

Meeting: 1003, Atlanta, Georgia, SS 9A, AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates, I

1003-92-985 **Julia Bethel*** (julia.bethel@gmail.com), Department of Mathematics and Statistics, 85 Lomb Memorial Drive, Rochester Institute of Technology, Rochester, NY 14623-5603, and **Patricia Clark** (pacsma@rit.edu), Department of Mathematics and Statistics, 85 Lomb Memorial Drive, Rochester Institute of Technology, Rochester, NY 14623-5603. *Model Development and Analysis of the 2001 Meningococcal Meningitis Disease Epidemic of the African Meningitis Belt.*

The standard S-I-R model for epidemics, introduced by W.O. Kermack and A.G. McKendrick, was used to model data from the World Health Organization (WHO) for the 2001 meningococcal meningitis disease epidemic in six countries of the African Meningitis Belt: Benin, Burkina Faso, Central African Republic, Chad, Ethiopia and Niger. Analysis of the model requires determination of the values for the parameters, transmissivity and recovery rates, which in turn requires an assessment of the susceptible population. Since this assessment was not directly available an indirect approach was used based on available data. Case-fatality ratios present in the 2001 epidemic combined with life expectancy for each of the six countries produce a ratio-parameter representing healthcare efficiency. This ratio-parameter and data based estimations allows weighted averages to be created of the infectious period and the recovery rates of each country. The recovery rates then permit the estimation of the initial susceptible population and transmissivity rates necessary for the model. With estimates for all parameters it is possible to determine the percentage of the population that needs to be immunized in order to avoid a meningococcal meningitis epidemic. (Received October 01, 2004)