Review Form 3

Journal Name:	**Asian Journal of Probability and Statistics**
Manuscript Number:	**Ms_AJPAS_127675**
Title of the Manuscript:	**Modeling COVID-19 Pandemic Data with New Pareto Model**
Type of the Article	

General guidelines for the Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty'**, provided the manuscript is scientifically robust and technically sound.
To know the complete guidelines for the Peer Review process, reviewers are requested to visit this link:

https://r1.reviewerhub.org/general-editorial-policy/

Important Policies Regarding Peer Review

Peer review Comments Approval Policy: https://r1.reviewerhub.org/peer-review-comments-approval-policy/
Benefits for Reviewers: https://r1.reviewerhub.org/benefits-for-reviewers

PART 1: Comments

	Reviewer's comment	**Author's Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. A minimum of 3-4 sentences may be required for this part.		
Is the title of the article suitable? (If not please suggest an alternative title)		
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.		
Is the manuscript scientifically, correct? Please write here.		
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.		

Review Form 3

Is the language/English quality of the article suitable for scholarly communications?		
Optional/General comments	Minor Revision The primary advantage of this paper lies in its development of the New Extended-Pareto (NE-P) distribution, which offers a more flexible and robust statistical framework for modeling COVID-19 mortality data compared to the traditional Pareto distribution. By introducing additional shape parameters, the NE-P distribution enhances the ability to capture the variability and skewness inherent in real-world epidemiological data. Through comprehensive simulation studies and applications to multiple real-world datasets, the paper demonstrates that the NE-P distribution consistently outperforms the baseline model in terms of goodness-of-fit measures such as AIC, CAIC, and HQIC. This makes the NE-P model a valuable tool for accurately analyzing pandemic data and supporting data-driven decision-making in public health. 1. The abstract clearly defines the purpose and methodology of the study, but it would benefit from briefly mentioning the real-world implications of using the new distribution for modeling COVID-19 mortality data. 2. Consider rephrasing 'superior model' to a more neutral phrase like 'a robust and effective model.' 3. The introduction provides a solid background on the use of probability distributions in statistical modeling. However, it might help to briefly elaborate on why the classical Pareto distribution requires generalization in the context of COVID-19 mortality data. 4. Ensure consistent formatting for equations, especially when referenced in the text. 5. The description of the NE-P distribution is comprehensive, but the derivations are dense. Consider simplifying the explanation of key steps for better accessibility to a broader audience. 6. The log-likelihood function and estimation methodology are described well. However, a brief mention of why the Newton-Raphson method was chosen over other numerical methods could strengthen the justification. 7. The comparison between the NE-P and baseline Pareto distributions is clear and convincing. Including a short discussion on potential limitations of the NE-P distribution (e.g., assumptions, biases) could balance the presentation. 8. The use of multiple datasets strengthens the analysis, but a paragraph on why these specific datasets were selected and their representativeness would add value. 9. The conclusion effectively summarizes the findings. However, consider adding a brief note on future work, such as extending the NE-P distribution to other types of epidemiological data. 10. Explicitly stating how these findings can assist policymakers or researchers in managing COVID-19 or similar pandemics could improve the practical relevance of the study. 11. The manuscript is well-structured, and the use of mathematical rigor is commendable. However, some parts could benefit from improved readability for audiences who may not specialize in statistics. 12. Figures are clear and support the analysis well. Ensure consistency in formatting across all figures. 13. The simulation study is well-structured and shows the robustness of the maximum likelihood estimation method. Adding a brief explanation of why specific parameter values were chosen for the simulation would enhance reproducibility. 14. Consider summarizing the findings of Table 1 in a sentence or two to make it easier for readers to understand the trends without needing to analyze the table in detail. 15. Reference formatting should be checked to conform to the journal's guidelines. 16. Some references (e.g., [1], [2]) are cited well but lack a detailed explanation of their relevance to this study. Expanding	

	on this can improve clarity. 17. This work should include a discussion of mathematical modeling's importance in the medical field. They should also include an overview of the different models available, and how they can improve diagnosis and treatment planning. I suggest authors examine the following relevant works: a. Alshehri, M. H., et al. (2021). A Caputo (discretization) fractional-order model of glucose-insulin interaction: numerical solution and comparisons with experimental data. Journal of Taibah University for Science, 15(1), 26–36. b. Alalyani, Ahmad and Saber, Sayed. "Stability analysis and numerical simulations of the fractional COVID-19 pandemic model" International Journal of Nonlinear Sciences and Numerical Simulation, vol. 24, no. 3, 2023, pp. 989-1002. c. Sayed Saber, et al. Mathematical Modelling and optimal control of pneumonia disease in sheep and goats in Al-Baha region with cost-effective strategies [J]. AIMS Mathematics, 2022, 7(7): 12011-12049. d. Saber et al., A Mathematical Model of Glucose-Insulin Interaction with Time Delay, J Appl Computat Math 2018, 7:3. e. Alshehri, Mansoor H., et al."Dynamical analysis of fractional-order of IVGTT glucose–insulin interaction" International Journal of Nonlinear Sciences and Numerical Simulation, vol. 24, no. 3, 2023, pp. 1123-1140. f. Al-Zahrani, et al., A Fractional Order SITR Model for Forecasting of Transmission of COVID-19: Sensitivity Statistical Analysis, Malaysian Journal of Mathematical Sciences 16(3): 517–536 (2022). g. Khalid I.A., et al. Different strategies for diabetes by mathematical modeling: Modified Minimal Model, Alexandria Engineering Journal, Volume 80, 2023, Pages 74-87, h. Khalid I.A,et al. Different strategies for diabetes by mathematical modeling: Applications of fractal–fractional derivatives in the sense of Atangana–Baleanu, Results in Physics, Volume 52, 2023, 106892. i. Najat Almutairi, et al. The fractal-fractional Atangana-Baleanu operator for pneumonia disease: stability, statistical and numerical analyses [J]. AIMS Mathematics, 2023, 8(12): 29382-29410.	

PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

Reviewer Details:

Name:	**Sayed Saber**
Department, University & Country	**Al-Baha University, Saudi Arabia**