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Julie C Blackwood*, 33 Stetson Ct, Williamstown, MA 01267, and **Junyan Duan, Mykhaylo Malakhov, Jordan Pellett, Ishan Phadke, Suzanne Lenhart** and **Katriona Shea**.

Transboundary Management Under Alternative Objectives with Applications to Diseases.

Public health policy is inextricably linked with the allocation of regulatory authority between different levels of government. While infectious disease dynamics are in general well-understood, few modeling studies have considered spatially heterogeneous populations that fall under multiple administrative jurisdictions and hence under levels of government with potentially differing objectives. We pose and numerically analyze a two-patch SIRS-type model that explicitly incorporates migration and allows managers to choose between vaccination, quarantine, medication, border closure, and a travel ban on infected individuals while aiming to minimize either the number of patients or the number of deaths. In particular, we consider three classes of manager: a central government that acts equitably, local governments that act selfishly, and a non-governmental organization that seeks to maximize the overall good. We establish general guidelines for optimal governance and demonstrate several anomalous cases of interest. (Received September 13, 2019)