

WATER SUPPLY AND ITS RELATION TO PUBLIC HEALTH IN CHICAGO

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ABSTRACT

Perhaps no item has had so great an effect on public health conditions in Chicago as the quality of the public water supply. This is only natural because water is the one item of diet which every citizen must use.

As Chicago grew, a demand arose for water for fire protection and domestic purposes which led to the building of the first water works by the Chicago Hydraulic Company in 1836. This system which took its supply a few hundred feet from the shore of Lake Michigan and distributed it through bored log mains soon became the source of numerous complaints of inadequate service and poor quality water. Chicago's own water board was organized in 1852 and a campaign launched against unsatisfactory health conditions to lessen the toll of typhoid and dysentery. No sooner had the city water works been built than the intake, which was about 600 feet off shore, was found to be in a zone of sporadic pollution and, as the city continued to grow, the frequency of pollution periods and the degree of pollution became more intense. Finally in the early sixties conditions became very acute, the water very objectionable and its taste and odor pronounced at times, resulting in a situation which forced the building of Chicago's first tunnel under Lake Michigan to an intake two miles from shore. This five foot tunnel which is still in use marked the beginning of the present water works system. It is very unfortunate that accurate statistical data of deaths from water-borne diseases are not available for this period which was unquestionably the darkest era in the city's history, insofar as public health was concerned.

Public improvements were not able to keep pace with the growth of the city, with the result that Chicago had to pay the penalty which every community has paid where the increase in population is out of proportion to that of the sanitary facilities. It is a well known fact that such epidemic diseases as cholera, typhoid fever and associated intestinal disturbances have followed in the wake of every concentration of population, whether temporary or permanent, unless adequate provisions were made for the proper disposal of human wastes.

Accepted factors in typhoid fever distribution are our water supply, our milk and food supply, and personal contact. Progress made in improving the Chicago water supply is especially reflected by a resumé of the typhoid fever death rates. In the water-borne epidemic years of 1872, 1881, 1891-2, typhoid fever was the most common disease which physicians were called upon to treat—today it is among the rarest.

Prior to 1893, analyses of water were of a chemical nature and methods of disease control were based largely upon the "filth" theory¹. The great discoveries in bacteriology which were announced in the 80's were applied to the practice of curative and preventive medicine in the early 90's, resulting in a remarkable reduction in the typhoid fever rate from 173.8 in 1891 to 37.5 in 1894. During the development period which followed in the next decade the rate was again materially lowered.

By far the most important step taken towards safeguarding Chicago's water supply was the opening of the drainage canal in January, 1900, permitting the diversion of sewage wastes away from Lake Michigan.

Pasteurization of milk, inaugurated in 1908, also aided materially in eradicating typhoid from metropolitan Chicago.

The value of chlorine compounds for disinfecting water was shown in 1908 by C. A. Jennings at the Union Stock Yards in Chicago and within a few years water supplies throughout the country were being treated with chlorine. Although experimental chlorination was tried at Chicago intake cribs in 1912, it was not until December of 1916, that the entire water supply was continuously chlorinated. The typhoid death rate then dropped from 5.1 in 1916 to 1.6 in 1917. Since that time there have been two localized typhoid fever outbreaks on the south side of Chicago. The first, which occurred in 1916, resulted from a flooded sewer in the vicinity of the 68th Street Pumping Station. The second, in 1923, was either caused by an interruption in the chlorination process or the occurrence of abnormally heavy pollution in the raw lake water. Following the latter epidemic a program was established for maintaining rigid supervision over chlorination in Chicago. Modern chlorinating equipment was purchased, each pumping station was provided with duplicate chlorinating units and three shifts of chlorine attendants to give their full time to the chlorination of the water supply.

Trained sanitary engineers of the Water Purification Division of the Bureau of Engineering are charged with the responsibility for chlorination control from the time the water leaves the crib until it reaches the consumer's home. Administrative supervision such as this is of vital importance². The Chicago system for chlorination control is today recognized as one of the most efficient and has frequently been used as a model by other cities. Its low per capita cost as indicated in the table, is an outstanding feature.

Distribution of 1930 Per Capita Costs

Item	Cost	Percent of Total Cost
Applying chlorine.....	0.0338	34.9
Chlorine gas.....	0.0254	26.3
Water pollution Inspection.....	0.0138	14.2
Laboratories.....	0.0126	13.0
Engineering and supervision.....	0.0089	9.2
Collection of samples.....	0.0023	2.4
Total cost.....	0.0968	100.0

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¹ Rawlings, I. D., *Rise and Fall of Disease in Illinois*, p. 375, 1927.

² Wolman and Gorman, *Waterborne Typhoid Fever Outbreaks*, p. 49, 1931.

³ Falk, I. S., *Journal Preventive Medicine* Vol. 1, p. 68, September, 1926.