A SEIR Model for Spread of Hand, Foot, and Mouth Disease

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Hand, foot, and mouth disease (HFMD) is an infection disease affecting tropical and subtropical regions worldwide. There are no vaccinations or antiviral medications available that target HFMD. In this study, an existing mathematical model is modified. The parameters which are used in this modified SEIR model are taken from previous studies in similar environments. The new mathematical model is proposed to calculate the transmission probability of two genders, and investigate the effect of indirect transmission from contaminated environments. Moreover, modified SEIR model is fitted to the real data on the number of infected children (under 14 years old) in 2020. Then some of the parameters that produce the best fit to the real data are estimated. In our results we can see that $\beta_g < \beta_b$, which means the disease infected boys more than girls. The parameters η_g and η_b are much less than the rate μ, which means that the loss of viruses due to individuals taking out is much less that the loss due to clearance. Throughout this results we can see that effect of indirect transmission has two sides, threshold amount of hand, foot, and mouth disease is very small, or indirect transmission is not effected of transmission of the disease as we thought.

Keywords: Hand, foot and mouth disease, the SEIR model, Reproduction number, Transmission rate, Indirect transmission