

Forum

# The Links Between Public and Ecosystem Health in Light of the Recent Ebola Outbreaks and Pandemic Emergence

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## INTRODUCTION

The Ebola outbreak in West Africa is an unprecedented public health emergency of international concern. It is the largest and most complex Ebola outbreak on record, having resulted in over 28,000 cases, and an estimated case fatality proportion of 40%. The Ebola outbreak took a significant economic and social toll on West African Nations beyond human death and illness. It has devastated families and communities, compromised essential services including health and education, weakened economies and isolated affected populations. The outbreak shows that we are still not ready to deal with infectious disease emergencies. It also demonstrates the importance of preparedness and building resilient health systems through the integration of disaster risk management into health care provision at all levels. Ebola exploits fragile and overstretched health systems with limited public health capabilities. Therefore, we must prioritize strengthening the health institutions, develop their infrastructure, and support the training of the health workforce.

## DISCUSSION

This is not the first time that a novel or re-emerging virus has tested the ability of national, regional and global

community to predict and prevent a pandemic and to respond to its impact. In fact no pandemic so far has been predicted before it emerges. This is a testament to our vulnerability to zoonotic health threats. Drivers of disease emergence of most pandemics, including HIV/AIDS, SARS, and pandemic influenza, are associated with ecological, behavioural, or socioeconomic changes (Morse et al. 2012). The increasing demand for land, water, and energy due to human population growth and density and economic development has led to deforestation and associated biodiversity loss, climate change, imbalances in agricultural and food supply systems. These drive the emergence of new diseases, while increasing international travel and trade including the transport of live animals, food items, plants; coupled with our own fragile health systems facilitate their spread and increase their impact.

Most pandemics originate in animals. More than 60% of EIDs are zoonotic (Karesh et al. 2012), and zoonoses of wildlife origin have dominated pandemics of the past 100 years (Morse et al. 2012). Changes in the overall pattern of pathogen–host–environment interactions and in key interfaces that promote contact among humans, livestock, and wildlife underlie disease emergence. Increasing environmental change alters the dynamics of pathogen transmission within these groups, leading to increased pathogen spill-over between species, and the widespread geographic redistribution of pathogens, vectors and hosts. Examples of drivers include bush or wild meat hunting and consump-

tion, mass rearing of animals and use or misuse of antimicrobials and vaccines. Changes in climate, weather conditions such as temperature and humidity also affect pathogen environmental survival and transmission, compounding the potential for spillover to lead to pandemic spread.

## WHAT CAN BE DONE?

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Against this background, several mitigation and control strategies can be adopted to predict, prevent and also respond in a timely and effective way to pandemic zoonoses. First a global strategy to coordinate pandemic preparedness and response is needed. The increasing frequency of pathogen emergence suggests that this should be a priority. Lessons learned from previous efforts at pandemic preparedness and response indicate that this is extremely complex and hard to implement through conventional sector support programmes. Hence the emergence of the One Health approach, which refers to the collaborative multidisciplinary, cross-sectoral work by public and animal health agencies, and the environmental sector to reduce the risk of disease emergence across their interfaces.

Cross-sectoral approaches are needed to gain sufficient momentum in controlling emerging disease because there are constant challenges to adopting them. Systems need to be put in place that make the One Health vision come to life, and these require careful investment, and time, to make them work. The time used to implement these programs must be used well—to build trust, innovate, learn lessons, and establish sustainable ways of working together. Adequate resources are needed to make this happen: if the funds needed for cross-sectoral collaboration are not available, collaboration will not materialize. OIE, FAO and WHO as part of the tripartite agreement and the World Bank have supported countries to work across sectors with the aim of building systems that are strong and resilient and that can respond to a range of health emergencies. As a result of these efforts, more countries are exploring the One Health approach and are implementing it in myriad creative ways.

Secondly, increasing capacity to analyse and predict disease emergence, and conduct surveillance in livestock, wildlife and people at the key interfaces where diseases emerge are of utmost importance. Enhancing innovation in molecular diagnostics and geo-spatial modeling is vital to pre-empt pandemic zoonotic disease emergence through

early identification of novel pathogens in high risk hotspots for disease emergence. Such important work has been pioneered by researchers in International Livestock Research Institute (ILRI) and EcoHealth Alliance. For example global hotspots for emerging infectious diseases that originate in wildlife have been mapped (Morse et al. 2012). Given that most pandemics have mainly originated in wildlife, these maps identify hotspots where the next pandemic is most likely to originate and thus facilitate targeted surveillance, which supports prevention and control efforts at source.

The WHO Research and Development Blueprint is a global strategy and preparedness plan to ensure that targeted R&D can strengthen emergency response by bringing medical technologies to patients during epidemics. The Blueprint aims to reduce the time between the declaration of an international public health emergency and the availability of effective tests, vaccines, and medicines that can be used to save lives and avert crisis. The Blueprint will be presented to Member States at the next World Health Assembly in May 2016.

A whole-of-government and a whole-of-society approach, with communities at the centre of preparedness and response to infectious disease emergencies, led by strong political commitment of Governments, is essential. In the current Ebola outbreak, this has involved presidents recognizing that the response needs to include all sectors as well as politicians and civil society. Integration of social sciences research, particularly that focused on human behavior, is pivotal to understanding the origins and evolution of pandemics (Janes et al. 2012). In the Ebola outbreak in West Africa, fear and panic led to distrust and may have exacerbated the spread of the disease and its subsequent impact on social cohesion. Moreover, the reaction to returning frontline health care workers from West Africa which in some cases included imposing isolation and quarantine on asymptomatic health care workers, as well as often sensational coverage by media and its use by politicians, have further damaged the response to the outbreak by delaying needed deployment of personnel.

This is not new. All of the above happened in our response to the emergence of AIDS in the 1980s. Public messaging needs to address the uncertainties surrounding the emergence of infectious diseases and promote evidence-based practices. Lessons learned during previous pandemics prove that it is difficult to be precise in communication, and that intelligent solutions are needed to deal with uncertainty in our relation with the public. It also points to

the importance of engaging with communities and mobilizing societies. Simple precautionary behavioral measures are often very effective in reducing exposure to pathogens and the risk of disease transmission. Efforts to reduce occupational exposure could be targeted in hotspots of emerging infectious diseases at high-risk animal-human interfaces through standard sanitation and biosafety precautions. This has proved successful in reducing the risk of H5N1 infection in for example livestock workers and food handlers in many agricultural settings (Ssematimba et al. 2012).

Finally, infectious disease emergencies put a considerable burden on health workers. In the Ebola outbreak not only were doctors and nurses affected, but also ambulance drivers, hospital cleaners, and burial team members. There have been a total of 869 confirmed health worker infections reported from Guinea, Liberia, and Sierra Leone since the start of the Ebola outbreak, with 507 reported deaths (WHO, June 2015). This points to the challenges in implementing infection prevention and control measures, including the development of infection control protocols, training staff, and obtaining supplies. It remains crucial that we boost recovery efforts in the affected countries, underpinned by building more resilient health systems that are better able to prevent and respond to all hazards. This will also require concerted efforts towards governance and economic development.

In addition to the horrific mortality, the Ebola outbreak has seriously undermined economic activities and livelihoods throughout West Africa. In Liberia real GDP growth for 2014, which was projected to be around 5.9 per cent was revised below 1 per cent in 2014 (World Bank 2014). The Ebola outbreak hit three sectors of the economy—agriculture, services, and manufacturing—particularly hard, with these accounting for nearly 97 per cent of the employed labour force in 2010 (Republic of Liberia, April 2015). Critical to recovery will be addressing the unique needs of Ebola survivors, including in protecting survivors from stigma and human rights violations and enabling their full reintegration into their communities. Comprehensive support is needed for Ebola survivors that include medical and psychosocial consequences of the disease. There is also an urgent need to address the risk of sexual transmission of the virus so that the continued transmission of the virus is interrupted, and the risk of reintroduction of the virus in areas where transmission has previously been eliminated is prevented (WHO 2016).

## CONCLUSION

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Pathogens will continue to emerge with potential spill-over and even rare events of human to-human transmission, posing the threat of a pandemic. Emerging infectious diseases and pandemic threats remain a major global concern. Responding to outbreaks and pandemics costs lives and livelihoods, and preventative approaches are urgently needed that are built on resilient systems at the human, animal and ecologies interfaces. It is essential to develop the capacity to anticipate, predict and prevent dangerous pathogen from spilling-over to humans causing pandemic threats. Zoonotic diseases should therefore be priority for risk assessment and reduction and management efforts. Collaborative multidisciplinary, cross-sectoral work is needed by environmental, public health and animal health agencies to reduce the risk of diseases at their interfaces. This calls for investment in each sector to build their capacities for prevention and control and to coordinate and sustain their collaboration.

## REFERENCES

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- Karesh WB, Dobson A, Lloyd-Smith JO, et al. (2012) Ecology of zoonoses: natural and unnatural histories. *The Lancet* 380:1936–1945
- Morse SS, Mazet JA, Woolhouse M, Parrish CR, Carroll D, Karesh WB, Zambrana-Torrel C, Lipkin WI, Daszak P (2012) Prediction and prevention of the next pandemic zoonosis. *The Lancet* 380:1956–1965
- Janes CR, Corbett KK, Jones JH, Trostle J (2012) Emerging infectious diseases: the role of social sciences. *The Lancet* 380:1884–1886
- Ssematimba A, Hagensars TJ, de Wit JJ, et al. (2012) Avian influenza transmission risks: analysis of biosecurity measures and contact structure in Dutch poultry farming. *Preventive Veterinary Medicine*. doi:10.1016/j.prevetmed.2012.09.001
- World Bank (2014) Update on the economic impact of the 2014 Ebola Epidemic on Liberia, Sierra Leone, and Guinea. <http://www.worldbank.org/content/dam/Worldbank/document/Economic%20Impact%20Ebola%20Update%202%20Dec%202014.pdf>
- WHO (2015) Ebola Situation Report. <http://apps.who.int/ebola/current-situation/ebola-situation-report-17-june-2015>
- Republic of Liberia (2015) The economic stabilization and recovery plan. [http://ebolaresponse.un.org/sites/default/files/liberia\\_recovery\\_strategy\\_en.pdf](http://ebolaresponse.un.org/sites/default/files/liberia_recovery_strategy_en.pdf)
- WHO (2016) Interim guidance: clinical care for survivors of Ebola virus disease