



A Primer on COVID-19

The disease

Placing the disease in context

Information backing up present public health measures

Practical tips on staying safe

And much more

To be updated periodically

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COVID-19

- Coronaviruses cause diseases in mammals and birds. Some cross species to humans causing zoonotic illness.
- In humans they cause respiratory disease. About a quarter of common colds are caused by Coronaviruses. More serious coronavirus diseases include SARS and MERS.

Why are novel coronaviruses so dangerous?

- Our bodies form antibodies to foreign invaders, such as bacteria or viruses.
- If we have antibodies from a previous exposure, then we can rapidly ramp up the production of those antibodies if we are infected by that same virus at a later date.
- COVID-19 is a severe respiratory illness caused by the virus named SARS-CoV2.* It is a novel virus, which means that no one in the world has antibodies to it because no one has ever been infected by it before.

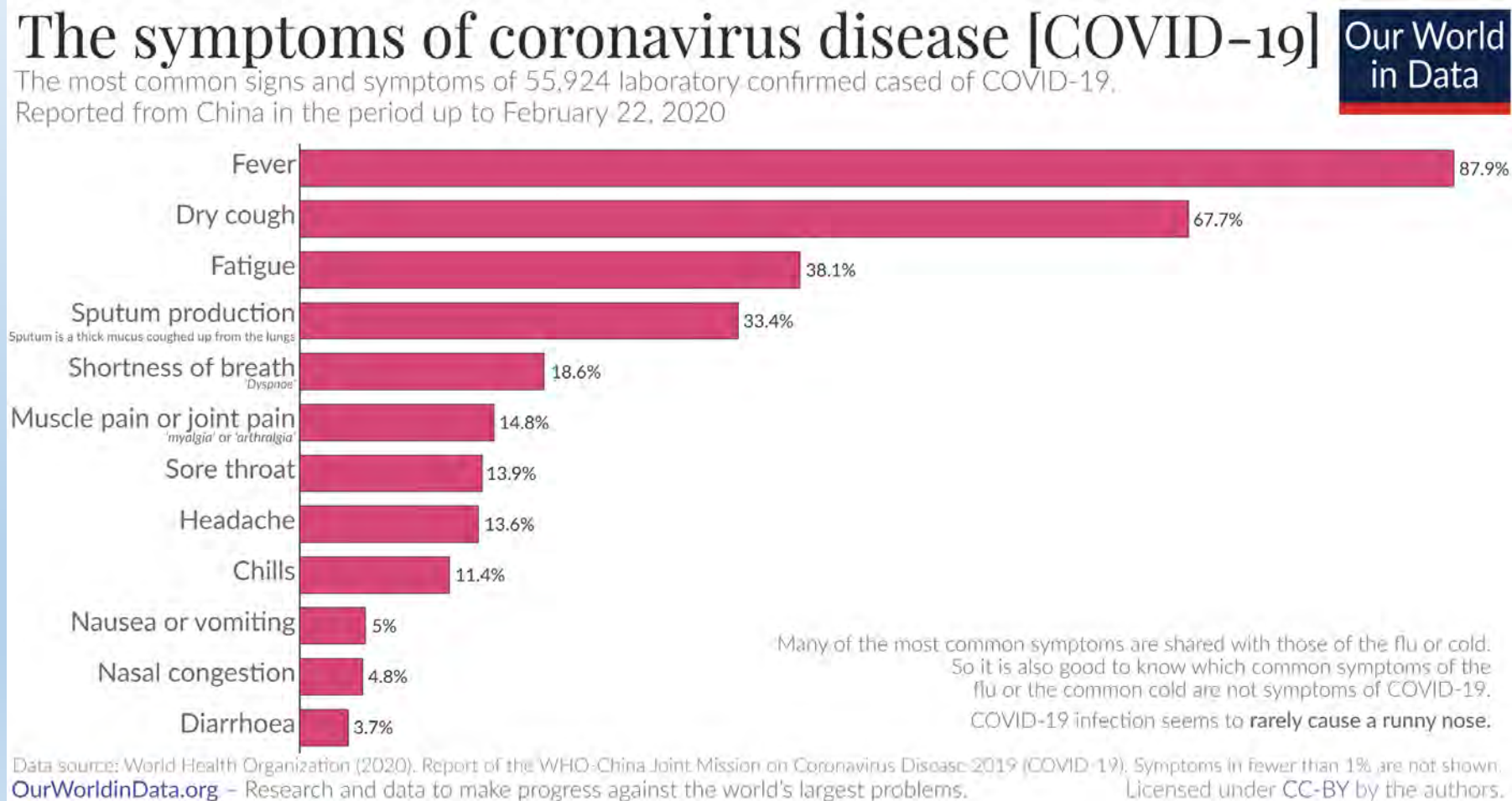


Facts about Covid-19









What we know at the moment








Subject to updates as the science progresses

Symptoms vary and mimic other common diseases until severe: Here is what we know from early studies in China



COVID-19 vs. Flu vs. Cold

	COVID-19	Flu	Cold
 Incubation period	1–14 days	1–4 days	1–3 days
 Symptom onset	Gradual	Abrupt	Gradual
 Fever	Common	Common	Rare
 Cough	Common	Common	Mild to moderate
 Fatigue	Common	Common	Sometimes
 Runny nose	Sometimes	Sometimes	Common
 Nasal congestion	Sometimes	Sometimes	Common
 Diarrhea	Sometimes	Sometimes	Rare

 Nasal congestion	Sometimes	Sometimes	Common
 Diarrhea	Sometimes	Sometimes	Rare
 Body aches	Sometimes	Common	Slight
 Sore throat	Sometimes	Sometimes	Common
 Headache	Sometimes	Common	Rare
 Loss of appetite	Sometimes	Common	Sometimes
 Shortness of breath	Common	Sometimes	Mild
 Respiratory issues	Common	Sometimes	Sometimes

What are the symptoms and how does it affect my body?

This video provides a thorough overview of mild-moderate-severe symptoms, and what is happening to the body during this time:

<https://www.businessinsider.com/novel-coronavirus-covid-19-symptoms-day-by-day-2020-3> (covers severity and day to day progression)

- More information on the difference between severity of illness and effects of infection on the body can be found here:
 - Mild-moderate-severe symptoms:
https://www.npr.org/sections/goatsandsoda/2020/03/13/814691018/coronavirus-symptoms-defining-mild-moderate-and-severe?utm_medium=RSS&utm_campaign=news&fbclid=IwAR3uavrr8jpgdqpfOS2IhzENR21OZeA073Lwn2jElv3ACB5ZpV8XZuoWFvc
 - Here's what coronavirus does to the body:
[nationalgeographic.com/science/2020/02/here-is-what-coronavirus-does-to-the-body](https://www.nationalgeographic.com/science/2020/02/here-is-what-coronavirus-does-to-the-body)
CDC: <https://www.youtube.com/watch?v=I-Yd-XIWJg&feature=share&fbclid=IwAR1g8OJPSInsSmPGdzAe6G8CIRJjtLQgUcVujJZkzbdFPE8PQ9502QTtRo4> (good knowledge and recommended practice summary)****



Signs of illness may precede actual symptoms

Pay attention to your senses

- Sudden loss of smell and taste have been documented in approximately 30% of confirmed cases before notable symptoms occurred
- Reported in South Korea, China, and Italy as well as UK and France
- Self isolate as soon as you notice this whether you have other symptoms or not
- Younger patients in particular may demonstrate only a loss of smell or taste, without demonstrating the more commonly recognized coronavirus symptoms of high fever and persistent coughs

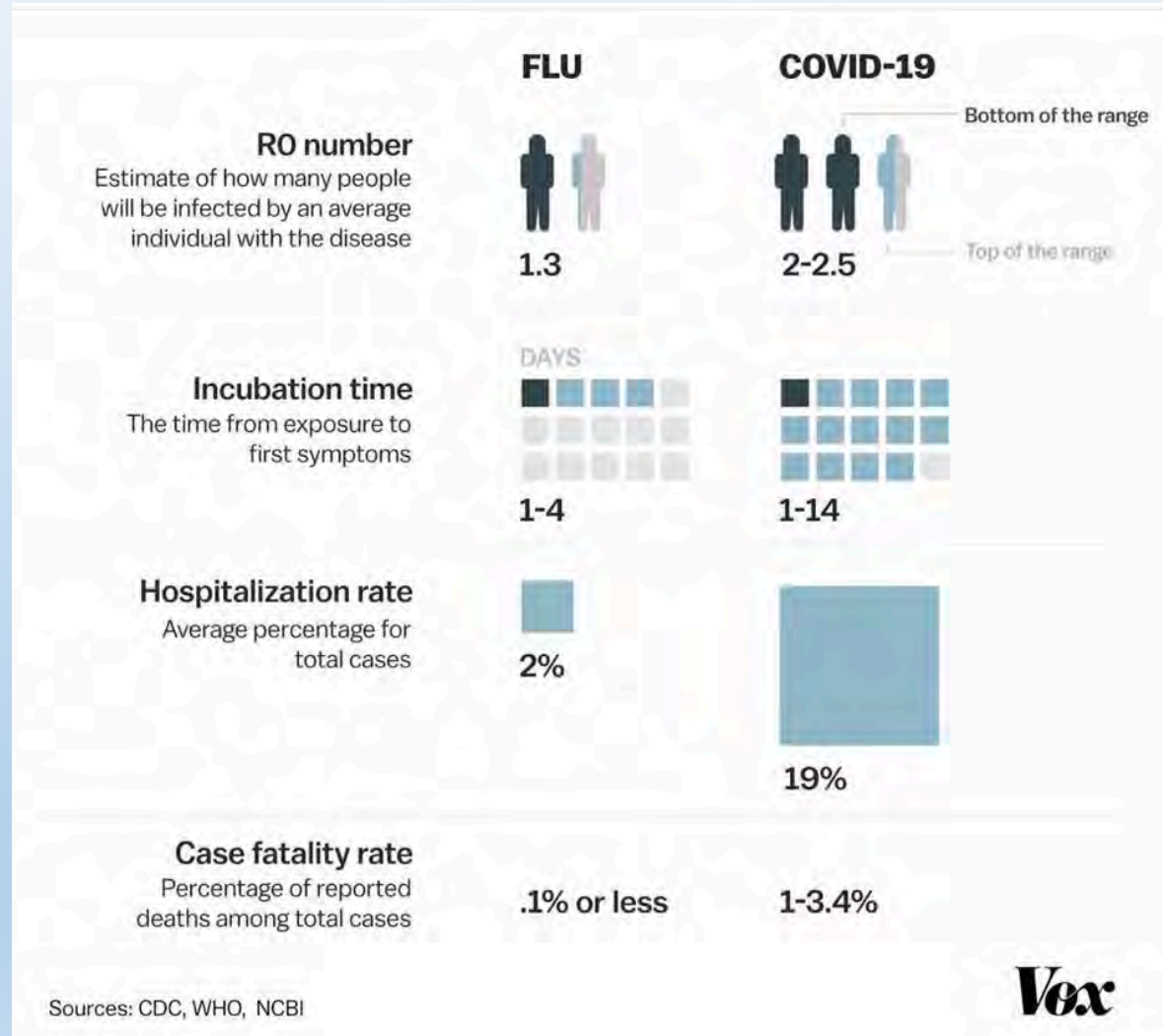
How does Covid-19 compare to seasonal flu

And other epidemics and pandemics

How serious is COVID-19 compared to the “flu”

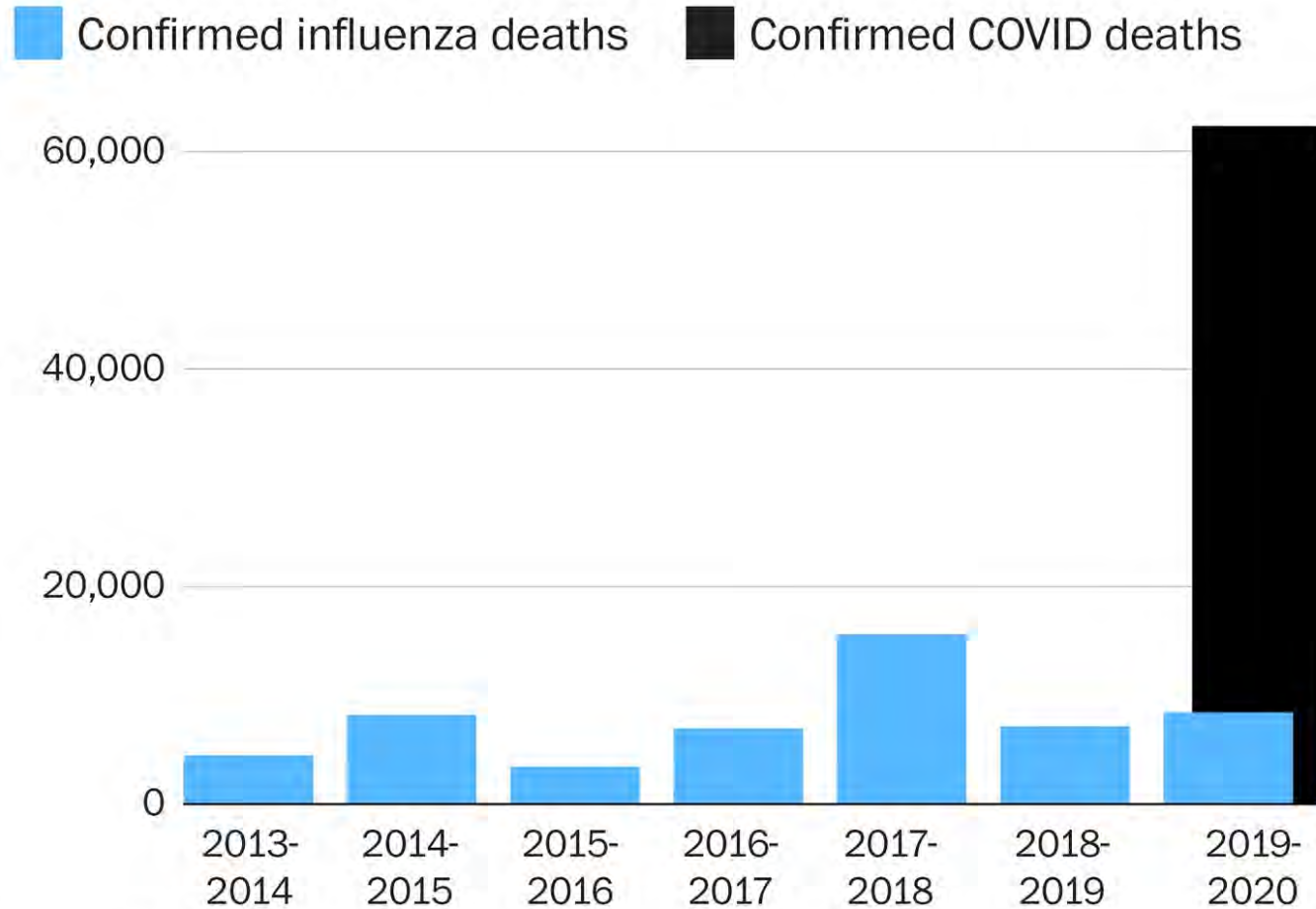
While COVID-19 has many of the same symptoms as the flu, there are some very important differences that make our current COVID-19 pandemic more serious.

Each person with COVID-19 infects 2-3 people on average, and the number of days that a person is contagious before feeling sick is much greater in COVID-19 compared to the flu.



<https://www.vox.com/science-and-health/2020/3/13/21176735/covid-19-coronavirus-worse-than-flu-comparison>

Flu vs. COVID mortality

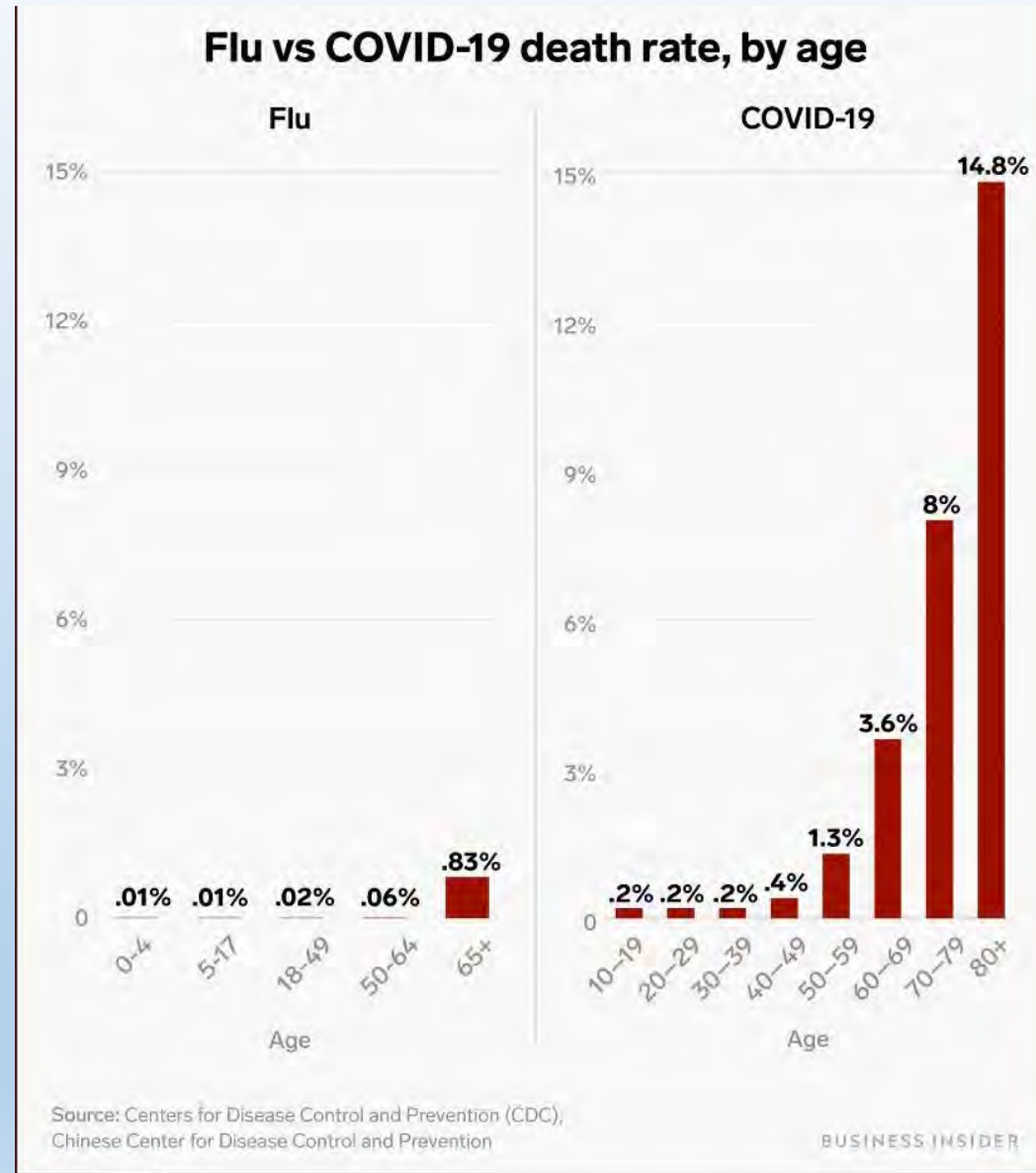


Source: CDC FluView, Washington Post COVID tracking

THE WASHINGTON POST

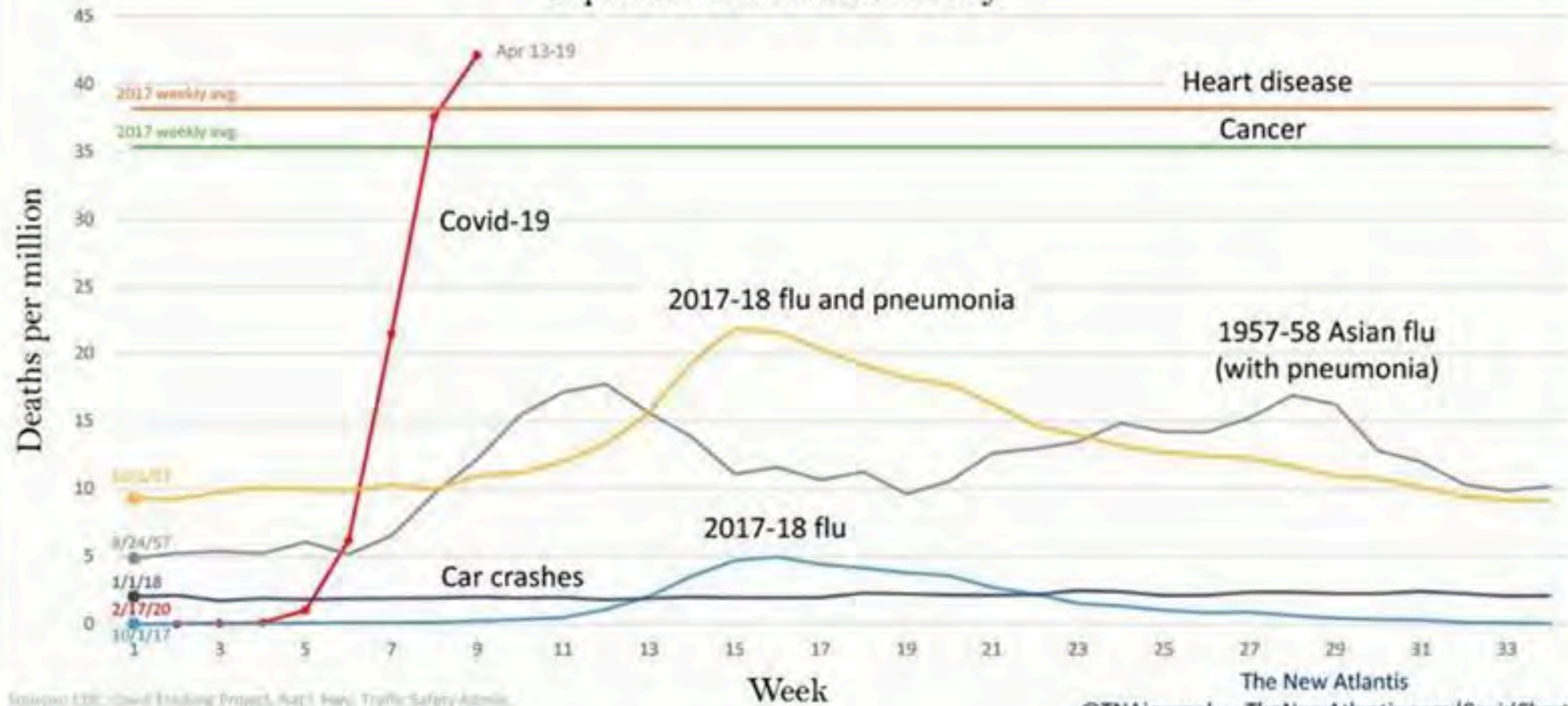


Any suggestion of COVID-19 being just like influenza is false. For those aged 20–29 years, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years.



COVID-19 infections are 10 times greater than that of the “flu” even in the least effected group of individuals > 10 and < 40

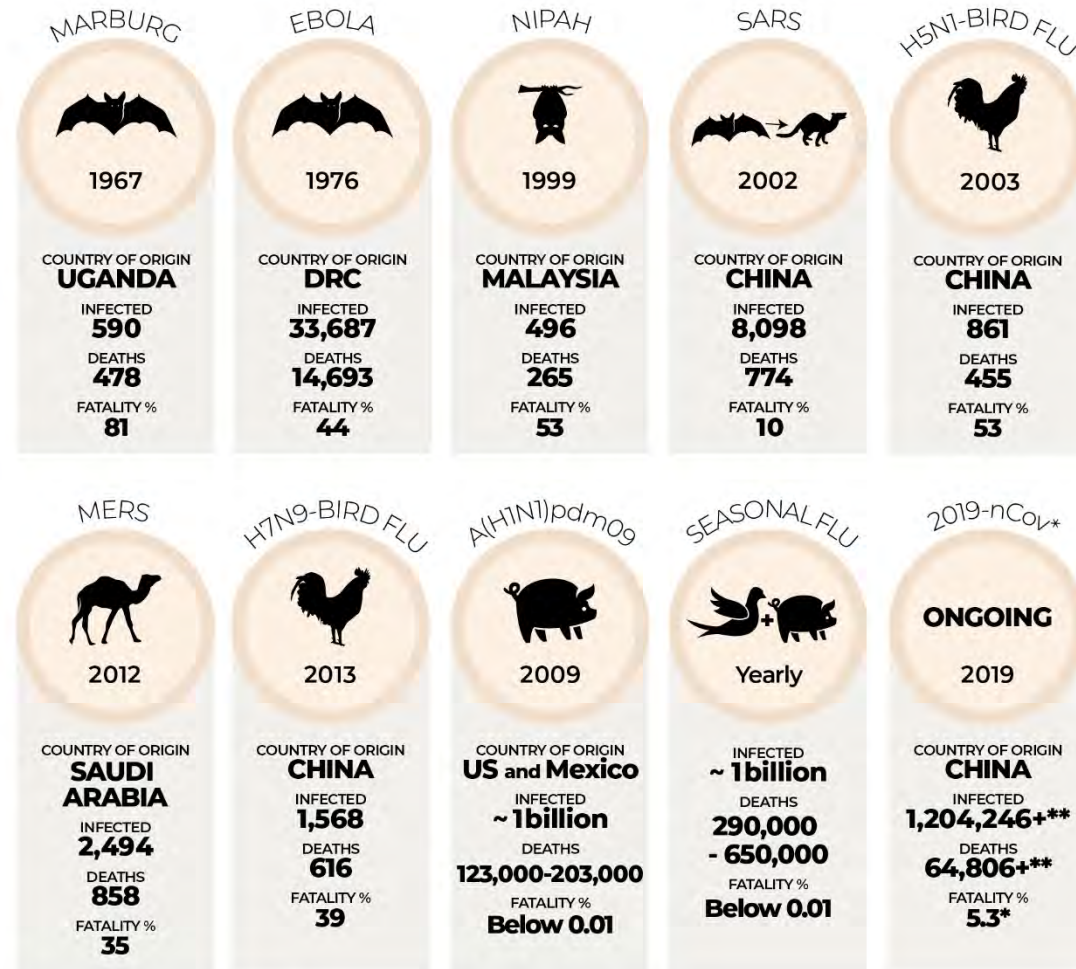
United States reported new deaths weekly



How does COVID-19 compare to other Epidemics

GLOBAL OUTBREAKS

Worst epidemics in recent history



*Origins yet to be determined

**Approximate figures as of April 5, 2020



Source: WHO | JOHNS HOPKINS UNIVERSITY | Last updated: 11:30 GMT, April 5, 2020

Covid-19

Severity and mortality

Severity : distribution

COVID-19 #Coronavirus Data Pack

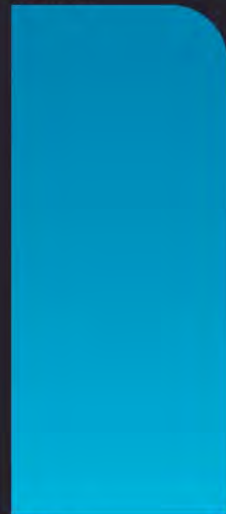
informationisbeautiful

updated
11th Mar 2020

The Majority of Infections are Mild

Seriousness of symptoms

80.9%



MILD
Like flu, stay at home

13.8%



SEVERE
Hospitalization

4.7%



CRITICAL
Intensive care

study of 44,672 confirmed cases in Mainland China
sources: China Centre for Disease Control & Prevention, Statista

The Bulk of People Recover

Of total worldwide confirmed cases...

Currently ill



40%

Recovered



56.6%



3.5%

source: Johns Hopkins University

Who is affected most severely?

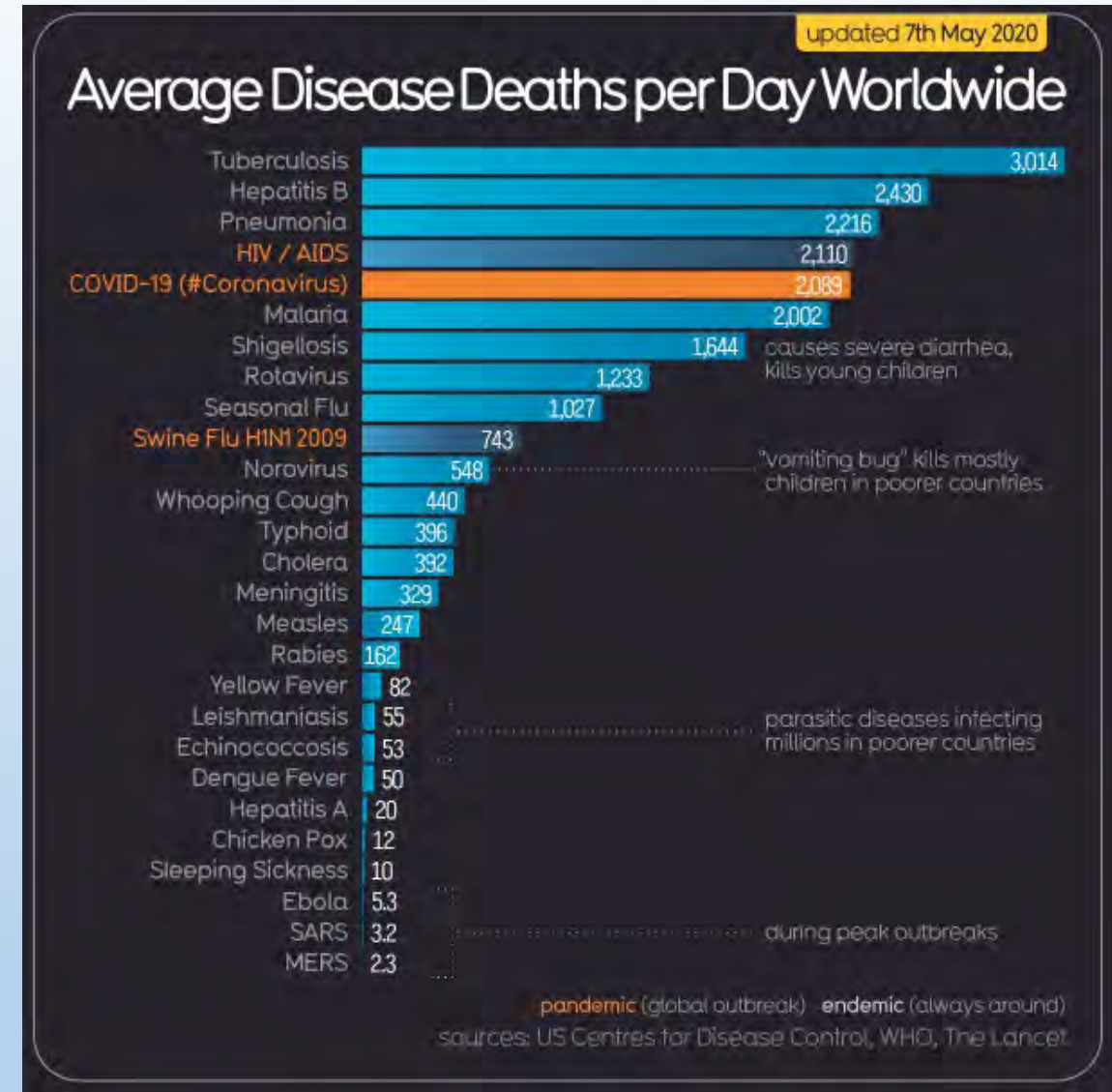
Mortality data

- Those > 65
- Those with chronic illness like heart disease, diabetes, lung disease
- Smokers

Even though the fatality rate is low for younger people, any suggestion of COVID-19 being just like influenza is false.

Even for those aged 20–29 years, once infected with SARS-CoV-2, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years.

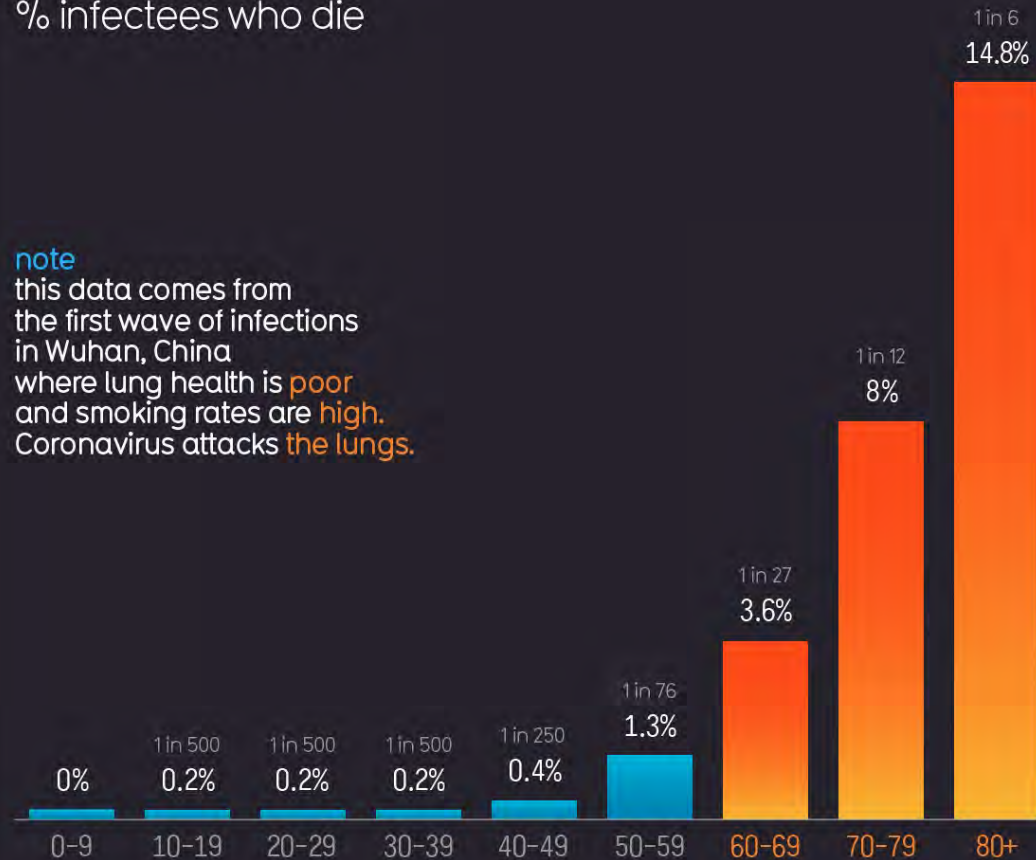
COVID-19 infections are 10x greater than that of the “flu” even in the least affected group of individuals > 10 and < 40



Those Aged 60+ are Most At Risk

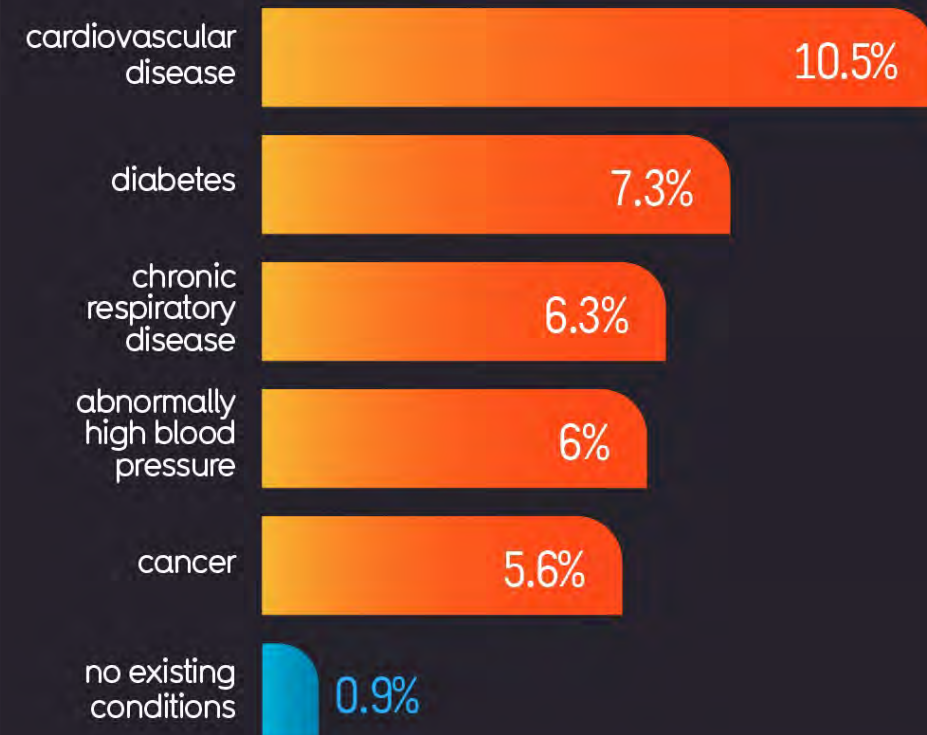
% infectees who die

note
this data comes from
the first wave of infections
in Wuhan, China
where lung health is **poor**
and smoking rates are **high**.
Coronavirus attacks **the lungs**.



Especially Those with Existing Conditions

% with other **serious ailments** who die





Demographics in part explains some of the differences in mortality due to COVID-19

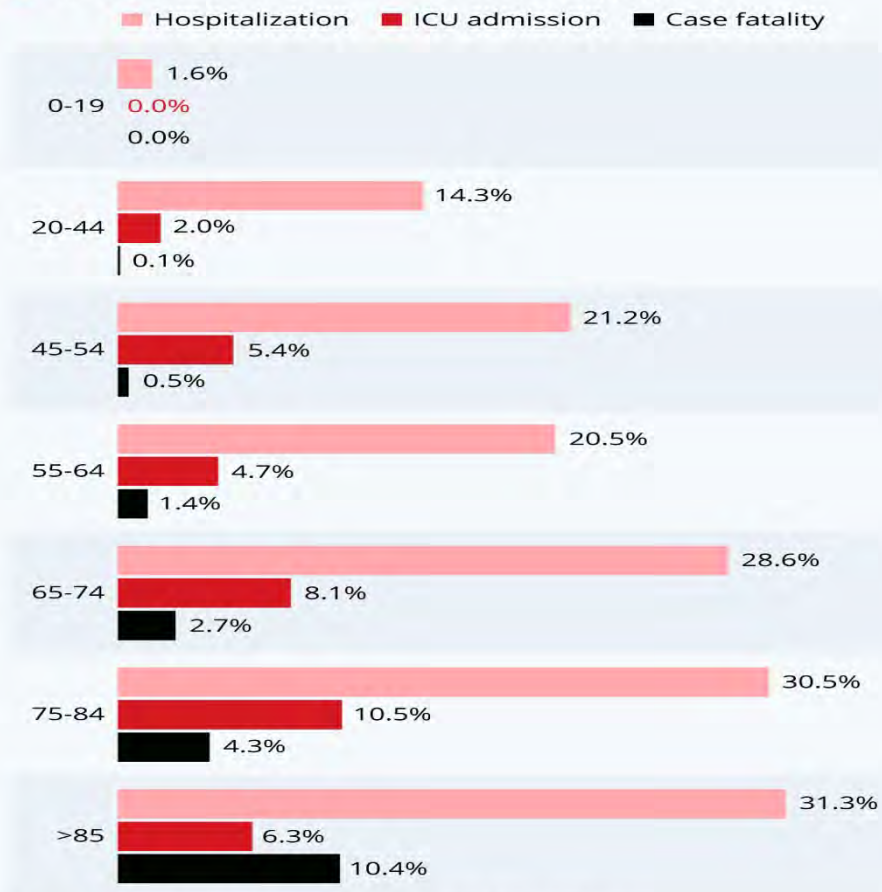
Demography is one factor that explains huge differences in mortality in Italy and S. Korea

- The population of Italy differs from much of the world. According to [a UN report](#) in 2015, 28.6% of the Italian population was 60 years old or older. By comparison, in South Korea, 18.5% of the population is at least 60 years of age, ranking 53rd globally.
 - In Italy, 90% of the more than 1,000 deaths occurred in those 70 or older.
 - By contrast, the outbreak in South Korea has occurred among [much younger people](#). There, only 20% of cases have been diagnosed in those 60 years old and up. The largest affected group is those in their 20s, who account for almost 30% of all cases.
 - **Other factors must also be taken into account as well.**
 - For example, testing policy, contact tracing, and quarantine. In South Korea, the rate of testing was [quite high](#) (3,692 tests per million people as of March 8) compared to Italy (826 people per million).
- Note: Both countries have excellent health care systems



How COVID-19 Affects Different U.S. Age Groups

Hospitalization, ICU admission and fatality rates for reported U.S. COVID-19 cases by age group*



* Based on 2,449 COVID-19 patients with a known age.
(February 12–March 16, 2020).

Source: Centers for Disease Control and Prevention



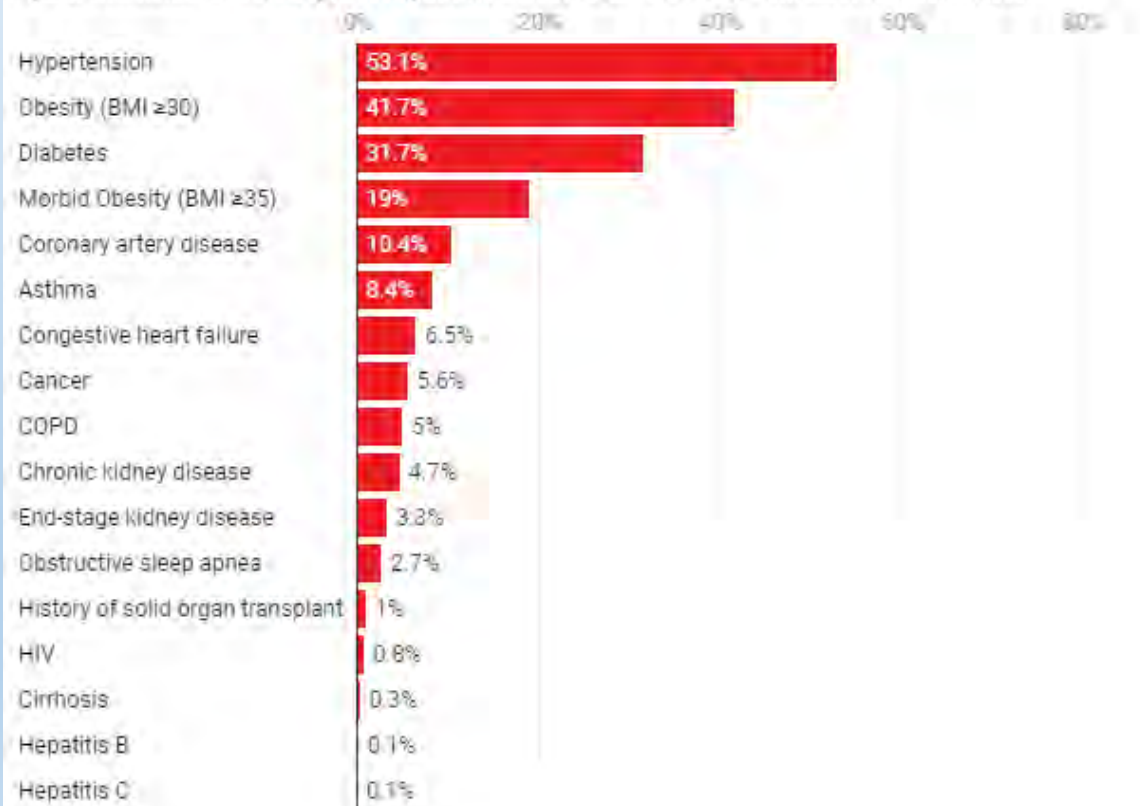
The most common health problems among hospitalized COVID-19 patients

Based on a study of 5,700 patients in the New York City Area

Of all hospitalized patients, 88% had more than one comorbidity:



Specific comorbidities of hospitalized patients with available EHR data, from most common to least:



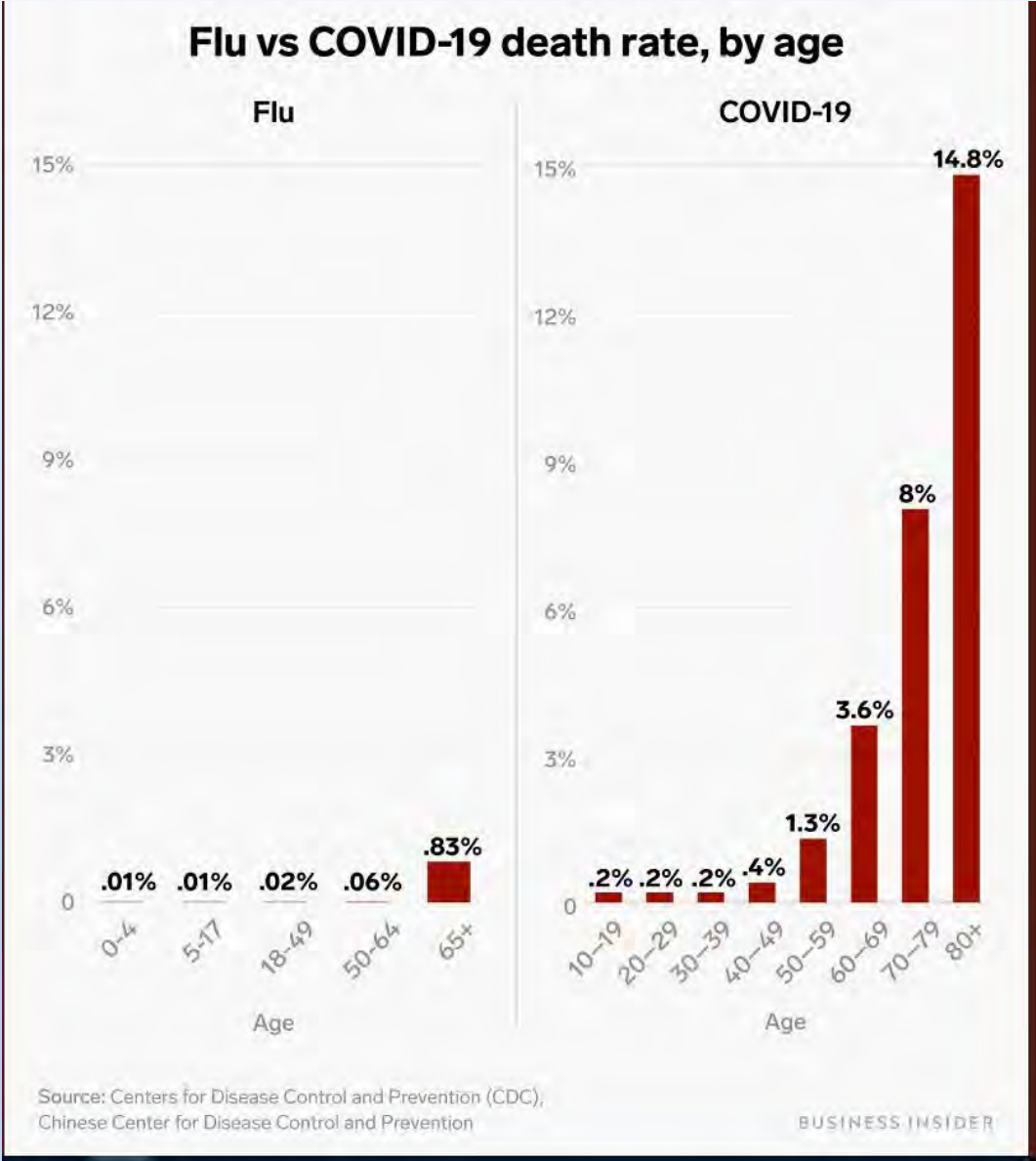


What about those aged 20-64 experiencing COVID-19

- 20% of COVID-19 deaths in the USA (first 4000 cases) as of March 16 were aged 20-64 years
- **As of April 11th, 23.3% of those hospitalized were aged 18-49 years.**
- Compared with the under-18 year old group, patients aged 18-64 years appear to be at higher risk for hospitalization and ICU admission



Any suggestion of COVID-19 being just like influenza is false. For those aged 20–29 years, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years.



COVID-19 infections are 10 times greater than that of the “flu” even in the least effected group of individuals > 10 and < 40



Children do not seem to be dying, but can they get very sick?

- Children are just as likely as adults to get infected*
- In general, children experiencing all coronaviruses do not become as ill as adults
 - During the previous outbreaks of Severe Acute Respiratory Syndrome (SARS) in HK and Middle East Respiratory Syndrome (MERS) in South Korea, very few pediatric patients were reported. Despite a high mortality rate of SARS and MERS in the adults, there were no fatalities in the pediatric patients. Children appeared to have a milder form of the disease caused by the coronaviruses, including Covid-19 (SARS-CoV-2).^{**}
- There is a range of severity and symptoms of COVID-19 in children^{***}
 - Infected children may be asymptomatic or have fever, dry cough and fatigue; some patients experience gastrointestinal symptoms, including abdominal discomfort, nausea, vomiting, abdominal pain and diarrhea. Most infected children have mild clinical manifestations and usually have a good prognosis. Usually they recover within 1–2 weeks after the onset of the disease.
- The idea that this is no big thing for youth is misguided – children can still experience pneumonia and be sick for a few weeks.



Younger adults and stroke

- There have been reports of adults experiencing strokes while sick with COVID-19 coming out of the Netherlands and US.
 - Strokes are usually more common in the elderly; however, these patients with COVID-19 are presenting with symptoms of strokes are as **young as 30 years old**.
- **This is due to blood clot formation while sick with the infection.**

Researchers are not positive as to what is causing these blood clots to form and travel to the brain.

 - Young adults who experience symptoms of COVID-19 should monitor themselves for neurological symptoms.
 - **If you start to experience weakness/numbness on one half of your body/face, trouble walking, trouble speaking, or difficulty concentration, contact EMS immediately.**



I have heard that the mortality rate for men is greater than women

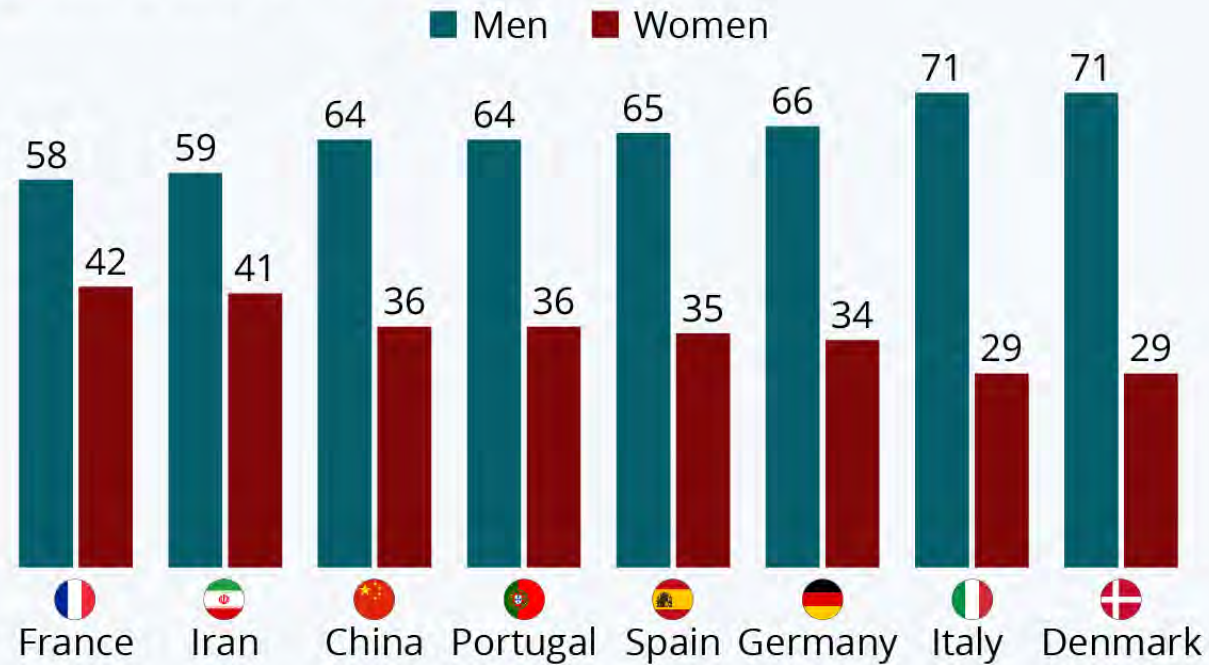
- Data from [China](#) show that among the tens of thousands of people infected there, 2.8 percent of men died from the virus compared with 1.7 percent of women. The median age of the fatal cases among women was five years older than among men*
- The mortality rate is twice as high among men in [Italy](#) as it is among women in every age group **
- **In the US, hospitalization rate from COVID-19 is slightly higher in men than in women.**

Why?

- Could be many factors
 - Differences in rates of smoking by gender
 - Differences in rates of high blood pressure and heart disease by gender
 - Differences in the way that male and female immune systems respond, and/or as a result of hormonal changes***
 - Differences exist: For example, women tend to have more autoimmune disorders than men
 - Gender differences in the microbiota
 - Differences in medication use

More Men Dying of COVID-19 Than Women

Percentage of deaths by gender due to the COVID-19 disease



Data as of March 27

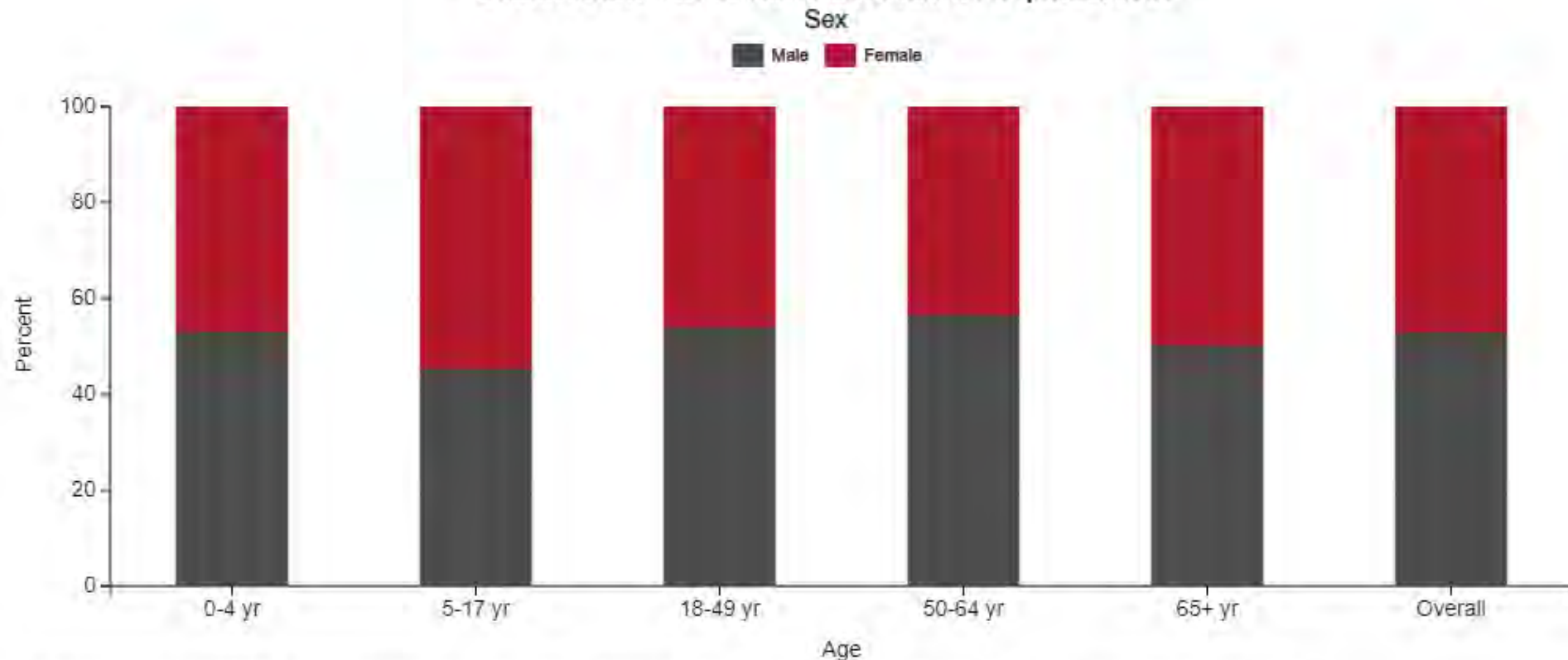
Sources: Wall Street Journal, Global Health 50/50



COVID-19 Laboratory-Confirmed Hospitalizations

Preliminary data as of May 02, 2020

Characteristics Of Covid-19-associated Hospitalizations



1. Data presented on COVID-19-associated hospitalizations collected through COVID-NET are preliminary and may change as more data are received.
2. The discrepancy between the total number of cases identified to date on 'Laboratory-Confirmed-COVID-19-Associated Hospitalizations' (https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html) and 'COVID-19-Associated Hospitalizations By Age' and the number of cases with information on characteristics (including race/ethnicity) differs because the characteristics data are restricted to cases with complete chart reviews. These data will be updated each week as additional chart reviews are completed.
3. The denominator for each characteristic is the total number of patients with non-missing data for that characteristic.
4. Race/Ethnicity is classified as Non-Hispanic White, Non-Hispanic Black, Hispanic and Other. The other category contains Asian/Pacific Islander, Native American/Alaskan Native, Multi-race, and Other.



I have read that this virus effects some racial groups more than others

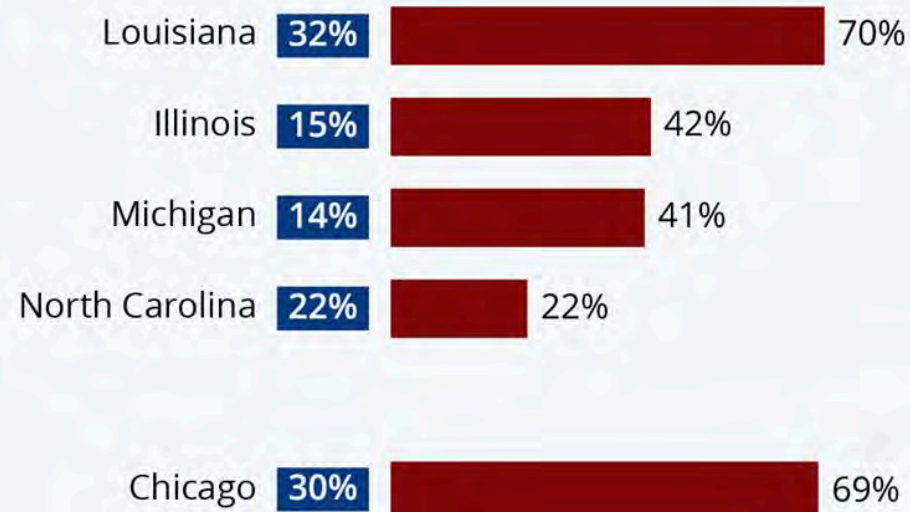
- There is no evidence to date suggesting that any particular racial group constitutes a group at risk because of race-related genetics.
- However, those living and working in environments of risk and engaged in risky behavior related to group norms are more likely to be exposed to this virus.
- Members of particular ethnic groups are more at risk due to difficulties in engaging in physical distancing related to housing, intergenerational contact associated with familial responsibility, and occupation, etc. Demographics and overall health status are also risk factors influencing the crude numbers of people hospitalized and dying.
- **You have no doubt heard that COVID-19 is an equal opportunity viral threat. This is only partially true. There are social and structural determinants of both disease transmission and prognosis based on access to resources and health care.**
 - For example, African Americans in the USA are far more likely to die of COVID-19. Black Chicagoans account for half of all coronavirus cases in the city and more than 70% of deaths, despite making up 30% of the population.
 - Louisiana, a major US hotspot, was the first southern state to categorize Covid-19 deaths by race. 70% of deaths were among African Americans, despite making up only 33% of the state's population.



COVID-19's Devastating Impact On African Americans

African American share of state/city populations and COVID-19 deaths (as of Apr 06, 2020)

■ Share of state/city's population ■ Share of COVID-19 deaths



Sources: 2010 Census, respective state/city health departments





Impact on Native people in the USA

- There is a wide range of COVID-19 rates among different American Indian reservations, but a handful of reservations have many-fold greater infection rates compared to the general U.S. population.
- **The case of New Mexico : As of May 11, 2020**
 - The state's 23 tribes have borne the brunt of the COVID-19 pandemic. Nearly 60% of people identified to date through testing as infected with the virus are indigenous.
 - Half of the 200 people who had died in New Mexico from COVID-19 were Native Americans, a jarring number for a population that makes up 11% of the state's population.

How does COVID -19 Spread



How does it spread?

- This virus is spread in large droplets by coughing, sneezing, and even talking
- You are **at risk** if a person coughing is close to you as droplets descend to surfaces; that is why it's best to remain 6 feet or more from others
- All the surfaces where droplets land are infectious **for 24 hours to a week** depending on what the surface is made out of:
 - **A recent study finds that the virus can survive on hard surfaces such as plastic and stainless steel for up to 72 hours and on cardboard for up to 24 hours.**



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COVID-19 PANDEMIC

How is the virus transmitted?



If the droplets land on surfaces, the virus may survive for as long as 24 hours on cardboard and up to 3 days on stainless steel and plastic, according to a recent study.



Source: AL JAZEERA | Last updated: 11:30 GMT, March 24, 2020

How long the new coronavirus can live on surfaces

SURFACE

LIFESPAN OF COVID-19 VIRUS

	Paper and tissue paper**	3 hours	<div></div>
	Copper*	4 hours	<div></div>
	Cardboard*	24 hours	<div></div>
	Wood**	2 days	<div></div>
	Cloth**	2 days	<div></div>



Stainless steel*

2–3 days



Polypropylene plastic*

3 days



Glass**

4 days



Paper money**

4 days



Outside of surgical mask**

7 days



*At 69.8 to 73.4°F (21 to 23 °C) and 40% relative humidity

**At 71°F and 65% relative humidity

Source: New England Journal of Medicine*; The Lancet Microbe**

BUSINESS INSIDER



How does it spread?

Protect your nose, mouth, and eyes

- The virus infects you through your nose or mouth via your hands or an infected cough or sneeze onto or into your nose or mouth
- This virus only has cell receptors for lung cells (it only infects your lungs)
- The eye is also a portal for entry and site for virus transmission.
*
- Some evidence suggests that the virus may be spread via a fecal–oral route but the data is still preliminary and few cases have been documented
 - The virus that causes COVID-19 has been found in the feces of some patients diagnosed with COVID-19. However, it is unclear whether the virus found in feces may be capable of causing COVID-19.



Can the virus remain in the air in aerosol form for some time?

- The primary point of contact appears to be the virus on surfaces
 - **At present the biggest concern is the surfaces you touch**
- However, some research suggests that the virus may remain in the air for some time if aerosolized.
 - **For minutes up to three hours*, depending on environmental conditions**
 - **A Chinese, 48-seat bus study found that the virus infected people in a closed environment with air-conditioning up to 15 feet,** suggesting that in some environments the transmission distance of this coronavirus exceeds the commonly recognized safe distance of 6 feet.



Asymptomatic & mildly symptomatic in relation to disease transmission

- Several studies have shown that people without symptoms are causing substantial amounts of infection.
- Chinese data suggests that the number of “silent carriers” could be as high as one-third of those who test positive
 - More than 43,000 people in China had tested positive without immediate symptoms by the end of February and were quarantined
- Of the 135 people in the Tianjin cluster, between 62% and 77% contracted the infection from someone who was pre-symptomatic.
- Between 48% and 66% of the 91 people in the Singapore cluster contracted the infection from someone who was pre-symptomatic.
- Iceland is attempting to test its entire small population and has the means to do so. It has reported that so far 50% of all cases identified are asymptomatic.
- Asymptomatic cases were found on the Diamond Princess cruise ship: 322 of 621 people tested positive but showed no symptoms
- It appears that a Massachusetts coronavirus cluster with at least 82 cases was started by people who were not yet showing symptoms
- **Hence the importance of physical distancing**
- **The > 60 group must distance themselves from youth. Someone you know, even your grandchild may be asymptomatic.**
- **Engage in safe forms of social interaction with loved ones such as sociality through social media and the phone.**



Incubation period

- 4 to 6* days appears to be the median amount of time, but the range is much larger with some studies suggesting up to 24 days***.
- Existing data suggests that about 97.5 percent of people who develop symptoms of COVID-19 infection will do so within 11.5 days of exposure.
- The researchers estimate that for every 10,000 individuals quarantined for 14 days, only about 101 would develop symptoms after being released from quarantine.**



When are you most contagious if you have a mild to moderate illness

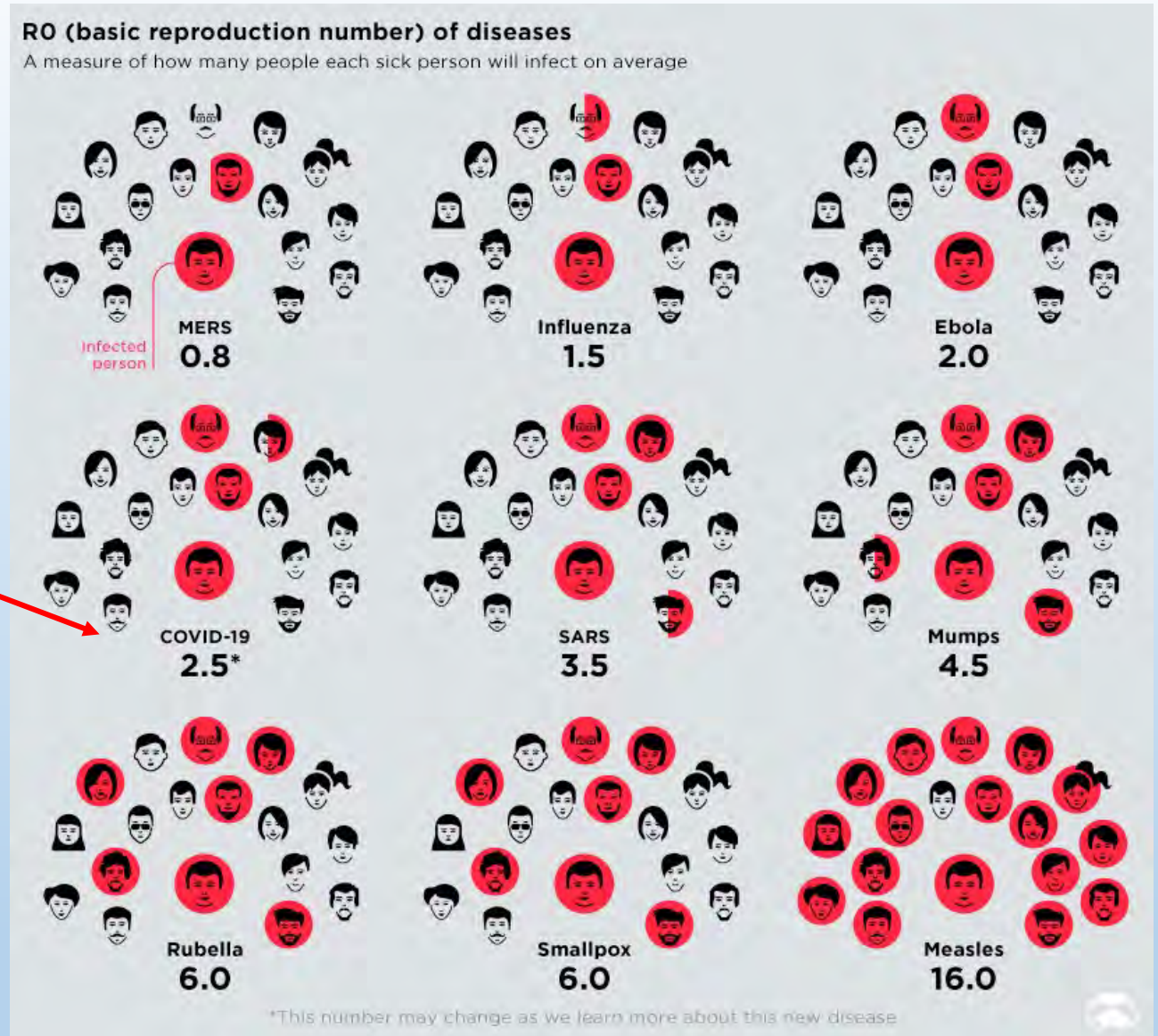
- In COVID-19 peak shedding occurs from the upper airways early on in the infection which makes for a virus much harder to contain than another coronavirus like SARS (where peak shedding occurs deep in the lungs) *
- At peak shedding, people with COVID-19 are emitting more than 1,000 times more virus than was emitted during peak shedding of SARS infection
- Research suggests that peak shedding for COVID-19 occurs **before you feel ill**. This emphasizes the importance of precautionary measures and helps explain why this is much harder to contain than previous coronavirus outbreaks like SARS and MERS.

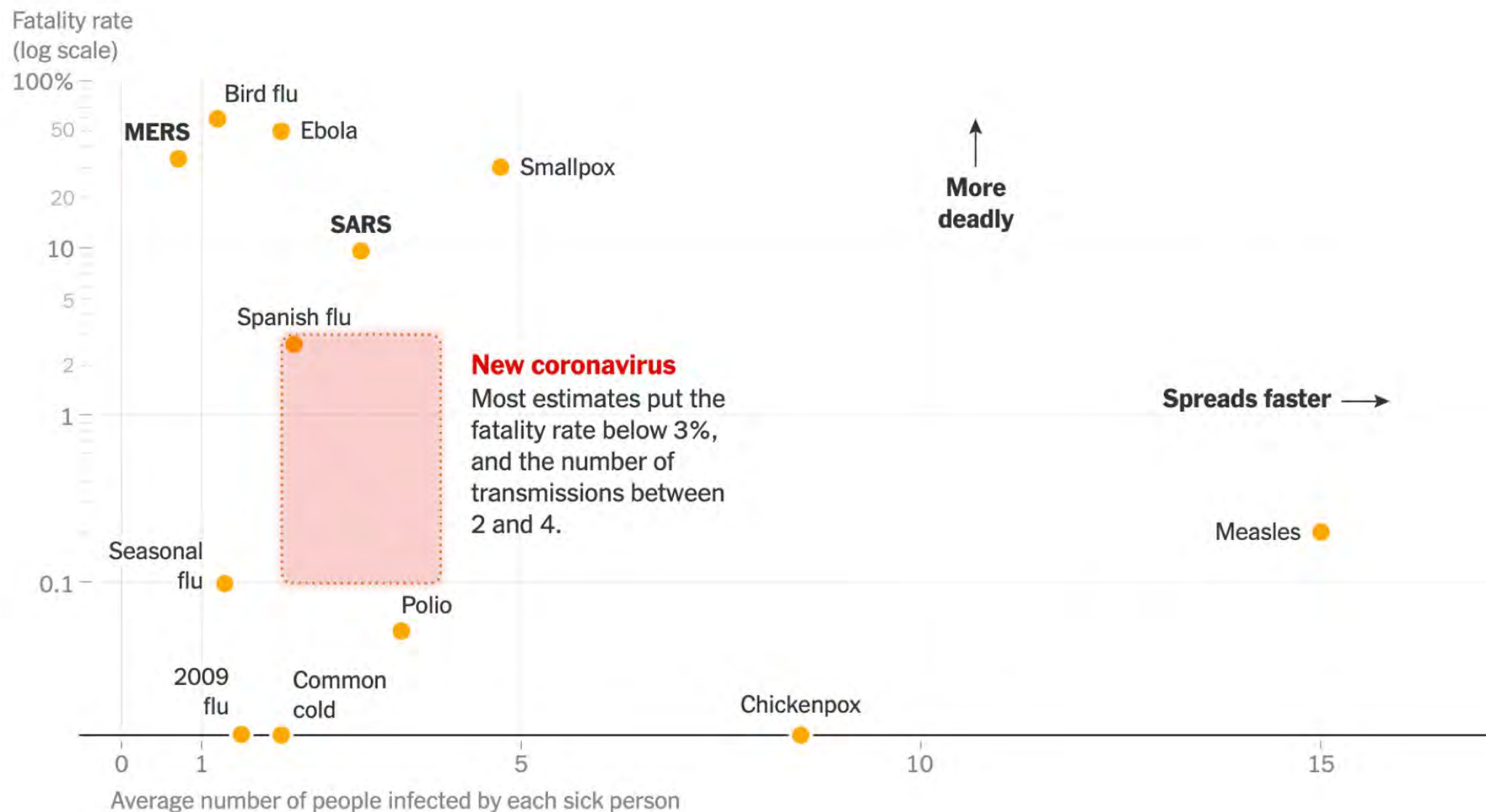
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How many people will a sick person infect?

Current studies suggest that a person with COVID-19 will on average infect between 2-3 additional persons, but the range of estimates is around 2-6.5.*

These estimates are likely to change as we progress in the pandemic.





Note: Average case-fatality rates and transmission numbers are shown. Estimates of case-fatality rates can vary, and numbers for the new coronavirus are preliminary estimates.



How long do people shed the virus and how does this relate to being contagious?

- Presence of the virus does not necessarily indicate level of contagion

What do we know so far ?

- Wuhan data: Median duration of viral shedding was 20.0 days (IQR 17.0–24.0) in survivors.
 - The longest observed duration of viral shedding in survivors was 37 days
- A small but important German study found that people with mild infections can still test positive by throat swabs for days and even weeks after their illness.*
- However, those only mildly sick are most likely not still infectious by about 10 days after they start to experience symptoms, and moderately sick by days 10-11.
 - The scientists could not grow viruses from throat swabs or sputum specimens after day 8 of illness from people who had mild infection.
 - The researchers found very high levels of virus emitted from the throat of patients from the earliest point in their illness—when people are generally still going about their daily routines. Viral shedding dropped after day 5 in all but two of the patients, who had more serious illness



Does a high viral load or infectious dose make COVID-19 worse ?

- Research has shown that those with **severe COVID-19 symptoms often have much higher viral loads than those with minor symptoms.**
- We know from influenza that a greater exposure to the virus often causes a more severe illness.
 - However, it is unclear as to whether a greater exposure to the virus for COVID-19 causes more severe symptoms.
 - Its also important to consider patient characteristics, as people with compromised or weakened immune systems due to extreme stress, exhaustion, or other conditions could cause a lower threshold of exposure needed to cause severe symptoms.



Is there a possibility of re-infection?

- Reports of patients testing positive for the coronavirus a second time have come out of China, Japan and South Korea.
 - Researchers believe this is due to **reactivation of the virus** and not because of reinfection. I.e. people may almost be completely recovered and then their infection increases again.
- Animal studies (rhesus macaques) have not documented cases of reinfection*
 - In these animal studies, animals were inoculated with the virus multiple times after recovery and none of them became re-infected. Suggests that recovery could result in some sort of immunity.
- However, much remains unknown about the virus**
- Reports of re-activation have health experts worried that the illness could remain dormant after an apparent recovery.



Is there a possibility of re-infection?

- **Dr. Anthony Fauci and other researchers think it is likely that someone who gets infected once is actually immune.**
 - Other experts think that one has an intermediate level of protection that dwindles over time, similar to that of influenza
 - **We know from previous coronavirus outbreaks that immunity to the infections decreases as time goes on and that the level of antibodies you develop may be dependent on how severe your illness was (mild illness = very little immunity)**
- **The question is not just is re-infection possible, but how long immunity lasts. This may vary by the amount of antibodies a person produces after having experienced this coronavirus. At this current time, it is too early to know.**



Can children spread the virus that causes COVID-19?

- Contact tracing has demonstrated that children can spread COVID-19, though likely at a reduced rate relative to adults.¹
- Children may be less susceptible to the virus, have a milder viral course, or a reduced viral load – all of which would contribute to a lesser role in transmission.^{1,2}
- Children, particularly school-aged children, may have more contacts than adults, thereby expanding their role in transmission in certain settings.¹
- Dr. Jeffery Shaman, epidemiologist at Columbia University: “...to open schools because of some uninvestigated notion that children aren’t really involved in this, that would be a very foolish thing.”³

How fast does this virus
escalate?

**Depends on steps taken during trajectory
of illness**

COVID-19 spreads fast

- **Compared to SARS and MERS, COVID-19 has spread strikingly fast: While MERS took two and a half years to infect 1,000 people, and SARS took roughly four months to hit that figure, COVID-19 reached 1,000 cases in just 48 days**
- The disease's global fatality rate is estimated to be less than 4 percent, compared to 35 percent for MERS and 10 percent for SARS



Exponential spread: For every two to six days that we delay engaging in physical distancing, the number of infections double

Official line:

- Every person with the COVID-19 virus infects approximately two to four people.
- The infection rate doubles every two to six days (there is a range depending on what policies/programs different countries are implementing)
- That means that if 50,000 people have the virus today, then in 6 days, 100,000 people will have it.
- In another 12 days it's 400,000 and less than two weeks later it's over a million people.
- We have 330 million people in the US. The experts expect that 40-70% of people will be infected.

Exponential spread

Total number of confirmed U.S. coronavirus cases at each
Tuesday: January to March 10

Jan. 14 — 0

Jan. 21 — 1

Jan. 28 — 5

Feb. 4 — 11

Feb. 11 — 14

Feb. 18 — 25

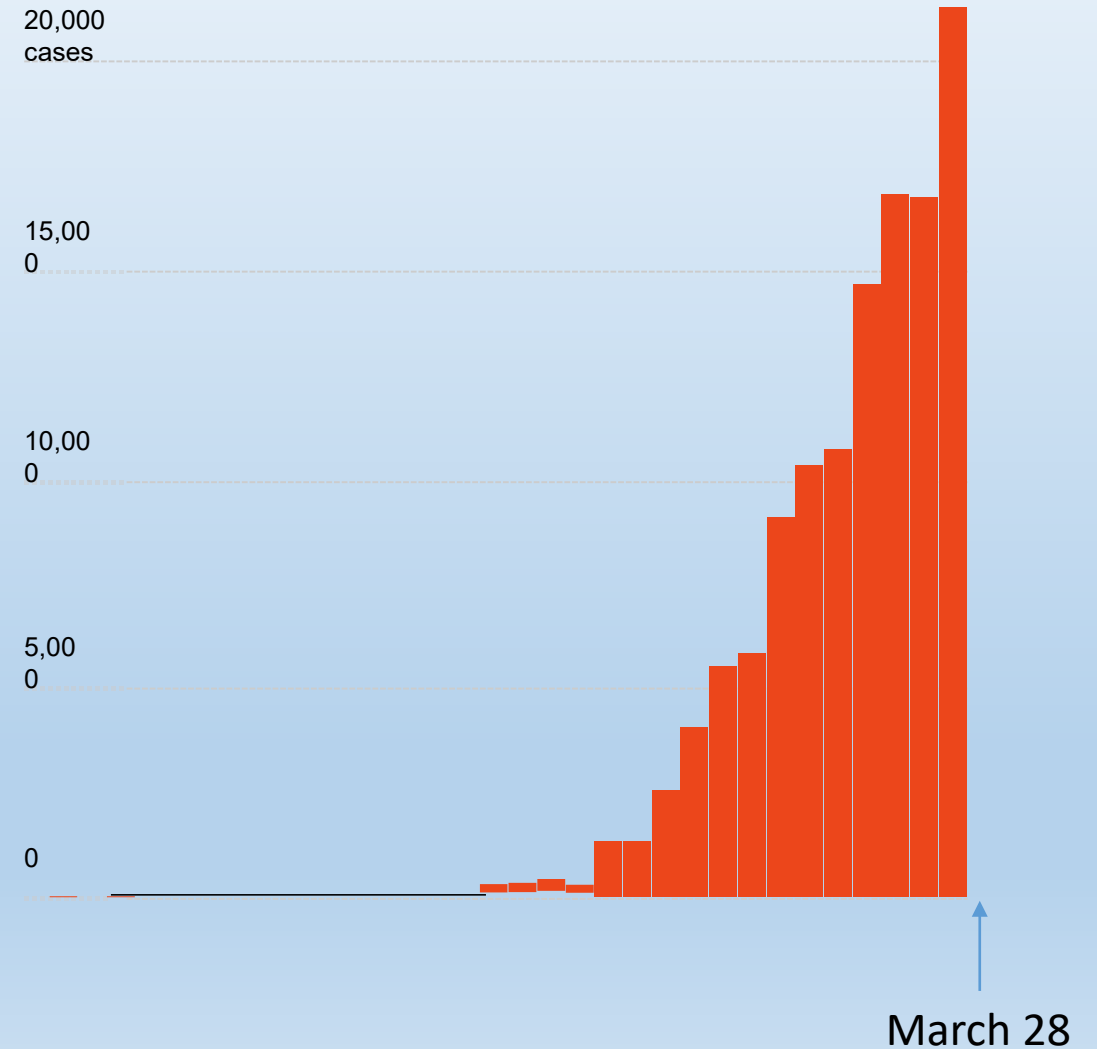
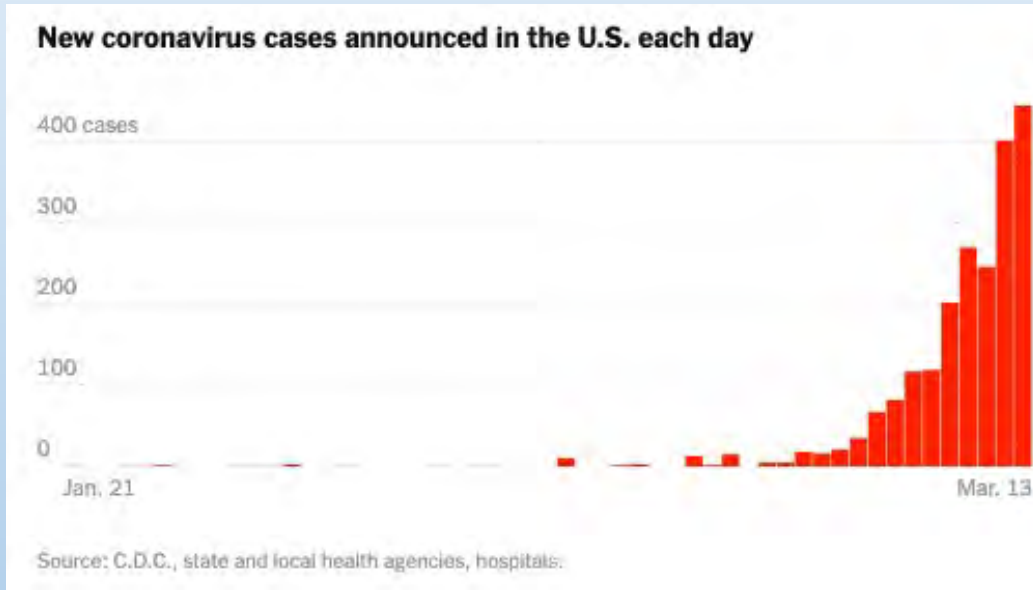
Feb. 25 — 59

Mar. 3 — 125

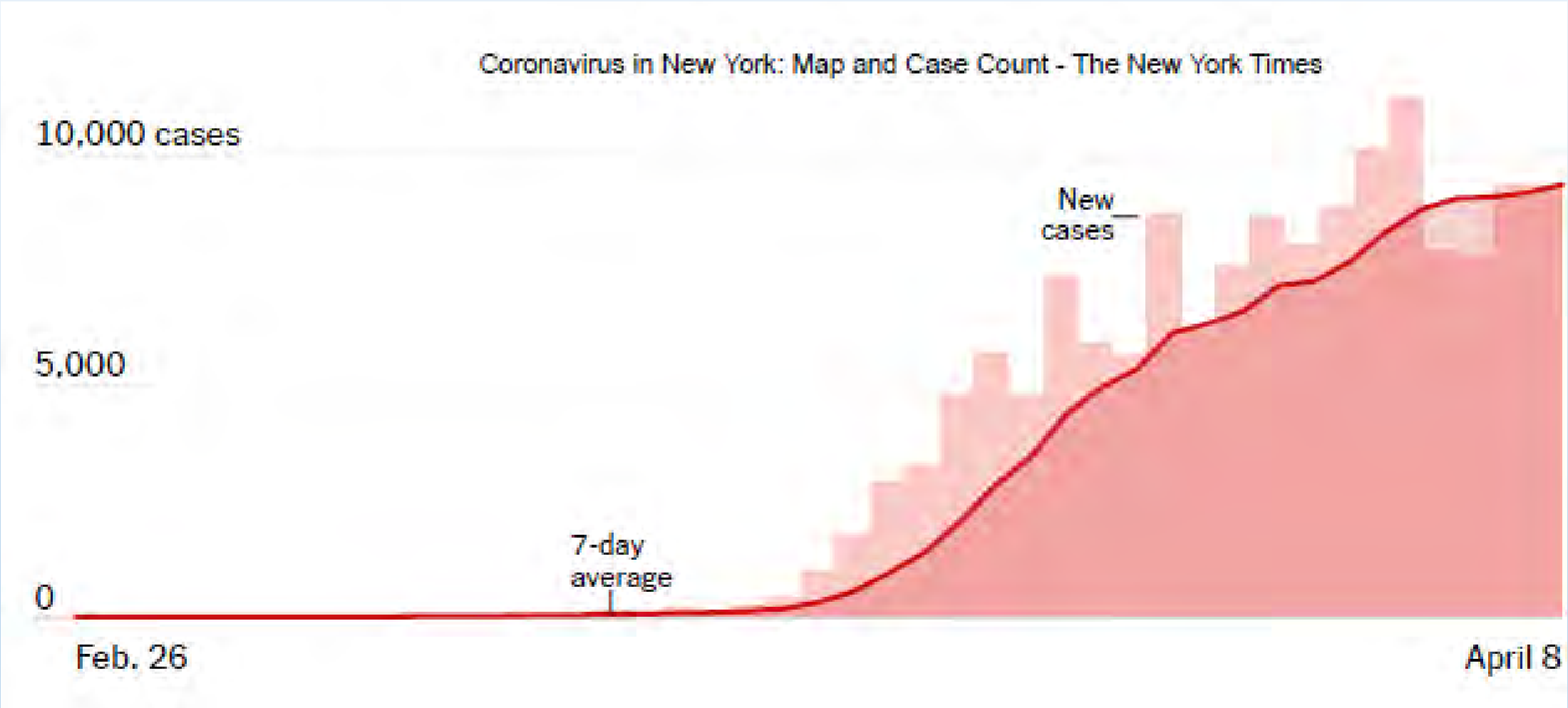
Mar. 10 — 1,004

And so on.....

Exponential Spread in March , USA



Coronavirus in New York: Map and Case Count - The New York Times



Where are we in the Disease Trajectory?

**Based on our evolving experience
with COVID-19**

The WHO Pandemic Phases

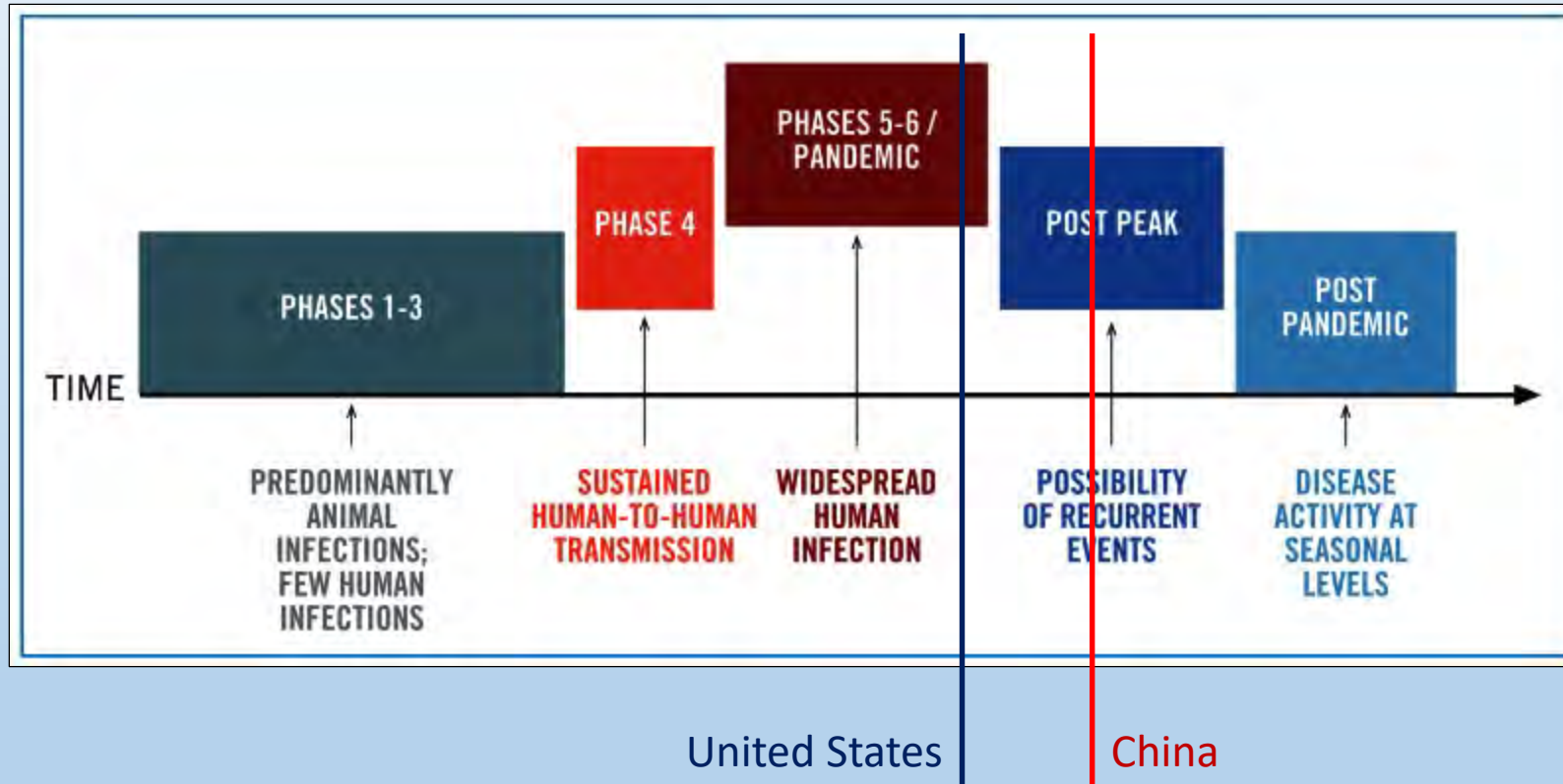
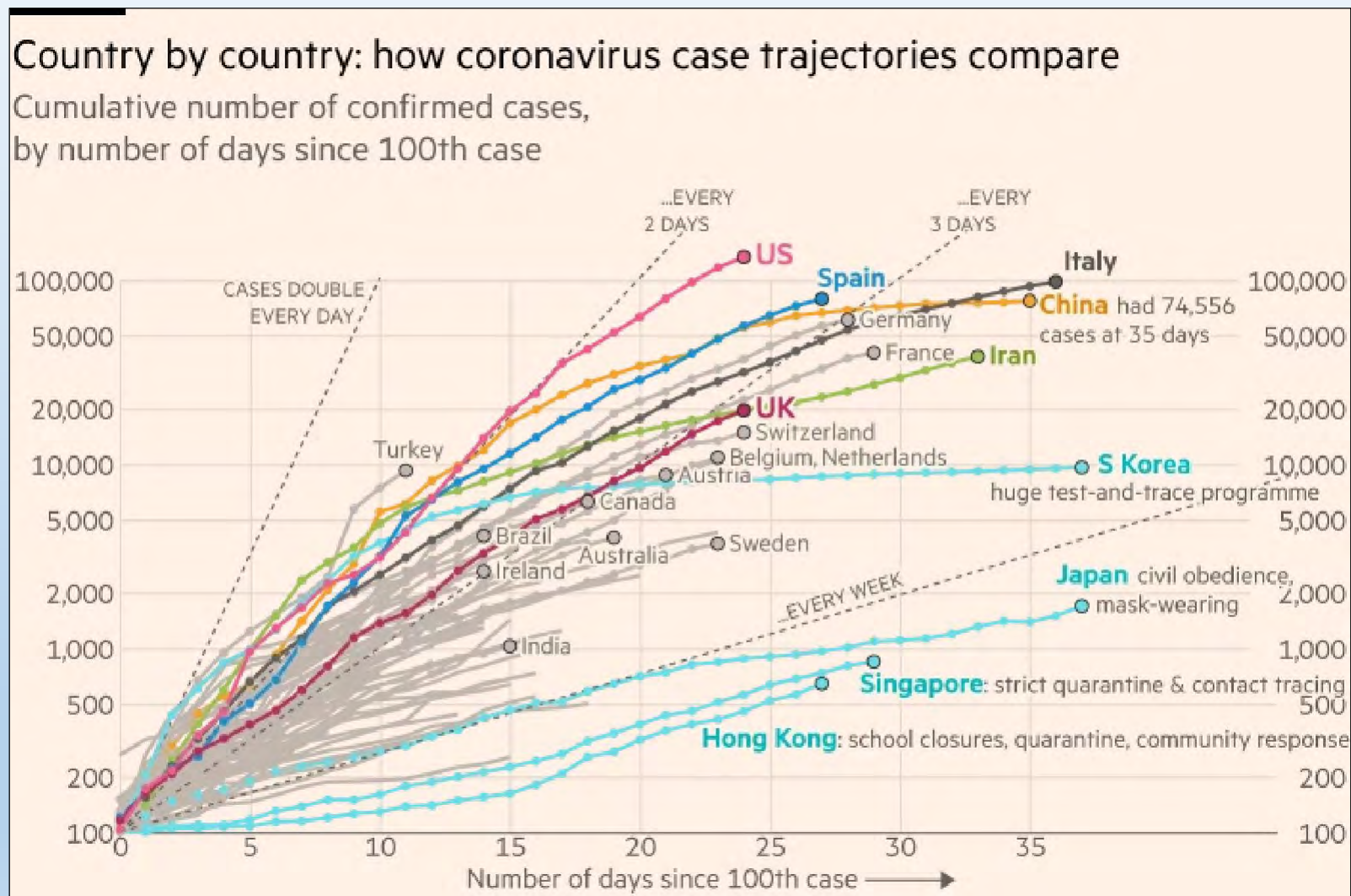


Figure: Pandemic Influenza Preparedness and Response: A WHO Guidance Document. Geneva: World Health Organization; 2009. 4, The WHO Pandemic Phases. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK143061>

March 29th, 2020 – Cumulative Confirmed Cases



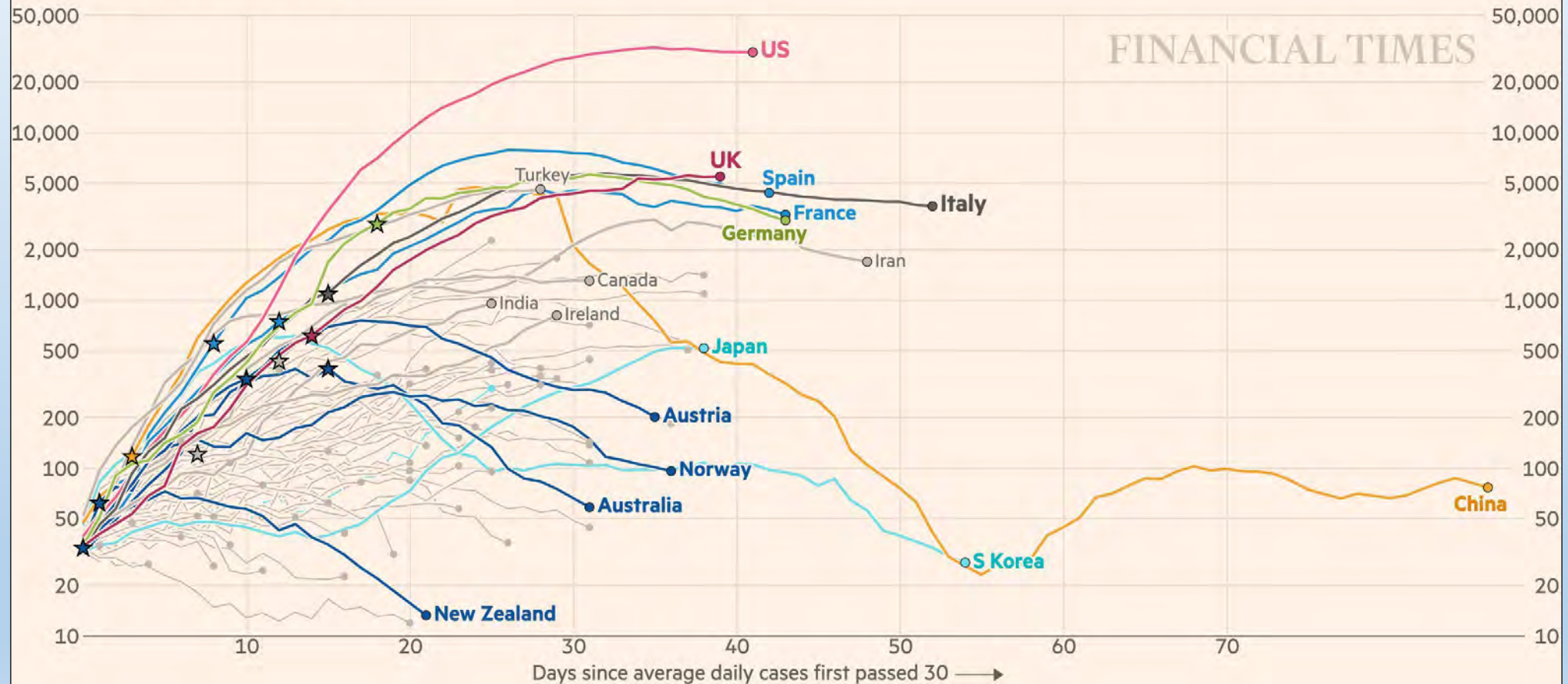
Graph: FT graphic: John Burn-Murdoch / @jburnmurdoch; **Source:** FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated March 29, 19:00 GMT ©FT

April 16th, 2020 – Daily Confirmed Cases

Several countries have turned the corner, with numbers of new cases now in decline

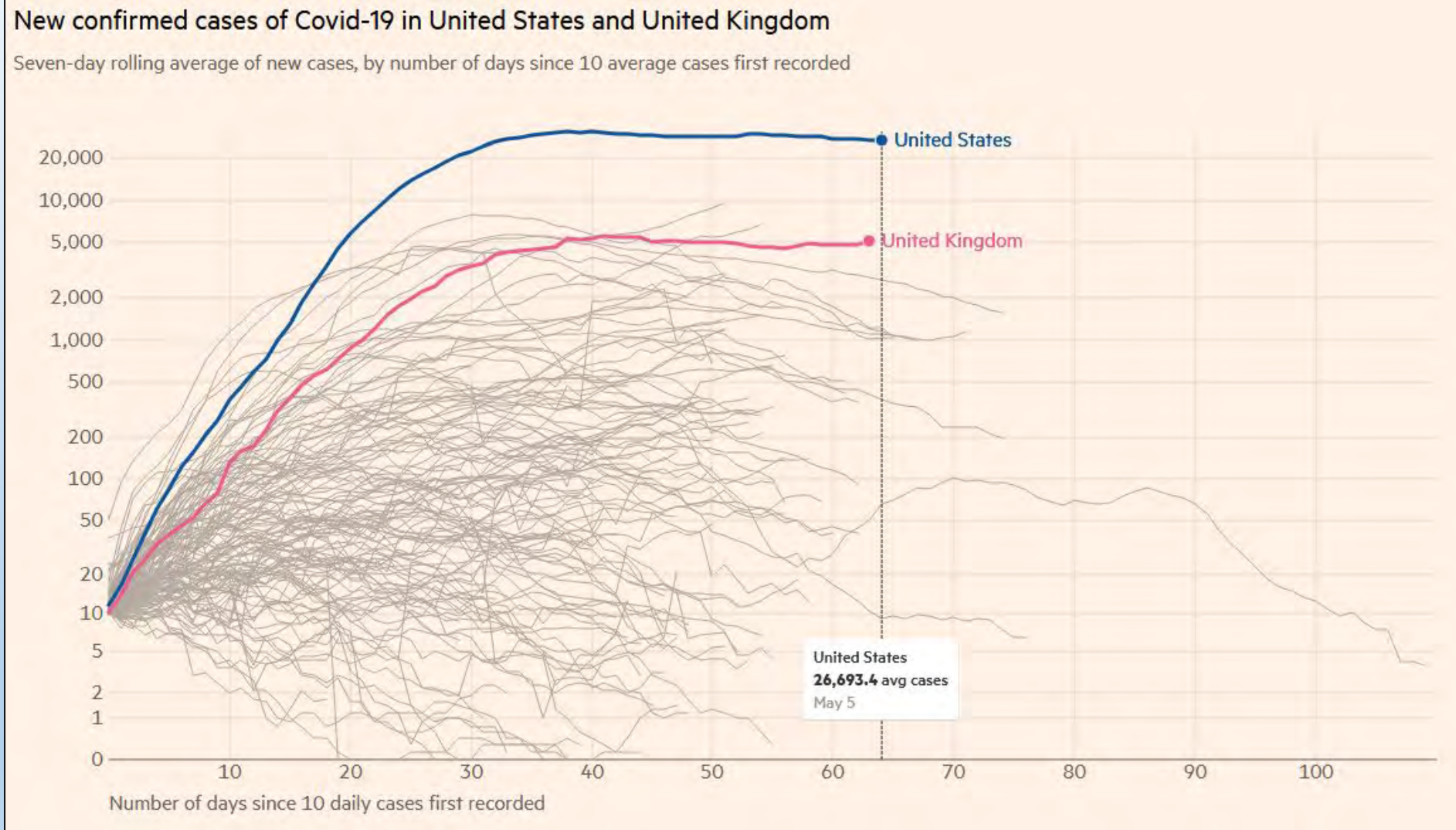
Daily confirmed cases (7-day rolling average), by number of days since 30 daily cases first recorded

Stars represent national lockdowns ★

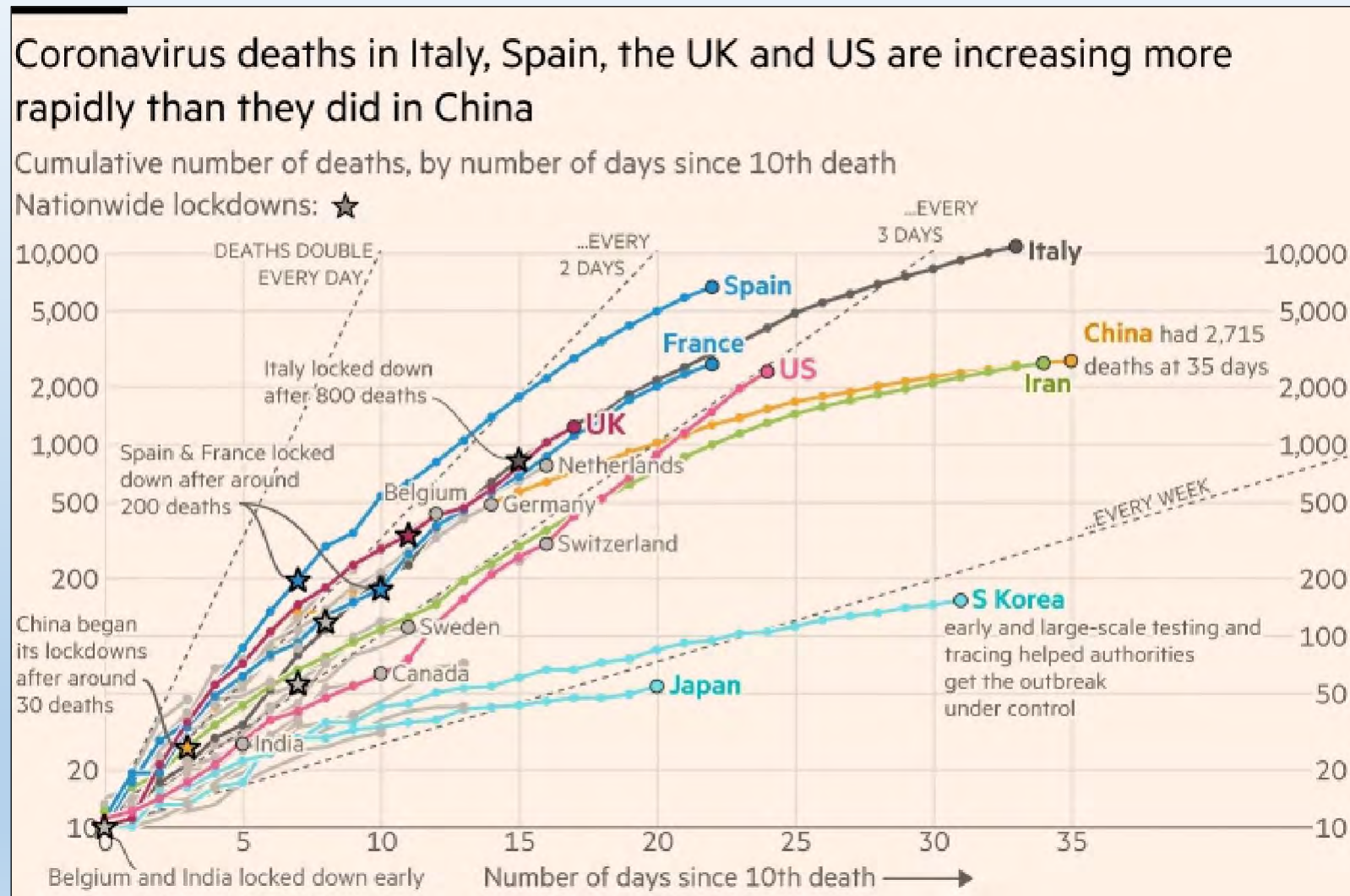




May 5th, 2020 – Daily Confirmed Cases



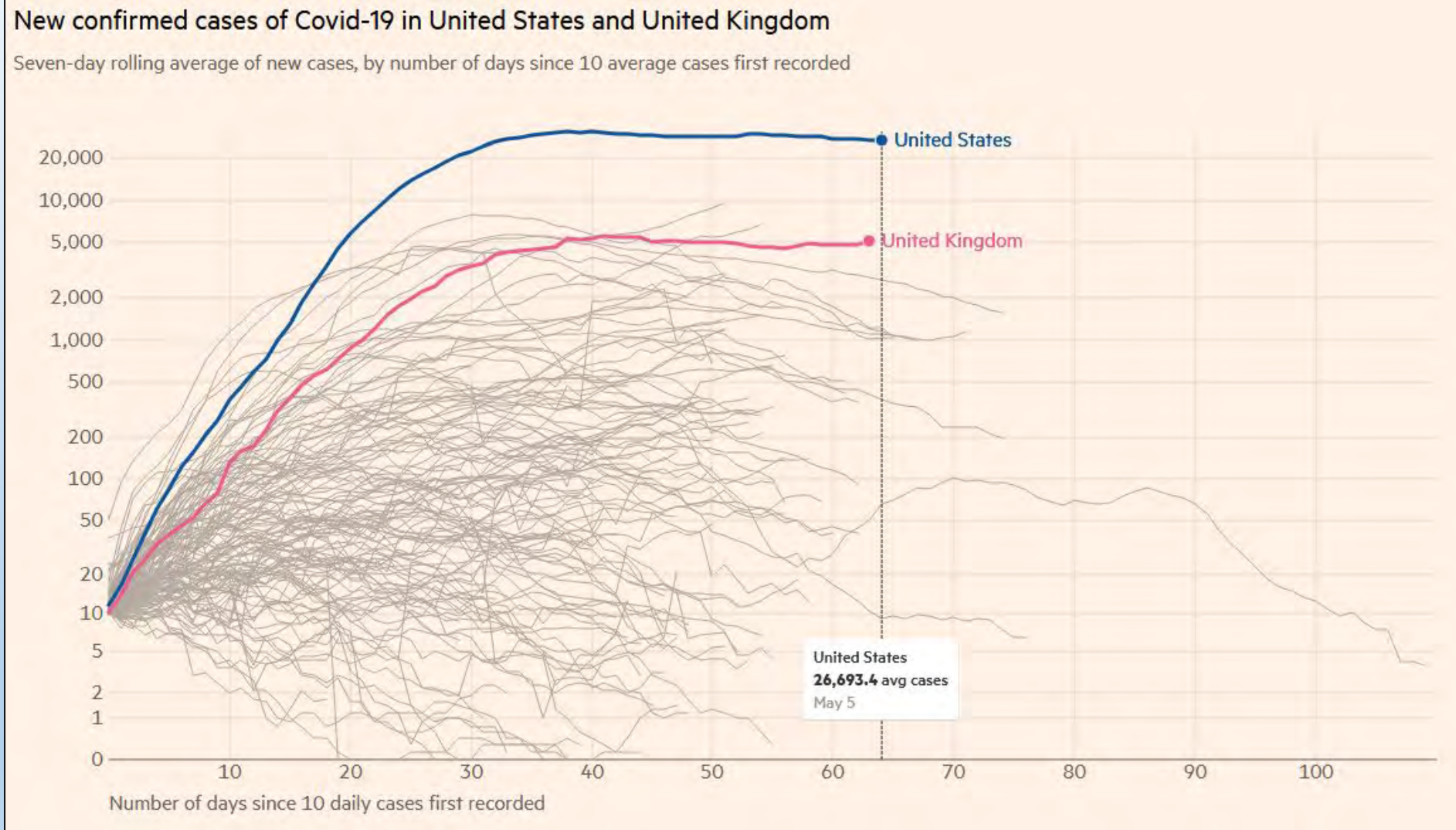
March 29th, 2020 – Cumulative Deaths



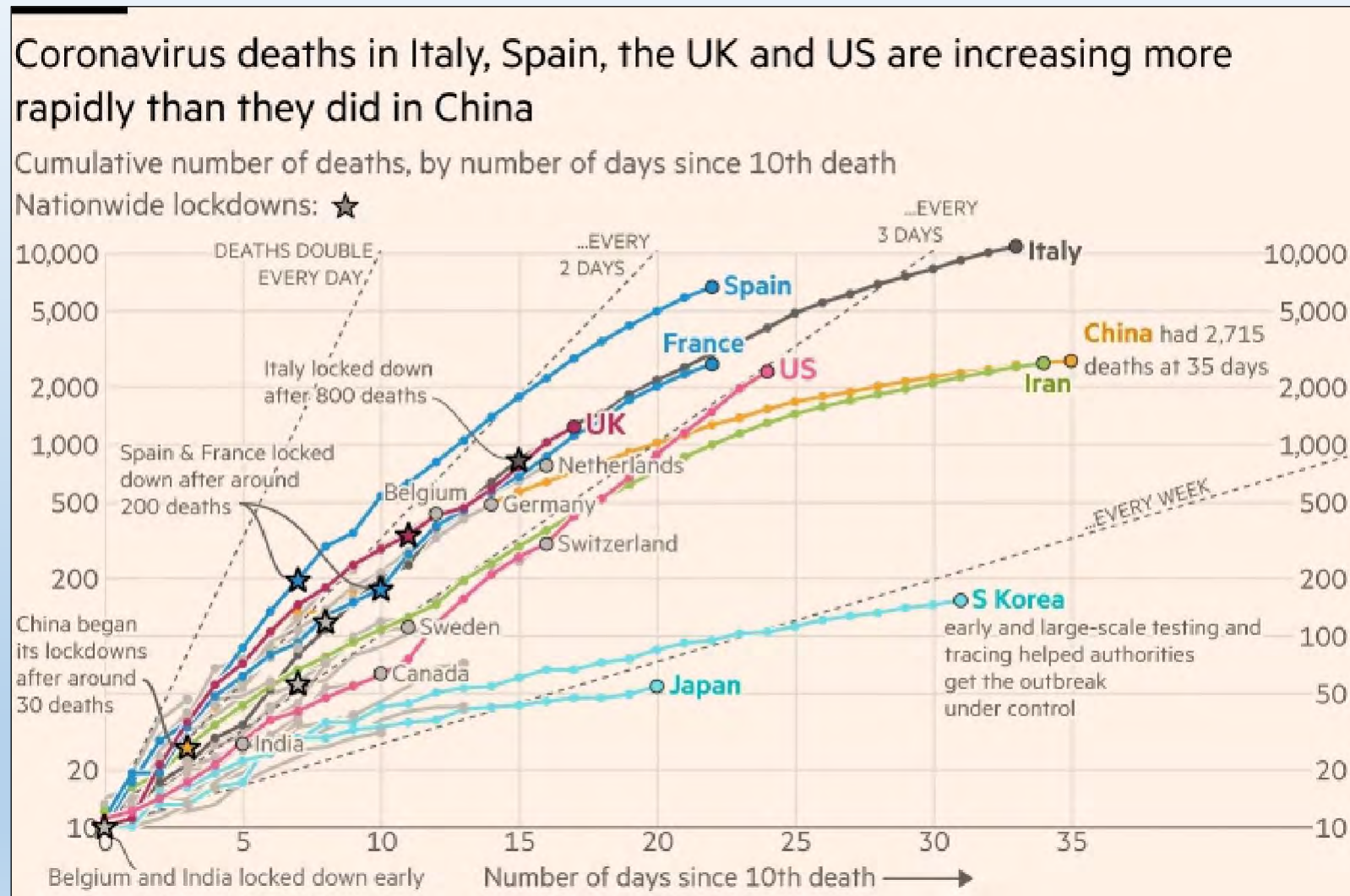
Graph: FT graphic: John Burn-Murdoch / @jburnmurdoch; **Source:** FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated March 29, 19:00 GMT. ©FT



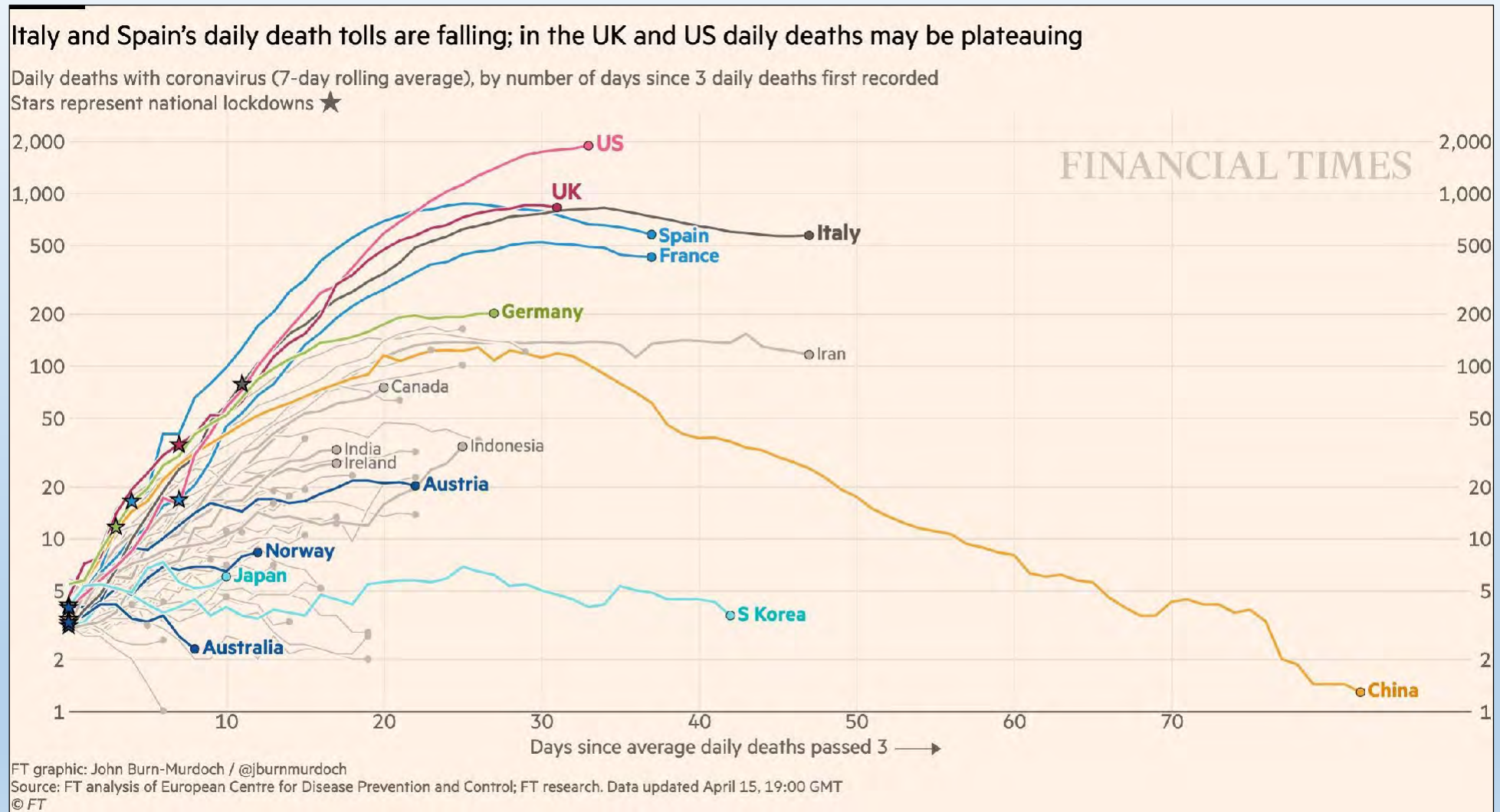
May 5th, 2020 – Daily Confirmed Cases



March 29th, 2020 – Cumulative Deaths



April 15th, 2020 – Daily Deaths

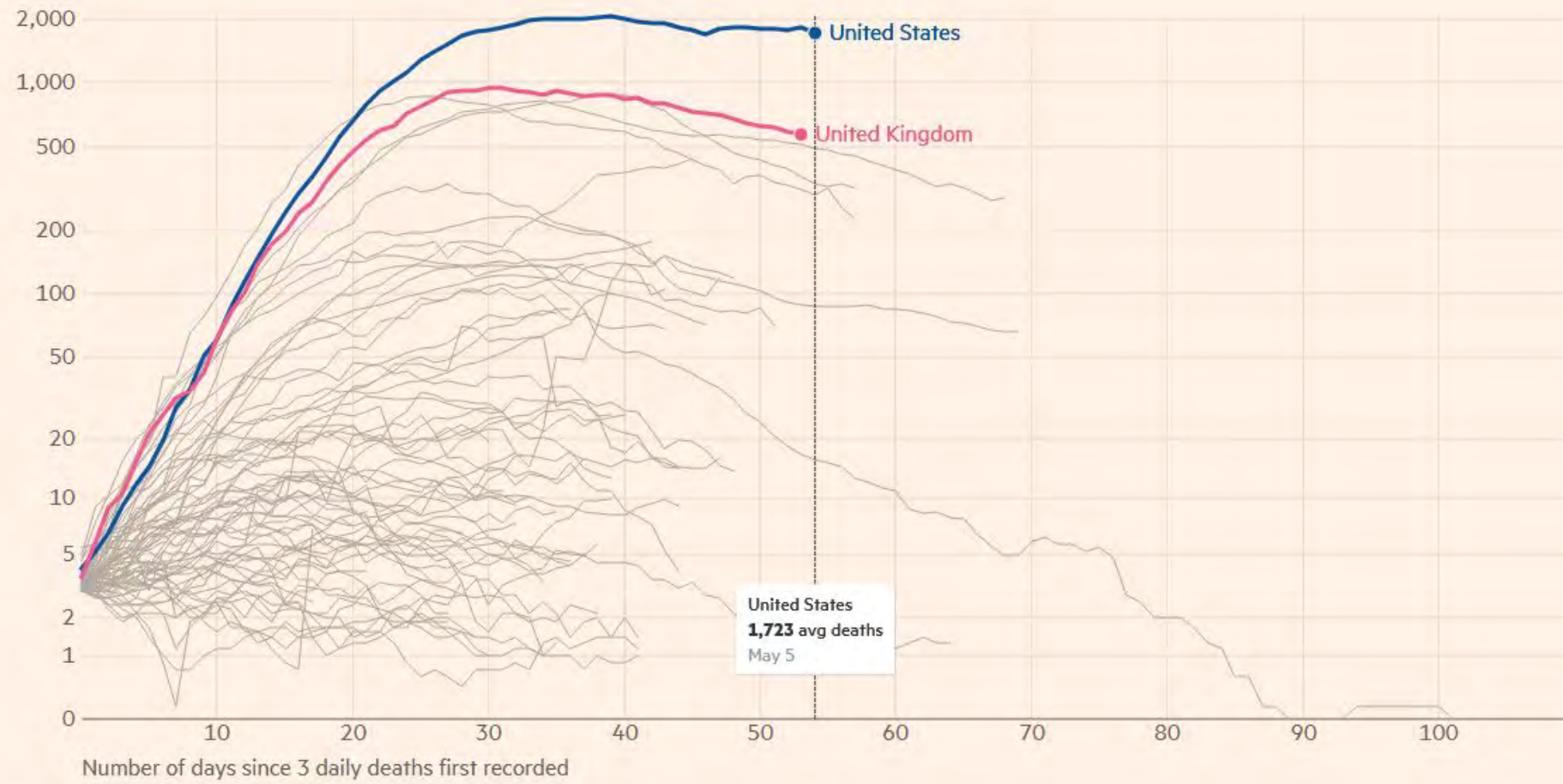




May 5th, 2020 – Daily Deaths

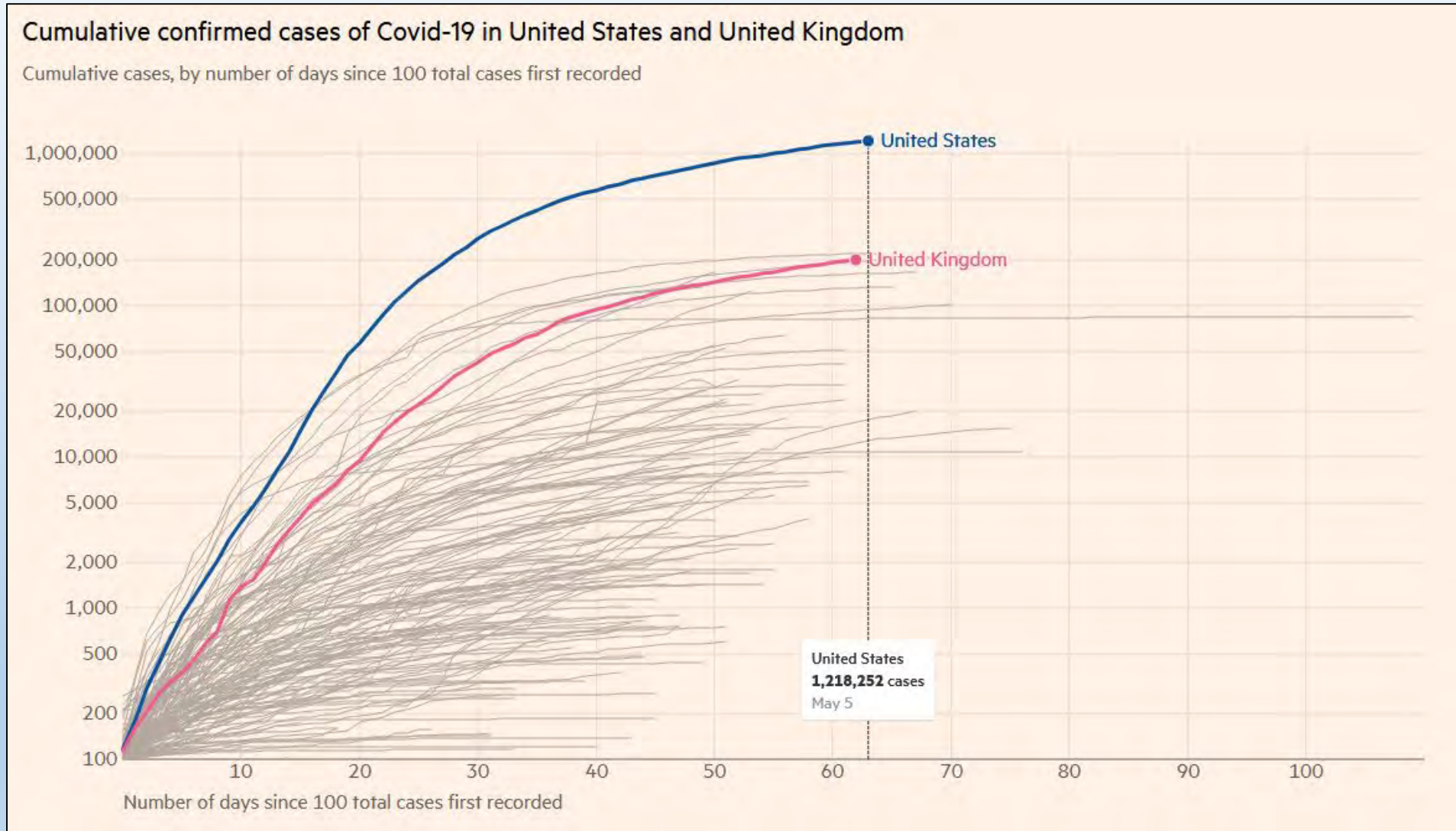
New deaths attributed to Covid-19 in United States and United Kingdom

Seven-day rolling average of new deaths, by number of days since 3 average deaths first recorded

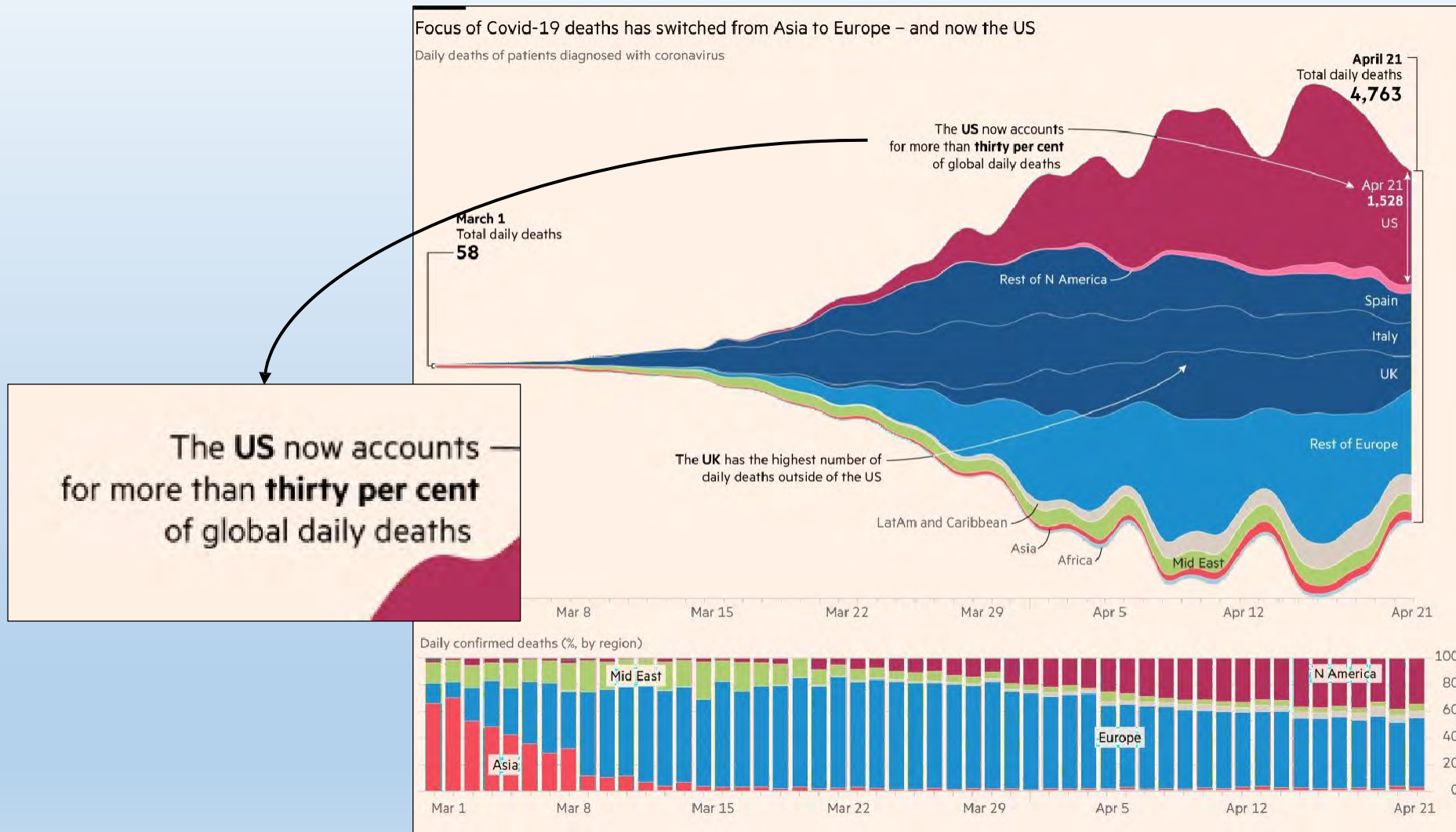




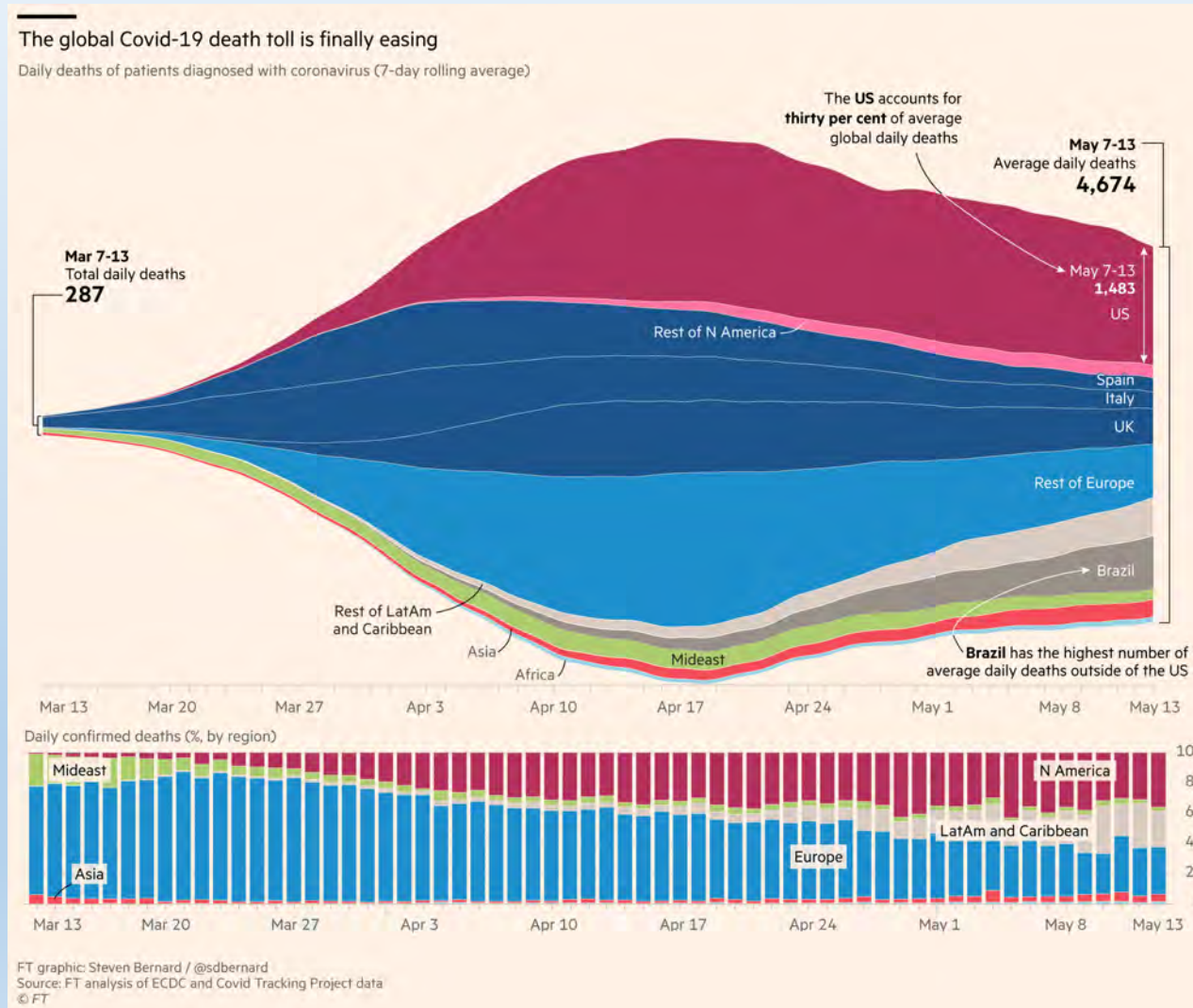
May 5th, 2020 – Daily Confirmed Cases



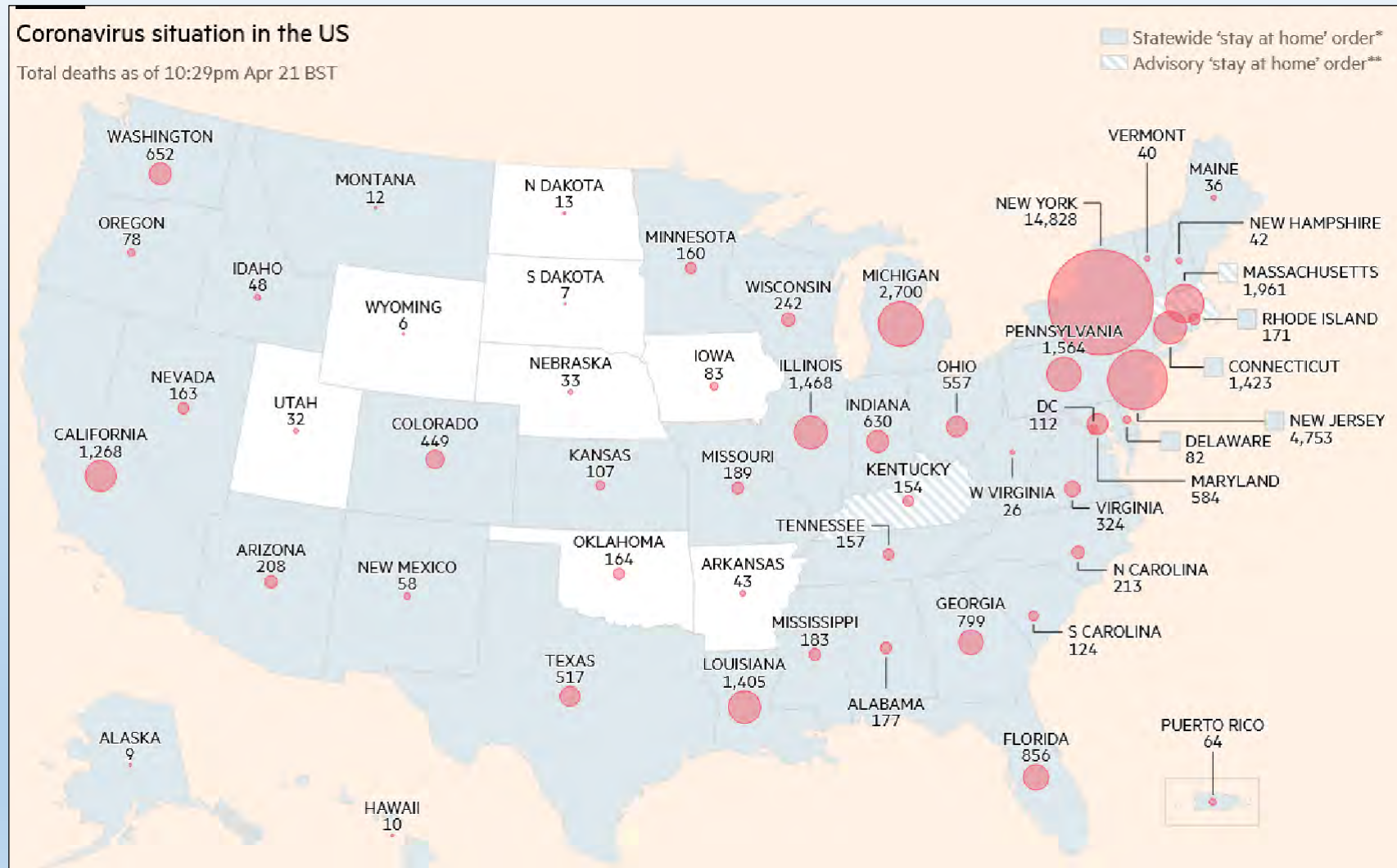
April 21st, 2020 – Streamgraph Distribution



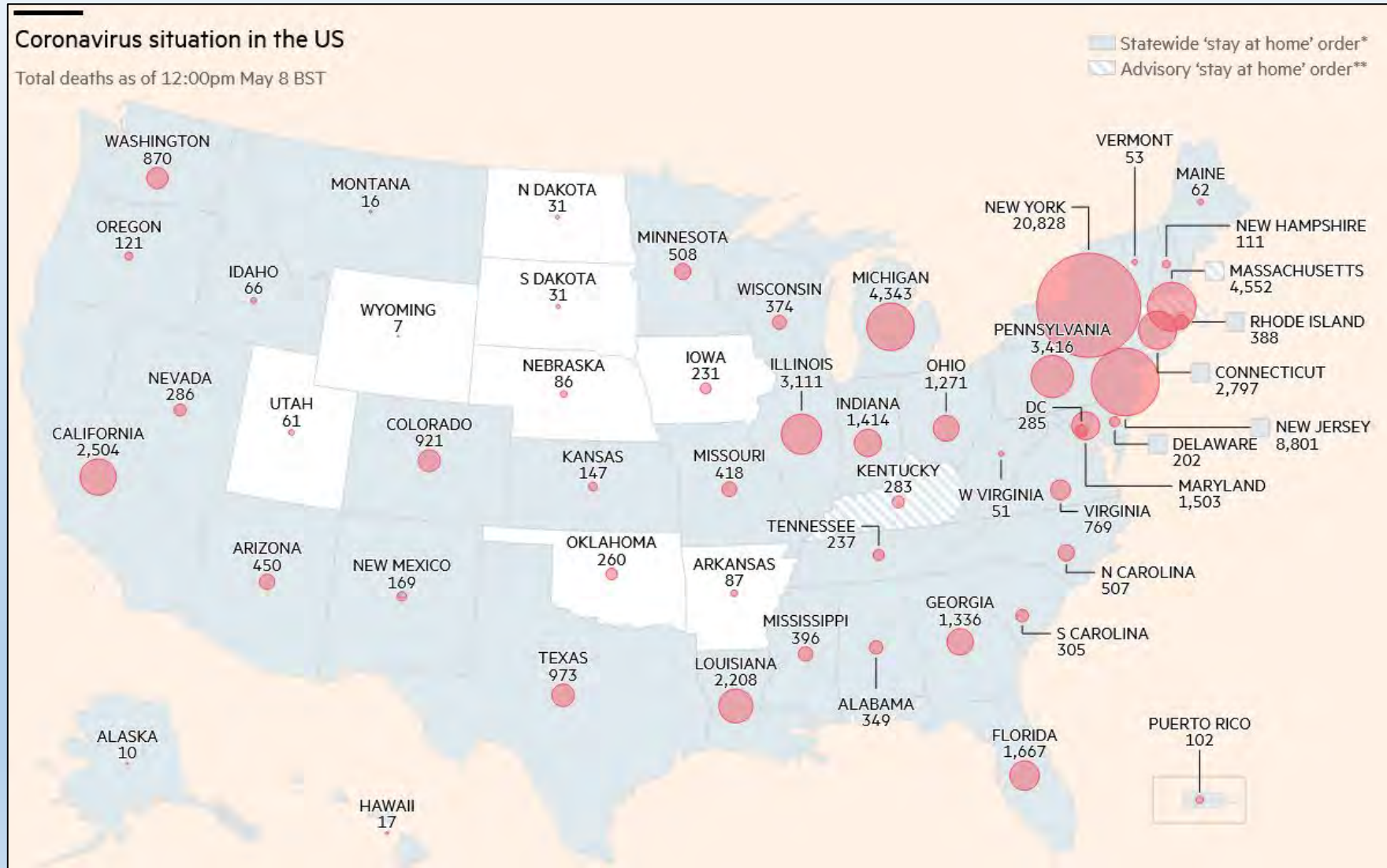
May 13, 2020 – Daily Average Streamgraph Distribution



April 21st, 2020



May 8th, 2020





Moving into *Post-Peak* Pandemic

- *New Cases* and *New Deaths* in the US have approximately plateaued at peak levels, with slow drops in both.
 - Some public health researchers suggest that this may be primarily be due to New York's decrease in new cases (as they were the epicenter in the US)
- A reduction in control measures & physical distancing at this point in time may cause both counts to rise.
- Most US states have passed their initial peak transmission; some will not peak until mid-May.
- Physical distancing and control measures are needed following peak transmission to prevent subsequent and immediate growth of new cases.



Multiple Peaks are likely

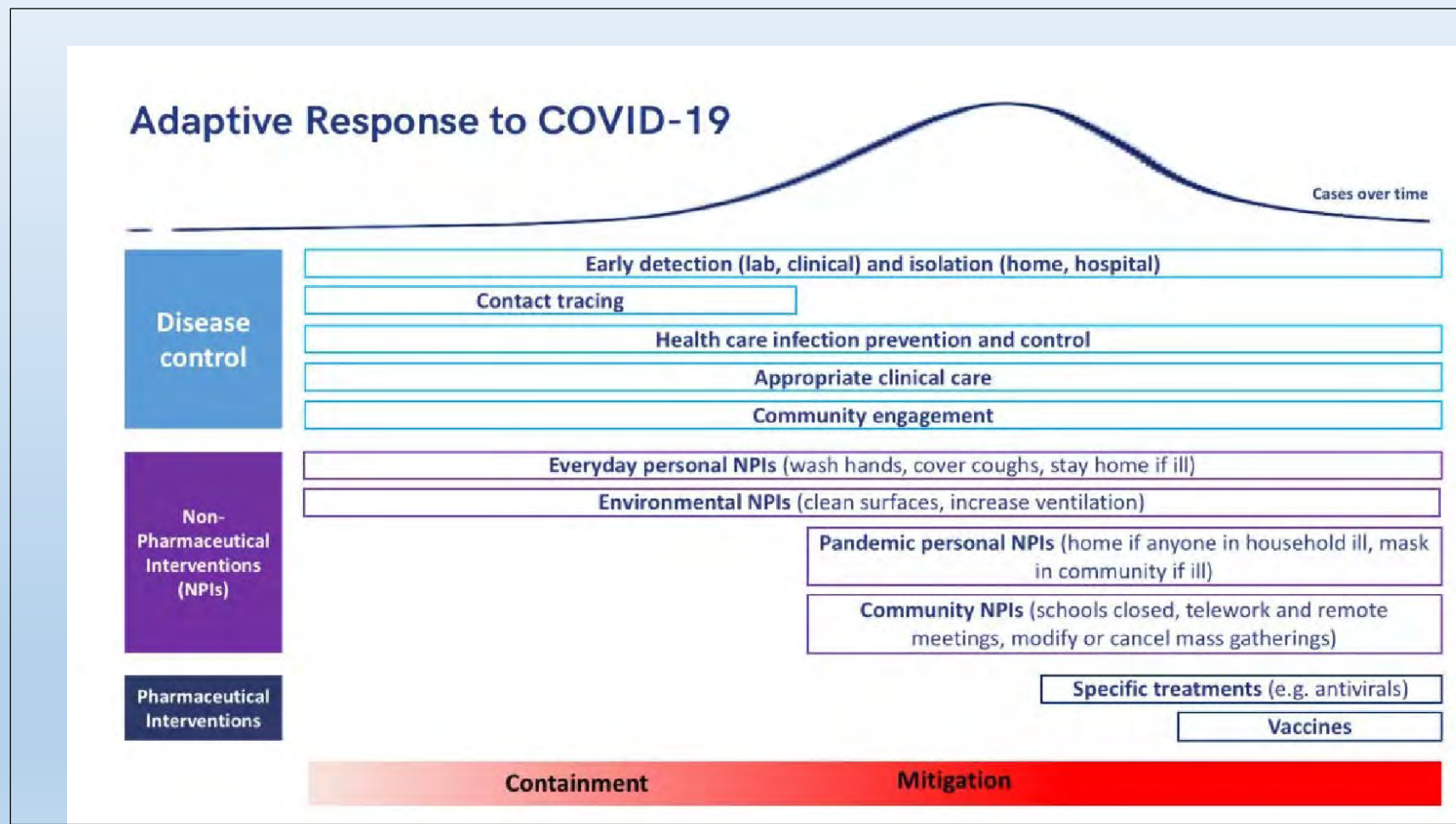
- True prevention of subsequent peaks in cases can only be achieved with herd immunity – when enough people are immune from recovery or vaccination.
- Vaccine development is ongoing, though this development may take 12-18 months.
- Factors that may contribute to subsequent peaks of cases:
 - Relaxation of control measures.
 - Physical, social distancing measures are lifted.
 - Localization of new waves – new locations, climates, populations, and movements of people.
 - Non-permanent immunity.
- Prevention of subsequent waves can be supported with consistent control measures and social distancing.



Seasonal Transmission cannot be assumed

- “Given that countries currently in ‘summer’ climates, such as Australia and Iran, are experiencing rapid virus spread, a decrease in cases with increases in humidity and temperature elsewhere should not be assumed ...Changes in weather alone will not necessarily lead to declines in cases without extensive public health interventions.”
- Historical context of the previous 10 influenza pandemic, dating 250 years, demonstrate peaks relative to time of emergence and spread, not seasonality.
- Similarly, pandemic influenza strains have not exhibited the typical seasonal pattern of endemic/epidemic strains that have decreased in summer months.

Response will require adaptation over time



Herd Immunity, Testing, and Contact Tracing



Herd immunity is key to control in an epidemic like this

- Herd immunity (also known as community immunity) is defined by the CDC as “a situation in which a sufficient proportion of a population is immune to an infectious disease (through vaccination and/or prior illness) to make its spread from person to person unlikely.”
 - When someone becomes immune to a pathogen, through **vaccination** or **recovery from illness**, that person will no longer spread the pathogen, meaning that person is not the only beneficiary of their immunity
 - Herd Immunity is key to controlling epidemics and pandemics.

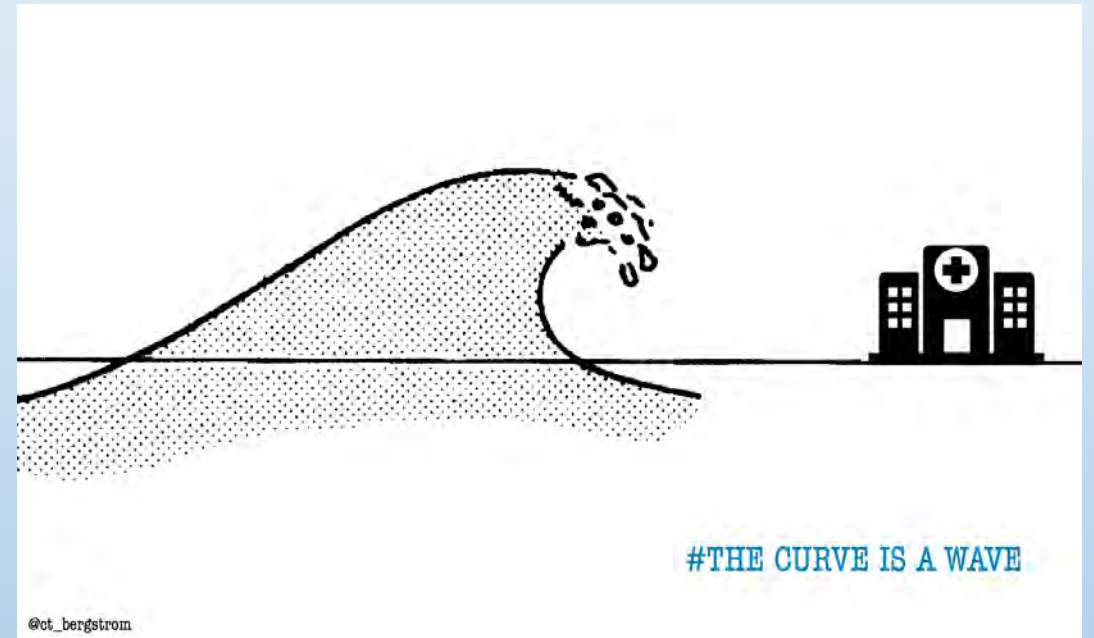


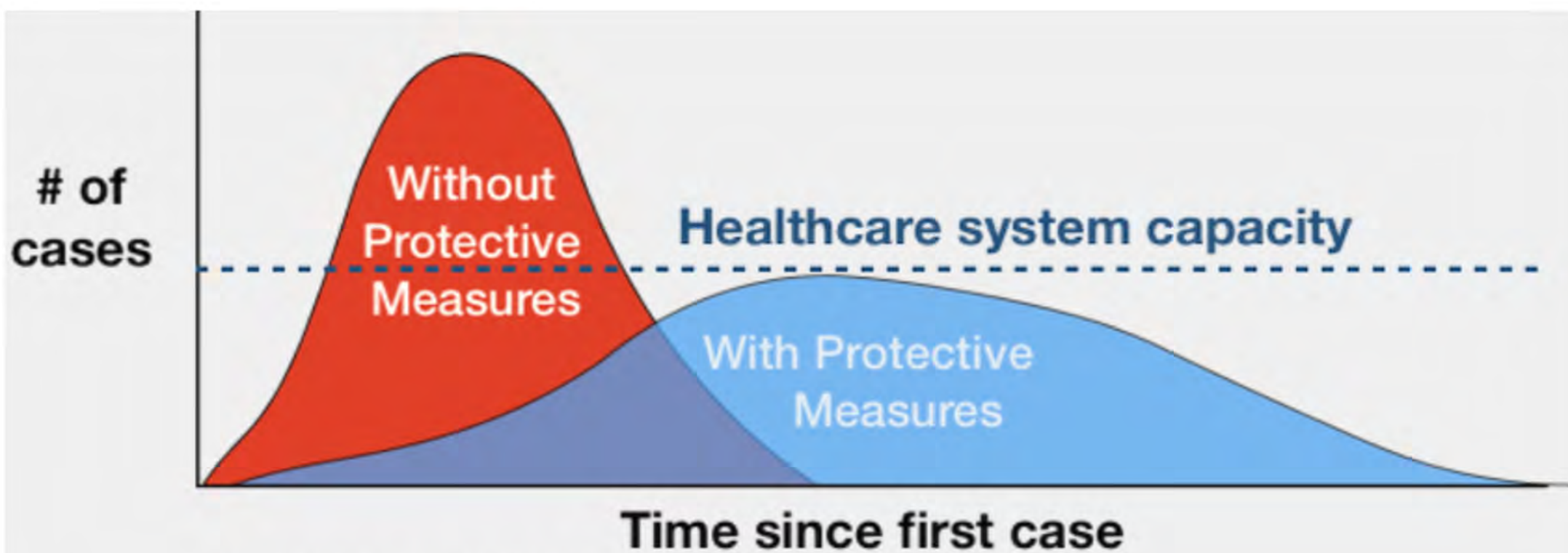
An Example of Herd Immunity: Measles

- An outbreak of measles occurred in Milwaukee, Wisconsin in the late 1980s.
- Researchers studied 1,011 adolescent measles cases confirmed between September 1989 and June 1990.¹
- Results showed an “association between immunization coverages and measles attack rate...” in which an increase in vaccination was associated with a decrease in the number in of people who contracted measles.
- Researchers estimated that an immunization coverage of approximately 80% would be sufficient to prevent sustained measles outbreaks in urban communities.

COVID-19 is different from measles as there is no vaccine: So the herd immunity situation is different

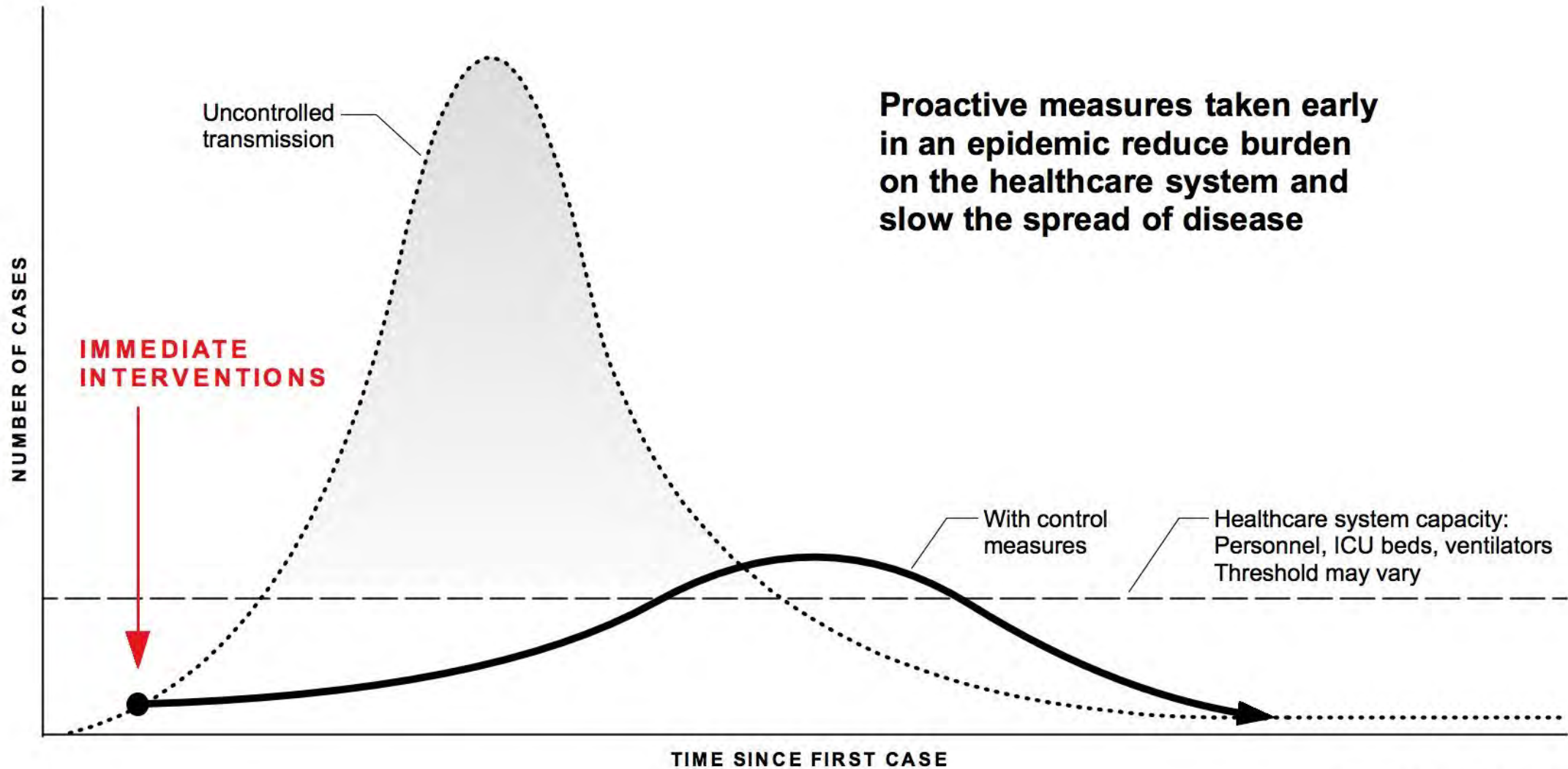
- There's no vaccine for COVID-19 yet – there will probably not be one available to the public for a year or more
- The only option is immunity after recovery from the virus. This means the majority of people will need to catch the virus at some point in time.
 - We will likely need at least 70% of the population to be immune to have herd protection.
- **But not at the same time or the health system gets swamped**
- **The curve everyone is talking about flattening entails spreading out the rate of infection to reduce case load in hospitals for the severely ill.**





Adapted from CDC / The Economist

LOWER AND DELAY THE EPIDEMIC PEAK



Covid-19 testing

Why is testing important

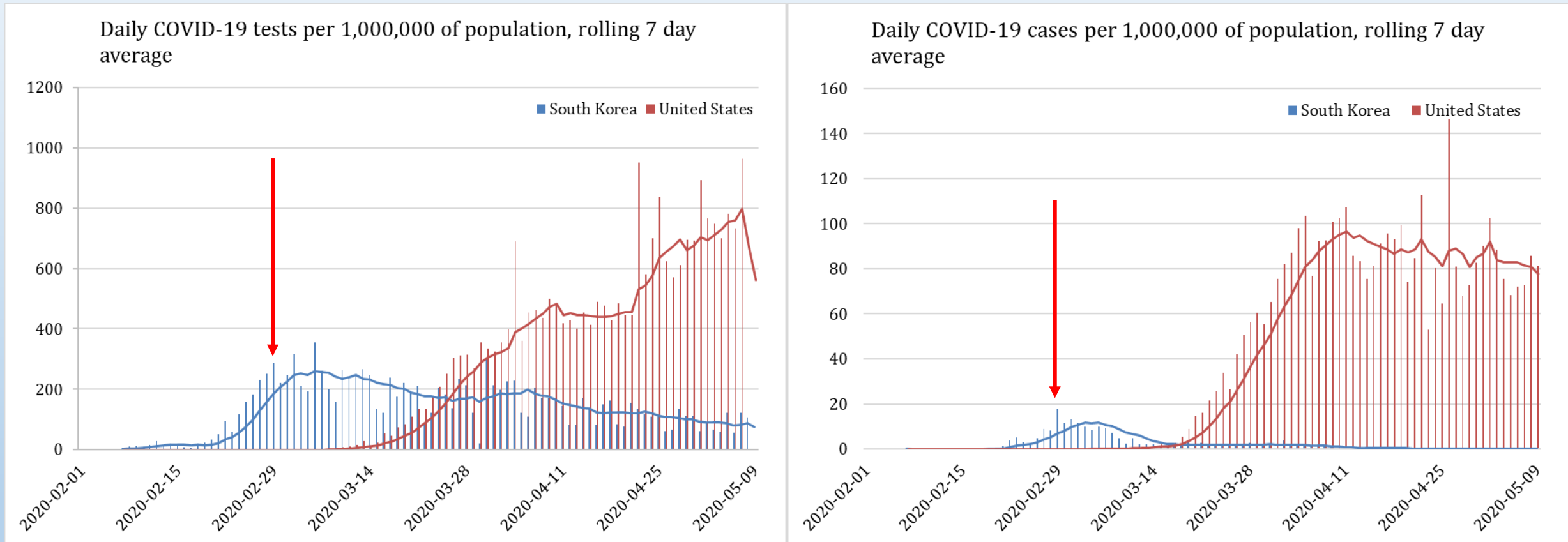
Different kinds of tests tell us different things

Why is testing so important?

- It is important to diagnose people quickly and to prevent spread of COVID-19 to the community through isolation of infected people and contact tracing when feasible.
- Effectiveness seen in South Korea
 - Used the WHO validated test
 - Test as many people as possible even with minor suggestive symptoms and get results back quickly
 - Contact trace
 - Isolate
- If we only wait until one is very ill to administer a test—those with minor or no symptoms spread the disease



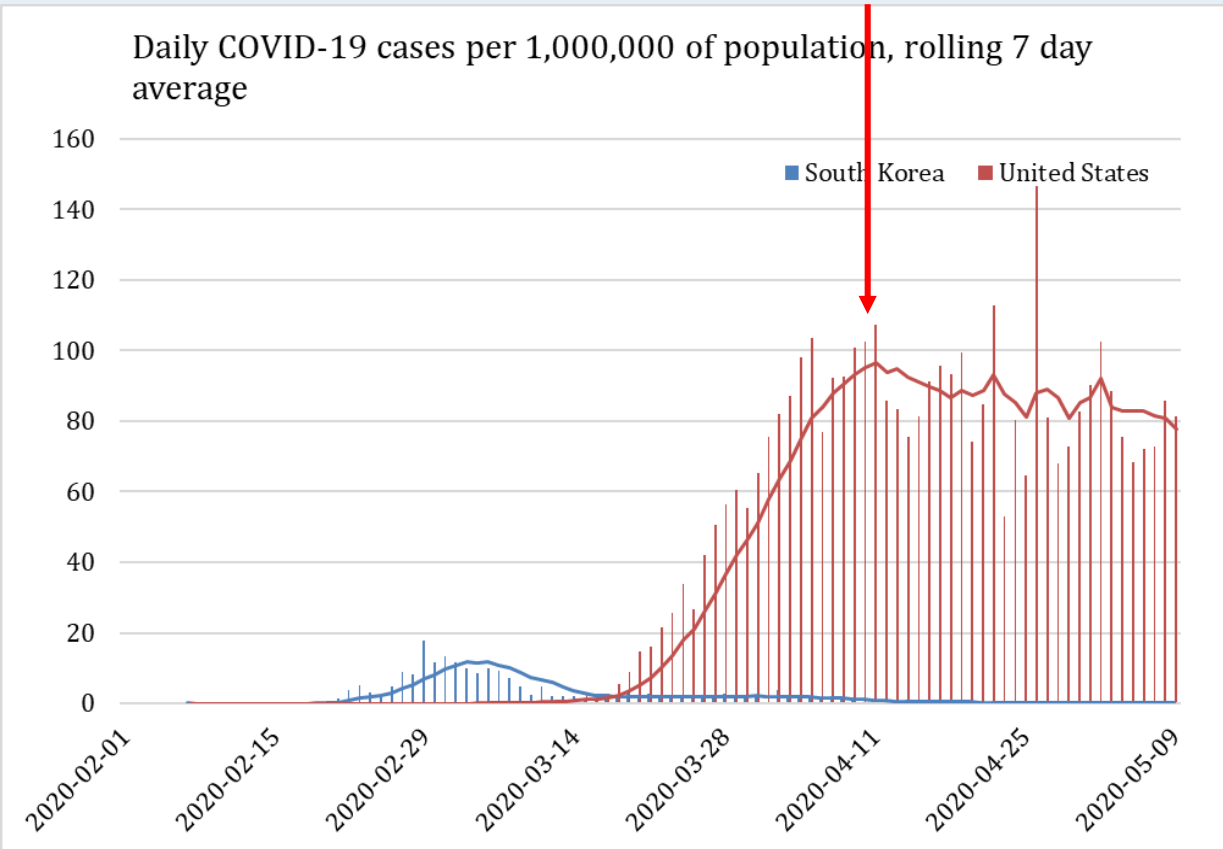
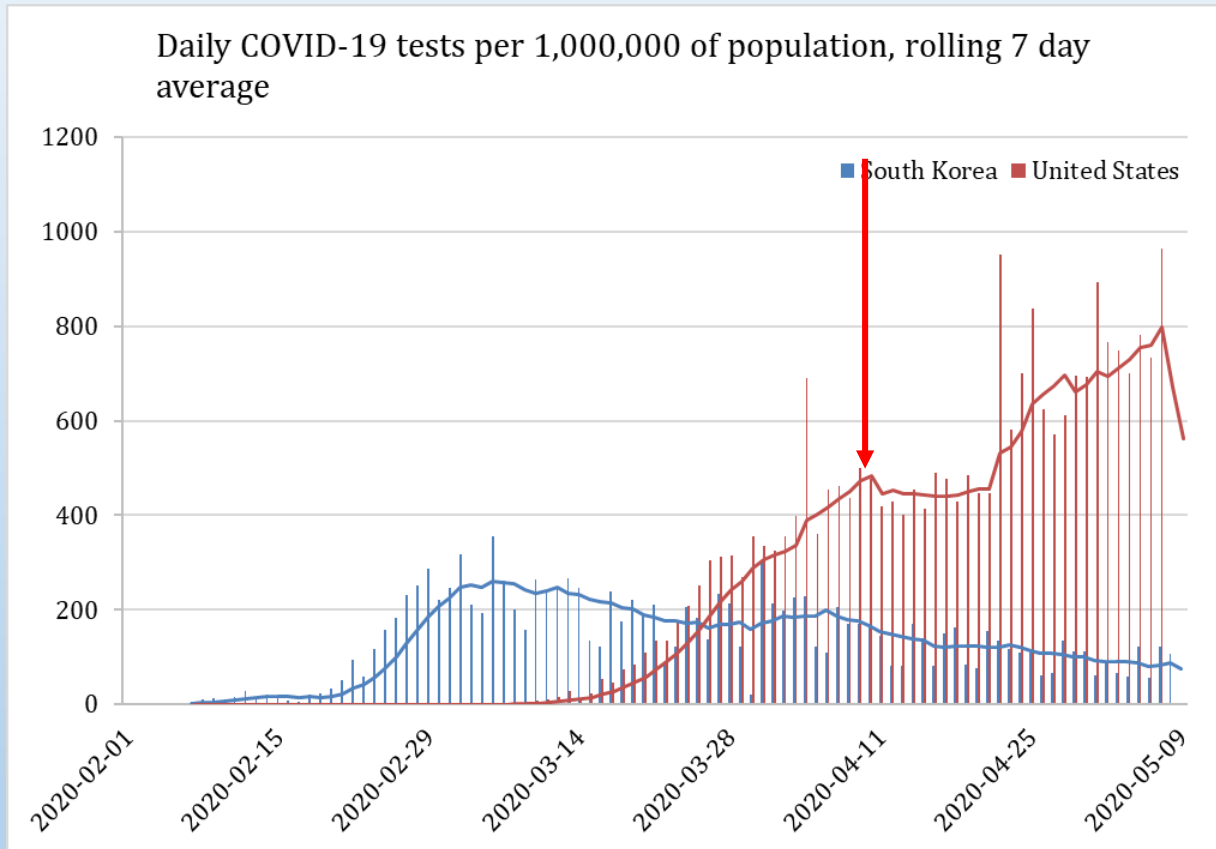
Testing early matters



Ramping up testing early on in the outbreak helps to reduce the spread of infection, and shorten the duration of the outbreak



Testing early matters



Whereas waiting to increase testing until the outbreak is already well underway increases the duration and peak of the outbreak



Testing early matters

- While the US is now testing more people per capita than South Korea, there are a few important things to keep in mind:
 - **South Korea's outbreak has been on the decline since early March, with an average rate of less than 9 new cases daily in the past two weeks.**
 - **In comparison, the US has had an average rate of greater than 28,000 new cases daily over the past two weeks in May .**
- The major difference is the timing and intensity of testing efforts.
 - South Korea began *robust testing very early on in their outbreak*, which when combined with rigorous contact tracing, helped them to curb their outbreak early on.



Testing early matters

- Because South Korea began robust testing efforts early, the average number of daily cases is low so they don't need to test the same amount of people that we do in the US.
- **To give you an idea as to how robust their response was compared to the US:**
 - At the height of their outbreak, South Korea was testing 16 times the amount of people as they had confirmed cases. **I.e. For each person that was positive, they also tested 15 other people who came back negative.**
 - In comparison, on the day we had the most new cases the US only testing 4 times the amount of confirmed cases. **I.e. For each person that tested positive, they were also testing 3 other people who came back negative.**
 - **South Korea's testing response was 4 times that of the US**



Two Types of Testing

Polymerase Chain Reaction (PCR)¹

The Swab Test

A diagnostic test used in the United States at present identifies people who are currently spreading the virus. The test does not reveal who has previously been infected.

- PCR for COVID-19 requires a nasal swab or sputum sample that identifies the specific viral RNA from the COVID-19 virus. It's the gold standard to see if you are actively infected.
- PCR detects the presence of this virus molecule in a person. **It does not detect the disease effect, meaning a person can be PCR positive before they have symptoms.**

Serological (antibody)²

The Blood test

*A blood-based serological test detects antibodies that people produce after they've become infected. These antibodies can appear in the blood weeks after infection. **Antibodies detect the immune system's response to the presence, not the current presence of the virus.***

- This test has epidemiological uses, supporting retrospective case counts, as well as diagnostic uses.
- It has been employed in China, Taiwan, and Singapore and is currently being deployed in the USA.^{2,3}

Why are there False Negative PCR Tests?

The Swab test

- A PCR test is **only valid for a single point in time**.
- A “false negative” is when someone who has the disease receives a negative test result.
- There are a number of reasons why a PCR test may result in a false negative¹:
 - It might be too early in the illness, when the amount of virus in the airway is still small.
 - It could be a problem with how the swab was done.
 - There could be issues with the handling or transport of the swab.
 - There could be laboratory error.

1: Carbone, M., Green, JB., Bucci, EM., & Lednicky, JA. (2020) Coronaviruses: Facts, Myths, and Hypotheses. *Journal of Thoracic Oncology*.



Why are serological tests so important?

The Blood test

- Identifies people who were not known to be infected:
 - Identifies current, silent infections, as well as those who have recovered.
 - Supports contact tracing.
- Presence of antibodies can mean several things:
 - Ability to care for sick.
 - Potential to donate antibodies through plasma.
 - Return to work, other demands.
- However - *does a positive response for the antibodies mean that a person is actively infected, or that they have been infected in the past?*

Two types of serological tests

Elisa immunoassay

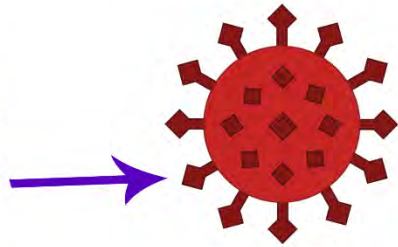
- Gold standard, but labor intensive and expensive
- Assesses IgM levels which indicate ongoing, or recent, infection.
- Excellent tests for determining true immunity by antibody titers.
 - “Titers,” or levels of antibodies, provide a quantification of antibody presence (high or low)

Lateral flow assays

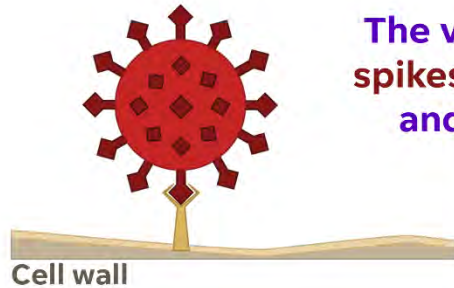
- Array of rapid turnaround tests that are cheap and usually rely on color change to give you a qualitative “binary” yes or no answer to whether antibodies are present in your blood
 - A common lateral flow assay test is a pregnancy test
- Accurate when positive, but have higher false negative rates compared to Elisa
 - Miss cases early on and are not helpful in the first 1~2 weeks of illness, may miss those having suppressed immune systems
- Not great for diagnosing “active” cases of COVID-19 infection, but useful for surveillance of large populations after the fact

Antigens are structural parts of a virus.

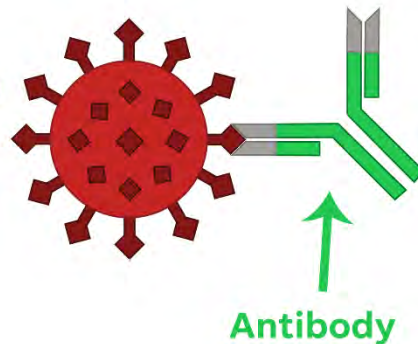
In the novel coronavirus, a series of spikes on the outside help the virus spread



The virus uses these spikes to bind to cells and infect them.



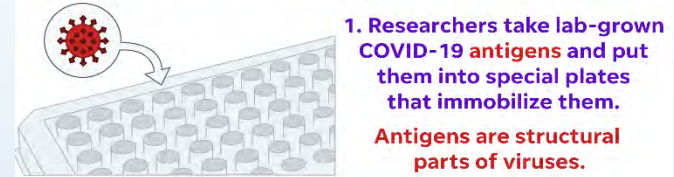
These spikes can be neutralized, or blocked by **antibodies**.



Antibodies are proteins produced by the immune system to fight infection.

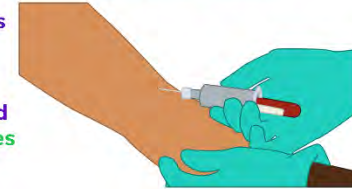
Developing a blood based serological test

How COVID-19 antibody testing works:



2. Health care workers take a sample of a patient's blood.

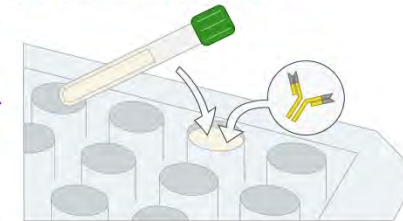
3. Parts of the blood containing **antibodies** are extracted into a serum.



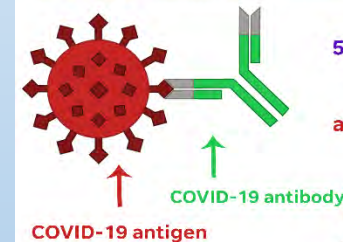
Antibodies are produced by the immune system to fight infection.

4. The serum and a **detector antibody** are added into the special plate mixture.

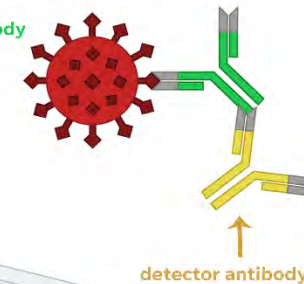
Detector antibodies alert researchers to the presence of virus antibodies.



5. If COVID-19 **antibodies** are present, they will stick to COVID-19 **antigens** and block them.



6. The **detector antibodies** will stick to the COVID-19 **antibodies** to cause a reaction.



7. The reaction causes the liquid in the plate to turn **blue**. If the liquid turns **blue**, it means the patient has had or currently has COVID-19.

Big questions remain related to testing for COVID-19 immunity

- How accurate are the tests –especially the lateral flow assays that are being developed and sold by many labs with suboptimal oversight
 - Both sensitivity and specificity of tests need to be considered
- We still don't have a reference point for COVID . At what level of antibody production is one immune and for how long
 - One might test positive to a lateral flow assay, but low levels of antibody response might mean they are not immune from reinfection.
 - Immunity exists on a continuum: not everybody exposed to the disease produces the same amount of antibodies
- What percentage of the antibodies being produced are neutralizing antibodies (which prevent the disease by binding to the virus), and what percentage are antibodies that just recognize the virus

Questions remain about the protective effect of antibodies

- It is still unknown having antibodies to COVID-19 would prevent re-infection.
 - We know from outbreaks of related coronaviruses (SARS and MERS) that whether someone develops antibodies and how long those antibodies lasts varies.
- Based on the assumption that those who have the infection are immune from acquiring it again, researchers suggest that **70% of the population would need to acquire COVID-19 to provide herd immunity.**
 - Currently only about 5% of the US population would be immune based on this assumption





Would different strains affect COVID-19 vaccine development?

- **Viruses mutate**, and at varying rates (some mutate very quickly while others are fairly stable).
- Current viral genomic research suggests:¹
 - **At least 10 strains** of the COVID-19 have been identified
 - Only small differences between the virus strains that cause COVID-19
 - They have a **slow rate of mutation**
- At the moment, scientists think:²
 - It is unlikely differences in mortality and symptom presentation are related to people being infected with different strains of the virus. *There may be a difference in how infectious they are.*
 - Immunity gained from infection will be across the different strains, but the question is *how long that immunity will last.*
 - A vaccine developed for SARS-CoV-2 would be a single vaccine, rather than a new vaccine every year like the flu vaccine (more like chickenpox and measles vaccines) and have a long-lasting effect

Contact tracing

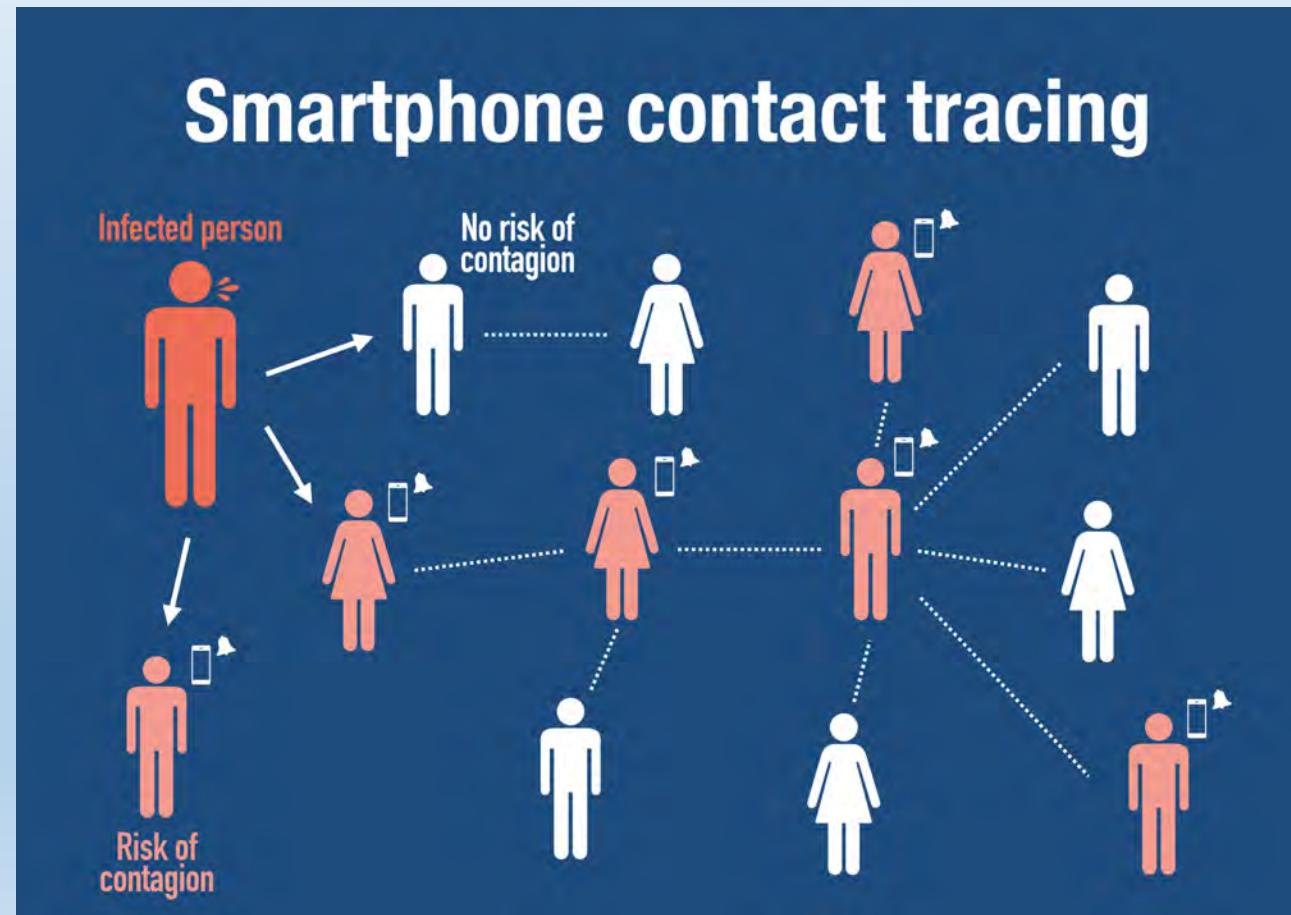
A necessary follow up to testing



What is contact tracing

- Contact tracing is a vital public health process in which individuals who may have been exposed to an illness are identified and then notified of their exposure so that they can take necessary precautionary measures (such as testing and self-isolation) to prevent exposing other people.
- **This is essential to curbing and preventing outbreaks of *infectious diseases*.** E.g. illnesses that can be passed from person-to-person.
 - If people who have been exposed are informed EARLY, then transmission of the virus to other people can be prevented.

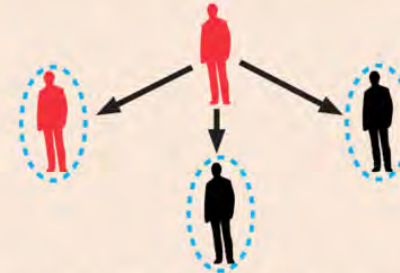
What is contact tracing in person as well as thru use of cell phones



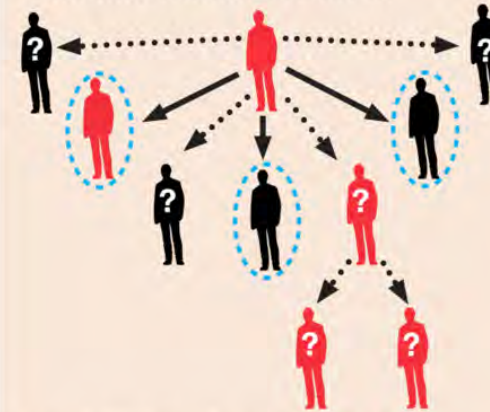
Contact tracing

- Contact tracing is different than community monitoring.
- In contact tracing, people who may have been exposed are identified by someone who has tested positive for the virus.
 - **These people are informed that they may have been exposed (without disclosing the person who tested positive to maintain confidentiality)**
- In community monitoring, all individuals in a community are under constant surveillance to identify and isolate people who become sick right away.

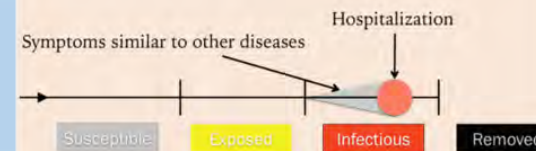
Contact tracing



Sick individuals asked to identify contacts. Authorities attempt to find and isolate contacts.

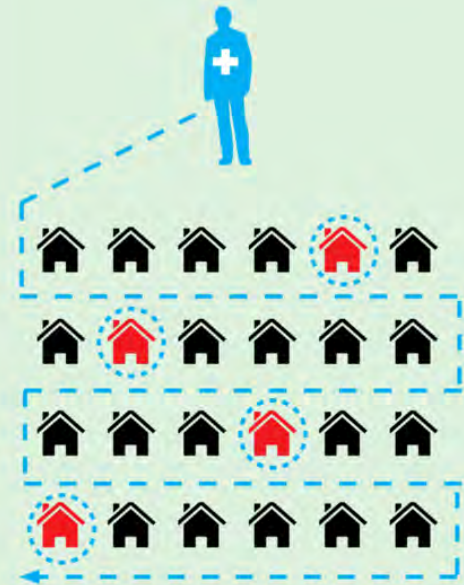


Hard in urban environments because of unknown contacts.

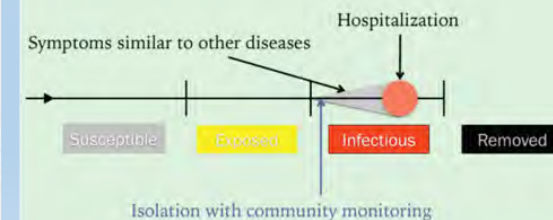


Sick individuals have a long time to infect others before being hospitalized.

Community monitoring



Communities with infected individuals monitored daily. Effective due to early identification of infections.



Sick individuals are isolated before they have a chance to infect others.

Contact tracing and testing

- **Both robust contact tracing efforts and robust testing are needed in order to fully understand the outbreak and to prevent surges in cases**
 - Contact tracing is effective, but if there isn't enough testing than we aren't able to identify everyone who is sick and figure out who they may have exposed.
 - Testing is effective, but if there isn't a way to contact people who may have been exposed by infected individuals then those who were exposed continue to expose others.
 - **BOTH are needed to identify who is infected and to prevent further transmission**

Physical distancing

**Why is this essential to mitigate
COVID-19**

Physical Distancing Buys us Time

- Distancing is currently the only way of slowing down the number of cases and reducing the number of serious cases needing hospitalization.
- Distancing helps prevent healthcare surges - which need to serve not only COVID-19 cases, but a broad range of urgent as well as routine health problems
- Gives suppliers time to make and distribute essential resources needed by health care providers to protect themselves and patients.
- Allows for time to develop:
 - Better clinic and home-based tests for present and past COVID-19 infection.
 - More effective antiviral treatment options, curative and preventative.
 - Vaccine development.

Physical Distancing in the 1918 Pandemic

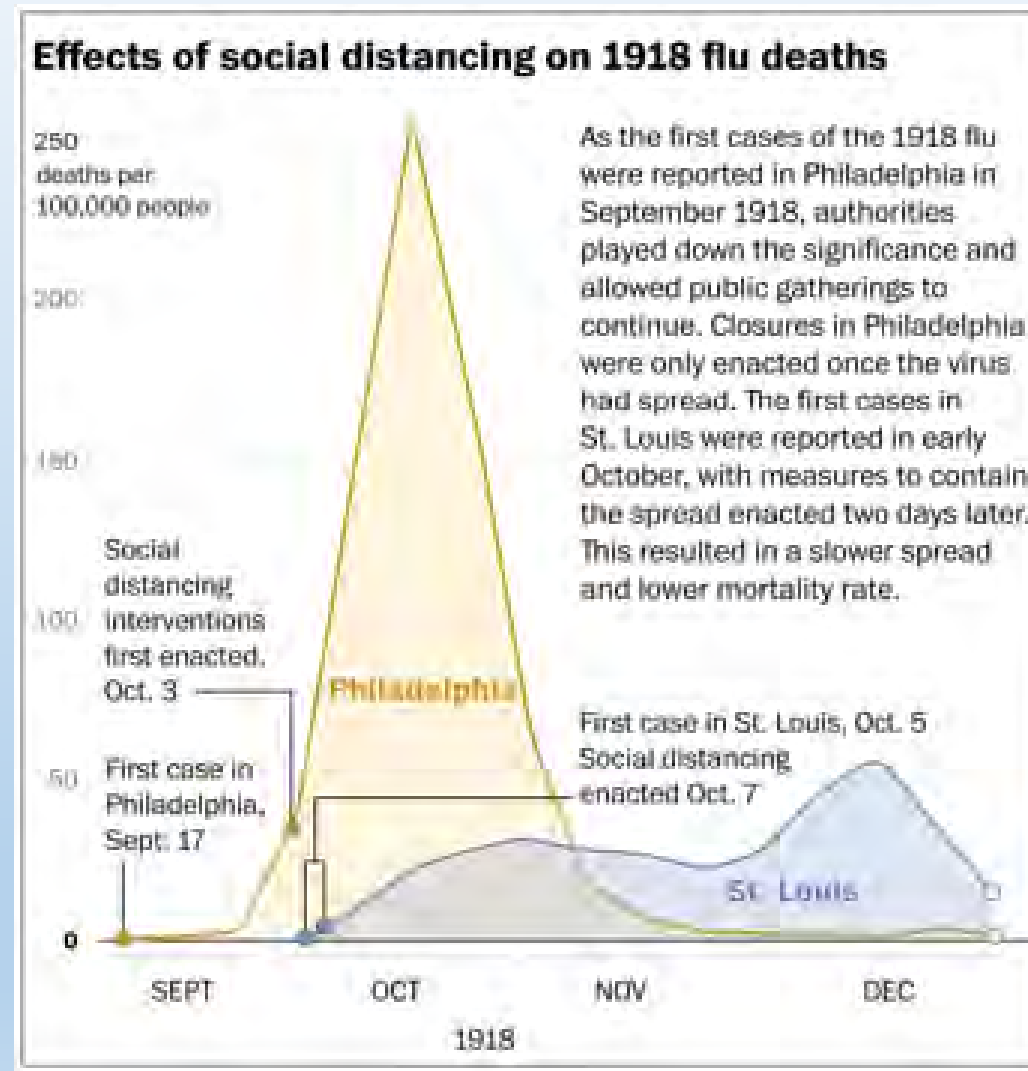
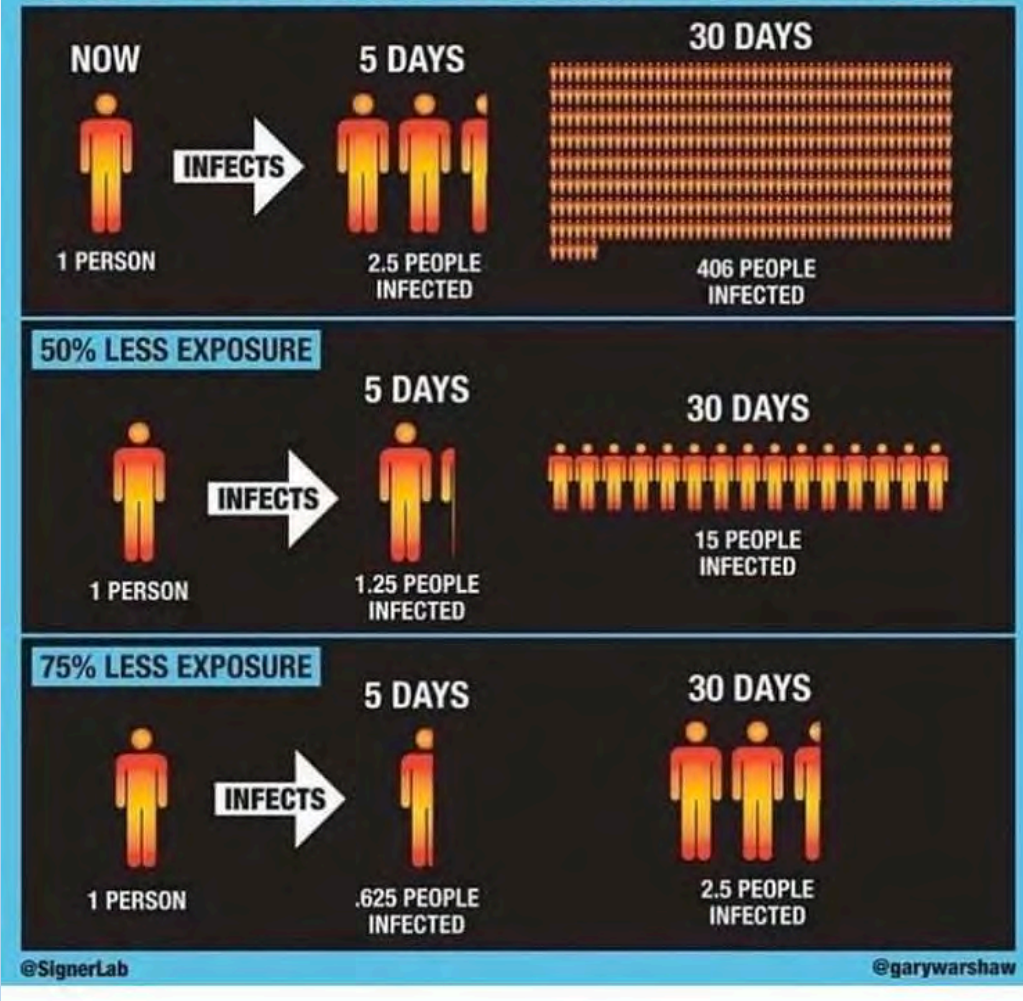


Image: Meko, T. (2020) Social distancing could buy U.S. valuable time against coronavirus. *Washington Post*.

THE POWER OF SOCIAL DISTANCING



The Vital Importance of Social Distancing

How a reduction in social contact can reduce the spread of the coronavirus

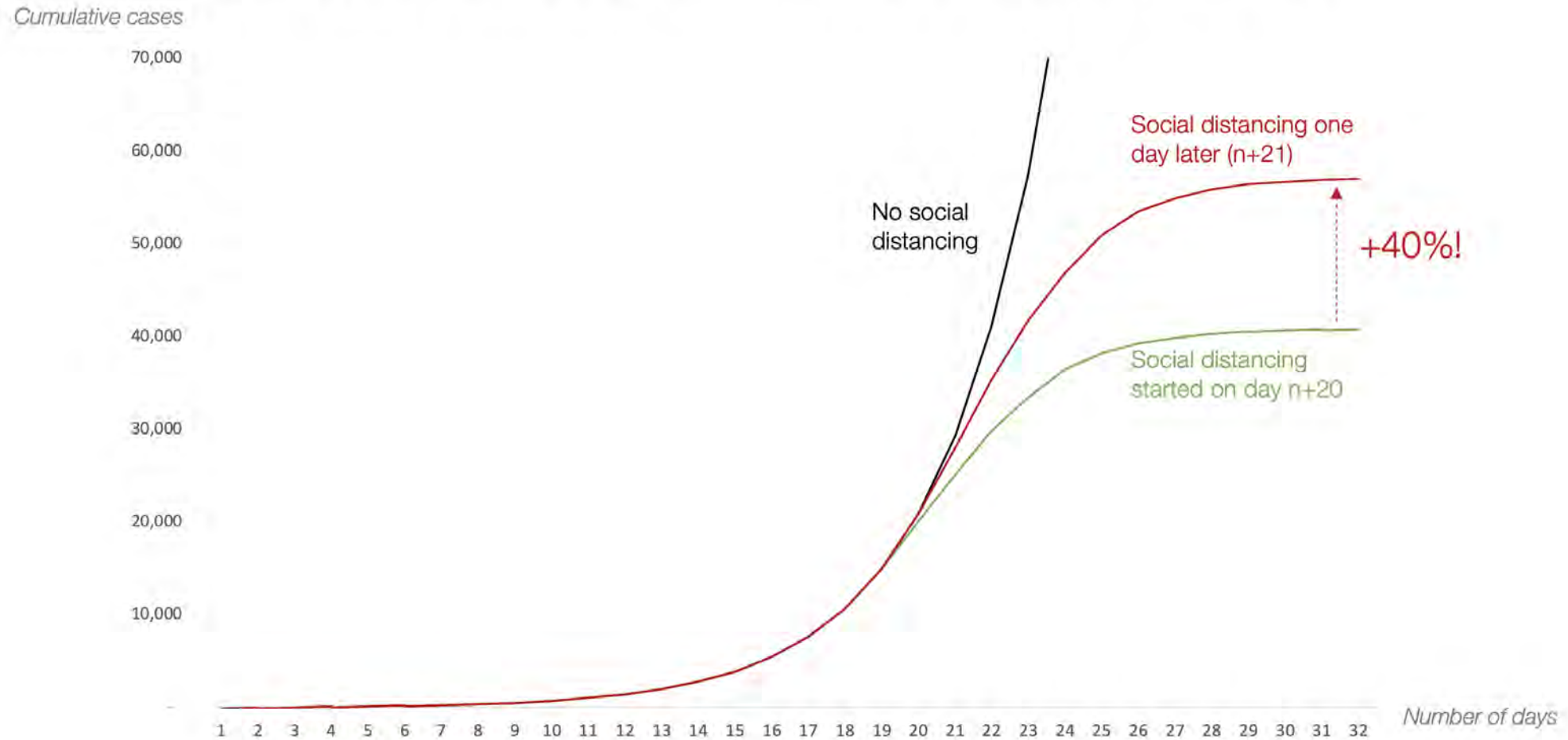


Source: Signer Laboratory/Gary Warshaw

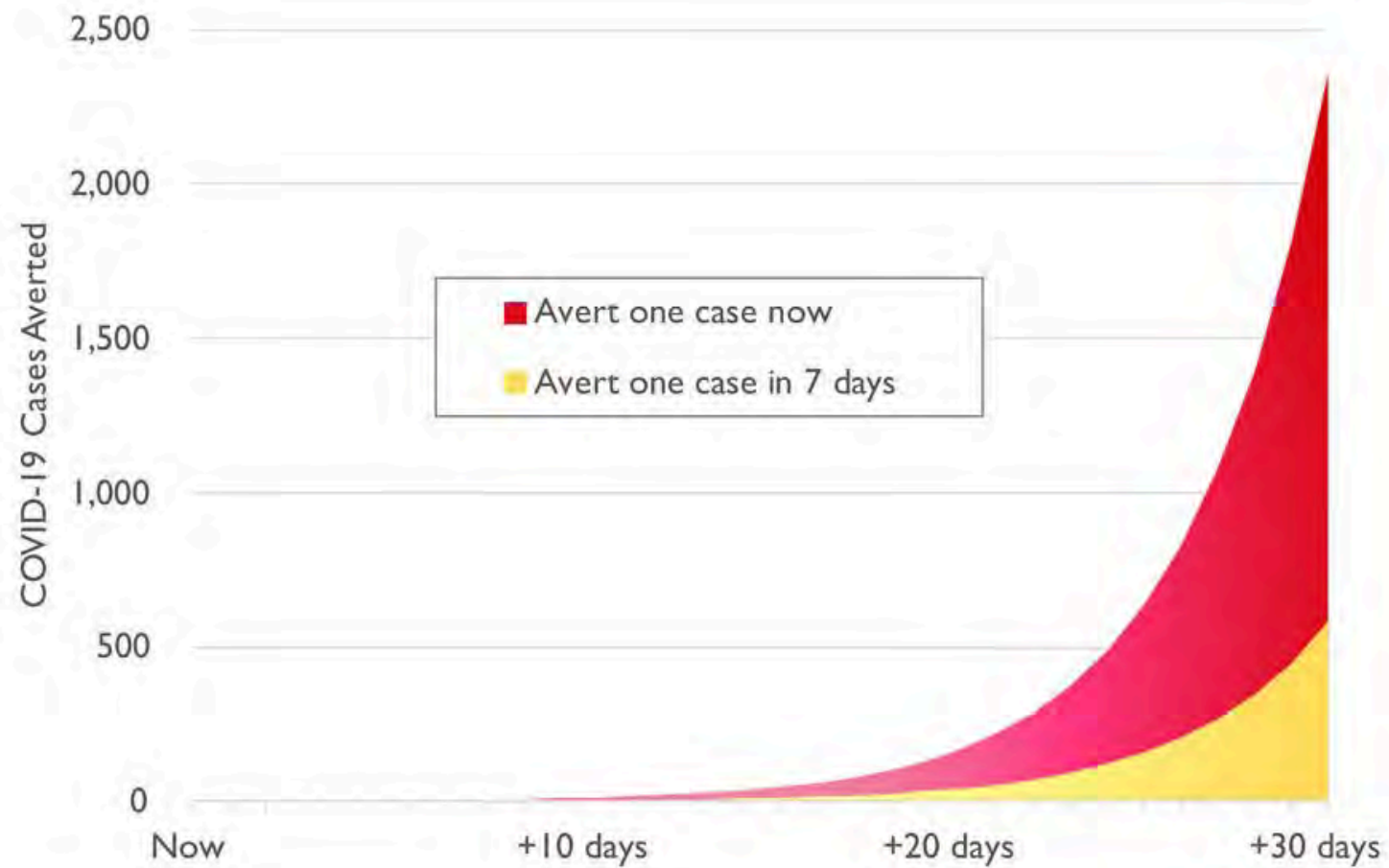


statista

Chart 23: Model of Cumulative Cases of Coronavirus with Social Distancing Measures Taken One Day Apart

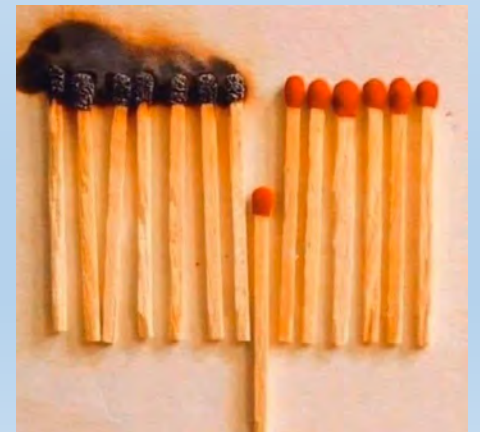
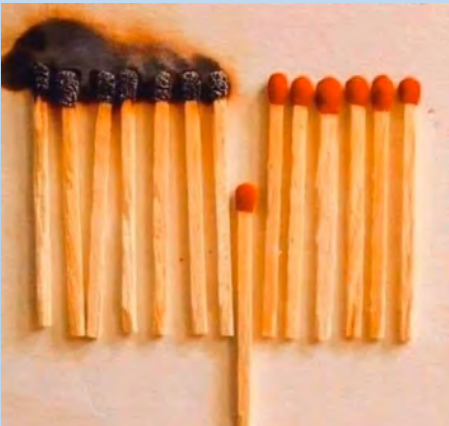


Source: Tomas Pueyo



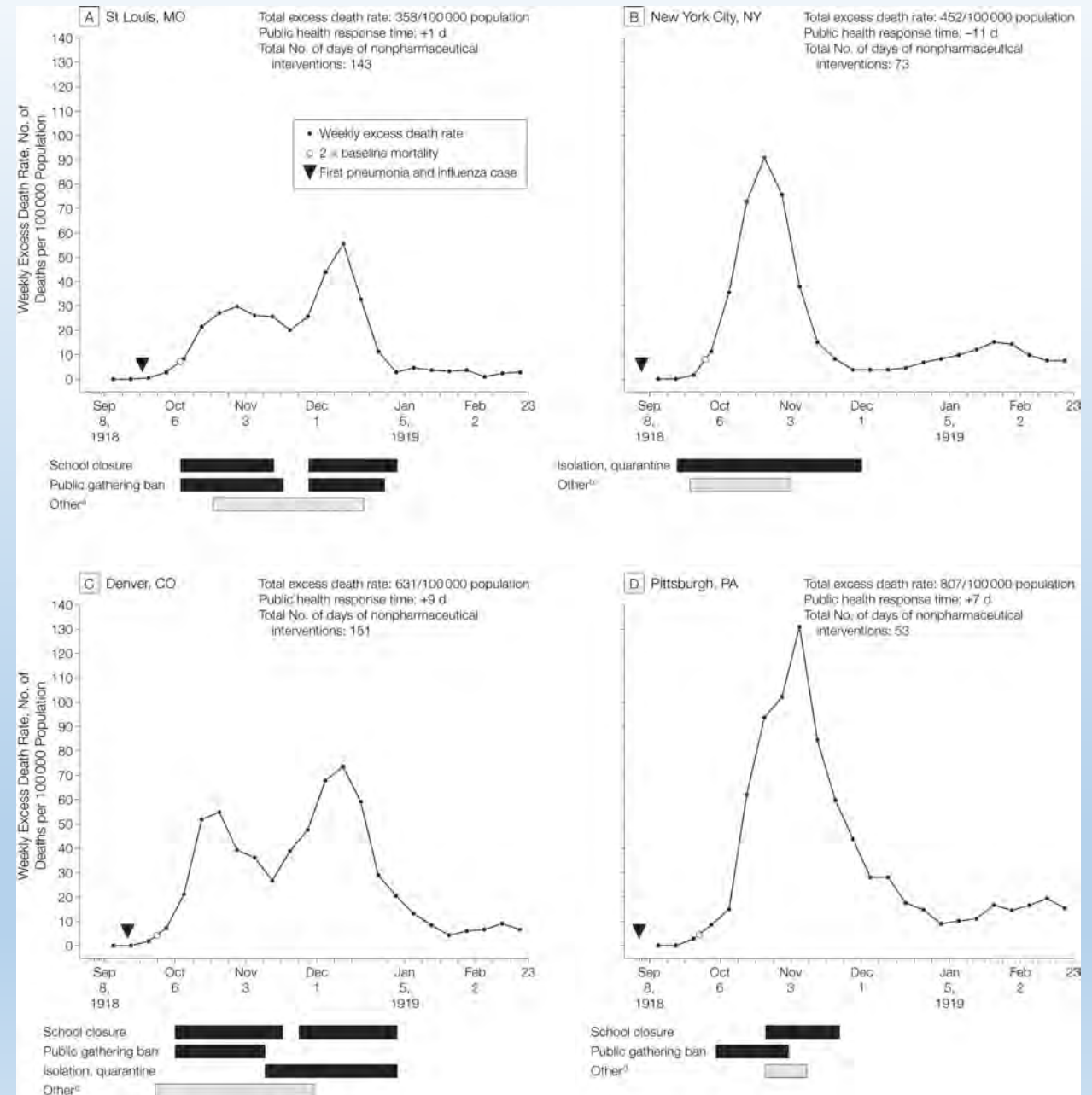
How do we know physical distancing and (when warranted) quarantine work?

We know from both history
and what other countries have done already.

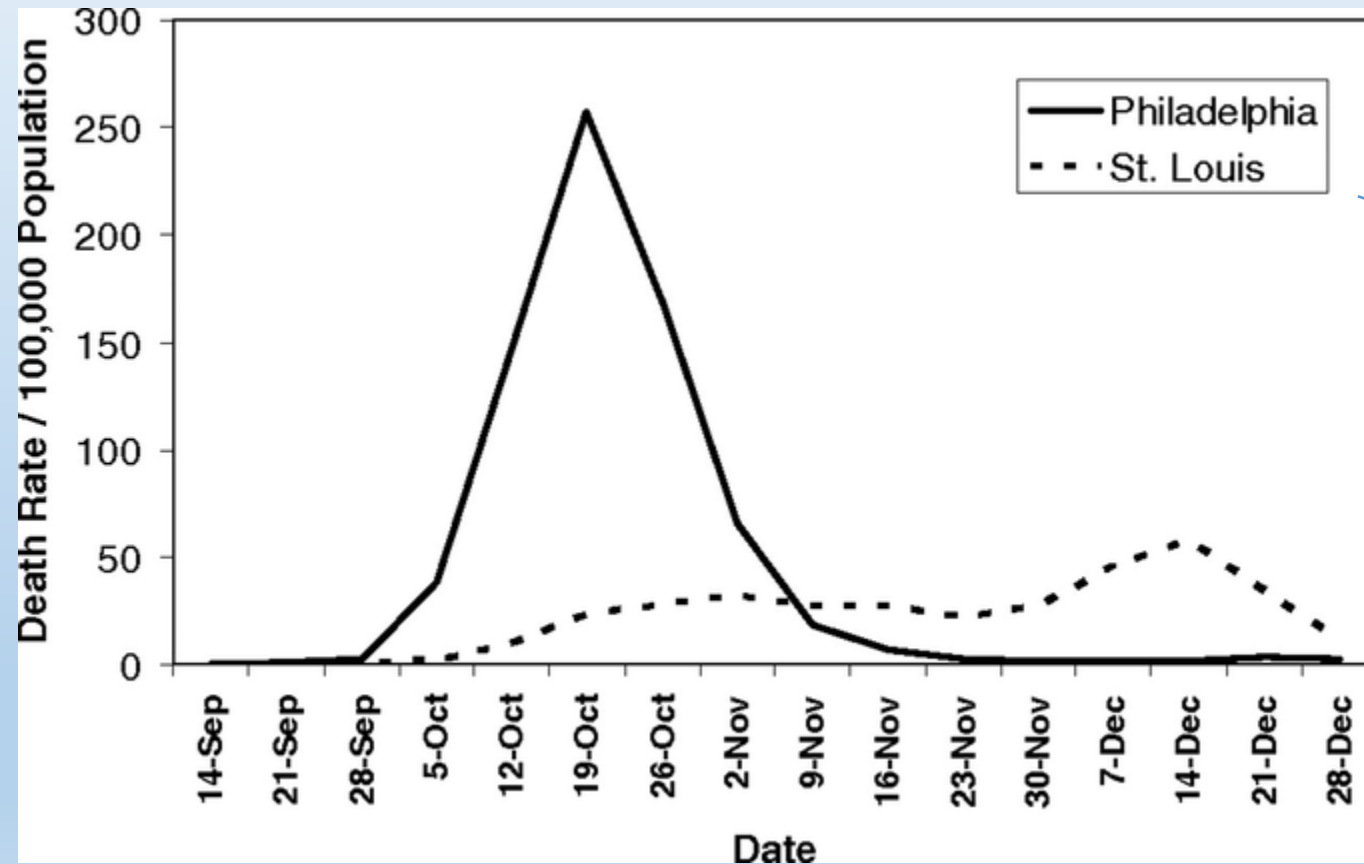


Lessons Learned from the 1918 flu

- We know that from a previous respiratory virus pandemic that the timing of easing restrictions is vital to preventing a second wave of cases.
- In cities that maintained non-pharmaceutical interventions (physical distancing, closures, etc), a second wave of cases was not observed.
- In cities that opened prematurely at the start of a decline, saw a second wave of cases that was more severe than the first.



A tale of two cities in 1918 is telling: There is a reason for canceling public gatherings



Public gathering

No public gathering

Physical Distancing

- **Persistence is necessary;** ending a lock-down and returning to business too soon will lead to a second surge in cases.
- Experts are considering a potential long-term intervention strategy in the future in which the curve is spread out to keep the curve low so as to avoid overwhelming healthcare capacity.¹
 - **When the curve appears low:** reduce physical distancing and follow prudent preventive health behavior.
 - **When the curve appears to rise:** return to physical distancing.
- This "*lightswitch*" approach would need to be carefully monitored with adequate testing and a good surveillance system – something the US does not have at present.



Current lessons from South Korea about relaxing restrictions too soon

- Relaxing of restrictions, and timing of reopening is imperative in controlling the spread of infection.
- South Korea had reopened most of their businesses and relaxed restrictions because of their significant decline in daily cases.
 - **However, they are starting to re-implement some of their restrictions due to data showing that lifting some of them may have been too soon.**
- One bar/club patron has recently tested positive for the virus that causes COVID-19, which has resulted in the shut-down of bars and nightclubs for at least 30 days.
- This person showed no symptoms when he was at these locations but 13 other cases have been traced back to him, and officials believe he may have potentially expose upwards of 1,500 in that one night.



Current lessons from Germany

- Germany has also been hard hit by the pandemic. Current data shows they have been one of the most affected countries in the EU and globally along with the US, Italy, UK and others.
 - Because of their aggressive contact tracing and testing efforts, they have observed a significant enough decline to begin a phased re-opening of their economy.
- **Germany is prepared to institute some sort of a “light switch” approach when it comes to controlling their outbreak.**
 - **Along with their phased reopening, some states are able to lock down at a moments notice of increased case counts, as has already occurred in 3 separate regions.**



Current lessons from US states that have reopened

- Early this week many US States have begun to reopen their economies by relaxing restrictions.
- **Some states have experienced increases in cases since reopening. Many of States that are beginning to reopen are still experiencing increases in case counts daily (they haven't reached their peak or seen a consistent decline).**
- In states that have recently reopened, we won't be able to see if these re-openings are resulting in more cases for at least a week or so due to the nature of the illness and testing.
 - Those who end up developing symptoms do not develop them for an average of 4-6 days, and then testing takes another couple days on top of that.
- This just further emphasizes the fact that testing and contact tracing, and maintaining precautionary measures are that much more important at this time. **Opening too early could result in consequences greater than what we've already experienced to this date.**

Current lessons from Sweden

- Sweden has taken a rather unconventional approach to controlling their outbreaks by relying on generating a herd immunity without lockdown measures (which many proponents of physical distancing and other precautions suggest should occur here in the US).
- **With no lockdown measures in place, Sweden's death rate due to COVID-19 is greater than the rate here in the US with our comparatively relaxed lockdown measures in place.**

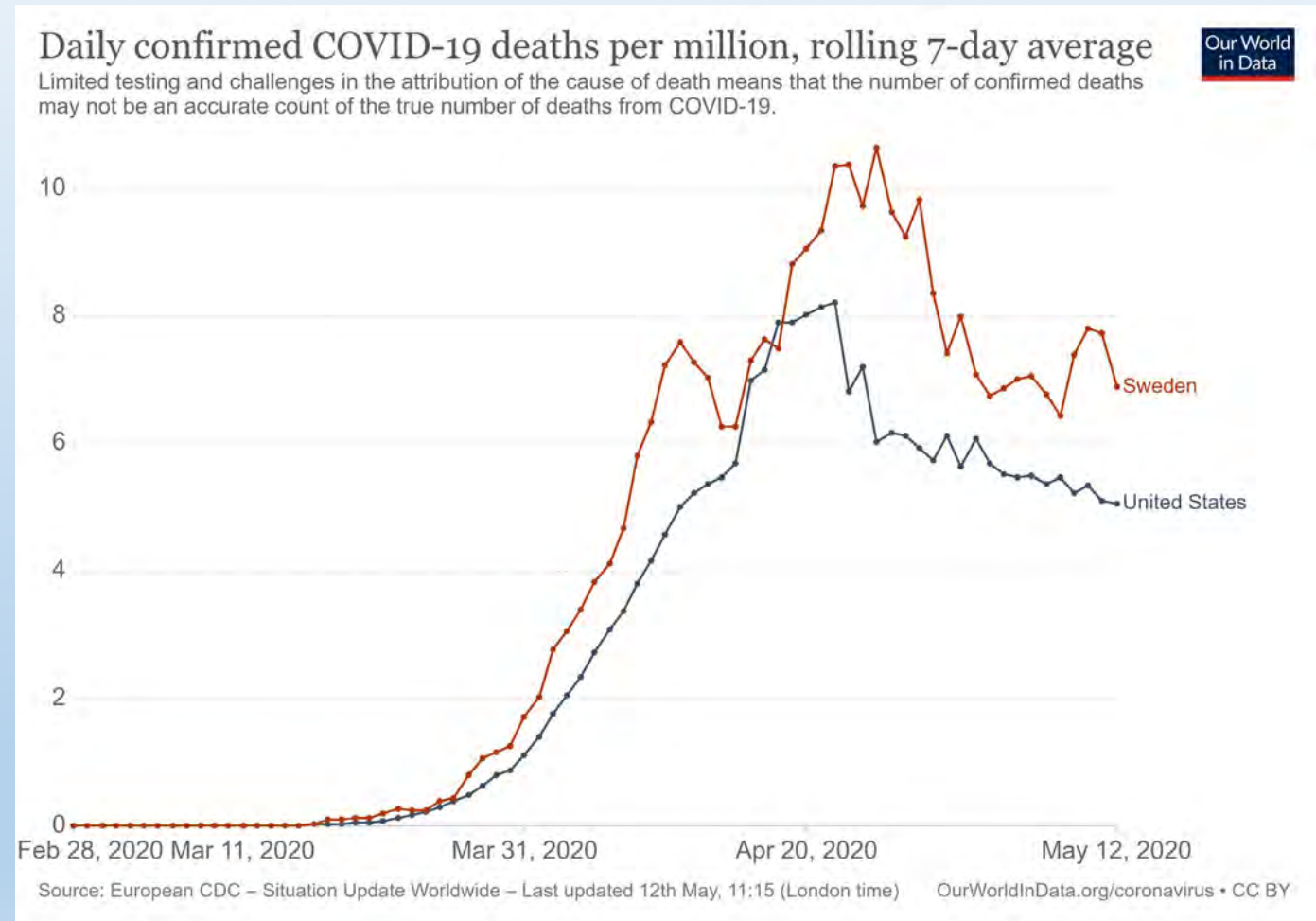
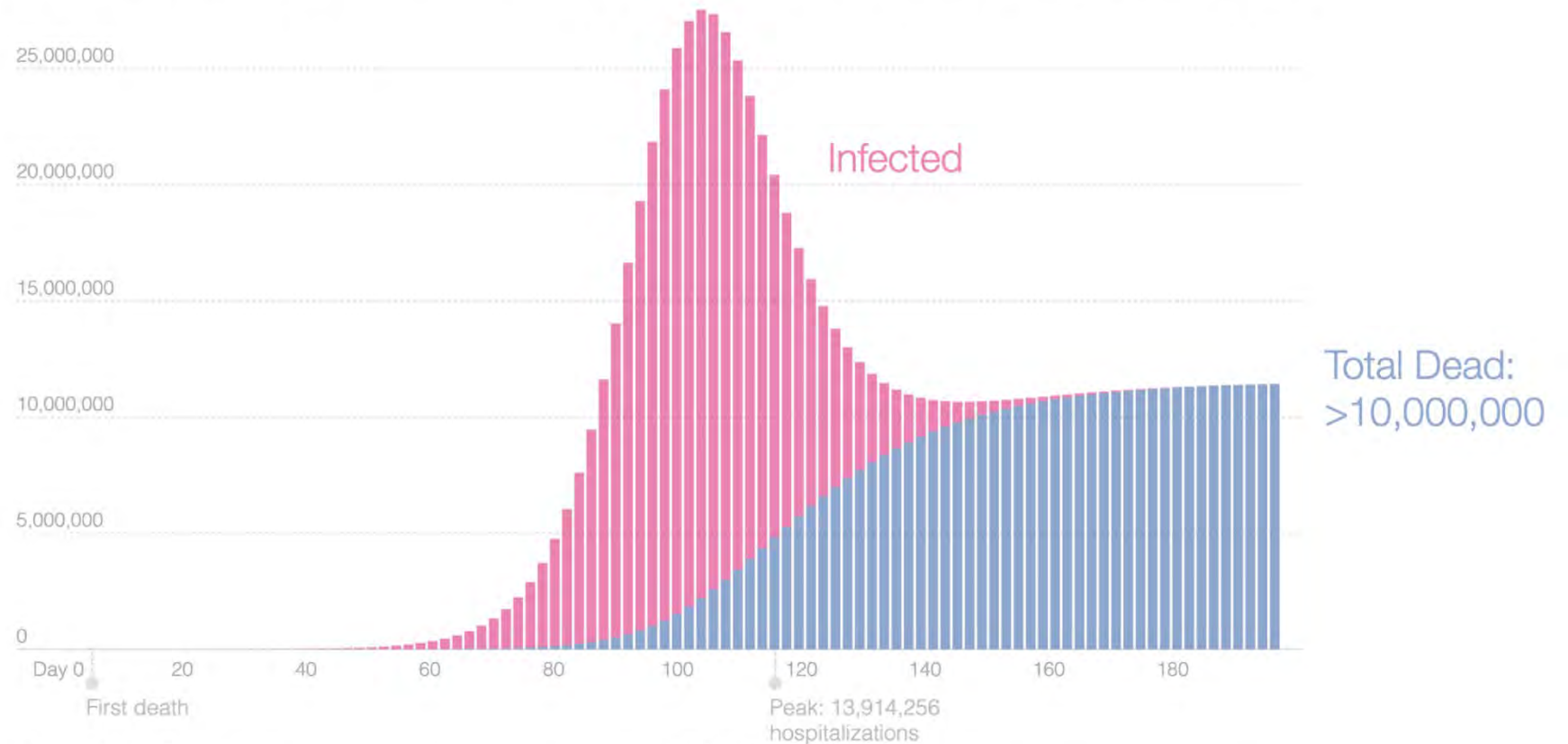


Chart 3: Infections and Deaths If We Do Nothing in the US



Transmission Dynamics

Population Inputs

Size of population.

328,484,431

Number of initial infections.

246

Basic Reproduction Number \mathcal{R}_0

Measure of contagiousness: the number of secondary infections each infected individual produces.

2.4

Transmission Times

Length of incubation period, T_{inc} .

5.20 days

Duration patient is infectious, T_{inf} .

2.9 Days

Clinical Dynamics

Morbidity Statistics

Case fatality rate.

4.00 %

Time from end of incubation to death.

21.3 Days

Recovery Times

Length of hospital stay

10 Days

Recovery time for mild cases

11.1 Days

Care statistics

Hospitalization rate.

14.00 %

Time to hospitalization.

5 Days

Source: Epidemic Calculator, Gabriel Goh, <http://gabgoh.github.io/COVID/index.html>.

What would happen
If we followed
Sweden's strategy
to reach herd
immunity

Lessons learned from success stories

Countries controlling COVID-19

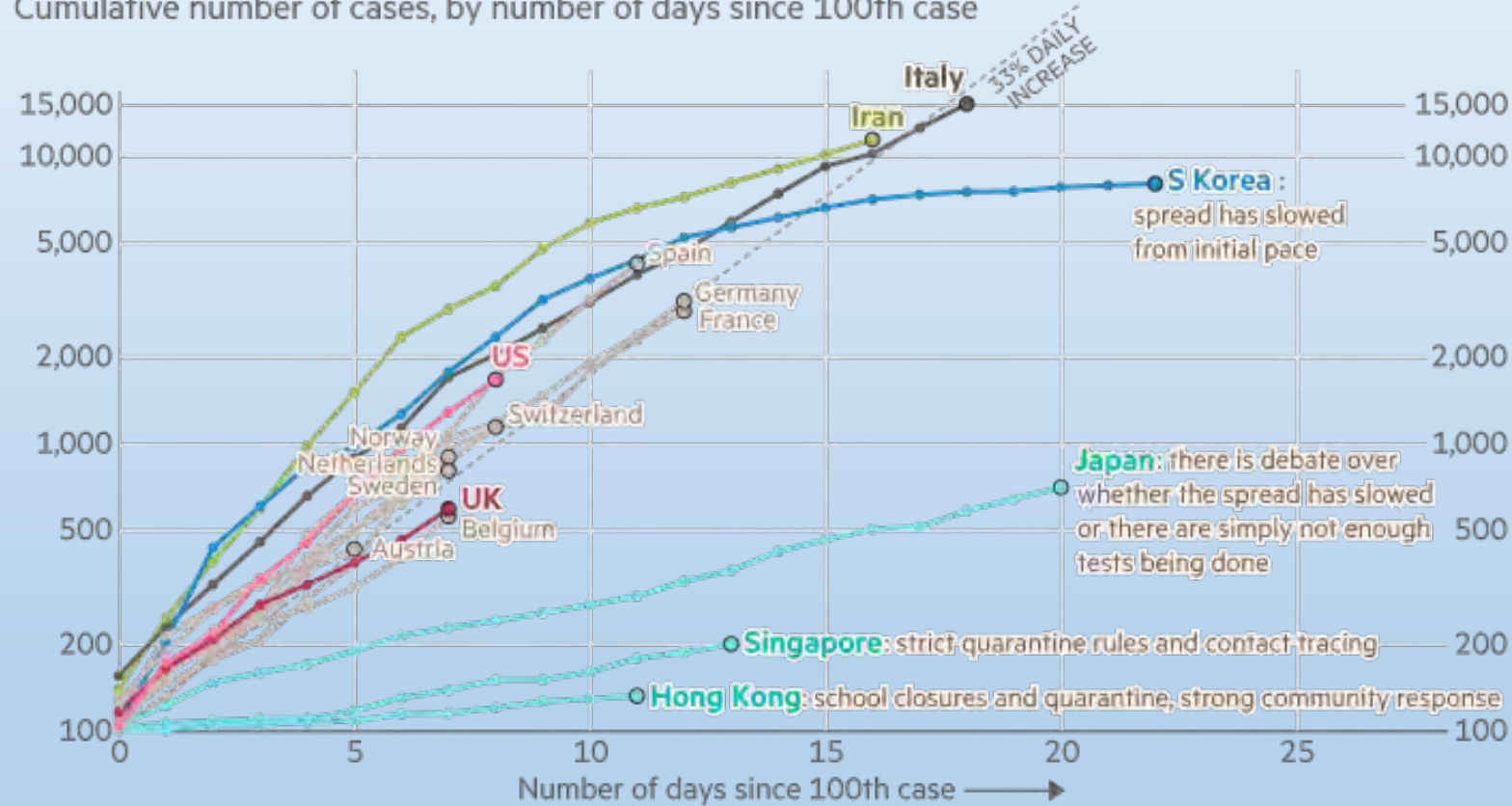


Lessons learned from Asian countries doing the best to contain the disease

- What has worked the best in Asia:
 - Early travel restrictions
 - Aggressive testing and screening of contacts
 - Strict quarantine rules
 - Use of social media to get out uniform and consistent messaging
 - Political will to deal with this crises and a clear chain of command
- Which countries:
 - Hong Kong, Singapore, South Korea, Taiwan, Vietnam
- What they have in place enabling them to do so
 - Universal healthcare
 - Clear management structures for the public health response
 - Proactive communication protocols to get the population on board
 - Preparedness resulting from experience with containing SARS and other pandemics

Hong Kong and Singapore have limited the spread of coronavirus; S Korea is slowing the rate of infection. Most western countries show a similar trajectory

Cumulative number of cases, by number of days since 100th case

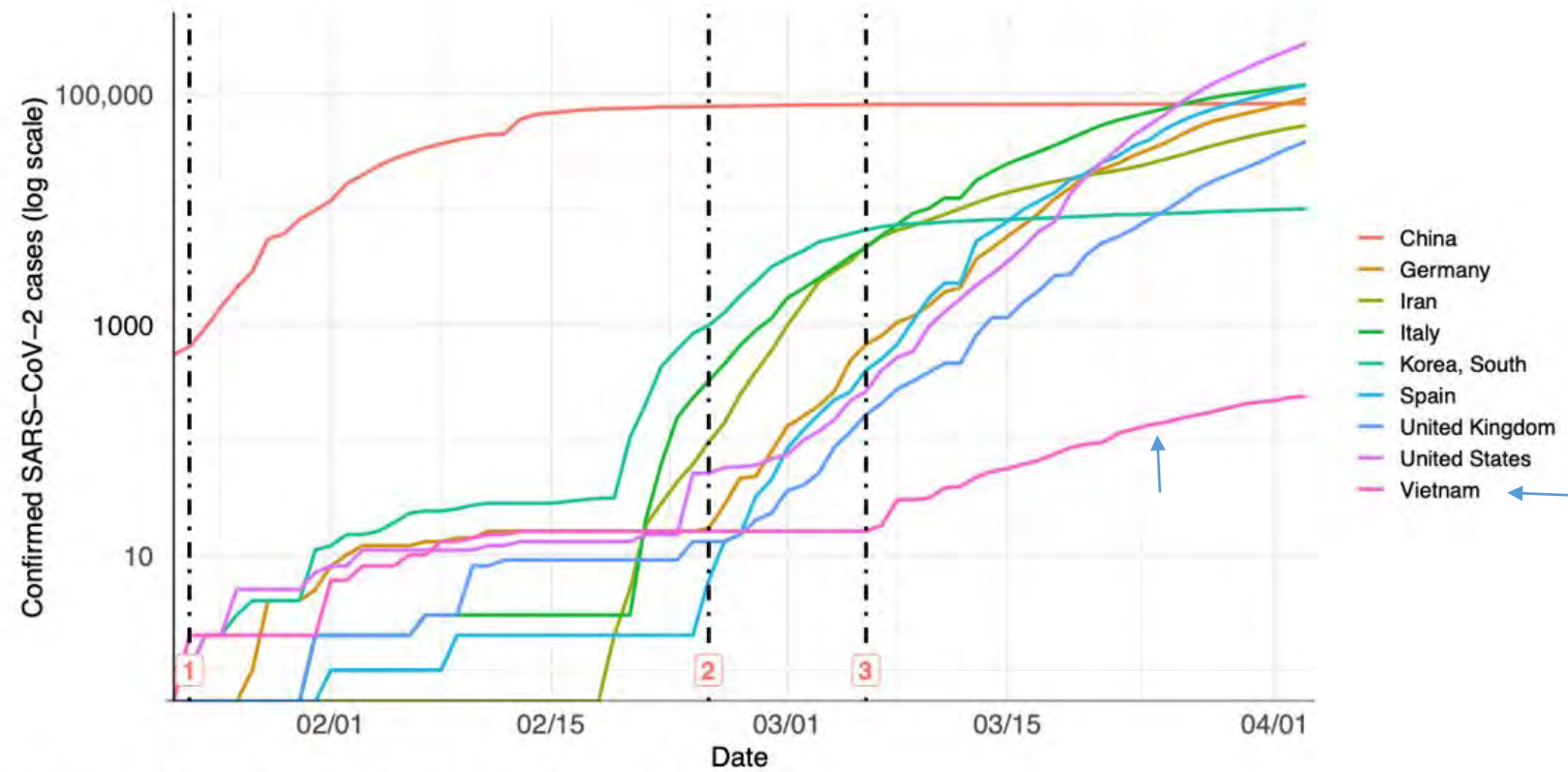


FT graphic: John Burn-Murdoch / @jburnmurdoch

Source: FT analysis of Johns Hopkins University, CSSE. Data updated March 13, 16:00 GMT

© FT

COVID-19 Cases in Selected Countries (as of April 1, 2020)



Source: A.I. for Social Data Lab, Hanoi

How they beat Covid-19

- **Early, common-sense action**

Don't wait for "more data" or results from complicated models

- **Isolate away from home**

Set up facilities to isolate an infected family member away from the rest

- **Strong lockdown**
- **Strict travel restrictions**

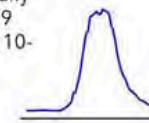
Even within the country

- **Massive testing**

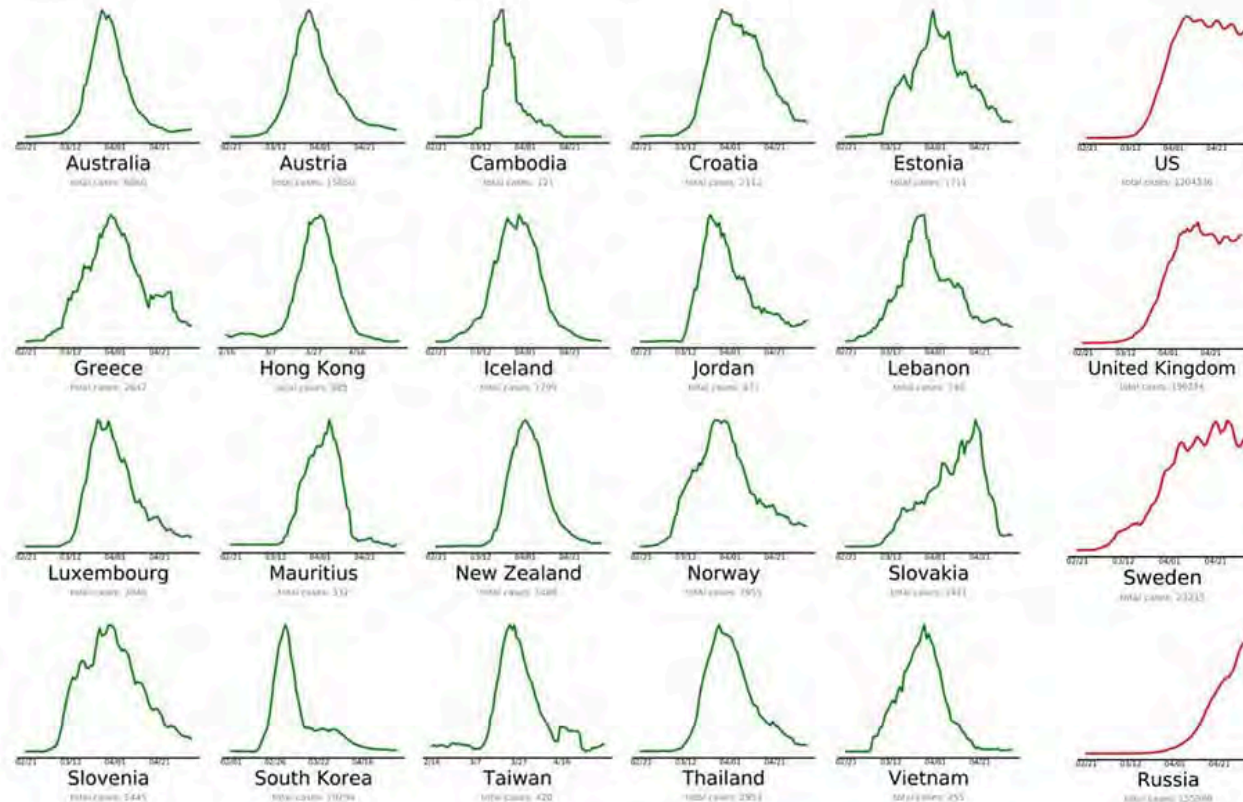
- **Face masks for everyone**

The stricter these are, the shorter the lockdown

Normalized daily new COVID-19 cases vs time, 10-day average



END CORONAVIRUS.org



Created by: Derrick VanGennep, Harvard University.

Last updated: 5 May 2020. Data source: JHU, <https://github.com/CSSEGISandData/COVID-19>.

Data source for Taiwan and Hong Kong: <https://www.worldometers.info/coronavirus/>

For more information about government measures taken to stop the spread of COVID-19, visit acaps.org.

Guidelines for opening up society

Rational Criteria for loosening COVID-19 Restrictions



COVID-19 – APRIL 2020

DRAFT



When and How to Reopen After COVID-19

COVID-19 PHYSICAL DISTANCING MEASURES CAN BE LOOSENED WHEN ALL OF THE FOLLOWING CRITERIA ARE MET:

Epidemiology	Health Care	Public Health
<ul style="list-style-type: none"> ✓ Decreasing cases in the context of increasing testing (or stable testing with decreasing positivity) for at least 14 days ✓ Decreasing numbers and proportions of cases not linked to a source case (goal less than 3 unlinked cases per 2-week period) ✓ Steady decrease in ILI in syndromic surveillance for at least 14 days ✓ Decline in deaths for at least 14 days ✓ Decreasing health care worker infections such that infections are now rare 	<ul style="list-style-type: none"> ✓ Ability – including staffing – to double number of patients treated in intensive care units from current census ✓ Ability – including staffing – to screen large numbers of symptomatic patients safely (e.g., outdoor tents, drive through) ✓ Sufficient PPE for all health care workers even if cases double ✓ Sufficient face masks to provide to all patients seeking care even if cases double ✓ More discharges than admissions for COVID-19 ✓ Ensure at least baseline capacity in general health services, including through expansion of telemedicine for Covid-19 and usual care ✓ Health care facilities enforce policies and redesign to minimize possibility of exposure at triage and all other locations 	<ul style="list-style-type: none"> ✓ All cases interviewed for contact elicitation ✓ Contacts elicited for at least 90% of cases ✓ 100% of symptomatic contacts and others with symptoms undergo testing within 12 hours of identification of symptoms ✓ Enough hand sanitizer to place at entry and strategically placed in buildings including workplaces ✓ Designated facilities for non-hospitalized covid-infected people who can't be safely cared for at home (e.g., because of space constraints, homelessness, medically vulnerable household members, or otherwise) ✓ Demonstrated ability to convey physical distancing recommendations that change behavior in most residents

Visit PreventEpidemics.org for more.

Prevent Epidemics is a project of Resolve to Save Lives, an initiative of Vital Strategies.

Criteria for reopening society over time

ONCE THE LOOSEN CRITERIA ARE MET, THE FOLLOWING ACTIONS CAN HAPPEN OVER TIME TO REOPEN:

Action	Initial re-opening only if all criteria above met	4-8 weeks later if no significant increase in cases and criteria remain met	8-16 weeks later if no significant increase in cases and criteria remain met
Wash hands often	Continue	Continue	Continue
Cover coughs	Continue	Continue	Continue
Don't go out if ill	Continue	Continue	Continue
Face mask if ill persons go out	Continue	Continue	Continue
Surface and object cleaning	Continue	Continue	Continue
Enhanced ventilation	Continue	Continue	Continue
Isolation of cases	Continue	Continue	Continue
Quarantine of contacts of cases	Continue	Continue	Continue
Physical distancing to 6 feet when possible – avoid crowding	Continue	Pause physical distancing	Pause physical distancing
Stop visits to nursing homes, hospitals, congregate facilities	Continue	Continue	Continue
Ban all gatherings including religious (above 10, 50 people)	Continue – 10	50	Allow all gatherings

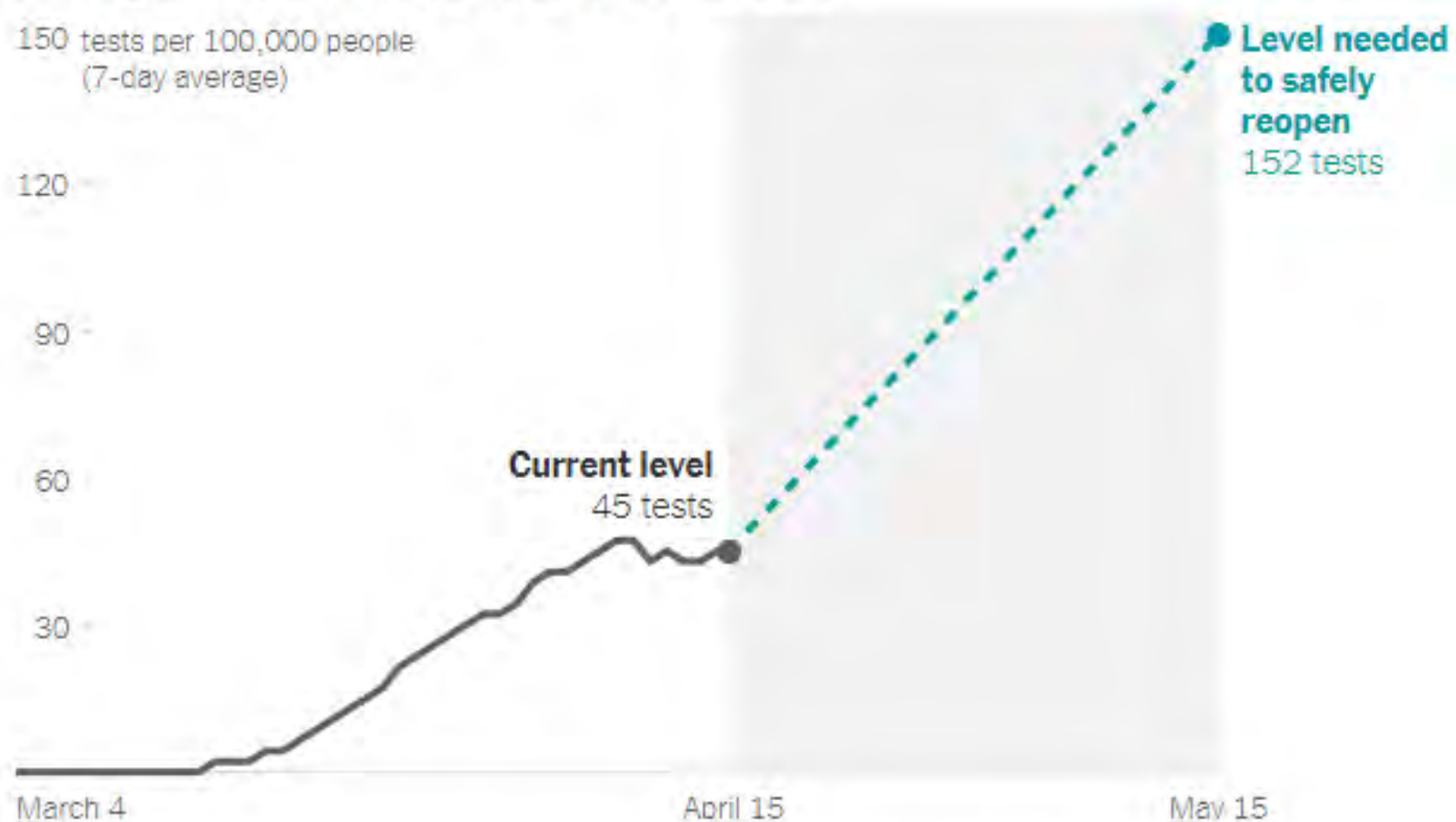
Surface and object cleaning	Continue	Continue	Continue
Enhanced ventilation	Continue	Continue	Continue
Isolation of cases	Continue	Continue	Continue
Quarantine of contacts of cases	Continue	Continue	Continue
Physical distancing to 6 feet when possible – avoid crowding	Continue	Pause physical distancing	Pause physical distancing
Stop visits to nursing homes, hospitals, congregate facilities	Continue	Continue	Continue
Ban all gatherings including religious (above 10, 50 people)	Continue – 10	50	Allow all gatherings
Restaurant closures	Reopen with physical distancing*	Reopen	Reopen
Bar closures	Continue	Reopen with physical distancing*	Reopen
General business closures	Partial reopening*	Additional phased reopening	Reopen
Special situation business closures**	Partial reopening*	Reopen	Reopen
Post-secondary ed closures	Continue	Consider reopening	Reopen
K-12 in-person closures	Reopen*	Reopen*	Reopen
Day care closures	Reopen*	Reopen*	Reopen
Quarantine of travelers from high-prevalence areas	Continue, informed by data on spread	Continue, informed by data on spread	Continue, informed by data on spread

*People over age 60, including employees and those who are medically vulnerable continue to shelter in place, including employees. Online education/work encouraged wherever possible.



Average Daily Coronavirus Tests in the U.S.

150 tests per 100,000 people
(7-day average)





Immunity passports

- Italy has provided a check list that for exiting from lockdown that requires:
 - **Increased virus testing**
 - **Mandatory antibody blood tests as the country seeks to set up a system of “immunity passports.”**
 - **The deployment and widespread use of a voluntary contact-tracing app**
- German researchers are considering immunity certificates based on an antibody blood test.
- The UK has considered immunity bracelets. Unfortunately, they have found current test kits are unreliable. Accurate, rapid home kits need to be developed and this may take months.

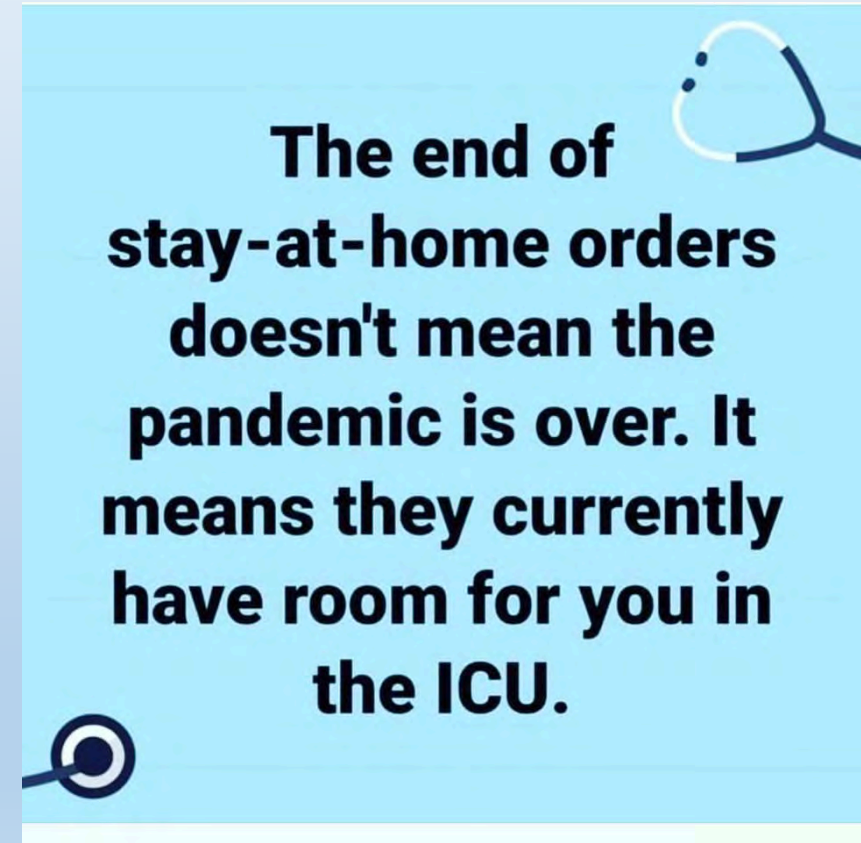


Logistical problems in issuing certificates of immunity: here are three

- **Testing issues:** At present, recovery from the illness and the results of serological tests do not reliably guarantee someone is immune.
 - It is unclear whether antibody production due to COVID-19 equals immunity, and people appear to produce different levels of antibodies.
 - We do not know how long protective immunity lasts after infection, or how often one would have to be retested to verify immunity
- **Social issues:** Will certification result in a stigmatization of those who are immune or not immune?
 - It could create a two-tiered workforce where antibody-positive workers might be favored for jobs leading to a perverse incentive for people to contract the virus, particularly millennials who might feel their chances of surviving it are high
- **Political issues:** There may be considerable fallout for undocumented immigrants. If certification requires proof of residency, they might be less likely to test for immunity.

Ending the lockdown and opening up businesses does not mean returning to life as usual

- The same precautions need be followed
- This is not a time to relax one's preventive health practices
- Herd immunity is no where near reached
- The new normal is a safe normal





What to do at home to stay safe

Beyond obeying a physical distancing
mandate



Wash your hands: learn how and with what

- Standard message: Wash your hands with soap thoroughly for 20 seconds and/or use a greater than 60% alcohol-based hand sanitizer
- ***Soap and water is more effective than hand sanitizers**
 - Washing with any water is good, hot water is better –lather up !
 - Washing you hands a lot –apply skin moisturizer so skin does not crack providing a place for virus to lodge
 - Use hand sanitizer when no soap and water alternative
 - Baby wipes are not effective
 - Do not expose your skin to straight bleach solutions or hydrogen peroxide
- **Whenever you return home from ANY activity that involves locations where other people have been, wash your hands with soap**
- Money exchange is a possible route of transmission
 - Wash hands afterward
 - Do not try to launder money by microwave—it does not work

Proper handwashing technique is *thorough*:





Clean surfaces you routinely touch – or that are touched by others – often

- Counters, door knobs, steering wheel, bathroom
- cell phones, computer keyboards
- Use appropriate cleaning products (look up approved list cited in notes)****
 - An effective bleach solution can be made by mixing 1/3 cup or 5 Tablespoons per one gallon of water or 4 teaspoons or 20 cc per quart.
- How about ultraviolet light devices?
 - Only type C are effective and only for smooth surfaces (think cell phone or a screen). UV-C penetrates superficially, and the light can't get into nooks and crannies. It also irritates skin (not to be used on hands or face)



How about wearing gloves?

- Unless you're a health-care worker or, say, a cook with a cut on your hands, it is not recommended that the general public wear gloves.
 - Experts say that gloves don't make sense for most people to wear
- Using your ungloved hands – and then washing them often – is the best bet for the typical tasks of everyday life.
- Wearing gloves might cause you to practice worse hand hygiene because you keep wearing the now-dirty gloves instead of washing your hands.
- Gloves are only useful when you use them and take them off the right way and in a meaningful way.
 - Many people who take off their gloves actually contaminate their hands with whatever was on the gloves



How about doing laundry if I suspect that I or a family member has COVID-19?

- If you're caring for someone in the house who is sick or you're cleaning the clothes of a family member who may have [been exposed to the coronavirus](#), consider those clothes contaminated and keep them in a **separate** laundry bin until it's time to do the wash.⁵
 - Place a washable or disposable liner in that laundry bin so that you can either launder it or throw it away after you remove the dirty clothes.
 - Use gloves when handling clothes and/or wash hands immediately after
- Wash contaminated clothes and linens as usual, but "launder items using the warmest appropriate water setting for the items and dry items completely"⁵
- Bleach may help inactivate viral microbes in the wash⁶
 - For [whites and light colors](#) could add bleach to the load
 - For colors, could use detergent that contains color-safe bleach if appropriate for fabric
- Dryers may be better than hanging the clothes to dry because the heat may also help inactivate any viral microbes. Dry fabrics are less likely to transfer germs than wet ones.
- Clean surfaces of washing machine and the laundry bin with [bleach or other household disinfectant](#) after you've removed the dirty clothes.



To mask or not to mask?

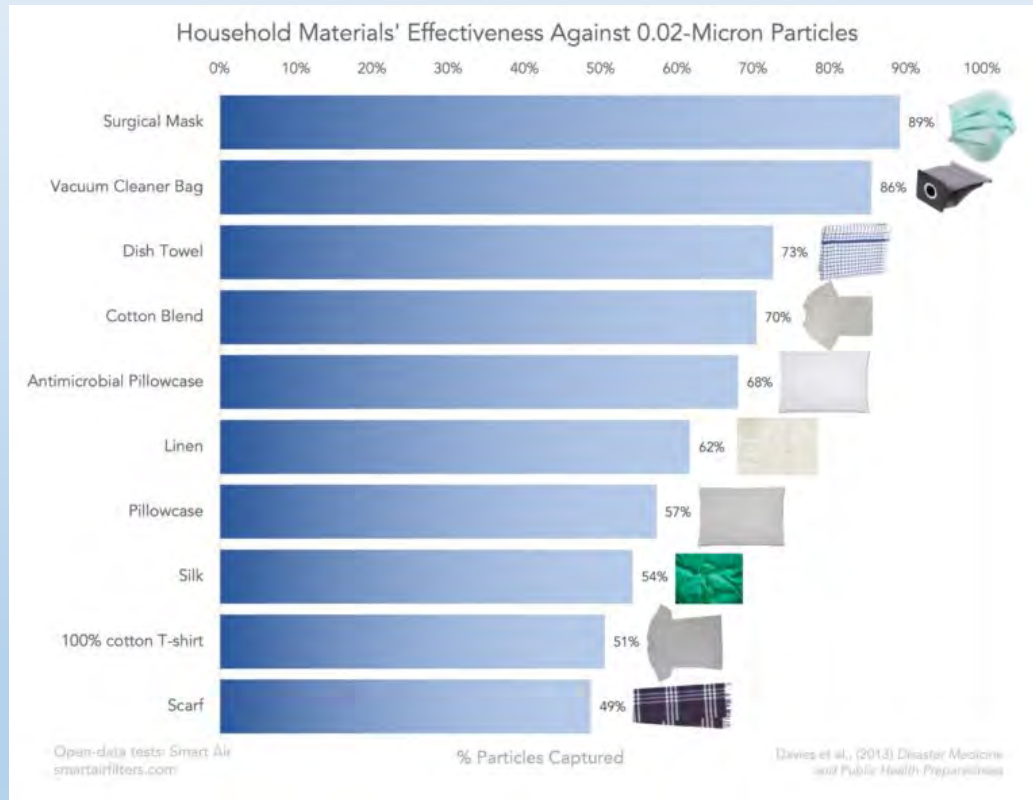
- Wearing a mask will probably make **little difference** if you're just walking around town.
- If you are likely to be in close contact with someone infected, a mask cuts the chance of the disease being passed on.⁷
 - Masks are **highly recommended** for family members who need to care for someone who is ill – ideally **both** the patient and caretaker should have a mask.
- Wearing a mask may **prevent touching of nose and mouth** in public- but may be **uncomfortable⁸**
 - They are symbolic – psychologically comforting – a form of harm reduction rendering a feeling you are doing all you can do
- If you're showing symptoms of coronavirus, or have been diagnosed, **wearing a mask protects others.**⁷
- If you are >65, especially if vulnerable due to a precondition, wearing a mask when in public is warranted. But remember, it is best **not to be in public unless absolutely necessary.**
- If your work in essential industries exposes you to people in close quarters, wear a mask



How about the rest of us? There is mixed informed opinion about wearing a mask

- **If you are asymptomatic and contagious, masks might reduce the spread of disease.** In Asia, it is widely believed that wearing masks slows down the spread of the virus in public.
 - There is some evidence suggesting this may be the case from several different countries *
 - Refer to slides on how long the virus may remain in the air in enclosed air-conditioned environments like a bus and the large percentage of asymptomatic cases capable of spreading the disease
- **In terms of protecting the healthy, opinion varies beyond an appeal to reserve our limited number of surgical and N95 masks for health care providers and those in essential services.**
- **Currently, the [CDC recommends homemade masks](#) when entering potentially crowded areas**
- **Read the references provided and the slides that follow and make your own decision.**

If I decide to wear a home made mask, what material is most effective?



- Double layers: Overall, double layers do not help much. The double-layer pillowcase captured 1% more particles, and the double-layer shirt captured just 2% more particles.
- Looking at the data, the dish towel and vacuum cleaner bag were the top-performing materials.
- However, the researchers chose the pillowcase and the 100% cotton t-shirt as the best materials for DIY masks due to breathability
- These materials filter out approximately 50% of 0.2 micron particles, similar in size to the coronavirus.

Mask effectiveness before and after 3 hours





How about washing masks and reusing them?

- **Surgical masks:** Avoid washing or sterilizing any part of surgical masks using water, alcohol, dish-washing solution, hand wash, soap or any kind of detergent.
 - If outer and inner layer of the surgical mask is damaged, it loses its filtration and water-resistant functions.
- **N95 masks:** Washing these masks with soap and water is much worse than natural “aging.”
 - Washing decreases particle capture by 21%. Cleaning with rubbing alcohol reduced effectiveness by 37%⁹
- **Masks you have made yourself: Use them, then clean them using proper laundering methods.**
 - You should not reuse a homemade mask without cleaning it first
 - Recommend making multiple homemade mask and rotating them out throughout the week
- **When taking off disposable masks at home:**
 - Have soap or sanitizer readily available.
 - Take off mask using ear loops, pull away from face, and discard in a lidded rubbish bin.
 - Wash hands immediately using soap/sanitizer



Caution when wearing homemade masks

- If you wear a mask, then you must know how to use it and dispose/clean it properly.
- If used incorrectly, the mask may end up contaminating you more than not wearing a mask at all
- *Do not cut holes the mask to make breathing easier* – effective masks will/should feel uncomfortable

Three common mistakes:

- **Less diligence complying with physical distancing recommendations when wearing a mask**
 - 6-feet social distancing is [still important](#) even with a mask¹⁰
- **Touching your mask and then your face often.**
 - Masks are uncomfortable and people adjust them and take them on and off frequently. This may expose you to the virus more as you touch your contaminated mask and face more often.
- **In the process of trying to clean a mask, you may contaminate yourself and your home.**

Failure to wear a mask correctly defeats the purpose of wearing a mask in the first place



INCORRECT



CORRECT



INCORRECT



Wearing masks can have symbolic value

- **Civic responsibility:** In Asia, wearing a mask is not seen as just a means of protecting yourself from getting infected, but also seen as an act that minimizes the chance of infecting others with a potential infection harboring in your body
 - This is a sign of health citizenship*
- **If all people wear a mask there is no stigma associated with wearing a mask**
 - In this case, it does not signal that you are a “dangerous other”
 - It rather indicates you are a responsible other
 - **Aside from places like Japan, the Czech republic instituted a policy of all citizens wearing masks as a control measure. Both the symbolic and epidemiological significance of this act are noteworthy.**
 - In just 10 days, the country went from no mask usage to nearly 100 percent usage, with nearly all the masks made at home with easily accessible materials, like old t-shirts.**



Surgical vs. N95 masks

- N95 masks are to protect YOU from the secretions of others, and the surgical mask is to protect others FROM you.
- Although surgical masks are in widespread use by the general population, there is no evidence that these masks prevent the acquisition of COVID-19, although they might slightly reduce the spread from an infected patient breathing in your face.
- A well-conducted, large, cluster randomized trial, undertaken largely in US primary care settings, did not identify a meaningful benefit from N95 respirators when compared to surgical masks for the prevention of influenza among staff.**
- N95 masks are most needed by those in hospital settings and are in short supply.

Masks are in short supply for health care workers

- Do not stockpile N95 masks
- Conserve them so those who work in health care settings have adequate protection until the supply is plentiful





Protection against COVID-19 entails doing several things in concert. Mask wearing must be used in combination with other forms of protection and not be seen as a panacea

- **An apt analogy may be drawn from road safety**

- Air bags reduce the risk of dying by about 30-40%.
- When added together with seatbelts, they are synergistic and reduce risk together by 65-70%.
- We add licensing, speed limits, anti-lock brakes, police enforcement, and other things to achieve very good risk reduction (well into the upper 90s).
- We need to be even more careful when we drive in more dangerous situations, such as in a snowstorm.

- **Protecting yourself (and society) from COVID-19 works exactly the same way: mask + physical distance + lockdown during the surge**

Food or food packaging has not been identified as a risk factor for COVID-19 transmission

- Currently there is no evidence to support transmission of COVID-19 associated with food (food itself –not packaging or handling)
- There is likely very low risk of spread from food products or packaging that are shipped over a period of days or weeks at ambient, refrigerated, or frozen temperatures.
- **Your biggest risk, especially if you are ordering takeout, is most like the person who delivers your food.**
- There is also no evidence to support transmission of COVID-19 associated with imported goods and there have not been any cases of COVID-19 in the United States associated with imported goods.

Do not engage in diagnosis by treatment

- > Do not take left-over antibiotics you have at home to see if your respiratory illness is bacterial or viral.



I have heard that medication X might be an effective treatment

- **Do not listen to anyone advocating treatment for COVID-19 not qualified to do so!**
- **Drug side effects and drug interactions have to be taken into account when prescribing medication as well as the health status of those taking them.**
- **When it comes to medicine prescription, the devil is in the details:**
 - **Who should/should not take X medication**
 - **In combination with/without other medications**
 - **When**
 - **What dosage**
- **Do not inject disinfectants or expose yourself to UV-C light; these can cause severe injury and will not treat COVID-19**



Case-in-point:

Fearing coronavirus, Arizona man dies after taking a form of chloroquine used to treat aquariums

By Theresa Waldrop, Dave Alsup and Elliott C. McLaughlin, CNN

Updated 12:50 PM ET, Wed March 25, 2020



(CNN) — A Phoenix-area man is dead and his wife is under critical care after the two took chloroquine phosphate in an apparent attempt to self-medicate for the novel coronavirus, according to hospital system Banner Health.

<https://www.cnn.com/2020/03/23/health/arizona-coronavirus-chloroquine-death/index.html>

[4-24-2020] FDA Drug Safety Communication

What safety concern is FDA announcing?

The FDA is aware of reports of **serious heart rhythm problems in patients with COVID-19 treated with hydroxychloroquine or chloroquine**, often in combination with azithromycin and other QT prolonging medicines. We are also aware of increased use of these medicines through outpatient prescriptions. Therefore, we would like to remind health care professionals and patients of the known risks associated with both hydroxychloroquine and chloroquine. We will continue to investigate risks associated with the use of hydroxychloroquine and chloroquine for COVID-19 and communicate publicly when we have more information.

Hydroxychloroquine and chloroquine have **not been shown to be safe and effective for treating or preventing COVID-19**. They are being studied in clinical trials for COVID-19, and we authorized their temporary use during the COVID-19 pandemic for treatment of the virus in hospitalized patients when clinical trials are not available, or participation is not feasible, through an **Emergency Use Authorization (EUA)**. The medicines being used under the **hydroxychloroquine/chloroquine EUA** are supplied from the Strategic National Stockpile, the national repository of critical medical supplies to be used during public health emergencies. This safety communication reminds physicians and the public of risk information set out in the **hydroxychloroquine and chloroquine healthcare provider fact sheets** that were required by the EUA.

Hydroxychloroquine and chloroquine **can cause abnormal heart rhythms** such as QT interval prolongation and a dangerously rapid heart rate called ventricular tachycardia. These risks may increase when these medicines are combined with other medicines known to prolong the QT interval, including the antibiotic azithromycin, which is also being used in some COVID-19 patients without FDA approval for this condition. Patients who also have other health issues such as heart and kidney disease are likely to be at increased risk of these heart problems when receiving these medicines.

<https://www.fda.gov/drugs/drug-safety-and-availability/fda-cautions-against-use-hydroxychloroquine-or-chloroquine-covid-19-outside-hospital-setting-or>



Get a “flu” buddy and prepare your home

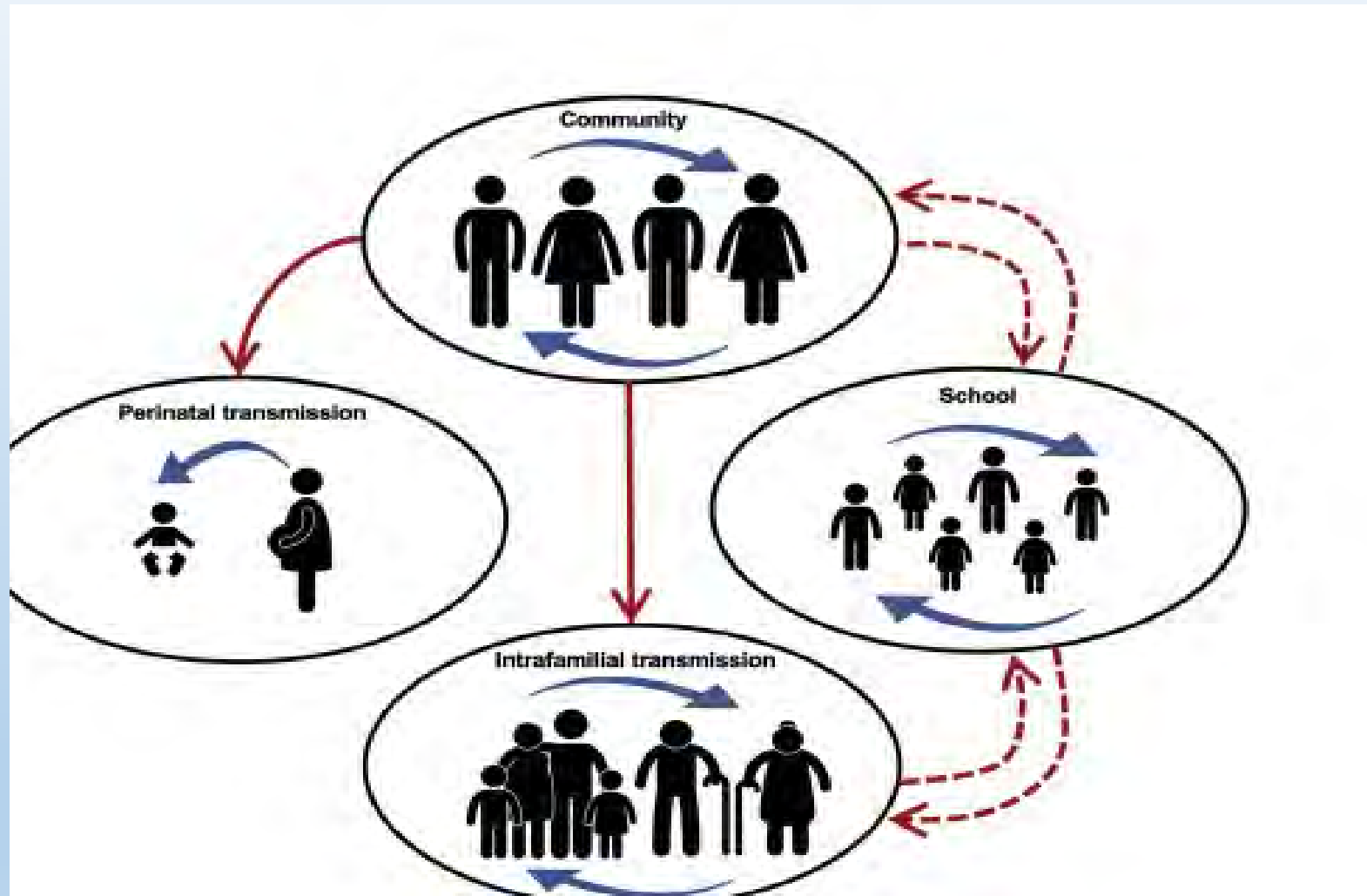
- **Get a flu buddy (aka “pandemic pal”) and make back-up plans for care of children, pets, and those in need of special assistance**
- **Prepare a hot zone in your home just in case someone falls ill**
- **Stock up on essential foods and medicines, etc.**



Young Kids and COVID-19 spread

- Data from the epidemic in China: kids get infected at the same rate as the population average
- Kids are less likely to get severely sick than adults, but are just as contagious
- Parents and grandparents can get very sick from children
 - **Limit contact with *grandparents > 60 years of age, especially if suffering from a chronic disease like diabetes or respiratory problems or if a smoker**
- Play: Form a small playgroup and play outside. Adults should stand > 6 feet away from children other than their own
 - Don't go into each other's homes
 - Playgrounds: COVID-19 virus can live on surfaces for hours or days in a laboratory environment, but there are no data that I am currently aware of regarding survival of the virus on playground equipment.

Why schools have to be closed





What if I suspect my child has COVID-19?

- If you think symptoms are serious enough to see a doctor, call your doctor
- If your child has the virus, clinicians will provide supportive care to children with COVID-19
- No special antiviral drugs have been approved for treatment



What if I have symptoms and am concerned I might have COVID-19?

- If you high fever, a persistent cough, or signs of respiratory distress such as shortness of breath you need to seek medical attention.
- What to do: Call ahead to your doctor or emergency care facility. Do not jut walk in or you risk other lives.
 - Waiting rooms are often full of older patients with heart disease, cancer, and other conditions for whom the coronavirus could be fatal
- Call ahead and receive instructions.
- If symptoms are not severe you will be given instructions on how to self treat and monitor your symptoms and if a test is necessary and available at the time of assessment by phone.

Danger signs of COVID-19

- **When to seek emergency medical attention¹³(symptoms of coronavirus):**
 - Trouble breathing
 - Persistent pain/pressure in chest
 - New confusion
 - Inability to wake or stay awake
 - Bluish lips or face
- **When seeking medical attention: call first.**
 - Call your doctor or emergency room before going in and tell them your symptoms. They will tell you what to do.
- **Wear a facemask:** If available, put on a facemask before you enter the health care facility.
- Try to stay at least 6 feet away from other people in the waiting room.



What does COVID-19 do to the lungs?

- Covid-19 often begins as an upper respiratory tract infection.
- Among some, the virus travels down the throat and enters the lower respiratory tract.
- If that happens, the virus damages the lung's tiny air sacs — alveoli — where oxygen enters the blood and carbon dioxide leaves.
- Inflammatory cells and fluid then render the alveoli unable to do their job. This makes it more difficult for oxygen to travel from the lungs into the bloodstream starving bodily organs (causing acute respiratory distress syndrome)
- **When this becomes an acute condition one has to be placed on a ventilator. The ventilator is not a treatment to heal damaged lungs; It gives the lungs a longer time to recover on their own.**



Given that COVID-10 affects the lungs, should I be monitoring my oxygen level if I feel ill

- Yes, it is a good idea. A simple finger insert pulse oximeter allows you to do this at home and the device is not costly.
- Notably, people may have silent hypoxia long before they complain of difficulty breathing and think of seeking medical care. Silent hypoxia occurs with COVID-19.
- When you have hypoxia, you compensate for the low oxygen in your blood by breathing faster and deeper: classic signs of pneumonia
 - The body's physiological response is inflammation as more and more air sacs collapse and the pneumonia worsens until oxygen levels plummet.
 - Fluid builds up and the lungs become stiff, carbon dioxide rises, and patients develop acute respiratory failure.
- One doctor has described what happens in this way*
 - Pneumonia is an infection of the lungs in which the air sacs fill with fluid or pus. Normally, patients develop chest discomfort, pain with breathing and other breathing problems. But when COVID pneumonia first strikes, patients don't feel short of breath, even as their oxygen levels fall. And by the time they do, they have alarmingly low oxygen levels and moderate-to-severe pneumonia.



What else can I do if I feel I am “coming down with something”

- There are additional measures that **may reduce** the risk of infection and the severity of viral respiratory diseases in general:
 - *Care for your throat and engage in practices that support the self-cleaning powers of the respiratory tract . Gargling with salt water or antiviral mouthwash, steam inhalations.*
 - Zinc supplements may reduce the duration of the illness and are available in capsule, tablet, and lozenge form. One review of seven studies showed that zinc lozenges containing 80-92mg of zinc may reduce common cold duration by up to 33%. Zinc-containing nasal sprays should be avoided.***
- **Recent studies suggest a pivotal role of vitamin D in viral infections.**
 - **It may reduce serious COVID-19 complications because vitamin D is important in regulation and suppression of the inflammatory cytokine response, which causes the severe consequences of COVID-19 and ‘acute respiratory distress syndrome’ associated with ventilation and death.**

Should I get a seasonal flu vaccine if I have not done so? Yes, for three good reasons!

- It is possible to get the “flu” and COVID-19 at the same time and this would increase the severity of your illness.
- As the coronavirus continues to spread across the country, doctors say it's **more important than ever to build up herd immunity for other strains of “flu.”**
 - **This protects the elderly and other vulnerable people .**
- It is very important to protect yourself from influenza virus and not put more pressure on the health system with the impending cases of coronavirus.
 - **The last thing they need is this double burden.**



How about pets, can they catch or pass on the virus

- Previous studies of SARS found that cats can be infected and pass it on to other cats. But there was no indication during the SARS pandemic that SARS-CoV became widespread in house cats or was transmitted from cats to humans.
- COVID-19 can be passed onto cats, but there is not data suggesting it can be passed on from cats to humans.
- It is possible for humans to pass the virus onto their cats.
 - The US Centers for Disease Control and Prevention recommends that people with COVID-19 limit contact with their pets, including avoiding stroking them, being licked and sharing food.
- Do not wash your pets with caustic solutions of bleach, etc.

Personal notes

Reflections

Role of educators in the time of COVID-19

**Role of Health social scientists and invitation to join a
COVID-19 collective**

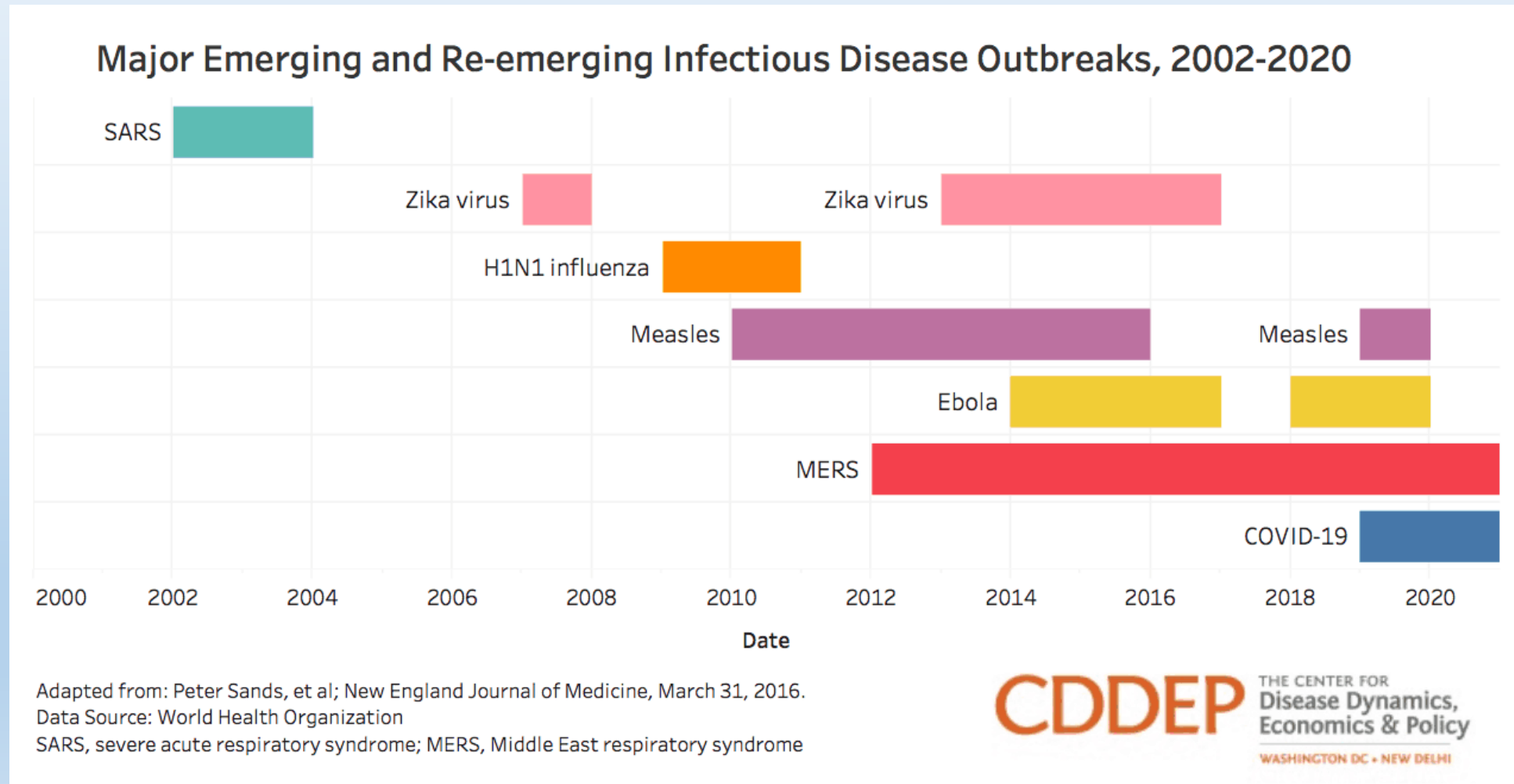
Personal Notes

- We need to get past fear-based messaging to community-based messaging and messaging that appeals to our sense of global as well as local health citizenship.
- COVID-19 needs to be treated as a family and community disease – if it is, the pandemic will be controlled faster – We learned this with Ebola. We need to provide those who need to self-quarantine with the resources to enable them to do so.
- We need to get into the weeds with a “devil in the details” approach to keeping ourselves safe.
- **Above all else: stay put, cocoon**
- “Social distancing” does not mean social disconnection – this is a time for community building, not social isolation at the personal or country level. We are in this together.

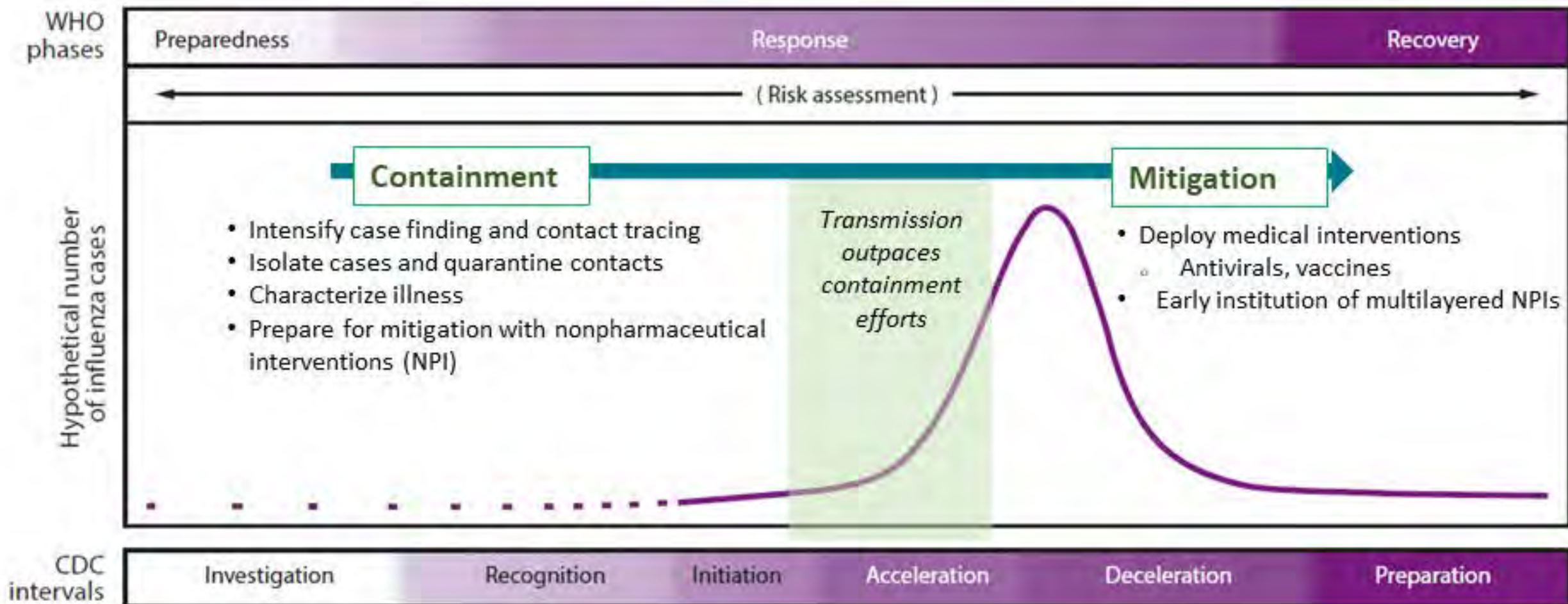
This is a test of family and cultural values as well as political responsibility.

- It is also a time for thinking about serious health care reform and the need for safety nets enabling public health recommendations to be implemented quickly by the average citizen and sustained economic support during the crises for all, especially the most vulnerable
- We must be prepared for periodic pandemic and reemerging disease threats. They are really not all that uncommon!!!!
- Pandemics need to be considered in stages : preparedness-response - recovery

This is not a one time unforeseen pandemic –we need to invest in preparedness and rapid response systems. We must be prepared for a future in which emerging and re-emerging diseases are expected.

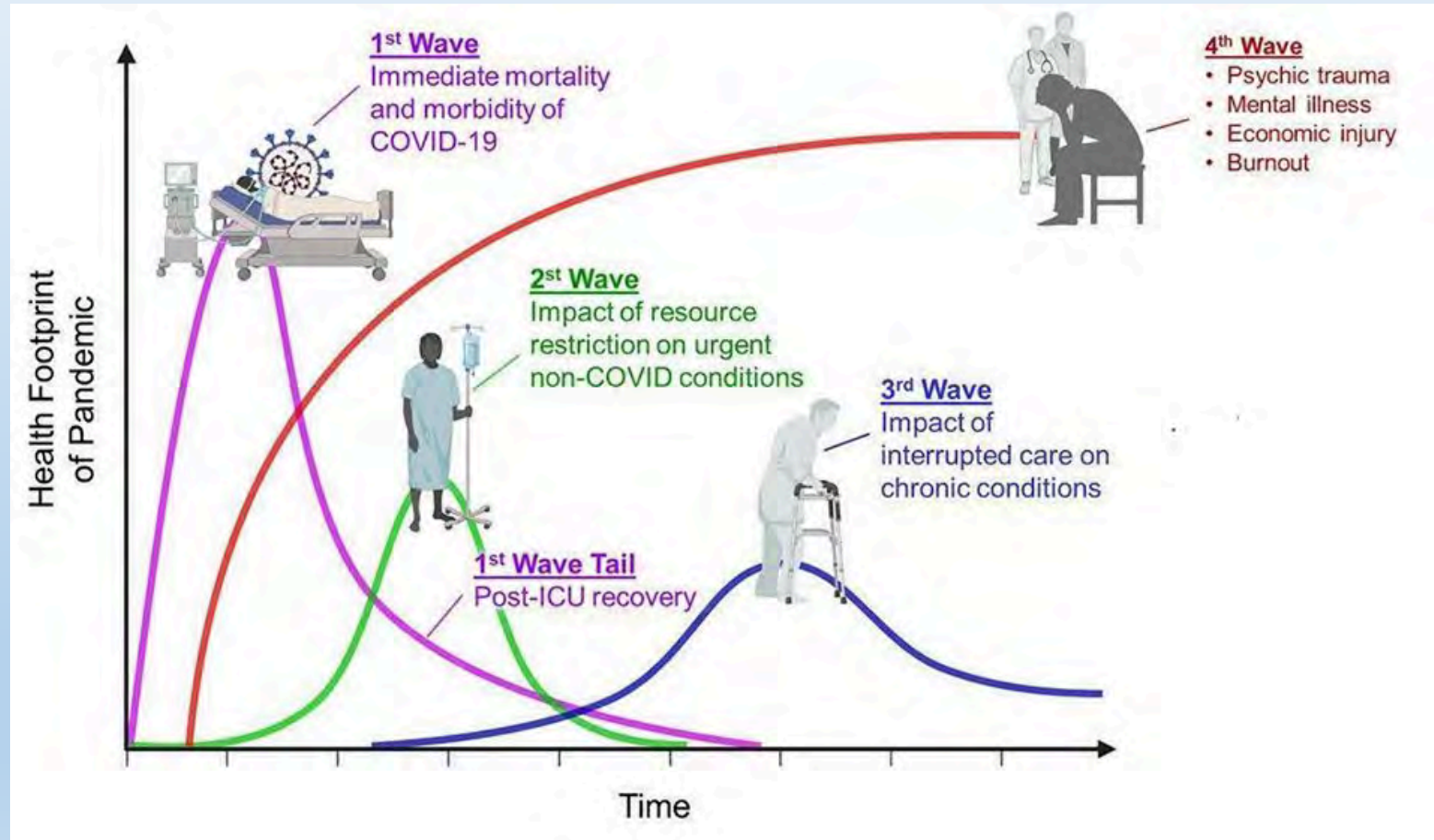


Preparedness and Response Framework for Pandemics



Adapted from: Holloway 2014, [MMWR Recomm Rep; 63\(No. RR-6\)](#). Qualls 2017, [MMWR Recomm Rep; 66\(No. RR-1\)](#). Jernigan 2020, [MMWR Early Release](#); February 25, 2020.

It is important to think about the impact of COVID-19 in terms of a larger health care footprint





Your responsibility as a university professor

- Aside from staying safe yourself, making sure your students are not compelled to be in spaces where they are going to be exposed
 - For example, university students without internet who may go to coffee shops to get online
 - Provisions for them to get internet to complete classes
- Educating youth about why **their physical distancing** is so important to containing this disease and preventing the swamping of our health care system which is ill prepared for a large surge
 - **Making this an ethical and citizenship issue**
- Dispelling the impression that “youth will only get a mild case with flu-like symptoms which is no big deal”
 - **Note: More young people are being admitted to hospital in Italy with coronavirus, as the outbreak continues...this follows a first wave of the elderly being hit hard**

As an engaged anthropologist what can you do

Action items: here are a few examples

- **Social determinants of health: Beyond looking at rates of disease by group, consider the ability of specific groups in specific home, community, and work environments to adhere to public health physical distancing guidelines**
 - **Identify constraints and opportunities for reducing risk**
 - **What may be done to reduce risk of contagion that is feasible**
 - **What resources would make a big difference**
 - **Move the discussion from groups at risk and risky behaviors to environments of risk*****
- **Identify what information sticks and does not stick given all that is out there and changing on a day by day basis – Participate in translational research efforts and identifying / supporting local spokespeople who are trusted and can act as filters of information**

As an engaged anthropologist what can you do

- Remind everyone that the household is an important unit of analysis: the families of both the ill and health care providers whose families themselves may be seen as dangerous to interact with and be indirectly stigmatized
- Consider opportunities for social connection and support for different types of people at this time of high risk contagion **so physical distancing does not become social isolation over what is likely to be a several month social isolation trajectory**
- Document “what if” scenarios as a means of getting people to engage in anticipatory problem solving.
 - For example, given different contexts, what would you do if you live alone and fall ill– how would you get resources?
 - What would you do if your children or grandchildren fell ill?
 - Given X means of employment, what is the best ways of protecting yourself while getting to work and while at work, and so on.
- **Work with your community to get out practical scenario driven advice.**

For working lists of engaged
health social science research
priorities and join a crowd source
collective

See

Arhe.medanthro.net

MedanthCovid-19.org

AAA *communities* platform

<https://www.facebook.com/groups/128678891021711/>

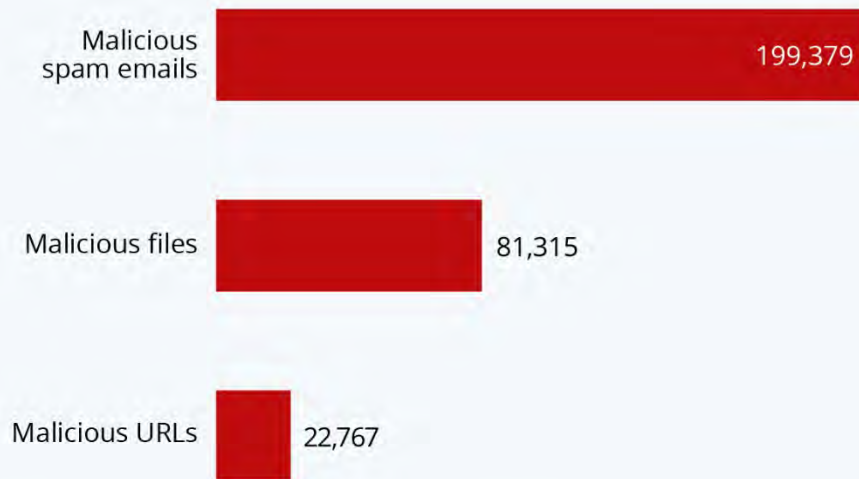
Concerns

- ✓ **Youth will blow this illness off and not social isolate**
- ✓ **Elders will not self isolate because they want to be close to their families and grandchildren**
- ✓ **People will try and escape hot spots by leaving and going to other “ safer” places or places with better medical care and thus spread the illness**
- ✓ **Confusing and contradictory messages by political leaders will lead to confusion and distrust of messages at a time when transparency and evidence based problem solving is needed**
- ✓ **Malicious messages mislead the public, undermines trust, and fosters epidemic fear**

Targeted misinformation and disinformation by Trolls and Bots as a form of bioterrorism

The Online Coronavirus Threat

Known coronavirus-related malicious online threats,
by type*



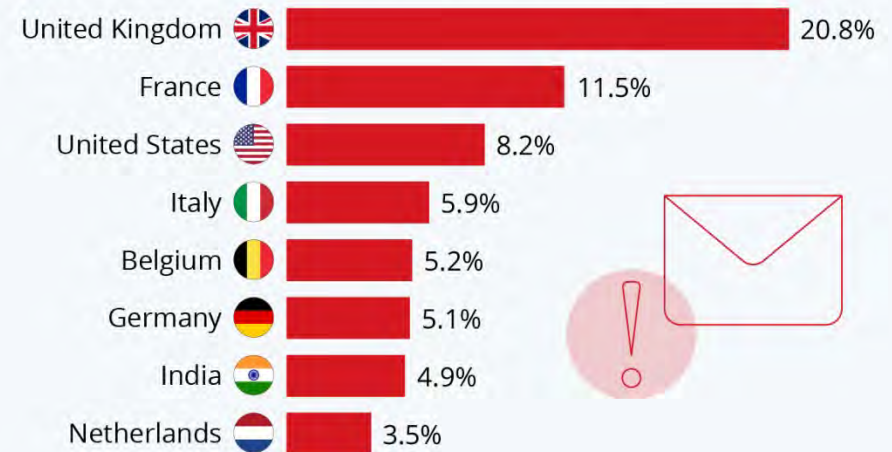
* Threats detected from January 1 to March 27, 2020.
Source: Trend Micro



statista

The Countries Targeted Most by Malicious Coronavirus Spam

Countries targeted by largest share of global malicious
spam emails with 'coronavirus' in the subject*



* January 1 to March 27, 2020.
Source: Trend Micro



statista

Political partisanship may be our undoing if it undermines public health dictates. Will reason prevail ?

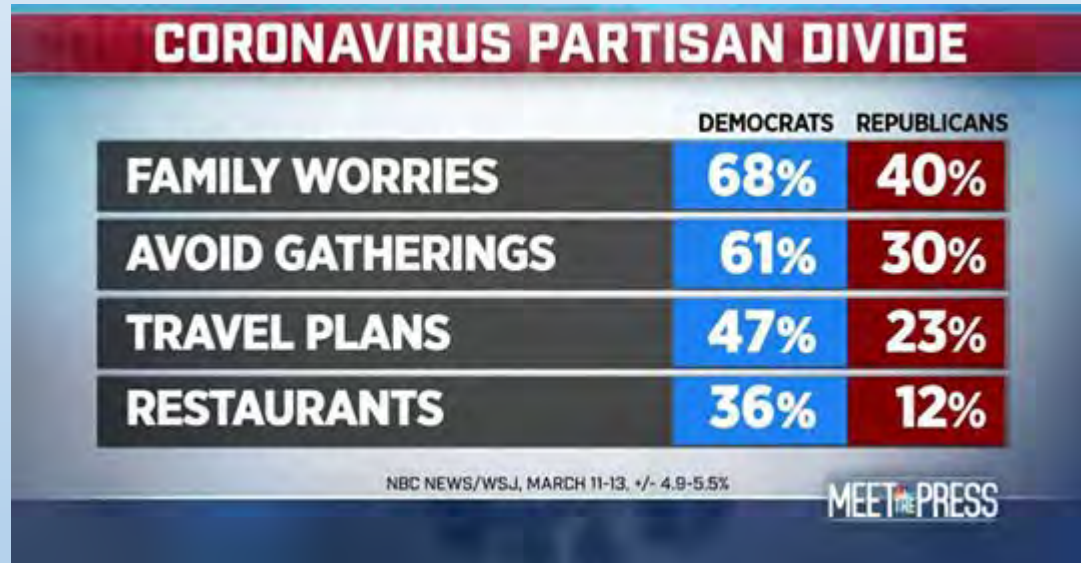
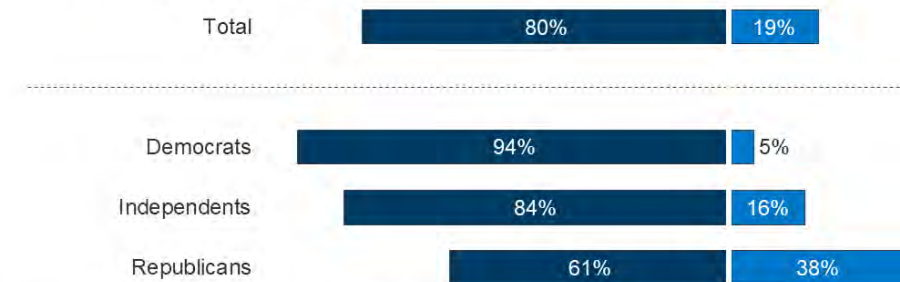


Figure 3

Majorities Across Partisans Say Shelter-In-Place Measures Are Worth It To Protect People

Which comes closer to your view:

- Strict shelter-in-place measures are worth it in order to protect people and limit the spread of coronavirus
- Strict shelter-in-place measures are placing unnecessary burdens on people and the economy and are causing more harm than good

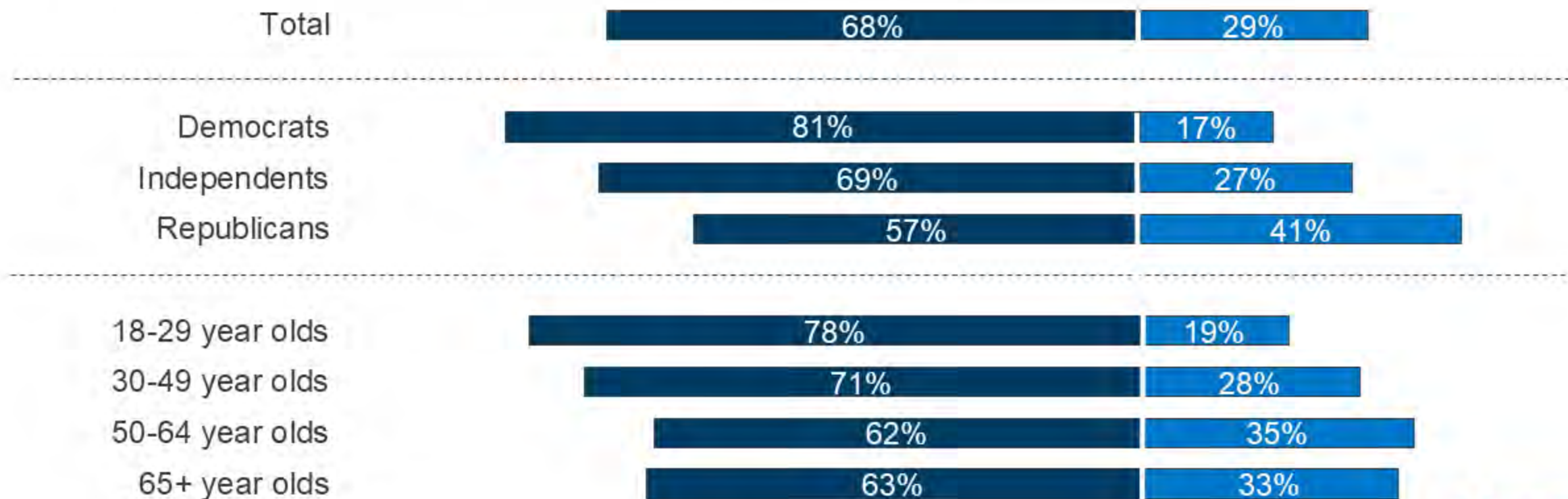


SOURCE: KFF Health Tracking Poll (conducted April 15-20, 2020). See topline for full question wording.

Figure 8

Majorities Willing To Share Test Results Using Smart Phone App

If you were tested for coronavirus, would you be **willing** or **unwilling** to use an app for your phone to share the results with public health officials in order for them to track the spread of the outbreak?



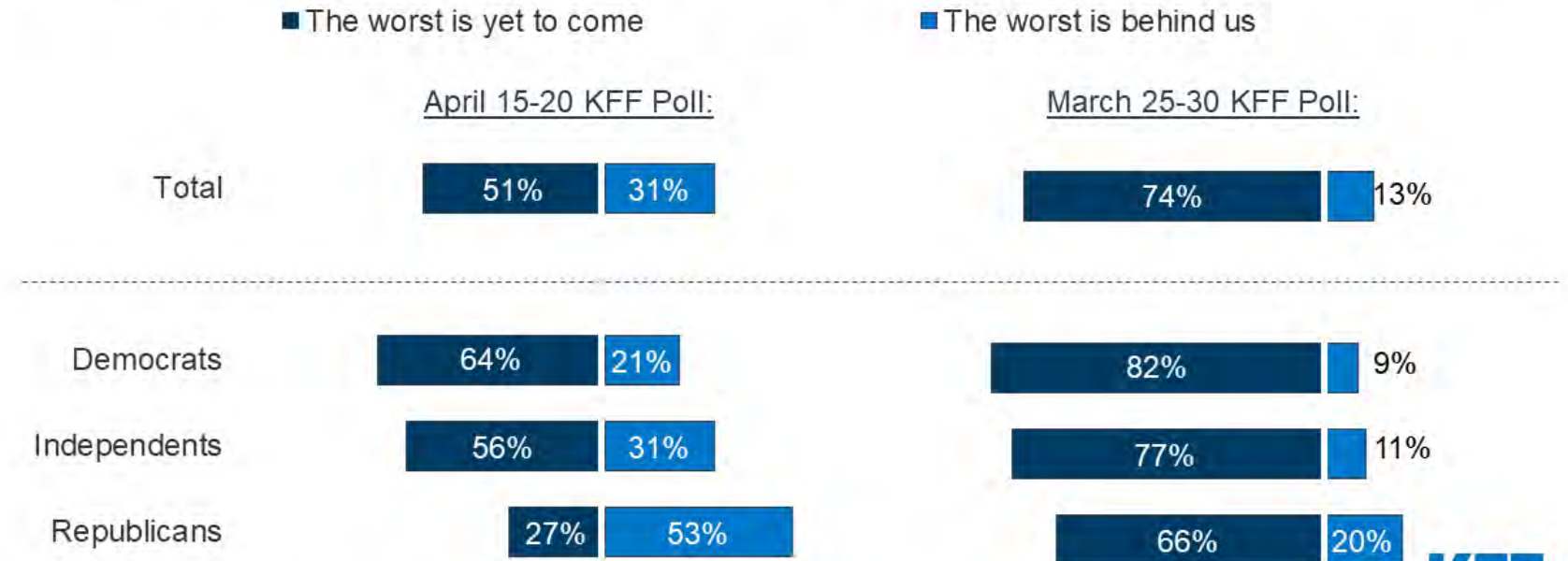
SOURCE: KFF Health Tracking Poll (conducted April 15-20, 2020). See topline for full question wording.

**Hope is a good thing.
But wishful thinking is not an antidote to Covid-19. Better to error on the side of caution and prepare for a next possible wave, than drown in the undertow.**

Figure 2

Partisans Now Divided On Whether The Worst Of Coronavirus Is Behind Us Or If The Worst Is Yet To Come

Which of the following best describes your feelings about the coronavirus outbreak in the United States?



SOURCE: KFF Health Tracking Polls. See topline for full question wording.

The United states does not have a homogenous “ Culture of health”
Disputes over relaxing restrictions are likely to index other cultural and political divides

Americans Divided on Return to Normal Life

% of respondents who'd return to normal day-to-day activities "right now" without government restrictions

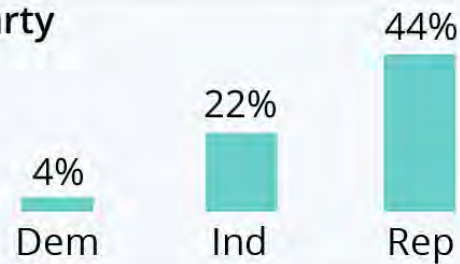
All U.S adults



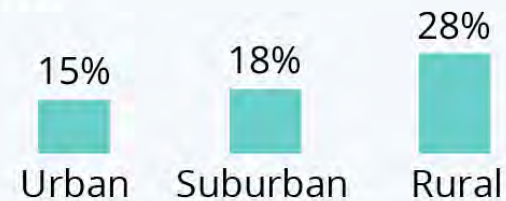
Age



Party



Area



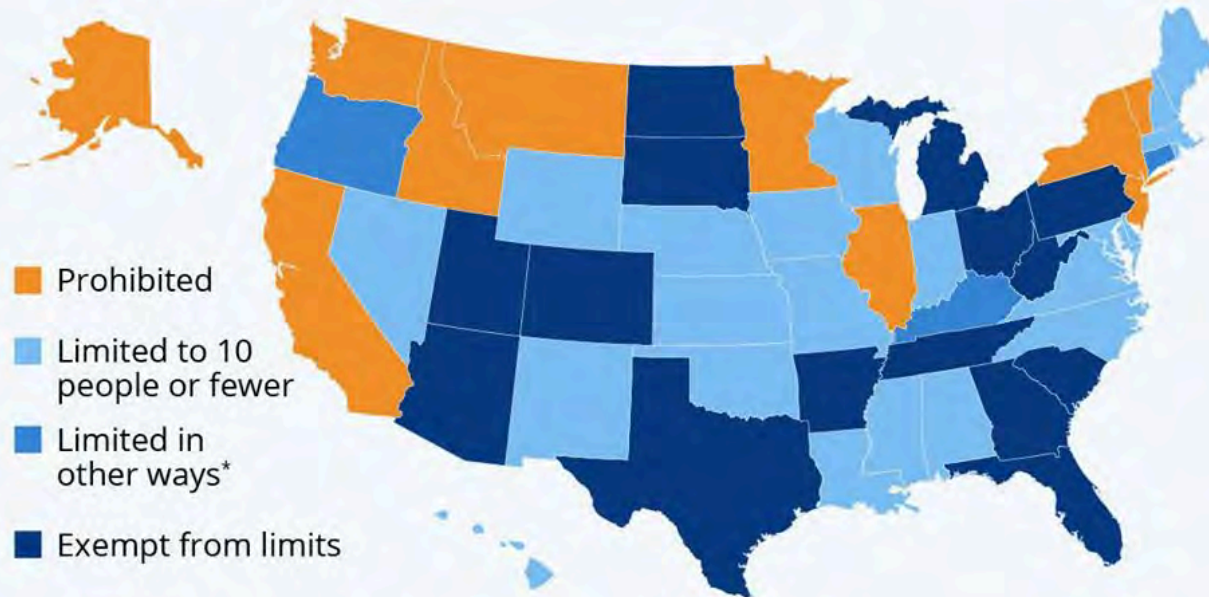
Based on a Gallup poll conducted April 20-26, 2020
Source: Gallup



There can be no exceptions to physical distancing when it becomes necessary. Outbreaks have occurred where this has not be respected as a principle.

The States Where Religion Is Exempt From Social Distancing

Status of religious gatherings in U.S. states on April 24, 2020



* States allowing more than 10 people to attend services but still limiting total attendees.

Pew noted that Montana was set to lift its restrictions on April 26.

Source: Pew Research Center





**Bottom line:
When called for,
Stay put,
cocoon.
Check in on
your family,
friends,
neighbors.
Don't just
think of
yourself.**

**Your grandparents
were called to war.
You're being called
to sit on your
couch. You can do
this.**