GEO VIRTUAL SYMPOSIUM 2021

Impact of the COVID-19 Pandemic on Health Care Infrastructure

June 21, 2021   Andreas N. Skouloudis

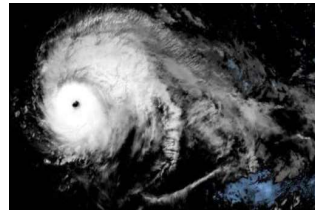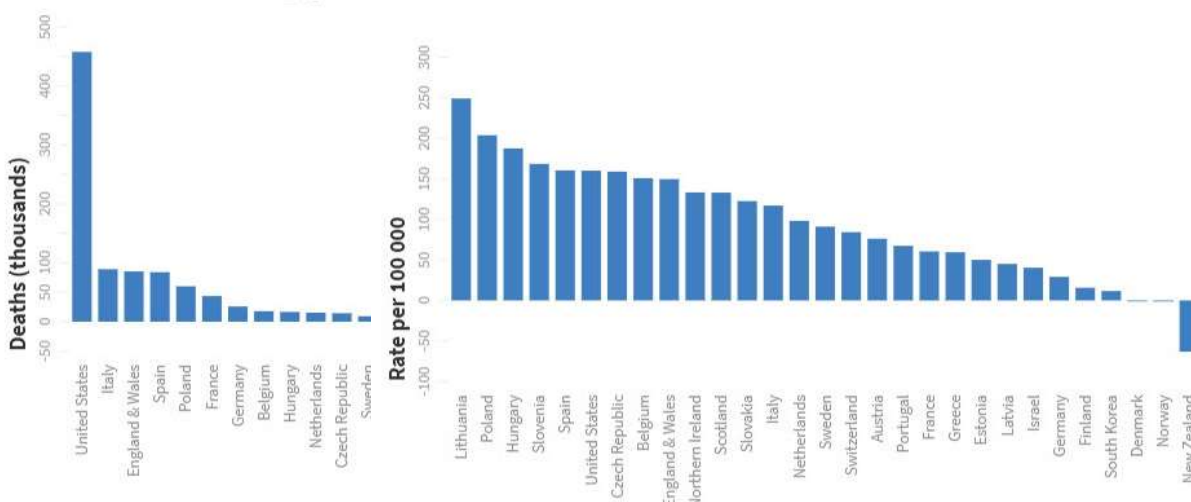# Are these rare extremes?

- Earthquakes, floods, atmospheric events landslides are regular natural extremes with significant effects on population.

- Man-made caused toxic releases and radioactive accidents are rare, but with large population exposures.

- These are "time depending events" with heath emergencies for which the status and operational capabilities of HCF is important.

- Epidemics (and the ongoing pandemic) are causing escalating demands for hospitalizations that can raise acute needs beyond the normal capabilities.

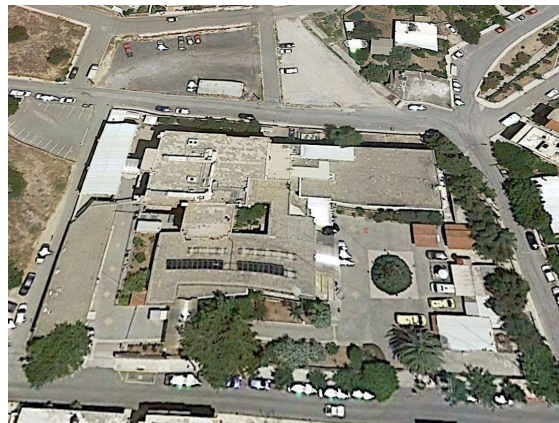**Geolocation: Covid-19 Short-term Mortality Fluctuations**

Data credit of: https://mpidr.shinyapps.io/stmortality/

Geolocation of Excessive Mortality Fluctuations

Data credit of: https://doi.org/10.1136/bmj.n1137 (19 May 2021)

Hospitals at North and South Europe

2020-2022: Geolocation processes on the basis of
Public health care facilities in Europe and US and working on:
hospitals, medical centers, federally qualified health centers, home health services,
nursing homes and pharmacies (arcgis.com and dhs.gov).

Big-data for efficient handling of emergencies

- Assessment of population health care capabilities associated with environmental exposure.

- Adequacy of their infrastructure status under usual and acute events.

- Testing of health infrastructure needs during emergency interventions.

- Coupled remote sensing with static ground observations for facilitating the real-time extraction processes.

    In the future integrate:

- Moving population densities (with e-passports) and

- Assessment and adaptation of health needs (intelligent with on-site technologies).

Current HCF (all levels) Italy:
In Italy 3816. In Lombardy 737 and in the counties:
• Milano 260;
• Brescia 77;
• Bergamo 76;
• Monza 63;
• Varese 57;
• Pavia 50;
• Mantova 49;
• Cremona 31;
• Como 30;
• Lecco 26;
• Lodi 10;
• Sondrio 8.

The automation process …

Footprint of the residential structures,
Using deep learning models from the imagery,
Image segmentation and
…no trivial GPU or CPU capacity.

Particularly thankful to:

Earth Science Division
NASA Goddard Space Flight Center

Amos, Helen M.
[SCIENCE SYSTEMS AND APPLICATIONS INC];

KC, Binita
[ADNET SYSTEMS INC]

Chapman, Helena
[BOOZ ALLEN & HAMILTON INC]

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Balbus, John [NIH/NIEHS]
[National Institute of Health] to the new …
Office of Climate Change and Health Equity

Slide 7

Stories of Success: Healthcare Facility Resilience
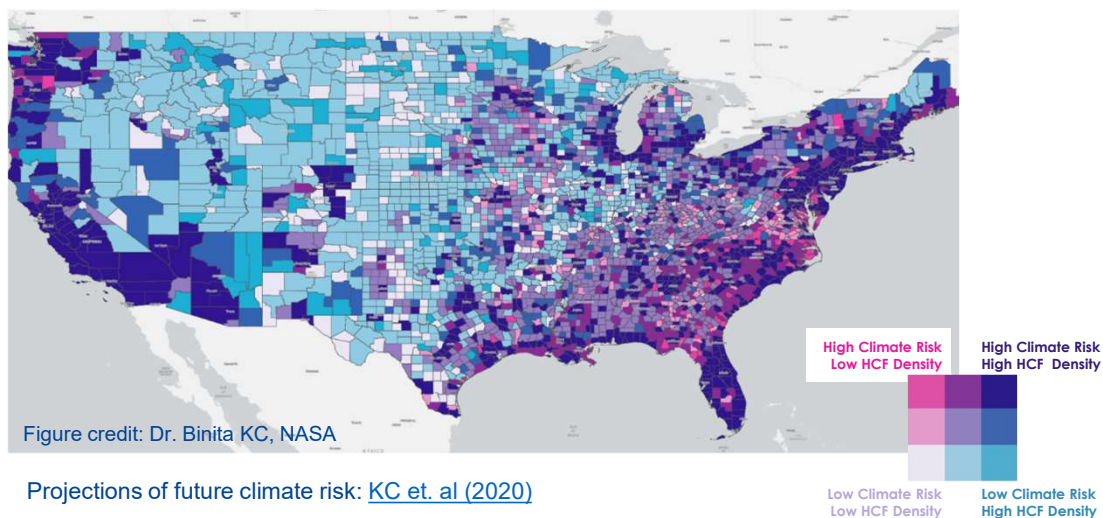## *Texas Medical Center in Houston, Texas*

Hurricane Harvey 2017

Tropical Storm Allison, 2001

Projected Future (2040s) Climate Risks for HCF

Figure credit: Dr. Binita KC, NASA

Projections of future climate risk: KC et. al (2020)

High Climate Risk
Low HCF Density

High Climate Risk
High HCF Density

Low Climate Risk
Low HCF Density

Low Climate Risk
High HCF Density

Some final remarks …

- This is the starting work and the initial efforts for developing an operational collaboration for health-care resilience,

- 3d generation of handling data sources for static geo-located data (with pilot studies)/

- Describes the flow of data necessary for conducting the monitoring and assessment process.

- Covers the observations needed for assessing vulnerability of health care facilities and

- This process could identify the areas where additional humanitarian facilities will be necessary or the resources that could be borrowed from neighboring areas and

- Can assist in the optimization of relief capabilities during emergencies.

- Target to specific vulnerable population groups (child, elderly or …) and

- Proliferate from the immense opportunities of Covid-19 pandemic for advancing big (and reliable) data handling for the benefit of many rich and poor countries.

Thank You!

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Collaborate and communicate with GEO: