

Michael Crane

Senior Division Mathematics & Computer Sciences

A Disease Model Of XDR-TB

The purpose of this experiment was to determine the possible detrimental effects from an outbreak of Extensive Drug Resistant Tuberculosis, through a theoretical mathematical model. The parameters for the model were obtained through statistics from the 2006 American Time Use Survey and The Center for Disease Control. The model was constructed assuming a lone patient, infected with XDR TB, would go through the average American day as established by the American Time Use Survey. The patient would be contagious, as well as, unaware of his condition for the duration of the model. The model was divided into 12 minute intervals and followed each infected subject for 48 hours. This leaves 17.2 possible hours where transmission was possible for each patient once infected. The model was based off of a Verhulst equation and constructed using Excel worksheets. The model revealed that given the relatively average circumstances of the simulation, a lone patient could directly infect 6.37 people and could indirectly infect 91.2 people over the course of several years.