On the probability of extinction of the Haiti cholera epidemic

Enrico Bertuzzo (1), Flavio Finger (1), Lorenzo Mari (1,2), Marino Gatto (2), Andrea Rinaldo (1,3)

(1) EPFL,Lausanne, Switzerland (enrico.bertuzzo@epfl.ch), (2) Politecnico di Milano, Milan, Italy, (3) Università di Padova, Padua, Italy

Nearly 3 years after its appearance in Haiti, cholera has already exacted more than 8,200 deaths and 670,000 reported cases and it is feared to become endemic. However, no clear evidence of a stable environmental reservoir of pathogenic *Vibrio cholerae*, the infective agent of the disease, has emerged so far, suggesting that the transmission cycle of the disease is being maintained by bacteria freshly shed by infected individuals. Thus in principle cholera could possibly be eradicated from Haiti. Here, we develop a framework for the estimation of the probability of extinction of the epidemic based on current epidemiological dynamics and health-care practice. Cholera spreading is modelled by an individual-based spatially-explicit stochastic model that accounts for the dynamics of susceptible, infected and recovered individuals hosted in different local communities connected through hydrologic and human mobility networks. Our results indicate that the probability that the epidemic goes extinct before the end of 2016 is of the order of 1%. This low probability of extinction highlights the need for more targeted and effective interventions to possibly stop cholera in Haiti.