Ebola Outbreak in a Small Town

NM Supercomputing Challenge

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Problem:

The purpose of our project was to see how an Ebola outbreak could affect a small town and whether or not quarantined hospitals are actually helpful to the good of the town. We have learned that very few people usually survive the outbreaks on the basic simulation, and wanted to see whether or not a quarantined hospital would help the survival rate. Unfortunately, in real life hospitals, we would run out of space. This makes the simulation unrealistic in that sense.

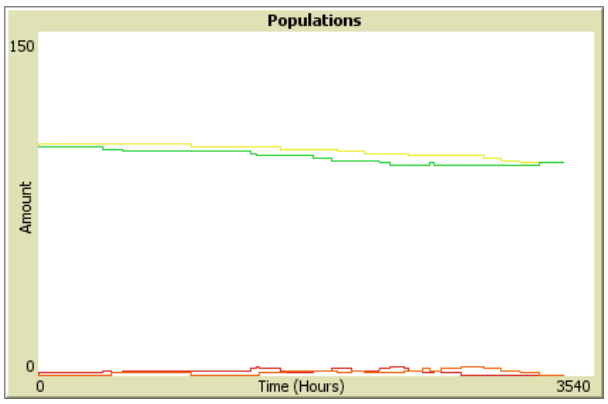
Researched Information/Applications of This Information

Dennis Drew, the researcher of the group, had been studying the infection rate, fatality rate, and other related information on Ebola. With this information, we were able to find that the fatality rate was 70% - 90%, and that the rate of infection was 100% when contact with bodily fluids occurs. Since we had this information, we incorporated it into the code so that there was a specific chance of contracting the disease, and, after a set amount of time, what chances they had to survive.

Method

Our team used the NetLogo computing and coding interface to write a program that would simulate a basic version of an Ebola outbreak in a small town. This was supposed to be a town in West Africa, where there would only be one or no hospital. We wanted to see what the effects of having medical care available were, and how helpful they were to stopping the total fatality of the disease. So, we wrote a program that simulated this exactly. We tested one setup that had no medical care whatsoever, and one setup that had one medical center. We recorded the results and compared them.

Data and Results



In each graph, the yellow line represents the total population of the people in the town, the green line represents the population of healthy people, the red line represents the total population of infected people, and the orange line represents the total population of people in the hospital/quarantine zone. The chart to the left was the average of the simulations with no hospital/quarantine zone. The death of the disease relied solely on the death of all the people with the disease. Also, the orange line stays at zero at the left because there was no hospital, therefore there were no hospitalized patients. As seen on the left, almost two thirds of the total population was wiped out. The chart to the right was the setup simulation with a hospital/quarantine zone. As seen on the right, some people were still killed in the epidemic, but not nearly as many as in the chart to the left.

Conclusion

By doing this simulation, we have found that Ebola can have a huge toll on a small town, and shows that a quarantined hospital does decrease the chance of decimation of the population. We had also learned that if a person is infected with Ebola, the chances of them recovering without medical help is nearly impossible, as in reality. Other aspects that we have been taught is how difficult it is to get a code to work smoothly with no bugs, and how to incorporate reality in computer simulations.

Bibliography

- "Ebola Death Rate Rises Above 70%." *Nypost.com*. The New York Post, 14 Oct. 2014. Web. Feb. 2015.
- "2014 Ebola Outbreak in West Africa - Case Counts." *Centers for Disease Control and Prevention*. Centers for Disease Control and Prevention, 10 Feb. 2015. Web. Feb. 2015.