Abstract Submitted
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Modeling ventilation in an urban-slum home in Dhaka, Bangladesh[1] YUNJAE HWANG, Stanford University, MAHAMUDUR HASAN, International Centre for Diarrhoeal Disease Research, Bangladesh, LAURA KWONG, Stanford University, FOSIUL NIZAME, International Centre for Diarrhoeal Disease Research, Bangladesh, STEPHEN LUBY, CATHERINE GORLE, Stanford University — Improved ventilation in slum housing could reduce the incidence of pneumonia, which is the leading cause of death in children under five. The goal of this project is to assess the effectiveness of different ventilation strategies for low-income housing in Dhaka, Bangladesh. One of the main challenges identified in field experiments is the dependency of the ventilation pattern on both the configuration of the home, and on the highly variable operating conditions defined by weather and occupancy. In this study, we validate a computational framework with uncertainty quantification to predict ventilation rates in a representative slum home with different sizes and locations of openings. A low-fidelity model is used within a second-order probability framework: uncertainty due to inconsistent ventilation patterns is represented using both single-sided and cross-ventilation models, while uncertainty in model parameters is accounted for using Monte-Carlo simulation. The resulting predictions for the ventilation rate show a similar trend as the field measurements, but are subject to large uncertainty. In ongoing work, we are performing high-fidelity computational fluid dynamics simulations to investigate reducing the uncertainty in the low-fidelity model predictions.

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