Public Abstract

First Name:Rebecca
Middle Name:Shattuck
Last Name:Lander
Adviser's First Name:Lisa
Adviser's Last Name:Sattenspiel
Co-Adviser's First Name:
Co-Adviser's Last Name:
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Epidemics have played a role in shaping human experiences of conflict among both soldiers and civilians. Prisoners of war, displaced populations, and confined refugees have experienced, and continue to experience, outbreaks of infectious disease, which are exacerbated by physical, environmental, and psychological stressors. Observations of epidemics at the global, regional, or national level are not always able to provide a complete picture of the unique health challenges of these wartime populations. This research develops and applies a computer simulation model to examine the way human behaviors, and the impact of those behaviors on the environment, can impact the way diarrheal diseases develop and spread in confined high-density living situations. This simulation was tested against the recorded death and sickness patterns for a dysentery outbreak at Camp Douglas, Illinois, a 19th Century Civil War prison camp.

The agent-based simulation used in this research is a unique approach, and is based on the feedback relationship between human movement and behavior and the resulting contamination of physical spaces with infectious material, rather than direct person-to-person pathogen transmission. The results of this simulation suggests that modeling disease transmission based on environmental result in distinct epidemic dynamics. The results of this research emphasize the importance of examining the relationship between humans, their environment, and patterns of health and disease. Additionally, it highlights the way that model design can help to increase knowledge of how even limited movement and interaction options available to confined individuals can lead to significant differences in patterns of disease spread and epidemic development, which can help to better design public health interventions targeted at confined populations.