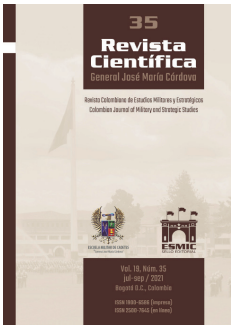

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War and pestilence: the impact of epidemics and pandemics in history up to the 20th century

Guerra y pestilencia: impacto de epidemias y pandemias en la historia hasta el siglo XX

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Abstract. Understanding the evolution and impact of epidemics and pandemics in history is essential to understand the future impact of the current pandemic on the security and well-being of nations and geopolitical dynamics. This work is the first of two articles that seek to account for how infectious diseases have affected and may affect the stability and prosperity of nations. The purpose of this article is to establish the impact of epidemics and pandemics as a decisive factor in political, economic, and military events from Antiquity to the 20th century. To this end, the impact of infectious diseases in history is studied. Then, their interaction with wars is analyzed to estimate their potential as a factor of crisis and instability.

Keywords: epidemic; history; pandemic; security; transmissible disease; war

Resumen. Para comprender el impacto que la actual pandemia tendrá en la seguridad y el bienestar de las naciones, y en la dinámica geopolítica, es necesario comprender la evolución y el impacto de las epidemias y pandemias en la historia. Esta es la primera entrega de dos artículos que buscan dar cuenta de cómo las enfermedades infecciosas han afectado y pueden llegar a afectar la estabilidad y prosperidad de las naciones. El propósito de este artículo es determinar el impacto de las epidemias y pandemias como factor decisivo en los acontecimientos políticos, económicos y militares desde la Antigüedad hasta el siglo XX. Para ello se estudia el impacto de las enfermedades infecciosas en la historia, y luego se analiza su interacción con las guerras para estimar su potencial como factor de crisis y de inestabilidad.

Palabras clave: epidemia; pandemia; enfermedad transmisible; guerra; historia; seguridad

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Introduction

To understand the current pandemic's impact on nations' security, societies' welfare, and, in general, the distribution of power in the international system, we need to understand the evolution of epidemics and pandemics in the history of mankind[1]. Indeed, various epidemics and pandemics have had a manifest impact on various events that have changed the course of history. Western historiography and military history have accounted for this. Scholars, such as McNeill (1978), have considered infectious diseases as "one of the fundamental and determining parameters of human society" (p. 2, author translation). Others claim that epidemics and other natural disasters have become "external agents of change that shape history and culture" (Robertson, 2010, p. 15, author translation).

Some historians even suggest that infectious epidemic diseases are a crucial variable in explaining the cyclical changes of the Bronze Age, including the collapse of the Hittite Empire. They also mention the defeat of Athens in the Peloponnesian War, the end of Carthaginian hegemony in the Mediterranean, the rise and fall of the Roman Empire, the end of the Byzantine Empire, the age of obscurantism in the Middle Ages, and the transition to the Modern Age, among others. This work is the first installment of two articles that seek to give an account of how infectious diseases have affected and can affect the stability and prosperity of States. Specifically, this article aims to determine whether epidemiological diseases were a significant contributing causal factor in major political, economic, and military events from antiquity to the 20th century. To do so, first, a brief historical review of pandemics and their social, economic, and political impact up to the 19th century is provided. Then, how epidemics and pandemics have shaped military conflicts up to the 20th century is analyzed.

Impact of infectious diseases up to the 19th century.

There are many historical examples of how epidemics and pandemics have destroyed societies and abruptly altered the destiny of civilizations. Written evidence of epidemic diseases can be traced back to 2700 BC. Among the disasters mentioned in the Babylonian Epic of Gilgamesh, in addition to the universal flood, is the frequent visit of the "god of pestilence," and in China, some writings dating from the 13th century BC show acquaintance with infectious epidemic diseases. According to Norrie (2016), infectious diseases played a significant role in the demise of the Hittite Empire and the weakening of the

1 The word *epidemic* comes from the Greek *epi*, meaning "over," and *demos*, meaning "people." The word *epidemic* comes from the Greek *pandemos*, meaning "over all the people." In general, an epidemic is considered an unexpected and widespread increase in the incidence of infectious disease at a given time. In contrast, a pandemic is considered a vast epidemic (McMillen, 2016).

Assyrian Empire. And, despite being written later, the biblical texts of the Hebrews preserve oral traditions that date back to about the same time, ostensibly providing a historical basis for the plagues of Egypt described in the book of Exodus and the epidemic suffered by the Palestinians as punishment for their seizure of the ark. Let alone the pestilence that punished David's sin, which killed 70,000 of the one million healthy men of Israel and Judah and the epidemic that claimed the lives of 185,000 Assyrians, forcing King Sennacherib to withdraw from Judah without capturing Jerusalem. According to McNeill (1978), these passages indicate that, between 1000 and 500 BC, the peoples of the ancient Middle East were quite familiar with sudden outbreaks of infectious diseases, which they usually interpreted as acts of God.

Thucydides (1989) recorded perhaps the earliest account of an epidemic contagion in the West, detailing the horror of the "plague of Athens" between 430 and 426 BC. Brought to Greece probably by sailors from North Africa, this infectious disease contributed to the defeat of Athens in the Peloponnesian War. In the words of Thucydides (1989), at the end of the first year of the war,

> The bodies of the dying were piled on top of each other, and half-dead creatures could be seen staggering in the streets or gathering around fountains in their desire for water. For the catastrophe was so overwhelming that men, not knowing what would happen to them next, became indifferent to any rule of religion or law. Athens owed the plague the beginning of an unprecedented state of anarchy. (p. 162)

By the end of 426 BC, this plague had reduced the population of Athens by more than a third, even claiming the life of Pericles, the great Athenian politician and strategist. In subsequent years, the plague's consequences would be expressed both in Athenian culture and in the Athenian imagination. According to Mitchell-Boyask (2008), the plague entered Athenian discourse almost immediately after its end, through a series of texts and its association with a major construction project on the southern slope of the Acropolis, the Athenian *Asklepieion*. Next to the Theater of Dionysus, this was where the Athenians saw performances of dramas dealing with the plague and its aftermath.

Conceivably, the plague of Athens was caused by smallpox (although others attribute it to typhoid fever). Until its eradication in 1980, this infectious disease killed hundreds of millions of people. The earliest and most explicit description of smallpox comes from a fourth-century Chinese alchemist named Ho Kung. However, the disease's most widespread description, which influenced the clinical care offered in the 17th century, originates from *A treatise on smallpox and measles*, written in the 10th century by Rhazes, a Persian physician based in Baghdad (present-day Iraq).

On the other hand, smallpox was considered a divine presence (Shitala was the Hindu goddess of smallpox) and not a disease in much of northern India, especially

between the 18th and 19th centuries. Thus, during the smallpox vaccination days conducted by the World Health Organization (WHO) in the 1970s, many Hindus rejected the vaccine because they considered this deadly disease a blessing. Likewise, in West Africa, the Yoruba nation held smallpox as one of its deities. In Japan, the Ainu considered smallpox a god that transcended the boundary between the earthly and heavenly realms, turning people into ghosts (Kiple, 1997). Therefore, it is not surprising that a disease that wreaked such havoc would have occupied a powerful place in the psyche of all these cultures.

Even in classical Greek times, the ancient Greeks thought of disease as an evil of spiritual origin, a punishment from the gods. Consequently, physicians were partly priests and magicians, and among their functions was mollifying irascible divinities with prayers, spells, and sacrifices. However, Hippocrates, the father of Western medicine, argued that the causes of disease were physical. Together with his disciples, he introduced a system for classifying diseases and was thus responsible for the notions of diagnosis and treatment. For him, an epidemic was all the symptoms experienced in a given place and time during which its population was prey to the disease (Spinney, 2017).

After the "plague of Athens," there were other relevant epidemics in Antiquity. For example, the "Orosius" plague in 125 AD killed 800,000 people in Nubia and 200,000 more in Utica. Likewise, there was the "Antonine plague," probably an outbreak of typhus that spread throughout much of the Roman Empire between 169 and 194 AD, to which the emperor Marcus Aurelius fell victim. Similarly, an epidemic of measles again devastated the Empire between 250 and 270 AD, killing 5000 Romans per day at its peak of virulence (Bray, 1996).

However, these horrors were overshadowed by the bubonic plague's arrival in the summer of 541, which, together with the "barbarian" peoples led by Odoacer, virtually wiped out the Roman Empire. This infectious disease likely made its appearance in the port city of Pelusium, located on the eastern edge of the Nile delta. Because it originated in the Byzantine Empire's domains, during the reign of Emperor Justinian, the Byzantines referred to this outbreak as the "plague of Justinian." According to Little (2007), this plague spread rapidly eastward along the Egyptian coast to Gaza and westward to Alexandria; by the spring of 542, it had reached the capital of the Byzantine Empire, Constantinople. In short, no region along the Mediterranean basin managed to escape this infectious disease. It affected Syria, Anatolia, Greece, Italy, Gaul, Iberia, and North Africa; inland territories as far east as Persia or as far north as the British Isles became infected.

From 541 to 750, the "plague of Justinian" remained virulent for just over two centuries; there was not a decade during those two centuries when it did not inflict damage somewhere in Asia, Africa, or Europe. According to McNeill (1978), this uncontrolla-

ble outbreak of *yersinias pestis* claimed the lives of 40% of the population of the city of Constantinople (approximately 200,000 inhabitants) and wiped out perhaps a quarter of the European population south of the Alps in 544; by its end, more than 25 million people had perished (Figure 1). The plague affected Justinian's plans to restore the Roman Empire and allowed several barbarian invasions, eventually forming new kingdoms and states. The considerable reduction of the Byzantine population enabled these invasions; the consequent decrease in the tax base limited the Byzantine Empire's ability to raise the necessary resources to finance the state's defense (Rosen, 2007). Consequently, long years of epidemics, barbarian attacks, and social revolutions weakened the Byzantine and Persian Empires' military and financial strength and facilitated the Arab armies' conquest of these territories. Therefore, the "Justinian plague" can be considered the first pandemic in history, both for its dimensions and geographical scope.

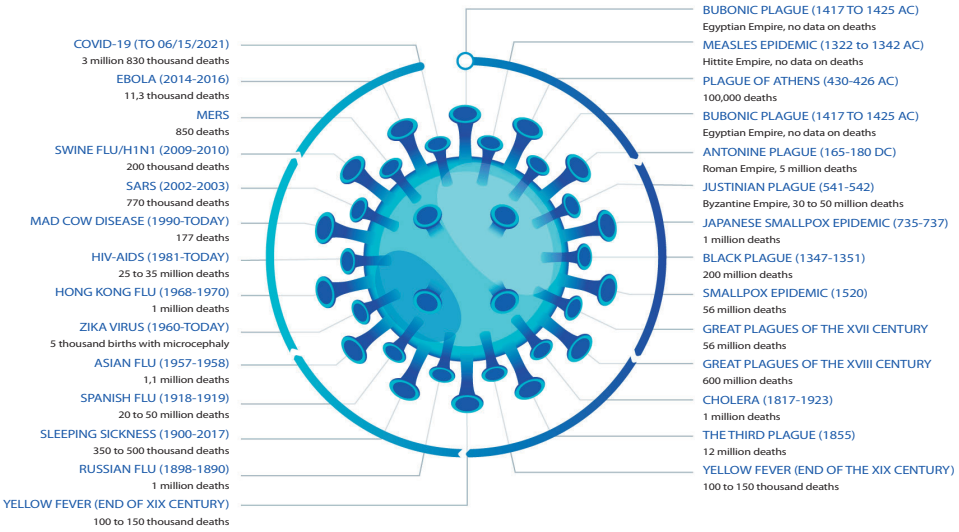

Figure 1. Major epidemics and pandemics in history.
Source: Created by the author.

The second pandemic, known as the "Black Death," broke out in Central Asia in the 1330s, spreading along the Silk Road in 1347 to Constantinople and ports throughout the Mediterranean. It later spread throughout the Arabian Peninsula and Europe, even as far as Scandinavia. Transmitted by rat fleas, the bubonic plague and its highly infectious cousin, pneumonia, were recurrent threats in the Middle Ages. Contagion was easy because of the convergence between rats and humans in barns, mills, and houses, where

the grains on which these rodents feed were stored or transformed. Rats also circulated along the same roads and moved by the same means as people, like boats. Typically, the bacterium was present in homes for 16 to 23 days before the first symptoms of the disease appeared; it took 3 to 5 more days before the first deaths occurred and perhaps another week before the population became fully aware of the problem's full extent. According to Bray (1996), the disease manifested in the groin, armpits, or neck, with inflammation of one of the lymphatic system nodes, accompanied by suppurations and high fevers that caused chills, cramps, and delirium in the patients.

The most common form of the disease was the bubonic plague[2]; however, there were other variants. For example, the septicemic plague, in which the contagion passed into the blood, manifesting in the form of visible dark spots on the skin (hence the name of *black death*). The pneumonic plague affected the respiratory tract and caused an expectorant cough, leading to contagion through the air (Kiple, 1993). Regardless of the variant, septicemic and pneumonic plagues left no survivors. Despite other diseases that persistently plagued the population, like dysentery, influenza, measles, and leprosy, the Black Death reduced the European continent's population by 45% (Figure 2) and one-third of the inhabitants of the Islamic world (Slack, 2012).

In addition to marking an almost unthinkable human calamity[3], the "Black Death" contributed to a radical change in Western civilization. It accelerated the collapse of the feudal state system, the decline of the political power of the Church, and the rise of the centralized, mercantilist, and expansive technology of the Westphalian state. However, far greater extermination was to occur when the absolutist European states set out to discover the New World. Long separated from the germ pool of Eurasia, the American Indians were defenseless against the "micro-soldiers" that the *conquistadors* brought with them.

While the conquest of the Americas has been attributed to a variety of European advantages, including more advanced weapons and materials, the use of horses, and effective conscription of native allies dissatisfied with the prevailing political order in the Americas prior to the colonial empires' arrival, perhaps the most important factor widening the Indian-European military imbalance was the conquistadors' unintentional introduction of infectious diseases. In other words, Europeans would not have been able to depopulate, conquer, and settle in the patterns and time scale they did without pestilences. According

2 The inflamed lymph node was called bubo or carbuncle; this is the origin of the term "bubonic" plague.

3 Some authorities suggest that the children's story of "The Pied Piper of Hamelin" recalls the outbreak of 1362, which killed mainly children in the town of Hamelin in Germany. Cultural remnants of this catastrophe still linger today, with some suggesting that the practice of greeting a sneeze with a "bless you!" arose at a time when colds perhaps signaled the onset of pneumonic plague.

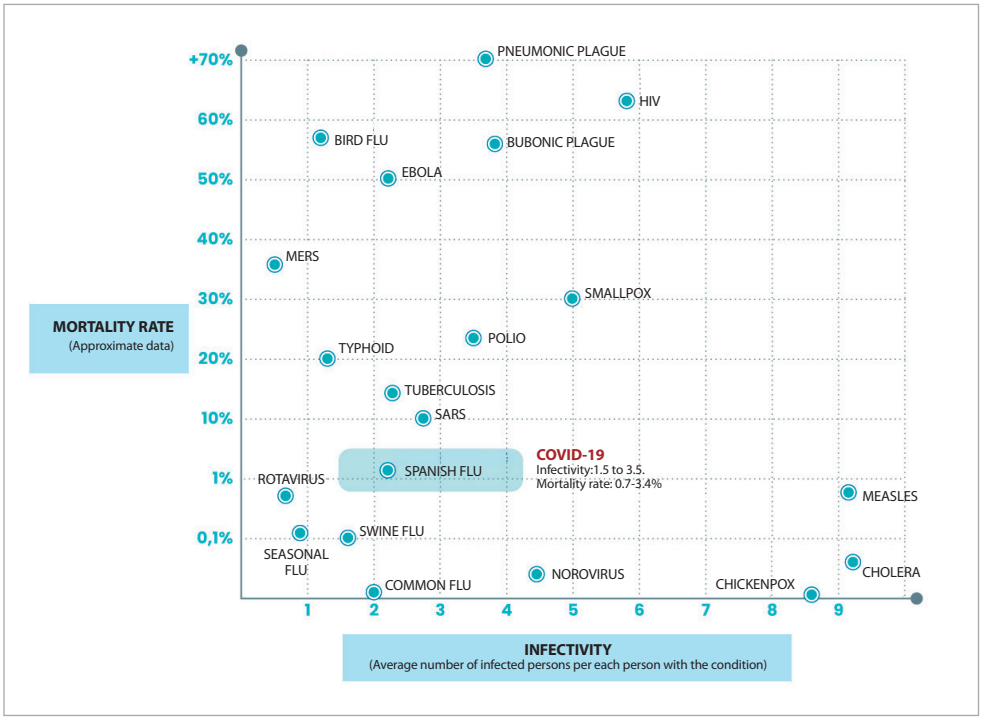

Figure 2. Contagion vs. mortality in viruses in history.
Source: Created by the author.

to Petriello (2015), "Europe's conquest of the New World was more on the backs of viruses and bacteria than on the backs of horses" (p. 12, author translation).

As devastating as the Justinian plague or the Black Death were in their respective historical moments, this calamity born of the Age of Discovery was probably the worst epidemiological disaster in history[4]. According to Diamond (2006), "throughout the Americas, diseases introduced with the Europeans spread from one tribe to another faster than among the Europeans themselves, causing the death of approximately 95% of the pre-Columbian American Indian population" (p. 90). Upon Christopher Columbus' arrival in the Caribbean, the local Taino population was reduced from 500,000 in 1492 to practically zero in 1535 (McMillen, 2016). A year after the conquistador Hernán Cortés' landing in Mexico in 1519, half of the Aztecs had died of smallpox, including the Aztec emperor Cuitláhuac. As Farther and Hine (2000) point out, the Mexica had no words for a disease they had never seen before. However, a 1520 description in the Florentine Codex confirms that it was smallpox that decimated the Aztec capital of Tenochtitlán and

4 Old World diseases also killed approximately 90% of the Oceania islanders (Harrison, 2004).

facilitated Cortés' conquest of that empire. According to Harrison (2004), the epidemics severely weakened the military Aztecs' resistance. When Cortés laid siege to the Aztec capital of Tenochtitlán in 1521, the city had already lost about 100,000 of its inhabitants to smallpox and other diseases; many more died of the disease during the siege lasting 75 days. Ultimately, measles, influenza, and typhus conspired with smallpox to reduce the pre-Hispanic population of the Aztec Empire from 20 million to just 1.6 million people 100 years after Cortés' arrival.

According to Aberth (2000), smallpox brought by the Spanish played a similar role in Francisco Pizarro's conquest of the Inca Empire. Despite having only 160 men (Emperor Atahualpa's forces outnumbered Pizarro's by a ratio of 300 to 1), he achieved the rapid dissolution of one of the largest empires in the world at the time. However, the Spanish success in conquering the Incas had begun five years before Pizarro's landing in Ecuador in 1532. At the voice of reports of a foreign group arriving at the northern end of his empire in 1527, Emperor Huayna Capac moved with his army to the current department of Nariño. Although the emperor found no Spaniards when he arrived in present southern Colombia, he and his troops brought smallpox with them when he returned to Cuzco.

Consequently, Huayna Capac, his heir Ninan Cuyochi, and more than 100,000 Incas were dead by late 1527. With no clear line of succession to the throne, civil war broke out from 1529 to 1532 between princes Huascar and Atahualpa, the remaining sons of Huayna Capac. At the end of the conflict, Prince Atahualpa and his army prevailed; however, more than 5% of the population had died, and the empire's fields were destroyed (Petriello, 2015). In addition, Pizarro and his troops capitalized on the internal divisions in a social order, where loyalties were questioned, and distrust and division among the Incas prevailed as a result of the civil war to gain native allies and exploit the weaknesses of the government in Cuzco. This episode in history is yet another example of how an epidemic preceding the conquistadors' arrival became the brew for another pre-Hispanic empire's destruction.

In turn, this clash of civilizations that triggered the discovery and conquest of America also affected Europeans. Mosquito-borne yellow fever and malaria (the only diseases as old as humankind) hampered the Spanish Empire's early settlement in parts of Central America and northern South America[5]. Indeed, after Alonso de Ojeda made landfall at Cabo de la Vela in 1499, and after a series of first expeditions carried out by Pedro de Heredia in 1533, the late Spanish conquest of the Colombian territory would

5 The same would happen in most sub-Saharan Africa, where the tsetse fly, which transmits the "sleeping sickness," prevented the early European colonization of the interior of the African continent.

only begin de facto with the incursions of Gonzalo Jiménez de Quesada, Sebastián de Belalcázar, Nicolás de Federmán, and Jorge Robledo, from the coastal areas to the center of the country, between 1536 and 1541 (Álvarez, 2017).

When the Spanish conquistadors arrived in the Colombian Caribbean, they faced adverse unhealthy weather, mosquitoes, and highly bellicose indigenous tribes, but, especially, tropical epidemics (Álvarez et al., 2017). As a result, Jiménez de Quesada decided to go up the Magdalena River to the Cundinamarca-Boyacá savannah, driven by the interest in finding gold in large quantities and distancing themselves from territories that would hinder human settlement and agricultural activity. There, he would find a climate with an average temperature that resembled Madrid's autumn. Of the 800 Spaniards who, under the command of Quesada, entered the Magdalena River on the Colombian Caribbean coast in 1537, only 170 managed to survive the voyage, arriving in the vicinity of the present city of Bogota in 1538. It was more the deaths from malaria and malaria, and not indigenous arrows, that decimated Quesada's troops considerably (Álvarez, 2017).

In the same line, it should be noted that the difficulty of completing the construction of the Panama Canal had as much to do with controlling yellow fever as engineering challenges. If this had not been the case, France, and not the United States, might have achieved the feat of uniting the Atlantic and Pacific Oceans. Even in the second decade of the 16th century, the specter of infectious diseases hampered Spanish attempts to establish permanent settlements on the Isthmus of Panama. In 1514, more than 700 settlers in the Darien succumbed to malaria and yellow fever, which eventually led to the overthrow of Pedro Arias de Avila, governor of the province of *Castilla de Oro*[6], in favor of the explorer Vasco Núñez de Balboa.

Likewise, as Harrison (2004) argues, the infamous trade of 10 million slaves across the Atlantic between 1527 and 1870[7] also brought diseases endemic to Africa, such as yellow fever, to the American tropics (Figure 3). Other epidemics, such as syphilis, which possibly originated in the New World, or cholera, which left India to kill millions of people worldwide in the early 19th century, evokes that globalization also helped local infectious diseases to reach pandemic status in the "Age of Discovery" (Álvarez & Zambrano, 2017).

6 *Castilla de Oro* was the original name of the territories between the Gulf of Urabá (in northern Colombia) and part of the Caribbean slope of present-day Nicaragua.

7 Faced with the devastation of the indigenous population due to epidemics, the need for slave laborers to replace the depleted native populations led to the implementation of the African slave system beginning in 1527. Therefore, it could be stated that the present rich African cultural and racial influence enjoyed in the American continent had bacterial and viral epidemics as its main catalyst.

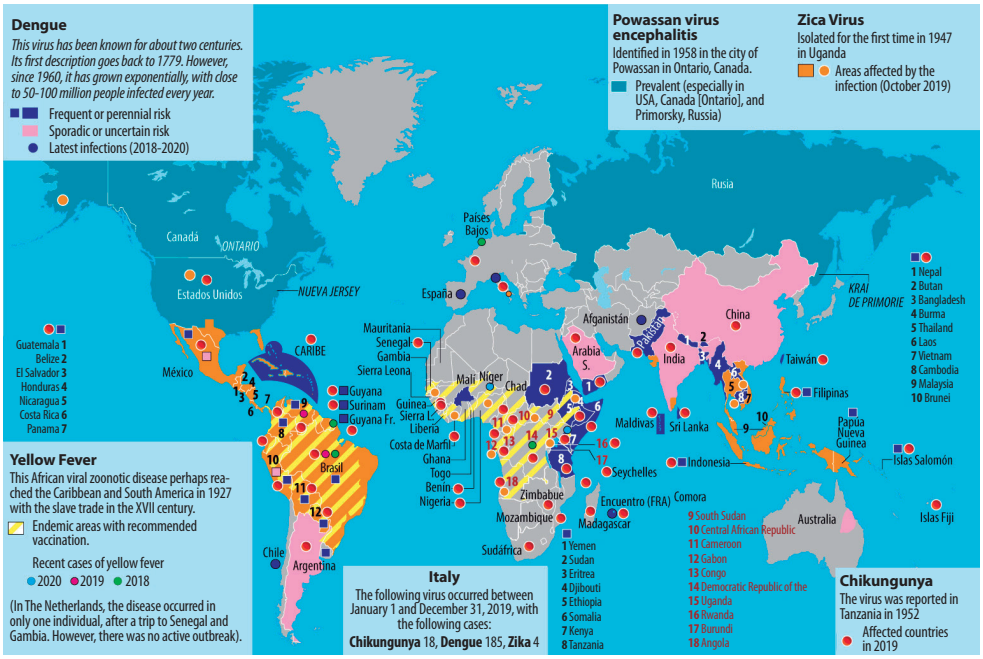

Figure 3. Yellow fever, Zika, Dengue, Powassan.
Source: Adapted from Canali (2020).

Before the mid-17th century, smallpox had not been a particularly virulent killer in Europe; it was a low-level endemic disease rarely described as dangerous in European medical texts. In cities like London, few were dying of smallpox at the end of the 16th century; however, by the 18th century, and for unclear reasons, smallpox had become the leading killer in the European continent. By 1762, smallpox had claimed the lives of 3,500 people and was responsible for 20% of London's mortality (Kiple, 1997). However, inoculation and subsequent vaccination made overcoming smallpox mortality possible. Inoculation involved introducing a small amount of the disease into a cut to induce a low-level reaction. If all went well, the patient experienced a mild form of smallpox and became immune for life, like anyone who had contracted the disease and managed to survive.

Although this procedure had been practiced long before in Africa, India, and China, it only became common in Europe in the mid-18th century[8]. At first, there was widespread opposition concerning the dangers involved in infecting people with smallpox and even interference with the Christian concept of "Destiny." However, most

8 By the 19th century in northern America, the Cherokee nation had developed a dance called *itohvnv* designed to appease an evil spirit called *Kosvkvskini*, which manifested itself in the form of smallpox.

objections were quickly silenced because inoculation saved lives by increasing the number of those immune to the disease. Thus, by the end of the 18th century, this practice had become established in much of Europe and America. Improvements in the method, combined with the inoculation of entire towns and cities, had a growing effect on public health during the latter half of the 18th century. Inoculation changed the way people viewed smallpox by making it a disease that could be defeated. Moreover, it ultimately paved the way for one of the most important breakthroughs in medical history, vaccination.

The term *vaccine* comes from Edward Jenner, who named cowpox as *variolae vaccinae* or "poxof the cow." When Jenner prevented smallpox in a young English boy in 1796 by inoculating him with a small amount of vaccine smallpox, he signaled the beginning of the end of smallpox. Vaccination with attenuated smallpox would almost immediately be recognized as a superior method to inoculation with smallpox because there was no risk of contracting smallpox and, thus, no risk of spreading it. As a result, 100,000 Englishmen had been vaccinated by 1800, and millions more would be vaccinated over the next two decades in America, the Middle East, and Asia. However, the smallpox vaccination process was not without its reluctance, which is the case today with some population segments concerning COVID-19 vaccines. In countries like Japan, which until recently had been "isolated" from the world, vaccination was initially met with a skeptical, even hostile, reception. However, those who imported vaccines in the Meiji era were at the forefront of opening Japan to the West; the vaccine would eventually become a major conduit to modernity. Thus, the Tokugawa shogunate attempted a state-sponsored vaccination campaign to help make the Ainu less "primitive" and more Japanese. The old Ainu beliefs on curing smallpox could no longer be sustained faced with vaccination's effectiveness, making the entire belief system ineffective in the face of this new and effective procedure.

However, despite vaccination's early success, smallpox epidemics still occurred occasionally. No one knew, at least initially, that although the vaccine reduced smallpox to such low levels, it did not necessarily confer lifelong immunity. Between 1836 and 1839, 30,000 people died of smallpox in England. The pandemic of 1870 to 1875, caused by the Franco-Prussian war, killed about 500,000 people; however, it was the last significant occurrence of smallpox on the European continent (McMillen, 2016). By the mid-20th century, thanks to vaccination and the gradual replacement of major smallpox by the less contagious and severe minor smallpox, it had ceased to be a major problem in much of the developed world (Figure 4).

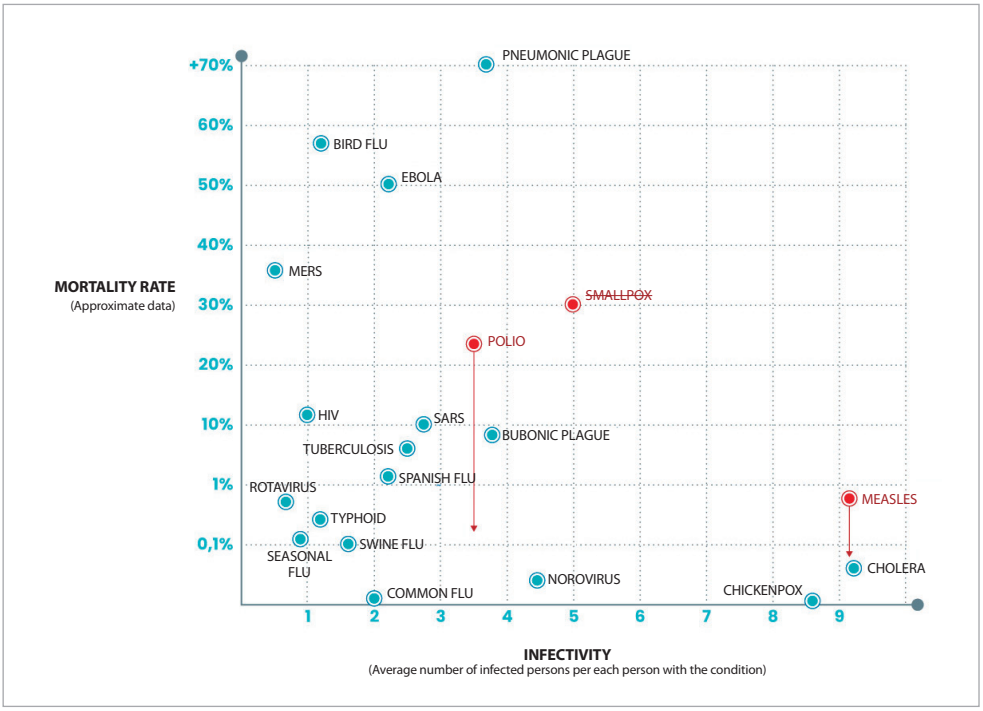

Figure 4. Contagion vs. mortality after the invention of vaccines.
Source: Created by the author.

Wars and plagues: two horsemen of the apocalypse

Of the four fearsome horsemen of the biblical Apocalypse, "war" and "pestilence" have sought to ride together. History is replete with examples of invading forces bringing infectious diseases to virgin populations and military forces that, in the course of hostilities, were afflicted by bacterial epidemics or viral epidemics. Bacterial infections have been a common problem for military forces, especially when relocated to new environments with unfamiliar bacteria. According to Seaman (2018), the absence of a bacterial epidemic during a particular war indicates that the bacteria present were not harmful, either because military personnel built up resistance to the bacteria or because the parameters necessary for propagation were not met in the environment. Diseases caused by viruses are treated differently from bacterial diseases because they do not act the same way in the organism they affect. For example, antibiotics are not effective against viruses[9].

9 Bacteria are unicellular organisms that replicate autonomously. They obtain their nutrients from the environment in which they live. In contrast, viruses are up to 100 times smaller than bacteria.

At times, the long-term impacts of epidemics on population and resources have made wars difficult or impossible to win. For example, the bubonic plague, introduced into the Hittite Empire by Egyptian prisoners of war in 1322 BC, marked the beginning of the end of the Hittites and the Bronze Age in 1200 BC. In turn, the Greek historian Herodotus gives an account of a plague that interrupted the Persian invasion of Greece in 480 BC. The Carthaginian Empire, which already controlled North Africa and southern Spain in 405 B.C, on its march to the seaport of Syracuse in pursuit of its expansion into Sicily, was infected with measles, forcing it to abandon most of its outposts in Sicily. Another outbreak occurred in 397 BC during a second attempt to conquer Syracuse, leading to the Carthaginians losing the war. Sometime later, Roman and Carthaginian soldiers succumbed to severe influenza infection in 212 BC, during the Second Punic War between Rome and Carthage, when the latter controlled Syracuse. Roman general Marcus Claudius Marcellus captured the port of Syracuse, avoiding infection by marching with his army around the infected lowland areas. This event, in which an infectious disease again played a significant role in the war, marked the end of Carthage's reign in Sicily and the beginning of Roman hegemony in the Mediterranean (Norrie, 2016).

The "Antonine plague" is another example of how an epidemic affected the invading forces and the general population. Indeed, the war between the Roman Empire and the Parthian Empire in the second century AD gave the disease access to a population that lacked immunity and understanding to treat it. The mortality rate was so high that it affected Roman politics and economy, both domestically and in its outer sphere of influence. As Thacker (2018) argues, the aggressive epidemic within the Roman army and population hampered Rome's abilities to attend to new hostilities on the northern frontier immediately after the Parthian Wars.

Regardless, Marcus Aurelius' chroniclers praised him for his success in the Marcomannic War (AD 166-180), particularly for his ability to raise the necessary troops despite the spread of disease. To meet the quota of troops needed for Rome's defense, Marcus Aurelius recruited and trained gladiators, bandits, and slaves (as in the Second Punic War) and hired Germanic warriors as mercenaries. It is also possible that the epidemic influenced Marcus Aurelius' decision to allow the defeated frontier Germanic tribes entry into Roman territory, granting them the right to settle within the Empire's boundaries to replace those who had died of war or disease. This situation eventually laid the foundation for the barbarians' subsequent conquest of the Western Roman Empire.

In 444 AD, a terrible epidemic facilitated the Saxon conquest of Britain. In turn, the Black Death played a critical role during the 1346-1450 Anglo-French military conflict,

known as the Hundred Year's War, at least in the conflict's early stages. The first outbreak of the disease in France occurred in November 1347 in Marseilles; by the summer of 1349, it had reached Paris. It is estimated that 60% of the French population died in this outbreak (Douglas, 2018), exacerbating the French monarchy's crisis due to military defeats at the hands of the English. The plague's impact was also catastrophic in England. It killed 2.5 million citizens, forcing Edward III and Philip VI to extend the Anglo-French truce of the Hundred Year's War until the end of 1349.

The Black Death had a marked effect on European society, trade, and conflict after the 15th century; its demographic impact led to labor shortages across the continent. Similarly, the plague's impact on trade and banking changed the economy and the ability of kings, nobles, and banks to raise funds for the war. For example, the English were forced to hire mercenaries, paving the way for the rise of the professional soldier in late medieval England. In the Thirty Years' War between 1618 and 1648, the various epidemics brought by different armies to desolate Central Europe competed with the atrocities committed in the conflict and decimated a third of Germany's population. Ultimately, war and plague helped conclude the Middle Ages and shape the modern world.

Wars associated with cholera (e.g., the Crimean War between 1853 and 1856) and typhoid fever (the Spanish-American War in 1898) are usually associated with conflicts in the 19th century when medical progress was being made in identifying these bacteria. However, cholera and its treatment were not clearly identified until after the Crimean War. For typhoid fever, the bacteria were discovered almost two decades before the outbreak of hostilities between Spain and the United States in the late 1890s (Seaman, 2018). However, antecedents of how typhoid fever affected the development of military operations can be traced well before the wars of the late 19th century. Transmitted by lice, typhus thrives in environments of poor sanitation and overcrowding; therefore, this infectious disease's association with military practice has caused it to be commonly referred to as "camp fever" or "General Typhus."

In this regard, early records show that the disease was probably present at the siege of Belgrade in 1456. There, the Hungarian army, under the command of John Hunyadi, was able to defeat the army of the Ottoman Sultan Mehmed II, who after the fall of Constantinople in 1453 planned to subjugate the Kingdom of Hungary. It could be that Mehmed II's Turkish army brought typhus with it from Anatolia. After the siege, the plague descended on Belgrade soon after the Muslims were driven out, killing many Hungarians, including King Hunyadi.

Similarly, during the siege of Moorish Granada in 1489 by the kingdoms of Castile and Aragon, the Christian armies lost 17,000 soldiers to typhus (more than a third of their forces), compared to 3,000 killed by enemy action (Jennings, 2018). This situation created an operational problem insofar as siege doctrine recommended that the attacking forces outnumber the defenders by a ratio of 3 to 1. Severely depleted in numbers by the epidemic, those surviving the disease fled, spreading the contagion to the rest of Spain. The Spanish were eventually able to replace their losses and conquer the city of Granada. However, they were unable to force the Muslims' total departure from the Iberian Peninsula until four years later.

During the Renaissance wars (1492-1559), particularly the siege of Naples by the French in 1529, almost three-quarters of the French forces (an army of 35,000) perished from typhus. They would eventually be defeated by the Spanish armies of Charles V. However, in 1552, in an attempt to subdue the Protestants in Germany during Charles V's siege of Metz, typhus played an adverse role for the Spanish troops. Indeed, although Charles V had a force of 220,000 soldiers, compared to the 6,000 defenders commanded by the Duke of Guise, the Spaniards were forced to "live" off the land. Unable to maintain any level of hygiene under siege conditions, Charles V would lose 26,000 men to disease. As Jennings (2018) notes, the outnumbered Duke of Guise made a relentless effort to keep his men healthy and prevent the outbreak of disease during the siege. He ensured that the men were adequately fed and hired doctors to supervise the distribution and guarantee the quality of the rations provided. Special groups of soldiers, called pioneers, were created to sweep the city streets, and water was constantly surveyed and checked to make sure it was not poisoned. Finally, no one was allowed to eat meat because of the danger of acquiring this infectious disease.

Similarly, during the military campaign against Russia in 1812, "General Typhus" caused more havoc in the army of 600,000 Napoleonic soldiers than the cold and the enemy's actions. In June, when Napoleon's army was on its way to Vilnius, about 5,000 soldiers were being lost to typhus and other diseases[10] every day. The soldiers would fall out of formation, unable to keep up with the main squad's pace; by the time they arrived in Vilnius, Napoleon had lost almost 25% of his forces (Jennings, 2018). He finally arrived in Moscow with only 90,000 soldiers able to fight. However, it was not until after the French defeat at the battle of Tarutino that Napoleon decided to withdraw from Russia. When the army returned to France, only 3,000 of the 600,000 soldiers had survived the long trek to and from Russia. The loss of the French army in Russia forced Napoleon

10 By August 1812, dysentery also affected 80,000 French soldiers in the Russian campaign. Indeed, the armies of the 19th century were not only prey to typhus. For instance, 3,000 of the 25,000 French soldiers succumbed to yellow fever in France's attempt to reconquer Haiti in 1802, collapsing the military operation.

to hurriedly recruit and train an entirely new army. Although he was able to build it before the battle of Leipzig in 1813, the soldiers were green recruits lacking the strength, determination, and ability of the original Napoleonic army that had been lost to typhus and the Russian winter. Thus, Napoleon was unable to match the numbers of the Sixth Coalition, which would eventually lead to the fall of the French Empire.

In the 20th century, typhus killed more than 10 million soldiers and was equally decisive on the eastern front of World War I between 1914 and 1918. Therefore, at the end of World War I, the Typhus Commission, later renamed the Epidemics Commission, was formed within the framework of the League of Nations to deal with the growing outbreaks of typhus, dysentery, cholera, smallpox, and influenza spread by demobilized soldiers. At the end of the war, the epidemiological situation was so severe that Lenin stated in 1919: "either socialism defeats the louse, or the louse will defeat socialism." This commission gave rise to the League of Nations Health Organization and, after World War II, the World Health Organization (WHO) in 1948.

Under the logic of trench warfare, the then Great War provided a perfect breeding ground for the spread of multiple diseases, such as an influenza pandemic known as the "Spanish flu." Between March 1918 and May 1919, it killed 50 million people worldwide[11], almost four times more than the war's total casualties. Barry (2005) notes that the Spanish flu first appeared in January 1918 in a civilian community in Haskell County, Kansas, USA. It then spread to nearby military camps at Camp Funston before U.S. troop deployments brought the epidemic overseas. Estimates indicate that in the United States alone, approximately 650,000 people died from the pandemic in less than a year (Becker, 2018). The number of U.S. service members who lost their lives to the flu was about the same as the number of U.S. soldiers killed on the battlefield during World War I.

The "Spanish flu" did not acquire that name until it reached the shores of Spain, a country that was not at war. However, while World War I was drawing to a close by the fall of 1918, the second deadly wave of the Spanish flu hit the western front during the last eight weeks of the war, leaving 100,000 soldiers dead on both sides of the front (Becker, 2018). Overcrowded military camps and trenches, chemical warfare, and inadequate rest and nutrition for the troops[12], combined with the largest deployment and mobilization of troops in history up to that time, enabled the Spanish flu to infect hundreds

11 It should be noted that the deaths were not only the result of influenza but also of subsequent secondary infections, such as pneumonia. However, the 1918 influenza pandemic killed more people in a single year than the bubonic plague did in a century during the Middle Ages and more people in 25 weeks than AIDS in 25 years.

12 The flu hit those in poor health most aggressively. It has even been speculated that trench diseases and chemical fumes weakened the troops' health even more than the usual exhaustion of fighting a prolonged war.

of millions of people worldwide by the end of 1919. Influenza spread among people by proximity, thus affecting civilians in wartime conditions through their interactions with soldiers and limited access to medical care (Arnold, 2018). For example, Chinese workers from Canton engaged by the French and British to work behind the battle lines during World War I may have inadvertently transferred the pandemic to France and, subsequently, to England, Canada, and even the United States.

Although Colombia did deploy soldiers in World War I, the pandemic also affected the country, which by 1918 had 5.8 million inhabitants (Martínez et al., 2007). There is no certainty as to how the pandemic reached Colombia (Lara, 2020); however, it came to be called the "Suarez embrace," referring to the late reaction of Marco Fidel Suarez's administration (who even lost his son to the disease) in handling it. The budgetary addition of COP 40,000 to address the onslaught of the disease entered the national budget only on December 4, 1918, with Law 35 addressing the grave deterioration of public health. Colombians had already suffered two previous influenza epidemics in 1879 and 1890 with relatively low mortality, possibly resulting in unawareness of the 1918 pandemic's actual magnitude (the Ministry of Health did not exist). For its part, the Congress of the Republic passed Law 46 in November 1918, a pioneer in hygiene and urban planning, which dictated measures on sanitation and solutions to the deficient hygienic conditions of the poorest neighborhoods (Cajas, 2020).

It is estimated that in Bogota alone, which had 141,000 inhabitants at the time, 80% of the population fell ill, and 1,900 people perished. This mortality rate applied to the present would be equivalent to 90,000 fatalities (*Semana*, n.d.). The epidemic then moved to Boyacá, affecting two-fifths of the population of Tunja in less than ten days and causing 2,700 deaths (Ospina et al., 2009). Between May and December 1918, the Spanish flu and yellow fever had caused the death of some 30,000 Colombians (*Credencial Historia*, 2016).

However, the country was spared a third wave of the flu, which reappeared in South America in 1919 and proved more lethal than its previous versions. According to Spinney (2017), countries like Colombia and Brazil experienced only one flu wave (fall of 1918); however, Chile experienced a second wave during all of 1919. The third wave at the beginning of 1920 was the most lethal, hitting cities like Lima, the Peruvian capital. In South America, the Spanish flu also spread to territories that could only be reached by river and air at the time, including Iquitos in the Peruvian Amazon. The mortality rate in Iquitos, the center of the Amazonian rubber trade, was twice as high as in Lima.

In all, this pandemic's impact was profound and global, with a significant impact on the course of the First World War. It is estimated that half the world was infected in

1918. Unlike the seasonal flu, which tends to kill only the elderly and sick, the Spanish flu killed indiscriminately of age, social status, or geographic location. According to Greger (2020), 99% of surplus deaths occurred among people under 65, and mortality peaked in the 20-34 age group. Women under 35 years of age accounted for 70% of all female deaths from 1918 influenza. Many factors that contributed to the outbreak's severity were unique to the times; during the Great War, the world was more connected, allowing the virus to spread faster than ever before. At the same, time the still incipient understanding of how diseases worked meant that sanitation patterns and treatment methods were lagging. However, it eventually strengthened independence movements in former colonies and forced countries to formulate policies for universal health care, which, in turn, spurred advances in epidemiology, virology, and vaccine development (Becker, 2018).

The development of antibiotics can be considered one of the major medical breakthroughs for treating infectious diseases between World War I and II. However, contrary to common belief, antibiotic exposure is not limited to modern times. Research by scholars such as Bassett et al. (1980) has revealed that some societies were aware of the properties of natural antibiotics even from more ancient times. For example, traces of tetracycline found in human bone remains from ancient Sudanese Nubia, dating from 350 to 550 AD, can only be explained by deliberate exposure to tetracycline-containing materials in these ancient peoples' diets. Another explanation for exposure to antimicrobials in the pre-antibiotic era is remedies used by traditional Chinese medicine. For instance, the potent antimalarial drug *qinghaosu* (artemisinin), extracted from Artemisia plants, has been and used by Chinese herbalists for thousands of years.

However, the advent of the "antibiotic era" is associated with Paul Ehrlich and Alexander Fleming. Ehrlich's idea of a "magic bullet" that selectively targets only disease-causing microbes and not the host was based on the observation that aniline and other synthetic dyes, available for the first time then, could stain specific microbes without staining others. In 1928, Alexander Fleming discovered penicillin. He was familiar with the treatment of bacterial infections through his experience as a captain in the British Medical Corps during World War I, witnessing the lack of drugs to treat war-related infections firsthand (causing almost one-third of military deaths). However, despite its historical significance, Fleming's discovery of penicillin attracted little attention at the time, as the technology and funds needed to isolate and produce the antibiotic were not available (Kiple, 1993).

However, by World War II, advances in technology and a wartime economy paved the way for the industrial production of penicillin and other drugs. The lessons of World

War I had shown that the ability to fight disease and infection could mean the difference between victory and defeat. Because British facilities were manufacturing other drugs needed for the war effort in Europe, a total of 21 US companies joined forces to produce 2.3 million doses of penicillin, preparing for the D-Day invasion of Normandy. From that moment on, penicillin quickly became known as the "wonder drug" of war, curing infectious diseases and saving millions of lives.

Despite international collaboration and advances in medical research, pandemics continued to emerge in the second half of the 20th century, often in the context of regional wars (Figure 5). For example, malaria was the most important infectious disease affecting the health and effectiveness of US soldiers deployed in Southeast Asia during the Vietnam War. It was the third most frequent medical cause of hospitalization of military personnel after respiratory and diarrheal diseases. According to Grant (2018), more than 80,000 cases of malaria were diagnosed in US forces between 1965 and 1971. However, the low mortality rate, 1.7 deaths per 1,000, reflected the army's ability to diagnose and rapidly treat new cases. This resilience was likely a product of the experiences of previous wars in Southeast Asia.

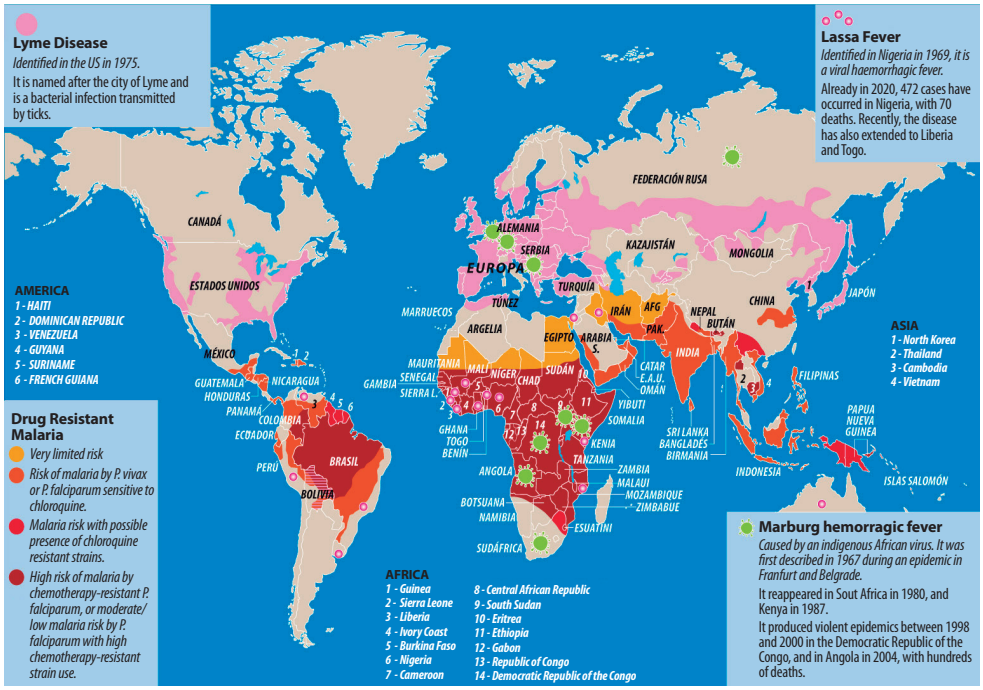

Figure 5. Malaria, Lyme disease, Lassa fever, Marburg fever.
Source: Adapted from Canali (2020)

For example, following the acquisition of the island of Puerto Rico and the Philippine archipelago, resulting from the 1898 Spanish-American war, US military operations began almost immediately after the occupation of Manila after a Philippine insurrection. The ancient bubonic plague resurgence between 1899 and 1903 and cholera from China accompanied the Philippine insurrection war. The Philippines had largely avoided cholera during previous outbreaks thanks to the territorial fragmentation characteristic of an archipelago that curbed its spread. However, General MacArthur's counterinsurgency strategy in the Philippine insurrection countered this natural low-population density protection. It confined tens of thousands of Filipinos in concentration camps to prevent their infiltration by Filipino guerrillas. After their release, following the declaration ending hostilities, the epidemic spread to all corners of the Philippines. In short, the pestilence struck in two waves, the first extending from 1902 to 1903 and the second from mid-1903 to 1904. According to Petriello (2015), mortality rates were estimated to be 31 Americans and 108 Filipinos per 1000 people. By the end of the conflict, 4200 US soldiers serving in the Philippine campaign had died. In fact, in 1900 alone, 70% of all US military deaths were from disease.

For its part, AIDS emerged as a pandemic amid the disruption of social structures and refugees fleeing the African wars of the late 20th century. By 2019, approximately 38 million people were living with HIV. Between 500,000 and 970,000 died the same year of AIDS-related illnesses, 70% of them in Africa (UNAIDS, 2020). Renfro (2018) noted that the Rwandan civil war and subsequent wars in the Congo amplified the prevalence of AIDS in conflict-affected areas; in these conflicts, rape as a weapon of war was crucial in the spread of the disease. Although the AIDS pandemic has stabilized in much of the world, the Congo remains a chronically unstable region, considering that coltan mining continues to fuel violence in that country (Álvarez & Trujillo, 2020).

While acts of sexual violence against women may be evident throughout the history of conflict (Vikman, 2005a), some modern wars have evidenced the large-scale use of rape as a "weapon" of warfare (Vikman, 2005b). Indeed, the use of sexual violence was a recurrent phenomenon in the Yugoslav wars (1991-2001), in the first Liberian civil war (1989-1996), the Sierra Leone civil war (1991-2002), the Rwandan civil war (1990-1993), and the first Congo war (1996-1997), among others. For example, based on unofficial statistics and data, Elbe (2006) estimates that between 200,000 and 500,000 women were raped during the 100-day genocide in Rwanda. According to Obijiofor and Rupiya (2012), about 49 % of women between 15 and 70 experienced at least one act of sexual violence by a soldier or member of the armed militia during the 1999-2003 Liberian civil war. In Sierra Leone, approximately 64,000 displaced women experienced war-related sexual violence between 1991 and 2001.

Furthermore, as Obijiofor and Rupiya (2012) stated, a notable difference between the use of rape as a weapon in the wars that preceded the 1990s and the wars of the last thirty years was the *intentional* transmission of HIV to the enemy's female population. Thus, the virus and conflicts' complex interaction has reinforced the dimension of AIDS as a threat to "human security"[13] and the threat to "national security."[14] Moreover, as a high-impact pandemic whose spread was exacerbated by violence, the United Nations Security Council recognized AIDS as a threat to "international security"[15] in Resolution 1308 of July 17, 2000. It is worth mentioning that this was the first resolution in the history of the UN Security Council on a health issue.

Conclusions

The arguments for considering AIDS a "security problem" provide an indication of the broader justifications for whether or not 21st-century pandemics should be considered threats to state security. According to Prins (2004), although AIDS has been visible in the medical community for four decades, it only began to be considered a security problem in the last twenty years. In this vein, Elbe (2006) considers that if AIDS had been considered a national security issue, international attention to the problem and resources directed to care for the disease and its victims might have increased. However, some skeptics such as Maclean (2008) consider that "labeling" AIDS as a security issue risk not only stigmatizing the disease but also those who suffer from it. Eventually, this "label" could even lead to the cancellation of their civil liberties because they are considered a threat.

Undoubtedly, the effects of pandemics on humanity would be on a par with the great wars of the past; an uncontrolled infectious disease can be as destructive or more destructive than a bomb, a missile, or the full kinetic power of an army. Viruses and bacteria have won and lost wars, altered economies, and decided the course of history. In the 20th century, the bloodiest period in human history, between 100 and 200 million people have died as a result of war, a similar number to those who have died from measles (*The Economist*, 2020). In contrast, the 800 million people who died from influenza and smallpox far exceed the lethality of the wars of the last century (Figure 6).

13 The United Nations Development Programme (UNDP) coined the concept of *human security* in 1994. It recognizes the emergence of new threats to individuals and peoples' security, including hunger, environmental degradation, natural disasters, and diseases, among others (Álvarez et al., 2017).

14 The concept of *national security* takes the state and not the individual as the preferred subject of security. Therefore, national security would seek the survival of the state in a hostile environment where threats are generally external and of a military nature (Álvarez et al., 2017).

15 *International security* refers to measures taken by states and supranational organizations, such as the UN, to ensure the collective security of states (Álvarez et al., 2017).

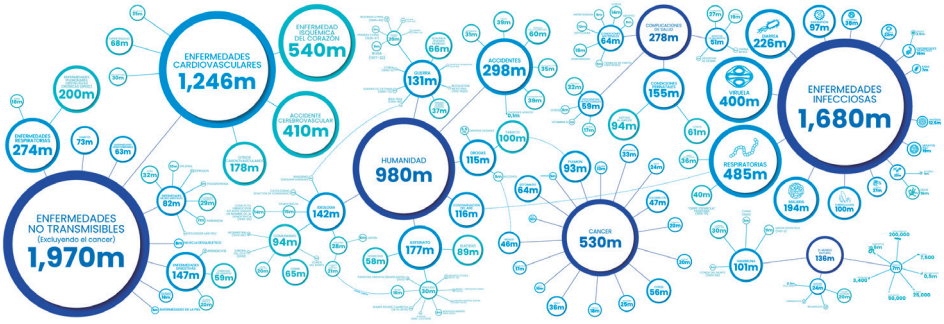

Figure 6. Causes of human mortality in the 20th century in millions of deaths
Source: Created by the author.

Thus, the coordinated eradication of smallpox through a series of worldwide vaccination campaigns can be considered one of the great triumphs of the 20th century. However, although the advance of human civilization has successfully reduced or eliminated some infectious diseases, it has also created the conditions for the irruption of new epidemics and pandemics in the 21st century. Once again, this potential seriously threatens humanity, just as infectious diseases have done for thousands of years. Thus, infectious diseases in the 21st century imply enormous challenges, which will be the subject of the second installment of this research, focusing especially on the threat posed by COVID-19 to Colombia's multidimensional security.

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