

Modeling Covid-19 spread via data-based multigroup SIR with comorbidities risks and fuzzy inference in an island context

S. REGIS, LAMIA - Pointe-à-Pitre
W. MERAT, LAMIA - Pointe-à-Pitre

S. P. NUIRO, LAMIA - Pointe-à-Pitre
A. DONCESCU, LAMIA - Pointe-à-Pitre

Simulation is an important tool for decision makers, especially in the health field. The Covid-19 pandemic has challenged the health systems of the most developed countries in the world, strongly impacting their economies and lifestyles. In this context, using fuzzy sets and aggregation operators [1, 2] to take into account rapidly identified risk factors (age and obesity), we have proposed a multi-group SIR model [3] to simulate the spread of Covid-19 in an insular context. In this model, the focus is on the hospital capacities which were the major issue of this pandemic by replacing the compartment R (Retired) by the compartment H (Hospitalization) [4]. For this specific class of viruses, it is worth noticing that our approach allows to better characterize the infectious transmissions between different age groups. The simulations of our model were carried out with real data from the official agencies of the islands of Guadeloupe [4].

Keywords : Data-based ; COVID-19 simulation ; SIR ; fuzzy subsets ; multigroup ; aggregation operators.

References

- [1] Didier Dubois and Henri Prade. On the use of aggregation operations in information fusion processes. *Fuzzy sets and systems*, 142(1) :143–161, 2004.
- [2] Richard Emilion, Sébastien Regis, and Andrei Doncescu. A general version of the triple π operator. *International journal of intelligent systems*, 28(10) :957–973, 2013.
- [3] Pierre Magal, Ousmane Seydi, and Glenn Webb. Final size of a multi-group sir epidemic model : Irreducible and non-irreducible modes of transmission. *Mathematical biosciences*, 301 :59–67, 2018.
- [4] Sébastien Regis, Silvere P Nuiro, Woody Merat, and Andrei Doncescu. A data-based approach using a multi-group sir model with fuzzy subsets : application to the covid-19 simulation in the islands of guadeloupe. *Biology*, 10(10) :991, 2021.