RESEARCH UPDATE

SITUATION ANALYSIS ZIMBABWE

The Dynamic Drivers of Disease in Africa Consortium is an ESPA[1]-funded research programme designed to deliver much-needed, cutting-edge science on the relationships between ecosystems, zoonoses, health and wellbeing with the objective of moving people out of poverty and promoting social justice. This document offers a research update on the Consortium case study exploring the drivers of trypanosomiasis in Zimbabwe.

Photo: Vupenyu Dzingirai

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INTRODUCTION

TSETSE FLY *Photo: USDA/Peggy Greb*

Trypanosomiasis is an infection affecting both animals and humans that has significant impacts on the wellbeing of the people of Zimbabwe. Caused by parasites transmitted by the tsetse fly (genus *Glossina*), in livestock African animal trypanosomiasis (AAT), or *nagana,* causes severe production losses. AAT also affects crop production as livestock play an important role as working animals in Zimbabwe. In people, human African trypanosomiasis (HAT), known as sleeping sickness, is a serious illness which causes death in the absence of appropriate treatment.

Currently, tsetse in Zimbabwe is confined mainly to the Zambezi valley in the north and north-east, where the Dynamic Drivers of Disease in Africa Consortium (www.driversofdisease.org) is working. As land use and population movements have changed, so has the pattern of trypanosomiasis transmission – with resulting differential affects on people's livelihoods. Researchers are using interdisciplinary and participatory methods to explore the ecological and social drivers of trypanosomiasis impacts. This contrasts with past work which has largely focused on tsetse control.

KEY QUESTIONS

The research is exploring the ecological, economic and social drivers behind an increase in HAT in the Zambezi Valley, and considering the impacts of HAT and what responses are appropriate.

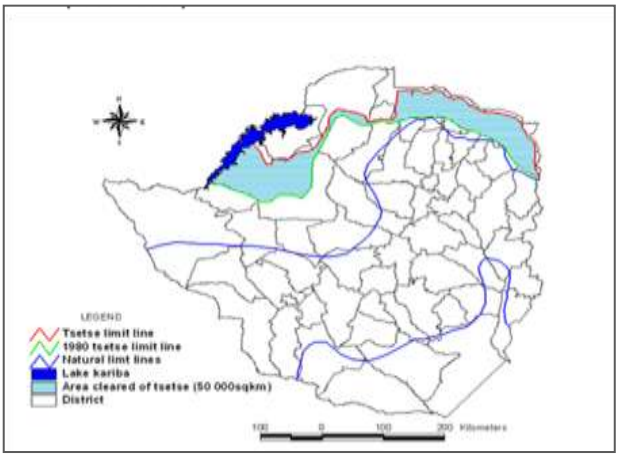
Specific questions for the research include:

- What is the effect of agriculture intensification on tsetse dynamics?
- Does movement of livestock have an impact on trypanosomiasis prevalence in an area?
- How do other livelihood strategies, e.g. foraging, tourism and hunting, expose people to the disease?
- Have livelihoods restructured by the land reforms further exposed people to trypanosomiasis?
- How has migration affected trypanosomiasis transmission?
- What are the livelihood and wellbeing impacts of HAT and AAT?

BACKGROUND

The acute form of human trypanosomiasis caused by *T. rhodesiense* that occurs in Zimbabwe is zoonotic in nature and can be passed from animals to humans. It is transmitted by the tsetse fly, which likes forested areas, preferring thickets and riverine woodlands. The fly feeds primarily on the blood of wildlife but also targets livestock and people.

Trypanosomiasis prevalence is largely determined by variation in tsetse populations, and tsetse population dynamics are determined by changes in ecosystem structure. In Zimbabwe these are mainly the result of tsetse intervention measures, human activities, natural disasters and climatic change. Trypanosomiasis incidence also depends on host behaviour. Over the years people have migrated and settled in tsetse-infested regions and there are fears that this movement results in biodiversity loss, including the loss of wildlife which provides a buffer against tsetse. This movement may also bring people closer to the fly, resulting in increased exposure of people and their livestock to tsetse and trypanosomiasis.



NATURAL TSETSE LIMIT LINES IN ZIMBABWE, AND AREA CLEARED OF TSETSE (1980-2010)

The tsetse fly and the disease it spreads are perceived in different ways by different people. Informal settlers, cattle owners, gold panners and foragers, for example, view tsetse and trypanosomiasis as a pest and a barrier to wealth, and so adopt strategies of furthering human settlement or vegetative clearing to control the fly. Other local people often regard the disease as punishment, for example for breaking with traditional religious and social mores. Consequently, they leave forests, where spirits are believed to dwell, undisturbed. Conservationists regard trypanosomiasis as a mechanism for regulating pristine nature by deterring settlement. Development organisations may perceive tsetse as an obstacle to development, preventing the expansion of productive agriculture. Meanwhile, public health officials highlight the growing threat to human wellbeing and argue for strengthened control measures.

These conflicting perceptions mean that responses to tsetse and trypanosomiasis are contested, requiring an integrated and holistic approach to research and policy, as proposed by the Drivers of Disease programme.

KNOWNS AND UNKNOWNS

The number of people affected by HAT is unknown but the disease is likely to be massively under-reported. Official figures point to a relatively low impact, averaging four cases annually since 1933, but these figures should be understood in the context of a lack of clinics, the widespread use of the informal health sector and the limited capacity of health workers to diagnose the disease, especially so given its similarities to malaria. In recent years, cases of HAT are on the increase, with 11 cases recorded in 2012, far more than previously, and all have been in the Zambezi Valley. Such reported cases are believed to be only the tip of a larger iceberg.

We know that disease incidence is influenced by the interaction between wildlife and the abundance of the tsetse fly, and is influenced by human and livestock densities and wider ecosystem patterns (notably vegetation structure). However, how these elements interact is not clear, nor is it known why there has been a sudden increase in HAT.

The Zambezi valley ecosystem has undergone major changes over time, affecting fly and disease incidence. From the 1960s, as tsetse fly were progressively cleared from large areas, the valley began to be occupied by farmers. Livelihoods in tsetse areas are dominated by agriculture and the promotion of cotton as a cash crop in parts of the valley has led to further intensification in agriculture resulting in tsetse and wildlife habitat changes. People are also now increasingly growing maize and tobacco as cash crops. The consequences of this intensification on trypanosomiasis dynamics are still to be quantified.

LIVESTOCK *Photo: Vupenyu Dzingirai*

Livestock production, once not possible as a land use due to AAT, is a growing livelihood strategy in the Zambezi valley following successful tsetse fly spraying operations. How the cattle are managed, where, and by whom are issues requiring research, as is the degree to which these livelihood strategies expose people and animals to disease.

Other livelihood strategies in the area depend on wildlife, e.g. game hunting, and the CAMPFIRE programme, which permits wildlife to roam in settled areas in return for benefits from sport hunting, is important. It is unclear what the impact of these is on exposure to trypanosomiasis. Foraging by women and young children is also a major livelihood strategy and this too exposes people to trypanosomiasis. Conservation and tourism workers may also be affected by HAT because they are more likely to work in wildlife areas where there is tsetse fly.

Recently, two further, related dynamics have come into play. First, beginning in 2000, the state initiated a land reform which reconfigured land ownership across the country. In the area where Drivers of Disease researchers are working, many of those who had worked on white farms were scattered in frontier areas, the home of tsetse, and those who occupied commercial farms as part of the land reform programme tried tobacco farming, clearing land. It remains unknown how the reconfigured land use and the restructured livelihoods changed exposure to trypanosomiasis.

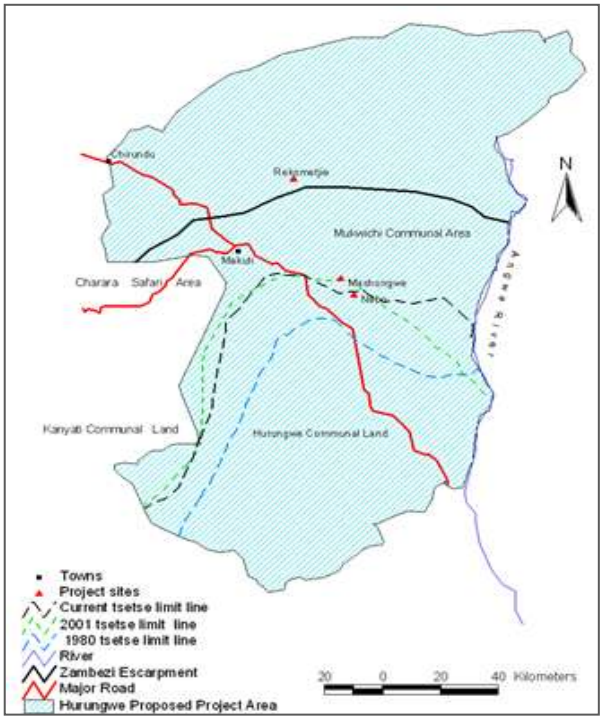
The second new dynamic has been drought, possibly influenced by longer-term climate change. Frequent droughts have led to increasingly precarious livelihood situations in which non-farm survival strategies, including cross-border trade in second-hand clothes and dried *kapenta* (the Tanganyika sardine), have become common. How such increased mobility affects trypanosomiasis exposure requires further research. Prediction models have indicated that the tsetse fly belt will expand due to global warming and climate change.

CASE STUDY METHODOLOGY

Tsetse distribution in Zimbabwe has changed, and HAT increased, both related to demographic, ecological, climate and land-use changes. However, the exact mechanisms and consequences are not clear. Our preliminary hypothesis is that the previous stable transmission dynamic has shifted, perhaps as a result of reduced wildlife and increased human contact with wildlife.

Drivers of Disease researchers are working in Hurungwe, a district with a long history of tsetse interventions. The site consists of three key locations along a transect (see map):

- Mana Pools and Chewore. 'Protected areas' with high wildlife biodiversity and negligible human disturbance.
- Mukwichi communal lands. Controlled by traditional leadership and an area where population and livestock densities have increased significantly from the late 1980s.
- Karoi farms. Former large-scale commercial farms (mixed cropping, with livestock). Lowest wildlife biodiversity.



EXTENT OF TSETSE DISTRIBUTION AND PROJECT SITES IN HURUNGWE

Fieldwork is including tsetse prevalence studies and trypanosomiasis parasitological and serological studies on cattle in multiple sites, and spatial-ecological modelling of tsetse distribution in relation to environmental and ecosystem change. Participatory modelling, involving a range of mapping exercises, is being undertaken in the selected village sites.

PATHWAYS TO IMPACT

At present, trypanosomiasis attracts relatively little attention from donors and policy makers. However, although the World Health Organization (WHO) reports HAT cases in sub-Saharan Africa as declining in recent years, with the number of new cases found dipping below 10,000 for the first time in 50 years in 2009, research points to the actual HAT incidence being higher. Currently WHO estimates the number of actual cases at about 30,000. As well as exploring the 'whys' and 'how manys' behind trypanosomiasis transmission, a major objective of Drivers of Disease researchers is to change this tragic situation. To this end, researchers are making contact and entering into dialogue with a wide range of stakeholders in health, environment and development in Zimbabwe, at the local, national and international levels, in order to inform policy and practice. The discussions taking place, it is hoped, will lead to greater joined-up action across government departments and other relevant agencies, so that effective One Health (www.onehealthinitiative.com) policies can be pursued which will achieve optimal health for animals, people and the environment. The Zimbabwe research findings will also prove relevant to understanding similar contexts elsewhere in Africa, especially so in Zambia where the Drivers of Disease programme is also working.

FURTHER INFORMATION

For more information on the work of the Dynamic Drivers of Disease in Africa Consortium:

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