

# Outbreak Analytics: using data science to inform the response to health emergencies

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Despite continuous improvement in disease surveillance systems, infectious disease outbreaks remain a major public health concern, as illustrated by the ongoing COVID-19 pandemic. Effective response to epidemics relies on timely intervention, and needs to be informed by all available sources of data. Unfortunately, the collation, curation, exploration and analysis of such data is often a complex task, owing to the diversity of data types (e.g. case linelists, contact networks, pathogen genome sequences) and methods to exploit them (e.g. time series analysis, graph theory, Bayesian methods). Recently, *outbreak analytics* has emerged as a new data science dedicated to extracting operationally relevant information from the data to inform the response to health emergencies in real time. I will be discussing the context of this emergence and some of the key challenges and opportunities of this new field of research. Using examples taken from the 2018-2020 Ebola outbreak in North Kivu and Ituri (Democratic Republic of the Congo) as well as the COVID-19 pandemic, I will illustrate how statistics and modelling may prove useful for adapting response strategies to infectious disease threats. I will conclude by outlining future avenues for the development of outbreak analytics, focussing on the development of new methods as well as of the software ecosystem.