Team Number: SSMA-1
School Name: Saturday Science and Math Academy
Area of Science: Medicine and Health

Visualizing the Spread of Zika

PROBLEM DEFINITION

Zika has been around since the late 1940's, but was not discovered to be sexually transmitted until 2008. This was the first instance of a traditionally insect-transmitted disease being spread sexually. A few years later, in March 2014, birth defects due to Zika also began to manifest in French Polynesia. This began the trend of babies born with microcephaly, meaning small heads. The Zika transmitting mosquito, Aedes aegypti, is more dangerous than traditional mosquitoes, because it is active during the day, thus putting more people at risk. Travel statements were issued to expectant mothers planning to visit the country, warning of the danger to fetuses exposed to Zika.

With this work, we plan to show the areas dangerous for traveling pregnant women and potential mothers, by visualizing the regions where mosquitoes thrive.

COMPUTATIONAL PLAN

We will generate our data using NetLogo to model regions where the Zika mosquito thrives as a function of elevation, humidity, and temperature. We will be working with Java through the Google VR APIs to create a virtual reality scientific visualization, which will highlight the areas unsafe for expectant mothers. The Software Developer Kit for Android gives us a platform for developing the VR app and is compatible with Google Cardboard [5], which is the most cost efficient virtual reality headset. We plan to use Google VR SDKs to create our code for Google Cardboard.

PROGRESS

We researched how the virus is transmitted globally, and its increasing prevalence in the Americas. We used this as a starting point for our map projection of where the infectious mosquitoes are spreading. Some of the boundary points have been determined in terms elevation because mosquitoes cannot spread Zika above about 6,500 feet (2,000 meters). Once we discovered that Aedes aegypti is only found in warm, wet tropical and subtropical urban areas, we added temperature and humidity as last boundary points for the model. We are

now looking at Google Cardboard and Google VR SDK to serve as the visual aspect of the model.

EXPECTED RESULTS

The visual representation with the backing of the code should reveal the regions with a higher chance of Zika virus. By visualizing where the virus is most evident, assumptions such as the impact of climate change on the spread of disease can be explored. The scientific visualization will enable a richer, interactive study into where the disease spreads as a result of environment (elevation, temperature, and humidity, etc.) as well other contributing factors. With a VR depiction of potentially dangerous regions, expectant mothers will be able to easily understand where they and their children are at risk for Zika.

CITATIONS

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