



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

**TO DETERMINE THE IMPACT OF ETHNO PHARMACOLOGICAL DRUGS ON
CONTROL OF TRYPANOSOMOSIS IN IRIIRI SUB-COUNTY, NAPAK DISTRICT**

By

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**A RESEARCH DISSERTATION SUBMITTED TO THE FACULTY OF
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MAY, 2023

DECLARATION

This dissertation contains my own original work and it has never been submitted in this university or any other institution of higher learning for the award of a degree.

Sign Date.....

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APPROVAL

This dissertation has been carried out/prepared under my supervision and is now ready for submission to academic Board of Busitema University Arapai campus, with approval of my Supervisor.

Sign Date.....

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DEDICATION

This dissertation is dedicated to all my family members, most especially my mother **Mrs. Amulen Hellen**, relatives, my friends and all my workmates for the effort and support they contributed towards making my dissertation expectedly successful.

Special dedications go to my friends **Moses Arita, Emma Ekwaru, Timothy Orode and Akiror Betty** who kept on offering socio-physiological and financial support during my course work.

Not forgetting my classmates, Okiror Emmanuel, Otim Samuel, Okuda William and Ikiring Grace to mention but few.

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LISTS OF ACRONYMS

CAHWs	: Community Animal Health Workers.
FAO	: Food Agricultural Organization.
GDP	: Gross Domestic Product.
IM	: Intramuscular.
ISO	: International Standards Organization.
IV	: Intravenous.
LCs	: Local Councils.
MAAIF	: Ministry of Agriculture Animal Industry and Fisheries.
ML	: Milliliters.
MOH	: Ministry of Health.
NGO	: Non-Government Organization.
OC	: Degree Celsius.
UBOS	: Uganda Bureau of Statistics.
USA	: United States of America.
WHO	: World Health Organization

ABSTRACT

The study was carried out so as to determine the impact of ethno pharmacological drugs, the types of ethno pharmacological drugs and their usage on control of trypanosomosis disease in Iriiri Sub County, Napak district. Trypanosomosis has effects on livestock sector as it reduces animal production and productivity thus undermining food security and economic development (Holt et al., 2016). There is currently limited information on the use of alternative interventions in the management of the disease like use of ethno medicine (Sofowora et al., 2013). No study has yet been conducted to address this gap. A cross sectional study was conducted for five days, while dealing with sampled respondents, the survey focused mostly on affected parishes of Iriiri and Tepeth. It targeted livestock farmers, youths, and elderly and kraal leaders. Questions were generated in a questionnaire and were posed to the sampled respondents to answer them respectively. The means of the results from the answers obtained were analyzed using the descriptive data analysis technique. Basing on the results obtained from the study, Belemnite trees, Acacia Spp, Neem and Croton Macrostachyus trees were the predominant ethno pharmacological drugs used for control of trypanosomosis in Iriiri Sub County, The Impact of Ethno pharmacological drugs on treatment and prevention of trypanosomosis was established at 66% and 30% respectively. Further exploration should be done to identify more plants with ethno pharmacological effects on control of African Animal trypanosomosis in Napak district. It is important that plants used in traditional medicine to treat African trypanosomosis be validated and their active principles identified in order to design standardized ethno medicines for treatment of African Animal trypanosomosis. Suggested areas for further research be on the mode of action of the active natural compounds has almost never been thoroughly studied.

CHAPTER 1: INTRODUCTION

1.1 Background

The Ugandan economy is dominated by the agricultural sector which accounts for 20% of Gross Domestic Product (GDP), 48% of the export earnings, 73% of employment and provides most of the raw materials to the agro-based industrial sector (Shinyekwa et al., 2016). Eighty five percent (85%) of Uganda's current population of 45.74 million an increase of 3.26% of original population, most of whom are women and young people living in rural areas and depend mainly on agriculture for their livelihood. The national Livestock sub-sector estimates the national herd of cattle to be 14.2 million, goats 16 million, sheep at 4.5 million, poultry at 47.6 million, and swine at 4.1, which contributes about 17% of the Agricultural Gross Domestic Products (GDP) respectively. The tsetse transmitted trypanosomosis is one of the major constraints to improved livestock production and productivity in Uganda (Malele, 2011).

Napak is one of the districts located in Karamoja region in Uganda which has for the past years suffered from trypanosomosis epidemic. It lies between latitude 2° 25'13.9" and longitudes; 34° 25'01.2", with land area of 4,978.4 square kilometers at an average altitude of 100m to 2500meters above sea level with an estimated total population of 197,700 people (UBOS 2013) and 168,700 of livestock (Muhanguzi et al., 2017).

Iriiri sub-county in particular has an estimated population of 46,100 people (UBOS 2013) with a total of 2,348 households (UBOS 2013) and 16,189 livestock (District Production Department 2014). This sub-county was one of the most invaded areas with tsetse flies (*Glossina* species) infestation including cases of sleeping sickness of human beings in the Sub-county. The latest manifestation of the disease emerged in the year 2017-2019 in two villages of Pilars and Namendera and neighboring villages of Kaeselem where swarms had Invaded the areas forcing herders and their families to migrate east of the district and Teso region. The disease outbreak hit the herds of Napak more so in Iriiri and Iopei Sub-counties and caused a lot of economic losses to the local people whereby over 3,000 heads of cattle got infected with trypanosomosis and because of high infection rates, loss of livestock markets and death of quite a bigger number of animals especially cattle occurred (District Production Department).

References

- Allison, E. (2019). Deity Citadels: Sacred Sites of Bio-Cultural Resistance and Resilience in Bhutan. *Religions* 2019, Vol. 10, Page 268, 10(4), 268.
<https://doi.org/10.3390/REL10040268>
- Baral, T. N. (2010). Immunobiology of African Trypanosomes: Need of Alternative Interventions. *Journal of Biomedicine and Biotechnology*, 2010.
<https://doi.org/10.1155/2010/389153>
- Center for Food Security & Public Health, Institute for International Cooperation in Animal Biologics, I. S. U.-C. of V. M. (2009). African Animal Trypanosomosis African Animal Trypanosomosis. *In Vitro*, 1–5.
- Desquesnes, M., & Dia, M. L. (2003). Mechanical transmission of *Trypanosoma congolense* in cattle by the African tabanid *Atylotus agrestis*. *Experimental Parasitology*, 105(3–4), 226–231. <https://doi.org/10.1016/j.exppara.2003.12.014>
- Desquesnes, M., Sazmand, A., Gonzatti, M., Boulangé, A., Bossard, G., Thévenon, S., Gimonneau, G., Truc, P., Herder, S., Ravel, S., Sereno, D., Waleckx, E., Jamonneau, V., Jacquiet, P., Jittapalapong, S., Berthier, D., Solano, P., & Hébert, L. (2022). Diagnosis of animal trypanosomosis: proper use of current tools and future prospects. *Parasites & Vectors*, 15(1), 235. <https://doi.org/10.1186/s13071-022-05352-1>
- Franco, J. R., Simarro, P. P., Diarra, A., & Jannin, J. G. (2014). Epidemiology of human African trypanosomosis. *Clinical Epidemiology*, 6(1), 257. <https://doi.org/10.2147/CLEP.S39728>
- Geiger, A., Ponton, F., & Simo, G. (2015). Adult blood-feeding tsetse flies, trypanosomes, microbiota and the fluctuating environment in sub-Saharan Africa. *The ISME Journal*, 9(7), 1496. <https://doi.org/10.1038/ISMEJ.2014.236>
- Hoet, S., Opperdoes, F., Brun, R., & Quetin-Leclercq, J. (2004). Natural products active against African trypanosomes: A step towards new drugs. *Natural Product Reports*, 21(3), 353–364. <https://doi.org/10.1039/b311021b>
- Holt, H. R., Selby, R., Mumba, C., Napier, G. B., & Guitian, J. (2016). Assessment of animal

African trypanosomosis (AAT) vulnerability in cattle-owning communities of sub-Saharan Africa the LCNTDR Collection: Advances in scientific research for NTD control. *Parasites and Vectors*, 9(1), 1–12. <https://doi.org/10.1186/s13071-016-1336-5>

Igweh, A. C., & Onabanjo, A. O. (1989). Chemotherapeutic effects of *Annona senegalensis* in *Trypanosoma brucei brucei*. *Annals of Tropical Medicine and Parasitology*, 83(5), 527–534. <https://doi.org/10.1080/00034983.1989.11812382>

Kasozi, K. I., Zirintunda, G., Ssempijja, F., Buyinza, B., Alzahrani, K. J., Matama, K., Nakimbugwe, H. N., Alkazmi, L., Onanyang, D., Bogere, P., Ochieng, J. J., Islam, S., Matovu, W., Nalumenya, D. P., Batiha, G. E. S., Osuwat, L. O., Abdelhamid, M., Shen, T., Omadang, L., & Welburn, S. C. (2021). Epidemiology of Trypanosomosis in Wildlife—Implications for Humans at the Wildlife Interface in Africa. *Frontiers in Veterinary Science*, 8, 565. <https://doi.org/10.3389/FVETS.2021.621699/BIBTEX>

Kennedy, P. G. E., & Rodgers, J. (2019). Clinical and Neuropathogenetic Aspects of Human African Trypanosomosis. *Frontiers in Immunology*, 10(JAN). <https://doi.org/10.3389/FIMMU.2019.00039>

Legros, D., Ollivier, G., Gastellu-Etchegorry, M., Paquet, C., Burri, C., Jannin, J., & Büscher, P. (2002). Treatment of human African trypanosomosis - Present situation and needs for research and development. *Lancet Infectious Diseases*, 2(7), 437–440. [https://doi.org/10.1016/S1473-3099\(02\)00321-3](https://doi.org/10.1016/S1473-3099(02)00321-3)

Lindner, A. K., & Priotto, G. (2010). The Unknown Risk of Vertical Transmission in Sleeping Sickness—A Literature Review. *PLoS Neglected Tropical Diseases*, 4(12), 1–5. <https://doi.org/10.1371/JOURNAL.PNTD.0000783>

Malele, I. I. (2011). Fifty years of tsetse control in Tanzania: challenges and prospects for the future. *Tanzania Journal of Health Research*, 13(5 Suppl 1), 399–406. <https://doi.org/10.4314/THRB.V13I5.9>

Mann, A., Ifarajimi, O. R., Adewoye, A. T., Ukam, C., Udemé, E. E., Okorie, I. I., Sakpe, M. S., Ibrahim, D. R., Yahaya, Y. A., Kabir, A. Y., & Ogbadoyi, E. O. (2011). In vivo antitrypanosomal effects of some Ethnomedicinal plants from Nupeland of north central

- Nigeria. *African Journal of Traditional, Complementary and Alternative Medicines*, 8(1), 15–21. <https://doi.org/10.4314/ajtcam.v8i1.60486>
- Muhanguzi, D., Mugenyi, A., Bigirwa, G., Kamusiime, M., Kitibwa, A., Akurut, G. G., Ochwo, S., Amanyire, W., Okech, S. G., Hattendorf, J., & Tweyongyere, R. (2017). African animal trypanosomosis as a constraint to livestock health and production in Karamoja region: A detailed qualitative and quantitative assessment. *BMC Veterinary Research*, 13(1), 1–13. <https://doi.org/10.1186/S12917-017-1285-Z/FIGURES/4>
- Percoma, L., Sow, A., Pagabeleguem, S., Dicko, A. H., Serdebéogo, O., Ouédraogo, M., Rayaissé, J. B., Bouyer, J., Belem, A. M. G., & Sidibé, I. (2018). Impact of an integrated control campaign on tsetse populations in Burkina Faso. *Parasites and Vectors*, 11(1), 1–13. <https://doi.org/10.1186/S13071-017-2609-3/TABLES/6>
- Shereni, W., Neves, L., Argilés, R., Nyakupinda, L., & Cecchi, G. (2021). An atlas of tsetse and animal African trypanosomosis in Zimbabwe. *Parasites and Vectors*, 14(1), 1–10. <https://doi.org/10.1186/s13071-020-04555-8>
- Shinyekwa, I., Kiiza, J., Hisali, E., & Obwona, M. (2016). The Evolution of Industry in Uganda. *Manufacturing Transformation*, 191–210. <https://doi.org/10.1093/ACPROF:OSO/9780198776987.003.0010>
- Sofowora, A., Ogunbodede, E., & Onayade, A. (2013). The Role and Place of Medicinal Plants in the Strategies for Disease Prevention. *African Journal of Traditional, Complementary, and Alternative Medicines*, 10(5), 210. <https://doi.org/10.4314/AJTCAM.V10I5.2>
- Sutrave, S., & Richter, M. H. (2021). The Truman Show for protozoan parasites: A review of in vitro cultivation platforms. *PLoS Neglected Tropical Diseases*, 15(8). <https://doi.org/10.1371/JOURNAL.PNTD.0009668>
- von Wissmann, B., Fyfe, J., Picozzi, K., Hamill, L., Waiswa, C., & Welburn, S. C. (2014). Quantifying the Association between Bovine and Human Trypanosomosis in Newly Affected Sleeping Sickness Areas of Uganda. *PLOS Neglected Tropical Diseases*, 8(6), e2931. <https://doi.org/10.1371/JOURNAL.PNTD.0002931>

- Wamwiri, F. N., & Changasi, R. E. (2016). Tsetse Flies (*Glossina*) as Vectors of Human African Trypanosomosis: A Review. *BioMed Research International*, 2016. <https://doi.org/10.1155/2016/6201350>
- Allison, E. (2019). Deity Citadels: Sacred Sites of Bio-Cultural Resistance and Resilience in Bhutan. *Religions* 2019, Vol. 10, Page 268, 10(4), 268. <https://doi.org/10.3390/REL10040268>
- Baral, T. N. (2010). Immunobiology of African Trypanosomes: Need of Alternative Interventions. *Journal of Biomedicine and Biotechnology*, 2010. <https://doi.org/10.1155/2010/389153>
- Center for Food Security & Public Health, Institute for International Cooperation in Animal Biologics, I. S. U.-C. of V. M. (2009). African Animal Trypanosomosis African Animal Trypanosomosis. *In Vitro*, 1–5.
- Desquesnes, M., & Dia, M. L. (2003). Mechanical transmission of *Trypanosoma congolense* in cattle by the African tabanid *Atylotus agrestis*. *Experimental Parasitology*, 105(3–4), 226–231. <https://doi.org/10.1016/j.exppara.2003.12.014>
- Desquesnes, M., Sazmand, A., Gonzatti, M., Boulangé, A., Bossard, G., Thévenon, S., Gimonneau, G., Truc, P., Herder, S., Ravel, S., Sereno, D., Waleckx, E., Jamonneau, V., Jacquet, P., Jittapalpong, S., Berthier, D., Solano, P., & Hébert, L. (2022). Diagnosis of animal trypanosomosis: proper use of current tools and future prospects. *Parasites & Vectors*, 15(1), 235. <https://doi.org/10.1186/s13071-022-05352-1>
- Franco, J. R., Simarro, P. P., Diarra, A., & Jannin, J. G. (2014). Epidemiology of human African trypanosomosis. *Clinical Epidemiology*, 6(1), 257. <https://doi.org/10.2147/CLEP.S39728>
- Geiger, A., Ponton, F., & Simo, G. (2015). Adult blood-feeding tsetse flies, trypanosomes, microbiota and the fluctuating environment in sub-Saharan Africa. *The ISME Journal*, 9(7), 1496. <https://doi.org/10.1038/ISMEJ.2014.236>
- Hoet, S., Opperdoes, F., Brun, R., & Quetin-Leclercq, J. (2004). Natural products active against

African trypanosomes: A step towards new drugs. *Natural Product Reports*, 21(3), 353–364. <https://doi.org/10.1039/b311021b>

Holt, H. R., Selby, R., Mumba, C., Napier, G. B., & Guitian, J. (2016). Assessment of animal African trypanosomosis (AAT) vulnerability in cattle-owning communities of sub-Saharan Africa the LCNTDR Collection: Advances in scientific research for NTD control. *Parasites and Vectors*, 9(1), 1–12. <https://doi.org/10.1186/s13071-016-1336-5>

Igweh, A. C., & Onabanjo, A. O. (1989). Chemotherapeutic effects of *Annona senegalensis* in *Trypanosoma brucei brucei*. *Annals of Tropical Medicine and Parasitology*, 83(5), 527–534. <https://doi.org/10.1080/00034983.1989.11812382>

Kasozi, K. I., Zirintunda, G., Ssempijja, F., Buyinza, B., Alzahrani, K. J., Matama, K., Nakimbugwe, H. N., Alkazmi, L., Onanyang, D., Bogere, P., Ochieng, J. J., Islam, S., Matovu, W., Nalumenya, D. P., Batiha, G. E. S., Osuwat, L. O., Abdelhamid, M., Shen, T., Omadang, L., & Welburn, S. C. (2021). Epidemiology of Trypanosomosis in Wildlife—Implications for Humans at the Wildlife Interface in Africa. *Frontiers in Veterinary Science*, 8, 565. <https://doi.org/10.3389/FVETS.2021.621699/BIBTEX>

Kennedy, P. G. E., & Rodgers, J. (2019). Clinical and Neuropathogenetic Aspects of Human African Trypanosomosis. *Frontiers in Immunology*, 10(JAN). <https://doi.org/10.3389/FIMMU.2019.00039>

Legros, D., Ollivier, G., Gastellu-Etchegorry, M., Paquet, C., Burri, C., Jannin, J., & Büscher, P. (2002). Treatment of human African trypanosomosis - Present situation and needs for research and development. *Lancet Infectious Diseases*, 2(7), 437–440. [https://doi.org/10.1016/S1473-3099\(02\)00321-3](https://doi.org/10.1016/S1473-3099(02)00321-3)

Lindner, A. K., & Priotto, G. (2010). The Unknown Risk of Vertical Transmission in Sleeping Sickness—A Literature Review. *PLoS Neglected Tropical Diseases*, 4(12), 1–5. <https://doi.org/10.1371/JOURNAL.PNTD.0000783>

Malele, I. I. (2011). Fifty years of tsetse control in Tanzania: challenges and prospects for the future. *Tanzania Journal of Health Research*, 13(5 Suppl 1), 399–406. <https://doi.org/10.4314/THRB.V13I5.9>

- Mann, A., Ifarajimi, O. R., Adewoye, A. T., Ukam, C., Udeme, E. E., Okorie, I. I., Sakpe, M. S., Ibrahim, D. R., Yahaya, Y. A., Kabir, A. Y., & Ogbadoyi, E. O. (2011). In vivo antitrypanosomal effects of some Ethnomedicinal plants from Nupeland of north central Nigeria. *African Journal of Traditional, Complementary and Alternative Medicines*, 8(1), 15–21. <https://doi.org/10.4314/ajtcam.v8i1.60486>
- Muhanguzi, D., Mugenyi, A., Bigirwa, G., Kamusiime, M., Kitibwa, A., Akurut, G. G., Ochwo, S., Amanyire, W., Okech, S. G., Hattendorf, J., & Tweyongyere, R. (2017). African animal trypanosomosis as a constraint to livestock health and production in Karamoja region: A detailed qualitative and quantitative assessment. *BMC Veterinary Research*, 13(1), 1–13. <https://doi.org/10.1186/S12917-017-1285-Z/FIGURES/4>
- Percoma, L., Sow, A., Pagabeleguem, S., Dicko, A. H., Serdebéogo, O., Ouédraogo, M., Rayaissé, J. B., Bouyer, J., Belem, A. M. G., & Sidibé, I. (2018). Impact of an integrated control campaign on tsetse populations in Burkina Faso. *Parasites and Vectors*, 11(1), 1–13. <https://doi.org/10.1186/S13071-017-2609-3/TABLES/6>
- Shereni, W., Neves, L., Argilés, R., Nyakupinda, L., & Cecchi, G. (2021). An atlas of tsetse and animal African trypanosomosis in Zimbabwe. *Parasites and Vectors*, 14(1), 1–10. <https://doi.org/10.1186/s13071-020-04555-8>
- Shinyekwa, I., Kiiza, J., Hisali, E., & Obwona, M. (2016). The Evolution of Industry in Uganda. *Manufacturing Transformation*, 191–210. <https://doi.org/10.1093/ACPROF:OSO/9780198776987.003.0010>
- Sofowora, A., Ogunbodede, E., & Onayade, A. (2013). The Role and Place of Medicinal Plants in the Strategies for Disease Prevention. *African Journal of Traditional, Complementary, and Alternative Medicines*, 10(5), 210. <https://doi.org/10.4314/AJTCAM.V10I5.2>
- Sutrave, S., & Richter, M. H. (2021). The Truman Show for protozoan parasites: A review of in vitro cultivation platforms. *PLoS Neglected Tropical Diseases*, 15(8). <https://doi.org/10.1371/JOURNAL.PNTD.0009668>
- von Wissmann, B., Fyfe, J., Picozzi, K., Hamill, L., Waiswa, C., & Welburn, S. C. (2014). Quantifying the Association between Bovine and Human Trypanosomosis in Newly

Affected Sleeping Sickness Areas of Uganda. *PLOS Neglected Tropical Diseases*, 8(6), e2931. <https://doi.org/10.1371/JOURNAL.PNTD.0002931>

Wamwiri, F. N., & Changasi, R. E. (2016). Tsetse Flies (Glossina) as Vectors of Human African Trypanosomosis: A Review. *BioMed Research International*, 2016. <https://doi.org/10.1155/2016/6201350>