to $1,000 a bed for site, building, and equipment, depending largely on the cost of the site. Preferably this should be at the center of population and near transportation facilities. The cost of maintenance would run in the neighborhood of $1.35 to $1.50 per day per patient.



THE TUBERCULOSIS ASSOCIATION DISPENSARY

The Springfield Tuberculosis Association now maintains a dispensary and visiting nurse. This is work of the right type, but to adequately meet the city's problem it should be considerably extended and should be re-enforced by a county sanatorium. The city health department should be built up so that it could take charge of the anti-tuberculosis campaign

C. FREE DISPENSARY SERVICE

One important step toward the control of tuberculosis is the discovery of patients before they have advanced too far for probable recovery, or recovery possible at anything short of great expense. One of the functions of the dispensary is to meet this

need. The usefulness of the dispensary might be increased by urging people, through the educational campaign and the visiting nurses, to voluntarily come for examination at the slightest symptom of the disease and at intervals when no striking symptoms are present.

The physician in charge of the dispensary should receive compensation for his services. The city might assume this expense at once as well as that for additional nurses.

Complete medical and social information concerning all patients who visit the dispensary or who are visited in their homes by the nurses must be obtained and fully recorded. This is essential to a first class service.

D. Adequate Nursing Service

The visiting nurse must be depended on to visit the afflicted in the home, follow up discharged institutional patients, and bring suspected cases to the dispensary for examination.

An increase of the nursing service is undoubtedly necessary in view of the lack of hospital facilities, and especially if the suggestion is adopted of broadening the field of the Springfield Tuberculosis Association's work to include the entire county. A supervising nurse could look after the details of administration; namely, arrange for the lectures previously mentioned, give some of them herself, and secure lecturers for the balance; take care of the correspondence of the association; assist in the membership campaign and the sale of Christmas seals; co-operate with the various sub-committees; supervise the work of the other nurses; and devote any balance of time to actual nursing. The other nurses would devote their entire time to the visitation of the sick in their homes. While no definite estimate may be made of the number of nurses needed, it can be safely stated that at least two assistant nurses for the city and one for the county outside the city are required to meet the need at the present time.

E. Reporting of Cases and Disinfection of Premises

In order that all patients may receive proper care and necessary preventive measures be taken, all living cases must be known to the health authorities. Physicians should report not

only the living cases but the recovery, death, or change of residence of any patient. When reporting a case the physician should state whether or not he is willing and able to give the patient the necessary care and instruction, and whether or not he wishes a nurse to assist him by visits to the home under his direction.

Surface disinfection with suitable liquids, and at times thorough cleansing, after the death or removal of a patient, is obviously necessary to prevent the spread of infection.

The least the municipality can do at the present time is to pass ordinances requiring the reporting of all cases of tuberculosis to the health department; requiring the disinfection, and when necessary the thorough cleansing, of all premises after the death or removal of a patient; and abolishing the common drinking cup and towel. It must also enforce the anti-spitting ordinance.

The attitude of the physicians of the city toward the first two of these recommendations is sufficient comment upon their desirability. The physicians were asked for their opinions as to the desirability of regulations requiring the reporting of cases of tuberculosis, and of disinfection of the premises after the death or removal of a patient. Forty-eight physicians replied.

To the question of whether there should be an ordinance requiring the reporting of cases of tuberculosis, the replies were as follows: Yes, 40; no, 4; for advanced cases only, 2; undecided, 2; total, 48.

Answers to the question whether there should be an ordinance requiring the disinfection of premises after the death or removal of a patient were as follows: Yes, 45; no, 3; total, 48.

F. Open-air Schools

Among the most encouraging features of the campaign against tuberculosis are the results obtained in open-air schools and fresh-air classes for tuberculous, predisposed, and physically subnormal children. Of the necessity for these measures in Springfield there can be no doubt.

Open-air classes may be conducted either with or without feeding, but experience has demonstrated that with feeding the children respond more readily. The board of education ordi-

narily supplies the teachers and paraphernalia for these schools and classes, and if possible the food, special clothing, and carfare for children who live at a considerable distance. These latter three items may have to be supplied by some other city department or by the Springfield Tuberculosis Association.

With the permission of the superintendent of schools an examination was made of children in the Palmer public school with special reference to glands, tonsils, adenoids, anemia, and suspicion of tuberculosis. Dr. George T. Palmer, who made the examination, reports as follows:

The Palmer School cannot be regarded as representative of the schools of Springfield. To a greater extent than any other, its student body is made up of foreigners and Negroes, and home conditions are not up to the general average. However, prosperity and even luxury of surroundings do not immunize children to the common physical defects, nor do they ensure sane and hygienic living. Tuberculosis is in no sense a disease of the poor, although it is a most potent poverty producer. Hence, while the findings in this study cannot be taken as an absolute index, they probably give a fair idea of conditions to be found among the children of Springfield.

To ascertain that a large percentage of the 456 children in the Palmer School were physically below par, and to classify the physical defects found by inspection, was in no sense difficult. To determine the extent of tuberculosis infection, however, was another and a different thing. The diagnosis of the disease in its incipient stages, always a delicate matter, is especially difficult among children. And in the present instance this difficulty was compounded because, to avoid any possible criticism, the useful tuberculin test was not applied nor was even an attempt made at a complete physical examination of the children.

The diagnosis of tuberculosis referred to in this report must therefore be regarded as merely a matter of diagnostic opinion based upon general physical conditions and comparatively fragmentary history. However, we are coming more and more to recognize that tuberculous infection among children is exceedingly common. Some authorities have gone so far as to hold that primary tuberculous infection almost invariably takes place before the sixth year of life and that later disease is due to the lighting up of this dormant child infection. It should also be borne in mind that the common conception that tuberculosis is always an acute and virulent disease is entirely erroneous. Many cases are never recognized and others doubtless manifest themselves only in enfeebled general health.

In the actual inspection a visit was made to each room in the school and the children who appeared below par were selected for more detailed examination.* To these were added all those among whom the school nurse had observed physical defects in her routine work. It is quite certain that in such a casual inspection many were omitted who possessed definite ailments and defects. However, the process adopted brought 182 of the 456 pupils to the examining room in the school.

As a means of rapid classification, the general nutrition was graded into three groups indicated by the numerals "1," "2," and "3," and a similar grading was employed for the general condition as determined by the history and physical examination. In this grouping, the class described "Nutrition 1; General Condition 1" included the best physical types, while "Nutrition 3; General Condition 3" would indicate the poorest. By this plan, the children were classified into nine different groups, as follows:

Nutrition 1; General Condition 1	25
Nutrition 1; General Condition 2	37
Nutrition 1; General Condition 3	8
Nutrition 2; General Condition 1	20
Nutrition 2; General Condition 2	48
Nutrition 2; General Condition 3	10
Nutrition 3; General Condition 1	1
Nutrition 3; General Condition 2	12
Nutrition 3; General Condition 3	21
Total	182

A relatively complete history of the immediate family was obtained by the nurses and this, with a record of the recent illnesses of the individual, were of assistance in reaching the tentative diagnoses of tuberculosis.

It is my conviction that all of the children rated below as suspected tuberculous cases would respond to the accepted tests for the disease, and I am under the impression that many others whose general condition and history would not warrant a tentative diagnosis, would give ready response to the von Pirquet test, which, in those of the lower grades at least, may be accepted as reasonably definite evidence of infection.

It will be borne in mind, of course, that all of these children had been selected as apparently below grade and that even the best were not normal.

* The inspection was carried on with the assistance of Mary J. Heitman, the school nurse employed by the board of education, Mrs. Eleanor Vining, supervising nurse of the Springfield Tuberculosis Association, and several volunteer workers of the Springfield Survey.

The following suggestive physical conditions were brought out in this examination of 182 children:

Enlarged tonsils	141
Adenoids	91
Enlarged cervical glands	140
Enlarged sub-maxillary glands	122
Apparent anemia*	139
Discharging ears (history or present)	43
Elevated temperature (above one degree)	63
Suspected tuberculosis	27

To those who hold the popular conception of tuberculosis and in whose minds the disease exists only as a devastating and virulent disease, the statement that 27 of the 456 children in this one Springfield school are probably tuberculous will come as a distinct shock. If, on the other hand, we accept the doctrine that 90 per cent of all persons acquire tuberculous infection, and that infection usually takes place in childhood, and then recall that one death in every eight is due to tuberculosis, we see that there is nothing sensational or improbable in the estimate. Those who recognize the decided tendency of tuberculosis to spontaneous recovery will, I believe, accept these figures as extremely conservative.

The following table shows the number of pupils in each grade, the number selected from each grade as presumably below par, and the condition found upon examination.

Grades	1	2	3	4	5	6	7	8	Total
Number of pupils	83	74	87	46	75	39	33	19	456
Number examined	26	20	41	21	35	16	15	8	182
Enlarged tonsils	22	15	32	14	27	14	11	6	141
Adenoids	13	11	23	9	15	10	7	3	91
Enlarged cervical glands	25	17	36	17	28	6	8	3	140
Enlarged sub-maxillary glands	18	7	23	11	28	16	14	5	122
Apparent anemia	24	17	32	12	28	11	11	4	139
Discharging ears	9	9	12	4	6	..	2	1	43
Elevated temperature	9	7	21	4	11	4	5	2	63
Suspected tuberculosis	9	3	7	2	3	..	2	1	27

That many of these children will "outgrow" their defects is, of course, certain. That others will never be seriously handicapped by them is like-

* As the examination did not go beyond the general inspection of the child, the examination of the throat, and the taking of pulse and temperature, the presence of anemia could not be verified, and its existence was deduced by the general appearance and that of the conjunctivæ and mucous membranes.

wise certain. There can be no question, however, but that some will show the results of the neglect of these ailments in physical and intellectual deficiency and perhaps in serious, prolonged illness and premature death.

There are two main conclusions to be drawn from this little study: First, the need for discovering the physical defects in our school children; second, the need for remedial measures. The first may be met by the thorough medical inspection of all school children. A factor in meeting the second would be fresh-air classes and open-air schools for the anemic and those predisposed to or suspected of tuberculosis.

G. Partial Reorganization of the Springfield Tuberculosis Association

As prospects point to the immediate burden of the campaign against tuberculosis in Springfield falling upon the Springfield Tuberculosis Association, a partial reorganization of this body is suggested.

The county, including both urban and rural population, is generally considered a more desirable unit for activity. Consequently a first and most commendable step on the part of the association would be to broaden its field of activities to include the entire county of Sangamon.

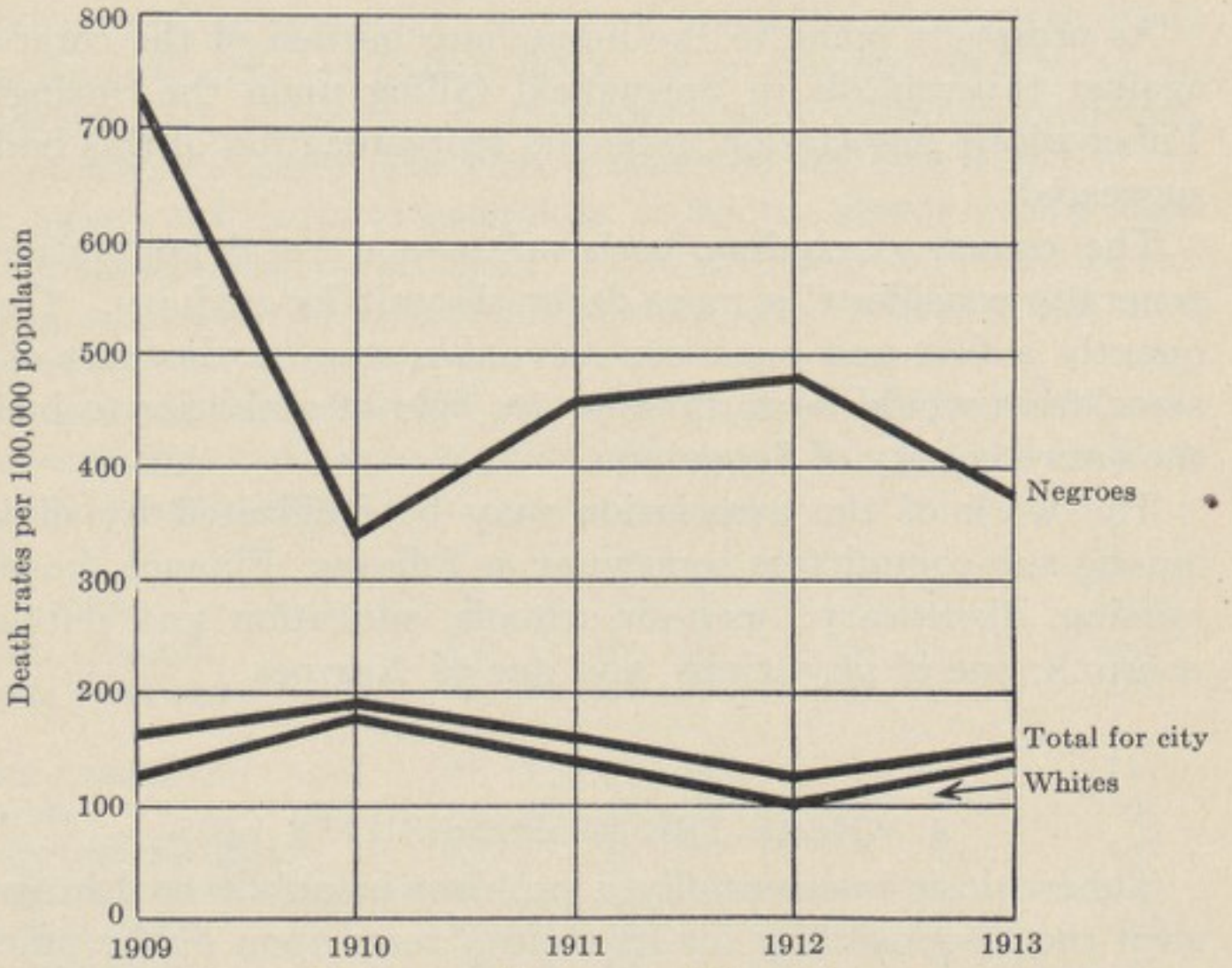
The work of the association may be facilitated by division among sub-committees somewhat as follows: Finance, hospital, nursing, dispensary, open-air schools, education and publicity, research, one of physicians, and one of Negroes.

4. WHERE THE RESPONSIBILITY LIES

Tuberculosis is essentially a problem in public health and as such the responsibility for its control rests upon public officials. Hospitals, nurses, dispensaries, and other institutions for its suppression should be supported by public funds. There can be no permanent evasion of the responsibility, as tuberculosis is a preventable disease and must be stamped out. The question facing each community, therefore, is how soon it will take proper measures to achieve this end. The effective carrying on of this work by the public points to the necessity for a full-time paid health officer.

A tuberculosis association with proper ideals will endeavor as rapidly as possible to place the responsibility where it belongs.

State appropriations in sufficient amount to furnish adequate provision for even the incipient cases can hardly be expected, and still less can we hope for adequate state provision for the advanced cases which more particularly need institutional care and treatment. Local hospitals for advanced cases, near centers of population and which are within easy reach of patients and their families, seem to be the most desirable. Theory points to the advisability of these local hospitals, and experience is tending to indicate that they are the most practical in handling the situation.



TUBERCULOSIS DEATH RATES BY COLOR AND YEAR, SPRINGFIELD, 1909–1913
Residents only

CONCLUSION

The foregoing suggestions are in no wise radical or experimental, but represent the best practice as developed so far in this country. The question of the expense involved must be settled on the basis of dollars versus human lives.

Tuberculosis is preventable, and curable especially in its early stages. These facts cannot be questioned. If true, why does Springfield permit the disease to persist and destroy so many of its people? In other words, why is this preventable disease not prevented? A decided beginning toward this prevention has been made in the city. It remains to broaden and intensify the work.

VI

TYPHOID FEVER

Typhoid fever is one of the best understood and most preventable of the communicable diseases. Caused by a specific microbe, which dies rapidly outside the body of its victim, the disease may be eliminated by simply keeping the bowel and bladder discharges of infected persons from entering the mouths of other persons. This would certainly seem a fairly simple undertaking; and it has been well said that the disease is preeminently one of defective sanitation and that its presence is a civic disgrace.

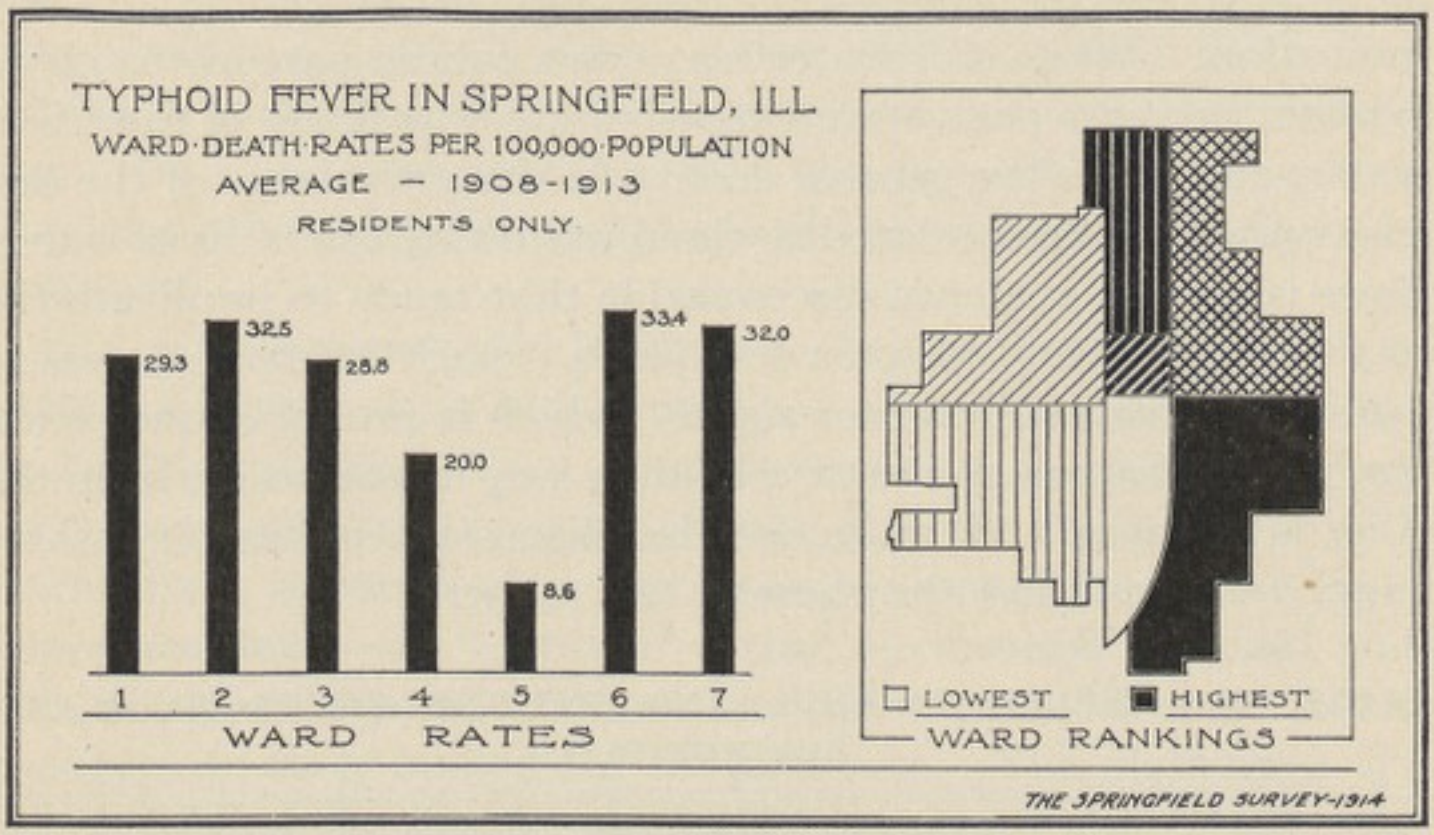
Springfield has suffered severely from typhoid in the past, even as compared with other American cities, which are in this respect notoriously worse than those of Europe. Thus in 1907 Springfield's rate of mortality was, according to the health department reports, 81.7 per 100,000 population, an exceedingly high rate; and in 1910, taking only deaths of residents, the rate reached 40.4. In the last six years, 84 of the city's residents have been killed by typhoid, and probably several hundred more have been made ill. The situation has shown a tendency to improve during this period, both as to prevalence and case fatality, the latter of which is in this instance probably a rather accurate criterion of completeness of reporting. But the city has no cause to be satisfied with the present situation, or with any other short of practical eradication.

TABLE 18.—DEATH AND FATALITY RATES, TYPHOID FEVER, SPRINGFIELD, 1908–1913 (RESIDENTS ONLY)

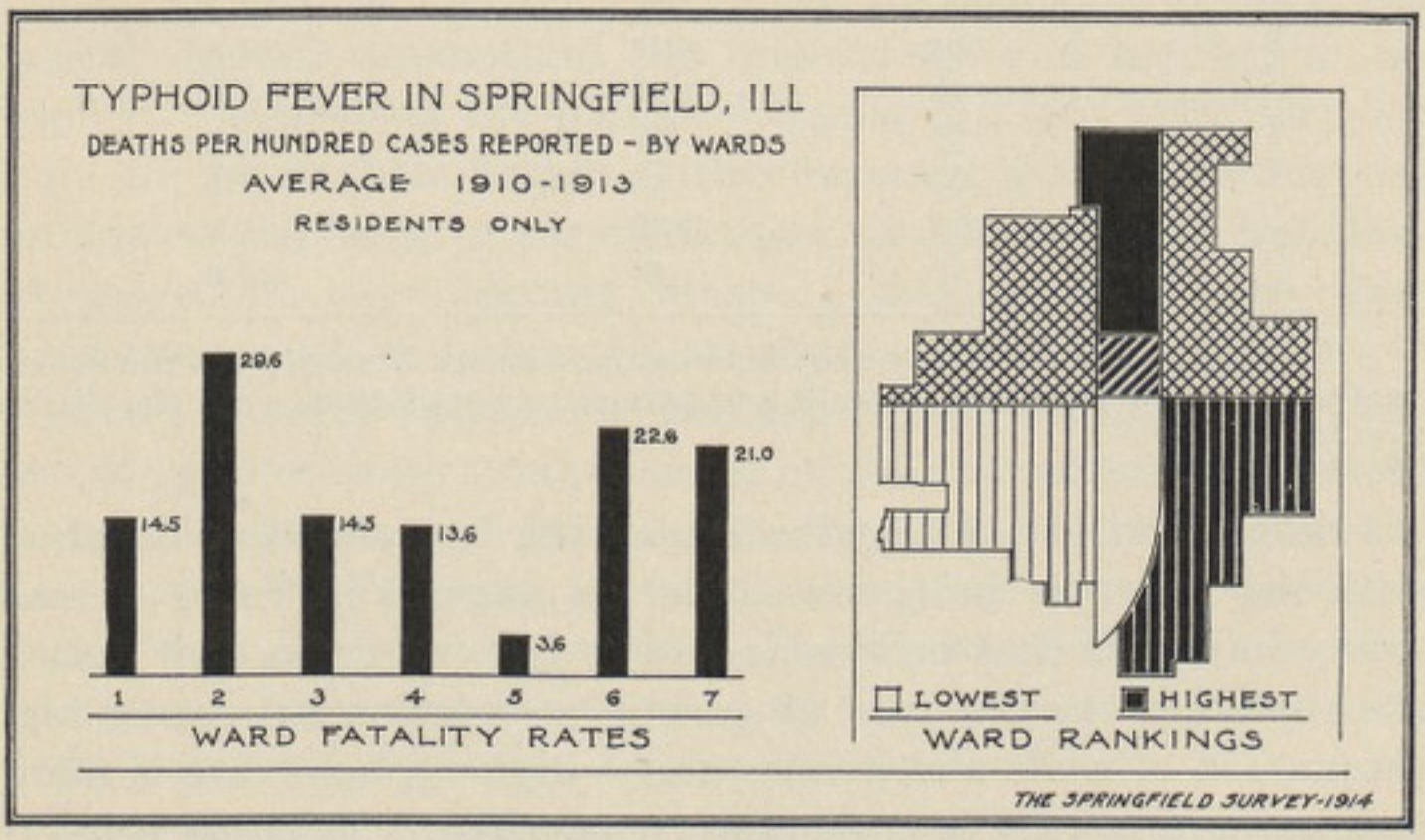
Year	Deaths per 100,000 population	Deaths per 100 cases reported
1908	32.7	..[a]
1909	29.7	..[a]
1910	40.4	21.4
1911	18.7	19.2
1912	21.8	15.0
1913	17.7	11.2

[a] Information not available.

The distribution of the disease throughout the city, which is indicated by the accompanying death rate chart, is of consider-



able significance with regard to the manner in which the disease is spread and the measures that should be adopted for its control. Evidently the east side has fared badly again, but so has the



whole city with the exception of the fourth and fifth wards, and the fourth ward's record is none too good. Such a general distribution would suggest suspicion of the city water supply were

it not that wards four and five, which are the most completely supplied with city water, make the best showings, and that the facts as to the distribution of wells and privies give a contrary indication. While city water may have caused part of the city's typhoid in years past when extensive use was made of raw river water, and while the general decline in the prevalence of the disease may have been related to the diminishing use of river water, there is no real evidence discoverable that tends to implicate the city supply during the past few years. Such evidence as exists exonerates the public water supply, which is probably one of the city's best weapons against typhoid, as long as the intake from the river is not used. A more detailed discussion of the city water supply will be found elsewhere in this report.*

TABLE 19.—WELLS, PRIVIES, AND TYPHOID FEVER BY WARD, SPRINGFIELD

Ward	Wells and privies per 1,000 population, 1914 [a]		Yearly deaths from typhoid per 100,000 population, 1908–13
	Wells	Privies	
1	180	183	29.3
2	103	101	32.5
3	126	128	28.8
4	97	86	20.0
5	67	56	8.6
6	202	206	33.4
7	39	42	32.0

[a] There is reason to believe that little actual change has occurred during the past six years in the ratios of wells and privies to population. See the discussion on page 87.

Comparison of the distribution of the last six years' typhoid with that of wells and privies, such as appears in Table 19, certainly indicates that privies and wells play an important part in the spread of the disease. A general correlation between a high proportion of wells and privies and a high typhoid rate is manifest, a relation that is commonly recognized. Typhoid urine or feces deposited in a common privy are freely accessible to flies, who can carry the infection directly to fresh victims; or the ma-

* See p. 72 ff.

terial may percolate rapidly through the ground and infect wells, thus securing another quick and easy entrance to new mouths. Some 7,000 wells and 7,000 privies standing side by side in an area of eight and a half square miles, with especially thick clusterings in some districts, as in Springfield, is simply bad sanitation. At some time or other infection is certain to be carried from the privies by flies and some of the wells are certain to be polluted.

The general correlation between wells and privies and typhoid is not absolute, as is indicated by a close examination of the Springfield figures. Ward seven, for example, has a high typhoid death rate but the lowest proportion of wells and privies. The truth of the matter is that the disease is spread in another very important way—by "contact"; that is, through personal contact between infected persons and their attendants or others coming into their immediate environment. The discharges of a person having the disease are highly infectious and minute particles from these discharges passing the lips of another person are sufficient to cause the disease. The discharges may be infectious even before the development of marked symptoms and are commonly so during convalescence. If the persons around the patient do not understand the importance and method of efficiently disinfecting the patient's discharges it is very easy for them to infect their fingers, either directly when handling the patient or disposing of his discharges, or indirectly by handling articles which have become infected; and fingers all too often reach the mouth or touch objects that enter the mouth.

In fact, there is a general lack of appreciation of the contagiousness of typhoid fever, and once an initial case occurs in a family or neighborhood it is lamentably common to find secondary cases appearing in about the incubation period of the disease—usually ten days or two weeks. The disease will thus smolder through a neighborhood in a manner less spectacular than that of the "epidemic" but in a way no less deadly.

The reporting of cases in Springfield, unfortunately, has not been complete enough nor has the information elicited been full enough to permit an intensive study of this phase of typhoid transmission. Some significant information is, however, avail-

able, and the data in Table 20, taken almost at random from the case records as reported to the health department, shed light on the subject.

TABLE 20.—EXAMPLES OF RETURN CASES OF TYPHOID FEVER, SPRINGFIELD

Year	Address	Dates of reporting			
		1st case	2d case	3d case	4th–6th cases
1910	208 W. Pine	June 28	July 6	July 27	
	1501 S. College	June 29	July 6		
	200 W. Pine	Aug. 4	Aug. 8		
	545 Elliott	July 27	Aug. 8		
	1124 N. Rutledge	Aug. 1	Aug. 8		
	1709 E. Clay	Aug. 5	Aug. 10		
1912	926 Patton	Aug. 26	Sept. 20	Sept. 20	Sept. 20
1913	900 N. 12th	Aug. ..[a]	Sept. 15		
	1535 E. Capitol	Sept. 25	Oct. 8		
	210 W. Jackson	July 15	Aug. 6[b]		
	216 W. Jackson	Aug. 12	Aug. 12		
	204 W. Jackson	Aug. 22			

[a] Exact date not available.
[b] A child who had stayed at 210 W. Jackson.

It will be noted that the average time between the return cases listed is about two weeks and that in only two instances is the interval less than one week. The West Jackson Street cases illustrate the spread of the disease through a neighborhood. Bearing in mind that no general epidemic was present in the city at any of the times covered by the above list, the suggestion is strong that we are dealing here with secondary cases. And indeed, considering the nature of the disease, the character of the attention it receives from the health department, and the experience of other cities, it would be surprising if secondary infection were not an important contributory factor in the causation of Springfield's typhoid.

The recommendations which may be made for the reduction of the city's typhoid, aside from the elimination of wells and privies and total abstinence from the use of unpurified river water, relate chiefly to administrative measures by the city health

department. In the first place, as in the other communicable diseases, the department should receive a prompt report of every case. Efforts in this direction have already been made by the department and reporting has improved, but up to 1914, when this investigation was made, there was still room for further improvement in parts of the city. The ward differences in case fatality for the six years previous are illustrated in the chart on page 59, and in examining them it should be borne in mind that with complete reporting the fatality seldom exceeds 10 per cent. Good reporting is required by law and is the absolute first essential to effective methods of control. Doctors should not harbor the idea that the case report is simply a matter of record with the department and that it may be sent in late or never; while if the department is alive to its opportunities the doctor will not be able to make such an excuse for delinquency in this duty.

Receipt of a case report by the health department now results in a visit to the patient's home by an inspector who leaves a copy of the state board of health circular regarding the disease and who attempts to learn the source of infection. Instructions are given that the family and milkman shall not take or deliver milk bottles, and that articles shall not be taken from the patient's room during the course of the disease. An attempt is also made to get a history of the case from the attending physician by telephone, usually without much success.

Criticism similar to that made of the procedures employed against the contagious diseases of children can be made of this system of visitation and instruction by untrained inspectors. Efficient bedside disinfection of discharges is the prime point in preventing secondary typhoid and it is doubtful whether the ordinary inspector, no matter how capable he may be in the matter of nuisance abatement or enforcement of the sanitary ordinances, is properly equipped to give instruction in the management of the patient. It is exceedingly doubtful whether the inspectors themselves, without special training, would be considered competent to look after a typhoid patient by the authorities of a first class hospital. Similarly the history taking and study of the origin and relation between cases (epidemiology) is a matter for a person of special training or ability. This work

calls for an understanding of the principles of statistics and the modes of infection such as may not be expected of persons who have not made a special study of such matters. The recommendations for improvement of the health department service are thus much the same as in the case of the contagious diseases of children: better reporting of cases; prompt visitation of cases by a medical inspector or specially trained nurse employed by the health department, with revisitation, or removal of cases if necessary; and more thorough epidemiological work.

In summing up the typhoid fever situation it may be said that Springfield has suffered unduly from the disease, and that although there has been a general improvement in recent years, too much typhoid still occurs. As to causation, the evidence is that since the use of unpurified river water has been abandoned the city water supply has been free from blame. The distribution of the disease throughout the city shows the fourth and fifth wards to a decided advantage, a distribution that corresponds in a general way to that of wells and privies, which assuredly play an important part in keeping up the death rate. Contact infection directly from person to person is, however, probably responsible for much of the trouble, a fact which calls for improved procedures of study and control on the part of the health department. Such improvements require some money and considerable skill, but the results would surely be well worth while, as typhoid killed 84 Springfield residents in the six years studied and is, at the same time, one of the most certainly preventable of the communicable diseases.

VII

THE VENEREAL DISEASES

Springfield's death rate from syphilis in 1913, 23.0 per 100,000, was greater than its death rate from typhoid fever. And this despite the fact that syphilis is seldom certified as a cause of death when any other can be substituted. The truth is that the number of deaths certified under this title is probably far short of the actual number. Similarly, we do not know the actual number of cases of syphilis in Springfield because the disease receives no official cognizance. It is entirely probable, however, that the same number of cases of typhoid fever, or scarlet fever, or diphtheria, would cause great public agitation and an insistent demand for action by the authorities.

Yet syphilis is only one of three communicable venereal diseases, the consequences of which are quite possibly much more important than some of the diseases mentioned and on account of which rigorous measures are commonly taken. This extraordinary and irrational state of affairs is partly due to the fact that those afflicted take pains to conceal these diseases, so that the public gets little idea of their prevalence, and partly to the fact that the public does not realize their contagiousness and their exceedingly serious after-effects.

To get some idea of the actual amount of venereal disease in Springfield, letters were sent to the physicians, requesting a statement of the number of cases under treatment during the past year and at the present time. Replies were received from 49 individuals, or about three-fourths of those addressed, and the results are as tabulated below.

TABLE 21.—CASES OF VENEREAL DISEASE TREATED BY 49 SPRINGFIELD DOCTORS, MAY, 1914

	Syphilis	Chancroid	Gonorrhea	Total
Under treatment "at present"	147	39	160	346
Under treatment "during 1913"	398	212	654	1,264

As this list does not include all cases treated by physicians, nor those treated by "specialists," nor untreated cases, it is evident that there is ample basis for a statement that these are the commonest communicable diseases in the community. An accurate idea of the damage actually done cannot be obtained, partly because of the tendency to certify other causes as responsible for death and partly because a large part of the damage is manifested indirectly.

Thus, syphilis can produce immediate suffering and injury of the most serious character; but it may also run a mild course, or be apparently cured, only to have the victim break down in middle age with paralysis or softening of the brain. A very large proportion of the cases of paresis and locomotor ataxia are caused, according to the best medical opinion, by antecedent syphilis. Similarly, in gonorrhea the local symptoms at the time of the attack may be mild and the patient may apparently make a complete recovery; yet the microbe of the disease can lie dormant in such an individual for years, retaining its power to infect others, who may be wholly innocent of any immorality. It is claimed that a large proportion of surgical operations among women are necessitated by gonococcus infections innocently obtained from their husbands. Gonorrhea seldom kills, but it blinds children and maims women. It is strictly true that the more we know of the venereal diseases the more we have reason to fear them.

The only information regarding these diseases that can be gathered from the local vital statistics relates to syphilis. In the past six years the deaths of 30 residents have been recorded as due to this disease, besides 19 due to locomotor ataxia and paresis. While these figures probably do not represent the situation adequately, it is interesting to note the distribution of the deaths throughout the city, and by age and year. From Table 22 it will be seen that the majority of the deaths have been among infants and that all the wards have had a share of the mortality. A factor in the sixth ward's excess is the presence of the Redemption Home, which receives a number of girls and infants having the disease. The marked increase in deaths during 1913 may be real or due simply to more accurate certification.

TABLE 22.—DEATHS FROM SYPHILIS AS CERTIFIED IN SPRINGFIELD, 1908–1913 (RESIDENTS ONLY)

Deaths by year		Deaths by ward		Deaths by age	
Year	Deaths	Ward	Deaths	Age at death	Deaths
1908	1	1	5	Under 1	18
1909	6	2	1	1 to 2	2
1910	3	3	6	Adults	10
1911	2	4	2		
1912	5	5	3		
1913	13	6	11		
		7	2		
Total	30	Whole city	30	Total	30

Granting the magnitude and importance of the venereal disease problem the question arises as to what can be done. The three diseases are each caused by a specific micro-organism with whose characteristics the bacteriologist is familiar. Given the same privileges as in typhoid, diphtheria, and other infections, the health department could undoubtedly reduce the prevalence of these diseases to a considerable extent. The "conspiracy of silence," however, that is, the unwillingness to speak of these diseases, is a factor that makes the complete reporting of individual cases and the institution of such preventive procedures impracticable. It even hinders the dissemination of educational material, and it is a condition which any plan of campaign must take into account.

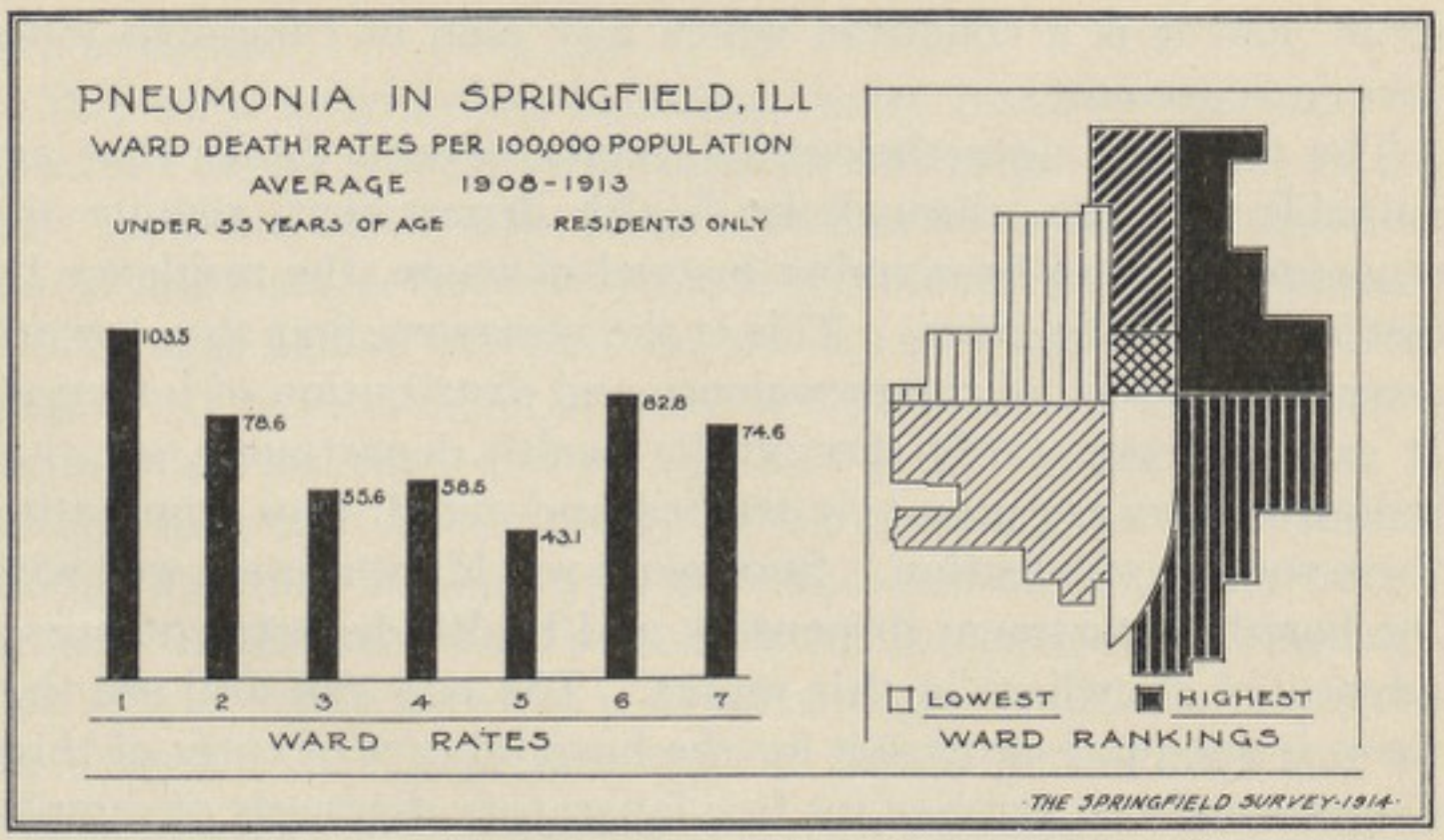
The city can, nevertheless, undertake several things that are valuable. It can, through its health department, require the reporting of cases by number instead of name, the residence by district also to be given. This is the necessary first step toward acquiring an idea of the prevalence and distribution of infection. It can also, preferably through its health department, see that indigent cases are promptly treated and cured, thus eliminating these sources of infection. Such work would coördinate well with the health department dispensary and health department nurses advocated elsewhere in this report. The city can also see that there is adequate provision for the hospital care of cases of these diseases and can arrange for free laboratory diagnosis of samples

of blood and discharges, this service to be offered freely to physicians. Finally the city can, through its health department, educate the public, telling how the diseases are contracted, how avoided and cured, and what precautions should be taken by patients to avoid infecting others.

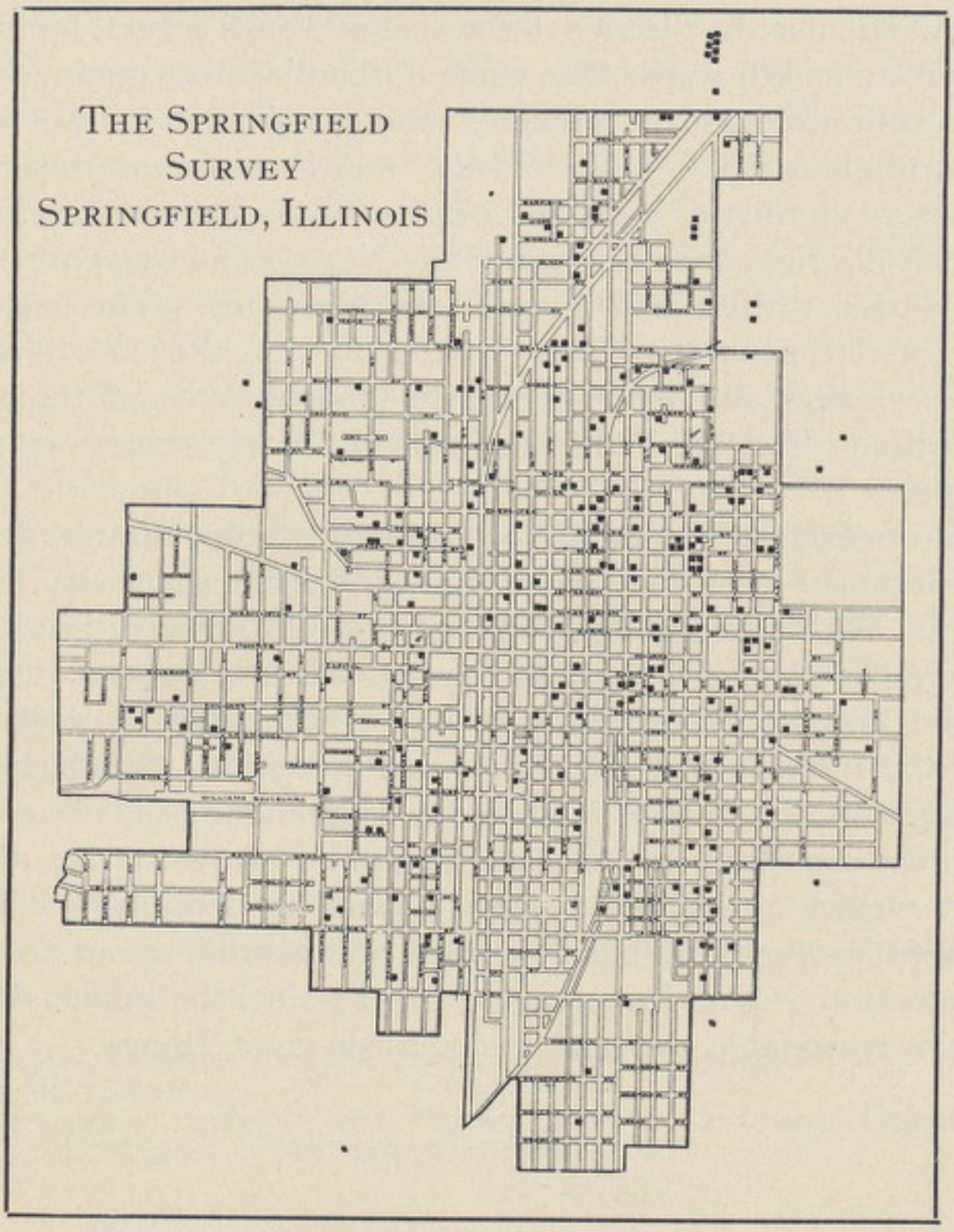
The city can, in other words, make a beginning, and should do so, imitating those procedures which have been instituted by progressive health departments in other cities. The general taboo placed on this subject by society is a heavy handicap to progress, just as was the case at the inception of the tuberculosis movement, but a good deal can be done even in the face of this handicap, while efforts meanwhile should be made to remove its most unreasonable aspects. Certainly the venereal diseases are of vast importance in the community and certainly a start should be made on their prevention.

SUMMARY OF THE PREVENTABLE DISEASE SITUATION IN SPRINGFIELD

Enough has been said to show what a very serious life and health wastage is constantly going on in Springfield,—to be explicit in a conservative way, something like the loss of 1,218 lives and a much greater number of cases of non-fatal illness in the last six years. The diseases most active in this telling ravage



are tuberculosis, those of infants—especially diarrhea and enteritis, the venereal diseases, the contagious diseases of children, and typhoid fever. Other preventable infections occur, but their



PNEUMONIA IN SPRINGFIELD

Deaths of residents under fifty-five years of age, 1908–1913. Pneumonia is another one of the important infectious diseases, and study of it by the health department, especially as related to the deaths it causes among infants, would probably be well repaid

extent is relatively small and they will be controlled in much the same manner and by the same administrative machinery as those specifically mentioned.

The variation in the amounts of preventable sickness and death in different parts of the city is of interest as re-emphasizing the preventability of the diseases and indicating the localities that call for special activity by the health department. In almost every particular the district to the east of Tenth Street, including the first and sixth wards, has come off badly in the comparisons. Here occur excesses of typhoid, tuberculosis, infant mortality, and contagious diseases of children; and here also are relatively the largest number of wells and privies. It is likewise significant that this district contains most of the Negroes, a large part of the foreign-born whites, and most of the illiterates. The east side is also, with the more northerly part of the city, the place of abode of the younger and more distinctly laboring part of the city's population. The public health problem clearly centers in these districts.

The underlying causes of the excesses of preventable disease are ignorance, insanitary conditions, and inadequate city health service. Although the detailed discussion of sanitary conditions in Springfield appears later in this report, it is not out of place to note here the deleterious effects of the existing wells and privies as indicated by the ward vital statistics. Similarly it is evident that the health department equipment needs augmenting, more especially in the form of public health nurses and of expert service as applied to isolation and epidemiology. These two agencies, working hand in hand and extending out to combat infection at that important contact point, the home, should, at very reasonable expense, accomplish great things.

SPRINGFIELD AS A SANITARY ENVIRONMENT

Man's environment may be defined as everything that surrounds him and exerts an influence on him. It thus includes the earth he treads, the air he breathes, the buildings he inhabits, the plants and animals about him, and—the rest of humanity. From the standpoint of infection, and so of public health, it is convenient to emphasize the difference between the human and non-human parts of this environment. On such a basis man's environment has two great components—first, all his fellow men, and second, everything else. This distinction is useful in public health work because while man may contract infection from both these parts of his environment, the modes of transmission and the methods of control are in the two cases materially different.

In discussing infection this report has dealt so far chiefly with the ways in which disease spreads directly from person to person and the ways in which this mode of infection may be combated. Attention will now be given to the principal sanitary influences in Springfield's non-human, or inanimate, environment. This group of influences, to be specific, includes the city water supply, sewer system, milk supply, food supply, wells and privies, and a few others. Two important parts of the sanitary environment, those surrounding children at school and workers in industrial establishments, are not treated in this report, as they are discussed in the sections of the survey dealing specifically with those subjects.*

* Ayres, Leonard P.: The Public Schools of Springfield, Illinois. (The Springfield Survey.)

Odencrantz, Louise C., and Potter, Zenas L.: Industrial Conditions in Springfield, Illinois. (The Springfield Survey.)

VIII

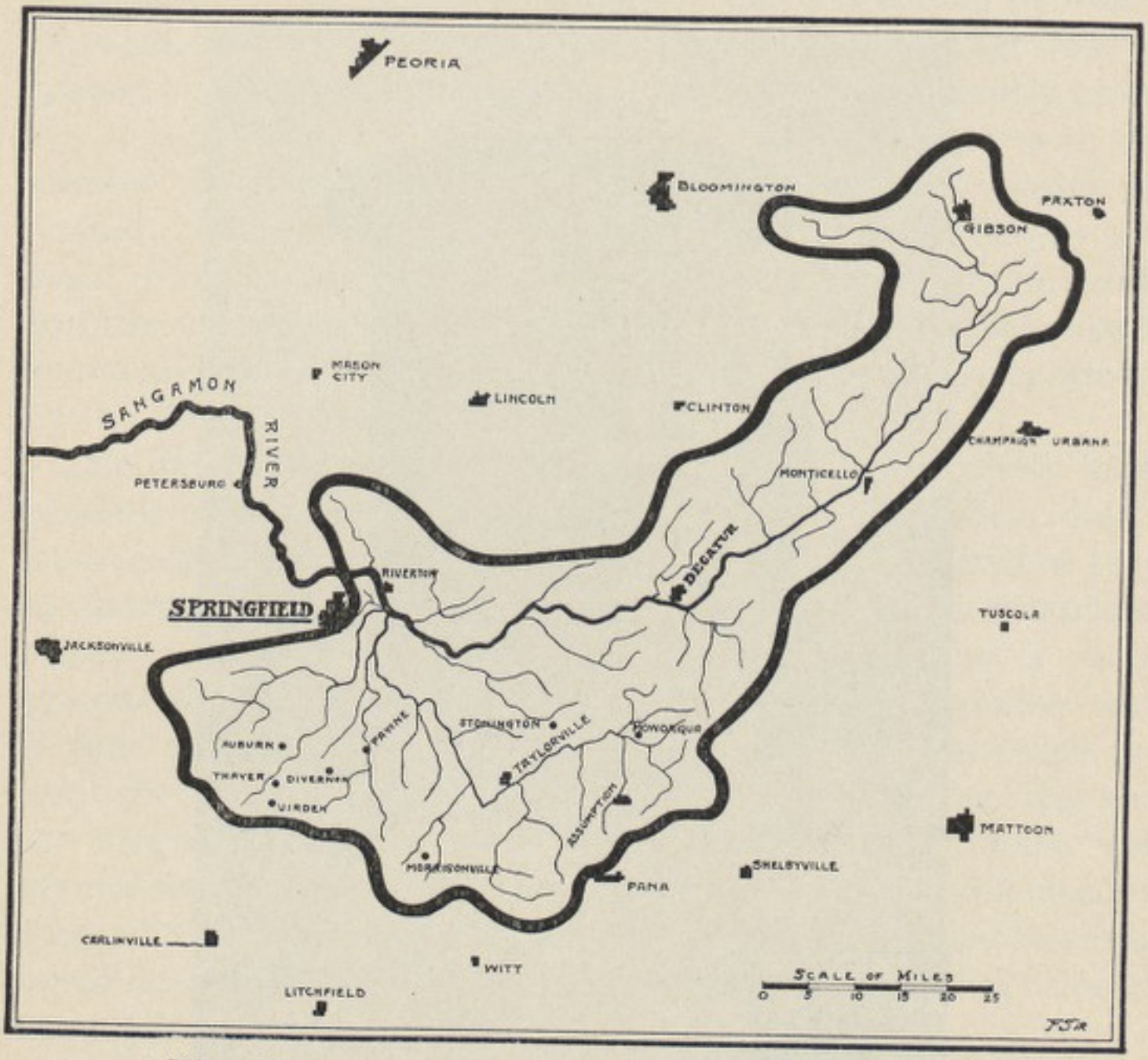
CITY WATER SUPPLY*

"Health requires pure water. Civic health requires faithful public service." These words appear on an inscription tablet at the new pumping station, and they are indeed well chosen. The relation between an impure water supply and high death rates from typhoid fever and other intestinal diseases is well known; and a considerable body of evidence has been collected which tends to show that impure water may even cause excesses of diseases formerly thought quite outside its range of influence.

The Springfield water works are situated at a point on the south bank of the Sangamon River about two miles from the northern edge of the city and four miles from its center. The first works were built at this point in 1867, water being pumped direct from the river to the city through a 15-inch pipe. River water proved so dirty, however, that in 1884 a large circular brick well, 60 feet in diameter and 53 feet deep, was constructed near the river's edge. A supply of ground water was secured from this well, but the yield was not sufficient to meet the demand and in 1888 an infiltration gallery was constructed running southeast from the large well. This gallery was laid in a gravel deposit about 26 feet below the surface of the ground, was constructed of elm planking, and was four feet broad, five feet high and 1,000 feet long. The supply still being insufficient a direct connection was made with the river in 1890, while increases were also made in the gallery system so that by 1900 some 2,735 feet were in use. Further attempts to find an adequate supply of ground water took a new form in 1902, four tubular wells being driven. No

* Much of the material in this section is drawn from Hansen, Paul, and Stromquist, W. G.: Report on the Public Water Supply of Springfield, State Water Survey, April 5, 1913. For a discussion of the supply from the standpoint of fire protection, reference should be made to the 85th Report of the Committee on Fire Prevention, National Board of Fire Underwriters, December, 1908.

adequate test of these wells seems to have been made, however, until 1911, possibly because filtration projects were in favor during the intervening period. The tests, when finally made, were encouraging, and in 1912 and 1913 new wells were driven,

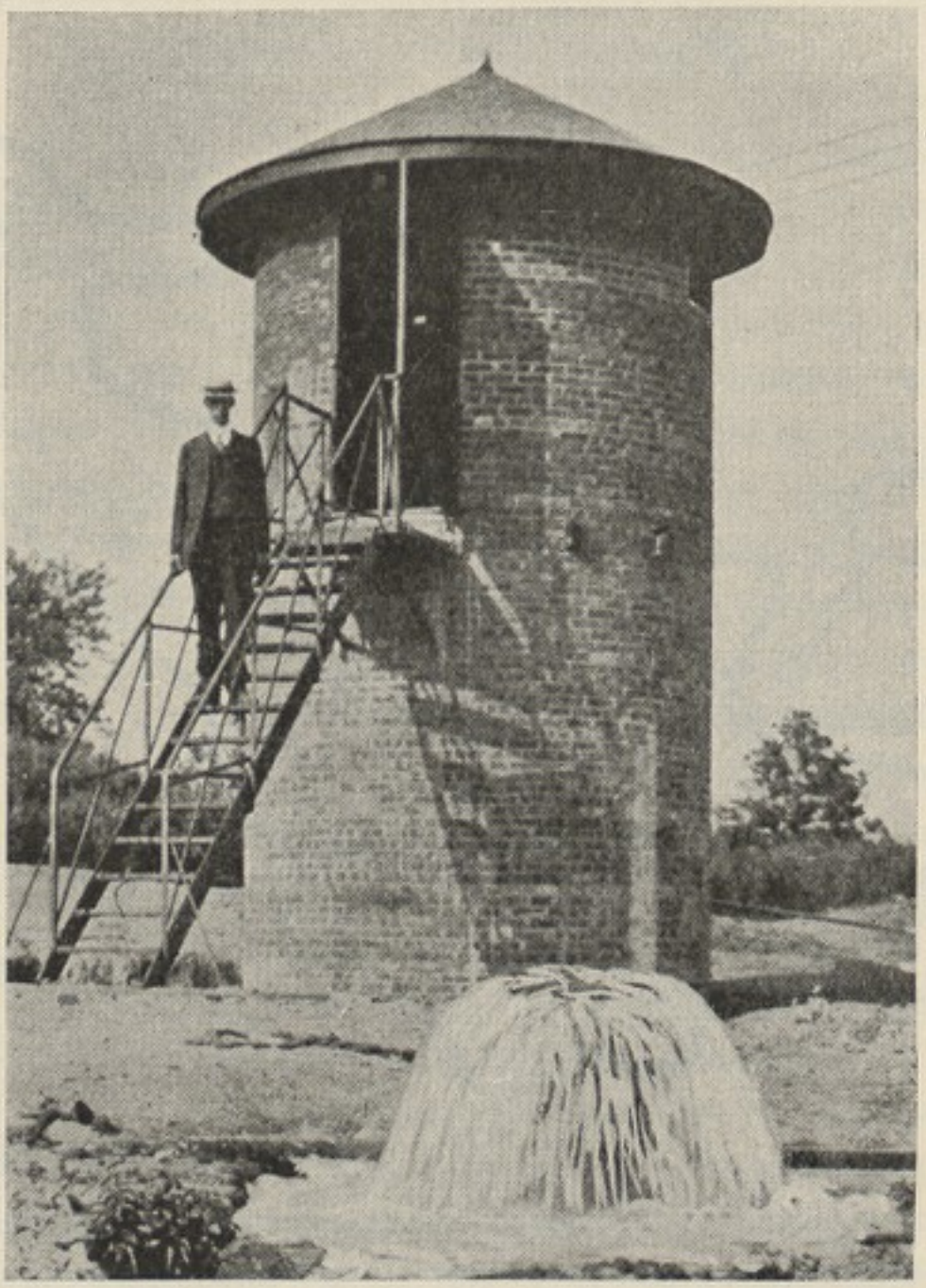


WHY SPRINGFIELD MUST NOT PUMP FROM THE RIVER

The heavy black line marks the limits of the drainage area of the Sangamon River above the city water works. This area was inhabited in 1910 by some 191,000 persons, of whom 110,000 resided in places of over 1,000 population. The river at Springfield is seriously polluted by the sewage of Decatur and parts of Springfield's own sewage, and water from it should not be used in an unpurified condition

the results being again satisfactory. Meanwhile, for over two decades, unpurified river water made up a considerable part of the supply, and even in 1914, although only for a few days at its very close, it was found necessary to pump from the river and advise citizens to boil the water.

The present water-gathering equipment consists then of the old galleries and six tubular well units. The old large well is still in use, but as a receiving cistern for the other developments. The tubular units each consist of a central pit about 20 feet deep



PRESENT TYPE OF CITY WATER SUPPLY DEVELOPMENT
One of the six tubular well units making up part of Springfield's supply. The well house covers a pit about 20 feet deep containing an electrically driven centrifugal pump. The latter pumps water from the several driven wells making up the unit to the receiving well at the main pumping station

and eight feet in diameter at the bottom of which is an electrically driven centrifugal pump surmounting a 12-inch tubular well, with suction lines running to supplementary 10-inch wells about 50 feet distant. All the tubular wells penetrate the alluvium of the river bank to a depth of 45 to 55 feet, reaching hard-pan.

The yield of these well units is stated to average 1,000,000 gallons per day, the total capacity thus being 6,000,000 gallons. Compared with the average daily consumption of 5,500,000 gallons this yield would seem fairly adequate, but as the maximum rate of demand reached 8,500,000 gallons in the year ending February 28, 1914, and as the system has practically no storage reserve against possible conflagrations, and as the city is constantly growing, it is evident that the development, and experiments to determine the limitations of the possible development, should be pushed. The fact that during the summer of 1914, despite unusual drought, sufficient ground water was had is encouraging, and the city should be liberal in its allowances for further experiments and development, the need of which is conclusively shown by the shortage experienced at the very end of 1914.

The important need is that the supply be made entirely independent of the river. The Sangamon above Springfield drains an area of about 2,710 square miles, which was inhabited in 1910 by about 191,000 persons of whom about 110,000 resided in places of over 1,000 population. Decatur, with a population of about 37,000, discharges its sewage directly into the Sangamon, and in time of flood fecal material from this source could reach the Springfield intake in about ten hours. Pollution of the river and the possibility of its infection is thus assured. The tubular well system should be developed to a point where the possible need of river water will be precluded, and the river intake should be eliminated because of possibility of leakage in the gate valve or of its being left partially open.

This need is emphasized by a long series of analyses made by the State Water Survey, which show that the quality of the water supplied in the past has varied widely in accordance with variations in pumpage from the river. A tabulation from these analytical records, giving an idea of the extent of these variations and the general tendencies of the last few years, may be found in Appendix F, page 146. While the number of samples has not been large enough nor the taking of them sufficiently systematic to allow of conclusive judgment, it would appear that the supply has improved in the past few years, as might be expected from the decreased use of raw river water.

Our discussion of the city water supply has so far dealt with the question of securing an adequate supply of pure water. The question that remains from the standpoint of sanitation is how thoroughly the water is distributed throughout the city. The adequacy of the pumping machinery and of the size of the mains is of the first importance in connection with fire risks, and is

TESTING A DRIVE WELL

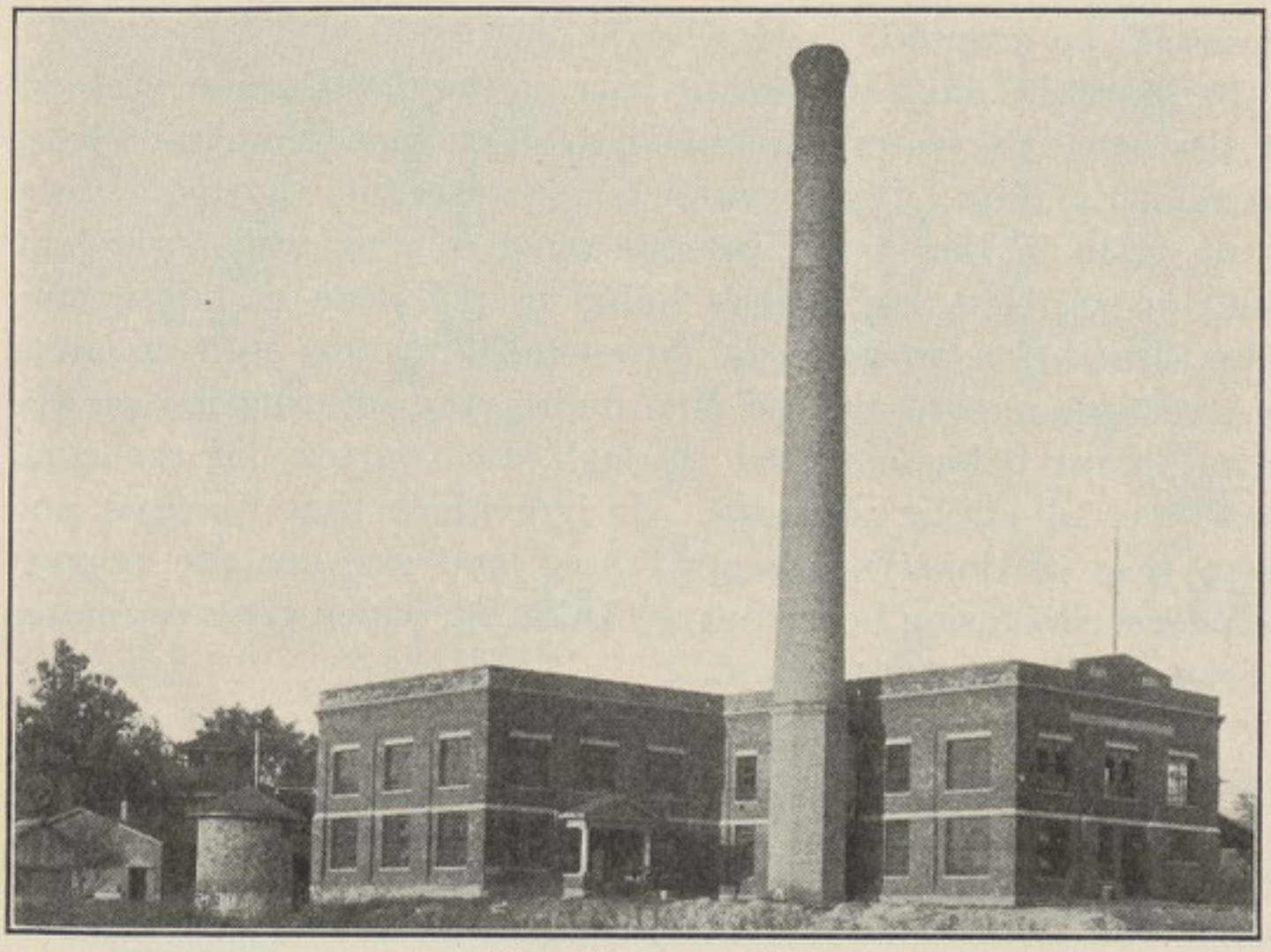
Test wells have been driven on the Sangamon River bank around the pumping station to determine the amount of ground water available and the best locations for permanent wells. There is need for more of this experimental work, as the yield from the present wells is not adequate in the face of long continued drought and does not insure sufficient reserve for possible conflagrations or the future growth of the city

discussed on that basis in the Municipal Efficiency section of the survey* and in the report of the National Board of Fire Underwriters. The sanitary need is met, however, if the capacity of the machinery and pipes is sufficient to give consumers satis-

* Decker, D. O.: City and County Administration in Springfield, Illinois. (The Springfield Survey:)

factory service and if the mains are distributed so that all persons in built-up sections may receive the water.

For these ordinary demands the present pumping equipment is entirely adequate, a new pump of modern design with a capacity greater than the maximum rate of demand experienced in the last two years having been installed in 1913. The old pumps, with at least equal capacity, are held in reserve. The



THE NEW PUMPING STATION

Built in 1913 at an expense of $55,000, it contains a new pump costing $52,000. To follow up this creditable improvement Springfield should now increase the force main capacity to the city and should extend the smaller mains to serve a number of parts of the city which cannot at present obtain city water. The location of the water works is shown in the frontispiece

distribution system is not so satisfactory. The force mains to the city, a 15-inch pipe laid in 1867 and a 24-inch pipe laid in 1892, are inadequate in size and, being laid over coal workings, are liable to disturbance and consequent impairment of the service. Such interruptions, resulting in a cutting off or fall in pressure of the water and marked increases in turbidity, are objectionable from a sanitary standpoint because they force

many to make temporary use of shallow wells and prejudice others against using the supply at all. The need for additional force main provision is beyond question, and the engineers of the National Board of Fire Underwriters in 1908 recommended the immediate construction of two additional 24-inch mains, while the commissioner of public property for the past year advocated the construction of a 36-inch main. The estimated cost of the latter project is $150,000; and whatever the necessary expense it should be granted.

Perhaps the most important part of the distribution problem is to see that the water is available to all persons living in built-up parts of the city. If city water is not available, that is, if there is no main in the street, persons must rely on wells, which in built-up districts are always liable to pollution and infection. The illustration on page 79 shows in black the built-up areas not served in 1914 by the city mains, the information on the latter point being supplied through the courtesy of the commissioner of public property. It is evident that the east and northwest sections (wards one, three, and six) are the poorest served, a conclusion borne out by Table 23, which gives estimates of the populations not served.

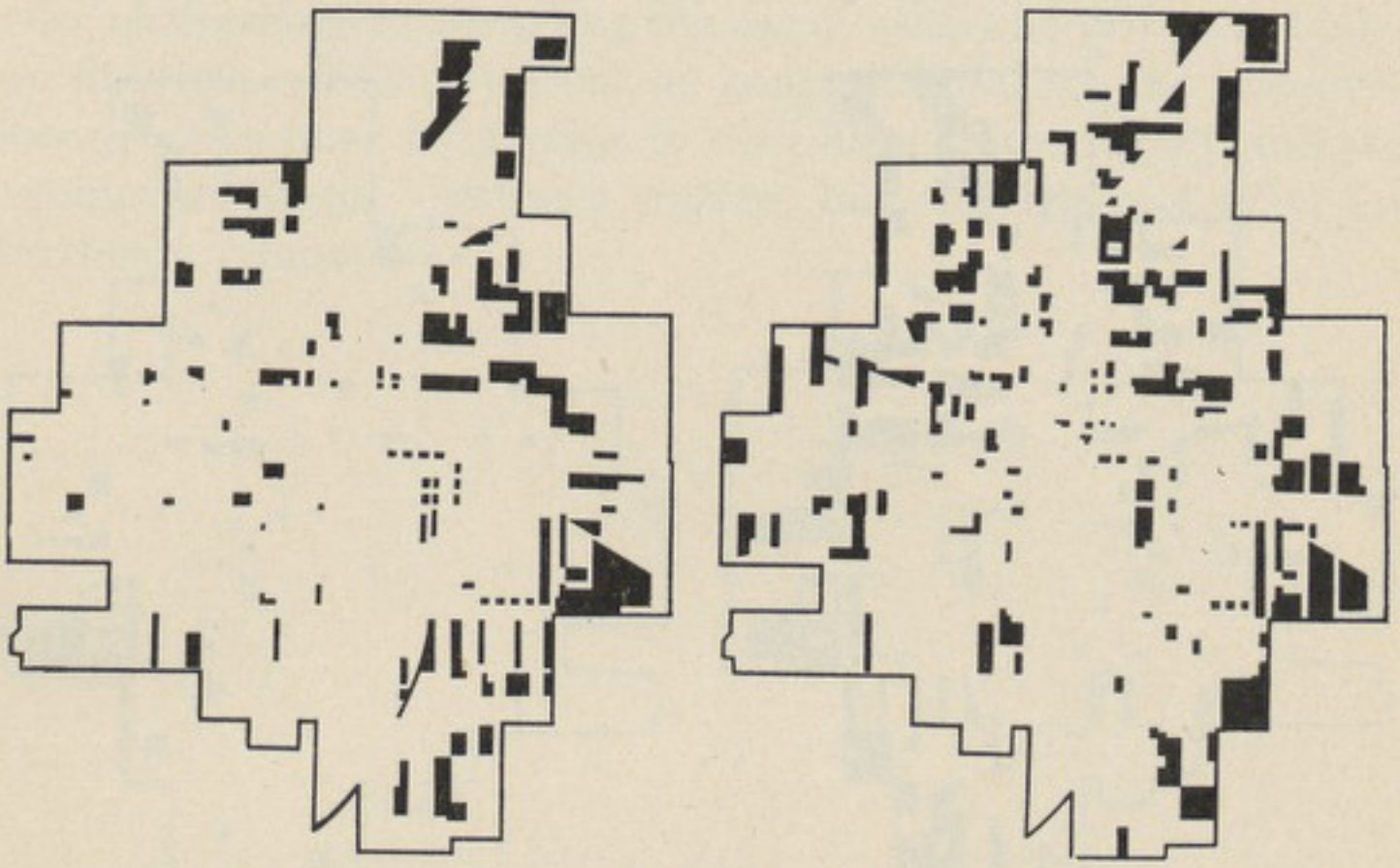
TABLE 23.—ESTIMATES OF WARD POPULATIONS NOT SERVED WITH CITY WATER, SPRINGFIELD, 1914[a]

Ward	Persons	Per cent of ward population
1	2,510	30.0
2	340	5.6
3	783	9.2
4	394	4.0
5	166	2.9
6	2,090	20.4
7	75	2.4
Whole city	6,358	12.3

[a] Based on present location of mains, but population of 1910.

The above estimates were arrived at by multiplying the number of houses listed in the 1912 city directory in the unserved

areas by the average number of persons per house in the corresponding ward according to the census of 1910. The resulting figures, while not strictly accurate, are sufficiently significant for the purpose at hand. That 30 per cent of the people in ward one and 20 per cent of the people in ward six cannot use city water are facts of serious sanitary import, and make a strong argument for a policy of liberal extension of the mains of the city, which should go hand in hand with one of well condemnation and com-



BUILT-UP AREAS WITHOUT CITY WATER AND WITHOUT SEWERS

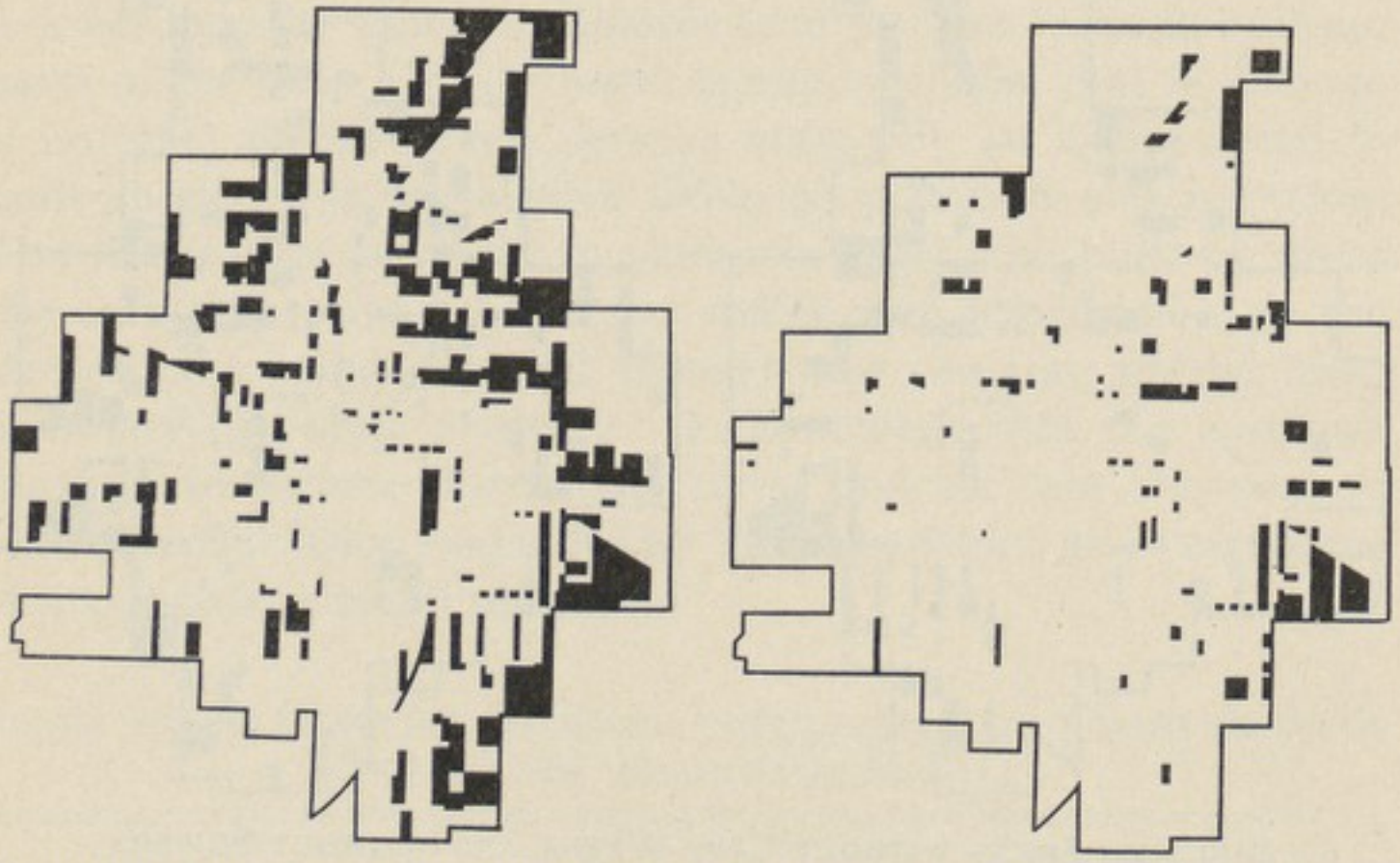
The map to the left shows in black inhabited areas without city water mains in the street; the map to the right shows similar areas without sewers in the street. Approximately 12 per cent of the population do not have city water available, while 17 per cent are without sewers. The deficiencies are evidently more marked in the eastern parts of the city

pulsory connection.* The small householder should be given every inducement to connect, as is done by the present arrangement whereby the water department will install a service connection from the street main to the house for $20, payable $5.00 in advance, the balance in instalments of one dollar a month. It is stated that requests for extension of mains exceed in the ratio

* On November 16, 1914, the city commissioners voted to authorize a number of new mains in certain parts of the city.

of four to one the additions permitted by the funds available, and it is evident that the cost of these extensions and of the new force main service needed will require that very considerable funds be placed at the disposal of the water department. Such funds should be made available, as pure water for the whole city is a sanitary and commercial necessity.

To sum up the situation: Springfield, after enduring for many years a supply more or less polluted with river water, has within recent years succeeded in locating a supply of pure ground water



BUILT-UP AREAS WITH EITHER NO CITY WATER OR NO SEWERS; AND AREAS WITHOUT BOTH

To the left, map showing inhabited areas lacking one or both of the services; to the right, map showing similar areas lacking both services

and a method of collection that promise to give satisfactory results for years to come. Further experiments should be made, however, to determine the ultimate possibility of development, and further development should be undertaken to assure a greater margin of reserve than now exists. Means should be devised whereby the supply of ground water will be sufficient to meet any possible demands, even in the face of large fires, and the river intake should, as has been recommended by the State Water Survey, be done away with. The present pumping equipment

is amply adequate for any normal demands, but the present force mains to the city should be supplemented by one or more new mains to preclude the possibility of interruptions in the service on account of breaks in the existing mains and to prevent excessive velocities in them such as give rise to objectionable turbidity.

Finally, there is much need for new distribution mains in the eastern part of the city. At the time of the survey 30 per cent of the population in ward one and 20 per cent of the population in ward six had no mains in the streets, a serious situation in view of the dangers attending the use of wells and privies in built-up districts. The city is to be congratulated on the improvements which have been made in the source of the supply and the equipment at the pumping station, but there is real need for further development.

IX

SEWERAGE AND SEWAGE DISPOSAL*

A detailed investigation of the design, construction, and maintenance of Springfield's sewer system has been impossible in the present survey owing to limitations as to time and funds. Some significant information is available, however, and there are prospects that a detailed survey may be undertaken by the city authorities at the instance of the State Water Survey. The information that can be presented here relates to the distribution of sewers throughout the city, and to the location of sewer outlets and the condition of streams into which they discharge. Springfield's sewerage is of the "combined" type; that is, one set of sewers cares for both house sewage and storm water.

The inadequacies in distribution of the existing sewers are brought out in the illustration on page 79, which shows in black the built-up areas having no sewers in the streets. The deficiencies are obviously similar to those in the case of the city water system; but the sewerage situation over the entire city is somewhat worse. This fact is brought out in Table 24, which gives estimates of the populations without sewers for the several wards, prepared on the same basis as the estimates on page 78 for city water. Here the estimates indicate that 17.5 per cent of the city's population cannot connect with sewers, as against 12.3 per cent in the case of the water mains. The east side again fares badly while the showings of wards two and three are materially worse than in the case of the city water system. The showing of ward five is again of the best.

* The reader is referred also to: Hansen, Paul, and Stromquist, W. G.: Report on the Public Water Supply of Springfield, April 5, 1913; and Hansen, Paul, and Norbury, Garm: Report on Inspection of Streams Into Which Sewage of Springfield Is Discharged, October 10, 1913. Information regarding the present location of sewers was available through the courtesy of the city engineer's office.

TABLE 24.—ESTIMATES OF WARD POPULATIONS NOT SERVED BY SEWERS, SPRINGFIELD, 1914[a]

Ward	Persons	Per cent of ward population
1	2,226	27.1
2	1,063	17.6
3	1,664	19.5
4	1,171	11.9
5	254	4.5
6	2,307	22.5
7	333	10.8
Whole city	9,058	17.5

[a] Based on present location of sewers but on population of 1910.

The presence of these very considerable unsewered areas is of prime sanitary importance. Lack of sewers compels the privy system, which in turn greatly increases the opportunities for fly infection. The city should undertake without delay a thorough survey of its present sewerage equipment and should utilize the results in formulating a plan for the rapid extension of the system to serve all built-up districts. Such a program should of course be attended by a policy of privy condemnation and city water main extension.

Springfield now discharges her sewage in a more or less haphazard manner at some twelve points either within or a short distance outside her boundaries. The location of these outfalls is shown in the frontispiece, while the particulars as to their size and construction appear in Table 25. Most of the sewage flows to the northwest and reaches Spring Creek; the remainder goes off to the southeast into Sugar Creek. None of the sewage is treated in any way, and according to the report of inspections made by the State Water Survey during August of 1913 serious pollution attended with nuisance occurs in the streams receiving the sewage, more especially that part of Spring Creek between the Old Town Branch and Camp Lincoln. The nuisance is objectionable to householders in certain places and with the growth of the city is sure to become worse. The volume of flow in some of the creeks manifestly is not large enough to assimilate the

amounts of sewage they receive. Aside from the nuisance caused in these streams by putrefaction of the sewage there is the added danger that must attend the discharge through populated districts of raw sewage which may at any time contain infectious matter.

TABLE 25.—DATA REGARDING SPRINGFIELD SEWER OUTLETS[a]

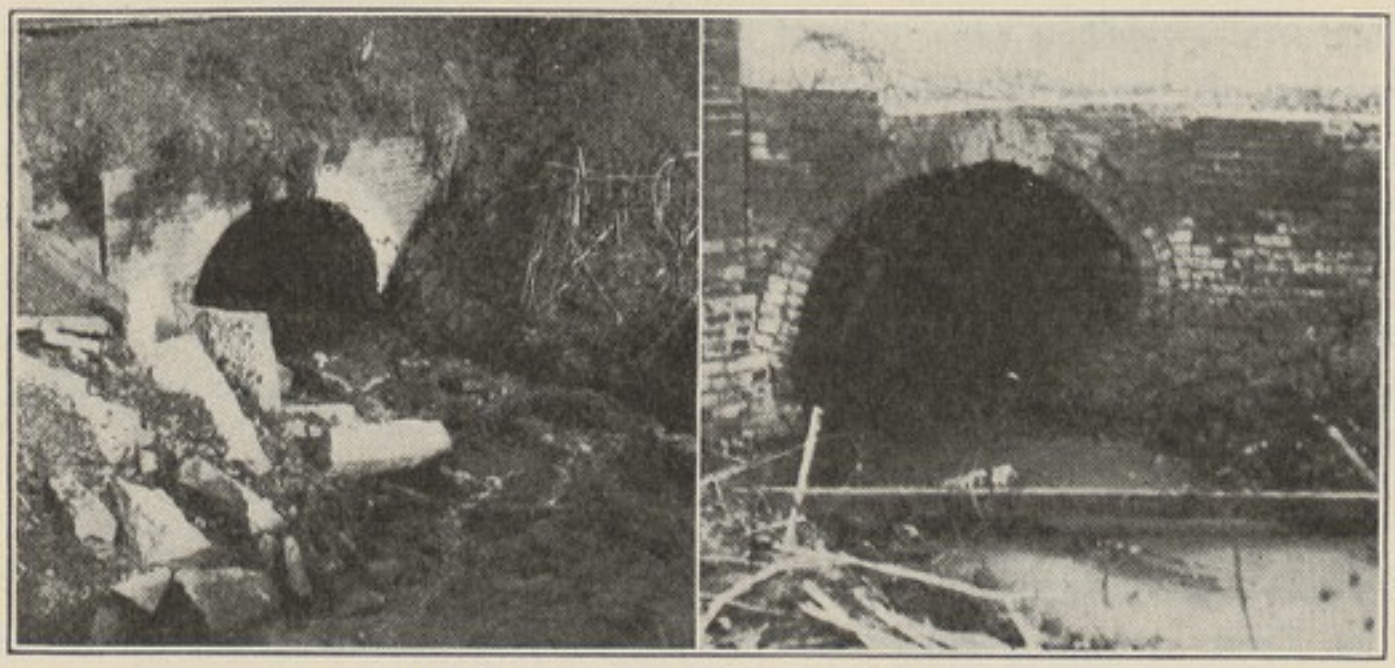
Outlet number	Material	Size	Stream reached
1	Concrete and brick	10′ x 12′ rectangular	Spring Creek
2	Brick	7′ circular	Spring Creek
3	Brick	2′ circular	Spring Creek
4	Brick	5′ circular	Spring Creek
5	Brick	4′ circular	Spring Creek
6	Brick	4½′ circular	Sugar Creek
7	Brick	3½′ circular	Sugar Creek
8	Brick	6′ circular	Sugar Creek
9	Several tile sewers	Stream to be covered	Spring Creek
10	Brick	3′ circular	Spring Creek
11	Brick	5′ circular	Spring Creek
12	Concrete	3′ circular	Spring Creek

[a] From the State Water Survey report on the Springfield Public Water Supply, April, 1913. See frontispiece for location of above outlets.

Under the circumstances, Springfield must be prepared to grapple not only with the question of adequate sewers within her boundaries but with the question of disposing of her sewage without nuisance and danger to herself or others. To quote from the State Water Survey report, "There can be no doubt but that if the present rapid growth of Springfield continues it will soon become necessary to install sewage treatment works."

The ultimate necessity for treatment has an important bearing on the selection of any sewer plan for the whole city, and should be given careful consideration in a thorough-going survey of the sewerage situation such as the city should make. The construction and maintenance charges for treatment works will be less with separate collection of sanitary sewage and storm water and with a single treatment plant.

In studying her sewage problem Springfield will do well to invest in the best engineering assistance, as the economies inciden-



SOME SPRINGFIELD SEWER OUTLETS

Springfield discharges her sewage in a haphazard manner at twelve different points along her borders. The creeks which receive the sewage are seriously polluted at a number of places. In the illustration the upper picture is of the main drain of the city (sewer No. 1 in Table 25) which consists of a creek, the Old Town Branch, covered over. Below to the left is outfall No. 2; to the right, outfall No. 8. There is need for a careful engineering study of the city's sewerage problem, which should take into account the possible ultimate necessity for disposal works

tal to starting with the right plan are likely to be very great. The work of bringing sewers into the unsewered sections should proceed with a minimum of delay, as should a study of the whole situation as regards existing and needed trunk sewers and a disposal system.

X

WELLS AND PRIVIES

In 1910 Dr. George Thomas Palmer, superintendent of health, undertook a sanitary survey to determine the number and location of all private wells, privies, cesspools, and premises otherwise insanitary. A house to house canvass was made and a large map was prepared representing in different colors the various conditions found. Extensive publicity was given the findings in this and other ways. An ordinance was passed requiring all persons building, or rebuilding, to make proper sewer and water connections if within 100 feet of a sewer and a water main, and requiring all wells and vaults to be abandoned within 30 days of such connection. Owners of wells and privies not affected by this ordinance were at the same time strongly advised to abandon these appurtenances and connect with the city water and sewer facilities wherever possible. In commenting on the findings of this survey in his annual report for 1910 Dr. Palmer expressed himself as follows:

1. There are 7,000 shallow wells in the city and the pollution of these is insured by 6,000 privy vaults.

2. There are 9,000 homes in the city, 6,000 of which are not connected with city sewers or water mains for sanitary purposes. The sewer and water systems of Springfield have cost the taxpayers approximately $4,000,000. This means that the public expenditure of $4,000,000 for sanitary purposes is utilized by but one-third of the population and the benefits which should be derived by the community are lost.

Four years having elapsed since the publication of Dr. Palmer's findings it was thought desirable to make a re-survey of the well and privy situation, and such an investigation was made possible through the generous co-operation of Dr. B. B. Griffith, present superintendent of health. The new canvass was made by the three regular health department inspectors during the summer of 1914, watch being kept for manure accumulations as well as for

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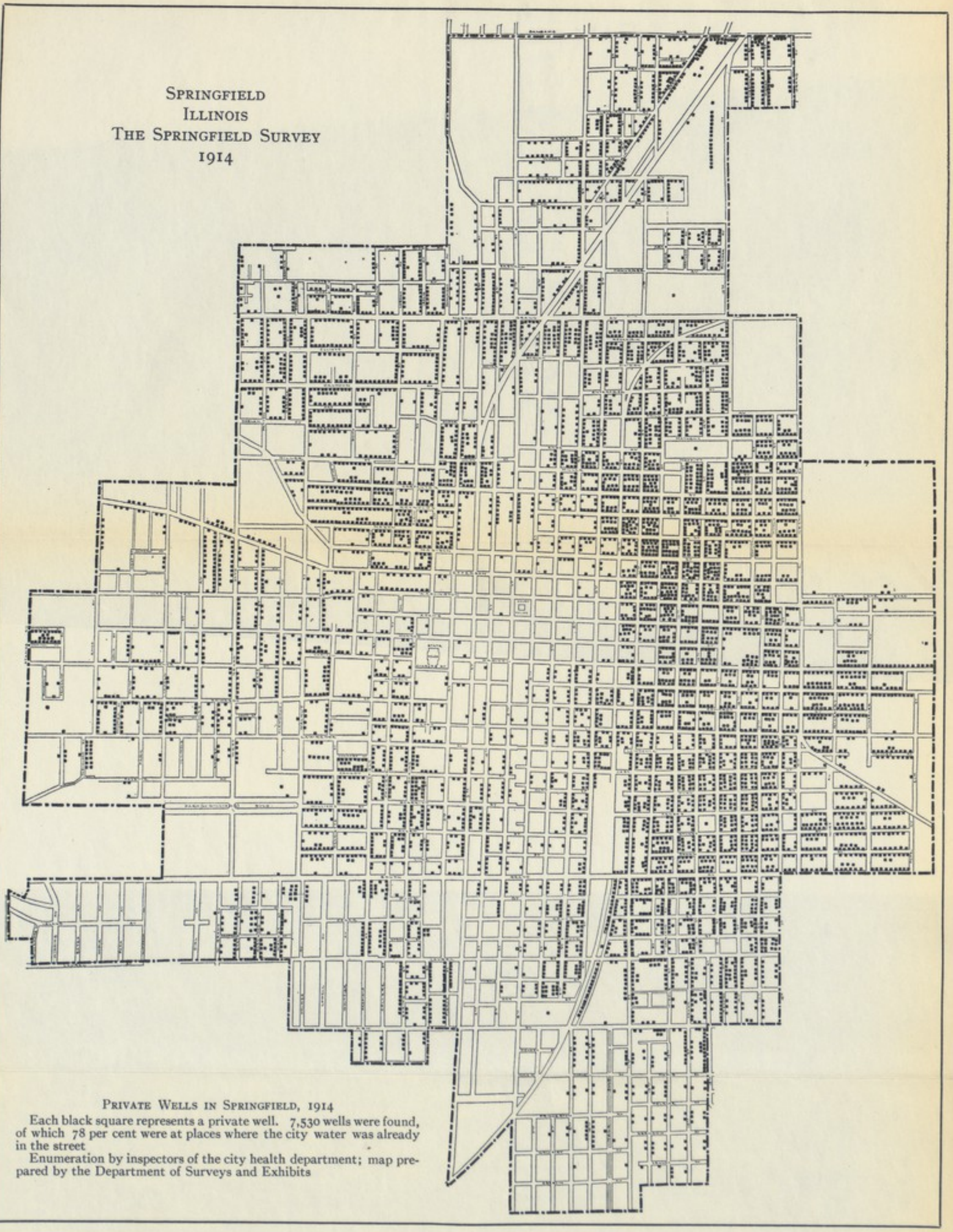


PRIVATE WELLS IN SPRINGFIELD, 1914

Each black square represents a private well. 7,530 wells were found, of which 78 per cent were at places where the city water was already in the street

Enumeration by inspectors of the city health department; map prepared by the Department of Surveys and Exhibits

wells and privies. Although an exact comparison of the situation in 1914 with that in 1910 cannot be made, because certain parts of the city were omitted from the 1910 survey, a fairly good idea of what has happened may be obtained from the tables below and the accompanying diagrams.

TABLE 26.—WELLS AND PRIVIES IN SPRINGFIELD, 1910 AND 1914

	Wells	Privies
Number actually enumerated in 1910	5,869	5,498
Number estimated in 1910	7,000	6,000
Number enumerated in 1914	7,530	7,431
Increase over 1910 enumeration	1,661	1,933
Increase over 1910 estimates	530	1,431
Per cent increase over 1910 enumeration	28.3	35.2
Per cent increase over 1910 estimates	7.6	23.9

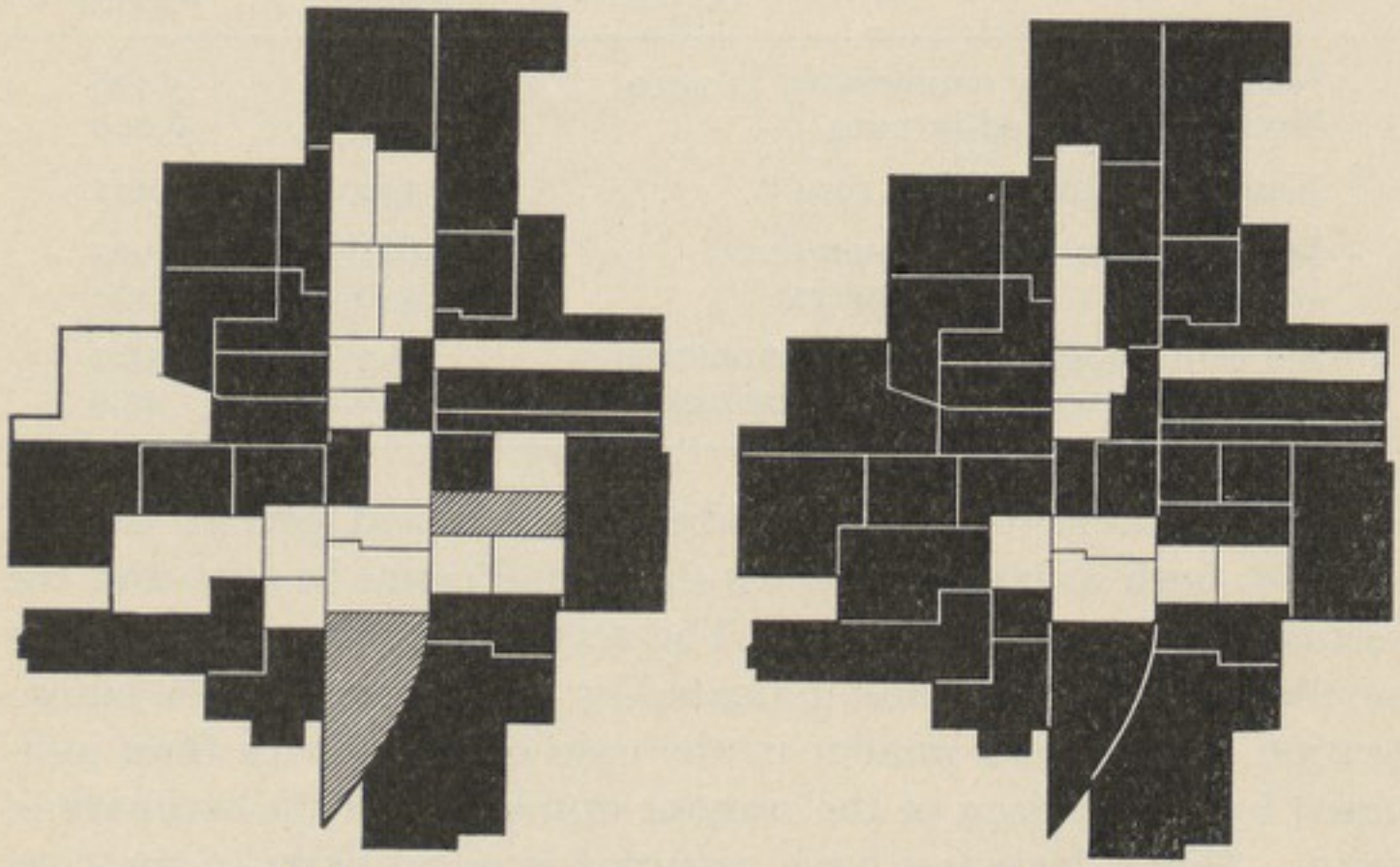
It is apparent that the number of wells and privies has increased, both as compared with the actual count in 1910 and the estimates made in that year. The actual increases are probably smaller in both cases than indicated by comparisons of the enumeration figures, and smaller in the case of the privies than indicated by comparison of the present number with the estimate of 1910. Slight decreases have occurred in some parts of the city, more especially in the case of wells, and the location of these areas is indicated in the accompanying diagrams. Table 27

TABLE 27.—CHANGES IN NUMBERS OF WELLS AND PRIVIES BY WARD BETWEEN 1910 AND 1914, SPRINGFIELD

Ward	Wells		Privies	
	Increase	Decrease	Increase	Decrease
1	445	..	418	..
2	..	62	24	..
3	412	..	487	..
4	175	..	184	..
5	..	34	..	..
6	771	..	846	..
7	..	46	..	26
Whole city	1,661	..	1,933	..

sets forth the increases or decreases in the several wards as between the two enumerations. The decreases are evidently more marked in the case of the wells, but in both instances are slight.

The actual increases which have taken place are probably due to the erection of new buildings at points where sewers and city water are not available, 400 cases of building or rebuilding at such places occurring in 1910–1913 according to the annual report of the



Wells Privies

COMPARISON OF THE NUMBERS OF WELLS AND PRIVIES FOUND IN 1910 AND 1914

According to the enumeration districts used by the United States Census of 1910. Black areas indicate increases in the period; white areas decreases; and shaded areas no change in number

Part of the increase is more apparent than real, as the survey of 1910 omitted certain sections near the city limits

Little actual change has taken place in the situation in the four years

health department for 1913. The present situation is evidently very much the same as in 1910; which is certainly discouraging, and discreditable to the city, in view of the strenuous efforts made by Dr. Palmer to do away with these rural appurtenances.

The distribution of wells and privies throughout the city is indicated on the maps opposite pages 86 and 92 and their accompanying diagrams. The largest numbers are manifestly in the sixth, first, third, and fourth wards, in the order named. Over 50 per

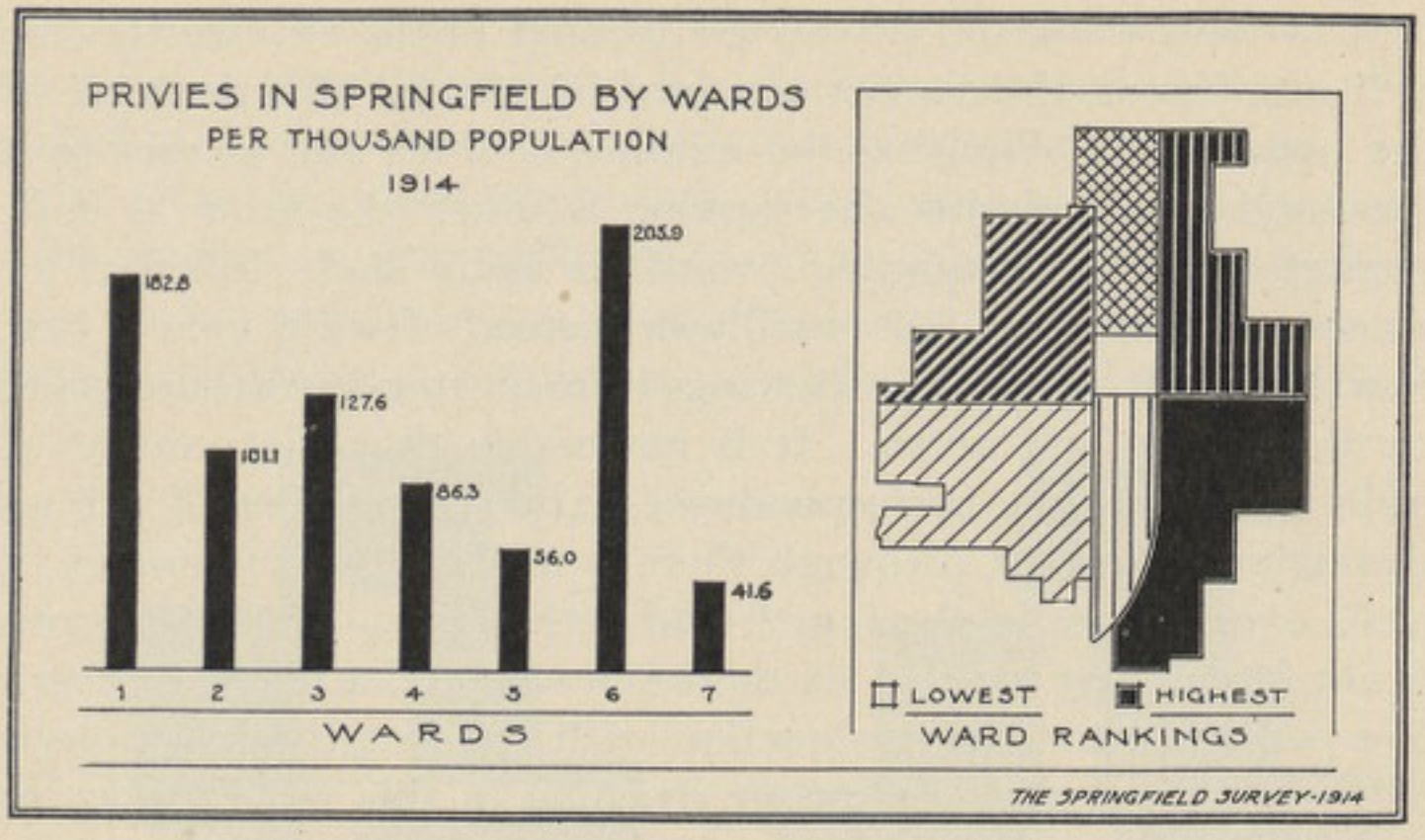
cent of both wells and privies are located in the two wards east of Tenth Street, the district occupied in 1910 by 36.4 per cent of the population. Figuring the number of wells and privies to a thousand of population the ranking is much the same as with respect to the gross number; ward six again leads, followed by wards one and three, but ward two instead of ward four is now fourth in rank. The best showings from all standpoints are made by wards five and seven. It is noticeable that the number of wells shows a close correspondence with the number of privies throughout the city, although there is a slight preponderance of wells over privies in the fourth and fifth wards. Another significant fact is that in ward six there is a well and a privy for every five persons, which in conjunction with the fact that the census of 1910 showed 4.4 persons per dwelling in this ward, indicates that over four-fifths of the people in the district rely on these conveniences, in spite of the fact that over three-fourths can connect with the city water and sewers. The situation in ward one is nearly as bad.

TABLE 28.—WELLS AND PRIVIES BY WARD, SPRINGFIELD, 1914[a]

Ward	Wells			Privies		
	Number	Per cent of total	Per 1,000 population	Number	Per cent of total	Per 1,000 population
1	1,689	22.4	180.1	1,714	23.1	182.8
2	697	9.3	103.1	683	9.2	101.1
3	1,206	16.0	126.2	1,219	16.4	127.6
4	1,058	14.1	96.5	947	12.7	86.3
5	424	5.6	66.5	357	4.8	56.0
6	2,321	30.8	201.8	2,368	31.9	205.9
7	135	1.8	39.3	143	1.9	41.6
Whole city	7,530	100.0	129.9	7,431	100.0	128.2

[a] Enumeration made by inspectors of the city health department.

The entire lack of necessity for most of Springfield's wells and privies is brought out in Tables 29 and 30 which give data with reference to the availability of sewers and city water. Seventy-eight per cent of the wells could be eliminated without any additions to the present city water mains, while 74 per cent of the

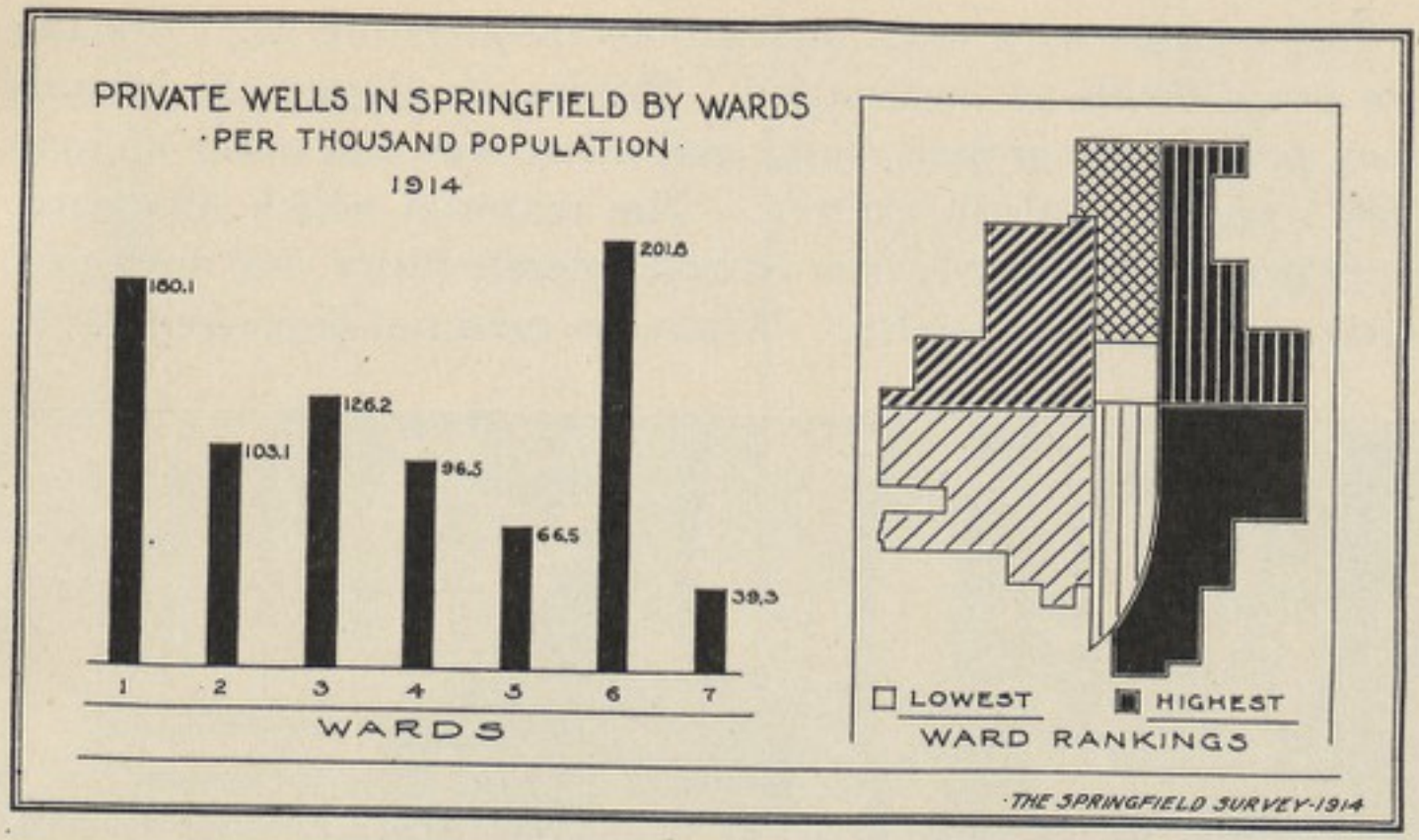


privies could be replaced by modern toilets without the construction of any new sewers. Nearly two-thirds of the privies are at places where both sewers and city water are available.

Glancing at the figures for the different wards it is evident that in general the highest proportions of unnecessary wells and privies occur in the wards where wells and privies are least numerous, these wards being the ones best equipped with sewers and water mains. At the same time, even in those wards most poorly equipped with the city services—wards one and six—most of the wells and privies are unnecessary. Approximately two-thirds of

TABLE 29.—UNNECESSARY WELLS BY WARD, SPRINGFIELD, 1914
Wells at Places where City Water is Available

Ward	Number	Per cent of all wells in ward	Per cent of all unnecessary wells in city
1	1,099	65.1	18.7
2	591	84.8	10.1
3	1,023	84.8	17.4
4	937	88.6	15.9
5	399	94.1	6.8
6	1,701	73.3	29.0
7	123	91.1	2.1
Whole city	5,873	78.0	100.0



the wells in ward one are at places where city water is available; while two-thirds of the privies in the ward are along sewer lines and nearly a half are at places where both sewers and city water are available. Ward six offers the greatest opportunity for the reduction of numbers, nearly one-third of all the unnecessary wells and privies in the city being in this ward. Ward one, the other east ward, stands second in this respect.

TABLE 30.—UNNECESSARY PRIVIES BY WARD, SPRINGFIELD, 1914

Ward	Privies with sewer available			Privies with both sewer and city water available		
	Number	Per cent of all privies in ward	Per cent of all privies with sewer	Number	Per cent of all privies in ward	Per cent of all privies with sewer and water
1	1,172	68.4	21.4	802	46.8	17.3
2	450	65.9	8.2	399	58.4	8.6
3	840	68.9	15.3	778	63.8	16.7
4	797	84.2	14.6	697	73.6	15.0
5	333	93.3	6.1	321	89.9	6.9
6	1,767	74.6	32.3	1,537	64.9	33.1
7	117	81.8	2.1	114	79.7	2.4
Whole city	5,476	73.7	100.0	4,648	62.6	100.0

The reasons why wells and privies in cities are objectionable are not difficult to understand. Privies are dangerous because they pollute the ground water and allow flies and other animals free access to human excreta. The material which flies carry from privies is probably in most cases merely filthy, and not necessarily dangerous to health. When the material deposited in the

SPRINGFIELD'S WELL AND PRIVY MENACE

A well with two privies about 25 feet distant. The conditions are favorable for pollution of the well, both through the soil and the loose planking. The privies were also quite open to flies. Springfield has approximately 7,500 wells and 7,500 privies, many of which are as objectionable as those shown above.

privy comes from a person suffering from intestinal disturbances, however, the danger becomes acute. The excreta of a person coming down with typhoid fever, for instance, may be swarming with the germs of the disease; and a fly touching such material may proceed directly into an adjoining house and infect food about to be eaten. Thus a new victim is secured.

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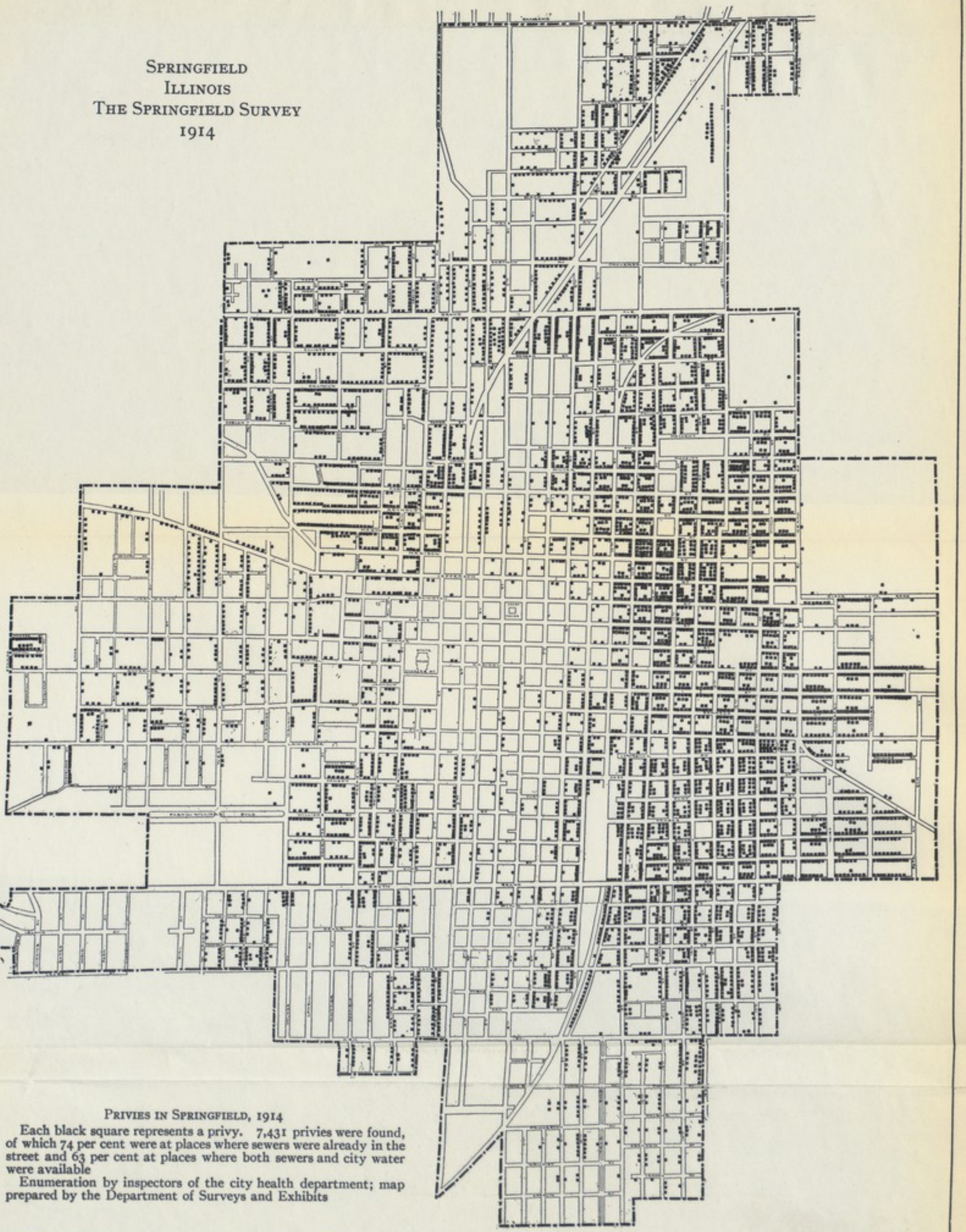


PRIVIES IN SPRINGFIELD, 1914

Each black square represents a privy. 7,431 privies were found, of which 74 per cent were at places where sewers were already in the street and 63 per cent at places where both sewers and city water were available

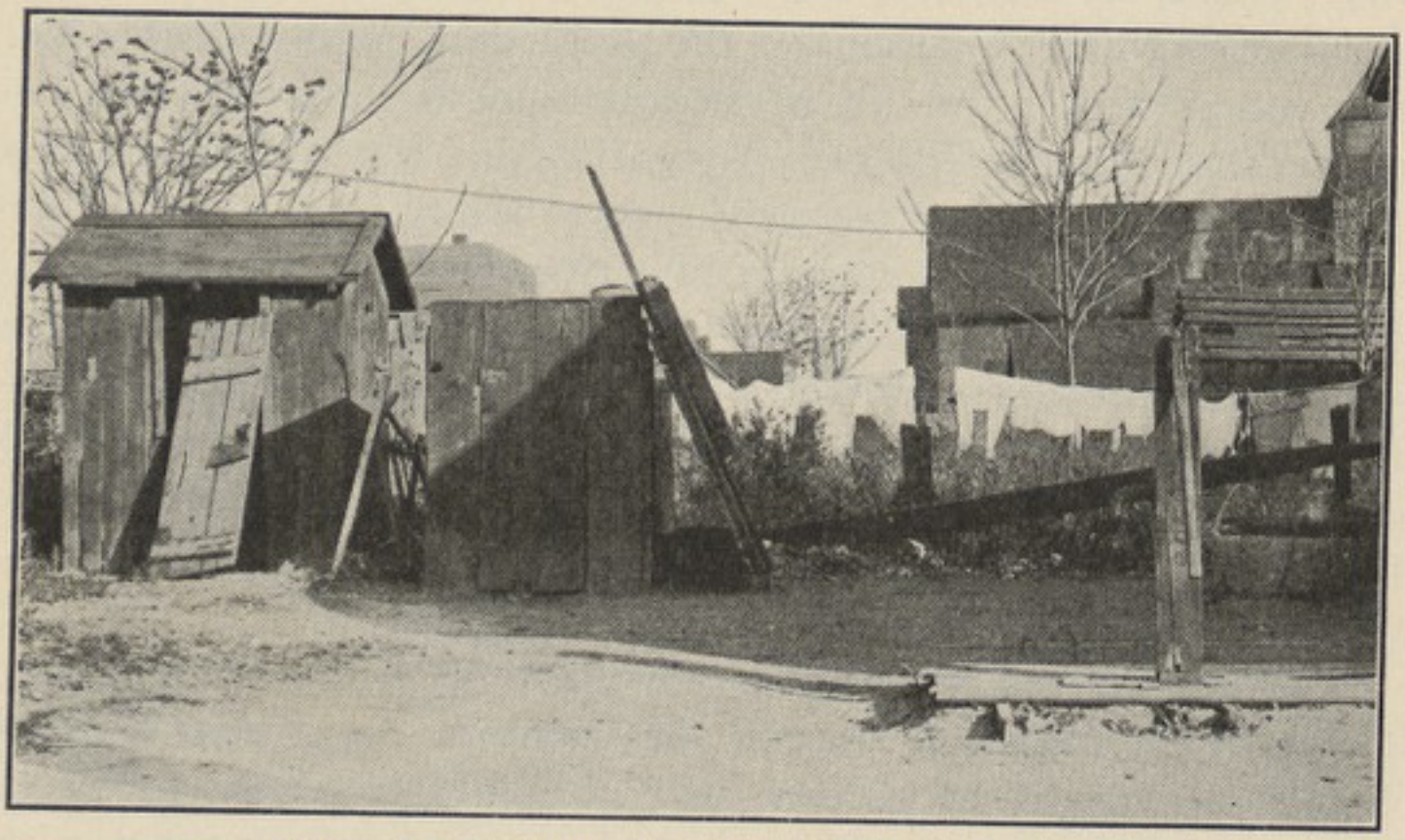
Enumeration by inspectors of the city health department; map prepared by the Department of Surveys and Exhibits

Many more persons are capable of discharging infectious matter in privies than is generally realized. Thus, in typhoid the danger is not limited to persons with a well-developed attack or to those coming down with the disease; some persons continue to harbor the germs and to discharge them in their urine and feces for years after recovery, while others become infected and discharge the germs without showing any symptoms of the disease whatever. Then there are mild cases that escape recognition, the patient excreting, nevertheless, the germs of the disease. These "carrier" cases, fortunately, are not relatively common, but their occurrence greatly complicates the problem of communicable disease control and in the case of the intestinal diseases increases the chances for privy infection. Altogether in a city of Springfield's size and with roughly 7,500 privies there is ample opportunity for some of the privies to contain infectious material from time to time; there is sure to be a supply of flies at hand at some of these times; and there is sure to be a supply of persons available for infection. Thus in the long run more typhoid and other intestinal disease is bound to arise from the privies. That such has actually been the case is indicated by the distribution in the past of typhoid and diarrheal diseases throughout the city.

The case for well pollution is very much the same. Some wells, owing to the nature of the soil they penetrate and their disposition with respect to privies, will probably never be polluted. Others with less favorable soil and more closely hedged with privies will be frequently polluted with human excreta. In the course of time this pollution may become infectious; that is, may come from an infected person, whereupon those drinking the water will suffer. In rural districts where the soil is of favorable quality and where it is merely a matter of protecting one's well from one's own privy, the situation can be controlled, but in the congested city, privies belonging to one's neighbors may be close at hand, and the distances between the wells and the privies not great enough and the pollution of the ground water too heavy for the material to be cared for in the natural way. For this reason wells in a city should always be regarded with suspicion, and always discarded when a pure supply of city water is at hand. That there is ample reason for suspecting the shallow wells of

Springfield is indicated by the results of analyses made by the State Water Survey of samples of Springfield well water. Several hundred such samples have been examined in the past few years and considerable amounts of pollution have been found in almost every case.

To remedy the situation will be relatively simple if Springfield decides to reform. Approximately three-fourths of the wells can be eliminated without extension of the water mains and three-fourths of the privies without new sewers. Public opinion



WELL AND PRIVIES USED BY THREE FAMILIES
The well is only 18 feet from the nearer privy. These are located on a corner lot and the well is said to be used freely by the public

should be strongly appealed to, and the city authorities should apply firm, even if gentle, pressure in the line of well and privy condemnation where city water and sewers are available. Certainly it is folly, as Dr. Palmer has pointed out, for the city to spend millions on water and sewers and then neglect three-fourths of the sanitary advantage. And the presence of the privies and wells, with the incidental communicable disease, is not a matter that affects merely the well and privy users. The presence of typhoid or other diarrheal disease is a menace to all, even to persons who have done away with their own wells and privies.

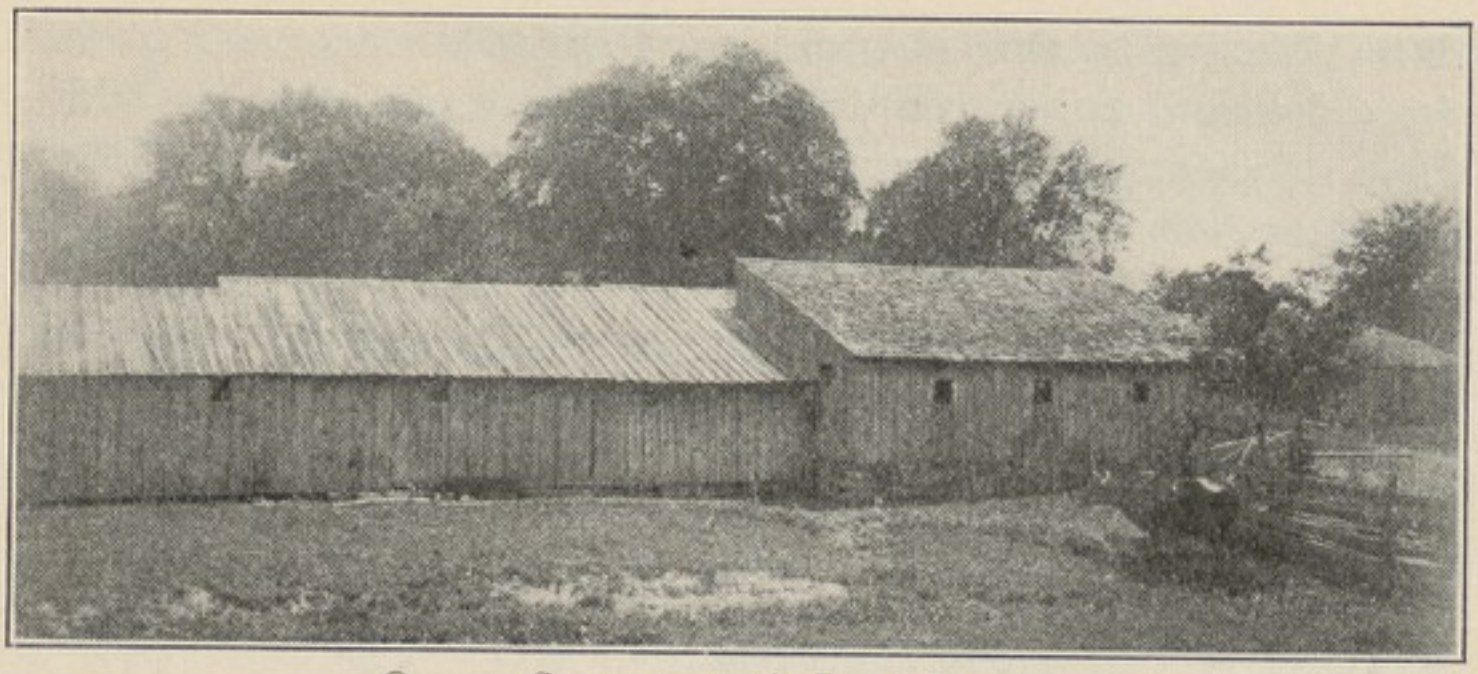
Privies can be made sanitary by rigid regulations as to their construction and screening; and, short of elimination, such measures should certainly be taken. Such a program, however, involves a considerable inspection system and an appreciable financial burden, and it is probable that the troubles incidental to keeping privies strictly sanitary would induce most people to abandon them. At all events, Springfield should set about to become a privy-less and well-less city, and should adopt a rational program working to accomplish this purpose. Until she makes marked progress on such a program she cannot hope to free herself of her typhoid and her diarrheal disease.

XI

MILK SUPPLY

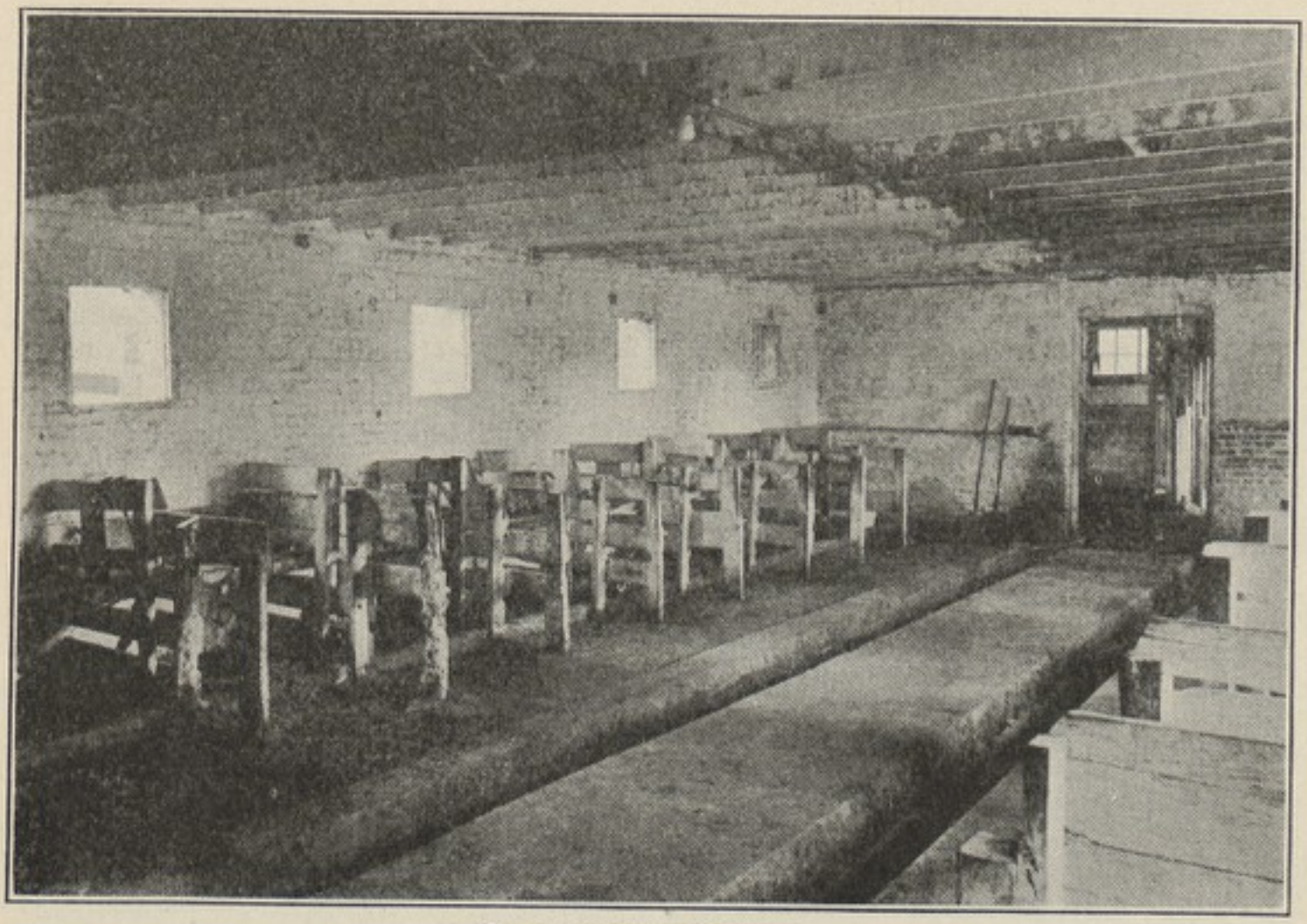
A valuable inspection of the dairy farms supplying milk to Springfield was secured to the Survey through the generous co-operation of the state board of health as represented by its chief, Dr. C. St. Clair Drake, and the city health department as represented by Dr. B. B. Griffith. Two inspectors, one from each department, visited the farms together and scored them on the modified government score card as used by the Chicago health department. In the course of this work it appeared that Springfield is supplied by some 100 producers owning about 1,055 cows and producing about 2,355 gallons a day. Approximately a fourth of the farmers, producing about a third of the city's supply, peddle their own milk; slightly more than half of them, producing slightly less than half of the supply, sell to one large dairy company; and the remainder dispose of their milk to stores and middlemen. The milk sold by the dairy company is pasteurized.

The results of the farm inspections were anything but favorable. Thus the average scores of all farms were 49 per cent on equipment and 44 per cent on methods. The average final score was 46 per cent, certainly a discreditable figure. To make the test as fair to the farmers as possible, since the government score card is somewhat severe on the small farmer who has little equipment, Dr. Drake prepared a tabulation rating the producers with respect only to those points on the score card that may be regarded as absolutely essential; such points as relate to cleanliness in all particulars, freedom from contaminating influences, cooling, and methods of storage and transportation. Out of the entire 200 points 125 such were selected, and in Table 31 there appears the classification of the farms with reference to good and bad showings on these points. It is assumed that any dairy deficient less than 10 per cent in prime essentials may be rated "very good,"



ONE OF SPRINGFIELD'S POOR DAIRIES

Note the lack of provision for light and ventilation. In the inspection of Springfield's dairies made for the Survey by the city and state health departments 102 out of 109 farms scored "bad" or "very bad." The city needs a milk inspector



SOMEWHAT BETTER

The concrete floor and deep gutter here shown are efforts in the right direction. The attempt to let in more light and to whitewash are also commendable. Reinspections of some of Springfield's dairies by the state health department a few months after the inspection for the Survey showed that 41 per cent of the orders for improvement, some of which called for radical changes, had already been obeyed

those deficient 10 per cent and less than 20 per cent as "good," those deficient 20 per cent and less than 30 per cent as "fair," those deficient 30 per cent and less than 50 per cent as "bad," and those deficient 50 per cent or more as "very bad."

TABLE 31.—DAIRY FARMS ACCORDING TO SCORES ON PRIME ESSENTIALS, SPRINGFIELD, 1914

Classified as	Deficient in essential points	Number of farms[a]	Per cent of total
Very good	Less than 10 per cent	1	0.9
Good	10 to 20 per cent	2	1.8
Fair	20 to 30 per cent	4	3.7
Bad	30 to 50 per cent	41	37.6
Very bad	Over 50 per cent	61	56.0

[a] Includes nine farms not selling or selling cream only.

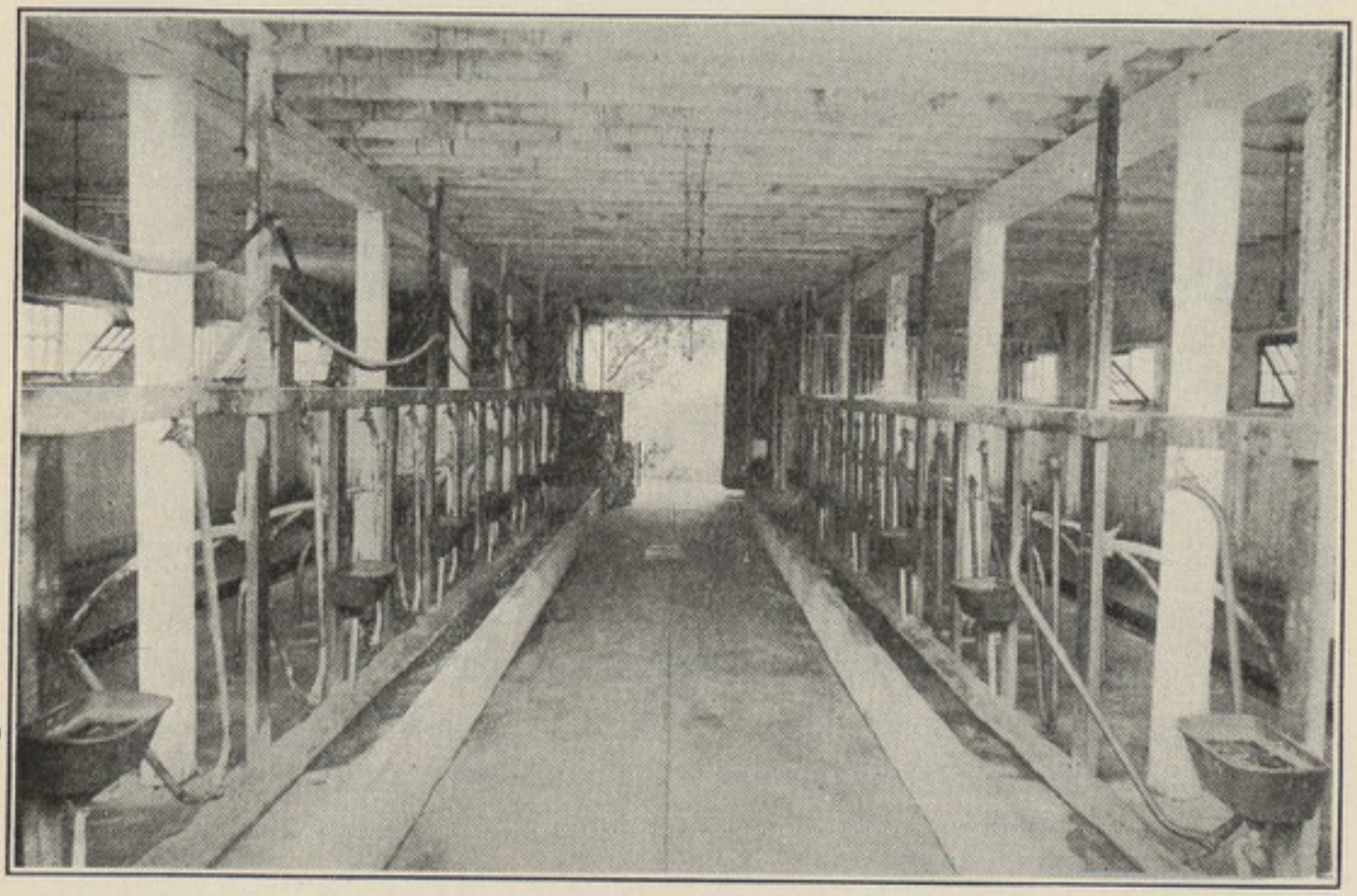
Comment on the above table is hardly necessary. Only three of the farms, less than 3 per cent of the total, earn the classification of "good," while over 90 per cent of them score "bad" or worse. There would seem no room for doubt but that the city needs to employ a milk inspector and to embark on a system of frequent and systematic farm inspection. In this connection it is encouraging to note that a reinspection of a number of the farms made later in the summer showed that considerable improvements had been made.

Information as to Springfield's milk production and dairy scores, classified according to the amount of milk produced and the manner of disposal, appears in Tables 32 and 33. The figures show that the small farmer is one of the serious problems met with in seeking to secure a sanitary milk supply, a fact which is generally recognized. The man with three or four cows, kept largely for supplying milk for the family and on account of their manure, usually makes very little profit from his milk sales, can afford very little in the way of equipment, and often would quit the business rather than clean up. At the same time it should be said that the public should be prepared to pay a fair price for clean milk and that experience in many places indicates that 10 cents a quart is not an excessive figure.

TABLE 32.—MILK PRODUCERS ACCORDING TO AMOUNT PRODUCED, SPRINGFIELD, 1914

Producing daily in gallons	Number of producers	Cows kept (average)	Gallons produced per day	Average scores			
				Equipment	Methods	Final	Per cent deficient in essential points
0–10	28	4.6	207	41.8	34.6	37.3	55.2
11–20	31	8.7	488	44.4	41.7	42.8	50.6
21–50	33	12.9	1,093	54.0	50.6	51.7	42.9
Over 50	8	29.0	562	67.4	61.8	63.6	32.9
Total	100	10.6	2,350	48.7	44.3	45.9	47.9

It is also evident from Table 33 that dairies selling direct to the consumer made the best scores, that those selling to middlemen were smaller and poorer, and that the poorest showing was made by dairies selling to the large milk company, and to bakeries,



IN ONE OF SPRINGFIELD'S GOOD DAIRIES

Note provision for good light and ventilation, cement floor with deep gutter, comfortable stanchions, and good receptacles for water and feed

confectioneries, and the like. In choosing a milk supply, however, cleanliness at the farm is not the sole criterion, as efficient pasteurization is highly desirable. Experience has abundantly shown that despite great efforts to secure cleanliness supplies may become infected, as by unrecognized "carriers" of communicable disease. The accumulated evidence also indicates that the early surmises that pasteurization can injure milk and cause rickets in infants are entirely groundless. Many of the best pediatricians, in fact, recommend boiled milk,—which is of course heated considerably higher than in pasteurization,—for infant feeding when a substitute for mother's milk must be employed. Clean milk is certainly to be desired and striven for, but proper pasteurization is the final essential for safety.

TABLE 33.—MILK PRODUCERS ACCORDING TO MANNER OF SALE, SPRINGFIELD, 1914

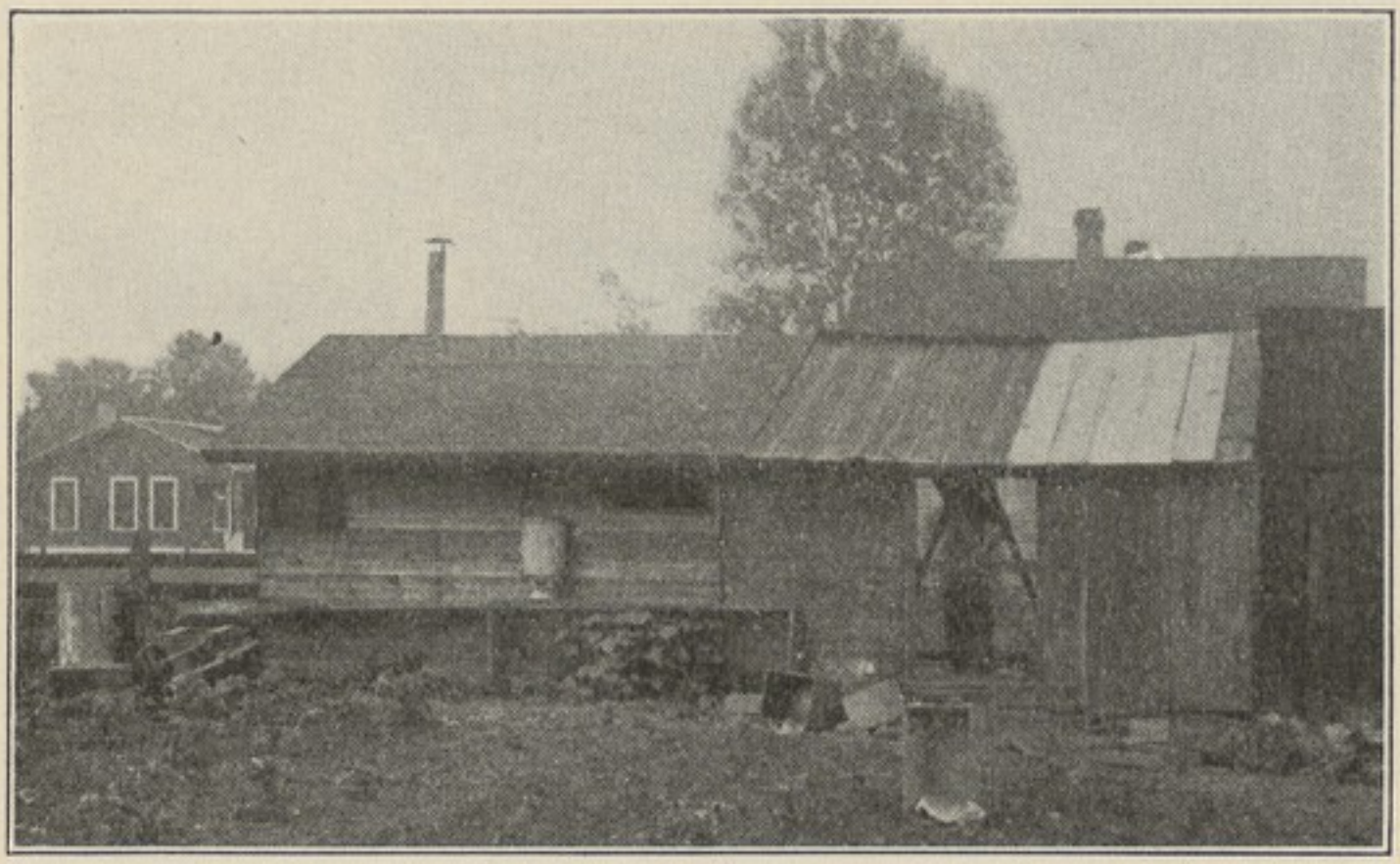
Manner of sale	Number of producers	Cows kept (average)	Gallons produced per day	Final score (average)	Average deficiency in essential points (per cent)
Directly to consumer	26	14.0	828	59.0	34.5
To middlemen	9	9.6	201	45.3	48.9
To stores, etc.	10	7.4	229	42.9	50.3
To dairy Co. "A"	55	9.7	1,092	40.3	53.7
Total	100	10.6	2,350	45.0	47.9

Although the city has no regular system of milk analysis, a few bacteriological examinations were made during the summer of 1914 at the instance of Dr. Griffith. Thirty-two samples were taken, all from delivery wagons. The results are as follows:

BACTERIA PER CUBIC CENTIMETER	NUMBER OF SAMPLES
Over 1,000,000	1
500,000 to 1,000,000	3
100,000 to 500,000	14
Less than 100,000	14
Total	32

The number of samples is too small to allow of judgment on the character of milk being supplied the city, but such as it is the showing is neither reassuring,—in view of the fact that all samples were from wagons and not from stores and so were relatively fresh,—nor alarming when compared with results in other cities.

Altogether it is entirely clear that the milk situation in Springfield needs attention. Dairy conditions were found to be bad and there is no city inspection service such as is necessary to keep track of the situation and secure the needed improvements. It



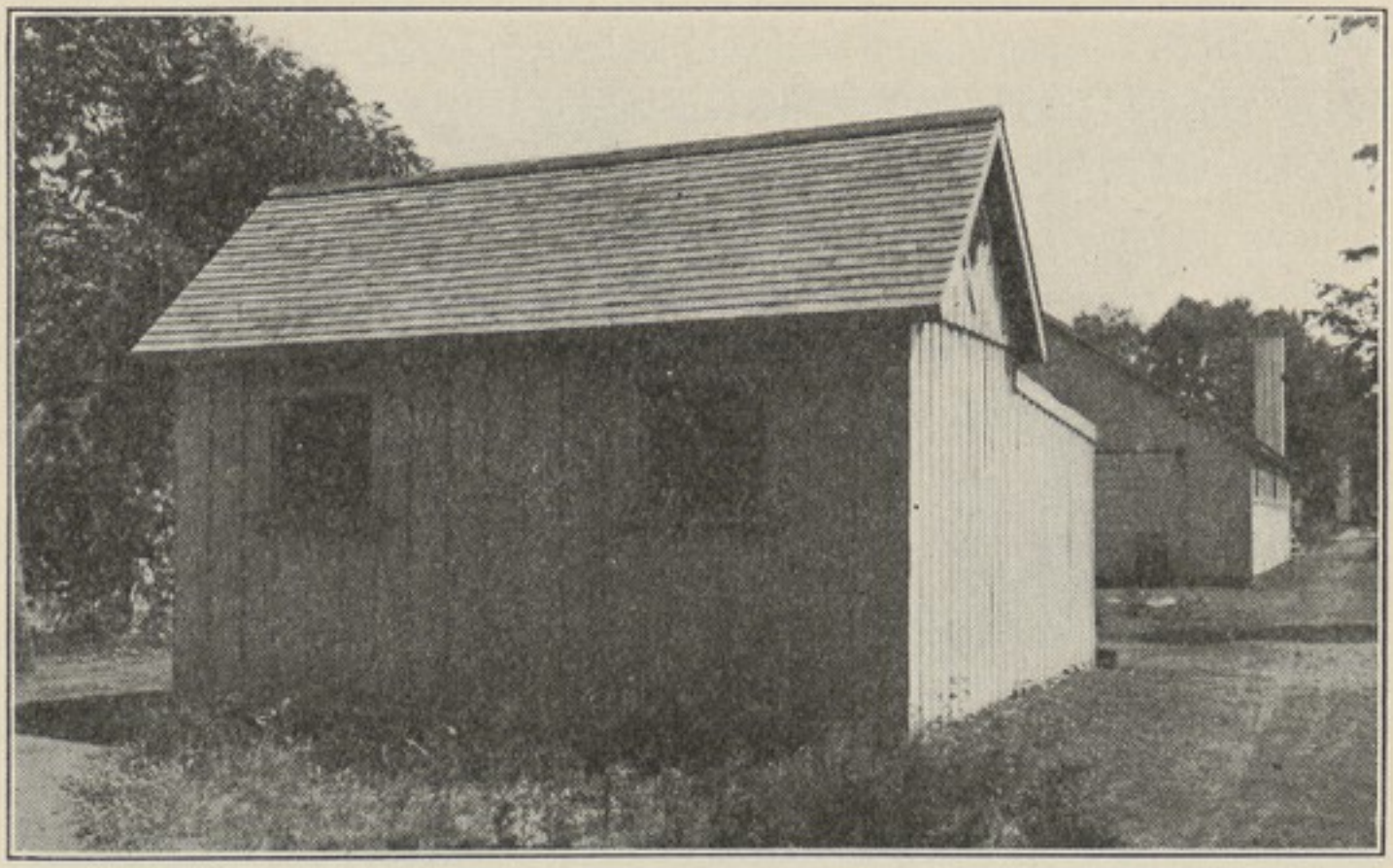
THE SMALL MIDDLEMAN

The milk house of a middleman who buys from farmers and bottles about 125 gallons a day. This place scored 50 per cent

may be stated emphatically that the city health department should be given a full-time milk inspector, a man competent to score dairies and examine milk. The activities of such an inspector should include the supervision of transportation and handling of milk and the making of tests of its temperature and bacterial content in transit and storage. The inspector should be furnished with means of rapid travel from dairy to dairy and should be paid a salary commensurate with the ability required. Incidentally it may be said that such a person will have little time

for relaxation in adequately covering the situation in a city of Springfield's size.

Granted an inspection system and a set of dairy rules, the other prime requisite is adequate publicity for the results of inspections. The health department should publish each month, or as often as practicable, a list of the inspections and analyses made, giving the particulars as to the name of the producer or dealer and whatever explanatory comment seems necessary. These results should be



A Good Milk House
Separate from the barn and with proper equipment for milk-handling

published in a health department bulletin and in the daily papers. Then every consumer will be able to know just what kind of place his milk comes from and just how it compares with other milk on sale. Such publicity is also a powerful stimulus to producers and dealers to improve their standing and makes them much more willing to listen to suggestions of the milk inspector. At the same time we may reiterate that the public should be prepared to do its part by paying a fair price for a more sanitary product.

XII

FOOD SUPPLY

The sanitary handling of the ordinary food products is a matter that has received more attention in Springfield than the sanitary production and handling of milk. The city has, for one thing, employed a meat inspector, while representatives of the state food commission have from time to time given more or less attention to conditions in the markets, groceries, bakeries, and the like. During the spring of 1914 one of the state inspectors devoted considerable time to Springfield, visiting some 134 places where food was handled or sold. The results of these inspections were placed at the disposal of the Survey through the courtesy of the state food commissioner, and some of the more important findings are brought out in Table 34.

TABLE 34.—RESULTS OF INSPECTION OF VARIOUS FOOD-HANDLING PLACES, SPRINGFIELD, 1914

(The Information Presented below is Taken from the Original Records of O. J. Lindstrom, State Food Inspector)

	Groceries	Meat markets	Restaurants	Candy shops	Total
Places inspected	55	16	28	15	114
Sanitary surroundings					
Good	40	12	24	12	88
Fair	13	4	4	3	24
Poor or bad	2	..	..	..	2
Floors					
Good	43	11	23	13	90
Fair	9	5	5	2	21
Poor or bad	3	..	..	..	3
Receptacles					
Good	43	11	23	13	90
Fair	9	5	5	2	21
Poor or bad	3	..	..	..	3
Implements					
Good	43	11	23	13	90
Fair	9	5	5	2	21
Poor or bad	3	..	..	..	3
Orders for improvement issued	63	17	33	19	132

It is reassuring to note that the general condition of the places visited is good, the showing being much better than in the case of the dairy farms, which are out of the consumer's sight and also not subject to the same amount of inspection. At the same time it is a fact that some dirty places exist in Springfield and that some order for improvement was issued in a very considerable proportion of the places visited. The conclusion is that while conditions are in general good, a city inspection service which can keep the

A Springfield Bakery

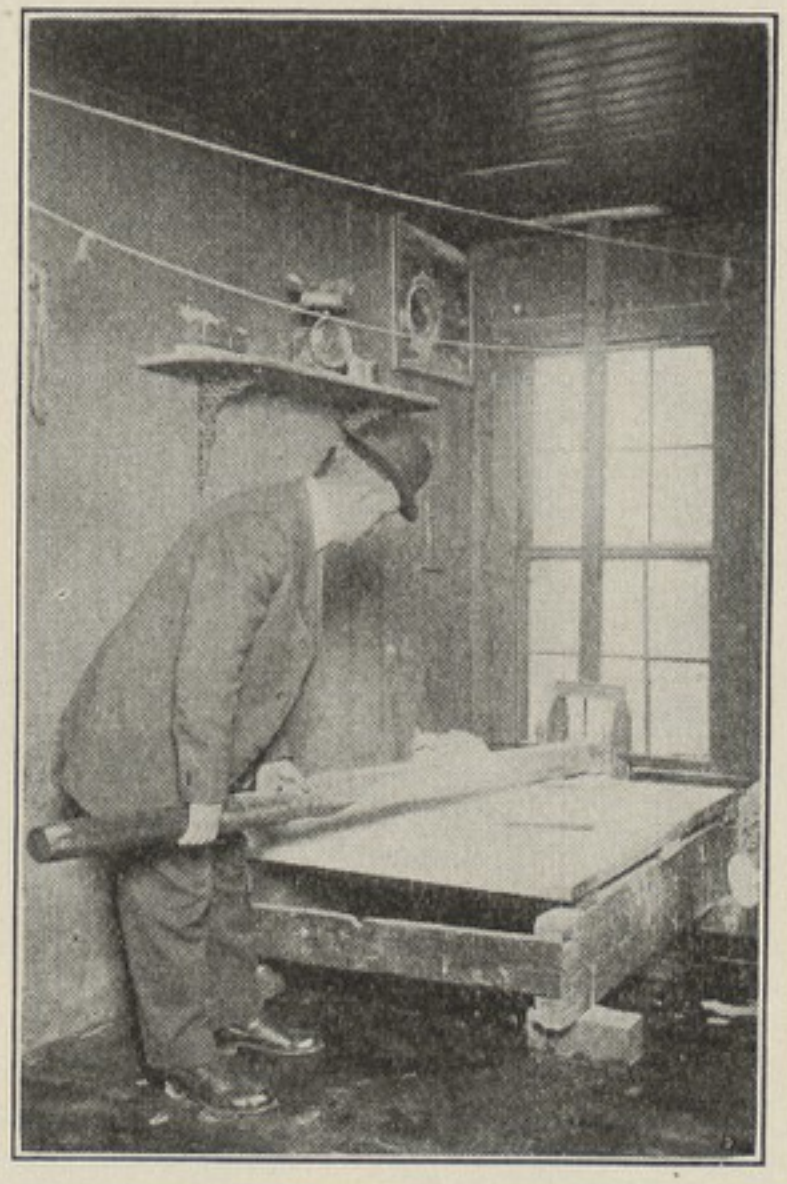
Declared unfit by the state food inspector and ordered closed pending improvements. Mixing room to the right; bake room at the center of the picture. The last shed to the left is the privy

situation under more constant supervision than is possible for the state authorities would be an advantage.

Perhaps the most serious conditions disclosed by an examination of the state inspector's records are those relating to the toilet and washing facilities in these food-handling places. In a considerable proportion of instances the ordinary privy was in use, while many of the flush toilets found were either not enclosed or lacked outside ventilation. In view of the abundance of flies usually in the neighborhood of food-handling places and the opportunities the common privy gives flies to pick up infectious

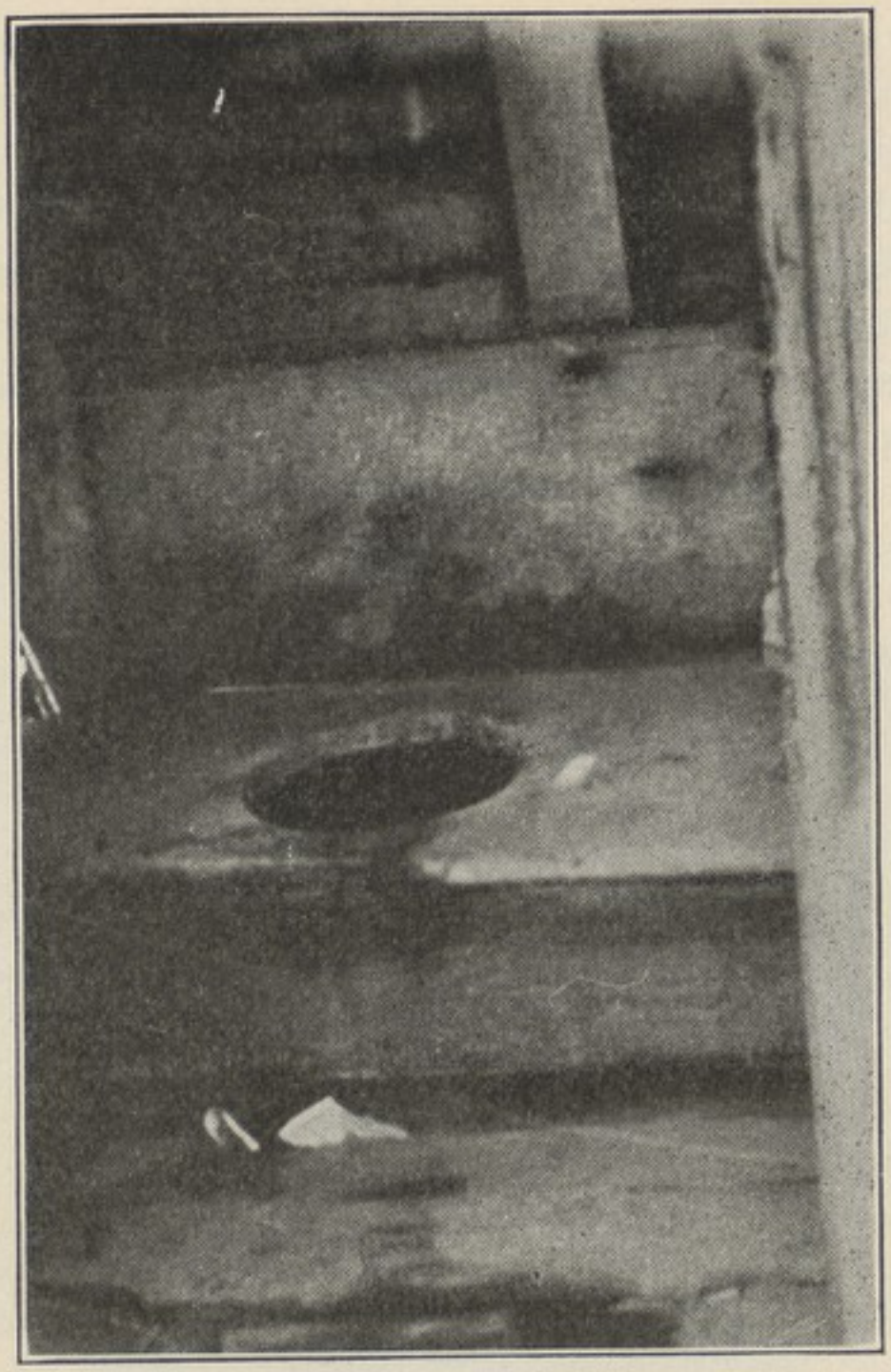
material, it is not only reasonable but important to require such places to make use of the city water and sewer services wherever the latter are available. When privies must be used special effort should be made to have them in a sanitary condition. The accompanying illustrations give an idea of what some of the privies now used by markets and bakeries are like.

The present city meat inspector is a practical butcher and de-



DOUGH KNEADER IN BAKERY SHOWN ON OPPOSITE PAGE
Photograph taken while the clean-up was going on. The city has no systematic inspection of such places

votes his time and efforts entirely to the inspection of meat, meat markets, slaughter houses, and sausage factories. The supervision of seven slaughter houses on the outskirts of the city and of a certain amount of killing in the outlying country receive about two-thirds of his official attention, the rest being devoted to the supervision of some 75 meat markets. The inspector cannot, on account of limitations of time and place, be present at all the

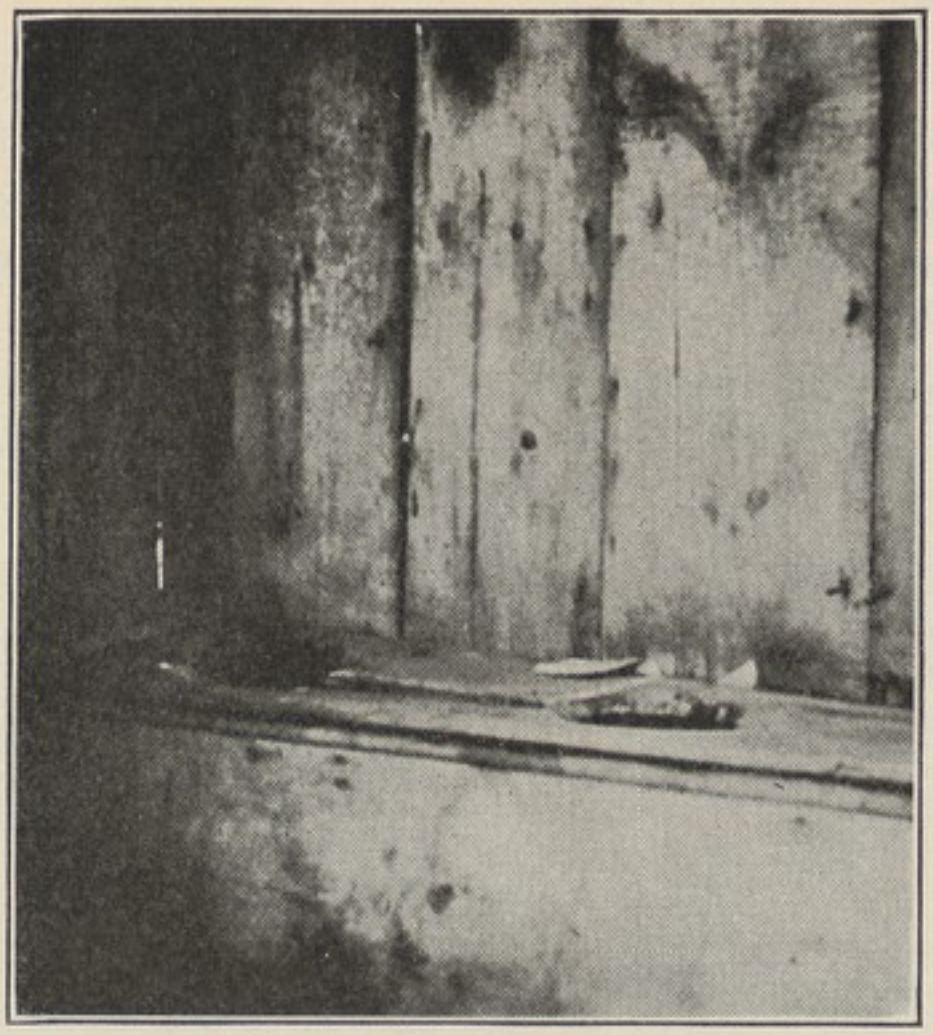


TOILET FACILITIES IN FOOD-HANDLING PLACES

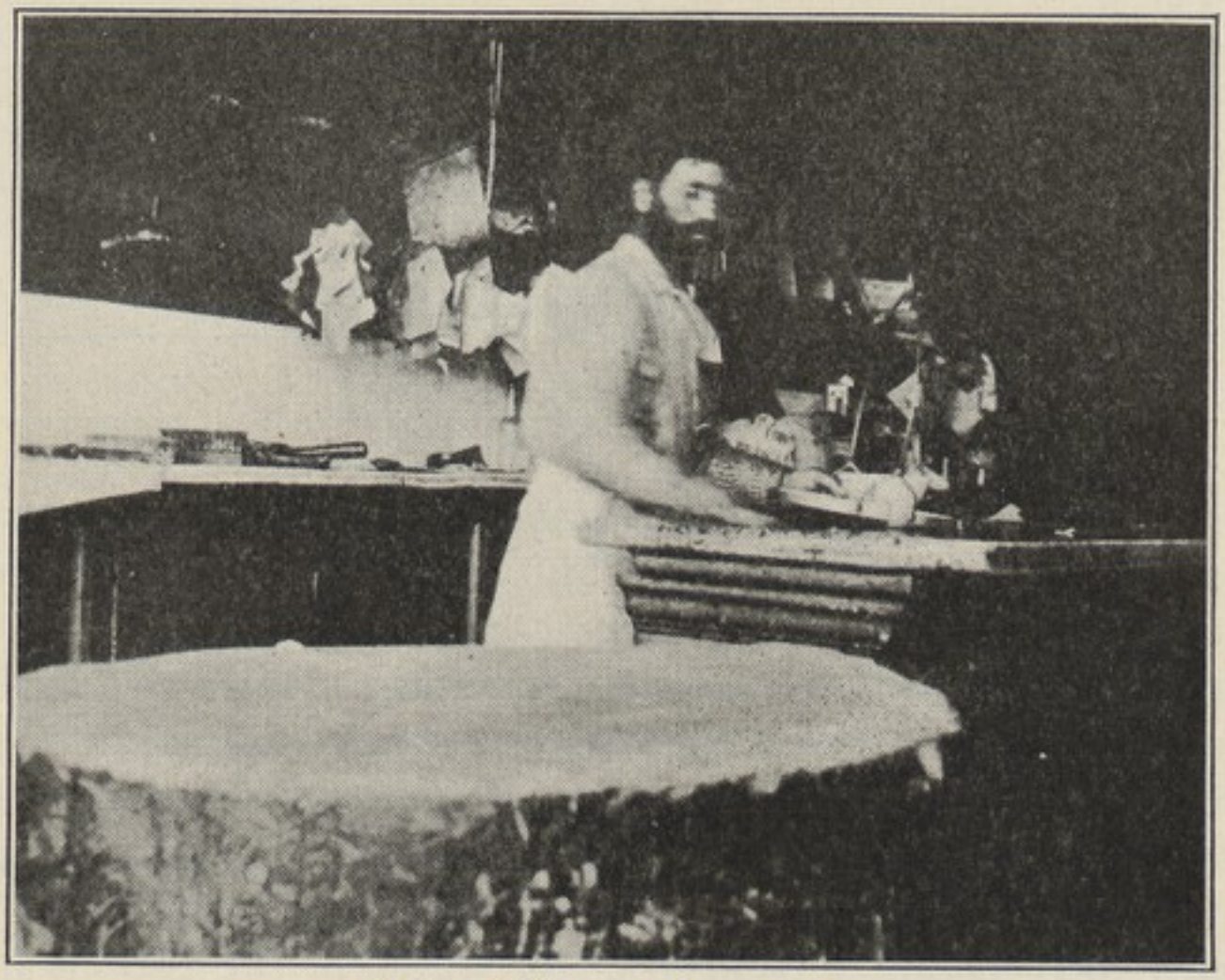
This privy is the sole toilet provision of a Springfield grocery store
On account of the dangers of fly infection a special responsibility rests on food-handling places to be provided with sanitary toilets

killing operations; he tries, however, to see all the stock on the hoof and requires any suspicious looking animals to be killed in his presence. Some of the country-slaughtered meat is brought into the city dressed and without previous inspection, which makes it practically impossible to determine whether the animal was healthy or diseased.

The inspector points out the advantages incidental to a central municipal abattoir where all animals slaughtered could be inspected by him at the most important time—that of killing.



A Meat Market Privy
Another bad example



Meat Market Interior
This is the market maintaining the privy shown above
Conditions were poor but the proprietor was trying to make the improvements demanded by the state food inspector

With such a plan in operation the slaughter of animals elsewhere in the city and the bringing in of country-slaughtered but uninspected meat would of course be forbidden. All meat shipped in by railroad has been inspected by the federal government. The details of the meat inspector's activities, taken from his reports for the first four months of 1914, are shown in Table 35.

TABLE 35.—WORK OF CITY MEAT INSPECTOR, SPRINGFIELD, JANUARY 1 TO MAY 1, 1914

Animals	Number inspected	Number condemned
Cattle	1,177	3
Hogs	4,436	5
Sheep	406	..
Calves	807	5
Total	6,916	13
Dressed meats and fish	**Pounds inspected**	**Pounds condemned**
Beeves	6,267	540
Hogs	5,520	360
Sheep	2,452	70
Calves	2,029	90
Pork sausage	435	435
Liver	135	135
Hamburger steak	40	40
Spare ribs	225	225
Fish	50	50
Total	17,153	1,945

To sum up the situation, Springfield's markets and groceries appear to be up to the average but open to improvement in a number of instances and in a number of ways, more especially with respect to toilet and lavatory facilities. Up to the present the city has relied for its food protective service on the state food inspectors and one meat inspector of its own. The latter is confronted with an abundance of work in looking after local slaughtering and meat in markets, and it is clear that there is need for another food inspector to keep closer watch of the various food shops, restaurants, and candy and ice cream shops and factories. Such an inspector could co-operate with the milk inspector in his

supervision of the handling of milk within the city and could relieve the meat inspector of much of the meat market and restaurant inspection that he must now attempt. It should also be

IN THE REAR OF A MEAT MARKET

Immediately behind the barrels is a smoke house which was in poor condition. The peak-roofed building behind the smoke house was used for slaughtering and was in filthy condition, being littered with remains of animals that had been some time killed. The place was drawing and feeding flies

noted that a central city slaughter house would greatly economize the meat inspector's time, would allow of more efficient inspection on his part, and would probably result in much cleaner slaughtering conditions.

XIII

OTHER SANITARY CONDITIONS

As has already been pointed out, two important sets of sanitary conditions, those surrounding children at school and workers in industry, are discussed in other sections of the Survey dealing specifically with the public schools and industrial conditions. At

PHYSICAL EXAMINATION OF CHILDREN IN SPRINGFIELD'S SCHOOLS

The board of education now employs two nurses to make regular inspections of school children. This is work in the right direction; it should be extended, and the examinations made more intensive through the employment of a physician

this point it is accordingly necessary merely to re-emphasize the importance of these subjects. The supervision of work conditions to ensure the proper guarding of dangerous machinery and the absence of injurious fumes and dusts or other insanitary conditions is delegated in Illinois, as is usual, to the state labor authorities; and there is no reason to believe that this is not the proper

method of administration. Still, such state authorities are commonly handicapped by inadequate resources and there is little reason to doubt but that a wide-awake and properly equipped local health department could do considerable that would be useful in protecting its citizens engaged in industrial pursuits.

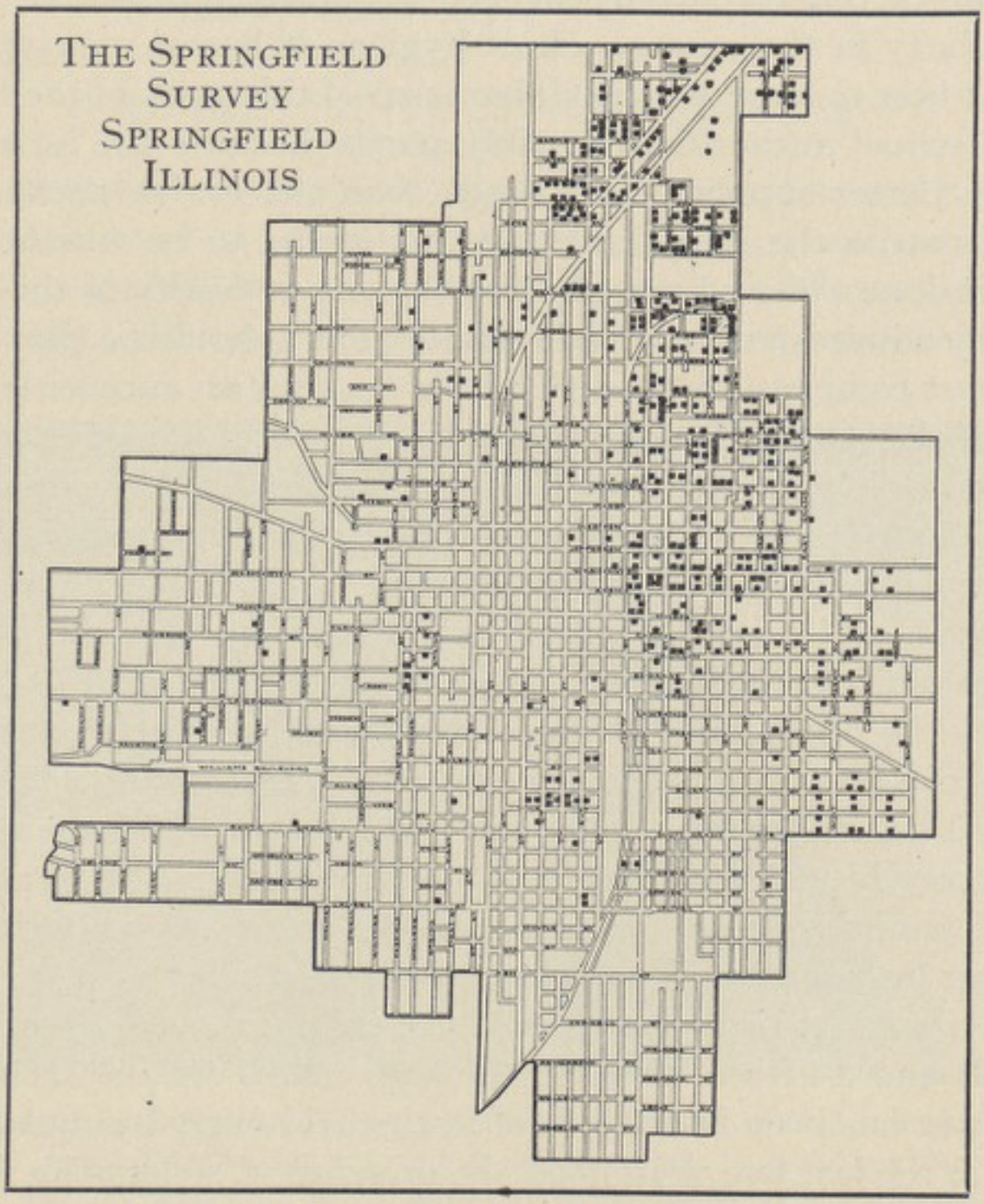
Similarly in the case of school hygiene it has in many places seemed best to leave the administration of this work in the hands of the school authorities, possibly partly because the latter are usually better supplied with funds than the health authorities. At all events the important question seems to be whether the work is done well and not whether the one authority or the other actually administers it. And certainly there should be the closest and most complete co-operation between the two authorities. In Springfield a start has been made on the school hygiene problem by the employment of a school nurse by the board of education. This is a step in the right direction but, as has been pointed out in Dr. Ayres' report on the school system,* more nursing assistance is needed, to be supplemented by the services of a physician.† The possibility of the joint employment of such additional persons by the board of education and the health department is well worth consideration. The health department needs additional medical assistance for the supervision of quarantine and might find it possible to share a medical inspector with the school authorities. Similarly the school nurses might be employed during the summer on infant hygiene work. Attention must also be drawn to the fact that three-quarters of the children in the elementary schools and a fifth of those in the high school are unvaccinated. Smallpox has been in and out of Springfield fairly frequently (87 cases in the last five years) and the presence of so large an unvaccinated population is an element of risk. It is unnecessary to comment on the unpleasant, embarrassing, and expensive aspects of locking the barn after the horse has been stolen.

Another matter, and one that is of first-rate public health importance, is the handling and disposal of manure. Without privies and sick people the fly would not be dangerous, and with-

* Ayres, op. cit., p. 105.

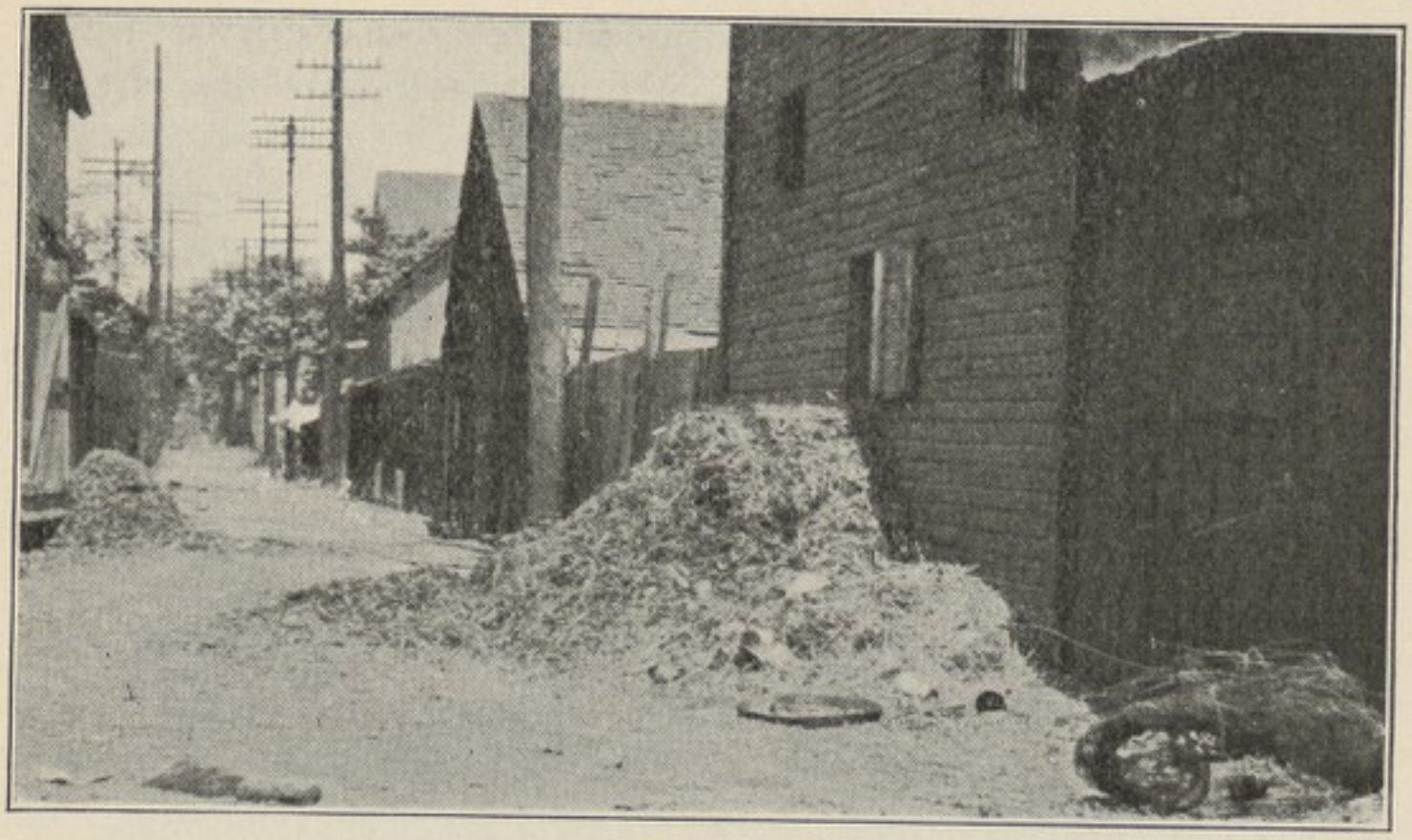
† Subsequent to Dr. Ayres' investigation the board of education employed a second school nurse.

out horse manure it is probable that flies would be relatively few. At all events manure is their favorite breeding material and in a campaign against them is ordinarily the point to concentrate on. The health department inspectors were instructed to keep watch



MANURE ACCUMULATIONS IN SPRINGFIELD, 1914
Each black square represents a manure accumulation found by the city inspectors—420 in all

for manure accumulations in their house-to-house canvass for wells and privies, and 420 such accumulations were noted, distributed as indicated on the accompanying map. The illustrations give an idea of the way in which this material is to be found piled in Springfield's alleys. The city should require tight containers for



WHERE FLIES BREED

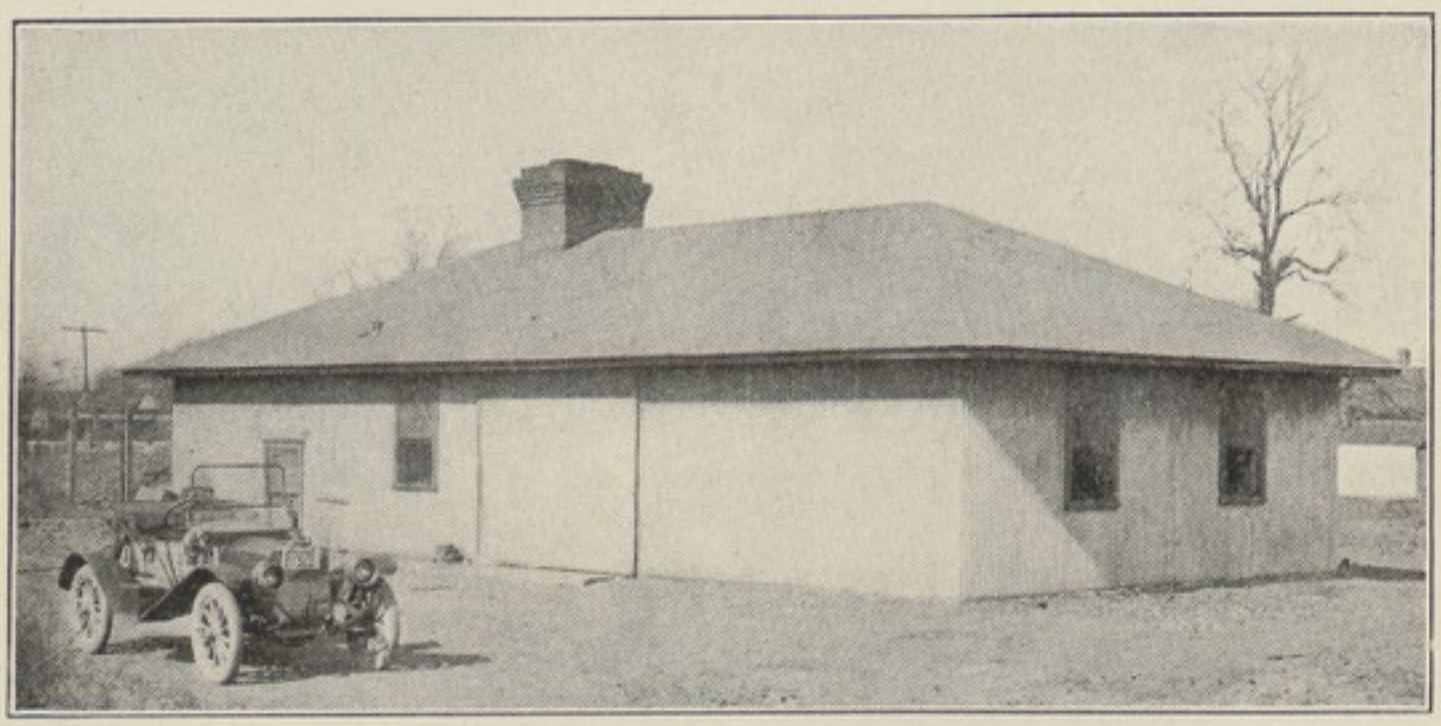
This picture and the one below give an idea of the manure accumulations to be found in Springfield. Horse manure is the fly's favorite breeding place

ANOTHER EXAMPLE OF SPRINGFIELD'S MANURE PROBLEM

In order to prevent fly breeding the city should adopt and enforce regulations prescribing how manure shall be kept and disposed of

manure, and weekly removal. The way to swat the fly at its source is to restrict its efforts to deposit eggs in manure and other organic matter, and to keep any such eggs from hatching out, at least within the city.

Two other subjects intimately related to civic decency and having some public health bearings are garbage disposal and housing. A general discussion of the housing situation in Springfield appears in a separate section of the Survey devoted to that subject.* It is to be hoped that the city will see the wisdom of



THE CITY REFUSE INCINERATOR

Anyone may bring refuse material to the city incinerator and dispose of it free of charge, but there is no general or compulsory system of collection such as is essential for civic cleanliness. The collection and disposal of garbage and other wastes are engineering matters and any attempt to meet these problems should be preceded by careful engineering studies

adopting a housing code to insure itself against the construction of unserviceable and indecent buildings, and that it will have its building inspection service keep the situation under supervision. It would seem best that such a service be concentrated, as far as practicable, under the building department, as the latter must pass on all buildings when first erected and is the department most familiar with the various details of a housing law.

Similarly in the case of garbage and refuse disposal, although the importance of garbage as a breeding place for flies and as a

* Ihlder, John: Housing in Springfield, Illinois. (The Springfield Survey.)

source of all sorts of vague deleterious effects on health has been the subject of even grotesque exaggeration, it must be acknowledged that the city should stand for decency; and it is indecent to tolerate alleys or yards littered with garbage, or haphazard systems of collection and disposal. The city of Springfield is at present in the somewhat anomalous position of maintaining a garbage incinerator but no collection system. Anyone may bring his material to the city incinerator and there dispose of it free of charge, but no one is under any compulsion to do so. The result is poor collection and considerable complaint over conditions throughout the city. It is also said that the lack of system in collection results sometimes in the arrival at the incinerator of greater quantities of material than the plant is capable of handling, while at other times the plant may be standing idle.

In considering this problem Springfield will do well to remember that the collection and disposal of garbage are engineering matters and that investigation by competent engineers before embarking on any plan is the part of wisdom. As in the case of sewerage and sewage disposal, the proper type of refuse disposal works depends to a certain degree on the type of collection system, and vice versa; while both depend on the nature of the material to be handled. The first thing for Springfield to do is to make up her mind what she really wants to accomplish in the way of collection; after that she should call in the engineers.

XIV

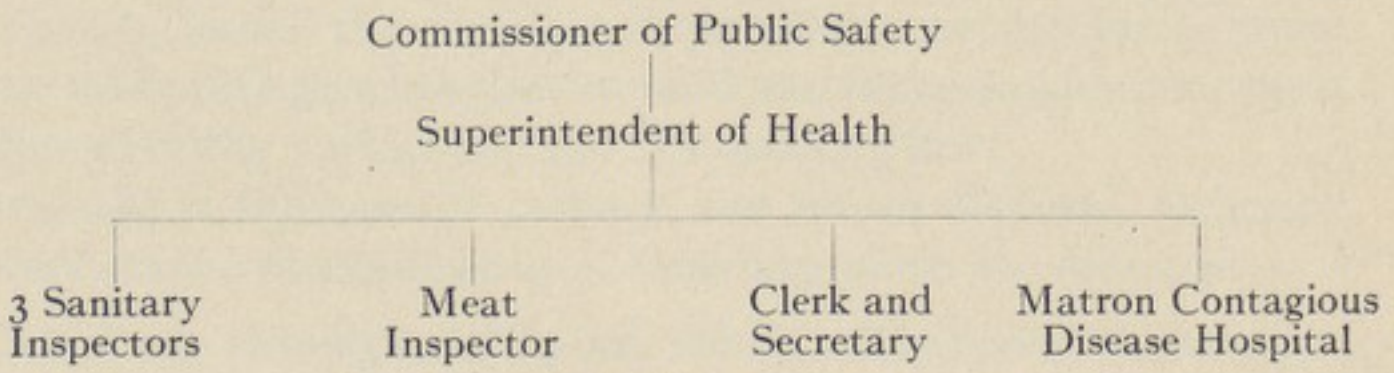
SPRINGFIELD'S PUBLIC HEALTH SERVICE

Having now considered the loss of life and health in Springfield from the preventable diseases, and the city as a sanitary environment, the question that remains for discussion relates to the machinery which the city government has created to cope with its health problems; that is, the city health department. Some discussion of the health department's activities has already been given in the sections of this report dealing with the communicable disease problems. In the present chapter attention will be given to the department as an organization,—to its staff, financial resources, deficiencies, and the improvements needed.

THE PRESENT HEALTH DEPARTMENT

The staff of the city health department consists of a part-time health officer, a secretary-clerk, a meat inspector, three sanitary inspectors, and the matron of the contagious disease hospital. The department's physical equipment consists of an office with a small laboratory in the city hall, and the contagious disease hospital situated beyond Oak Ridge Cemetery. An assistant superintendent of health was formerly employed at full time but when he resigned during the summer of 1914 the office was done away with and a young woman appointed as secretary and clerk instead. The health officer is appointed by the commissioner of public safety for an indefinite period and may be removed by the latter at pleasure. The scheme of organization is as shown in the diagram below.

PRESENT ORGANIZATION OF THE HEALTH DEPARTMENT, SPRINGFIELD, 1914



The routine work of the department is represented largely by the activities of the three sanitary inspectors, and consists principally in placarding and fumigating reported cases of contagious diseases and in abating nuisances. Most of this work is of a reflex character; that is, in response to complaints; some original work, however, is instituted. The work of the meat inspector has already been described.* The isolation hospital receives cases of the common contagious diseases and boards them free of charge.

DEFECTS IN THE EXISTING ORGANIZATION

Most of the defects in the present organization relate to deficiencies in the service rendered and may be considered more conveniently under that head. The most serious defect that is not an out-and-out deficiency is the part-time employment of the health officer. The part-time system is a relic of days when health department work was regarded as merely an emergency provision in the event of epidemics, on which occasions the health officer could be called on for a heavy contribution of time. At other times the health officer presumably would have nothing to do. Since those days we have come to know that a great health and life wastage is going on even in the absence of epidemics, and that the health department can and must prevent this steady wastage. We have also come to realize that health departments should prevent epidemics and not merely curb them after they are well established. These modern ideas of the health department's usefulness and functions call for a continuous, ever-watchful campaign against disease—and for the full-time health officer. Of this there can be no doubt whatever.

Springfield finds it worth while to employ a full-time superintendent of schools at a salary of $5,000 a year. If the city wishes to take advantage of the developments of sanitary science and to make a serious attempt to eliminate the 200 odd deaths a year occurring from preventable diseases, it will do well to employ a health officer on a similar basis. This is clearly one of the greatest improvements that can be effected in Springfield's health department.

* See page 105.

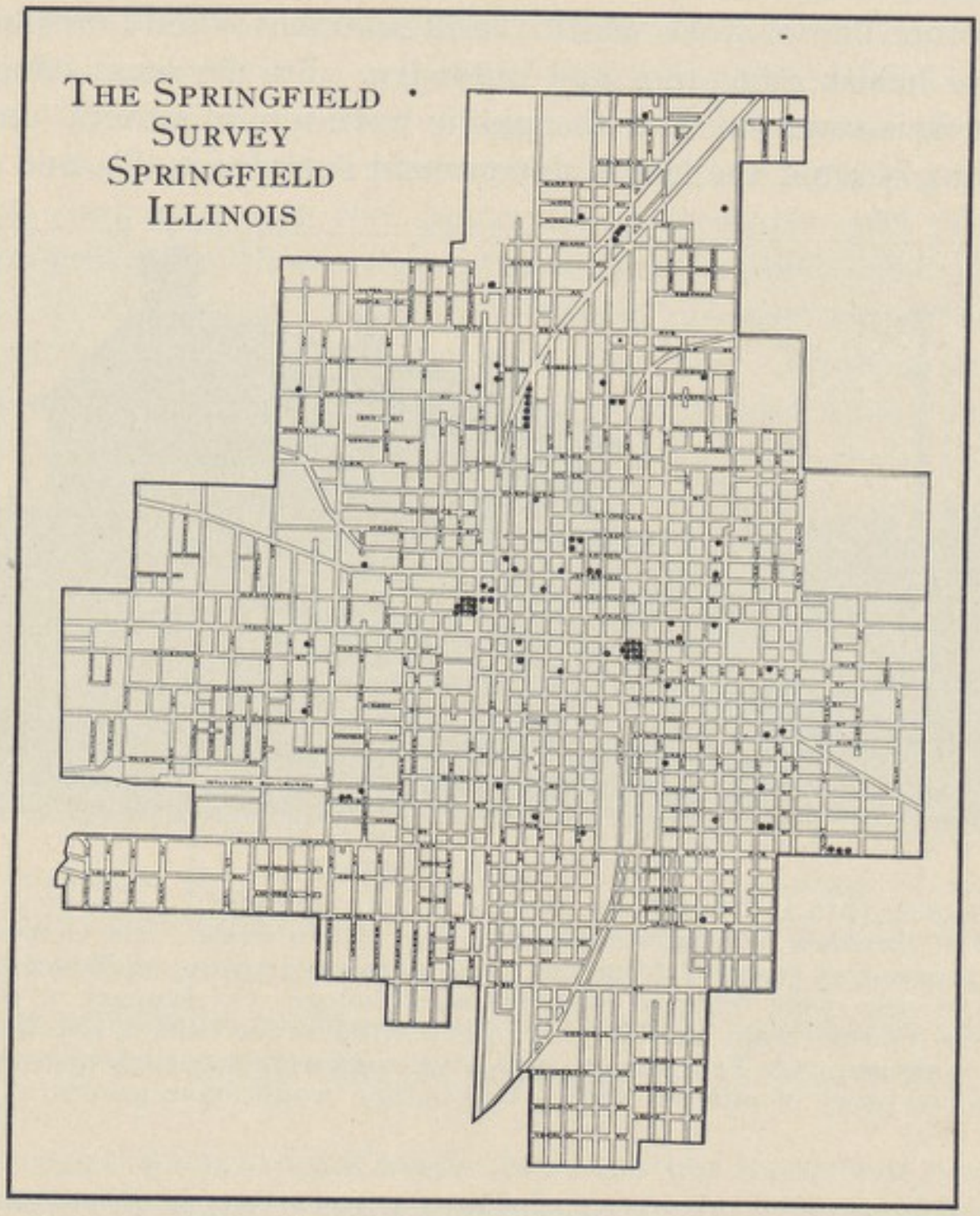
Another detail in the present organization that offers possibilities for detrimental results relates to the manner of the health officer's appointment. This officer is now entirely subordinate to the commissioner of public safety. The latter can remove the health officer at will and can reverse that official's slightest decision. It would seem that this condition would tend to make the position unattractive to a man of the caliber needed, and would, furthermore, seem likely to subject the health officer and his decisions to political pressure. Many of the health officer's orders are necessarily burdensome to the individuals affected, and if any of these individuals should be influential politically and the commissioner of public safety be susceptible to pressure, there is a very real possibility that the health officer's ruling might be interfered with. Such an occurrence would be fatal to the morale of the health department. It is well worth considering whether it is preferable to weaken the health office in this way or whether it would not be better to appoint the health officer for a definite period and make him removable only for cause.

DEFICIENCIES IN THE PRESENT SERVICE

As has already been noted, important deficiencies exist in the present city health service. Thus two of the most important opportunities for life-saving, campaigns against infant mortality and tuberculosis, are quite neglected, while the work to control the common communicable diseases is open to radical improvement. Emphatically, properly trained nurses should be employed and a beginning made on the infant and tuberculosis work. If lack of funds absolutely prohibited this it would even be worth while considering the substitution of nurses for one or more of the present sanitary inspectors. Nuisance abatement is a practical necessity, but it is not a matter of life and death like work for infants. Some authorities, in fact, declare that nuisance abatement is more properly a function of the police department. To re-enforce the work of the nurses a free tuberculosis clinic, such as is maintained by the Anti-Tuberculosis Association, and a free baby consultation station * to which sick infants may be brought, are necessary.

* See page 23.

The need for an epidemiologist* (a person qualified to study the progress of the communicable diseases and to check up on the measures to be taken for their control) and for a milk inspector†



SMALLPOX IN SPRINGFIELD

Cases reported to the health department in 1909–1913. Smallpox is one of the most contagious of diseases and is extremely hard to control by ordinary methods of isolation. Vaccination is by far the most effective barrier to the disease

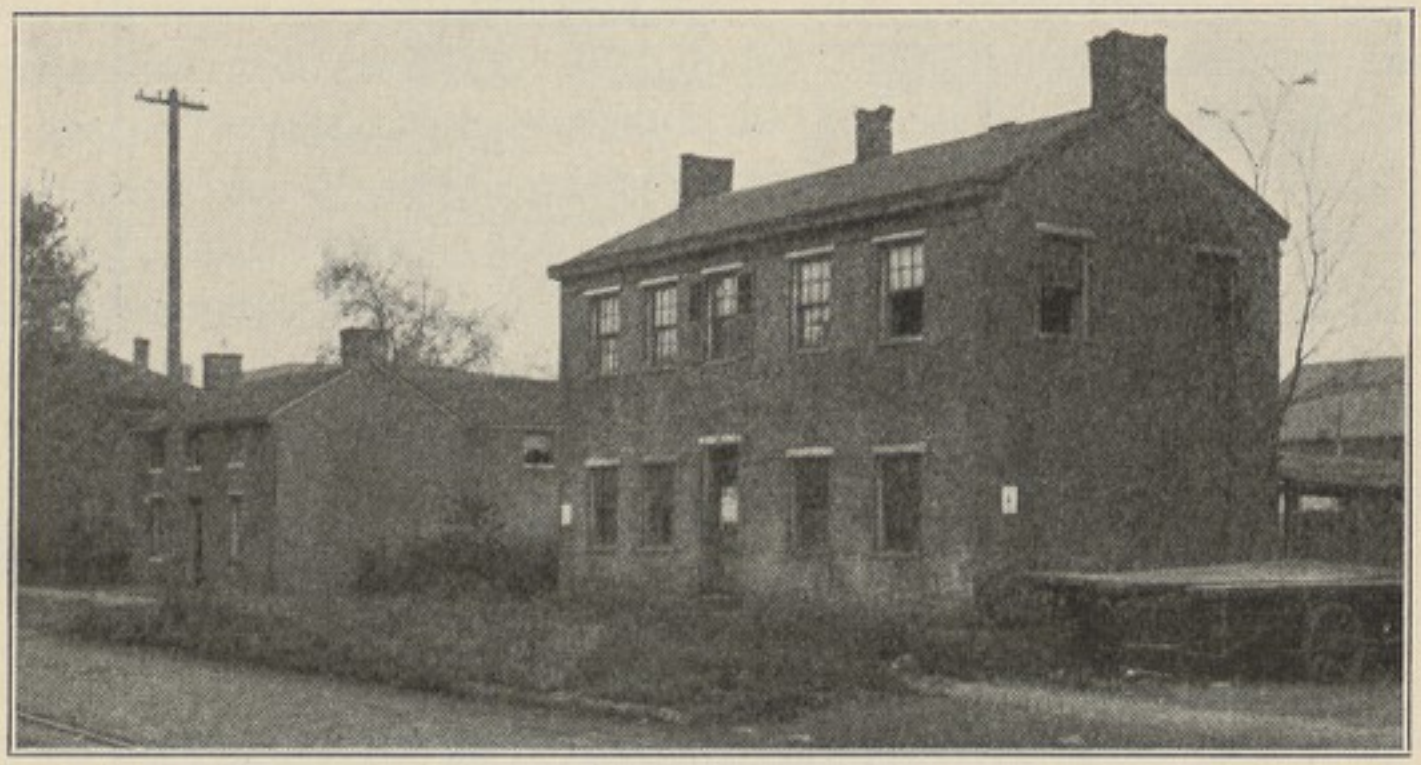
have been discussed elsewhere, and are real and urgent. A food inspector to supplement the activities of the meat inspector would

* See page 63.

† See page 101.

also be a benefit; and it is probable that when all the work that is recommended is under way the department will require a laboratory man for the examination of milk and water and for the laboratory diagnosis of the communicable diseases.

Another line of work which the department should develop is that of health education and publicity. For its most effective labors it is essential that the public have a sympathetic understanding of what the health department is trying to do, and that



How Smallpox Spreads

Houses at 1016 and 1008 East Monroe Street, Springfield. The incubation period of smallpox is usually about ten days to two weeks. On October 28, 1911, a case was reported from the house numbered 1016; on November 12 six more cases were reported from the same house. On January 3, 1912, a case was reported from number 1012, a house that stood back of and between the two shown. On February 7, 1912, two cases were reported from 1008½, the second story of number 1008. Vaccination would have prevented these cases

the public receive advice on the best ways to avoid infection and on other subjects of public health importance. To this end many departments find it advantageous to distribute a bulletin, which should be accurate, and simply and attractively prepared. It should be made understandable to all,—and not merely a compilation of unintelligible and insignificant statistics. The cooperation of the newspapers should also be secured and they should be furnished with interesting copy such as they would care to use. Lectures and exhibits may be arranged, and moving

pictures utilized. Some such efforts have been made in the past by the Springfield health department; and they should be continued and extended.

The importance of an adequate annual report should also be emphasized, the form preferably to follow in general one of the excellent standard forms prepared by certain public health associations. In this connection a word of praise may be given to some of the department's past reports, which are certainly creditable as compared with the department's resources and deserve to be published with greater regularity and in fuller form.

The record keeping of the department has been rather better than the average found in cities of similar size. Minor improvements can be made in the manner of keeping and filing some of the present records, but the most radical suggestions relate to new and fuller records, as in the case histories of communicable disease. The keeping of these records is, however, contingent on the initiation of new inspection work such as has been outlined elsewhere in this report. The situation regarding the sanitary code is somewhat similar. The old code is admittedly unsatisfactory, and a new one has been drawn up, but had not been passed on by the commission at the time this report was prepared. It would seem, however, not so important to have a new code complete in every particular (many provisions of which could not be enforced with the present staff), as that the health officer be able to have ordinances passed as needed authorizing work he especially wishes to prosecute. The ordinances should be printed as often as may be necessary for the convenience of citizens.

The registration of vital statistics is another important branch of the work in which improvement should be made, although in this case the responsibility rests more particularly with Springfield's physicians. In examining the death certificates on file it is evident that there is a pronounced tendency to certify symptoms as the cause of death, or to certify vague and indefinite causes. There is also confusion as between the primary and contributory causes of death, an all-too-common failure to grasp the fact that by "primary cause of death" the census office means the disease primary in point of occurrence and causation. If a child ill with

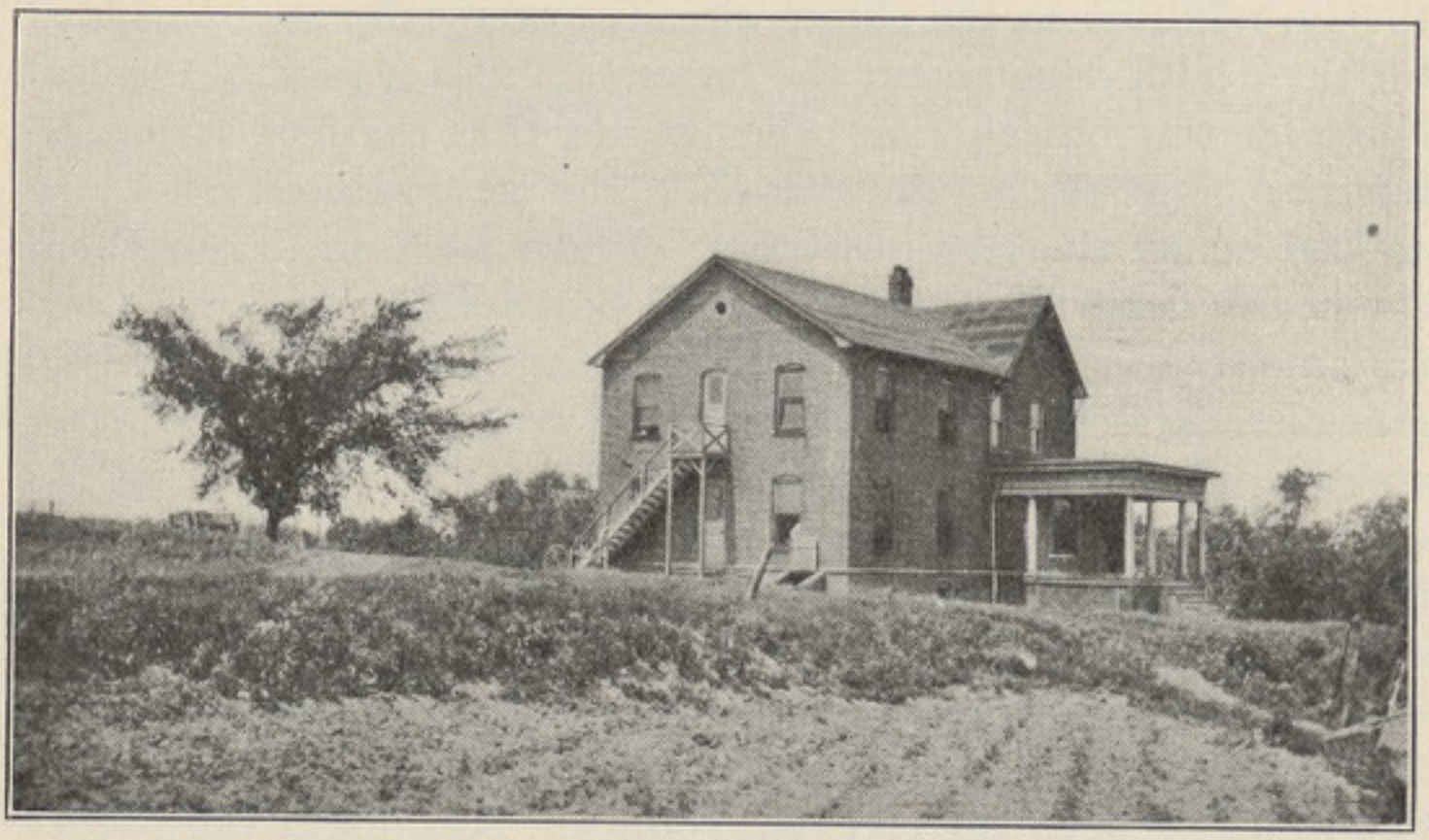
measles becomes greatly weakened and dies with pneumonia as the final complication, measles and not pneumonia is the primary cause of death. Similarly, to certify that an infant has died of inanition (lack of nourishment) or marasmus (wasting) is about as illuminating as to say that death was due to shortness of breath.

If we are to get on with the prevention of deaths and an understanding of local situations we must get nearer the real cause of death. There is no excuse for such examples of poor workmanship on the part of trained professional men, especially as the census office has issued and distributed to all doctors convenient vest pocket booklets setting forth just what is wanted and just what constitutes bad certification. In fact, general directions as to certification are printed on the back of every standard death certificate signed by a doctor, but one must conclude that these directions are far too seldom read. All of Springfield's physicians should realize that the accurate certification of death is a matter of first-rate public health importance, and the health department should apply firm pressure to this end.

A word must also be said regarding the contagious disease hospital. This institution, the appearance of which is shown in the accompanying picture, is located northwest of the city near Oak Ridge Cemetery and is maintained jointly by the city and county, although only city patients are received. No charge is made. The building has 14 rooms and is stated to have capacity for 12 smallpox patients and 20 cases of other diseases. The hospital is under the immediate care of a matron and under the general supervision of the health officer. No medical staff is in attendance, reliance being placed on the patient's attending physician. The medical equipment is slight. In considering the value of the hospital it must be admitted that its location at such a distance from the city is unfortunate. It might be called the Isolated Hospital. This isolation means a longer ambulance ride for the patient and greater difficulty in securing nursing and medical service. A properly maintained contagious disease hospital is no danger to its immediate neighborhood and should be centrally located.

Taking the hospital as it is, there is need for renovating much of the equipment and for making the surroundings more attrac-

tive. With the above defects in mind it may be stated that the hospital probably meets its present purpose—that of a boarding house for persons with contagious disease—fairly well. While this purpose does not realize the ideal of a contagious disease hospital it does allow of useful service in taking infectious patients out of homes where proper isolation cannot be maintained or where the patients cannot have decent care.



THE CONTAGIOUS DISEASE HOSPITAL

Maintained jointly by the city and county but taking only city patients. Its isolated location (beyond Oak Ridge Cemetery) is a disadvantage both as it affects the transportation of patients and the securing of medical service; whereas a properly maintained contagious disease hospital is no danger to its immediate neighborhood and should be centrally located. The needs of the present hospital are for renovations in its equipment and for greater attractiveness in the building and its surroundings

The employment of nurses has been advocated a number of times in this report, the particular work for which they were recommended being in connection with tuberculosis, infant mortality, and the supervision of cases of contagious disease. Recommendations have also been made for the institution by the city of free clinics for poor persons suffering from tuberculosis and the venereal diseases, and for the dissemination of information relating to baby hygiene. At this point it may not be amiss to

point out the opportunity for the correlation of such work with other work of a medical nature already performed by the city. The work referred to is that now carried on by the city physician. A considerable part of the latter's time is already taken up with cases of communicable disease, such as syphilis, and in the course of this work he acquires much information of public health significance—information that would be of value to the health authorities in their efforts to control infection. The suggestion is offered that in addition to the clinics already specifically recommended for the health department the latter establish a general medical clinic for the indigent; in other words, that the health department be given the administration of the medical poor relief now carried on by the city physician. Under such an arrangement the health department nurses would be available for home visiting among the sick poor, as would the health department medical man already recommended. This plan would seem to offer better treatment for the sick poor, more efficient administration of the city's medical relief, and an advantage to the health department in its efforts to discover sickness and contagion throughout the city.*

One other point regarding the organization of health work in Springfield may be noted—the possibility for advantageous cooperation between the city and county. At present the county carries on practically no public health work, which is a serious disadvantage to county residents outside of Springfield and to residents of the city itself. The county residents need protection on their own account, and many of them live just over the city limits so that infection among them is a danger to residents of the city proper. This last point is recognized by the city in setting up its jurisdiction, as far as quarantining contagious diseases is concerned, for a distance of a half mile beyond its borders. Under similar conditions a number of American communities have established joint city and county health departments. Such departments are financed by both city and county and exercise equal jurisdiction and supervision over both the city and the rest of the

* The reader is referred to the discussion of medical poor relief to be found in a companion report, McLean, Francis H.: The Charities of Springfield, Illinois. (The Springfield Survey.)

county. The arrangement is desirable because it secures for the county the nucleus for a strong service and for the city a stronger department because of the additional funds available. The result is better health in both county and city. Springfield and Sangamon County are of a size to make such an arrangement economically desirable. The formation of a joint department would very probably be advantageous to the community and such a step is hereby suggested.

FINANCIAL TREATMENT OF THE HEALTH DEPARTMENT

The health department cannot, of course, be expected to carry on the necessary work without adequate funds. For this reason it is essential to examine the size of its appropriation and to compare the latter with the amounts found necessary for proper service in other cities. The details of the Springfield appropriation for the year ending February 28, 1915, are given in Table 36.

TABLE 36.—HEALTH DEPARTMENT APPROPRIATION, SPRINGFIELD, ILLINOIS

Fiscal Year ending February 28, 1915

Salaries	
Superintendent of health	$1,200.00
Assistant superintendent (resigned) / Secretary	1,020.00
Meat inspector	1,000.00
Three sanitary inspectors	2,520.00
Matron, isolation hospital	720.00
Office supplies and incidentals	515.00
Fumigation and quarantine work	650.00
Dairy inspection	50.00
Milk investigation and laboratory supplies	475.00
Isolation hospital	
Supplies and repairs	150.00
Light	75.00
Transportation to hospital	150.00
Sanitary investigation	200.00
Educational work	300.00
Total	$9,025.00

The total appropriation, $9,025, represents a yearly expenditure of 15.6 cents for each inhabitant. This figure is much lower

than is necessary for a well-rounded department, most authorities recommending 50 cents to $1.00 per inhabitant as a proper figure. The deficiencies which have been noted in the health department's program must be considered in the light of this small appropriation. In the same year Springfield allowed its police department $56,630 and its fire department $99,758, expenditures that are probably not excessive. It is not clear why the city should be willing to spend 98 cents per person on police protection and $1.72 on fire protection and yet stop short at about 16 cents per person for the much-needed health protection. If the city has simply acquired the habit of regarding 16 cents per person as an adequate health department figure, it should make all haste to disabuse its mind of any such pernicious and expensive delusion.

SUMMARY OF RECOMMENDATIONS REGARDING THE HEALTH DEPARTMENT

The principal recommendations which are made for the improvement of the city health department may be summed up as follows:

1. The employment of a full-time health officer. This is a most important recommendation. The health officer should be appointed for a term of years and should be given a free rein over his department.

2. The employment of public health nurses to carry on work against tuberculosis and infant mortality. This recommendation is hardly second to that for the employment of a full-time health officer, and the employment of such nurses should take precedence over that of any other additional persons, such as inspectors.

3. The employment of an epidemiologist, who might act also as medical inspector in contagious diseases. This person along with nurses to supervise isolation are the most necessary reenforcements to the present work against typhoid and the contagious diseases of children.

4. The employment of a milk inspector and, somewhat less urgently needed, a food inspector. The possibility for the ultimate need for a laboratory man should also be noted.

5. The initiation of systematic efforts at health education and publicity.

6. Greater insistence on more accurate certification of death by physicians.

7. The shifting of emphasis in the control of the communicable diseases from quarantine of the premises and fumigation to early recognition of all cases and efficient bedside disinfection of the patients' discharges. Also greater strictness in the matter of release from quarantine, in diphtheria by the culture method only, and in scarlet fever only after inspection of the patient by a medical representative of the health department.

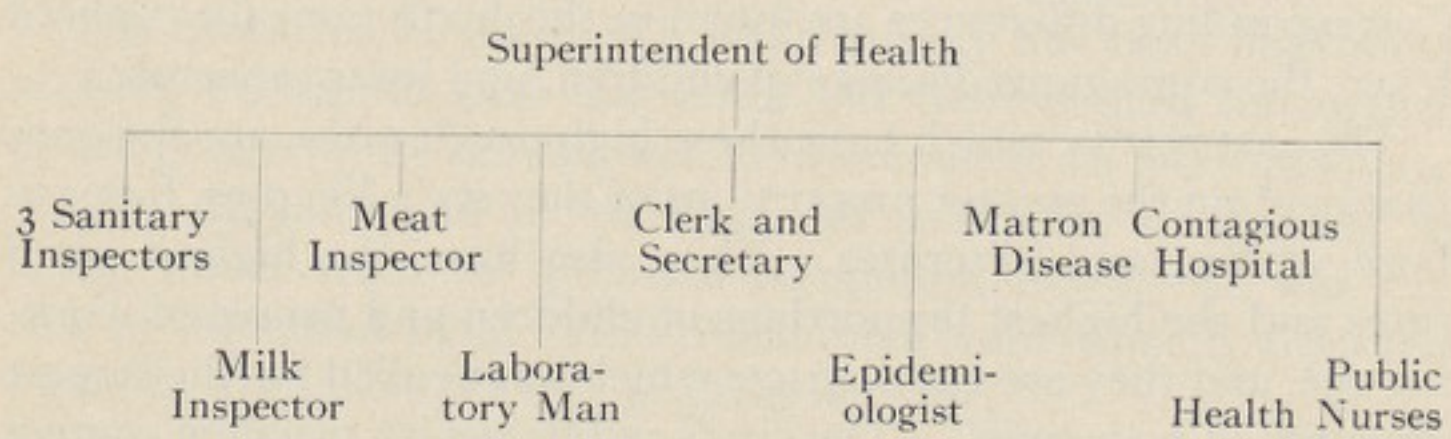
8. The initiation of work against the venereal diseases such as has been instituted by progressive health departments in other cities.

9. Renovation of considerable of the equipment at the contagious disease hospital and the inception of measures to add to the attractiveness of the place. A new hospital, centrally located, would be preferable if funds are available.

10. Finally, the increase of the present scanty appropriation of the health department sufficiently to permit the adoption and proper administration of the measures recommended.

PROPOSED REORGANIZATION OF THE SPRINGFIELD HEALTH DEPARTMENT

Proposed additions to the present staff appear in the lower line. A full-time superintendent of health (health officer) and at least three public health nurses for tuberculosis, infant mortality, and contagious disease work, are the most important necessities.



XV

SUMMARY AND CONCLUSION

LIFE WASTAGE IN SPRINGFIELD

Serious life and health wastage is constantly going on in Springfield. Thus in the last six years 1,218 residents died from the more common communicable diseases and several thousand more were made ill. At least a fourth of the deaths from all causes may be laid to these preventable diseases.

The greatest single agent in this devastation is tuberculosis, responsible for 490 deaths in the last six years and for 11 per cent of all the deaths in 1913, the year here studied in detail. The diseases of infants form another great contributing group; 727 infants under one year of age died in the last six years, deaths of such infants amounting to 18 per cent of all deaths in 1913. Nearly half of these infant deaths are from the ordinary preventable causes, such as diarrhea and enteritis, pneumonias, and acute infections. Other important contributory factors in the city's preventable mortality and morbidity are the contagious diseases of children, typhoid fever, and the venereal diseases.

The toll exacted is much heavier in certain sections of the city than in others. Thus the tuberculosis death rate in the wards east of Tenth Street is over twice that in the two southwest wards. Corresponding differences are found in the death rates for typhoid fever, the contagious diseases of children, and infant mortality.

The east wards, which have these high death rates, are the ones that contain the greater proportions of the city's Negroes, foreign-born whites, and illiterates. They also have the highest birth rates and the highest proportions of children and people of working age, and they are the districts which have called for the largest amounts of poor relief. The city's public health problem centers in these districts and it is here that the health department should concentrate its attack against disease.

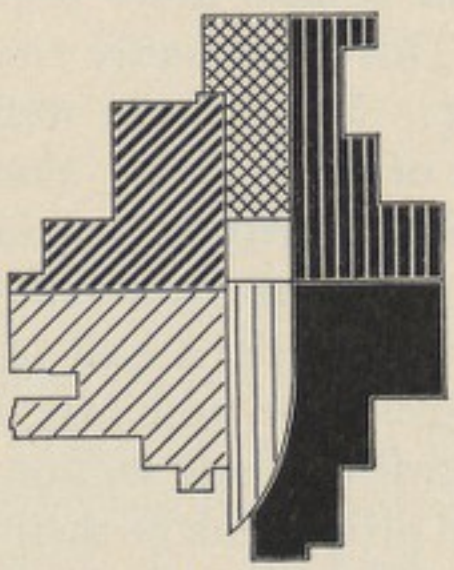
SANITARY CONDITIONS IN SPRINGFIELD

Within Springfield's eight and a half square miles are to be found 7,500 privies and 7,500 wells. This is probably the most serious insanitary condition in the city. Most of the wells and privies are unnecessary, three-fourths of them being along the city water or sewer lines. The two east wards, which in 1910 contained 36 per cent of the population, contain over half of the wells and privies in the city and approximately a half of those that are absolutely unnecessary. Wards four and five, to the southwest, and ward seven, in the central business section, have relatively the fewest wells and privies in proportion to their population. The southeast ward (six) has five times as many wells and privies per 1,000 population as the central ward (seven); it has a well and privy for each five persons. This ward and its 11,500 odd inhabitants, in other words, depend almost entirely on wells and privies, a situation which puts this section of the capital city of Illinois in a class with those small villages of the state which still depend upon the insanitary makeshifts of pioneer days.

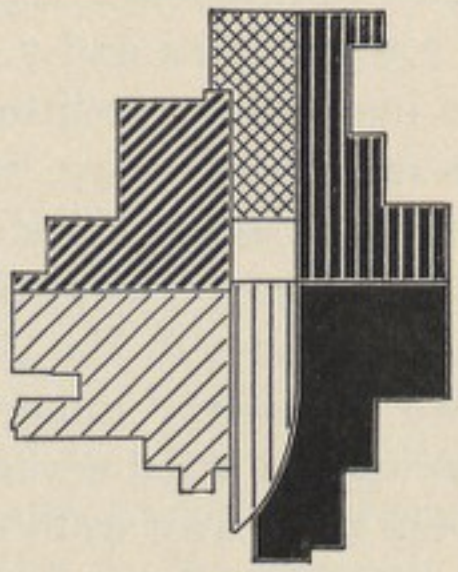
The city is fairly well covered by public water mains and sewers, estimates at the time of the Survey indicating that 88 per cent of the people could connect with the former and 83 per cent with the latter. The distribution of these services is, however, markedly deficient in certain parts of the city, notably the east wards again. In the northeast ward (one), for example, 30 per cent of the inhabitants were unable to connect with the water system and 27 per cent with the sewer system.

The character of the public water supply has been improving steadily during the past few years, but there is need for further development of the tubular well system to insure a more adequate reserve capacity and to eliminate all possibility of needing to pump direct from the polluted Sangamon River,—as was the case at the end of 1914. Additional force main capacity from the pumping station to the city is also a necessity.

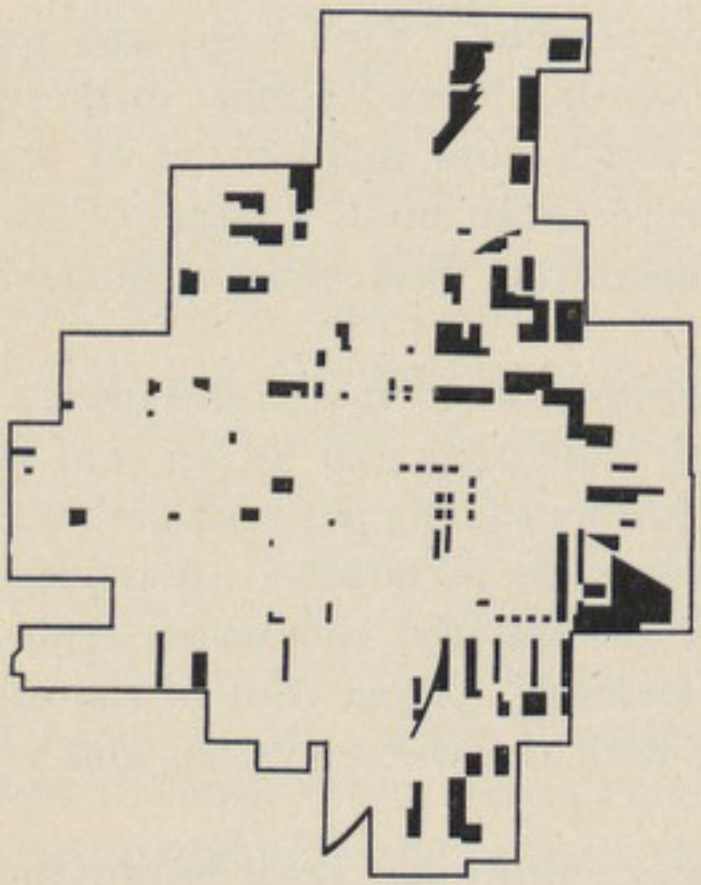
The city disposes of its sewage in a haphazard way, the outfalls being located at some 12 different points along the city's limits. Serious stream pollution occurs at certain points. The city must



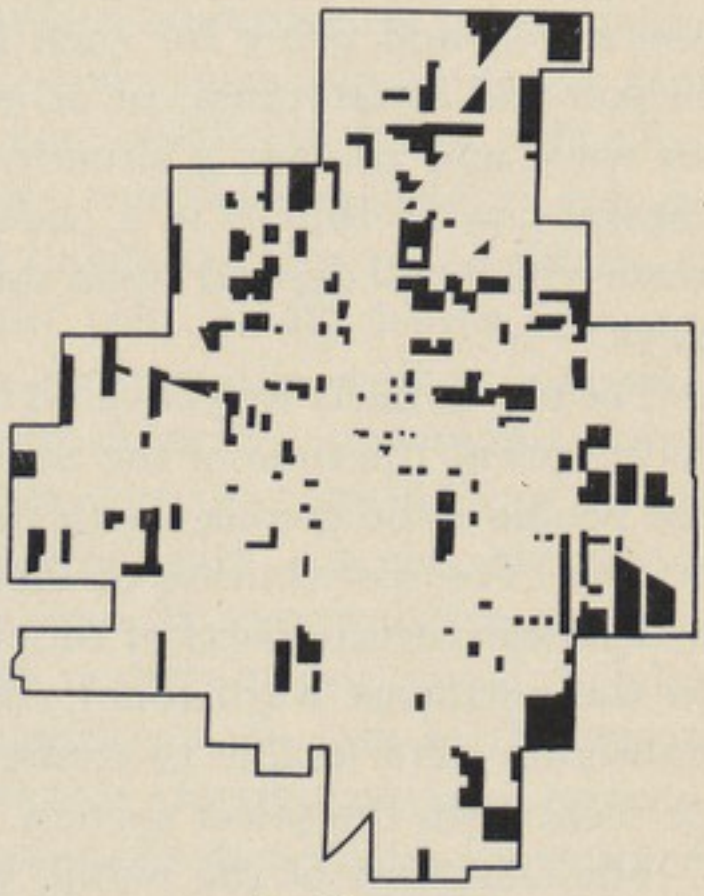
Wells



Privies



No City Water



No Sewers

SANITARY CONDITIONS IN SPRINGFIELD WARDS

The darker shadings in the smaller maps indicate higher proportions of wells and privies per 100,000 population; the black areas in the larger maps indicate built up districts without sewers and without city water. The original diagrams from which the smaller maps are taken are to be found on pages 90 and 91. The larger maps are described on page 79. Compare with illustrations on pages 132 and 133

look forward to the erection of sewage treatment works, both for her own safety and self-respect and because of the possibility of compulsion by the state authorities. In this event it will be a distinct advantage if the sewage can be treated at a single point and if separate sewers are provided for the collection of storm water and house sewage. Consequently this is the time for Springfield to make a thorough survey of her sewers and to formulate a sewer plan for future developments.

Inspection of the dairy farms supplying the city showed them to be in poor condition, less than 3 per cent scoring good or better. A city milk inspector is clearly needed. The usefulness of such an inspector is indicated by the fact that reinspection of a number of farms several months after the original inspection showed that considerable improvements had been made.

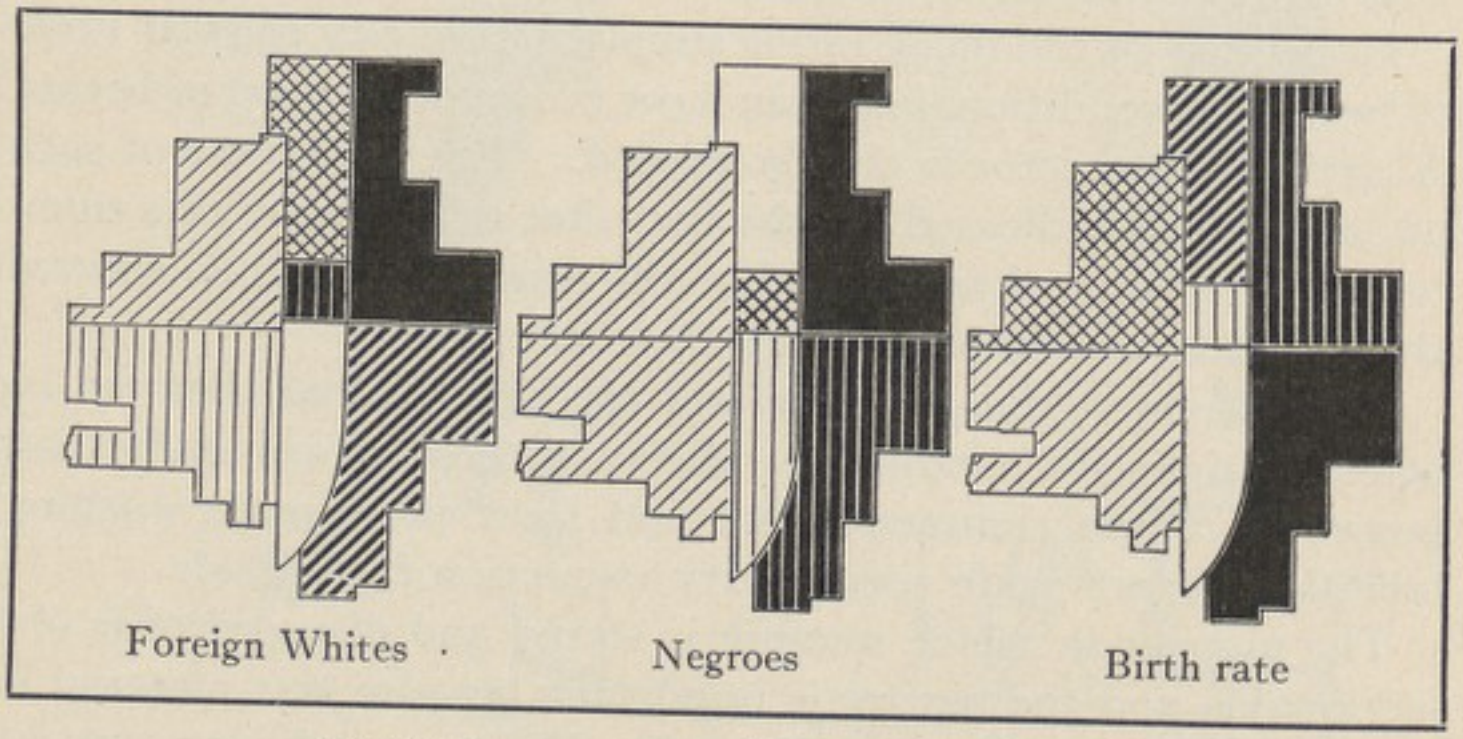
Inspections of the groceries and markets showed them to be generally in good condition. Many of these places make use, however, of the common privy and have inadequate washing facilities. Here again regular city inspection is desirable.

The manner in which manure is stored and disposed of is objectionable and the matter is important because this material is the chief breeding place of flies. In the house-to-house canvass the inspectors noted 420 open accumulations of manure, most of them in the northeast part of the city. The city should require tight bins and stable floors, and regular collection and disposal. In this connection it may be noted that Springfield has a small refuse incinerator but no system of collection. Regular and general collection and proper disposal of refuse are certainly essential for a clean city.

THE CITY HEALTH DEPARTMENT

The city health department has done creditable work with the resources at its command, but is very meagerly financed and, probably as a consequence, ignores its greatest opportunities for life-saving. The department does nothing to stop the heavy inroads upon infant life or to restrict the ravages of tuberculosis. In the face of these vital losses Springfield allows its health department only a fraction of the funds needed for a well-rounded and effective organization, and less than a sixth of the amount

allowed the police department, and less than a tenth of that allowed the fire department. Granting the importance of the police and fire departments, which are largely for the protection of property, Springfield should consider whether it will continue to put such a relatively low value on its health department—the service it has created more specifically for the protection of life and health.



SOCIAL STATISTICS OF SPRINGFIELD WARDS

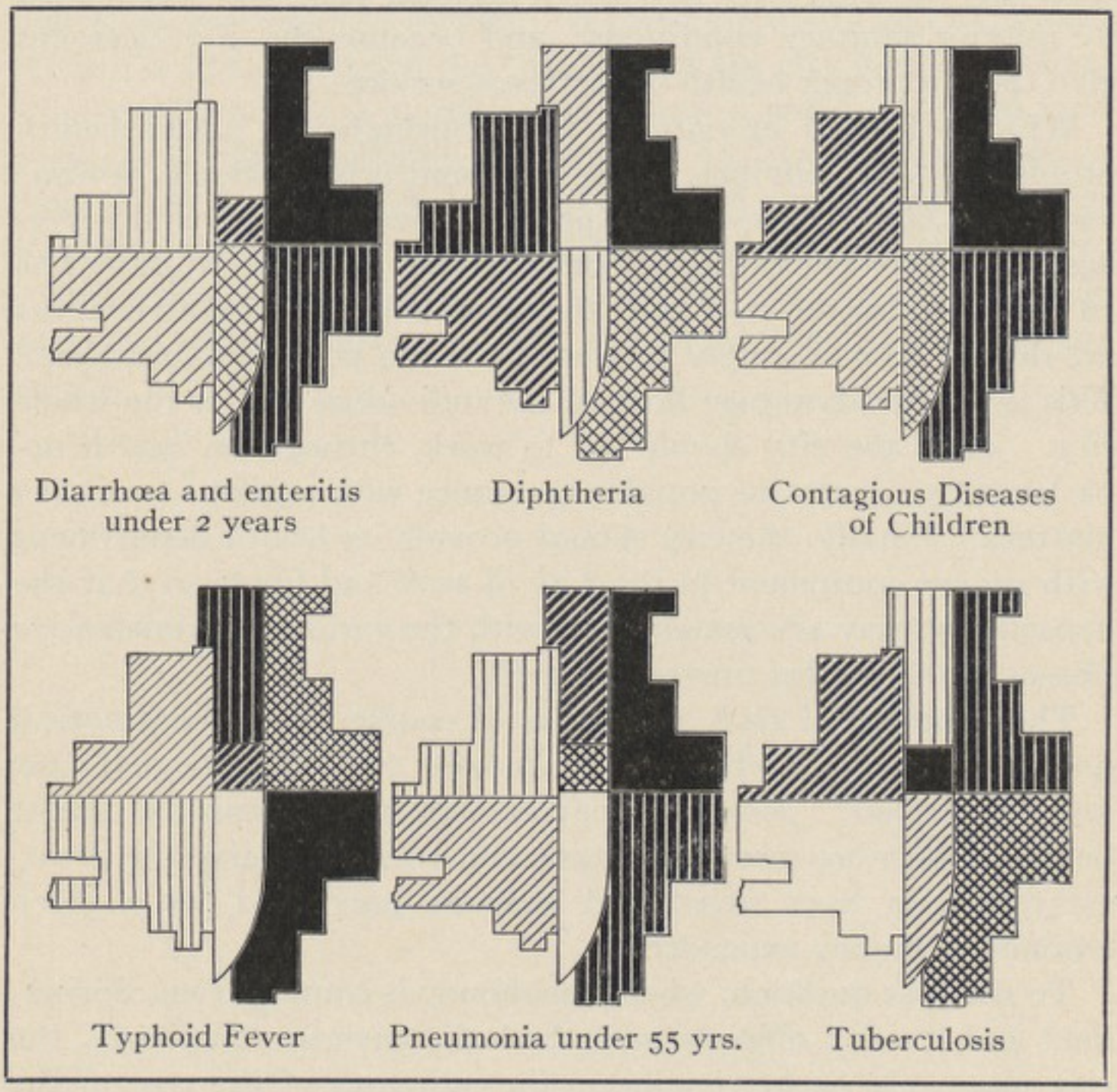
The darker shadings indicate higher proportions of Negroes and foreign born whites, and higher birth rates. The east wards evidently have the higher ratios. The original diagrams from which these maps are taken may be found on pages 10 and 15. Compare with illustrations on pages 130 and 133

The most urgent needs of the health department are a full-time health officer and nurses for baby-saving, tuberculosis work, and the supervision of quarantine. Better methods for the study and supervision of cases of typhoid and the contagious diseases of children should be instituted and an epidemiologist should be provided. These additions to the staff, as well as a milk inspector, are of prime importance.

Moreover, the department should develop certain other new lines of work, such as the prevention of venereal diseases and better health education and publicity. It should also work for improvement in the registration of vital statistics.

CONCLUSION

Springfield has a well defined and clearly localized public health problem. It has a combination of serious life wastage from pre-



PREVENTABLE MORTALITY IN SPRINGFIELD WARDS

The darker shadings indicate higher death rates. The rates on which the rankings are based are per 100,000 population, except in the case of diphtheria and the contagious diseases of children in which cases they are per 100,000 children of school age. The figures are for residents only. The original diagrams from which these maps are taken are to be found on pages 21, 28, 30, 38, 59, and 68. Compare with illustrations on pages 130 and 132

ventable diseases, fairly good sanitary conditions, except for the presence of an extraordinary number of wells and privies, and a poorly supported and weak health department. Certain parts of

the city, notably the wards east of Tenth Street, have excessively high rates of mortality from preventable causes, and it is in these districts that sanitary conditions are specially bad. The plain fact is that people are dying in parts of the city because they are ignorant; because they are poor; because they are surrounded by inferior sanitary conditions; and because the city does not give them a proper health department service.

What is needed at once to meet Springfield's public health problem is fairly obvious. The wells and privies should be done away with, and the city should perfect its water supply and sewerage, and make the mains of both systems available to all. The city should also see to it that the benefits of such improvements are denied no one simply because he is too poor to afford them. This is to the advantage both of the individual and of the whole city. Then the city should set to work, through its health department, to overcome popular ignorance with regard to sanitary matters. Finally, the city should provide its health department with proper equipment in the way of staff and funds so that the department may adequately cope with the various administrative phases of the needed preventive work.

The adoption of such a program of course raises the practical question of cost. Where is the money coming from and how much is needed? Also, if money enough for all measures cannot be had, which are most important and which will give the greatest return in lives saved and sickness prevented for a given amount of money expended?

To the first question, where the money is coming from, Springfield and its city officials must find the answer. Similarly, the city must rely on her engineers for estimates of the cost of the various sanitary improvements needed. But it can be said here emphatically, and should be promptly recognized, that her present health department expenditure needs to be trebled or quadrupled. Even then it will be moderate as compared with health department expenditures in more progressive cities and small as compared with what Springfield now spends on its police and fire departments.

It can also be said here that the investment in the health department will probably, dollar for dollar, save more lives than will the investments for the various sanitary improvements.

This is not to say that the other improvements, as in the water supply and sewer system, should not be made; it means simply that the health department need is most urgent and should be met first.

The whole question of better health in Springfield is in no sense limited to the realm of theory. It is a thoroughly practical matter and is squarely up to the citizens and the city administration. That public health is purchasable is now a well recognized fact. Springfield has a splendid opportunity to buy—to save 200 or more lives a year and to prevent much additional sickness. Realizing that the safety and welfare of the citizens are involved to this extent, there ought to be no question of the city's willingness and determination to find the funds needed and to buy wisely.

APPENDICES

APPENDIX A

SELECTED MORTALITY AND MORBIDITY STATISTICS BY YEAR AND WARD, SPRINGFIELD, 1908–1913

The general plan followed in the investigation of Springfield's vital statistics was to study the mortality from all causes for two years, 1910 and 1913, and to study the mortality from the preventable diseases for the last six years, 1908 to 1913 inclusive. To this end a transcription was taken of the certificates of all deaths occurring in Springfield in 1910 and 1913 and of all deaths from preventable causes in the city in the other four years. The transcription cards were then studied on the basis of residence and cause of death. The results are to be found in the text and in Appendix B, prepared by W. J. V. Deacon, to whom thanks are due for the detailed studies of 1910 and 1913.

The six-year period was selected for the study of the preventable deaths because it was desired to obviate as far as is practically possible erroneous impressions arising from the fluctuations in mortality occurring from year to year in a city of Springfield's size, and because it was desired to have a larger base for computing ward rates than would be afforded by the figures for a single year. It is hoped that the six-year period in large measure overcomes the difficulty due to small numbers, as it makes the ward figure for any disease approximately as reliable as the figure for that disease for the whole city for a single year. It is realized, however, that even taking the six-year period, the numbers are in some instances rather small for statistical purposes, as for example in the death and fatality rates for the several contagious diseases of children. But in this connection it should be remembered that a small number of deaths from a communicable disease may be a positive indication of satisfactory health conditions and not merely a sign of an inadequate base; and that the primary object of this report is to describe local conditions in Springfield and not to add to our general knowledge of sanitation. In some cases it is realized that larger numbers would be desirable; but in these instances it has seemed wise to make the best of the material at hand, taking care not to draw any unjustifiable conclusions from such figures.

Mid-year populations are used in every case for the computation of yearly death rates; and in the cases where an average yearly death rate is computed

for a period of years the figure is obtained by dividing the number of deaths in the whole period by the number of years in the period and referring this quotient to the population as estimated for the middle of the period. Of the estimates of population used, those for 1910, 1911, 1912, and 1913 are as furnished by the United States Bureau of the Census; in computing those for 1908 and 1909 it is assumed that the annual increase in those years was the same as estimated by the census office for the years subsequent to 1910.

Some further discussion of the statistical methods used in this report are to be found in the foreword and the introductory discussion.

The ruling of tables follows the statistical practice of the Russell Sage Foundation.

DEATHS FROM CERTAIN CAUSES BY YEAR, SPRINGFIELD, 1908–1913
(RESIDENTS ONLY)

Disease	1908	1909	1910	1911	1912	1913	Total
Tuberculosis	72	81	98	85	68	86	490
Pneumonias under 55 years	33	38	40	40	30	46	227
Infants under 1 year (all causes)	123	105	131	104	118	146	727
Diarrhea and enteritis under 2 years	37	34	41	29	33	54	228
Typhoid fever	16	15	21	10	12	10	84
Diphtheria	6	2	9	12	19	13	61
Scarlet fever	10	1	5	6	..	1	23
Whooping cough	6	2	4	5	11	16	44
Measles	1	14	2	..	1	13	31

DEATHS FROM CERTAIN CAUSES BY WARD, SPRINGFIELD, 1908–1913
(RESIDENTS ONLY)

Disease	1	2	3	4	5	6	7	Total
Tuberculosis	98	42	99	45	42	114	50	490
Pneumonias under 55 years	53	29	29	35	15	52	14	227
Infants under 1 year (all causes)	173	43	105	95	48	238	25	727
Diarrhea and enteritis under 2 years	72	10	17	20	12	80[a]	11	228
Typhoid fever	15	12	15	12	3	21	6	84
Diphtheria	14	7	12	11	4	13	..	61
Scarlet fever	10	..	1	..	1	11	..	23
Whooping cough	9	1	8	6	3	16	1	44
Measles	6	5	5	3	3	6	3	31

[a] Excluding six who died in the Redemption Home.

DEATHS FROM DIPHTHERIA AND SCARLET FEVER BY WARD, SPRINGFIELD, 1909–1913 (RESIDENTS ONLY)

Disease	1	2	3	4	5	6	7	Total
Diphtheria	12	7	10	11	2	13	..	55
Scarlet fever	5	..	1	..	1	6	..	13

CASES OF CERTAIN COMMUNICABLE DISEASES BY YEAR, SPRINGFIELD, 1909–1913 (RESIDENTS ONLY)
As reported to the city health department

Disease	1909	1910	1911	1912	1913	Total
Diphtheria	102	143	89	195	158	687
Scarlet fever	77	257	348	35	37	754
Typhoid fever	..[a]	98	52	80	89	319
Smallpox	20	27	15	15	10	87

[a] Information not available.

CASES OF CERTAIN COMMUNICABLE DISEASES BY WARD, SPRINGFIELD, 1909–1913 (RESIDENTS ONLY)
As reported to the city health department

Disease	1	2	3	4	5	6	7	Total
Diphtheria	127	79	109	134	56	154	28	687
Scarlet fever	118	80	120	165	88	128	55	754
Typhoid fever	62	27	62	59	28	62	19	319
Smallpox	6	13	21	5	7	26	9	87

APPENDIX B

AN ANALYSIS OF SPRINGFIELD'S DEATH RATE FOR 1910 AND 1913

By W. J. V. Deacon
State Registrar of Vital Statistics for Kansas

All populations as of July 1, according to the estimates of the United States Census Office.

DEATHS AND DEATH RATES BY RESIDENCE AND COLOR

	1910	1913
Deaths registered[a]	860	994
Crude death rate	16.54	17.60
Deaths of non-residents	185	185
Deaths of residents	675	809
Death rate for residents only	12.98	14.32
Deaths of white residents	621	737
Deaths of Negro residents	54	72
Death rate for white residents	12.68	13.85
Death rate for Negro residents	18.13	22.26

[a] According to the 1913 report of the city health department.

DEATHS AND DEATH RATES BY AGE (RESIDENTS ONLY)

Age group	Population		Deaths		Death rates	
	1910	1913	1910	1913	1910	1913
Under 1 year	938	1,019	131	145	139.7	142.3
1 to 4 years	3,846	4,178	41	70	10.7	16.8
5 to 14 years	8,974	9,748	26	34	2.9	3.5
15 to 24 years	9,893	10,747	46	54	4.6	5.0
25 to 44 years	17,471	18,979	130	133	7.4	7.0
45 to 64 years	8,314	9,031	136	173	16.4	19.2
65 years and over	2,467	2,680	165	200	66.9	74.6
All ages	51,989[a]	56,476[b]	675	809	13.0	14.3

[a] Includes 86 persons of unknown age.
[b] Includes 94 persons of unknown age.

Death rate corrected to standard million of population (England and Wales in 1901) becomes 13.31 for 1910 and 14.76 for 1913.

DEATHS AND DEATH RATES BY WARD (RESIDENTS ONLY)

Ward	Population		Deaths		Death rates	
	1910	1913	1910	1913	1910	1913
1	8,410	9,136	115	152	13.67	16.64
2	6,060	6,583	82	80	13.53	12.15
3	8,567	9,307	106	127	12.37	13.65
4	9,836	10,685	121	135	12.30	12.63
5	5,716	6,209	77	82	13.47	13.21
6	10,316	11,206	129	179	12.50	15.97
7	3,084	3,350	40	54	12.97	16.12
Ward unknown	..	..	5	..	..	..
Whole city	51,989	56,476	675	809	12.98	14.32

APPENDIX C

TUBERCULOSIS DEATH RATES

TUBERCULOSIS DEATH RATES PER 100,000 BY YEAR, SPRINGFIELD, 1909–1913 (RESIDENTS ONLY)

Year	White	Negro	Total
1909	126.1	725.6	160.4
1910	179.6	335.7	188.5
1911	140.9	456.9	158.9
1912	102.3	476.3	123.7
1913	139.0	370.9	152.3

These figures are represented graphically in the chart on page 56.

APPENDIX D

POPULATION STATISTICS BY WARD, SPRINGFIELD

POPULATION OF WARDS BY SEX, AGE, AND ILLITERACY, SPRINGFIELD

United States Census, April 15, 1910

Ward	Total population	Males		Children 6–20 years		Illiterates in population over 10 years	
		Number	Per cent	Number	Per cent	Number	Per cent
1	8,360	4,432	53.0	2,430	29.1	723	11.2
2	6,024	2,866	47.6	1,624	27.0	133	2.6
3	8,516	4,153	48.8	2,301	27.0	150	2.1
4	9,777	4,505	46.1	2,452	25.1	142	1.8
5	5,682	2,704	47.6	1,216	21.4	63	1.3
6	10,254	5,201	50.7	2,994	29.2	581	7.4
7	3,065	1,627	53.1	561	18.3	189	6.8
Whole city	51,678	25,488	49.3	13,578	26.3	1,981	4.7

FOREIGN-BORN WHITES AND NEGROES BY WARDS, SPRINGFIELD

United States Census, April 15, 1910

Ward	Foreign-born whites born in				Negroes
	Germany	Ireland	Russia	All countries	
1	439	193	575	1,858	1,186
2	178	175	49	810	60
3	456	169	32	977	218
4	272	90	87	812	249
5	117	126	17	447	91
6	496	209	183	1,469	1,026
7	169	50	108	527	131
Whole city	2,127	1,012	1,051	6,900	2,961

CHILDREN 6 TO 20 YEARS INCLUSIVE, BY WARD, SPRINGFIELD, 1910 AND 1914

Ward	United States Census 1910	School census 1914	Decrease	
			Number	Per cent
1	2,430	2,336	94	3.9
2	1,624	1,604	20	1.2
3	2,301	2,222	79	3.4
4	2,452	2,356	96	3.9
5	1,216	1,031	185	15.2
6	2,994	2,822	172	5.7
7	561	518	43	7.7
Whole city	13,578	12,889	689	5.1
District omitted in 1910		53		
Total		12,942		

Note.—The figures from the school census of 1914 were prepared by Mrs. H. L. Morrison. It seems improbable that a decrease such as is indicated in the above comparison has actually taken place; and it should be noted that enumerations undertaken by school authorities do not in general approach the accuracy of the federal census. The comparison is interesting in so far as it indicates that no radical change has taken place in the distribution of children throughout the city.

APPENDIX E

ESTIMATES OF GROSS AND NET ACREAGE, SPRINGFIELD

The information below is supplementary to that given in Table 3, page 9. The areas are as of April 15, 1910, as are the population figures used in computing the densities given in Table 3. The area figures were obtained by planimetering the map of Springfield as revised and copyrighted by Frank R. Simonds, 1911. The gross acreage gives the entire area of the ward; net acreage excludes areas not built up for habitation, such as parks and land used for industrial purposes, but includes the ordinary street areas.

ESTIMATES OF GROSS AND NET ACREAGE, BY WARD, SPRINGFIELD, 1910

Ward	Gross acreage	Net acreage
1	914.5	577.3
2	590.1	374.2
3	938.9	687.7
4	1,023.3	683.1
5	537.5	411.2
6	1,152.4	842.0
7	153.2	144.8
Whole city	5,309.9	3,720.3

APPENDIX F

BACTERIOLOGICAL EXAMINATIONS OF CITY WATER

RESULTS OF BACTERIOLOGICAL EXAMINATIONS OF SPRINGFIELD CITY WATER, 1907–1914

From the records of the State Water Survey

Year	Number of samples	Bacteria per c.c.[a] (average)	Per cent of counts over 500	Fermentation in dextrose broth[b]		Indol formation[c]	
				Number of tubes inoculated	Per cent positive	Number of tests	Per cent positive
1907	4	225	33.3[d]	8	25.0	..	..
1908	5	716	40.0	10	50.0	5	40.0
1909	18	593	22.2	16	75.0	17	88.2
1910	15	1,120	40.0	22	40.9	15	86.7
1911	7	160	16.6[d]	14	35.7	7	100.0
1912	12	1,120	41.7	24	33.3	12	50.0
1913	26	147	8.0	52	25.0	26	46.2
1914	22	243	15.0[d]	42	33.3	21	19.0

[a] On gelatine at 20° C.
[b] 1 c.c. of water inoculated.
[c] 10 c.c. of water inoculated in 10 c.c. of Dunham's solution; incubated for 72 hours at 37.5° C.
[d] Result lost on one sample.

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