Environmental Determinants of Enteric Infectious Disease

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Mortality & Morbidity

Globally, diarrhea kills 2,195 children every day

This is 1 out of 9 child deaths, worldwide
It is more than AIDS, malaria, and measles combined
It is the second leading cause of death in children less than five years old

EID-related diarrhea also leads to impaired cognitive development, stunting and reduced vaccine response

Liu et al. (2012)
EID are preventable and treatable

In some cases, **vaccines** are available

Improved Water, Sanitation and Hygiene (**WASH**) infrastructure and behavior is critical

Those suffering from diarrhea can be treated with **oral rehydration therapy**
Project goal

Establish the feasibility of Earth Observation-informed EID risk mapping, monitoring, and prediction systems

We are doing this through collaboration with multiple EID studies performed at sites around the world
Current list of collaborating studies
Earth Observation data

None of these infection studies included collection of data on climate or environment.

Earth Observations offer an opportunity to fill this gap.

Colston et al. (2018)
For Example: Rotavirus transmission

Colston et al. (2019)
Recent Results
Impacts of the 2011-2012 La Nina floods on enteric infections in Santa Clara, Peru

Colston et al. (2020)
Multiple pathogen analysis
Shigella

Variable Importance Plot

Impurity-corrected Random Forest;
Unconditional permutation scheme;
cross-validated results
Shigella risk maps

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Probability of Shigella Infection

0.0 0.1 0.2 0.3 0.4 0.5
Next steps

Shift to a Bayesian modeling framework

Multi-pathogen risk maps, disseminated through the Tethys App
Thank You