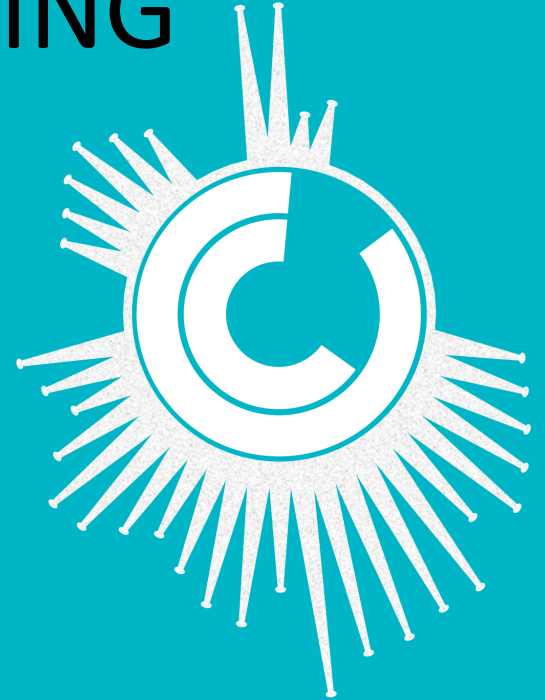

namahn

DATA VISUALIZATION DURING THE COVID-19 PANDEMIC

June 4, 2020

Paul Kahn, p.kahn@neu.edu



Outline of the Talk

- How The Year 2020 All Began
 - Creating COVIC
(COVID-19 Online Visualization Collection)
 - Intended Message #1:
Communicating the Current Medical State,
Magnitude / Spread
 - Intended Message #2: Communicating the
Current Medical State,
Supplies
 - Transition from Data Visualization to
Concept Visualization
 - Intended Message #3:
Communicating Transmission and Infection
 - Translation from Academic figures to
News stories
 - Intended Message #4: Communicate Risk ,
Flatten The Curve
 - Intended Message #5: Communicate Risk,
Future Models
 - Intended Message #6: Communicate Risk,
Re-Opening Plans
 - COVID-19 Concept Map
-

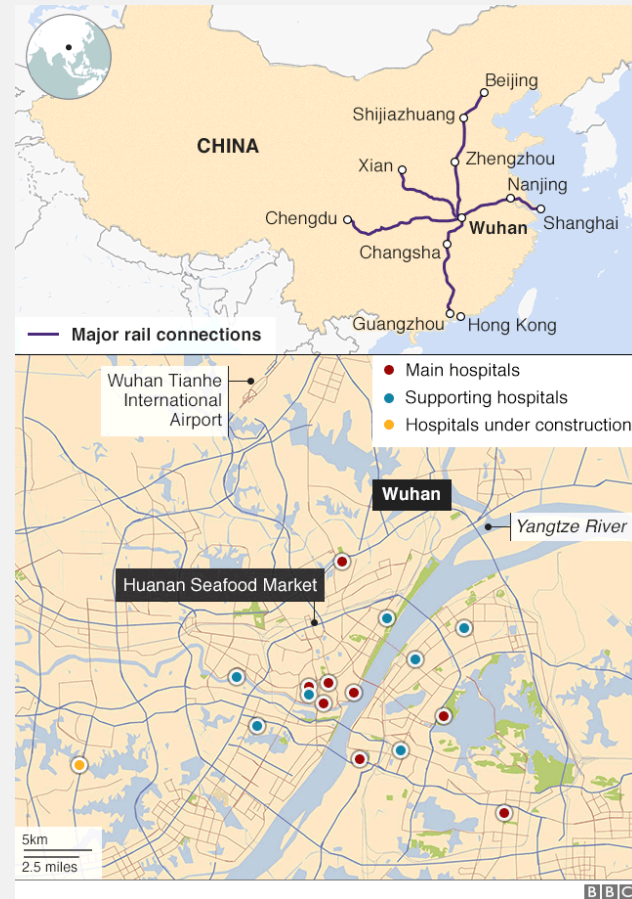
How The Year 2020 All Began (January-February)

The Year 2020 was going to be about

- Tokyo Olympics
- General Elections in the USA
- Brexit
- Climate Change

-- Irene de la Torre-Arenas, BBC

But by early January news of a new infectious disease appeared in Wuhan, China



Map from 24th January 2020

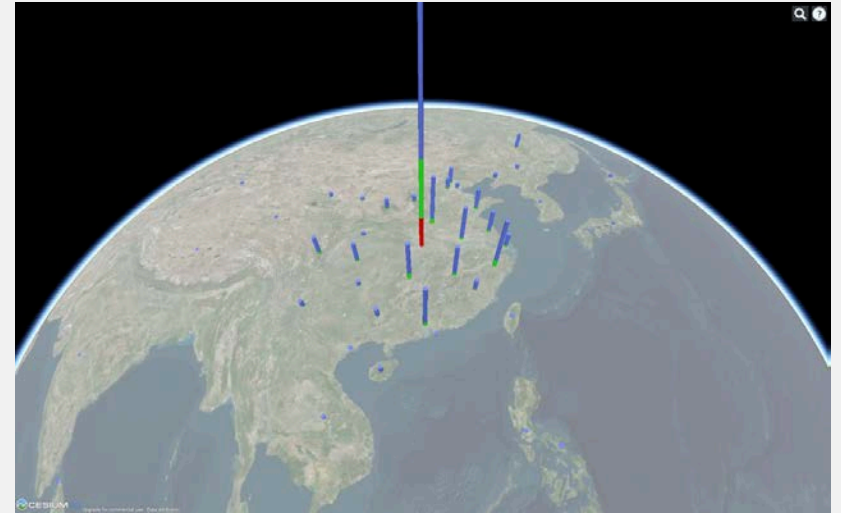
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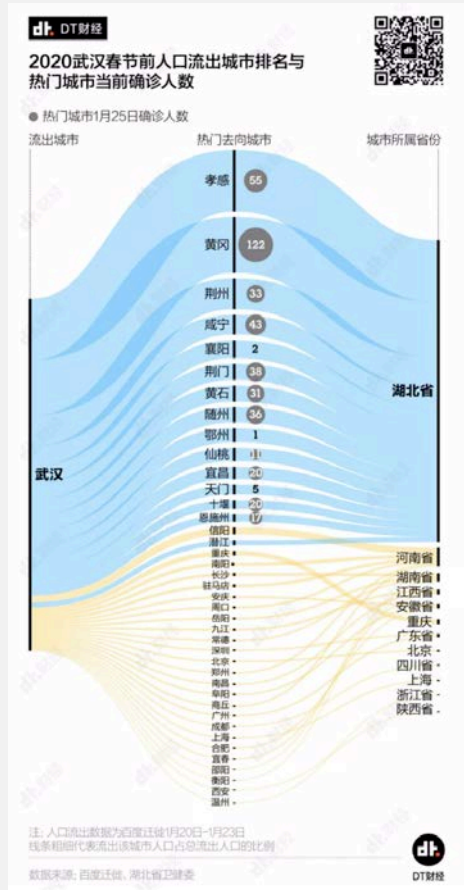


3D visualization of data from the LiveTracker of the Center for Systems Science and Engineering (CSSE) at John Hopkins University, by Institute for Information Design Japan (IIIDJ), February 2, 2020

How The Year 2020 All Began (February)

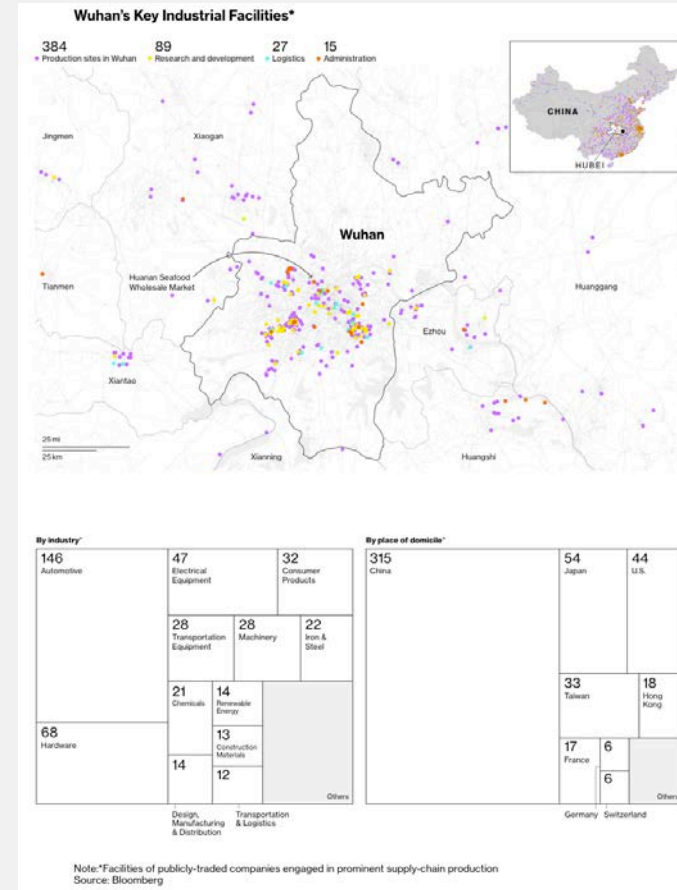
Movement of people from Wuhan to other cities in Hubei Province (blue) and other parts of China (yellow)

DT Finance
January 27, 2020



Charting the Global Economic Impact of the Coronavirus (production, research, logistics and administration sites in Wuhan)

Bloomberg News
February 5, 2020

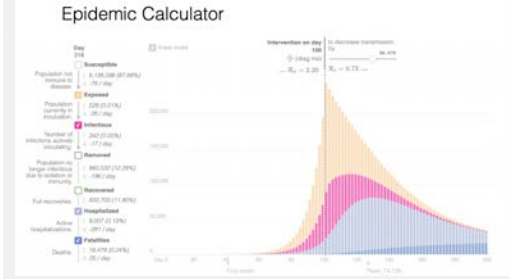
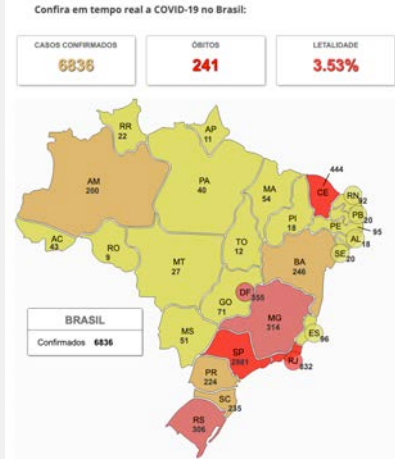


How The Year 2020 All Began (March)

REDUCE THE SPREAD OF COVID-19. WASH YOUR HANDS.

1. Wet hands with warm water
2. Apply soap
3. For at least 20 seconds, make sure to wash:
4. Rinse well
5. Dry hands well with paper towel
6. Turn off tap using paper towel

Additional tips: palm and back of each hand, between fingers, under nails, thumbs.



Kovid-19 çelik yüzeylerde 72 saat canlı kalabiliyor

New England Journal of Medicine ile yapılan araştırmada, Kovid-19'nun çelik yüzeylerde 72 saate kadar canlı kalabildiği belirlendi.

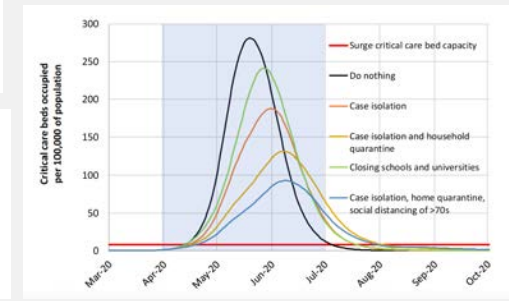
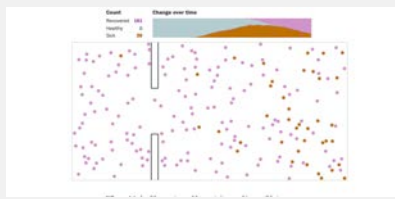
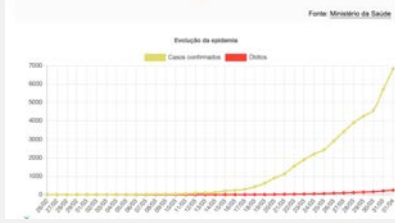
SAC VE SAKALA DİKKAT!
Çelikten yapılmış yüzeylerde 72 saate kadar canlı kalabilir. Bakır, karton, kumaş, plastik, cam, kağıt gibi yüzeylerde ise bu süre daha kısadır.

CORONAVIRUS

La grande corsa a trovare il vaccino anti-Covid

Come funziona

The infographic details the structure of the coronavirus, including its RNA genome, spike proteins, and envelope. It also illustrates how the vaccine works by training the immune system to recognize and fight off the virus.



Creating COVIC (COVID-19 Online Visualization Collection)

COVIC 0 – March

- Paul Kahn and Janice Zhang began collecting examples of data visualization related to the COVID-19 pandemic independently in March
- Kahn sent out requests to an international network requesting *“ANY example of visualizing the current pandemic data, past, current or projected”*
- Zhang was also collected examples for her own research, focusing on data visualization types

COVIC 1 – March (100+ items)

- Kahn developed metadata on publisher, language, country and distinguishing types of publications and intended messages
 - Zhang examined the joint collection (100+) and developed the first iteration of a formal classification of data visualization types, interaction attributes
-

Creating COVIC (COVID-19 Online Visualization Collection)

COVIC 2 – April (500+ items)

- Zhang refined and expanded the classification scheme:
 - Data visualization types
 - Visual Technique
 - Interaction Technique
 - Intended Messages
- Hugh Dubberly, members of the Dubberly Design Office, and additional Northeastern graduate students joined the effort

COVIC 3 – May-June (1000+ items)

- Developing a software process for capturing images of all pages
- Engaging seminar students to classify pages
- Designing a web-based application and database to manage the collection



Our Goals for COVIC

- COVIC is an opportunistic collection of visualizations of COVID-19.
 - A large fraction of what appears online every day includes visualizations — images used to "explain" some aspect of the situation.
 - In a few months, an astonishing number of "representations" have been created, all pointing at the same phenomenon.
 - Our goal is to collect and classify these representations, then make the collection available for future research.
 - This body of work refers to the same or very similar events, offering an unparalleled opportunity for study.
 - It defines both a problem space and a solution space — and illustrates the range of possibilities within that space.
 - It also provides a snapshot of information design practice at a moment of inflection, accelerating the transition from print to online representation.
-

Creating COVIC (COVID-19 Online Visualization Collection)

TOP TIER	Title	URL	Publisher	Language	Country	Source Type	Data Recorded	Date	Data Source(s)	Data Update	Choropleth Map	Bubblin' Map	Other Map	Classic Barchart	Single Stacked Barchart	100% Stacked Barchart	Diverging Stacked Barchart	Spinechart	Classic Linechart	Areachart	Stacked Areachart	Streamgraph	Piechart	TreeMap	Scatterplot	
	(20) Seismologie.be (@Seismologie.be) / Twitter	https://twitter.com/Seismologie.be/	Twitter	English	Belgium	Social Media	4/30/2020	4/6/2020	Royal Observatory																	
	(21) Nicholas A. Christakis on Twitter "In this 100%	https://twitter.com/NACChristakis/status/123920481	Twitter	English	USA	Social Media	3/15/2020	3/15/2020																		
	95% of US Artists Have Lost Income Due to Plan	https://hyperalliance.com/598998/95-of-us-artists	Hyperalliance	English	USA	News Media	4/28/2020	4/24/2020	Artist Relief																	
	Age-Adaptive Social Distancing: A Nonlinear Eng	https://www.sciencedirect.com/science/article/pii/S095026882030304	PeerJ	English	USA	Independent	4/8/2020	4/8/2020																		
	alyning covid	https://science.sagepub.com/journalsFullText.action?uri=doi:10.1177/095026882030304	Sara Di Bartolone	English	USA	Independent	4/8/2020	no date																		
	AMC Corona Positive case location - Google My	https://www.google.com/maps/@34.001434,-117.161434,34z	Ahmedabad Mur	English	India	Government	4/29/2020	no date	Corona positive cas																	
	CARTE / COURBE - Coronavirus : Evolution de	https://france3-regions.francetvinfo.fr/bretagne/corona	Franceinfo	French	France	News Media	4/9/2020	4/8/2020	Santé Publique Fra																	
	CARTE Coronavirus - 1171 cas positifs au COVI	https://france3-regions.francetvinfo.fr/bretagne/corona	Franceinfo	French	France	News Media	4/3/2020	4/2/2020	Santé Publique Fra																	
	CARTE Coronavirus - Où se trouvent les 962 ca	https://france3-regions.francetvinfo.fr/bretagne/corona	Franceinfo	French	France	News Media	3/19/2020	3/30/2020	ARS - Prefecture																	
	Chart: US coronavirus cases and testing, compa	https://www.vox.com/blogs-and-panels/2020/3/11/20190788-us-covid-19-testing	VOX	English	USA	News Media	4/28/2020	4/27/2020	Vox analysis of Ce																	
	Coronavirus - The National	https://www.thenational.ae/world/coronavirus	The National	English	UAE	News Media	4/30/2020	4/29/2020																		
	Coronavirus COVID-19 (2019-ncov)	https://ourworldindata.org/coronavirus	Johns Hopkins U	English	USA	NGO	3/15/2020	2/11/2020	WHO, CDC, ECDC																	
	Coronavirus Map: Tracking the Global Outbreak	https://www.nytimes.com/interactive/2020/04/06/world/coronavirus-map.html	New York Times	English	USA	News Media	3/24/2020	no date																		
	Coronavirus tracked: the latest figures as the pa	https://www.ft.com/content/9684698d-4081-486c-8034-300a09120000	Financial Times	English	UK	News Media	3/25/2020	no date	ECDC, FT Researc																	
	Coronavirus: Number of cases, deaths, and test	https://www.vox.com/2020/3/26/21193848/coronavirus-tracking	VOX	English	USA	News Media	4/2/2020	4/2/2020	COVID Tracking Pr																	
	Coronavirus: 2332 cas de Covid-19 confirmés e	https://france3-regions.francetvinfo.fr/bretagne/corona	Franceinfo	French	France	News Media	4/28/2020	4/27/2020	Santé Publique Fra																	
	Coronavirus: 2146 cas de Covid-19 confirmés e	https://france3-regions.francetvinfo.fr/bretagne/corona	Franceinfo	French	France	News Media	4/30/2020	4/29/2020	Santé Publique Fra																	
	COVID-19 (SARS Coronavirus 2) - timeline, cont	https://www.timeline.com/en/2020-04-02/coronavirus-timeline	YouTube	English	Australia	Social Media	4/29/2020	4/8/2020	Arnando Hasoutou																	
	COVID-19 à Landspítali - útlöngun upplýsinga	https://www.landspitali.is/deild/landspitali.spa/2020-04-01-landspitali	Landspítali (Nat	Icelandic	Iceland	NGO	3/19/2020	no date																		
	COVID-19 Coronavirus Tracker - Updated as of	https://www.kff.org/global-health-policy/fact-sheet/coronavirus-tracker/	Kaiser Family Fo	English	USA	NGO	3/19/2020	3/29/2020	Johns Hopkins C&I																	
	COVID-19 impact on drugs essential for ventilat	https://www.bioscienceonline.com/news/coronavirus-impacts-on-drugs-essential-for-ventilation	Visivent	English	USA	Commercial	3/19/2020	3/28/2020	Visivent																	
	COVID-19 projections assuming full social dista	https://www.covid19.healthdata.org/projections	IHME	English	USA	NGO	3/19/2020	3/30/2020																		
	COVID-19: Mapping COVID-19 in Your Commu	https://publiclab.org/notes/2020/04/06/covid-19-in-your-community/	Children's Hospit	English	USA	NGO	4/28/2020	no date																		
	Covid19 ELWOODOWN	https://www.danrodding.org/books/ELWOODOWN/	Danny Dodging	English	UK	Independent	4/30/2020	4/22/2020																		
	Daily chart - Oil and commodity prices are wher	https://www.economist.com/agriculture/2020/04/02/coronavirus-and-commodity-prices	The Economist	English	UK	News Media	4/28/2020	4/27/2020	RIP The Economis																	
	Daily in the crosshairs - The South is likely to h	https://www.economist.com/finance-and-economics/2020/04/02/coronavirus-and-the-south	The Economist	English	UK	News Media	4/28/2020	4/25/2020	US Census Bureau																	
	El mapa del coronavirus: así crecen los casos d	https://elpais.com/actualidad/2020/04/13/coronavirus-el-mapa.html	El País	Spanish	Spain	News Media	4/16/2020	no date	Johns Hopkins C&I																	
	Five Ways to Follow the Coronavirus Outbreak i	https://www.nytimes.com/interactive/2020/04/23/world/coronavirus-ways-to-follow.html	New York Times	English	USA	News Media	4/28/2020	no date	New York Times																	
	GitHub - mro-ide/covid-sim: COVID-19 CovidSim	https://github.com/mro-ide/covid-sim	Imperial College	English	UK	NGO	4/29/2020	4/27/2020																		
	Global coronavirus death toll could be 60% high	https://www.ft.com/content/088b7e-3388-4843-9938-300a09120000	Financial Times	English	UK	News Media	4/29/2020	4/26/2020	FT analysis of mor																	
	How epidemics like covid-19 end (and how to avo	https://www.washingtonpost.com/archive/local/2020/04/22/coronavirus-how-to-end-epidemics/	Washington Post	English	USA	News Media	4/4/2020	2/19/2020	NCBI, WHO																	
	Reasons From China's COVID-19 Visualizations	https://medium.com/visualizations/10-reasons-from-china-s-covid-19-visualizations-b4c5c2303879	Hightower	English	USA	Independent	4/12/2020	4/8/2020																		
	Map: How Many Cases Of Coronavirus Are Ther	https://www.nytimes.com/interactive/2020/04/02/world/coronavirus-cases.html	Johns Hopkins C&I	English	USA	News Media	4/28/2020	4/28/2020	Johns Hopkins C&I																	
	Mapping 2019-nCoV - CSSE	https://systems.jhu.edu/research/public-health/ncov/	Johns Hopkins U	English	USA	NGO	3/15/2020	1/23/2020																		
	Mapping coronavirus casebooks	https://www.esri.com/en-us/blogs/products/arcgis/storymaps/coronavirus-casebooks	ESRI	English	USA	Commercial	3/24/2020	3/24/2020																		
	Mapping coronavirus, responsibly	https://www.esri.com/en-us/blogs/products/arcgis/storymaps/coronavirus-responsibly	ESRI	English	USA	Commercial	3/19/2020	2/25/2020																		
	N.Y.C. Deaths Reach 6 Times the Normal Level	https://www.nytimes.com/interactive/2020/04/22/nyc-covid-deaths.html	New York Times	English	USA	News Media	4/28/2020	4/27/2020	National Center fo																	
	Packet With Migrant Workers, Domestics Fuel	https://www.nytimes.com/interactive/2020/04/23/world/coronavirus-migrant-workers.html	New York Times	English	USA	News Media	4/29/2020	4/29/2020	Springer Ministry of																	
	Survey: How Big Is The Contact Tracing Workfo	https://www.npr.org/sections/health-shots/2020/04/02/831410000-contact-tracing-workforce	NPR	English	USA	News Media	4/29/2020	4/29/2020	NPR survey of state																	
	The latest coronavirus numbers from Massachu	https://www.boston.com/news/health/2020/04/02/coronavirus-massachusetts/	Boston Globe	English	USA	News Media	4/28/2020	4/28/2020	Johns Hopkins U																	
	Three graphs that show a global slowdown in CC	https://beaconai.com/news/2020/04/02/coronavirus-three-graphs.html	The Conversation	English	UK	Independent	4/30/2020	no date																		
	Town-by-town coronavirus data in Massachusetts	https://www.bostonherald.com/2020/04/15/coronavirus-town-by-town/	Boston Globe	English	USA	News Media	4/28/2020	4/22/2020	Massachusetts Dep																	
	U.S. coronavirus cases: Tracking deaths, confi	https://www.washingtonpost.com/archive/local/2020/04/06/coronavirus-tracking-cases/	Washington Post	English	USA	News Media	3/27/2020	no date	Johns Hopkins C&I																	
	U.S. G.D.P. Declined in First Quarter, With Wors	https://www.nytimes.com/2020/04/02/us/economy/gdp-2020.html	New York Times	English	USA	News Media	4/30/2020	4/29/2020	Bureau of Economi																	
	Why outbreaks like coronavirus spread exponen	https://www.washingtonpost.com/archive/local/2020/04/23/coronavirus-spread-exponentially/	Washington Post	English	USA	News Media	3/24/2020	3/24/2020																		
	新型コロナの発生状況を可視化するWeb	https://haganah.mhl.go.jp/ncov/covid19/	Boonhamazaka	Japanese	Japan	Independent	4/29/2020	no date																		
	Facts about novel coronavirus and how it spread	https://www.bbc.com/news/health-55697129	The British New	English	USA	News Media	3/18/2020	no date	King County Public																	
	Frightful Coronavirus Graphs The New Yorker	https://www.newyorker.com/magazine/2020/04/13/coronavirus-graphs	The New Yorker	English	USA	News Media	4/30/2020	3/25/2020																		
	From Bats to Human Lungs, the Evolution of a C	https://www.newyorker.com/science/evolution/coronavirus	The New Yorker	English	USA	News Media	4/30/2020	3/27/2020																		
	România - Grafana	https://board.oxid.ro/ncov/ncov-romania/	UBBF/SEGA, Fac	Romanian	Romania	NGO	4/30/2020	no date																		
	COVID-19 România - Resurse media	https://covid19-romania.ro/	ESRI Romania	Romanian	Romania	Commercial	4/30/2020	no date	Johns Hopkins C&I																	
	Erdélyi koronavírus	https://www.esri.com/en-us/blogs/products/arcgis/storymaps/coronavirus-erdelyi-koronavirus	(Trans) Romania	Romanian	Romania	Government	4/30/2020	no date																		
	Koronavírus Magyarország - statisztika, be	https://koronavirus.hu/covid19-magyarorszag/	Personal Project	Hungarian	Hungary	Independent	4/30/2020	no date																		
	Index - TechTudomány - Infografika a koronavír	https://www.techtudomany.com/infografika-a-koronavirusrol/	Infografika	Hungarian	Hungary	News Media	4/30/2020	1/18/2020																		
	Koronavírus - Átló	https://www.esri.com/en-us/blogs/products/arcgis/storymaps/coronavirus-atlo	Atlo	Hungarian	Hungary	NGO	4/30/2020	no date	Koronavirus.gov.hu																	
	Koronavírus - Átló	https://www.esri.com/en-us/blogs/products/arcgis/storymaps/coronavirus-atlo	Atlo	Hungarian	Hungary	NGO	4/30/2020	no date																		
	Koronavírus - Átló	https://www.esri.com/en-us/blogs/products/arcgis/storymaps/coronavirus-atlo	Atlo	Hungarian	Hungary	NGO	4/30/2020	no date																		
	Koronavírus	https://koronavirus.gov.hu/	Hungarian Minist	Hungarian	Hungary	Government	4/30/2020	no date																		
	Analysis and Visualize Data for COVID-19: Mac	https://www.kdnuggets.com/2020/04/visualizing-covid-19-data.html	analyze and visu	English	USA	Independent	5/1/2020	4/28/2020	Johns Hopkins C&I																	
	Charts of COVID-19 using per capita date. To	https																								

Preliminary Numbers: Source Type

- About 50% of all the items are from **News Media**.
- **Independent Media** includes self-publishing, Medium publications, and pre-prints of journal articles
- **NGO** includes universities and foundations
- **Peer-Review Publications** are scientific journals
- **Commercial** includes company blogs and website publications
- **Government** includes any government institution
- **Social Media Posts** include Twitter and Facebook

News Media	602	52.3%
Independent Media	132	11.5%
NGO	121	10.5%
Peer-reviewed Publication	97	8.4%
Commercial	84	8.4%
Government	79	6.9%
Social Media Posts	37	3.2%
TOTAL (100%)	1,152	

Preliminary Numbers: Data Visualization Type

- There are more **Linecharts** than **Barcharts**
- There are more **Barcharts** and **Other Charts** than **Maps**.
- There are more **Maps** than **Illustrations**.

LINECHARTS	501
BARCHARTS	436
OTHER CHARTS	345
MAPS	308
ILLUSTRATION	103

Data Visualization Type	#
Choropleth Map	164
Bubble Map	144
Other Map	34
Classic Barchart	269
Simple Stacked Barchart	85
Spanchart	36
Diverging Stacked Barchart	31
100% Stacked Barchart	15
Classic Linechart	384
Areachart	76
Stacked Areachart	32
Streamgraph	9
Scatterplot	52
Heatmap	47
Piechart	36
Bubblechart	36
Treemap	29
Flowchart	26
Network	21
Radar	9
Other Chart	89
Instructional Graphic	58
Scientific Illustration	45

Preliminary Numbers: Language, Country, &c.

- About 80% of the items are in **English**.
- We have examples from 50 countries, but 70% are from **USA** and **UK**.
- About 25% (278) are **Data Update**, designed to load current numbers.
- About 25% (82) of the **Data Update** items are in **Dashboard** format.

Country	#
USA	587
UK	209
China	46
France	42
Italy	29
Japan	18
Germany	16
Brazil	12
Spain	8

Preliminary Numbers: Intended Message

Intended Messages			
Communicate Current Medical State	284	MAGNITUDE SPREAD	234
		SUPPLIES	50
Communicate Current Non-Medical State	121	ECONOMIC	46
		SOCIAL	65
		ENVIRONMENT	10
Communicate Risk	110	HISTORICAL	27
		FUTURE MODEL	59
		FLATTEN THE CURVE	24
Communicate Transmission and Infection	112		
Provide Data Visualization advice, critique, and resources	36		
Communicate Biomedical Research	64		

COMMUNICATING THE CURRENT MEDICAL STATE, MAGNITUDE / SPREAD

Intended Message #1



Coronavirus COVID-19 Global Cases by Johns Hopkins CSSE



Total Confirmed

43,141

Confirmed Cases by Country/Region

42,670 Mainland China

135 Others

49 Hong Kong

45 Singapore

32 Thailand

28 South Korea

26 Japan

18 Malaysia

18 Taiwan



Total Deaths

1,018

974 deaths
Hubei Mainland China

1 deaths
Guangdong Mainland China

7 deaths
Henan Mainland China

1 deaths
Hunan Mainland China

4 deaths
Anhui Mainland China

Total Recovered

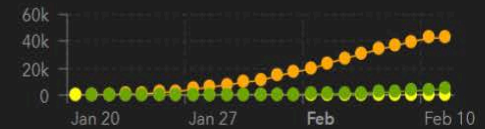
4,340

2,310 recovered
Hubei Mainland China

270 recovered
Zhejiang Mainland China

247 recovered
Hunan Mainland China

218 recovered
Henan Mainland China



● Mainland China Confirmed
● Other Locations Confirmed

Actual

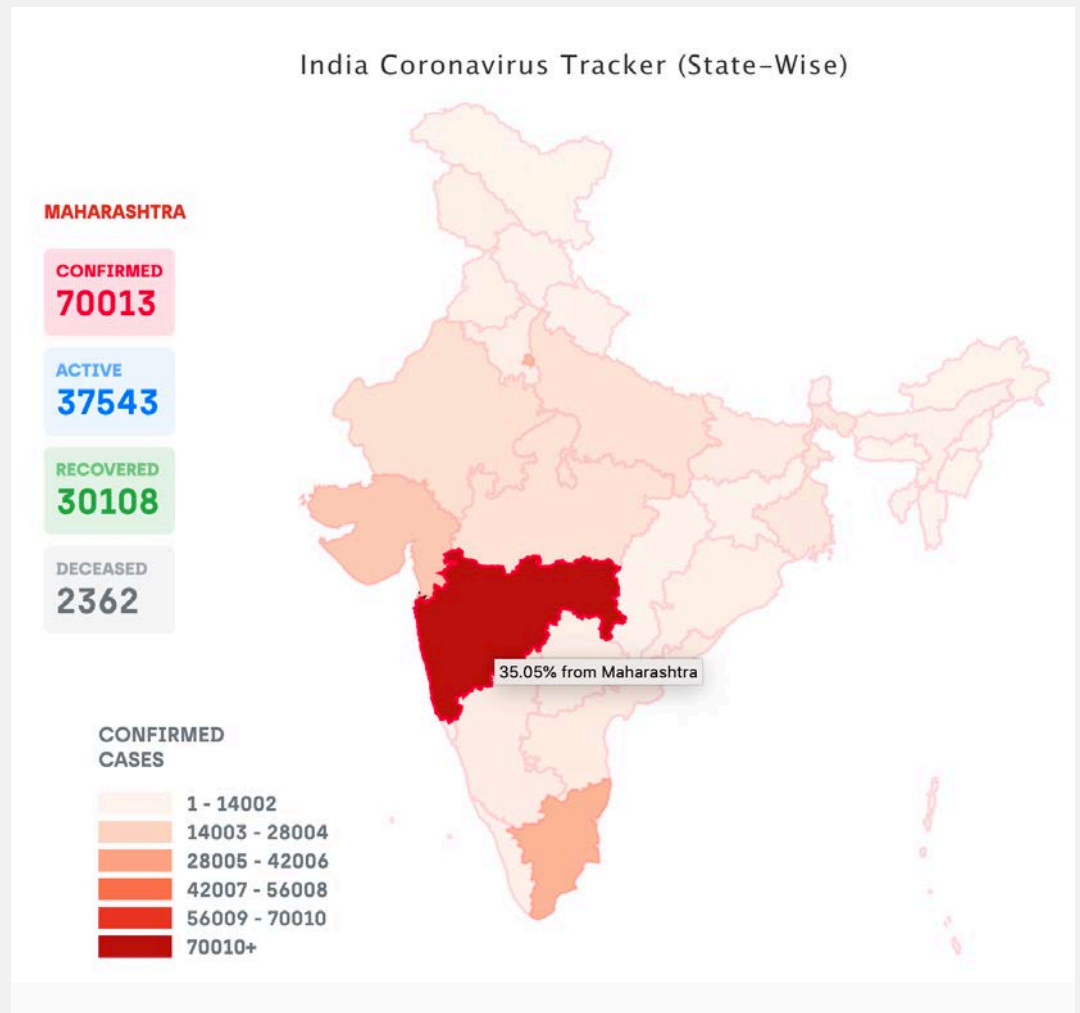
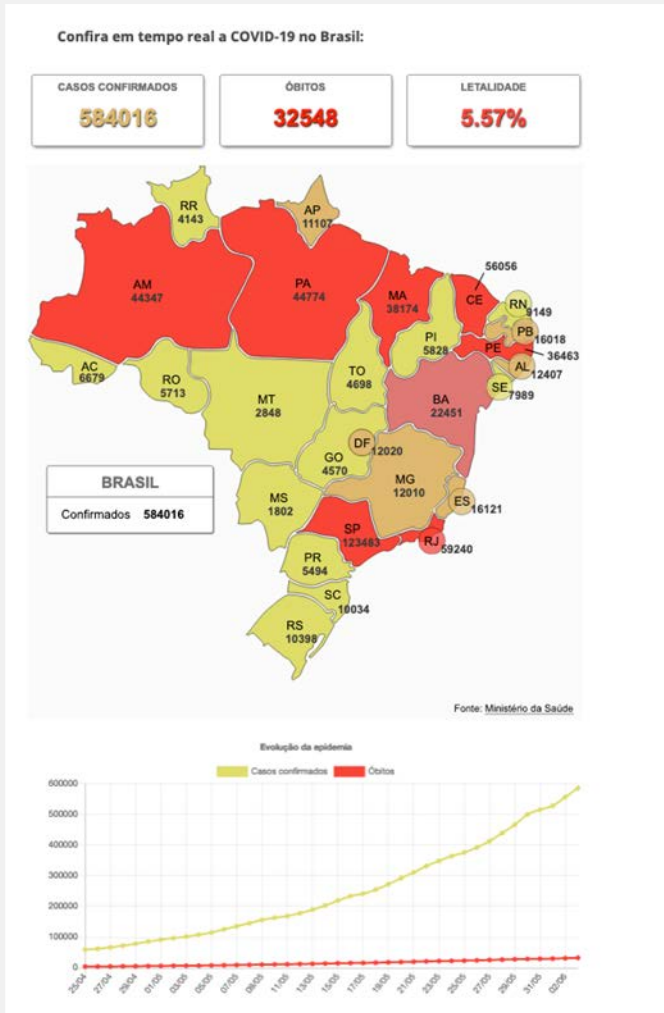
Logarithmic

Visualization: [JHU CSSE](#). Automation Support: [Esri Living Atlas team](#).
Data sources: [WHO](#), [CDC](#), [ECDC](#), [NHC](#) and [DXY](#). Read more in this [blog](#). [Contact US](#).
GitHub: [Here](#). Google Sheet: [Here](#). Time series table: [Here](#). Feature layer: [Here](#).

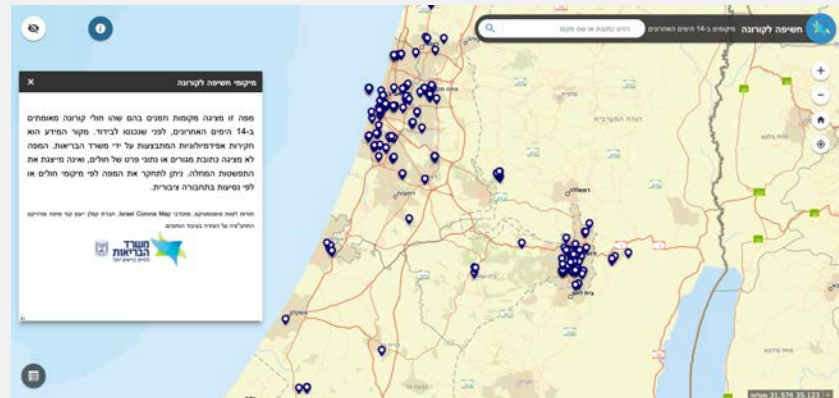
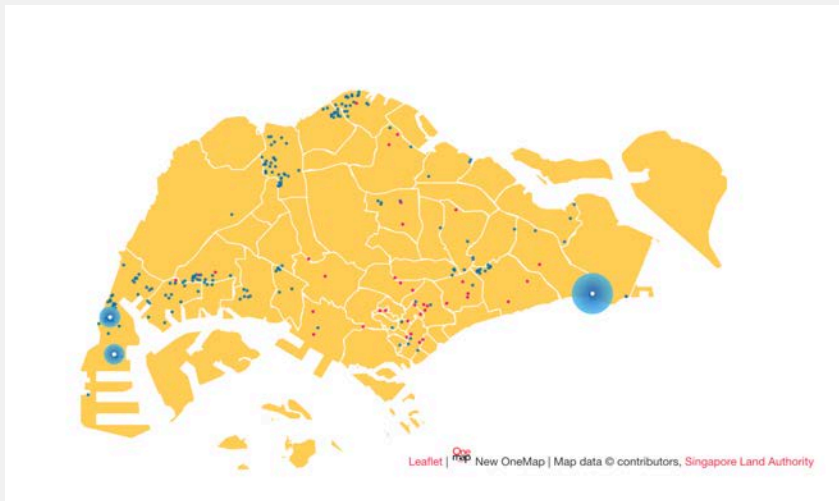
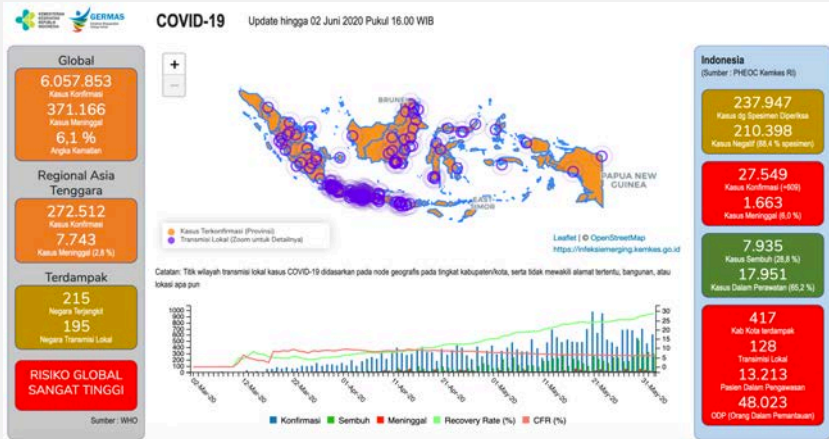
Last Updated at (M/D/YYYY)

2/11/2020 10:23:04 a.m.

Different ways to represent cases on maps



Different ways to represent cases on maps



California 3/23/20: Bubble Map (San Francisco Chronicle) vs Choropleth Map (L.A. Times)



Mapping the worldwide spread of the coronavirus | The Washington Post

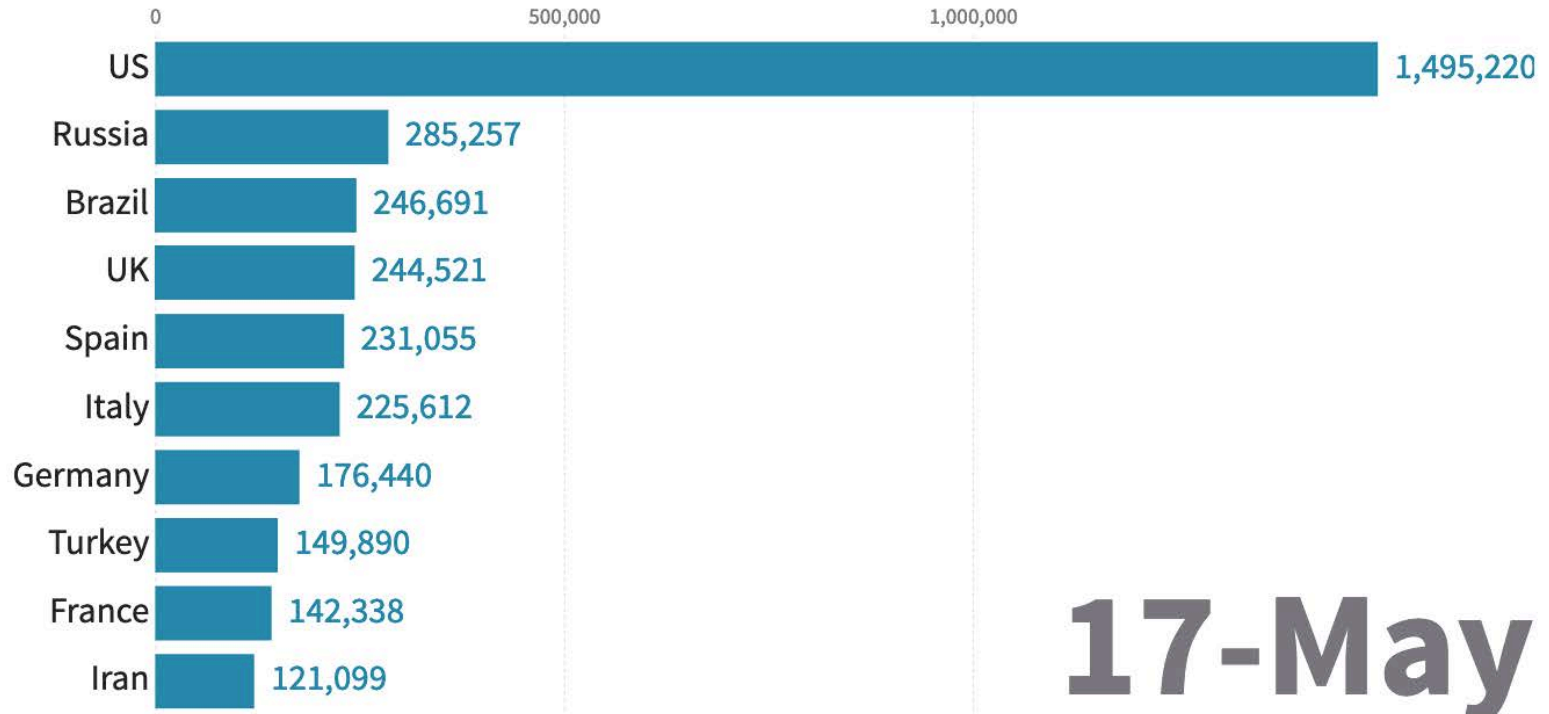
At least **345,000** reported deaths At least **5,512,000** reported cases

Deaths Cases **Adjusted for population** Raw numbers

U.S.		
	Per 100K	Total
Deaths	29.7	97,217
Cases	506.0	1,655,515



How confirmed cases of coronavirus have spread



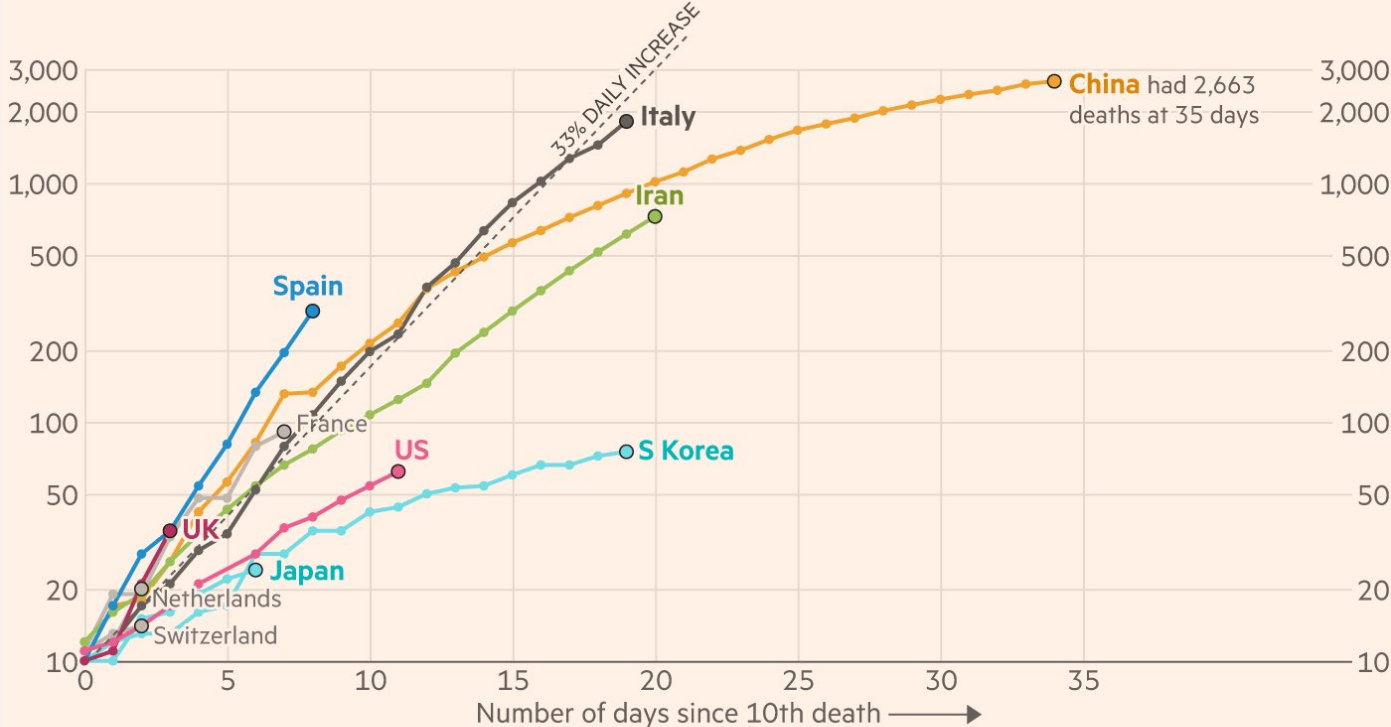
17-May



22-Jan 27-Jan 01-Feb 06-Feb 11-Feb 16-Feb 21-Feb 26-Feb 02-Mar 07-Mar 12-Mar 17-Mar 22-Mar 27-Mar 01-Apr 06-Apr 11-Apr 16-Apr 21-Apr 26-Apr 01-May 06-May 11-May 16-May 21-May

Coronavirus deaths in Italy and Spain are increasing much more rapidly than they did in China

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



FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of Johns Hopkins University, CSSE. Data updated March 15, 17:00 GMT
© FT

Coronavirus tracked: has the epidemic peaked near you? | Financial Times

Choose country or select up to six to compare

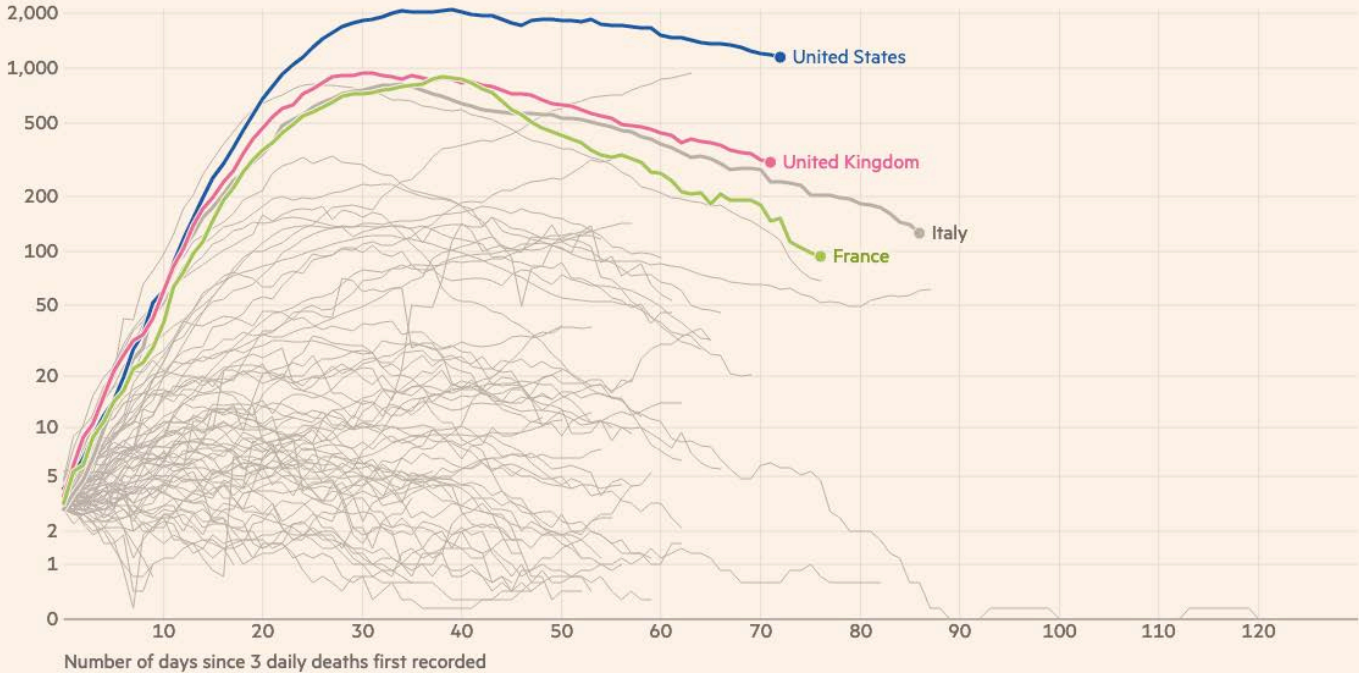
United States × United Kingdom × France ×

Deaths Cases New Cumulative

More options

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

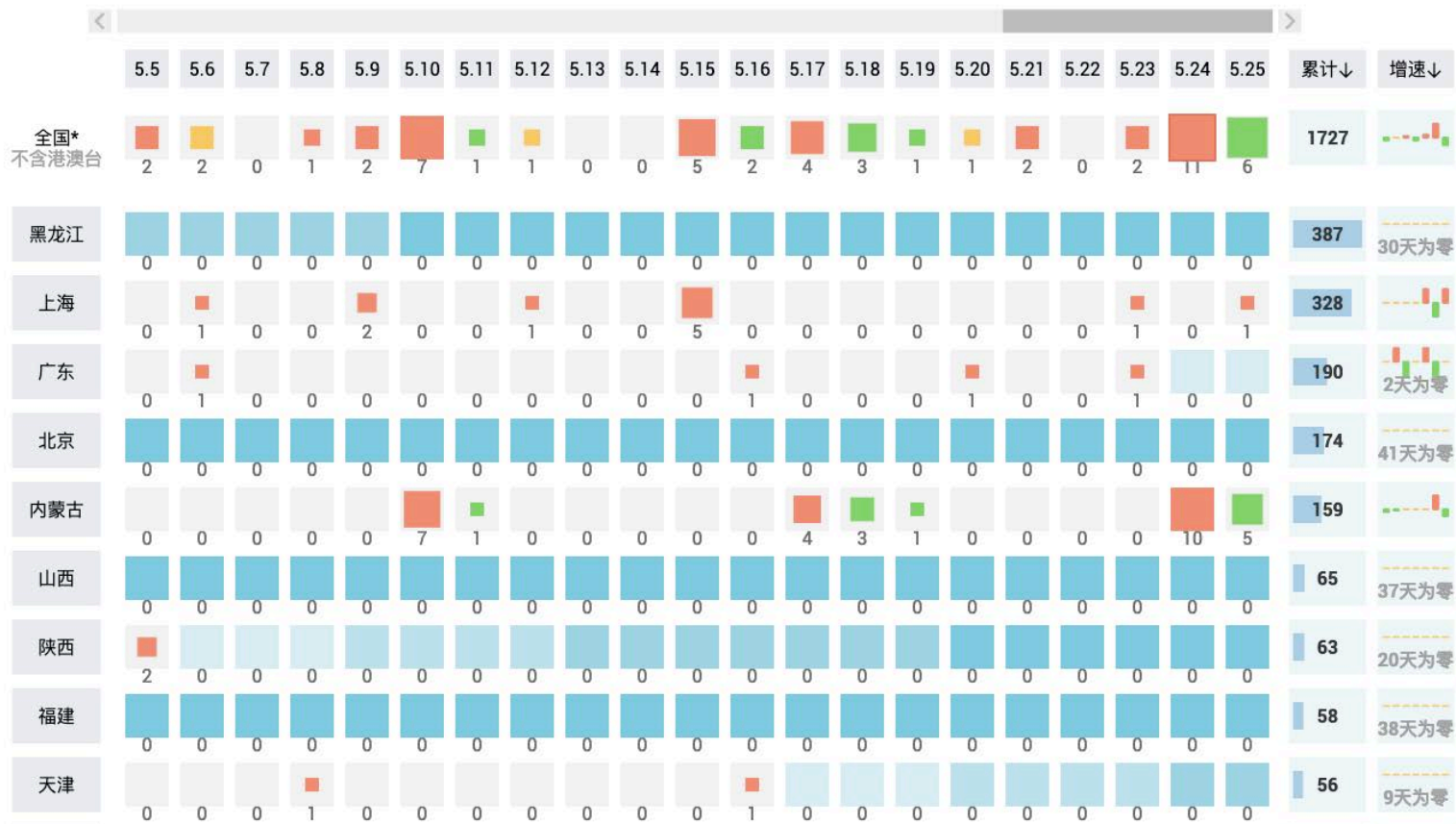
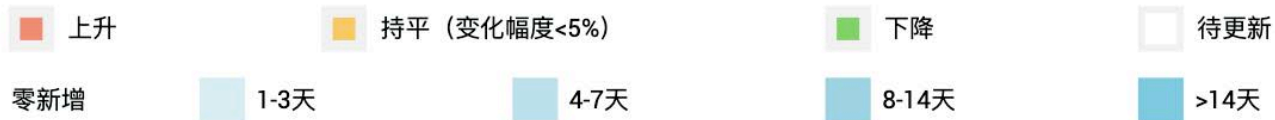
Seven-day rolling average of new deaths, by number of days since 3 average deaths first recorded



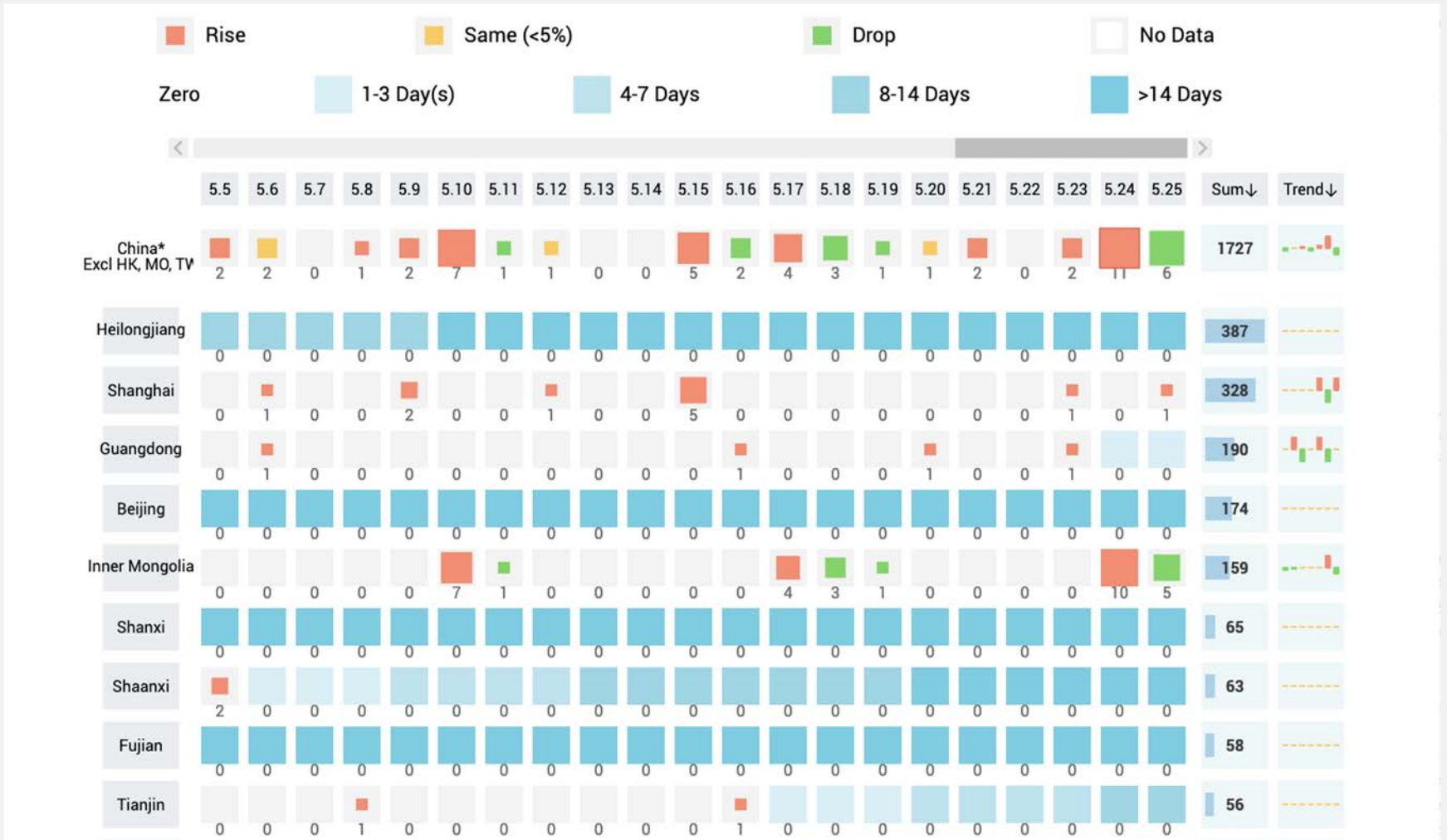
The latest figures on the Swiss COVID 19 outbreak | Tages-Anzeiger (Zurich)



COVID-19 Barometer | Visualization and Visual Analytics Laboratory, PKU (China)



COVID-19 Barometer | Visualization and Visual Analytics Laboratory, PKU (China)

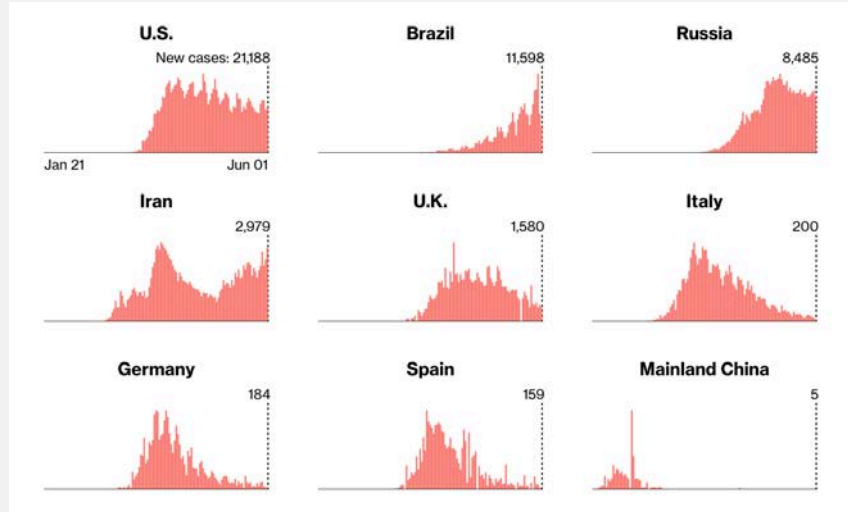


晴雨记录表

代号 月/日	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
	1月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
4月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
6月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
9月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12月	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
图例	晴	●	雨	●	阴	●	半阴半晴	●																								

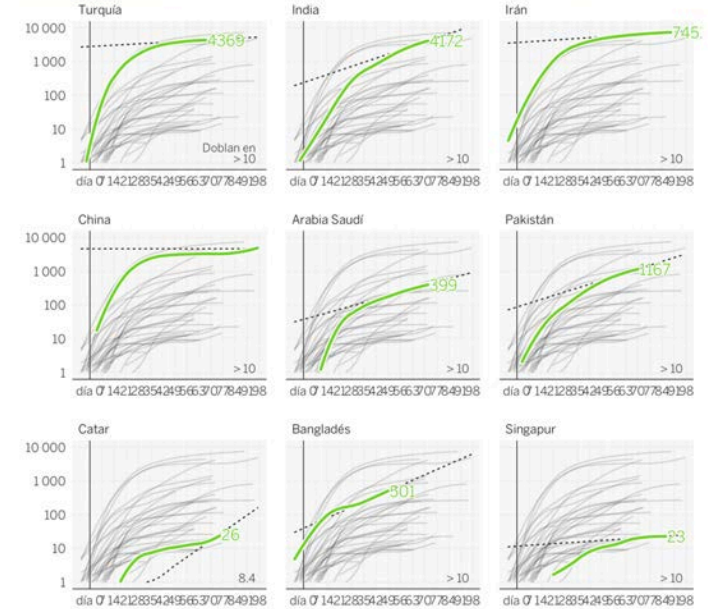
Proliferation of Small Multiples

Where new cases are increasing



Muertos Casos R muertos R casos

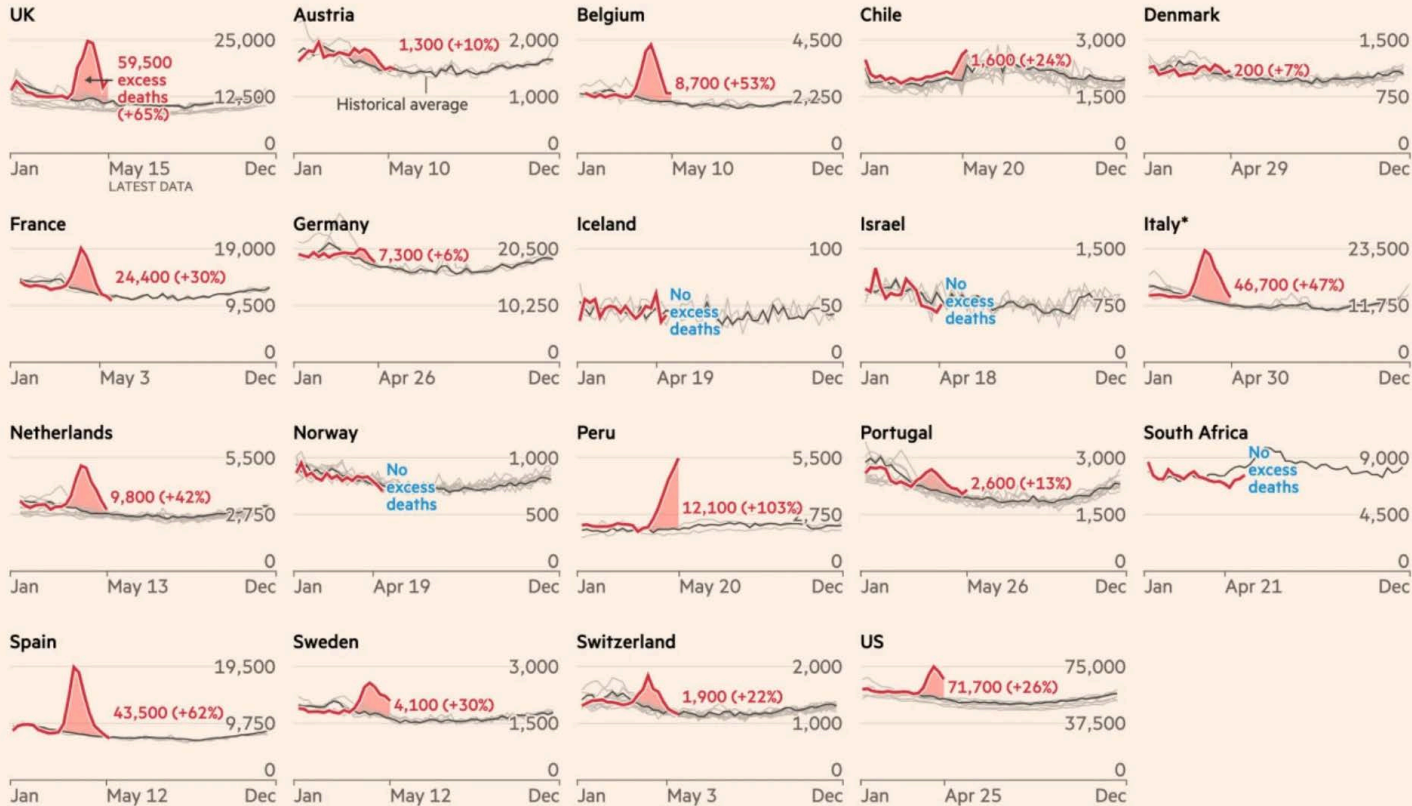
Fallecidos acumulados (en escala logarítmica) y evolución estimada en cada país de Asia.



Coronavirus tracked: the latest figures as countries fight to contain the pandemic | Financial Times

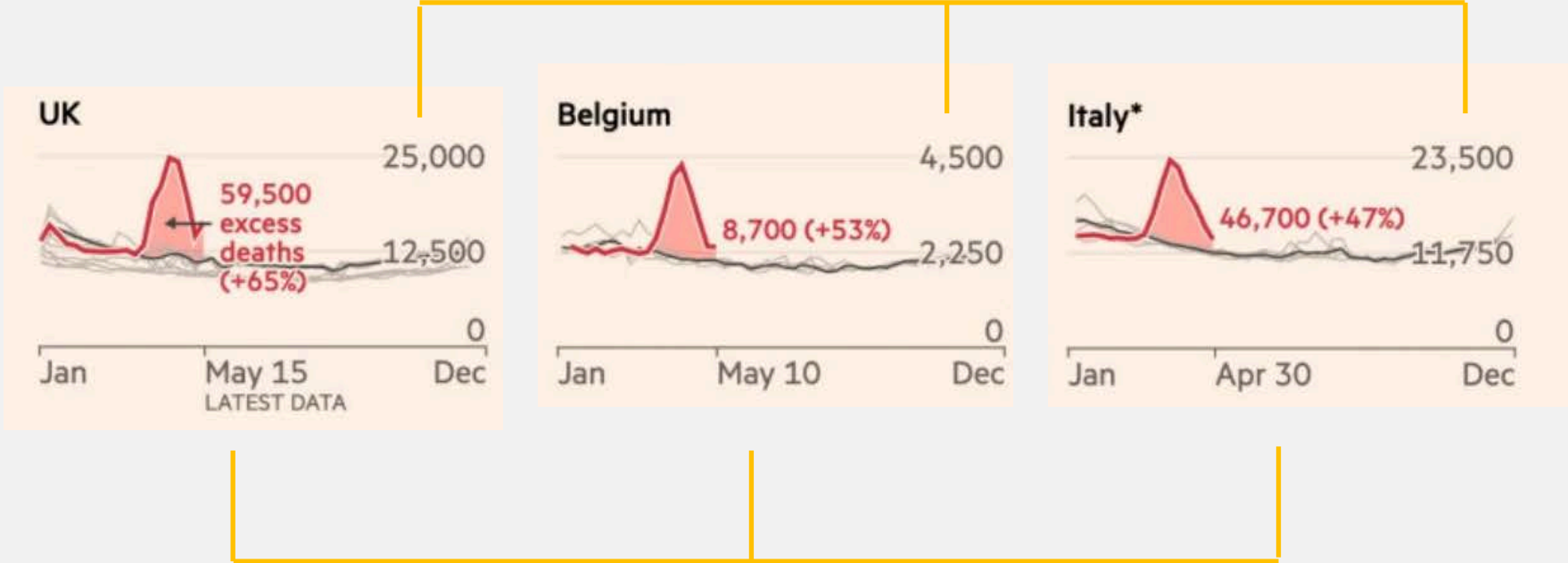
Death rates have climbed far above historical averages in many countries that have faced Covid-19 outbreaks

Number of deaths per week from all causes, 2020 vs recent years: Shading indicates total excess deaths during outbreak



*Italian figures may not exactly match the source data as they were scraped from a PDF
 Source: FT analysis of mortality data. Data updated May 29
 FT graphic: John Burn-Murdoch / @burnmurdoch
 © FT

Coronavirus tracked: the latest figures as countries fight to contain the pandemic | Financial Times



COMMUNICATING THE CURRENT MEDICAL STATE, SUPPLIES

Intended Message #2

Mask Guide (Taiwan)

Xuefu Pharmacy 21:52

Adult mask **1377** sheet

Children's masks **9** sheet

1F, No. 225 Xuefu Road, Daya District, Taichung City

04-25609333

Purchase Notes

8: 30-10: 00

Open on Google Maps

Mapbox © OpenStreetMap. Improve this map

U.S. Coronavirus Testing Still Falls Short. How's Your State Doing? | NPR

See How All The States Are Doing

To sort the table, click or tap the column headers.



LOCATION	SIZE OF OUTBREAK <i>Deaths per 100K</i>	CURRENT DAILY TESTING VS. TARGET <i>Tests per 100K</i>	POSITIVE TEST RATIO <i>Target: 10% or less</i>
New Jersey	96	77	32.8%
Massachusetts	64	153	15.9%
District of Columbia	39	116	23.5%
Connecticut	76	67	25.4%
Rhode Island	35	259	10.2%
Delaware	20	72	22.8%
Michigan	43	87	7.6%
New York	132	115	13.8%
Illinois	23	118	17.1%
Pennsylvania	26	46	18.0%
Louisiana	47	117	7.2%
Maryland	24	78	22.1%
Indiana	20	61	16.2%
Colorado	16	41	15.9%

Welche Masken schützen und wie man sie richtig trägt | Tages-Anzeiger (Zurich)



✘ **Not correct!**
The mask should always cover the entire nose.

✘ **Not correct!**
The chin should also always be completely covered.



✘ **Not correct!**
The mask must not hang loosely over the ears, but must be lashed down.



✘ **Not correct!**
The mask should never be pushed under the chin to relieve the strain.



That is how it goes!



✔ **Correct!**

2nd What types of masks are there?

Respirators (with and without valve)

FFP1, FFP2, FFP3



- FFP stands for Filtering Face Piece. FFP1, FFP2 and FFP3 provide 80, 94 and 99 percent protection against viruses - but they are not completely dense. FFP1 masks do not protect against aerosols and are unsuitable for self-protection in the medical field.
- FFP2 / 3 masks protect the wearer, e.g. nurse or doctor, from infections, since the air we breathe is filtered from the outside when inhaled.
- Particle filters also collect dust, vapors or some microorganisms.
- Should be strictly reserved for medical personnel.
- Warning: some of these masks have a valve for easier exhalation. Infected people with or without symptoms of illness should not use these masks because they contribute to the spread of viruses.
- The protection values only apply if the mask fits perfectly, so "beard hair in the area of the sealing line between the respirator and facial skin can impair the protective effect", as the Robert Koch Institute emphasizes.

Hygiene masks or surgical mask

Type II or IIR

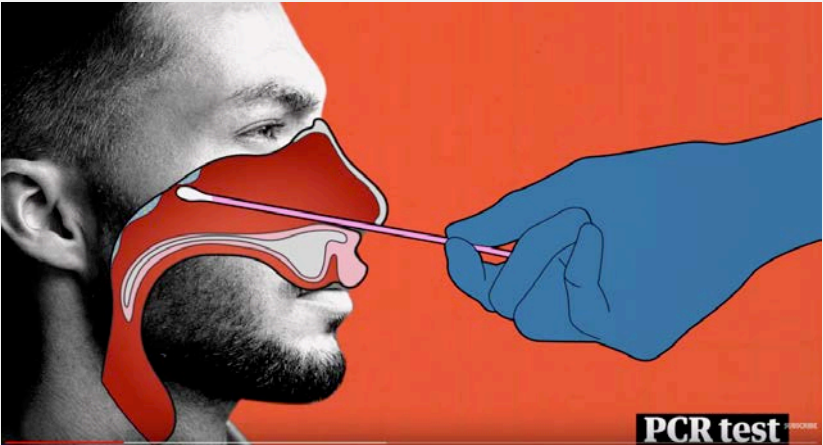
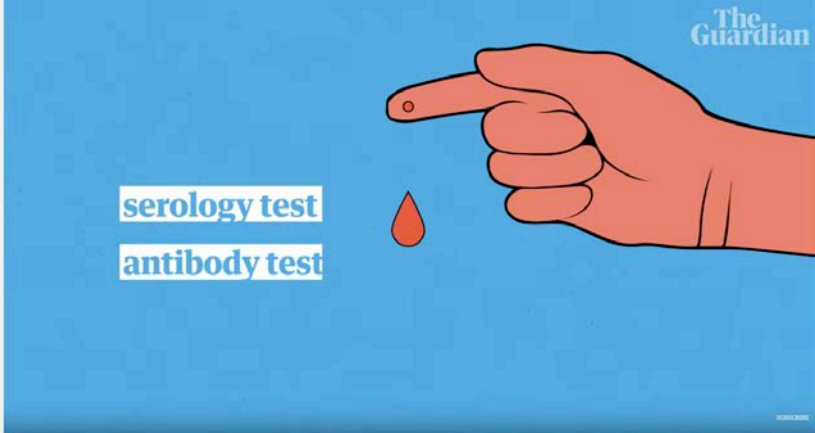


- The inside of most medical masks are white, while the outside is of any other color.
- Intended for people with symptoms of illness. They protect the environment from infectious agents from the nose and mouth of the mask wearer. So can reduce the risk of infection in older and chronically ill people.
- They do not offer reliable protection against infection because they do not have a filter and a lot of air is sucked in at the edges.
- Prevent mucous membranes from being touched by the mouth and nose with any contaminated hands.
- Press the metal piece over the nose firmly at the beginning so that the mask fits tightly.
- Throw away immediately after one use and then wash your hands with soap and water.

Fabric masks



Coronavirus tests: how they work and what they show | The Guardian (UK)



COMMUNICATING TRANSMISSION AND INFECTION

Intended Message #3

Transition from Data Visualization to Concept Visualization

Hidden Outbreaks Spread Through U.S. | New York Times

Hidden Outbreaks Spread Through U.S. Cities Far Earlier Than Americans Knew, Estimates Say

By Benedict Carey and James Glanz

Published April 23, 2020 Updated May 14, 2020



By the time New York City confirmed its first case of the [coronavirus](#) on March 1, thousands of [infections](#) were already silently spreading through the city, a hidden explosion of a disease that many still viewed as a remote threat as the city awaited the first signs of spring.

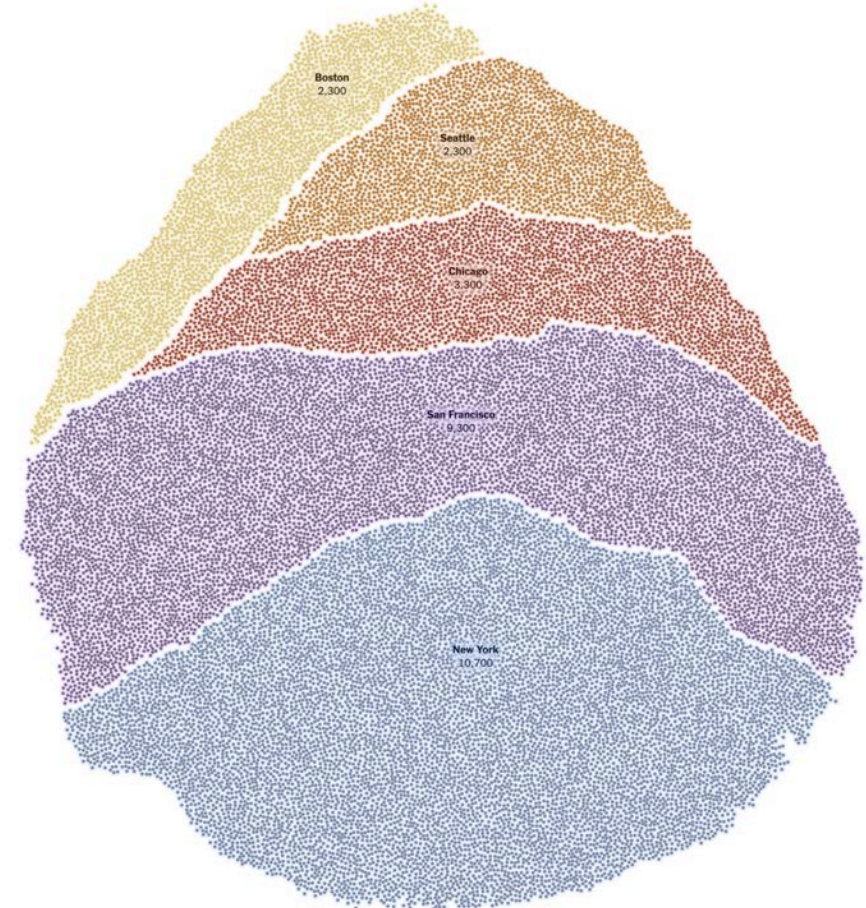
Hidden outbreaks were also spreading almost completely undetected in Boston, San Francisco, Chicago and Seattle, long before testing showed that each city had a major problem, according to a model of the spread of the disease by researchers at Northeastern University who shared their results with The New York Times.

Even in early February — while the world focused on China — the virus was not only likely to be spreading in multiple American cities, but also seeding blooms of infection elsewhere in the United States, the researchers found.

In five major U.S. cities, as of March 1 there were only **23 confirmed cases** of coronavirus.



But according to the Northeastern model, there could have actually been about **28,000 infections** in those cities by then.



Note: Numbers are median estimates that the Northeastern model calculated for each city. The true number of infections could have been substantially higher or lower than shown here. — By Derek Watkins

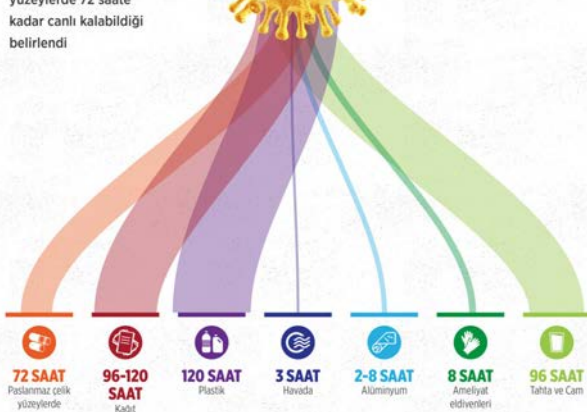
COVID-19 can stay alive on metal for 72 hours

Kovid-19

çelik yüzeylerde 72 saat canlı kalabiliyor

New England Journal of Medicine'de yayımlanan araştırmada, Kovid-19'un paslanmaz çelik yüzeylerde 72 saate kadar canlı kalabildiği belirlendi

KOVID-19'UN YÜZEYLERDE KALMA SÜRESİ



SAÇ VE SAKALA DİKKAT

Uzmanlar saç ve sakalın virüsün üremesi için uygun yerler olduğunu bu nedenle saç ve sakalın kısa kesilmesi ve gerekli yerlerde bone kullanılması gerektiğini belirtiyor



Bu tür yerlerin düzenli olarak temizliği yapılmalı

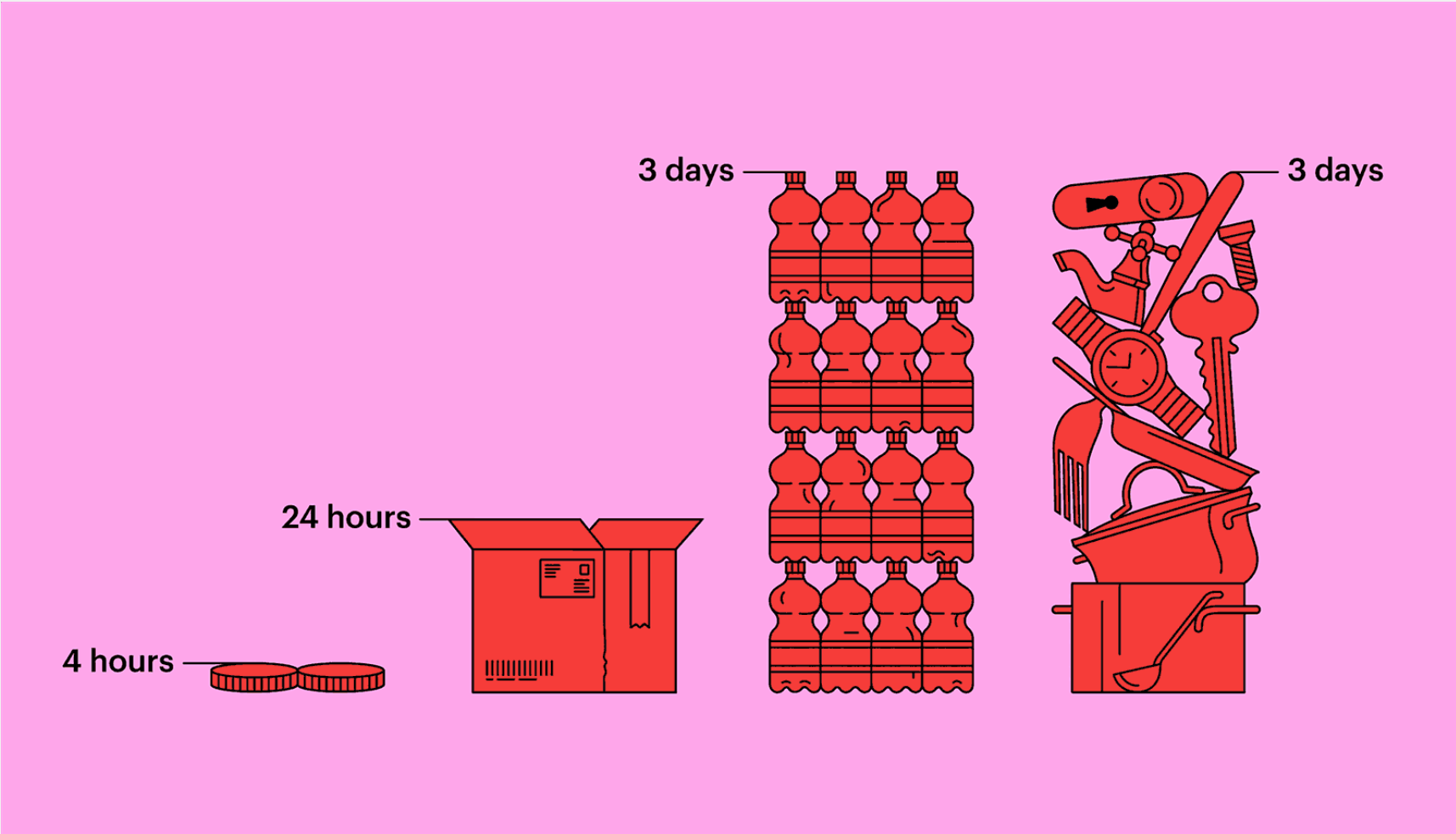


Bu yüzeylerle temastan sonra el temizliğine dikkat edilmeli

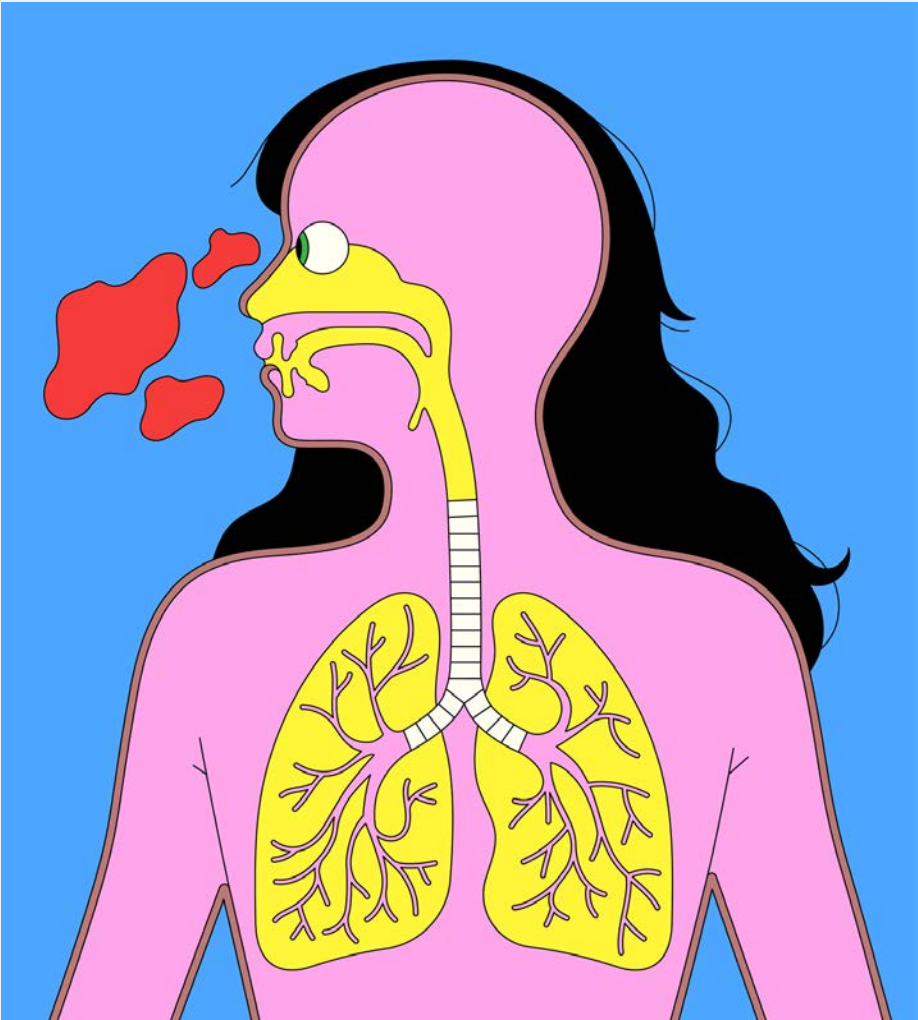


Temastan sonra eller yüz, ağız ve buruna kesinlikle götürülmemeli

From Bats to Human Lungs, the Evolution of a Coronavirus | The New Yorker

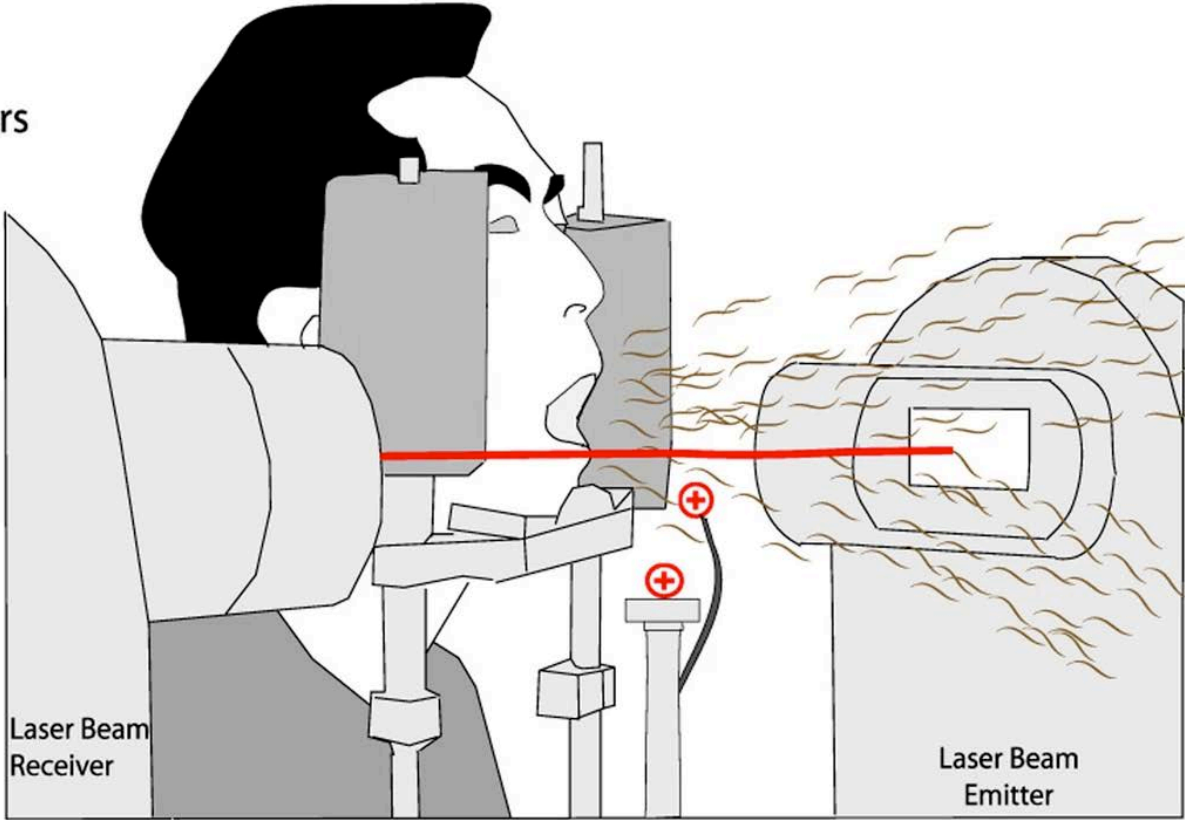


From Bats to Human Lungs, the Evolution of a Coronavirus | The New Yorker



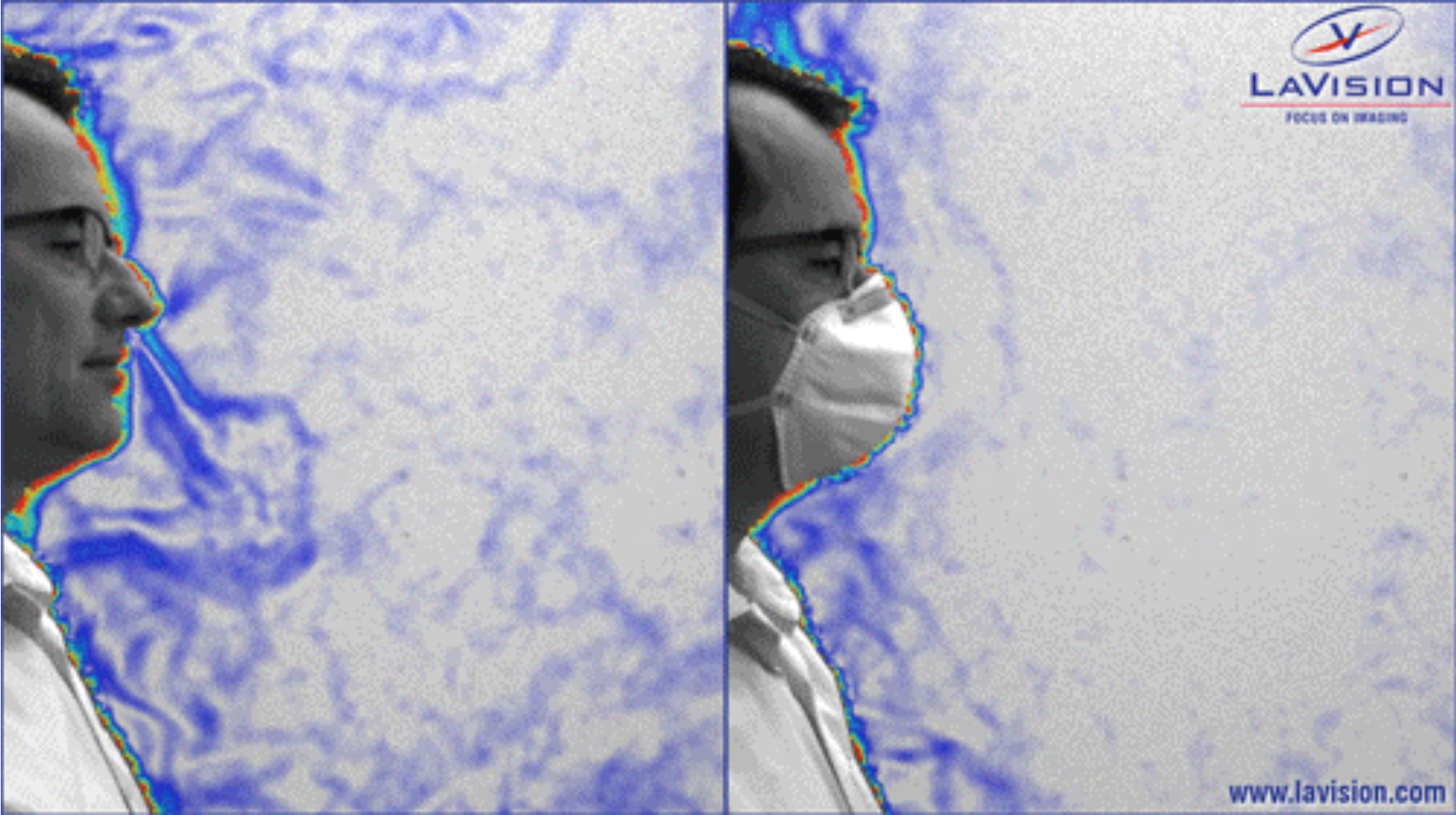
Cough Aerosol Model

⊕ = Sensors



Open Bench Cough

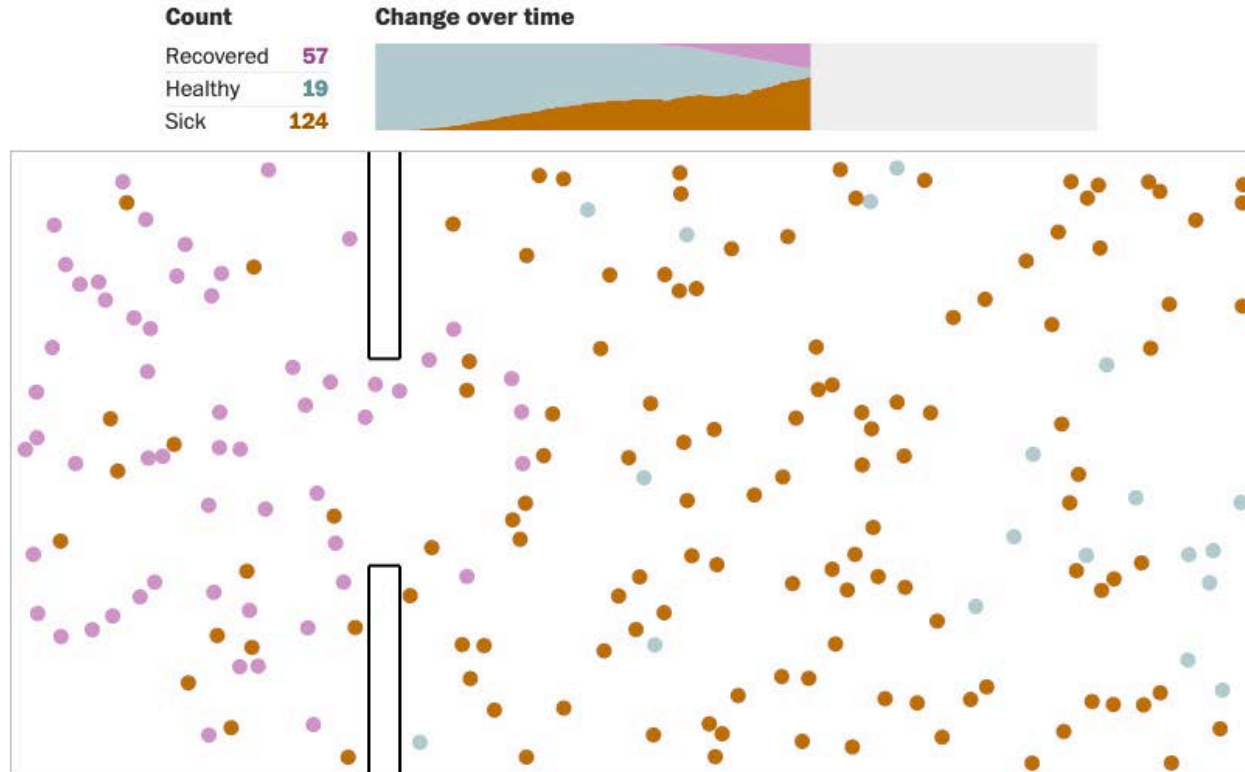
LaVision imaging technique shows how masks restrict the spread of exhaled air



This 3-D Simulation Shows Why Social Distancing Is So Important | New York Times



Why outbreaks like coronavirus spread exponentially, and how to “flatten the curve” | Washington Post

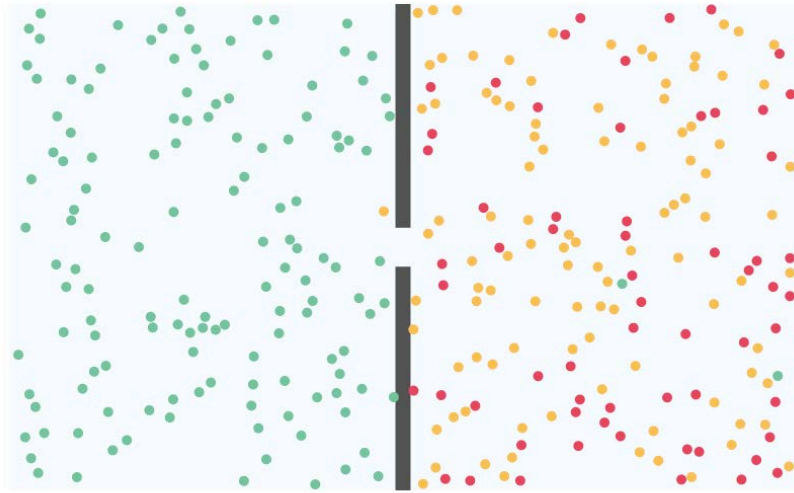
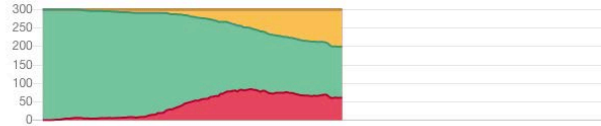


Whoops! As health experts would expect, it proved impossible to completely seal off the sick population from the healthy.

DÉCOMPTÉ

Contaminé : **62**
Sain : **136**
Immunisé : **102**

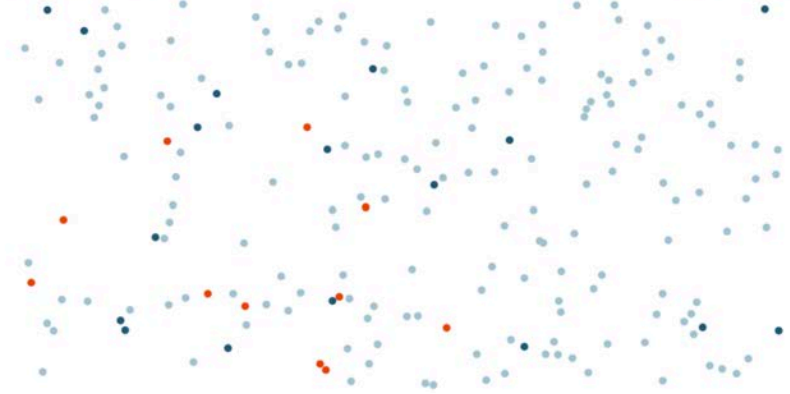
ÉVOLUTION AU FIL DU TEMPS



Verlauf bei hoher Bewegungseinschränkung

"Social Distancing" und Einschränkungen des öffentlichen Lebens

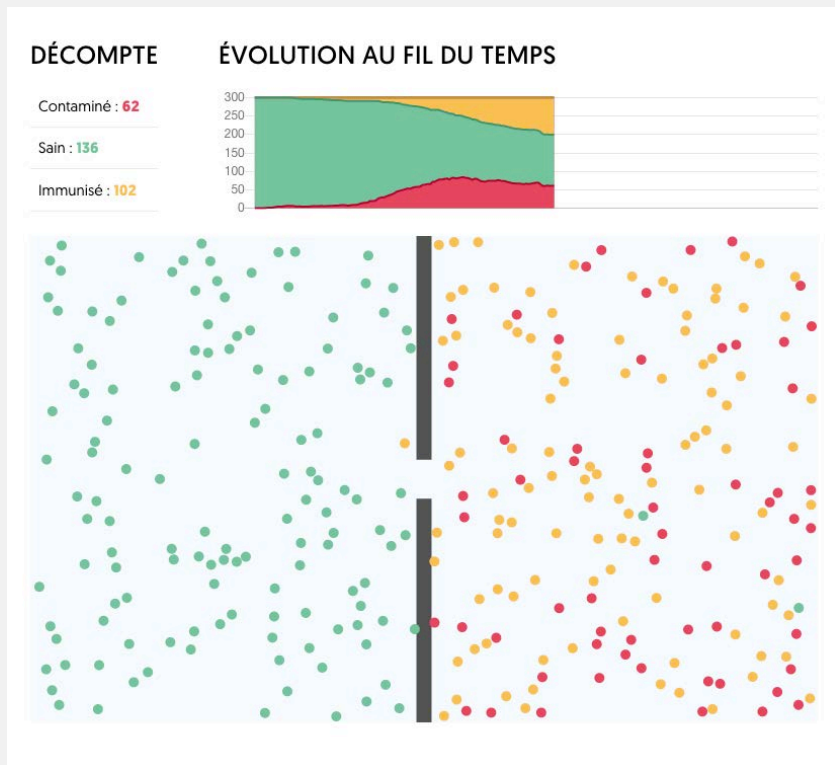
● Gesunde: 17 ● Kranke: 11 ● Genesene: 172



Quelle: Washington Post

[Simulation noch einmal starten](#)

Spanien, Frankreich und Italien haben gezeigt, dass es noch eine weitere Eskalationsstufe geben könnte: die Ausgangssperre. Sie könnte verhängt werden, wenn sich in einigen Tagen nicht abzeichnet, dass die



ВИДЕО: Хөл хорио, хөдөлгөөний хязгаарлалт | medee.mn

ВИДЕО: Хөл хорио, хөдөлгөөний хязгаарлалт

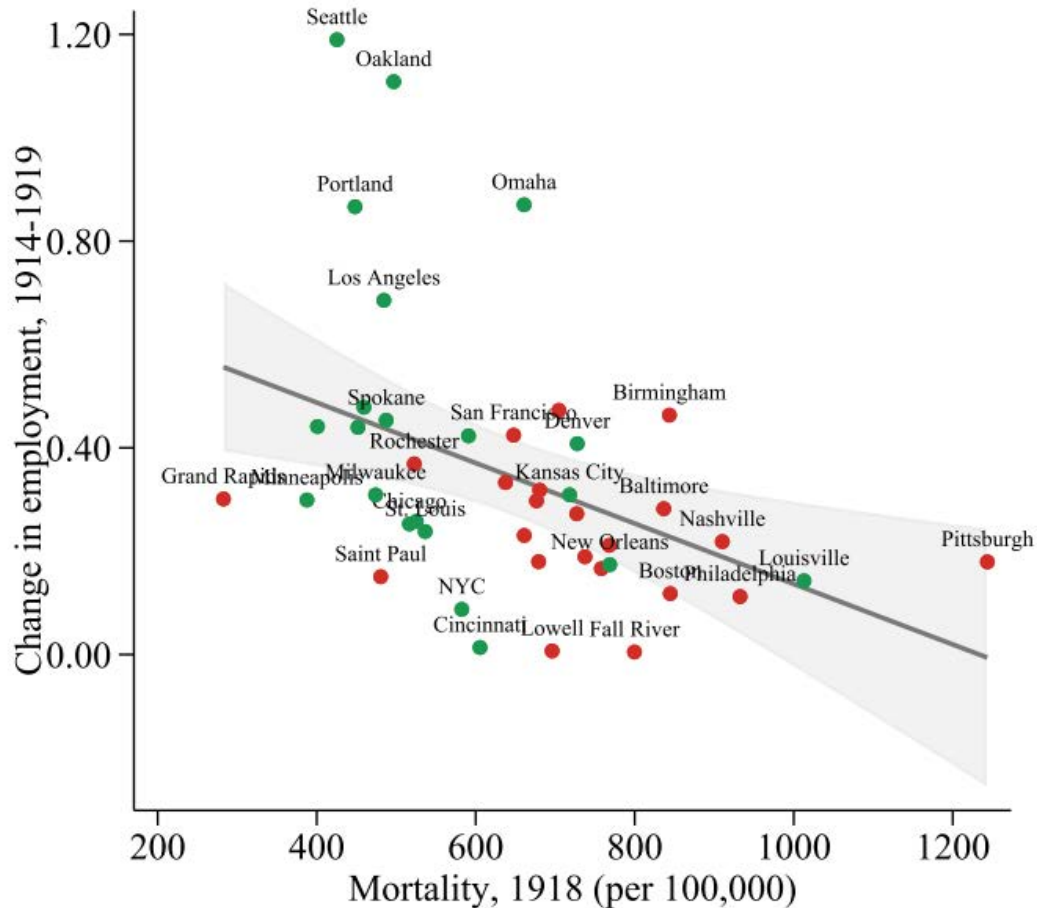
Ц.Анударь / Нүүр | 2020.03.22

Хөл хорио, хөдөлгөөний хязгаарлалт зэрэг урьдчилан сэргийлэх арга хэмжээг цогцоор нь аваагүй тохиолдолд коронавируст халдвар геометрийн прогрессоор өснө. Хөдөлгөөний хязгаарлалт хийсэн Хөдөлгөөний хязгаарлалт хийсэн хийгээгүй эмнэлгийн ачаалал

Хөл хорио, хөдөлгөөний хязгаарлалт зэрэг урьдчилан сэргийлэх арга хэмжээг цогцоор нь аваагүй тохиолдолд

Translation from Academic Figures to News Stories

Pandemics Depress the Economy, Public Health Interventions Do Not: Evidence from the 1918 Flu



• Total NPI days below med. • Total NPI days above med.

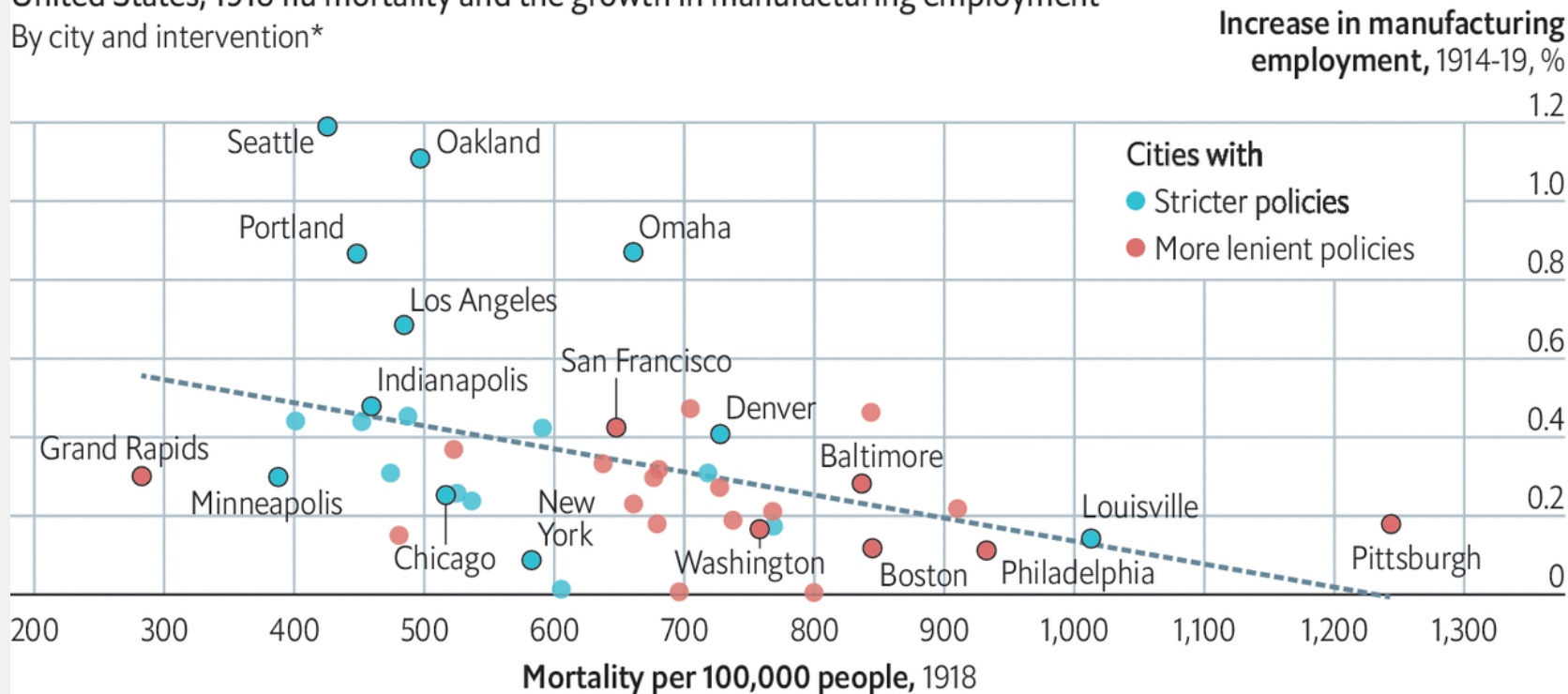
By Sergio Correia, Stephan Luck and Emil Verner, published in SSRN 3/26/20

- NPI = Non-Pharmaceutical Interventions
- RED DOT = cities with below median days of NPI
- GREEN DOT = cities with above median days of NPI
- X = Influenza deaths per 100K population
- Y = Change in employment rate from 1914-1919

Necessary precautions

United States, 1918 flu mortality and the growth in manufacturing employment

By city and intervention*



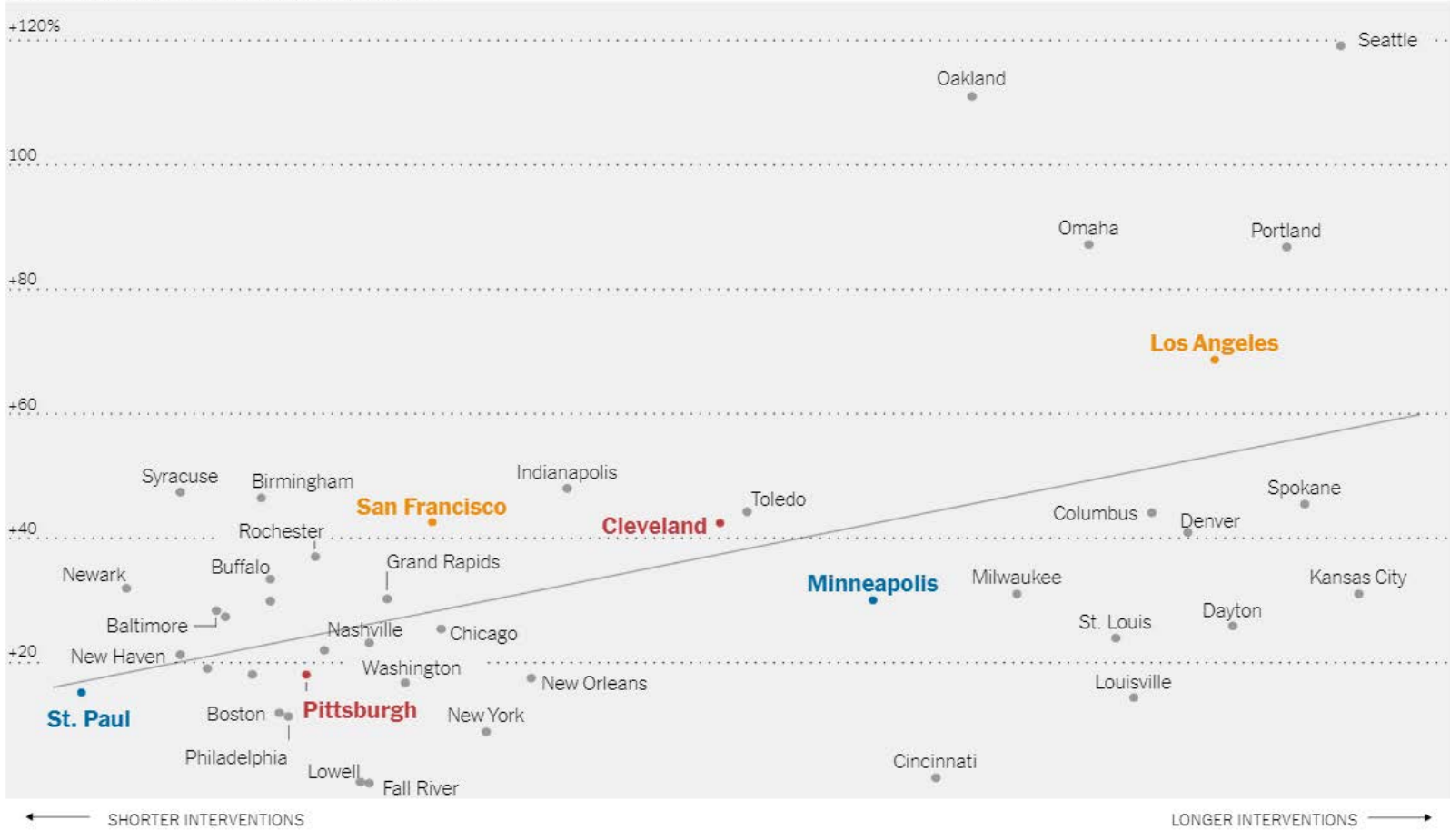
Source: "Pandemics depress the economy, public health interventions do not: evidence from the 1918 flu" by S. Correia, S. Luck and E. Verner, 2020

*Non-pharmaceutical measures, e.g. social distancing, closing schools and churches, mandatory face masks

Cities That Went All In on Social Distancing in 1918 Emerged Stronger for it | New York Times

Cities That Had More Aggressive Interventions Tended to Have Higher Employment Growth

GROWTH IN MANUFACTURING EMPLOYMENT 1914 TO 1919



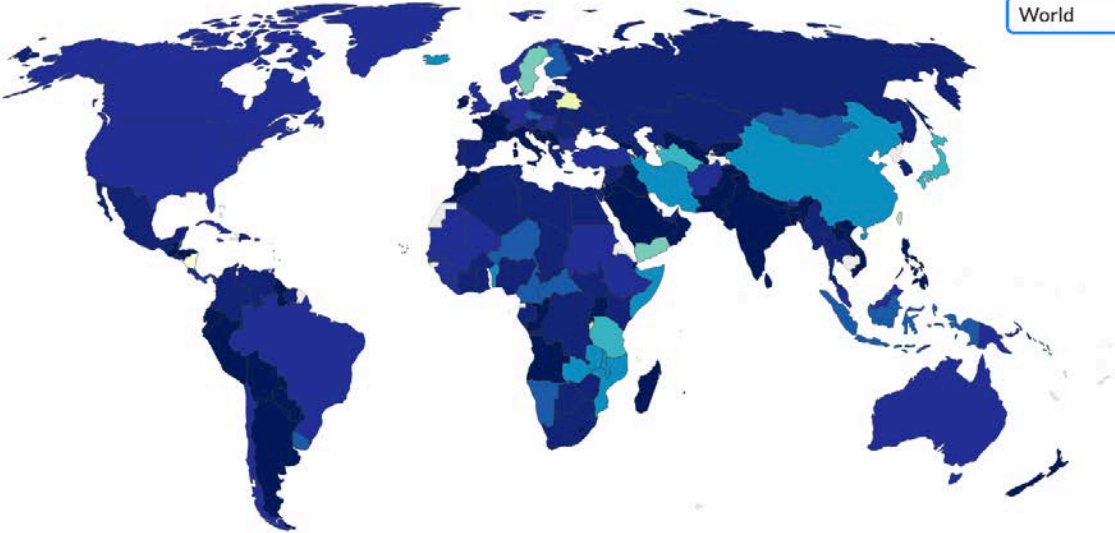
COVID-19: Government Response Stringency Index | Our World in Data (Oxford UK)

COVID-19: Government Response Stringency Index, Apr 14, 2020

The Government Response Stringency Index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest response).



World



Source: Hale, Webster, Petherick, Phillips, and Kira (2020). Oxford COVID-19 Government Response Tracker – Last Updated 29th May.
Note: This index simply records the number and strictness of government policies, and should not be interpreted as 'scoring' the appropriateness or effectiveness of a country's response.
OurWorldInData.org/coronavirus • CC BY

▶ Jan 21, 2020 May 29, 2020

CHART

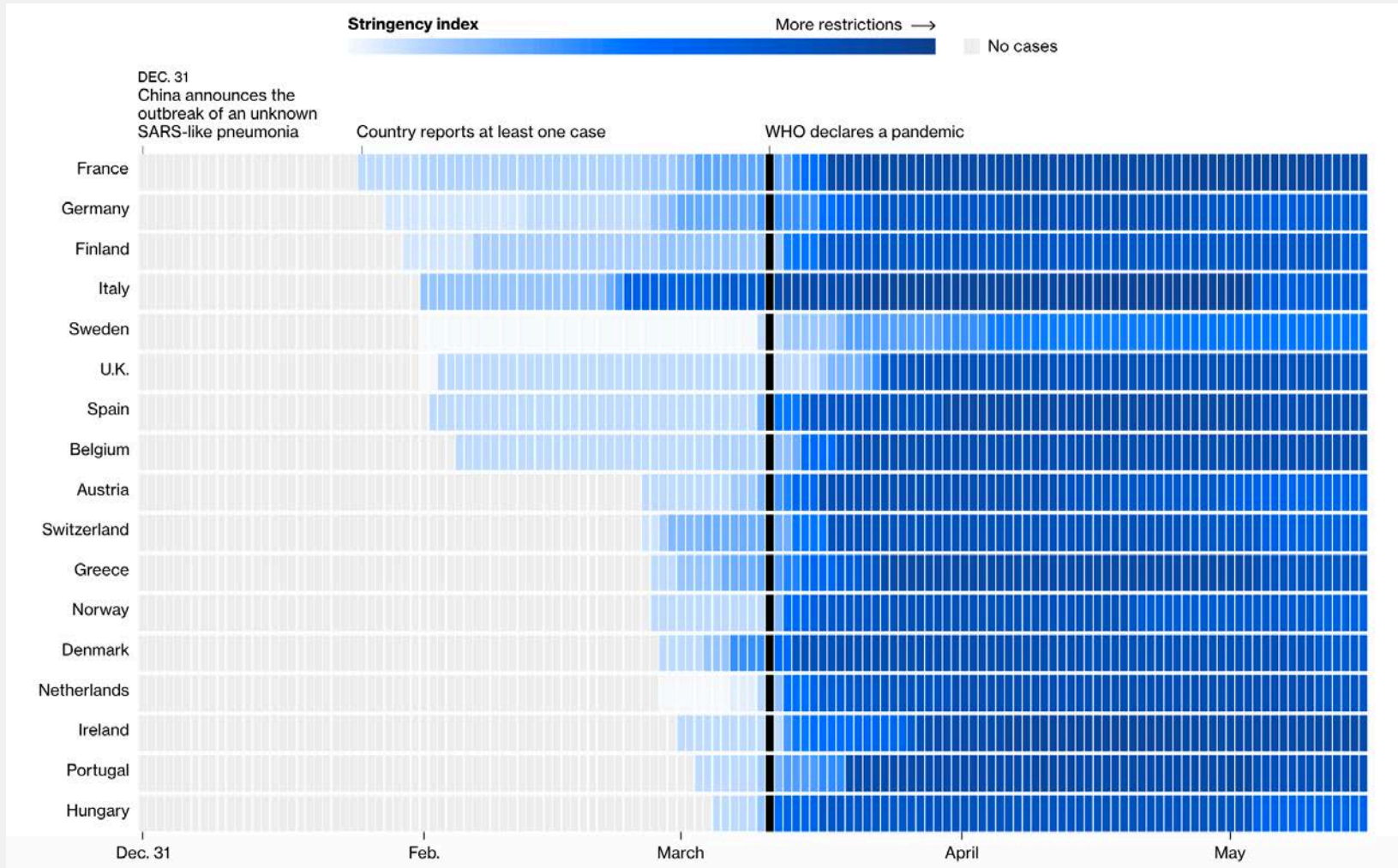
MAP

DATA

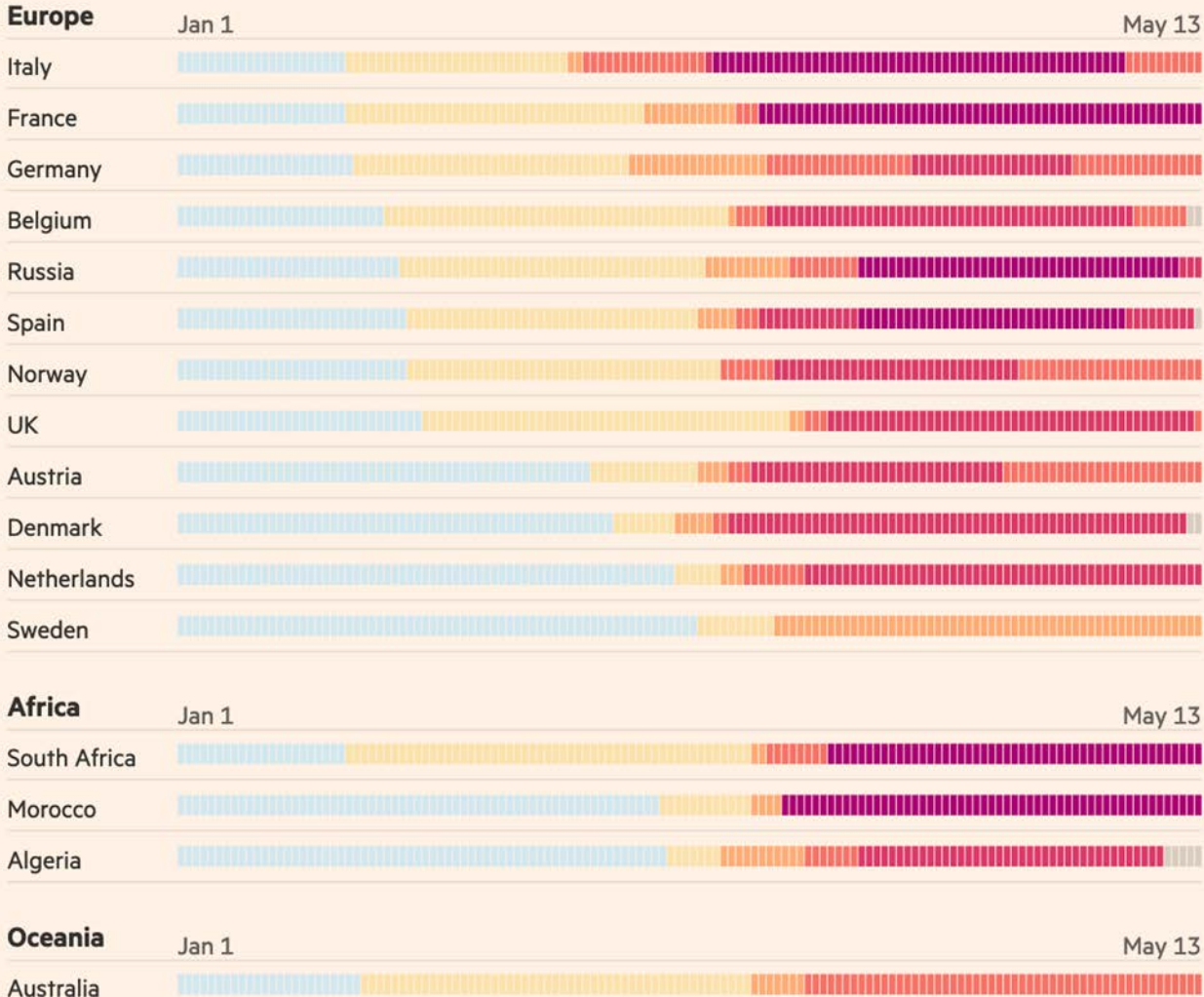
SOURCES



The Results of Europe's Lockdown Experiment Are In | Bloomberg News



Exiting lockdowns: tracking governments' changing coronavirus responses | Financial Times



COMMUNICATE RISK FLATTEN THE CURVE

Intended Message #4

Why outbreaks like coronavirus spread exponentially, and how to “flatten the curve” (Washington Post)

Count

Recovered	187
Healthy	1
Sick	12

Change over time



Free-for-all



Attempted quarantine



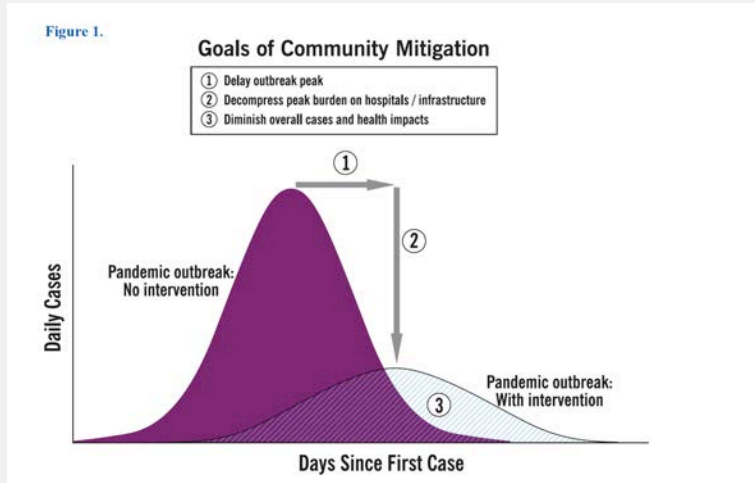
Moderate distancing



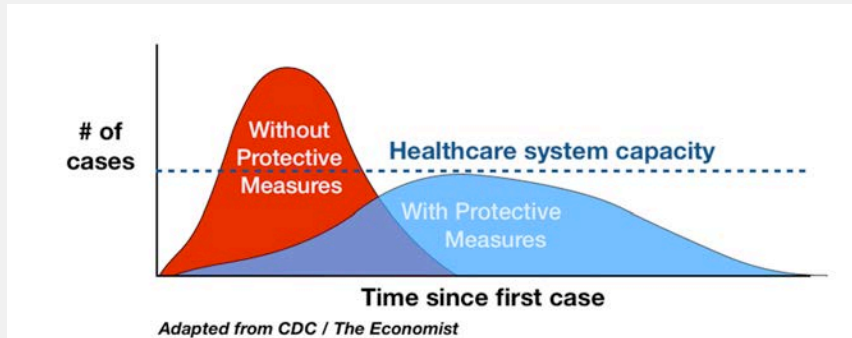
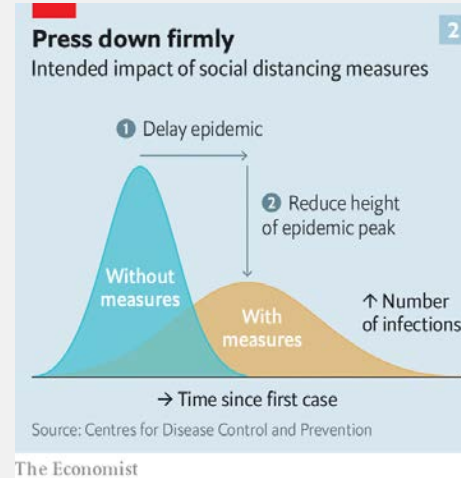
Extensive distancing



Community Strategy for Pandemic Influenza Mitigation in the United States | CDC, 2007

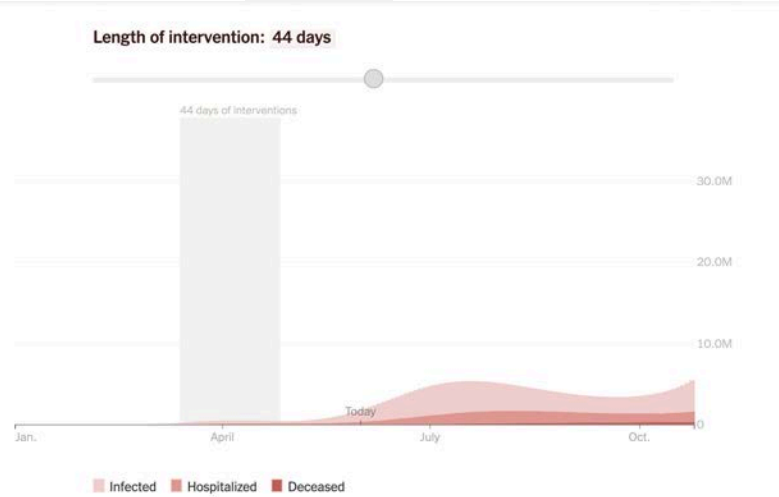
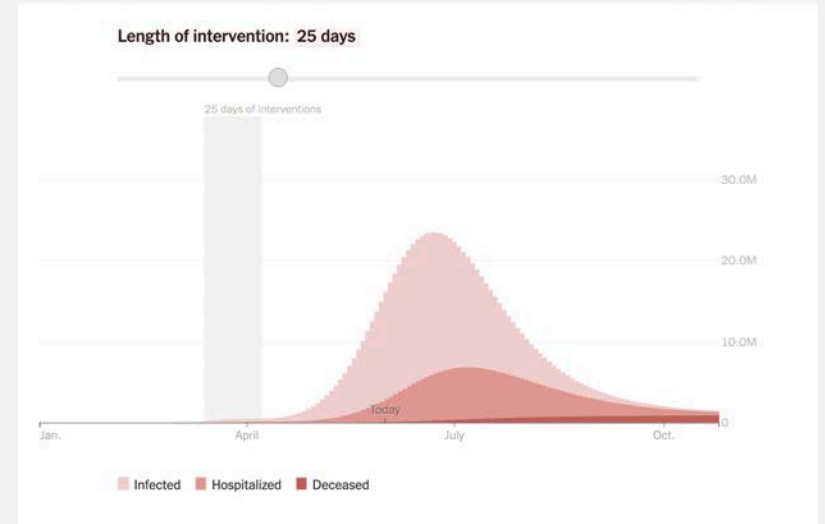
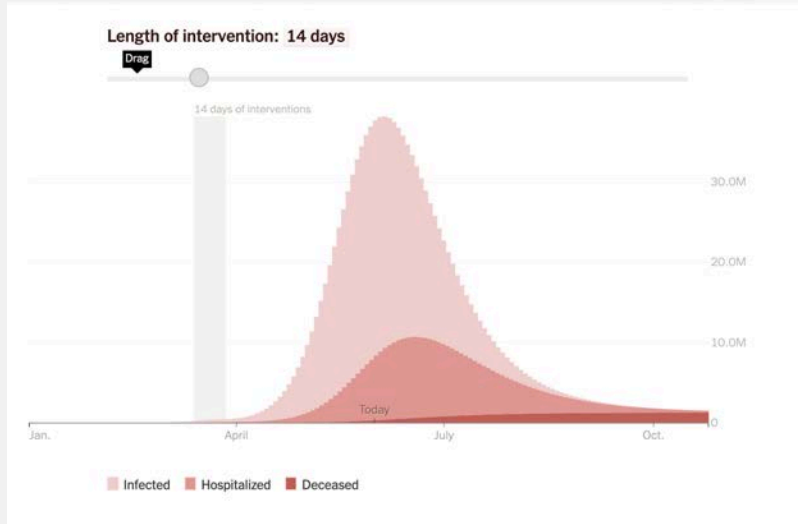


Covid-19 is now in 50 countries, and things will get worse | The Economist (2/29/20)



Redrawn by Drew Harris, professor of Population Health and published on Twitter

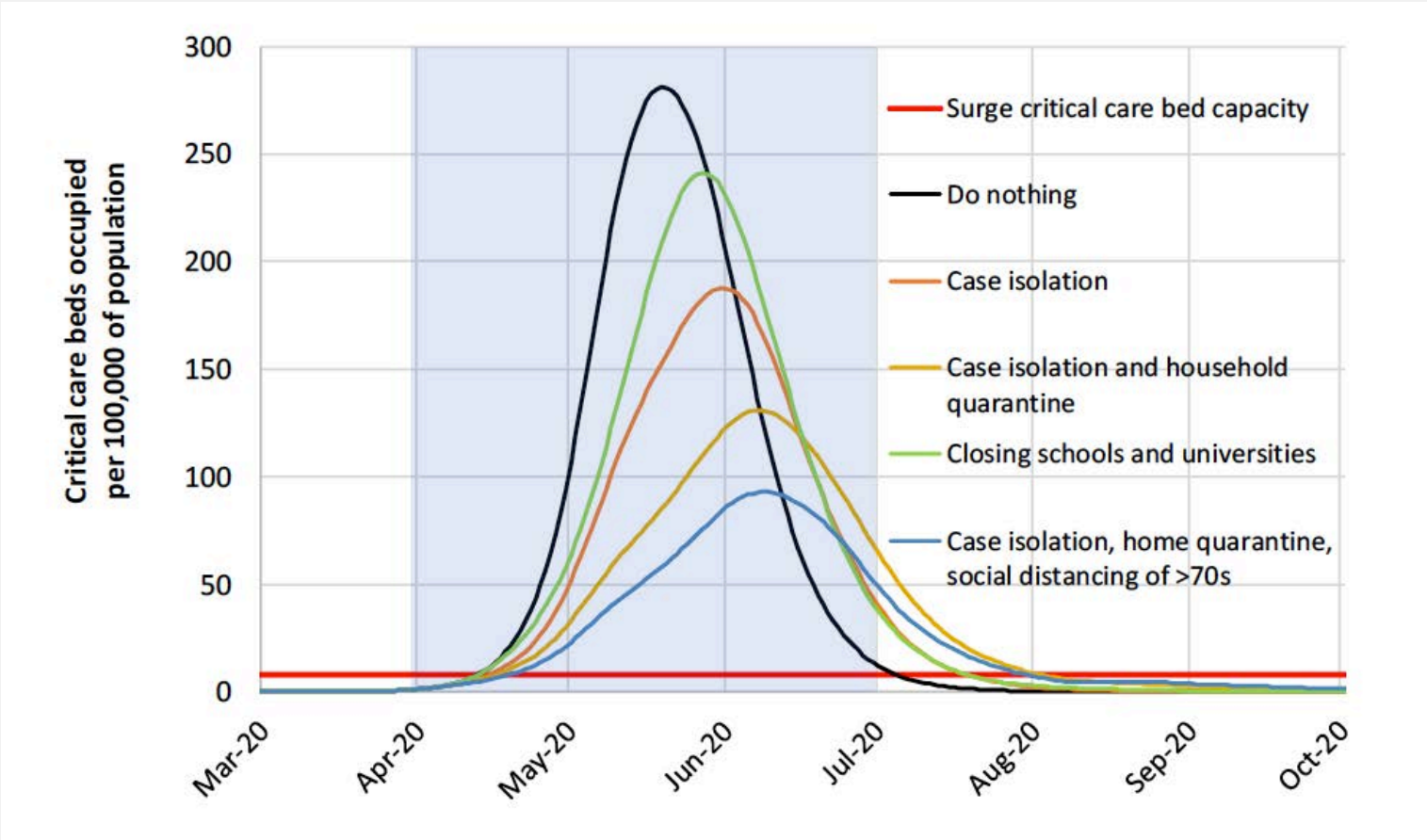
Trump Wants to 'Reopen America.' Here's What Happens if We Do. | New York Times (3/25/20)



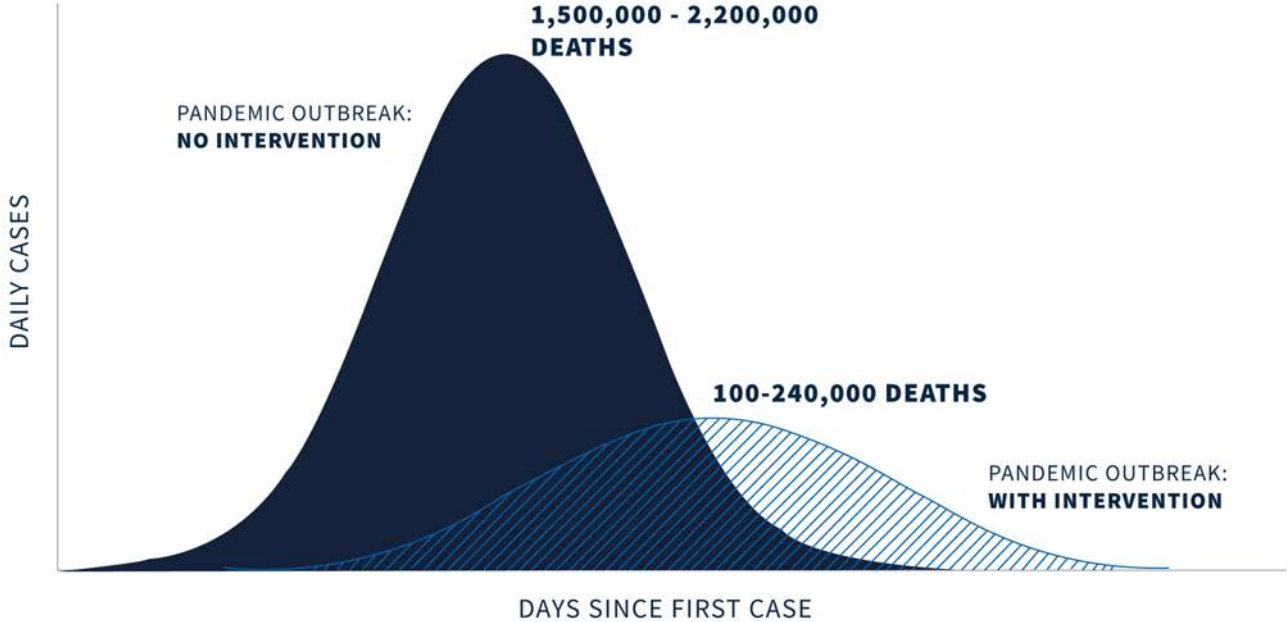
COMMUNICATE RISK FUTURE MODELS

Intended Message #5

Imperial College COVID-19 Response Curves (3/16/20)



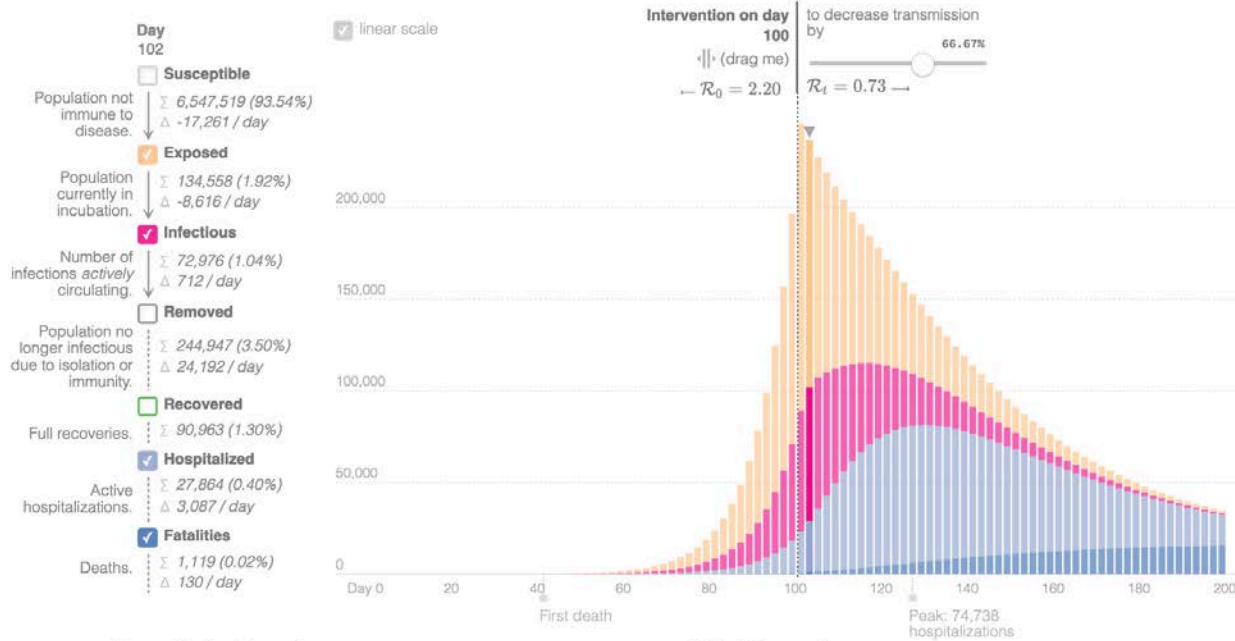
GOALS OF COMMUNITY MITIGATION



- 1 Delay outbreak peak
- 2 Decompress peak burden on hospitals/infrastructure
- 3 Diminish overall cases and health impacts
- 4 Decreases fatalities

Epidemic Calculator (Gabriel Goh, OpenAI)

Epidemic Calculator



Transmission Dynamics

Population Inputs

Size of population.



Number of initial infections.



Basic Reproduction

Number \mathcal{R}_0

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



Transmission Times

Length of incubation period, T_{inc} .



Duration patient is infectious, T_{inf} .



Clinical Dynamics

Mortality Statistics

Case fatality rate.



Time from end of incubation to death.



Recovery Times

Length of hospital stay



Recovery time for mild cases



Care statistics

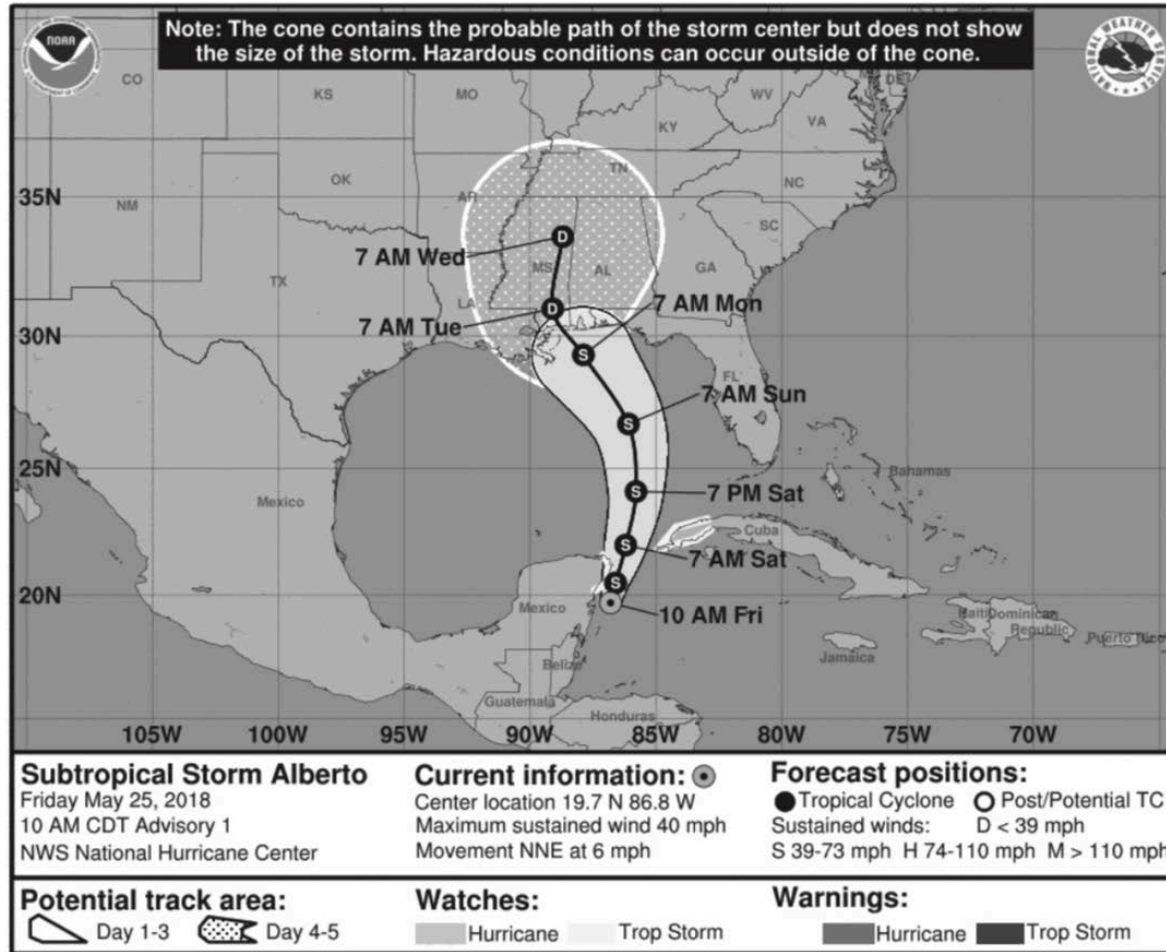
Hospitalization rate.



Time to hospitalization.



The Cone of Uncertainty in the Hurricane Chart



COVID-19 Projections | Institute for Health Metrics and Evaluation (University of Washington)



COVID-19 Projections

GHDX VIZ HUB

Last updated May 26, 2020 (Pacific Time)

[FAQ](#) | [Update notes](#) | [Article](#)

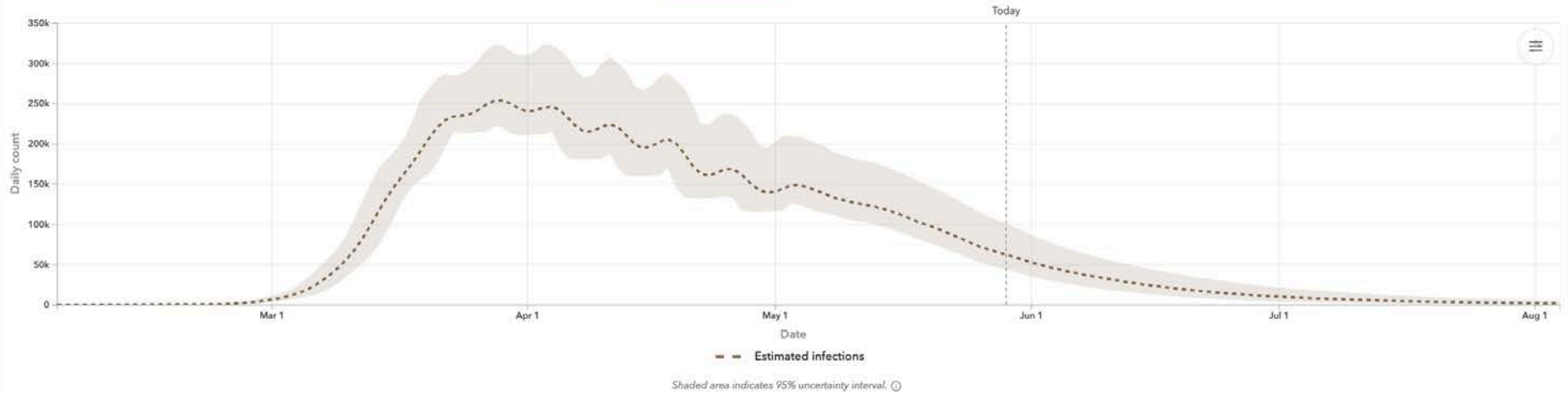
United States of America ▾



[Trend](#) [Compare](#) [Map](#)

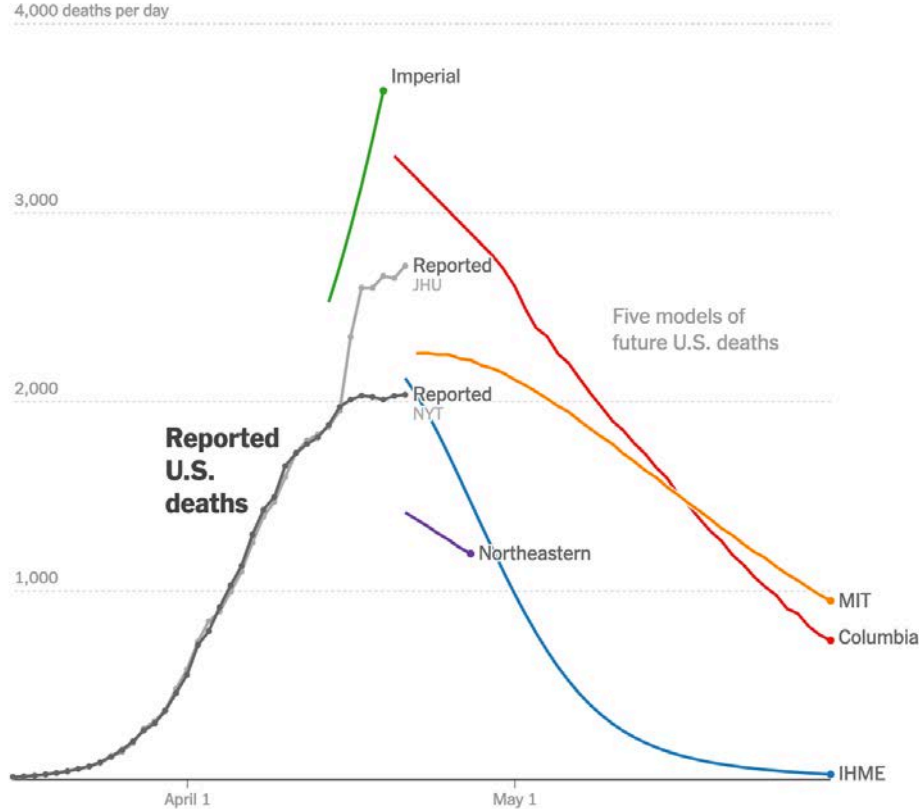
Daily infections and testing ⓘ

All **Estimated infections** Confirmed infections Tests



What 5 Coronavirus Models Say the Next Month Will Look Like | New York Times

U.S. coronavirus deaths in five different forecasts

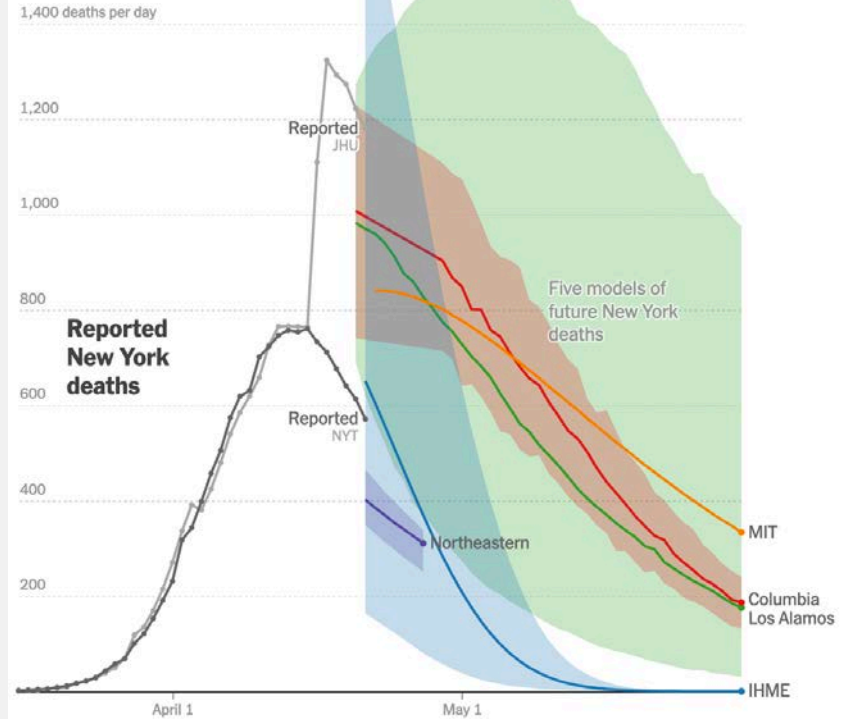


Reported deaths are rolling 7-day averages. Lines differ on whether to include roughly 5,000 probable deaths in New York City.

Latest model projections for Northeastern, I.H.M.E. and M.I.T. are April 21; Columbia is April 19; Imperial is April 13.

May. Four of the other modelers are publishing estimates for individual states as well as the nation as a whole.

New York State coronavirus deaths in five different forecasts



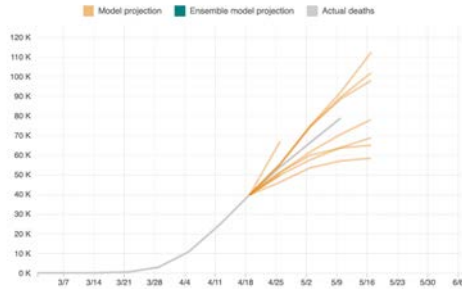
Reported deaths are rolling 7-day averages. Lines differ on whether to include roughly 5,000 probable deaths in New York City.

Los Alamos model available only at the state level. Columbia, Los Alamos and Northeastern include 80% intervals. I.H.M.E. shows a 95% interval. M.I.T. calculated confidence intervals, but chose not to include them.

How To Make Sense of All The COVID-19 Projections? A New Model Combines Them | NPR

Multiple Models Converge, Projecting 110K U.S. Deaths by Early June

Lines represent projections for cumulative COVID-19 death totals four weeks ahead. The ensemble model combines other models' projections and updates weekly.



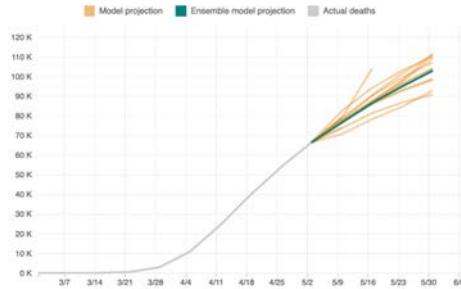
Notes

Ensemble model incorporates projections from Imperial College, University of Washington Institute for Health Metrics and Evaluation, Columbia University, Northeastern University, YYG, University of Geneva / Swiss Data Science Center, UT-Austin, Johns Hopkins University, Los Alamos National Labs, MIT, Georgia Institute of Technology, Iowa State University and UCLA.

Source: Reich Lab
Credit: Sean McInnis/NPR

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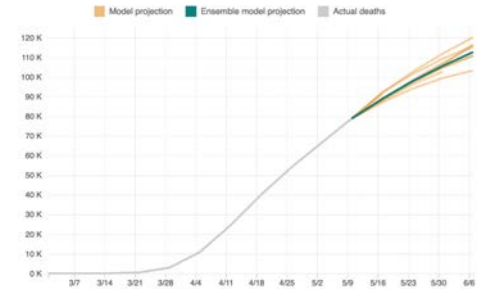
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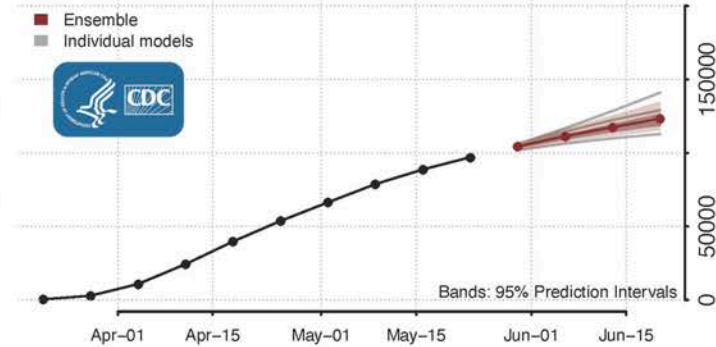
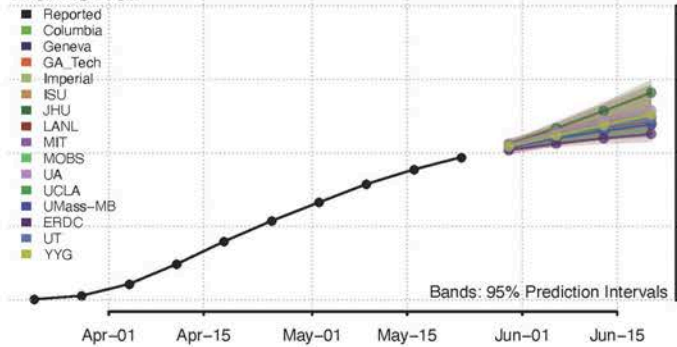
Source: Reich Lab
Credit: Sean McInnis/NPR

COVID-19 Forecasts: Cumulative Deaths | CDC

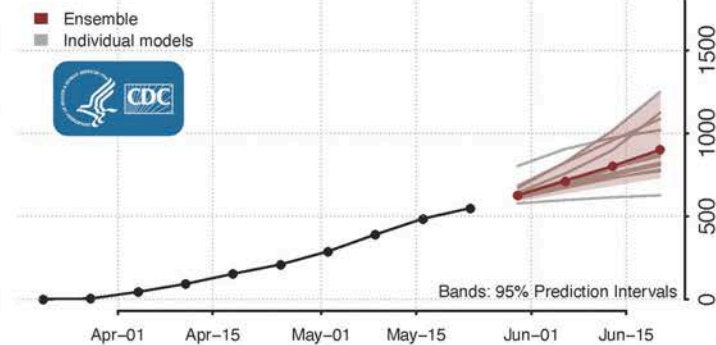
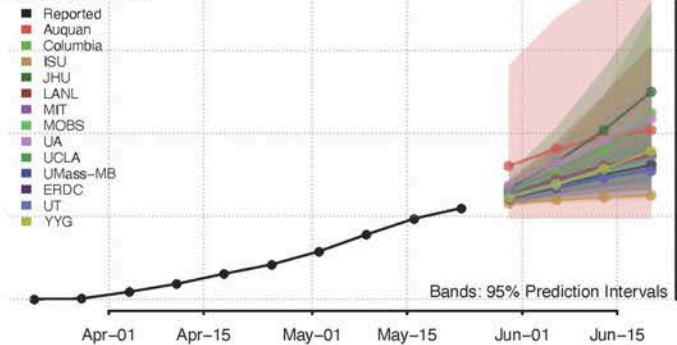
Update: 2020-05-26

<https://www.cdc.gov/coronavirus/2019-ncov/covid-data/forecasting-us.html>

National



Alabama



Alaska



1 deaths

COMMUNICATE RISK FUTURE MODELS / RE-OPENING PLANS

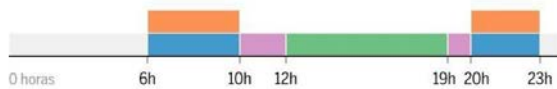
Intended Message #6

Re-Opening Plan: Spain (4/30/20), Massachusetts (5/18/20)

Franjas horarias en las salidas para pasear y hacer deporte

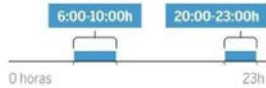
Entrada en vigor a partir del sábado 2 de mayo de 2020.

- Personas de 14 años en adelante
- Menores de 14 años
- Mayores de 70 o dependientes con cuidador
- Deporte no profesional

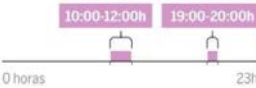


Municipios con población igual o inferior a 5.000 habitantes: sin franjas. El horario para estas actividades es de 06:00 a 23:00 horas.

Personas de 14 años en adelante

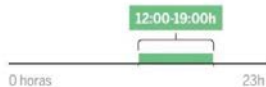


Mayores de 70 o personas dependientes con cuidador

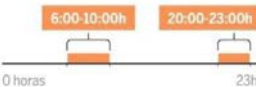


Menores de 14 años

Máximo 3 y con un adulto.



Deporte no profesional



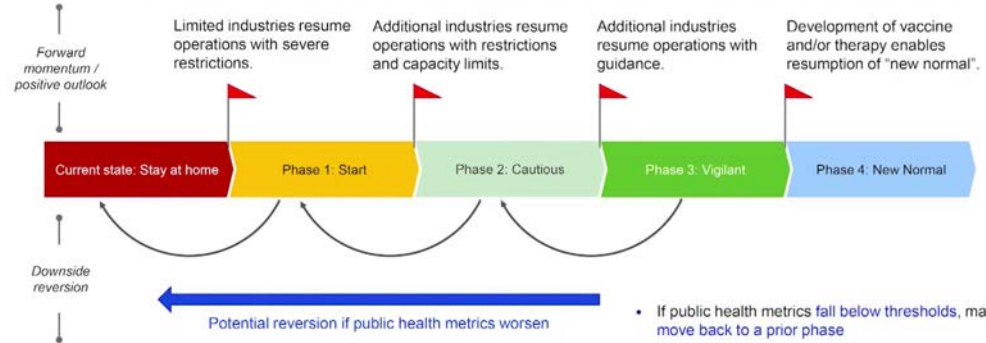
Deporte: debe ser individual, sin contacto con otros, 1 vez al día y dentro del municipio.

Paseos: se pueden realizar con 1 persona conviviente. Las personas que tengan que salir acompañadas podrán hacerlo también con 1 cuidador. 1 vez al día y a no más de 1 kilómetro.

Siempre debe mantenerse la distancia de seguridad. Se excluyen las personas con síntomas o en cuarentena.



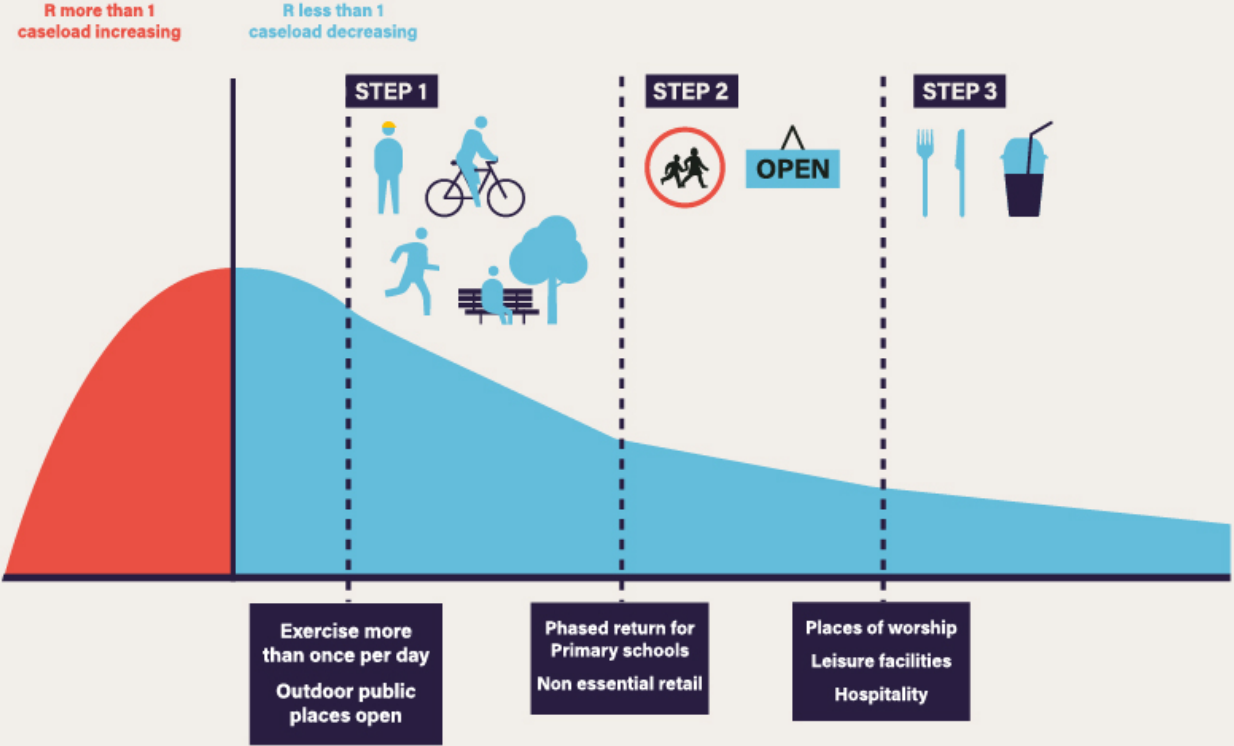
Four-Phase Approach to Reopening Massachusetts



- If public health metrics fall below thresholds, may move back to a prior phase
- Potential for focused interventions to prevent local outbreaks from spreading as part of reopen process (e.g., at the business, business type or city level)

UK: Steps of adjustment to current social distancing measures - As the caseload falls, different steps can be taken to adjust social distancing measures. | Her Majesty's Government (5/11/20)

Steps of adjustment to current social distancing measures



COVID-19 - Risk Assessment Dashboard | Washington State

COVID-19 Risk Assessment Dashboard

The data we use to protect public health while beginning our economic recovery



Phases and Risk Assessment
Populations at Higher Risk

COVID-19 Disease Activity
Testing Capacity
Healthcare System Readiness
Case Investigations and Contact Tracing

PHASES AND RISK ASSESSMENT

Data as of June 02, 2020 11:59PM PT

Phases by County

Select a County

All ▼

Select key metric

- Rate per 100K newly diagnosed cases
- Number of individuals tested per new case
- Percent of individuals testing positive
- Percent of licensed beds occupied
- Percent of licensed beds occupied by COVID-19 cases

Chart View
Tabular View

COVID-19 in Washington State

County Phases and Risk Assessment

This map shows the current phases and the key metrics used to determine county readiness to move between phases. Select a county to see the status of key metrics for that particular county, or select a key metric for additional detail.

[Learn More](#)

Washington State key metrics

	Value	Goal	Meeting Goal
Rate per 100K newly diagnosed cases during the prior two weeks	41.9	<25	No
Number of individuals tested for each new case during the prior week	19.5	>50	No
Percent of individuals testing positive for COVID-19 during the past week	5.1%	<2%	No
Percent of licensed beds occupied by patients	65.6%	<80%	Yes
Percent of licensed beds occupied by COVID-19 cases	3.7%	<10%	Yes

Phases by County

Sources: Washington State Department of Health

COVID-19 CONCEPT MAP

COVID-19 is a new disease with no known cure. It is highly

a contraction of "CoronaVirus Disease-2019", referring to the disease is caused by

SARS-CoV-2
a contraction of "Severe Acute Respiratory Syndrome CoronaVirus 2," referring to the virus

which is a type of **coronavirus**
a common type of virus that causes upper respiratory infections, similar to a cold or flu, named because it looks a crown

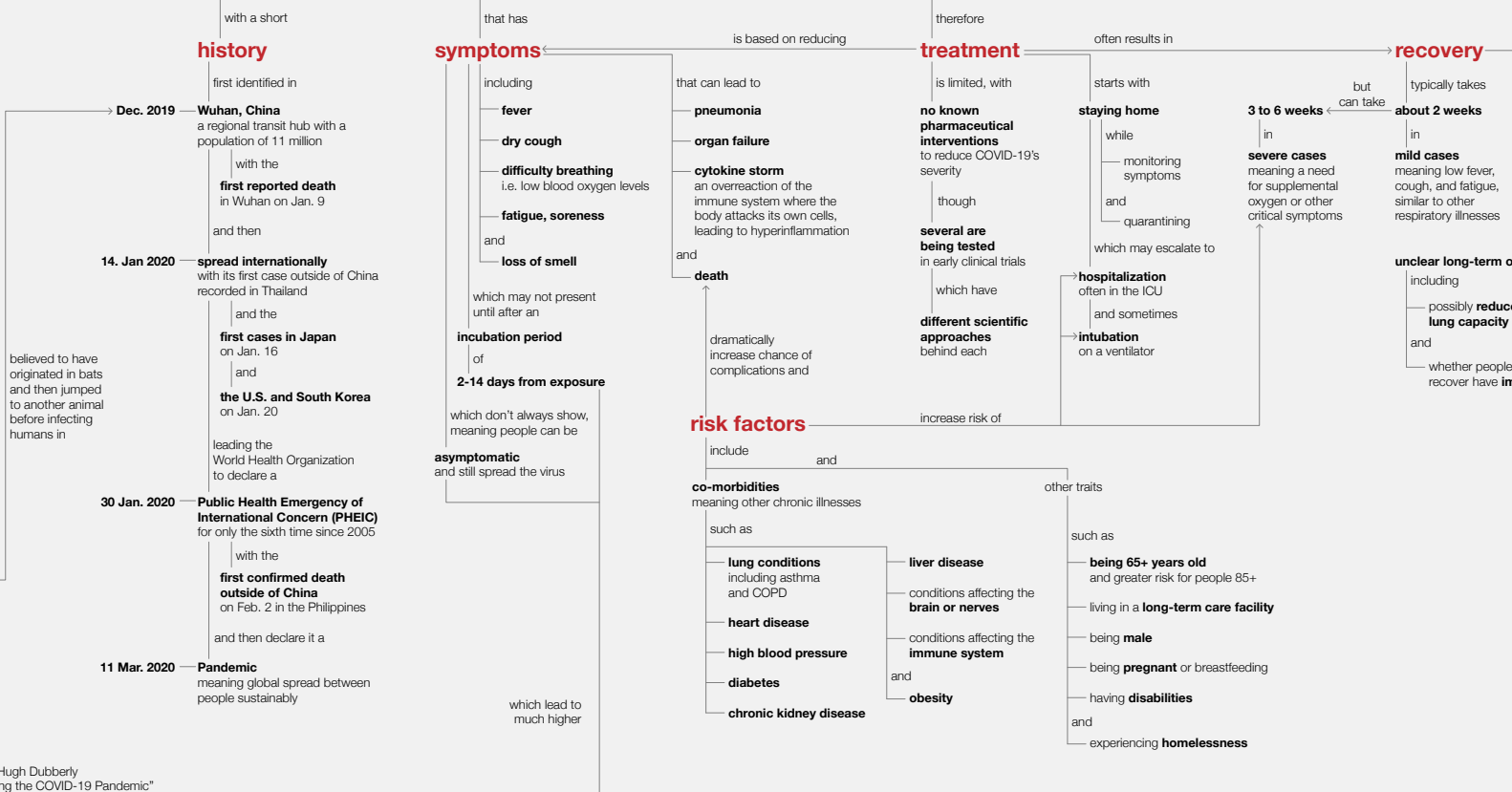
which have **seven known types**

including **four common human types** which are usually mild and **three which originated in animals** which are more serious

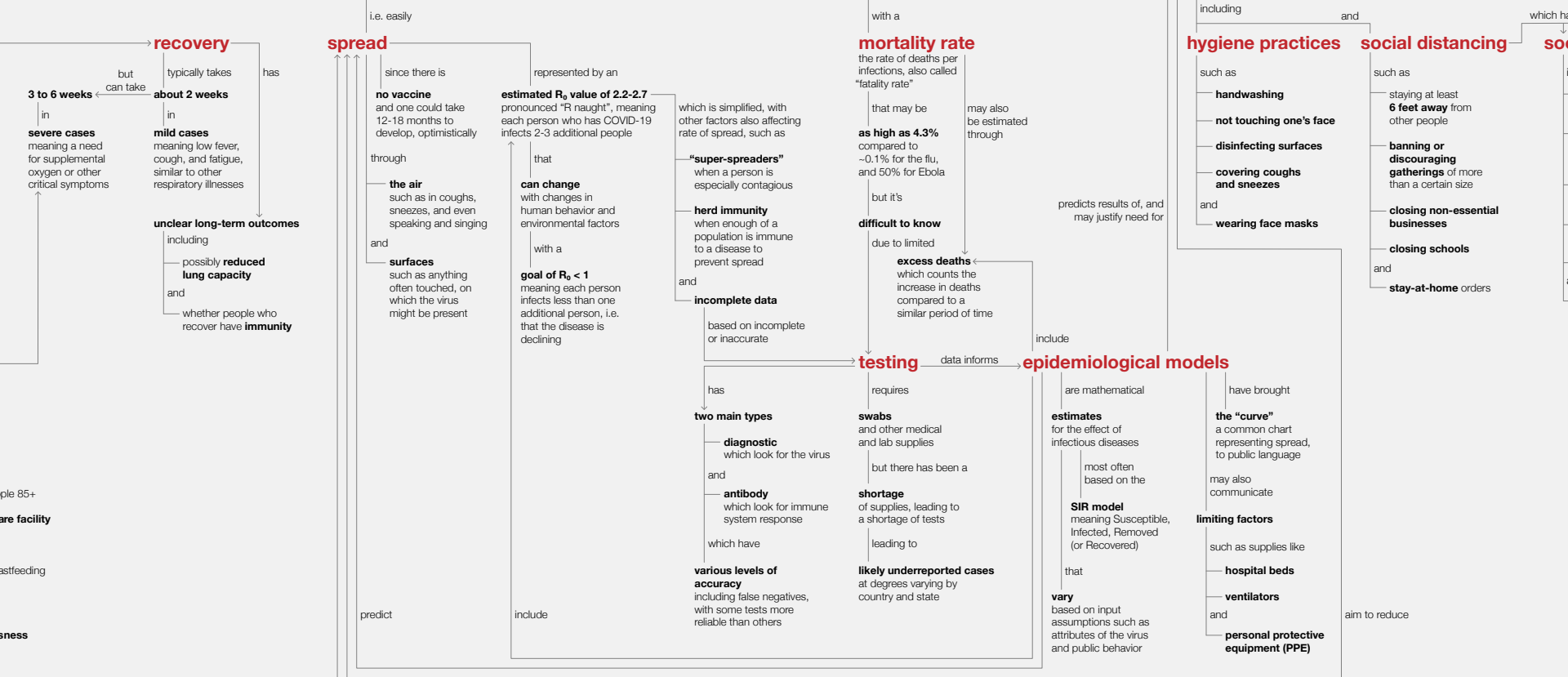
including **SARS** which emerged in 2002, **MERS** which emerged in 2012 and now **SARS-CoV-2**

June 4, 2020
Information on COVID-19 is rapidly changing. Here's a glimpse of current public information, intended for updates and comparison as we learn more.

Rachel Peterson, NEU IDV Program with material and support from Paul Kahn and Hugh Dubberly for Paul Kahn's course, "Data Visualization During the COVID-19 Pandemic" and associated "COVIC" project

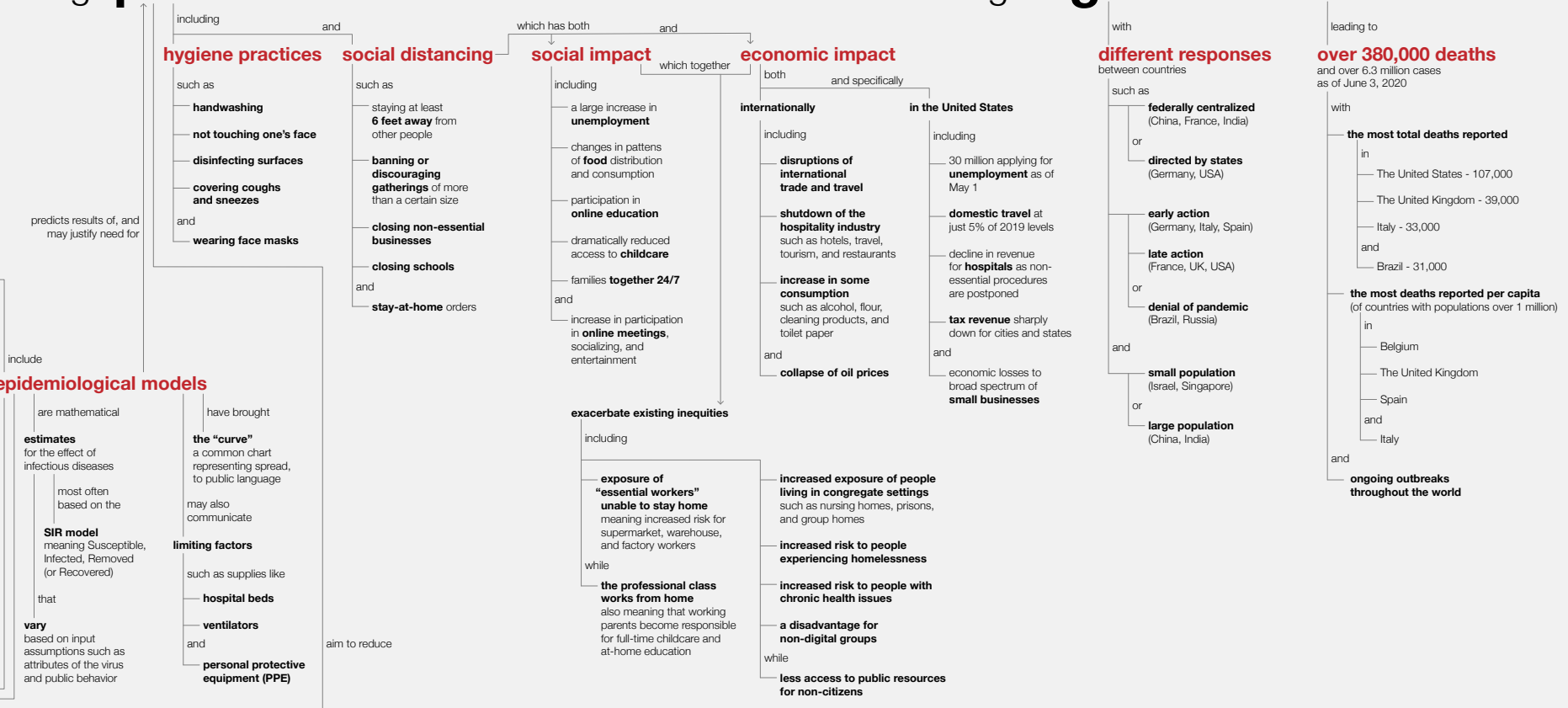


It is highly infectious and can be fatal necessitating public health interventions



Concept map by Rachel Peterson, work in progress

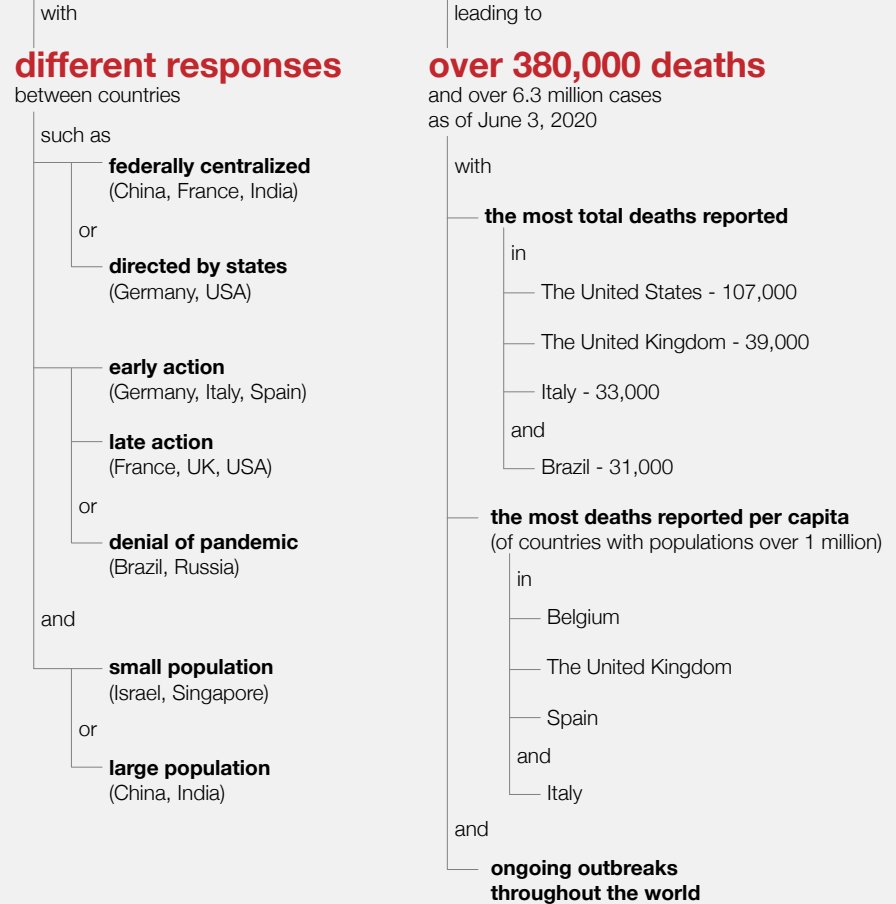
...tating **public health interventions** and creating a **global crisis.**



Concept map by Rachel Peterson, work in progress

Conventions and creating a

global crisis.



COVIC thanks the people who helped make this possible

Our International Contributors

Arushi Singh, Andreas Schneider, Andrew Tang, Andy Krackov, Antonio Solano, Aprisa Chrysantina, Attila Bátorfy, Bassel Abu Fakher, Ben Shneiderman, Catherine Plaisant, Chihiro Hosoe, David Bumbeishvili, David Serrault, Eric Reiss, Ewa Lenk, Hannes van Zyl, Irene Rietschel, Jack Lenk, Joep Paemen, Karim Chaibi, Kita Kaczmarek, Lewis Chou, Lilly Diaz, Lihhuaying Yang, Lorenzo Scarpelli, M. Natsagbadam, Magga Dora Ragnarsdottir, Matteo Riva, Matthew Siu, Matthias Mueller-Prove, Max Spielmann, Megan Danielson, Nuno Correia, Rupesh Vyas, Sarah Callaghan, Sergelen Tsogt-Ochir, Susan Hazan, Tarun Deep Chhabra, Zeynep Ozturk, Zhengyan Yu

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Thank You

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