

Impact of Precipitation on Vector-Borne Disease in Colombia

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INTRODUCTION

Climate variability is a major driver of vector-borne diseases. Because vector-borne are highly dependent on environmental factors, erratic changes in precipitation and rise in temperatures are increasing the levels of transmission due to the real-life threats posed by ongoing climate change.

While transmission of many diseases are likely to be impacted by climate change, vector-borne diseases are of particular concern due to both their dependence on environment conditions for transmission and high baseline burden in tropical climates.

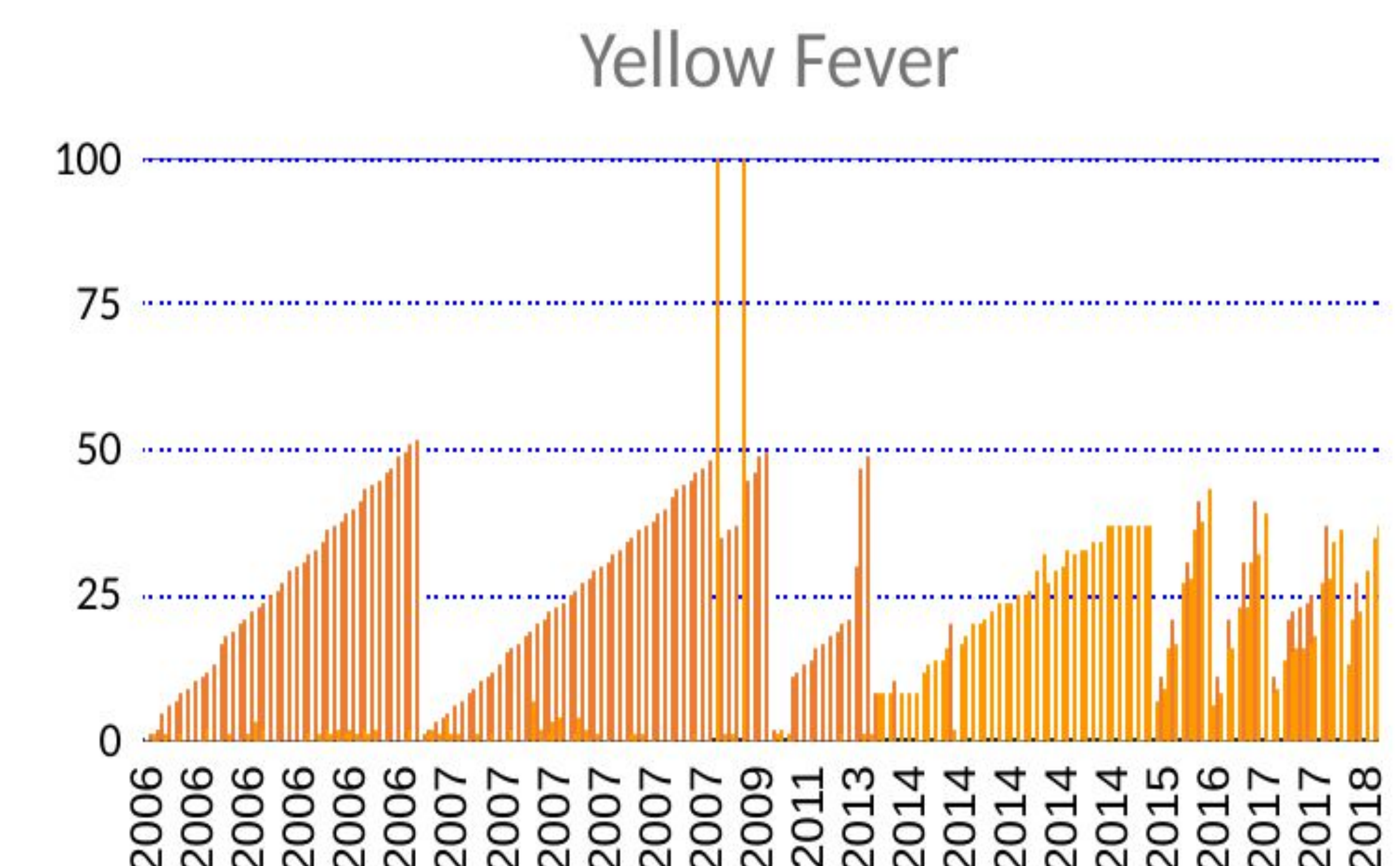
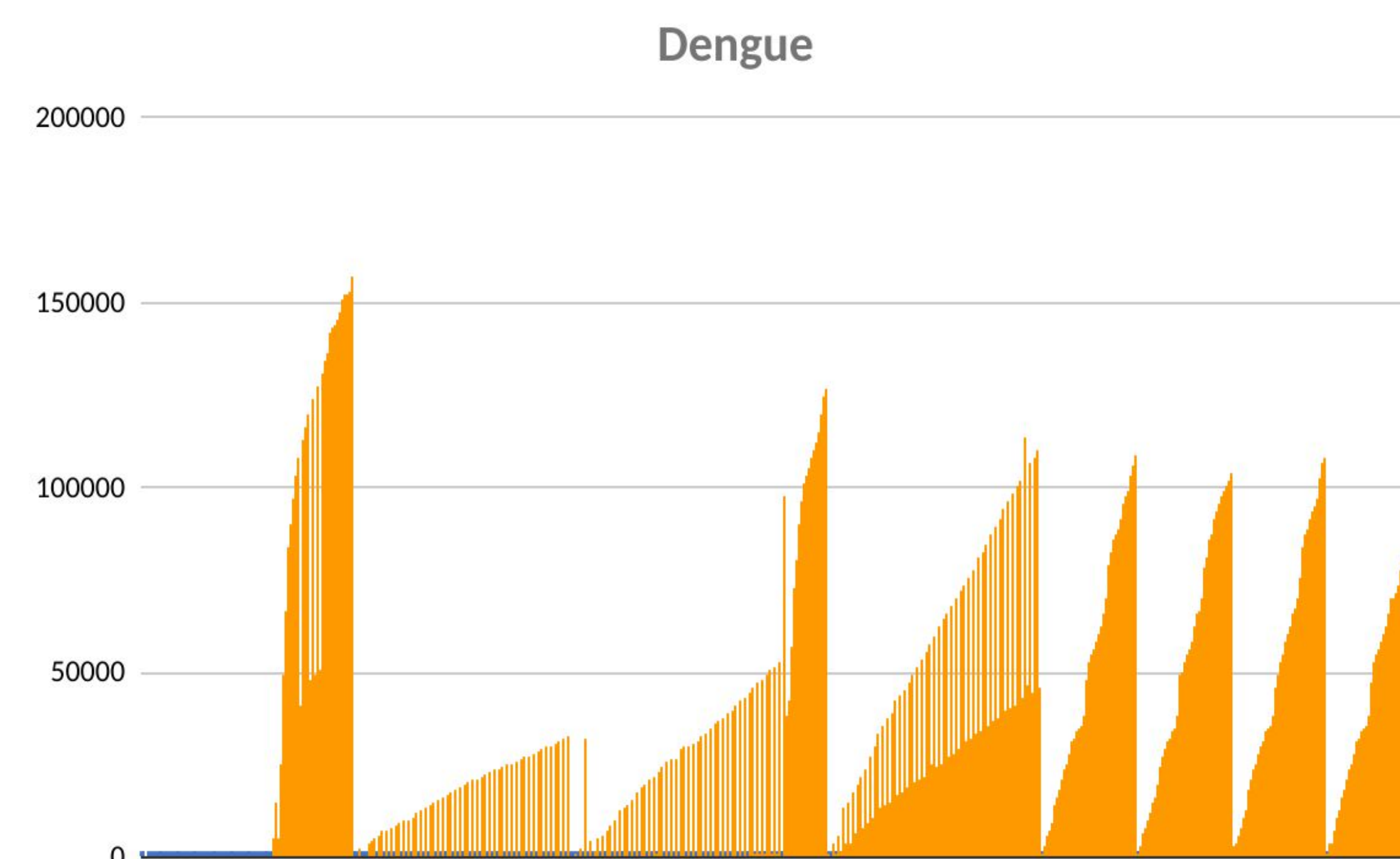
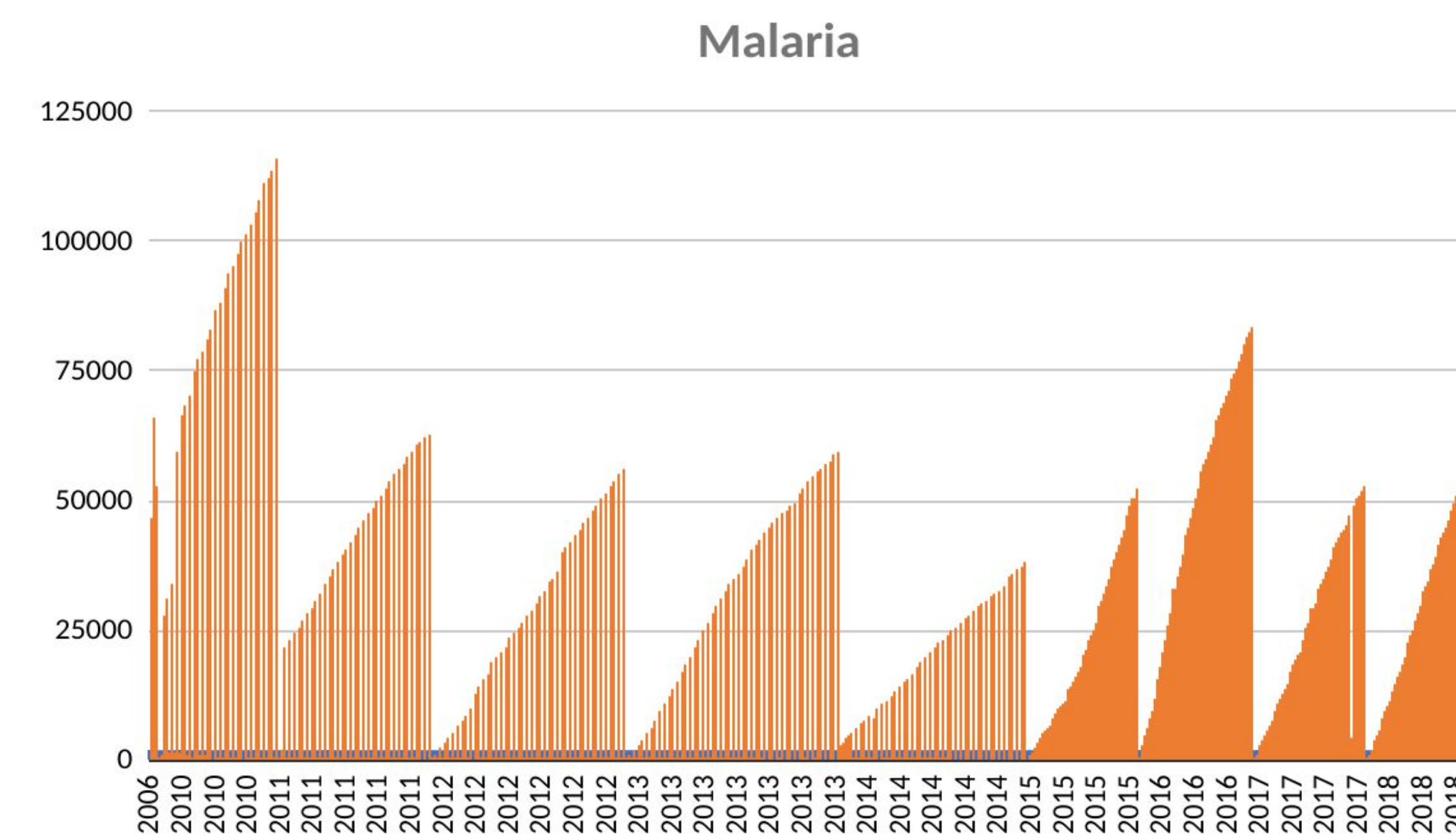
We want to look at the South American nation of Colombia, and understand the changes to the incidence levels of malaria, dengue and yellow fever which are vector-borne diseases, during summer months and seasons with high precipitation levels. This will explain if climate change and increase in extreme rainfall will lead to an higher incidence of these diseases.

METHOD

- Using weekly bulletins posted by the country's health department, we examined the weekly disease outcomes (cases and deaths) of malaria, dengue, and yellow fever.
- We looked at disease incidence data of the South American nation of Colombia starting from 2006 to 2018. Extracting the data into a spreadsheet, to be able to examine and create graphs.
- We also extracted rainfall data from publicly available reanalysis datasets for Colombia to examine the relationship between precipitation and disease incidence and burden.
- After the data was collected, we were able to create three incidence graphs for each of the diseases. (malaria, dengue, and yellow fever.) Lastly, we were able to compare the trends of the graphs with seasons of high temperatures and the rainfall data to see correlations between high incidence of disease and higher rainfall levels.

RESULTS

Graphs-



- The graphs show that incidence levels of malaria, dengue, and yellow fever increases during the summer months when temperatures rise. And also the graphs show an increase in incidence of these vector-borne during the rainy months in Columbia, when precipitation levels are high. This makes sense as vector-borne disease thrive in those environments.
- The summer months in Colombia are June to August. The rainy season comes in April to May and October to November. From the graphs we can see the spikes in cases during those seasons.
- The malaria graph clearly show that from 2016 to 2018, the incidence levels of malaria increased during the summer and rainy seasons. As we know malaria is passed through mosquitoes, and they are more pronounced during rainy season, as mosquitoes depend on this environment. The graph shows spikes in cases during April to May and also in October to December, but a sudden drop in other dry and cold seasons.
- Dengue is a vector-borne disease that is passed through mosquitoes in tropical areas, similar to malaria. And as seen in the graph, from 2006 to 2018, the incidence levels of dengue increased during rainy seasons, and plateaued during dry and cold seasons. Like malaria, the cases of dengue also spike during warmer and rainy seasons in Colombia.

- Yellow fever is a viral infection spread by a particular species of mosquito. Yellow fever being a vector-borne disease similar to malaria and dengue, also has higher incidence levels during April to May and October to November, which are the rainiest seasons in Colombia. The graphs shows the sudden increase in cases of yellow fever during those season, but drops afterwards.

Next Steps

- The next step is to overlap the rainfall data with the vector-borne disease data to get a much more concise understanding of the levels of rainfall and the disease incidence for each week.
- These new graphs will show exactly the levels of rainfall, and the incidence rate for each week. We can also map this with perhaps temperature trends.

CONCLUSIONS

Higher levels of rainfall in general and rise in temperature in particular may increase incidence of vector-borne diseases, particularly as climate change progresses and extreme rain becomes more common.

As seen from the results, incidence rate trends spike during warmer summer months and rainy seasons. Therefore, vector-borne disease will become more prevalent as the climate becomes warmer and causes erratic changes in rainfall.

There is an urgent need to develop alternative healthcare prevention methods and inform policymakers in order to be better prepared to predict and address the global risks posed by these diseases as climate change is to cause more erratic rainfall and rise in temperatures.

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