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Full Length Research Paper

Assessment of the impact of drug use on tsetse (Glossina) and trypanosomiasis among populations in western Serengeti Tanzania

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A cross-section study was conducted to evaluate knowledge, attitude and practices about tsetse (Glossina) and trypanosomiasis among the agro-pastoralists communities around the Ikorongo/Grumeti game reserves in the Western Serengeti. Structured questionnaire were administered to 80 respondents and out of these 95% had adequate knowledge about tsetse flies and 79% knew the local names of the fly. The study also revealed that 25.5% of respondents recognized the common hideouts of tsetse to be the grazing areas near the reserves 29% along rivers and 20.4% in bushes and forests. Twenty four percent of respondents knew the clinical signs of African Animal Trypanosomiasis (AAT) which included rough coat, emaciation (21%), diarrhea (13.3%) and loss of appetite (11.9%). Other mentioned disease symptoms which had small proportions included miscarriages, coughing, reduced milk yield and break tail. Ninety six percent of respondents ranked Animal Trypanosomiasis the first among other existing animal diseases in the area including Contagious Bovine Pleuropneumonia (CBPP), Foot and Mouth Disease (FMD), East Coast Fever (ECF) and Anaplasmosis. Chemotherapy was the most practiced method to control trypanosomiasis in the western Serengeti. Cattle owners used isometamedium chloride (samorin) and dimenazine aceturate (berenil) to treat sick animals. Economic losses caused by the disease in their animals were identified to be deaths, reduced milk production and income. Lack of enough resources to contribute to the maintenance of cattle dips and the grazing of animals inside the reserves especially during the dry season when there was shortage of pastures outside the reserves were the main constraints associated with cattle productivity in the area.

Key words: Agro-pastoralists, animal trypanosomiasis, Glossina,

INTRODUCTION

Tsetse-transmitted trypanosomiasis in man and livestock poses a serious threat to the lives and livelihoods of people in African countries. Tsetse (Glossina) infestation in Africa covers over 10 million km^2 representing 37% of

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the continent (Jordan, 1986). There are 23 identified species and 8 subspecies of *Glossina* (Moloo, 1993) and all are potential vectors of Animal African Trypanosomiasis (AAT) and Human African Trypanosomiasis (HAT). African animal Trypanosomiasis remains to be an obstacle to sustainable development of livestock production in the tsetse infested areas of sub-Saharan Africa (PATTEC, 2001). An estimated annual losses in meat and milk yield as well as cost of the disease control amounts to about US $ 1.2 billion (Kuzoe and Schofield, 2004). It is estimated that the removal of trypanosomiasis would lead to as much as a threefold increase in cattle numbers in affected countries and to economic benefits of billions of dollars per year (FAO-PAATIS, 2006). Surveys by Daffa et al. (2013) in Tanzania had shown that about 33% of the land is tsetse infested by 7 *Glossina* species and all play a significant role in the transmission of AAT and HAT. The losses suffered annually in cattle due to the disease in terms of mortality, morbidity and reduced milk yield have been estimated at $7.98 million (MOAC, 1995). About 4 million people are at risk of acquiring HAT and about 400 cases are reported annually (Komba et al., 1997; Sindato et al., 2008). The presence of tsetse excludes livestock from large area of considerable agricultural potential by virtue of the severity of the disease caused by tsetse and transmitted trypanosomes (Msangi et al., 1999). Western Serengeti provides a significant grazing ground for livestock in villages surrounding the Ikorongo/Grumeti Game Reserves. The reserves and the National Parks are homes of tsetse flies and the game animals that provide blood meals to tsetse and at the same time acting as reservoirs of trypanosomes. The interaction between humans, livestock, game animals and the tsetse flies greatly influences disease transmission in western Serengeti. The privatization of veterinary services in Africa including Tanzania had led a situation where diagnosis, treatment and prevention of the AAT has remained almost entirely in the hands of cattle owners or extension workers who are unskilled in differential diagnosis and also lack knowledge on appropriate drug to be used for various diseases (Doran and van den Bossche, 1997). In western Serengeti trypanocidal drugs have been widely used by livestock owners due to lack of large scale tsetse control at national level. At farmer level trypanocides provides a way for individual to take actions to control the disease and very often only sick animals are treated because they constitute the problem perceived by the farmer. The extensive use of trypanocidal drugs and insecticides for trypanosomiasis treatment and tsetse control or the use of other drugs for tick control and other insects of economic importance could cause changes in the tsetse populations. Little was known on the situation in the western Serengeti therefore such information was of vital importance in the determination of disease epidemiology.

This study was conducted in order to determine the level of knowledge, altitude and practice towards tsetse management and control in the course of prevention of devastating trypanosomiasis in the study area. The results obtained from this study could be used in the assessment of the impact of drug use on Glossina populations in western Serengeti. Similarly the results can be used in the formulation of extension material in disease prevention.

MATERIALS AND METHODS

The study area is located in Serengeti district which lies between latitude 2° 00 S and longitude 34 50 E. The four villages (Makundusi, Natta-Mbiso, Rwamchanga and Bunchugu) were involved in the study. The ethnic groups found in this area include the Ikoma, Sukuma, Ikizu, Natta and Taturu. The Sukuma, Taturu and Ikizu are mainly agro-pastoralists keeping large herds of cattle some people having up to 4,000. The climate is savannah and the area experiences bimodal rainfall pattern. The area is covered by a range of vegetation types including grasslands, open woodlands, closed woodlands and riverine vegetation found along existing rivers.

Selection Criteria of Agro-pastoralists to be interviewed based on the number of cattle the person is having, readiness to be interviewed, the time one has spent in the area and those practicing communal grazing near Ikorongo/Grumeti game reserves.

Administration of questionnaires

Interviews were conducted in Kiswahili (the national language) to respondents from the selected villages (Figure 1). Pretest interviews were conducted with twenty copies to ensure that questions were comprehensive and acceptable. The questionnaires were administered by the researchers, veterinary officers and drug vendors. The three parameters assessed were Knowledge, Attitude and Practice (KAP). Under knowledge respondents were assessed on the knowledge of tsetse fly causes of HAT and AAT, clinical signs of the disease. On attitude the respondents were asked to rank the problem of AAT as compared to other animal diseases found in the study area. The practice section dwelt with the methods of control, trypanocidal drugs used, where do they obtain them, frequency of drug use, prices and dose rates. Eighty questionnaires out of 100 were retrieved from the respondents.

Analysis of data

All data collected through the questionnaires were entered into Microsoft excel sheet and the SPSS I6 and STATA II statistical tools were used to analyze and interpret the data. Descriptive statistics (frequency and percentage) were used to analyse qualitative data.

RESULTS

Participants' characteristics

The results (Table 1) shows that majority of respondents 34 (42.5%) fall within the age group of 45 to 60 years and 28.8% were within the age group of 36 to 45. Other 11 respondents (13.8%) were in the age group of 21 to 35 years while 10 respondents (12.5%) were above 61 years. The total numbers of respondents was 80 and out

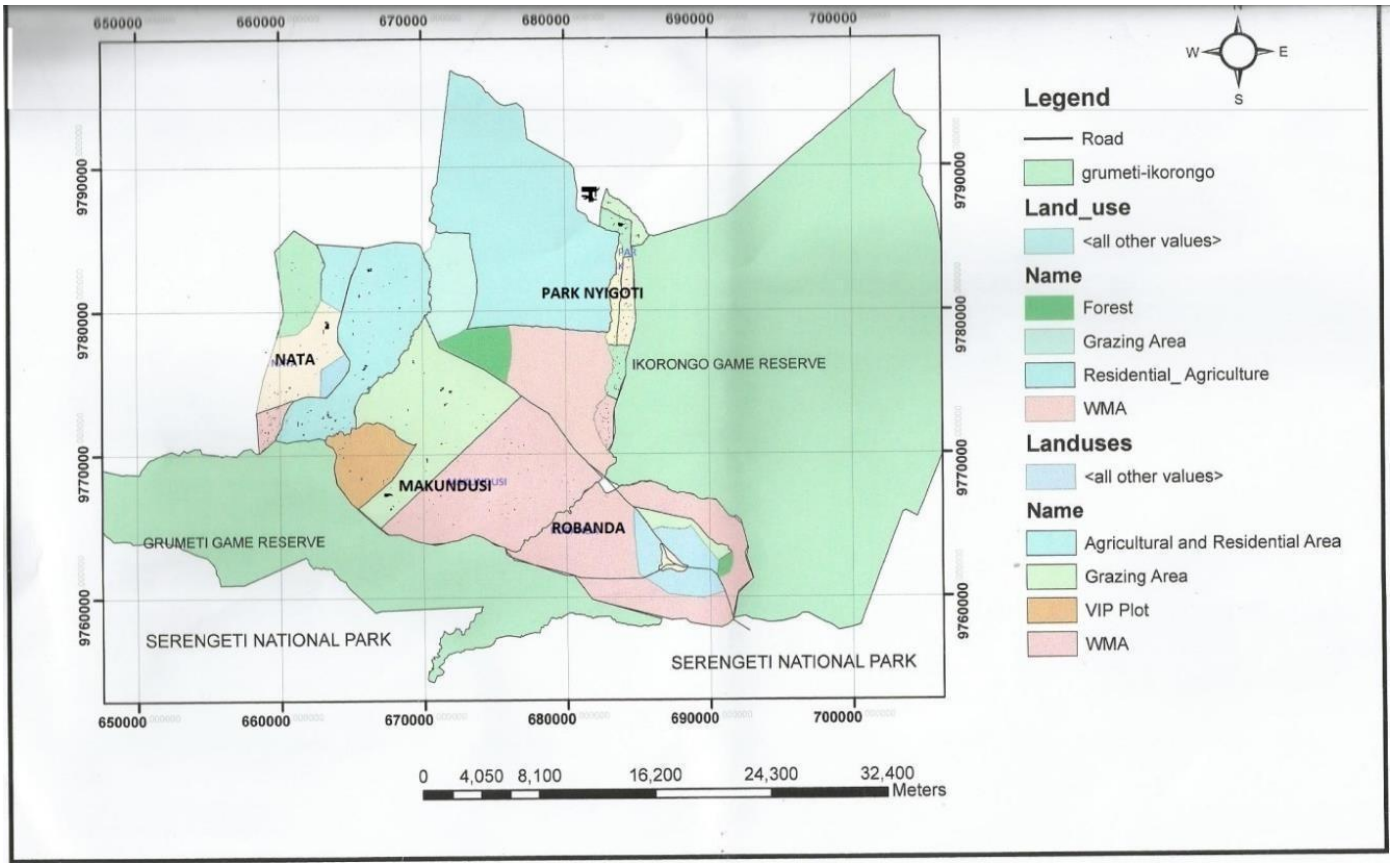

Figure 1. Villages in western Serengeti where interviews were conducted.

Table 1. Age of respondents in years.

Age category	Frequency	Percent
Below 20 years	2	2.5
21 to 35 years	11	13.8
36 to 45 years	23	28.8
46 to 60 years	34	42.5
61 to 90 years	10	12.5
Total	80	100
Sex	Frequency	Percent
Male	69	86.2
Female	21	13.8
Total	80	100

of these males were 69 (86.2%) and females were 11 (13.8%).

From the results in Table 2, it was revealed that 76 (95.0%) of respondents knew about tsetse flies and 54 (67.5%) of them were able to give its local name. Few respondents 3 (3.8%) did not know tsetse flies. From the same table most respondents (69%) knew that tsetse flies cause the disease to animals and humans.

Table 3 indicates that, 54 (29.0%) respondents know that tsetse flies hides along the rivers, 47 (25.3%) in grazing areas, 47 (25.3%) near Serengeti National Park and 38 (20.4%) in bushes and forest.

Table 5 indicates that 72 (82.8%) respondents ranked tsetse fly to be the first cause of animal trypanosomiasis while 11(12.6%) believed that the disease was caused by other flies and ticks. 4(4.6%) respondents associated the

Table 2. Evaluation of knowledge of tsetse fly in Serengeti District.

Knowledge N= 80	Frequency	Percent
Do you know tsetse fly	76	95
If yes give the local name		
Ndorobo	11	20.4
Endorobo	20	37
Andorobo	12	22.2
Other six names	11	21.4
Do not know	3	3.8
Do tsetse transmit disease to animals and human beings		
Yes	69	86.2
No	10	12.5
Do you know the disease		
Yes	76	95
No	3	3.8

Table 3. Evaluation of the common hideouts of tsetse in the community (Effect N = 80).

Hideouts	Frequency	Percent
Grazing areas	47	25.3
Along rivers	54	29
Near Serengeti National Park	47	25.3
Bush and forest	38	20.4

disease with the presence of wild animals. Table 6 indicates that the respondents ranked trypanosomiasis (ndorobo) first important among disease existing in the area. Other animal diseases are CBBP, FMD, ECF, anaplasmosis, dizziness and LCD.

Table 7 shows that respondents were aware of the effect of tsetse on livestock productivity. Animal deaths ranked first with 72 (37.3%) respondents, loss of income 52 (26.9%) and11 (5.7%); respondents mentioned other consequences like reduced draft power and animals not being marketable. From the same table other respondents 18 (9.3%) sited miscarriage as another effect of the disease and failure of oxen to plough were 5 (2.6%).

Table 8 shows that majority of respondents were using different methods to control AAT in the study area. Sixty two (35.0%) treating their sick animals, 69(39.0%) are using sprays and 46(26%) use vaccines.

Table 9 indicates that respondents are using drugs in the treatment of animal trypanosomiasis and other diseases. Sixty one (21.4%) respondents Samorin, novidium 42(21.4%), dimenazine 37(18.9%) and are the most used drugs. Other drugs used for treatment include: Berenil 12(6.1%) and veriben 9(4.6%). For the treatment of other diseases they use OTC, DIP and TRIDOX.

Table 10 shows that drugs are obtained from different sources: 65 (56.0%) of respondents obtained from private and animal chemical stores, 5(4.3%) government subsides, 43 (37.1%) livestock officers and 3(2.6) from neighbors.

DISCUSSION

The findings indicate that most respondents were men 69(86.2%) aged between 45 to 60 years and also there was a good number of active reproductive age 36 to 45 it is easier for these groups of people to acquire and share new skills on disease prevention. It was also discovered that majority of the respondents had knowledge 76(95%) of tsetse fly and knew the local name of the flies. Respondents also knew that tsetse fly bite cause the disease to human and livestock. Similar observation was made Nigeria by Njoku et al. (2003) and Gumel et al. (2012) were farmers new the local names for tsetse flies. Respondents have identified riverside, forest and grazing areas as the most risky places for fly and trypanosomes exposure. This is in line with scientific description about the biology and ecology of the flies (Hargrove, 2004: Leak, 1999). Similar observation in a study done in Nigeria (Gumel et al., 2012) showed that farmers believe livestock contact tsetse in forest and riverine areas. Majority of respondents were aware of the disease symptoms in their animals which are used as

Table 4. Respondents views on animal trypanosomiasis symptoms (Effect N= 80).

Symptoms	Frequency	Percent
Rough coat	52	23.9
Loss of appetite	26	11.9
Abortion	10	4.6
Diarrhea	29	13.3
Coughing	5	2.3
Hump licking	22	10.1
Reduced milk yield	14	6.4
Emaciation	47	21.6
Break tail	13	6

(11.9%) loss of appetite, 22 (10.1%) and hump licking were the main symptoms of the disease. Others symptoms mentioned included; abortion, coughing and reduced milk production.

Table 5. Evaluation on the main causes of Trypanosomiasis (Effect N = 80).

Cause	Frequency	Percent
Mbungo (tsetse)	72	82.8
Flies	5	5.7
Ticks	6	6.9
Wild animals	4	4.6

Table 6. Important diseases/conditions perceived by respondents (Effect N= 80).

Disease	Frequency	Percent
Ndorobo (trypanosomiasis)	74	31.0
CBPP	26	10.9
FMD	18	7.5
Worms	30	12.6
ECF	22	9.2
Anaplasmosis	29	12.1
Dizziness	13	5.4
LCD	19	7.9

Table 7. Evaluation of respondents on the effect of tsetse fly on livestock (Effect N = 80).

Consequences	Frequency	Percent
Animal deaths	72	37.3
Not marketable	40	20.7
Miscarriage	18	9.3
Animals fetch low price	6	3.1
Loss of income	52	26.9
Oxen fail to plough	5	2.6

basis for treatment. It was observed that agro-pastoralists base on clinical signs to diagnose sick animals this could lead to the wrong treatment of animals and hence drug misuse. A similar observation was made in the study by Magwisha et al. (2013).in Southern Tanzania where the diagnosis of disease based entirely on clinical signs. It

Table 8. Evaluation of respondents on the methods of control (Effect N = 80).

Control method	Frequency	Percent
Treatment	62	35.5
Spraying	69	39
Vaccination	46	26

Table 9. Evaluation of respondents on drug use (Effect N= 80).

Drug	Frequency	Percent
Novidium	42	21.4
Samorin	61	31.1
Diminasan	37	18.9
Veriben	9	4.6
Berinil	12	6.1
Saulinin	1	0.5
OTC	9	4.6
Alben	7	3.6
DIP	3	1.5
TRIDOX	15	7.7

Table 10. Source of drugs as per respondents (Effect N = 80).

Source	Frequency	Percent
Private animal chemical stores	65	56
Government subsides	5	4.3
Livestock officers	43	37.1
Neighbors	3	2.6
Total	116	100

was revealed that the majority of respondents understands the causes of animal trypanosomiasis to be the tsetse fly, while other respondents related the disease with presence of wild animals. This result coincides with tsetse fly ecology that their availability is influenced by the presence of host animals (Leak, 1999). Of the reported diseases African animal trypanosomiasis has been perceived as the number one obstacle to cattle production in the study area. These findings were consistent with a study done in Southwestern Ethiopia (Seyoum et al., 2013) and Kenya (Ohaga et al., 2007) where trypanosomiasis was perceived as the number one among other diseases inaffecting cattle production. From this study respondents have emphasized that if cattle was suspected of trypanosomiasis; noticeable reductions could be observed on milk production, body condition, oxen working ability, growth rate and price of animal and increased mortality in untreated cases. This indicates average level of awareness of the respondents on the role played by tsetse in the disease transmission to their cattle. Similar observation was made in the study by Onyiah (1997) and Gumel et al. (2012) where most respondents knew that tsetse bite has an effect on cattle. This study revealed that trypanocidal drugs are mostly used by respondents for treatment and control of animal trypanosomiasis. This indicates that the respondents have a good knowledge on the effects caused by tsetse fly on their livestock which influenced them to use drugs to control the disease. Similar findings were reported by Magwisha et al. (2013) in Southern Tanzania and Gumel et al. (2012) in Nigeria they found that livestock keepers had a good knowledge on tsetse and the disease are causing to their animals. On practices for disease control the study revealed that majority of respondents were using different methods to control the AAT which included treating sick animals, using drugs and vaccines. Most of these drugs were obtained from private stores and livestock officers while few were from the government subside. This indicates that majority of the agro-pastoralists had knowledge and were aware of the

consequences of the disease to their livestock.

Conclusion

The findings from this study indicate that respondents have a high knowledge of tsetse fly and the effects it causes on cattle productivity. Their attitudes and practices towards control of tsetse fly and the disease are good though knowledge and sensitization is needed for livestock keepers to contribute towards dip maintenance and guidance on the proper administration of drugs. In this area the tsetse burden could be successful reduced by involving the agro-pastoralists and the management of Ikorongo/Grumeti reserve in government supported control campaign using insecticide impregnated targets.

Conflict of Interests

The authors have not declared any conflict of interests.

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