

ZOONOSES - FROM PANIC TO PLANNING

Over two thirds of all human infectious diseases have their origins in animals. The rate at which these zoonotic diseases have appeared in people has increased over the past 40 years, with at least 43 newly identified outbreaks since 2004. In 2012, outbreaks included Ebola in Uganda (see **Ebola** box), yellow fever in the Democratic Republic of Congo and Rift Valley fever (RVF) in Mauritania. Zoonotic diseases have a huge impact – and a disproportionate one on the poorest people in the poorest countries. In low-income countries, 20% of human sickness and death is due to zoonoses. Poor people suffer further when development implications are not factored into disease planning and response strategies. A new, integrated ‘One Health’ approach to zoonoses that moves away from top-down disease-focused intervention is urgently needed. With this, we can put people first by factoring development implications into disease preparation and response strategies – and so move from panic to planning.

Drivers of disease

The main drivers behind the transmission of animal infections to people (known as ‘spillovers’), and the subsequent spread of the infections, relate to where and how people live, and the contacts people have with animals, both wild and domestic. These drivers have intensified rapidly in recent decades as previously inaccessible natural habitat is converted into farmland or settlements and wildlife is exploited for food. The likelihood of disease spillover is also increasing as climate change affects habitats, wildlife populations and the distribution of the organisms that carry these diseases from one animal to another (‘vectors’).

In addition, the massive growth of human populations in urban areas (see **Making risk managers** box), combined with the greater connectedness of cities around the world, makes a global pandemic resulting from a geographically remote spillover event a real possibility. The health of people and animals are thus interconnected and inextricably linked to the environments both inhabit. Given the complex pathways that lead to spillovers, it is important that prevention and control measures are undertaken with a strategic approach and an understanding of the many interdependencies.

Livestock are a key part of the story. Around 70% of the rural poor and 10% of the urban poor are dependent on livestock, and the demand for animal-based protein is expected to grow 50% by 2020. This may potentially increase zoonoses such as African animal trypanosomiasis. At present 10% of livestock in Africa are infected with trypanosomiasis, which reduces livestock production by 15%. In humans, it can cause sleeping sickness and be fatal if untreated.

Glossary

Endemic: an infection maintained in a population.

Epidemic: an outbreak of a contagious disease that spreads rapidly and widely beyond what would normally be expected during a period of time in a particular region.

One Health: One Health is a globally recognised approach established to promote the collaborative effort of multiple disciplines, working locally, nationally and globally, to attain optimal health for people, animals and the environment. More details at www.onehealthinitiative.com and www.onehealthglobal.net

Pandemic: an outbreak of global proportions.

Spillover: the process in which diseases originating in animals pass to susceptible humans and/or animals.

Transmission: the passing of a communicable disease from an infected animal or human to a susceptible animal or human.

Vector: the organisms that carry diseases from one animal to another.

Zoonoses: animal diseases transmissible to humans (SARS, Ebola), including human diseases emerged from animal diseases (HIV/AIDS, smallpox).

The importance of a 'One Health' approach

Current approaches to zoonotic disease management are fragmented. Veterinarians deal with livestock disease, wildlife specialists with wild animal populations, ecologists with ecosystem biodiversity and public health experts with human disease. Meanwhile, separate groups work on disease management and disease eradication. A more integrated and strategic research and development effort is needed on disease surveillance, management and eradication to assist risk-based and cost-effective zoonoses prevention and control options for poor people in developing countries.

When zoonotic outbreaks occur they can massively disrupt development and poverty reduction efforts. The US Institute of Medicine observed that it was 'unable to identify a single example of a well-functioning, integrated zoonotic disease surveillance system across human and animal sectors'. There is evidently a need and a demand for a new approach.

'One Health' seeks to replace the disease-centred approach to zoonoses with a system-based one. It consists of the collaborative effort of multiple disciplines, working locally, nationally and globally, to attain optimal health for people, animals and the environment. 'One Health' can play a role in catalysing better preparedness and surveillance that are informed by cross-disciplinary approaches.

It could also help accelerate research discoveries, enhance the efficacy of response and prevention efforts, and improve education and care. Policy actors are hindered in embracing 'One Health' policymaking by the global health governance system. An important part of realigning policy to embrace 'One Health' will be a refocusing from the current disease-centred approach to a holistic perspective that values human health, animal health and the environment.

Key recommendations

1. Ring-fence long-term funding

There is currently a tendency for responses to be reactive to crises. As each new disease threat emerges, prior threats are easily forgotten. However, planning and long-term strategies for disease control are key. Resources also need to be made available to control and manage endemic diseases, even when the threat is not visible. Many diseases are possible to control if this advice is followed. Brucellosis in livestock is a good example. In most developed countries, programmes, compensation and financial incentives for disease-free herds have more or less eliminated the disease, but in developing countries it remains a neglected endemic zoonosis.

For diseases of global importance, investments need to be made with general, rather than specific, disease use in mind. This will save money and resources and, as clustered diseases are easier to control, transform geographical weaknesses into strengths.

National platforms and structures established as a result of large avian influenza investments could provide the basis for long-term, cross-sector collaboration for other zoonotic diseases. With their remit broadened they could establish the basis needed for surveillance and management of both endemic and epidemic disease.

Ebola - a deadly disease whose control may lie with local people

In July 2012, the Ugandan Ministry of Health notified the World Health Organization (WHO) of an Ebola haemorrhagic fever outbreak in Kibaale district resulting in at least 16 deaths. A further outbreak was confirmed in November, 40 miles from Kampala. These outbreaks are part of a long struggle with the disease. One of the worst Ebola outbreaks, in 2000, infected 425 people, killing more than half of them.

The Ebola virus kills up to 90% of those infected. Fruit bats are thought to be the virus's natural host, but the disease also spreads through human-to-human transmission and from other animals that fall victim to it, such as chimpanzees and antelope. It occurs mostly in remote villages in Central and West Africa near tropical rainforests. No treatment or vaccine is available.

Risks of human-to-human transmission include contact with blood, secretions, organs or other bodily fluids of the infected. Hence, caring for the sick and burying victims remain high-risk activities. This can be seen in the July outbreak where nine deaths were within the same household from Nyanswiga village. However local cultural logics and social protocols by those who have long lived with the disease may provide a basis for building better response strategies.

2. Plan for uncertain futures

Disease emergence is inherently uncertain. Even with improved scientific modelling and surveillance, planning must get to grips with uncertainty and ignorance. This requires an approach centred on adaptive management, in which constant observation and careful experimentation are combined.

While large-scale modelling efforts can improve our understanding of zoonoses risk factors and disease locations, these need to be complemented by contextual understandings. Local people are often best placed to become the 'adaptive managers' of animals, ecosystems and disease, albeit with the support from cross-sectoral agencies.

3. Improve measurement and mapping

There is massive under-reporting of zoonoses. A recent high-level group convened by the World Health Organization (WHO) recommended assessing the societal burden of disease attributable to zoonoses. Zoonoses mapping is essential to help decision-makers plan and manage disease control, as well as to identify disease hotspots and allow for prioritisation.

Further research work on disease dynamics also needs to be undertaken, particularly in areas where there is evidence of infection but not disease outbreak. For example, to understand why one in five people in Gabon have antibodies to the Ebola virus with no apparent ill-effect.

4. Improve systemic surveillance

Zoonoses surveillance needs to be reinforced and maintained at national and international levels. If effective surveillance systems are in place for 'what we do know' then we are better prepared to deal with 'what we don't know'.

Improved monitoring provides a more accurate, real-time estimate of disease burden and impact and allows for better planning. Better monitoring should also lead to improved understanding of the impact of successful policy options and greater motivation for control.

Surveillance and monitoring need to shift from a focus on a disease or specific event to the whole system, looking at interactions between disease drivers and disease incidence at the community level, as well as poverty and equity impacts. Such systemic surveillance approaches will require new organisational arrangements and diverse expertise, including direct involvement of local people affected by disease.

Making risk managers of city dwellers

People in growing towns and cities need to be included in zoonoses management. Increasingly people are leaving the countryside and moving to urban areas. However, at least 800 million urban dwellers remain reliant on agriculture for a living, often keeping animals in close confinement in densely populated areas. This poses health risks, including from zoonoses. An example of this is the high household prevalence of *Cryptosporidium* in Nairobi, of particular concern because of its serious health consequences among people with HIV/AIDS and malnourished children.

A recent study with a 'One Health' approach addressed the complex problem of assessing and mitigating risk by using cross-disciplinary and participatory methods and working with policymakers from the outset. It established useful ways to identify the most at-risk groups and evidence-based messages best suited to these groups. Education and training were identified as strategies that would improve safety in the food chain and encourage people to be their own 'risk managers'. This offers a model for improving zoonoses management which can be further developed and evaluated.

Violence and conflict as drivers of disease

RVF, Lassa fever and other zoonoses are rife in conflict zones where disease detection and control is a major challenge amid collapsed health systems, destroyed infrastructure, breaks in supply chains of medicine and the disruption of disease control.

Population displacement can also lead to mixing and sharing of infectious agents, resulting in disease outbreaks which then often last longer than in comparatively stable areas.

During the civil war in Sierra Leone, where fighting was concentrated in the Lassa fever belt as a Lassa epidemic raged, clinics were looted and staff fled, making the transportation of patients from disease epicentres impossible. Lassa fever left untreated can kill up to 80% of those infected and people died in the bush, reversing the previously falling case-fatality rate.

However, a cross-sectoral 'One Health' approach can be applied in conflict zones. For example, in 2005 collaborative surveillance efforts resulted in early detection and response to outbreaks of Ebola in Yambio in South Sudan.

5. Develop more flexible and collaborative working

Improving human, animal and ecosystem health needs to be viewed as a cooperative endeavour. International leadership and coordination is important to stop zoonoses falling through the gaps between different disciplines and sectoral responsibilities.

There is good cooperation between the World Health Organization (WHO), Food and Agriculture Organization (FAO) and World Organization for Animal Health (OIE) on 'One Health', but this cooperation and political commitment needs to be translated to national and local levels. A promising development is the emergence of cross-sectoral 'zoonoses groups' in several countries.

Cross-sector working also ensures better preparedness and contingency planning, more efficient and effective surveillance systems, cost-sharing between sectors according to their benefits of control, increased health equity and improved sharing of logistics and costs for service provision.

6. Draw on multiple forms of expertise

Complex processes with uncertain outcomes require multiple sources of expertise. This means combining modelling and data collection approaches. For example, satellite technology led to successful prediction of a RVF outbreak in 2006/7, providing a two to six week period of warning which enabled resources to be mobilised to contain the epidemic.

Participatory approaches can also lead to new understandings and strategies, especially in the developing world where detailed data sources are often unavailable. Very often in remote areas, without public health and veterinary coverage, it is local people who know most about disease dynamics and impacts. Mobile phone technologies and social media have potential uses in new forms of participatory surveillance and disease monitoring.

7. Develop a 'One Health' approach that is justice- and rights-based

Zoonotic diseases have a disproportionate impact on the poor. Interventions therefore must integrate poverty reduction, ecosystem management and disease control. This means assessing the costs of intervention and control. Too often the impacts on people's lives and livelihoods are neither assessed or considered and may be greater than the local costs of the disease.

Equally, issues of access to disease prevention and control measures must be evaluated. Who will gain access to vaccines or drugs in an epidemic? Who will pay? Who will benefit? There are always winners and losers, and equity remains an important consideration. A 'One Health' approach must be justice- and rights-based. It should incorporate a balanced assessment of the pros and cons of alternative control and response approaches which ensures that the poor and marginalised do not lose out.

Further reading

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www.driversofdisease.org

Credits

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