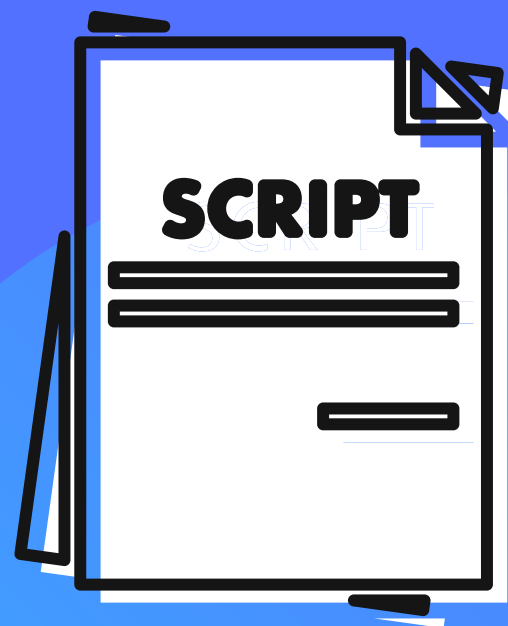


Yarmouk University

Community Medicine

Lec. 14 - Pandemics (Part 1)

Written By : Group G4 - Ahmad Haidar



If you come by any mistake , please
kindly report it to
shaghafbatch@gmail.com

- done by G4
- Record in red

Pandemics

How Did We Get Here And Where Are We Going?

*Dr. Batool Eldos
Assistant Professor in Family Medicine
Infectious Diseases/Geriatrics Fellowships*

Objectives

- To define level of disease and distinguish between them
- To understand history of Pandemics
- Take a look at noticeable past pandemics as well as ongoing pandemics
- Create an Epic curve
- How to investigate and solve an outbreak
- COVID update
- Provide solutions to prevent the next pandemics

Level of Disease

- **Endemic**: disease that is usually present in a community (baseline level) or expected level of disease
- Observed level and not necessarily the desired level
- In absence of intervention, disease will likely continue to occur as this level indefinitely.
- Examples ?

Seasonal Flu , Malaria in certain countries such as Africa

(disease that's constantly present in a population or a region with relatively low spread with usual numbers if no intervention occur)

- **Epidemic:** increase, often **sudden not gradual** , in the number of cases of a disease above what is normally expected in that population in that area **like malaria increasing from the usual endemic 100000 N of cases into 300000.**
- **Yellow fever, Smallpox, Measles, and Polio** are prime examples of epidemics.
- An epidemic disease doesn't necessarily have to be **contagious. Anything more than u expect could be bad behavior like vaping**
- West Nile fever and the rapid increase in obesity rates are also considered epidemics .
- Epidemics can refer to a disease or other specific health-related behavior (e.g., smoking) with rates that are clearly above the expected occurrence in a community or region.
- **It usually affects a larger area than an outbreak .**

- **Outbreak:** is when an illness happens in unexpected high numbers. (afraid that we can't control it)
- It may stay in one area or extend more widely .
- Can last days or years .
- Sometimes, experts consider a **single case** of a contagious disease to be an outbreak. This may be true if it's an **unknown disease**, if it's new to a community, or if it's been **absent from a population for a long time** .

Causes for disease outbreaks

Several factors contribute to the outbreak of infectious diseases.

- Weather conditions. For example, whooping cough occurs in spring, whereas measles tend to appear in the winter season.
- Exposure to chemicals or radioactive materials. For example, Minamata is a disease contracted after exposure to mercury.
- The social aftermath of disasters such as storms, earthquakes, and droughts can lead to high disease transmission.
- A number of environmental factors such as water supply, food, air quality, and sanitation facilities can catalyze the spread of infectious diseases.

- **Pandemic:** refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.
- Often caused by new virus or disease that has not been in circulation for centuries or decades
- Most humans have little to no immunity against the disease
- Known to cause more death than epidemic
- Often result in social disruption and/or economic loss
- Examples: **COVID-19 pandemic, HIV/AIDS pandemic, Spanish Flu**

The number of lives lost in a pandemic depends on **:(mortality rate)**

- How many people are infected (no immunity)
- How severe of an illness the virus causes (its virulence)
- How vulnerable certain groups of people are (immune state like in DM or immunocompromised or chronic disease)
- Prevention efforts and how effective they are

The WHO's pandemic alert system ranges from Phase 1 (a low risk) to **Phase 6** (a full pandemic) :

- **Phase 1:** A virus in animals has caused no known infections in humans (only animals)
- **Phase 2:** An animal virus has caused infection in humans. (humans infected)
- **Phase 3:** There are scattered cases or small clusters of disease in humans. If the illness is spreading from human to human, it's not broad enough to cause community-level outbreaks. (clusters of the disease and very low human to human spreading)
- **Phase 4:** The disease is spreading from person to person with confirmed outbreaks at the community level. (sudden increase of cases at certain areas)
- **Phase 5:** The disease is spreading between humans in more than one country of one of the WHO regions. (more than one epidemic)
- **Phase 6:** At least one more country, in a different region from Phase 5, has community-level outbreaks (new country or continent epidemic)_full pandemic

Related Definitions

- **Sporadic** means cases are rare and happen unevenly (scattered not a lot of numbers)
- **Endemic** means a disease is constant and happens about as often as expected (specific location and population with usual prevalence)
- **Hyperendemic** means an illness is constant but people are getting sick at a higher rate (specific location and population with higher than usual prevalence)

Cases can also come in a **Cluster**, a group of illnesses in a certain place and time.

- Order the following terms from the smallest (1) to largest (4) level of disease occurrence

Epidemic

Outbreak

Pandemic

Cluster

- Order the following terms from the smallest (1) to largest (4) level of disease occurrence

Epidemic

3

Outbreak

2

Pandemic

4

Cluster

1

What's the difference between an endemic, epidemic and pandemic disease?



ENDEMIC DISEASE

is constantly present in a certain population or region, with relatively low spread (or there may be periods when it doesn't affect people at all, if it is only present in the environment).



EPIDEMIC DISEASE

is when there is a sudden increase in cases spreading through a large population like a country (an outbreak is similar, but usually covers a smaller geographic area).



PANDEMIC DISEASE

is when there is a sudden increase in cases spreading through several countries, continents, or the whole world.

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

1. 22 _____ cases of Legionellosis occurred within 3 weeks among residents of a particular neighborhood (usually 0 or 1 per year)

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

1. E 22 cases of Legionellosis occurred within 3 weeks among residents of a particular neighborhood (usually 0 or 1 per year)

sudden increase in number of cases from 1 yearly into 22 in 3 weeks at large area in a specific population(not pandemic)

not a hyperendemic as there's a sharp increase in number of cases in a short period

I think not an out break because there's usual prevalence(endemic) previously and now just higher prevalence "my opinion"

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

____.2 Average annual incidence was 364 cases of pulmonary tuberculosis per 100,000 population in one area, compared with national average of 134 cases per 100,000 population

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

__2C__ Average annual incidence was 364 cases of pulmonary tuberculosis per 100,000 population in one area, compared with national average of 134 cases per 100,000 population

Nearly triple the number of cases in a specific population but it needed on year so we consider it as hyperendemic

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

____.3 Over 20 million people worldwide died from influenza in 1918–1919

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

___**3D**___ Over 20 million people worldwide died from influenza in 1918–1919

Very high number of deaths All over the world so a pandemic

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

____.4 Single case of histoplasmosis was diagnosed in a community

For each of the following situations, identify whether it reflects:

- A. Sporadic disease
- B. Endemic disease
- C. Hyperendemic disease
- D. Pandemic disease
- E. Epidemic disease

___4A___ Single case of histoplasmosis was diagnosed in a community
if the disease is contagious or unknown disease, if it's new to a community, or if
it's been absent from a population for a long time we consider it as an outbreak

For each of the following situations, identify whether it reflects:

- Sporadic disease
- Endemic disease
- Hyperendemic disease
- Pandemic disease
- Epidemic disease

____.5 About 60 cases of gonorrhoea are usually reported in this region per week, slightly less than the national average

For each of the following situations, identify whether it reflects:

- Sporadic disease
- Endemic disease
- Hyperendemic disease
- Pandemic disease
- Epidemic disease

___.5B__ About 60 cases of gonorrhoea are usually reported in this region per week, slightly less than the national average

What was the first known pandemic in history??

- The first pandemic was likely 1350 BC plague of Megiddo in [Megiddo](#), land of [Canaan](#)
- Mayor of Megiddo complains to [Amenhotep III](#) of his area being "consumed by death, plague and dust"
- Death toll : unknown

How many pandemics have there been?

There have been **249** Pandemics throughout recorded history from 1,200 BC, up to the Covid- 19 virus today هاي هبده ما انزل الله بها من سلطان

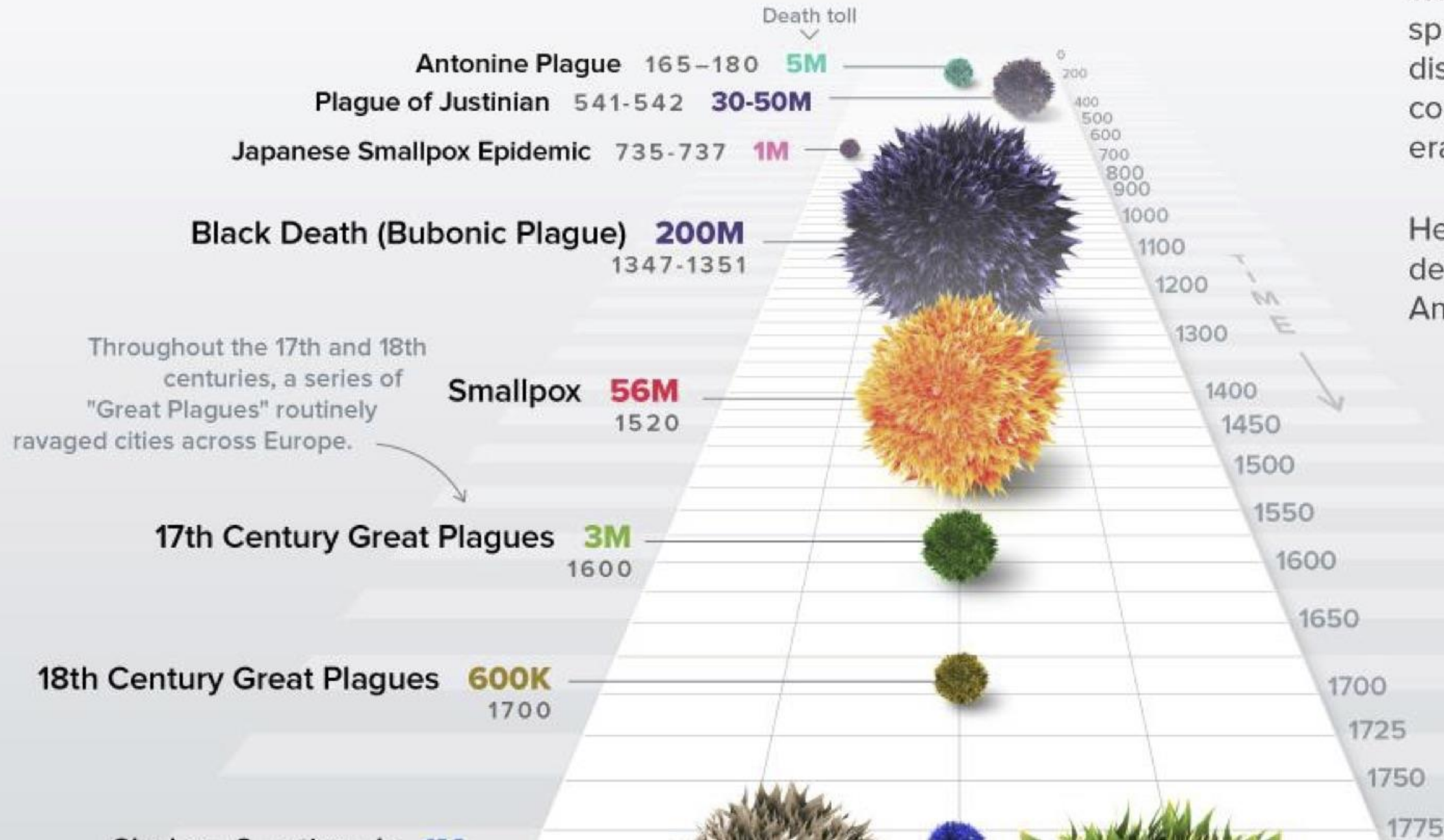
THE REASONS THAT HAVE CAUSED AN EPIDEMIC OR PANDEMIC :

- 1.The shift from humans being hunter-gatherers to agrarian societies, which started 12,000 years ago
- 2.Expanded trade between communities
- 3.Increased interactions between humans and animals that caused the transmission of pathogens
- 4.Expanded cities and trade territories
- 5.Increased travel to other places that exposed people to other viruses and germs
- 6.Increases in human population

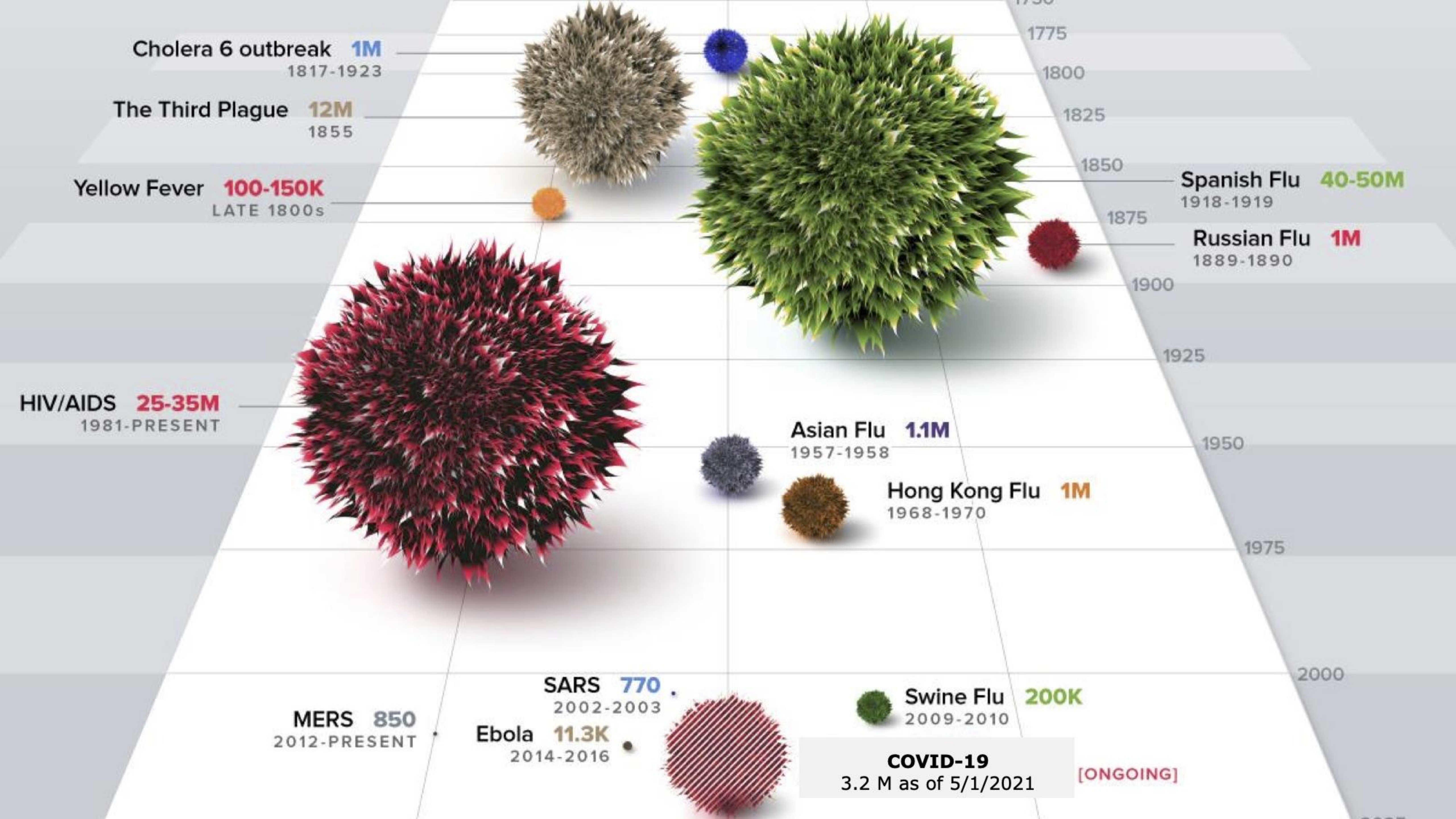
HISTORY OF PANDEMIC

PAN-DEM-IC (of a disease) prevalent over a whole country or the world.

THROUGHOUT HISTORY, as humans spread across the world, infectious diseases have been a constant companion. Even in this modern era, outbreaks are nearly constant.



Here are some of history's most deadly pandemics, from the Antonine Plague to COVID-19.



Notable Past Pandemics

- **The Black Death.** Experts think the plague, sparked by bacteria called *Yersinia pestis*, is to blame for the illness that tore through Europe in 1347-51

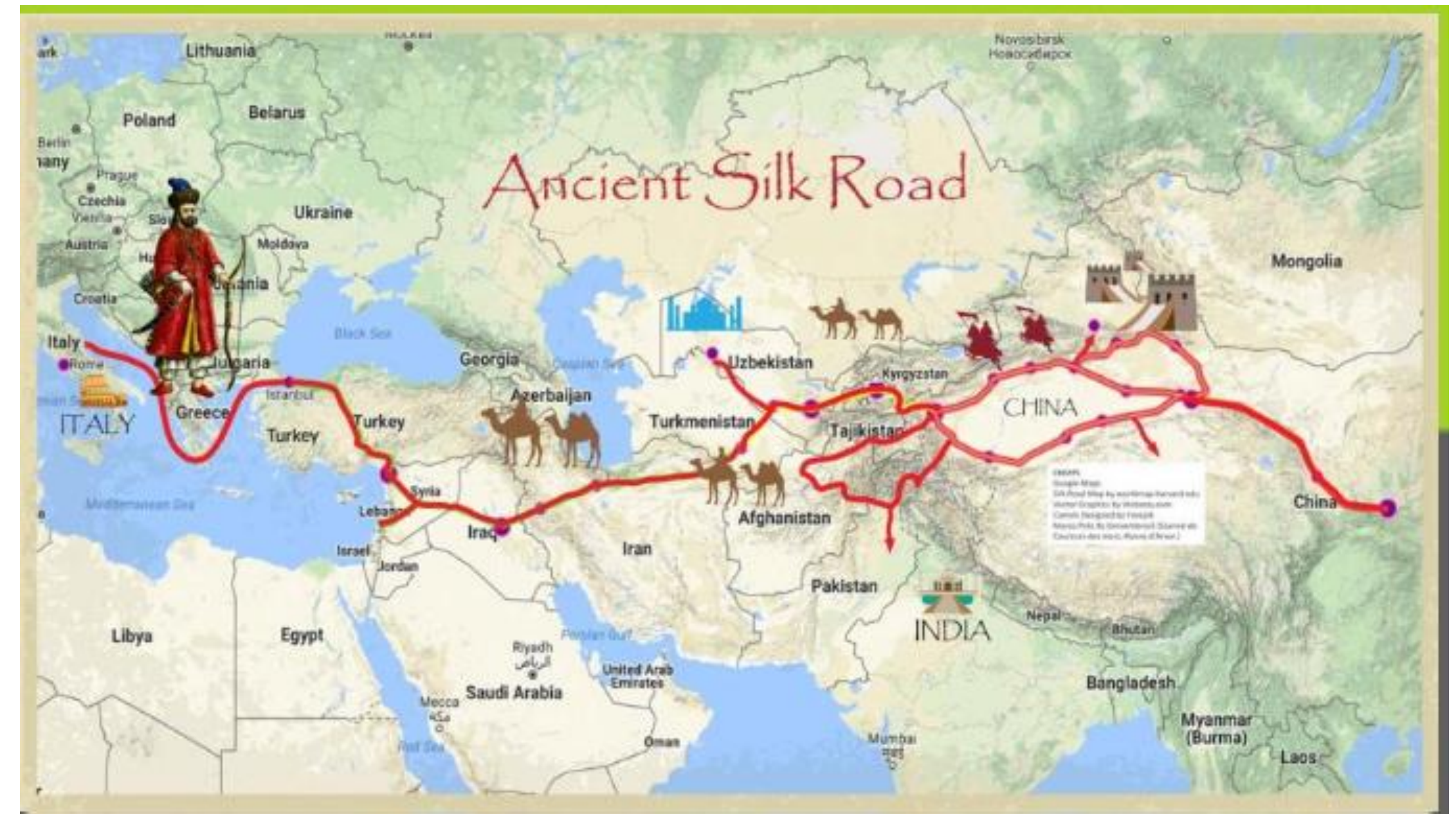
- An ~200 million people died over 50 years

- Mortality (if untreated) was close to 70%

- Thought to be “punishment for sins”

- Shortage of doctors which led to people selling useless cures

- Shortage of labor leading to crops not harvested and trade stopped



- Before the germ theory of disease, doctors believed that the plague spread was through poisoned air .
- The beaked masks that doctors wore, were filled with theriac, a mixture of more than 55 herbs and other compounds including cinnamon and honey .
- The shape of the beak was supposedly designed to give the air enough time to be cleansed by the herbs before it reached the nose .



- Medieval societies recognized connection between passage of time and onset of symptoms (**occupation period**)
- Started instituting mandatory isolation
- Quarantine “Quarantena” meaning 40 days
- First known quarantine in 1377 → 40 days isolation before entering city
- First measure and Still an effective public health measure to combat outbreaks

Notable Past Pandemics

- **The influenza pandemic of 1918**. It's often called the “**Spanish flu**”, not because the virus started there but because Spain was one of the first countries to announce cases.
- First true global pandemic (called the “forgotten pandemic(” **treated globally**
- H1N1 strain on influenza virus
- Mortality rate 10 - 20%
- Affected > 1/4 of global population
- Death toll : 40 - 50 million

Notable Past Pandemics

- **Smallpox:** The smallpox pandemic stretched over hundreds of years. Experts estimate that it killed as many as 300 million people in the 20th century alone
- Highly contagious
- Fever and pustules on skin
- %30 mortality rate
- **Led to the world's first vaccine in 1798**



Notable Past Pandemics

-  **Smallpox - Yugoslavia 1972**

- **Example of an outbreak**

- Started with pilgrim returned from middle east with fever and skin eruption
- Physician had not seen this in over 30 years _ “incorrectly diagnosed”
- Patient infected 38 others (including health care workers(
- Mandatory revaccination & quarantined villages/neighborhood
- Closed borders and suspended non essential travel
- Due to prompt response, society returned to normal within 2 months

- Thanks to widespread vaccine use, it was declared eradicated in 1980

This event has proven to be a useful model for working out scenarios for response to an outbreak of a highly contagious disease , both as a natural occurrence and as an act of bioterrorism

Notable Past Pandemics

- **HIV and AIDS:** The human immunodeficiency virus (HIV), acquired immunodeficiency syndrome (AIDS), and related illnesses have killed about 32 million people around the world
- Slowly progressing global pandemic
- Started in early 1980s in the U.S
- **Considered a pandemic as it affect the whole world with variable numbers yearly and we don't have a treatment**

DEATH TOLL

[HIGHEST TO LOWEST]

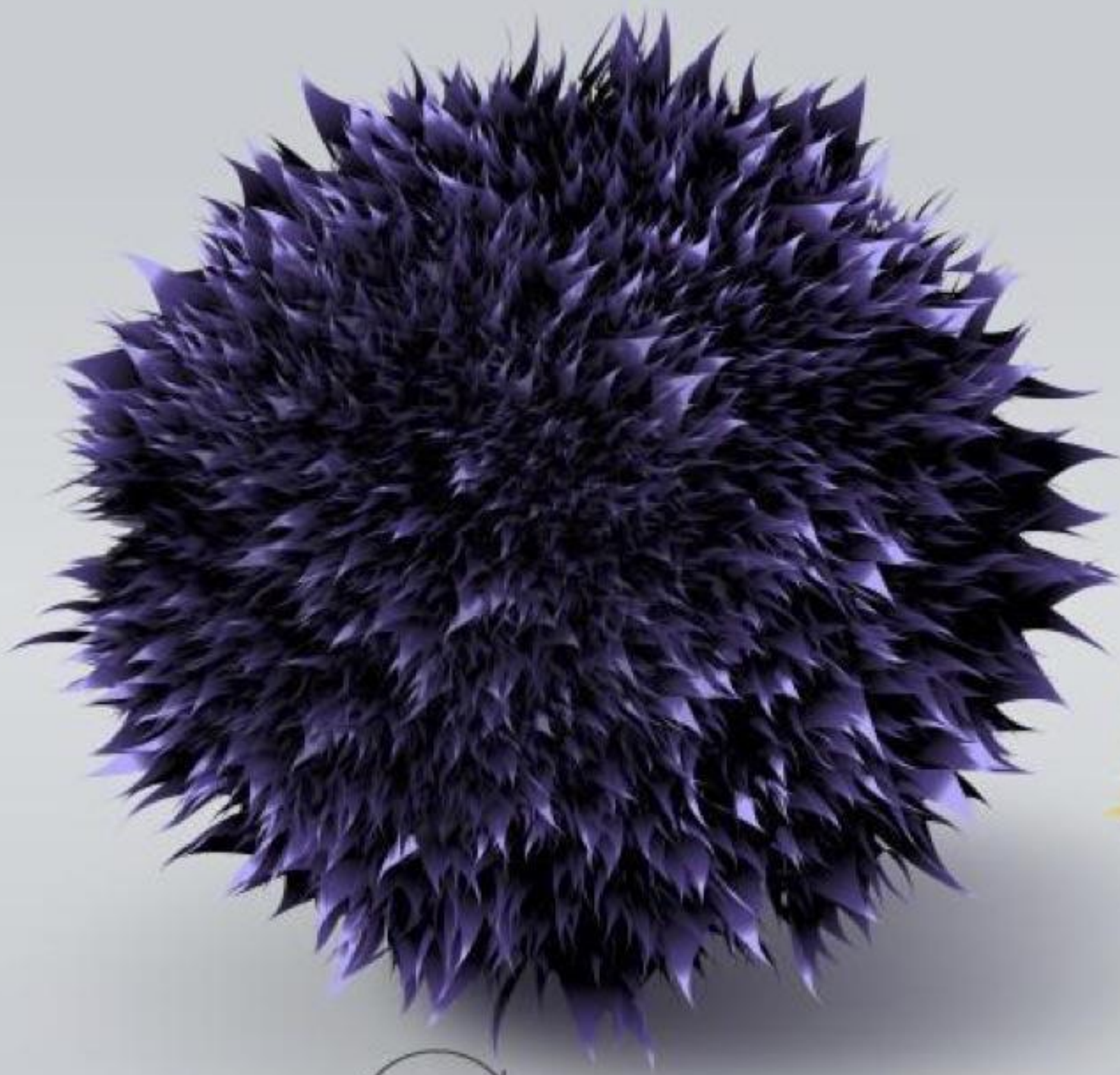
the disease is new to medicine, and data is still coming in.

*Johns Hopkins University estimates

200M

Black Death (Bubonic Plague)

1347-1351



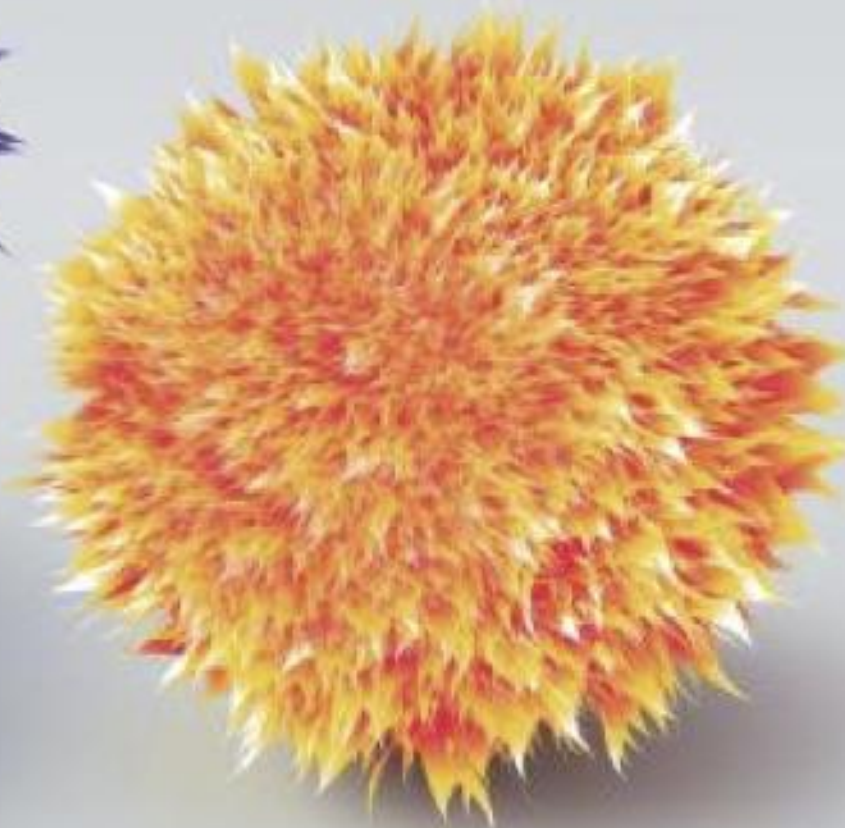
The plague originated in rats and spread to humans via infected fleas.

The outbreak wiped out 30-50% of Europe's population. It took more than 200 years for the continent's population to recover.

56M

Smallpox

1520



Smallpox killed an estimated 90% of Native Americans. In Europe during the 1800s, an estimated 400,000 people were being killed by smallpox annually. The first ever vaccine was created to ward off smallpox.

40-50M

Spanish Flu

1918-1919



30-50M

Plague of Justinian

541-542



The death toll of this plague is still under debate as new evidence is uncovered, but many think it may have helped hasten the fall of the Roman Empire.



25-35M

HIV/AIDS

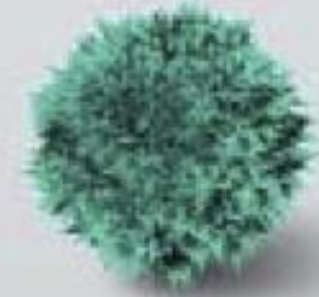
1981-PRESENT



12M

The Third Plague

1855



5M

**Antonine
Plague**

165-180



3M

**17th Century
Great Plagues**

1600



COVID-19

3.2 M, as of
5/1/2021

[ONGOING]



1.1M

Asian Flu

1957-1958



1M

Russian Flu

1889-1890



1M

Hong Kong Flu

1968-1970



1M

**Cholera 6
outbreak**

1817-1923



1M

**Japanese
Smallpox Epidemic**

735-737



600K

**18th Century
Great Plagues**

1700



200K

Swine Flu

2009-2010



100-150K

Yellow Fever

LATE 1800s



11.3K

Ebola

2014-2016



850

MERS

2012-PRESENT



770

SARS

2002-2003

*Johns Hopkins University estimates

Sources:
CDC WHO BBC

Influenza Pandemics

Flu also killed millions of people worldwide in other pandemics:

- 1957 (1.1) million
- 1968 (1) million
- 2009 up to (575,000)
- In previous figures just look at death toll for the first 5 diseases



Just as people have spread across
the world...

...so have infectious diseases



WE SEE OUTBREAKS CONTINUALLY, THEY
JUST ALL DON'T REACH PANDEMIC LEVEL

Ongoing
Outbreaks/Epidemics/Pandemics

COVID-19 Pandemic - 2019)present(

- Caused by SARS-CoV-2
- First identified from an outbreak in [Wuhan, China](#), in December 2019
- Declared Pandemic on March 11, 2020 by WHO
- Revealed vulnerabilities in the global response to outbreaks
- As of August 5 2022, the pandemic had caused more than **587 millions** cases and **6.4 million** confirmed deaths, **making it one of the deadliest in history**

COVID-19 Pandemic

What have we learned??

- Massive improvement in sanitation, hygiene, nutrition
- Human population less vulnerable to illness
- Pandemics are more likely to occur if the threat has not been seen before & is easily transmissible

Nigeria yellow fever epidemic (2020 - present)

- Yellow fever is acute viral disease transmitted by infected mosquitos
- Endemic in Nigeria
- First reported in November 2020
- Travelers should take steps to prevent Yellow fever by getting the vaccine 10 days prior to travel
- Mass vaccination campaigns are planned in the affected areas.

India black fungus epidemic - 2021)present(

- Black fungus/COVID-associated mucormycosis
- Prior to COVID, rates of mucormycosis in India were estimated to be about 70 times higher than in the rest of the world albeit rare
- “Black fungus” because of the black discoloration of dead and dying tissue the fungus causes
- Death toll : 4,332
- Increased with covid due to Dm, immunocompromised, corticosteroids

2022 Hepatitis of unknown origin in children - 2021)present(

- October 2021 with cluster of cases of children with severe hepatitis in the US
- Hepatitis by [Adenovirus](#) variant AF41 (Unconfirmed)
- 450 ~ reported cases worldwide
- 18 deaths