Cholera and rainfall data collected in Haiti from 2010-2011 (Cholera Disease Dynamics project)

Website: https://www.bco-dmo.org/dataset/644730
Data Type: Other Field Results
Version: final
Version Date: 2016-05-04

Project
» Modeling the Effects of Heterogeneity in Water Quality on Cholera Disease Dynamics (Cholera_Disease_Dyn)

Contributors	Affiliation	Role
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Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
- Data Files
- Parameters
- Project Information
- Funding

Coverage

Spatial Extent: **N**:20.0878 **E**:-71.6133 **S**:18.021 **W**:-74.4786
Temporal Extent: 2010-10-17 - 2011-03-20

Dataset Description

Data relating cholera and rainfall from four areas in Haiti:

1. Country-wide cholera case data from Haiti Ministry of Health (MSPP), together with rainfall data from NASA Tropical Measurement Mission.
2. Cholera case data from Hospital Albert Schweitzer (Haiti), together with rainfall data from NASA Tropical Measurement Mission.
3. Cholera case data from Port-au-Prince, as reported by the MSPP, together with rainfall data measured from USGS rain gauge in Foret de Pins.
4. Cholera case data from Internally Displaced Persons camps, together with rainfall data from USGS rain gauge in Morne Gentilehomme.

These data were reported in:
Examining rainfall and cholera dynamics in Haiti using statistical and dynamic modeling approaches.
Eisenberg MC1, Kujbida G, Tuite AR, Fisman DN, Tien JH.
Epidemics. 2013 Dec;5(4):197-207.

http://www.sciencedirect.com/science/article/pii/S1755436513000431
doi:10.1016/j.epidem.2013.09.004

DMO notes:

Rainfall was made into two columns, one for each unit of measure.
The four received spreadsheets were into one dataset.

Methods & Sampling

Aggregated weekly cholera cases were collected at three levels of granularity: country, city, and internally displaced persons camps (IDP). Rainfall was collected from USGS rain gauges at Morne Gentilehomme, and Foret de Pins. Rainfall was also collected from NASA satellite data over two areas: lat=[18.041N,19.844N] and lon=[74.323W,71.79W], lat=[19.0N,19.2N] and lon=[72.6W,72.4W].

[table of contents | back to top]

Data Files

File
haiti_cholera.csv (Comma Separated Values (.csv), 4.00 KB) MD5:0afccb2551e54ee11199884bcf4a977f Primary data file for dataset ID 644730

[table of contents | back to top]

Parameters

Parameter	Description	Units
brief_desc	short description of data	text
date_start	start date of weekly data collection	yyyymmdd
days_since_start	number of days since date_start	number
rainfall_mm	amount of rain per week from NASA satellite data	millimeters
rainfall_in	amount of rain per week from USGS rain gauges	inches
cases	number of cholera cases per week	number

[table of contents | back to top]

Project Information

Modeling the Effects of Heterogeneity in Water Quality on Cholera Disease Dynamics (Cholera_Disease_Dyn)

Coverage: Haiti, Angola and London

Funding was requested to analyze and model cholera epidemics. In order to accomplish this task, the team will

Funding was requested to analyze and model cholera epidemics. In order to accomplish this task, the team will analyze spatio-temporal data from cholera outbreaks in Haiti (2010), Angola (2006) and London (1832); develop mathematical theory for coupled patch models of waterborne disease; and develop models to predict disease spread under different scenarios. The study will explore the contribution of humans (direct) and of environmental (delayed) pathways to disease transmission and investigate how heterogeneity in water quality, which is ubiquitous in developing countries, affects cholera disease dynamics. This project will advance understanding of the factors governing the spatial spread of cholera, examine how the arrangement and connectivity between cholera risk hot spots influence disease spread and develop a modeling framework for rapid response to a cholera crisis.

The proposed study has clear practical and theoretical significance for understanding and predicting not only cholera transmission, but other waterborne diseases as well, reaching beyond the specific study system. The team will develop mathematical theory for coupled patch models of waterborne diseases and advance understanding of the effects of movement of individuals and of water to cholera transmission. The team will also explore inclusion of data from early stages of an outbreak on parameter estimates and whether information on water quality and availability and on types of sanitation facilities available can be used to improve knowledge of model parameters before the disease has reached a given area.

This study will result in the training of undergraduates and graduate students, and include outreach to the Columbus Science Pub (public), Cornell's Summer Math Institute (undergraduates) and the UCLA Math Circle (grades K-12). This project will strengthen international scientific collaboration through interaction with scientists and students from the University of Toronto.

The research from this study will provide society benefits through improved understanding of the factors influencing the ability of cholera to invade, spread and persist in a region. The proposed study will provide a tool to predict disease spread under different scenarios for rapid response to a cholera crisis and evaluate the efficacy of different intervention strategies on containing cholera spatial spread. The team will interact and communicate their research findings to the Centers for Disease Control and the National Biosurveillance Integration Center within the Department of Homeland Security. They will collaborate with the United Nations University Institute for Water, Environment and Health to compile a database of time series data from cholera outbreaks worldwide, in association with data on water quality, water availability, and sanitation facilities from several outbreak locales.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1115881

[table of contents | back to top]