GEO WEEK & MINISTERIAL SUMMIT 2023

Earth Observations and Smartphones: Water and Health Risk for Decision Makers and Grassroots

Flash Talk

#TheEarthTalks
From Space to Village:
Disease Early Warning for the Masses
>2 billion
drink water from faecally contaminated water sources
2.4 billion
are without basic sanitation facilities

Global Cholera cases:
1.3 to 4.0 million/year
Global death due to Cholera: 21,000 to 143,000 [3]
Cholera, a waterborne diarrheal disease, remains a major threat to global health.

Cholera is fatal, if untreated for 24-48 hours.

Cholera can thrive in environment and humans.

Disease burden is severely underreported.

Originated in South Asia, but have become endemic in many parts of Sub-Saharan Africa in late 1900s.

Cholera is preventable with early warning, with data on climatic, environmental, societal drivers.
Projects:

2. CholeraMap Bangladesh (2019 – 2022)
Existing EO-based warning systems target high-end technical users. The remote populations are typically outside information umbrella.

Women, who typically make household water and health decisions in most of the developing world, rarely have access to such information.

The reality is:

Ultimate end-users of water and health related information in South Asia and Sub-Saharan Africa are outside our reach.

CholeraMap

- An inclusive dissemination approach via smartphone application
- Geospatial water quality and cholera risk directly for grassroots
- Influence decision-making for safe water and health behavior
This is a sustainable development issue! #EO4SDG

This is also a gender empowerment issue! #EO4SDG

This is an information inequality and access issue! @GEO Open EO Data

This is an environmental and climate justice issue! #EO4HEALTH @NASA Earth Science
Monsoon floods
Saltwater intrusion
MATLAB

Cases
Months
**MATLAB sub-district**
Population: 500,000

- Field workers visited 2000+ households
- Explained cholera risk and project goals
- Surveyed members on water/sanitation
- Got agreement with smartphone owners
- Registered 1500 application users (750 control and 750 treatment)

**Cholera risk includes:**
- IMERG rainfall observations
- TRMM/GPM rainfall anomaly
- SERVIR NMME rainfall forecast
- MODIS land surface temperature
- SRTM land surface elevation
- SEDAC population density

Validated with:
- ECBS Cholera Surveillance data
- Bill and Melinda Gates Foundation

**1 x 1 km cells**
- Updated monthly
- Biweekly SMS text
- Local languages
Information flow

Satellites to URI server to smartphones in the hands of the population of Matlab

High Risk
Med Risk
Low Risk

The risk of cholera outbreak in your locality is very high

To save yourself from high risk of cholera:
The Cholera Prediction Hub is a web-based platform that helps users worldwide see the potential risk of cholera outbreaks affecting individual countries and regions within.

**Features and Use**

- Indicates regions with high risk of cholera at least 4 weeks in advance.
- Integrates climate, weather, societal, demographical, and environmental factors in geospatial algorithm.
- Provides a clear understanding of how disease risk is calculated and derived to better inform end users of the risk in their current areas.
- Users include researchers studying water-borne diseases, public and non-government decision-makers, and individuals wanting to learn the current disease risk in their location.
Yemen Cholera Forecast Risk
Forecast Period: May 1 – 7, 2021
Detailed Risk Map – Local 1x1 km

Select a Region
Local Healthcare and Demographic Info via API Request
View Earth Observations and Geospatial Risk Info
View High Resolution Cholera Risk Distribution

Information Flow Chain for Global Cholera Risk Communication to Decision-Makers and NGOs
Cholera Prediction Consortia

Partner with our collaborative team to reduce global cholera burden

Help us provide critique in:

- How to make prediction accuracy better than what we have?
- What are the pitfalls in our modeling system?
- How can we improve prediction intelligence for cholera?

Send email at choleraprediction_users@lists.ufl.edu
Vibrio Prediction Hub
A decision-making initiative for protecting human health and enhancing the resilience of coastal communities under current and changing environments

GeoHealth & Hydrology Lab at the University of Florida
https://vibrio-prediction-ufl.hub.arcgis.com/

OUR PRIORITIES

Understand the Role of Humans in the Hydrological Cycle
We work hard to meet this goal by researching these key areas for a sustainable environment

Water-borne Diseases
Remote Sensing
COVID-19 Pandemic
We want a cholera free village.
#TheEarthTalks

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6-10 NOVEMBER
CAPE TOWN, SOUTH AFRICA