



**EPIDEMIOLOGICAL, CLINICAL AND THERAPEUTIC PROFILE OF NEGLECTED TROPICAL DISEASES IN BUTEMBO CITY, EASTERN OF THE DEMOCRATIC REPUBLIC OF THE CONGO (DRC)**

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Article Received on 29/10/2019

Article Revised on 19/11/2019

Article Accepted on 09/12/2019

### ABSTRACT

**Background:** It is estimated that more than 1 billion of people worldwide suffer from one or more neglected tropical diseases (NTDs). The wealthy countries are not immune to this multi-faceted scourge affecting the populations of the poorest and most marginalized regions. This environment is a hindrance to socio-economic development and an additional barrier to overcome poverty. The aim of this work was to determine and evaluate the epidemiological, clinical and therapeutic profile of neglected tropical diseases in Butembo city. **Methods:** This was a retrospective study, which took place from 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016 in the Butembo city, Eastern of the Democratic Republic of the Congo. **Result:** The overall frequency of NTDs was 2.6% in Butembo city. The female sex was more represented in 60.8% of cases with the sex ratio of 1.5 in favor of the female sex. The majority of patients were under 15 years old, single, with a primary education level, without profession and resident in the city respectively in 82%, 84%, 62.5%, 85.4 and 92%. Soil-transmitted helminthiasis were more represented in 94.4%, followed by schistosomiasis (5%), lymphatic filariasis (0.4%) and rabies (0.2%). 72.6% of patients were treated on an outpatient basis. 23 deaths or 0.8% and 4 patients, or 0.1% came out with a physical deformation during our study period. **Conclusion:** NTD present a major public health problem in Butembo city seen the number of deaths and physical disability that result from NTD. A therapeutic approach with preventive chemotherapy and public awareness in the fight against insalubrity will help to reduce and eliminate these diseases.

**KEYWORDS:** Diseases, tropical, neglected, Butembo.

### INTRODUCTION

Neglected Tropical Diseases (NTDs) are a group of communicable diseases that are prevalent in poor countries.<sup>[1]</sup> They are said to be neglected because of the lack of interest they arouse in international bodies on the one hand and the limited resources devoted to them by the affected countries.<sup>[2]</sup> These diseases can cause severe pain, permanent disability, and long-term consequences for patients and family members caring for them.<sup>[3]</sup> Affected young children suffer from stunted growth, anemia leading to decreased school performance, or

adults with disabilities, deformities, or complicated pregnancies.<sup>[4]</sup>

According to the World Health Organization, more than one billion people suffer from a neglected tropical disease that is a global scourge comparable to HIV / AIDS, tuberculosis or malaria.<sup>[5]</sup> Every year, NTD kill, weaken or permanently incapacitate millions of people. It often results in permanent physical pain, social exclusion and abuse.<sup>[6]</sup>

Around one billion people around the world are affected by a neglected tropical disease. Most of them are marginalized rural poor living in low-income countries.<sup>[7]</sup>

Africa bears the heaviest burden of NTD in the world. For example, almost all cases of schistosomiasis and onchocerciasis worldwide are recorded in Africa. The most common disease in Africa is lymphatic filariasis, and an estimated 406 million people are exposed to this disease, followed by soil-transmitted helminthiasis (340 million people exposed) and trachoma (232 million people exposed). All of these diseases pose a huge burden to communities plagued by poverty and other health problems.<sup>[8]</sup>

Ghana is endemic to 10 of the 17 NTD on the global list of NTD, of which 5 belong to the category of preventable and communicable chemotherapy diseases. Thanks to the commitment of the Government and its development partners, an integrated program of control and elimination has been under way since 2006, with notable achievements.<sup>[9]</sup>

Although the burden of infectious diseases has decreased worldwide, they remain a major obstacle to development in Africa. These diseases continue to perpetuate inequalities, poor health and development outcomes especially for the marginalized, the rural and urban poor.<sup>[8]</sup>

The DRC, following WHO's recommendations, had an integrated NTD control plan for the years 2012 to 2016. This plan was inspired by the national NTD control policy document that defined principles, guidelines and strategies to be put in place for integrating the fight against NTD, in accordance with the guidelines of the National Health Development Plan [*Programme National de Développement Sanitaire (PNDS)*] and the guidelines contained in the WHO guide on preventive chemotherapy.<sup>[10]</sup> From the foregoing, given the relevance and the seriousness of the problem, the Butembo city, part of Democratic Republic of the Congo, would it be no exception to the reality that accompanies Black communities around the world.

The objective of this work was to determine and evaluate the epidemiological, clinical and therapeutic profile of neglected tropical diseases in Butembo town in order to show its scale, develop control strategies and contribute to the achievement of the Sustainable Development Goals.

## MATERIAL AND METHODS

Our study was conducted in the Katwa and Butembo Health Facilities Zones in Butembo City, North Kivu Province in the Eastern part of the Democratic Republic of the Congo.

The following structures were selected in Butembo health zone: La Lumière Hospital Center, Wanamahika Hospital Center, CBCA d'Ambiance Hospital Center and Katwa Health Zone: Matanda Hospital and Sainte Famille Hospital Center.

The choice of these structures in the health zones above is based on the fact that the study was carried out in Butembo city and the latter includes two health zones. These structures are more frequented by the population of the whole city because it is almost in all the most populated parts of the city.

The study population consisted of 3050 outpatients and hospitalized for one of the neglected tropical diseases diagnosed according to the WHO classification and the sample was comprehensive.

This was a retrospective study, which took place from 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016.

Were included in this study all patients consulted, diagnosed, managed outpatients or hospitalized for a NTDs.

This study excluded all patients who were not admitted to hospital or followed outpatients for other conditions outside NTDs.

The information for each patient was collected on the pre-established individual collection form using outpatient consultation records and hospital records as well as the laboratory records.

The following parameters have been studied: age, sex, marital status, educational level, occupation, background, diagnosis, treatment, length of stay, treatment outcome and complication.

Were considered neglected tropical diseases in this study, all diseases found among the 17 diseases considered neglected by World Health Organization found in our study setting.

As judgment criteria, cured patients are those who have left the hospital without any complaint. The improved patients were those whose discharge was signed, who, however, still had minor complaints and had to return regularly on an outpatient basis. Referred patients were those whose care required specialized treatment that was not available to us. Patients discharged with sequelae are those who were delivered with functional morpho-deformity that did not exist before the onset of the disease. The deceased patients are those who are dead from the hospital and the patients who are discharged on request are the ones who asked for discharge during their hospitalization without being cured.

The data capture and analysis was performed using the EPI INFO software version 3.5.4 of July 30, 2012.

The standards of ethics have been respected in carrying out this work: Confidentiality was guaranteed for all patients because a code was given instead of the name. The authorities of the Health Zones of Katwa and Butembo as well as the health structures concerned by the study and the faculty of medicine of the Université Catholique du Gabon have approved their consent to carry out this work.

As difficulties in conducting this study, all NTDs could not be found in our study medium since some of them are not found in our study environment. The exceptional cases found were those referred to health structures in rural areas.

## RESULTS

### 1. Frequency of NTDs in health facilities in Butembo city

**Table I: Tropical Diseases Neglected by Health Facilities in Butembo City.**

This one divides the patients with NTDs according to the health structures in Butembo city.

**Table I: Tropical Diseases Neglected by Health Facilities in Butembo City.**

| Health Facilities in Butembo    | Total number of patients | NTD present | Percentage |
|---------------------------------|--------------------------|-------------|------------|
| Matanda Hospital                | 88855                    | 1236        | 1.3        |
| Sainte Famille Hospital center  | 9400                     | 550         | 5.8        |
| La Lumière Hospital center      | 7500                     | 500         | 6.6        |
| Wanamahika Hospital center      | 7346                     | 430         | 5.8        |
| CBCA d'Ambiance Hospital center | 6112                     | 334         | 5.4        |
| <b>Total</b>                    | <b>119213</b>            | <b>3050</b> | <b>2.6</b> |

**Table II: Sociodemographic characteristics of patients with NTDs.**

| Sociodemographic characteristics of patients | N = 3050 | Percentage |
|--|----------|------------|
| <b>Sex</b>                                   |          |            |
| F  | 1853     | 60.8       |
| M  | 1197     | 39.2       |
| <b>Age in year</b>                           |          |            |
| 0-5  | 1352     | 44.3       |
| 5-15   | 1150     | 37.7       |
| 15 and more                                  | 548      | 18         |
| <b>Marital status</b>                        |          |            |
| Single                                       | 2565     | 84         |
| Married                                      | 429      | 14         |
| Unmarried                                    | 58       | 2          |
| <b>Level of study</b>                        |          |            |
| No   | 350      | 11.5       |
| Primary                                      | 1907     | 62.5       |
| Secondary                                    | 704      | 23         |
| University                                   | 89       | 3          |
| <b>Profession</b>                            |          |            |
| Any  | 2601     | 85.4       |
| Farmer                                       | 307      | 10         |
| trader                                       | 124      | 4          |
| Other  | 18       | 0.6        |
| <b>Origin</b>                                |          |            |
| City   | 2807     | 92         |
| Out of the city                              | 243      | 8          |

### 2. NTDs and socio-demographic variables

**Table II. Sociodemographic characteristics of patients with NTDs**

This one represents patients with NTDs according to their socio-demographic characteristics.

### 3. Classifications of Neglected Tropical Diseases found

**Table III. Neglected Tropical Diseases found among our respondents.**

This one distributes patients according to the NTDs found with them.

### 4. Treatment and outcome

**Table IV. Treatment, duration of hospital stay, treatment, outcome and complication**

The table below divides patients by treatment received, duration of hospital stay outcome of treatment and complications.

**Table III: Neglected Tropical Diseases found among our respondents.**

| NTDs                 | N = 3050 | Percentage |
|----------------------|----------|------------|
| Ascariasis           | 1048     | 34.4       |
| Amoebiasis           | 995      | 32.7       |
| Anguilluloses        | 288      | 9.5        |
| Enterobiasis         | 242      | 7.9        |
| Hookworm             | 213      | 7          |
| Schistosomiasis      | 155      | 5          |
| Giardiasis           | 91       | 2.9        |
| Lymphatic filariasis | 13       | 0.4        |
| Rage                 | 5        | 0.2        |

**Table IV: Treatment, duration of hospital stay, treatment, outcome and complication.**

| Variables  | N = 3050 | Percentage |
|--|----------|------------|
| <b>Treatments</b>  |          |            |
| <b>Ambulatory</b>  | 2214     | 72.6       |
| Vermifuge (V), Oral Rehydration Serum (ORS) and Zinc (Z) | 1550     |            |
| Dewormers, Oral Rehydration Serum (ORS) and ATBQ         | 364      |            |
| Other handsets as appropriate                            | 300      |            |
| <b>Hospitalization</b>                                   | 836      | 27.4       |
| Medical (Rehydration, Deworming, Zinc and Antibiotics)   | 832      |            |
| Surgical   | 4        |            |
| <b>Duration of hospital stay in a day</b>                |          |            |
| 0-8  | 816      | (97.6)     |
| 9-16   | 16       | (1.9)      |
| More than 16 days  | 4        | (0.1)      |
| <b>Treatment and outcome</b>                             |          |            |
| Recovered  | 2978     | 97.6       |
| Discharged on request                                    | 45       | 1.5        |
| Deceased   | 23       | 0.8        |
| Discharged with sequel                                   | 4        | 0.1        |

## DISCUSSION

The frequency of NTDs is 2.6% in Butembo city according to our study environment.

A study published in 2011 by Guilhem Rascalou on the Ecology, Evolution and Control of Neglected Tropical Diseases in the Pubmed medical journal, found an overall prevalence of NTDs at 5.1%.<sup>[11]</sup> According to the WHO, more than one billion of the population suffers from a neglected tropical disease that presents about 13.3% based on the statistics of 2017 which amounted to 7.5 billion of the world's population.<sup>[5]</sup>

The predominance of the female sex was found in 60.8% with the sex ratio of 1.54 in favor of the female sex. Children under 15 years were more affected in 82% of cases and the majority resided in the city in 92% of cases. Eighty-four percent of patients were single, 85.4% had no jobs, and 62.5% had primary education.

These results can be explained by the fact that these diseases affect a large number of individuals in the poorest categories of the population, particularly in disadvantaged urban areas and in rural areas. And as said above, this category of affected populations are mostly children, school age, which is why single and unemployed were more represented.

NTDs thus contribute to the sustainability of the poverty-disease-poverty cycle.<sup>[10]</sup>

Children are vulnerable to infections due to the immaturity of their immune system and their exposure through their daily activities such as play, participation in farm work and living in an overcrowded, unsuitable environment.

In a WHO publication on NTDs, children under 14 years were more exposed to NTDs.<sup>[6]</sup>

In a study by Peter J et al. on the prevalence, distribution, and burden of NTDs in sub-Saharan Africa, 40 to 50 million school-age children and 7 million of pregnant women were the most affected.<sup>[12]</sup>

Women, children, ethnic minorities, as well as those living in isolated areas with limited access to health services, are at the highest risk of infection.<sup>[6]</sup>

In general, women are more exposed to communicable diseases than men, either in terms of morbidity or mortality. They also face additional barriers to requesting, and often receiving, treatment. The consequences of stigma, which goes hand in hand with many neglected tropical diseases, are often more

pronounced for women as part of their family life and, more broadly, social.<sup>[6]</sup>

NTDs are the cause of stigma and discrimination, especially for women and girls.<sup>[10]</sup>

This study shows that Soil-transmitted helminthiasis (Ascariidiosis 34.4%, Amebiasis 32.7%, Anguillulose 9.5%, Oxyurose 7.9%, Ankylostomiasis 7%, Giardases 2.9%) were the most commonly found following by schistosomiasis (5%), lymphatic filariasis (0.4%) and rabies (0.2%). The high prevalence of Soil-transmitted helminthiasis in our study is due to unsanitary water and poor housing and sanitation conditions in our living environments. Patients with schistosomiasis and lymphatic filariasis had come from rural areas outside the Butembo city. Most of the patients were referred to Butembo town by health centers located in rural areas near the city of Butembo for better care.

About one-third of the world's population is infected with Soil-transmitted helminthiasis, including over 270 million preschool children and more than 600 million school-aged children living in areas where transmission of these parasites are intense.<sup>[12]</sup> Sequelae include stunting, impaired cognitive function, limited school progress and compromised economic prospects.<sup>[13]</sup>

A study conducted by the National Nutrition Program (PRONANUT) in the Democratic Republic of the Congo in 2005 found an average prevalence of 82% of Soil-transmitted helminthiasis in children aged 1 to 5 in all provinces.<sup>[10]</sup>

In 2012, prevalences ranged from 10% to 50% for hookworm, 10% to 60% for roundworms and 10% to 40% for whipworm. The survey conducted in Kasai Oriental in the Kasansa Health Zone recorded a 37% prevalence of Soil-transmitted helminthiasis.<sup>[10]</sup>

Peter J et al. found that about 85% of the NTD burden comes from helminths. Hookworm infection affects almost half of the poorest people in sub-Saharan Africa, including 40 to 50 million school-aged children and 7 million pregnant women, among whom it is one of the main causes of anemia. Schistosomiasis is the second most common NTD after hookworm (192 million cases), accounting for 93% of the world's cases. Lymphatic filariasis (46-51 million cases) and onchocerciasis (37 million cases) are also widespread in sub-Saharan Africa, with each disease representing a major cause of disability and a reduction in agricultural productivity in the region.<sup>[12]</sup>

This can also be explained by a lack of information on NTD in Africa.

Based on a WHO publication in 2014, it is estimated that 44 million pregnant women, and up to one third of pregnant women in sub-Saharan Africa, have hookworm

at some point.<sup>[14]</sup> Hookworm causes about 7% of the 20% of maternal deaths from anemia in Africa. In Africa alone, it is estimated that schistosomiasis affects 10 million pregnant women, half of whom will subsequently suffer from anemia and its complications (increased maternal morbidity, low newborn weight at birth, and other adverse effects) during their pregnancy.<sup>[15]</sup> Ankylostomiasis and schistosomiasis contribute to infertility and a range of problems that affect women's reproductive health. Women with urogenital schistosomiasis are three times more at risk of HIV infection.<sup>[16]</sup>

This study shows that 72.6% of patients were treated on an outpatient basis and largely by deworming, Oral Rehydration Solution, Zinc and sometimes antibiotics. And those who were hospitalized or 27.4% had received a treatment based on the severity of the disease and the type of disease (intravenous rehydration, deworming, surgery and sometimes associated with antibiotics).

The duration of hospitalization was a maximum of one week and the latter depended on the type of illness and the complications.

During our study period and in our respective study environments, during 5 years, we recorded 23 deaths or 0.8% and 4 patients, or 0.1% came out with a physical deformation.

The fight against NTDs is nevertheless progressing thanks to the development of strategies for innovative and intensive care. More attention should be paid to innovations in the field of vector control, which plays a key role in reducing transmission and disease burden.

The WHO estimates that about 890 million children need chemo prophylaxis annually against Soil-transmitted helminthiasis.

The main action recommended by the WHO against Soil-transmitted helminthiasis is the regular administration of chemo prophylaxis in albendazole or mebendazole.<sup>[17]</sup>

In January 2012, the results of a systematic literature review, conducted with the WHO support, on the association between improved sanitation and reduced risk of transmission of Soil-transmitted helminthiasis were published. A positive correlation shows the advantage, in order to sustainably reduce the prevalence of helminths, to prioritize improvements in the field of sanitation alongside chemo-prophylaxis and health education.<sup>[18]</sup>

## CONCLUSION

The NTDs remain a public health problem in Butembo. Pregnant women and children, as well as those living in isolated, unhealthy areas with limited access to health care services, are at the highest risk of infection.

Many of these diseases could be avoided, eliminated or even eradicated by putting in place an adequate health policy (preventive, curative and management of complications) and permanent.

#### ACKNOWLEDGMENTS

The author **MATHIEU KATEMBO MANZEKELE** thanks the BEBUC scholarship system [Bourse d'Excellence Bringmann aux Universités Congolaise (BEBUC), [www.foerderverein-unikinshasa.de](http://www.foerderverein-unikinshasa.de)], and the Elser-Kroener-Fresenius Foundations Stiftung and Holger-Poeh Imann - Stiftung for their support in his medical studies at Université Catholique du Graben.

The author Dr **Joel KAMBALE KETHA** thanks the charity society named **Safe Anesthesia Worldwide - United Kingdom (SAWW UK)** for financial support in Master of Anesthesia and Critical Care at the College of Medicine of the University of Rwanda. We are also very grateful for the financial support of the society **World Federation of Societies of Anesthesiologists -United Kingdom (WFSA- UK)** throughout our training in Master of Anesthesia and Critical Care at the College of Medicine of the University of Rwanda.

#### CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

#### AUTHORS CONTRIBUTIONS

All the authors participated actively in the realization of this work.

**FINANCIAL COMPETING INTEREST:** None

**FOUNDING:** None

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