Review of: "A Mathematical Characterisation of COVID-19 in Mauritius"

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Potential competing interests: No potential competing interests to declare.

Summary of the Work

The aim of this study is to investigate the spreading of the SARS-COV2 infection in Mauritius. To this end, the author developed mathematical models of the progression of COVID-19 in Mauritius and numerous other countries primarily in Europe. By comparing similar models for numerous countries, the author found that, for the first COVID-19 wave, the ceiling value of the number of cases was inversely correlated to the slope of mathematical models fitted to the curve. He also determined relevant parameters such as the reproduction number, the immunity percentage of the population that was needed to stop the spread of the infection, etc.

General Considerations

- Please, check English, some typos were found.

- The authors do not propose a real model of equations governing the spread of COVID-19, but rather a series of curves able to fit the experimental data. These curves show trends that follow "*a priori*" the experimental trends and the free parameters are chosen in such a way as to "*optimize*" such fittings.

- Despite the author's claims, the present work is not well framed in the (by now very vast) literature in modeling the spread of SARS-CoV2 infection.

- The list of references is not exhaustive and must be completed.

- Limitations of the authors' approach are not well specified (see point **5)** below)..

In my opinion, there are some flaws and several weak points in this work. The following tips are meant to fill some gaps.

Suggestions

One of the main subjects of the current research is to construct a realistic model able to determine space-time patterns of the spreading of outbreaks of a virus (e.g., outbreaks of SARS-CoV2) that have appeared in a determined region of a Country. More specifically, it is crucial to be able to construct software based on a particular model. The model should be able to determine these patterns by taking into account the presence of poles of attraction and the distribution of the Hospitals.

1) Please, report the magnitudes of the experimental errors in Figures**1., 4.**, and **6.**

2) Please specify how the author's approach may take into account the distribution of hospitals in a Country.

3) Please, clarify how the author's approach may evaluate the impact of the Lockdown and the Quarantine measures adopted by the Government of the Country;

4) Generally, the dynamics for the spread of COVID-19 is strongly affected by the intrinsic (i.e., spontaneous) fluctuations to which a macroscopic system is usually subjected. Generally, the correlation functions of fluctuations are obtained by statistical mechanics. The author is invited to discuss this important aspect by mentioning how their approach can somehow take into account the role of intrinsic fluctuations.

5) Mauritius is an island nation in the Indian Ocean with an extension of about 2,040 km². So, the realistic dynamics of the SARS-COV2 infection is governed by space-time stochastic differential equations. These equations must take into account the spatial distribution of the hospitals as well as the poles of attraction of susceptible people (e.g., shopping centers, workplaces, etc.). The author's approach does not take into account these crucial elements and this constitutes a real limitation of this work. The authors are asked to discuss this point.

6) The literature cited in the References is far from exhaustive. The author should complete it, perhaps by expanding Introductory Section **1.**

Conclusions

The work is interesting, but written in this form it contains many defects and the analysis conducted by the authors is sometimes incomplete. The author is encouraged to take into account the suggestions expressed above.