



How can geoscientists help fight COVID-19?

Presented by Thriving Earth Exchange



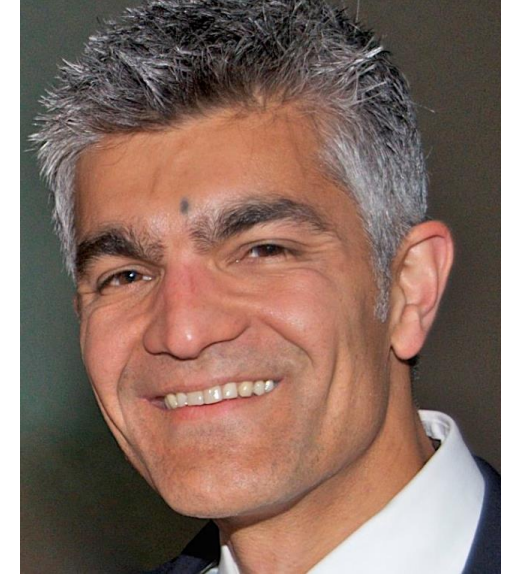
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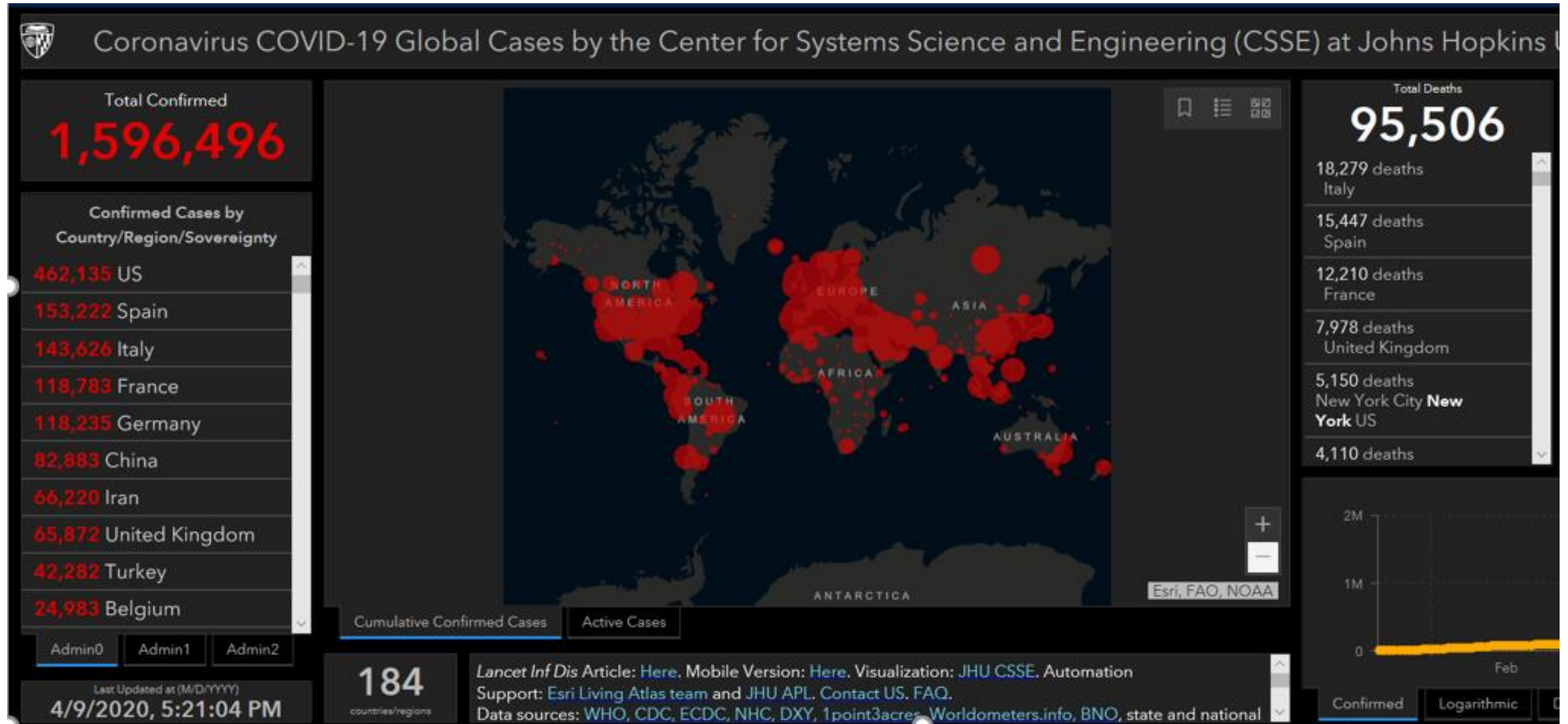
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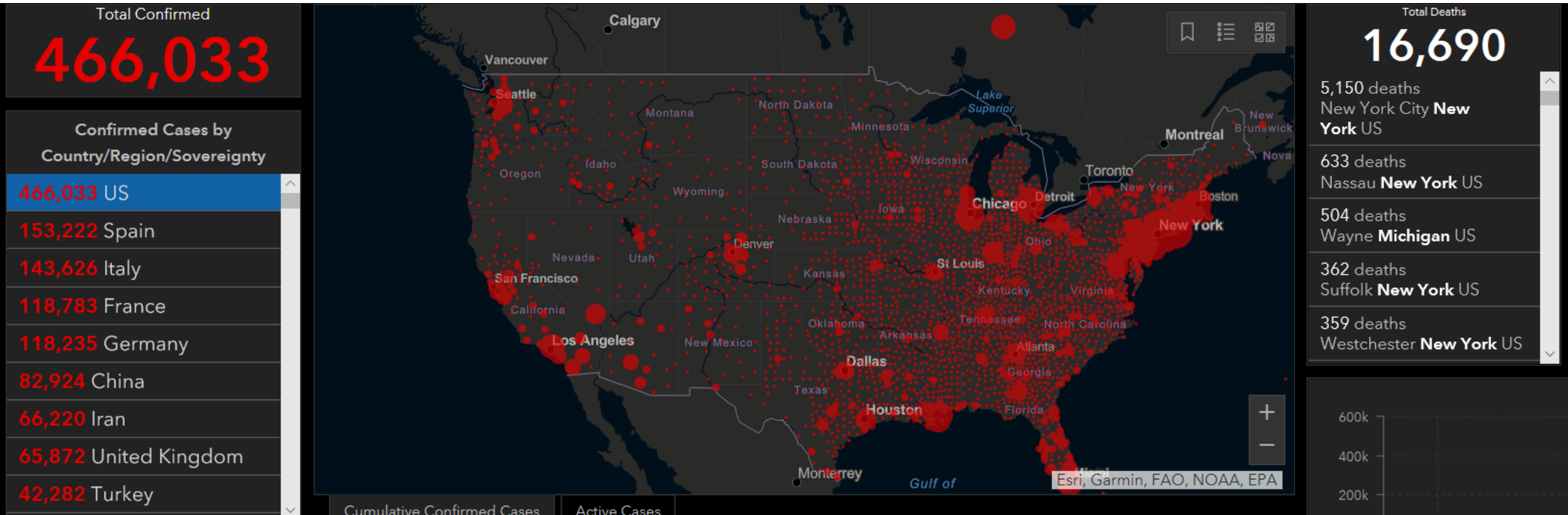
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DATA COMPILATION ACROSS COUNTRIES



REPORTED CASES IN THE UNITED STATES



Cases – not rates! – Doesn't portray health disparities

<https://coronavirus.jhu.edu/map.html>

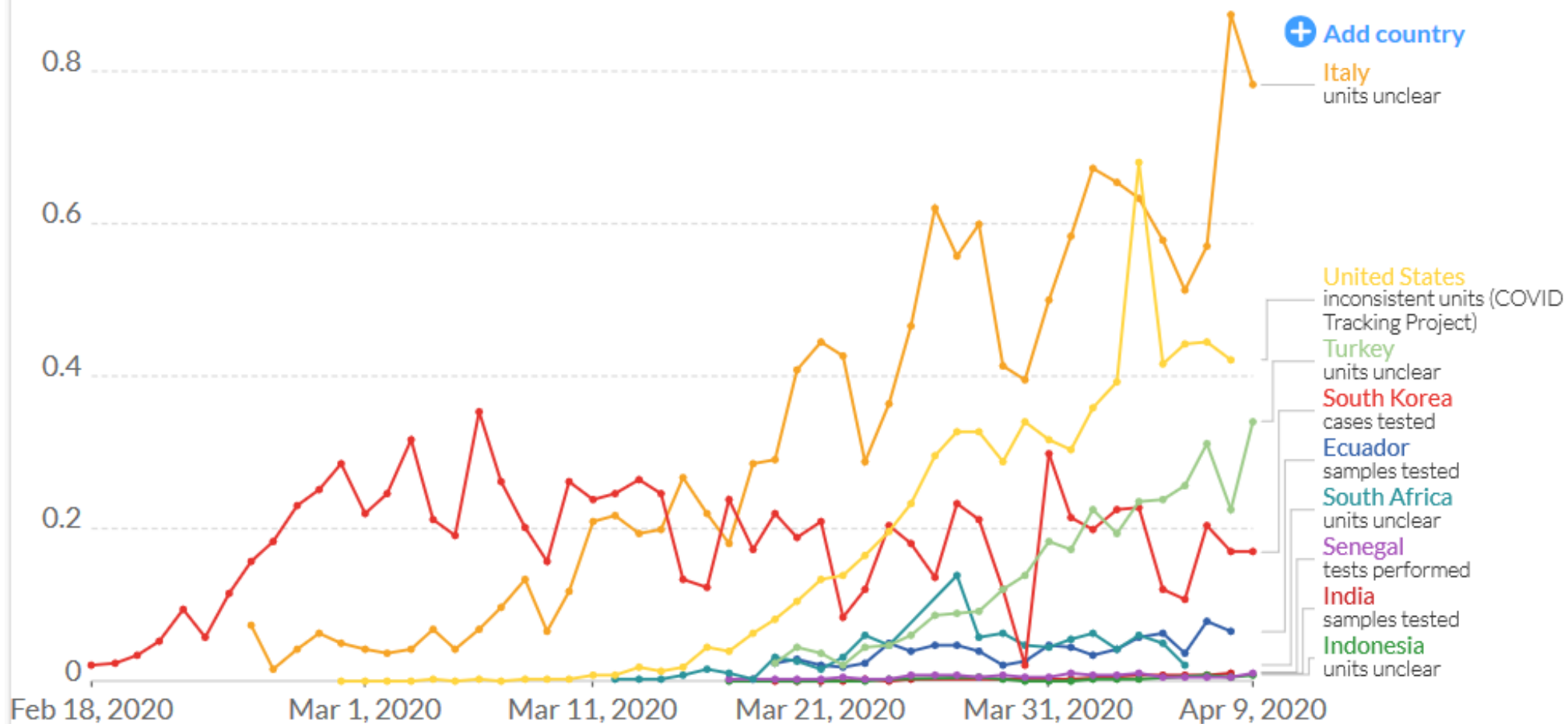
CASE COUNTS AND TESTING PRACTICES

- Heterogeneity in COVID-19 testing (<https://covidtracking.com/data>)
 - Test kit availability and capacity
 - Criteria for testing
 - Test accuracy
- Case counts are a gross underestimate of cases in the US – late to adopt testing in healthcare/communities
- Cross country comparisons affected by timing, aggressiveness of testing



Daily COVID-19 tests per thousand people

LINEAR



Source: Official sources collated by Our World in Data

Note: There are substantial differences across countries in terms of the units, whether or not all labs are included, the extent to which negative and pending tests are included and other aspects. Details for each country can be found at ourworldindata.org/covid-testing.

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CASE FATALITY RATE CAVEATS

- CFR ≠ Infection Fatality Rate ≠ Crude Mortality Rate
 - CFR = DEATHS IN CONFIRMED CASES/ CONFIRMED CASES
 - IFR = DEATHS OF THOSE INFECTED/ TOTAL INFECTED
 - CRUDE MORTALITY RATE = TOTAL DEATHS/ TOTAL POPULATION
- Healthcare capacity affects CFR
- Population characteristics matter

Table. Case-Fatality Rate by Age Group in Italy and China^a

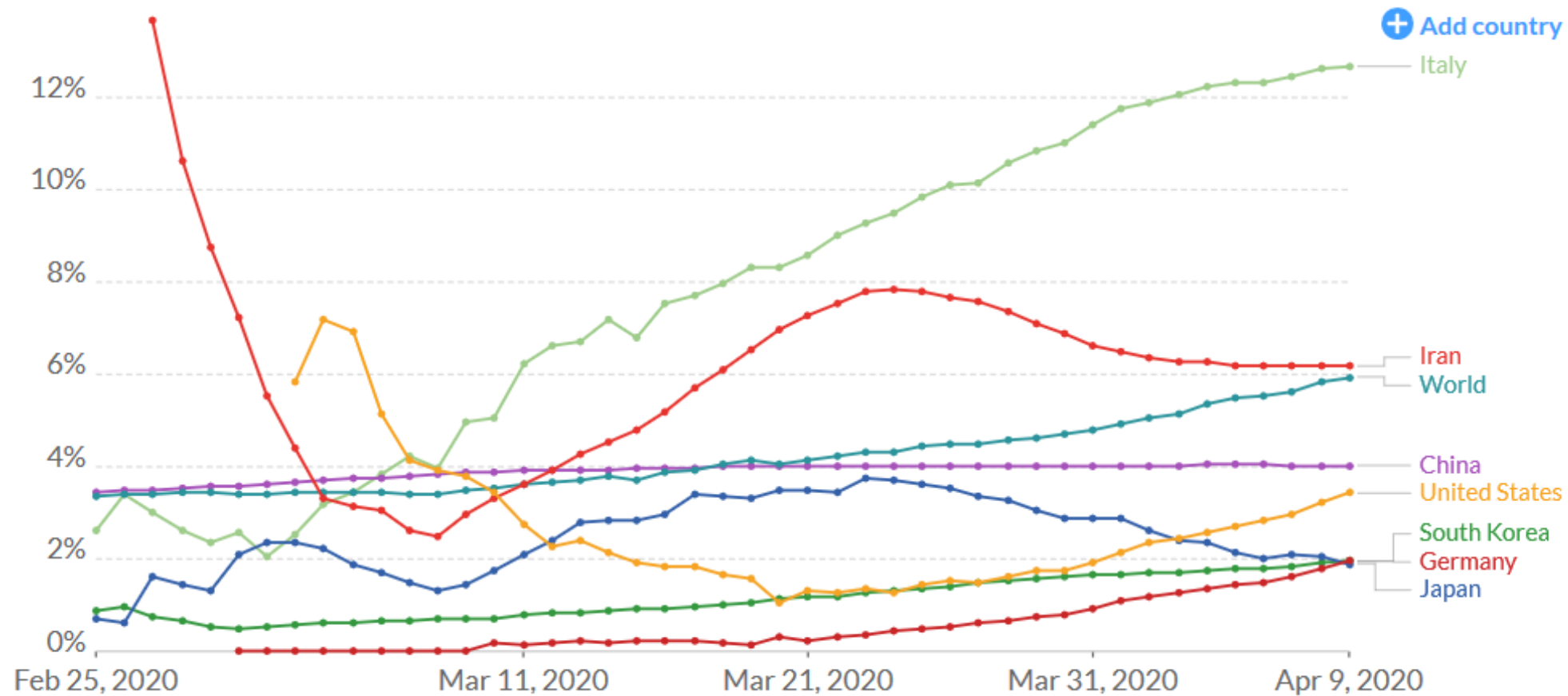
	Italy as of March 17, 2020		China as of February 11, 2020	
	No. of deaths (% of total)	Case-fatality rate, % ^b	No. of deaths (% of total)	Case-fatality rate, % ^b
All	1625 (100)	7.2	1023 (100)	2.3
Age groups, y				
0-9	0	0	0	0
10-19	0	0	1 (0.1)	0.2
20-29	0	0	7 (0.7)	0.2
30-39	4 (0.3)	0.3	18 (1.8)	0.2
40-49	10 (0.6)	0.4	38 (3.7)	0.4
50-59	43 (2.7)	1.0	130 (12.7)	1.3
60-69	139 (8.6)	3.5	309 (30.2)	3.6
70-79	578 (35.6)	12.8	312 (30.5)	8.0
≥80	850 (52.3)	20.2	208 (20.3)	14.8

Case fatality rate of the ongoing COVID-19 pandemic

Our World
in Data

The Case Fatality Rate (CFR) is the ratio between confirmed deaths and confirmed cases.

During an outbreak of a pandemic the CFR is a poor measure of the mortality risk of the disease. We explain this in detail at OurWorldInData.org/Coronavirus



Source: European CDC – Situation Update Worldwide – Last updated 9th April, 11:45 (London time)

Note: Only countries with more than 100 confirmed cases are included.

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CASE FATALITY RATE (CFR) CAVEATS

- “Case” infers confirmation by laboratory testing
- Restrictive testing inflates CFR (only severe cases)
- Aggressive testing will lower CFR
- Real-time calculations can underestimate CFR
 - Symptom onset → Death = 2-8 weeks
 - Cases alive today (denominator) could die in coming days/weeks (move to numerator)
- Appropriate attribution of COVID-19 as cause of death
 - Complicated by co-morbid conditions
 - Hospital and vital statistics documentation
 - Overall availability of testing
 - Posthumous testing

POTENTIAL FOR TRANSMISIÓN – THE BASIS OF “FLATTENING THE CURVE”

Reproductive number

$$R = \beta \cdot D \cdot c \cdot x(t)$$

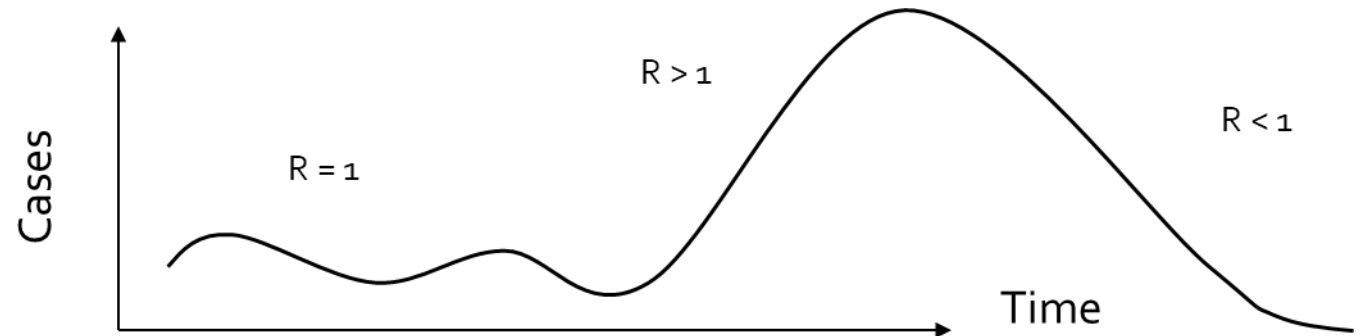
Conceptual components

β : probability of transmission per given contact

D: duration of infectiousness

c: number of contacts per time

$x(t)$: susceptibility



SUMMARY – CONTEXT IS EVERYTHING



- Considerations for interpreting data
 - Testing rates
 - Conditions for testing
 - Case definitions (probable vs. confirmed)
 - Demographic, medical, and social vulnerabilities
 - Healthcare capacity: space, equipment, workforces, resources
 - Density of urban areas
 - Norms of contact patterns
 - Public transportation
 - Crowding
- There are no ABSOLUTE numbers
- Special thanks to Dr. Kate Ellingson for preparing some of these slides

PHYSICAL DISTANCING: THE WAY FORWARD

Mary Hayden, PhD

National Resilience Center

University of Colorado

April 10, 2020

THIS IS JUST THE BEGINNING FOR MANY REGIONS OF THE COUNTRY

-
- The epidemic is only now beginning to take shape in some regions; others like NYC may be seeing the positive impact of physical distancing with decreasing hospitalizations
 - We will see cases and deaths continuing to rise both globally and in the U.S.
 - This is a normal epidemic trajectory
 - We need to brace for the impacts that are coming, but we don't need to despair

STAY STRONG

- We can only fight this epidemic if we work together
 - We all know that our lives have been upended, but we need to persevere
 - We cannot stop this epidemic unless we physically distance ourselves from one another – period.
-

FAMILY MUST FUNCTION AS A SINGLE UNIT

- Physical distancing may decrease contact with the larger community, but it increases the amount of time and contact with family members
- If one person in the family puts him/herself at risk, everyone is at risk
- One 'quick' outing such as for a haircut or a trip to the store for an unnecessary item, sets off a chain reaction and places everyone at risk
- You 'encounter' everyone with whom the hairdresser has come into contact, and you bring that back to your family.

DISCONNECT THE PHYSICAL BUT NOT THE SOCIAL NETWORK

-
- Physical distancing WILL work
 - In Colorado, our governor has asked everyone to wear a mask when in public
 - We need to remember that without a vaccine and/or effective treatment, physical distancing is the ONLY thing that will work – period.
 - We know what's coming, and we must not become paralyzed by fear. By knowing what to expect, we can remain resolute in maintaining our distance and ensuring the information we pass along is factual.

WORLD HEALTH ORGANIZATION MYTH BUSTERS

[HTTPS://WWW.WHO.INT/EMERGE
NCIES/DISEASES/NOVEL-
CORONAVIRUS-2019/ADVICE-
FOR-PUBLIC/MYTH-BUSTERS](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters)

- 5G mobile networks DO NOT spread COVID-19



Cold weather and snow CANNOT kill the coronavirus.



The coronavirus CAN be transmitted in areas with hot and humid climates



Being able to hold your breath for 10 seconds or more without coughing or feeling discomfort DOES NOT mean you are free from the coronavirus disease (COVID-19) or any other lung disease.



There is NO evidence that companion animals/pets such as dogs or cats can transmit the coronavirus.

WE ARE
STRONGER
“ALONE
TOGETHER”!

We can model the wise choice, and we can
do this as a family, as a community, as a
nation!

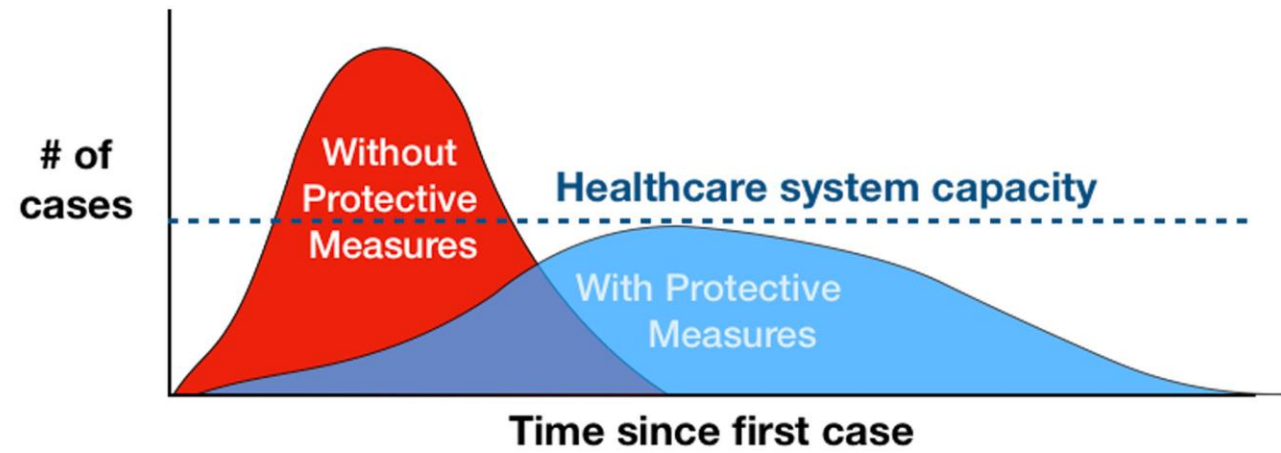




EXTRA SLIDES

FLATTENING THE CURVE

- The ONLY option for flattening the curve in the absence of
 - Vaccines
 - Treatments
- Reducing the number of contacts
 - Mass physical distancing
- In certain circumstances
 - Probability of transmission per contact
 - Personal protective equipment
 - Masks
 - Gowns
 - Gloves
 - Face shields

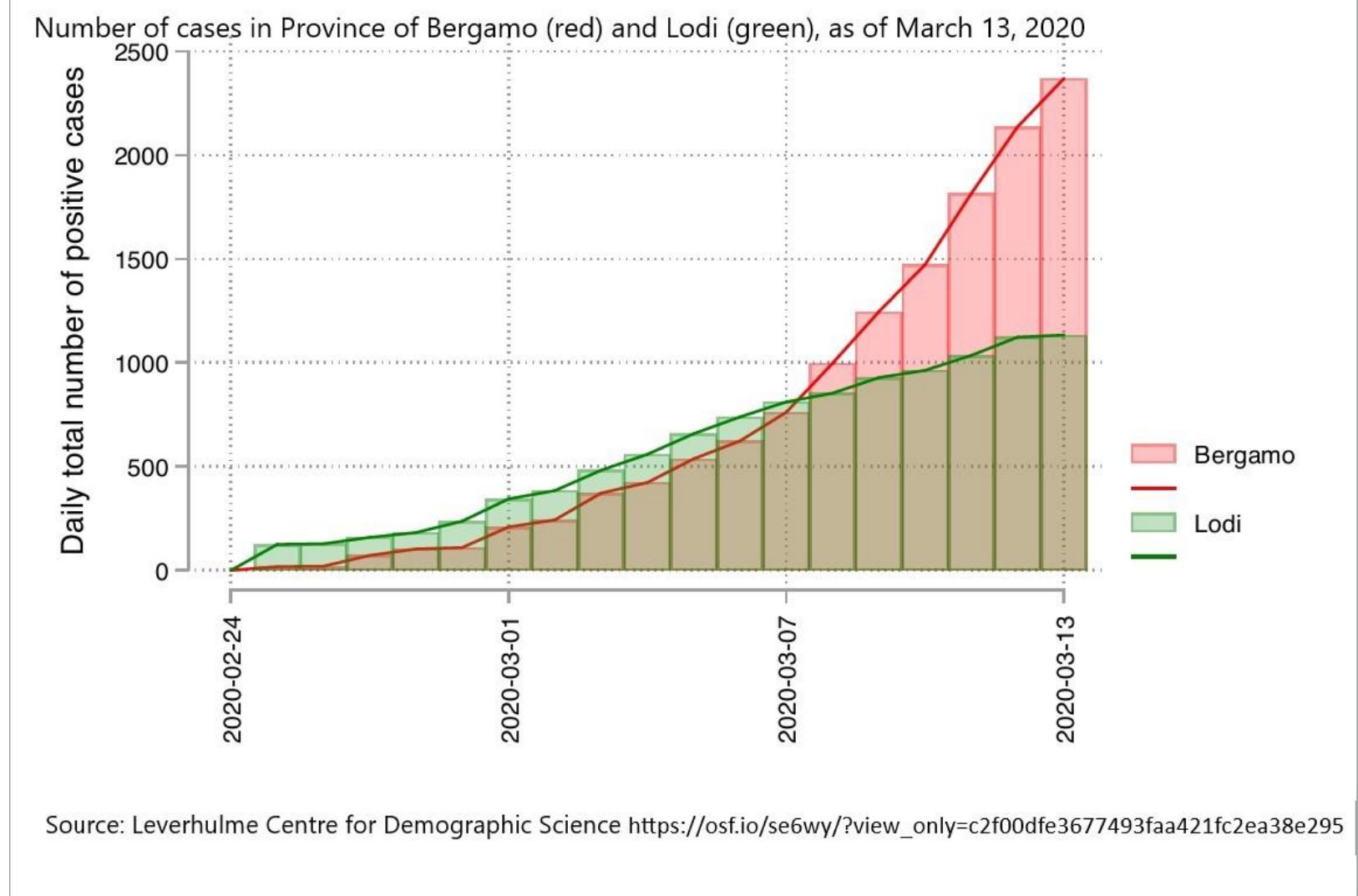


Adapted from CDC / The Economist


SO IS PHYSICAL DISTANCING WORKING TO FLATTEN THE CURVE?


- Evidence suggests physical distancing may be working
 - Lodi vs. Bergamo
 - California and Washington vs. New York
- Other factors need to be taken into account
 - Density of city
 - Average contacts per unit time


Lodi – restrictions enacted Feb. 23 vs. Bergamo – March 8th.




WORLD HEALTH ORGANIZATION MYTH BUSTERS

 Spraying alcohol or chlorine all over your body WILL NOT kill viruses that have already entered your body

 Vaccines against pneumonia, such as pneumococcal vaccine and Haemophilus influenzae type b (Hib) vaccine, DO NOT provide protection against the coronavirus.

 There is NO evidence that regularly rinsing the nose with saline has protected people from infection with the coronavirus.

 Garlic is healthy but there is NO evidence from the current outbreak that eating garlic has protected people from the coronavirus.

WORLD HEALTH ORGANIZATION MYTH BUSTERS



Taking a hot bath DOES NOT prevent the coronavirus



Hand dryers are NOT effective in killing the coronavirus



Ultraviolet light SHOULD NOT be used for sterilization and can cause skin irritation



Thermal scanners CAN detect if people have a fever but CANNOT detect whether or not someone has the coronavirus



Federal Resources on COVID-19 for Geoscientists

John Balbus, MD, MPH

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Director, NIEHS-WHO Collaborating Centre for Environmental Health Sciences

AGU Thriving Earth Exchange Webinar
April 10, 2020

Some US resources related to COVID-19

- Get the latest public health information from CDC: <https://www.coronavirus.gov>
- Get the latest research information from NIH: <https://www.nih.gov/coronavirus>
- [LitCovid](#), a curated literature hub for tracking up-to-date scientific information about the 2019 novel Coronavirus from the U.S. National Library of Medicine:
 - <https://www.ncbi.nlm.nih.gov/research/coronavirus/>
- NIH Open-Access Data and Computational Resources to Address COVID-19
 - <https://datascience.nih.gov/covid-19-open-access-resources>

Some US resources related to COVID-19

- Coronavirus news and resources for global health researchers from the Fogarty International Center at NIH
 - <https://www.fic.nih.gov/ResearchTopics/Pages/infectiousdiseases-coronavirus-cov.aspx>
- Training resources for coronavirus workers dealing with the spread of COVID-19 from NIH's National Institute of Environmental Health Sciences (NIEHS) Worker Training Program (WTP)
 - <https://tools.niehs.nih.gov/wetp/covid19worker/>
- FEMA Geospatial Coordination Calls During Disasters
 - <https://communities.geoplatform.gov/disasters/contact-us/>

Some US resources related to CCHH resilience

- NIEHS Climate Change Literature Portal
 - <http://tools.niehs.nih.gov/climatehealthlit>
- NIEHS Climate and Health Educational Materials
 - <https://www.niehs.nih.gov/lessonsinclimatechange>
- CDC's BRACE framework and guidance documents
 - <http://www.cdc.gov/climateandhealth/default.htm>
- 4th National Climate Assessment
 - <https://nca2018.globalchange.gov/>
- Impacts of Climate Change on Human Health in the United States: A Scientific Assessment
 - <https://health2016.globalchange.gov/>
- US Climate Resilience Toolkit
 - <https://toolkit.climate.gov/>



National Institute of Environmental Health Sciences
Your Environment. Your Health.

Thank you for your attention!

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<http://www.niehs.nih.gov/geh>





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