

Original Research Article

The Burden of Neglected Tropical Diseases in Sub-Saharan Africa

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Abstract: Health is a fundamental human right. However, a large population of the world is dogged with ill health which adversely affects the economy and development of nations. Although neglected tropical diseases (NTDs) cause enormous suffering, rob individuals of social and economic opportunities, and set-back countries' development efforts, they receive only 0.6% health fund of official development assistance. Globally, more than one billion people suffer from one or more NTDs, and unfortunately, 500,000 die yearly. Despite remarkable progress in the effort against NTDs globally, they still persist in SSA. The objective of this study was to determine the burden of NTDs and suggest ways of reducing the burden. A scoping review of literature was conducted through Google Scholar according to Arksey and O'Malley (2005) methodology using the search terms "Burden" and "Neglected Tropical Diseases" or "NTDs" and "Sub-Saharan Africa" or "SSA". Eligible studies were those addressing NTDs in SSA, published in English, for which the full text were available, and published between 2021 and 2023 in peer-reviewed scientific journals. Out of 20,800 identified studies, only 36 fully met the inclusion criteria. The study concluded that: SSA has a high burden of NTDs; communities in the region, including healthcare workers, have inadequate knowledge on NTDs; lack of community participation and engagement, and offering of fragmented care to people affected by NTDs; and lack of a robust clinical, public health, laboratory, pharmaceutical, and research capacity. The study recommends educating communities, as well as healthcare workers, on NTDs; ensuring community participation and engagement, and provision of holistic care to people affected by NTDs; and ensuring a robust clinical, public health, laboratory, pharmaceutical, and research capacity in SSA.

Keywords: Burden, Neglected Tropical Diseases, NTDs, sub-Saharan Africa, SSA.

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INTRODUCTION

According to World Health Organization (WHO), health is a basic human right. Moreover, universal health care (UHC) is firmly enshrined in the WHO Constitution which declares health a fundamental human right. However, a large population of the world is dogged with ill health which adversely affects the economy and development of countries. Hence, WHO calls for countries to be committed to ensuring the highest attainable level of health for all (World Health Organization, 2021).

Neglected tropical diseases (NTDs) are a diverse group of 20 conditions that are mainly prevalent

in tropical areas, where they mostly affect impoverished communities and disproportionately affect women and children. The NTDs include: Buruli ulcer, Chagas disease, dengue and chikungunya, dracunculiasis (Guinea-worm disease), echinococcosis, foodborne trematodiasis, human African trypanosomiasis (sleeping sickness), leishmaniasis, leprosy (Hansen's disease), lymphatic filariasis, mycetoma, chromoblastomycosis and other deep mycoses, onchocerciasis (river blindness), podoconiosis, rabies, scabies and other ectoparasitoses, schistosomiasis, soil-transmitted helminthiasis, snakebite envenoming, taeniasis/cysticercosis, trachoma, and yaws and other endemic treponematoses. These diseases cause devastating health, social and economic consequences to

more than one billion people. Furthermore, the epidemiology of NTDs is complex and often related to environmental conditions. Many of them are vector-borne, have animal reservoirs and are associated with complex life cycles. Thus, all these factors make their public-health control challenging (World Health Organization, 2023).

On 8th June 2022, the WHO released pivotal guidance, “Ending the neglect to attain the Sustainable Development Goals: A strategic framework for integrated control and management of skin-related neglected tropical diseases.” Skin-related neglected tropical diseases, or skin NTDs, comprise a group of NTDs that produce signs and symptoms on the skin and include at least 9 diseases or disease groups. Moving away from disease-specific approaches, it is anticipated that synergies will be identified and integrated building on this shared feature, where possible, to achieve a greater health impact. Additionally, the past three years has seen the launch of a new WHO NTDs roadmap titled, ‘Ending the Neglect to Attain the Sustainable Development Goals: A Road Map for Neglected Tropical Diseases 2021–2030. There is need to incorporate a One Health approach, recognizing critical links between human and animal health and the environment (Díaz *et al.*, 2023; Mogaji *et al.*, 2023; Yotsu *et al.*, 2023).

Globally, more than one billion people suffer from one or more NTDs. These diseases create enormous suffering, rob individuals of social and economic opportunities, and set-back countries’ development efforts. NTDs are found in 149 countries and are second to HIV/AIDS in terms of number of people affected by the diseases. There are over one billion people with at least one NTD (including more than 500 million children) and 500,000 deaths yearly. Yet, NTDs receives only 0.6% health fund of official development assistance compared with HIV/AIDS, malaria and tuberculosis that collectively receive above 50%. NTDs are among the top 10 leading causes of years of healthy life lost to long-term disability and premature deaths worldwide (Emeto *et al.*, 2021; Makau-Barasa *et al.*, 2023).

Africa is home to about 14% of the global population. However, the continent accounts for over one-third of the global burden of NTDs. There has been real progress in eradication, elimination, and control of NTDs since 2015. Examples are the eradication of wild polio in 2020, and the eradication or elimination of NTDs such as dracunculiasis in Kenya in 2018, human African trypanosomiasis (AT) in Togo in 2022, and trachoma in Togo, Gambia, Ghana, and Malawi in 2022. Although continental efforts have been made to combat these diseases, there still exists a significant gap in this fight, ranging from a lack of data to multisectoral participation and, most critically, health inequity. There is, therefore, the need for inclusion in achieving UHC towards eradicating NTDs, through addressing the problem of inequitable distribution and limited access to basic and

essential life resources such as water, housing, toilets, soap, and the facilitation of literacy about the existence of NTDs (Emeto *et al.*, 2021; George *et al.*, 2023; Impouma *et al.*, 2023; Yotsu *et al.*, 2023).

NTDs remain endemic in many regions of SSA. These diseases are markers of extreme poverty and inequity that are propagated by the political, economic, social, and cultural systems that affect health and wellbeing. More than 500 million people are affected by soil-transmitted helminths, schistosomiasis, lymphatic filariasis, trachoma and onchocerciasis. Hookworms affect 40-50 million school-aged children and about seven million pregnant women. Despite the remarkable progress in the effort against NTDs globally, they still persist in SSA. Ignorance and lack of the skill to identify and treat NTDs have been one of the many reasons that have allowed these NTDs to flourish especially in rural communities. Additionally, studies have shown that the burden of NTDs in SSA has proved difficult to quantify due to under-reporting, focal clustering and poly-parasitism (Emeto *et al.*, 2021; Gachoki *et al.*, 2023; Ochola, Elliott, *et al.*, 2021; Ochola, Karanja, *et al.*, 2021). The objective of this study was to determine the magnitude of the burden of NTDs in SSA and suggest ways of reducing the burden.

METHODOLOGY

Method

A scoping review of literature was conducted through Google scholar according to the criteria and methodology by Arksey and O’Malley (2005)

Eligibility Criteria

Eligible studies were those addressing NTDs in SSA. Only studies published in English, for which the full text were available, and published between 2021 and 2023 in peer-reviewed scientific journals, were included. Studies that were not published in peer-reviewed scientific journals, for which the full text were unavailable, or were published earlier than 2021 were excluded

Search

The search for studies was conducted from July to October 2023. The authors used the search terms “Burden” and “Neglected Tropical Diseases” OR “NTDs” and “Sub-Saharan Africa” OR “SSA”.

Selection Process

The selection process included the following steps: (i) specifying the research questions; (ii) identification of studies; (iii) selection of studies published between 2021 and 2023; (iv) screening of the identified studies to see if they met the inclusion criteria; and (v) synthesis and reporting of the results.

Selection of Studies

Studies that were identified through the database searches underwent a 2-stage screening

process. First, the authors screened the titles and abstracts using Mendeley reference manager to remove duplicates and identify eligible articles based on the set inclusion and exclusion criteria. Secondly, following the selection of the articles through the title and abstract review, the full text articles were then reviewed and a

consensus reached whether to include or exclude each article.

The flowchart of the selection process is presented in figure 1 below:

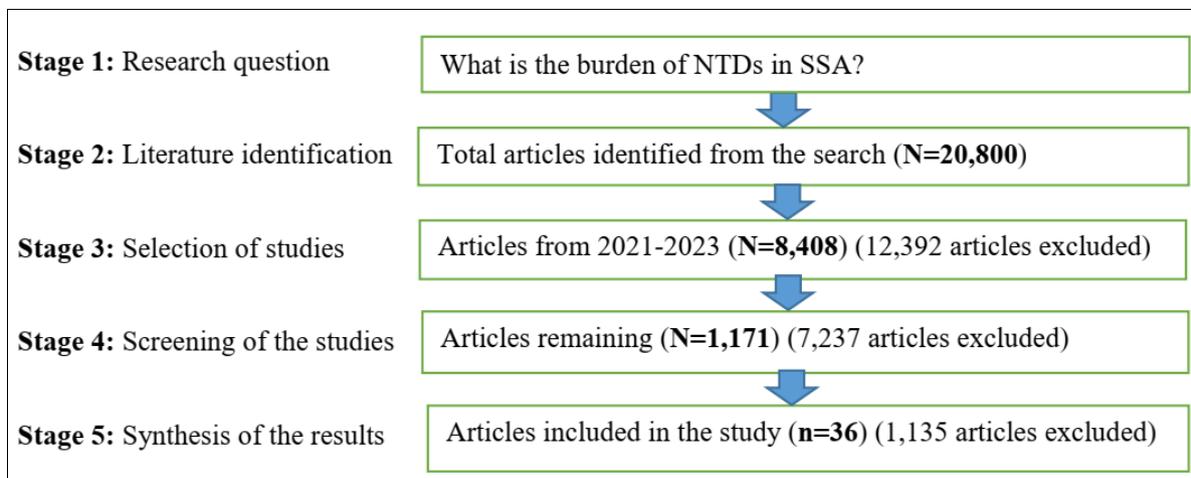


Figure 1: The Flowchart

RESULTS

Following a comprehensive literature review as shown in figure 1 above, only 36 studies fully met the

inclusion criteria. The results are shown in the table below.

Table 1: Selected studies

Year	Author(s)	Title of article	Source/DOI
2021	Ali, O., Mengiste, A., Semrau, M., Tesfaye, A., Fekadu, A., & Davey, G.	The impact of podoconiosis, lymphatic filariasis, and leprosy on disability and mental well-being: A systematic review.	https://doi.org/10.1371/journal.pntd.0009492
2021	Amazigo, U. V., Leak, S. G. A., Zoure, H. G. M., Okoronkwo, C., Diop Ly, M., Isiyaku, S., Crump, A., Okeibunor, J. C., & Boatin, B.	Community-directed distributors—The “foot soldiers” in the fight to control and eliminate neglected tropical diseases.	https://doi.org/10.1371/journal.pntd.0009088
2021	Emeto, D. C., Salawu, A. T., Salawu, M. M., & Fawole, O. I.	Recognition and reporting of neglected tropical diseases by primary health care workers in Ibadan, Nigeria.	https://doi.org/10.11604/pamj.2021.38.224.20576
2021	Eltom, K., Enan, K., El Hussein, A. R. M., & Elkhidir, I. M.	Dengue virus infection in sub-Saharan Africa between 2010 and 2020: A systematic review and meta-analysis.	https://doi.org/10.3389/fcimb.2021.678945
2021	Grifferty, G., Shirley, H., McGloin, J., Kahn, J., Orriols, A., & Wamai, R.	Vulnerabilities to and the socioeconomic and psychosocial impacts of the leishmaniases: A review.	https://doi.org/10.2147/RRTM.S278138
2021	Kelly-Hope, L. A., Sanders, A. M., Harding-Esch, E., Willems, J., Ahmed, F., Vincer, F., & Hill, R.	Complex emergencies and the control and elimination of neglected tropical diseases in Africa: Developing a practical approach for implementing safe and effective mapping and intervention strategies.	https://doi.org/10.1186/s13031-021-00356-7
2021	Ng’etich, A. K. S., Voyi, K., & Mutero, C. M.	Assessment of surveillance core and support functions regarding neglected tropical diseases in Kenya.	https://doi.org/10.1186/s12889-021-10185-1
2021	Ochola, E. A., Elliott, S. J., & Karanja, D. M. S.	The impact of neglected tropical diseases (NTDs) on women’s health and wellbeing in sub-Saharan Africa (SSA): A case study of Kenya.	https://doi.org/10.3390/ijerph18042180

Year	Author(s)	Title of article	Source/DOI
2021	Ochola, E. A., Karanja, D. M. S., & Elliott, S. J.	The impact of neglected tropical diseases (NTDs) on health and wellbeing in sub-Saharan Africa (SSA): A case study of Kenya.	https://doi.org/10.1371/journal.pntd.0009131
2021	Onasanya, A., Bengtson, M., Oladepo, O., Van Engelen, J., & Diehl, J. C.	Rethinking the top-down approach to schistosomiasis control and elimination in sub-Saharan Africa.	https://doi.org/10.3389/fpubh.2021.622809
2022	Afolabi, M. O., Adebisi, A., Cano, J., Sartorius, B., Greenwood, B., Johnson, O., & Wariri, O.	Prevalence and distribution pattern of malaria and soil-transmitted helminth co-endemicity in sub-Saharan Africa, 2000–2018: A geospatial analysis.	https://doi.org/10.1371/journal.pntd.0010321
2022	Bauleni, A., Tiruneh, F. N., Mwenyenkulu, T. E., Nkoka, O., Chirwa, G. C., Gowelo, S., Chipeta, M. G., & Ntenda, P. A. M.	Effects of deworming medication on anaemia among children aged 6–59 months in sub-Saharan Africa.	https://doi.org/10.1186/s13071-021-05123-4
2022	Duffey, M. M., Patel, T., Koukaz, Y., Sepulveda, T., Barbour, K., Fredricks, K., & Weatherhead, J. E.	The impact of neglected tropical diseases on women and girl refugees: A call for increased awareness and strategic intervention.	https://doi.org/10.3389/fitd.2022.1095174
2022	Kokaliaris, C., Garba, A., Matuska, M., Bronzan, R. N., Colley, D. G., Dorkenoo, A. M., Ekpo, U. F., Fleming, F. M., French, M. D., Kabore, A., Mbonigaba, J. B., Midzi, N., Mwinzi, P. N. M., N’Goran, E. K., Polo, M. R., Sacko, M., Tchuem Tchuenté, L.-A., Tukahebwa, E. M., Uvon, P. A., ... Vounatsou, P.	Effect of preventive chemotherapy with praziquantel on schistosomiasis among school-aged children in sub-Saharan Africa: A spatiotemporal modelling study.	https://doi.org/10.1016/S1473-3099(21)00090-6
2022	Koschorke, M., Al-Haboubi, Y. H., Tseng, P.-C., Semrau, M., & Eaton, J.	Mental health, stigma, and neglected tropical diseases: A review and systematic mapping of the evidence.	https://doi.org/10.3389/fitd.2022.808955
2022	Manjang, B., Ochola, E. A., & Elliott, S. J.	The use of non-pharmaceutical interventions for the prevention and control of schistosomiasis in sub-Saharan Africa: A systematic review.	https://doi.org/10.1080/17441692.2020.1869799
2022	Njenga, S. M., Kanyi, H. M., Mwatele, C. M., Mukoko, D. A., Bockarie, M. J., & Kelly-Hope, L. A.	Integrated survey of helminthic neglected tropical diseases and comparison of two mosquito sampling methods for lymphatic filariasis molecular xenomonitoring in the River Galana area, Kilifi County, coastal Kenya.	https://doi.org/10.1371/journal.pone.0278655
2023	Abouyannis, M., Boga, M., Amadi, D., Ouma, N., Nyaguara, A., Mturi, N., Berkley, J. A., Adetifa, I. M., Casewell, N. R., Lalloo, D. G., & Hamaluba, M.	A long-term observational study of paediatric snakebite in Kilifi County, south-east Kenya.	https://doi.org/10.1371/journal.pntd.0010987
2023	Afolabi, M. O., Sow, D., Mbaye, I., Diouf, M. P., Loum, M. A., Fall, E. B., Seck, A., Manga, I. A., Cissé, C., Camara, B., Diouf, A., Gaye, N. A., Colle Lo, A., Greenwood, B., & Ndiaye, J. L. A.	Prevalence of malaria-helminth co-infections among children living in a setting of high coverage of standard interventions for malaria and helminths: Two population-based studies in Senegal.	https://doi.org/10.3389/fpubh.2023.1087044
2023	Akinsolu, F. T., Abodunrin, O. R., Olagunju, M. T., Adewole, I. E., Rahman, N. O., Dabar, A. M., Njuguna, D. W., Soneye, I. Y., Salako, A. O., Ezechi, O. C., Varga, O. E., & Akinwale, O. P.	Community perception of school-based mass drug administration program for soil-transmitted helminths and schistosomiasis in Ogun State, Nigeria.	https://doi.org/10.1371/journal.pntd.0011213

Year	Author(s)	Title of article	Source/DOI
2023	Amoak, D., Dhillon, S., Antabe, R., Sano, Y., & Luginaah, I.	Factors associated with deworming medication utilization among pregnant women in Benin: Evidence from the demographic and health survey.	https://doi.org/10.3390/tropicalmed8030166
2023	Bhaumik, S., Menon, G. R., & Habib, A. G.	Prioritising snakebite in the child and adolescent health agenda.	https://doi.org/10.1016/S2352-4642(23)00224-9
2023	Díaz, A. V., Walker, M., & Webster, J. P.	Reaching the World Health Organization elimination targets for schistosomiasis: The importance of a One Health perspective.	https://doi.org/10.1098/rstb.2022.0274
2023	Elias, E., Silvestri, V., Mushi, V., & Mandarano, M.	Ovarian schistosomiasis: Challenges of a neglected ectopic involvement of blood flukes. Case report and review of literature.	https://doi.org/10.32074/1591-951X-891
2023	Elson, L., Kamau, C., Koech, S., Muthama, C., Gachomba, G., Sinoti, E., Chondo, E., Mburu, E., Wakio, M., Lore, J., Maia, M., Adetifa, I., Orindi, B., Bejon, P., & Fillinger, U.	National prevalence and risk factors for tungiasis in Kenya.	https://doi.org/10.1186/s40249-023-01131-x
2023	Gachoki, S., Groen, T. A., Vrieling, A., Skidmore, A., & Masiga, D.	Evidence-based advice on timing and location of tsetse control measures in Shimba Hills National reserve, Kenya.	https://doi.org/10.1371/journal.pntd.0011398
2023	George, N. S., David, S. C., Nabiryo, M., Sunday, B. A., Olanrewaju, O. F., Yangaza, Y., & Shomuyiwa, D. O.	Addressing neglected tropical diseases in Africa: A health equity perspective.	https://doi.org/10.1186/s41256-023-00314-1
2023	Guile, L., Lee, A., & Gutiérrez, J. M.	Factors associated with mortality after snakebite envenoming in children: A scoping review.	https://doi.org/10.1093/trstmh/trad031
2023	Hong, S.-T.	Review of recent prevalence of urogenital schistosomiasis in sub-Saharan Africa and diagnostic challenges in the field setting.	https://doi.org/10.3390/life13081670
2023	Impouma, B., Kalu, A. A., Makubalo, L., Gasasira, A., Cabore, J., & Moeti, M.	Responding to Africa's burden of disease: Accelerating progress.	https://doi.org/10.1017/S0950268823000997
2023	Kepha, S., Ochol, D., Wakesho, F., Omondi, W., Njenga, S. M., Njaanake, K., Kihara, J., Mwatha, S., Kanyi, C., Oloo, J. O., Kibati, P., Yard, E., Appleby, L. J., McRae-McKee, K., Odiere, M. R., & Matendehero, S. H.	Precision mapping of schistosomiasis and soil-transmitted helminthiasis among school age children at the coastal region, Kenya.	https://doi.org/10.1371/journal.pntd.0011043
2023	Makau-Barasa, L. K., Onduma, N., Yotebieng, K., & Karutu, C.	African institutions will lead on the road to end neglected tropical diseases.	https://doi.org/10.3389/fitd.2023.1116831
2023	Mogaji, H. O., Omitola, O. O., Bayegun, A. A., Ekpo, U. F., & Taylor-Robinson, A. W.	Livestock reservoir hosts: An obscured threat to control of human schistosomiasis in Nigeria.	https://doi.org/10.3390/zoonoticdis3010006
2023	Mørkve, A. W., Sitienei, J., & Van den Bergh, G.	A qualitative case study of community experiences with Tungiasis in high prevalence villages of Bungoma County, Kenya: "The whole body aches and the jiggers are torturing me!"	https://doi.org/10.1371/journal.pntd.0011304
2023	Sumaili, E.	Evolutionary trend of the significant decrease in histopathological conditions associated with neglected tropical diseases at the Kinshasa University Hospital in 51 years: Fake or reality?	https://doi.org/10.4314/aamed.v16i3.1
2023	Yotsu, R. R., Fuller, L. C., Murdoch, M. E., van Brakel, W. H., Revankar, C., Barogui, M. Y. T., Postigo, J. A. R., Dagne, D. A., Asiedu, K., & Hay, R. J.	A global call for action to tackle skin-related neglected tropical diseases (skin NTDs) through integration: An ambitious step change.	https://doi.org/10.1371/journal.pntd.0011357

DISCUSSION

Studies have shown that NTDs negatively impact SSA. This is because NTDs are mainly prevalent in tropical areas and mostly affect impoverished communities. Unfortunately, both of these conditions are aptly present in SSA. Despite the remarkable progress in the effort against NTDs globally, these diseases still persist in SSA. Ignorance and lack of skills to identify and treat NTDs have been one of the major reasons that have allowed these NTDs to flourish especially in rural communities. Additionally, complex emergencies resulting from conflict and political instability are a major challenge for NTDs control and elimination programmes in SSA. However, studies have shown that the burden of NTDs in SSA is difficult to quantify due to under-reporting, focal clustering and poly-parasitism (Emeto *et al.*, 2021; Gachoki *et al.*, 2023; Kelly-Hope *et al.*, 2021; Njenga *et al.*, 2022; Ochola, Elliott, *et al.*, 2021; Ochola, Karanja, *et al.*, 2021).

In SSA, more than 500 million people are affected by soil-transmitted helminthiasis, schistosomiasis, lymphatic filariasis, trachoma and onchocerciasis. Hookworms affect 40 to 50 million school-aged children and about seven million pregnant women. One study showed high prevalence of dengue virus infection in SSA. It is estimated that almost 80% of all deaths caused by snakebite occur in south Asia and SSA. Additionally, jigger infestation (tungiasis) is common in SSA. For example, in Kenya, it is estimated that 4% of the population suffer from tungiasis. Another great burden is schistosomiasis. Reports have shown that the burden of schistosomiasis remains extremely high despite over two decades of mass preventive chemotherapy (mass drug administration), predominantly to school-aged children. The NTDs trap the affected individuals in a cycle of poverty through their devastating effects on health, wellbeing and social-economic capabilities that extend to other axes of inequity such as gender and/or ethnicity (Afolabi *et al.*, 2023; Amoak *et al.*, 2023; Bauleni *et al.*, 2022; Duffey *et al.*, 2022; Eltom *et al.*, 2021; Emeto *et al.*, 2021; Kokaliaris *et al.*, 2022; Mogaji *et al.*, 2023; Mørkve *et al.*, 2023; Ochola, Elliott, *et al.*, 2021).

Many authors have highlighted the impact of NTDs on women and girls. Although NTDs affects everyone, women and girls have been shown to be more adversely affected due to their low socio-economic status and lack of inclusiveness. One study reported that female genital schistosomiasis (FGS) is the most neglected sexual and reproductive health condition in SSA with an estimated 20-120 million cases. And despite NTDs being regarded as equity tracers, little attention has been paid toward gender dynamics and relationships for gender-equitable access to NTD programs in SSA. The authors call for increased awareness and strategic interventions, and advocate for access to medical care to all individuals with providers that are knowledgeable about NTDs. It has been suggested that, to eradicate NTDs, health

disparities must be addressed to provide excellent health care to all populations and adequate UHC for long-term sustainability. NTD programmes need to be data-driven to ensure better decision-making and ensure the inclusion of diverse population groups including women, children, and youths. This will definitely ensure that no one is left behind, drawing upon the sustainable development goals. Community participation and engagement should also be considered as an essential approach to ensure people are at the centre of health programmes and their implementation (Abouyannis *et al.*, 2023; Akinsolu *et al.*, 2023; Bhaumik *et al.*, 2023; Díaz *et al.*, 2023; Duffey *et al.*, 2022; Elias *et al.*, 2023; Elson *et al.*, 2023; George *et al.*, 2023; Guile *et al.*, 2023; Hong, 2023; Impouma *et al.*, 2023; Kepha *et al.*, 2023; Manjang *et al.*, 2022; Ochola, Elliott, *et al.*, 2021; Ochola, Karanja, *et al.*, 2021).

One study done in Kenya demonstrated the menace of tsetse flies in the country. Tsetse flies are the sole biological vector of both human and animal African trypanosomiasis. Thus, controlling tsetse flies is critical for effective management of the NTD in the country. The authors lamented that limited reliable information on tsetse temporal dynamics hindered the implementation of effective control strategies and recommended the enhancement of timely and targeted deployment of tsetse control strategies (Gachoki *et al.*, 2023). Another study carried out in Kenya revealed that there was evidence of low-performing surveillance functions regarding preventive chemotherapy NTDs especially at the peripheral surveillance levels. Case detection, registration and confirmation, reporting, data analysis and feedback performed sub-optimally at the facility and community levels. They found that support functions including standards and guidelines, supervision, training and resources were particularly weak at the sub-national level (Ng'etich *et al.*, 2021). Many authors concur with these findings. Additionally, they found that healthcare workers' knowledge on NTDs was inadequate. They recommend periodic training and continued education on NTDs, regular supportive supervision, as well as strengthening of preventive chemotherapy (Amazigo *et al.*, 2021; Emeto *et al.*, 2021; Gachoki *et al.*, 2023; George *et al.*, 2023; Impouma *et al.*, 2023; Kepha *et al.*, 2023; Makau-Barasa *et al.*, 2023; Ng'etich *et al.*, 2021; Njenga *et al.*, 2022; Sumaili, 2023; Yotsu *et al.*, 2023).

According to a study done in Ethiopia, podoconiosis, lymphatic filariasis (LF), and leprosy are NTDs commonly found among disadvantaged rural and poor urban communities in that country. These diseases lead to disabilities of the leg, resulting in reduced productivity. The longer the duration of the disease, the more severe the disability. People affected by these diseases also commonly experience stigma and discrimination, which, in turn, affect health-seeking behavior. Due to this disability, stigma, and discrimination, people affected by these 3 NTDs have a poor quality of life. Additionally, another study carried

out in the same country on NTDs and mental health or psychosocial outcomes provided evidence on the association between disability, psychosocial, and mental health. The study revealed a high burden of mental illness varying from 12.6% to 71.7%. However, despite people being affected by NTDs, their disability, psychosocial, and mental health status are overlooked in global NTD discourse. Many authors concur on offering of holistic care. They all recommend increased investment in practical and integrated interventions to support the wellbeing of people affected by NTDs (Ali *et al.*, 2021; Amazigo *et al.*, 2021; George *et al.*, 2023; Grifferty *et al.*, 2021; Guile *et al.*, 2023; Impouma *et al.*, 2023; Koschorke *et al.*, 2022; Ochola, Elliott, *et al.*, 2021; Yotsu *et al.*, 2023).

One study noted that what ails SSA is the neglect of developments in new diagnostic tools and point-of-care tests using modern molecular techniques or in the provision of and training in the use of simple laboratory methods. The authors argued that there have been very few new developments in research and field testing of new treatments. They recommended integration of management of NTDs in a broader sense, ranging from combining of 2 or 3 diseases or programmes to having the disease embedded into the health system. It is expected that innovative integration will happen through successfully utilising available resources and opportunities, and ensuring that they are embedded within endemic country health services to ensure sustainability. This is what WHO recommends as a “One Health Approach” (Afolabi *et al.*, 2022, 2023; Díaz *et al.*, 2023; Yotsu *et al.*, 2023).

Ultimately, the elimination of NTDs will not happen without a concerted effort and plan to ensure that the most affected countries have a robust clinical, public health, laboratory, pharmaceutical, and research capacity to ensure that the last mile towards reaching elimination is not only reached, but sustained. The recent elimination of onchocerciasis in Niger, trachoma in Burundi and Malawi as well as the ongoing progress to eliminate lymphatic filariasis in Kenya and other SSA countries demonstrate the capacity of African leadership in NTD control and elimination efforts. Achieving the goals for control and elimination of NTDs requires a bottom-up and pro-active approach involving multiple stakeholders. Such a pro-active integrated approach will improve the wellbeing of those living in endemic areas (Amazigo *et al.*, 2021; Emeto *et al.*, 2021; George *et al.*, 2023; Impouma *et al.*, 2023; Kelly-Hope *et al.*, 2021; Makau-Barasa *et al.*, 2023; Onasanya *et al.*, 2021; Sumaili, 2023; Yotsu *et al.*, 2023).

CONCLUSION

The study concluded that:

1. SSA has a high burden of NTDs.
2. Communities in the region, including healthcare workers, have inadequate knowledge on NTDs.

3. Lack of community participation and engagement, and offering of fragmented care to people affected by NTDs.
4. Lack of a robust clinical, public health, laboratory, pharmaceutical, and research capacity.

RECOMMENDATIONS

1. Provision of reliable information/data on NTDs to communities as well as healthcare workers.
2. Ensuring community participation and engagement, and provision of holistic care to people affected by NTDs.
3. Ensuring a robust clinical, public health, laboratory, pharmaceutical, and research capacity.

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