

# Historical Policies, Biological Principles, and Causes of Pandemic of Tuberculosis in the U. S.

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## ABSTRACT

The late 19th and early 20th centuries in the United States saw a boom in immigration, which brought with it the unintended consequence of disease transmission. Tuberculosis was one of the most lethal diseases at the time which had significant impacts on both the economy and society. The spread of tuberculosis was exacerbated by the poor sanitary conditions and overcrowded living conditions in urban areas. This paper analyzes the underlying causes of tuberculosis and their relationship to immigration policies and rapid urbanization, critically analyzing the impact of immigration policies, urban public policy challenges, the tuberculosis prevalence connection between Europe and the United States, and the role of medical advancements, hygiene practices, and government regulations in reducing US tuberculosis cases. The history of the spread of tuberculosis in the US can inform future strategies for establishing better disease preparedness and response systems.

## Introduction

During the 1870s, the United Kingdom began the Industrial Revolution, which quickly swept across Europe, Asia, and the United States, transforming the dominant economic industries from farming and agriculture to manufacturing and production. This shift created a significant problem of unemployment among those who had previously relied on farming as their main source of income (*Americans*), thus encouraging large-scale emigration of desperate job seekers in the late nineteenth century. The United States implemented new immigration policies in the late 1800s that opened up various opportunities across multiple fields, attracting immigrants from all over the world who sought economic prosperity or political freedom. The influx of immigrants resulted in mass migration to the United States, leading to rapid urbanization and a sharp increase in population. Concurrently, urbanization emerged as a consequence of the Industrial Revolution, as mass numbers of people flocked to cities to seek employment and opportunities.

The influx of immigrants to the United States during this period brought with it an unintended consequence: the spread of diseases, which was exacerbated by low sanitary conditions and insufficient construction of urban infrastructure as a result of the unprecedented speed of urbanization. Industrial expansion and population growth caused more issues in the urban area. "Noise, traffic jams, slums, air pollution, and sanitation and health problems became commonplace" (Library of Congress). This combination of poor living conditions and a crowded environment in urban areas led to uncontrollable disease outbreaks, with tuberculosis being one of the most lethal diseases at the time.

Tuberculosis, a highly contagious bacterial infection, spread throughout the United States during the late 19th century and early 20th century. The disease claimed the lives of one-seventh of the population due to inadequate treatments and a lack of awareness or medical knowledge. As a result, both the economy and society of the United States were significantly impacted by the disease. This paper aims to explore the cause-and-effect relationship between the emergence of tuberculosis and its underlying biological principles, and also examine the effect of immigration policies have on the spread of tuberculosis in urban areas.

## General Introduction to Tuberculosis

Tuberculosis is a contagious disease that primarily targets the lungs, though it may also affect other parts of the body, such as the brain, spine, or kidneys. The disease is caused by *Mycobacterium tuberculosis* bacteria, which are spread through droplets in the air, close contact with infected individuals, or airborne transmission. Once infectious droplets are inhaled, the bacteria enter the trachea and travel to the lungs. TB can be classified into two types: latent and active. Latent TB is characterized by mild or no symptoms and is not contagious; However, if left untreated, latent TB can progress to active TB, which is highly contagious and requires immediate medical attention (National Institution of Health).

The symptoms of tuberculosis include fatigue, night sweats, and weight loss, which can lead to an overall decline in the patient's health. Due to these debilitating symptoms, people in the 19th century referred to tuberculosis as "consumption," as it consumed one's soul and weakened the body. At the time, there were no reliable treatments for tuberculosis, and physicians mainly relied on traditional bloodletting therapy inherited from medieval times. This treatment method, tracing back to the Greeks in the third century B.C., believed that all illnesses resulted from an excess of blood (National Institution of Health). Unfortunately, this treatment often led to further spreading of the disease due to contaminated equipment.

Other popular treatments included advising patients to go outdoors, exercise, rest, and eat well to boost their immune systems. However, these methods rarely worked, and few cases reported a recovery. For those who successfully overcame tuberculosis the first time, recurrences were often accompanied by severe symptoms. Such dire circumstances were documented in literature and works that describe healthcare conditions at the time, such as "Living in the Shadow of Death" by Sheila M. Rothman, which states at the turn of the century, around 450 Americans died of tuberculosis every day, primarily between the ages of 15 and 44.

In 1882, Robert Koch, a German scientist, discovered the microorganism responsible for tuberculosis, marking a significant milestone in the history of public healthcare regulation. The discovery of an effective treatment was hitherto obscure until then. In the United States, heightened public awareness of coughing and sneezing subsequently led to a decline in the number of tuberculosis cases. Simultaneously, sanatoriums, which were antique hospitals to treat specific diseases, were widely established worldwide, leading to a global sanatorium movement. However, as technological advancements were made, particularly the emergence of chemotherapy, reliance on the sanatorium movement gradually waned and eventually came to an end.

## The United States and the Immigration Policy

The attitudes of the United States toward immigration during the 19th century were relatively open and encouraging, a trend that continued until the 20th century, when a decline in the United States' economy led to a shift in immigration policies. In 1875, the Supreme Court declared immigration regulation as a federal responsibility, resulting in an increase in the number of immigrants entering the country. During the 1870s, the majority of immigrants came from Canada, Germany, Ireland, and the United Kingdom. The number of immigrants entering the country rose significantly from 1880 to 1890, nearly doubling from 2,742,137 to 5,248,568. By the 1890s, the number of immigrants continued to rise, with 72% of the 7.6 million European immigrants arriving between 1900 and 1909 coming from Austria-Hungary, Italy, and Russia (Homeland Security).

Along with the surge of immigrants pouring into U.S. states came a clear connection between immigrants and the spread of tuberculosis. As stated by the National Institution of Health, "It became an especially pressing public health issue in the late 19th century, as millions of immigrants poured into America's larger cities." The poor organization and sanitary condition of the urban areas greatly contributed to the spread of tuberculosis and many of the other diseases (National Institution of Health). Many of these immigrants left their homelands to escape religious persecution or seek monetary gain from events such as the gold rush or construction of the transcontinental railroad.

Immigrants traveling to the United States primarily used steamboats, which provided a difficult journey due to the cramped quarters that made it difficult to exercise or breathe fresh air. The cumulative stress and the unsanitary conditions on board led to the rapid spread of disease among passengers before they even reached the American continent (National Institution of Health). As a result, many immigrants became carriers of diseases such as tuberculosis, which they brought from their home continents.

Due to the spread of the disease on the boat, most immigrants became carriers of the disease and brought the disease into the United States. A study conducted by the American Journal of Epidemiology explicitly examined the relationship between the immigration from 1906 to 1914 and the spread of diseases and suggested that tuberculosis was spread through the steamboats among the immigrants from Europe and Asia to America. It also noted a higher occurrence rate of diseases like tuberculosis, pneumonia, bronchitis, and pleurisy in immigrants than in native-born Americans (American Journal of Epidemiology).

## Urban Public Policy in the United States

Driven by the technological advancements of the industrial revolution, the late 19th century witnessed a rapid shift towards urbanization in the US. Individuals from suburban areas began moving into urban centers in large numbers. Various factors contributed to this sudden boost in immigration, including the replacement of workers with farming machines and the migration of black farmers from the South to Northern cities in search of new opportunities. Such rapid urbanization and population migration presented a significant challenge for the United States. As noted by *Americans*, city governments faced problems related to providing residents with essential services and safe living conditions. Issues such as housing, transportation, water, and sanitation emerged as major concerns (*Americans*, p470). At the beginning of this period of rapid urbanization, city governments struggled to control the situation due to the large number of people living in close proximity. This led to the spread of diseases that killed hundreds and thousands of people before effective policies could be implemented.

To address the housing needs of the growing population, tenements - multifamily dwelling houses - were created. However, these structures were often unsanitary and overcrowded, leading to increased interpersonal contact and contributing to the spread of tuberculosis. These conditions were documented by authors like Jacob Riis, who described the negative impacts of limited living spaces on public health in "How the Other Half Lives".

In addition to unsanitary conditions, unclean water and dirty streets further exacerbated public health concerns. Drinking water was contaminated, and pipeline water was in short supply. The streets were filled with trash, sewage water, and other waste. These unsanitary conditions facilitated the transmission of tuberculosis and other illnesses.

## Tuberculosis in Europe

During the eighteenth and nineteenth centuries, tuberculosis was a severe problem in Europe. Tuberculosis caused approximately 25% of deaths in Europe, reaching epidemic levels during the mid-nineteenth century (Medicine Net). Patients often died helplessly before the invention of antibiotics, and death rates rose exponentially overnight.

Coinciding with this period of widespread tuberculosis in Europe, the United States opened its doors to immigrants from around the world. As European immigrants flooded into the country through Ellis Island in New York City, the disease quickly spread throughout the United States. New York City Government notes that New York City had one of the highest morbidity rates in the country, making it a particularly vulnerable location for the spread of tuberculosis (Government NYC). Furthermore, as Europe is located across the Atlantic Ocean, on the east coast of the United States, the data provides evidence supporting the hypothesis that some European immigrants were carriers of the disease.

## Analyzing the causes of Tuberculosis in late 19th - early 20th century US

The highly contagious nature of tuberculosis, combined with the lack of mature healthcare programs and medical technology, made it easy for tuberculosis to spread rapidly in urban areas. Although vaccination was invented in the late 18th century, it was only effective in treating viral infections and not bacterial infections such as tuberculosis. Vaccination attempts against tuberculosis failed because the disease did not have protein shells or receptors that could be targeted by antibodies.

Rapid urbanization created crowded conditions that facilitated the spread of diseases, including tuberculosis. Contaminated water and unsanitary living conditions also contributed to its spread. In Europe, tuberculosis had reached epidemic levels, making it easy for the disease to be carried overseas to the United States before quarantine policies were implemented. Even though quarantine had been practiced as early as the 14th century to prevent the spread of the Black Death, it was not implemented in the United States until 1892 during an outbreak of cholera.

In addition, during the trip to the United States, the crowded cabins and uniform food served on steamships weakened passengers' immune systems, making them more susceptible to infection from tuberculosis. Some infected individuals became asymptomatic carriers who unwittingly transmitted the disease upon arriving in the United States.

### Conclusion

In summary, the number of tuberculosis cases in the United States was significantly impacted by four factors: the contagious nature of tuberculosis, rapid urbanization, the severe TB epidemic in Europe, and the challenging conditions experienced during travel. Due to modern technology and improved healthcare, tuberculosis can now be treated effectively. The occurrence of tuberculosis in the United States has decreased by 44% from 1993 to 2003 and is currently occurring at a historically low level, with only 8,916 reported cases in 2019 (CDC).

Improved hygiene conditions, non-contaminated sources of food, and better healthcare facilities have all contributed to this decrease. Additionally, the US have implemented regulations to monitor immigrants for infectious diseases, which has further lowered the number of reported cases of tuberculosis and other diseases within the region.

These significant improvements in public health demonstrate the effectiveness of modern medical technologies and government policies in preventing the spread of infectious diseases. By regulating immigration and implementing effective disease control measures, public health officials have been able to successfully combat tuberculosis and other illnesses in the United States. By triangulating the situation during the tuberculosis pandemic, multiple improvements across disciplines have been adjusted. It is crucial to draw lessons from the strategies that were developed when fighting against tuberculosis to establish a better understanding and a solid foundation for our future responses toward infectious disease.

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