

Swine flu in the Holy Land – a case country for studying the onset of a pandemic

Uri Roll¹, Haggai Katriel¹, Amit Huppert², Rami Yaari¹, Oren Barnea¹ and Lewi Stone¹

¹ Biomathematics Unit, Dept. of Zoology, Faculty of Life Science, Tel Aviv University.

² Center for Risk Analysis, The Gertner Institute, Chaim Sheba Medical Center, Tel Hashomer.

We analyze and model the spatio-temporal dynamics of the onset of swine flu in Israel from the 26/4/2009 to the 7/7/2009. Our database included the first 713 confirmed cases, identified as primary or secondary, and assigned to age-classes, sexes, social groups, contact networks, geographic localities etc. This unique dataset, which is arguably one of the best records of the swine flu pandemic in the world, enabled us to construct a representative age-class model that faithfully reproduced the dynamics of the outbreak. In the process, we estimated key epidemiological parameters of the pandemic and constructed models to evaluate its generation time distribution, basic reproduction number, differential age-class infection rates and spatial dynamics. We find that the pandemic in Israel started spreading after seven weeks of its initiation, mostly infected the 18-25 age group (many soldiers), and was more biased towards males. The basic reproduction number – R_0 – was found to be relatively low (1.08-1.25). The spread of the disease was mostly from the central coastal plain to other regions, with higher infection rates in more densely populated regions with higher income households. Our work aims at providing tools for managing this pandemic as it progresses as well as, devising methods for analyzing future pandemics.