

Developing the Framework for an Early Warning System for Ebola based on Environmental Conditions

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The 2014-2016 Ebola outbreak in West Africa indicated that this lethal disease can become a National Security issue as it crossed borders and taxed regional health care systems. Ebola symptoms are also similar to other endemic diseases. Thus, forewarning of its possible presence can alert local public health facilities and populations, and may thereby reduce response time. Early work by our group has identified local climate (e.g. temperature, precipitation) and vegetation health (e.g. remote sensing using normalized difference vegetation index, NDVI) variables as leading indicators to known historical Ebola outbreaks. The environmental stress placed on the system as it reaches a climatic tipping point provides optimal conditions for spillover of Ebola virus from the reservoir host (which is unknown but suspected to be bats) to humans. This work outlines a framework for an approach to provide early warning maps based on the present state of the environment. Time series data from Climate Forecast System ver. 2 and AVHRR and MODIS satellite sensors are the basis for the early warning models used. These maps can provide policy makers and local health care professionals timely information for disease surveillance and preparation for future Ebola outbreaks.