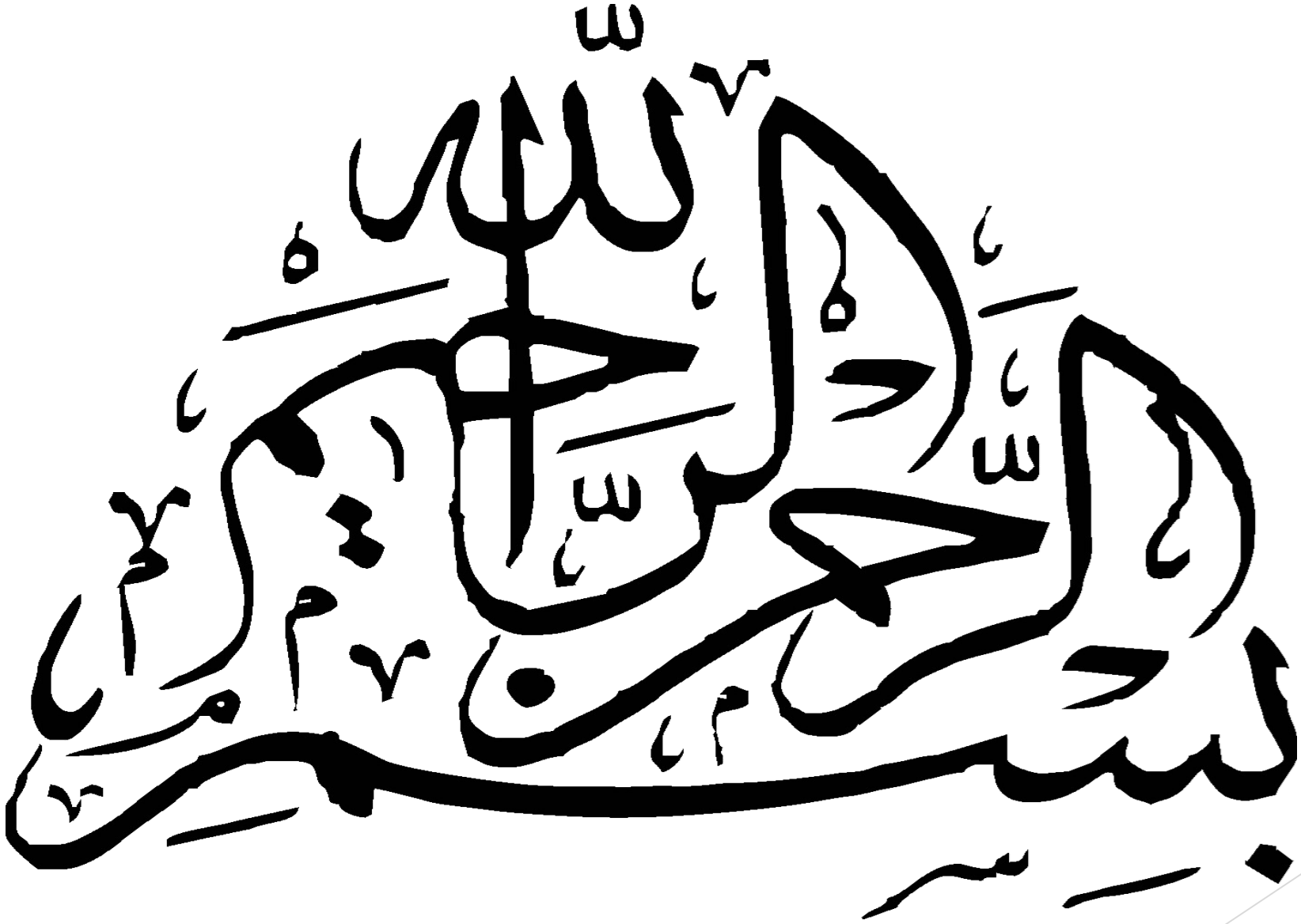
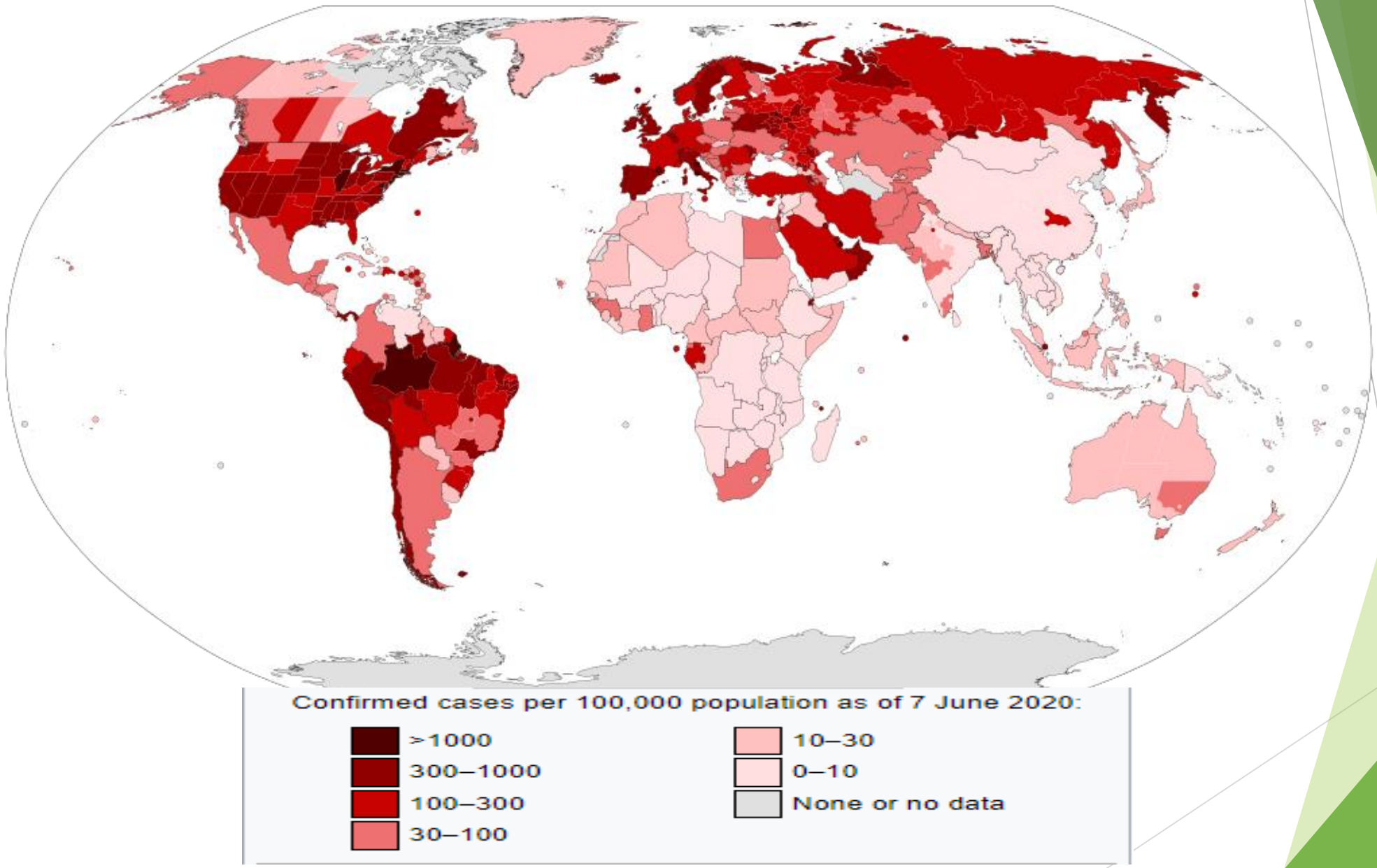

بسم الله الرحمن الرحيم

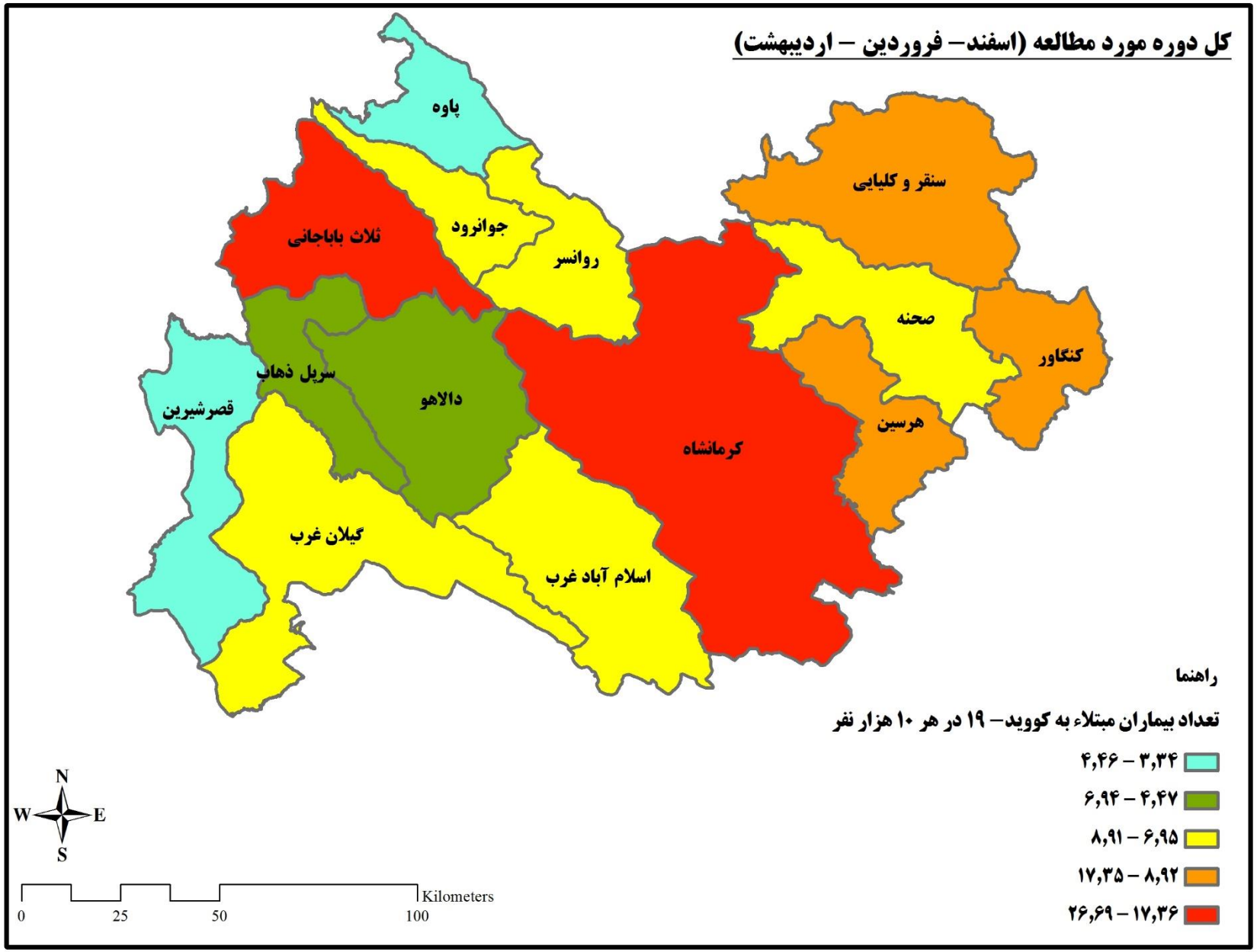
Environmental Conditions effects on COVID-19 Epidemy, Regarding social & Meteorological parameters

Presented: by Ali Almasi, Professor of Environmental Engineering, Public Health School and Head of the Social Development and Health Promotion Research Center, KUMS, Tel. No. ++98 9181317314, E-mail: aalmasi@kums.ac.ir

Covid-19

- We are facing a global health crisis one that is killing people, spreading human suffering, and upending people's lives. But this is much more than a health crisis.
- It is a human, economic and social crisis. The coronavirus disease (COVID-19), which has been characterized as a pandemic by the World Health Organization (WHO), is attacking societies at their core.


Confirmed cases per 100,000 population as of 7 June 2020:
>1000
300–1000
100–300
30–100
10–30
0–10
None or no data


کل دوره مورد مطالعه (اسفند– فروردین – اردیبهشت)
پاوه
ثلاث باباجانی
جوانرود
روانسر
سنقر و کلیایی
صحنه
کنگاور
هرسین
سرپل ذهاب
دالاهو
قصرشیرین
کرمانشاه
گیلان غرب
اسلام آباد غرب
راهنما
تعداد بیماران مبتلاء به کووید– ۱۹ در هر ۱۰ هزار نفر
۴,۴۶ – ۳,۳۴
۶,۹۴ – ۴,۴۷
۸,۹۱ – ۶,۹۵
۱۷,۳۵ – ۸,۹۲
۲۶,۶۹ – ۱۷,۳۶
N
W
E
S
Kilometers
0
25
50
100

Policy actions to limit loss of life

- In this rapidly unfolding crisis, governments, health agencies and disease experts must take immediate action to confront COVID-19, but must also tackle inevitable climate-related disasters to help minimize loss of life.

- Emergency response agencies and first responders are particularly likely to find themselves deployed across multiple crises simultaneously, putting them under unprecedented strain. As an example, in the USA, the Federal Emergency Management Agency (FEMA) is now tasked with coordinating the nationwide COVID-19 response as well as any response to ongoing extreme weather and climate-related disasters, all while understaffed and under-resourced to do so.

NECESITIES OF ORGANIZATION CO-OPERATIONS

Coordination is needed at every level of government to prevent potential conflicts of strategy across agencies, sectors and scales. For example, this spring, communities in the Midwestern USA have faced the prospect of evacuation due to flooding at the same time as stay-at-home orders have been in place[9], and local emergency responders are urging social distancing. In these and other exposed communities (for example, hurricane zones or wildfire regions), difficult policy decisions lie ahead, including whether and how hospitals — especially intensive care units — can be evacuated safely, and how to manage broader health risks in the event of large-scale emergency sheltering needs[10]. Given that federal disaster response will likely prioritize evacuation and will leave local efforts to contain the resulting surges in COVID-19 cases, issuing formal updates to COVID-19 response guidance for state and local authorities (for example, covidlocal.org) will be critical.

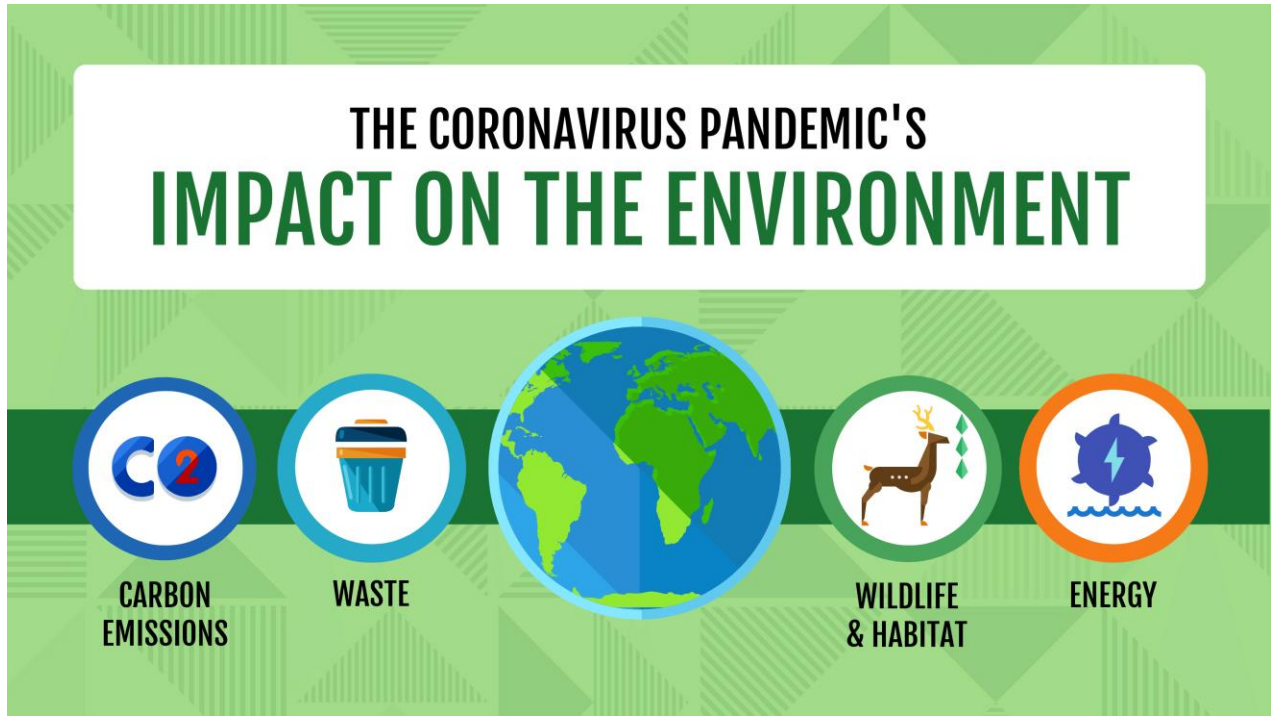
Compound climate risks in the COVID-19 pandemic

- The COVID-19 pandemic will be an unprecedented test of governments' ability to manage compound risks, as climate hazards disrupt outbreak response around the world.
- Immediate steps can be taken to minimize climate-attributable loss of life, but climate adaptation also needs a long-term strategy for pandemic preparedness.

World wide Whole Finding of COVID-19 Pandemic

- The COVID-19 emergency has acutely overshadowed public reckoning with the climate crisis; the outbreak is still growing in most places, with over nine million confirmed cases in 213 countries at the time of writing, and 470000 deaths.
- The pandemic's disruption of daily lives, health systems and economies is unprecedented, and reverberations will continue long after the first wave of infections ebbs and a vaccine is developed. As outbreaks continue, governments will be faced with developing and adjusting policies that address not only the pandemic itself, but also potential collisions and intersections with other regional or global crises

COVID-19 and environment



- As the coronavirus pandemic unfolds across the globe, threatening lives and upending the world economy, it's also had a profound impact on the environment.
- Scientists first noticed a decrease in greenhouse gas emissions in China, where the pandemic began. This trend followed the pandemic's spread across the world.
- Meanwhile, viral social media posts started to pop up about wildlife sightings in urban areas, claiming "nature just hit the reset button on us.

CARBON EMISSIONS

UNITED STATES

40% LESS DOMESTIC AIR TRAFFIC

New York: **50%** DECREASE IN CARBON MONOXIDE

Seattle: **41%** DECREASE IN PEAK TRAFFIC CONGESTION

EUROPE

67M FEWER AIR PASSENGERS

DECREASE IN NITROGEN DIOXIDE:

75% Madrid, Spain

10% Northern Italy

CHINA

Improved air quality may have saved the lives of **4,000** CHILDREN UNDER 5 YRS*

CARBON EMISSIONS FELL BY **25%**

*As of April 2020, the official death toll is 3,322, but is likely higher.

Greenhouse gas emissions have plunged due to the rapid decline in travel and economic activity. They're likely to go back up once the pandemic subsides. But, some pre-existing trends, like the rise of remote work, have now accelerated and will have lasting effects on cutting carbon emissions.

CARBON EMISSIONS STATISTICAL SOURCES:

- Carbon Brief
- G-FEED
- The New York Times
- Atmosphere Monitoring Service
- EL PAÍS
- ACI Europe
- BBC News
- NPR
- FOX News
- CF International

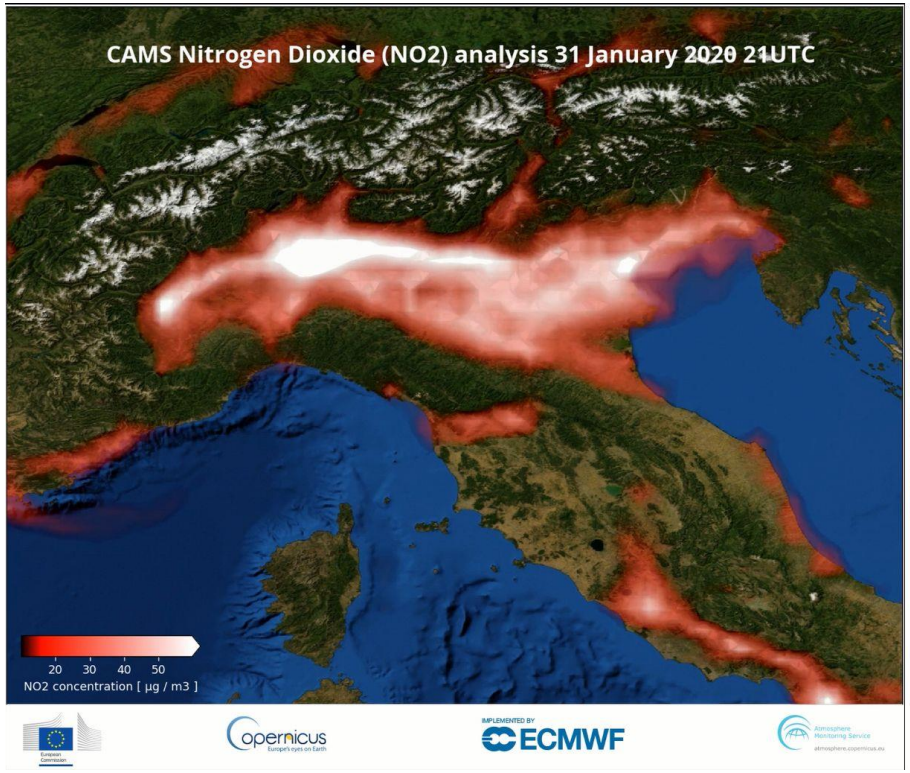
7 AFFORDABLE AND CLEAN ENERGY

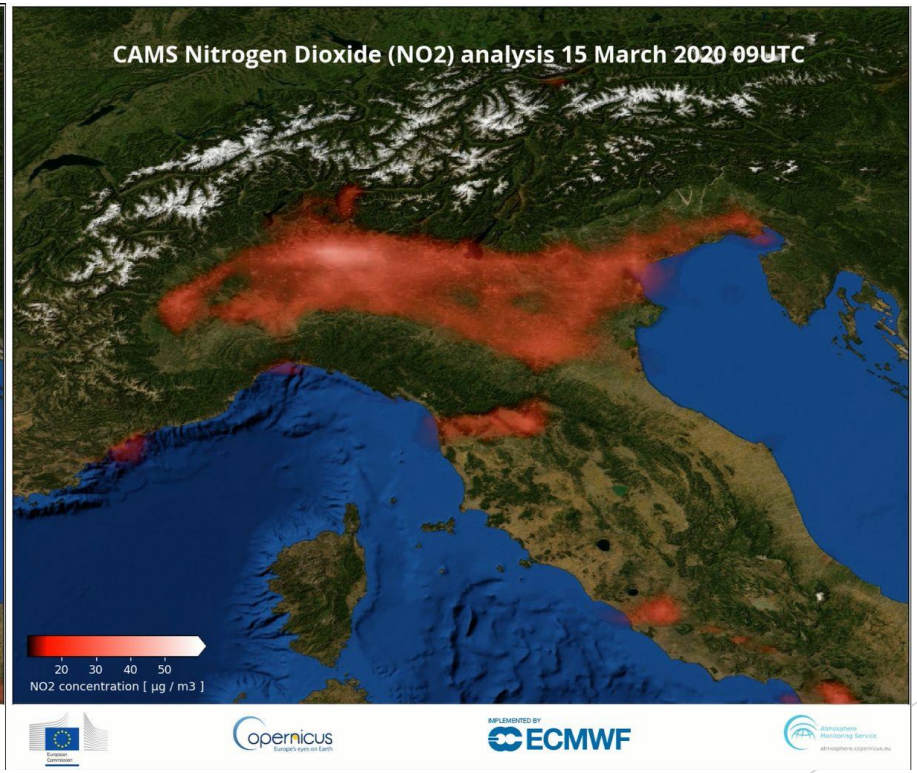
11 SUSTAINABLE CITIES AND COMMUNITIES

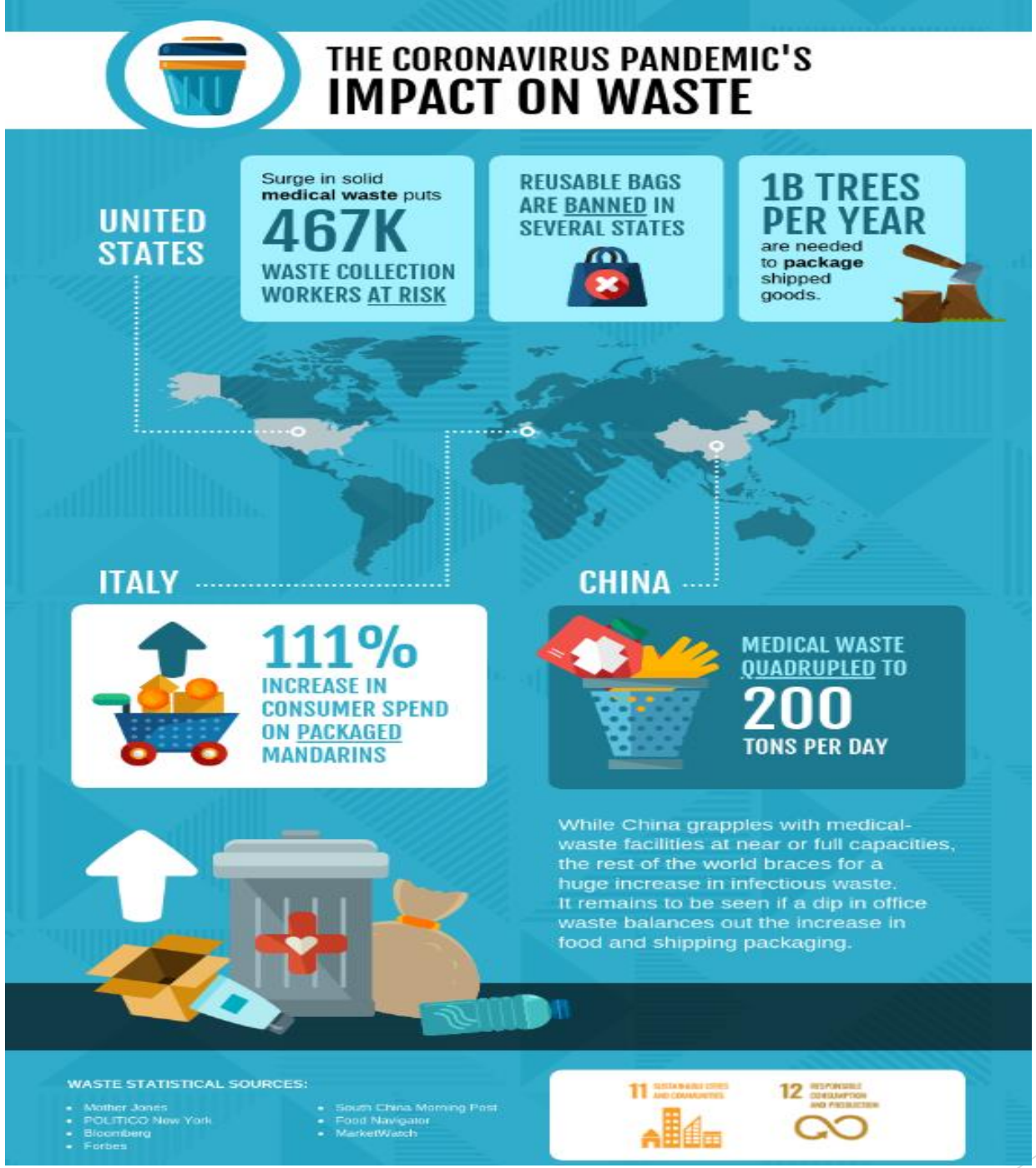
13 CLIMATE ACTION

- With lockdown or stay at home orders in effect in countries across the globe due to the coronavirus pandemic, there's been a steep decline in travel and economic activity worldwide.
- With less traffic comes less pollutants like carbon monoxide.
- Air travel has also taken a major hit, thanks to order to shelter in place, and greenhouse gases will predictably decline too.
- The average level of nitrogen dioxide recorded on March 17 was almost 75 percent lower than the previous week. And in New York City, carbon monoxide, mainly from cars, had been reduced by nearly 50 percent compared with March 2019.

Effect on carbon emissions over northern Italy, comparison between 31 January and 15 March 2020






THE CORONAVIRUS PANDEMIC'S
IMPACT ON WASTE
UNITED STATES
Surge in solid medical waste puts
467K
WASTE COLLECTION WORKERS AT RISK
REUSABLE BAGS ARE BANNED IN SEVERAL STATES
1B TREES PER YEAR
are needed to package shipped goods.
ITALY
111%
INCREASE IN CONSUMER SPEND ON PACKAGED MANDARINS
CHINA
MEDICAL WASTE QUADRUPLED TO
200
TONS PER DAY
While China grapples with medical-waste facilities at near or full capacities, the rest of the world braces for a huge increase in infectious waste. It remains to be seen if a dip in office waste balances out the increase in food and shipping packaging.
WASTE STATISTICAL SOURCES:
Mother Jones
POLITICO New York
Bloomberg
Forbes
South China Morning Post
Food Navigator
MarketWatch
11
12

- The huge demand for disposable medical products such as single-use gloves, surgical masks and empty IV bags in the wake of the pandemic has created a deluge of medical waste.
- In Wuhan, China, the volume of medical waste is reported to have risen from 40 to 240 tons a day at the height of the epidemic
- About 165 billion packages are shipped in the US each year, with the cardboard used roughly equating to more than 1 billion trees, Now, with the public afraid to leave the house or under strict shelter in place rules, there’s been a surge in demand for online shopping. (online shopping)

WILDLIFE & HABITAT

UNITED STATES

FAKE NEWS!

False reports claimed that **wild turkeys** were now in Oakland, CA, but they've already been roaming the city for years.

ITALY

FAKE NEWS!

Dolphins and swans did not return to Venice's canals. The dolphins were elsewhere and swans are already local regulars.

JAPAN

SIKA DEER WANDERED THE STREETS AND SUBWAY STATIONS OF NARA

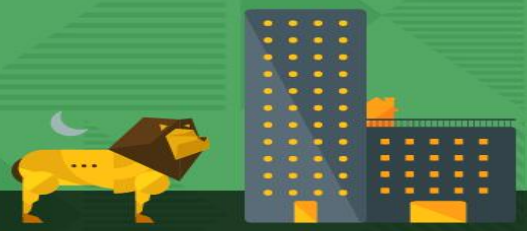
CHILE

A PUMA SHOWED UP IN THE CENTER OF SANTIAGO

INDIA

A STAG RAN AROUND THE STATE CAPITAL OF DEHRADUN

Viral social media posts showing wildlife returning to urban areas? Largely fake news, sadly. Most of these animals were already regular visitors, or the location was misrepresented. The popularity of these posts shows the need for people to find meaning in this pandemic.



WILDLIFE & HABITAT STATISTICAL SOURCES:

- Salon
- National Geographic
- The Guardian

VIRAL FAKE NEWS SOURCE:

- The Japan Times

14 LIFE BELOW WATER

15 LIFE ON LAND

- Since the coronavirus pandemic began, an idea began circulating online that the earth is regenerating itself. Supposed sightings of wildlife roaming free in urban areas gained tens of thousands of likes and shares.
- In Nara, Japan, sika deer wandered through city streets and subway stations because the tourists who normally fed them in city parks have evaporated.
- The popularity of these animal stories shows the need to find meaning in this devastating global pandemic and that there is a purpose behind the thousands of deaths.

ENERGY

UNITED STATES

1.5%
OF THE TOTAL POWER IN THE U.S. IS CONSUMED BY DATA CENTERS ANNUALLY

EUROPE

40% INCREASE IN BROADBAND DEMAND

9.1 TERABITS PER SECOND
A **new world record** for data throughput at the Internet Exchange in Frankfurt, Germany.

WORLDWIDE

63M STREAMS OF STRANGER THINGS S3*

Comparable to driving **420 miles + 189 million kg of CO2.**

*Between Oct. 2018 to Sept. 2019

SOUTH KOREA

30% INCREASE IN ONLINE GAMING ACTIVITY

Broadband demand has risen dramatically thanks to online conferencing, schooling and streaming videos, but not all experts agree it's energy intensive. Some experts argue that big data, like the kind that picks what products to show you on a website, requires more energy.

ENERGY STATISTICAL SOURCES:

- SaveOnEnergy
- The Channel Company, CRN
- Forbes
- CNN News
- DE-CIX

7 AFFORDABLE AND CLEAN ENERGY

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

- a new world record for data throughput on March 10, resulting in more energy usage.
- At more than 9.1 Terabits per second, a new sound barrier has been broken–thanks to more people streaming video and searching for information on coronavirus.

exposure to air pollution and COVID-19 mortality

- increase of only 1 $\mu g/m^3$ in $PM_{2.5}$ is associated with an 8% increase in the COVID-19 death rate.
- A small increase in long-term exposure to $PM_{2.5}$ leads to a large increase in the COVID-19 death rate. Despite inherent limitations of the ecological study design, our results underscore the importance of continuing to enforce existing air pollution regulations to protect human health both during and after the COVID-19 crisis.

In summary: the coronavirus pandemic's impact on the environment

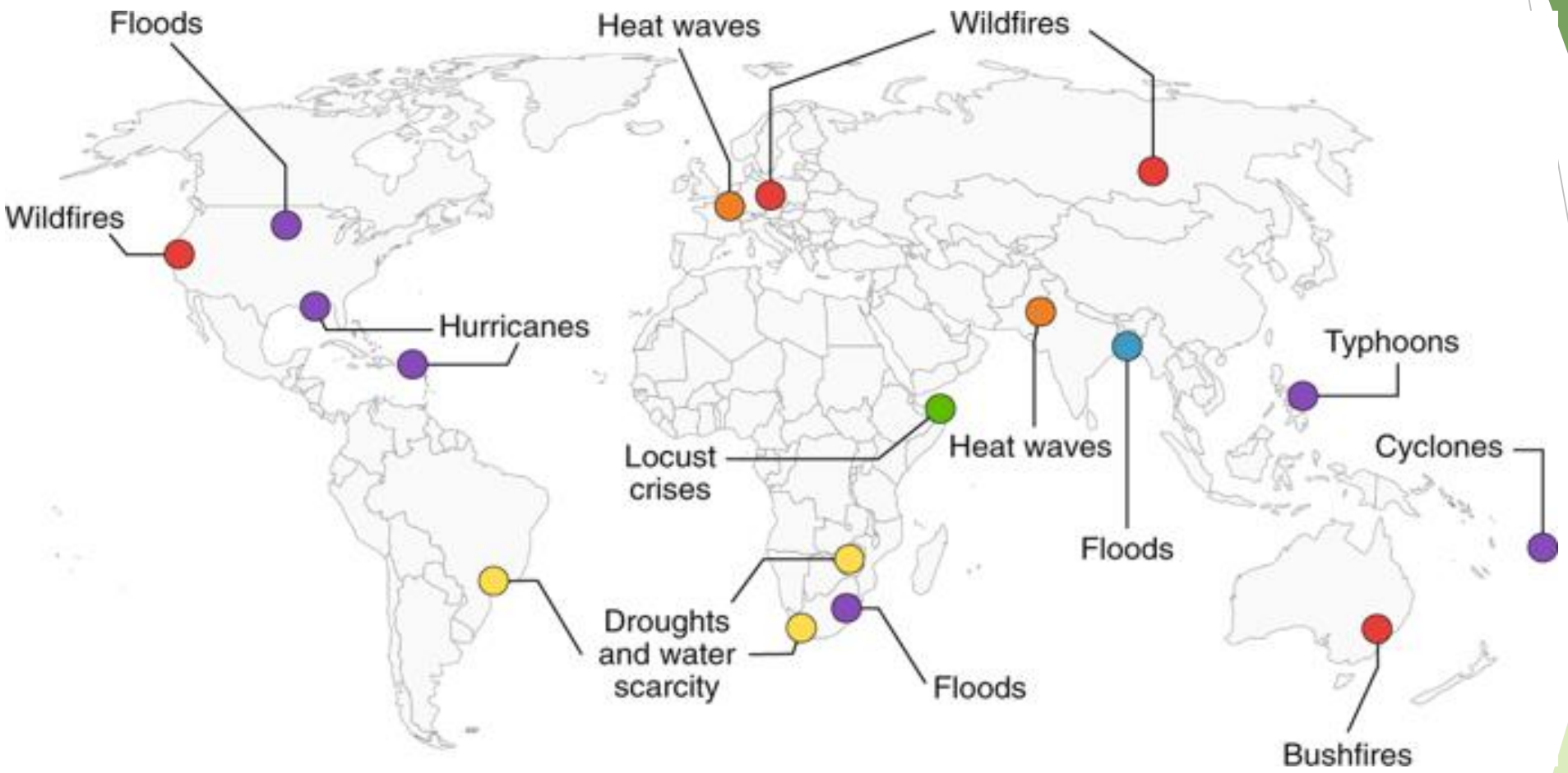
- Most environmental impacts of the coronavirus pandemic, such as a decline in carbon emissions and increase in medical waste, will be temporary.
- The real lesson lies in some pre-existing climate-friendly trends which have been accelerated. Business travel could decline, as executives realize video conferences can achieve the same effect. International trade might roll back as countries realize how reliant they are on the global supply chain and decide to produce their own goods.

- And the demand for remote work has long existed. Companies may now finally realize workers can still be productive from home, while downsizing offices or getting rid of them altogether (and the expenses associated with them).
- Doubtless, the loss of life from COVID-19 will be devastating. There is nothing to celebrate about such a horrific tragedy.
- It is perhaps a small victory against such a reality to learn from what's happened and apply it to fight climate change and slow global warming in the future.

The socio-economic effects of COVID-19

- The COVID-19 pandemic has resulted in near 9 million confirmed cases and over 470000 deaths globally (June 24st 2020).
- It has also sparked fears of an impending economic crisis and recession.
- Social distancing, self-isolation and travel restrictions forced a decrease in the workforce across all economic sectors and caused many jobs to be lost.
- Schools have closed down, and the need of commodities and manufactured products has decreased.
- In contrast, the need for medical supplies has significantly increased.
- The food sector has also seen a great demand due to panic-buying and stockpiling of food products.

Likely upcoming climate hazards during the COVID-19 pandemic.



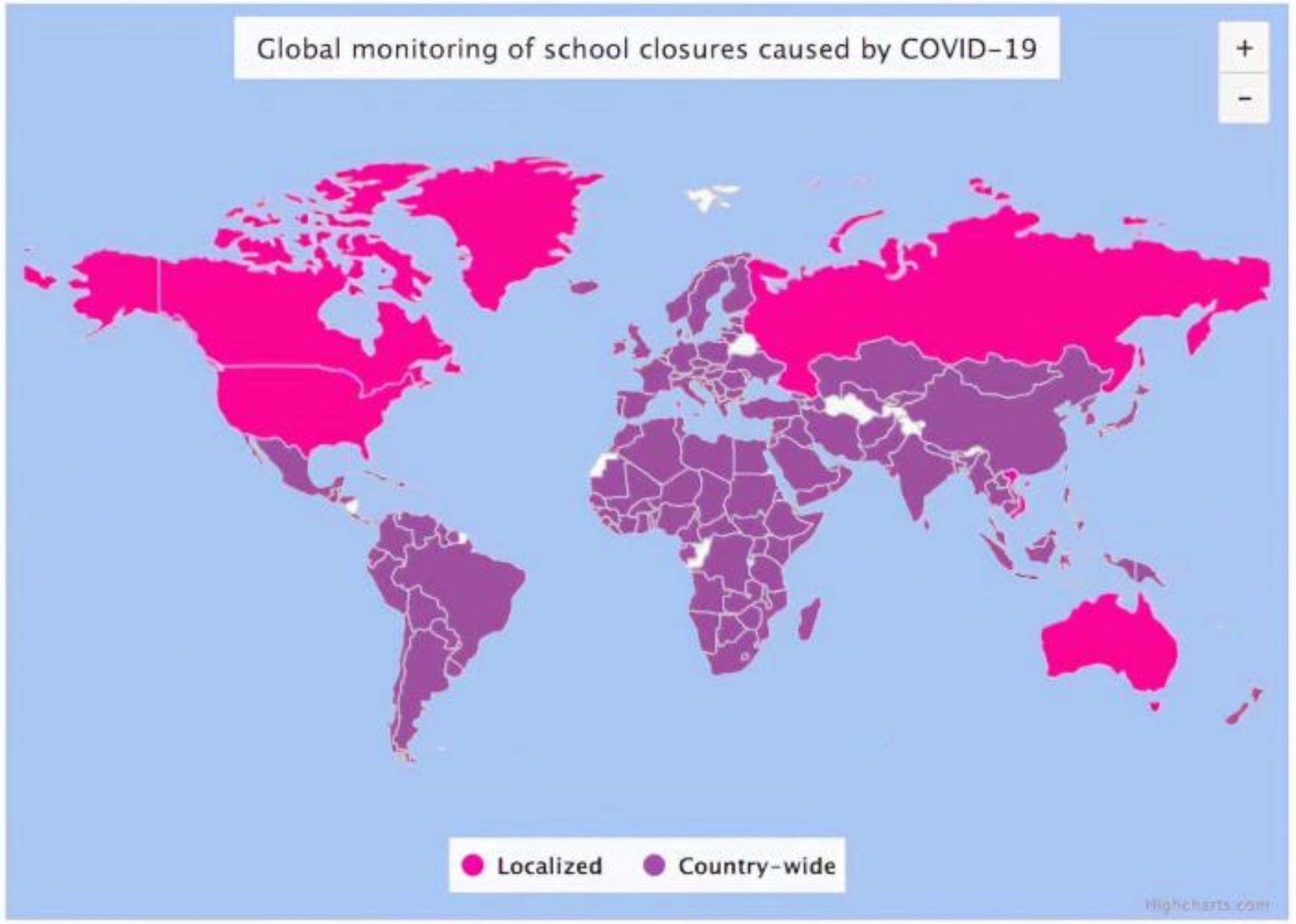
Climate-attributable risks are likely to intersect with the COVID-19 crisis all around the world, with many already causing disruptions or likely to do so over the next 12 to 18 months.

A pandemic preparedness strategy for climate adaptation

- The climate adaptation community must develop a long-term strategy for pandemic preparedness[12,13], as COVID-19 is neither the first nor only time that our globalized society will face these types of compound risks; for example, Puerto Rico was forced to stop Zika surveillance and response in the aftermath of Hurricane Maria.

- Current governance and institutional structures — and the risk frameworks used in the IPCC and National Climate Assessment reports — are vulnerable to compartmentalization, especially in the health sector. More interdisciplinary, cross-sectoral risk assessments are needed, including planning for low-probability, high-impact events. These assessments must explicitly consider spatial and temporal coincidence of physical hazards and health or socioeconomic risk factors, interdependencies between sectors (for example, the food–energy–water–health nexus) and the potential for feedback loops. Solutions must similarly be more integrated and robust, taking into account interactions, trade-offs and co-benefits across sectors and at different scales — and therefore across traditional jurisdictions of government agencies — under a range of scenarios.

Global impact of COVID-19 on school closures



The Social Impact of COVID-19

- The COVID-19 outbreak affects all segments of the population and is particularly detrimental to members of those social groups in the most vulnerable situations, continues to affect populations, including people living in poverty situations, older persons, persons with disabilities, youth, and indigenous peoples.
- Early evidence indicates that that the health and economic impacts of the virus are being borne disproportionately by poor people.

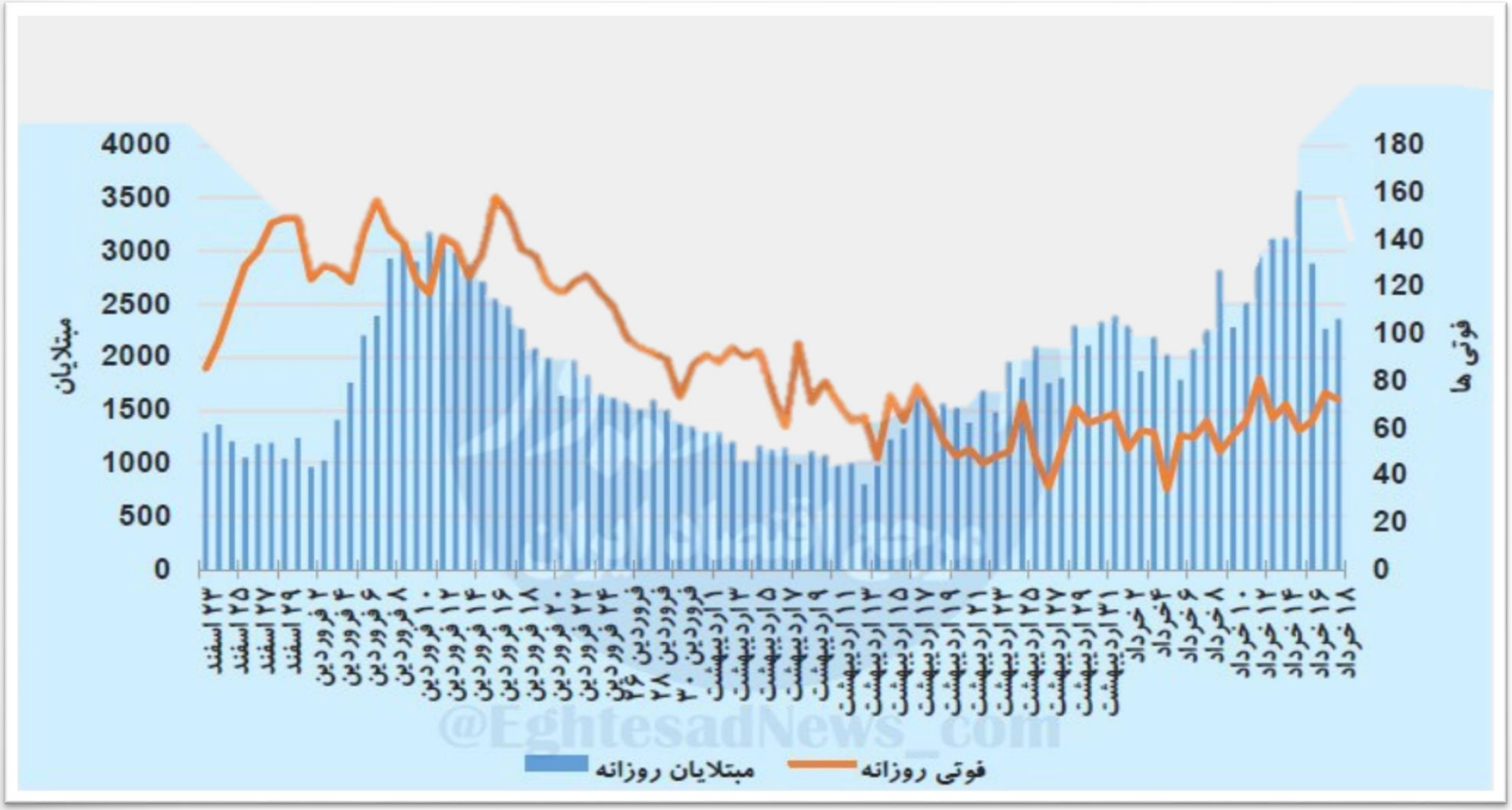
The Social Impact of COVID-19

- If not properly addressed through policy the social crisis created by the COVID-19 pandemic may also increase inequality, exclusion, discrimination and global unemployment in the medium and long term.
- Comprehensive, universal social protection systems, when in place, play a much durable role in protecting workers and in reducing the prevalence of poverty, since they act as automatic stabilizers. That is, they provide basic income security at all times, thereby enhancing people's capacity to manage and overcome shocks.

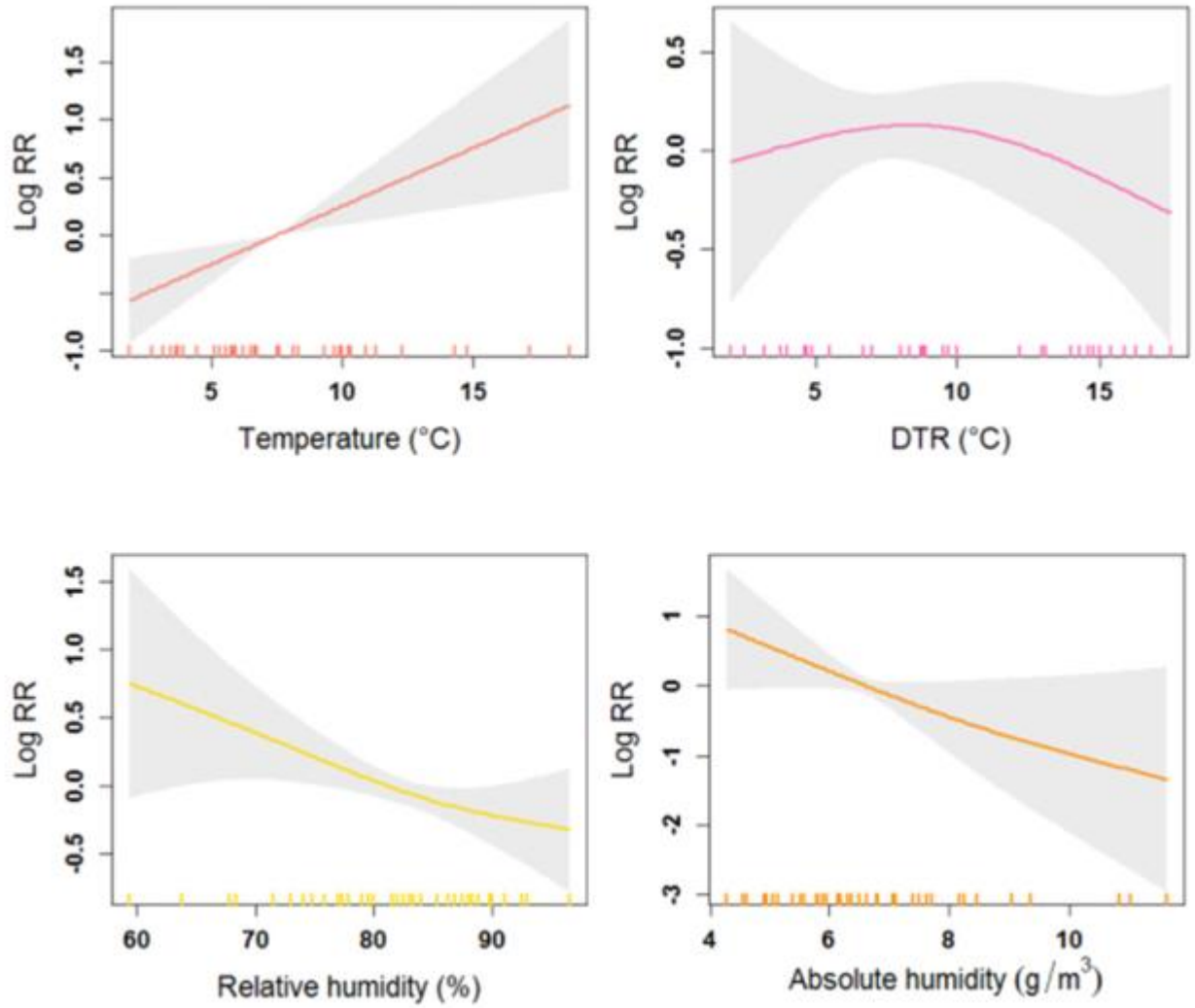
Meteorological factors and Covid-19

- In retrospect studies, the outbreak of severe acute respiratory syndrome (SARS) in Guangdong in 2003 gradually faded with the warming weather coming, and was basically ended until July.
- A study in Korea found that the risk of influenza incidence was significantly increased with low daily temperature and low relative humidity, a positive significant association was observed for diurnal temperature range (DTR).
- Moreover, temperature and DTR have been linked to the death from respiratory diseases. A study demonstrated that absolute humidity had significant correlations with influenza viral survival and transmission rates. But in COVID-19, there is no any evidence such as infuenza.

در نمودار زیر آمار روزانه جانبخاتگان و مبتلایان کرونا از ابتدای بحران تا ۱۸ خرداد مورد بررسی قرار گرفته است

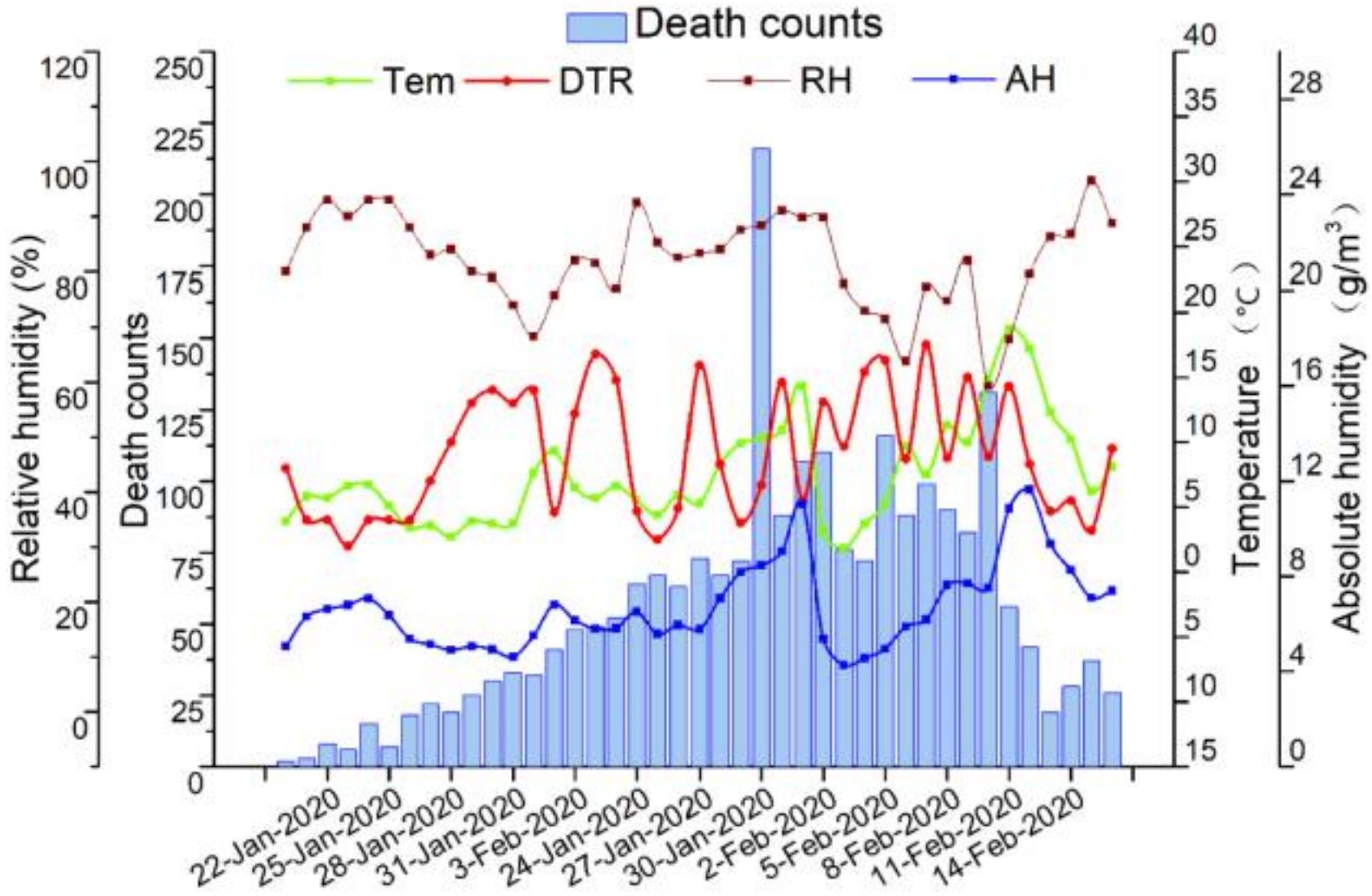


The exposure-response curves of meteorological factors and COVID-19 daily mortality counts in Wuhan, China



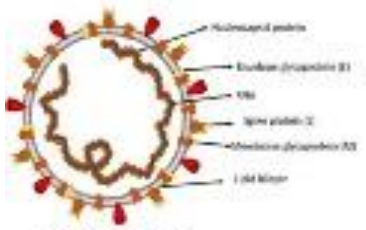
- Researches shows that the daily mortality of COVID-19 is positively associated with DTR (diurnal temperature range) but negatively with absolute humidity.
- In summary, the temperature variation and humidity may also be important factors affecting the COVID-19 mortality. And it is reasonable to sustain a stable and comfortable environment for the patients during therapy.

Temporal pattern of COVID-19 daily mortality and meteorological factor levels



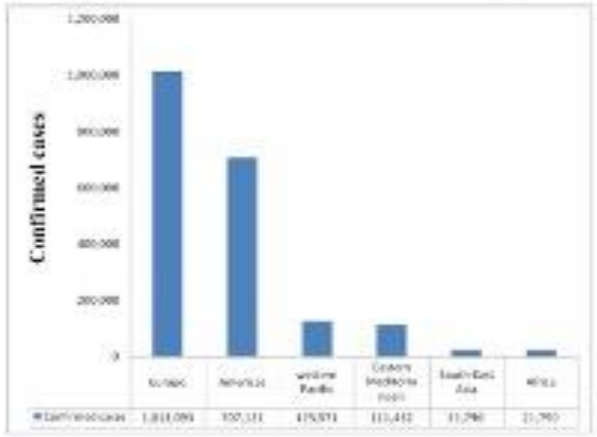
The results of another study showed:

- meteorological factors play an independent role in the COVID-19 transmission.
- A weather with low temperature, mild diurnal temperature range and low humidity favors the transmission.
- The study indicated that the epidemic might gradually ease as a result of rising temperatures in coming months as well as the implementation of public health control measures.

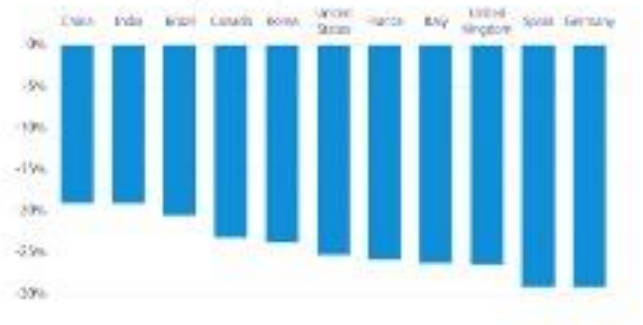


coronavirus

Global Environment Change



Global health



Economy decrease

The COVID-19 pandemic is considered as the most crucial global health calamity of the century and the greatest challenge that the humankind faced since the 2nd World War.

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Any question? Or comment?

- رَبِّ زِدنی عِلماً و إیماناً وَ عَمَلاً صالِحاً وَ أَلحِقنی بالصّالِحین

پروردگارا بر دانش و ایمان و اعمال شایسته‌ام بیافزای و من را به صالحان ملحق گردان