

Understanding the spread and lethality of Ebola in various populations

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Ebola virus disease (EVD), is a rare, deadly, and highly contagious viral infection which has caused severe outbreaks, mostly centered in regions across Central and West Africa. Scientists are not fully sure where Ebola originated, but it is a zoonotic that they believe may have spread from fruit bats of the Pteropodidae family, who are natural hosts of the virus. These bats then infect wild animals which are subsequently eaten by humans, leading to initial population exposure. Ebola is spread via direct contact with the body fluids of infected people, animals, or contaminated objects and surfaces. It has an extremely high mortality rate and outbreaks are generally met with rapid containment to prevent a widespread epidemic.

Modeling Ebola's spread involves looking at population size, transmission rates, recovery, and mortality rates, as well as containment speed of the outbreak amongst other factors. I am curious how things like the timing and effectiveness of medical intervention impact the spread and growth or decline rates of Ebola in a population. Other things that might be worth asking are how things like population density and access to quality healthcare, as well as healthcare capacity affect the rate of disease transmission.

A learning goal for this research would be to understand how the transmission of Ebola differs from diseases with lower mortality rates, as well as what disease model best fits Ebola, and how various parameters might need to be adjusted to appropriately suit it. I also hope to better understand how rapid containment/intervention can reduce severity of an outbreak.

Connections to class material:

- Disease modeling using SIR and SEIR Models
- Vaccination and herd immunity
- Steady States and Equilibrium

Sources:

<https://www.idsociety.org/public-health/ebola/ebola-resources/ebola-facts/>

<https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease>

https://www.who.int/health-topics/ebola#tab=tab_1