MINISTRY OF WATER AND ENVIRONMENT
CLIMATE CHANGE DEPARTMENT

Economic Assessment of the Impacts of Climate Change in Uganda

Briefing Note: Malaria prevalence in the districts of Tororo and Kabale

An Economic Assessment of the Impacts of Climate Change has been completed at the national level in Uganda. As part of this nation-wide study, this case study seeks to assess the impacts of climate change and their costs in the health sector in the districts of Tororo and Kabale, drawing on national projections of climate change. For further information see www.cdkn.org or http://ccd.go.ug/index.php/projects/cdkn or contact olivier.beucher@baastel.com

Malaria is endemic in 95% of Uganda, and poses significant economic and social costs. In both districts looked at in this study, the costs associated with malaria could more than double by 2050 as a result of both population increase and predicted changes in climate. In Tororo, the **economic cost of malaria due to climate change may rise** from $9-$221 million in 2010 to $20-$561 million in 2050. In Kabale, these costs may increase from between $0.7-$15.8 million in 2010 to between $1.55-$41.7 million in 2050. Efforts need to be increased to reduce this burden – and there are a number of low cost actions that may be taken. Adaptation options such as Long Lasting Insecticide Nets (LLINs), Indoor Residential Spraying (IRS), clearing of breeding sites and proper treatment have been shown to have benefits that far outweigh the costs when they are properly targeted, even without climate change. Additional cost-effective adaptation actions in the immediate term may include information dissemination, particularly to high risk areas, revised planning regimes to help control malaria prevalence, and measures for early warning and action for malaria risk. The spatial differentiation in malaria risk suggests there is no "one size fits all" policy for malaria, and hence there is a need for comprehensive disease vulnerability assessments and action planning across districts.

Figure 1: Tororo and Kabale, Uganda

Introduction

Uganda has one of the highest incidence rates of malaria worldwide. According to a recent USAID study (USAID, 2014), malaria is the leading cause of morbidity and mortality in Uganda. **Climate change is one of the many drivers for malaria, and in the opinion of the study team it is likely to increase the existing burden of malaria in Uganda,** leading to significant costs for society. This study looks in depth at the potential impact of climate change on malaria in the Tororo and Kabale regions. This study attempts to quantify the possible increases in cases of malaria in 2025 and 2050 building on the existing evidence.

There is significant uncertainty in the analysis – the knowledge base is not well developed as to the precise linkage between climate and malaria and the evidence on the valuation of health outcomes in Uganda is still weak. Available quantitative relationships between malaria and climate are coupled with projections of climate and population to estimate future impacts. The evidence base is limited, but does indicate that **with an increase in temperature there is likely to be an increase in the number of cases of malaria**. Only one study dealing with this linkage is from Uganda and is not methodologically strong. Other studies from South Africa and Ethiopia point to a similar relation but with different quantitative estimates. We use the study from Uganda to derive upper and lower bound estimates.

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Climate Change

Climate projections indicate that the temperature may rise in Tororo by around 1.5 to 3.5°C by 2095 under Representative Concentration Pathways (RCP) scenarios 4.5 and 8.5 respectively. The projections for Kabale, generally cooler due to altitude (2,000 metres above sea-level), suggest there may be higher increases in temperature by 3.0 to 4.5°C by 2095 under the same scenarios. In neither district is there any prediction of an increase in average annual rainfall, although there is indication of more days with a small amount of rainfall and fewer days with heavy rainfall.

The findings indicate that there may be some increase in cases of malaria due to climate change (in relation to rainfall changes and temperature increase) **but also a larger increase due to the fact that there is likely to be more people exposed** (due to the expected high population growth).

The economic cost of these additional cases, due to both increasing populations and climate change, has been estimated using data on the costs of treatment, time losses and productivity, and the value attached to the loss of a life. The cost of malaria in Tororo could rise from US$8.7-221 million per annum in 2010 to a range of US$20.1-560.5 million per annum in 2050. In Kabale, malaria is expected to increase in cost from between US$0.7-15.8 million per annum in 2010 to between US$1.55-41.7 million per annum in 2050.

Adaptation

There is already an active program to reduce the incidence of malaria and its consequences in Uganda. Stakeholders consider that Long Lasting Insecticide Nets (LLINs), Indoor Residential Spraying (IRS), clearing of breeding sites and treatment are effective short-term actions.

In future, improved agricultural practices such as planting crops away from houses and improved drainage, as well as new drugs, are possible adaptation options. We estimate the current costs and costs in 2050 of three adaptation options: surveillance, LLINs and IRS. In both locations, **the costs of each of the three options may at least double between 2010 and 2050.** Studies indicate that LLINs and IRS have a very high benefit to cost ratio when appropriately targeted. However, our preliminary analysis suggests that **in areas where malaria may be less prevalent, benefits may not always justify costs**, suggesting that a strategy of careful surveillance followed by swift response when outbreaks occur may be most appropriate in areas such as Kabale. Measures may also likely become more cost-effective over time due to socioeconomic and climatic change.

There is a need for cross-collaboration bringing together different ministries to ensure the health co-benefits of actions to adapt to climate change are maximized and maladaptation is avoided. For example, appropriate drainage systems need to be included in new road construction schemes to reduce the potential breeding grounds for mosquitos. Additional actions that need to be advanced in the immediate term, ordered by priority, include:

i. Conducting more research on the climate-malaria linkage, using either existing or new datasets. Better weather data, alongside malaria surveillance data, may enable a better understanding of the climate related risks for malaria and potentially lead to improved early warning for malaria risk.
ii. Strengthening dissemination of information about malaria risk and the appropriate use of bednets, particularly in areas where malaria may newly appear or significantly increase in prevalence due to climatic variation.
iii. Revising planning regimes to ensure proper drainage, control construction and prevent encroachment on wetlands in particular.
iv. Implementing measures to ensure that farming practices take account of malaria risk, e.g. planting crops away from houses.

The spatial differentiation in climate and malaria risk suggests there is **likely no one policy for malaria across the different districts**. **There is a need for investment in comprehensive disease surveillance, vulnerability assessments, and action planning -** taking into account differences in malaria prevalence, climate change projections and socio-economic determinants. Better data is needed to support assessments. Action is also needed to support local adaptive capacity, involving engagement with local stakeholders. Figure 2 gives an overview of potential adaptation measures.

Figure 2: Overview of selection of potential adaptation measures for malaria