
Response for the additional comments from Reviewer 4:

- 1. Dr. Martin was the PI in Boston when the study was done**
- 2. The IRB mentioned covered both sites (mentioned explicitly)**

We also added the following sentence in the Discussion: ‘Larger sample sizes will also help to further characterize uncertainty and robustness properties of the inferred models.’ In general, we feel the rest of the commentary from Reviewer 4 has already been addressed, including the issue of bacterial load. Since we take into account all classes including “unclassified bacteria”, those effects are already accounted for.

1. Our office is still missing author paperwork from Drs. Nicholas Sizemore, Kaitlyn Oliphant, and Erika Claud. Please note all author paperwork must be submitted before a manuscript can be accepted. A separate email will be sent to this author with instructions on completing the forms directly after this message.

SHOULD BE FIXED

2. The following author noted patents in the author paperwork: Ishanu Chattopadhyay. Please confirm that all authors are referring to the same patents and that these are the only patents related to this work. Additionally, please note that the patents should be disclosed in the Competing Interests statement. Please provide a sentence for inclusion. If the patent(s) is already filed, please also include the following details of this patent in the statement: current patent status, the name of the organization filing the patent, the names of the authors on this paper who are also authors on the patent, dates, and serial numbers. Please note that patent applications may be impacted by publication.

None of the patents from any of the authors are related to this work.

3. Dr. Camilia Martin noted a consulting relationship in the author paperwork (Reckitt/Mead Johnson Consulting: Baxter Scientific Advisory Board: LactaLogics, Plakous, Vitara, Evive). Does this relationship need to be disclosed in your paper's Acknowledgments? If so, please provide a sentence for inclusion. If you feel this relationship does not need to be declared, please provide a brief explanation of why not for our records.

This relationship does NOT need to be declared, as it has no connection or relation to the present work.

4. Science Advances' abstracts should be under 160 words and should not have references to previous publications nor callouts to figures and tables. Please revise accordingly.

DONE

5. Please avoid the use of personal pronouns such as "we" in the teaser. The teaser should be a one sentence summary of the conclusions of the article and should be geared toward a general audience. The revised teaser can be included in the title page of the manuscript file and should not exceed 130 characters (including spaces and a period at the end).

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6. Science Advances uses a complete citation format that includes all authors, full titles of journal articles, the journal abbreviation, the volume, the first and last page, and the year of publication. The absolute formatting (what is bold and what is italic) is less important than having a complete citation for each journal article cited. Please adjust your references.

7. Please provide sub-heading for the Competing Interests statement in your Acknowledgements section.

DONE

8. Please confirm that all funding information, including grant numbers and grant recipients, are listed in the Funding statement within your Acknowledgements. If details are missing, add them to the files and notify staff so that the electronic record can also be updated.

ALL PRESENT

9. Please place the "Author Contributions" statement in the Acknowledgements, between the Funding and Data and Material Availability statements.

DONE

10. Please place the "Software Availability" section in the Materials and Methods section.

DONE

11. There are links to 7 Github datasets in the “Software Availability”. If you own or generated any of these datasets please note that, upon publication, data and code must be available in the paper or archived in a permanent, independent, preferably non-profit repository such as Dryad, Dataverse, or Zenodo with an access code provided in the Data and Materials Availability statement. A Github link may be included but only as an additional resource. Please provide the data as part of your submission or in a repository. If applicable, please list any repositories storing additional data and the access code to obtain the data. For additional information, please see our editorial policies website here: <https://www.sciencemag.org/authors/science-journals-editorial-policies#data-and-code-deposition>

All these datasets are already linked to Zenodo

12. Science Advances asks that all figure captions include a clear one-sentence title at the beginning of the caption. The title should appear as bolded text. Please include a one-sentence title for caption titles for supplemental Figures S2-S3.

DONE

13. Please send any updated files to eagre@aaaas.org.

14. Note: Please send a version of the updated Article Content file in PDF format and .tex. If any changes are made to the References list, please send an updated .bib file as well.