

EMERGING DISEASES— assessing the epidemiological and socioeconomic risks

Integrated disease management is based on an accurate understanding of risk systems, areas and periods, and on the assessment of their impact and the socioeconomic impact of control measures. In addition to veterinary science, a range of disciplines such as ecology, epidemiology, modelling and, to an increasing extent, social and economic sciences, are involved. CIRAD and its partners have implemented this strategy for several emerging or spreading diseases in Africa and Asia.

Our modern societies could now be on the brink of the fourth major global epidemiological change, following that of the neolithic era, which was associated with animal domestication, and the two changes associated with urbanization and trade exchange, which led to “microbial unifications” in Eurasia, beginning in the 5th century, and in the Old and New Worlds,

as of the 15th century. Panzootic, pandemic influenza and diverse viral haemorrhagic fever in animals and humans are emerging or feared “microbial storms” induced by a broad range of environmental and socioeconomic factors, but especially by the increasingly frequent and intense contacts between humans and animal reservoirs. In this setting, all epidemiological dynamics

factors must be assessed, including not only biological factors, which are too often the only ones taken into account, but also environmental, economic and societal factors. It is essential to develop surveillance and control systems based on risk assessment that include human and social dynamics, in particular the cost-effectiveness of these systems and how they are perceived and accepted

Partners

SNRA Ethiopia, Mali, Cambodia, Vietnam, Thailand, Madagascar, University of Kasetsart (Thailand), University of Pretoria (South Africa), University of Murdoch (Perth, Australia), Institut Pasteur (Cambodia, Madagascar), The Royal Veterinary College (UK), Food and Agriculture Organization of the United Nations (FAO, Italy), World Organisation for Animal Health (OIE, France), International Livestock Research Institute (ILRI, Kenya), Institut national de la recherche agronomique (INRA, France), Institut de recherche pour le développement (IRD, France), Agence française de sécurité sanitaire des aliments (AFSSA, France), Centre de recherche et de veille sur les maladies émergentes de l’océan Indien (CRVOI, France), Ecole nationale vétérinaire in Toulouse and Maisons-Alfort (France), Agronomes et vétérinaires sans frontières (AVSF, France), etc.

Vietnam, avian influenza vaccination





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by livestock farmers, health professionals and the entire society.

An integrated approach

This integrated approach is implemented by CIRAD and its partners for several emerging or spreading diseases. A corpus of methods and tools, which combine ecology, quantitative epidemiology, socioeconomics, statistical and mathematical modelling, is applied to several diseases: avian influenza, African swine fever, bovine tuberculosis and haemorrhagic fever, along with ovine catarrhal fever, which serves as a model of climate-related disease emergence. In addition, CIRAD is developing epidemiological outcome research applied to vaccination strategies and to innovative surveillance system assessment methods. This dual research and risk man-

agement issue is crucial in developing countries where human and financial resources are limited and where communication networks hamper interventions. This is the case in sub-Saharan Africa (especially southern Africa and Sahelian West Africa), in the Mediterranean Basin, where diseases threatening Europe may be kindled, and recently also in Southeast Asia.

Southern Africa and Southeast Asia—two hard-hit regions

In southern Africa, research is under way to assess risks of disease transmission between wild and domestic species and human populations. The studies are focused on outbreak sites, while considering transmission between species in settings of high ecological pressure—habitat fragmentation and transformation, dwindling biodiversity, etc.

In Southeast Asia, where several disease drivers are found (ie ecological, agro-industrial, socioeconomic and political), there is an increase in the number of areas conducive to disease outbreaks. Because of the current panzootic avian influenza of Asian origin and the risk of it developing into a pandemic outbreak, stricter veterinary control measures are being implemented in countries where the disease is recurrent and enzootic, especially in continental Southeast Asia. In this region, several other animal reservoir diseases have appeared in recent years, such as swine viral diseases and severe acute respiratory syndrome

(SARS), or are beginning to emerge, such as Japanese encephalitis, surra and PPR (*peste des petits ruminants*). Others could also be introduced from elsewhere, especially from Africa, including African swine fever and Rift Valley fever.

International expertise networks

As most emerging diseases are transborder phenomena, a regional approach is required to assess the factors involved. CIRAD has thus made agreements with hubs of excellence, which include South African and Australian universities and regional reference centres, with the aim of launching international expertise networks with associated institutional and scientific partners. Through comparative strategies, these networks will be better able to gain overall insight into emerging diseases and to compare the medical and economic efficacy of disease control systems. A key challenge will ultimately be to bring together medical and veterinary teams working in the public health sector, as has already been achieved in South Africa and Thailand, and to draw up health policies that are in line with the social and economic expectations of local populations.

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For further information



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