

Spanish flu

From Wikipedia, the free encyclopedia

Soldiers from [Fort Riley, Kansas](#), ill with Spanish flu at



a hospital ward at [Camp Funston](#)

Types
Treatment
Pandemics
<ul style="list-style-type: none">1918 Spanish flu1957 Asian flu1968–1969 Hong Kong flu2009 swine flu
Outbreaks
<ul style="list-style-type: none">1976 swine flu2006 H5N1 India2007 Australian equine2007 Bernard Matthews H5N12008 West Bengal2015 United States H5N2 outbreak

The **Spanish flu**, also known as the **1918 flu pandemic**,^[1] was an unusually deadly [influenza pandemic](#). Lasting from January 1918 to December 1920, it infected 500 million people—about a quarter of the world's population at the time.^[2] The death toll is estimated to have been anywhere from 17 million^[3] to 50 million, and possibly as high as 100 million, making it one of the [deadliest epidemics](#) in human history.^{[4][5]}

To maintain morale, [World War I](#) censors minimized early reports of illness and mortality in Germany, the United Kingdom, France, and the United States.^[6] Papers were free to report the epidemic's effects in neutral Spain, such as the grave illness of [King Alfonso XIII](#), and these stories created a false impression of Spain as especially hard hit.^[7] This gave rise to the pandemic's nickname, "Spanish flu".^{[8][9]} Historical and [epidemiological](#) data are inadequate to identify with certainty the pandemic's geographic origin, with [varying views as to the origin](#).^[2]

Most influenza outbreaks disproportionately kill the very young and the very old, with a higher survival rate for those in between, but the Spanish flu pandemic resulted in a higher than expected mortality rate for young adults.^[10] Scientists offer several possible explanations for the high mortality rate of the 1918 influenza pandemic. Some analyses have shown the virus to be particularly deadly because it triggers a [cytokine storm](#), which ravages the stronger [immune system](#) of young adults.^[11] In contrast, a 2007 analysis of medical journals from the period of the pandemic^{[12][13]} found that the [viral infection](#) was no more aggressive than previous [influenza](#) strains. Instead, [malnourishment](#), overcrowded medical camps and hospitals, and poor [hygiene](#) promoted bacterial [superinfection](#). This superinfection killed most of the victims, typically after a somewhat prolonged death bed.^{[14][15]}

The Spanish flu was the first of two pandemics caused by the [H1N1 influenza virus](#); the second was the [swine flu in 2009](#).^[16]

Contents

- [1 History](#)
 - [1.1 Hypotheses about the source](#)
 - [1.1.1 United Kingdom](#)
 - [1.1.2 United States](#)
 - [1.1.3 China](#)
 - [1.2 Spread](#)
- [2 Mortality](#)
 - [2.1 Around the globe](#)
 - [2.2 Patterns of fatality](#)
 - [2.3 Deadly second wave](#)
 - [2.4 Devastated communities](#)
 - [2.5 Less-affected areas](#)
 - [2.6 Aspirin poisoning](#)
 - [2.7 End of the pandemic](#)
 - [2.8 Long-term effects](#)

History

Hypotheses about the source

United Kingdom

The major UK troop staging and hospital camp in [Étaples](#) in France has been theorized by researchers as being at the center of the Spanish flu. The research was published in 1999 by a British team, led by [virologist John Oxford](#).^[17] In late 1917, military pathologists reported the onset of a new disease with high mortality that they later recognized as the flu. The overcrowded camp and hospital was an ideal site for the spreading of a respiratory virus. The hospital treated thousands of victims of chemical attacks, and other casualties of war, and 100,000 soldiers passed through the camp every day. It also was home to a [piggery](#), and [poultry](#) was regularly brought in for food supplies from surrounding villages. Oxford and his team postulated that a significant precursor virus, harbored in birds, [mutated](#) and then migrated to pigs kept near the front.^{[18][19]}

A report published in 2016 in the *Journal of the Chinese Medical Association* found evidence that the 1918 virus had been circulating in the European armies for months and possibly years before the 1918 pandemic.^[20]

United States

There have been statements that the epidemic originated in the United States. Historian [Alfred W. Crosby](#) stated in 2003 that the flu originated in [Kansas](#),^[21] and popular author [John Barry](#) described [Haskell County, Kansas](#), as the point of origin in his 2004 article.^[11] It has also been stated by historian Santiago Mata in 2017 that, by late 1917, there had already been a first wave of the epidemic in at least 14 US military camps.^[22]

A 2018 study of tissue slides and medical reports lead by evolutionary biology professor Michael Worobey found evidence against the disease originating from Kansas as those cases were milder and had fewer deaths compared to the situation in New York City in the same time period. The study did find evidence through [phylogenetic analyses](#) that the virus likely had a North American origin, though it was not conclusive. In addition, the [haemagglutinin glycoproteins](#) of the virus suggest that it was around far prior to 1918 and other studies suggest that the [reassortment](#) of the H1N1 virus likely occurred in or around 1915.^[23]

China

One of the few regions of the world seemingly less affected by the 1918 flu pandemic was [China](#), where there may have been a comparatively mild flu season in 1918 (although this is disputed due to lack of data in the [Warlord Period](#) of China, see [Around the globe](#)). Multiple studies have documented that there were relatively few deaths from the flu in China compared to other regions of the world.^{[24][25][26]} This has led to speculation that the 1918 flu pandemic originated in China.^{[27][25][28][29]} The relatively mild flu season and lower rates of flu mortality in China in 1918 may be explained due to the fact that the Chinese population had already possessed [acquired immunity](#) to the flu virus.^{[30][27][25]} However, a study by K.F. Cheng and

P.C. Leung in 2006 have suggested it was more likely because the traditional Chinese medicine played an important role in prevention and treatment.^[27]

In 1993, Claude Hannoun, the leading expert on the 1918 flu for the [Pasteur Institute](#), asserted the former virus was likely to have come from China. It then mutated in the United States near [Boston](#) and from there spread to [Brest, France](#), Europe's battlefields, Europe, and the world with [Allied](#) soldiers and sailors as the main disseminators.^[31] He considered several other hypotheses of origin, such as Spain, Kansas and Brest, as being possible, but not likely. Political scientist [Andrew Price-Smith](#) published data from the [Austrian archives](#) suggesting the influenza had earlier origins, beginning in Austria in early 1917.^[32]

In 2014, historian Mark Humphries argued that the mobilization of 96,000 [Chinese laborers](#) to work behind the British and French lines might have been the source of the pandemic. Humphries, of the [Memorial University of Newfoundland](#) in [St. John's](#), based his conclusions on newly unearthed records. He found archival evidence that a respiratory illness that struck northern China in November 1917 was identified a year later by Chinese health officials as identical to the Spanish flu.^{[33][34]}

A report published in 2016 in the Journal of the [Chinese Medical Association](#) found no evidence that the 1918 virus was imported to Europe via Chinese and Southeast Asian soldiers and workers and instead found evidence of its circulation in Europe before the pandemic.^[20] The 2016 study suggested that the low flu mortality rate (an estimated 1/1000) found among the Chinese and Southeast Asian workers in Europe meant that the deadly 1918 influenza pandemic could not have originated from those workers.^[20]

A 2018 study of tissue slides and medical reports lead by evolutionary biology professor Michael Worobey found evidence against the disease being spread by Chinese workers, noting that workers entered Europe through other routes that did not result in detectable spread, making them unlikely to have been the original hosts.^[23]

Spread



As U.S. troops deployed en masse for the [war effort in Europe](#), they carried the Spanish flu with them.

When an infected person sneezes or coughs, more than half a million virus particles can [spread](#) to those nearby.^[35] The close quarters and massive troop movements of [World War I](#) hastened the pandemic, and probably both increased transmission and augmented mutation. The war may also have increased the lethality of the virus. Some

speculate the soldiers' immune systems were weakened by malnourishment, as well as the stresses of combat and chemical attacks, increasing their susceptibility.^{[36][37]}

A large factor in the worldwide occurrence of this flu was increased travel. Modern transportation systems made it easier for soldiers, sailors, and civilian travelers to spread the disease.^[38]

In the United States, the disease was first observed in Haskell County, Kansas, in January 1918, prompting local doctor Loring Miner to warn the [US Public Health Service](#)'s academic journal. On 4 March 1918, company cook Albert Gitchell, from Haskell County, reported sick at [Fort Riley](#), a US military facility that at the time was training American troops during World War I, making him the first recorded victim of the flu.^{[39][40][41]} Within days, 522 men at the camp had reported sick.^[42] By 11 March 1918, the virus had reached [Queens, New York](#).^[38] Failure to take preventive measures in March/April was later criticised.^[43]

In August 1918, a more [virulent strain](#) appeared simultaneously in Brest, France; in [Freetown, Sierra Leone](#); and in the U.S. in Boston, Massachusetts. The Spanish flu also spread through Ireland, carried there by returning Irish soldiers.^[citation needed] The Allies of World War I came to call it the Spanish flu, primarily because the pandemic received greater press attention after it moved from France to Spain in November 1918. Spain was not involved in the war and had not imposed wartime [censorship](#).^[44]

Mortality

Around the globe

The difference between the influenza mortality age-distributions of the 1918 epidemic and normal epidemics – deaths per 100,000 persons in each age group, United States, for the interpandemic years 1911–1917 (dashed line) and the pandemic year 1918 (solid line)^[45]

Three pandemic waves: weekly combined influenza and pneumonia mortality, United Kingdom, 1918–1919^[46]

Estimates vary as to the total number who died. **An estimate from 1991 says it killed 25–39 million people.**^[47] A 2005 estimate put the death toll at probably 50 million (less than 3% of the global population), and possibly as high as 100 million (more than 5%).^{[48][49]} But a reassessment in 2018 estimated the total to be about 17 million,^[3] though this has been contested.^[50] With a world population of 1.8 to 1.9 billion,^[51] these estimates correspond to between 1 and 6 percent of the population.

This flu killed more people in 24 weeks than [HIV/AIDS](#) killed in 24 years.^[52] The [Black Death](#), which lasted much longer, killed a much higher percentage of the world's then smaller population.^[53]

The disease killed in every area of the globe. **As many as 12-17 million people died in India, about 5% of the population.**^[54] The death toll in [India's British-ruled districts](#) was **13.88 million.**^[55] Arnold (2019) estimates at least 12 million dead.^[56]

Estimates for the death toll in China have varied widely,^{[57][47]} a range which reflects the lack of centralised collection of health data at the time due to the [Warlord period](#). The first estimates of the Chinese death toll was made in 1991 by Patterson and Pyle, which estimated China had a death toll of between 5 and 9 million. However, this 1991 study was later criticized by later studies due to flawed methodology, and newer studies have published estimates of a far lower mortality rate in China.^{[24][58][59]} For instance, Iijima in 1998 estimates the death toll in China to

be between 1 and 1.28 million based on data available from Chinese port-cities.^[60] As Wataru Iijima notes,

"Patterson and Pyle in their study 'The 1918 Influenza Pandemic' tried to estimate the number of deaths by Spanish influenza in China as a whole. They argued that between 4.0 and 9.5 million people died in China, but this total was based purely on the assumption that the death rate there was 1.0–2.25 per cent in 1918, because China was a poor country similar to Indonesia and India where the mortality rate was of that order. Clearly their study was not based on any local Chinese statistical data."^[61]

The lower estimates of the Chinese death toll are based on the low mortality rates that were found in Chinese port-cities (for example, Hong Kong) and on the assumption that poor communications prevented the flu from penetrating the interior of China.^[57] However, some contemporary newspaper and post office reports, as well as reports from missionary doctors, suggest that the flu did penetrate the Chinese interior and that influenza was bad in some locations in the countryside of China.^[62]

In [Japan](#), 23 million people were affected, with at least 390,000 reported deaths.^[63] In the [Dutch East Indies](#) (now [Indonesia](#)), 1.5 million were assumed to have died among 30 million inhabitants.^[64] In [Tahiti](#), 13% of the population died during one month. Similarly, in [Samoa](#) 22% of the population of 38,000 died within two months.^[65]

In [New Zealand](#), the flu killed an estimated 6,400 Europeans and 2,500 indigenous [Maori](#) in six weeks.^[66] [Geoffrey Rice](#) has found that Maori died at eight times the rate of Europeans.^[67]

In [Iran](#), the mortality was very high: according to an estimate, between 902,400 and 2,431,000, or 8% to 22% of the total population died.^[68]

In the U.S., about 28% of the population of 105 million became infected, and 500,000 to 675,000 died (0.48 to 0.64 percent of the population).^[69] Native American tribes were particularly hard hit. In the [Four Corners](#) area, there were 3,293 registered deaths among [Native Americans](#).^[70] Entire [Inuit](#) and [Alaskan Native](#) village communities died in [Alaska](#).^[71] In Canada, 50,000 died.^[72]

In [Brazil](#), 300,000 died, including president [Rodrigues Alves](#).^[73]

In Britain, as many as 250,000 died;

in France, more than 400,000.^[74]

In [Ghana](#), the influenza epidemic killed at least 100,000 people.^[75] Tafari Makonnen (the future [Haile Selassie](#), [Emperor of Ethiopia](#)) was one of the first Ethiopians who contracted influenza but survived.^{[76][77]} Many of his subjects did not; estimates for fatalities in the capital city, [Addis Ababa](#), range from 5,000 to 10,000, or higher.^[78] In [British Somaliland](#), one official estimated that 7% of the native population died.^[79]

This huge death toll resulted from an extremely high [infection rate](#) of up to 50% and the extreme severity of the symptoms, suspected to be caused by [cytokine storms](#).^[47] Symptoms in 1918 were unusual, initially causing influenza to be misdiagnosed as [dengue](#), [cholera](#), or [typhoid](#). One observer wrote, "One of the most striking of the complications was [hemorrhage](#) from [mucous membranes](#), especially from the nose, stomach, and intestine. Bleeding from the ears and [petechial hemorrhages](#) in the skin also occurred".^[48] The majority of deaths were from [bacterial pneumonia](#),^{[80][81]} a common [secondary infection](#) associated with influenza. The virus also killed people directly by causing massive hemorrhages and [edema](#) in the lungs.^[81]

Patterns of fatality

The pandemic mostly killed young adults. In 1918–1919, 99% of pandemic influenza deaths in the U.S. occurred in people under 65, and nearly half of deaths were in young adults 20 to 40 years old. In 1920, the mortality rate among people under 65 had decreased sixfold to half the mortality rate of people over 65, but 92% of deaths still occurred in people under 65.^[82] This is unusual, since influenza is typically most deadly to weak individuals, such as [infants](#) under age two, adults over age 70, and the [immunocompromised](#). In 1918, older adults may have had partial protection caused by exposure to the [1889–1890 flu pandemic](#), known as the "Russian flu".^[83]

According to historian John M. Barry, the most vulnerable of all – "those most likely, of the most likely", to die – were pregnant women. He reported that in thirteen studies of hospitalized women in the pandemic, the death rate ranged from 23% to 71%.^[84] Of the pregnant women who survived childbirth, over one-quarter (26%) lost the child.^[85]

Another oddity was that the outbreak was widespread in the summer and autumn (in the [Northern Hemisphere](#)); influenza is usually worse in winter.^[86]



[Alberta's](#) provincial board of health poster

Modern analysis has shown the virus to be particularly deadly because it triggers a cytokine storm (overreaction of the body's immune system), which ravages the stronger immune system of young adults.^[11] One group of researchers recovered the virus from the bodies of frozen victims and [transfected](#) animals with it. The animals suffered rapidly progressive [respiratory failure](#) and death through a cytokine storm. The strong immune reactions of young adults were postulated to have ravaged the body, whereas the weaker immune reactions of children and middle-aged adults resulted in fewer deaths

among those groups.^{[52][87]}

In fast-progressing cases, mortality was primarily from [pneumonia](#), by virus-induced lung [consolidation](#). Slower-progressing cases featured secondary bacterial pneumonia, and possibly [neural](#) involvement that led to [mental disorders](#) in some cases. Some deaths resulted from malnourishment.

A study conducted by He *et al.* (2011) used a mechanistic modeling approach to study the three waves of the 1918 influenza pandemic. They examined the factors that underlie variability in temporal patterns and their correlation to patterns of mortality and morbidity. Their analysis suggests that temporal variations in transmission rate provide the best explanation, and the variation in transmission required to generate these three waves is within biologically plausible values.^[88]

Another study by He *et al.* (2013) used a simple [epidemic model](#) incorporating three factors to infer the cause of the three waves of the 1918 influenza pandemic. These factors were school opening and closing, temperature changes throughout the outbreak, and human behavioral changes in response to the outbreak. Their modeling results showed that all three factors are important, but human behavioral responses showed the most significant effects.^[89]

Deadly second wave



[American Expeditionary Force](#) victims of the Spanish flu at U.S. Army Camp Hospital no. 45 in [Aix-les-Bains](#), France, in 1918

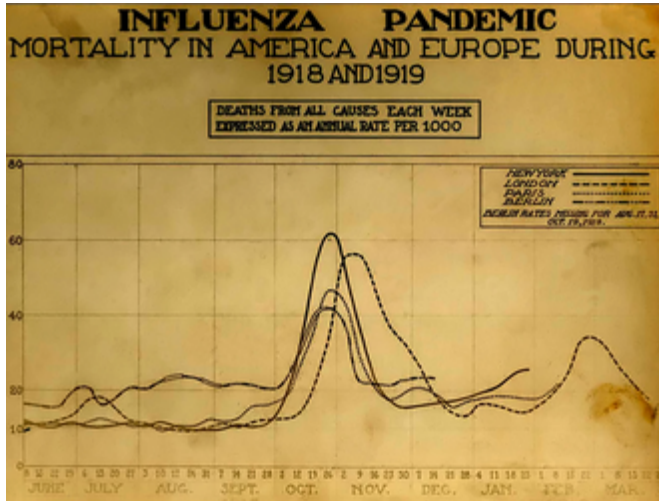
The second wave of the 1918 pandemic was much deadlier than the first. The first wave had resembled typical flu epidemics; those most at risk were the sick and elderly, while younger, healthier people recovered easily.

By August, when the second wave began in France, Sierra Leone, and the United States,^[90] the virus had mutated to a much deadlier form. October 1918 was the deadliest month of the whole pandemic.^[91]

This increased severity has been attributed to the circumstances of the First World War.^[92] In civilian life, [natural selection](#) favors a mild strain. Those who get very ill stay home, and those mildly ill continue with their lives, preferentially spreading the mild strain. In the trenches, natural selection was reversed. Soldiers with a mild strain stayed where they were, while the severely ill were sent on crowded trains to crowded field hospitals, spreading the deadlier virus. The second wave began, and the flu quickly spread around the world again. Consequently, during modern pandemics, health officials pay attention when the virus reaches places with social upheaval (looking for deadlier strains of the virus).^[93]

The fact that most of those who recovered from first-wave infections had become [immune](#) showed that it must have been the same strain of flu. This was most dramatically illustrated in [Copenhagen](#), which escaped with a combined mortality rate of just 0.29% (0.02% in the first wave and 0.27% in the second wave) because of exposure to the less-lethal first wave.^[94] For the rest of the population, the second wave was far more deadly; the most vulnerable people were those like the soldiers in the trenches – adults who were young and fit.^[95]

Devastated communities



A chart of deaths in major cities, showing a peak in October and November 1918

Coromandel Hospital Board ([New Zealand](#)) advice to influenza sufferers (1918)

Even in areas where mortality was low, so many adults were incapacitated that much of everyday life was hampered. Some communities closed all stores or required customers to leave orders outside. There were reports that

healthcare workers could not tend the sick nor the gravediggers bury the dead because they too were ill. Mass graves were dug by [steam shovel](#) and bodies buried without coffins in many places.^[96]

Several [Pacific island](#) territories were hit particularly hard. The pandemic reached them from New Zealand, which was too slow to implement measures to prevent ships, such as the [SS Talune](#), carrying the flu from leaving its ports. From New Zealand, the flu reached [Tonga](#) (killing 8% of the population), [Nauru](#) (16%), and [Fiji](#) (5%, 9,000 people).^[97]

Worst affected was Western Samoa, formerly [German Samoa](#), which had been [occupied by New Zealand](#) in 1914. 90% of the population was infected; 30% of adult men, 22% of adult women, and 10% of children died. By contrast, [Governor John Martin Poyer](#) prevented the flu from reaching neighboring [American Samoa](#) by imposing a blockade.^[97] The disease spread fastest through the higher social classes among the indigenous peoples, because of the custom of gathering [oral tradition](#) from chiefs on their deathbeds; many community elders were infected through this process.^[98]

In New Zealand, 8,573 deaths were attributed to the 1918 pandemic influenza, resulting in a total population fatality rate of 0.7%.^[99] Māori were 10 times as likely to die as Europeans, because of their poorer and more crowded housing and rural population.^[98]

In [Ireland](#), the Spanish flu accounted for 10% of the total deaths in 1918.^[citation needed]

Data analysis revealed 6,520 recorded deaths in [Savannah-Chatham County, Georgia](#) (population of 83,252) for the three-year period from 1 January 1917 to 31 December 1919. Of these deaths, influenza was specifically listed as the cause of death in 316 cases, representing 5% of all causes of death for the total time period.^[100]

Less-affected areas

[China](#) may have experienced a relatively mild flu season in 1918 compared to other areas of the world.^{[101][102][30][103] [104][30]} However, the view that China's experience of the flu in 1918 was mild has also been challenged. Though there was no centralised collection of health statistics

in the country at the time, some reports from its interior suggest that mortality rates from influenza were perhaps higher in at least a few locations in China in 1918.^[105] However, at the very least, there is little evidence that China as a whole was seriously affected by the flu compared to other countries in the world.^[105] Although medical records from China's interior are lacking, there was extensive medical data recorded in Chinese port-cities, such as then [British](#)-controlled [Hong Kong](#), [Canton](#), [Peking](#), [Harbin](#) and [Shanghai](#). This data was collected by the [Chinese Maritime Customs Service](#), which was largely staffed by non-Chinese foreigners, such as the British, French, and other European [colonial](#) officials in China.^[106] As a whole, accurate data from China's port cities show astonishingly low mortality rates compared to other cities in [Asia](#).^[106] For example, the British authorities at Hong Kong and Canton reported a mortality rate from influenza at a rate of 0.25% and 0.32%, much lower than the reported mortality rate of other cities in [Asia](#), such as [Calcutta](#) or [Bombay](#), where influenza was much more devastating.^{[106][107]} Similarly, in the city of [Shanghai](#) – which had a population of over 2 million in 1918 – there were only 266 recorded deaths from [influenza](#) among the Chinese population in 1918.^[106] If extrapolated from the extensive data recorded from [Chinese](#) cities, the suggested mortality rate from influenza in China as a whole in 1918 was likely lower than 1% – much lower than the world average (which was around 3–5%).^[106] In contrast, [Japan](#) and [Taiwan](#) had reported a mortality rate from influenza around 0.45% and 0.69% respectively, higher than the mortality rate collected from data in Chinese port cities, such as Hong Kong (0.25%), Canton (0.32%), and Shanghai.^[106] Some researchers have proposed that [traditional Chinese medicine](#) may have played a role in the low influenza mortality rate in China.^[102]



1919 Tokyo, Japan

In Japan, 257,363 deaths were attributed to influenza by July 1919, giving an estimated 0.4% mortality rate, much lower than nearly all other Asian countries for which data are available. The Japanese government severely restricted sea travel to and from the home islands when the pandemic struck.

In the Pacific, American Samoa^[108] and the French colony of [New Caledonia](#)^[109] also succeeded in preventing even a single death from influenza through effective [quarantines](#). In Australia, nearly 12,000 perished.^[110]

By the end of the pandemic, the isolated island of [Marajó](#), in Brazil's Amazon River Delta had not reported an outbreak.^[111] [Saint Helena](#) also reported no deaths.^[112]

The death toll in [Russia](#) has been estimated at 450,000, though the epidemiologists who suggested this number called it a "shot in the dark".^[147] If it is correct, Russia lost roughly 0.2% of its population, meaning it suffered the lowest influenza-related mortality in [Europe](#). Another study considers this number unlikely, given that the country was in the grip of a [civil war](#), and the infrastructure of daily life had broken down; the study suggests that Russia's death toll was closer to 1%, or 2.7 million people.^[62]

Aspirin poisoning

In a 2009 paper published in the journal *Clinical Infectious Diseases*, Karen Starko proposed that [aspirin poisoning](#) contributed substantially to the fatalities. She based this on the reported symptoms in those dying from the flu, as reported in the [post mortem](#) reports still available, and also the timing of the big "death spike" in October 1918. This occurred shortly after the [Surgeon General of the U.S. Army](#) and the [Journal of the American Medical Association](#) both recommended very large doses of 8 to 31 grams of [aspirin](#) per day as part of treatment. These levels will produce [hyperventilation](#) in 33% of patients, as well as [lung edema](#) in 3% of patients.^[113]

Starko also notes that many early deaths showed "wet", sometimes hemorrhagic lungs, whereas late deaths showed bacterial pneumonia. She suggests that the wave of aspirin poisonings was due to a "[perfect storm](#)" of events: [Bayer](#)'s patent on aspirin expired, so many companies rushed in to make a profit and greatly increased the supply; this coincided with the Spanish flu; and the symptoms of aspirin poisoning were not known at the time.^[113]



A street car conductor in [Seattle](#) in 1918 refusing to allow passengers aboard who are not wearing masks

As an explanation for the universally high mortality rate, this hypothesis was questioned in a letter to the journal published in April 2010 by Andrew Noymer and Daisy Carreon of the [University of California, Irvine](#), and Niall Johnson of the Australian Commission on Safety and Quality in Health Care. They questioned the universal applicability of the aspirin theory, given the high mortality rate in countries such as India, where there was little or no access to aspirin at the time, compared to the death rate in places where aspirin was plentiful.^[114]

They concluded that "the [salicylate](#) [aspirin] poisoning hypothesis [was] difficult to sustain as the primary explanation for the unusual virulence of the 1918–1919 influenza pandemic".^[114] In response, Starko said there was [anecdotal evidence](#) of aspirin use in India and argued that even if aspirin over-prescription had not contributed to the high Indian mortality rate, it could still have been a factor for high rates in areas where other exacerbating factors present in India played less of a role.^[115]

End of the pandemic

After the lethal second wave struck in late 1918, new cases dropped abruptly – almost to nothing after the peak in the second wave.^[52] In Philadelphia, for example, 4,597 people died in the week ending 16 October, but by 11 November, influenza had almost disappeared from the city. One explanation for the rapid decline in the lethality of the disease is that doctors became more effective in prevention and treatment of the pneumonia that developed after the victims had contracted the virus. However, John Barry stated in his 2004 book [The Great](#)

[Influenza: The Epic Story of the Deadliest Plague In History](#) that researchers have found no evidence to support this position.^[11]

Another theory holds that the 1918 virus mutated extremely rapidly to a less lethal strain. This is a common occurrence with influenza viruses: there is a tendency for pathogenic viruses to become less lethal with time, as the hosts of more dangerous strains tend to die out^[11] (see also "[Deadly Second Wave](#)", above).

Long-term effects

A 2006 study in the *Journal of Political Economy* found that "cohorts *in utero* during the pandemic displayed reduced educational attainment, increased rates of physical disability, lower income, lower socioeconomic status, and higher transfer payments compared with other birth cohorts."^[116] A 2018 study found that the pandemic reduced educational attainment in populations.^[117]

The flu has been linked to the outbreak of [encephalitis lethargica](#) in the 1920s.^[118]

Legacy



[American Red Cross](#) nurses tend to flu patients in temporary wards set up inside [Oakland](#) Municipal Auditorium, 1918.

Academic Andrew Price-Smith has made the argument that the virus helped tip the balance of power in the latter days of the war towards the Allied cause. He provides data that the viral waves hit the [Central Powers](#) before the Allied powers and that both [morbidity](#) and mortality in [Germany](#) and [Austria](#) were considerably higher than in

Britain and [France](#).^[32]

Despite the high morbidity and mortality rates that resulted from the epidemic, the Spanish flu began to fade from public awareness over the decades until the arrival of news about [bird flu](#) and other pandemics in the 1990s and 2000s.^[119] This has led some historians to label the Spanish flu a "forgotten pandemic".^[21]

There are various theories of why the Spanish flu was "forgotten". The rapid pace of the pandemic, which, for example, killed most of its victims in the United States within less than nine months, resulted in limited media coverage. The general population was familiar with patterns of pandemic disease in the late 19th and early 20th centuries: typhoid, [yellow fever](#), [diphtheria](#) and cholera all occurred near the same time. These outbreaks probably lessened the significance of the influenza pandemic for the public.^[120] In some areas, the flu was not reported on, the only mention being that of advertisements for medicines claiming to cure it.^[121]

Additionally, the outbreak coincided with the deaths and media focus on the First World War.^[122] Another explanation involves the age group affected by the disease. The majority of fatalities, from both the war and the epidemic, were among young adults. The number of war-related deaths of young adults may have overshadowed the deaths caused by flu.^[82]

When people read the obituaries, they saw the war or postwar deaths and the deaths from the influenza side by side. Particularly in Europe, where the war's toll was high, the flu may not have had a tremendous psychological impact or may have seemed an extension of the war's tragedies.^[82] The duration of the pandemic and the war could have also played a role. The disease would usually only affect a particular area for a month before leaving. The war, however, had initially been expected to end quickly but lasted for four years by the time the pandemic struck.

https://en.wikipedia.org/wiki/Spanish_flu