COVID-19 PANDEMIC

THOUGHTS ON HOW IT TOUCHED EVERY ASPECT OF LIFE ON THIS PLANET!

ALBERTO TORRES, OMNI, CCL; FAYETTEVILLE, AR JUNE 7, 2020

Fig. 1. Phylogenetic analysis of coronaviruses from different species and 2019 novel coronavirus in China. The 41 complete genome sequences of coronavirus were analyzed using MEGA 5.0. The phylogenetic tree was constructed using maximum-likelihood (ML) with a bootstrap of 100. Red triangle, SARS-CoV-2 isolate. (For interpretation of the references to colour in this figure legend, t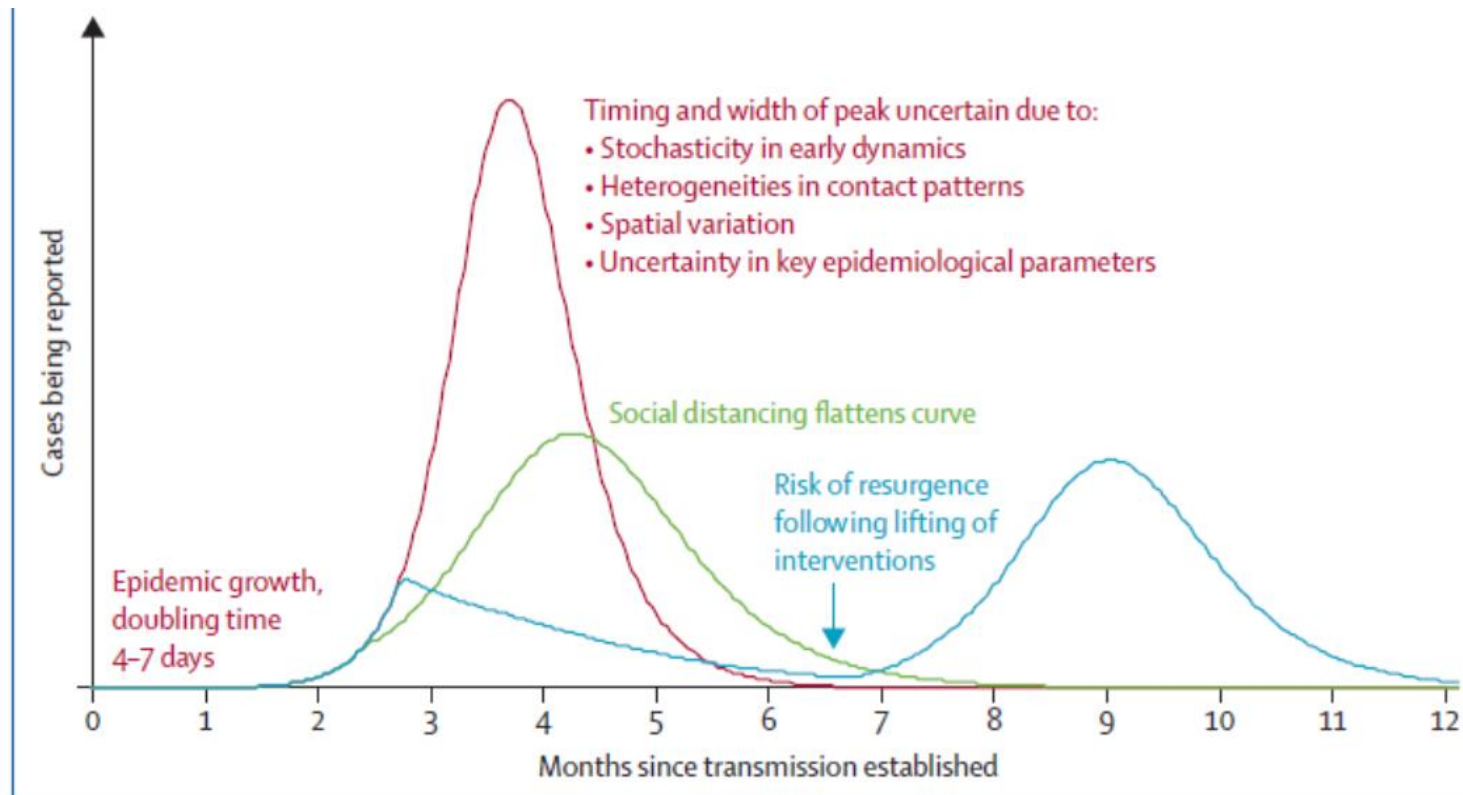he reader is referred to the web version of this article.) (https://www.sciencedirect.com/science/article/pii/S1567134820301167#f0005)

Timing and width of peak uncertain due to:
- Stochasticity in early dynamics
- Heterogeneities in contact patterns
- Spatial variation
- Uncertainty in key epidemiological parameters

Social distancing flattens curve

Risk of resurgence following lifting of interventions

Epidemic growth, doubling time 4–7 days

Cases being reported

Months since transmission established

Figure: Illustrative simulations of a transmission model of COVID-19
A baseline simulation with case isolation only (red); a simulation with social distancing in place throughout the epidemic, flattening the curve (green), and a simulation with more effective social distancing in place for a limited period only, typically followed by a resurgent epidemic when social distancing is halted (blue). These are not quantitative predictions but robust qualitative illustrations for a range of model choices.
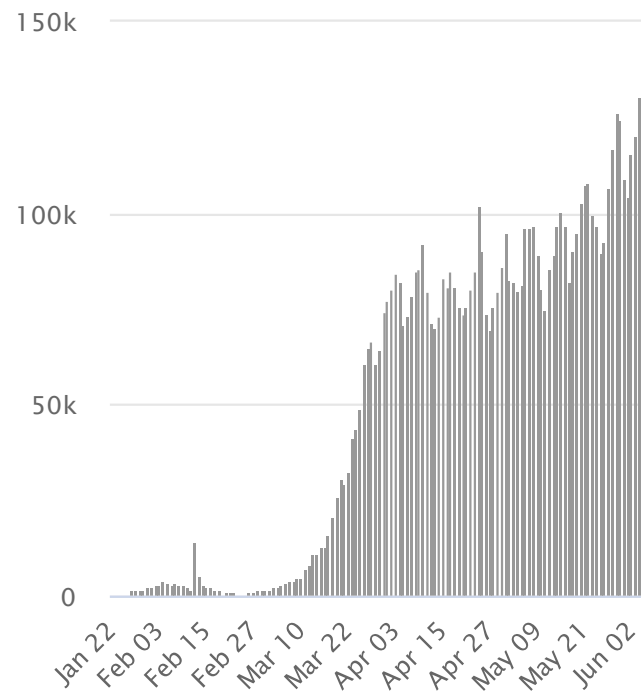
Coronavirus Cases: **6,966,440**

Recovered:
3,404,480

Daily New Cases

Cases per Day
Data as of 0:00 GMT+0

Deaths:
401,607

Daily Deaths

Deaths per Day
Data as of 0:00 GMT+0

https://www.worldometers.info/coronavirus/
(June 6, 2020)
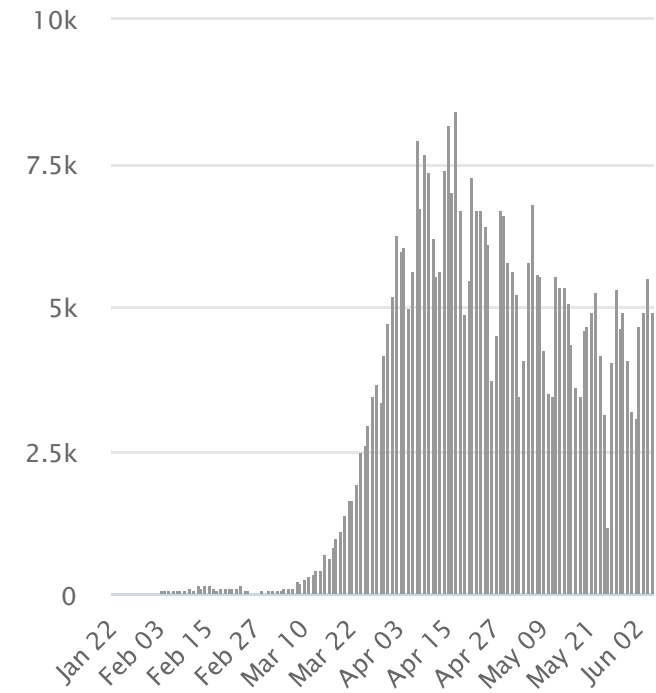
#	Country, Other	Total Cases	New Cases	Total Deaths	Total Recovered	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests	Tests/ 1M pop	Population
	World	6,966,440	+126,119	401,607	3,404,480	53,582	894	51.5			
1	USA	1,988,489	+22,781	112,096	748,752	17,021	6,010	339	20,790,238	62,834	330,875,237
2	Brazil	673,587	+27,581	35,957	302,084	8,318	3,170	169	999,836	4,706	212,459,250
3	Russia	458,689	+8,855	5,725	221,388	2,300	3,143	39	12,388,968	84,896	145,930,530
4	Spain	288,390	+332	27,135	N/A	617	6,168	580	4,063,843	86,920	46,753,640
5	UK	284,868	+1,557	40,465	N/A	604	4,198	596	5,438,712	80,143	67,862,715
6	India	246,622	+10,438	6,946	118,695	8,944	179	5	4,524,317	3,281	1,379,085,538
7	Italy	234,801	+270	33,846	165,078	293	3,883	560	4,187,057	69,245	60,467,327
8	Peru	191,758	+4,358	5,301	82,731	1,062	5,821	161	1,173,003	35,611	32,939,749
9	Germany	185,696	+282	8,769	168,900	576	2,217	105	4,348,880	51,917	83,766,726
10	Iran	169,425	+2,269	8,209	132,038	2,578	2,019	98	1,040,289	12,396	83,918,450

(June 6, 2020)

#	Country, Other	Total Cases	New Cases	Total Deaths	Tot Cases/ 1M pop	Deaths/ 1M pop	Tests/ 1M pop	Population	Continent	1 Case every X ppl	1 Death every X ppl
	World	6,966,440	+126,119	401,607	894	51.5			All		
1	USA	1,988,489	+22,781	112,096	6,010	339	62,834	330,875,237	North America	166	2,952
2	UK	284,868	+1,557	40,465	4,198	596	80,143	67,862,715	Europe	238	1,677
3	Brazil	673,587	+27,581	35,957	3,170	169	4,706	212,459,250	South America	315	5,909
4	Italy	234,801	+270	33,846	3,883	560	69,245	60,467,327	Europe	258	1,787
5	France	153,634	+579	29,142	2,354	447	21,216	65,264,303	Europe	425	2,240
6	Spain	288,390	+332	27,135	6,168	580	86,920	46,753,640	Europe	162	1,723
7	Mexico	110,026	+4,346	13,170	854	102	2,522	128,840,531	North America	1,171	9,783
8	Belgium	59,072	+165	9,580	5,098	827	79,733	11,586,352	Europe	196	1,209
9	Germany	185,696	+282	8,769	2,217	105	51,917	83,766,726	Europe	451	9,553
10	Iran	169,425	+2,269	8,209	2,019	98	12,396	83,918,450	Asia	495	10,223

# https://www.worldometers.info/coronavirus/
(June 6, 2020)

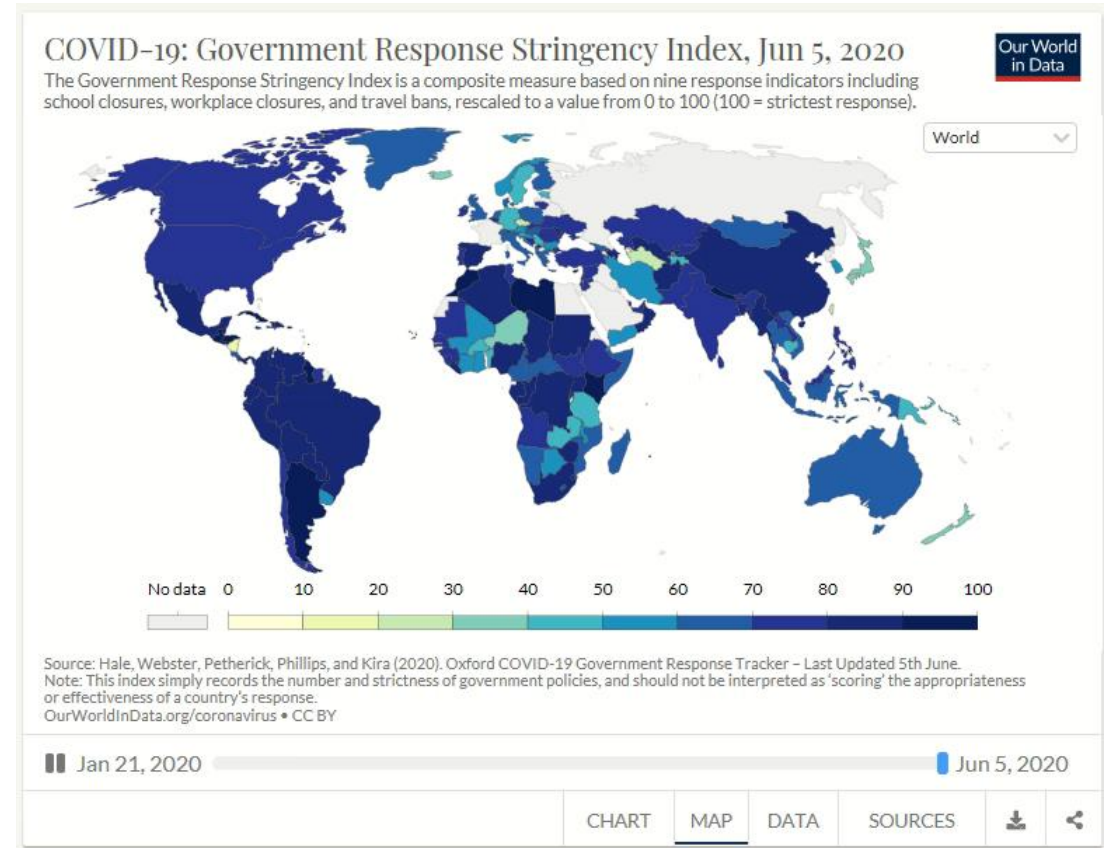|	Country, Other	Total Cases	Total Deaths	Tot Cases/ 1M pop	Deaths/ 1M pop	Tests/ 1M pop	Population	1 Case every X ppl	1 Death every X ppl
1	San Marino	680	42	20,044	1,238	139,981	33,926	50	808
2	Belgium	59,072	9,580	5,098	827	79,733	11,586,352	196	1,209
3	Andorra	852	51	11,028	660	48,539	77,257	91	1,515
4	UK	284,868	40,465	4,198	596	80,143	67,862,715	238	1,677
5	Spain	288,390	27,135	6,168	580	86,920	46,753,640	162	1,723
6	Italy	234,801	33,846	3,883	560	69,245	60,467,327	258	1,787
7	Sweden	43,887	4,656	4,347	461	27,290	10,095,119	230	2,168
8	France	153,634	29,142	2,354	447	21,216	65,264,303	425	2,240
9	Netherlands	47,335	6,011	2,763	351	22,654	17,132,455	362	2,850
10	Sint Maarten	77	15	1,797	350	10,970	42,843	556	2,856
11	Ireland	25,183	1,678	5,104	340	70,615	4,934,012	196	2,940
12	USA	1,988,489	112,096	6,010	339	62,834	330,875,237	166	2,952
13	Isle of Man	336	24	3,953	282	60,268	85,004	253	3,542
14	Channel Islands	563	46	3,240	265	59,020	173,755	309	3,777
15	Switzerland	30,956	1,921	3,579	222	48,550	8,650,419	279	4,503
16	Canada	95,057	7,773	2,520	206	49,530	37,719,929	397	4,853
17	Ecuador	41,575	3,534	2,359	201	6,857	17,624,147	424	4,987

Accessed on June 7th

Relationship between number of COVID-19 cases and government response
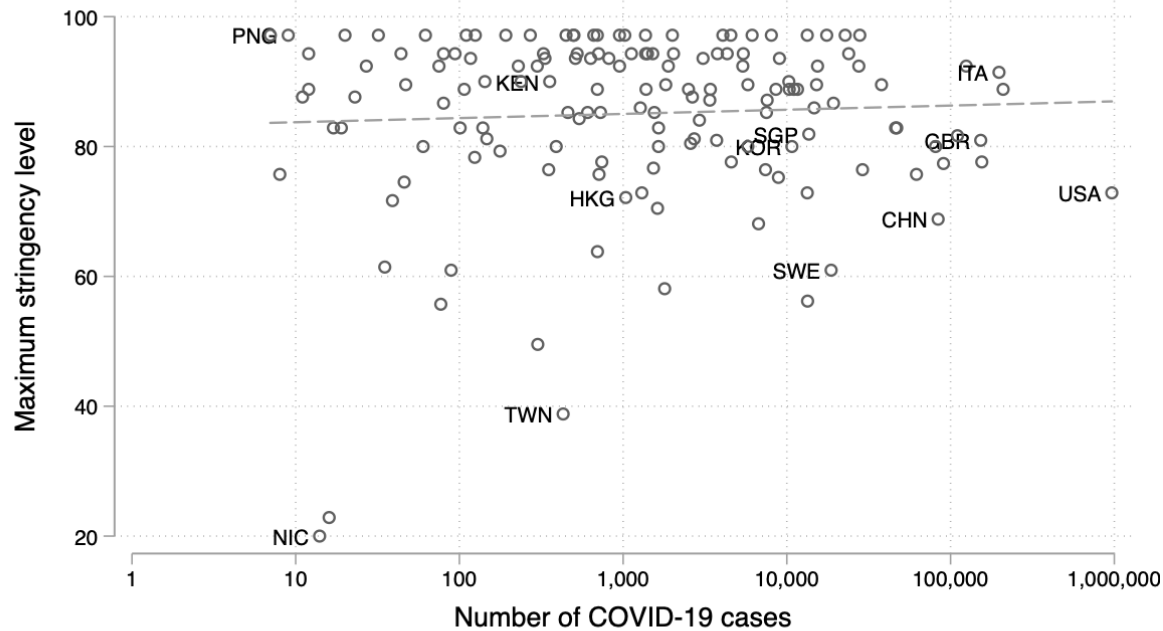
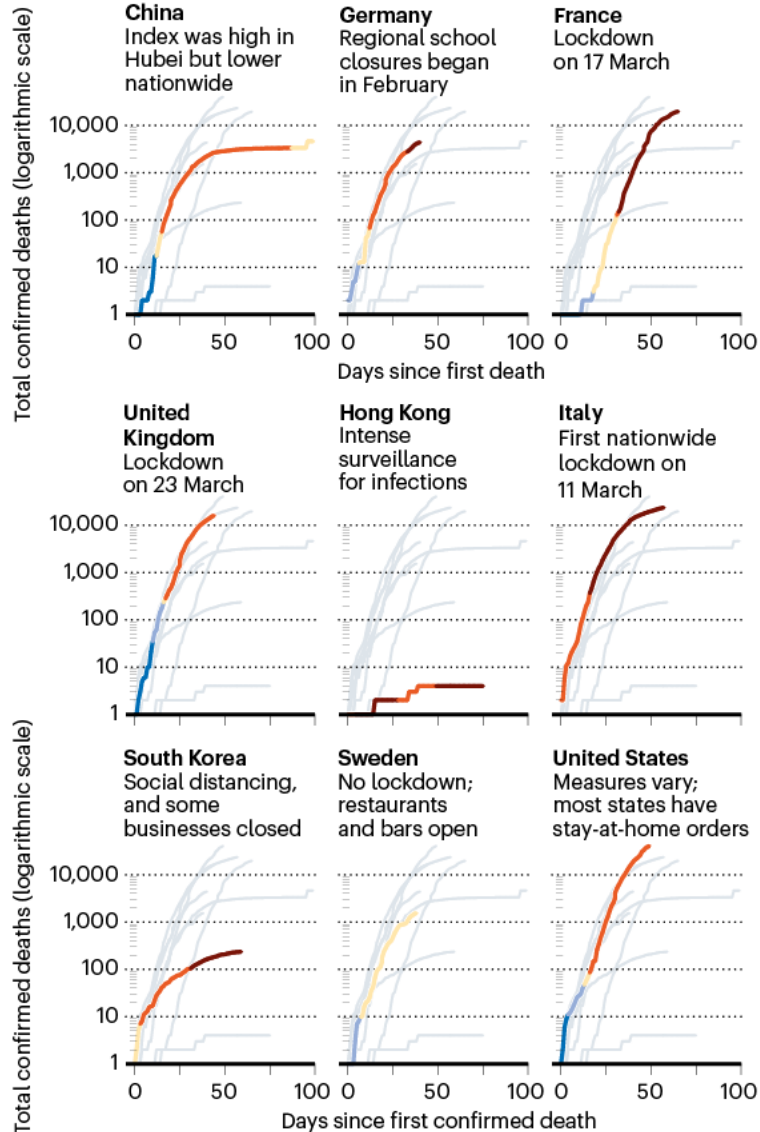Data from 27 April 2020. Individual countries may be several days older.
Source: Oxford COVID-19 Government Response Tracker. More at: bsg.ox.ac.uk/covidtracker or github.com/OxCGRT/covid-policy-tracker

COVID-19: Government Response Stringency Index, Jun 5, 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).

Source: Hale, Webster, Petherick, Phillips, and Kira (2020). Oxford COVID-19 Government Response Tracker – Last Updated 5th June.
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.
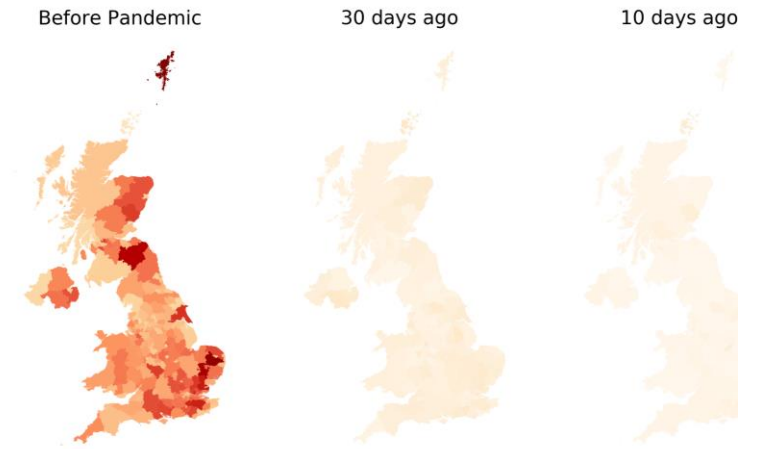OurWorldInData.org/coronavirus • CC BY
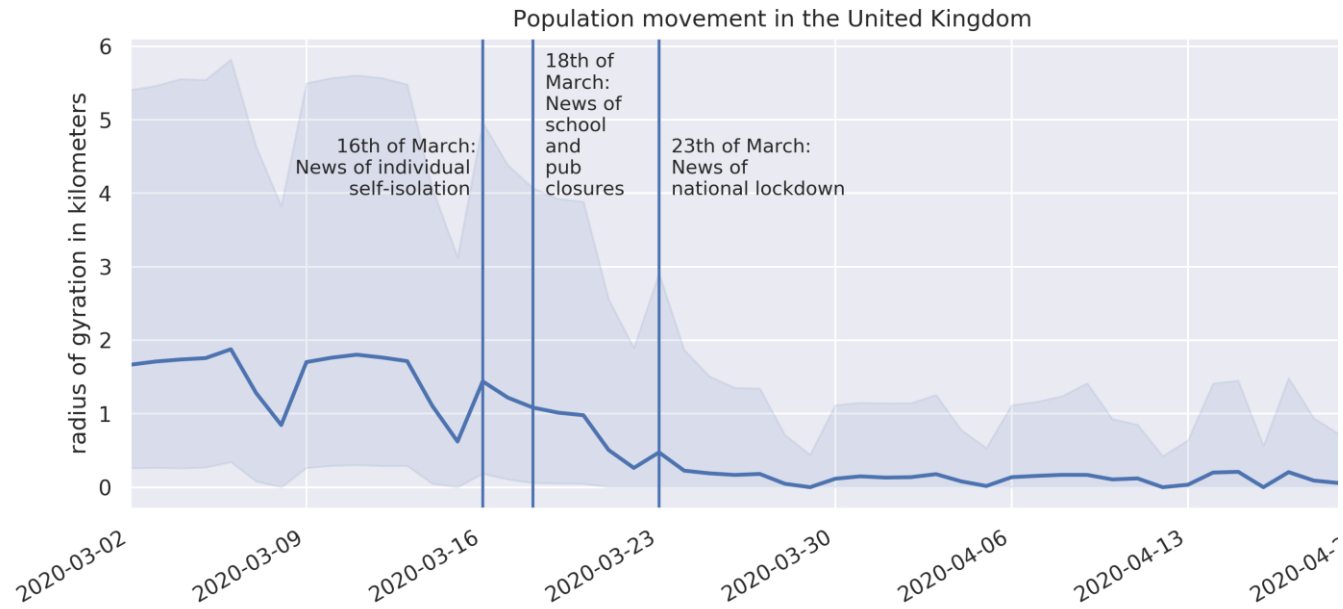
PANDEMIC PROTECTIONS

Researchers have created a 'stringency index' that describes the overall severity of a country's response to the coronavirus outbreak and allows responses to be compared. The index takes into account seven control measures, such as school closures and restrictions on people's movements.

Stringency Index: Low —— —— —— —— High

China
Index was high in Hubei but lower nationwide

Germany
Regional school closures began in February

France
Lockdown on 17 March

United Kingdom
Lockdown on 23 March

Hong Kong
Intense surveillance for infections

Italy
First nationwide lockdown on 11 March

South Korea
Social distancing, and some businesses closed

Sweden
No lockdown; restaurants and bars open

United States
Measures vary; most states have stay-at-home orders

Total confirmed deaths (logarithmic scale)

Days since first death

Days since first confirmed death

Confirmed deaths undercount true COVID-19 mortality. Stringency index

https://www.nature.com/articles/d41586-020-01248-1

Population movement in the United Kingdom

16th of March: News of individual self-isolation

18th of March: News of school and pub closures

23th of March: News of national lockdown

Before Pandemic   30 days ago   10 days ago

UK population movement **drops by 87%**
Movement has been steadily falling since 17th March
https://www.oxford-covid-19.com/#
accessed May 5th

Daily death tolls are now at their peak or falling in many western countries

Daily deaths with coronavirus (7-day rolling average), by number of weeks since 3 daily deaths first recorded
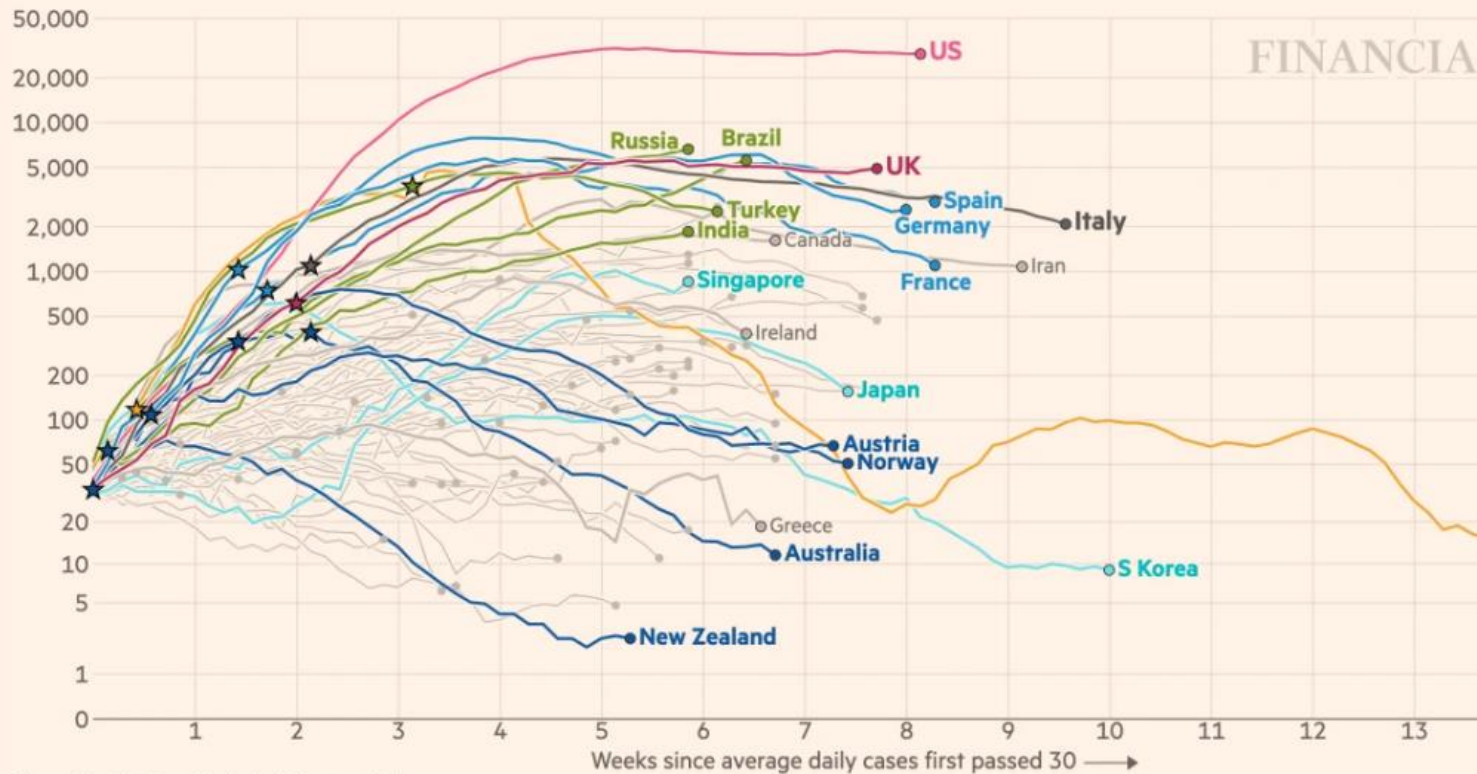Stars represent national lockdowns ★
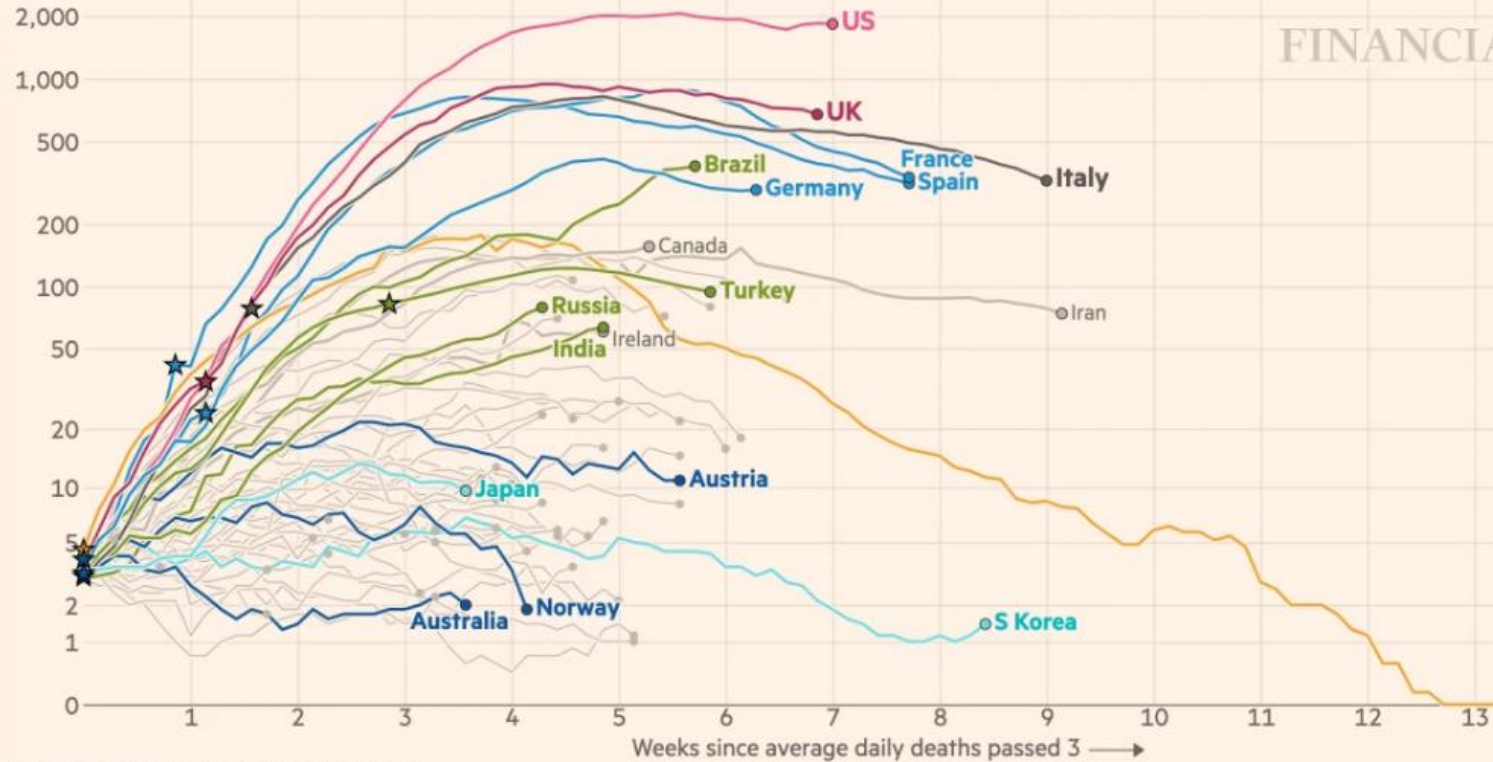
FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of European Centre for Disease Prevention and Control; FT research. Data updated May 02, 21:53 BST
© FT

https://www.ft.com/coronavirus-latest?campaign_id=9&emc=edit_nn_20200504&instance_id=18202&nl=the-morning&regi_id=128855086&segment_id=26556&te=1&user_id=48acb84f89aabd2dbdbab29fd6e7e51a
accessed May 5th

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

Daily confirmed cases (7-day rolling average), by number of weeks since 30 daily cases first recorded
Stars represent national lockdowns ★

FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of European Centre for Disease Prevention and Control; FT research. Data updated May 02, 22:01 BST
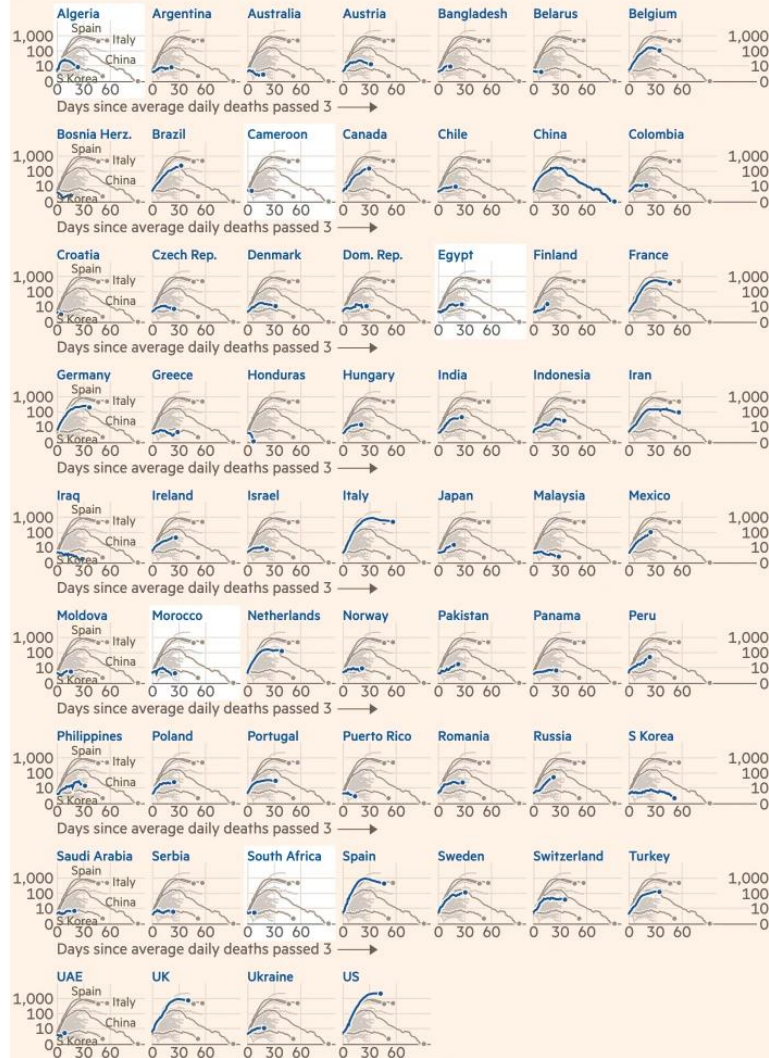© FT

Low Covid-19 death toll raises hopes Africa may be spared worst
https://www.ft.com/content/e9cf5ed0-a590-4bd6-8c00-b41d0c4ae6e0

Reported Covid death tolls in African countries are lower than elsewhere

Daily coronavirus deaths (7-day rolling avg.), by number of days since 3 daily deaths first recorded

FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of European Centre for Disease Prevention and Control; FT research. Data updated April 27, 20:34 BST
© FT

African countries have much smaller elderly populations than other parts of the world

Share of population aged 70 or over, 2020

Source: UN World Population Projections
© FT

In South Africa, deaths are down slightly on usual levels, due chiefly to sharp falls in homicides and road traffic fatalities
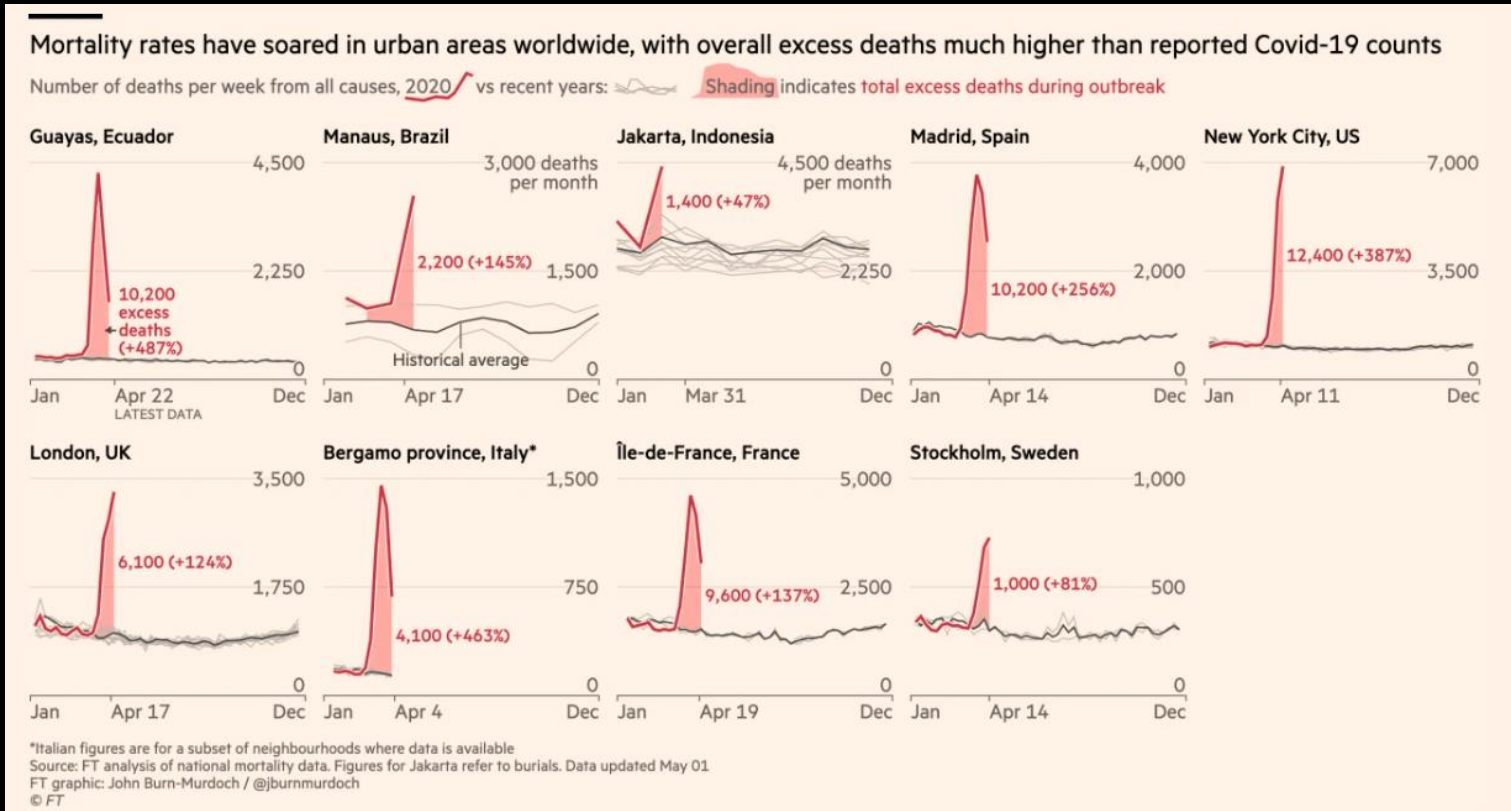
Weekly death numbers

Source: South African Medical Research Council
© FT

This thing is "fake news"

Excess deaths much higher than seasonal and covid-19 reports

Latin American gravediggers fear virus death toll higher than admitted https://www.ft.com/content/7b46b8c3-b395-45ba-af68-50280cfeed47 **Frontline workers say Brazil and Mexico's governments are under-reporting fatalities**

Mortality rates have soared in urban areas worldwide, with overall excess deaths much higher than reported Covid-19 counts

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

Guayas, Ecuador
4,500
2,250
10,200 excess deaths (+487%)
Jan Apr 22 Dec
LATEST DATA

Manaus, Brazil
3,000 deaths per month
2,200 (+145%) 1,500
Historical average
Jan Apr 17 Dec

Jakarta, Indonesia
4,500 deaths per month
1,400 (+47%)
2,250
Jan Mar 31 Dec

Madrid, Spain
4,000
2,000
10,200 (+256%)
Jan Apr 14 Dec

New York City, US
7,000
3,500
12,400 (+387%)
Jan Apr 11 Dec

London, UK
3,500
6,100 (+124%) 1,750
Jan Apr 17 Dec

Bergamo province, Italy*
1,500
750
4,100 (+463%)
Jan Apr 4 Dec

Île-de-France, France
5,000
9,600 (+137%) 2,500
Jan Apr 19 Dec

Stockholm, Sweden
1,000
1,000 (+81%) 500
Jan Apr 14 Dec

*Italian figures are for a subset of neighbourhoods where data is available
Source: FT analysis of national mortality data. Figures for Jakarta refer to burials. Data updated May 01
FT graphic: John Burn-Murdoch / @jburnmurdoch
© FT

New deaths attributed to Covid-19 in Sweden and the UK

Seven-day rolling average of new deaths (per million)

Number of days since 0.1 daily deaths (per million) first recorded

Sweden

UK
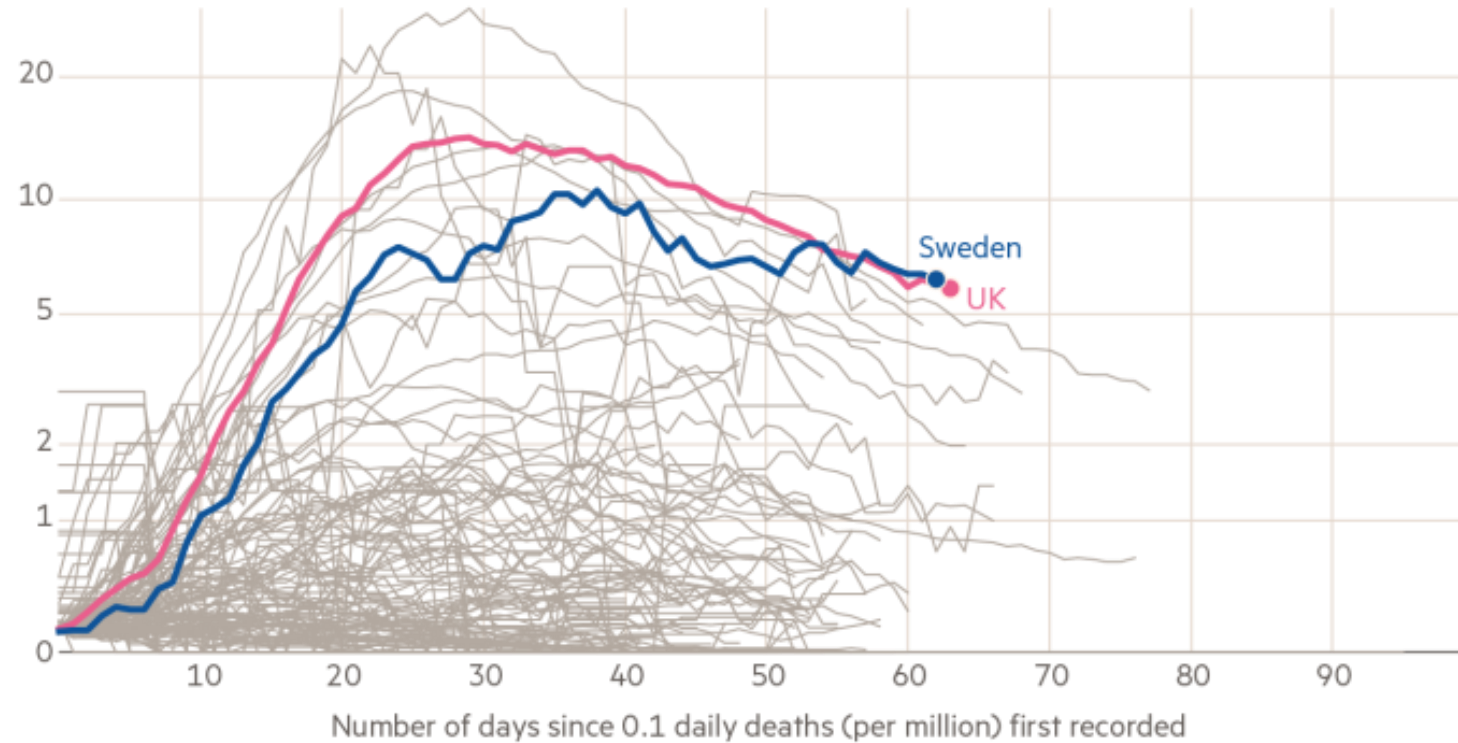
Data updated May 19, 2020 1:32pm BST

As of Wednesday, 3,831 people had died from Covid-19 in Sweden, a country with a population of 10m. Denmark, Finland and Norway — which each have about 5m inhabitants — have recorded death tolls of 551, 301 and 233, respectively. Swedish authorities argued that a lockdown and closed borders would bring relatively few benefits at a high cost to public health and the economy. https://www.ft.com/content/46733256-5a84-4429-89e0-8cce9d4095e4

Coronavirus situation in the US

Total deaths as of 11:31pm May 3 BST

Statewide 'stay at home' order*
Advisory 'stay at home' order**

WASHINGTON 830
MONTANA 16
N DAKOTA 25
MINNESOTA 419
VERMONT 52
MAINE 57
OREGON 109
IDAHO 63
S DAKOTA 21
WISCONSIN 339
MICHIGAN 4,049
NEW YORK 19,189
NEW HAMPSHIRE 84
MASSACHUSETTS 4,004
WYOMING 7
IOWA 184
ILLINOIS 2,618
OHIO 1,038
PENNSYLVANIA 2,444
RHODE ISLAND 320
NEVADA 257
UTAH 50
NEBRASKA 76
INDIANA 1,246
DC 251
CONNECTICUT 2,436
CALIFORNIA 2,215
COLORADO 832
KANSAS 134
MISSOURI 352
KENTUCKY 248
NEW JERSEY 7,871
DELAWARE 177
MARYLAND 1,281
W VIRGINIA 50
VIRGINIA 660
ARIZONA 362
NEW MEXICO 139
OKLAHOMA 238
ARKANSAS 76
TENNESSEE 210
N CAROLINA 422
GEORGIA 1,177
S CAROLINA 275
TEXAS 867
LOUISIANA 1,969
MISSISSIPPI 303
ALABAMA 290
ALASKA 9
FLORIDA 1,403
PUERTO RICO 97
HAWAII 16

Graphic: Steven Bernard and Cale Tilford
Sources: Covid Tracking Project; FT research
© FT

*Includes 'shelter in place' orders
**Includes Kentucky's 'healthy at home' order

3. Where Outbreaks Might Come Next

The virus has begun cropping up in new places as it spreads across the country. To identify places that could flare up next, it's helpful to look not just at the number of cases but how fast they are rising (we're looking at the last two weeks here).
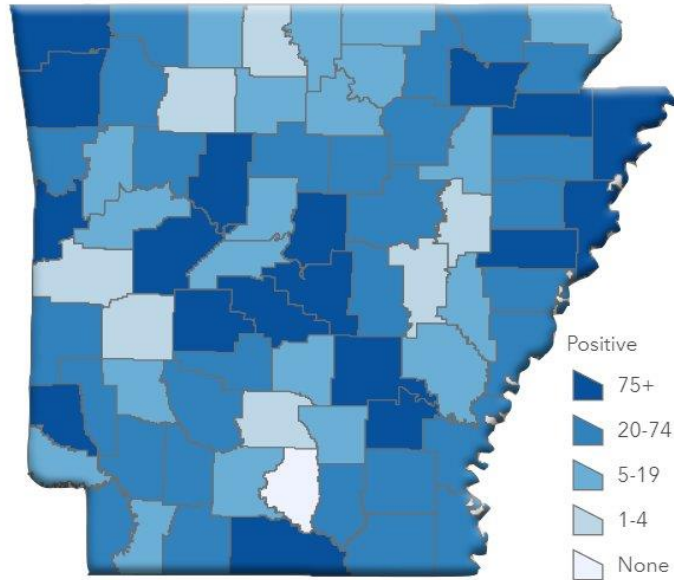
Highest avg. daily growth rate of cases

	METRO OR MICRO AREA	RECENT CASES	DAILY GROWTH RATE	CASES DOUBLE EVERY...
1	Fayetteville-Springdale, Ark.	397	12%	6.3 days
2	Hanford-Corcoran, Calif.	363	9%	7.9 days
3	Yuma, Ariz.	510	9%	8.5 days
4	Chattanooga, Tenn.	567	7%	9.9 days
5	Salem, Ohio	314	6%	11.9 days
6	Sherman-Denison, Texas	198	6%	12.2 days
7	Dalton, Ga.	164	6%	12.2 days
8	El Centro, Calif.	766	6%	12.9 days
9	Cookeville, Tenn.	246	5%	13.2 days
10	Topeka, Kan.	195	5%	13.3 days
11	Faribault-Northfield, Minn.	262	5%	13.4 days
12	Laurel, Miss.	300	5%	13.9 days
13	Hickory-Lenoir, N.C.	278	5%	14.1 days
14	Montgomery, Ala.	1,030	5%	14.1 days
15	Elkhart, Ind.	535	5%	14.2 days
290	New York City area	29,758	0%	184.7 days

https://www.nytimes.com/interactive/2020/04/23/upshot/five-ways-to-monitor-coronavirus-outbreak-us.html?action=click&module=Spotlight&pgtype=Homepage&login=email&auth=login-email&fbclid=IwAR0nfPrbw3WDl0Ljyodc2bZGozUHIwsa4HhXApmusPR9rOjoNst1lCXgZ1k#next-hotspots

Best defense: individual practices
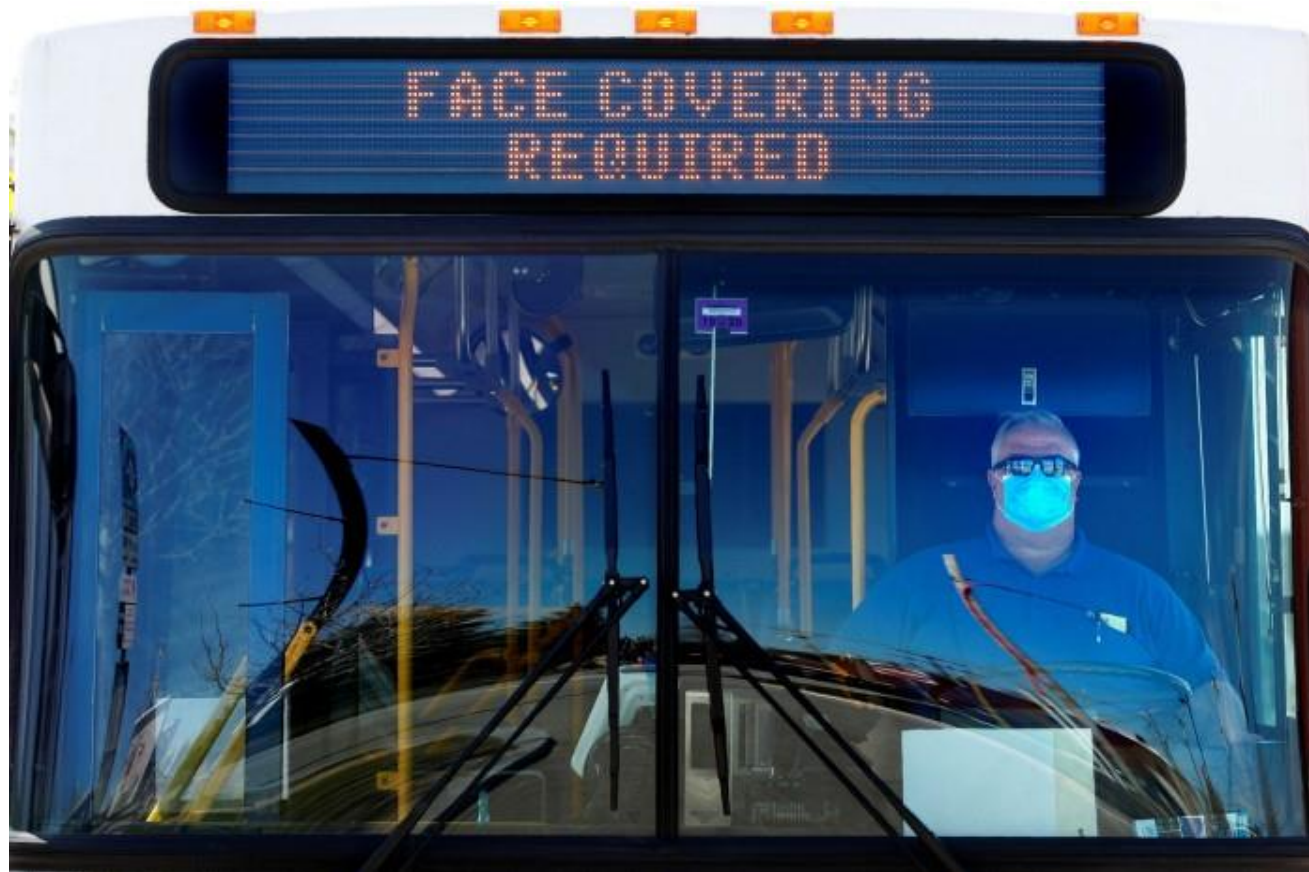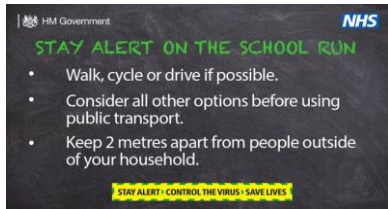
Other...

Up to 20% unemployment

Black community might be upwards of 30% unemployed

Inequality on top of inequality: current data suggest a disproportionate burden of illness and death among racial and ethnic minority groups (Massachusetts – Harvard study)

BR: According to a recent study, Black people who lacked a formal education were 4 times more likely to die from the coronavirus than white people with a higher education. Among Brazilians with the same level of education, Black people were still 37% more likely to die from the coronavirus than white people.

Coronavirus: how to prevent a second wave
https://www.ft.com/content/ca2f127e-698a-4274-917f-cbe2231a08d7

REUTERS GRAPHICS

On January 23, more than 20,000 flights departed from or landed in Europe.

graphics.reuters.com/HEALTH-CORONAVIRUS/FLIGHTS/qzjvqeqrvxm/

REUTERS GRAPHICS

Two months later, after Italy emerged as an epicenter and travel restrictions went into place around Europe, flights dropped to fewer than 5,000 per day.

Climate change and coronavirus: Five charts about the biggest carbon crash
https://www.bbc.com/news/science-environment-52485712

Global CO2 emissions, 1900-present
Billion tonnes of CO2 per year

Spanish flu

Great Depression

World War Two ends

1st & 2nd oil shocks

Soviet Union collapse

Financial crash

2020 forecast
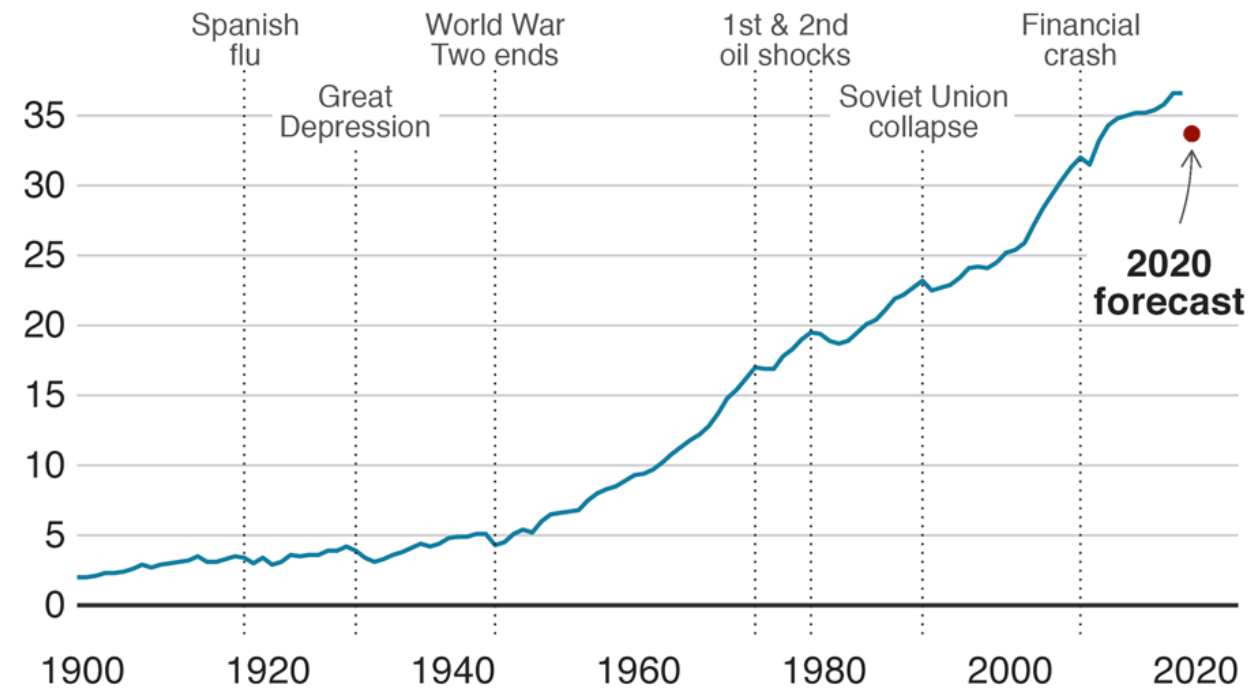
Source: Global Carbon Project, CDIAC & IEA

BBC

Climate change and coronavirus: Five charts about the biggest carbon crash
https://www.bbc.com/news/science-environment-52485712

Traffic flows in selected cities

Average congestion per day

— 2019 — 2020
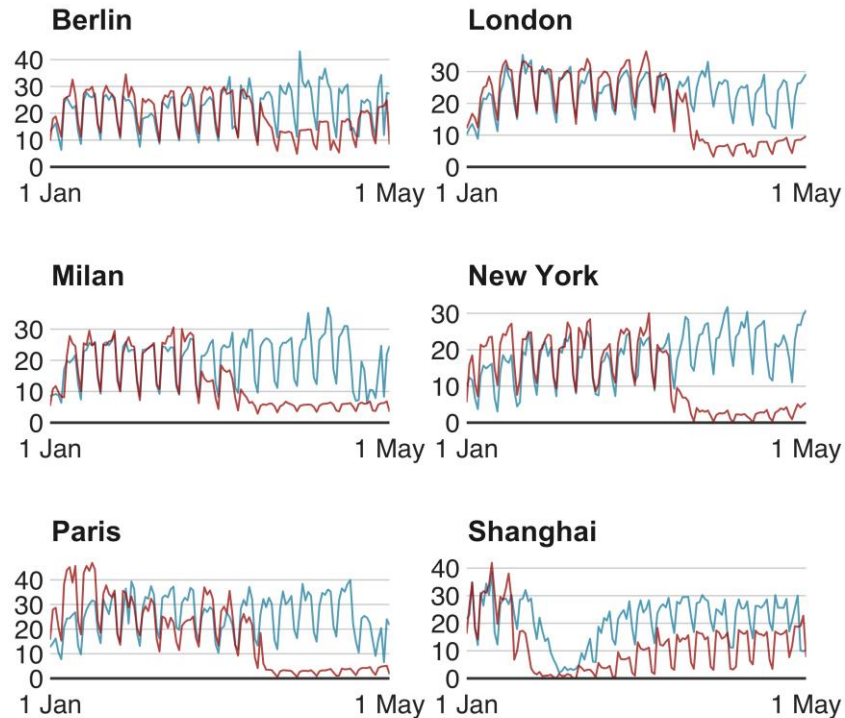
Source: TomTom, 5 May 2020

BBC

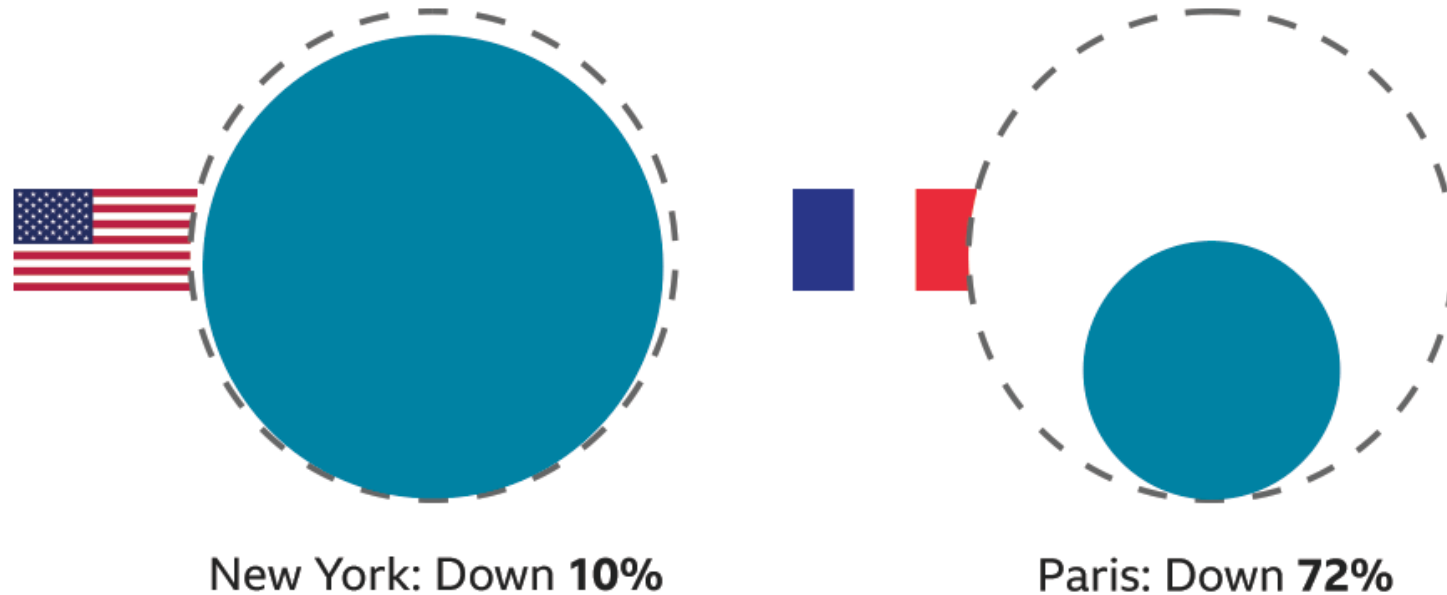**Airline capacity hit by coronavirus**

Scheduled seats (millions)

— Adjusted weekly capacity — Base global capacity on 20 Jan 2020
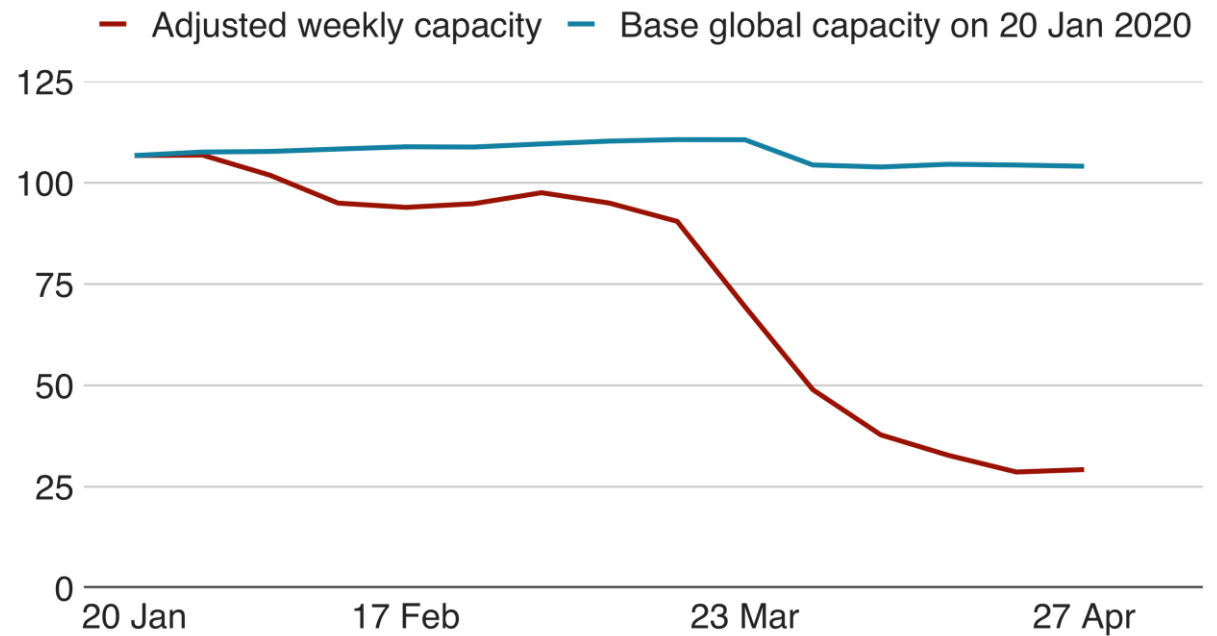
Source: OAG

BBC

Climate change and coronavirus: Five charts about the biggest carbon crash
https://www.bbc.com/news/science-environment-52485712

Lockdown impact on CO2 emissions in March

New York: Down **10%**

Paris: Down **72%**

BBC

Climate change and coronavirus: Five charts about the biggest carbon crash
https://www.bbc.com/news/science-environment-52485712

Keeping temperature rise to 1.5C

Historical figures

Forecast

1.5C low overshoot average

Below 1.5C median

Net negative global emissions
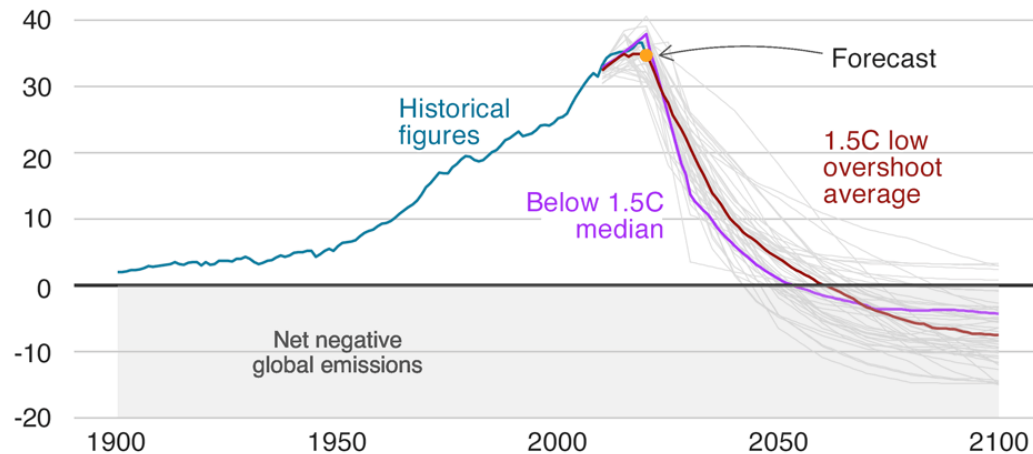
Source: Glen Peters, IAMC, IIASA

BBC

What if CO2 was cut like this each year?

- To keep the world on track to stay under 1.5C this century, the world needs similar cuts for the foreseeable future to keep this target in view.

- "If Covid-19 leads to a drop in emissions of around 5% in 2020, then that is the sort of reduction we need every year until net-zero emissions are reached around 2050," said Glen Peters, also from Cicero.

- "Such emissions reductions will not happen via lockdowns and restrictions, but by climate policies that lead to the deployment of clean technologies and reductions in demand for energy."

- Energy experts believe there will be a bounce back next year, but that, long term, the world will move to greener fuels.

Temporary reduction in daily global CO_2 emissions during the COVID-19 forced confinement

- **Abstract**

Government policies during the COVID-19 pandemic have drastically altered <u>patterns of energy demand</u> around the world. Many international borders were closed and populations were confined to their homes, which <u>*reduced transport*</u> and changed consumption patterns. Here we compile government <u>policies and activity data</u> to estimate the decrease in CO_2 emissions during forced confinements. Daily global CO_2 emissions decreased by −17% (−11 to −25% for ±1σ) by early April 2020 compared with the mean 2019 levels, just under half from changes in surface transport. At their peak, emissions in individual countries decreased by −26% on average. The impact on 2020 annual emissions depends on the duration of the confinement, with a low estimate of −4% (−2 to −7%) if prepandemic conditions return by mid-June, and a high estimate of −7% (−3 to −13%) if some restrictions remain worldwide until the end of 2020. Government actions and economic incentives postcrisis will likely influence the global CO_2 emissions path for decades.

The Confinement Index (CI) categories of restrictions to normal activities that have the potential to influence CO_2 emissions. (Based on policies adopted by national and subnational governments)

Level	Description	Policy examples
0	No restrictions	
1	Policies targeted at long distance travel or groups of individuals where outbreak first nucleates	Isolation of sick or symptomatic individuals Self-quarantine of travellers arriving from affected countries Screening passengers at transport hubs Ban of mass gatherings >5,000 Closure of selected national borders and restricted international travel Citizen repatriation
2	Regional policies that restrict an entire city, region or ~50% of society from normal daily routines	Closure of all national borders Mandatory closure of schools, universities, public buildings, religious or cultural buildings, restaurants, bars and other non-essential businesses within a city or region Ban of public gatherings >100 Perhaps also accompanied by recommended closures at a broader or national level Mandatory night curfew
3	National policies that substantially restrict the daily routine of all but key workers	Mandatory national 'lockdown' that requires household confinement of all but key workers Ban public gatherings and enforce social distancing >2 m

Fig. 1: Fraction of global CO_2 emissions produced in areas subject to confinement.
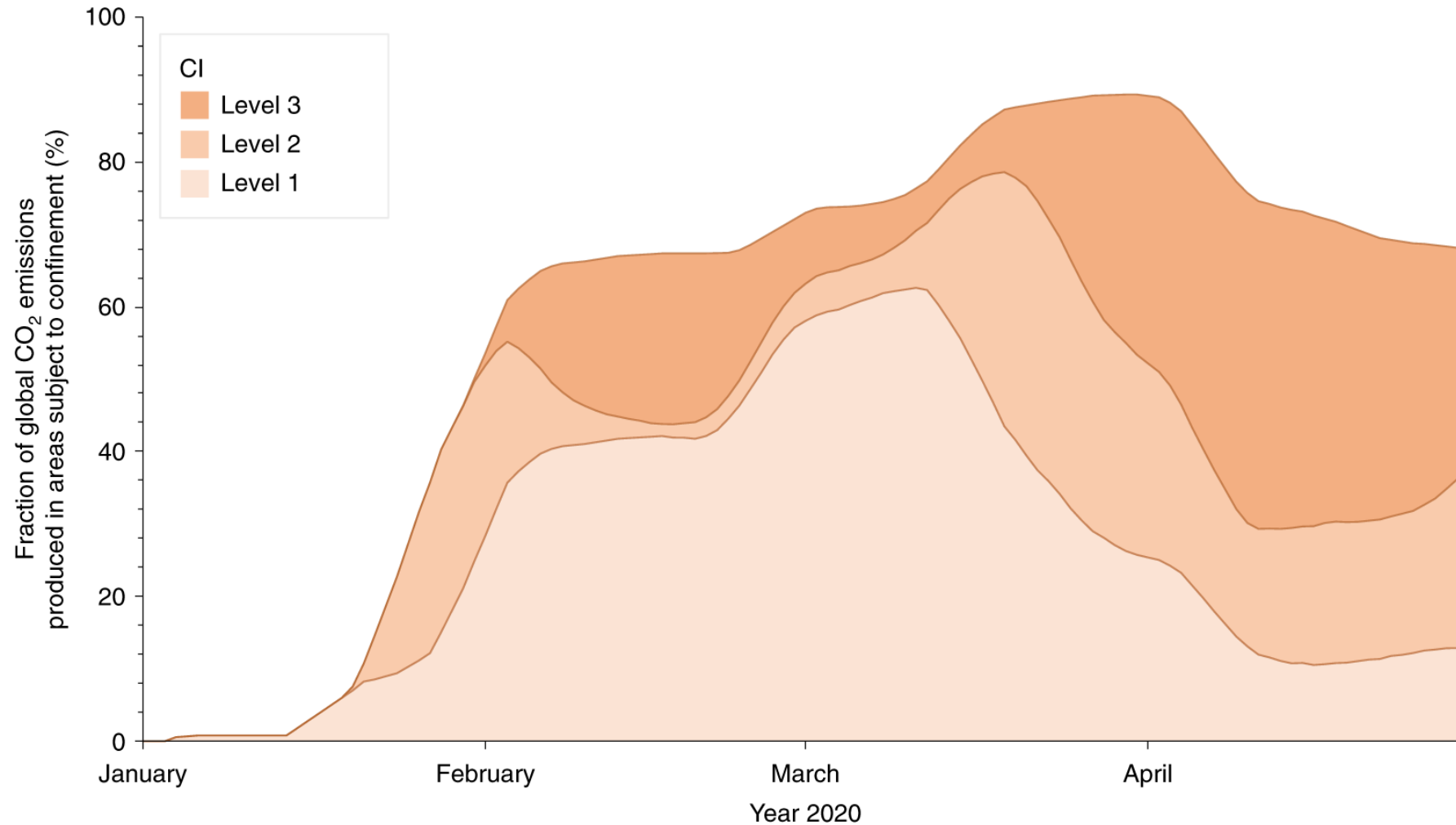
- CO_2 emissions from countries, states and provinces in each confinement level (Table 1) aggregated as a fraction of global CO_2 emissions. CO_2 emissions are from the Global Carbon Project[1] (Methods).
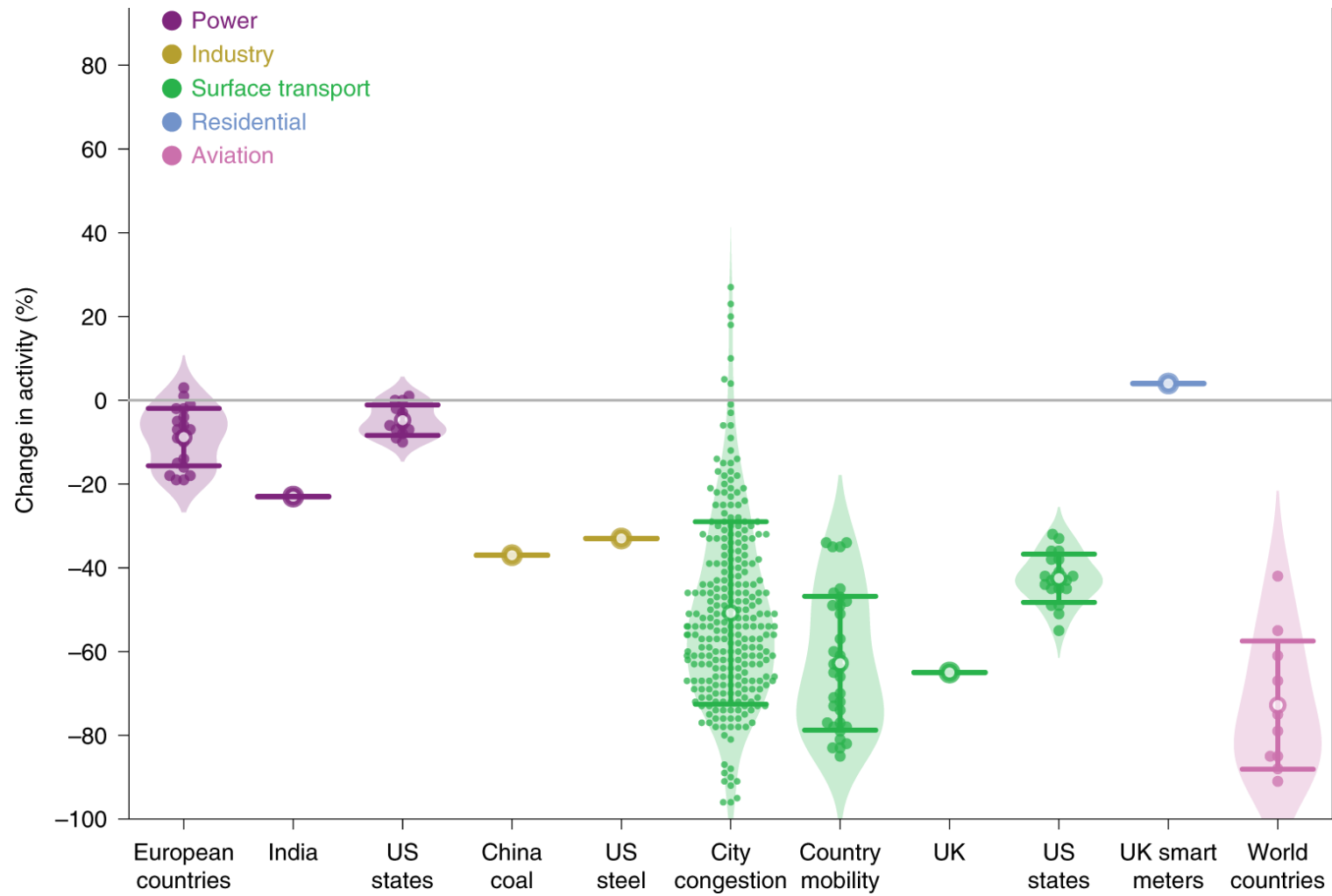
Fig. 2: Change in activity by sector during confinement level 3 (percent). https://www.nature.com/articles/s41558-020-0797-x/figures/2

# Table 2 Change in activity as a function of the confinement level (%) [The change is estimated relative to the mean level of emissions in 2019]

	Change in activity as a function of confinement level (equation ([1]))[a]			Results[b]
	Level 1	Level 2	Level 3	Daily change 7 April 2020
Power	0 (0 to 0)	–5 (0 to –15)	–15 (–5 to –25)	–7.4 (–2.2 to –14)
Industry	–10 (0 to –20)	–15 (0 to –35)	–35 (–25 to –45)	–19 (–10 to –29)
Surface transport	–10 (0 to –20)	–40 (–35 to –45)	–50 (–40 to –65)	–36 (–28 to –46)
Public	–5 (0 to –10)	–22.5 (–5 to –40)	–32.5 (–15 to –50)	–21 (–8.1 to –33)
Residential	0 (0 to 0)	0 (–5 to +5)	+5 (0 to +10)	+2.8 (–1.0 to +6.7)
Aviation	–20 (0 to –50)	–75 (–55 to –95)	–75 (–60 to –90)	–60 (–44 to –76)
Total				–17 (–11 to –25)

Questions?
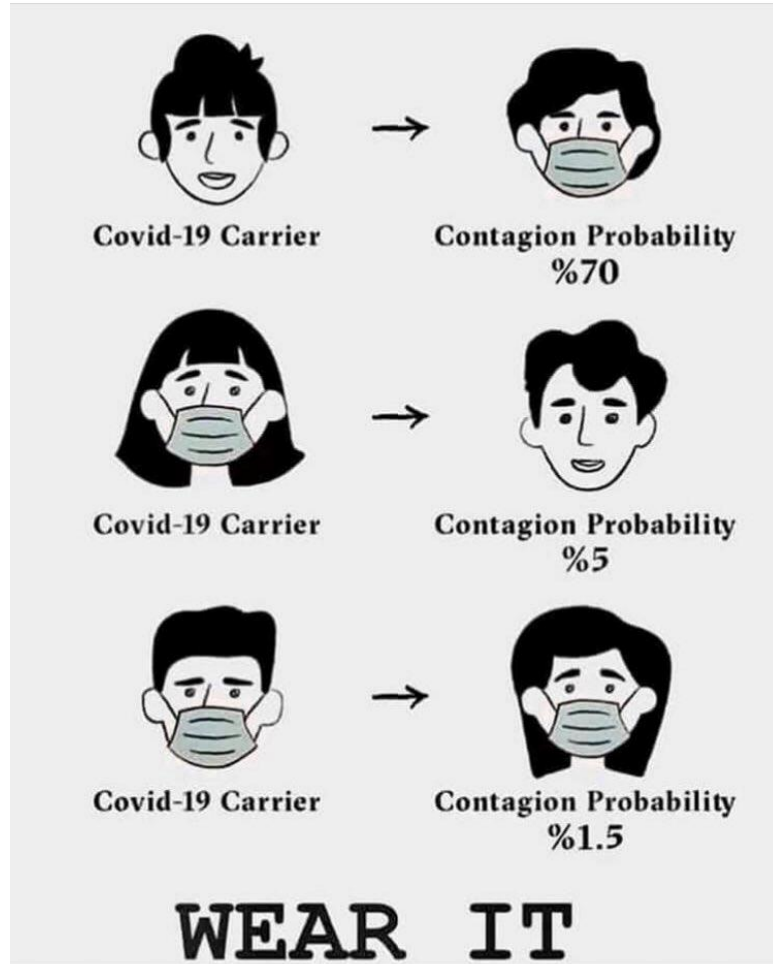
WEAR IT...like your life depends on it.