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Research Article

Neglected Tropical Diseases in the Central African Region: A Review of their Mass Treatment Coverage

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Abstract

Background: The neglected tropical diseases (NTDs) are the most common conditions affecting the poorest 600 million people living in sub-Saharan Africa (SSA) of which the Central African region is part and parcel, and together produce a burden of disease that may be equivalent to one-half of SSA's malaria disease burden and more than double that caused by tuberculosis. Establishing specific information on the mass treatment coverage would provide a basis for prioritizing control strategies as a means to address the Sustainable Development Goals (SDGs). The objective of this review was to determine the mass treatment coverage trend resulting from 5 NTDs amenable to mass treatment in the Central African region.

Methods: A search on PubMed, ScienceDirect, Uniting to Combat NTDs, Cochrane Library, African Journals Online, MEDLINE, Scopus and Google Scholar with the following Keywords: "Neglected Tropical Diseases", "Mass Treatment Coverage", "Control", "Elimination", "Lymphatic filariasis", "Onchocerciasis", "Schistosomiasis", "Soil-transmitted helminthiases", "Trachoma was conducted, with the Medical Subject Headings (MeSH), with specific diseases listed as 5 NTDs amenable to mass treatment per Central Africa region country. Studies to assess the mass treatment coverage resulting from 5 NTDs amenable to treatment in Central Africa as the primary outcome variable, were included. Our search was limited to, articles published from the year 2013 to 2018 (A 5 years review) in English and French. The search identified a total of 140 articles amongst which 10 data-based reports and 5 original articles met the inclusion criteria to give a total of 15 papers that were considered.

Results: Our review shows that, in the Central African region, Cameroon has the highest mass treatment coverage

index (58/100) for 5 NTDs while Rwanda, Gabon, Equatorial Guinea, Sao Tome and Principe had mass treatment coverage indexes of 3/100, 1/100, 0/100, 0/100 respectively indicating the need for coordinated action in filling the missing gaps. Also, in the Central African region; over 66 million people received NTD treatment and those who didn't receive NTD treatment were over 27 million.

Conclusion: There is a need for more data on progress made in reaching people in need of NTD Mass treatment. The way forward paradigm in achieving the control and elimination of NTDs amenable to mass treatment in Central African countries will be to establish, and sustain a task force on NTDs at the African Union, set up a sustainable fund for neglected tropical diseases at the Africa Union, Regularly monitor and report on progress on neglected tropical diseases while recognizing and celebrating countries as they achieve elimination goals. Equally, operational studies on assessing the rate and impact of NTDs mass treatment coverage in the Central African region should be carried out.

Keywords: Neglected tropical diseases; Central African Region; Mass treatment coverage

1. Introduction

Neglected tropical diseases (NTDs) encompass 17 bacterial, parasitic and viral diseases that occur solely, or principally in tropical regions [1]. They are often termed 'neglected' as the people who are most affected are the poorest populations living in rural areas, urban slums and conflict zones [1]. The NTDs are a group of chronic, disabling, and disfiguring conditions that occur most commonly in the setting of extreme poverty, especially among the rural poor and some disadvantaged urban populations [2]. Today, the world's greatest concentration of poverty occurs in sub-Saharan Africa (SSA), of which the Central African region is part and parcel. According to a recent World Bank analysis [3], More than half of the extremely poor people live in Sub-Saharan Africa. In fact, the number of poor in the region increased by 9 million, with 413 million people living on less than US$ 1.90 a day in 2015, more than all the other regions combined [3]. Few studies have been carried out to indicate that the NTDs are widespread among the poor in the Central African Region [4, 5], with the most common being soil-transmitted helminth (STH) infections ((Ascaris, hookworm, and whipworm), schistosomiasis, lymphatic filariasis (LF), trachoma, Dracunculiasis (Guinea Worm Disease) and onchocerciasis together affecting more than 500 million people [6]. It is worthy to note that NTDs represents a major reason why the "bottom 500 million" people in Africa cannot escape poverty [7]. More than one billion people suffer from one or more NTDs worldwide and the WHO African Region bears about half of this global burden [8]. New and ongoing efforts to control and eliminate or eradicate the NTDs represent key elements for achieving the Africa's Sustainable Development Goals (SDGs). It is in this light that Uniting to Combat Neglected Tropical Diseases, a global movement of people and organisations is committed to combating 10 NTDs, that is to control, eliminate or eradicate 10 NTDs by 2020 [9].

Uniting to Combat Neglected Tropical Diseases, has been making progressive efforts to combat 10 NTDs (leprosy, sleeping sickness, African human trypanosomiasis), blinding trachoma, Chagas disease, soil transmitted helminths,

schistosomiasis, visceral leishmaniasis (VL or kala-azar), onchocerciasis (river blindness), lymphatic filariasis, (elephantiasis) and guinea worm disease) in the Central African region [10-19], Establishing specific information on the mass treatment coverage resulting from the 5 NTDs amenable to treatment in the Central African region would provide a basis for prioritizing control strategies as a means to address the SDGs. Over the last decade, spatial epidemiology of NTDs including geographic information systems (GIS) and remote sensing (RS) have facilitated and enhanced a deeper understanding of the prevalence and distribution of NTDs, particularly for helminth infections in the Central African region [20] thus facilitating where to target mass treatment. Concurrently, a fresh assessment of the chronic and subtle morbidities caused by NTDs has highlighted a previously underappreciated disease burden [21-23].

Substantial progress in control and elimination of neglected tropical diseases (NTDs) has been achieved and policy momentum has been generated through continued bilateral, philanthropic, and non-governmental organizations (NGOs) support, and donations of drugs from pharmaceutical companies [24]. WHO has defined a Roadmap to reach 2020 targets, which was endorsed by member states in a World Health Assembly Resolution in 2013 [24]. NTDs have been included within the Sustainable Development Goal targets and are a crucial component of universal health coverage, conceptualised as "leaving no one behind". Here, the main objective of this review was to determine the mass treatment coverage trend resulting from 5 NTDs amenable to mass treatment in the Central African region, specifically focusing on the NTD mass treatment coverage index and rank for each country, coverage (%) of 5 NTDs amenable to mass treatment per country, profile of people in need of NTD Mass treatment as well as those who receive the treatment and the social determinants influencing NTDs mass treatment in the region.

2. Definition of Operational Terms

2.1 Mass treatment

Mass Treatment to mean delivering safe and inexpensive essential medicines based on the principles of preventive chemotherapy, where populations or sub-populations are offered treatment without individual diagnosis [25].

2.2 Control

Control to mean reduction of disease incidence, prevalence, morbidity, and/or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction. Control may or may not be related to global targets set by WHO [26].

2.3 Mass treatment coverage index to mean

Mass treatment coverage index to mean an average of coverage across the Neglected Tropical diseases endemic in the Central African Region that are amenable to mass treatment, calculated using the geometric mean [27].

2.4 Scorecard

Scorecard to a collection of indicators and milestones compiled from the NTD specific community and WHO [28].

3. Methods

Our review team comprised of experts in Neglected Tropical Diseases, Epidemiology and Control of Infectious Diseases, and systematic reviews methodology. The research design that was applied to this study was a review of the available evidence on five NTDs amenable to mass treatment in Central African Countries. A review permitted us to conduct an exhaustive search for primary studies with our focus on the research questions, selecting studies using clear and reproducible eligibility criteria, critically appraising study quality and completing a synthesis of our findings according to pre-determined methods. Our expectation was to combine data of all studies on five NTDs amenable to mass treatment in the Central African states and observe trends and extend of uniformity in the available results. We also anticipated that by studying similar outcomes across a wide variety of contexts and settings, we would be able to assess the rigor of available evidence of mass treatment coverage on five NTDs amenable to mass treatment in the region, and the transferability of the results within and between member states and beyond. Equally, it is worthy to note that reviews are considered among the best source of evidence, thus, our study intended to provide pooled estimates about the impact of NTDs in the region, which may be more reliable than evidence from single studies. This evidence will be critical to inform research, and guide policy makers as they constantly seek innovative solutions on how to significantly contribute to the control and elimination of neglected tropical diseases particularly in the Central African region.

3.1 Search strategy

We initially conducted a scoping search done to identify existing reviews on five NTDs amenable to mass treatment in Central Africa, and this permitted us to further highlight relevant search terms and clarify inclusion and exclusion criteria as well as to avoid duplication of efforts. For this review, we searched several electronic databases for published and unpublished articles from 2013 to 2018. The search identified a total of 40 articles amongst which 15 original articles met the inclusion criteria. We decided to start our search in 2013 to be up-to-date on this topic in Central Africa. We used the Boolean strategy to search through the following databases; PubMed, ScienceDirect, Cochrane Library, African Journals Online, MEDLINE, Scopus and Google Scholar. We used a combination of Medical Subject Heading (MeSH) and free text terms to search through these databases using the following key words;

"Neglected Tropical Diseases", "Mass Treatment Coverage", "Control", "Elimination", "Lymphatic filariasis", "Onchocerciasis", "Schistosomiasis", "Soil-transmitted helminthiases", "Trachoma"

And combined with

"Central Africa", or "Economic Community of Central African States (ECCAS)", or "Gabon", "Cameroon", or "Central African Republic (CAR)", or "Chad", or "Congo Brazzaville", or "Equatorial Guinea", or "Burundi", or "Rwanda", or the "Democratic Republic of Congo (DRC)", or "Sao Tome and Principe".

We sought to find relevant databases for research in the region, and came across the Africa and neglected tropical diseases data base by the Uniting to Combat NTDs Group, which was what basically provided us with the key information we needed to sort out for this review. In order to further extend our evidence base, and minimize publication bias due to selective availability of papers, we decided to search for grey literature (conference abstracts,

research reports, book chapters and policy documents). Finally, we manually searched through bibliographies and performed hand searching of key journals on the topic. The most recent comprehensive search for each database was January 23rd, 2019, and all relevant studies were exported to Zotero bibliographic software.

3.2 Records retrieved

A total number of 140 records were retrieved from the search. Subsequently, the Zotero reference management software (version 5) was used to check for and remove duplicate articles. A manual verification was also carried out. From the search results, all potential articles for full-text review were screened using the titles and abstracts (N=55). The full text of articles and data based reports were retrieved and reviewed (N=29). Also, a systematic search of the reference lists of the full texts was conducted to identify studies that may have been missed. Finally, a total of 15 studies were retrieved for the review.

3.3 Eligibility criteria

According to our study design and the research topic, we established predefined criteria for study retention in the review as follows;

3.3.1 Study content: All published research articles focusing on five NTDs (Lymphatic filariasis, Onchocerciasis, Schistosomiasis, Soil-transmitted helminthiases, Trachoma) amenable to mass treatment.

3.3.2 Timeframe: Papers are eligible if published in or after the year 2013.

3.3.3 Context: We sought studies carried out in any of the 10 Economic Community of Central African States (ECCAS) Countries which include; Gabon, Cameroon, the Central African Republic (CAR), Chad, Congo Brazzaville and Equatorial Guinea, Burundi, Rwanda, the Democratic Republic of Congo (DRC) and Sao Tome and Principe.

3.3.4 Study design: Spatial Epidemiological, Health Economics, Prevalence and surveillance studies.

3.3.5 Population: Adult and Pediatric populations.

3.3.6 Setting: Community, laboratory and healthcare facilities.

3.3.7 Language: English and French.

3.4 We excluded studies with the following characteristics

- Neglected Tropical Disease studies that focused on animal subjects
- Studies that reported data for non- ECCAS

3.5 Data screening and extraction

We first of all removed all duplicate articles that we found from the databases. We then performed an initial screening of the titles and abstracts on the basis of the eligibility criteria stated above in order to validate their selection as part of this review. Next, we performed full text screening of selected studies. All the articles that met our inclusion criteria were retained for data extraction. This was done using an electronic standardized data extraction template that was designed by the team in line with the study objectives, the inclusion criteria, and made up of relevant study components for data analysis. This data extraction template was first pilot tested on a representative sample of articles. The titles, abstracts and full texts screening as well as data extraction was done independently and in duplicate (FSW and DEAA), with disagreements resolved via consensus, or by a tie breaker (PAN).

3.6 Data analysis

The extracted data was uploaded into Excel and SPSS for analysis. Considering that the studies on Neglected Tropical Diseases in the Central African region were homogenous and methodologically the same (context, population, study design, setting, and type of NTD outcomes), we performed a formal study quality assessment on the selected studies. We assessed the papers based on a judgment of their validity and reliability as well as overall relevance to our topic. We collated, summarized and categorized the extracted data in order to perform appropriate analyses.

4. Results and Discussion

After a careful examination, taking into consideration the inclusion and exclusion criteria, 15 studies were found eligible for review. The PRISMA flow diagram as shown in Figure 1 presents the inclusion and exclusion process. The full text of the 15 studies included for review were retrieved, and information regarding study design, the objective of the study, the mobile technology used, location, intervention, and outcome were extracted.

4.1 NTD mass treatment coverage index and rank

In our search, it was reported that the NTD coverage index is an average of coverage across the diseases endemic in the various Central African countries that are amenable to mass treatment, calculated using the geometric mean [27]. It is worthy to note that by using the geometric mean for the index, it prevents high coverage of one disease compensating for very low coverage of other diseases. This provides countries with a sense of how well they are delivering integrated treatment across neglected tropical diseases [27]. Also, the index tracks progress against five NTDs amenable to mass treatment. Table 1 shows an overview of the Central African region coverage index and rank of the five NTDs amenable to mass treatment. From Table 1, it shows that much still has to be done in terms of NTD mass treatment coverage in the Central African region. Though Cameroon stands as the top country in which NTD mass coverage index is high, it is not sufficient. Advocacy around mass treatment for the elimination of selected Neglected Tropical Diseases (NTDs) has typically put the cost per person treated at less than US$ 0.50 [29]. From Table 1, Equatorial Guinea, Sao Tome and Principe have zero index as their mass treatment coverage was not reported and the fact that they don't require Mass treatment for Trachoma. No reporting points out to the fact that,

there is a gap of NTDs surveillance in the sub-region that needs to be filled. Active and passive surveillance will be needed in order to establish data for empirical decision making. In addition, in Sao Tome and Principe, it was that reported mass treatment is not needed for people suffering from Onchocerciasis.

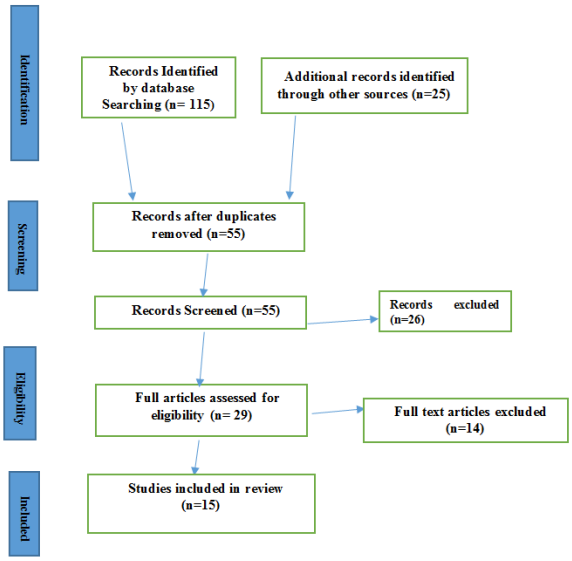

Figure 1: PRISMA flow diagram of the included studies on the review of five NTDs amenable to mass treatment in the Central African region (2013-2018).

Country	NTD mass treatment coverage index (/100)	Overall rank (African Region) in ascending order	Overall rank (Central African Sub-Region) in ascending order
Cameroon	58	11	1
Democratic Republic of Congo	44	18	2
Central African Republic	32	24	3
Burundi	16	28 (tied)	4 (tied)
Congo Brazzaville	16	28 (tied)	4 (tied)
Chad	10	30	5
Rwanda	3	33	6
Gabon	1	38	7
Equatorial Guinea	0	42 (tied)	8 (tied)
Sao Tome and Principe	0	42 (tied)	8 (tied)

Table 1: Central Africa Region NTD profile, an overview of their mass treatment coverage index and rank, 2013-2018.

Given the increasing focus of the NTD community on value for money and, in the context of universal health coverage, of the global health community on outreach beyond health facilities, there is a need for greater nuance [29] in the Central African region. Our review showed that, Equatorial Guinea, Sao Tome and Principe have low NTD mass treatment coverage index (i.e. 0), each indicating the need for more action in these countries else transmission rate will increase and incapacitate their control efforts. High-coverage MDA in endemic areas aims to prevent and alleviate symptoms and morbidity on one hand, and can reduce transmission on the other, together improving the health of the "poorest". Table 2 shows the Central African region coverage in terms of percentage (%) of the five NTDs amenable to mass treatment. From Table 2, we can clearly see that there are issues of no reporting in the following countries Burundi, Chad, Gabon, Equatorial Guinea, Sao Tome and Principe. This leads to missing data such that evidence–based decision making is compromised and thus affects the control and elimination targets by WHO. MDA is the recommended strategy of the World Health Organisation to control or eliminate several neglected tropical diseases (NTDs) especially five NTDs amenable to mass treatment [30]. More than 700 million people now annually receive these essential NTD medicines [25].

Country	**Lymphatic filariasis MTC (%)**	**Onchocerciasis MTC (%)**	**Schistosomiasis MTC (%)**	**Soil-transmitted helminthiases MTC (%)**	**Trachoma MTC (%)**
Cameroon	71	75	77	61	26
Democratic Republic of Congo	42	76	58	67	13
Central African Republic	16	50	66	40	17
Burundi	MTC Not required	80	91	96	0 rep
Congo Brazzaville	12	79	25	3	MTC Not required
Chad	51	68	0 rep	6	38
Rwanda	MTC Not required	MTC Not required	MTC Not required	100	MTC Not required
Gabon	0 rep	0 rep	36	14	MTC Not required
Equatorial Guinea	0 rep	0 rep	0 rep	0 rep	MTC Not required
Sao Tome and Principe	0 rep	MTC Not required	0 rep	0 rep	MTC Not required

MTC: Mass Treatment Coverage, rep: Reported

Table 2: Central Africa Region Coverage (%) of 5 NTDs amenable to mass treatment, 20163-2018.

4.2 Progress made in reaching people in need of NTD mass treatment

There has been progress in reaching people in need of NTD mass treatment in the Central African region, though there is still a huge gap that's needs to be filled. In the past year, the collective NTD community has continued to make significant progress towards the WHO roadmap targets. The most significant progress was made in human African trypanosomiasis where cases hit a 75 year low with 3, 796 cases found after similar numbers were screened [28]. Table 3 shows the total number of people who received NTD treatment (total of 66, 120, 000) versus those who didn't receive NTD treatment (total of 27, 766, 000) in the Central Africa Region. There is a need for more data on progress made in reaching people in need of NTD Mass treatment. Progress towards achieving the NTD treatment goals is followed by relying on WHO data where possible, and with additional input from partners as needed [28]. Thus, in case of no data, NTD treatment goals are hampered. Table 3 indicates that there is a huge difference between people receiving treatment and those in need of the treatment, thus a call for more coordinated action in filling this gap. Also, monitoring and evaluation (M and E) should be greatly implemented when obtaining mass treatment data for the various countries as it will lead to the identification of issues/errors and implementation of corrective actions. Applying an effective Monitoring and Evaluation mechanism will contribute to filling the gap of no/under reporting among the Central African Countries. Table 4 shows an overview of the number of people in need of mass NTD treatment and those who received the treatment as per specific NTD. Table 4 indicates the need for reporting to be ameliorated in the Central African region, as we could observe a trend of no reporting for Lymphatic filariasis mass treatment coverage in Gabon, Equatorial Guinea, Sao Tome and Principe.

Country	**People who received NTD treatment**	**People in need who didn't receive NTD treatment**
Cameroon	13.6 million	5.7 million
Democratic Republic of Congo	38.4 million	11.5 million
Central African Republic	1.8 million	2 million
Burundi	4.8 million	1.1 million
Congo Brazzaville	473, 000	1.8 million
Chad	2.6 million	3.6 million
Rwanda	4.38 million	810,000
Gabon	67,000	627,000
Equatorial Guinea	0 reported	429,000
Sao Tome and Principe	0 reported	200,000
Total	66,120,000	27,766,000

Table 3: Total Number of people who received NTD treatment versus those who didn't receive NTD treatment in the Central Africa Region, 2013-2018.

Country	Lymphatic filariasis MT		Onchocerciasis MT		Schistosomiasis-MT		Soil-transmitted helminthiases-MT		Trachoma-MT	
	PNT	PRT	PNT	PRT	SACNT	SACRT	PSACNT	PSACRT	PNT	PRT
Cameroon	17 m	12 m	10.9 m	8.16 m	2.1 m	1.61 m	9.02 m	5.51 m	1.64 m	421000
Democratic Republic of Congo	38.7 m	16.1 m	41.2 m	31.4 m	9.59 m	5.6 m	26 m	17.4 m	5.46 m	706000
Central African Republic	3.3 m	517000	2.49 m	1.24 m	559000	370000	1.76 m	709000	2.04 m	356000
Burundi	No MT	No MT	1.7 m	1.36 m	1 m	920000	3.93 m	3.77 m	2.46 m	0 rep
Congo Brazzaville	963000	112000	597000	473000	69000	17000	1.69 m	50000	No MT	No MT
Chad	3.18 m	1.64 m	3.82 m	2.59 m	2.07 m	0 rep	381000	24000	6.14 m	2.31 m
Rwanda	No MT	No MT	No MT	No MT	969000	0 rep	4.38 m	4.38 m	No MT	No MT
Gabon	346000	0 rep	76	0 rep	165000	59000	459000	63000	No MT	No MT
Equatorial Guinea	420000	0 rep	99000	0 rep	30000	0 rep	145000	0 rep	No MT	No MT
Sao Tome and Principe	188000	0 rep	No MT	No MT	4000	0 rep	81000	0 rep	No MT	No MT

m-Million; rep-Reported; PNT-People Needing treatment; PRT-People receiving treatment; MT-Mass Treatment; SACNT-School-Aged Children Needing Treatment; SACRT-School-Aged Children Receiving Treatment; PSACNT-Pre-School and School-Aged Children Needing Treatment; PSACRT-Pre-School and School-Aged Children Receiving Treatment.

Table 4: Central Africa Region NTD profile, an overview of the number of people in need of mass NTD treatment and those receiving the treatment as per specific NTD, 2013-2018.

4.3 Social determinants affecting NTDs and their mass treatment coverage

Neglected tropical diseases (NTDs) exist and persist for social and economic reasons that enable the vectors and pathogens to take advantage of changes in the behavioural and physical environment. Persistent poverty at household, community, and national levels, and inequalities within and between sectors, contribute to the perpetuation and re-emergence of NTDs [31]. Significant public health gains have been made and documented in the process to reduce the transmission and impact of preventive chemotherapy NTDs, specifically those NTDs that respond to preventive chemotherapy and include: lymphatic filariasis; schistosomiasis; onchocerciasis; trachoma; and STH [32]. Several social determinants have been established to affect mass treatment coverage. They include water and sanitation. In relation to NTDs, water can have both negative and positive connotations. It can act as a source of infection or as a breeding ground for vectors; on the other hand, adequate quantity and quality [5]. Also, housing and clustering (including building design, peri-domestic area and crowding of people) affect transmission dynamics of NTDs. Selection of new housing sites away from vector habitats, and improved and properly

maintained housing, are important elements of environmental management for vector control [5]. In the Central African region, there are several politically driven conflicts/wars that result in migration (including refugees, nomads, migrant workers and resettlers) that affect NTD occurrence. In the same-light, gender and sociocultural factors have a role to play. For example, most studies indicate higher prevalence of schistosomiasis for males than females, presumably due to higher exposure [33, 34].

5. Conclusion

This review has established a trend of the mass treatment coverage index and rank of 5 NTDs' for the Central African states, coverage (%) of 5 NTDs amenable to mass treatment per country, the profile of people in need of NTD Mass treatment as well as those who receive the treatment and the social determinants influencing NTDs mass treatment in the region. 40% of the global NTD burden is in Africa. However, out of the 17 countries that have been validated as having eliminated one of the five diseases, only two are from Africa (Morocco (trachoma, 2016) and Togo (lymphatic filariasis, 2017)) [27] of which no Central African country has been validated as having eliminated any of the NTDs. The question is-what can be done to realize the elimination of these NTDs in the Central African sub-region? The World Health Organization has specific coverage targets for each NTD amenable to mass treatment: that is, for Lymphatic filariasis: 65% and above, Onchocerciasis: 65% and above, Schistosomiasis: 75% and above for school-aged children, Soil-transmitted helminths: 75% and above for pre-school, school-aged children, Trachoma: 80% and above [5, 27]. For these targets to be achieved, global, continental and regional efforts need to put into perspective. It is worthy to note that, global efforts to address neglected tropical diseases (NTDs) were stimulated in January 2012 by the London declaration at which 22 partners, including the Bill & Melinda Gates Foundation, World Bank, World Health Organization (WHO) and major pharmaceutical companies committed to sustaining and expanding NTD programmes to eliminate or eradicate 11 NTDs by 2020, thus achieving the goals outlined in the recently published WHO road map (30). Control and elimination of Neglected Tropical Diseases (NTDs) pose significant challenges to the health system, especially in low and middle income countries [35]. The World Health Organization has set a target of eliminating at least one NTD in additional countries by 2023. This presents an opportunity to take the lead on delivering this goal and support the broader SDGs [27].

Recommendation

Mass drug administration (mass treatment) is one of the public health strategies recommended by the World Health Organization for the control and elimination of five neglected tropical diseases (NTDs). We recommend mass treatment coverage surveys in the Central African states as a means to enhance the attainment of treatment targets as set by WHO. This recommendation falls in line with that of WHO which stipulates that adequate coverage is vital to achieve program goals, such that periodically conducting surveys to validate reported coverage to guide NTD programs should be implemented [36]. These mass treatment surveys will also provide an opportunity to assess other questions of interest, such as sex and age-specific coverage, drug adverse events, reasons for non-compliance as well as to collect information about Mass treatment delivery, impact assessments of NTDs mass treatment and health education strategies. Equally, in the same light with Uniting To Combat NTDS in Africa, the way forward

paradigm in achieving the control and elimination of NTDs amenable to mass treatment in Central African states will be to establish and sustain a task force on NTDs at the African Union, set up a sustainable fund for neglected tropical diseases at the Africa Union, Regularly monitor and report on progress on neglected tropical diseases while recognizing and celebrating countries as they achieve elimination goals.

Declarations

Ethics approval and consent to participate

Not applicable.

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Consent for Publication

Not applicable.

Availability of Data and Material

Not applicable.

Competing Interests

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Author Contributions

Conceived and designed the study: FSW; Contributed in the analysis and interpretation of the data and in writing the original manuscript: FSW; Contributed in the intellectual content of the manuscript: FSW, DEAA, PAN.

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