Mapping the Risk of International Infectious Disease Spread (MRIIDS)

Funded through USAID’s ‘Combating Zika and Future Threats: A Grand Challenge for Development’ program

Sangeeta Bhatia, John Brownstein, Maja Carrion, Emily Cohn, Anne Cori, Mark Herringer, Moritz Kraemer, Britta Lassmann, Larry Madoff and Pierre Nouvellet

11 November, 2018
Big Brother Is Watching
Problem statement
Project partners
Project Schematic

2. Transmissibility of pathogen.
From literature reviews. Can vary across space e.g. with climate.

3. Connectivity between locations.
Various models and data sources will be explored.

4. Host & environment susceptibility.
E.g. vaccine coverage.
From ghsagenda.org and other sources.

1. Number of cases over time/space.
From ProMED.

5. Ability to contain the outbreak.
E.g. healthcare capacity.
From Healthsites.io.

Model outputs: Mapping the risk of disease spread

A. What is the relative level of risk across space?

B. Where does the risk come from?
HealthMap and ProMed data pre-processing
Data stream 1: case numbers
Example of the 2013-16 West African Ebola epidemic

Innovative Diseases
Surveillance:
- ProMED
- HealthMap

Traditional Disease
Surveillance:
- WHO
Comparing transmissibility based on different data sources
Models of movement (Gravity model)

- Movement between places modeled by a gravity like attraction of large population centers.
- Flow of people is proportional to the product of population sizes and decreases with the distance (with some power).
Prediction using data from ProMED (Guinea)
Prediction using data from ProMED (Sierra Leone)
Prediction using data from ProMED (Liberia)
Relative risk of spread (estimated on 21st November 2014)
Performance Metrics

- Bias
- Sharpness
- Mean absolute error
- Proportion of observations in 50% CI
- Others ??
Next steps and Issues

- Include health care capacity in the model.
- Informative priors for model parameters.
- Model averaging to account for model uncertainty.
- How best to choose the window for estimating the reproduction number?
- What is a good way to assess model performance?
- Issues: What publicly available data sources can we use for spatial information (population movement, latest census data, updated shapefiles)?
- Issues: Good proxy for healthcare capacity?
Get in touch

sangeetabhatia03

sangeeta0312

http://www.repidemicsconsortium.org

https://github.com/annecori/mRIDSprocessData