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Towards A Regional Approach for Animal Health Services Provision and Disaster Risk Reduction: The Economics of the Caribvet Network

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Abstract

Climate change is expected to increase the frequency and intensity of natural disasters (Mechler et al. 2010) that impact the socio-economic development of nations worldwide, including those in the Caribbean, a region particularly vulnerable to natural perils (Macpherson and Akpinar-Elci, 2013). Global changes and climate change are also expected to have a significant impact on animal and human health, especially distribution and impact of vector-borne and zoonotic diseases which are considered particularly sensitive to climatic variables (Harvell et al. 2002).

An integrated approach of disaster risk reduction (DDR) and climate change adaptation (CCA) has been suggested to avoid unnecessary duplication of efforts and to improve program effectiveness (Dwirahmadi et al. 2013). Consistent with the call of the World Organization of Animal Health (OIE), for reinforcing the role of veterinary authorities at national levels for disaster risk reduction (OIE and World Bank, 2007), a similar strategy is needed at the regional level in the Caribbean.

In the Caribbean, veterinary services, agricultural and veterinary universities, research institutes, and regional and international institutions in agriculture and health have garnered efforts to create a regional animal health network (CaribVET) in 2006 to assist in decision making and to advise on best management practices to mitigate the impact of animal diseases on livestock production and health, human health and welfare. Since 2012, the Epidemiology working group of CaribVET works on DRR in close collaboration with CENSA, which is the OIE collaborating center on DRR in animal health in Cuba (Gongora et al. 2012). According to CENSA's expertise, prevention and preparedness are the key components of the DRR cycle towards which CaribVET's efforts should be oriented.

In this paper, we propose a model that explains the economic rationale behind an animal health regional network as CaribVET. Then, the role of CaribVET in the improvement of knowledge on animal diseases, the development of tools that facilitates the provision of animal health, and the capacity development in the region is explained and associated to the well-known concepts of comparative advantages and economies of scale. We explain the role of CaribVET in DRR and the challenges to a regional approach on the deliverance of animal health services and DRR are discussed.

Keywords: Animal health economics; Regional networks, CaribVET

The model

The presence of externalities is the main economic argument in favor of a regional approach for the provision of animal health. When the Veterinary Service decides to implement actions to improve the level of animal health in its territory, it is indirectly benefiting other territories in the region. These externalities are generally not considered when planning individually resources allocation to disease surveillance and control thus leading to a sub-optimal allocation of resources on animal health provision in the region, which is a key problem in a framework characterized by the scarcity of resources, as the one faced by Veterinary Services in the Caribbean.

By implementing a regional approach for the provision of animal health, the internalization of these externalities is theoretically feasible and the indirect effects are included when deciding the allocation of resources towards control and surveillance activities. If we consider a set of k animal diseases, we can construct the maximization problem of the Veterinary Service of a territory i in a region comprising of m territories as follows:

$$\max_{cs^i, ss^i} U^i = n(y^i, cs^i, ss^i) * [L] + ne(y^{-i}, cs^{-i}, X^i, ss^i) * [L] - e(cs^i, ss^i)$$

Where:

U^i – the utility function that is maximized by the Veterinary Service of territory *i*, which in this case is expressed in monetary terms [1x1].

n – a function characterizing the number of infected animals by disease that depends on the characteristics of the territory and the control strategy implemented [1xk].

y^i – the characteristics of territory *i* that define its natural propensity to host a disease (ecosystem and environment, animal population, location, historic outbreaks, infrastructure, social and economic development, etc.).

cs^i – the control strategy implemented by territory *i* [kx1].

ss^i – the surveillance strategy implemented by territory *i* [kx1].

L – the economic loss associated to cases of infection by disease (negative domain) [kx1].

ne – a function characterizing the number of infected animals by disease due to the characteristics of neighboring territories, their control strategies, the degree of integration between territories, and the surveillance system implemented [1xk].

X^i – a vector that characterizes the degree of integration between territories [mx1].

e – an expenditure function associated with the control and surveillance strategies [1x1].

The ne function characterizes the externalities associated with the control strategies implemented by veterinary services of other territories. A naïve solution to the problem would be not to take into account this component, so the allocation of resources for surveillance will be lower than socially optimal. When the externality component is incorporated, the solution of the

problem leads to the optimal allocation on surveillance but the allocation on the control strategy remains socially suboptimal. The only way to obtain the socially optimal allocation is by pooling resources and letting a social planner to choose the corresponding allocations for control and surveillance strategies for all countries/territories (first best allocation).

Improvement of knowledge on Animal Diseases in the Region

The existence of a regional network contributes to the improvement of knowledge on animal diseases, through improved coordination and communication among members. Indeed, it allows the exploitation of the comparative advantages of each territory and to share and impart knowledge among members. Moreover, environments that foster interactions between different types of institutions (such as CaribVET) have been described as a fruitful mechanism for innovation (Porter and Stern, 2001). Indeed, CaribVET promotes the collaborations and coordination by exploiting the comparative advantages of its members (Veterinary Services, research institutes, laboratories, and regional and international organizations) for optimal partnership that provides favorable conditions for research collaborations in close link with regional priorities which are addressed within its working groups.

Development of Tools and Capacities in the Region

In the procurement of animal health services and the management of disasters, as in any other production process, labor (human capabilities) and capital (tools and equipment) are fundamental. As the labor (or capital) capabilities of a territory increases, the expenditure associated to any control and surveillance strategy is reduced. If territories can, not only invest in their control strategy and surveillance strategy, but also allocate resources to train other territories or provide tools (capital) that can help them to reduce their costs linked to the provision of animal health services or to DRR, they can indirectly benefit via the regional externalities. This increases the set of possible actions that a country can implement to better control diseases or improve the management of disasters.

Training sessions are organized to improve the capabilities of the staff of Veterinary Services and laboratories, such as trainings in new laboratory diagnostic tools, risk assessment, and outbreak preparedness. The optimal level of training is characterized by the equi-marginal condition between training and the control and surveillance activities: a territory will prefer to contribute to a training benefitting other territories if the indirect marginal benefit (per dollar spent) of doing it is larger than the marginal benefit of increasing the level of the control and surveillance.

Moreover, CaribVET is a platform that allows the identification of most common training needs in the Caribbean, the implementation, follow-up and ideally evaluation of impact of such training programs. A training program can be seen as a transfer of knowledge, skills and competences from developed/experienced to less-developed/less-experienced countries/territories such that the capabilities of the receiving countries/territories increase due to the transmission of knowledge by the trainer. The indirect benefits of trainings extend to the whole region and are not restricted to the territory being trained.

Role of CaribVET in DRR

The role of CaribVET in DRR is very important when dealing with biological disasters, but its contributions can be extended to other type of natural disasters, such as floods or earthquakes. CaribVET contributes in three different dimensions to the DRR problem:

1. On the prevention of disasters, by developing a regional disaster plan and providing countries with recommendations and advising about good practices and specific measures to develop national disaster plans. The joint work of experts/experienced persons from different countries along with researchers and international organizations increases the quantity of information and knowledge that is necessary when designing emergency plans and to identify weaknesses and strengths of VS to participate in the DRR.

2. On the level of preparedness of ministries of agriculture in the Caribbean to face a disaster, by organizing training workshops, simulation exercises that improve the capabilities of veterinary authorities to react properly and on time when a disaster arrives, together with other agencies and collaborating sectors in the countries/territories.

3. On the response to disaster situations, by increasing the responsiveness of veterinary authorities, promoting the early detection and early reaction, and facilitating the flow and exchange of information in the region, and by the strategic development of the Caribbean network of laboratories allowing identification and use of regional laboratories and facilitation of sample shipment to reference laboratories for quick disease diagnostic/confirmation (due to a biological or a natural disaster that increases the risk of diseases).

Challenges and Final Remarks

Language and sometimes political barriers, free-riding, and turnover of personnel of veterinary authorities in the countries are some of the challenges to the efficient implementation and success of a regional strategy such as the one developed by CaribVET. These challenges are derived from the great heterogeneity of countries/territories and the public good nature of animal health but also from the history of each individual country/territory in the region. Mechanisms to avoid the free-riding problem are hard to propose in an international framework, in which sanctions are not feasible.

In the last 10 years CaribVET has shown that a regional approach that encourages communication and cooperation in a region is feasible and the results are very promising. The efforts to construct regional animal health networks should continue despite the difficulties. The capacities in surveillance and diagnostic built from these efforts can be useful for different interests such as mitigating climate change effects, the provision of human health services (One Health approach), and the control/surveillance of antibiotic resistance that are of regional and worldwide importance. In an integrated world, the need for integrated approaches and solutions at regional levels arises. Since single countries/territories cannot efficiently manage animal health in isolation, the interconnection of neighboring and farther countries sharing similar constraints and in link with different regions in the world makes animal health a global issue where regional networks can become adapted structures to build a functional world-wide platform of animal health.

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