Surveillance for the present and the future

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Surveillance is a topic that often sparks considerable debate. Discussions usually start in the middle (the activities), move to the end (the outputs) and then only by necessity to the beginning (the programme objectives). Planning surveillance is greatly simplified by clearly articulating the objectives at the outset. In the case of animal health surveillance, examples of programme objectives are the improvement of production and food security, economic development, enhancing access to trade and safeguarding the health and productivity of people. The value addition that can result from One Health approaches to surveillance requires clarity about shared objectives, as well as strategies for institutional integration at the appropriate level. This knowledge first enables technical objectives to be prioritized (suitable indicators and estimates of prevalence, and so on). While operating within the context of available financial, institutional and human resources, this clarity on shared objectives will make it possible to select appropriate surveillance activities to deliver the outputs, reporting activities and implementation of the desired system.

The Participatory Epidemiology Network for Animal and Public Health (PENAPH) seeks to facilitate research and information-sharing among professionals interested in participatory approaches to epidemiology and risk-based surveillance. (Stark *et al.* 2006) As part of this process, the network supports innovation in institutional capacity by promoting minimum training guidelines, good practice and continued advancement of methods through action research. It is composed of nine core partner organizations including NGOs (Vétérinaires sans Frontières Belgium and Veterinarians Without Borders/Vétérinaires sans Frontières Canada), international and regional bodies (World Organisation for Animal Health (OIE), UN Food and Agriculture Organization (FAO), African Union – Interafrican Bureau for Animal Resources (AU-IBAR), and African Field Epidemiology Network (AFENET), and leading academic and research institutions (Royal Veterinary College (RVC) in the United Kingdom and the United States Centers for Disease Control and Prevention (US-CDC).

(Mariner *et al.*, 2009) At the request of PENAPH, the International Livestock Research Institute (ILRI) hosts the PENAPH Secretariat.

PENAPH advocates a broad-based approach to the assessment and design of surveillance programmes intended to promote an appropriate mix of conventional, risk-based and participatory activities that meet the attributes of effective surveillance systems. (Thacker *et al.*, 1989; CDC, 2001) Participatory surveillance approaches recognize that surveillance systems can take many forms, from passive surveillance to active case finding and sero-surveys, (Cameron, 2009) but that these core methodologies can perform more effectively when supported by complementary risk-based tools that allow cost-effective intelligence gathering tailored to the needs of policy development.

SURVEILLANCE NEEDS

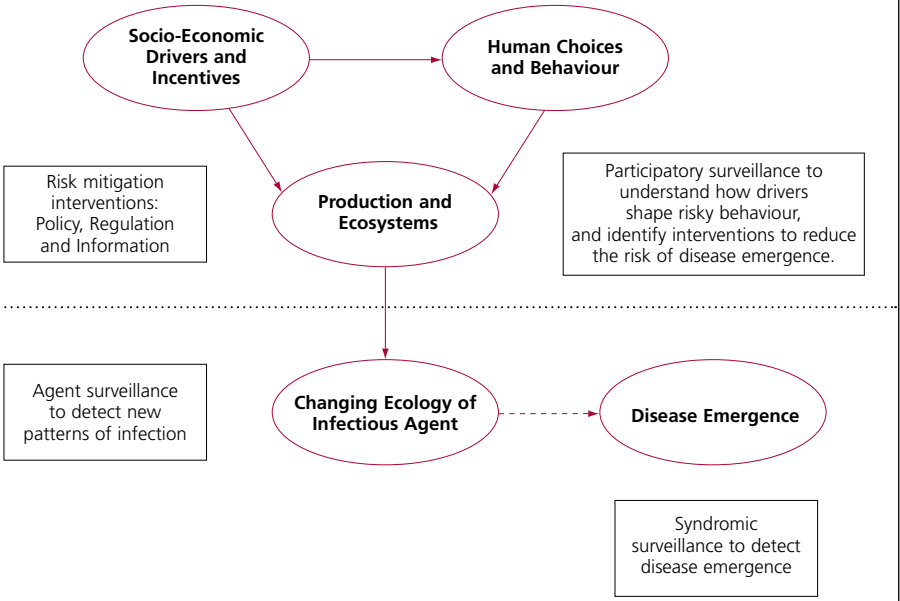
Planning surveillance for the future is complicated as it entails anticipation of the nature of future challenges which can unfold as a chaotic mix of conflicting forces. In this regard, scenario analysis can help. The process involves identifying drivers of change in terms of the interactions between people, production systems and the environments that shape health challenges of the present and the future. A short list of drivers can be used to define possible future scenarios which can inform the process of designing surveillance activities.

Figure 1 presents a framework for understanding how diseases emergence. Incentive systems shape people's behaviour and decisions, which ultimately determine agricultural production systems and their interactions with ecosystems and environmental drivers. For example, land scarcity and commodity prices can drive communities to penetrate forest margins, thus creating high-risk situations for disease emergence or re-emergence. Alternatively, the drivers of urbanization – combined with poor policies for managing urban migration and low-income residential areas in cities – can lead to the expansion of slums with poor sanitation and very high human, livestock, and pest densities.

Risk assessment combined with scenario analysis is particularly helpful in considering surveillance for emerging disease threats. Current efforts in the area of emerging disease are focusing on sampling for new agents in areas of high-risk interactions between host species and the environment. Newly detected agents may or may not be pathogens. For surveillance to be truly forward-looking in terms of predicting and preventing the emergence of disease, the surveillance effort should be looking more broadly at the socio-economic drivers that are incentives for high-risk behaviour that lead to environmental change and that produce high-risk interactions. This will in effect shift the emphasis away from detecting agents of unknown significance to a process that directly measures risk and identifies the means of mitigating risk of the emergence of new pathogens.

The principal interventions that could mitigate risk and reduce the probability of disease emergence are policy reform, improving regulations, and improving the exchange of information. Policy and regulatory interventions can occur at any of the three levels shown in Figure 1: drivers and incentives, choices and behaviour, and production and ecosystems. Unfortunately, most regulatory interventions focus on directly prohibiting risky behavior, rather than seeking to eliminate the need for it by modifying or generating incentives that lead to economically viable alternatives.

FIGURE 1
A partial model of disease emergence and early detection illustrating the role of selected surveillance approaches



Participatory epidemiological approaches to surveillance are well suited to tracking high risk behaviour and for obtaining primary data on the incentives and drivers shaping risky behaviour. By involving key informants at all levels, from policy-makers to actors in production systems and value chains for high risk products, the interaction of policy, incentives and behaviour can be clarified. This information is valuable in scenario analysis (to assess future threats) and effective policy reform (to mitigate threats). In addition, participatory approaches are valuable for syndromic surveillance activities (Jost *et al.*, 2007; Azhar *et al.*, 2010) and could greatly enhance the targeting of biological testing to potential emerging pathogen events. Integration of these surveillance activities informed by effective risk assessment would lead to a more comprehensive and holistic surveillance system allowing a fuller analysis of the threat of emerging disease and enhancing the ability to respond effectively and efficiently.

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