R Data Analysis Project

Weather and Malaria Incidence and Intervention Data for Mozambique

Alyssa Forber

11/15/2017

The write-up should include a background section with a literature review and citations (at least one page), a description of the problem and data (approximately one page), results (no page expectation, but thereshould be 4-5 figures and at least one should be a map), conclusions, references and any supplemental material you choose to include.

The incidence data today are likelyrelated to exposure up to 14 days prior and the effects of weather and temperature, etc, are likely related to exposure at an uncertain time before that. This time is typically thought tobe 2, 4 or 8 weeks from the day the person showed up in the health center. You are expected to create the lagged variables and explore their relationships with malaria incidence.

Background (1 page) (with a literature review and citations)

- malaria affecting a lot of people
- life threatening, # people kills
- Mozambique stats
- preventions include insecticide treated bed-nets, indoor residual spraying
- temporary effect and the protection wears off
- seasonal effect, rainy season, mosquitos bread in standing water
- after rain they breed and increase in number which increases bites/infections

- some time after rain we see rise in cases which is unknown, and something that will be explored in this analysis

Data (~ 1 page)

The data for this analysis include incidence data, malaria intervention data, weather data, and spatial data. The incidence data contains information on the weekly number of cases of malaria reported by districts along with information about each district, and spans from 2010 to 2017. The district information includes square kilometers, province, region, population, and x and y coordinates. Incidence was calculated by dividing cases by the population and multiplying by 1000. The intervention data contains the week and year for each district that the two preventative interventions occured– insecticide treated bed nets (ITN) and indoor residual spraying (IRS). The weather data originally contained daily information by district on five weather measures– rainfall, temperature, relative humidity, saturation vapor pressure deficit, and surface barometric pressure. All variables in this dataset were averaged by week–except rainfall which was summed–in order to be merge with the other datasets. Lastly the spatial data was geospatial information on the country of Mozambique in order to map the other data spatially. Data was merged based on the district, week, and year.

In order to capture the seasonal effect of weather on malaria trends, the weather information has a lagged relationship with the incidenence data. With this lag being unknown, the incidence data was lagged by two, four, and eight weeks to the weather data. This analysis also explored the protection of the interventions over time, in which 100% protection from malaria is assumed at the start week that slowly decays at a linear rate. We assumed 75% protection 6 months after the start for IRS, which translates to a 0.01042 decrease in protection each week, and we assumed 60% protective 96 months after the start for ITN, which translates to a 0.0042 decrease each week. Variables that contained the

information for the decay in protection were created for each intervention treatment to be used for analysis.

Results

Conclusions

References

https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-12-363

http://www.who.int/mediacentre/factsheets/fs310/en/index1.html

https://www.newvision.co.ug/new_vision/news/1423973/malaria-leading-cause-death-uganda

http://health.go.ug/programs/national-malaria-control-program

https://www.cdc.gov/malaria/

https://www.pilgrimafrica.org/malaria/

https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-12-363

Reproductable Research Information

All work and materials can be found at https://github.com/aforber/RProject.

Appendix