MONT 100N – Modeling the Environment
Chapter 5 Project – The 2014-15 Ebola Outbreak.
October 30, 2017

The Chapter Project for this chapter will be to continue the study of the 2014-2015 Ebola outbreak begun class (the same example appears in Examples 5.10 and 5.11 in the text). The data we were using there comes from the Wikipedia page

`https://en.wikipedia.org/wiki/West_African_Ebola_virus_epidemic_timeline_of_reported_cases_and_deaths`

On that page, you will see a large table with the data we used at the bottom and rows above that giving the later course of the outbreak, all the way to November 2015, when the outbreak was declared to be concluded. (The rows are in reverse chronological order, for some reason.) The cumulative cases and deaths are also broken down by country, with separate totals for Guinea, Liberia, and Sierra Leone.

The data you will be working with has been entered into the spreadsheet file

`EbolaOutbreakFullRecord.xlsx`

that you will download from the course homepage to start your work.

Questions

Most of the work you will do will involve analyzing subsets of the data along the lines of what we did in the examples above, to try to develop answers to the following questions.

(A) Considering the total reported cases and total deaths for the whole course of the outbreak, for how long did the cases and deaths continue increasing at about 2% per day? When does it seem that the tide started to turn, in the sense that the epidemic was starting to "slow down" noticeably from the 2% per day rate of increase.[1] Try fitting models starting at March 22, 2014, but going farther than we did above. Some landmarks to watch for are November 2, 2014, 27 May 2015, 26 July 2015, and so forth. Explain how you are determining that "turn of the tide." Also, can you identify something definite that happened about that time that might have been a cause for the epidemic starting to come under control?

(B) Examining the data, it is pretty clear that the course of the outbreak was different in Guinea as compared to Liberia and Sierra Leone. Fit exponential models for initial phases of the epidemic in each ot the three countries separately. Were the numbers of infections and deaths increasing at a rate of 2% per day at the start in all three countries?

(C) Not everyone who was infected with Ebola died as a result of the infection. Some people actually recovered. How did the percentage of infected people who recovered change over the course of the epidemic? Consider both the aggregate figures and the figures by country.

[1] It had to do that at some time; if it didn't, then we would probably all be dead by now!

What type of model fits that data the best? Note: One would hope that as an epidemic progresses, health care professionals would accumulate useful experience in how to treat the disease successfully so that their treatment outcomes would improve over time. Was that the case here?

Assignment: Submit a spreadsheet showing all of your calculations with the Ebola data set. Answer the questions above in a separate text document. As always, document your sources if you consult things other than the Wikipedia page given above.