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The University of Georgia®
Odum School of Ecology

August 28, 2020

Re: Effects of assortative mixing and sex-traits on male-bias in tuberculosis: A modelling study

Dear Editor,

Please find enclosed with this letter our manuscript "Effects of assortative mixing and sex-traits on male-bias in tuberculosis: A modelling study" which we submit for publication as a research article in *Royal Society Open Science*.

Tuberculosis is the number one cause of death by an infectious disease globally, and case notifications among males are nearly twice as common as those among females. This male-bias in incidence is a longstanding unsolved problem in tuberculosis epidemiology. There are two main mechanisms used to explain sex-disparities in tuberculosis: biological sex-traits (e.g., susceptibility) and behavioral factors (e.g., social mixing patterns). We conducted a simulation study to compare the effects of these mechanisms on sex-disparities and explored what disease factors might cause sex-disparities in infectious diseases to be sensitive to assortative mixing. Our most important finding is that an interaction exists between biological and social network factors that can increase sex-disparities in infectious diseases, especially for slow-spreading infectious diseases such as tuberculosis. While focusing on how assortative mixing can lead to sex-disparities in tuberculosis, this study contributes to our growing understanding of how social network structure can affect the epidemiology of infectious diseases. Our work is on the interface of epidemiology, mathematical modelling of infectious diseases, and network science and has implications for public health.

All authors have approved this manuscript for submission. We assert that these results are original and not under consideration for publication elsewhere. We declare no competing interests.

I can be reached by email (paige.miller@uga.edu) or phone (651-767-2412). Thank you for your consideration.

Sincerely,

Paige Miller