

Survey On Bovine Trypanosomosis In Selected Districts Of Asossa Zone Benishangul Gumuz Regional State, Western Ethiopia

*Asmamaw Aki, Yami Bote, Mulugeta Zerihun and Gutema Gudeta

*Regional Veterinary Diagnostic, Surveillance, Monitoring and Study Laboratory, P.O. Box: 326, Asossa, Ethiopia.
Email: asmamawaki@gmail.com

Abstract: - Across-sectional study was carried out in Bambasi, Homosha and Kurumuk Districts of Benishangul Gumuz Regional State, Western Ethiopia from September to January, 2018 to determine bovine trypanosomosis prevalence, prevailing trypanosomes species, vector density and associated risks. Blood samples collected from (n=340) randomly sampled cattle (*Bos indicus*). Dark phase contrast buffy coat procedures were used for determining prevalence. Whereas, haematocrit method was used for packed cell volume (PCV) values determination. Furthermore, traps were deployed for the purpose of entomological survey. Out of total 340 samples, 18/340 (5.29 %) were found trypanosome positive. Based on Predominant *trypanosome species* among recorded were *Trypanosome congolense* 14/18(77.7%) and *Trypanosome vivax* 4/18 (22.2 %). There were statistically significant differences concerning existing trypanosome species ($P < 0.05$). Mean packed cell volume (PCV) value of the parasitic animals was lower ($21.06 \% \pm 0.03 \text{ SE}$) than aparasitic animals ($28.99\% \pm 0.012$) and the variation was not statistically significant ($P > 0.05$). Sex groups, age categories and study sites ($P > 0.05$) were not demonstrated significant risk factors, however body conditions was found significant ($p < 0.05$). During the survey, *Glossina moristans submorsitans* was found in the area (1.39 f/t/d) along with other mechanical vectors such as *stomoxys* (7.37f/t/d), *haematopota* (0.018 f/t/d) and *tabanus* (0.064 f/t/d). In conclusion, the current study showed moderate trypanosomosis prevalence in the area reflecting the need for strategic control measures.

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1. Introduction

African animal trypanosomiasis (AAT) is a disease complex caused by tsetse-fly-transmitted *T. congolense*, *T. vivax*, or *T. brucei*, or simultaneous infection with one or more of these trypanosomes. African animal trypanosomiasis is most important in cattle but can cause serious losses in pigs, camels, goats, and sheep. Infection of cattle by one or more of the three African animal trypanosomes results in subacute, acute, or chronic disease characterized by intermittent fever, anemia, occasional diarrhea, and rapid loss of condition and often terminates in death. In southern Africa the disease is widely known as nagana, which is derived from a Zulu term meaning "to be in low or depressed spirits", a very apt description of the disease (Kuzoe, 1991).

African animal trypanosomiasis is caused by protozoa in the family Trypanosomatidae genus *Trypanosoma*. *T. congolense* resides in the subgenus *Nannomonas*, a group of small trypanosomes with medium-sized marginal kinetoplasts, no free flagella, and poorly developed undulating membranes. In east Africa, *T. congolense* is considered to be the single most important cause of AAT. This trypanosome is also a major cause of the disease in cattle in west Africa. Sheep, goats, horses, and pigs may also be

seriously affected. In domestic dogs, chronic infection often results in a carrier state (OAU, 2001).

African Animal Trypanosomosis is disease complex caused by tsetse fly transmitted *T. congolense*, *T. vivax* or *T. brucei* or simultaneous infection with one or more of these trypanosomes. African animal trypanosomosis is important in cattle, but can cause serious losses in pig, camels, goat, and sheep (Brown *et al.*, 1990).

In Ethiopia, tsetse transmitted animal trypanosomosis is a serious constraint to livestock production and agricultural development (Langridge, 1976; Abebe, 2005). exorcising farmers and livestock keepers out of areas having very high potential for growth, and forcing them to live on a highly degraded highlands of the country. The problem caused by tsetse and trypanosomosis is not only limited to inflicting diseases but also leading to significant negative impacts such as losses due to mortality and morbidity in domestic animals, cost of livestock treatment and tsetse control, and getting rid of draught animals from their infestation areas (Juyal *et al.*, 2005).

Tsetse flies in Ethiopia are confined to southern and western regions between longitude of 33° and 38° East and latitude of 5° and 12° North which amounts

to be about 200,000 Km². Tsetse infested areas lies in the low lands and also in the river valleys of Blue Nile, Baro Akobo, Didessa, Ghibe and Omo. Benishangul Gumuz is one of the five regions of Ethiopia infested with more than one species of tsetse flies (Keno, 2005). Five species of Glossina (*Glossina morsitans submorsitans*, *G. Pallidipes*, *G. tachnoides*, *G. f. fuscipes* and *G. longipennis*) have been registered in Ethiopia (Keno, 2005). The tsetse flies (vectors), *G. fusca*; the bush fly, *G. morsitans*, which inhibit principally savannah area and *G. palpalis*; a riverine species, effectively prevent the rearing of the cattle over the large area of the Africa (Blood *et al.*, 1989).

Transmission of trypanosomosis in livestock is either cyclically (*T. congolense*, *T. vivax*, *T. brucei*) by tsetse flies or non-cyclically (*T. evansi*) by haematophagus flies (tabanids and stomoxys). The exception is infection with *T. equiperdum*, which is transmitted by sexual contact. During cyclical transmission, tsetse flies acquire infection of bloodstream trypomastigotes from the mammalian host blood. The trypanosomes enter the midgut where they transform through lengthwise division into epimastigotes in the cardia. Later they penetrate the haemocoel via the peritrophic membrane and the midgut epithelium into the salivary glands or proboscis of the fly where they develop into metacyclics, which are infective. During feeding, these infectious stages are inoculated into the skin of the host (Senifert, 1996). Trypanosomes are unicellular which the trypanosomes is classified as flagellated protozoa from genus trypanosomes of the family trypanosomatidae which belongs to the order kinetoplastida of class zoomastigophora. The zoomastigophora is classified under the phylum sarcomastigophora (FAO, 1998).

Trypanosomosis is a protozoan disease of both human and animals caused by different species of the genus trypanosome. The disease is characterized by intermittent fever, anaemia, lymphadenopathy, splenomegaly and cachexia often followed by death in untreated cases. The most important trypanosomes in terms of economic loss in domestic livestock and by the way of cyclical transmission are the tsetse transmitted species such as *T. congolense*, *T. vivax* and *T. brucei* (Getachew, 2005). The modern classification of Trypanosomiasis is rearranged in to two sections, the Stercoraria which is non pathogenic to man and animals with few exceptions and the Salivaria which is pathogenic to human & other animals (Kassa, 2005).

Trypanosomes are microscopic, elongated and flattened cell which move with the help of single flagella directed towards, at the base of which is found characteristic structure, the kinetoplast (Jemere, 2004). The distribution of trypanosomosis is depending on the three factors: the distribution of vectors, the

virulence of the parasite and the response of the host. Epidemiologically trypanosomes are distributed in the tropical Africa in the latitude of 14^oc and 29^oc where they are associated with their vectors, Glossina, the tsetse fly (Urquhart *et al.*, 1996).

Trypanosomosis is a complex disease transmitted by tsetse flies cyclically (biologically), non cyclically (mechanically) by other biting flies and by other means like venereal, Iatrogenic and by coitus of transmission (Awoke, 2000).

Trypanosomosis is transmitted by tsetse and other biting flies through the transfer of blood from one animal to another. The most important mechanical vectors are flies of the genus Tabanus, stomoxys, Haematopota, hiperosia and chrysops flies (Urquhart *et al.*, 1996). *T. vivax* and *T. brucei* have spread beyond the tsetse fly belts where transmission by biting flies (FAO, 1998). With single exception of *T. equiperdum* of equines which is venereal disease. All species have an arthropod vector, in which transmission is either cyclically or non cyclically (mechanical transmission) (Urquhart *et al.*, 1996).

Treatment and control of trypanosomosis in order to be effective treatment should be given early in the initially phase of parasitaemia. As no new drugs have been withdrawn because of resistance; treatment is now essentially limited to two compounds, diaminazene aceturate and homidium salts (either chloride or bromide) (IAEA, 2002).

In the Abay basin areas of northwest Ethiopia, tsetse transmitted trypanosomosis is one of the most economically important diseases impeding the development of livestock and agricultural farming activity which requires development of proper surveillance and control strategy. Benishangul-Gumuz regional state pertains to the area of North west part of the country and nearly 31,000 km² or 62% of the region's total land area is believed to be infested with tsetse fly (NTTICC, 1996).

Bambasi, Homoshi and Kurmuk Districts were among the seven districts of Asossa zone in the Benishangul Gumuz regional state, western Ethiopia with a serious problem of trypanosomosis. Controlling this economically important disease in this area could have a number of benefits to improve the livelihood of the poor people of the district by increasing milk, meat, surplus capital from the sale of livestock and livestock products and improving the availability of draft power (oxen).

Recent findings and field observations have indicated that the common trypanosomosis control tools; that is anti trypanosomosis drugs have become ineffective in many areas due to development of drug resistance by the parasite; moreover, toxicity of the drugs and exhibition of antigenic variation which hampers vaccine production are the limitations facing

the modern Veterinary Medicine (FAO, 1998). Even though the studied woredas' are rich in different livestock population, the presence of animal trypanosomosis is pulling the agricultural sector backward. Nearly 31,000 km² or 62% of the region's total land area is believed to be infested with tsetse fly, as a result, the woreda, regional states as well as the country does not benefit from this sector (NTTICC, 1996).

Objectives

- To determine the prevalence of bovine trypanosomosis
- To identify the apparent vector density
- To find out the dominant trypanosoma species
- To identify the species of trypanosoma
- To assess the associated risk factors

2. Materials And Methods

2.1 Study area

The study was conducted in selected Districts of Asossa zone of Benishangul Gumuz Regional State from September to January, 2018. It was carried out in three districts here after called namely: Bambasi, Homesha and Kurmuk. Asossa zone has 214 peasant associations, stretching over an area of 18,340.55 kilometer square, with human population of 270,980. The region is located between latitude of 8°30' and 40° 21' N and longitude of 34° 21' and 39° 1' E and its altitude range is 700 -1560 meter above sea level. Annual rain fall is between 900 -1500 mm with unimodal type of rainfall that occurs between April and October. Annual temperature ranges between 25 - 35°C. The livelihood of the society largely depends on mixed livestock and crop production having livestock population of 77,688 Cattle, 167281 Goat, 9651 Sheep, 27638 Equines, 279,098 Poultry and 66,019 beehives (CSA, 2015).

2.2 Study Design and Study Animals

Cross-sectional study design was used. A local zebu cattle (*Bos indicus*), which are usually kept under an extensive husbandry system grazing the communally owned pasture land throughout the year were randomly sampled. They grazed together during the day time and returned to their individual owner's farmstead each evening. The body condition of each of the study cattle was scored as good, medium and poor Nicholson MJ, and Butterworth MH, (1986). Concurrently, their age was categorized in years (≤ 3 , 4-7, >7) based on De-Lahunta A, and Habel RE, (1986).

2.3 Sample Size Determination

The study sites were selected purposively as convenient. Sampling animals were sampled randomly involving both sexes, all age groups, and all types of body conditions. The desired sampling size was

calculated according to the formula given by (Thrusfield, 2005). The sample size was determined having, previous sum up average of Asossa zone cattle trypanosomosis prevalence 7.85% (Asmamaw A *et al.*, 2016); confidence level of 95%, and 5% desired absolute precision. As result a total of 111 cattle were calculated, however; it was increased to (n=340) to increase precision and these cattle were sampled at their communal grazing area using simple random sampling method.

2.4 Study Methodology

2.4.1 Packed cell volume (PCV) determination

Blood samples were obtained by puncturing the marginal ear vein with a lancet and collected directly into a pair of heparinized capillary tubes. The tubes were then sealed at one end with crystal seal. PCV was measured in a micro-haematocrit centrifuge (Hermmler Labortechnik, type Z, Germany). The capillary tubes were placed in microhaematocrits centrifuge with sealed end outermost. Then the tube was loaded symmetrically to ensure good balance. After screwing the rotary cover and closing the centrifuge lid, the specimens were allowed to centrifuge at 12,000 rpm for 5 minutes. After centrifugation, the capillary tubes were placed in a haematocrit reader. The length of the packed red blood cells column is expressed as a percentage of the total volume of blood. Animals with PCV less than 24% were considered to be anemic (OIE, 2008).

2.4.2 Buffy coat technique

Heparinized microhaematocrit capillary tubes, containing blood samples were centrifuged for 5 minutes at 12,000 rpm. After the centrifugation, trypanosomes were usually found in or just above the buffy coat layer. The capillary tube was cut using a diamond tipped pen 1 mm below the buffy coat to include the upper most layers of the red blood cells and 3 mm above to include the plasma. The content of the capillary tube was pour onto a glass slide, and covered with cover slip. The slide was examined under x40 objective and x10 eye piece for movement of parasite (Paris, 1982). Trypanosome species were identified according to their morphological descriptions as well as movement in wet film preparations (OIE, 2008).

2.4.3 Fly survey

A total of 54 traps including 10 monopyramidal, 24 monoconical and 20 biconical traps were deployed. Every trap was deployed with odor baited with acetone and cow urine. The underneath of each trap pole was smeared with grease in order to prevent the ants climbing up the pole towards the collecting cage that could damage the tsetse flies. The trap deployment time was 48 hours. After the flies captured in the collecting cage they were then sorted by sex and species and recorded. The species of tsetse was

identified based on the characteristic morphology. Other biting flies were also separated according to their morphological characteristics such as size, color, proboscis and wing venation structures at the genus level (Langridge, 1976; Fischer and Say, 1989). Sexing was done for tsetse fly just by observing the posterior end of the ventral aspect of abdomen by hand lens, as a result male flies easily identified by enlarged hypophageum.

2.5 Data Analysis

All the collected raw data and the results of parasitological and hematological examination data were entered into a Microsoft excel spread sheets program and then was transferred to Intercool STATA version 11.0 for analysis. The prevalence of trypanosome infection was calculated as the number of positive animals as examined by buffy coat method divided by the total number of animals examined at the particular time. Data collected on PCV values were analyzed by ANOVA to compare the mean PCV values of infected animals against that of uninfected animals. Pearson's chi-square (χ^2) was used to evaluate the association of different variables with the prevalence of trypanosome infection. In all of the statistical analysis, a confidence level of 95% is used and P-value of less than 0.05 (at 5% level of significance) was considered as statistically significant.

3. Result

3.1 Trypanosomes survey results

Out of the total animals examined, 18/340 (5.29 %) were infected with trypanosomes. The trypanosome species responsible for the infection were *T. congolense* and *T. vivax*. The proportional prevalence of each species of trypanosome was 14(77.7%) for *T. congolense* and 4 (22.2%) for *T. vivax*, were observed in the fresh blood examined during the study period and it was found to be statistically significant ($P < 0.000$, $\chi^2 = 261.19$) (Table -1).

3.2 Haematological survey result

The mean PCV values for all examined animals were 27.22 ± 0.033 SE. However, the mean PCV value for non - infected animals were 28.99 ± 0.012 SE and the mean PCV value of the infected animals was 21.06 ± 0.03 SE. There was no significant

difference in the mean PCV value between non-infected and infected animals ($P > 0.05$, $\chi^2 = 1.78$) (Table -2).

3.3 Trypanosomosis associated risks

In the present, study animals examined were categorized in different age groups as ≤ 3 years, 3-7 years and >7 years old. The lowest cattle trypanosomosis prevalence (3.77%) was observed in ≤ 3 years of age and the highest (6.5 %) was seen in >7 years of age. The difference in the prevalence was not statistically significant ($p > 0.05$) (Table - 3). The highest and the lowest prevalence of trypanosomosis were recorded in Horezeb PA (17.64 %) and Darselam and keshmando nq2 (0 %) study sites respectively. However, there was no significant difference among the study sites ($p > 0.05$) (Table-3). The prevalence of trypanosomosis varies in both sexes; the infection in female is slightly higher (5.86 %) than male (3.77 %) and the association was not statistically significant ($P > 0.05$) (Table 3).

Similarly, animals are categorized in to different body conditions as good, medium and poor. The infection rate was highest (25 %) in poor body condition and lowest (2.31%) in good body conditions. Trypanosome infection and body condition scores of study animals were statistically significant ($p < 0.05$) (Table 3).

3.4 Entomological Survey result

The present survey of tsetse flies depicted that *G. morsitans submorsitans* is the only species of tsetse fly responsible for cyclical transmission of trypanosomosis in the study area. Overall, 956 flies were captured during the study period from different sites. Tsetse flies account for 151 (15.79 %) of the total whereas other biting flies covers 805/956 (84.2%) comprising of 796 (83.26%) stomoxys, 7(0.73 %) tabanus and 2(0.21%) haematopota. Of the 151 tsetse flies captured, 109/151 (72.18 %) were females. *G. morsitans submorsitans* were identified in the survey site with the overall apparent density of 1.39 f/t/d (fly/trap/day) while the mean apparent density of mechanical vectors such as stomoxys (7.37f/t/d), tabanids (0.064 f/t/d) and haematopota (0.018 f/t/d) were recorded (table 4). The highest fly density were observed in Sonka 24.91 F/T/D and the lowest recorded in Darselam 0.8 F/T/D (Table 4).

Table 1: Prevalence of infection of trypanosomes in selected districts

| Trypanosomes | No. positive | Prevalence (%) | χ^2 | (p-value) |
|----------------------|--------------|----------------|----------|-----------|
| <i>T. congolense</i> | 14 | 77.7 | 261.19 | 0.000* |
| <i>T. vivax</i> | 4 | 22.2 | | |
| <i>T. brucei</i> | 0 | 0 | | |
| Mixed | 0 | 0 | | |
| Total | 18 | 100 | | |

*= trypanosome species were statistically significant

Table 2: Mean PCV comparison between parasitaemic and aparasitaemic animals

| Status | Frequency | Mean PCV | SE | 95 %CI | X ² | p- value |
|--------------|-----------|----------|--------|--------------|----------------|----------|
| Infected | 76 | 21.06 | 0.03 | 0.018-0.1508 | 1.78 | 0.18 |
| Non infected | 264 | 28.99 | 0.0126 | 0.019-0.069 | | |
| Total | 340 | 27.22 | 0.033 | 0.02-0.15 | | |

Table 3: prevalence of bovine trypanosomosis and its association with various risk factors in selected districts

| Risk factors | No. examined | No. positive | Prevalence (%) | coordinates | altitudes | χ ² | p-value |
|------------------------|--------------|--------------|----------------|----------------------------|-----------|----------------|---------|
| Study Sites | | | | | | | |
| N/keshemando | 62 | 2 | 3.22 | N-094104.7 E-0344213.3 | 1466m | 10.30 | 0.17 |
| Keshmando no2 | 28 | 0 | 0 | N-093613.4 E-0344111.0 | 1390m | | |
| Shobora | 100 | 6 | 6 | N-094838.12 E-0344029.6 | 1441m | | |
| Sonko | 75 | 3 | 4 | N-094902.8 E-0344153.3 | 1391m | | |
| Dunga | 16 | 1 | 6.25 | N-101339.1 E-0343548.7 | 1551m | | |
| Darselam | 15 | 0 | 0 | N-101933.8 E-0344012.8 | 1377m | | |
| Abadi | 27 | 3 | 11.11 | N-103123.3 E-0343143.9 | 1369m | | |
| Horezeb | 17 | 3 | 17.64 | N-103419.8 E-0342130.2 | 708m | | |
| Total | 340 | 18 | 5.29 | | | | |
| Sex | | | | | | | |
| Male | 101 | 4 | 3.77 | | | 0.50 | 0.47 |
| Female | 239 | 14 | 5.86 | | | | |
| Total | 340 | 18 | 5.29 | | | | |
| Age (years) | | | | | | | |
| ≤ 3 | 106 | 4 | 3.77 | | | 0.85 | 0.65 |
| 4-7 | 111 | 6 | 5.4 | | | | |
| > 7 | 123 | 8 | 6.5 | | | | |
| Total | 340 | 18 | 5.29 | | | | |
| Body conditions | | | | | | | |
| Good | 173 | 4 | 2.31 | | | 35.07 | 0.000* |
| Medium | 126 | 4 | 3.17 | | | | |
| Poor | 40 | 10 | 25 | | | | |
| Total | 340 | 18 | 5.29 | | | | |

*0.000= statistically significant

Table 4: Flies caught in different areas of survey sites of selected districts

| Sites | Total flies caught | No. of traps | Tsetse flies caught | | | | Biting flies | | | |
|---------------|--------------------|--------------|---------------------|---------|-----------|------------|--------------|------------|----------|-------------|
| | | | No. | Species | M | F | *F/T/D | Stomoxys | Tabanid | Haematopota |
| N/keshemando | 50 | 6 | | | | | 50 | 0 | 0 | |
| Keshmando no2 | 54 | 6 | | | | | 54 | 0 | 0 | |
| Shobora | 233 | 8 | | | | | 231 | 2 | 0 | |
| Sonko | 299 | 6 | | | | | 299 | 0 | 0 | |
| Dunga | 36 | 8 | | | | | 36 | 0 | 0 | |
| Darselam | 8 | 5 | | | | | 8 | 0 | 0 | |
| Abadi | 257 | 11 | 142 | | 40 | 102 | 6.45 | 108 | 5 | 2 |
| Horezeb | 19 | 4 | 9 | | 2 | 7 | 1.125 | 10 | 0 | 0 |
| Total | 956 | 54 | 151 | | 42 | 109 | 1.39 | 796 | 7 | 2 |

F/T/D=fly per trap per day, GM=*Glossina morsitans submorsitans*, M=male, F=femal

4. Discussion

This study showed; an overall cattle trypanosomosis prevalence of 18/340 (5.29%), Comparable research works were reported in various parts of Ethiopia, for example, Asmamaw A *et al.* (2016) revealed cattle trypanosomosis prevalence of 9.85% in Assosa zone of seven districts, Western Ethiopia. In addition, Aki A. (2016) in Asossa districts and Aki A *et al.* (2016) in Pawe district, indicated prevalence of 4.58 % and 5.58 % during his research activity on prevalence of cattle trypanosomosis, associated risk factors and vector density respectively.

Comparably, high findings were reported by Asmamaw A. (2017), indicated that, cattle trypanosomosis prevalence of 26.30%, and 22.77% in mandura and Dangur districts, respectively and the difference in the disease distribution was due to the difference in climatic conditions of the areas and seasonal variation and also, attributed to the similarities of the study areas in their ecological set up such as altitude, ambient temperature, vegetation cover and vector abundance.

In this research, the majority of trypanosomosis infection was due to *Trypanosoma congolense*. The relative prevalence of trypanosome species showed 14/18 (77.7%) *T. congolense* and 4/18(22.2%) *T. vivax*. This result was in agreement with earlier works of Aki A *et al.*, (2016) demonstrated *T. congolense* proportional prevalence of 75.86% and proportional prevalence *trypanosome vivax* of 24.14% during his research on cattle trypanosomosis in Pawe district, Benishangul Gumuz Regional State, Western Ethiopia; (Bayisa *et al.*, 2015) demonstrated *T. congolense* proportional prevalence of 85% during his research on cattle trypanosomosis prevalence in Asossa district, Benishangul Gumuz Regional State, Western Ethiopia. But, low findings was reported by Zelalem *et al.* (2015) in Asossa and Homosha districts, which was indicated that, the relative proportion of trypanosomosis species, 1.82, 0.52 and 0.26% for *T. vivax*, *T. congolense* and *T. brucei* respectively.

The current study revealed an overall mean PCV value of 27.22 % \pm 0.033 SE. The PCV value of the infected animals was not statistically significantly lower (21.06% \pm 0.03) than that of non-infected animals (28.99 % \pm 0.012). This result was inline with earlier reports (Asmamaw, 2017; Mulaw *et al.*, 2011; Bayisa, *et al.*, 2015).

In this study, animal parameters like study sites, age categories, and sex groups, were not observed significant for susceptibility of animals to trypanosomosis. These findings were lining up with earlier works (Ayele *et al.*, 2015; Lelisa, *et al.*, 2015; Regasa, *et al.*, 2015). The fact that trypanosomosis do not depend on sex could possibly be hypothesised that

both male and female animals have virtually equal chance of being in contact with flies and ultimately developing the disease. This survey revealed the highest (17.64 %) trypanosomosis prevalence in Horezeb and the lowest (0 %) in Darselam and Keshmando no2. The variation was statistically non significant ($p > 0.05$). This might be attributed to the relative ecological pattern variation such as microclimate of the sites, distance between herds, animal herd density, and other factors which, in turn, influences tsetse fly and/or other biting flies' population and type present in each study sites (Bayisa *et al.*, 2015). Similarly, Asmamaw (2017) indicated the significant variation of trypanosomosis prevalence among the study sites in Bullen district.

In entomological survey, overall, 956 flies were captured in the study period from different sites. Tsetse flies account for 151(15.79%) of the total whereas other biting flies covers 84.21 % comprising of 796 (83.26%) stomoxys, 7(0.73 %) tabanus and 2 (0.21 %) haematopota. Of the 151 tsetse flies captured, 109 (72.18 %) were investigated as females. Apparent density of *Glossina submorsitans* found in the area was (1.39 f/t/d) along with other mechanical vectors such as stomoxys (7.37 f/t/d), haematopota (0.018 f/t/d) and (0.064 f/t/d) tabanid respectively.

The result of tsetse fly survey agrees well with the general knowledge on the ecology of tsetse species found in the District. Typical habitat pattern were found in the study area for the savanna fly species *G.m. submorsitans* which prefers for savanna grass and riverine. The geographical distribution of *G. m. submorsitans* is concentrated in the lowland area as climatic conditions are more favourable. Some flies, however, were found as high as 1780 m.a.s.l. Earlier works by (Ford *et al.*, 1976; Langridge, 1976) had established the tsetse geographical limit at 1600 m.a.s.l and later Tikubet and Gemechu (1984) the upper limit reaches to 1700 m.a.s.l. and NTTICC (1996) reported the limit to be 2000 m.a.s.l. while in the present survey the maximum limit was 1780 m.a.s.l. *G. tachinoides* and *G. m. submorsitans* were detected by Langridge (1976) in the Abbay valley areas and Beles river valleys is also incriminated with these species of tsetse fly. While Tikubet and Gemechu (1984) also reported *G. tachinoides* and *G. m. submorsitans* in the Abbay and Didessa valleys.

The present research were similar with previous works of Asmamaw A. *et al.* (2016) at Asossa zone, north western Ethiopia, who reported *G. m. morsitans* with apparent density of 2.49 fly/trap/day, and he also indicated other findings such as 1.66, 0.12, 0.31 fly/trap/day for Stomoxys, Tabanus and haematopota respectively. It was also in agreement with findings of (Aki 2016) at Asossa district of Benishangul Gumuz

Regional state, western Ethiopia, which was reported to be 2.84 f/t/d, 0.56 f/t/d, 0.071 and 0.11 f/t/d for *G. m. morsitans*, *Stomoxys*, *Tabanus* and *haematopota* respectively. Comparable result was reported by Asmamaw A. (2016) from Bambasi district which is 3.92, 1.76, 0.2, 0.35 f/t/d for *G. m. morsitans*, *Stomoxys*, *tabanids*, and *haematopota* respectively.

Ford et al. (1976) reported that 5902 km² of the river basin of the Angar, Didessa and Wama valleys were infested by *G. tachinoides* and *G. m. submorsitans*. *G. tachinoides* has a more wide spread habitat in the north western part of metekel zone bordering Beles river.

5. Conclusion And Recommendations

Animal trypanosomosis is a major problem to livestock production and productivity in study areas. Since the Districts lies within the tsetse belt area, the overall prevalence of animal trypanosomosis prevailing in the area was moderate. It was found to be 18(5.29 %), which was statistically non significant ($p>0.05$). And also the trypanosomosis and other factors such as (nutritional, seasonal; concurrent disease) was found to be negatively affects the PCV values and body condition score of affected animals. The most widely distributed and dominant species is *T. congolense* followed by *T. vivax*, which was mainly transmitted by tsetse fly, *Glossina submorsitans* and biting flies (*stomoxys*, *tabanid* and *haematopota*) respectively.

Based on the current findings, the following recommendations are forwarded;-

- Particular attentions towards the identified trypanosome species are essential to control the impact of the disease on cattle that are potential reservoir of the infections.
- Development of control options that could minimize the tsetse fly and biting flies in the study area should be introduced in a wholistic approach.
- Proper and strict follow up of trypanocidal drug distribution, therapeutic strategies and alternative control measures should be implemented by concerned stake holders.
- The farmer in the area should be trained how to control the vector of the disease and provided with materials
- Further study on the trypanosomosis, tsetse fly investigation and also on possible factors should be carried out by laboratory experts to give the best strategic control and prevention measures in the study area.

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