**COVID-19 Biweekly Newsletter**
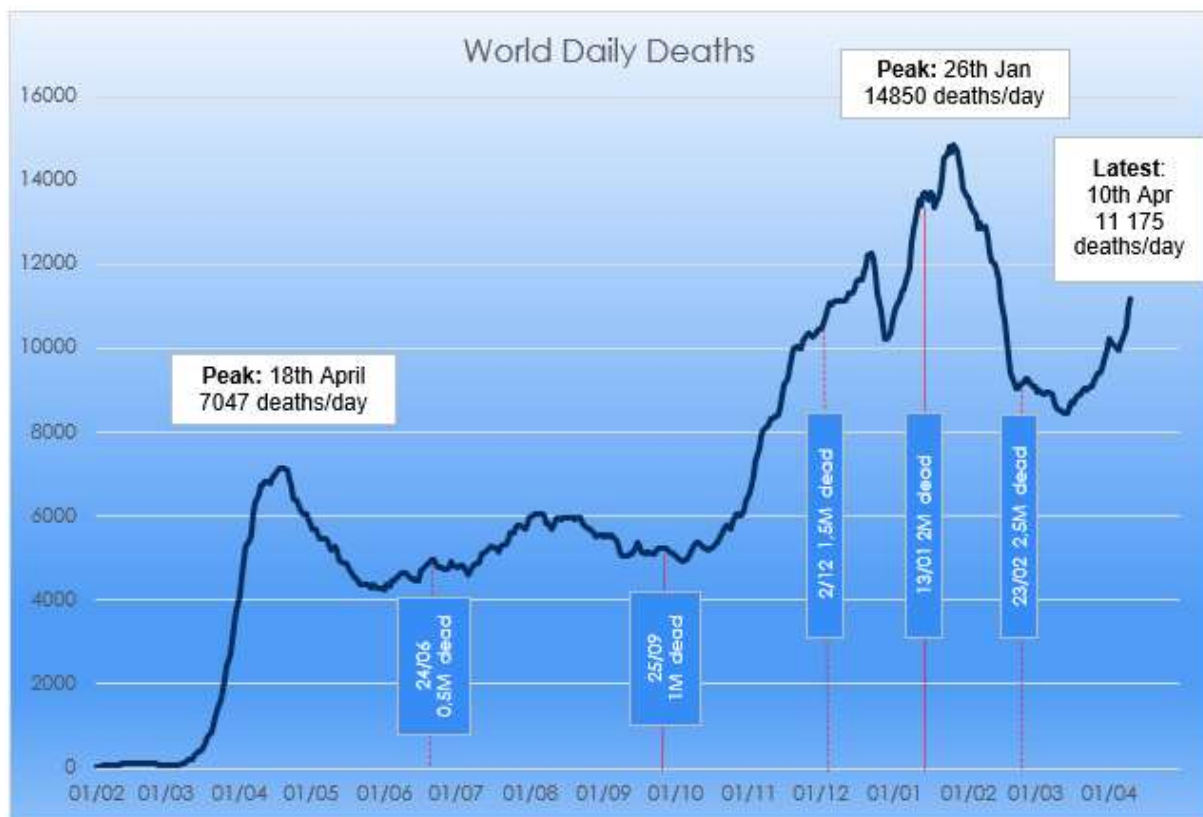Issue N° 117, Sunday, 2021-04-11
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**Contents**: Global overview / National comparisons / EU Test comparisons / US States focus / NYC&LI status / Today's images: Bird hide on Leigh Marshes / [Notes]
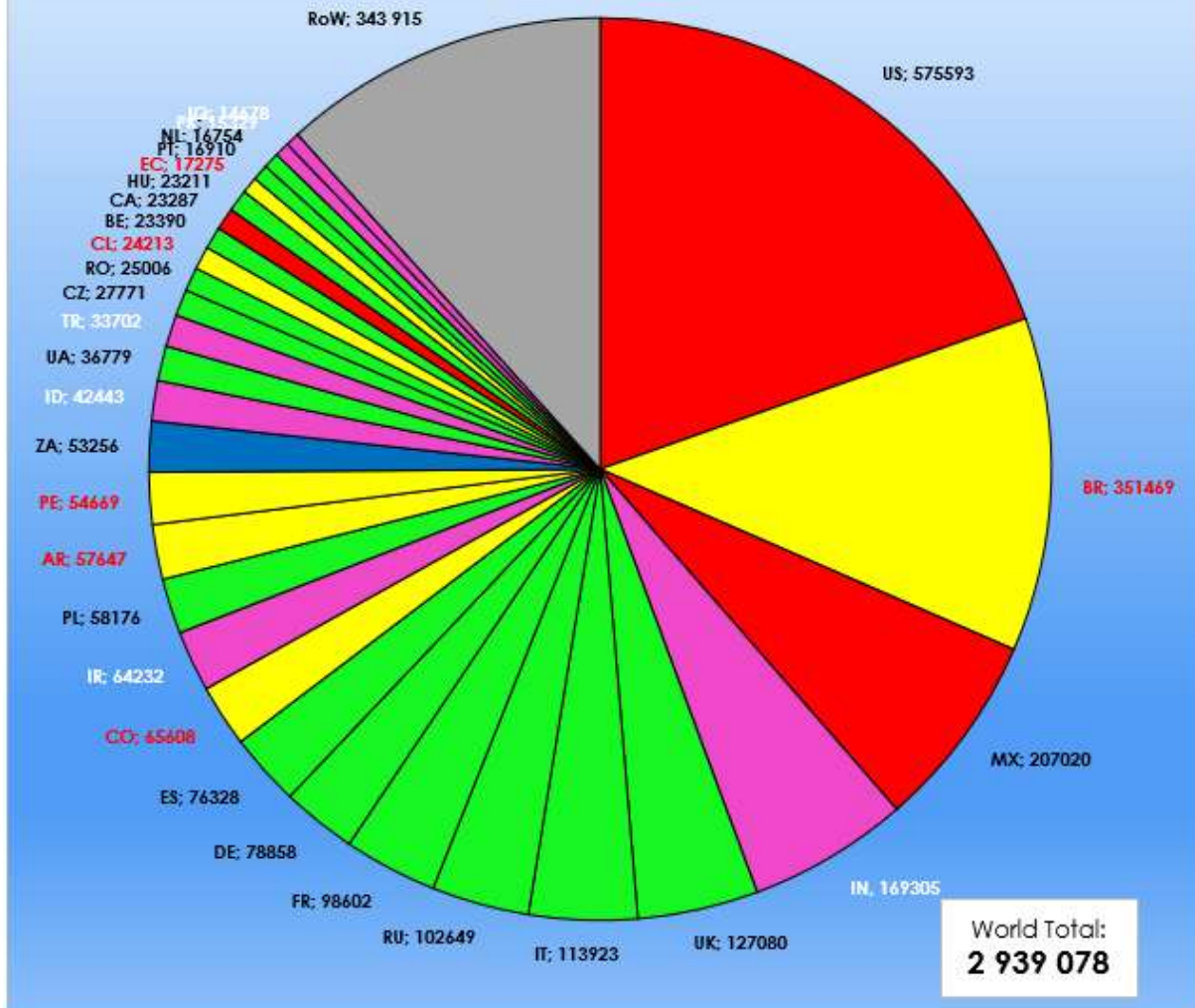

**Global overview**: [0]
Since last time:

– The global death rate (7-day moving mean) is again rising sharply.
– Global cumulative deaths will soon pass the 3 million mark.
– Yemen & Estonia (codes YE & EE) become the 96th & 97th countries to record >1000 COVID-19 deaths.




World Daily Deaths

Peak: 26th Jan
14850 deaths/day

Latest:
10th Apr
11 175
deaths/day

Peak: 18th April
7047 deaths/day

24/06 0.5M dead
25/09 1M dead
2/12 1.5M dead
13/01 2M dead
23/02 2.5M dead


Cumulative death tolls for the top 30 countries [0]: N. America, S. America, Europe, Asia, & Africa
Poland overtakes Argentina:

## Cumulative Death Toll by Country
### Top 30 countries by no. of deaths

RoW; 343 915
US; 575593
BR; 351469
MX; 207020
IN, 169305
UK; 127080
IT; 113923
RU; 102649
FR; 98602
DE; 78858
ES; 76328
CO; 65608
IR; 64232
PL; 58176
AR; 57647
PE; 54669
ZA; 53256
ID; 42443
UA; 36779
TR; 33702
CZ; 27771
RO; 25006
CL; 24213
BE; 23390
CA; 23287
HU; 23211
EC; 17275
PT; 16910
NL; 16754

World Total:
2 939 078

Lots of upward movement amongst the other >1000-death countries not shown above: PH, HR, PY, AZ, ET, PS, KE, VE & UY. (again)

Per-capita death rates for all 97 countries with >1000 deaths:
European countries dominate at the high end.

COVID-19 Deaths/100K population - Part 1
(Countries with > 1000 deaths)
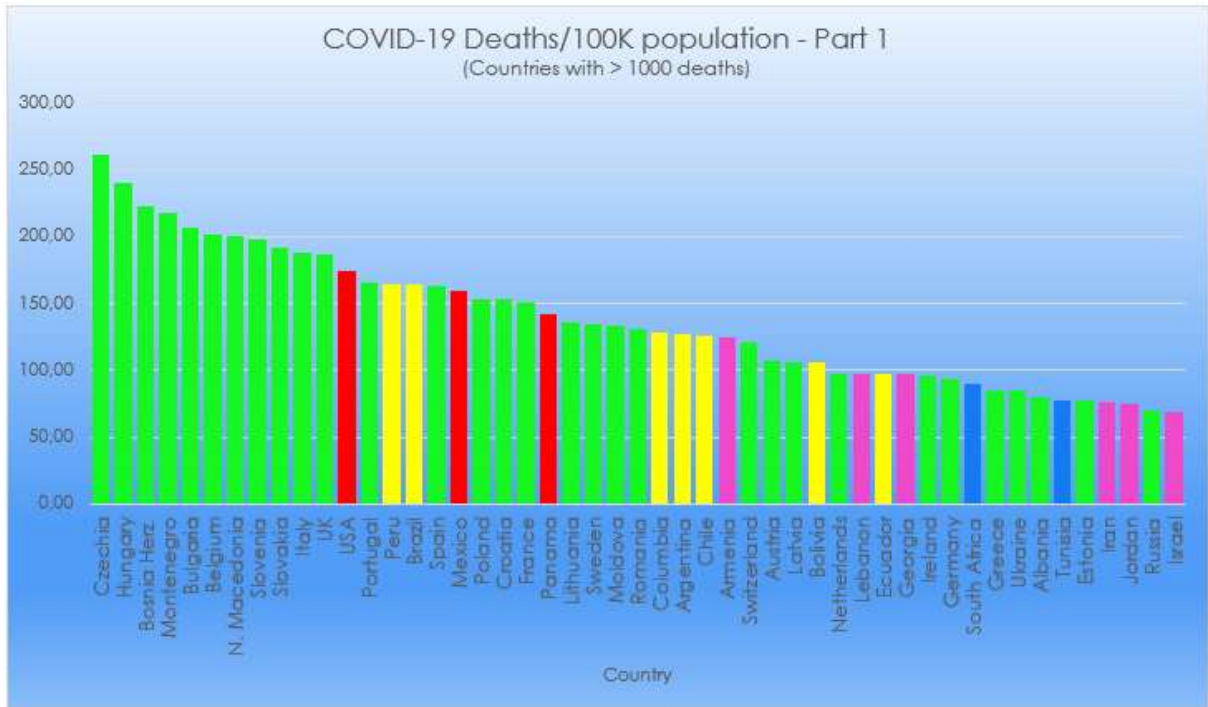
Moving left: MK, SK (again), IT, PE, BR, PL, LV, LB & EC.

The bottom half is more of a mixture:



COVID-19 Deaths/100K population - Part 2
(Countries with > 1000 deaths)
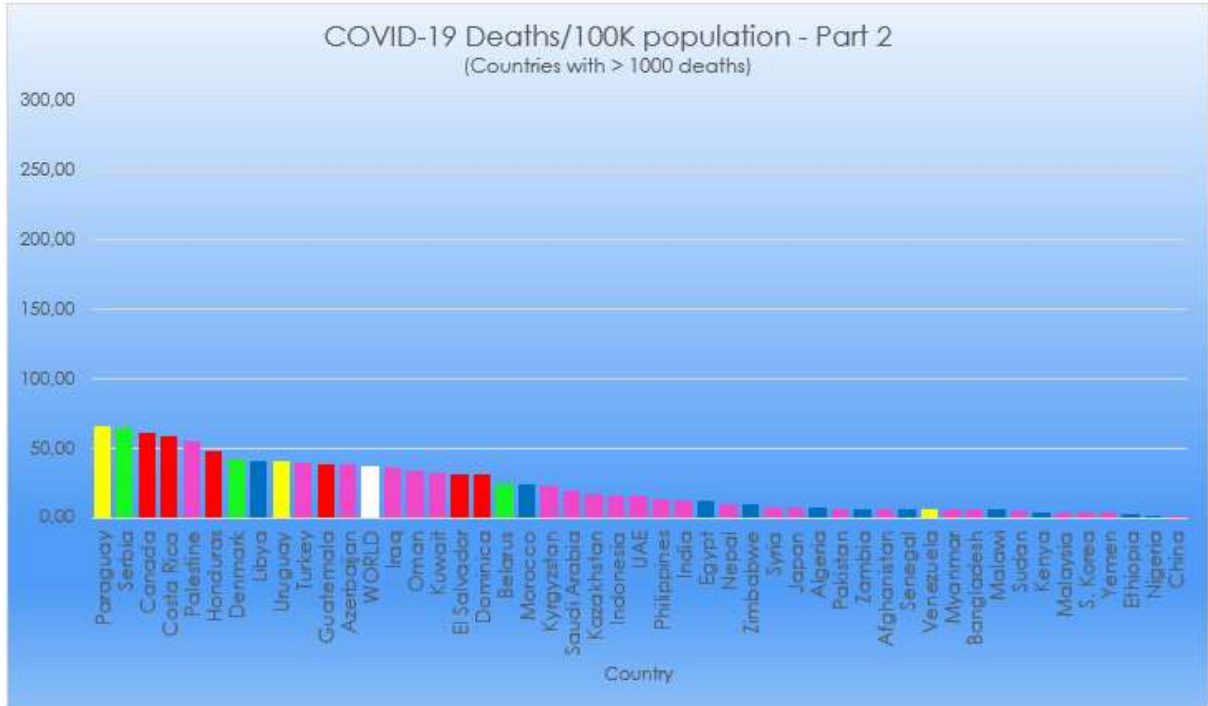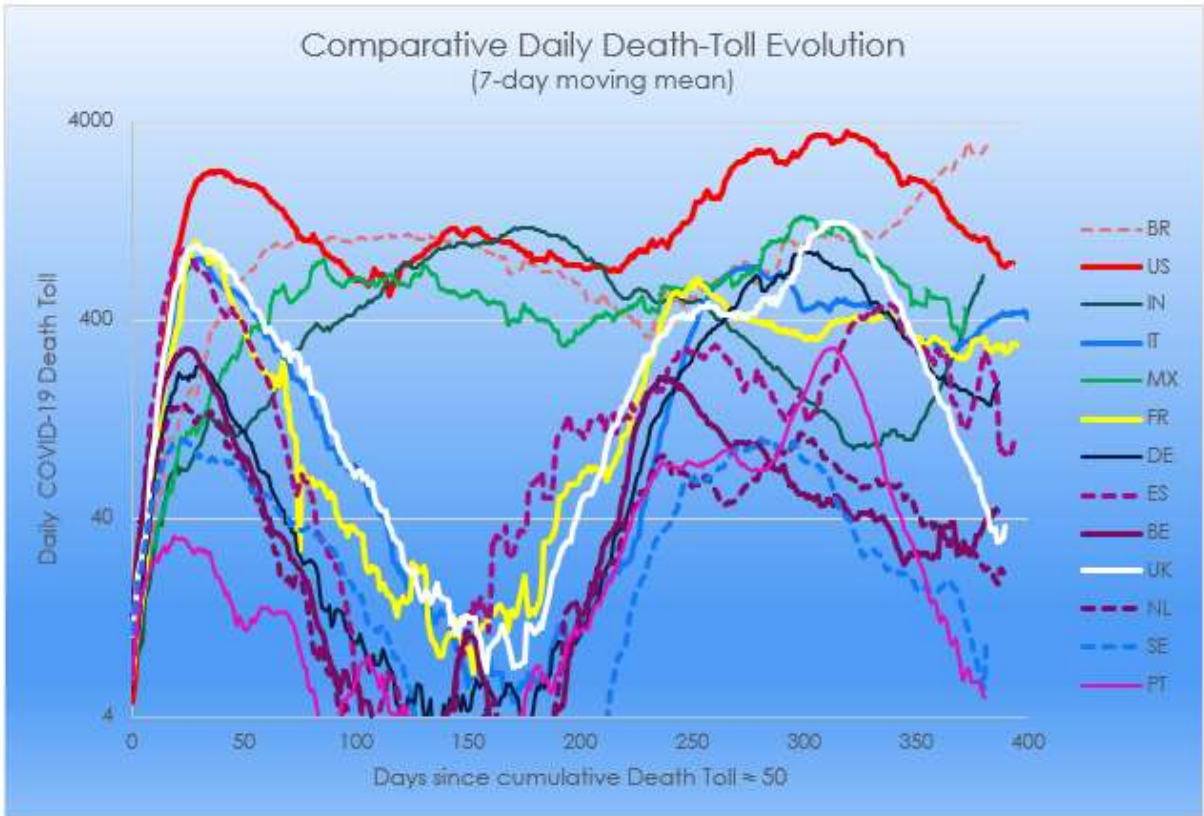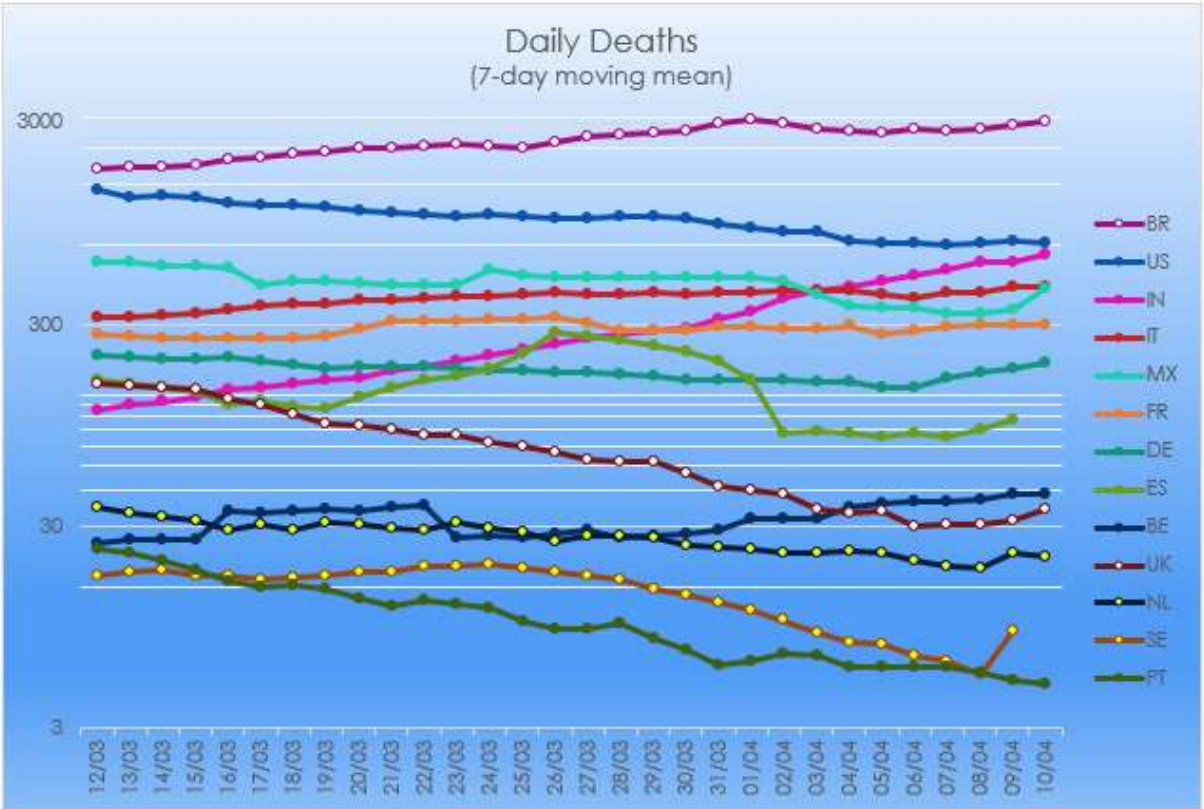
Movement to the left in Part 2: PY, UY & BD.

**National comparisons** (selected countries)
Here is the evolution in daily deaths rates (7-day moving mean) since each country's "Day0" [1]:

Comparative Daily Death-Toll Evolution
(7-day moving mean)

(Log y scale!)

Daily death rates (7-day moving mean) for the last 30 days:



Daily Deaths
(7-day moving mean)

(Log y scale!)

Comments apply to both of the above graphs:

- Rising sharply & consistently: BR & IN. Rising recently: DE & BE.
- Falling consistently: PT; and until just recently: US, UK & SE.
- The others are more or less static with IT, MX & FR remaining at a stubbornly high level.

**Tendencies: Comparison of time scales** [2, 3]

<span style="background-color:red">Double digits</span>, <span style="background-color:orange">triple+shortening,</span> <span style="background-color:yellow">triple</span>, <span style="background-color:green">quadruple</span>

| Country | 1st death | Days since 1st death | "Day0" | Days since "Day0" | Doubling time (7-day fits) | | |
|---|---|---|---|---|---|---|---|
| | | | | | 10 Apr | 06 Apr | 03 Apr |
| IT | 21 Feb | 414 | 02 Mar | 404 | 153 days | 198 days | 160 days |
| FR | 15 Feb | 420 | 11 Mar | 395 | 199 days | 266 days | 210 days |
| ES | 03 Mar | 403 | 11 Mar | 395 | 434 days | 748 days | 530 days |
| US | 29 Feb | 406 | 13 Mar | 393 | 451 days | 551 days | 408 days |
| UK | 05 Mar | 401 | 16 Mar | 390 | 2078 days | 3404 days | 2044 days |
| NL | 06 Mar | 400 | 17 Mar | 389 | 503 days | 611 days | 469 days |
| DE | 09 Mar | 397 | 19 Mar | 387 | 229 days | 445 days | 290 days |
| BE | 11 Mar | 395 | 20 Mar | 386 | 365 days | 408 days | 433 days |
| SE | 11 Mar | 395 | 24 Mar | 382 | 1245 days | 1660 days | 371 days |
| BR | 17 Mar | 389 | 24 Mar | 382 | 67 days | 99 days | 69 days |
| PT | 16 Mar | 390 | 25 Mar | 381 | 2293 days | 1819 days | 1838 days |
| IN | 12 Mar | 394 | 26 Mar | 380 | 164 days | 212 days | 239 days |
| MX | 19 Mar | 387 | 03 Apr | 372 | 280 days | 525 days | 309 days |
| World | 11 Jan | 455 | 25 Jan | 441 | 163 days | 217 days | 182 days |

- (compare 10/04 with 03/04 data [3])
- Mixed:
  - Improvement for some countries - PT, UK, SE, NL & US
  - Deterioration for the rest.
- Poorest performance: BR.

This is how doubling times have been evolving since mid-June:
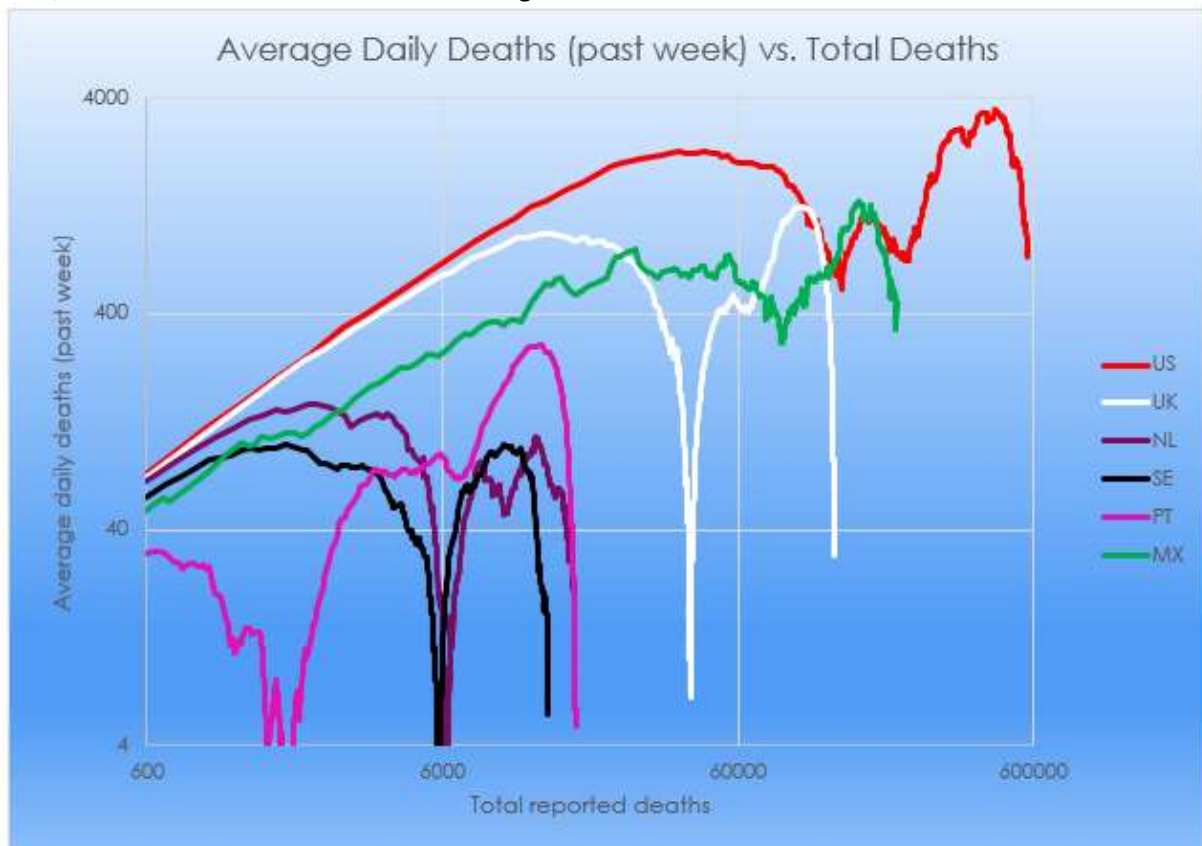(Only "Sunday" values have been plotted [3].)
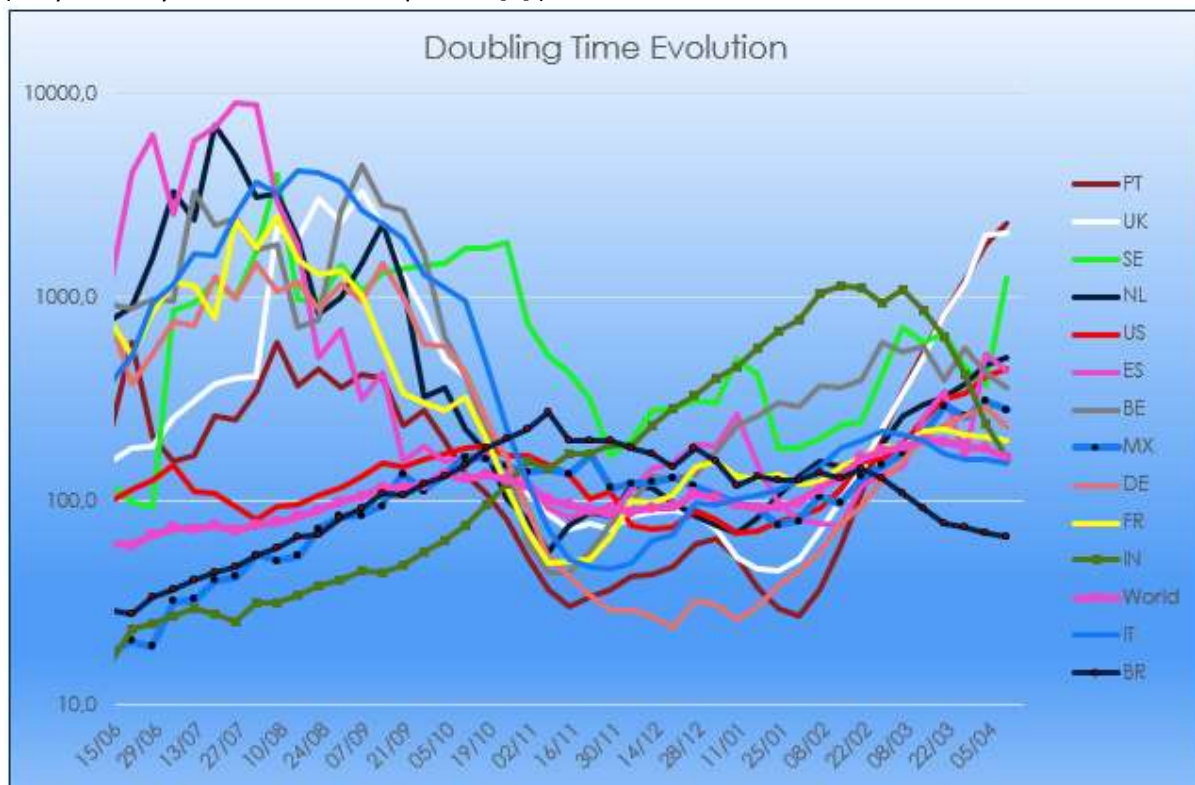


(Log y scale. Remember: Shorter doubling times equate to a faster evolution of the disease.)
As I said above: mixed very results.
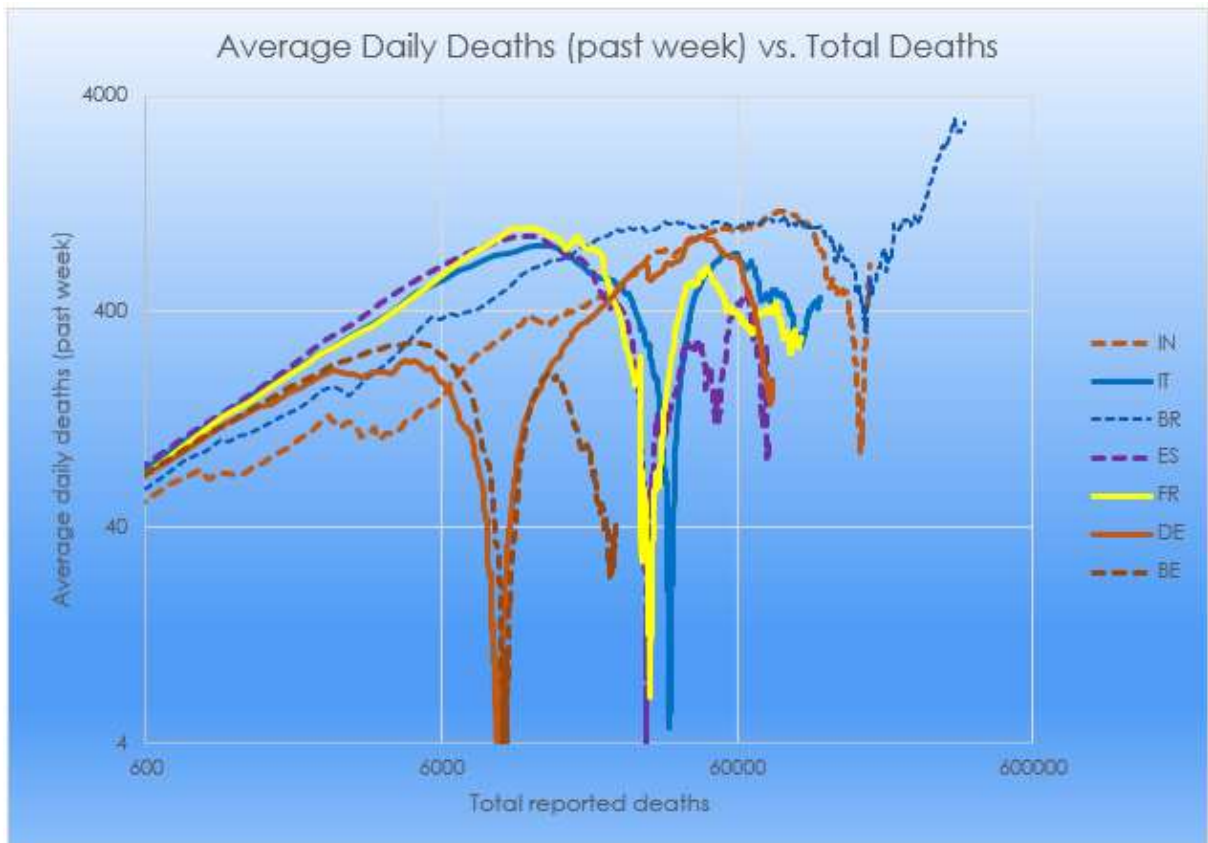
**Predictive statistics** [4]

To improve readability, I'm showing the same graph twice.

First, the countries with the most convincing fall off:



(log-log plot!)

The second for the other countries considered:

Average Daily Deaths (past week) vs. Total Deaths

BR is still the only country currently showing no evidence whatsoever of dropping down.

**EU Test Comparisons**
**Warning**: National data on testing are not really comparable [6].



Daily New Cases per 1M of population (7-day moving mean)
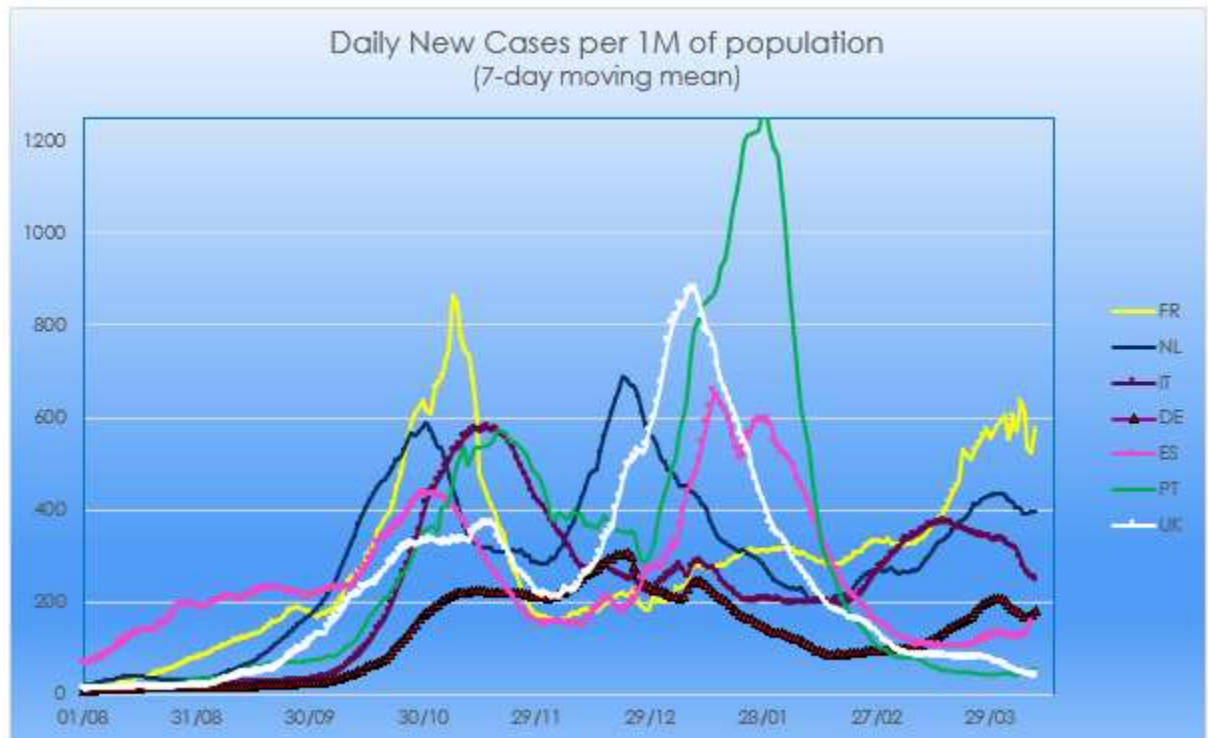
The rate of new cases in FR is starting to oscillate around 600/1M/day (while the daily death rate remains static).

Here is the evolution in the total number of cases (not normalized to population):



Total Number of Reported Cases
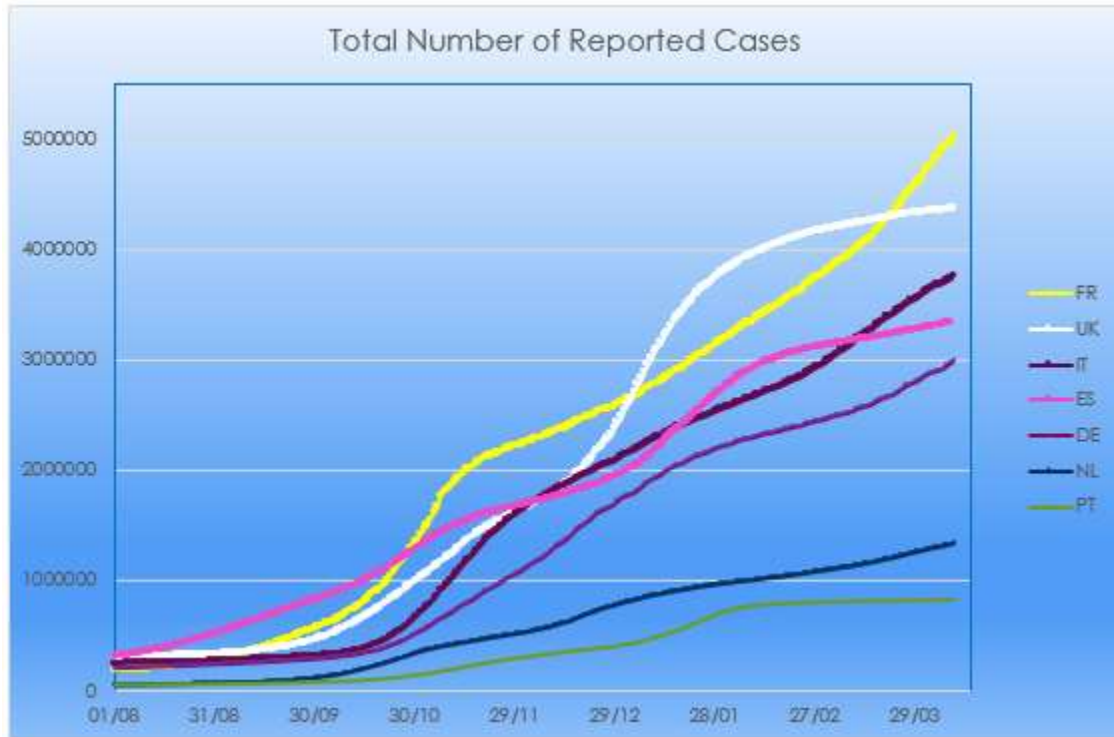
**US States Focus** (selected states)
Comparative Daily Death Toll evolution since each state's Day0 [1]:



Comparative Daily Death-Toll Evolution
(7-day moving mean)
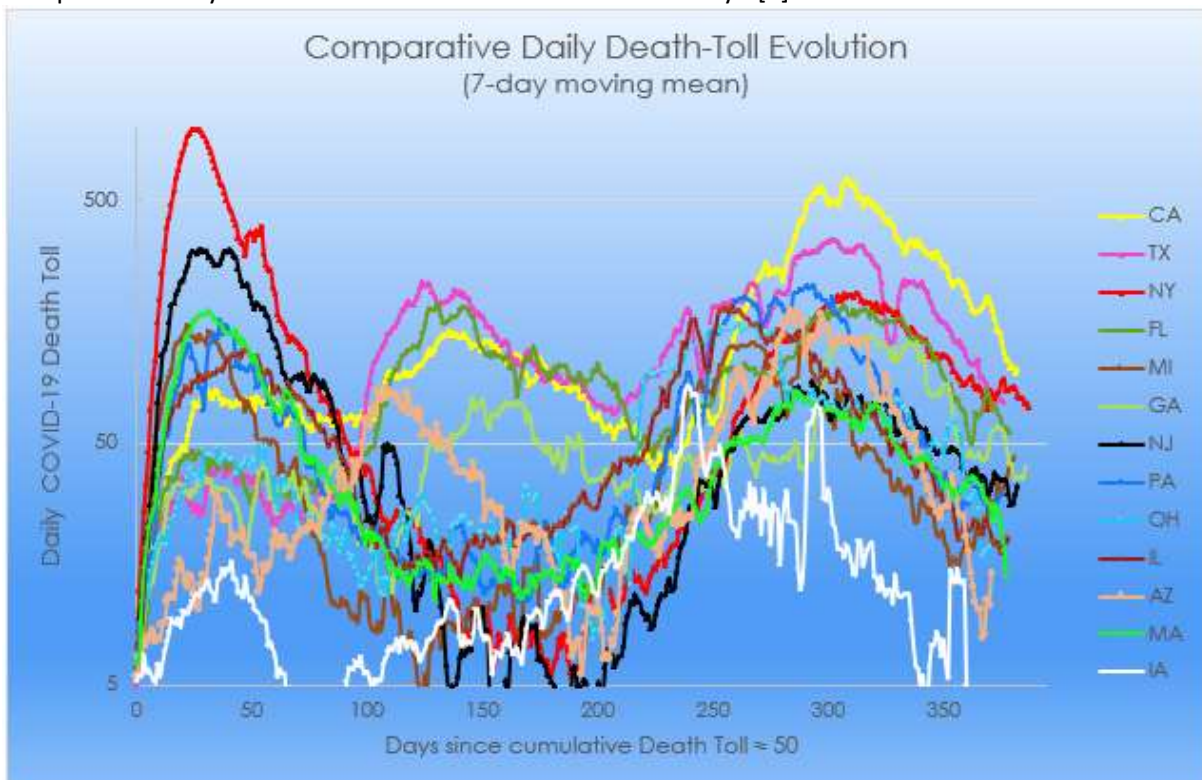
(Log y scale!)

Comparative Daily Death Toll evolution over the past 30 days:

Daily Deaths
(7-day moving mean)
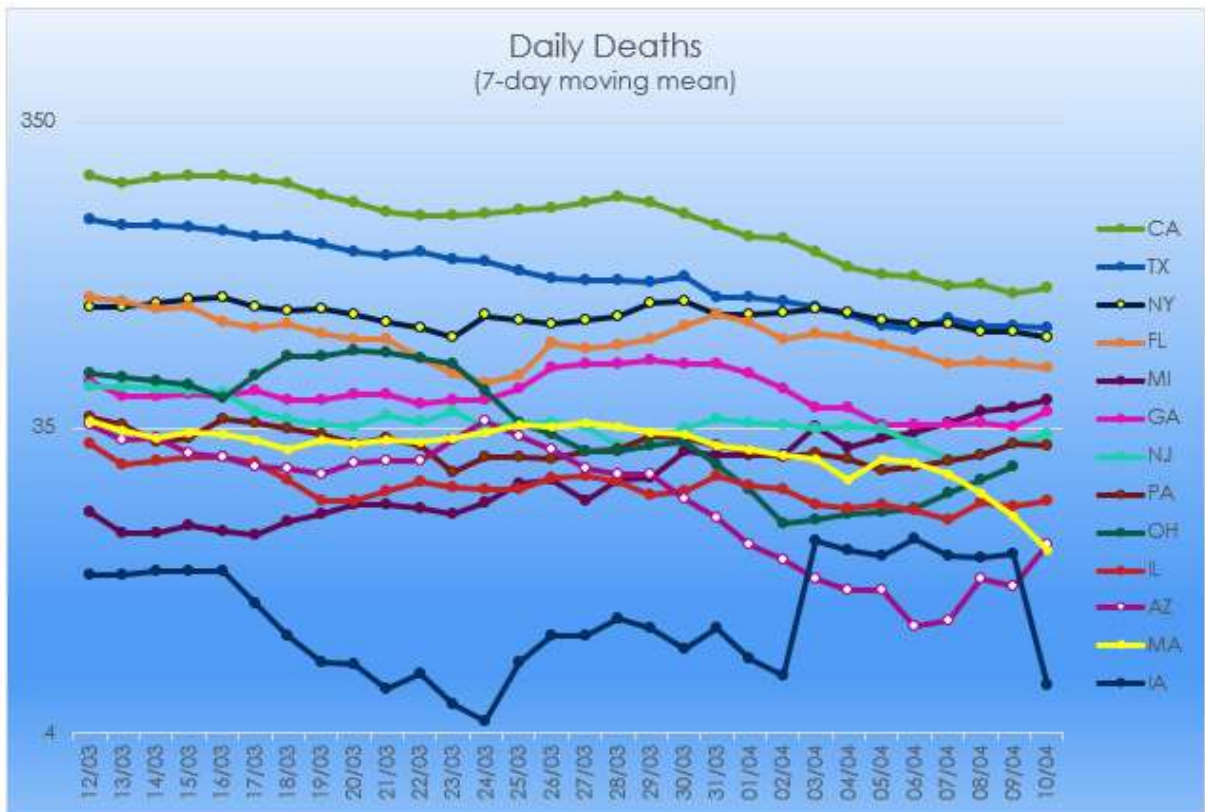
(Log y scale!)

Comments apply to both of the above graphs:
− Death dates falling consistently for many states, esp. CA & TX.
  Only CA remains above 100 deaths/day (just).
− Recently, however, a few states are showing rises.
− IA reported an unusually high no. of deaths in a single day (68) a week ago.

Cumulative death toll for the top 33 US states:
Oklahoma jumps up sharply, overtaking 7 states:

**Cumulative Death Toll by State**
Top 33 states by no. of deaths

RoUS; 45100
CA; 60382
KS; 4967
NV; 5332
WA; 5376
AR; 5661
IA; 5857
KY; 6241
CO; 6296
OK; 6669
WI; 6676
MN; 7012
MS; 7095
CT; 7944
MD; 8444
MO; 9213
SC; 9273
LA; 10216
VA; 10458
AL; 10712
TN; 12001
NC; 12248
IN; 13138
AZ; 17092
MA; 17379
MI; 17563
OH; 18827
GA; 19488
IL; 23777
NJ; 24859
PA; 25515
FL; 34055
TX; 49411
NY; 51316

USA Total:
**575 593**
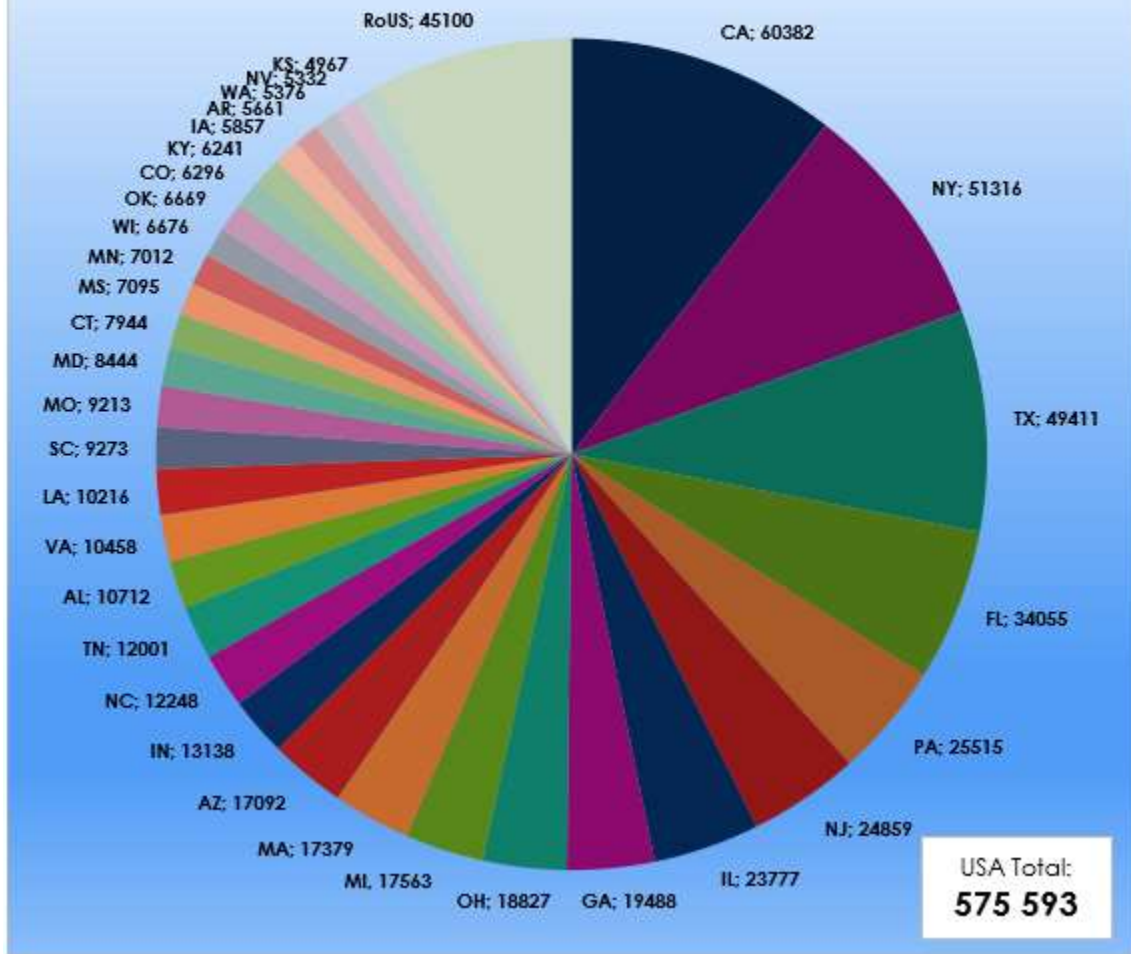
Per capita (for all 50 states):

COVID-19 Deaths/100K population
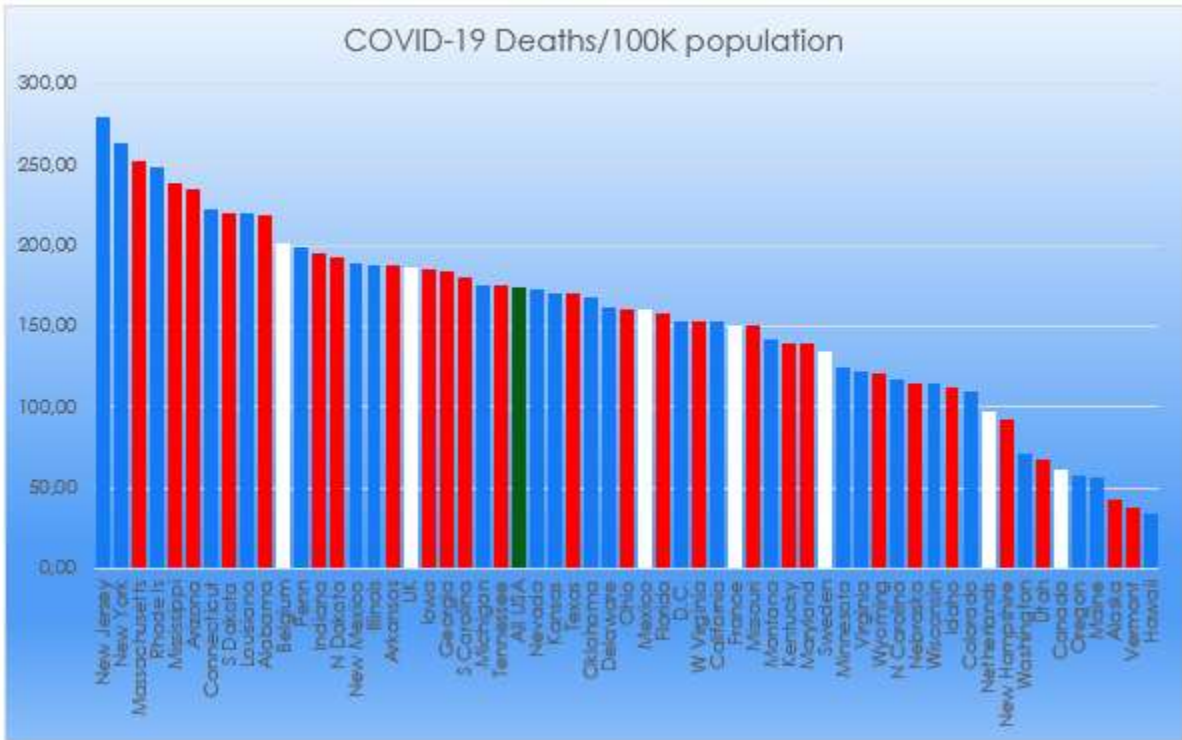
Moving left: IL, MI, OK (overtaking 11 states), WV, MT, KY & NE.

**Tendencies: Comparison of time scales** [2, 3]

Double digits, triple+shortening, triple, quadruple

| State | 1st death | Days since 1st death | "Day0" | Days since "Day0" | Doubling time (7-day fits) | | |
|-------|-----------|----------------------|--------|-------------------|------------|------------|------------|
| | | | | | 10 Apr | 06 Apr | 03 Apr |
| AZ | 20 Mar | 386 | 04 Apr | 371 | 650 days | 2747 days | 829 days |
| CA | 04 Mar | 402 | 24 Mar | 382 | 370 days | 420 days | 303 days |
| FL | 06 Mar | 400 | 27 Mar | 379 | 374 days | 421 days | 294 days |
| GA | 14 Mar | 392 | 20 Mar | 386 | 270 days | 482 days | 262 days |
| IA | 24 Mar | 382 | 15 Apr | 360 | 678 days | 231 days | 308 days |
| IL | 17 Mar | 389 | 28 Mar | 378 | 731 days | 1047 days | 764 days |
| MA | 20 Mar | 386 | 29 Mar | 377 | 795 days | 476 days | 415 days |
| MI | 18 Mar | 388 | 25 Mar | 381 | 239 days | 351 days | 340 days |
| NJ | 10 Mar | 396 | 24 Mar | 382 | 433 days | 811 days | 379 days |
| NY | 14 Mar | 392 | 20 Mar | 386 | 524 days | 458 days | 425 days |
| OH | 18 Mar | 388 | 31 Mar | 375 | 477 days | 623 days | 828 days |
| PA | 18 Mar | 388 | 30 Mar | 376 | 470 days | 816 days | 546 days |
| TX | 16 Mar | 390 | 30 Mar | 376 | 380 days | 497 days | 352 days |

- (compare 10/04 with 03/04 values [3]).
- Improvements for most states; deterioration for 5.
- Poorest performance: MI.

This is how doubling times have been evolving since mid-June:
(Only "Sunday" values have been plotted [3].)

Doubling Time Evolution

(Log plot! – Remember longer doubling times are preferable.)
This upward trend of all doubling times since the first week of the year continues, but is slowing.
The doubling times for the 12 states shown remain bunched together.
The range is currently from 239 (MI) to 795 (MA). This gap has tightened slightly.

**NYC/LI status**
Average daily death rates for the 5 boroughs & 2 counties:



NYC/LI: Daily COVID-19 Fatalities
(7-day moving means)
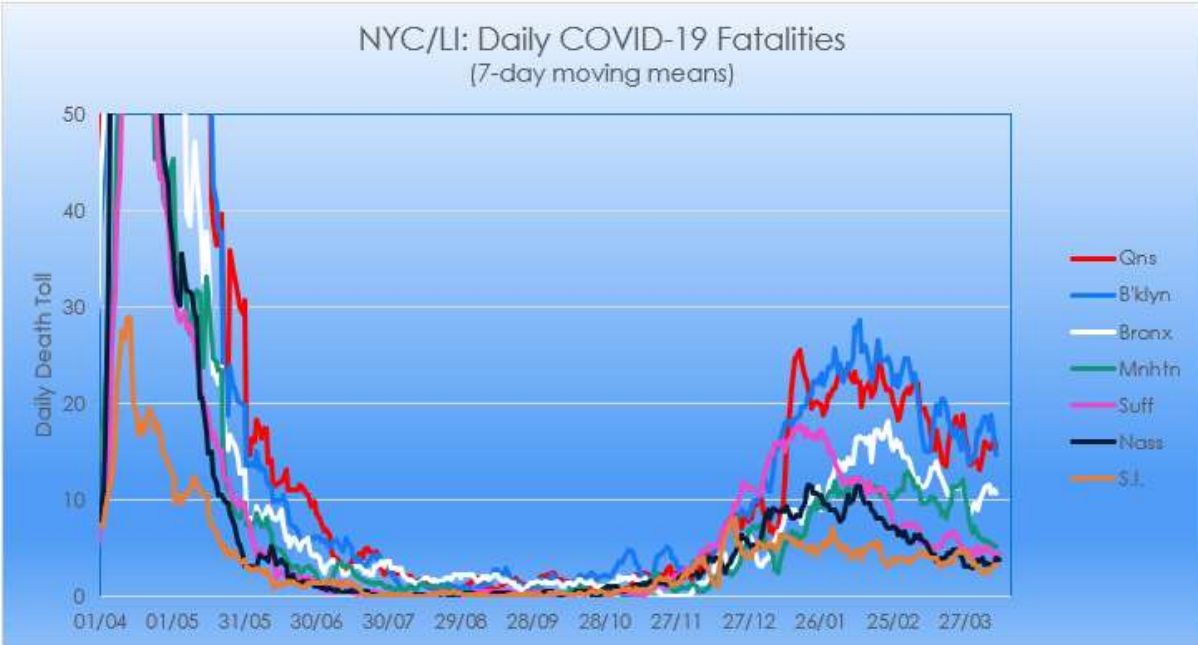
It really does look as if the peak has been passed for all boro's/counties, but the fall off is a lot slower than was the rise.

Cumulative death tolls:

**NYC/LI Death Toll by Boro/Cty**

- Staten Is.; 1522
- Nassau; 3087
- Suffolk; 3294
- Manhattan; 3571
- Bronx; 5366
- Brooklyn; 8060
- Queens; 8148

NYC 26 667

East L.I. 6 381
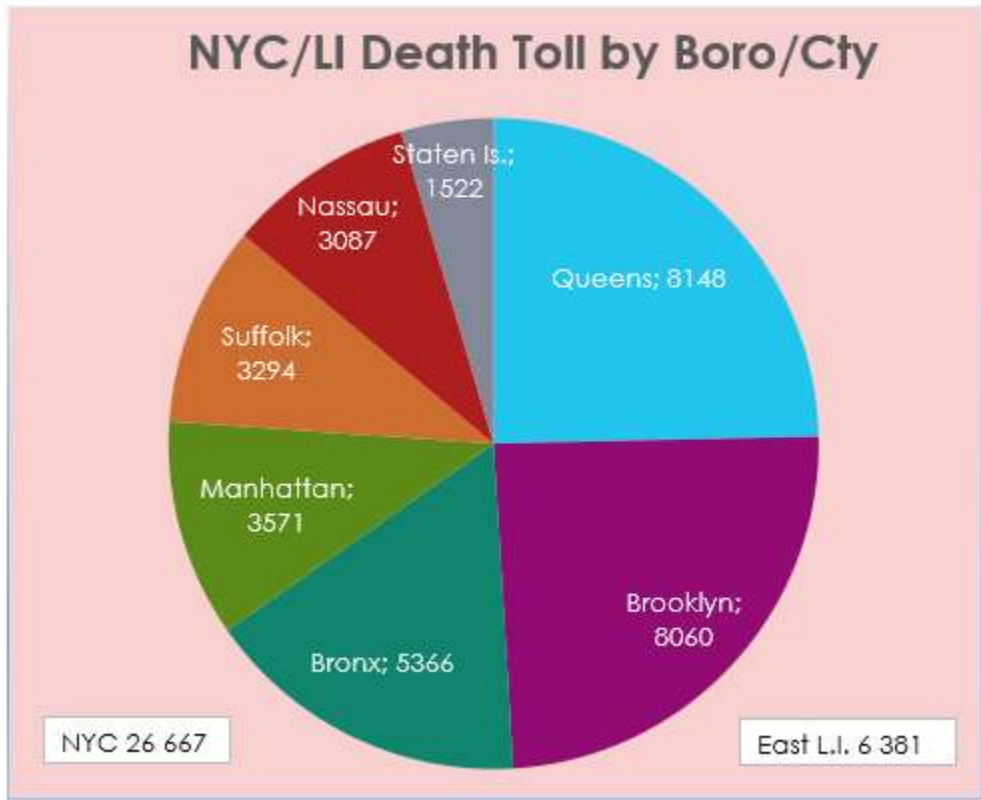
Next update on Wednesday.

Keep well, keep safe, keep isolated – and I hope you're all getting vaccinated!

David

**Today's image:** Reconstructed bird hide overlooking Leigh Marshes in Essex:

It has a green roof and lots of nesting places for the local insects.
Great views from the inside:

And you can see the remains of Hadleigh Castle in the distance, too!

Thanks to **Allan** for the photos!

Please keep sending me your images for this space…


**Notes**

[0] The national COVID-19 data are taken from the worldometer website which reproduces the data collected from Official Websites of Ministries of Health of other Governmental Institutions and Government authorities' social media accounts.

- Different countries use different criteria in recording COVID-19 deaths, often distinguishing between *probable* and *confirmed* cause of death.
    - Belgium appears to have the loosest criterion attributing any death to COVID-19 if there is any suspicion that COVID-19 could have been the cause.
    - The UK recently changed the definition: death occurring within 28 days of a positive test for COVID-19. (If the patient dies 29 days after the test, it wasn't officially caused by COVID-19.)
    - China has only reported a single COVID-19 death since 17th May 2020! This occurred on 14th January 2021.
- Some countries, notably Sweden & Spain, regularly update the entire set of historical data provided to the website. Other counties, e.g., UK & USA, do the same but more rarely.


**ISO two-letter country codes used in this Update**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| All | World | CR | Costa Rica | IL | Israel | MW | Malawi | SD | Sudan |
| AE | UAE | CZ | Czechia | IN | India | MX | Mexico | SE | Sweden |
| AF | Afghanistan | DE | Germany | IQ | Iraq | MY | Malaysia | SI | Slovenia |
| AL | Albania | DK | Denmark | IR | Iran | NL | Netherlands | SK | Slovakia |
| AM | Armenia | DO | Dominican Rep. | IT | Italy | NO | Norway | SN | Senegal |
| AR | Argentina | DZ | Algeria | JO | Jordan | NP | Nepal | SV | El Salvador |
| AT | Austria | EC | Ecuador | JP | Japan | OM | Oman | SY | Syria |
| AZ | Azerbaijan | EE | Estonia | KE | Kenya | PA | Panama | TN | Tunisia |
| BA | Bosnia Herzegovina | EG | Egypt | KG | Kyrgyzstan | PE | Peru | TR | Turkey |
| BD | Bangladesh | ES | Spain | KR | Rep. Of Korea | PH | Philippines | UA | Ukraine |
| BE | Belgium | ET | Ethiopia | KW | Kuwait | PK | Pakistan | UK | UK |
| BG | Bulgaria | FI | Finland | LB | Lebanon | PL | Poland | US | USA |
| BO | Bolivia | FR | France | LT | Lithuania | PS | Palestine | UY | Uruguay |
| BR | Brazil | GE | Georgia | LV | Latvia | PT | Portugal | VE | Venezuela |
| BY | Belarus | GR | Greece | LY | Libya | PY | Paraguay | YE | Yemen |
| CA | Canada | GT | Guatemala | MA | Morocco | RO | Romania | ZA | South Africa |
| CH | Switzerland | HR | Croatia | MD | Moldova | RoW | Rest of World | ZM | Zambia |
| CL | Chile | HU | Hungary | ME | Montenegro | RS | Serbia | ZW | Zimbabwe |
| CN | China | ID | Indonesia | MK | North Macedonia | RU | Russia | | |
| CO | Columbia | IE | Ireland | MM | Myanmar | SA | Saudi Arabia | | |


**US States**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| AL | Alabama | HI | Hawaii | ME | Maine | NJ | New Jersey | SD | South Dakota |
| AK | Alaska | IA | Iowa | MI | Michigan | NM | New Mexico | TN | Tennessee |
| AR | Arkansas | ID | Idaho | MN | Minnesota | NV | Nevada | TX | Texas |
| AZ | Arizona | IL | Illinois | MO | Missouri | NY | New York | UT | Utah |
| CA | Califormia | IN | Indiana | MS | Mississippi | OH | Ohio | VA | Virginia |
| CO | Colorado | KS | Kansas | MT | Montana | OK | Oklahoma | VT | Vermont |
| CT | Connecticut | KY | Kentucky | NC | North Carolina | OR | Oregon | WA | Washington |
| DE | Delaware | LA | Louisiana | ND | North Dakota | PA | Pennsylvania | WI | Wisconsin |
| FL | Florida | MA | Massachusetts | NE | Nebraska | RI | Rhode Island | WV | West Virginia |
| GA | Georgia | MD | Maryland | NH | New Hampshire | SC | South Carolina | WY | Wyoming |

[1] For comparison purposes, the data of individual countries have been shifted horizontally so that a synchronization occurs at the same point on the horizontal (time) axis which I denote "Day0". Day0 has been chosen to be the date on which the cumulative number of deaths was closest to **50** for the country concerned.

[2] The doubling time is a characteristic of exponential growth. It is the period of time over which the number of cases double, and is an inverse measure of the gradient of the curve. A doubling time makes sense when the curve is close to an exponential, i.e., a straight line on a semi-logarithmic graph. For this reason. in order to follow the evolution in the number of cumulative deaths per country, I fit an exponential to the data at the end of the curve (7 days' data) and extract from this a "doubling time".
The doubling time means what it says: If the exponential tendency persists unchanged, the numbers of deaths at the end of the doubling time will be double the current number.
Example based on US data: On 29/08/2020 no. deaths was 188 900 and doubling time was 116 days.
This implies no. deaths on 23/12/2020 (116 days later) will have doubled – to 377 800.
The actual number on that date was 339 422, which reveals that there was a decline in the exponential tendency – but not by that much.
Clearly, long doubling times are good; short ones are bad.

[3] Saw-tooth effect: Doubling times published in the Wednesday report (extracted from Wed-Tue datapoints) are systematically longer than doubling times published in the Sunday report (extracted from Sun-Sat datapoints). This is associated with weekend reporting delays.

[4] One of the characteristics of the exponential function is that the gradient (or rate of change), is proportional to the value of the function.
(For those who remember their calculus, the solution of $df(t)/dt = k\, f(t)$ is $f(t) = e^{kt}$ .)
By plotting the change (number of deaths in a given period) on the y-axis against the total number of deaths on the x-axis, an exponential gives a straight line on a log-log graph. When the mortality rate stops being exponential, the country curve plummets down from the main sequence.
The points represent values on a succession of days, the end point being yesterday. The more closely spaced are the points (days), the slower the evolution; the greater the distance between points, the faster the evolution.
To give a clearer meaning to the y-axis data, we plot the average no. of deaths in the past 7 days vs. the cumulative no. of deaths on the x-axis.
This analysis was proposed by **Dr Aatish Bhatia**. An animated version of this graph can be viewed on his website. (Use the panel on the right to configure for *Reported Deaths* and select the countries to be viewed.)
An entertaining video explaining this presentation of the data can be found here.

[5] The sources of the NYC & Long Island data are not the same as the one used for national data:
Source for the 5 boroughs:
https://github.com/nychealth/coronavirus-data/blob/master/totals/by-boro.csv
Source for Nassau & Suffolk counties:
https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html#states

[6] **Testing policies vary widely & unpredictably both regionally and in time.**
(The only reason I include these data is because they influence government policy for some govts.)