An Update of Trypanosome Infection Rates in *Glossina pallidipes* as a Function of Season in the Middle Zambezi Valley, Zimbabwe

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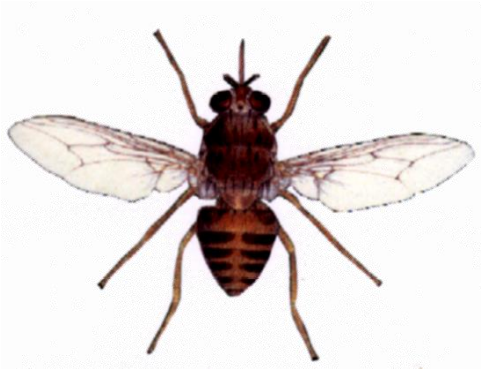
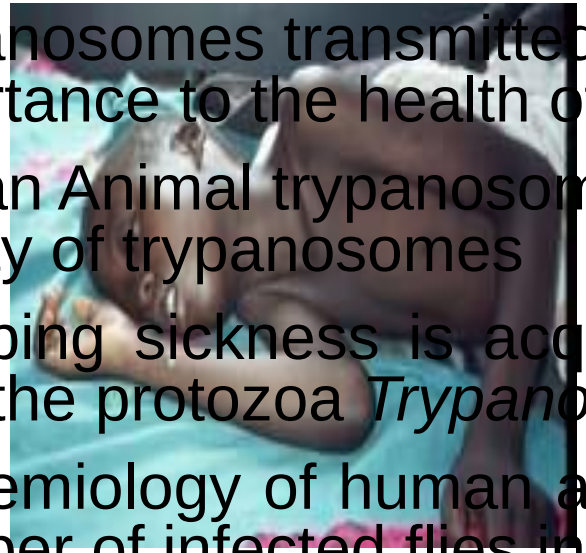
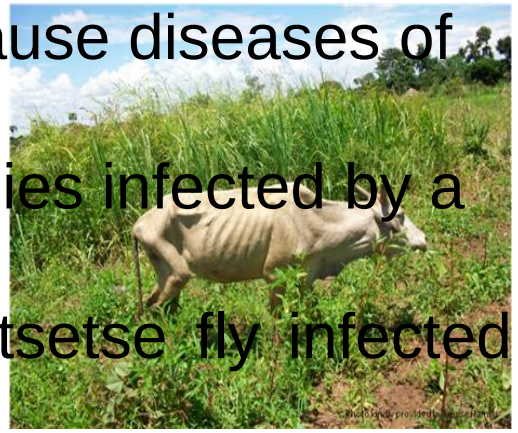


Introduction





- Trypanosomes transmitted by tsetse (genus *Glossina*) cause diseases of importance to the health of both humans and livestock
- African Animal trypanosomiasis is transmitted by tsetse flies infected by a variety of trypanosomes
- Sleeping sickness is acquired following a bite from a tsetse fly infected with the protozoa *Trypanosoma brucei.*
- Epidemiology of human and animal trypanosomiasis is determined by the number of infected flies in a specific area
- Factors influencing trypanosome infection rates in tsetse can be exogenous, parasitic, ecological and host
- Rising temperature due to climate change is expected to have an impact on the interactions between pathogens and their hosts

Objectives of study

1. To determine the prevalent trypanosome species associated with each population
2. To determine the relationship between the species, sex, age of the fly and the trypanosome infection rates
3. To determine the influence of seasonal changes on trypanosome infection rates in tsetse flies in the Zambezi Valley

Materials and Methods

1. Study site

- Rekomichi Research Station in the Zambezi Valley

2. Tsetse Collections

Flies were collected daily from six sites in riverine fringes and mopane woodland

- Epsilon trap baited with 3-n-propylphenol, octenol,4-methylphenol and acetone
- Flies were removed from traps every 2 hours.

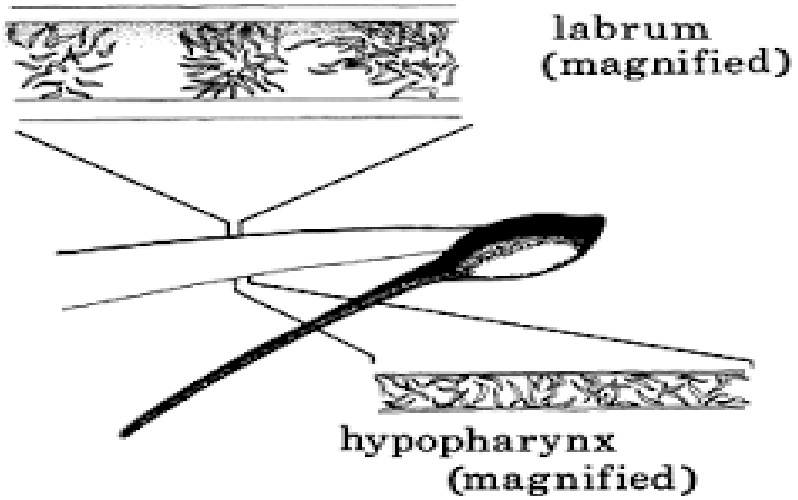
One of cluster traps used to collect flies

Materials and Methods cont…

3. Tsetse dissections

- Flies were dissected within 24 hours of capture.
- Wings were removed and wing fray scored on a scale 1-6
- Ovarian dissections were performed on all females scored by ovarian category on scale 0-7.
- Mouthparts dissection were performed on the labrum and hypopharynx under a light microscope
- Further dissection of salivary gland and midgut

Dissection for trypanosome inspection



Labrum and Hypopharynx infected with trypanosomes

Data records and Statisical analysis

1. Data records

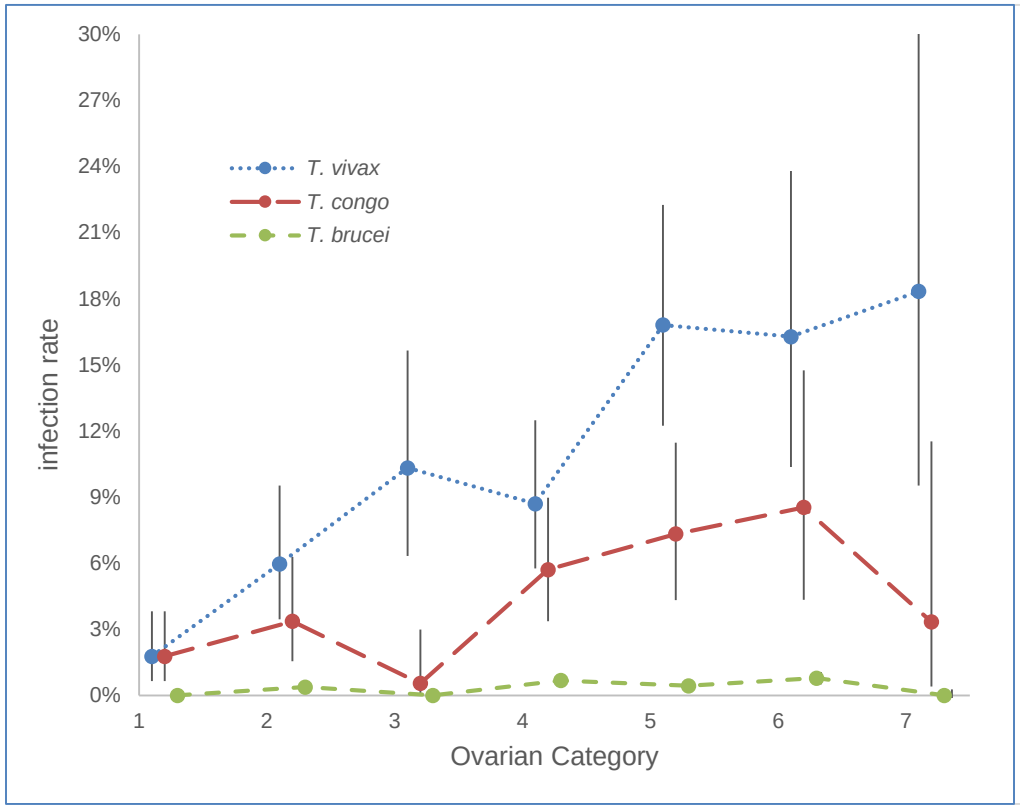
- Tsetse species, sex and age (ovarian dissection and wing fray);
- Trypanosome infection for each tsetse fly dissected,
- Date, month and year of capture

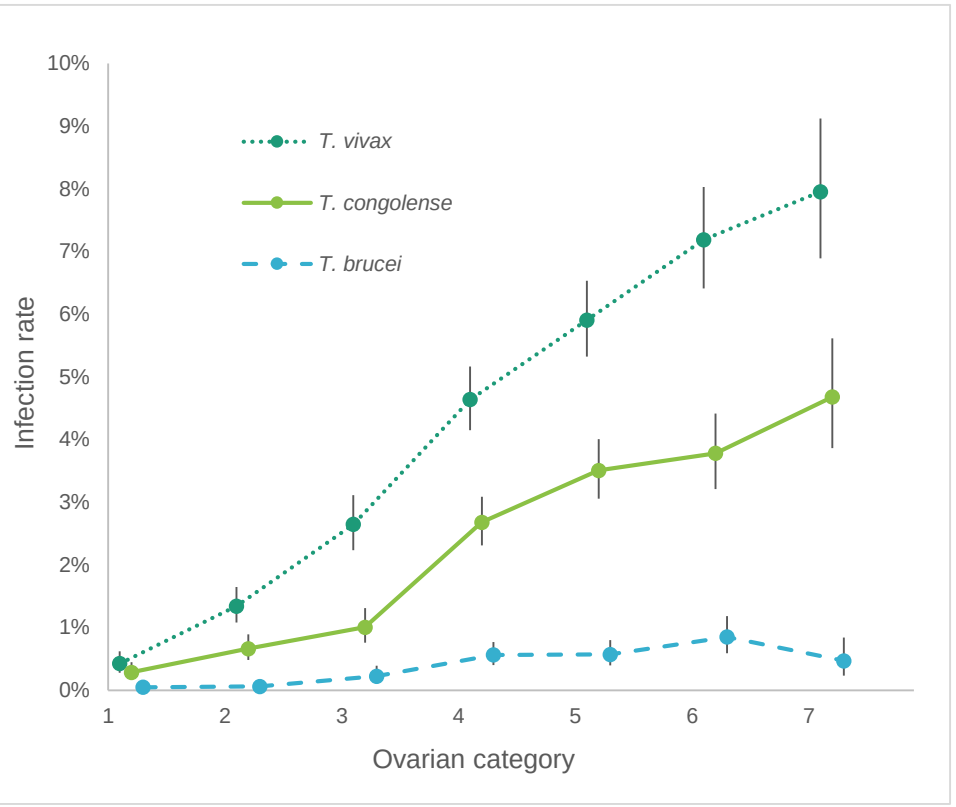
2. Statistical analysis

- Stata (StataCorp, 1999) statistical package, version 14.
- Historical data were inserted into Micrsoft (MS) Excel Sheet Program to create a database
- Database was exported to Stata and subjected to Chi-square tests @ 95% Confidence Interval to determine the respective associations between trypanosome infection rate and fly age, sex, season and species
- The trypanosome prevalence rate was calculated for all data as the number of infected individuals divided by the number of individuals sampled and multiplied by 100.
- The upper and lower limits were plotted against age and significant differences were denoted by non-overlapping error bars at 95% confidence interval.

Findings of study

- The most prevalent trypanosome strain detected during microscopic examination was *T. vivax*, *T. congolense* and *T.brucei* in that chronological order
- Trypanosome prevalence increased with age as measured by ovarian category
- For *vivax* and *congolense*-type infections, the age-prevalence relationship could be described by a curvilinear relationship



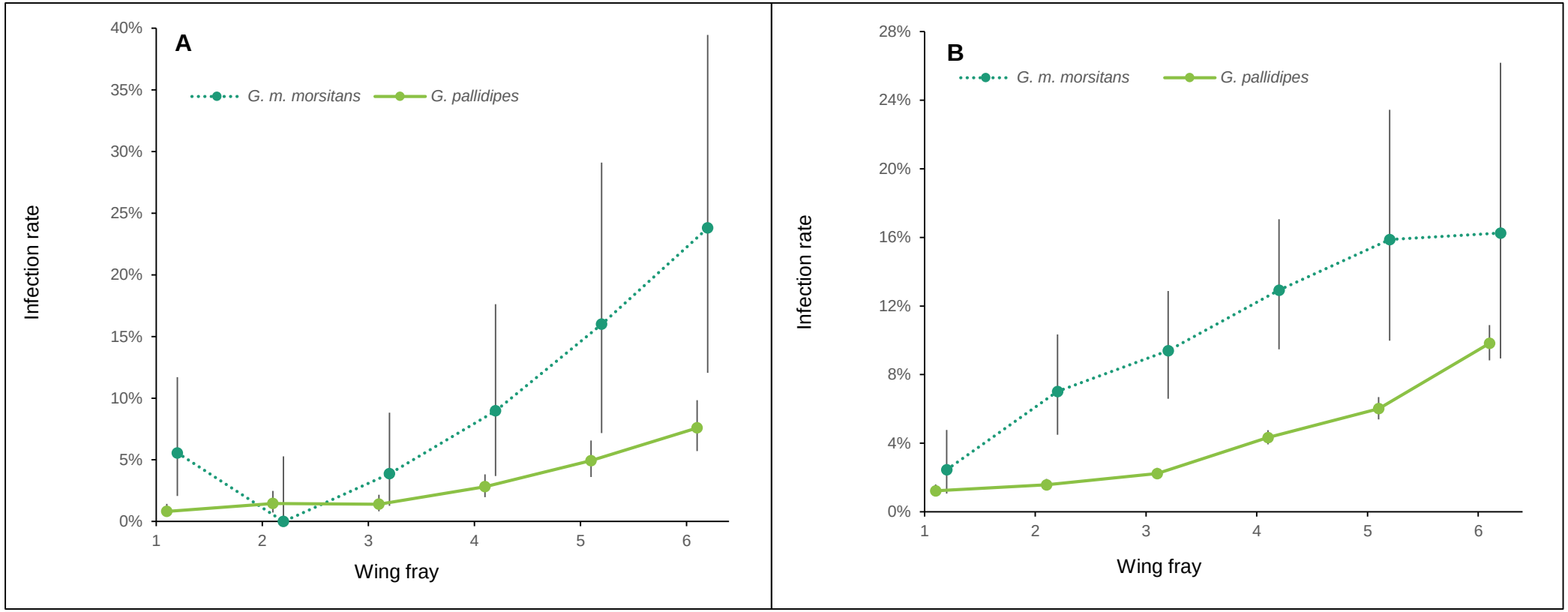


Prevalence of *T. vivax*, *T. congolense* and *T. brucei* in female tsetse *G.m.morsitans* (left) and *G. pallidipes* (Right)

Findings of study conti

2. Effects of species, sex and age of the fly on trypanosome infection rates

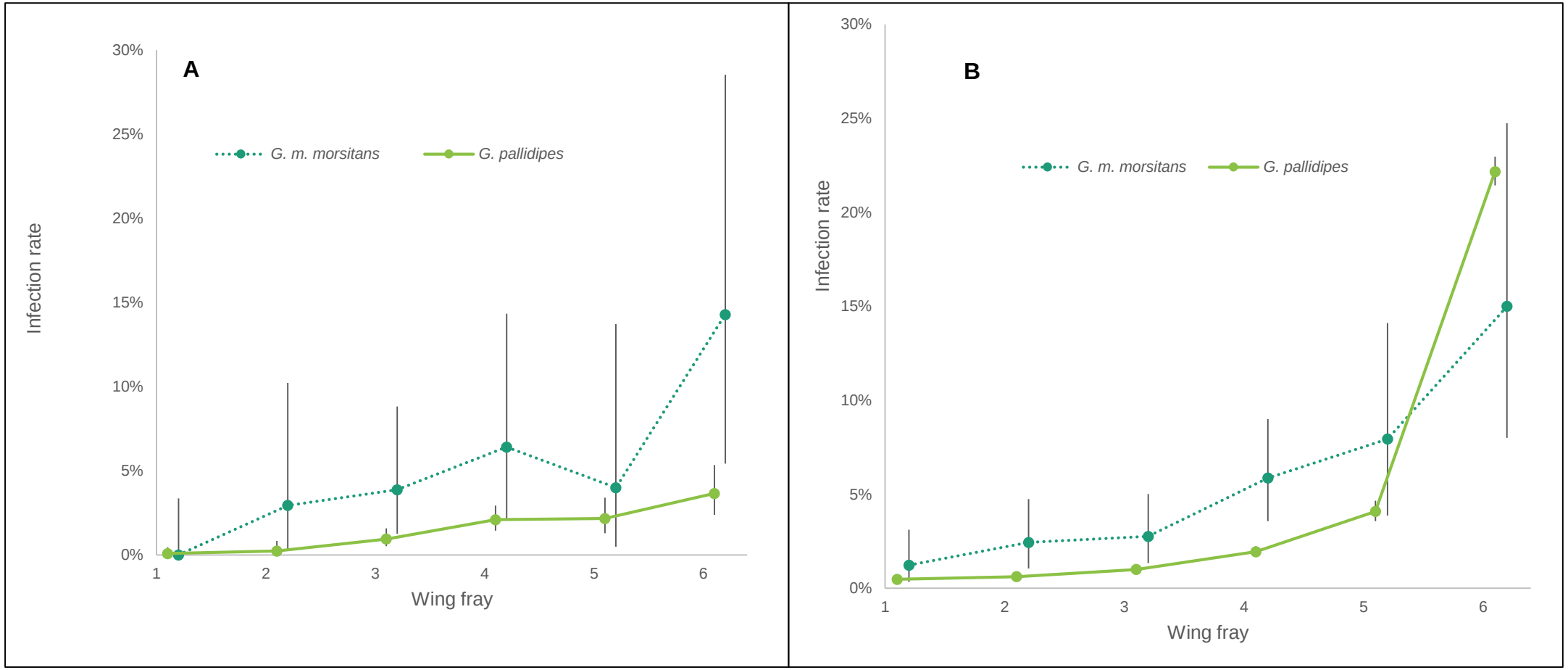
- In general infection of *G. m. morsitans* was higher than that of *G. pallidipes* in all age groups
- Despite the general trend of an increase in *T. vivax* infection in *G. m. morsitans* with age, there were no significant differences in infection rates among the male and a significant difference in female fly age groups except the youngest and oldest as denoted by wing fray indices



Prevalence of *T. vivax* in male (A) and female (B) *G. m. morsitans* and *G. pallidipes* as a function of fly age (as measured by wing fray)

Finding of study conti….

- There was no apparent differences between sex and susceptibility of tsetse to trypanosome infection rate
- Over 80% of the infection for tsetse were found in the 30- and40- age group and varied with total infection rate



Prevalence of *T. congolense* in male (A) and female (B) *G .m. morsitans* and *G. pallidipes* as a function of age as measured by wing fray

Conclusions

- Trypanosome infection rate increased with age as measured by the wing fray index and ovarian category
- Three salivarian trypanosome subgenera, *T. vivax*, *T. congolense* and *T. brucei* were identified and generally, there was low infection rate in tsetse flies in the Zambezi Valley
- *Trypanosoma vivax*-type, which is detected in the mouthparts, was the most dominant species of trypanosome detected in tsetse followed by *T. congolense*. There was low prevalence of *T. brucei* throughout the study. However, the trend was more marked for *G. pallidipes* than *G. m. morsitans*.
- The study also concluded that *G. m. morsitans* harbours more infection than *G. pallidipes*. The cooler drier times of the year coincided with *T. vivax* infection in male *G. m. morsitans* and female *G. pallidipes.* Prevalence was found to be much lower during the hottest months of the year than the coolest. Prevalence of *T. brucei* in female *G. m. morsitans* was detected in the coolest months. There was a significant change in trypanosome infection in tsetse between the early 1990s aand almost end of the decade

Recommendations

- Much more useful information can be generated if molecular techniques are used to detect trypanosomes in tsetse. Currently, field personnel are relying on morphological features using microscopic examination to detect trypanosome species in tsetse. Although this is an acceptable method of detecting trypanosomes in tsetse, it would be more prudent and accurate to use a combination of both microscopic examination and DNA probing techniques so as to come up with better and reliable results. Future research should be directed at confirming the effects of climatic factors such as temperature and rainfall on trypanosome infection rate under field conditions.