

Peer Review File

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Reviewer A

Thank you for the opportunity to review the manuscript titled "Analysis of factors influencing maternal mortality and newborn health - A machine learning approach." While this is an interesting study, there are several critical issues that need to be addressed for better clarity and rigor:

Comment 1: Misalignment Between Introduction and Methods: The introduction suggests the advantage of combining a random forest machine learning (ML) model with geospatial statistical analysis. However, the methods section does not adequately describe the use of the random forest model. Instead, it primarily focuses on K-means clustering and factor analysis. To align the paper with its stated objectives, the authors should either provide more details about the random forest model's application or revise the introduction to accurately reflect the methods employed.

Reply 1: The authors thank the reviewer for offering valuable suggestions, which have been thoughtfully integrated into the introduction and method sections. This has resulted in a harmonized alignment between these two sections. In particular, we have provided a comprehensive elaboration on applying the Random Forest machine learning model. The methodological intricacies of this approach have been thoroughly discussed in the methods section, while the corresponding results have been presented in a detailed manner within the results section..

Changes in text: Pls. see the red highlighted part in the introduction section, page number 5 to 6 For method section, pls see the red highlighted text on page number 7 to 13.

Comment 2: Unclear Correlation Methodology: The manuscript lacks transparency regarding how correlations between identified factors and clusters were established, as demonstrated in Table 6 (Factors Correlation with Matern Deaths). It is crucial to specify whether these correlations were determined through specific analytical techniques or were based on observational findings. Clear documentation of the methodology used for correlation analysis is essential for the research's credibility.

Reply 2: The authors thank the reviewer for providing valuable suggestions. In response to the feedback received, the methodology section has undergone significant revisions, now featuring a step-by-step process outlining identifying factors and cluster analysis. To enhance clarity, we have also expanded and refined the methodological aspects, ensuring a more thorough presentation of the associated results within the results section. The methodology section has been carefully modified and improved in accordance with the reviewer's insightful suggestions.

Changes in text: Pls refer the section 4.2 and 4.5 section in Methodology (Page no. 8 and 10).

Comment 3: Ineffectual Utilization of Cluster Analysis: The value and meaningfulness of the cluster analysis are unclear in the paper. Moreover, the clusters were formed by amalgamating data related to both maternal mortality and newborn health. Given the potential differences in contributing factors, it would be more scientifically sound to separately identify risk clusters for maternal mortality and infant mortality. Analyzing the factors associated with these clusters individually would likely yield more relevant insights.

Reply 3: The authors thank the reviewer for the insightful suggestion. The risk clusters have been directly generated from the raw data, ensuring that all clusters exhibit comparable rates of maternal and infant deaths. This implies that high-risk clusters feature both maximum infant and maternal deaths, and this pattern extends to the remaining clusters. The final clusters, derived through a combination of statistical analysis and AI/ML techniques, have been distinctly formulated for Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR). Subsequently, these previously identified risk clusters are systematically compared with the ones determined through the analytical process. We have revised the methodology section and result part thoroughly as per the reviewer suggestion.

Changes in text: Pls. refer to section 4 methodology (Page no. 7), section 4.5 and 4.5.1 (Page no.10). Further, for more clarification on risk factor and clustering is provided in result section 5 on page number 13-15 (red text).

Comment 4: Minor issues: The overall organization of the manuscript can be improved. I encountered difficulties in establishing connections between various sections, leading to a lack of coherence.

Reply 4: The authors thank the reviewer for the valuable suggestion, and we fully agree with the feedback. In response, we have diligently revised the sections, aiming to enhance the overall clarity of the manuscript. We sincerely appreciate the reviewer's guidance. Notably, the introduction, methodology, results, and discussion sections have been improved to address the reviewer's comment on the connectivity of the manuscript. Changes in text: The changes are highlighted in red text throughout the manuscript.

Reviewer B

This is an interesting article applying advanced techniques to better understand causes of infant and maternal mortality in a specific geographic region in India. Unfortunately, the study design is poorly described and the manuscript is very difficult to read. Some specific suggestions.

Comment 1: The introduction is far too long and contains too much discussion. Focus on key foundational elements and move discussion to the "Discussion" section.

Reply 1: The authors thank the reviewer for the valuable suggestion. We appreciate the feedback, particularly on the introduction section, and have made significant modifications as per the suggestion. The introduction has been refined, focusing on precision, and the unnecessary discussion part has been removed and appropriately

relocated to the discussion section for better organization and coherence

Changes in text: Pls. refer the red highlighted part in introduction section (page number 4-6) and the result and discussed part is also improved, pls refer the discussion (page no. 15 to 18)

Comment 2: The manuscript contains numerous typographical errors, fragmented and run on sentences, and grammatical errors. These mistakes significantly impact readability.

Reply 2: The authors thank the reviewer for the valuable suggestion, and we completely agree with the feedback. We have thoroughly revised the manuscript, carefully reviewing and editing sentences to reduce errors and improve the overall quality of the document. We appreciate the constructive input and believe that these efforts have contributed to the enhancement of the manuscript.

Changes in text: The changes are highlighted in red, and some sentences are completely modified and removed, which reflect in the track-change mode version of the manuscript.

Comment 3: The methods section contains a mix of results and methods, please leaves the results to the results section.

Reply 3: The authors thank the reviewer for the valuable suggestion, and we completely agree with the feedback. In response, both the results and methods sections have undergone revisions, and they have been separated for clarity and improved organization in the manuscript.

Changes in text: The changes are marked in red in both methods (page no 7-12) and result section (page no. 13 to 15).

Comment 4: The manuscript would benefit greatly from a methodological overview. As written, it reads more like a laboratory notebook providing a chronologic list of tasks performed rather than convey a study design.

Reply 4: The authors thank the reviewer for the valuable suggestion. The methodology section has been carefully revised, and a methodology diagram has been incorporated. This diagram aims to provide a visual representation of the step-wise procedures followed, clearly illustrating the methodology employed to derive the final findings.

Changes in text: We have modified the methods section, pls. refer the page no. 7-12.

Comment 5: The mixed results/discussion section is difficult to follow. As with Methods, please provide "clean" sections focusing on summary results with references to tables/figures as appropriate.

Reply 5: The authors thank the reviewer for the valuable suggestion. In response, the methodology section has undergone revisions, and the result and discussion sections have been appropriately separated to present methods and results distinctly, addressing the previous mixing. Furthermore, there has been a streamlining of references to tables and figures, ensuring proper and relevant referencing in the text. These improvements are in accordance with the reviewer's suggestions, enhancing the overall clarity and

structure of the manuscript.

Changes in text: Pls. refer the result section 5 and 6 (page number 13 and 15).

Comment 6: Tables provide insufficient detail to understand the meaning of the values

Reply 6: The values in table number 6 and 7 reflects factor loading. The same has been accordingly added in the tables.

Comment 7: Figure 2 is very difficult to read due to label size

Reply 7: Figure 2 which is now Figure 3 in revised manuscript is updated and readable now. The editable version of figure 3 is also submitted separately.

Reviewer C

The derived factors mostly have no logical association with the outcomes of interest and can't be explained in any meaningful way. The authors are probably just finding correlations that are about unmeasured poverty or health access variables. I hope you find that useful.

Reply: The authors thank the reviewer for the valuable suggestion. Acknowledging the shortcomings in the previous draft, particularly in the explanation of methodology and the structure of the methods, results, and discussion sections, we have undertaken significant revisions in the revised manuscript. The methodology section has been thoroughly revised, and a methodology flow diagram has been incorporated to provide a clear and accurate depiction of the procedural steps. Additionally, detailed information about the methods has been included in this section. We genuinely hope that these changes contribute to a clearer and more meaningful presentation of the manuscript.