

**Jane Heffernan**, York University, Toronto, Canada  
Suma Ghosh, University of Utah, USA

### **The effects of pre-existing immunity in seasonal influenza**

Seasonal influenza continues to cause waves of infection every year. Vaccination programs aid individuals and populations in resisting infection, however, the vaccine is usually imperfect and may not confer immunity against the strain in circulation. Immunity gained from infections or vaccines from previous years will aid an individual, and a population, in resisting infection through partial immunity. The extent of these effects however, on the individual and the population, have not been quantified. We have developed a model of seasonal H3N2 influenza infection including epidemic and inter-epidemic periods. The model includes the effects of partial immunity and vaccination and tracks two years of infection history. The model is used to compare and contrast the benefits of an imperfect vaccine and pre-existing immunity on an individual, and on a population. Latin hypercube sampling is employed to determine individual and population parameters which most affect the spread and impact of influenza infection.