

# Capacity and Policy Change in Managing Human African Trypanosomiasis in Endemic Rural Districts of Eastern Zambia

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## Abstract:

**Background:** Capacity to diagnose Human African Trypanosomiasis (HAT) by health centres in endemic areas has remained an important challenge in public health. There is poor diagnostic capacity of zoonoses in Sub-Saharan Africa including Zambia. Laboratories in rural areas lack the capacity to manage most emerging and re-emerging diseases. Therefore, this study was carried out to investigate and compare capacities relative to the management of HAT at rural health centres (RHCs) in tsetse infested Chama and Mambwe districts of Eastern Zambia.

**Materials and Methods:** Structured questionnaires were used to collect information from 110 health personnel drawn from 23 RHCs in a cross sectional comparative study undertaken between April and July 2013. Stata/SE version 11.0 was used to analyze collected data

**Results:** The study reviewed missed opportunities to detect HAT compared to malaria cases between Chama and Mambwe districts ( $P=0.027$ ). Staff from both districts had preference to detect fever related conditions rather than HAT as reviewed in the direction of most Government and private support ( $P=0.007$ ). Staff from Chama district were less likely to miss HAT cases compared to their Mambwe counterparts ( $P<0.001$ ) due to previous reported cases.

**Conclusion:** RHCs lack the capacity to manage HAT as compared to other priority conditions which direct critical review of HAT management and health priorities

**Keywords:** Human African Trypanosomiasis, capacity, management, rural health centres, Zambia

## Abbreviations

HAT: Human African Trypanosomiasis; RHC: Rural Health Centre; MOH: Ministry Of Health;

WHO: World Health Organization; NTDs: Neglected Tropical Diseases

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## 1. INTRODUCTION

Human African Trypanosomiasis (HAT) is a zoonosis and remains an important public health problem in Africa merely due to health care accessibility problems or political instability. Despite the significant socio economic impact of zoonoses to human health, Governments in affected countries have failed to come up with deliberate policies to manage most diseases including HAT. Therefore, reinforcing capacities of local health centres for disease diagnosis and management as well as establishing effective multi-sectoral coordination for disease and vector control is very crucial and an important step towards eliminating HAT as a public health problem [1].

Countries affected by HAT rank amongst the poorest in Africa. In 2000, WHO estimated that over 60million people are exposed to the disease while about 300,000 were affected. From the estimated 27,000 HAT cases that were diagnosed and treated; there was an obvious underestimation due to limited diagnostic capacities and remoteness of affected areas. Elimination of HAT has been on the global health agenda for over 2 decades but although control efforts have produced good results, there can be no elimination without integrating control activities into wider health system reforms [2, 3].

One century ago, HAT was believed to curb the development of colonial territories. As soon as the cause of the disease was clearly identified, colonial authorities established extensive control operations. Systematic screening, treatment and patient follow-up were established in western and

central Africa for Gambian HAT while animal reservoir and vector control was implemented in eastern and southern Africa for the Rhodesian HAT. By the 1960s, disease transmission was practically interrupted in all endemic areas but lack of sustained surveillance systems and the overlooked risk of re-emergence of the disease led to flare-ups that have been observed in past endemic areas leading to worrisome increase in the number of reported cases.

Ownership of integrating HAT surveillance in health care services must be taken by National health systems while maintaining the capacity to react rapidly to the results of the surveillance outcome. Systematic control and surveillance activities in most HAT endemic areas have not been successful mainly due to the lack of capacity to manage the disease by responsible governments due to disease burden, lack of funds, political insecurity or decreasing human resource. In such scenarios, non-governmental organisations have stepped in to bridge the gap with some success [1, 4]

Generally, there is poor diagnostic capacity of many zoonotic diseases in Sub-saharan Africa including Zambia. Cases are missed though treatment is available through WHO initiative. Lack of continued medical education for health practitioners in regions at risk of specific conditions, inadequate human resource, lack/poor diagnostic facilities and health seeking behaviours of affected communities maybe some of the contributing factors in the reduced capacity to manage HAT in endemic rural areas [3, 5, 6, 7].

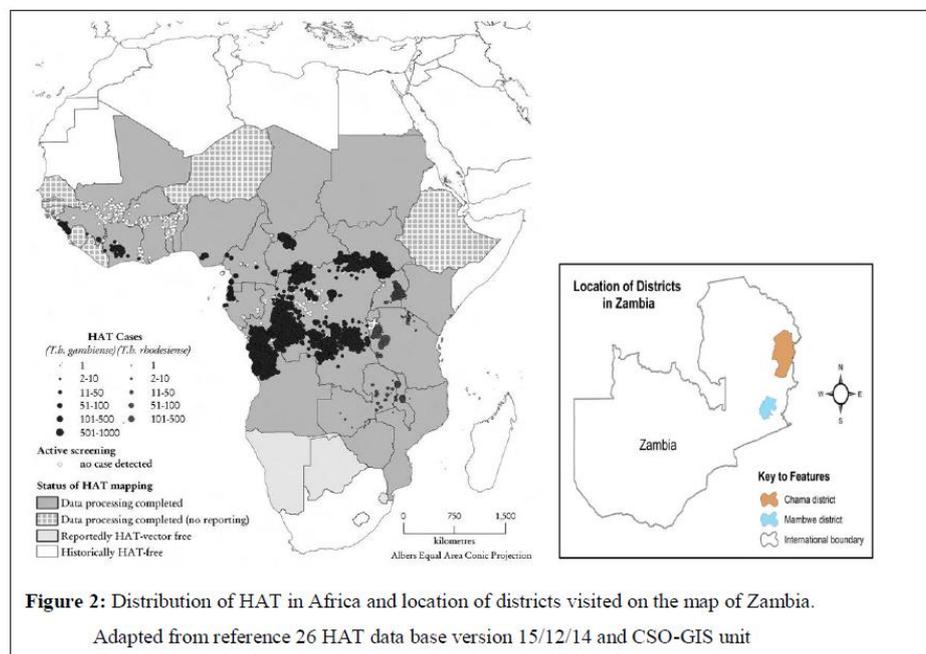
Ability of health centres to detect infected individuals is very critical in the control of HAT. Although Zambia was previously lauded for its success in fighting HAT, recent study which investigated the state of health facilities regarding HAT diagnosis, showed that even in areas where infection rates were low, much could still be improved [8]. On the other hand, the country has no dedicated structure for surveillance or control of HAT in affected areas which has resulted in sporadic cases been reported from time to time even in areas where the disease was previously controlled. In 2014, Rufunsa district of Zambia alone reported 9 new cases [9] raising a lot of concern.

Control of HAT in Zambia has been based on passive case detection and treatment of HAT cases in hospitals in transmission areas [10] which in most cases has missed HAT patients in the community who are unable to go to the health centres. Comprehensive HAT control programmes require combined efforts of government and private sectors into a co-ordinated approach; treatment of infected individuals, active screening of populations in affected areas, health education and control of the tsetse vector. Therefore, this study was undertaken to investigate and compare capacities to diagnose and manage HAT at health centres located in tsetse infested Chama and Mambwe districts of Eastern Zambia.

## 2. MATERIALS AND METHODS

### Study Area and Sample Size

The study was cross sectional comparative, conducted in Mambwe and Chama districts of the Eastern and Muchinga Provinces of Zambia.



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The two districts were purposively selected because they are tsetse infested, inhabited by wild animals with man as a casual intruder and at risk of HAT. Structured questionnaires were administered to 52 and 49 health personnel drawn from 12 and 11 RHCs from Chama and Mambwe districts respectively. The researcher intended to capture at least 50% of the total staff present from the sampled districts but due to low staffing levels, 79% and 80% of total health personnel present from Chama and Mambwe districts respectively were instead captured. Interviews using structured questionnaires were conducted among health personnel present at visited health centres to gather information related to their capacity to diagnose and manage HAT. Data on reported HAT cases between 2003 and 2013 was obtained from both the district offices and RHCs involved.

### Data Analysis and Ethical Consideration

The data collected from the questionnaires were stored in SPSS-statistics 20 and then converted to basic excel format for easy handling. After checking for quality and completeness, all the data were then transferred and analyzed using descriptive statistics in Stata version 11.0. Confidence interval was set at 95%. Pearson's chi-square test was used to compare proportions between the two districts involved. P values <0.05 were considered statistically significant. Fisher's exact test was used where expected values were less than 5.

Scientific and ethical clearance was sought from the institutional research ethics committee at the University of Zambia [Reference No. 001-12-12]. Before the project was initiated, clearance was also sought from the MOH headquarters, Eastern Provincial Health Director and District directors of health from both districts involved. Permission was also sought from the health officers of each respective health centre before commencement of the interviews. Individual informed consent from the health officers were obtained prior to sampling. Local requirements, rules and regulations were observed during the study with respondents made aware of the benefits of the study. Study confidentiality was ensured through the use of codes instead of names.

## 3. RESULTS

### Demographic Data

A total of 23 RHCs were involved in the study, from which 101 health personnel participated (Table 1). Results showed that the majority of the participants from both districts were nurses. Although the districts involved indicated the presence of laboratory technicians and medical officers, the numbers of these key health personnel in disease management however, were extremely low. In particular, both districts reported low numbers of medical officers and clinical officers who in most cases provide the first point of care to patients visiting the health facility.

**Table 1.** Occupation of health personnel involved in the study

District	Medical officers	Clinical officers	Nurses	Environmental health technicians	Lab technicians	Other <sup>a</sup>	Total
Chama	2 (3.8%)	7 (3.5%)	22 (42.3%)	5 (9.6%)	4 (7.7%)	12 (23.0%)	52
Mambwe	2 (4.1%)	3 (6.1%)	31 (63.3%)	4 (8.1%)	6 (12.2%)	3 (6.1%)	49
Total	4 (3.96%)	10 (9.90%)	53 (52.48%)	9 (8.91%)	10 (9.90%)	15 (14.85%)	101

<sup>a</sup> Community health assistants and professions not specified in the various staff categories

### Responses on Diseases Reported and HAT Management

During the period 2003 to 2013, Chama district reported about 43 suspected HAT cases of which 8 were confirmed while Mambwe district only reported one confirmed case in March 2013. Despite the two districts reporting HAT cases as well as malaria as one of the topmost four diseases, responses showed that about 67% (35/52) of the health staff from Chama district carried out further investigations for malaria negative cases compared to 43% (21/49) of their Mambwe counterparts (P=0.027).

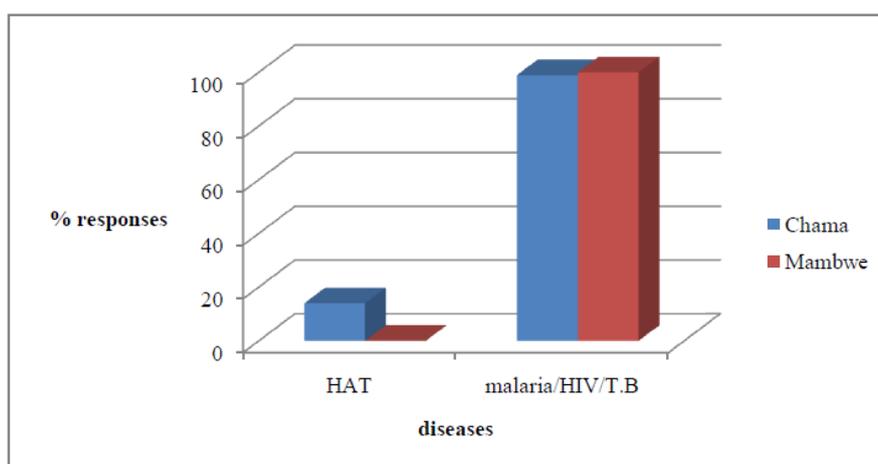
Measuring the association between respondent's occupation and their responses on carrying out further diagnosis for malaria negative cases, results (Table 2) showed no significant difference (P=0.292) in the overall responses from the two districts indicating that staff's occupation had no influence on further investigations carried out for malaria negative cases.

**Table2.** Staff occupation and their responses on further investigations for malaria negative cases

		Responses on further investigations done for malaria negative cases			
		Yes (%)	No (%)	Don't know (%)	Totals
Occupation of respondents	Medical Officer	3(75.0)	1 (25)	0	<b>4</b>
	Clinical Officer	8 (80.0)	2 (20.0)	0	<b>10</b>
	Nurses	24 (45.3)	27 (50.9)	2 (3.8)	<b>53</b>
	Laboratory Technician	7 (70.0)	2 (20.0)	1 (10.0)	<b>10</b>
	Other	14 (58.3)	8 (33.3)	2 (8.3)	<b>24</b>
<b>Totals</b>		<b>56 (55.4)</b>	<b>40 (39.6)</b>	<b>5 (4.9)</b>	<b>101</b>

**Government Support, Health Priorities and Collaboration with Vector Control Unit/Private Sectors**

With regards to GRZ support received for the management of HAT, responses indicated 13.5% for Chama district and no support for Mambwe district as compared to 99.9% and 100% GRZ support received for the management of malaria, HIV/AIDS and TB in Chama and Mambwe districts, respectively (Fig. 1). These results indicated that the two districts were receiving very little support from the government towards HAT management compared to the support for malaria, HIV/AIDS and TB ( $P<0.001$ ).



**Figure1.** GRZ support for endemic diseases in Chama and Mambwe districts

Responses in relation to collaboration between vector control unit/private sectors and the government on issues regarding HAT management were also considered. As shown in Table 3, results showed that there was no collaboration whatsoever between the vector control section and the government on issues surrounding the management of HAT from both Chama and Mambwe districts ( $P>0.05$ ).

**Table3.** GRZ support and collaboration with other sectors on HAT management and other diseases

Responses for GRZ support for diseases		Collaboration with other sectors (vector control unit and private) on HAT management								P values
		Chama district responses				Mambwe district responses				
		Yes (%)	No (%)	Don't know (%)	Totals	Yes (%)	No (%)	Don't know (%)	Totals	
HAT	Yes	4 (57.1)	3(42.9)	0	<b>7</b>	0	0	0	<b>0</b>	0.147
	No	10 (22.2)	27(60.0)	8(17.8)	<b>45</b>	14(28.6)	26 (53.1)	9(18.4)	<b>49</b>	
<b>Totals</b>		<b>14 (26.9)</b>	<b>30(57.7)</b>	<b>8(15.4)</b>	<b>52</b>	<b>14(28.6)</b>	<b>26 (53.1)</b>	<b>9(18.4)</b>	<b>49</b>	
Malaria	Yes	13 (25.5)	30(58.8)	8(15.7)	<b>51</b>	14(28.6)	26 (53.1)	9(18.4)	<b>49</b>	0.268
	No	1 (100)	0	0	<b>1</b>	0	0	0	<b>0</b>	
<b>Totals</b>		<b>14 (26.9)</b>	<b>30(57.7)</b>	<b>8(15.4)</b>	<b>52</b>	<b>14(28.6)</b>	<b>26 (53.1)</b>	<b>9(18.4)</b>	<b>49</b>	

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HIV/AI DS and T.B	Yes	14 (27.5)	29(5 6.9)	8(15.7)	<b>51</b>	14(2 8.6)	26 (53.1)	9(18.4)	<b>49</b>	0.66
	No	0	1(10 0)	0	<b>1</b>	0	0	0	<b>0</b>	
<b>Totals</b>		<b>14 (26.9)</b>	<b>30(5 7.7)</b>	<b>8(15.4)</b>	<b>52</b>	<b>14(2 8.6)</b>	<b>26 (53.1)</b>	<b>9(18.4)</b>	<b>49</b>	

On the other hand, results in Table 4 further indicates that Chama district was at least undertaking some programmes in relation to HAT awareness and management as compared to Mambwe district where no such programmes were conducted (P=0.006). Overall, results from both districts, indicate that support from both the government and private sectors was biased towards the management of HIV/AIDS, TB and malaria rather than HAT.

**Table 4.** GRZ support and programmes running in the districts on awareness and management of HAT

Responses for GRZ support for diseases		Programmes running in the districts on awareness and management of HAT								P value
		Chama district responses				Mambwe district responses				
		Yes (%)	No (%)	Don't know (%)	Totals	Yes (%)	No (%)	Don't know (%)	Totals	
HAT	Yes	5(71.4)	22(28.6)	0	<b>7</b>	0	0	0	<b>0</b>	0.002
	No	6(13.3)	26(57.8)	13(28.9)	<b>45</b>	9(18.4)	33(67.3)	7(14.3)	<b>49</b>	
<b>Totals</b>		<b>11(21.2)</b>	<b>28(53.8)</b>	<b>13(25.0)</b>	<b>52</b>	<b>9(18.4)</b>	<b>33(67.3)</b>	<b>7(14.3)</b>	<b>49</b>	
Malaria	Yes	10(19.6)	28(54.9)	13(25.5)	<b>51</b>	9(18.4)	33(67.3)	7(14.3)	<b>49</b>	0.129
	No	1(100)	0	0	<b>1</b>	0	0	0	<b>0</b>	
<b>Totals</b>		<b>11(21.2)</b>	<b>28(53.8)</b>	<b>13(25.0)</b>	<b>52</b>	<b>9(18.4)</b>	<b>33(67.3)</b>	<b>7(14.3)</b>	<b>49</b>	
HIV/AIDS and T.B	Yes	11(21.6)	28(54.9)	12(23.5)	<b>51</b>	9(18.4)	33(67.3)	7(14.3)	<b>49</b>	0.129
	No	0	0	1(100)	<b>1</b>	0	0	0	<b>0</b>	
<b>Totals</b>		<b>11(21.2)</b>	<b>28(53.8)</b>	<b>13(25.0)</b>	<b>52</b>	<b>9(18.4)</b>	<b>33(67.3)</b>	<b>7(14.3)</b>	<b>49</b>	

## 4. DISCUSSION

HAT is overwhelmingly a disease of tsetse infested remote rural areas inhabited by wild animals where man is a casual intruder and access to medical facilities is very limited. There is considerable under-diagnosis of HAT caused by *T. b. rhodesiense* in sub-Saharan Africa including Zambia [5]. Therefore data on reported cases of HAT diagnosed annually in such endemic areas might not represent the actual situation on the ground. Initial symptoms of HAT are very similar to those of other common febrile diseases such as malaria and HIV/AIDS and this gives reason to suspect that in the absence of experienced personnel and diagnostic tools, HAT could easily be mistaken for other common ailments and may hence exist and cause fatalities without being identified as such. Therefore, one would expect health providers deployed in such areas to be adequately trained and vested with the knowledge on HAT and also to be more alert and aware about the possible occurrences of HAT their areas. In the current study, the numbers of trained staff available at the RHCs visited was low, which in most cases was as low as only one or two trained health staff per RHC. Such low staffing levels did not only limit the sample size of the study but could have also compromised the provision of quality healthcare provided to each and every person visiting the RHC. The fact that the few available health workers may have also been overwhelmed with the large numbers of patients to attend to, could have contributed to their limited capacity to detect and manage some HAT cases passing through the health facility.

Understanding the way a disease manifests itself by health personnel is very important in disease management. Unfortunately, as indicated on the similarity in clinical symptoms of HAT with febrile diseases, detection of HAT in its early stage is not easily achievable in rural settings of Africa [11, 12]. Increase in rapid diagnostic tests has made microscopy redundant hence eliminating the opportunity of making incidental diagnoses. With malaria being one of the top most four diseases reported from both districts, there is therefore a possibility that in those areas where HAT and malaria are endemic, HAT could easily be mistaken and treated as malaria [13]. There is also a possibility that HAT may co-exist with malaria, HIV/AIDS and TB [14], in which case patients are treated only for the later diseases. In this case, patients with co-infections may even be said to be resistant to the drugs being administered [15, 16, 17], when in the actual fact they are just being treated for one disease and not for the others.

Results of this study revealed that on average, health personnel from the RHCs visited in Chama and Mambwe districts were aware of the possible occurrences of HAT in their districts. Respondents from both districts also indicated to have had received patients with symptoms of a disease similar to malaria but which after laboratory diagnosis was found not to be malaria and could thus easily been HAT. Health personnel from Chama reported to have encountered more HAT cases compared to staff from Mambwe ( $P < 0.001$ ). Therefore, such results may indicate that health care providers from Chama district were less likely to miss a case of HAT when re-occurred compared to their Mambwe counterparts.

With one case of HAT being reported from Mambwe district and several others from Chama district, it is not known as to how many possible cases could have gone unreported and resulted in death without seeking medical attention [18]. According to the WHO expert committee on HAT control and surveillance [2] and Odiit *et al.*, [5], it can be extrapolated that from the 8 confirmed HAT cases reported in Chama district between 2003 and 2013, 80 more cases remained unreported in the field and about 5 cases died undetected. Furthermore, from the one case reported from Mambwe district, 10 more cases could have gone undetected in the field. The rate of death due to HAT remains unknown as a number of HAT cases only present themselves to the health centres in the late stage and generally with similar manifestations to TB and HIV/AIDS [19]. The distances between health centres as presented in the study could have also limited locals in accessing expert medical care when needed resulting in late presentation of cases at health centres or most unfortunate cases, non presentation of suspected cases of HAT to the health centres

Capacity to detect HAT by health care providers was seen to be higher in Chama district (43 cases reported) as compared to Mambwe District where only one case was reported [20]. Such a trend could have resulted from the fact that Chama district was receiving some support for the management of HAT i.e. 13% response compared to Mambwe district which indicated 0% response regarding support for the management of HAT. Considering the geographical location of Chama and Mambwe districts, it may also be possible that HAT cases occurring along the borders of Zambia may not be reported in Zambia but instead reported in the neighbouring countries or districts. For instance, some of the HAT cases from Chama may be conveniently reported in Malawi [21]. Similarly, some remote areas in Chama district that are apparently located near Mpika district but very far from Chama boma could also instead report cases to Mpika district. As such, the actual cases being reported from the two districts may not be well documented [8].

In regards to government support for diseases, results clearly showed how HIV, T.B and malaria epidemics have pushed HAT from the diagnostic limelight. The lack of political and financial support as demonstrated in the study, in most cases has contributed to most health personnel shifting their attention only to the much campaigned and supported diseases which may at least explain in part the re-emergence of Neglected Tropical Diseases (NTDs) such as HAT [4]. The MOH seem to be overwhelmed by the number of diseases under their management which has made them concentrate more on those diseases that receive more financial support than those that do not or receive less support. The study also revealed lack of collaboration between the departments of health and the vector control unit [7] which may also contribute to the pitfalls in the control and management of HAT. Support from the private sector could go a long way in preventing some of the NTDs. Currently, WHO has provided support for the control and management of most NTDs including HAT [22]. Chama district, in particular, was observed to perform better in terms of disease reporting than Mambwe because of the support the former was receiving from WHO in form of drug supply and staff capacity building programmes on HAT diagnosis [20].

The opportunities of preventing deaths due to HAT are greater than many other diseases including HIV/AIDS. However, governments in sub-Saharan Africa seem to be more committed to support malaria, HIV/AIDS and TB [10] due to the major health impact they have on communities unlike HAT which is viewed to affect much fewer people. However, as shown in this study and elsewhere [5, 23, 24, 25], this notion may not be true as HAT is seriously under-estimated and could have a negative impact on the country's economy if not properly managed [26].

## 5. CONCLUSION

HAT has serious social and economic consequences, which far outweigh the cost of maintaining surveillance. Elimination of HAT is technically feasible and economically justifiable as one of the important initial steps in Africa's efforts to alleviate poverty. With studies conducted along the

Luangwa valley, this study included, it can be concluded that health personnel in HAT endemic areas have the ability to manage the disease but lack sufficient government and private support for the management and control of the disease.

In building capacities in the control of zoonotic diseases, the following cardinal issues may be taken into consideration; Continued education in HAT management for health care providers in HAT endemic areas, standardised policy guidelines to be distributed to RHCs to guide in the provision of services in relation to HAT, availability of appropriate diagnostic tools for detecting HAT, game rangers as well as affected communities to be trained in tsetse control and HAT management.

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