In this 1625 illustration, Londoners fleeing the plague are barred by country dwellers. NEW YORK PUBLIC LIBRARY/SCIENCE SOURCE

From Black Death to fatal flu, past pandemics show why people on the

When the Black Death arrived in London by January 1349, the city had been waiting with dread for months. Londoners had heard reports of devastation from cities such as Florence, where 60% of people had died of plague the year before. In the summer of 1348, the disease had reached English ports from continental Europe and begun to ravage its way toward the capital. The plague caused painful and frightening symptoms, including fever, vomiting, coughing up blood, black pustules on the skin, and swollen lymph nodes. Death usually came within 3 days.

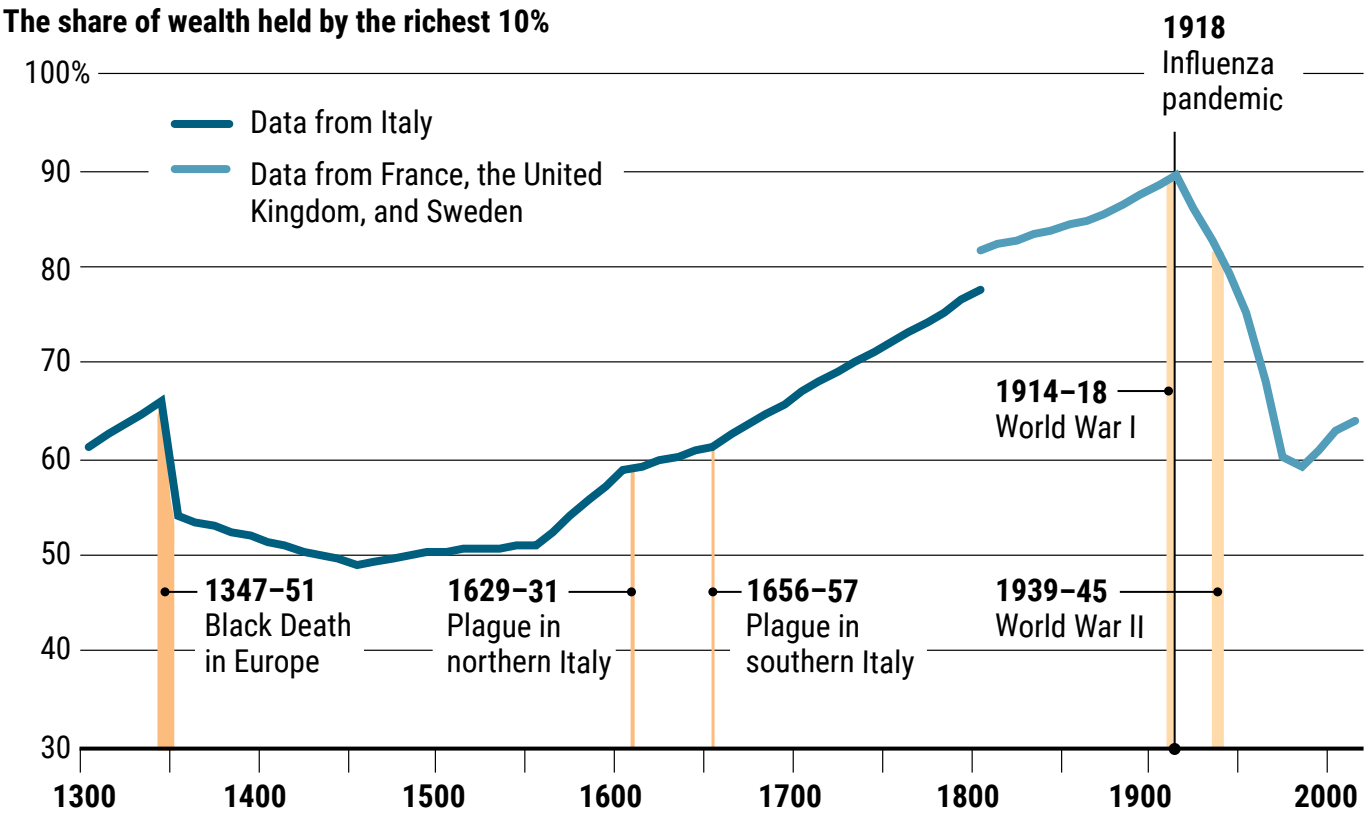
The city prepared the best way it knew how: Officials built a massive cemetery, called East Smithfield, to bury as many victims as possible in consecrated ground, which the faithful believed would allow God to identify the dead as Christians on Judgment Day. Unable to save lives, the city tried to save souls.

The impact was as dreadful as feared: In 1349, the Black Death killed about half of all Londoners; from 1347 to 1351, it killed between 30% and 60% of all Europeans. For those who lived through that awful time, it seemed no one was safe. In France, which also lost about half its population, chronicler Gilles Li Muisis wrote, “neither the rich, the middling sort, nor the pauper was secure; each had to await God’s will.”

But careful archaeological and historical work at East Smithfield and elsewhere has revealed that intersecting social and economic inequalities shaped the course of the Black Death and other epidemics. “Bioarchaeology and other social sciences have repeatedly demonstrated that these kinds of crises play out along the preexisting fault lines of each society,” says Gwen Robbins Schug, a bioarchaeologist at Appalachian State University who studies health and inequality in ancient societies. The people at greatest risk were often those already marginalized—the poor and minorities who faced discrimination in ways that damaged their health or limited their access to medical care even in prepandemic times. In turn, the pandemics themselves affected societal inequality, by either undermining or reinforcing existing power structures.

Sometimes a leveler

Before the 20th century, rising economic inequality in Italy was reversed only once: during and after the Black Death, according to tax records. Data from elsewhere in Europe suggest economic inequality dropped again after 1918, but the impact of that year’s influenza pandemic can’t be separated from that of two world wars.



(GRAPHIC) N. DESAI/*SCIENCE*; (DATA) GUIDO ALFANI AND THOMAS PIKETTY

That reality is on stark display during the COVID-19 pandemic. Although the disease has memorably struck some of the world's rich and powerful, including U.K. Prime Minister Boris Johnson and actor Tom Hanks, it is not an equal-opportunity killer. In hard-hit New York City, Latino and black people have been twice as likely to die from COVID-19 as white people. Cases there have been concentrated in poorer ZIP codes, where people live in crowded apartments and can't work from home or flee to vacation homes.

"The ways that social inequalities are manifested … put people at higher risk," says Monica Green, an independent historian who studies the Black Death. "We should all be learning in our bones, in a way that will never be forgotten, why [the coronavirus pandemic] has happened the way it has."

WHEN THE BLACK DEATH STRUCK, many places in Europe were already beleaguered. The late 13th and 14th centuries were a time of climatic cooling and erratic weather. Harvests had failed and famines had struck in the century or so before the pandemic emerged. In the Great Famine of 1315–17, up to 15% of the population of England and Wales died, according to historical records. As wages fell and grain prices soared, more people were driven into poverty. Household account books and records of payments to workers on English manors show that by 1290, 70% of English families were living at or below the poverty line, defined as being able to buy enough food and goods to not go hungry or be cold. Meanwhile, the wealthiest 3% of households received 15% of

Black Death tended to be shorter and more likely to die young than people who died during the two previous centuries. Those who lived in the century before plague also had more grooves on their teeth from disrupted enamel growth, a sign of malnutrition, disease, or other physiological stressors during childhood.

DeWitte lacks samples from the decades immediately before the Black Death, but historical evidence of the Great Famine and low wages until the 1340s make it likely that those trends continued right up until the pandemic struck, she says.

To see whether ill health made people more susceptible to plague, DeWitte turned to hundreds of skeletons excavated from East Smithfield. She calculated the age distribution of people in the cemetery, as well as the life expectancies of people with markers of stress on their skeletons. Her rigorous models show older adults and people already in poor health were more likely to die during the Black Death. Contrary to the assumption that "everyone who was exposed to the disease was at the same risk of death … health status really did have an effect," she says.

In the 1980s, archaeologists excavated plague victims buried in London's East Smithfield cemetery in 1349.
MOLA/GETTY IMAGES

Skeletons don't announce their possessors' social class, so DeWitte can't be sure any particular person buried in East Smithfield was rich or poor. But then, as now, malnutrition and disease were likely more common among people at society's margins. And historical evidence suggests England's wealthiest may have gotten off more lightly than the growing ranks of poor. Perhaps 27% of wealthy English landowners appear to have succumbed to plague, whereas counts of rural

FOUR HUNDRED YEARS LATER and half a world away, smallpox struck Cherokee communities in what would become the southeastern United States. Elsewhere in the world, the disease—with its fever and eruption of pustules—killed about 30% of people infected. But among the Cherokee, the feared pathogen had help, and likely became even more devastating, says Paul Kelton, a historian at Stony Brook University.

Although a lack of acquired immunity often gets all the blame for Native Americans' high mortality from disease during the colonial period, social conditions amplified the impacts of biological factors. The mid–18th century smallpox epidemic in the Southeast, for example, coincided with escalated British attacks on Cherokee communities in what's called the Anglo-Cherokee War. The British used a scorched-earth strategy, burning Cherokee farms and forcing residents to flee their homes, causing famine and spreading smallpox to more Cherokee communities. Historians think by the end of the epidemic and the war, the Cherokee population had fallen to its smallest recorded size, before or since. War "created the conditions for smallpox to have a devastating effect," Kelton says.

Similar tragedies were repeated for hundreds of years in Indigenous communities across the Americas as colonial violence and oppression rendered Native Americans susceptible to epidemics, says Michael Wilcox, a Native American archaeologist of Yuman descent at Stanford University. Indigenous communities forced off their land often lacked access to clean water or healthy diets. People living on Catholic missions were forced to do grueling labor and live in crowded conditions that Wilcox calls "petri dishes for diseases." The skeletons of people buried on 16th century Spanish missions in Florida show many of the signs of ill health that DeWitte finds in London cemeteries from before the Black Death.

Such oppression and its biological effects "was not a 'natural' thing. It was something that could have been changed," Wilcox says.

The contrasting experience of Native American communities who managed to live outside colonial rule for a time supports his point. One such community was the Awahnichi, hunter-gatherers who lived in California's Yosemite Valley. According to an account from the late 19th century, an Awahnichi chief named Tenaya told an American miner and militia volunteer in the 1850s about a "black sickness"—likely smallpox—that swept through his community before they had direct contact with white settlers. The disease probably arrived with Indigenous people fleeing missions, says Kathleen Hull, an archaeologist at the University of California, Merced.

Indigenous artists documented smallpox in 16th century Mexico City. Colonial violence made recovery from such outbreaks difficult. FLORENCE, LAURENTIAN MEDICEAN LIBRARY, MS. MAD. PALAT. 220, F. 461V COURTESY OF MIBACT

She excavated in the valley and analyzed data on the number of villages occupied, the amount of debris created by manufacturing obsidian tools, and changes in controlled burns as revealed by tree ring data. Those indicators suggested the Awahnichi experienced a 30% population decline around 1800. Before the epidemic struck, the Awahnichi numbered only about 300; the death of about 90 people would have been devastating.

Chief Tenaya told the militia volunteer that after the black sickness, the Awahnichi left their traditional home and moved to the eastern Sierra Nevada mountains, likely to the territory of the Kutzadika'a people. There, the Awahnichi found support and, in the longer term, an opportunity to rebuild their community through intermarriage. After about 20 years, they moved back to their valley homeland, their numbers bolstered and their culture preserved.

Hull's data support that account, showing the Awahnichi left their valley for 2 decades. She sees their departure and return to their way of life as a sign of resilience. "They persevered despite this really challenging event," she says.

Mikaëla Adams, a medical historian at the University of Mississippi, Oxford. “Part of the reason is that they were already suffering from extreme poor health, poverty, and malnourishment.”

Some cases were particularly extreme. The Navajo Nation, for example, suffered a 12% mortality in that pandemic, whereas the mortality rate across the globe was an estimated 2.5% to 5%. Some Indigenous communities in remote Canada and Alaska lost up to 90% of their people in the pandemic, says Lisa Sattenspiel, an anthropologist at the University of Missouri, Columbia.

Today, during the coronavirus pandemic, the Navajo Nation has reported more per capita cases of COVID-19 than any state except New York and New Jersey, although the testing rate on the reservation is also high. Diabetes, a risk factor for COVID-19 complications, is common on the reservation, and many people there live in poverty, some without running water.

The coronavirus pandemic reveals the dangers caused by centuries of discrimination and neglect, says Rene Begay, a geneticist and public health researcher at the University of Colorado Anschutz Medical Campus and a member of the Navajo Nation. But she cautions against characterizing the Diné—the traditional name for the Navajo people—as passive victims. “We’ve gone through pandemics. We can get through this, too.”

ALTHOUGH THE 1918 FLU hit the Diné particularly hard, few people outside the reservation realized it at the time. For those living through the pandemic, which killed 50 million people worldwide, flu gave the impression of being an indiscriminate killer, just as the Black Death had 600 years before. “This pesky flu’s all over town! And white and black and rich and poor are all included in its tour,” went a prose poem in the *American Journal of Nursing* in 1919.

But recent demographic studies have shown many groups on the lower end of the socioeconomic spectrum, not just Native Americans, suffered disproportionately in 1918. In 2006, Svenn-Erik Mamelund, a demographer at Oslo Metropolitan University, published a study of census records and death certificates that reported a 50% higher mortality rate in the poorest area of Oslo than in a wealthy parish. In the United States, miners and factory workers died at higher rates than the general population, says Nancy Bristow, a historian at the University of Puget Sound.

So did black people, who already faced astonishingly high death rates from infectious disease. In 1906, the mortality rate from infectious diseases among nonwhite (at the time, mostly black) people living in U.S. cities was a shocking 1123 deaths per 100,000 people, Elizabeth Wrigley-Field, a sociologist at the University of Minnesota, Twin Cities, has found. By comparison, in the heat of the 1918 pandemic, urban white people’s mortality from infectious disease was 928 deaths per 100,000 people. Nonwhite urban mortality didn’t drop below that level until 1921. “It’s as though blacks were experiencing whites’ 1918 flu every single year,” Wrigley-Field says. “It’s truly staggering.”

In 1918, barriers were erected around soldiers' beds at a naval station in San Francisco to slow the spread of flu. U.S. NAVAL HISTORY AND HERITAGE COMMAND PHOTOGRAPH

The 1918 pandemic struck in a spring and an autumn wave, and black people were more likely than white people to get sick in the first wave, according to a study by Mamelund and a colleague of military and insurance records and surveys from the time. Then, in the deadlier autumn wave, black people were infected at lower rates, presumably because many had already acquired immunity. But when black people did get sick in the fall of 1918, they were more likely to develop pneumonia and other complications, and more likely to die, than white people. That may be because black people had higher rates of pre-existing conditions such as tuberculosis, Mamelund says.

Discrimination also played a role. "This time period is called the nadir of race relations," says Vanessa Northington Gamble, a doctor and medical historian at George Washington University. Jim Crow laws in the South and de facto segregation in the North meant black flu patients received care at segregated black hospitals. Those facilities were overwhelmed, and the care of black flu patients suffered, Gamble says.

Today in Washington, D.C., 45% of COVID-19 cases but 79% of deaths are of black people. As of late April, black people made up more than 80% of hospitalized COVID-19 patients in Georgia, and almost all COVID-19 deaths in St. Louis. Similar trends have been seen for black and South Asian patients in the United Kingdom. And in Iowa, Latinos comprise more than 20% of patients, despite being only 6% of the population.

For example, in the Sabaudian state in what is now northwestern Italy, the share of wealth owned by the richest 10% fell from about 61% in 1300 to 47% in 1450, with a dramatic drop during the Black Death and a slower slide in the century after (see graph, above). Alfani found similar trends in the south of France, northeastern Spain, and Germany. Analyses of household accounts and manor records show a similar trend in England, where real wages nearly tripled between the early 1300s and the late 1400s and general standards of living improved.

Alfani says so many workers died of plague that labor was in demand, driving up wages for those who survived. And as owners died, great swaths of property went on the market. Many heirs sold plots to people who never could have owned property before, such as peasant farmers.

Plague didn't disappear after the Black Death; many countries, including Italy and England, suffered recurring outbreaks. Yet later bouts seem to have entrenched inequality instead of reducing it. Alfani thinks by the time later epidemics hit, the elite had found ways to preserve their fortunes and even their health. "Plague becomes a feature of Western societies. It's something you have to expect," he says.

Across Europe, wills changed so large estates could be transferred to single heirs instead of being broken up. The rich also began to quarantine in country estates as soon as an outbreak began. From 1563 to 1665, mortality during plague outbreaks declined dramatically in the wealthy parishes of London but remained roughly the same or increased in poorer, more crowded areas, according to burial and baptism records. During the 15th and 16th centuries, Italian doctors "increasingly characterize plague as a disease of the poor," Alfani says.

That class prejudice is "seen over and over again in history," Kelton says. For example, during 19th century cholera epidemics in the United States, elites "created this idea that somehow it's only going to hit people with a predisposition to the disease. Who was predisposed? The poor, the filthy, the intemperate." But it wasn't a moral failing that made poor people vulnerable: The bacterium *Vibrio cholerae* was more likely to contaminate their substandard water supplies.

The economic legacy of the 1918 flu is unclear. According to data gathered by economist Thomas Piketty of the Paris School of Economics, economic inequality in Europe fell dramatically beginning in 1918, a decline that lasted until the 1970s. But Alfani says disentangling the flu pandemic's effects from those of World War I is impossible. That war destroyed property in Europe, and the rich lost access to foreign property and investments, lowering inequality, he says.

In the United States, that pandemic did nothing to blunt structural racism. "The 1918 pandemic revealed the racial inequalities and fault lines in health care," Gamble says. At the time, black doctors and nurses hoped it would prompt improvements. "But nothing changed. After the pandemic there were no major public health efforts to address the health care of African Americans."

Posted in: **Archaeology**, **Economics**, **Health**, **Social Sciences**, **Coronavirus**
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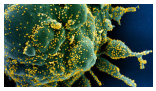

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