Young MONID Initiative

MONID | MODELING NETWORK for Severe Infectious Diseases

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# Young MONID Webinar

## Capturing Household-level Dynamics in Stochastic Differential Equation Models of Infectious Disease Transmission

**Guest speaker: Houda Yaqine, Bielefeld University**

**WHAT: Young scientist talk**

**WHEN: Friday, 6th September 2024 10:00 am (CEST)**

**WHERE: online** https://helmholtz-hzi-de.zoom-x.de/j/64363087508?pwd=RTZkcHFWc3VkMlJpa0lPSXpLclJSZz09


### ABSTRACT

Infectious diseases pose a significant and persistent challenge to global public health, leading to significant mortality and disability worldwide. It is crucial to understand the mechanisms of disease transmission to devise effective interventions and assess the outcomes of health policies. Our study introduces a new SIR stochastic model that depicts the variable transmission rates within households, thus deepening our understanding of infection dynamics. This model integrates household structure and varied mixing patterns, defined by the average contact rates across distinct population subgroups. We employ Markov jump processes, which are approximated later by diffusion processes through stochastic differential equations (SDEs). Our simulations are geared towards evaluating the model's behavior in different scenarios and its sensitivity to a range of parameters. We also demonstrate a refined simulation of contact matrices that distinguish between consistent and diverse social interactions, incorporating a public policy aspect to model both targeted and broad interventions. This approach aims to improve public health responses and intervention strategies by providing a more accurate representation of disease transmission.


### SPEAKER BIO: Houda Yaqine

- Doctoral researcher at Bielefeld University, Germany
- Research focuses on advanced mathematical and statistical modeling techniques
- Addresses challenges in understanding and managing complex systems
- Explores modeling approaches such as stochastic differential equations for disease spread
- Utilizes Bayesian semiparametric methods for diagnostic test evaluation
- Engages in optimal experimental design for biological systems
- Investigates the value of information concept for water quality monitoring

**Link to speaker bio: https://houdayaqine.github.io**

**Website: https://monid.net/en/young-monid-initiative/**