# Sensitivity analysis of contact-related interventions for modeling epidemics

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Mathematical models used to understand the spread patterns of infectious diseases such as influenza and coronavirus disease 2019 (COVID-19) are very complex. The transmission component of the models can be modeled in an age-dependent manner by introducing a population contact matrix that describes the contact rates between age groups. In epidemic modelling, subtle changes in parameters affect disease dynamics such as the baseline reproduction number and the structure of the epidemic curve. This problem can be studied through a sensitivity analysis approach to express the impact of a change in the mixing pattern, which could lead to planning an optimal NPI intervention strategy.

In this talk, we examine the sensitivity of contact matrix elements estimated in [1] to gain insight into the impact of changing social contact structure based on Latin Hypercube Sampling (LHS). The Partial Rank Correlation Coefficient (PRCC) method uses these sampled contacts to find out which elements are important to the model. We also investigate an approach to aggregate the PRCC values to obtain pairwise sensitivity analysis results. The application of the methodology is illustrated by analyzing a COVID-19 model from [2], and the results could support the decision makers during a pandemic.

*Keywords: Sensitivity analysis, age-dependent epidemic model, social contact matrix, Latin hypercube sampling (LHS), Partial rank correlation coefficient (PRCC).*

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### References

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