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Title: Alternative roles of heterogeneities in driving transmission dynamics: analysis of contrasting compartmental models

Heterogeneities in host susceptibility and infectiousness are known to affect the dynamics of parasite spread. However, their combined effect on transmission is not well understood. We break down the classic Susceptible-Infected compartmental model to integrate heterogeneities in host susceptibility and infectiousness, under two alternative scenarios: Recipient Dependent (RD), where both susceptibility and infectiousness are fixed characteristics of the individual, and Donor Dependent (DD), where an individual's infectiousness is determined by the identity of the infecting individual. We show that these alternative mechanisms lead to different outcomes for transmission, and are influenced by heterogeneities in susceptibility and infectiousness in different ways. DD systems show highest variability in transmission outcomes (R_0 and equilibrium host population size) at intermediate heterogeneity levels, determined purely by infectiousness. For RD systems, however, increasing host heterogeneity increases the range of possible transmission outcomes, influenced by both susceptibility and infectiousness, and the correlation between them. DD and RD models represent two ends of a spectrum in how host infectiousness is determined, with specific host-parasite systems likely lying at different points between them. Therefore, heterogeneities in susceptibility and infectiousness are both important drivers of transmission, but which of these traits is more consequential will be system dependent.