

COVID-19 or: how I learned to stop worrying and love social distancing

Parinaz Fozouni
MD/PhD Student, Ott Lab
UCSF/Gladstone Institutes
March 24, 2020

A brief introduction to me...

- Sacramento-native
- Fell in love with viruses in middle school after learning about the Ebola outbreak/reading “The Hot Zone”
- B.A. in molecular and cell biology (research on evolution of animal multicellularity) & political science from UC Berkeley (Class of 2014)
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...and some disclaimers

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- I am not a doctor (yet), information is changing rapidly, and I will try my best to give you a sense of what the current accepted knowledge is now (subject to change)
- There are few *true* coronavirus experts in the world, I am not one of them, and I would be skeptical of most people who claim to be or speak too definitively about the outbreak
- I do not speak officially on behalf of UCSF or the Gladstone Institutes

'Unrecognizable': Experts warn of historic collapse in economic activity



Sam Ro
Managing Editor
Yahoo Finance March 22, 2020

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Europe

Italy's coronavirus deaths are staggering. They may be more preview than anomaly.

How the Covid-19 recession could become a depression

Coronavirus is a global economic catastrophe.

All of Italy is in lockdown as coronavirus cases rise

By Valentina Di Donato, Emma Reynolds and [Rob Picheta](#), CNN

🕒 Updated 2:50 PM ET, Fri March 13, 2020

LETTER FROM CHENGDU MARCH 30, 2020 ISSUE

LIFE ON LOCKDOWN IN CHINA

Forty-five days of avoiding the coronavirus.

FINANCE • CORONAVIRUS

Coronavirus economic impact 'will be severe,' at least as bad as Great Recession, says IMF

BY ERIC MARTIN AND BLOOMBERG

March 23, 2020 11:31 AM EST

China Stopped Its Economy to Tackle Coronavirus. Now the World Suffers.

The virtual shutdown of one of the world's biggest economies is hurting business around the globe, from multinational firms to truck drivers and tour guides.

Rex Nutting

Opinion: The Fed can't stop coronavirus from slamming the economy, but it could ease the pain

Southern California police to patrol with drones during coronavirus lockdown: report

Man Dead From Taking Chloroquine After Trump Touts Drug For Coronavirus

What is a virus really?

NEW VIRUS FOUND FRIENDLY TO MAN

Link Between Animate and
Inanimate Kills Bacteria, Dr.
Northrop Says at Harvard.

VALUE IN ANTIBODIES SEEN

Dr. Landsteiner Asserts They
Counter Germs—Dr. Shiga
Shows Drop in Dysentery.

By WILLIAM L. LAURENCE
Special to THE NEW YORK TIMES.

CAMBRIDGE, Mass., Sept. 10.—

A new link bridging the gap between the animate and the inanimate, which offers evidence for the existence of a twilight zone between living and non-living matter inhabited by shadowy creatures, some

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New York Times (1936)

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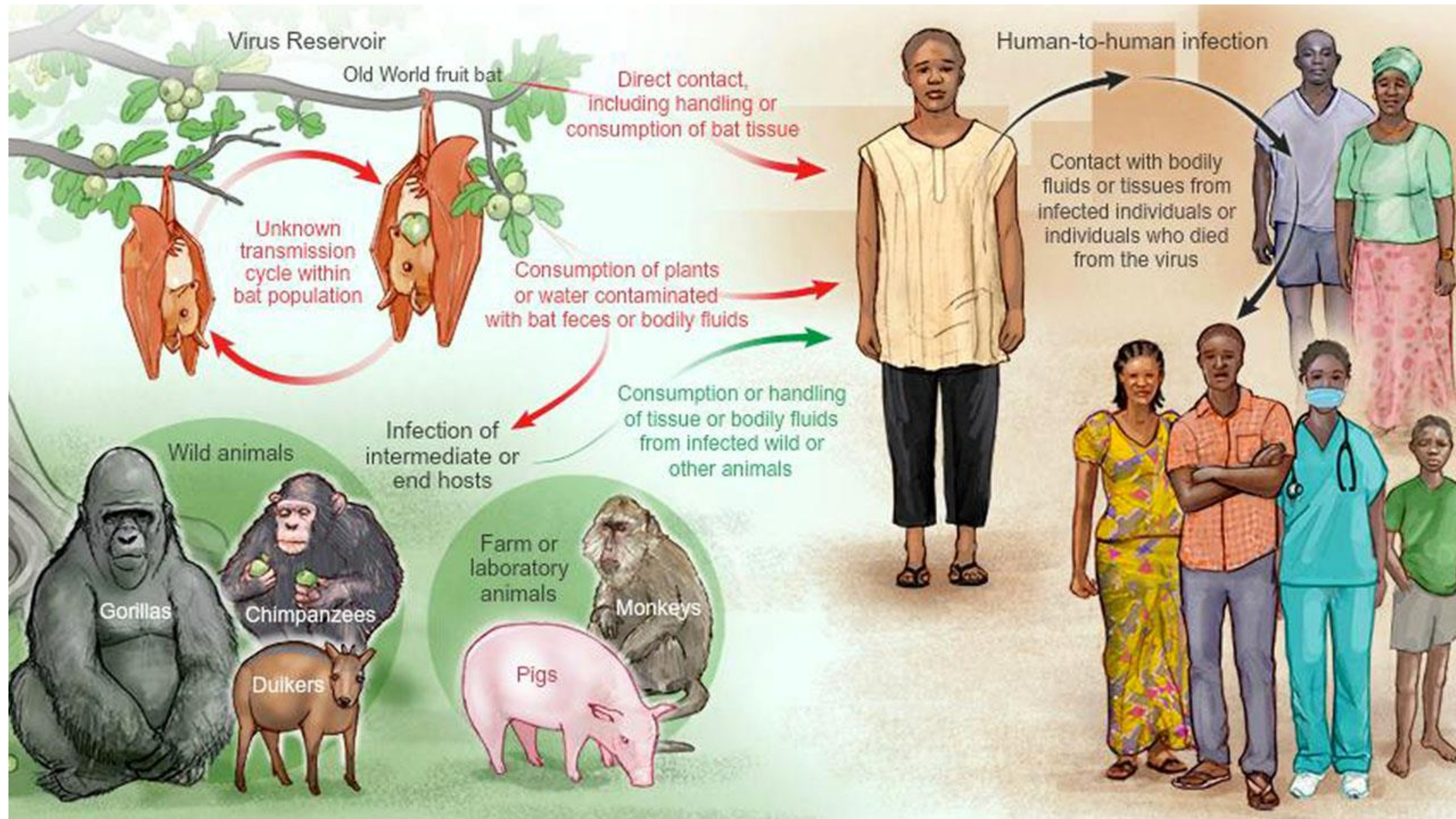
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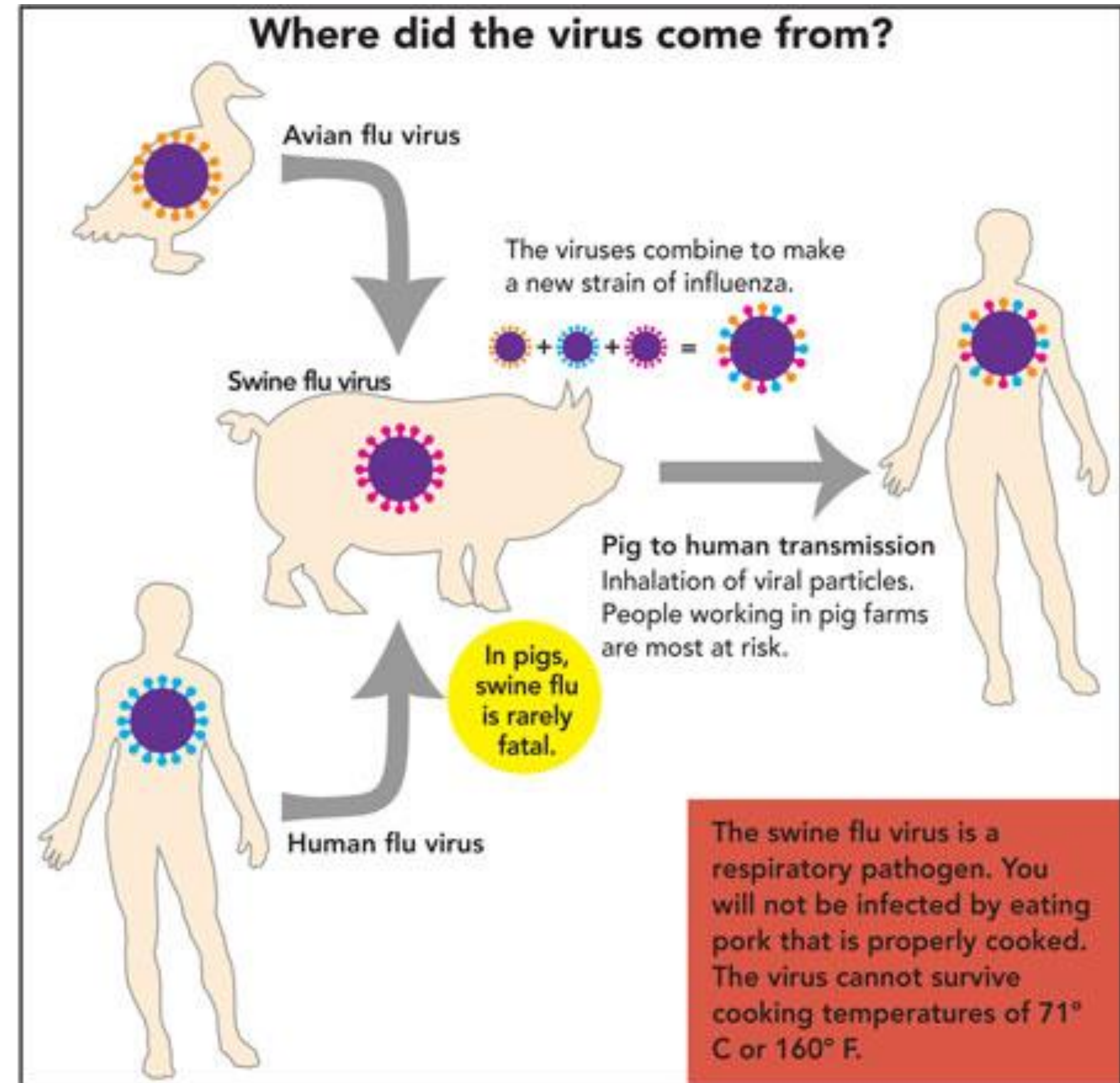
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- Thought that the placenta evolved from an ancient virus

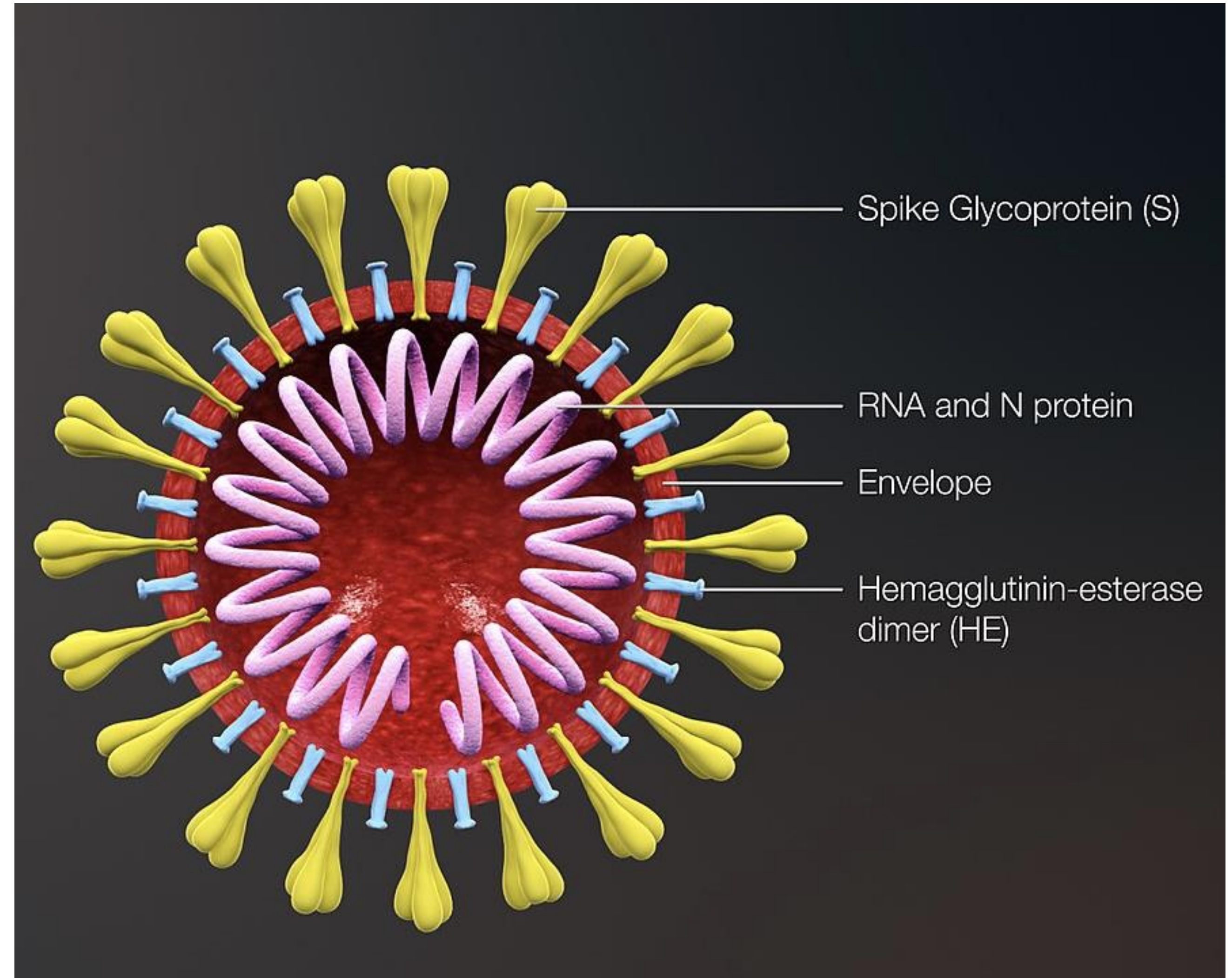
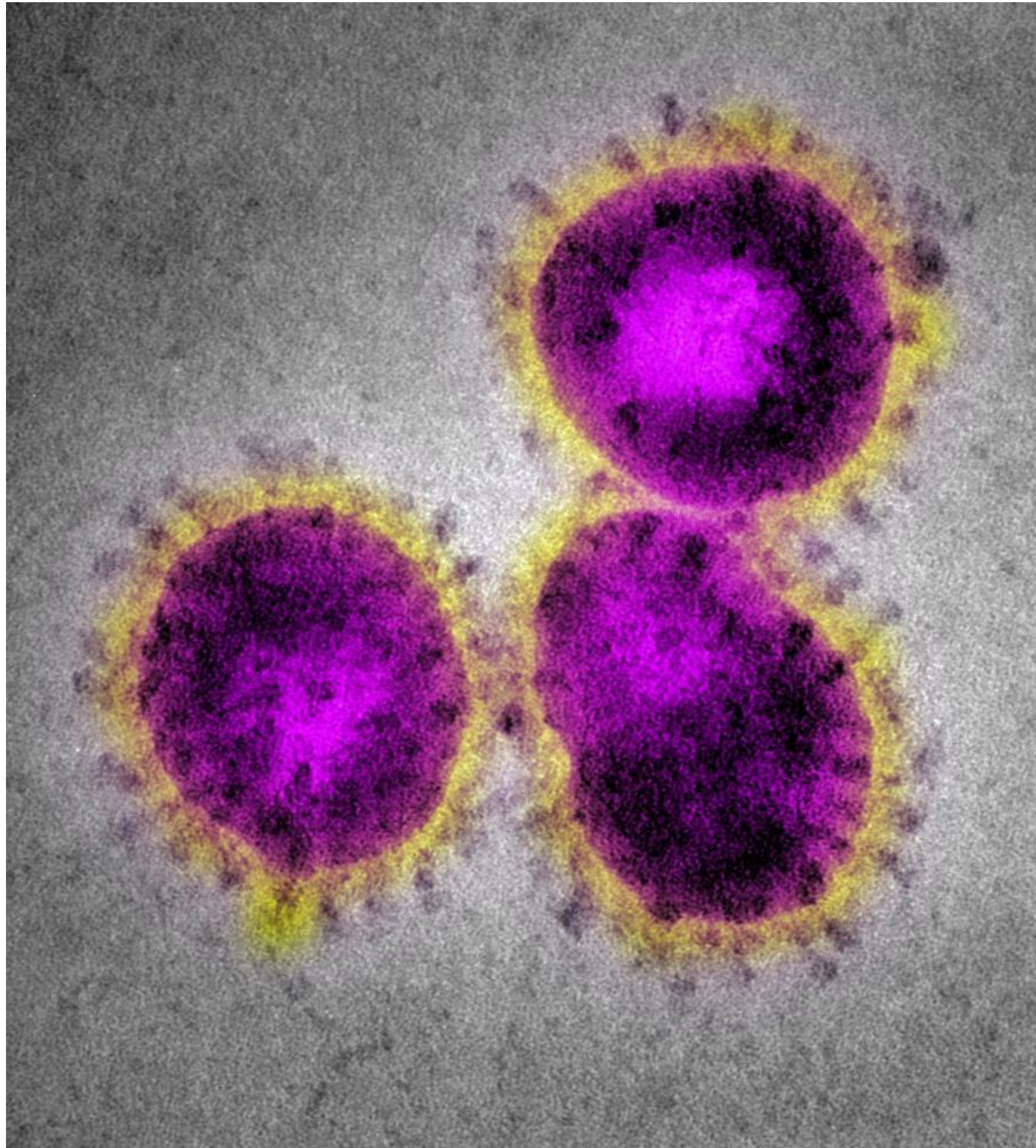
How do humans get new viruses?



How do humans get new viruses?



What are coronaviruses?



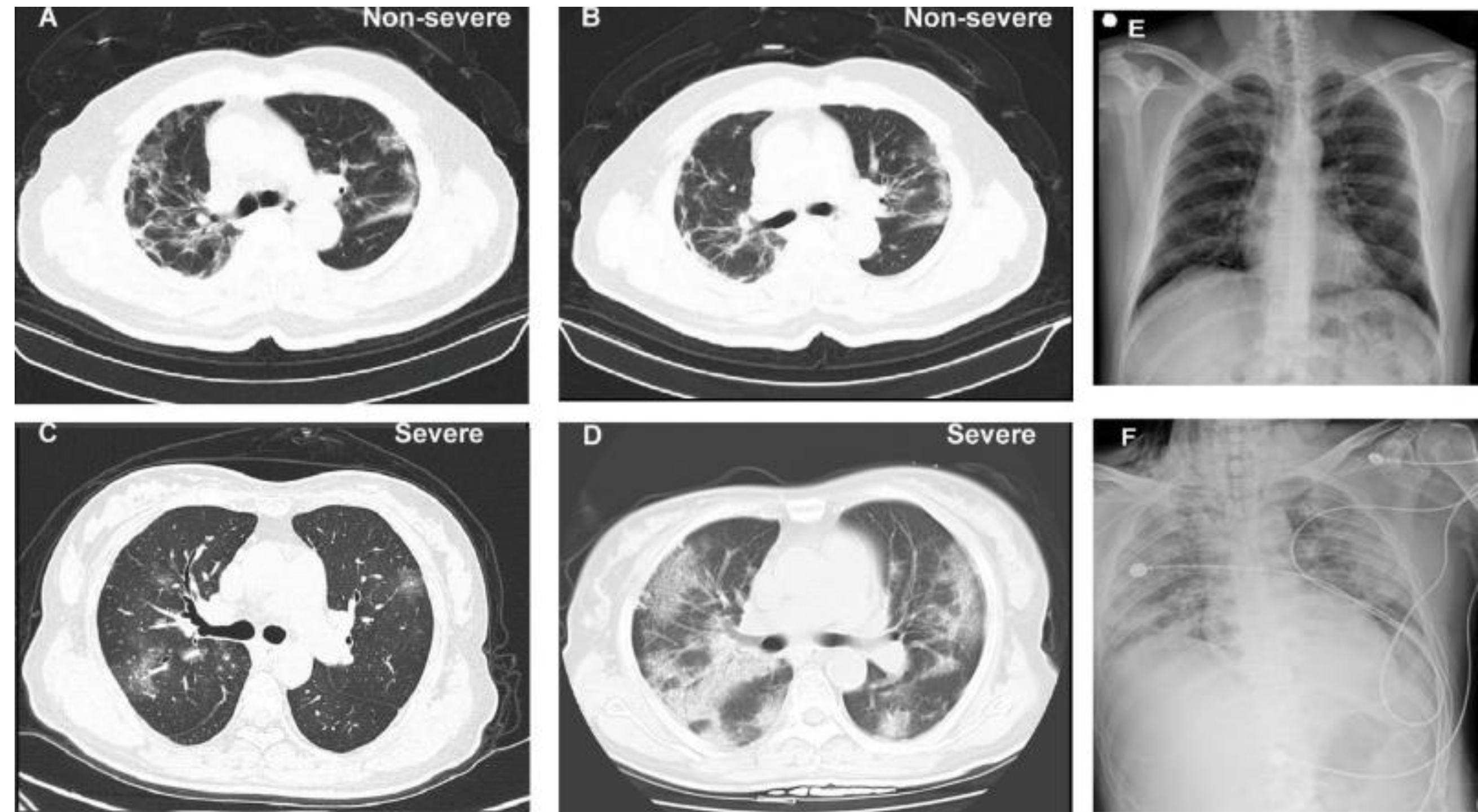
Where did COVID-19 come from?

- Caused by the virus SARS-CoV-2
- First cluster of patients in Wuhan, Hubei Province, China associated with seafood & live animal market
- Bat is likely original reservoir was in a bat, then an intermediate host (possibly Malayan pangolin) before final zoonotic transfer to humans
- Likely emerged late Nov/early Dec 2019



What is the clinical manifestation of disease?

- Common triad: fever + cough + shortness of breath
- Upper respiratory symptoms (headache, sore throat, runny nose) seen in <15% of hospitalized patients
- Gastrointestinal symptoms: diarrhea in <25%, nausea/vomiting in <10% of hospitalized patients
- Progression to pneumonia

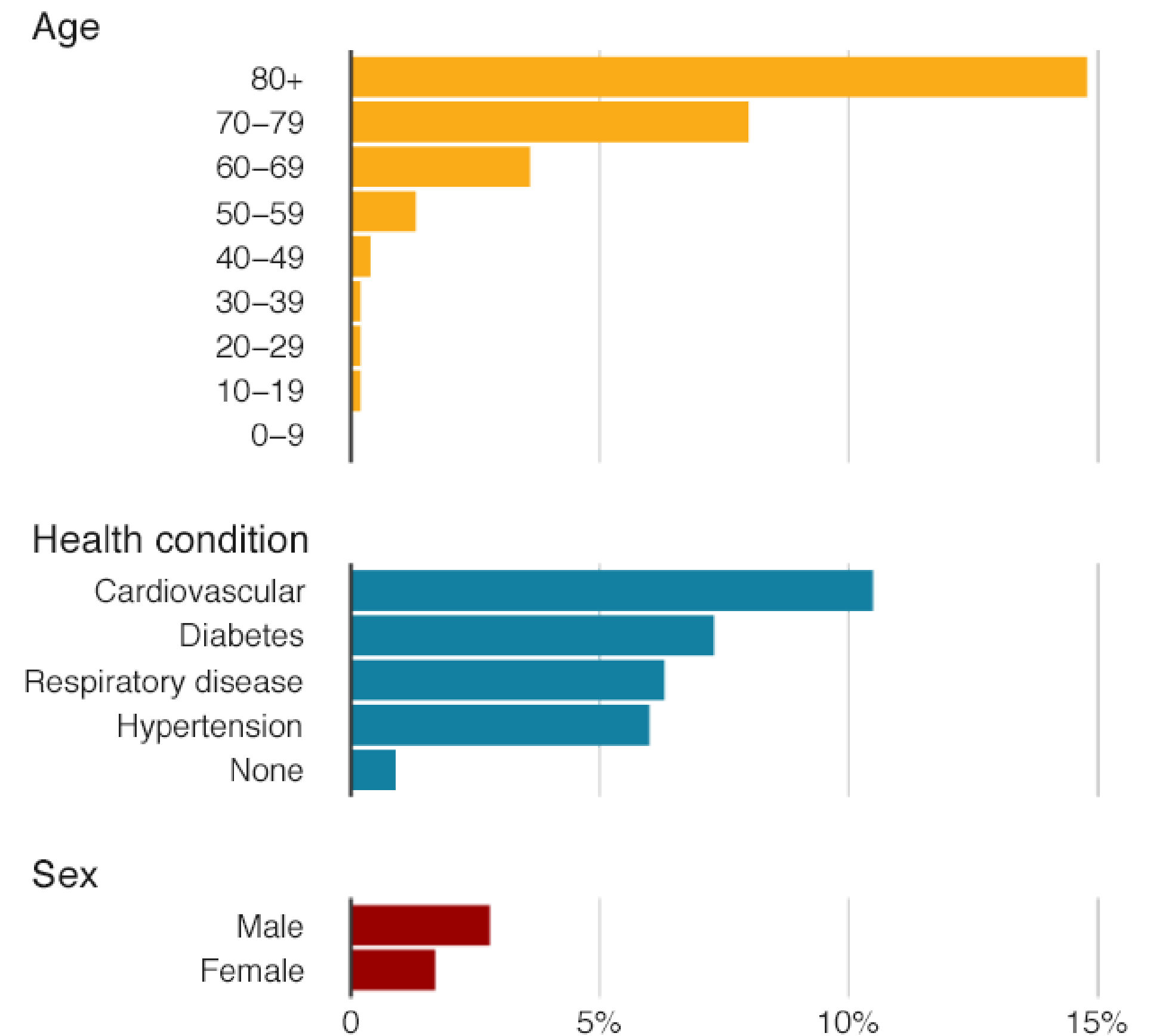


Who is especially susceptible?

- Age 65 or older
 - 8 out of 10 deaths in the US have been in adults > 65 years old
 - 10-27% of adults 85 yo or older died
 - 4-11% of adults 65-84 yo died
- Co-morbidities (diabetes, chronic lung disease, cardiovascular disease)
- In China, odds of progression to severe disease was 14 times higher in smokers
- Immunocompromised (cancer treatment, organ transplant recipient, etc)
- Nursing home environment

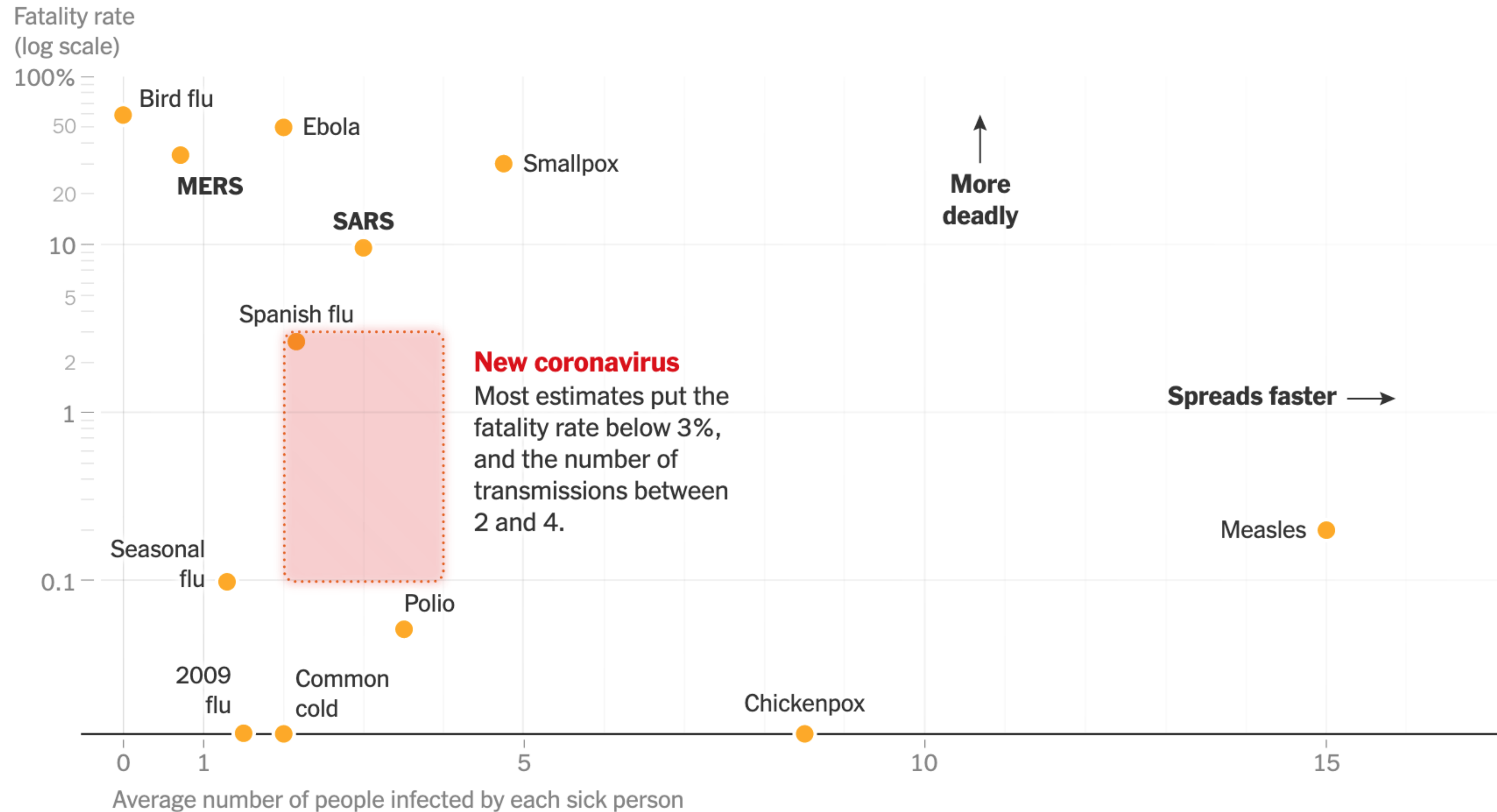
Death rate varies by age, health and sex

Proportion of deaths among confirmed cases

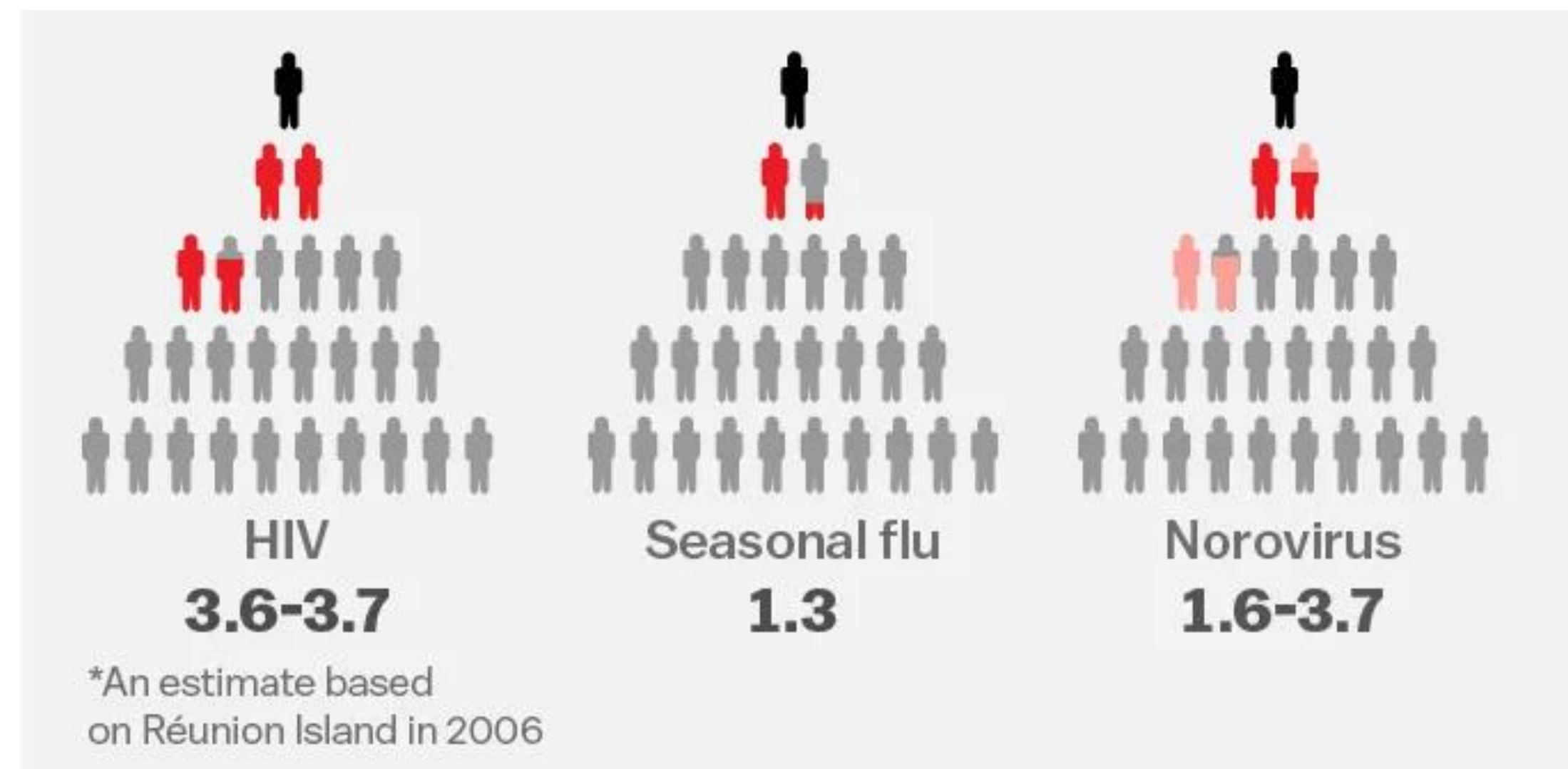
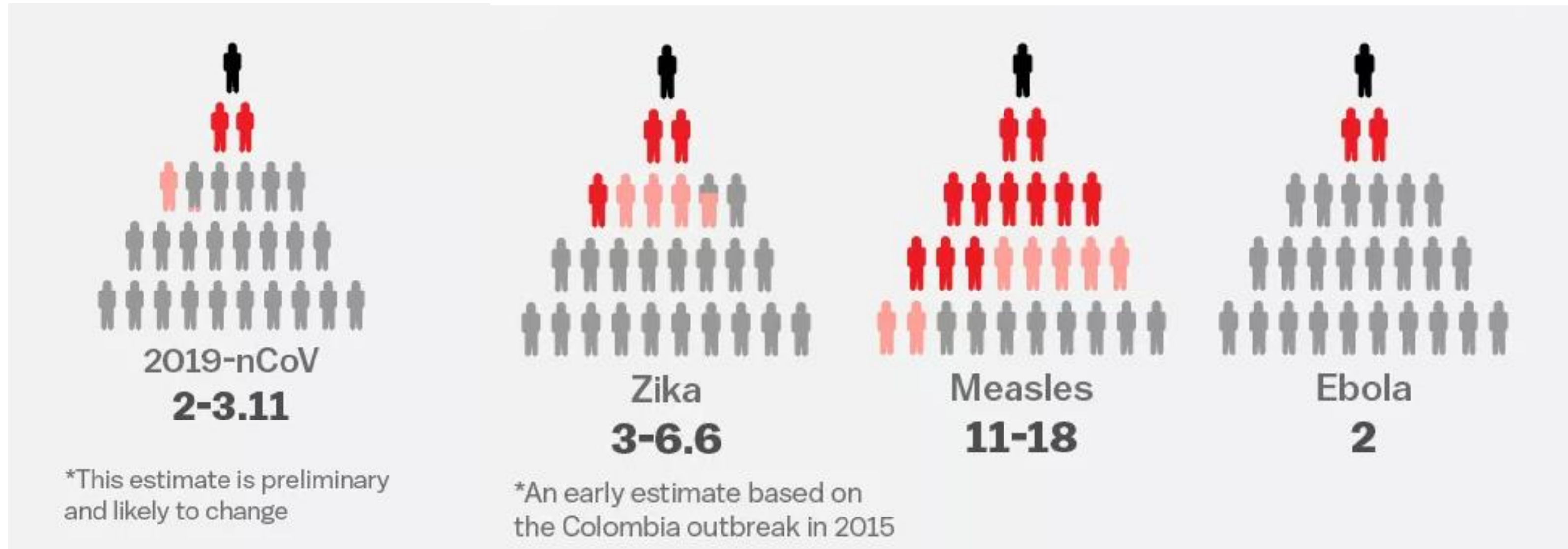


Source: Chinese Centre for Disease Control & Prevention, 18 Feb 2020

Why is this virus so bad?

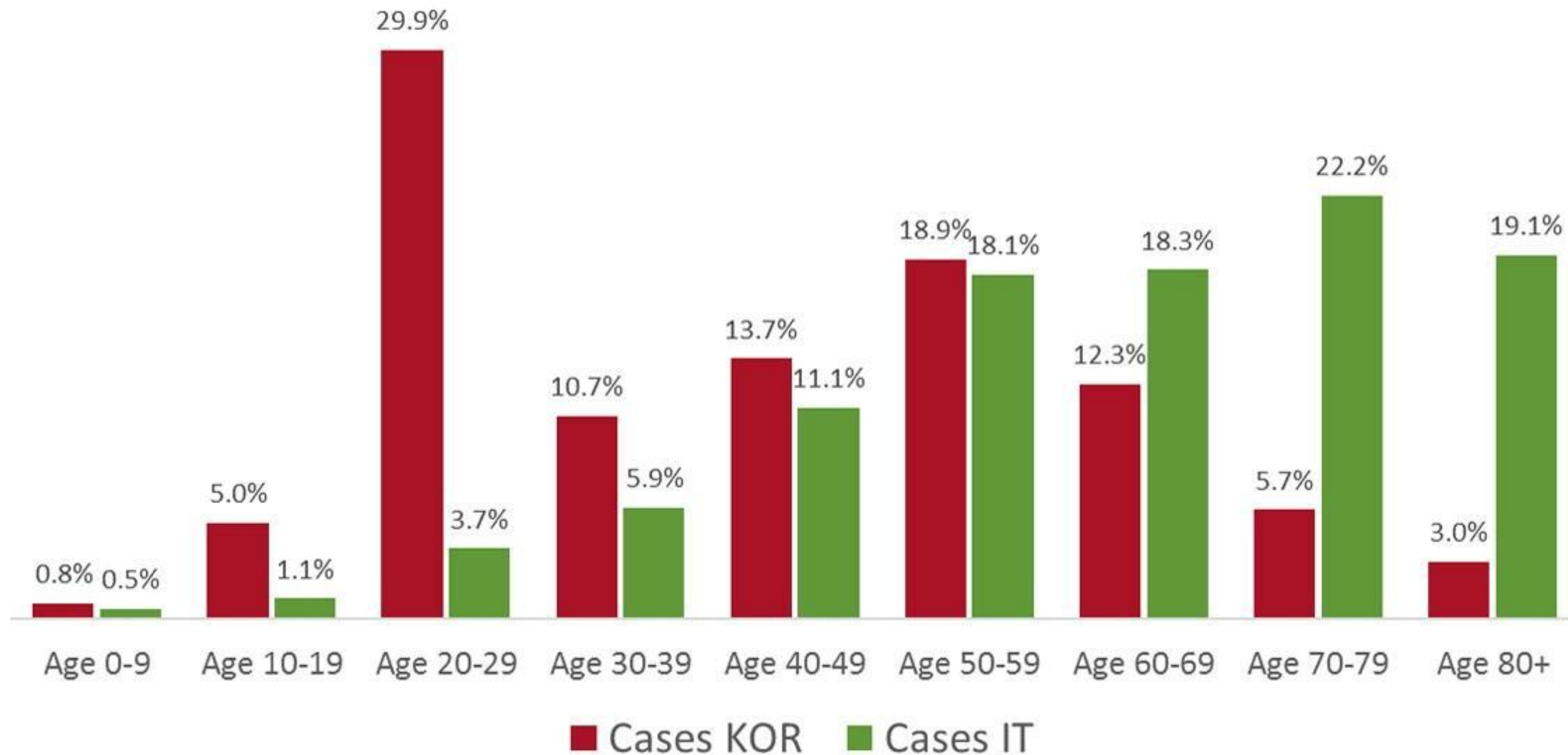


R_0 estimates how many other people one sick person is likely to infect



Why is this virus so bad?

Coronavirus cases (%) in South Korea and Italy by age groups



Why is this virus so bad?

Younger Adults Make Up Big Portion of Coronavirus Hospitalizations in U.S.

New C.D.C. data shows that nearly 40 percent of patients sick enough to be hospitalized were age 20 to 54. But the risk of dying was significantly higher in older people.

How has the US response been?

In a single word: abysmal

How has the US response been?



Testing failures & mismanagement

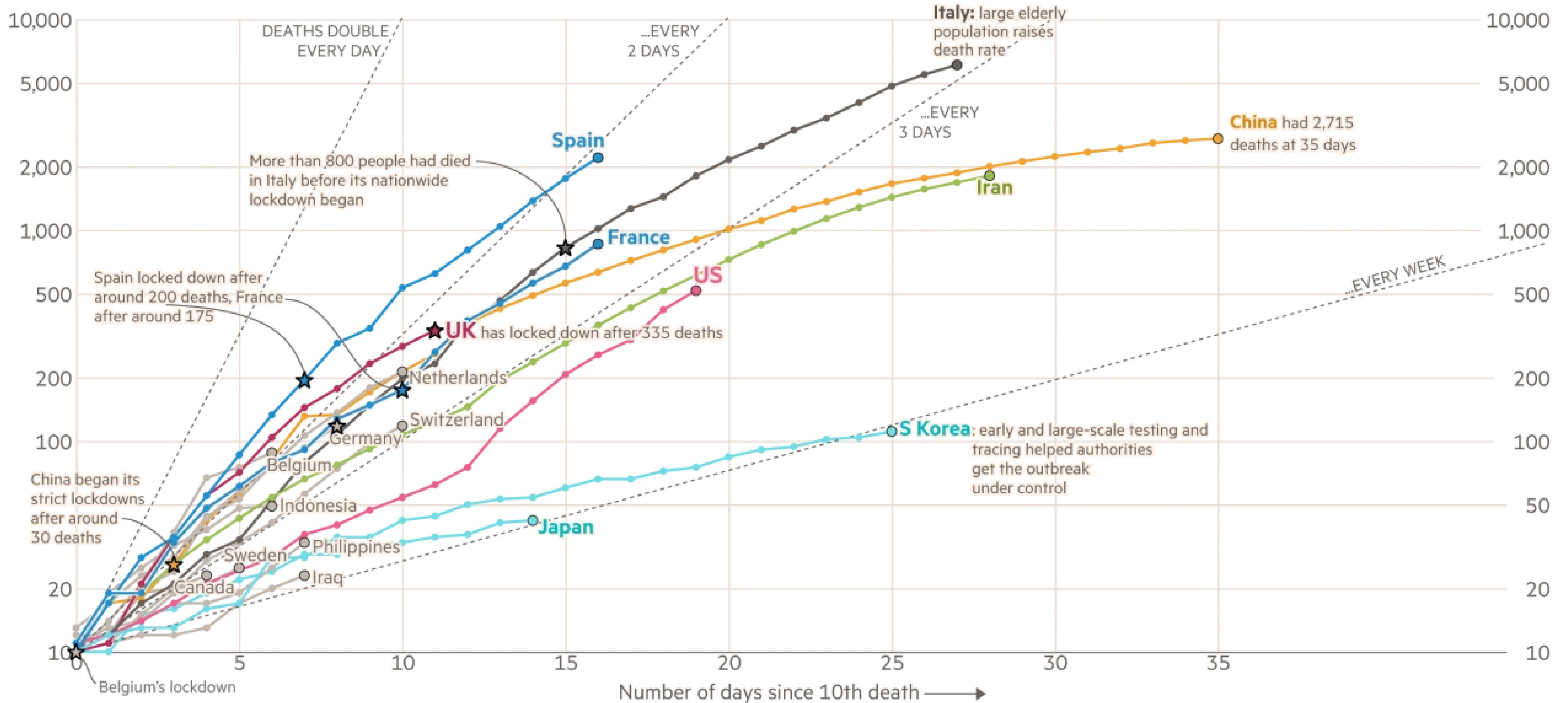


Lack of ICU beds, ventilators, PPE

Italy, Spain and the UK have had more deaths attributed to coronavirus than China did at the same stage

Cumulative number of deaths, by number of days since 10th death

Nationwide lockdowns: ★



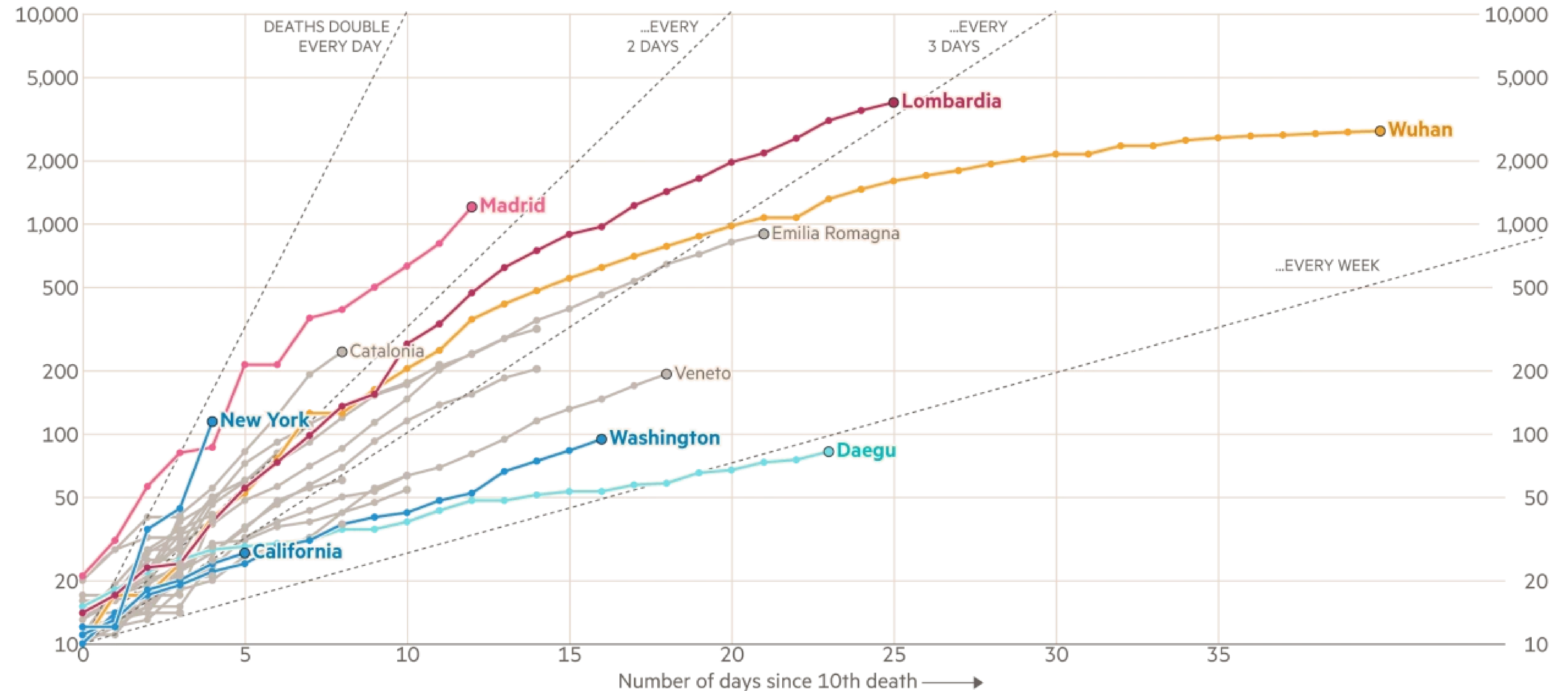
FT graphic: John Burn-Murdoch / @jburnmurdoch

Source: FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated March 23, 21:00 GMT

© FT

Madrid could pass Lombardia as the worst affected subnational region. New York's death toll is also rising fast

Cumulative number of deaths, by number of days since 10th death. Showing selected subnational regions in Italy, Spain, China, S Korea and the US



FT graphic: John Burn-Murdoch / @jburnmurdoch

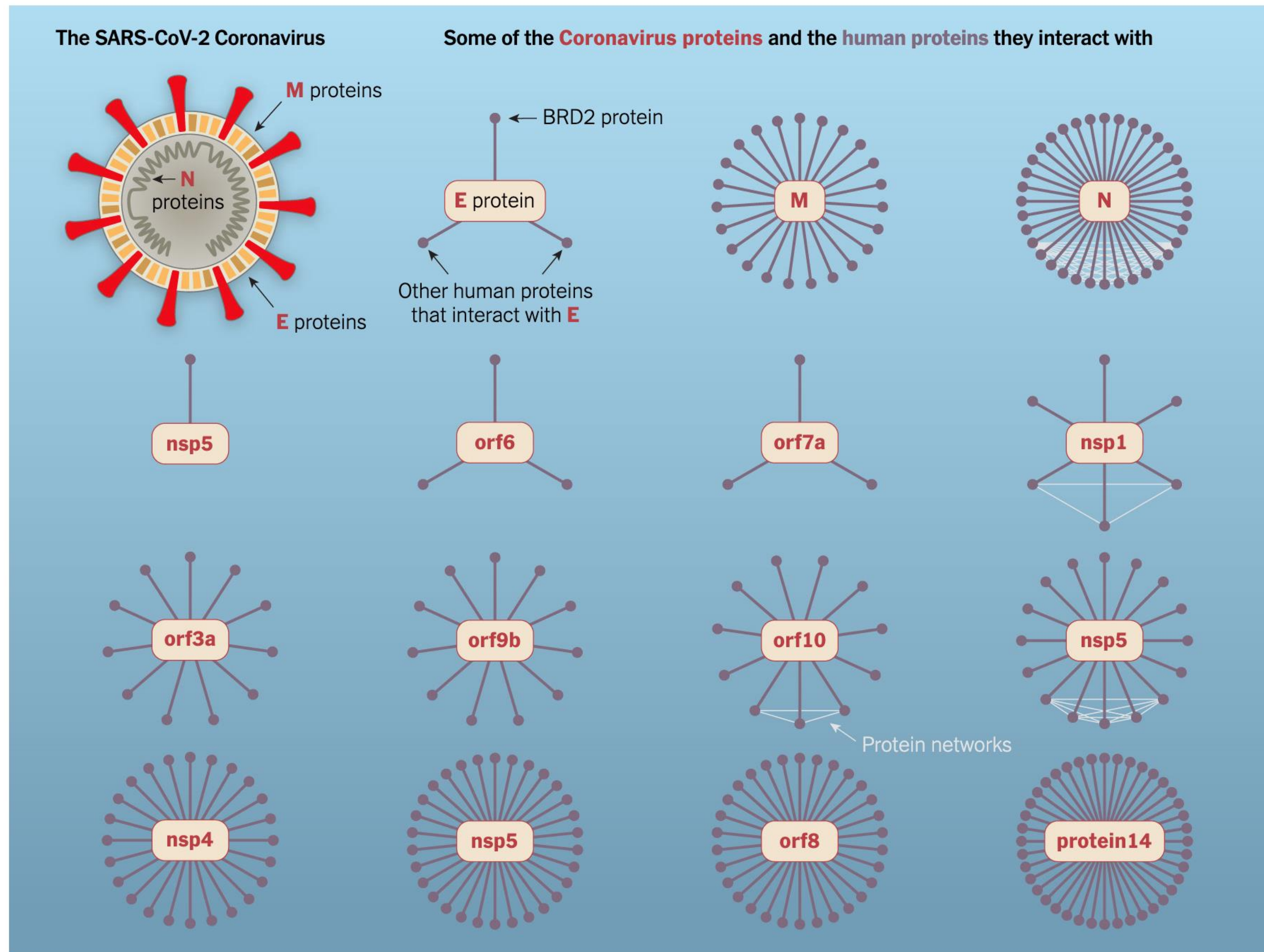
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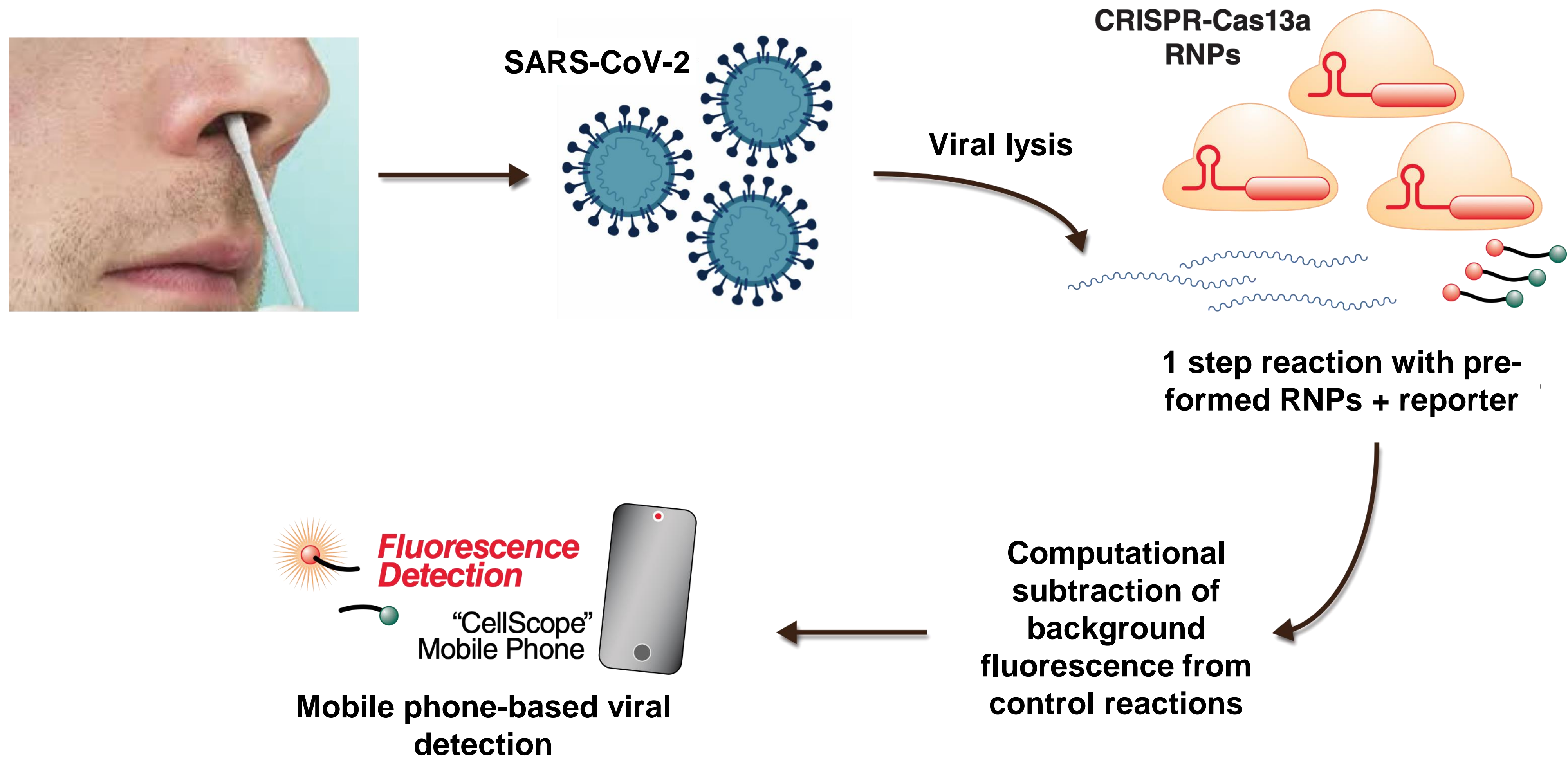
Is there a vaccine or treatment?

- Vaccine: several underway, will take about 12-18 months
- Treatments - potential repurposing of old drugs:
 - **Remdesivir** (Gilead): originally made for Ebola, effective against SARS/MERS in the lab
 - **Chloroquine & hydroxychloroquine**: used for malaria prophylaxis, also for tx of autoimmune diseases
 - **Ritonavir/lopinavir**: HIV drugs, inhibit viral protease
 - **IL-6 inhibitors**: used for rheumatoid arthritis, reduce immune activation/inflammation

What are researchers doing about it?

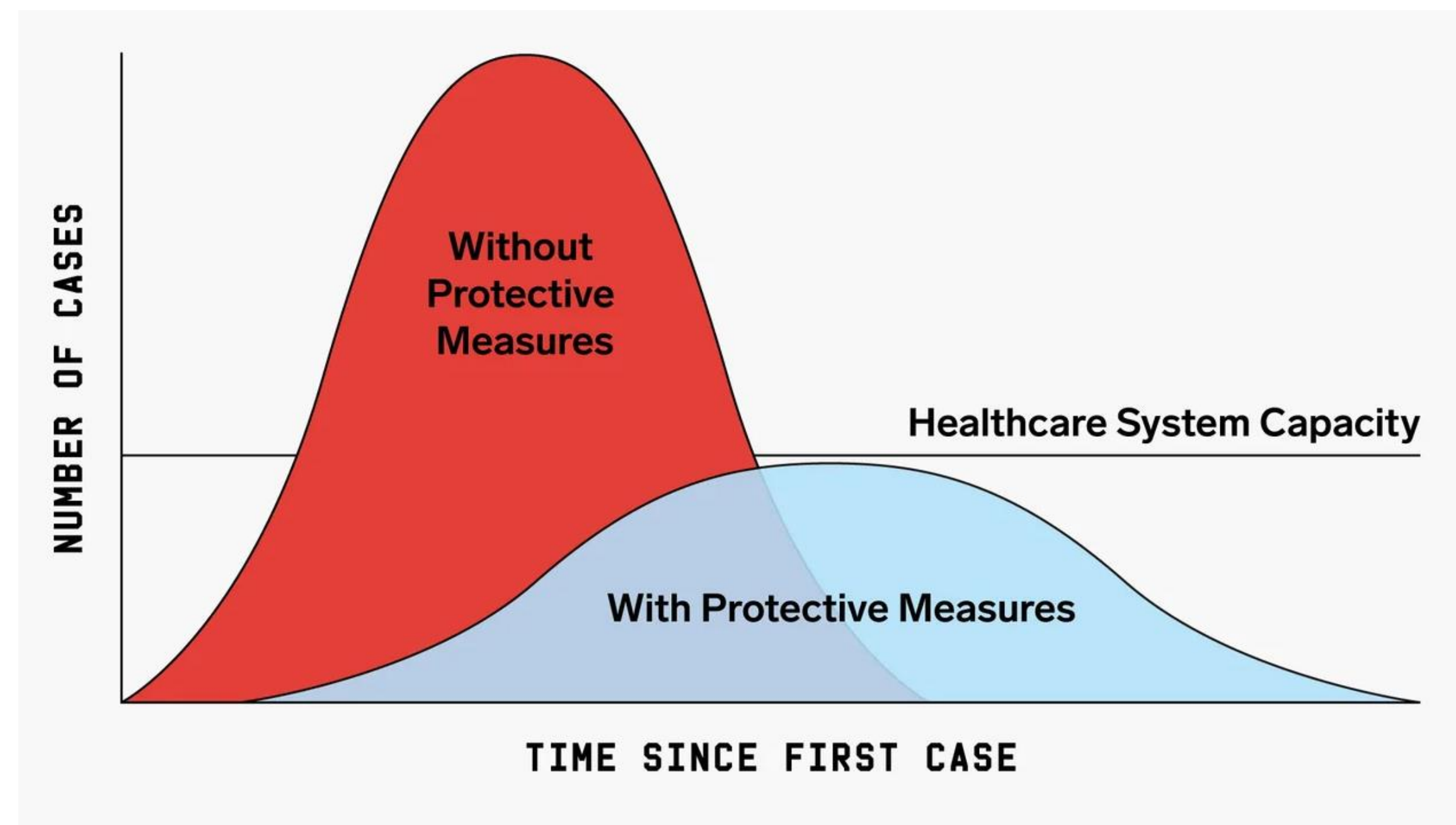


What are researchers doing about it?



What should I do about the coronavirus?

- Social distancing: learn to love it & flatten the curve
- Wash your hands (soap is extremely effective)
- Use common sense measures
- Donate any PPE to frontline health workers who desperately need it (check local hospital)



What about the future of humanity?

2015

A SARS-like cluster of circulating bat coronaviruses shows potential for human emergence

Vineet D Menachery¹, Boyd L Yount Jr¹, Kari Debbink^{1,2}, Sudhakar Agnihothram³, Lisa E Gralinski¹, Jessica A Plante¹, Rachel L Graham¹, Trevor Scobey¹, Xing-Yi Ge⁴, Eric F Donaldson¹, Scott H Randell^{5,6}, Antonio Lanzavecchia⁷, Wayne A Marasco^{8,9}, Zhengli-Li Shi⁴ & Ralph S Baric^{1,2}

2016



SARS-like WIV1-CoV poised for human emergence

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- There is no escaping viruses - they will come with us to planet B
- Climate change + globalization = rise of novel infectious diseases
- Fund basic science/biomedical research in infectious diseases & public health departments
- International cooperation & heeding warnings key

A black and white photograph of a large, circular conference room. In the center, a long, curved table is surrounded by many people, mostly men in suits, seated and facing each other. The room's walls are covered with large-scale world maps. A bright, circular light fixture hangs from the ceiling, illuminating the table. The overall atmosphere is formal and professional.

Questions, please?