

MATHEMATICAL MODELING OF MENINGOCOCCAL MENINGITIS DISEASE BETWEEN INDONESIA (INA) AND SAUDI ARABIA (KSA) USING $(SCIR)_{INA}$ - $(SI)_{KSA}$ COMPARTAMENT

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The purpose of this study are (1) to establish a mathematics model of *Meningococcal meningitis* disease between Indonesia and Saudi Arabia, (2) analyzes stability of equilibrium point, (3) and explains the model simulation of *Meningococcal meningitis* with the effect of vaccination on populatios from Indonesia.

The stages for analyzing the $(S-C-I-R)_{INA}-(S-I)_{KSA}$ model on *Meningococcal meningitis* are forming the $(S-C-I-R)_{INA}-(S-I)_{KSA}$ model, transforming the model, determining equilibrium point, determining basic reproduction number, analyzing stability of equilibrium point and do the simulations.

The results of this study obtained are $(S-C-I-R)_{INA}-(S-I)_{KSA}$ with six classes of population which are *Susceptible* populations class from Indonesia, *Carrier* populations class from Indonesia, *Infected* populations class from Indonesia, *Recovered* populations class from Indonesia, *Susceptible* populations class from Saudi Arabia and *Infected* populations class from Saudi Arabia. The model obtained is a system of non linear differential equations. The model of the transmission of the *Meningococcal meningitis* is simplified into $(s-c-i-r)_{INA}-(s-i)_{KSA}$ by administering the vaccine only to populations from Indonesia. The stability of the disease-free equilibrium point will locally asymptotically stable when the reproduction number is less than one and unstable when the reproduction number is more than one. In addition to the stability of the locally asymptotically stable endemic equilibrium point when the reproduction number is more than one. Based on the model simulation, the higher level of vaccination then the infected class on populations from Indonesia and Infected class on populations from Saudi Arabia will decrease to zero. So, the vaccination program can be used to control the transmission of *Meningococcal meningitis* disease.