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## THE GLOBAL BURDEN OF (HOW WE MANAGE) ANIMAL DISEASE: LEARNING LESSONS FROM SOUTHERN AFRICA

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**ABSTRACT:** It is long past the time when we should be recognizing that the potential impacts of animal health interventions focused on livestock may in fact be far from environmentally benign. “First, do no harm” must apply to animal health policy-making as much as these wise words apply to clinical practice. An effort to assess the Global Burden of Animal Diseases, analogous to a long-standing and highly regarded endeavor in the public health realm, has only just been recently announced. This development offers an important opportunity for the formulation of data-driven policy guidance in support of holistic animal health and land-use management decisions that are more likely to be socially, ecologically, and economically sustainable for generations to come.

In terms of human health, the concept of measuring the global burden of disease (Global Burden of Disease 2018) is of course not a new one. There is now an important initiative underway to develop a similarly comprehensive and quantitative approach to assessing the global burden of animal disease (Rushton et al. 2018). However, for any measurement of impacts, one has to be quite specific in terms of the sectors (e.g., agriculture, environment, public health) one proposes to monitor. Given that there are examples of the “treatment being worse than the disease” in both human and animal health, some cross-sectoral introspection is indicated, especially given humanity’s stewardship responsibilities for domestic as well as wild animals.

Reliable, comprehensive global estimates of the direct and indirect costs of many animal diseases to society are currently lacking—hence the value of a global assessment. However, it is safe to say that the impacts of nonzoonotic as well as zoonotic (transboundary as well as endemic) diseases on livestock and agriculture systems, national economies, public health systems, and society overall are in the billions of dollars every year (Food and Agriculture Organization 2016). Such direct and indirect costs relate, but are not limited, to disease management programs (including surveillance and vaccinations), control of outbreaks, production losses, impacts on

human nutrition, public health costs related to zoonotic diseases, and environmental impacts and associated effects on livelihoods. Rural communities in particular depend upon wildlife, biodiversity more broadly, as well as ecosystems and the services they provide.

To give one example, the global impacts of foot and mouth disease (FMD) have been estimated to potentially exceed US\$22.5 billion annually (Knight-Jones and Rushton 2013), making this disease of artiodactylids arguably the most economically impactful nonzoonotic animal disease in the world. Notably, assessments of such costs have, to date, not evaluated the negative impacts of *the approaches used to control the disease* on other sectors, such as the wildlife sector in southern Africa.

In southern Africa, FMD control has largely been based on the deployment of extensive cordon fences that separate wildlife such as the African buffalo (*Syncerus caffer*), known to carry foot and mouth disease viruses, from livestock (Fig. 1). Over the past 70 yr of using fencing as the focus of control, hundreds of thousands (Gadd 2012), if not millions, of wild animals have died due to their being impeded from undertaking seasonal migrations critical for accessing grazing and water resources. Looking at fencing impacts in Botswana as an example, formerly abundant populations of wildebeest (*Connochaetes taurinus*) and red hartebeest (*Alcelaphus*

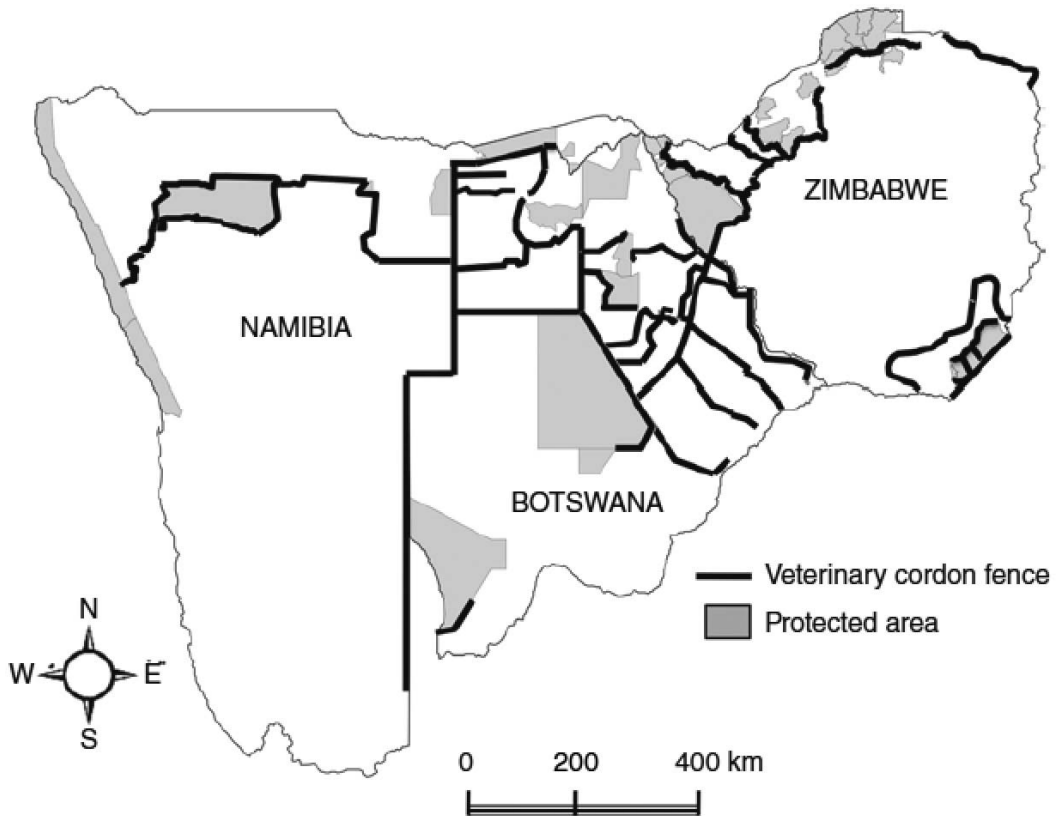


FIGURE 1. Map showing the major veterinary cordon fences (black lines) that have been deployed in Namibia, Botswana, and Zimbabwe from 1950–2010. Protected areas (gray shading) are those areas designated for conservation (e.g., national parks and game reserves). Map used with permission (Cumming et al. 2015).

*phus buselaphus caama*) in the Kalahari system in the western part of the country declined by an order of magnitude between 1978 and 2003: wildebeest from 315,000 to 16,000 and hartebeest from 293,000 to 45,000. Similar impacts occurred in Botswana's Makgadikgadi system (Perkins 2010).

Nature-based tourism now contributes as much or more to the gross domestic product of the Southern African Development Community (SADC) region as do agriculture (including livestock), fisheries, and forestry combined (Scholes and Biggs 2004). The very real impacts of FMD-related cordon fencing on the free-ranging wildlife resource should give us pause. The history of veterinary cordon fencing in the region is one of significant external subsidies going back to the colonial era (Taylor and Martin 1987;

Cumming et al. 2015): one sector (livestock) has been supported at the expense of another (wildlife). With wildlife having moved into such a prominent position, in terms of its contribution to SADC's economy through nature-based tourism and associated economic activities, the importance of rethinking a reliance on fencing becomes even clearer. Fortunately, new approaches to managing FMD-related beef trade risks that do not depend on fencing are now available (Thomson et al. 2013b, 2018). These offer genuine traction for the success of transfrontier conservation areas as multi-use systems with interlinked poverty alleviation and conservation goals (Thomson et al. 2013a). It is now critical for economic analyses of FMD control options to be truly cross-sectoral so that assessments of the benefits and costs of

disease control strategies, including fencing (Woodroffe et al. 2014), more accurately reflect optimal, sustainable land uses. Foot and mouth disease management policies in other wildlife-rich areas of Africa can also benefit from experiences in the SADC region.

There are other examples of how the global burden of *how we choose to manage animal diseases* needs to be more thoroughly assessed. The public health community now faces major challenges due to the antimicrobial resistance crisis. The realities of climate change also emphasize the need for system resilience: approaches to disease management need to avoid tipping the scales away from land uses likely to be more sustainable than others in, for example, increasingly semiarid and arid systems. Although the history of FMD management in southern Africa offers a useful window into the importance of a truly holistic approach to any attempts to develop an assessment of the global burden of animal disease, there are many other diseases in various parts of the world (e.g., brucellosis in the greater Yellowstone system or African swine fever in Eurasia) where animal health professionals and policy-makers must also take a precautionary, wide view of the potential impacts of disease management decisions.

Economists working on animal health need to partner with those analyzing the economic contributions of (and potential negative impacts of specific livestock health interventions upon) wildlife and associated natural resources in the very same landscapes in order to provide robust, data-driven policy guidance. Only then will we have a chance of yielding results that are socially, ecologically, and economically sustainable for generations to come.

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