



# PANDEMIC



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## Introduction to Pandemic!

In a rural village in a distant province of the world, a farmer seeks treatment for a fever. The next day, that farmer's spouse succumbs to a similar fever. A week later, that farmer, too, will die. The following week, one of the health care workers that treated that farmer comes down with a mysterious – yet now familiar – illness.

Two weeks later, a student who had been visiting family returns to school and in the airport, that student coughs. None of it seems particularly consequential at first glance. But what if that province had been dealing with an outbreak of a mysterious disease for months – one unreported by the media, unknown to international authorities, and unimaginable by the rest of the world? What if that farmer's spouse was not the first to die from that mysterious illness? Or the second, or even the hundredth? That's how a pandemic begins.

In Pandemic!, delegates will represent member nations on an ad-hoc committee of the United Nations at the beginning of what the World Health Organization is warning could be the next major pandemic – one that threatens to kill millions of people, or more. The committee has been called together to discuss this new threat to world health and security, and to work together to create and implement policies to stop the spread of the new disease and prevent the deaths of millions of people. In a rapidly changing situation, delegates will have to respond quickly before the disease becomes too widespread to control.

### **Crisis Powers**

Although this committee is formed as an ad-hoc committee of the United Nations Security Council, veto abilities will not be included in the committee. Group directives and press releases must receive the support of more than half of the committee to pass and be implemented.

Per crisis rules, delegates may communicate with their government to implement individual directives regarding their country's actions during the pandemic crisis. These directives will be approved at the discretion of the chair. For instance, actions that would affect the ability of another delegate to continue in their assigned role will not be implemented.

### **Pandemic Definition**

The classical definition of a pandemic is “an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people”<sup>1</sup>. At this time, the World Health Organization (WHO) does not have a technical definition of a pandemic. As of 2009, a pandemic was described by the WHO as an epidemic that has reached Phase 6 of their guidelines, “characterized by community level outbreaks in at least one other country in a different [second] WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way”. Pandemics are not defined by the numbers of illness or deaths that they cause, but rather by their ability to spread to multiple populations in different parts of the world.

### **Pandemic Phases**

The World Health Organization has described six phases of the origin of an influenza pandemic (see chart on following page). The first signs of a pandemic occur at phase 4, involving community-level outbreaks. At this stage, the WHO should be notified by local health care providers. Stage 5 involves

transmission between two countries within one WHO region; this stage indicates that a pandemic is imminent, and that preventative and response preparations should be undertaken as quickly as possible.

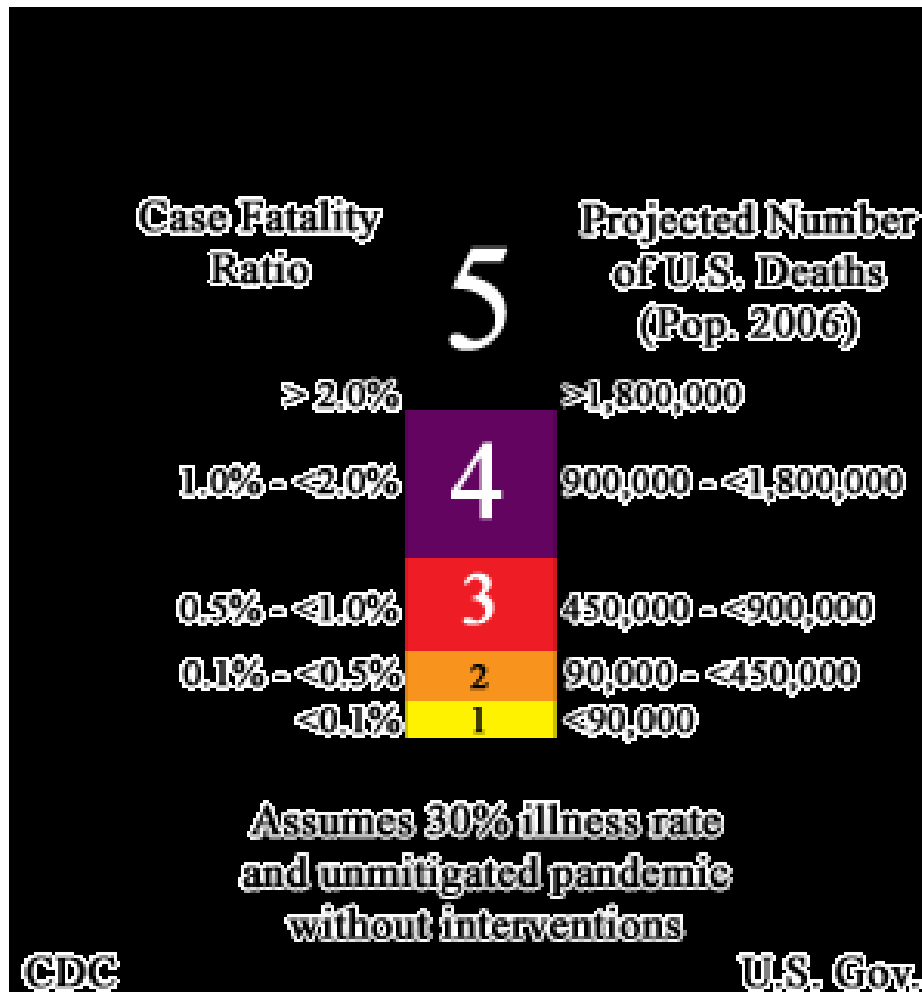
Two additional phases mark the decline of a pandemic: a post-peak period, in which activity and infections appear to decrease, and a post-pandemic period, in which influenza activity returns to seasonal norms. Monitoring is vital during both periods, particularly during the post-peak period in which a second wave of disease is possible.

**Pandemic Severity Index**

The United States Centers for Disease Control and Prevention (CDC) proposed a classification system for pandemic severity in 2007 to provide guidelines to local communities in the event of a pandemic. Besides the provision of category levels for a pandemic in the United States, the report also recommended four measures for slowing a pandemic: isolation and treatment of suspected and confirmed cases, voluntary home quarantine of the family members of suspected or confirmed cases, the closures of schools and daycares, and the cancellation of large public gatherings and changes to work schedules.

WHO Phases		Federal Government Response Stages	
<b>INTER-PANDEMIC PERIOD</b>			
1	No new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals. If present in animals, the risk of human disease is considered to be low.	0	New domestic animal outbreak in at-risk country
2	No new influenza virus subtypes have been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease.		
<b>PANDEMIC ALERT PERIOD</b>			
3	Human infection(s) with a new subtype, but no human-to-human spread, or at most rare instances of spread to a close contact.	0	New domestic animal outbreak in at-risk country
		1	Suspected human outbreak overseas
4	Small cluster(s) with limited human-to-human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans.	2	Confirmed human outbreak overseas
5	Larger cluster(s) but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans, but may not yet be fully transmissible (substantial pandemic risk).		
<b>PANDEMIC PERIOD</b>			
6	Pandemic phase: increased and sustained transmission in general population.	3	Widespread human outbreaks in multiple locations overseas
		4	First human case in North America
		5	Spread throughout United States
		6	Recovery and preparation for subsequent waves

Although these actions could reduce the numbers of new disease cases, the initial report on the guidelines noted that they may also have social and economic consequences for communities.



Note: The Federal Government referred to in the chart above is that of the United States; this chart was prepared during the 2009 H1N1 pandemic and describes government levels of response to that particular incident. (source: <http://www.examiner.com/article/who-declares-h1n1-pandemic>)

### A Recent History of Pandemic Policy

Throughout history, the world population has faced disease, from the common cold to epidemics that devastated a continent's population.

One of the best-known pandemics is the Black Death, caused by the bacterium *Yersinia pestis*. Consisting of a series of plagues, it eventually led to the deaths of up to 200 million people worldwide and reduced the global population by one-fifth in the 14<sup>th</sup> century. Although the plague had existed for centuries, causing outbreaks in Europe and the Middle East in the 6<sup>th</sup> and 7<sup>th</sup> centuries, its best-known occurrence was in the 1300s in Europe. While it was generally believed at the time that the disease was spread through something in the air – the “miasma theory” – current knowledge suggests that the disease was spread through fleas carried on rats living on merchant ships, bringing the disease from China or its neighbouring regions to Europe.

Despite reducing the population of Europe by about 50%, the Black Death had many other social and political consequences. Increased superstition led to greater anti-Semitism; a failure to cure disease led to the downfall of alchemy as a medical tool, and to a growing distrust of the Catholic Church. A shortage of labour may have contributed to an increase in available food and land; to combat these effects, authorities instituted wage controls and restricted the mobility of workers. In turn, these restrictions led to rebellion, particularly in England, although these were generally unsuccessful. Art and architecture were also affected by the Black Death, and the devastation that artists had witnessed became prominent themes in their work.

- How will your citizens react to the policies you implement? How will you balance the need to prevent the spread of disease with citizen satisfaction?

Another disease outbreak that had a major impact on history was the arrival of smallpox in indigenous communities around the world, brought to those communities by European settlers. Although Europeans had developed some immunity to the disease, likely through earlier, non-fatal infection, this was not true of the native populations of the Americas, who were devastated by the arrival of the disease, reducing populations from 30-90%. Other diseases brought by Europeans included measles and influenza, which contributed to the destruction and killed millions of people.

In the 19<sup>th</sup> century, cholera killed tens of millions of people around the world in multiple outbreaks. Seven pandemics swept across Europe, Asia, and North America, lasting from a few years to decades. By the end of the century, public health advances led to protection from the last pandemic in most of Europe – as cholera is a waterborne disease, often caused by poor sanitation, improving sanitation infrastructure and procedures led to decreased infection rates – but many deaths occurred in Asia, particularly in Russia and India. Cholera remains a threat today in regions where hygiene and sanitation are poor.

One of the largest outbreaks in the last few years occurred in Haiti after the 2010 earthquake; suspected to be the result of transmission from UN workers in the area, over 7,000 people have died and 500,000 people became ill in the outbreak. Another outbreak leading to thousands of deaths occurred in Zimbabwe in 2008, affecting nearly 100,000 people. Outbreaks continue to occur throughout Africa and South Asia to this day.

- How could the demographics and geography of your nation affect the spread of disease?
- What role will your country's level of development have on preventing the spread of disease?

## Influenza Outbreaks

Most of the most devastating pandemics of the past century have been influenza outbreaks. The Spanish flu of 1918-1919, an H1N1 strain, infected 500 million people and killed up to a fifth of those infected, or three to five percent of the world population at the time. In contrast to previous pandemics, where most deaths occurred among vulnerable populations (the elderly, the very young, and the immunocompromised), the 1918 flu pandemic mostly affected young, previously healthy adults due to an overreaction of the immune system to the virus. The disease spread from Europe around the world after the end of World War I, in large part due to troops and military personnel returning home at the end of the war. Increased feasibility of transportation – thanks to improvements in speed and mechanics of transport vehicles – increased the spread of the disease.

Other factors contributing to the disease transmission include the close quarters and troop movements during the war; stress and malnourishment may also have increased lethality of the disease in soldiers. The rapid pace of the pandemic, including its decline in less than a year and its rise at the end of the war may have contributed to the pandemic being underreported in the news and ignorance of its lethality by the general population until recently, when concerns about pandemics have become prevalent again. In particular, the 2009 H1N1 influenza strain showed similarities to the 1918 version, although the later strain was not nearly as lethal.

Avian flu has also caused influenza pandemics in the last century. In the late 1950s, a strain of H2N2 virus that originated in China caused the deaths of millions of people, including 70,000 in the United States. A later evolution of the virus caused another pandemic a few years after the first. Exposure to the H2N2 influenza strain may have conferred some immunity to other strains of influenza; adults who were born before 1957, when the strain first emerged, showed greater immunity to H1N1 during the 2009 pandemic than other members of the population.

## SARS

Over four months between 2002 and 2003, Severe Acute Respiratory Syndrome (SARS), an atypical pneumonia caused by a coronavirus called SARS-CoV – spread across the world, causing 775 deaths and over 8,000 reported cases worldwide.

The initial outbreak occurred in Guangdong province in China, in November of 2002. A doctor who had been treating SARS patients there would later travel to Hong Kong in February, where he checked into a hotel on February 22, 2003, taking a room on the ninth floor. During his stay, he developed symptoms of the disease, sought care at a local hospital, and died about a week after staying at the hotel. Within twenty-four hours, other travellers staying at or visiting the same hotel on the ninth floor also became infected by SARS, spreading it to Vietnam, Singapore, and Canada. The disease was spread in Canada through a family member of the first Canadian patient, who, upon seeking treatment at a local hospital, led to further spread of SARS within the hospital.

The transmission of SARS through family members of the initial patients and the medical staff who had treated them also occurred in the other countries where the outbreak initially occurred. Early in the outbreak, medical staff in Hong Kong may not have been using appropriate protective precautions; SARS was not identified as a new disease until it reached health workers in Hanoi. In the first few weeks of March, over a hundred health care workers in Hong Kong and Hanoi were infected with SARS.

During the initial epidemic in Guangdong, China discouraged media reporting on the disease and did not report the outbreak to the World Health Organization. The WHO did not issue a global alert on the disease until March 12th, 2002; within days, it had upgraded its alert to include an emergency travel advisory to health workers and international travellers. The U.S. Centre for Disease Control quickly issued a travel advisory regarding travel to affected areas in Asia; the WHO would issue its own travel advisories in April. A global health alert for SARS specifically was issued by the WHO on April 11th, and the organization identified the cause as a coronavirus on April 16th, almost a month after an initial investigation by an international network of laboratories to determine the cause of and potential treatments for SARS had begun.

Over March and April, multiple actions were taken by local governments to prevent the spread of SARS. Schools in Hong Kong, Singapore, and Beijing were closed, mandatory quarantines of infected individuals and sites of outbreak (such as apartment buildings) were instituted, and the United States called back non-essential personnel from consulates in affected regions. As the death toll in Beijing climbed, authorities also closed many entertainment venues to prevent the spread of the disease. Early in the outbreak, there were reports of hospitals being understaffed due to workers staying home to avoid infection; as the outbreak continued, some hospitals would themselves be closed and quarantined. Despite these actions, SARS continued to spread, with higher numbers of deaths reported through the end of March and into April.

It was not until the end of April that progress against SARS became noticeable, when the WHO declared Vietnam to be SARS-free and lifted the travel advisory on Toronto (a controversial policy which had only lasted a week, during which the city sustained high economic losses). Although the number of new cases in Hong Kong dropped dramatically by the beginning of May, the travel advisory against it would not be lifted until the end of May; Hong Kong and Singapore were later removed from the WHO's list of affected areas by the end of the month. Toronto remained on the list due to the discovery of a new cluster of suspected SARS patients on May 24th; at this time, over 5000 people were quarantined in Canada. In total, 25,000 Canadians were quarantined during the outbreak.

Although the outbreak was considered to be contained by July of 2003, and no new cases were reported for months, SARS has not been eradicated as a disease. Cases of SARS continued to be reported into 2004, nearly all of them in China; however, most of these patients did not contract the disease through human contact. Nevertheless, China was not declared SARS-free until 2004. The economic impact from SARS was also high: due to the travel advisory placed on it, Toronto alone lost \$350 million from tourism, and retail sales were \$380 million lower than expected. Hong Kong introduced a relief package near the end of the outbreak costing more than a billion dollars. Efforts were later made to revitalize the tourism industry that had been affected by the outbreak.

Although rapid responses in identifying the disease, the issuance of travel advisories, and quarantines were crucial in preventing further spread of SARS during the outbreak, some actions were nevertheless identified as having contributed to its dispersal. The initial failure of authorities to report the outbreak in Guangdong prevented the rest of the world from knowing about a potentially dangerous disease months before the outbreak in Hong Kong; this led to changes in Chinese policy regarding the reporting of diseases, particularly an increase in reporting on SARS cases in the nation as the disease spread.

Additionally, the health care setting may also have contributed to the spread of the outbreak before disease control measures were fully implemented. ICU infection control procedures were not



implemented in Toronto until after the son of the first Toronto patient had been admitted to hospital, and infection controls were implemented three days after. By this time, SARS transmission had already occurred in the hospital. 'Super-spreading' events also occurred to increase transmission of the disease; at least one occurred in an emergency department. Overcrowding, open observation wards, poor hand-washing compliance by health workers, and unrestricted visitor access are considered to have contributed to the event. However, subsequent actions taken by the hospital to control infectious disease, from increased emphasis on handwashing, proper protective equipment, restriction of patient visits and volunteer activity, and staff quarantine to the closure of the ICU and ER of the affected hospital, appeared to be successful in controlling the spread of SARS in Toronto.

Another factor that was believed to contribute to the SARS outbreak in Canada was the lack of communication between health officials at various levels of government and between regions, which restricted access to epidemiological information and data analysis.

- How soon should policies designed to reduce disease transmission be implemented?
- What level of quarantine, if any, should be imposed to prevent the spread of disease most effectively?
- How will you ensure the safety of health care workers during a disease outbreak?
- How will you balance measures to prevent disease transmission with the need for economic prosperity for your nation?

## **AIDS**

Acquired Immunodeficiency Syndrome (AIDS), caused by the human immunodeficiency virus (HIV), is currently the only ongoing pandemic in the world, and has been considered a pandemic for decades. It was first identified as an epidemic in 1981, although it had existed in humans for years prior, and since then has led to thirty million deaths worldwide. First identified in the United States, the disease is currently most prevalent in Sub-Saharan Africa, with additional high rates in South and Southeast Asia, where infection rates are rising, as well as the United States.

As of 2011, over thirty million people were infected with HIV; 68% of these people lived in sub-Saharan Africa, with an adult prevalence rate of 5%. In some countries in southern Africa, prevalence exceeds 20% (or even 30%) of the total adult population. Women tend to be infected at higher rates than men, a gap that continues to grow. Mother-to-child transmission through contaminated breast milk also contributes to the spread of HIV; hundreds of thousands of infants every year are affected. In Asia, prevalence is higher among migrants due to human trafficking and lack of access to health services for migrants.

Stigma of the disease has contributed to higher rates of HIV infection as individuals are reluctant to seek out testing and treatment for the disease. Denial of the existence of HIV/AIDS, as well as other false beliefs about treatment options, has been a major detriment to the treatment and containment of the pandemic: South Africa in particular has a recent history of government denial that prevented access to antiretroviral treatments and led to the deaths of hundreds of thousands of South Africans.

Education of safe sex policies, programs to include HIV screening in routine medical examinations, and increased access to antiretroviral treatment (although it remains prohibitively expensive for many individuals who require it, due in part to the limited ability to manufacture generic, less expensive versions of the drug) have all been factors in a decline in prevalence of HIV/AIDS in African nations in recent years.

**H1N1, 2009**

In 2009, an outbreak of H1N1 influenza dubbed “swine flu” due to its creation as an amalgamation of a previous assortment of viruses combined with a pig flu virus occurred in Veracruz, Mexico. Although first reported in March, evidence has suggested the infection actually began in January of that year, months earlier. The epidemic led to a shutdown of many public and private facilities in Mexico City in an attempt to contain the outbreak, and trade and travel to Mexico were halted. Cases of this strain of H1N1 were reported in the U.S. by April, and had spread to all fifty states by the end of June, when the number of cases and disease-related deaths from H1N1 surpassed those of all other nations.

The first incidents of H1N1 in Canada were reported at the end of April; around this time, other nations around the world were starting to report incidence of the disease, and the WHO raised its pandemic alert level to 5, the second-highest rating indicating an imminent pandemic. Level 6 was declared in June, officially designating the outbreak as a pandemic. Incidence and deaths increased throughout the summer, in contrast to typical seasonal influenza outbreaks, and prompted school closures in North America in September.

By the end of September, vaccination campaigns had begun in China and Australia, but many other nations did not receive vaccines until October. One cause of the delay in producing vaccines was the inability of pharmaceutical companies to produce both the seasonal influenza vaccine and the H1N1 vaccine at the same time, as vaccines required months to prepare and produce; if mistakes were made in identifying the strain, changes could be costly in both time and money.

A predicted shortfall in the United States led to concerns about who should receive the initial doses. National health agencies recommended the establishment of priority groups, such as pregnant women, children aged six months to four years, the families of those children or other immunocompromised individuals, and health care workers. A predicted necessary double dose of the vaccine was found to be unnecessary; the success of a single dose in protecting against H1N1 was important in alleviating the shortage. By mid-November, millions of vaccines had been distributed, and the pandemic appeared to have peaked; by the spring of 2010, rates had declined below epidemic levels in most of the United States. The pandemic was declared officially over by the WHO in August of 2010.

Despite the delay in vaccination distribution, the campaigns were widely successful. In Canada, 40% of the population was immunized against that particular strain of H1N1. A vaccine surplus was also discovered by the spring of 2010 as some nations had ordered more vaccines than were actually necessary. Following the pandemic, reports of vaccine side effects, such as the development of narcolepsy by some children, surfaced. Other concerns included questions about the feasibility of implementing compulsory vaccination and conflicts of interest regarding WHO advisors’ ties to pharmaceutical companies.

Current estimates of deaths from this strain of H1N1 stand in the hundreds of thousands, although only 15,000-18,000 have actually been confirmed. The pandemic strain of H1N1 continues to circulate among the general population as a strain of seasonal flu, with typical seasonal flu incidence rates.

- Who should be the first to receive vaccinations during an outbreak?
- How can you ensure that vaccines and/or medication can be accessible to everyone who needs it?

## **Tuberculosis**

Tuberculosis may be remembered by many as a disease of the 19th century, when it killed a quarter of Europe's adult population, but it remains one of the most important and dangerous diseases in less wealthy nations. One-third of the world population is infected with tuberculosis, although in most individuals it remains inactive. Nevertheless, millions of people die from the disease every year. Identification of individuals with tuberculosis is often difficult due to a lack of access to health services, as well as stigma that may make an infected individual less likely to seek treatment. Furthermore, failure to complete the drug program required to properly treat tuberculosis, a process that takes months to complete, and may require multiple drugs, has led to a drug-resistant strain that does not respond to either first-line treatment drugs. Reasons the drug regimen is not completed include improper physician oversight, lack of antibiotics, patients feeling better and prematurely stopping treatment, or forgetting to take the antibiotics. Approximately 2.7% of new cases of tuberculosis are multi-drug-resistant. Mismanagement of this form of tuberculosis can lead to extensively drug-resistant forms (XDR-TB), which require more extensive and expensive treatment and have higher fatality rates.

All types of tuberculosis are spread through airborne methods, such as coughing or sneezing by an individual with active tuberculosis. Immunocompromised individuals are particularly vulnerable; tuberculosis is a leading cause of death for people with AIDS.

## **MERS-CoV**

The Middle East respiratory syndrome coronavirus (MERS-CoV) was discovered in September of 2012 in Saudi Arabia. Similar in nature to SARS, it can cause renal failure and severe acute pneumonia, potentially proving fatal. Of 177 reported cases as of January 2014, 74 had died, almost all located in the Middle East.

While MERS-CoV is not considered to be an epidemic, and has not yet demonstrated a sustained ability for human-to-human transmission, it is nevertheless being monitored closely due to its potential to mutate into a more dangerous strain. Relatively little is currently known about the disease; for instance, while an animal reservoir for MERS-CoV is suspected, it has not yet been identified, although strains have been discovered in camels, and is similar to coronaviruses carried by bats.

One primary concern about MERS-CoV was its potential for worldwide transmission due to the hajj, an important Islamic pilgrimage to Mecca in Saudi Arabia. In 2013, the Saudi government restricted the number of people allowed to perform the pilgrimage, and advised individuals vulnerable to disease to avoid the hajj that year. Nevertheless, a Spanish woman who had undertaken the hajj was reported to have contracted MERS-CoV, and the case is under investigation by the WHO.

## **Avian Flu: H5N1**

A number of different influenza strains have initially been discovered in birds, and all may be considered to be strains of 'avian flu'. Different strains of avian influenza have proven fatal to humans in the past, most notably during an outbreak of H2N2 during the 1950s. Currently, the strain which is most concerning to the WHO and other disease prevention experts is a strain of H5N1 influenza that was identified in 2004 and which first appeared in Asia. Although humans have been infected, and a few cases of human-to-human transmission have been reported, the strain has failed to become a community-level infection that would indicate a pandemic is imminent. Furthermore, vaccines for this

particular strain have been developed and stockpiled in a number of countries for use in the event of a pandemic; while continuous mutations in the viral strain limit the effectiveness of the current vaccines, research and development into the most up-to-date vaccines is ongoing.

The high mortality rate of H5N1 infections in humans and the potential for mutation into a more infectious strain have necessitated close attention by the WHO. Genetic analysis suggests that a mutated H5N1 could be more lethal than the Spanish Flu outbreak of 1919. Since the strain's discovery, billions of dollars have been spent on research and millions of birds have been killed for the purpose of containing a potential pandemic.

☐ If an animal vector for the disease is identified, what action – if any – should be taken against that animal?

Delegates should also consider researching their country's health care system, its strengths and weaknesses, the health-based challenges the system is currently facing, and any recent outbreaks of disease that the system experienced.