



Interdisciplinary research in epidemic preparedness and response

Executive Summary

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Despite enormous progress in the prevention and treatment of infectious diseases during the 20th century, infectious disease epidemics continue to affect the world. Transmission of pathogens from animals to humans poses a particular risk, as seen in devastating recent Ebola, severe acute respiratory syndrome (SARS) and new coronavirus outbreaks (SARS-CoV-2). Furthermore, climate change, urbanisation, extensive population mobility and intercontinental air travel have created opportunities for the rapid global spread of emerging and re-emerging pathogens.

These threats have focused attention on global health security and the urgent need for global and national preparedness, outbreak prevention, and coordinated responses to extinguish new outbreaks as rapidly as possible. Effective preparedness covers multiple areas, spanning infectious disease surveillance, infection prevention and control within the community and health facilities, population protection through vaccination, outbreak investigation, and planning of rapid coordinated responses to emergent epidemics. Furthermore, effective preparedness requires a thorough understanding of the ecology of infectious diseases, the impacts of factors such as changing land use and mobility patterns, the effects of urbanisation and climate change, as well as cultural contexts.

Research has a key role to play in both epidemic preparedness and response, including the development and clinical evaluation of new interventions (drugs, vaccines and diagnostics), understanding transmission, and assessing the effectiveness of responses. Infectious disease transmission and control is a complex area, affected by multiple biological, environmental, behavioural and social factors. Understanding how all these factors interact calls for input from researchers across multiple disciplines, including laboratory sciences, epidemiology, engineering, clinical research, veterinary science, ecology, climate science, health systems research, health economics and behavioural sciences.

All these domains of research have important contributions to make, to identify key factors in the emergence and spread of infectious disease and ways in which the spread of infections can best be controlled. However, the efforts of researchers in different disciplines are not always fully integrated, and significant obstacles exist to productive interdisciplinary research.

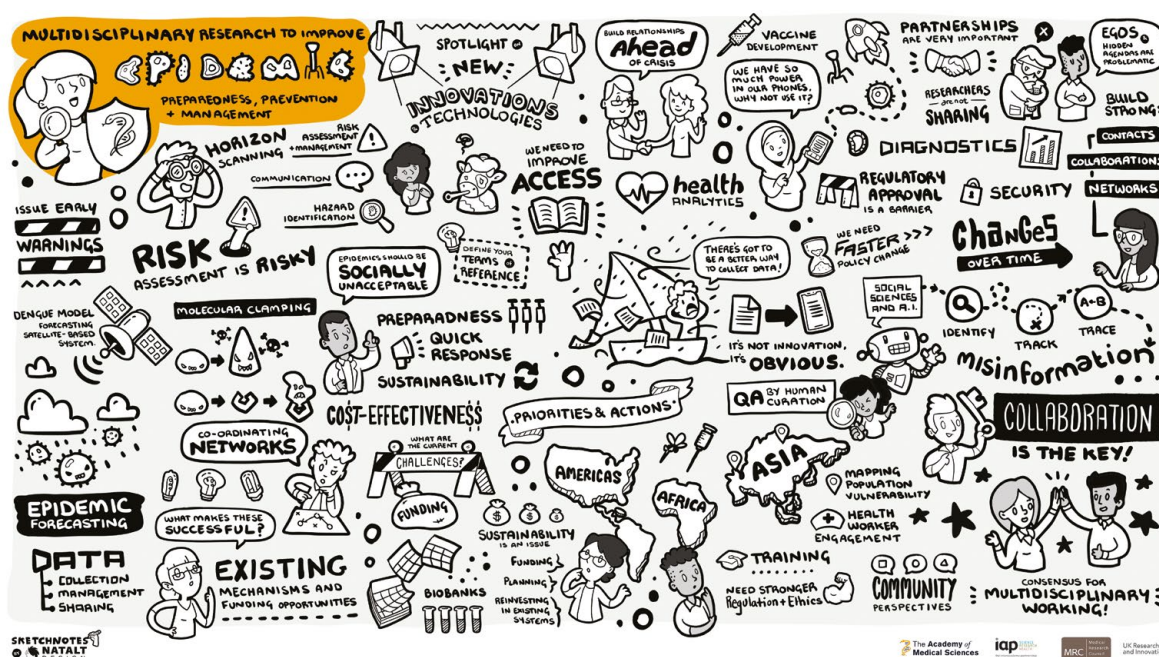
Participants at a two-day international workshop organised by the Academy of Medical Sciences, the InterAcademy Partnership and the Medical Research Council (held in London, October 2019) identified a range of key multi- and interdisciplinary research priorities in support of public health goals across four key phases – ‘prepare’, ‘prevent’, ‘respond’ and ‘recover’. Much attention is given to the development of new drugs, vaccines and diagnostics to control outbreaks. However, environmental factors, human behaviour, and social and political contexts are all powerful influences on the emergence, transmission and spread of infectious disease, highlighting the potential of wider public health interventions to control disease. Interdisciplinary research is therefore key to ensure effective:

- **Knowledge generation:** Understanding the full range of physiological, cultural, environmental and socioeconomic factors affecting infectious disease emergence/re-emergence and transmission.
- **Intervention development:** Developing and evaluating multifaceted evidence-based public health interventions to prevent infection and interrupt transmission.
- **Modelling:** Developing multidimensional models for risk assessment, comparing the impact of intervention strategies, and assessing their cost-effectiveness.
- **Evaluation:** Informing and evaluating preparedness plans, prevention activities and outbreak responses.

A key need for interdisciplinary research is to understand the factors underpinning the behaviour and decision-making of groups, such as communities at risk or affected by outbreaks, healthcare workers and public health officials, and political leaders and policymakers with responsibility for preparedness and responses. In addition, as the climate emergency is likely to increase the risk of infectious disease outbreaks, multi- and interdisciplinary research on outbreaks needs to be integrated with wider climate change preparedness activities.

Workshop participants also identified critical obstacles to multi- and interdisciplinary research and ways they might be overcome. Among the key facilitators highlighted were:

- **Building and sustaining partnerships:** Establishing interdisciplinary research partnerships in advance of epidemics and sustaining them.
- **Community engagement:** Developing strong relationships with communities, building trust, and involving communities in agenda setting, intervention development and research activities.
- **Capacity building:** Developing in-country multi- and interdisciplinary research capacity.
- **Funder engagement:** Ensuring that funders prioritise and develop appropriate mechanisms to support multi- and interdisciplinary research for epidemic preparedness and response.



Opinions expressed in this report do not necessarily represent the views of all participants at the event, the Academy of Medical Sciences, and partner organisation (to be updated depending on partner) or its Fellows.



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