

INCORPORATING THE BURDEN OF HUMAN SLEEPING SICKNESS IN AN ECONOMIC IMPACT ASSESSMENT OF TRYPANOSOMOSIS

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Tsetse-transmitted trypanosomosis is regarded as the most debilitating livestock disease in sub-Saharan Africa, responsible for annual economic losses of over US\$1.3 billion¹. To date, however, all economic impact assessments of trypanosomosis have excluded the public health burden of the disease.

Human trypanosomosis, known as sleeping sickness, is caused by *Trypanosoma brucei gambiense* and *T. b. rhodesiense*, the former occurring in West and Central Africa and the latter restricted to East Africa with the predominant focus in South-East Uganda. Human trypanosomosis is a fatal disease if not treated. Current WHO estimates place the number of new cases per year, due to both parasites, across the whole of Africa, as high as 300,000². The burden of sleeping sickness may be expressed in terms of disability adjusted life years (DALYs), a generic health measure incorporating both mortality and morbidity and used to gauge the public health importance of different diseases³.

T. b. rhodesiense is a zoonotic disease, with the available evidence suggesting that cattle are the major reservoir of the disease in South-East Uganda and that controlling *T. b. rhodesiense* in cattle could significantly reduce public health burden⁴. Here, we use data on sleeping sickness patients in South-East Uganda to calculate the annual DALYs incurred due to *T. b. rhodesiense* infection across Africa and within South-East Uganda.

Materials & Methods

The DALYs due to a given disease consist of the years of life lost (YLLs) and the years of life lived with disability (YLDs). Our calculations of DALYs followed the methodology described by Murray³. The DALY scores were not estimated separately for males and females, but were combined. The age of onset of sleeping sickness was calculated from data of 923 patients admitted for sleeping sickness at LIRI Sleeping Sickness Hospital, Tororo, South-East Uganda, between 1979 and 1992⁵. The life-expectancy at the age of death used to calculate the mortality component of the DALY (YLLs) was based on a hypothetical population derived from a African standard life table with a life expectancy at birth of 50 years⁶. The case fatality rate for admitted sleeping sickness patients was estimated as 5.3%, based on the clinical outcome of 755 patients also treated at the LIRI hospital between 1988-1990⁷. Without treatment, the disease is considered invariably fatal.

To calculate the morbidity component of the DALY (YLDs), a disability weighting of 0.81 was used. This was based on expert opinion of the severity of *T. b. rhodesiense* sleeping sickness and the disability weighting definitions given by Murray³. The duration of morbidity was a combination of the period of symptoms prior to admission⁶ and the time of admission for treatment. A median duration of 61 days prior to treatment and a mean hospital stay of 34 days were used in the DALY calculation. It was assumed that the disability weighting was age-independent and the same for non-admitted and admitted patients.

The WHO estimates of sleeping sickness cases per year² was used to estimate the DALY burden of *T. b. rhodesiense* across Africa, assuming that 10% of all cases are due to *T. b. rhodesiense* and that the reporting rate is 10%. For South-East Uganda, the average number of reported sleeping sickness cases over the last five years was approximately 300. The DALY burden was calculated for an under-reporting rate of 0% and 50%. Under-reporting is defined as a percentage of reported cases, thus a 50% under-reporting rate means that for every two cases reported one case goes unreported. All unreported cases are assumed to remain undetected and so receive no treatment.

The DALY calculations used a discount rate of 3%, and were performed with and without age weighting, which adjusts the DALY score by the social productivity of the different age groups³. The age distribution of reported sleeping sickness cases was compared with the age-weight function.

Results

The DALY burdens for *T. b. rhodesiense* across Africa and South-East Uganda are shown in Table 1. For South-East Uganda the DALY burden is given for 0% and 50% under-reporting of sleeping sickness. The comparison of the age distribution of cases and age-weight function is shown in Figure 1.

Region	No age weighting	With age weighting
Africa	658,531	753,828
South-East Uganda		
0% under-reporting	420	488
50% under-reporting	3,819	4,379

Table 1. Estimated DALY burdens for *T. b. rhodesiense* sleeping sickness.

Discussion

Economic impact assessments of trypanosomiasis have excluded the public health burden of the disease¹. The *T. b. rhodesiense* sleeping sickness DALY estimates in South-East Uganda and for Africa indicate that there are great potential benefits of tsetse control to human health where *T. b. rhodesiense* sleeping sickness exists. Tsetse control is usually a mandate of the Ministries of Agriculture of most governments in Africa. The treatment of livestock for trypanosomiasis is one of the important control strategies where *T. b. rhodesiense* sleeping sickness occurs because of the reservoir of the disease in domestic animals. Again, like tsetse control, treatment of livestock is a mandate of the Ministries of Agriculture. It is important that information of the public health burden of trypanosomiasis is not restricted to the human health sector but rather is disseminated to all decision makers involved with the livestock and agricultural development in the sleeping sickness areas.

The DALY is currently the most widely accepted measure for the burden of human disease. This is the first study to address the specific burden due to *T. b. rhodesiense*, as opposed to sleeping sickness in general. It is important that the DALY estimates of zoonoses be made available across the human and livestock health sectors. We recommend that *T. b. rhodesiense* sleeping sickness DALY estimates of public health burden should be considered in addition to other conventional agricultural economic methods of determining potential productivity gains¹ when prioritising livestock disease control programmes.

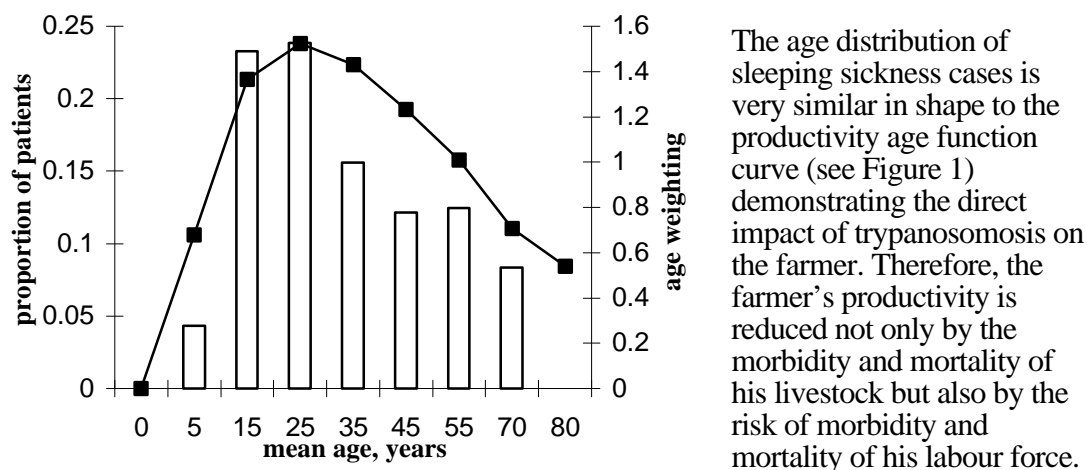


Figure 1. Age distribution of sleeping sickness patients (bars) and the age weight function (line)

The WHO estimates that currently only around 10% of all sleeping sickness cases go reported. In South-East Uganda, where the reporting rate is much higher, it is estimated that there is, nevertheless, a minimum 50% under-reporting rate. For this reason, the actual disease burden incurred may be greater than that estimated in this study. Our results are none-the-less an initial step in estimating the burden of sleeping sickness in South-East Uganda, and suggest that a human health perspective be considered when prioritising livestock disease control programmes in the region.

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