A Bayesian stochastic SIRS model in discrete time using environmental factors for the study of Respiratory Syncytial Virus in the Region of Valencia, Spain.

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Respiratory syncytial virus (RSV) is the most important respiratory virus in children, causing bronchiolitis or pneumonia which make the hospitalization necessary. In Spain there are around 17000 visits to primary care due to RSV each year, and around 1280 children aged < 5 years go to hospital each year in the Region of Valencia due to RSV. In addition, the cost of pediatric hospitalizations for the Valencian Health System is around 3.5 million euro per year. Hence, it is very important to understand RSV dynamics from both the sanitary and economic point of view.

Its coincidence with other seasonal epidemics, such as influenza or rotavirus, produces a large number of infections and hospitalizations. In warm climates, infections by RSV usually occur in winter, while in tropical climates this infection is related to precipitations. A person that has been infected by RSV and recovered will lose immunity and be susceptible again. Recently, there has been an increase of cases in which old adults have been infected by RSV: up to 18% of the pneumonia hospitalizations in patients aged > 65 years are due to RSV.

In this work, our goal is the modeling of the number of new hospitalizations per week for children < 1 years caused by the Respiratory Syncytial Virus (RSV) in the Region of Valencia using a Bayesian stochastic SIRS (susceptible-infected-recovered-susceptible) model in discrete time. Environmental factors, such as temperature, humidity and precipitations, are utilized to model the spread of the disease. With our model, we will be able to predict statistically the number of new hospitalizations per week for children aged < 1 years in the Region of Valencia and also to determine which environmental factors influence in the infection by RSV.