Ignaz Semmelweis (1840's) demonstrated that hand washing could reduce the spread of disease.

Louis Pasteur (1860's) was a French Chemist and microbiologist. He is remembered for his remarkable breakthroughs in the causes and preventions of diseases. In the 1860's the did experiment to show that air did not cause disease, that disease could be caused by microorganisms in the air.

Joseph Lister (1860's) built on the work of Semmelweis and Lister to develop and promote the use of chemicals to reduce infection.

Walter Reed (1900) was a US physician who confirmed the theory that Yellow Fever is transmitted by a type of mosquito, rather than by direct contact. This led to preventative measures being taken to control the mosquito population and allowed the completion of the work on the Panama Canal.

Jonas Salk (1953) announces that he has successfully tested a polio vaccine.

“Recurring epidemics of cholera, yellow fever, and other deadly diseases were a powerful force in the development of what we know today as Tennessee’s public health system. Through the mid-1800s, Nashville, Knoxville, Memphis and many smaller cities and towns experienced epidemics that threatened human life and economic well-being.

As a result, efforts began to establish a State Board of Health, and a bill was signed into law in 1877 to create such a board. For many years, the main activities of the board were combating epidemics, forming county boards of health, working on school sanitation, and maintaining vital records of births and deaths in the state.”¹

Yellow Fever

The Yellow Fever epidemic of 1878 that devastated Memphis caused only two deaths in Knoxville and both of these were refugees.²

Intermittent Fever

"Knoxville is situated on the Holston River, in Knox County. From East to West it is spread over a portion of two hills, a third commencing just at the Western termination of the town. The East and West hills are separated from the middle hill, on which is located the principal portion of the town, by two creeks. Directly

¹ [http://health.state.tn.us/history.htm](http://health.state.tn.us/history.htm); accessed 31 OCT 2011.
² JM Keating, A History of the Yellow Fever: The Yellow Fever Epidemic of 1878, in Memphis, Heritage Books, Westminster, MD p. 94. (original copyright 1879)
north of the town was a large fresh-water pond, supplied by a spring, containing fish, and filled with a kind of flag, which gave to the body of water the name of Flag-pond; while the river forms the Southern boundary of the town. On the creek running through the East side of the town there were three mill-ponds within the -apace of half a mile. The upper, known as the White millpond, extended North and Northeast for more than a mile. On the creek at the Western termination of the town, known as Second Creek, there were two large mill-ponds.

"Thus it will be observed the town was almost surrounded with water, which was, for the most part, stagnant, and filled with decaying vegetable matter, during the remarkably dry summer of 1838.

"The creeks have considerable fall, and ordinarily run with rapidity, and the river is generally navigable for small-class steamboats for at least ten months of the year. But during the summer of 1838, so very little rain fell, that the creeks scarcely ran—collected in puddles between the dams, and the water in the ponds was stagnant, and filled with aquatic plants, animalculae, and debris from the saw and grist mills, and tanyards, exhaling, especially towards evening, a disagreeable odor; while the river bed was almost dry, and contained an unusual quantity of long moss, which lay on the surface of the water, exposed to the full rays of the sun, and which emitted, when disturbed, as it frequently was, by hogs, in search of muscles, a foetid smell.

"At the northern margin of the town is a grave-yard, which has been used for more than thirty years, and is consequently very full. Over this, at night time, phosphorescent appearances were observed, clearly indicative of a noisome influence emanating from that location and its circumstances.

"About the year 1834, intermittent fever was noticed as being much more common than it had been—our oldest inhabitants not remembering it to have occurred for very many years previous, to an extent worthy of being remarked.

"From 1834, this affection continued to prevail, acquiring an intensity and persistency with its continual presence, with occasional cases of remittent fever, some of which were almost intractable, and some fatal, until the spring preceding the epidemic, when few, if any, cases of intermittent fever were observed.

"The epidemical sickness began in June, 1838, in an increase of the number of sufferers, and of the severity of bowel complaint in children. When the sickness became more prevalent, and exhibited more decided characteristics, bowel complaint seemed to disappear, or to merge in the sickness. It soon appeared in all parts of the town, no quarter being exempt, and increasing fearfully in the number of its victims, until it reached its acme in August, which it sustained until
towards the close of September, when it commenced its declension, and finally disappeared coincidently with the advent of cold, changeable weather, which occurred during the latter part of October.

"Few persons wholly escaped the influence of the epidemical cause, during its prevalence. Their color was bad, tongue more or less coated, and experiencing great physical languor; under these circumstances, the least irregularity in diet or habit insured to them an attack.

"In many cases the attack was induced by indulging in the use of fruit. Indeed, some thought the peaches of that season possessed a poisonous quality; but it is evident that the essential cause was the weakness or irritability of the stomach and digestive organs, rather than any unusual qualities of the peaches.

"When the sickness became prevalent, many left town, and removed to the country, yet but few profited by the change. The fatigue, trouble, anxiety of moving, together with the fear of the disease, occasioned many to sicken; and the wants of the comforts of home, and the absence of prompt and proper medical aid, rendered their condition worse than if they had remained in town. This fact was felt so severely, by the most of those who had removed, that they hastened to return to their own homes, from the pure country air, to the close and contaminated atmosphere from which they had fled.

"The topographical sketch which has been given of Knoxville, very strongly sustains the doctrine of malaria, evolved from stagnant water and decaying matter, originating disease. What marsh miasm, or malaria, is, I believe is not known; we speak of it from its effects, without any knowledge of what it is in itself. That heat and moisture, in due proportions, and acting on decaying organic matter, produces, or evolves, a something, or an influence, injurious, and productive of disease, was known in olden times, and modern science has made no new revelations respecting the essential character of this productive cause of sickness.

"The most common form of fever which the epidemical sickness assumed, was the continued, though even this form, in many cases, had an intensity of manifestation towards evening, which it did not wear during the mornings. Indeed, it not unfrequently assumed something of the remittent element, being most severe on alternate days, constituting the Tentian of the old masters of physic; but generally it preserved its own characteristics throughout an attack—a gradual increase of the intensity of fever from the commencement.

"There were cases of intermittent and remittent, and, very rarely, of congestive fever. The sickness began with but little chilliness, and but slight rigors, and the sensations were confined, for the most part, to the spine. A more considerable chill was generally followed by a remittent, while a distinctly formed rigor, of some duration, ushered in an intermittent.
The treatment adopted in this endemic, as it may properly be denominated, was upon general principles, the object being to meet the indications in each individual case. In the remittent and intermittent variety, quinine was administered very freely, and a general tonic and supporting course pursued during the convalescent stage.

It is stated that, in a population little exceeding two thousand, more than one hundred deaths occurred. Many perished solely from want of proper professional attention, and the absence of the necessary care of a good nurse. The visitation of the disease above described was remarkable, as occurring in a locality so favorable to health, and it is to be attributed to the dryness and heat of the season, and the abundance of local miasm emating from the ponds and low places described. As a matter of subsequent history, we will here state that, through the courts, those mill-dams were decided to be nuisances, and, being removed in a year or two, no further trouble ensued.

The history above related is quoted nearly in full, as it is interesting, both locally and in a general sense. Visitations of disease of a febrile character are not common in a naturally healthy region of country, and the facts deduced in connection with this, show that the atmosphere may be intensely poisoned under certain circumstances.

In the Southern Journal of Medical and Physical Sciences, for May, 1857, is a report on Epidemic Rubeola, as it prevailed in McMinn County, in 1856. The paper was read before the East Tennessee Medical Society, in April, 1857, by Dr. J. A. Long. He says—

"The year 1856 was somewhat remarkable for its freedom from any epidemic of a grave or dangerous character. In fact, there were fewer diseases, of any kind of a grave form, than we have witnessed for many years past; and a greater tendency to periodicity than what is usual in this locality. Diseases of a low grade were less common, and a greater tendency to an inflammatory type or form of disease, than there has been since 1844. The only prevalent disease the past season was measles. The disease was brought in by way of the East Tennessee and Georgia Railroad, and quickly spread throughout the country. The disease attacked all ages, but was less severe among children. The principal delays in the appearance of the characteristic eruption were a result of debility. In the athletic robust subjects, internal congestions occurred."

In the transactions of the same meeting, James H. Sawyer, M. D., read a report of an epidemic neuralgia which prevailed in Knox County, in February and March, 1857. The locality in which the disease appeared is a district lying South of Knoxville, across the Holston, and not extending more than four miles. Dr.
Sawyer says—

"The neighborhood is made up of a number of hills and valleys, with meandering streams coursing their way to the Holston. Their banks are generally low, and much of the bottom land is very damp, and in some instances, marshy. It was on, or in the vicinity of those streams, that the major part of the cases occurred."

Two proved fatal. Although Dr. Sawyer defines the disease as neuralgia, it appears conclusive, from his descriptions, that it was rather a pernicious form of remittent fever—or, perhaps, more properly, congestive. It was evidently paludal in its nature, and caused by poisoned air from the low places mentioned.

**Cholera**

Tennessee suffered crippling cholera epidemics during the nineteenth century, most notably in 1834, 1849, 1873, and 1892. The disease claimed many thousands of lives throughout the 1800s. James K. Polk died of cholera in Nashville just after leaving the presidency in 1849.

1838 Cholera epidemic
1854 Cholera epidemic

When a cholera epidemic swarmed Knoxville in 1854, many succumbed, and many more fled. Brownlow stayed. There’s an old story that the overworked gravedigger at Old Gray, an Irishman known as Neddy Lavender, had no help in burying the dead except for Parson Brownlow himself. It’s another scene Dickens might have written.³

(First and Second) which empty into the river at about right angles, and is that portion upon which the original town was laid out in 1792. About the year 1812 the village was extended eastward across First Creek, and quite a number of houses erected west of Second Creek. The land lay in commons, or was cultivated for crops, for more than half a century.

In 1838 the town began to extend northward. The ascending ground alluded to above as extending northward suddenly drops about 100 feet, to a low strip of land which was originally known as the "flag-pond." Along this depression is laid the track of a railroad connecting Bristol, Va., and Chattanooga. Farther north, and a short distance from the railroad-track, is a slight elevation which gradually rises till it reaches a high ridge three miles from the river. The present town, with its suburban additions, extends about a mile north and south, and nearly the same distance east and west. The surface-drainage, except in the locality upon which the railroad is built, is almost perfect. The soil is a solid ferruginous clay, intermixed with a fragile limestone rock, which is filled with seams, and in some places cavernous openings, through which water can pass off to an unknown depth, but probably on a level with the bed of the river.

The streets, although narrower than in more modern laid out cities, are very well graded and generally provided with gutters, which carry off water falling from the clouds, immediately either to the creeks or the river. The creeks descend rapidly and give fall enough for mill-sites. The creek-bottoms are rocky, a formation made by the outcropping of the underlying solid structure of the general surface. Numerous ravines which ran across, at different angles, the whole original site have been filled from time to time with material taken from cellar-excavations; the removal of hillocks, and the ordinary debris formed in the gutters and back yards of buildings. Streets and alleys have also been leveled across these ravines, and hence more or less of the surface is composed of made ground.

The original water-supply for the inhabitants came from numerous springs which for ages appear to have gashed forth along the edges of the creeks and the river-bank. The water from these springs is as pure as any of the kind, and is never rendered otherwise except when the streams are flooded by heavy rains. Cistern-water has been used extensively in families from the earliest days of municipal existence, especially at points remote from the springs. For many years no house of any pretensions has been erected without being provided with a large and substantial cistern, and a filter more or less effective attached. The mildness of "the climate renders it practicable to have cisterns easily constructed, it not being necessary to go below a frost-line as in the more
northern States.
Likewise, from the fact that it is not necessary to provide against extreme cold, there are less cellars' made in which to store vegetables in winter. Hence there is comparatively little of decaying matter under the houses to cause sickness. In fact, but few lay by a store of vegetables and fruit, the main dependence being upon small purchases made at short intervals in the market.

There are no low places of any extent in which water can become stagnant, even in the suburbs, except where the grading of streets has interfered with natural drainage.

There are no animals slaughtered very near the city limits, but the slaughter-houses are in some instances along the banks of one of the creeks, and more or less impurity finds its way into the stream to pass on to the river.

Comparatively little animal matter, however, is deposited for any length of time, as the rapid current and frequent flooding from rain tend to carry everything away.

No sewerage system has as yet been inaugurated, but the United States Government building (court-house and post-office) is drained by means of a deep sewer, which empties near the river into one which was already made. Some of the property-owners along the street through which it passes have made openings into which they may discharge drains, and one gentleman has already availed himself of this opportunity, in order to carry off sewage from his premises.

His example will soon be followed by others, and before many years there will probably be a plan devised for supplying the city with water from the river, and this movement will forcibly suggest the sewer system.

One important drawback to the present and future health is the manner in which privy-vaults are constructed, or rather their non-construction. For nearly a century the soil has been filling up with effete matter accumulating in a series of privy-vaults which have been at times dug, used, filled, and others substituted.

Whether animal matter has to any extent been conveyed by percolation through the soil to the several springs is uncertain, but we are told of one instance in which coloring matter was found to have been carried from a tannery to a spring from which many families procured water. This occurred in 1854. The probability is, however, that surface-water only is likely to affect the water-sources which nature so abundantly supplies.

It will be seen, then, that the natural location of Knoxville is favorable to health, and that time, with improvements made from year to year, have not served to render it insalubrious.
Cholera prevailed here in 1849, 1854, and 1866. It was very fatal at each period, and the people had the usual dread of the disease.

Daring the month of May, 1873, there were indications of an outbreak of disease. Early in June, however, the disease began to be choleraic, but of a mild type and easily controlled. Among the adult population cholera-morbus made its appearance about the middle of the month. Both white and black were attacked, but none died for more than a week after the first case occurred. The number of deaths from all causes in May and June was below the usual ratio.\(^4\)

1883 Money appropriated for the East Tennessee Insane Asylum and in 1886 the asylum was ready for occupancy.\(^5\)

![East Tennessee Hospital for Insane\(^6\)](image)

1898 Dr. H P Coile was elected professor of clinical medicine at Tennessee Medical College and delivered the first clinical lectures in the Knoxville Hospital.\(^7\)

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\(^5\) Rule p. 536.


\(^7\) Rule; p. 518.
The Knoxville General Hospital opened in 1902 on Cleveland Place. It served as the city hospital until The University of Tennessee Hospital was built in 1956. It is currently used as a nursing home.

Knoxville General Hospital

1914 Typhoid vaccine licensed in the US.  

1915 Pertussis vaccine (whooping cough) licensed in the US.

**Influenza**

A worldwide influenza pandemic broke out in 1918 just as U.S. troops were landing in Europe to fight in World War I. To prevent panic, Allied governments censored reports about the "Spanish Flu" and military death records often cited pneumonia as the cause of death.

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The Great Influenza Pandemic of 1918-1919 killed 25-40 million people on all seven continents and has been described as "the greatest medical holocaust in history."

More than 7,700 Tennesseans died of influenza-related sickness during the great pandemic of 1918-1919.  

View of Fort Sanders Hospital in 1922.

Tuberculosis

Tuberculosis (TB) is an infectious disease and was greatly feared well into the 20th century. Frequently called "consumption," TB was often fatal. In By 1943 it was the No. 3 cause of death in Tennessee.

Antituberculosis Camp Established.—An emergency antituberculosis camp has been established by the Associated Charities at Knoxville, in a pine grove on the ridge near Clinton Pike, west of the New Gray Cemetery. A pavilion for a family of four has already been erected on this site. The tract of land is sufficient for the erection of enough tents for the accommodation of all the cases of tuberculosis in Knoxville, but the Associated Charities wish it understood that the camp is only to be temporary during the development of the East Tennessee Sanatorium on Tazewell Pike, 7 miles east of Knoxville.  

Mortality report of the Tennessee State board of health
It would be improper to think that these 4,499 persons contracted tuberculosis and died of the disease in one year. These deaths, in a majority of cases, marked the ending of a long fight, in which the disease was conqueror. There are now as many more persons in Tennessee who are in the advanced stages of the disease, who will die in 1916, and as many more doomed to the same fate in 1917, which means that on January 1st, 1916, there existed in Tennessee 9,000 persons with the disease (tuberculosis) sufficiently advanced as to prove fatal within two years. The average age at death from tuberculosis

is 34 years. At least, one half of all the persons who died of the disease were either fathers or mothers. They have left the orphan handicapped by a hereditary predisposition to the disease; with the infection in their systems as a result of intimate contact, and in many instances in poverty as a result of the prolonged illness in the home. A large number of these orphans as a result of all these circumstances will join the throng of advanced cases as the years go by. In Knox County Tuberculosis was responsible for 12% of deaths in 1915.¹⁴

August 21, 1931

Tuberculosis control is shared by the health department and the Beverly Hills Sanatorium. Patients are admitted to the hospital from field clinics and department of health is notified upon their release. The average patient census was 133.¹⁵

Beverly Hills Sanatorium in North Knoxville

From UT Special Collections¹⁶

Polio

September 1935 ... The Knox County Quarterly Court appropriated $7,500 to match Works Progress Administration (WPA) funds for the establishment of a Crippled Children’s Hospital

¹⁴ Tennessee State Board of Health, Mortality report of the Tennessee State Board of Health, 1915, pp. 2-6
March 1937 ... Knox County Crippled Children's Hospital opened.\(^{17}\) The link in the footnote is to the history of East Tennessee's Children's Hospital which was first called the Crippled Children's Hospital. The history also contains several photographs.

In 1952--an epidemic year for polio--there were 58,000 new cases reported in the United States.\(^{18}\)

1955 The first polio vaccine licensed.\(^{19}\)

\(^{17}\) Unknown, Our History; http://www.etch.com/about_us/our_history.aspx; accessed 1 NOV 2011.
\(^{18}\) Unknown; http://www.history.com/this-day-in-history/salk-announces-polio-vaccine; accessed 1 NOV 2011.
\(^{19}\) Unknown; http://www.immunize.org/timeline/; accessed 1 NOV 2011.