



World Health
Organization

Report of the first meeting of the **Global Onchocerciasis Network for Elimination**

Saly Mbour, Senegal, 1–2 November 2023



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Abbreviations and acronyms

CHIP	country health information platform
COVID-19	coronavirus disease
ELISA	enzyme-linked immunosorbent assay
ESPEN	Expanded Special Project for Elimination of Neglected Tropical Diseases
GONE	Global Onchocerciasis Network for Elimination
MDA	mass drug administration
NOEC	National Onchocerciasis Elimination Committee
NTD	neglected tropical disease
OCP	Onchocerciasis Control Programme in West Africa
Ov	<i>Onchocerca volvulus</i>
PCR	polymerase chain reaction
RDT	rapid diagnostic test
WHO	World Health Organization

Executive summary



More than 150 onchocerciasis partners, including national onchocerciasis coordinators from health ministries of endemic and formerly endemic countries, national onchocerciasis elimination committee chairs, experts, researchers, nongovernmental organizations, the donor community and civil society gathered on 1–2 November 2023 in Saly Mbour, Senegal, for the first meeting of the newly established Global Onchocerciasis Network for Elimination (GONE) whose goal is to strengthen collaboration among countries and partners.

The meeting provided an opportunity for GONE stakeholders to review, discuss and endorse the terms of reference of the network, to highlight the progress made by various countries towards eliminating onchocerciasis, and to explore new opportunities for partnerships to support initiatives aimed at accelerating the global elimination of onchocerciasis. To this end, the various speakers emphasized the importance of public–private partnerships in mobilizing funding to cover all programmatic areas to reach the elimination targets. The meeting served also as a platform for participants to enhance global and regional collaboration by sharing knowledge, lessons learnt and best practices among countries and partners. Specific working groups were set up during the conference to identify challenges and discuss solutions to accelerate elimination.

The meeting was conducted in plenary and breakout sessions. The plenary sessions heard presentations on the main achievements, gaps and challenges of endemic countries and the way towards achieving the 2030 road map targets for onchocerciasis elimination as well as updates from the Mectizan Expert Committee. The technical session provided updates on diagnostics, post-verification surveillance, research and development, and business case scenarios for new tools and the management of onchocerciasis-associated epilepsy.

Participants divided into small working groups during the four breakout sessions (on the terms of reference of GONE; mapping, monitoring and evaluation of access and logistics; entomology; and cross-border collaboration) where participants discussed their feedback and preparatory work on the guiding questions. At the end of the first breakout session, the GONE terms of reference were endorsed by more than 90% of the participants.

The meeting closed with statements from a high-level panel of representatives of key constituencies and the Minister of Health and Social Action of the Government of Senegal.

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Globally, at least 244 million people in 31 countries suffer from this debilitating, painful disease.

1. Introduction

Onchocerciasis (also known as river blindness) is the second leading infectious cause of blindness after trachoma. It is classified as a neglected tropical disease (NTD). The infection can cause intense itching, rashes, skin discoloration, visual impairment and eye disease leading to permanent blindness.

The parasite is spread by the bites of infected black flies that breed in rapidly flowing rivers. Globally, at least 244 million people in 31 countries suffer from this debilitating, painful disease. Africa houses 99% of the people at risk of onchocerciasis; the remaining 1% live on the border between Brazil and Venezuela (Bolivarian Republic of). The World Health Organization (WHO) has verified four countries for having eliminated transmission of the disease: Colombia (in 2013), Ecuador (in 2014), Mexico (in 2015) and Guatemala (in 2016).

A global community of partners has been working for decades to address the suffering caused by river blindness. Before control and elimination efforts began, communities deserted fertile farmland near the rivers where the black flies breed, which had devastating socioeconomic impacts. The advent of control efforts yielded remarkable progress towards eliminating the disease as a public health problem. Manifestations are increasingly rare, and transmission is being eliminated nationally and sub-nationally. This success led to a shift in approach by WHO from control of the disease to elimination of transmission. In 2023, Niger became the first country in the African Region to submit a dossier to WHO to verify the elimination of transmission.

Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030 (1) (“the road map”) was endorsed by the Seventy-third World Health Assembly in November 2020. The targets for the elimination of onchocerciasis are, by 2030: (i) to stop mass drug administration (MDA) of ivermectin in at least one focus in 34 countries; (ii) to stop MDA in more than 50% of the population in at least 16 countries; (iii) to stop MDA in the entire endemic population of at least 12 countries; and (iv) to verify interruption of transmission in 12 countries.

The Global Onchocerciasis Network for Elimination (GONE) was launched in January 2023 with the goal of strengthening collaboration among countries and partners towards the achievement of the road map targets for elimination of onchocerciasis. Its first meeting was held on 1–2 November 2023 in Saly Mbour, Senegal, convening more than 150 onchocerciasis partners. The meeting agenda is included as Annex 1 and the participants are listed in Annex 2.

2. Welcome and opening remarks



Barnabé Gning (Ministry of Health of Senegal) welcomed the participants to the meeting and delivered the opening remarks.

Senegal is proud and honoured to have been chosen as the host country of the inaugural meeting of GONE. It has succeeded in interrupting transmission of onchocerciasis, confirming Senegal as only the second country in sub-Saharan Africa after Niger to achieve this milestone. Following the required evaluations, treatment stopped in 2022 and the 3-year post-treatment surveillance phase was initiated. Senegal is now on track to be the second country in Africa to submit a verification dossier to WHO.

The achievement in Senegal provides a further proof of concept that progress against NTDs is possible, not only in West Africa but also across the entire continent. This accomplishment results from the hard work and dedication of the Government of Senegal, local and international partners and health workers. Removing the burden of onchocerciasis will lead to improved physical, social and economic well-being for families and communities in Senegal.

Now, 16 million people nationwide can live without fear that the devastating effects of river blindness will return to their communities.

In Senegal, river blindness was prevalent in the south-east in eight health districts spread across three regions (Kedougou, Kolda and Tambacounda), affecting more than 300 000 people directly. The disease has ripple effects for families and communities, leaving those afflicted unable to work and often forcing children to abandon school to work when their parents cannot. Senegal was among the first countries to use ivermectin (Mectizan) in mass treatment campaigns to fight the disease. By maintaining high treatment coverage over the years, Senegal is now close to eliminating transmission.

The Government of Senegal highly appreciates the activities of GONE. The network favours an integrated, intersectoral approach and aims to advocate nationally and internationally to find solutions to the immediate and last-mile challenges in the elimination of onchocerciasis.

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Now, 16 million people nationwide can live without fear that the devastating effects of river blindness will return to their communities.

3. Towards the 2030 road map targets: achievements and way forward

Daniel Argaw Dagne and Maria Rebollo Polo (WHO Global NTD Programme [WHO/NTD]) summarized the progress achieved, the challenges in implementing the road map (1) and the way forward.

Encouraging progress has been made towards achieving the 2030 road map targets in some areas. The number of countries achieving the elimination of at least one NTD as a public health problem has reached the half mile (50 countries out of the 100 target) and in Sustainable Development Goal 3, target 3.3, indicator 3.3.5 of reducing the number of people requiring interventions against NTDs, which has increased to 25%. Eradication of dracunculiasis has progressed, with five remaining endemic countries and only 13 cases reported in 2022. The yaws eradication programme is hampered by a persistent lack of funding for scaling up implementation of eradication efforts including total community treatment.

On implementation of the three road map pillars, significant progress has been made to address the gaps in developing various guidance and companion documents to accelerate programmatic action, intensify cross-cutting approaches and change operating models and culture to facilitate country ownership.



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The number of people requiring preventive chemotherapy for onchocerciasis and schistosomiasis has increased by 13 million but has decreased for lymphatic filariasis, soil-transmitted helminthiasis and trachoma. In general, the total number of people who received preventive chemotherapy interventions for at least one NTD has dropped in 2022 from 2021, partly related to reporting and missed MDA. Disruptions caused by the coronavirus disease (COVID-19) pandemic and the changing global funding landscape are severely affecting progress in addition to the persisting challenges related to conflict, insecurity and political instability worldwide.

As a way forward, high-level concerted advocacy is needed to quickly recover from the COVID-19 disruptions and address the ever challenging and reduced funding landscape. NTD communities must devise innovative approaches that foster integration and cross-sectoral collaboration while ensuring country ownership and leadership towards sustainable financing of NTD programmes. Active engagement with and mainstreaming of NTD interventions such as primary health care/universal health coverage, health emergencies, climate health, One Health and other relevant global health initiatives are critical not only for maintaining the gains but also for accelerating progress towards the road map targets.

On the elimination of onchocerciasis, significant progress has been made since the launch of the road map in 2021. Countries have achieved high coverage after the initial disruptions caused by the COVID-19 pandemic measures. In 2022, more than 29 million people no longer required treatment in areas where onchocerciasis transmission has been suppressed and maybe interrupted. More than 1300 districts (implementation units) in Africa have received more than 16 rounds of MDA with ivermectin. Impact assessments of all areas where high numbers of treatments have occurred will allow us to accelerate progress towards the road map targets. As of October 2023, however, none of the milestones set for each of the four indicators included in the road map to track progress towards eliminating onchocerciasis had been met (Table 1).

Table 1. Road map indicators and 2023 milestones for onchocerciasis elimination

Road map indicator	Milestone (by WHO region)
Countries verified for interruption of transmission ($n=4$)	Colombia, Ecuador, Guatemala, Mexico (WHO Region of the Americas)
Countries that stopped MDA in at least one focus ($n=14$)	Equatorial Guinea, Ethiopia, Malawi, Mali, Nigeria, Senegal,* Uganda, United Republic of Tanzania (WHO African Region)
	Colombia, Ecuador, Guatemala, Mexico (WHO Region of the Americas), Venezuela (Bolivarian Republic of)
	Sudan (WHO Eastern Mediterranean Region)
Countries that stopped MDA for $\geq 50\%$ of population ($n=9$)	Equatorial Guinea, Senegal,* Uganda (WHO African Region)
	Colombia, Ecuador, Guatemala, Mexico (WHO Region of the Americas), Venezuela (Bolivarian Republic of)
	Sudan (WHO Eastern Mediterranean Region)
Countries that stopped MDA for 100% of population ($n=6$)	Equatorial Guinea, Senegal* (WHO African Region)
	Colombia, Ecuador, Guatemala, Mexico (WHO Region of the Americas)

MDA: mass drug administration; WHO: World Health Organization.

* Senegal implemented MDA in 2022 and transitioned to post-treatment surveillance in 2023.

Source: Elimination of human onchocerciasis: progress report, 2022–2023 (2).

4. Survey findings on gaps and needs of endemic countries

Maria Rebollo Polo (WHO/NTD) presented the findings of the survey on the gaps and needs of countries endemic for onchocerciasis.

One of the key recommendations of the first GONE brainstorming meeting (September 2022) was to consult with the health ministries of countries in which onchocerciasis is endemic on how GONE can help address gaps and challenges without duplicating the work of existing country initiatives and partnerships. To this end, the GONE Secretariat has undertaken a needs assessment in all endemic countries to identify the status of onchocerciasis elimination efforts and the challenges, hindrances and critical actions required to achieve the elimination targets. The findings are summarized in this report, which can help determine priorities and critical actions to be implemented by GONE partners. The scoping exercise identified a series of key opportunities and associated needs of the endemic countries. These issues have been raised several times by interviewees and can be summarized as follows.

- Develop formalized cross-border collaboration plans with all key actors (governments, partners, funders, researchers, procurement agencies): facilitate communication, connect relevant stakeholders for MDA synchronization and information-sharing, and provide guidance.
- Advocate for increased (domestic, public, private and philanthropic) resources to fully fund onchocerciasis elimination programmes and cross-border activities (e.g. value proposition, investment case, impact modelling).
- Share best practices on the practical implementation of WHO guidance by country programmes.
- Facilitate access to and provide the necessary equipment, reagents and supplies for laboratory processes for diagnostics.
- Build capacity among local scientists and experts in all onchocerciasis-related areas (laboratory, entomology, etc.) for carrying out programmatic steps according to WHO guidance.
- Support the establishment of quality-assured laboratories in endemic countries.
- Develop incentives to recruit and sustain community drug distributors and enhance community support for MDA campaigns.

5. Breakout session 1: terms of reference of the network

The first breakout session was moderated by Clara Jones (Ministry of Health of the United Republic of Tanzania). Its purpose was:

(i) to present the drafting process and the key sections of the terms of reference of GONE;



(ii) to discuss the key sections of the terms of reference in small working groups;



(iii) to hear from rapporteurs the key takeaways from the working group discussions in plenary; and



(iv) to vote on the key sections of the terms of reference.





5.1 Background

Maria Rebollo Polo (WHO/NTD) gave a historical overview of how the onchocerciasis community has worked collaboratively to develop the terms of reference of GONE.

Several consultations and discussions with key stakeholders have recommended the need for a well-coordinated partnership locally, regionally and globally to enhance collaboration and implement critical actions towards achieving the road map 2030 targets and milestones for onchocerciasis (1). The initial discussions about the creation of a global onchocerciasis network started in June 2022 when the first draft of terms of references for an onchocerciasis network were circulated to the onchocerciasis community for input and review. On World NTD Day 2023, WHO, Member States and partners officially launched the Global Onchocerciasis Network for Elimination, or GONE, to assist endemic countries in achieving the road map's targets and milestones for onchocerciasis.

From mid-2022 to September 2023, the draft terms of reference were presented and discussed at several national, regional and global onchocerciasis and NTD meetings, which informed the final version. Several rounds of consultations were held with the GONE network and country

representatives (national onchocerciasis coordinators, members and chairs of national onchocerciasis elimination committees [NOECs]) to enable all network participants to provide their input, proposals and amendments to the terms of reference that follow.

The mission of GONE is to assist countries to reach the 2030 road map targets for onchocerciasis elimination.

- GONE's vision is to see onchocerciasis GONE.
- GONE is a WHO-managed informal network with core values such as inclusiveness, diversity, transparency, alignment with WHO's norms and standards, and coordination to advance WHO's priorities on the road map.
- GONE has two key objectives:
 - **objective 1:** to provide an inclusive, open access forum to improve communication, coordination, partnership and communities of practice for all onchocerciasis stakeholders to work closely to reach the road map targets; and
 - **objective 2:** to conduct action-oriented, effective advocacy towards the road map targets and milestones for onchocerciasis elimination.

- GONE comprises a steering group made up of representatives of key constituencies, working groups, members and network participants. Its current members are: the interim vice-chairs (elected by the GONE network at the beginning of 2022); the representatives of nine health ministries of onchocerciasis-endemic countries (composition strives for appropriate geographical, gender, language and onchocerciasis programme status representation); the funders of GONE (the Mectizan Donation Program/Merck & Co., Inc., Sightsavers, The Carter Center, the Bill & Melinda Gates Foundation, The END Fund and GLIDE (the Global Institute for Disease Elimination); the major funders of the onchocerciasis elimination programmes (the United States Agency for International Development); key constituencies (the chair and vice-chair of the NDGO Group for onchocerciasis elimination, the chair of the Diagnostic and Technical Advisory Group subgroup for onchocerciasis; the chair of the Onchocerciasis Technical Advisory Subgroup; and a representative of the Task Force for Global Health/COR-NTD). Members of the steering group have met regularly throughout 2023 to review the terms of reference of GONE and the agenda of the first GONE meeting.
 - The steering group operates on the basis of consensus after having consulted with the constituencies it represents. If no consensus on a given matter is possible, the decision in relation to that matter will be taken by WHO. The steering group provides strategic direction and guidance on how GONE will operate, mobilize collaboration to implement agreed activities and mobilize resources to accomplish GONE's work plan, including GONE plenary meetings. It reviews annual work plan priorities and budget allocation, and provides advice and recommendations to the GONE Secretariat. The establishment of specific time-limited working groups will be decided by the steering group, which shall approve the related terms of reference of such groups.
 - Only organizations can apply for membership of the GONE network if they adhere to the terms of reference of GONE. Member organizations will nominate 1–2 lead representatives who serve as the primary liaison between their organization and GONE. Membership of GONE consists of representatives from Member States of endemic and non-endemic countries; intergovernmental organizations; nongovernmental organizations; not-for profit product development partnerships; academic institutions; the private sector; and philanthropic foundations.
 - Individuals can join the network and activities of GONE as non-member participants on an individual basis. A table annexed to the terms of reference presents the different mandates and activities of WHO bodies and global groups supporting onchocerciasis elimination. The WHO mandate is to (i) provide leadership and create partnerships to improve health; (ii) manage information and promote research; (iii) set norms and standards; (iv) provide technical support; (v) issue policy guidance to national onchocerciasis programmes and endemic countries; and (vi) receive the medicines donated for the purposes of onchocerciasis elimination.
 - WHO serves as the Secretariat of GONE. Its role is to oversee the day-to-day management of GONE's work, including coordinating working groups and discussions among stakeholders on priorities and gaps, and preparing draft work plans for consideration by the steering group and/or the working groups, along with administration and budget management.
 - After the endorsement of the terms of reference, organizations can register as members of GONE and vice-chairs will be elected who will then be appointed by WHO.
- Following the presentation of the GONE terms of reference, participants divided into 10 working groups.



5.2 Key questions

Each breakout session was led by a rapporteur who facilitated discussion on the following key questions:

- What should be the key activities for objectives 1 and 2?
- What should be the role of each stakeholder in contributing towards objectives 1 and 2?
- How can we ensure country leadership to achieve the respective objective?

5.3 Proposed activities

A number of activities were proposed to achieve the objectives.

- Organize regular meetings (e.g. webinars) to discuss topics of interest (e.g. cross-border collaboration; elimination strategies).
- Disseminate newsletters to keep members abreast of country developments and best practices.
- Organize annual meetings with national onchocerciasis coordinators, donors, implementing partners and NOEC chairs to review progress, address issues and share information and best practices and to foster collaboration among technical bodies.
- Network members to inform the preparation of technical guidance documents that WHO will ultimately develop.
- Create a website where information can be stored and found (e.g. database with programme information, repository of documents, strategies, toolkits in languages of endemic countries; templates to assess progress regarding onchocerciasis control and elimination).
- Establish and coordinate the working structure of the GONE network: each member organization should appoint two liaison persons to actively engage in GONE activities and promote the GONE mission in national NTD fora (e.g. appoint Ambassadors); set up working groups (e.g. cross-border collaboration, communications and resource mobilization).
- Establish national GONE working groups to work with NOECs to assess needed funds, contribute to onchocerciasis-specific information and mobilize national resources.
- Strengthen integrated approaches with other sectors (e.g. health and climate change; universal health coverage).

5.4 Stakeholder roles

Each stakeholder has a vital role to play in contributing towards the objectives of GONE (Table 2).

Table 2. Roles of GONE stakeholder

Stakeholder	Roles
Endemic countries/health ministries	<ul style="list-style-type: none"> • Provide updated information/data/funding gaps for all programmatic areas, including contact information of the coordinator • Share best practices as soon as available • Ensure the onchocerciasis programme is included in high-level government policy and strategy documents • Ensure high-level political commitment and active engagement including earmarked budget allocation to fill budget gaps/needs for programmes • Ensure programme sustainability until and beyond onchocerciasis elimination • Ensure that the country coordinates all efforts from partners • Mobilize domestic funding to enhance ownership • Strengthen NTD integrated approaches in health and climate change • Lead all onchocerciasis programme planning and implementation • Be open and transparent with sharing data and information • Lead the local coordination of main stakeholders
WHO	<ul style="list-style-type: none"> • Continue to be the Secretariat of GONE • Host GONE website and facilitate webinars • Inform the preparation of policy and guidance documents and avail them in multiple languages at same time • Develop a costed global plan • Actively disseminate up-to-date information from global meetings/ initiatives to country level • Develop an advocacy guide for programs; strengthen the understanding of each stakeholder on the concept/role of GONE
Donors	<ul style="list-style-type: none"> • Maintain/enhance commitments and provide adequate sustainable resources for all phases of onchocerciasis elimination • Advocate to attract new donors • Listen and respond to country priorities and needs
Implementing partners	<ul style="list-style-type: none"> • Support endemic countries in translation of plans of action into implementation (technical and operational assistance) • Support countries to prepare financial plans to high-level decision makers and support them with local and international advocacy efforts • Pool efforts towards common goals and work transparently • Advocate for community engagement
Research and development organizations and academia	<ul style="list-style-type: none"> • Develop diagnostic and treatment tools and avail them through peer reviewed journals and other outlets • Innovate preventive tools such as vector control • Institutions should conduct operational research which will solve programmatic problems • Advocate for NTD-specific curricula • Produce evidence to demonstrate impact of advocacy on onchocerciasis elimination
Endemic communities and civil society	<ul style="list-style-type: none"> • Ensure sustained community engagement until and beyond onchocerciasis elimination • Identify champions who serve as spokespersons of affected persons • Appoint ambassadors/designation of ambassadors

GONE: Global Onchocerciasis Network for Elimination; NTD: neglected tropical disease; WHO: World Health Organization.



5.5 Country leadership actions

The following actions will ensure country leadership towards achieving the objectives of GONE.

- Build programme capacity (technical and human resources) at national level.
- Provide country support to ensure leadership of health ministries is well informed.
- Provide support (skills development) to NTD/onchocerciasis leadership in health ministries to help ensure that its leadership prioritizes/allocates adequate attention to NTDs.
- Ensure good representation of countries in the GONE steering committee.
- Mobilize support from national nongovernmental organizations to advocate for NTDs/onchocerciasis elimination

5.6 Endorsement of the terms of reference

At the end of the session participants were invited to approve or reject the mission, vision and objectives 1 and 2 of the terms of reference by placing a green sticky note (for approval) or a red sticky note (for objection) on the wallpaper next to where the key sections were written.

At the end of the first breakout session, the GONE terms of reference were endorsed by more than 90% of the participants.

6. Country health information platform



Alexandre Pavluck and Andy Tate (Sightsavers) made the presentation on the country health information platform (CHIP).

Each year, national NTD programmes submit programmatic data to WHO and the International Trachoma Initiative to report on endemicity status, treatments delivered, surveys conducted, morbidity recorded, and medicines required and remaining for the current reporting period.

Launched in early 2022, CHIP is a publicly-accessible online business intelligence dashboard built using Microsoft Power BI that draws on this wealth of reported data. Within CHIP, data from single-year reporting forms are presented longitudinally, using visual formats optimized to support programme review and decision-making. CHIP contains no data itself; it is a visual tool only. Any errors or data omissions therefore will require a joint reporting form resubmission to “correct” CHIP.

All countries in the WHO African Region that are endemic for at least one of the NTDs amenable to preventive chemotherapy have a CHIP dashboard. The dashboard can be accessed via the ESPEN (Expanded Special Project for Elimination of Neglected Tropical Diseases) portal either via each country page or the dedicated CHIP resource site (3).

Currently, CHIP is being upgraded. A number of useability fixes and improvements will be introduced, in addition to new data submissions via the epidemiological data reporting form for preventive chemotherapy, or EPIRF.

CHIP is funded by GLIDE and Sightsavers. Development partners include Sightsavers, ESPEN and Standard Co.

7. Breakout session 2: mapping, monitoring and evaluation of access and logistics

The second breakout session was moderated by Didier Bakajika (WHO Regional Office for Africa). Its purpose was to discuss barriers to progress, identify specific solutions and critical actions, and share best practices for improving mapping, monitoring and evaluation of access and logistics.

7.1 Update on mapping, monitoring and evaluation

Didier Bakajika’s presentation summarized current data, needs and projections. Three phases are used to eliminate onchocerciasis using MDA programmes:

- phase 1 – treatment (pre-suppression and transmission suppressed);
- phase 2 – post-treatment surveillance (lasting 3–5 years); and
- phase 3 – post-elimination surveillance (starting 3–5 years after post-treatment surveillance). During this phase, strong evidence of elimination of transmission is provided in a defined geographical area. The road map onchocerciasis targets, sub-targets and milestones are shown in Table 3.

Table 3. Road map targets, sub-targets and milestones for onchocerciasis elimination

Indicator	2020	2023	2025	2030
Number of countries verified for Interruption of transmission	4	5	8	12
Number of countries that stopped MDA in ≥ 1 focus	9	22	24	34
Number of countries that stopped MDA in ≥ 50% of the population	6	10	25	> 16
Number of countries that stopped MDA for 100% of the population	5	6	10	> 12

MDA: mass drug administration.
Source: WHO road map (1).

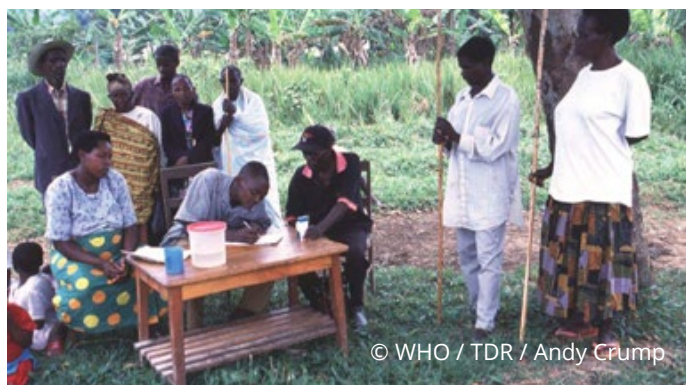
Onchocerciasis elimination mapping involves the identification of all areas needing MDA to achieve elimination of transmission. The five key steps are: (i) desk review and exclusion phase; (ii) breeding sites' assessment; (iii) epidemiological surveys; (iv) laboratory analysis; and (v) data management and interpretation.

Routine monitoring and evaluation surveys need to be done every 3–5 years in 3–5 first-line communities; 100 children aged 5–9 years are examined in each village; when there are fewer than 100 children present in a selected village, children living in villages at close proximity are included to reach the required total. Finger-prick blood samples are taken from these children using filter papers in the field and then transported and, following current recommendations, subsequently processed in a laboratory for the presence of antibodies to *Onchocerca volvulus* using the Ov16 rapid diagnostic test (RDT). As recommended by the WHO Onchocerciasis Technical Advisory Subgroup, if surveyed villages have less than 2 positive IgG4 rapid diagnostic tests, the area can move to a full stop-MDA survey. Features for making decisions for a full stop-MDA survey depend on the delineation of the operational transmission zone, serological and entomology surveys in the operational transmission zone. Serological surveys required a threshold of 0.1% seroprevalence in children aged 5–9 years, the WHO-recommended diagnostics are the OV16 IgG4 enzyme-linked immunosorbent assay (ELISA). However, 0.1% is very conservative and recent modelling has suggested further investigation of the use of > 0.1%, and preferably < 2%, which might be sufficient to determine stopping MDA. For entomological surveys, the threshold of 0.05 % blackfly infectivity rate is recommended using O-150 PCR (pool screen), at least 6000 black flies should be screened per operational transmission zone, collection should be done during the high transmission period. However, this technique may change in the near future. In general, co-evaluation should be considered when and where possible, such as integrated transmission assessment survey/onchocerciasis elimination mapping surveys; integrated TAS/pre-stop; integrated TAS/epidemiological component of full-stop MDA. The details of the algorithms can be found in the fourth report of the Onchocerciasis Technical Advisory Subgroup (4).



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The African Region has made important progress on MDA for onchocerciasis. While in 2014 there were 15 endemic implementation units where more than 25 rounds of MDA were carried out, in 2022 there was an almost tenfold increase to 166 endemic implementation units where more than 25 rounds of MDA were carried out. Regarding progress in eliminating onchocerciasis, Benin, Burkina Faso, Cameroon, Guinea, Liberia, Malawi, Mali, Senegal and Sierra Leone have 100% endemic areas potentially eligible for pre-Stop or stop MDA. The Democratic Republic of Congo and Nigeria have reached almost 90% of their endemic areas potentially eligible for pre-stop or stop MDA. Concerning the geographical distribution and transmission status of onchocerciasis in the Region of the Americas, in 2017 more than half a million regional population was no longer at risk while about 30 000 people are still at risk. In the Eastern Mediterranean Region, onchocerciasis MDAs were stopped in the Ahu Hamed and Galabat focus; MDAs are ongoing in the Radon and Khur Yabous onchocerciasis transmission zones. WHO has verified the elimination of onchocerciasis in Colombia (in 2013), Ecuador (2014), Mexico (2015) and Guatemala (2016).



7.3 Pre-stop and stop mass drug administration in Nigeria

The presentation was made by Chukwuemeka Makata (Federal Ministry of Health and Social Welfare of Nigeria).

Nigeria has 32 States and Federal capital territories that are endemic for onchocerciasis and are currently conducting either pre-stop or stop MDA evaluations either to measure impacts of implementations or to make decisions about stopping MDA. The evaluations are conducted in communities and entail collecting a minimum of 300 dried-blood spot samples and analysis with Ov16 ELISA for re-stop entomological evaluations in addition in case of stop MDAs. The processes are faced with increasing implementation challenges which the programme continues to surmount.

Nigeria is one of the 31 sub-Saharan African countries endemic for Onchocerciasis. About 25% of the total population of the country live with or at the risk of the disease in about 40 000 communities spread across 32 of the 36 federating states and the Federal Capital Territory.

The first case of onchocerciasis in Nigeria dates back to 1906. The formal effort to control the disease was launched in 1982 and became operational in 1986; it was supported by APOC, which transitioned to ESPEN in 2015. At about the same time, the programmatic objective changed to elimination following the emergence of evidence that the diseases can be eliminated with sustained treatment with ivermectin and a diagnostic test to measure impact.

The NOEC, constituted in 2015 by the Honorable Minister for Health, provides technical support to the national onchocerciasis elimination programme. The committee developed a decision matrix for the programme to conduct both pre-stop and stop-MDA evaluations in the course of programme implementation to measure impact and/or generate evidence to stop MDAs represented in a colour flag. Given that all transmission zones in Nigeria have treated the disease above the WHO-recommended minimum number of years, the notion of whether

7.2 Onchocerciasis elimination mapping in Senegal

The presentation was made by Ngayo Sy (Ministry of Health and Social Action of Senegal).

Senegal has an estimated population of more than 17 million inhabitants. Of its 79 health districts, eight are co-endemic for onchocerciasis and lymphatic filariasis. According to the WHO protocol, onchocerciasis elimination mapping has five phases. In Senegal, it is focused on two phases:

- (i) data review associated with exclusion mapping and
- (ii) larval prospecting.

Data review relies on historical data from the time of the Onchocerciasis Control Programme in West Africa (OCP) and from the African Programme for Onchocerciasis Control (APOC).

In the south of the country, onchocerciasis is found close to the border with Guinea-Conakry and in the east of Senegal along the border with Mali in the south of the Falémé river. In the north, the disease does not seem to cross a theoretical line with the eastern border of Gambia at the town of Kidira. In the south-west, it is more difficult to identify where the disease is prevalent: cases were previously reported by Masseguin and colleagues (5) in the east of the Kolda district, and the disease and its vectors are known from Rio Geba in Guinea-Bissau.

an evaluation is a pre-stop or a stop MDA is made retroactively based on the threshold or result of sample analysis. All evaluations entail the collection of a minimum of 3000 dried blood spot samples analysed with the Ov16 ELISA. If the outcome is $< 0.1\%$ positivity rate, the programme will proceed to conduct entomological evaluations, which are confirmatory and involve the collection of a minimum of 6000 blackflies from a minimum of three sites per transmission zone over a period of one year. An outcome of $< 1/2000$ positive flies after analysis qualifies the transmission zone where the evaluation was conducted to stop MDA. If the outcome is above the threshold, the programme will proceed to implement a biannual regimen of ivermectin administration for the next 2 years, after which the evaluations are repeated.

The surveys are conducted in communities selected by the NOEC and require programme officers going into the communities to collect samples. Recently, however, this has become very difficult with both emerging and old challenges that threaten the uptake of public health interventions in the communities. There is also the case of absence of the political will towards programme ownership on the part of the government which leaves the burden of funding on partners, a serious threat in the face of dwindling funding opportunities. The programme however continues to forge ahead due to the resilience of stake holders and innovations and best practices to overcome obvious challenges.

7.4 Bioline rapid diagnostic test and Ov16 enzyme-linked immunosorbent assay

The presentation was made by Gary Johnson and Kuku Appiah (Abbott).

Abbott looks forward to playing its part in the elimination effort by providing a reliable supply of the diagnostic solutions that will contribute towards the elimination programmes. It is committed to providing diagnostic solutions for NTDs and has developed diagnostics for six of the 20 diseases and disease groups listed in the road map (1) plus other diagnostics

beyond the road map. Abbott has three diagnostic platforms within its portfolio of diagnostic products for onchocerciasis diagnosis (two rapid tests and one ELISA).

A workable solution for filariasis procurement and supply can be replicated with onchocerciasis to ensure optimum supply and demand. By using data from country programmes and consolidating them into a global demand channelled either through funders or global programmes can create a view of demand across the onchocerciasis network. This helps manufacturing processes to provide the correct numbers of tests for each country when needed for their programmes. Procurement can be done by funders and global programmes to lift this burden from country programmes, allowing them to concentrate on implementing programmes locally and not being distracted by supply chain management. Abbott is committed to playing its part in onchocerciasis elimination by providing high-quality, reliable diagnostic tools consistently and reliably where and when programmes need them.

7.5 Summary of key messages

National onchocerciasis coordinators were asked to complete actions needed for each implementation unit, whether there was funding secured for 2024, who are the donors and partners in the respective units. Countries were tasked to review their forecasts of onchocerciasis elimination mapping, pre-Stop and full-Stop MDA surveys together with their implementing partners and donors in the room. Detailed information per country is available separately.

8. Breakout session 3: entomology

The third breakout session was moderated by Dieudonné Sankara (WHO/NTD). Its purpose was to discuss challenges and opportunities, and to share experiences on the use of entomology for mapping, stop MDA decisions and vector control.

8.1 The WHO entomology manual

The presentation was made by Eddie Cupp (University of Auburn), Daniel Boakye (The END Fund and Paul Cantey (United States Centers for Disease Control and Prevention).

In 2023, WHO published an entomological manual to support country programmes to undertake entomological interventions in support of onchocerciasis elimination (6). The manual was prepared by renowned onchocerciasis entomological experts and financially supported by the Mectizan Donation Program.

Medical entomology is essential for the control and elimination of NTDs, particularly onchocerciasis. However, there is a shortage of medical entomologists worldwide, especially in countries that are most affected by these diseases, where resources are scarce and promising job opportunities are not offered by the medical entomology sector. Training more health and field workers in entomology therefore remains a critical gap, as highlighted in the road map (7).



The WHO entomology manual is a new resource for strengthening the capacity of scientists combatting onchocerciasis. It will be a fundamental tool in the last mile as we approach elimination of onchocerciasis, where entomological evaluations and surveillance will be required in all endemic countries in order to achieve verification of elimination.

All onchocerciasis-endemic countries need to maintain an up-to-date breeding site mapping information for all onchocerciasis transmission zones, including sharing information among countries to address cross-border transmission issues. Programmes should carry out entomological surveys in advance of stop MDA, along with serological surveys as per protocols.

Vector control could be considered as support for MDA when possible and required by epidemiological evidence. When it is used, there should be proper targets and proper monitoring. Vector ecology matters, and regional and country specificity, should therefore be considered.

8.2 Onchocerciasis entomology in the United Republic of Tanzania

The presentation was made by Rory Post (Liverpool John Moores University).

East Africa has significant blackfly biodiversity issues that complicate onchocerciasis elimination. Breeding sites for *Simulium damnosum* s.l. or the *Simulium neavei* group cannot therefore be used as indicators of vectors. Anthropophilic non-vector species can be caught in large numbers and result in misleadingly low estimates of transmission in stop-MDA surveys and post-transmission surveillance. Vector control is resource-hungry and can be environmentally damaging, but it can be a useful support for MDA when there is a high force-of-infection.

There have been three major campaigns to map onchocerciasis endemic areas in the United Republic of Tanzania: firstly by Puiip Wegesa from Amani, secondly by the National Institute for Medical Research Tukuyu laboratory with the assistance of DANIDA (Danish International Development Agency), and finally rapid epidemiological mapping of onchocerciasis studies supported by APOC. However, many areas need to be confirmed by onchocerciasis elimination mapping.

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... there is a shortage of medical entomologists worldwide, especially in countries that are most affected by these diseases ...

Mapping is complicated by vector issues, because only three out of 20 cytotypes of the *S. damnosum* complex in the United Republic of Tanzania are confirmed vectors, and only one out of three members of the *S. neavei* group. This means that the existence of *S. damnosum* s.l. and *S. neavei* group breeding sites is not an indicator of the presence of vectors in the country during onchocerciasis elimination mapping. Instead, the presence of vectors has to be confirmed by human landing catches, cytotaxonomy or molecular identification.

Pool-screening PCR for the stop-MDA survey and for post-transmission surveillance is complicated by the occurrence of at least four anthropophilic species that are not currently thought to be vectors (*S. bovis*, *S. vorax*, *S. adersi*, *S. nyasalandicum* and the Kibwezi form of the *S. damnosum* complex). These anthropophilic, non-vector blackflies should be excluded from pool-screening, otherwise they will incorrectly lower measures of infectivity rates. However, their vector status is poorly understood, and they should be subject to pool-screening, in their own pools, to determine if they are efficient vectors.

The Tukuyu vector elimination project was time-consuming and expensive. It failed because of reinvasion by vectors with the prevailing winds from 150 km away. Vector control using larvicides would not require the same precision as vector elimination, but this will still be significant. It is currently unknown what would be a cost-effective reduction in annual biting rates, and this might vary between foci. There is a danger that vector control instigated without proper planning might incur costs and environmental damage for very little gain. However, in Tukuyu, the combination of larviciding during 2002–2005 with MDA seems to have resulted in a greater drop in infection rates than in other parts of the United Republic of Tanzania, and environmental damage was not recorded in Tukuyu.

8.3 Onchocerciasis entomology in Mali

The presentation was made by Yacouba Sangare (Ministry of Public Health and Hygiene of Mali).

Mali has fought onchocerciasis since 1974. Various interventions made it possible to move from control to elimination in 2015. Multiple studies on the feasibility of eliminating onchocerciasis through ivermectin treatment and on the process of verifying elimination have been recommended by WHO. In 2016, Mali joined this process. Entomology played an important role in implementing some of these activities. Serological surveys carried out in all areas of operational transmission identified the vector species involved in transmission. To accelerate the cessation of onchocercal transmission in KA05, ground treatment of potential watercourses is being deployed as an alternative strategy. The prospecting of larval breeding sites will determine the potential watercourses to be treated in 2024.

8.4 Summary of key messages

- Participants divided into groups and shared their feedback on the guiding questions.
- Describe the current capacity of country programmes for, and past experiences conducting, entomological evaluations:
- there is an overarching need to strengthen/maintain entomological capacity in onchocerciasis-endemic countries (from null to excellent);
 - many countries have a great deal of experience while a few countries have none.
- Describe the important challenges programmes are facing regarding entomological evaluations and thoughts on any potential solutions (Table 4).

Table 4. Onchocerciasis entomological evaluations: challenges and potential solutions

Challenges	Potential solutions
<ul style="list-style-type: none">• Paucity of flies in historical sites• Difficulty to access some breeding sites for evaluations• Transmission zones not known	<ul style="list-style-type: none">• Use satellite images to fine tune the number of locations that need to be evaluated• Use drones if allowed and available
<ul style="list-style-type: none">• Limited number of black fly entomologists	<ul style="list-style-type: none">• Recruit graduate (biology) students to become entomologists• Train entomologists who are working with other vector-borne diseases on black fly entomology
<ul style="list-style-type: none">• Many laboratories have PCR capabilities but are not able to do black fly PCR. Lack of reagents for PCR.	<ul style="list-style-type: none">• Train the laboratories with the capabilities on how to do black fly PCR• Improve the supply chain for PCR reagent
<ul style="list-style-type: none">• Lack of financial resources	<ul style="list-style-type: none">• Conduct advocacy and resource mobilization

PCR: polymerase chain reaction.

Annex 3 provides more detailed answers from the small group discussion.

9. NTD advocacy tool project update and key recommendations



The presentation was made by Carol Tangum (Task Force for Global Health) and Georges Nko'Ayissi Barthélémy (Ministry of Public Health of Cameroon) during which participants learnt about a project of The Task Force for Global Health, funded by Merck & Co., Inc., related to advocacy and mobilization of domestic resources. The goal of the project is to build the capacity of NTD programme managers to effectively advocate for the domestic resources needed to sustain the gains achieved by NTD programmes, particularly onchocerciasis and lymphatic filariasis elimination programmes.

The project engaged three African countries (Cameroon, Malawi and Togo) as partners in the development and testing of advocacy tools and resources. It culminated in a two-day, in-person meeting (Addis Ababa, Ethiopia, October 2023) and also led to the development of an online advocacy guide for NTD programme managers, which was shared during the GONE meeting.

Key recommendations

The following key recommendations were made.

- Forge new partnerships, strategies and ways of working together to address challenges and seize opportunities to sustain the gains made by NTD programmes.
- Identify and involve new partners/players based on country needs and context.
- Design a comprehensive, multilingual advocacy tool for NTD programmes.
- Provide countries with ongoing opportunities to share and learn from one another about how to best advocate for resources to sustain the gain.

10. Technical progress updates

The session on technical progress was moderated by Camilla Ducker (WHO/NTD).

10.1 Diagnostics

Paul Cantey (United States Centers for Disease Control and Prevention) presented the update on diagnostics for onchocerciasis.

WHO has made recommendations on serological tests (Ov16 ELISA and Ov16 RDT) for mapping and stopping MDA and on molecular tests (O-150 PCR ELISA) for stopping MDA and conducting post-treatment surveillance. All available tests have limitations and the serological tests do not meet the WHO target product profiles; nevertheless, they can be used to make programmatic decisions, and programmes should continue to use them while awaiting the new tools under development.

The United States Centers for Disease Control and Prevention have created a new ELISA – the mOv16 ELISA – in response to quality assurance issues with the alkaline phosphatase ELISA used previously. The new ELISA has a number of advantages, including decreased cross-reactivity, high reproducibility, a 2-hour run time, temperature-stable pre-coated plates and commercially available reagents. Once the test has completed the Centers' internal validation process, external laboratory validation in three laboratories in Africa that are involved in ongoing operational research is due to take place during the first and second quarters of 2024, after which it will be reviewed by WHO and then become available for programme use if approved.

At least two additional RDTs are undergoing field validation after promising evaluations in their own laboratories and at the Centers. The first RDT, produced by Drugs & Diagnostics for Tropical Diseases, uses Ov16 and a second antigen designed to make the test highly specific. If all goes well it could be commercialized by 2025. The second RDT, designed by Global Access Diagnostics, uses Ov16. It is undergoing field validation as well. If all goes well, production could begin sometime in 2024.

The United States Centers for Disease Control and Prevention have also noted some challenges with the O-150 PCR ELISA and thus transitioned to using new quantitative real-time PCR that targets O-150 and ND5 that were developed by a number of research groups in the United States of America. Quantitative real-time PCR has a number of advantages, including improved turnaround time, decreased risk of cross-contamination, built in quality control, available quality assurance panels and commercially available controls; all reagents can be shipped at room temperature. One challenge is that the method requires the use of a tissuelyser, which has to be imported as most laboratories do not already have the equipment. The Task Force for Global Health has helped procure this equipment for several laboratories. Scientists from the Centers participated in a training at Smith College (Northampton, USA) in which scientists from seven African countries were trained. The Centers will help validate quantitative real-time PCR in several laboratories in Africa during the first two quarters of 2024. After this the testing data will be reviewed by WHO and made available for programme use if approved.



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10.2 Strengthening integrated post-verification surveillance for neglected tropical diseases

The presentation was made by Abdel Direny (PATH) by video.

PATH is developing an integrated post-verification surveillance planning toolkit for NTDs in collaboration with WHO and funding from the Bill & Melinda Gates Foundation. The toolkit aims to assist national NTD programmes in assessing options for sustainable and integrated surveillance in post-elimination settings, with an initial focus on lymphatic filariasis and onchocerciasis. Development of the toolkit will allow for, and is planning to incorporate, additional NTDs in the future. The toolkit is a Word document with six chapters that offer a systematic approach to developing an integrated post-verification surveillance plan that leverages existing systems in a given country. The chapters include:

- an introduction to outline the use case, timeline and audience for the toolkit, as well as the resources needed to get started;
- an initial gathering phase to compile information about the target NTD(s) and existing surveillance systems in country;
- a synthesization phase to produce a compatibility ranking that directs NTD programmes towards systems that are most compatible with their needs for post-verification surveillance;
- an assessment phase to determine the best combination of surveillance systems to integrate with;
- a planning phase to outline processes for integrating NTD surveillance with stakeholders; and
- an implementation phase to develop standard operating procedures for implementing post-verification surveillance.

The toolkit also has several associated data collection instruments to assist countries in qualitatively and quantitatively assessing options for integration.

A device called the loascope was developed to support the test-and-not-treat strategy for implementing MDA in areas hypoendemic for onchocerciasis and co-endemic for loiasis. A new version of the scope has been made and is undergoing validation. Once validated, the scopes will be available for operational research. Once an implementation strategy for treatment in hypoendemic areas co-endemic for loiasis is approved by WHO and the Mectizan Expert Committee, then the scope could be used for ivermectin MDA.

Drugs & Diagnostics for Tropical Diseases has developed an RDT for loiasis and a prototype RDT that could test for Loa and onchocerciasis at the same time. More evaluations are needed before either test could be used in an implementation strategy.

10.3 Moxidectin development and business case scenarios

The updates were provided by Barbara Roth (Medicines Development for Global Health), Manuela Runge (MMGH Consulting GmbH) and Deidre Hollingsworth (NTD Modelling Consortium).

Medicines Development for Global Health, a not-for-profit organization involved in the development of medicines to treat infectious diseases and the marketing authorization holder of moxidectin, presented two slides to provide a short background to the business case.

Moxidectin is a second-generation macrocyclic lactone with a similar mode of action to that of ivermectin. The data presented from the phase III trial, which took place in Liberia, Ghana and two sites in the Democratic Republic of the Congo, indicate that moxidectin suppresses skin microfilariae to a greater extent, in more people and for longer than ivermectin, thus reducing or potentially preventing the risk of new infections and thereby reducing the persistence of infection within an endemic community.

The second slide referred to data presented at the ASTMH (American Society of Tropical Medicine & Hygiene) 2023 annual meeting by the Death to Onchocerciasis and Lymphatic Filariasis team of the University of Washington from their ongoing study in Côte d'Ivoire comparing moxidectin and ivermectin combined treatment for lymphatic filariasis. The standard treatment for lymphatic filariasis in Africa, ivermectin–albendazole was administered once every 6 months and was compared to a single dose of moxidectin–albendazole, ivermectin–DEC–albendazole and moxidectin–DEC–albendazole.

In this small study, the microfilariae density in the blood was measured at baseline. At month 12 and month 24, microfilaraemia was measured again. This study shows that moxidectin–albendazole performed significantly better than ivermectin–albendazole given twice and similarly to DEC-containing regimens. The results of this study will be confirmed in further studies but have already raised some hope for its potential in contributing to elimination of lymphatic filariasis in Africa.

The role of a new medication – moxidectin – for accelerating the elimination of onchocerciasis transmission is being assessed using modelled outcomes that inform a comprehensive business case in which use cases are defined, sized, and the health and economic impact assessed as well as demand and financial impact estimated.

The Bill & Melinda Gates Foundation and global NTD partners aim to assess the potential impact of moxidectin, alone and in combination, in accelerating the elimination of onchocerciasis transmission as well as the elimination of lymphatic filariasis as a public health problem. To this end, a comprehensive business case was developed to define scenarios in which the development and use of moxidectin and the combination moxidectin–albendazole for the treatment of onchocerciasis and lymphatic filariasis, respectively, can deliver value and impact. The modelled impact of the use of moxidectin in different scenarios provides the platform for the assessment. The business case seeks to define use cases of moxidectin for onchocerciasis and moxidectin–albendazole for lymphatic filariasis, to assess the health impact and cost–effectiveness of these treatments for both diseases, to estimate demand for moxidectin and albendazole, and to assess the financial viability from the standpoint of producers of the drug. The outcomes will describe under which conditions (in terms of risks, timelines, benefits/risks) it will be worthwhile for national programmes to switch to or add the use of moxidectin or moxidectin–albendazole in areas endemic for onchocerciasis, lymphatic filariasis, or both. It will also be informative for the drug producers and potential funders of the drug treatment programmes and for the WHO Global Onchocerciasis Programme and recommendations for introduction of moxidectin.

Expected outcomes: Description of the conditions (in terms of risks, timelines, benefits/risks) under which it will be worthwhile for national programmes to switch to or add the use of moxidectin or moxidectin–albendazole in areas endemic for onchocerciasis, lymphatic filariasis or both, and trade-offs in health, economic and financial impacts.



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Shifting from elimination of a disease as a public health problem to elimination of the disease itself requires more tailored tools including the development of drugs with superior efficacy ...

10.4 Macrofilaricide development

The update was provided by Sabine Specht (Drugs for Neglected Diseases initiative) by video.

Repurposing strategies and collaborative efforts have resulted in the population of a minimal development pipeline for a macrofilaricide. This needs to be continued to develop tailored tools for future helminth elimination challenges.

Shifting from elimination of a disease as a public health problem to elimination of the disease itself requires more tailored tools including the development of drugs with superior efficacy (macrofilaricides) as indicated in the road map (1). The use of a future macrofilaricide could be envisaged in (i) programmatic test-and-treat strategies or test-and-not-treat strategies in areas with loiasis, (ii) case management or (iii) focal MDA. Use cases will depend on product characteristics, such as simultaneous macro- and microfilaricidal effect (dual acting) and macrofilaricidal activity (single acting), of which the latter would be useful for Loa-coendemic areas.

A healthy drug pipeline for new chemical entities however does not exist. Through repurposing strategies and novel screening approaches, a few candidates have been identified and are currently being tested. Candidates are classified as either direct acting (target on the nematode) or indirect acting (anti-*Wolbachia*). Anti-*Wolbachia* drugs in the pipeline are (i) corallopyronin-A (preclinical), (ii) AWZ1066 (phase I) and (iii) ABBV-4083 (point-of-care), discontinued. Direct acting drugs in the pipeline are (i) DNDi-6166 (preclinical), (ii) emodepside (point-of-care) and (iii) oxfendazole (point-of-care). Already registered drug combinations, such as moxidectin–DEC–albendazole and rifapentin–moxidectin combination, are further under investigation for their macrofilaricidal activity.

Repurposing is a mitigation strategy based on the One Health principle to reduce drug development timelines and costs and is based on successful use in veterinary medicine to increase chances of success. In addition, liaison with the pharmaceutical industry and smart clinical trial designs enable drug development under funding constraints. Drug development however remains cost-intensive and risky. Funders should share this risk by jointly supporting promising macrofilaricide development.



10.5 Management of onchocerciasis-associated epilepsy

The update was provided by Nicoline Schiess (WHO Brain Health) by video.

Over the decades there has been a significant number of studies associating higher prevalences of epilepsy in high-burden onchocerciasis settings. In addition there is growing epidemiological evidence that in such settings onchocerciasis may directly or indirectly induce seizures (i.e. onchocerciasis-associated epilepsy (7). Onchocerciasis-associated epilepsy is a form of epilepsy that appears in onchocerciasis-endemic regions with high ongoing transmission in previously healthy children aged 3–18 years without an obvious cause. Acknowledging that 50% of cases of epilepsy remain of unknown cause, the proposed definition of onchocerciasis-associated epilepsy does not point at causality but rather at association between onchocerciasis and epilepsy. A broad spectrum of seizures has been observed in persons with onchocerciasis-associated epilepsy; nodding syndrome is one of the clinical presentations. Onchocerciasis-associated epilepsy is often associated with cognitive decline, behavioural and psychiatric problems and high premature mortality. More than 300 000 persons may suffer from onchocerciasis-associated epilepsy.

The stigmatization and discrimination experienced by people with epilepsy can be combatted by raising awareness in communities and promoting respect for human rights. Tools are available to improve the knowledge of primary care health workers about epilepsy, which would increase access to diagnosis and treatment. Onchocerciasis could be one of the easily preventable causes of epilepsy; therefore elimination of onchocerciasis could contribute to preventing the suffering and premature death of many. Further, the onchocerciasis elimination programme provides an excellent platform from which to raise awareness and increase access to ensure that those who suffer from epilepsy in onchocerciasis-endemic communities receive the care and access to treatment they deserve. We call on governments, civil society, donors, pharmaceutical companies and WHO to increase efforts to eliminate preventable epilepsy by increasing investments and efforts to help identify and combat preventable causes of epilepsy to improve the quality of life and avert the premature death of thousands today and for generations to come.

11. “No to NTDs” campaign and key recommendations

Papa Momar Touré (Speak Up Africa) presented the “No to NTDs” campaign.

Speak Up Africa has set out to alleviate suffering from NTDs by galvanizing action among policy-makers, civil society organizations and citizens, including youth. It works closely with government departments and WHO to build sustained leadership, mobilize foreign and domestic resources, and improve the use of NTD data for decision-making. Since 2019, the “No to NTDs” campaign has brought together individuals, political leaders and civil society organizations to increase awareness and prioritization of, as well as commitment to, the control and elimination of NTDs. To this end, the “No to NTDs” movement aims to:

- increase overall political and private sector engagement to increase domestic resources for NTDs;
- strengthen the capacity of civil society organizations, including youth-led groups, to make NTD decision-making spaces more inclusive; and
- create an enabling national environment to increase prioritization of NTD elimination.

Speak Up Africa has worked with the national NTD programmes of Benin, Burkina Faso, Guinea, Niger and Senegal to design NTD advocacy plans aligned with their national objectives, engaging 126 stakeholders at national and subnational levels to develop these plans. It has also joined forces with 14 other civil society organizations to form a regional coalition to improve governance at the national and regional levels, build accountability and increase ownership of NTD-related issues.

Key recommendations

The following recommendations were proposed.

- Provide a platform for African civil society organizations to collaborate to ensure their meaningful engagement in national and global efforts to control and eliminate NTDs.
- Ensure strategic partnerships with WHO as well as with donors and affected countries’ governments to encourage collaboration and positive action on the control and elimination of NTDs.
- Strengthen the effectiveness of the collective strategy to strengthen national financing of national programmes to combat NTDs.
- Promote the creation of inclusive national coalitions to advocate for the control and elimination of NTDs and promote the design, financing and implementation of inclusive, people-centred policies.
- Celebrate collective action, and amplify and enable African voices to meaningfully participate in shaping national and continental agendas for NTD control and elimination.

12. Breakout session 4: cross-border collaboration



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The fourth breakout session was moderated by Gregory Smith Noland (The Carter Center), Moses Katarwa (RTI International), Aissatou Diawara (GLIDE) and Achille Kabore (FHI360). Its purpose was to exchange information on best practices to address bottlenecks and applied approaches for cross-border collaboration, to discuss critical actions needed and to propose an inventory checklist of factors that countries can use to promote binational cooperation.



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12.2 Examples of cross-border initiatives

An introductory overview highlighted several examples of cross-border initiatives, including an east Africa regional initiative between Ethiopia, Sudan and South Sudan and the Brazil-Venezuela (Bolivarian Republic of) cross-border efforts to eliminate onchocerciasis transmission in the Amazon. Multilateral agreements have served as important frameworks for these efforts, namely the cross-border health security declaration known as the Khartoum Declaration signed by Sudan and neighbouring countries in 2018 and a 2014 binational agreement between Brazil and Venezuela (Bolivarian Republic of) to promote coordinated action. However, these initiatives have stalled in part due to the COVID-19 pandemic, the instability in Sudan and the economic crisis in Venezuela (Bolivarian Republic of), respectively. It was emphasized that while coordination is necessary at national and international levels, programmes are encouraged to develop and to leverage relationships between health officials at the local level.

A live panel discussion following the breakout session featured ministry of health representatives from Benin and Togo, who described their successes and challenges in cross-border collaboration.

12.3 Draft checklist tool for onchocerciasis elimination programmes

The session organizers presented a draft inventory checklist tool that programme managers could use to assess readiness and monitor progress for cross-border collaboration (Table 5).

12.1 Challenges

Cross-border collaboration for elimination of onchocerciasis is a challenge for many endemic countries. The June 2023 GONE country needs and gap assessment identified cross-border collaboration as a key area of opportunity (8). Specifically, there is a need to develop formalized cross-border collaboration plans with all involved key actors and facilitate communication, connect relevant stakeholders for MDA synchronization and information-sharing, and provide guidance. The report found that “[i]n general, there is keen interest in and willingness for cross-border collaboration among countries”, but that a number of obstacles exist. These include operational challenges such as different languages, difficult logistics, inadequate financial resources, difficulty coordinating between implementing partners and ministries, and operational/legal jurisdiction issues, issues of insecurity and conflict, and population mobility across borders. These issues can apply not only to international borders but also to domestic cross-border areas between states or other administrative boundaries within a country that are often demarcated by rivers.

Table 5. Draft checklist tool for onchocerciasis elimination programme managers

	Present	Partially present	Absent	N/A
Framework				
Binational/multinational MOU or agreement that permits cross-border movement of programme staff				
Implementing partners have institutional permission to cross international boundary				
Process				
Transmission status defined in cross-border areas				
Regular cross-border meetings at local level				
Invite onchocerciasis/NTD programme coordinator of neighbouring countries to NOEC				
Participation in neighbouring countries' NOEC				
Translators available for meetings and field work (if different languages spoken)				
Cross-border action plan				
Harmonized MDA campaigns				
Coordinated treatment of mobile populations				
Donor financing for cross-border activities				
Domestic financing for cross-border activities				
Coordinated impact assessments (entomological and epidemiological)				
Impact				
Coordinated stop MDA				
Coordinated post-treatment surveillance				

MDA: mass drug administration; MOU: memorandum of understanding; N/A: not applicable; NOEC: national onchocerciasis elimination committee; NTD: neglected tropical disease.



12.4 Conclusions and recommendations

Small groups were asked to evaluate the suitability of the tool and to suggest changes for improvement. Groups emphasized that binational action plans were essential. Specific recommendations are listed below.

- Stress the important role of WHO as a facilitator of cross-border collaboration.
- Establish a system for monitoring and evaluating cross-border activities, including developing indicators to measure the achievements (impact).
- Clarify who would use this tool, when it would be used and what actions would be taken if activities were absent or not fully functioning
- Specify how learnings are shared.
- Consider steps to take in case of financial difficulties or different partner priorities.
- Country programmes should develop annual plans and identify needs that the partners/donors support.
- Specify corrective action if a factor is absent
- Cross-border activities should be addressed through micro-planning that should be occurring at district level before MDA or surveys are implemented and not to view cross-border activities as something separate.
- Remove the factor referring to implementing partner institutional permission; it is not relevant to a national programme checklist.

12.5 Suggested additions to the checklist

The following changes were suggested to improve the checklist.

- Involve civil society organizations, nongovernmental organizations and communities, especially those of the border districts; local health officials, supervisors and community drug distributors.
- Secure political will and high-level political and administrative buy-in and commitment.
- Share endemicity maps of borders and districts among countries to include (i) breeding sites' prospection, (ii) transmission zones and (iii) joint cross-border maps.
- Include cross-border issues/plans in national NTD strategic plans, NTD master plans and annual plans.
- Change "harmonized MDA campaigns" to "synchronized MDA campaigns".
- Include the development of a cross-border committee (not explicitly stated in the tool). The committee should develop (i) guidelines or standard operating procedures for how countries will engage on issues and (ii) a communication platform to provide clear guidance around communication at all levels, data-sharing, planning, etc.
- Include engagement with community members to understand when/why/how often people are travelling across borders.
- Include coordinated treatment of mobile populations (internally displaced persons, refugees).
- Include capacity-building focused on health workers in cross-border areas.
- Include and expand upon subdistrict-level activities (meetings/planning/implementation).
- Add pre-stop MDA surveys (coordinated impact assessments/surveys).
- Reference any agreements that are external to health that are actively being implemented.
- Add timelines.
- Celebrate binational success in cross-border areas.

13. Update from the Mectizan Expert Committee

The update was provided by Yao Sodahlon (Mectizan Donation Program).

13.1 Background

Established in 1987, the Mectizan Donation Program is the longest-running, disease-specific drug donation programme of its kind and is committed to donating as much ivermectin (Mectizan) as needed for as long as needed. Nearly 13 billion tablets have been shipped since 1987, and 1 billion tablets were shipped in a single year in 2022. The Program has worked with partners in 58 countries in Africa, Latin America, the Caribbean, the Middle East, South-East Asia and the Western Pacific to achieve a future free of onchocerciasis and lymphatic filariasis. It oversees the donation of ivermectin (Mectizan) by Merck & Co., Inc.¹ to eligible countries where onchocerciasis and lymphatic filariasis are endemic. National programmes work with partners including nongovernmental organizations to train a network of community-directed distributors to ensure that everyone living in endemic communities has access to treatment.

The Mectizan Donation Program has been providing up to 100 million treatments per year during 2017–2025. It also supports triple-drug therapy to fight lymphatic filariasis using ivermectin with DEC (diethylcarbamazine citrate) and albendazole (IDA) to accelerate elimination of lymphatic filariasis in countries where onchocerciasis is not co-endemic.

The Mectizan Expert Committee consists of eight members who provide technical oversight. The Secretariat is based at the Task Force for Global Health (Decatur, USA). The Committee meets twice a year (spring and autumn). The spring meeting convenes the members and liaisons (organized in the partners' countries). The autumn meeting is open to other stakeholders (preferably in an endemic country) to recognize a country that reaches a significant milestone or to lobby for a poorly performing country. The meetings discuss programme updates, application reviews and approvals, supply chain monitoring and safety reporting, accountability and country-level programmatic challenges. Partners provide updates on initiatives to support the road map with emphasis on the global elimination of lymphatic filariasis and onchocerciasis. The ivermectin (Mectizan) supply process is very complex and involves multiple stakeholders. Enhanced collaboration is critical to deliver the medicines in the country at least 1 month before mass distribution starts.

¹ Merck & Co., Inc. is known as MSD outside Canada and the United States of America.



13.3 Progress

As of October 2023, 19 countries have fully signed the agreement;² Nigeria and Senegal are in the pipeline for signature. There is no progress with the Democratic Republic of the Congo, Guinea-Bissau, Central African Republic and Chad. Packages are not sent yet to Congo (Brazzaville), Niger³ and Yemen. Gabon and Equatorial Guinea are eligible but have not applied for Mectizan.

To ensure responsible and safe use of the donation to achieve impact, it is crucial to (i) have a good supply chain management system to avoid wastage and expiration of drugs and to sustain funding; (ii) to monitor, manage and report any adverse events; and (iii) to have a well-functioning cross-border collaboration.

“

It is important to have a planning process so that drugs can arrive on time. In order to start the shipping process, countries need to know how many drugs they still have and whether they have financial resources that allow timely distribution of drugs.

13.2 Challenges

Several challenges need to be addressed. The Mectizan Donation Program asks countries to estimate treatment needs in the short and medium terms in order to plan production. Another bottleneck is the shipping of drugs to the country. It is important to have a planning process so that drugs can arrive on time. In order to start the shipping process, countries need to know how many drugs they still have and whether they have financial resources that allow timely distribution of drugs. The Program needs to get green light from the countries' tax authorities which either provide tax relief or reduced customs fees. If there is no discount for customs fees, the drug price can increase up to 8 %. If there is no tax relief, drugs stay at the airport until clearance of customs. Benin is a good example: it waived the fees in 2023, which helped to get the drugs delivered to the country on time. National NTD programmes are responsible for facilitating the supply process. Key aspects are: (i) production needs to meet demand, (ii) timely submission of the completed Joint Application Package along with an inventory report; (iii) countries must specify the month of the MDA to facilitate supply planning for pharmaceutical companies; and (iv) full tax and clearance fee exemptions should be secured. Since January 2023, a revised agreement country-MDP for access to ivermectin (Mectizan) has been in place for endorsement by the Ministry of Health and the Ministry of Finance. The Mectizan Donation Program is also a signatory with clear roles and responsibilities. The agreement is reviewed every 5 years and is available in English, French and Portuguese.

² Angola, Benin, Burkina Faso, Burundi, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Liberia, Malawi, Mali, Mozambique, Sierra Leone, South Sudan, Sudan, Togo, Uganda, United Republic of Tanzania.

³ Only one district remains under treatment for lymphatic filariasis in Niger.

14. High-level closing statements on accelerating progress towards the 2030 road map targets



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During the high-level closing session, representatives of key constituencies made statements about the contributions and roles of their organizations in the fight against onchocerciasis, the key actions needed, the way forward to reaching the road map targets for onchocerciasis elimination and the ways in which GONE can contribute to assisting countries to reach the elimination targets.

14.1 NGDO group for onchocerciasis elimination

Francisca Olamiju, Chair of the NGDO group for onchocerciasis elimination, said that it is fully committed to eliminating onchocerciasis globally. Almost all members of the NDGO group have attended this first GONE meeting. Partners want to make sure they know the status of onchocerciasis. Thanks to partnerships, we have achieved control, but for elimination certain things need to be done differently. Partners are happy about the availability of guidelines and are committed to using them. Engagement in cross-border collaboration is important to the group, which also refers to the cross-border collaboration chapter of the GONE needs assessment report (8) discussed at the last NGDO group meeting (September 2023). GONE can take an important role in enhancing cross-border collaboration. No one should be left behind. We walk as a coalition to check all sites. We celebrate together successes and pick low hanging fruits.

14.2 Merck & Co., Inc.

Chirfi Guindo said, by video message, that Merck & Co., Inc. appreciates this global partnership to improve collaboration. In 1987, it committed to donating ivermectin (Mectizan) – as much as needed for as long as needed – with the goal to help control river blindness. We look back to 50 years of strong partnership and progress. However, the threat of recrudescence of the disease is high and threatens to erase the hard-won gains. Therefore, ongoing monitoring and surveillance are critical to ensure elimination is forever. GONE is uniquely positioned to advocate to sustain the gains, to mobilize resources and to encourage countries to stay on course until the disease is gone. Together, we can stamp out onchocerciasis.

14.3 United States Agency for International Development

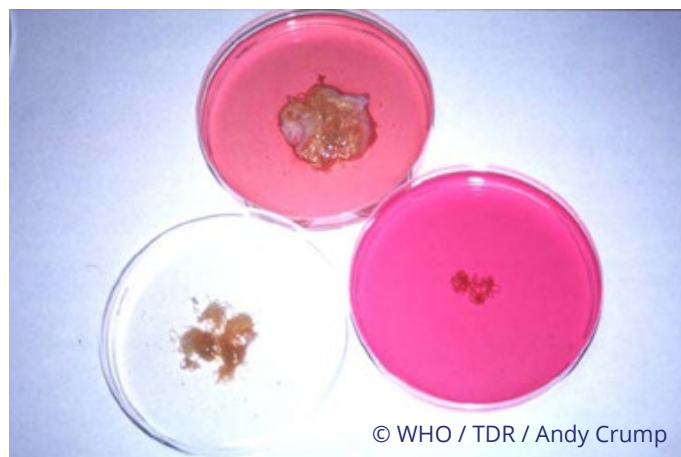
Penny Smith said that the Government of the United States of America has been supporting efforts to eliminate onchocerciasis for 30 years and has just celebrated 17 years of integrated NTD programmes. The United States Agency for International Development recently extended two flagship awards to its Act to End NTDs | West Program and Act to End NTDs | East Program through 2026 to help continue that effort. In 2022, the budget is US\$ 114.5 million, of which 80% is for implementation funding and a big part is for onchocerciasis elimination. This demonstrates that the Agency is fully committed to eliminating onchocerciasis. Key focal areas are providing treatments against onchocerciasis in 16 countries and leaving a major footprint in 14 of those countries. In 2023, 105 million treatments are being distributed for onchocerciasis and 180 surveys will be done. It is treating more cases of onchocerciasis than those for any other NTD amenable to preventive chemotherapy combined. It expects to scale up onchocerciasis treatments and surveys over the next few years. One of the biggest achievements is the sustainability planning which is supported by many programme managers working to get these plans validated and implemented by their governments. Furthermore, other priorities are the creation of common platforms for the preventive chemotherapy NTDs, cross-border collaboration, the integration of health and logistics management information systems, and domestic resource mobilization to help countries to achieve the 2030 road map targets. The United States Agency for International Development is committed to building bridges with its country governments.

14.4 Mectizan Donation Program

Yao Sodahlon said that we have been fighting onchocerciasis for more than 10 years following the closure of APOC and that we should make sure we remain united. GONE is our common success. Let us be proud to have had the terms of reference adopted. It will help us that we sit together and focus only on onchocerciasis. We have learnt a lot and created many relationships. We cannot fight alone: we need to stay together, share experiences and make sure that we help each other. It is a very flexible mechanism, with respect. Partnership can help to drive the elimination agenda.

14.5 The END Fund

Jamie Tallant said that the best elimination tool is to show past successes. Some 10 years ago the END Fund celebrated the milestone of delivering 100 million treatments a year, but this narrative has changed. Now we celebrate stopping treatment, which gets funders excited. The next chapter is about proving elimination. Investors and funders are excited to see that progress has been made. This progress has helped us to mobilize additional funding to expand our support from originally seven to now 11 countries. Another powerful tool is storytelling. The END Fund was funded to support countries to achieve elimination and to rigorously document success with storytelling trips. Attracting new donors by bringing them to the field helps to leverage additional funding. Storytelling trips are very time-consuming and cumbersome for all stakeholders involved, but they are important to mobilize new funds. It is also important to be honest about the challenges. Funders want to understand and help solve problems. It is therefore important that programme managers stay open-minded and creative when dealing with donors.



14.6 Bill & Melinda Gates Foundation

Christy Hanson said that the Bill & Melinda Gates Foundation invests about US\$ 100 million for NTDs per year, a level similar to that invested by the United States Agency for International Development but with a different focus on four pillars. (i) The Foundation funds research and development of innovative new tools and new approaches and is willing to take risks, try new things and see some failure. (ii) The Foundation also allocates 40% of its resources to leverage funds from other people and organizations. Bill Gates' legacy is to mobilize funds from other people and the private sector who have the means to get into the philanthropic space to respond to countries with disease endemicity. We put in US\$ 1 and manage to raise US\$ 4. (iii) Pillar three involves high-level advocacy to mobilize governmental support. (iv) The fourth pillar is the underlying systems needed to ensure that countries have access to tools and databases (e.g. the ESPEN program) for evidence-based decisions. The Foundation wants to respond to the priorities of programmes (e.g. cross-border challenges, innovation programmes). These are areas which I will take back to the Foundation and discuss. GONE is really a valuable platform for us to hear about the needs and approaches directly from countries and programme managers.

14.7 WHO Global Neglected Tropical Diseases Programme

Ibrahima Socé Fall said that a well-coordinated partnership can contribute towards achieving the 2030 road map targets. Countries are both the drivers and the beneficiaries of progress towards these targets. National and local governments must therefore lead work to define agendas and realize their objectives. We need a strong network and country-driven programmes moving away from partner-led to country-owned work. We need to shift from vertical programming to horizontal and more cross-cutting programming. Governments are the most important players and GONE can help to stimulate joint energy to tackle problems together.

14.8 Government of Senegal Ministry of Health and Social Action

The final closing remarks were delivered by the Honourable Dr Marie-Khemesse Ngom Ndiaye (Ministry of Health and Social Action of the Government of Senegal).

Senegal has been part of the western extension area of the OCP since 1988. The disease was once endemic in the south-east of the country in eight health districts in Kédougou, Kolda and Tambacounda regions. Treatment strategies have evolved over time: mass campaigns by mobile teams (1988–1996), community-based ivermectin treatment (1996–1998), ivermectin treatment under community directives (1998–2007) and mass drug distribution campaigns with ivermectin (since 2007) that were integrated with the distribution of praziquantel in 2013. Senegal, after more than 33 years of struggle, with the support of partners, has made significant progress in the fight against onchocerciasis. Entomological assessments carried out in 2018 and 2019 showed, with a confidence level of 95%, infectivity rates below the threshold of 0.5 in the Falémé and Gambia basins.



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The results of the analysis of dried blood spots carried out in Senegal, using the SD Bioline Onchocerciasis IgG 4 RDTs and the OV ELISA method, recorded respectively in 2020 and 2022, did not reveal any infections in children aged 5–9 years. After reviewing and analysing the data according to WHO criteria, the members of the international and national expert committee on onchocerciasis of Senegal unanimously decided in October 2022 that Senegal has provided proof of interrupting transmission of onchocerciasis in the Falémé and Gambia basins. Senegal thanks and congratulates WHO, all partners and stakeholders for achieving the interruption of transmission in the two basins and preparing for the post-treatment surveillance phase against onchocerciasis in Senegal. Senegal also expresses its gratitude to the former leadership and technical experts of the OCP, the APOC Program and their collaborators, and to the former national coordinators for their invaluable contribution to the fight against onchocerciasis in Senegal. Senegal is grateful also to the community distributors, women and men, who have voluntarily stepped up and dedicated themselves to the fight against river blindness in their respective communities and who play a key role. May their commitment serve as a model in all actions to combat disease in the country and in advocacy with partners to support programmes for training the next generation.

15. Moxidectin symposium on a potential new tool for onchocerciasis elimination

Barbara Roth (Medicines Development for Global Health) provided an overview of the data available on moxidectin, a promising alternative tool to accelerate the efforts for the elimination of onchocerciasis.

Medicines Development for Global Health, in partnership with the Special Programme for Research and Training in Tropical Diseases, completed the clinical development of moxidectin and submitted a comprehensive data package which led to its approval in 2018 for the indication on onchocerciasis in patients aged 12 years and older. Some of its key characteristics are a long half-life (23–33 days), compared with 0.5 days for ivermectin, and the fact that it can be taken with or without food and has no advisory to avoid alcohol. In the phase III trial, comparing a single dose of moxidectin with a single dose of ivermectin, patients treated with moxidectin showed consistently lower or no skin microfilariae at 6 months than those treated with ivermectin, reducing significantly the risk of further transmission. The data from the phase III trial also indicate that moxidectin has a similar safety profile to ivermectin. The most commonly reported adverse events were efficacy-related; no serious adverse events were reported for either moxidectin or ivermectin in both phase II and phase III trials. Like ivermectin, there is a precaution for use in individuals exposed to *Loa loa*. Moxidectin is currently not recommended for use in pregnancy and there is limitation to its use in lactating women.

Since the approval of moxidectin by the United States Food and Drug Administration in 2018, Medicines Development for Global Health has (i) completed a paediatric pharmacokinetics and safety study to identify the dose to treat individuals down to 4 years of age, (ii) is generating safety data in infected and at-risk individuals living in endemic communities, including where onchocerciasis and lymphatic filariasis are co-endemic, and has started including children in that study recently and (iii) is planning a small-scale community distribution of moxidectin in Ghana to evaluate the feasibility and acceptability of moxidectin in programmatic settings. All these data will be submitted to WHO to support guideline development.

The data for lymphatic filariasis presented at the American Society of Tropical Medicine and Hygiene conference by the Death to Onchocerciasis and Lymphatic Filariasis team showed that a single dose of moxidectin plus albendazole was superior at 24 months to ivermectin plus albendazole given annually for microfilariae clearance. Further studies are being planned to confirm these initial results, but it already indicates its potential to contribute to elimination of LF in Africa.

Medicines Development for Global Health is grateful for the opportunity to engage with the programme managers and national onchocerciasis elimination committees and looks forward to understanding where, from the participant's perspectives, moxidectin would be most helpful in onchocerciasis elimination programmes and what would be needed to integrate this new tool into the national programmes.

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Annexes

Annex 1.

Meeting agenda

Day 1: Wednesday, 1 November 2023

08:00–9:00	Accreditation and registration
09:00–09:30	Welcome and opening remarks Maria Rebollo Polo, WHO Barnabé Gning, Director General of Public Health, Ministry of Health, Senegal
09:30–09:45	Towards the road map targets for onchocerciasis: main achievements and what lies ahead Daniel Argaw Dagne, Maria Rebollo Polo, WHO
09:45–10:00	Findings of the survey on the gaps and needs of endemic countries Maria Rebollo Polo, WHO
10:00–10:15	Break
10:15–12:00	Breakout session 1: terms of reference of GONE Moderator: Clara Jones, Ministry of Health, United Republic of Tanzania <ul style="list-style-type: none">• Presentation of terms of reference: Maria Rebollo Polo• Breakout session: participants to divide into groups• Rapporteurs to report back in plenary• Endorsement of the terms of reference
12:00–12:30	Country health information platform presentation (without interpretation) Alex Pavluck, Andy Tate, Sightsavers
12:30–14:00	Lunch (hotel restaurant)
14:00–15:30	Breakout session 2: mapping, monitoring and evaluation of access and logistics Chair: Didier Bakajika, WHO AFRO/ESPEN Update on mapping, monitoring and evaluation: data, needs and projections Didier Bakajika, WHO AFRO/ESPEN Country presentation of Senegal on onchocerciasis elimination mapping Ngayo Sy, Ministry of Health and Social Action, Senegal Country presentation of Nigeria on pre-Stop and Stop MDA Chukwuemeka Makata, Federal Ministry of Health and Social Welfare, Nigeria RDT Bioline and Ov16 ELISA Gary Johnson, Kuku Appiah, Abott Breakout session: Participants to divide into groups and share their feedback on guiding questions
15:30–15:45	Break
15:45–17:00	Breakout session 3: entomology Chair: Dieudonné Sankara, WHO Presentation of the WHO entomology manual Eddie Cupp (University of Auburn), Daniel Boakye (The END Fund and Paul Cantey (United States Centers for Disease Control and Prevention) Country example: United Republic of Tanzania Rory Post, NOEC Chair Country example: Mali Yacouba Sangare, Ministry of Public Health and Hygiene, Mali Breakout session: Participants to divide into groups and share their feedback on guiding questions
17:00	Conclude day 1
19:00	Welcome cocktail

Day 2: Thursday, 2 November 2023

08:00–08:45	Side event: NTD advocacy tool project update (without interpretation) Carol Tangum, TFGH; Georges Nko'Ayissi, Ministry of Public Health, Cameroon
09:00 – 09:15	Summary of findings Day 1 Dieudonne Sankara, Didier Bakajika, WHO
09:15–10:30	Technical progress session: Chair: Camilla Ducker, WHO 09:15–09:25: Oncho DTAG diagnostics update Paul Cante, United States Centers for Disease Control and Prevention 09:25–09:35: Strengthening integrated post verification surveillance for NTDs Abdel Direny, PATH (video) 09:35–09:45: Scenarios for the business case for moxidectin Barbara Roth (Medicines Development for Global Health), Manuela Runge (MMGH Consulting GmbH), Deidre Hollingsworth (NTD Modelling Consortium) 09:45–09:55: Updates on macrofilaricides development Sabine Specht, DNDi (video) 09:55–10:05: Morbidity management and disability prevention: management of epilepsy; Tarun Dua, Nicoline Schiess, WHO (video) 10:05–10:30: Question and answer session
10:30–10:45	Break
10:45–12:00	BREAKOUT SESSION: Cross-border collaboration Chairs: Gregory Noland, The Carter Center; Moses Katarwa, RTI International, Aissatou Diawara, GLIDE Inventory of cross-border challenges and country examples Countries/participants will divide into small groups
12:00–12:30	No to NTDs campaign presentation (without interpretation) – Speak up Africa
12:30–14:00	Lunch and continuation of discussions of breakout session
14:00–14:15	Report back on outcomes of breakout session on cross-border collaboration Gregory Noland, Moses Katarwa, Aissatou Diawara
14:15–14:45	Updates from the Mectizan Expert Committee Yao Sodahlon, Mectizan Donation Program
14:45–15:15	Break
15:15–16:45	High-level closing session: accelerating progress towards the onchocerciasis 2030 road map targets Moderator: Maria Rebollo Polo Panelists: Francisca Olamiju, Chair of the NDGO group on onchocerciasis Chirfi Guindo, Merck & Co., Inc (video) Penny Smith, United States Agency for International Development Yao Sodahlon, Mectizan Donation Program Jamie Tallant, The END Fund Christy Hanson, Bill & Melinda Gates Foundation Ibrahima Socé Fall, Director, WHO Global NTD Programme Closing remarks: Hon. Dr Marie Khemessé Ngom Ndiaye, Minister of Health and Social Action of the Government of Senegal
16:45–17:00	Group photo
17:00–17:30	Press conference with panellists of closing session
17:30–19:00	Symposium on the progress of moxidectin

Annex 2.

List of participants

National coordinators for onchocerciasis (listed alphabetically by country)

Maria Cecília César De Almeida,
Ministry of Health, Angola

Ndeye-Marie Adama Bassabi-Alladjim,
Ministry of Health, Benin

Justin Compaore,
Ministry of Health, Burkina Faso

Juvénal Niyongabo,
Ministry of Health, Burundi

Theophile Mpaba,
Ministry of Public Health, Cameroon

Georges Hermana,
Ministry of Health, Central African Republic

Chidi Djorkodei Hamit,
Ministry of Health, Chad

Francois Missamou,
Ministry of Health, Congo

Kadia Marie Hugues N'Gassa,
Ministry of Health, Côte d'Ivoire

Naomi Uvon Pitchouna Awaca,
Ministry of Health, Democratic Republic of the Congo

Ana Judith Sanchez Pinuela,
Ministry of Health, Ecuador

Rufino Nguema Andema,
Ministry of Health, Equatorial Guinea

Kadu Meribo Burika,
Ministry of Health, Ethiopia

Julienne Atsame,
Ministry of Health, Gabon

Odame Dacosta Asiedu,
Ministry of Health, Ghana

Carmen Xiomara Castaneda Colindres,
Ministry of Health, Guatemala

Mamadou Siradiou Balde,
Ministry of Health, Guinea

Victorino Martinho Aiogale,
Ministry of Health, Guinea-Bissau

Sophia Moraa Ayienga,
Ministry of Health, Kenya

Sonnie Zياما Gbewo,
Ministry of Health, Liberia

Loncy Sajeni,
Ministry of Health, Malawi

Yacouba Sangare,
Ministry of Public Health and Hygiene, Mali

Chukwuemeka Cletus Makata,
Federal Ministry of Health and Social Welfare, Nigeria

Ngayo Sy,
Ministry of Health and Social Action, Senegal

Abdulai Conteh,
Ministry of Health, Sierra Leone

Ojara Benson David Kastom,
Ministry of Health, South Sudan

Piham Gnossike,
Ministry of Health, Togo

Alfred Mubangizi,
Ministry of Health, Uganda

Clara Jones,
Ministry of Health, United Republic of Tanzania

Sami Ahmed Ali Al-Haidari,
Ministry of Health, Yemen

Adham Mohammed Awadh Ebrahim,
Ministry of Health, Yemen

National onchocerciasis elimination committee chairs

Ahlin Achille Marie Massougbodji, Benin
Adrian Dennis Hopkins, Burundi
Same Ekobo, Cameroon
Boy Otchom Brahim, Chad
N'Guessan Jean Anouan, Côte d'Ivoire
Policarpo Ricardo Ncogo Ada, Equatorial Guinea
Rory James Post, Ethiopia
Kofi Yankum Dadzie, Ghana
Ousmane Bangoura, Guinea
Cristóvão Manjuba, Guinea-Bissau
David Poumo Tchouassi, Kenya
Newton Isaac Kumwenda, Malawi
Mamadou Soungalo Traore, Mali
Bertram Ekejiuba Bright Nwoke, Nigeria
Ladislav Nshimiyimana, Rwanda
Barnabé Gning, Senegal
Fatu Yumkella, Sierra Leone
Charles Mackenzie, South Sudan
Koffivi Komlan Ketoh, Togo
Thomas Raymond Unnasch, Uganda
Maria Eugenia Grillet Marquez, United States of America

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Annex 3. Group work breakout session on entomology

Entomology capacity and current activities	Challenges	Suggested solutions
Senegal, Guinea		
<ul style="list-style-type: none">• Training facilities and research institutions exist (Senegal)• Laboratory infrastructures are available (Guinea, Senegal)• Some countries still have technicians from the OCP/APOC era	<ul style="list-style-type: none">• Ageing technical staff (since OCP/APOC)/lack of entomology technicians• Local experts at the country level and within research institutions and universities not available• Existing entomologists are not specialized in onchocerciasis• Poor inter-country collaboration• Lack/absence of equipment/tools for entomology field work	<ul style="list-style-type: none">• Train new and young field entomologists and entomology technicians• Implement a mentorship programme• Sign an MoU/agreement between MoH/NTDP and research institutions/universities• Refresh/train/convert entomologists in black fly entomology• Reinforce inter/cross-country collaboration in the field of entomology• Equip countries in field entomology materials/tools/equipment
South Sudan		
<ul style="list-style-type: none">• No <i>Simulium</i> entomologists present; past experience with <i>Simulium</i> was in the 1980s along the Jur River• However, there are mosquito entomologists under the Malaria Control Programme who could be trained on <i>Simulium</i> entomology	<ul style="list-style-type: none">• No local <i>Simulium</i> entomologists• Lack of funds for entomological evaluation	<ul style="list-style-type: none">• Prioritize training. The Uganda programme (TCC) supported river prospection along cross-border IUs (Magwi and Kajokeji county)• Consider deploying vector control or larviciding in certain areas of the country (e.g. Maridi dam)

Ethiopia

- 5–6 entomologists
- Currently use human landing catching techniques
- Only 1 national laboratory is able to perform black fly PCR, but other local laboratories in country with PCR equipment for other diseases
- To evaluate black fly breeding sites they would go to districts and discuss with the local population
- Difficulty to access some breeding sites for evaluations
- Attempt to use satellite imaging to decrease the number of locations that need to be evaluated

Malawi

- 1 entomologist
- No facility for black fly PCR; but laboratories are able to do PCR for other diseases
- Limited number of black fly entomologists; some places have bans on recruiting new staff
- Difficulty advancing non-human landing catching; difficulty getting traps to catch flies
- Lack of capacity in the general community and also the medical community with regards to onchocerciasis
- Lack of reagents for PCR
- Recruit, in places where it is allowed, graduate biologists to become entomologists
- Train entomologists who are working with other diseases/insects on black fly entomology

Uganda

- 2 laboratory staff for black fly PCR
- 2 entomologists
- Laboratories have PCR capabilities, but are not able to do black fly PCR
- Train the laboratories with the capabilities on how to do black fly PCR

Burkina Faso

- Previous experiences in conducting entomological assessments
- 2 medical entomologists
- 5 technical entomologists
- Lack of entomologists and technicians specialized in black flies
- Prospect for blackfly larval breeding grounds,
- Train blackfly catchers
- Supervise catchers in the collection of black flies
- Dissect black flies
- Ship black flies to the laboratory/ESPEN in Ouagadougou
- Experiment on repellent creams

Côte d'Ivoire

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| <ul style="list-style-type: none"> • Previous experiences in conducting entomological assessments | <ul style="list-style-type: none"> • 2 medical entomologists • 8 technical entomologists • Lack of entomologists and technicians specialized in black flies | <ul style="list-style-type: none"> • Prospect for black fly larval breeding grounds • Train blackfly catchers • Supervise catchers in the collection of black flies • Dissect black flies |
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Mali

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Previous experiences in conducting entomological assessments | <ul style="list-style-type: none"> • 1 medical entomologist • 3 technical entomologists • Lack of entomologists and technicians specialized in black flies | <ul style="list-style-type: none"> • Prospect for blackfly larval breeding grounds, • Train black fly catchers, • Supervise catchers in the collection of black flies • Dissect black flies |
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Burundi, Congo, Democratic Republic of the Congo, Gabon, Rwanda

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|---|--|--|
| <ul style="list-style-type: none"> • It turns out that for all of these countries, entomology skills (training of personnel in capture and identification) were mainly developed within the framework of onchocerciasis programmes • The first wave of training was carried out by APOC, for its phases 1b or phase 2 • The second wave of training was only recently organized by ESPEN | <ul style="list-style-type: none"> • Country representatives consider that the number of trained people is insufficient; for example, 10 people for the whole of the Democratic Republic of the Congo actually seems too few to cover the different households across this large country • Apart from Rwanda, the other countries have competent personnel for prospecting and collection but not for identification; all samples are sent to Ouagadougou, where the return of results often takes a very long time • Country representatives also deplore the lack of synergy between university or technical training and program needs | <ul style="list-style-type: none"> • Develop skills for the morphological and molecular identification of black fly • Use the equipped laboratories dedicated to other tasks in some countries from time to time for the needs of the onchocerciasis programme • Address lack of funds to develop the skills or equip themselves. |
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Nigeria

- Entomology human resource capacity is available in Nigeria
- Recently 46 young scientists were trained
- The training was conducted in October 2023 (43% of trainees were female)
- Paucity of flies in historical sites
- Conduct modelling: breeding sites prediction (this has been done in Nigeria and validation is ongoing in five States)
- Improve trapping methods
- Insecurity
- None for now
- Poor funding
- Conduct high-level advocacy

Venezuela (Bolivarian Republic of)

- One entomology team per foci (national)
- M&E surveys every 3–5 years in sentinel sites
- In remote areas there is estimation of the vector through ecology and landscape analysis

Ecuador

- Vector control has helped to reduce the numbers of flies
- Entomology is currently happening for post-verification surveillance

Guatemala

- National entomology team
- Surveillance

Equatorial Guinea

- Collection of adult flies
- River prospections
- Taxonomic studies
- Measuring of river flow
- Vector control and measure of impact
- Stop MDA verification
- Support from APOC and ESPEN
- Lack of entomologists
- Lack of technical resources
- Lack of financial resources
- Lack of clear protocols
- Lack of training of national technicians
- Mobilize funding
- Train medical and technical entomologists

Angola

- Not much experience
- Integration of entomology groups (with malaria) and training
- Lack of entomologists
- Lack of technical resources
- Lack of financial resources
- Lack of clear protocols
- Lack of training of national technicians
- Mobilize funding
- Train medical and technical entomologists

Guinea-Bissau

- Not much experience
- Two studies collecting larvae
- Lack of entomologists
- Lack of technical resources
- Lack of financial resources
- Lack of clear protocols
- Lack of training of national technicians
- Mobilize funding
- Train medical and technical entomologists

Cameroon, Central African Republic, Chad

- Insufficient capacity; human resources were not replaced after the retirement of former entomologists
- Insufficient national capacity for sample analysis (equipment, reagents)
- When there is capacity, it is concentrated at the capital level (centralization)
- Absence of demarcation of transmission zones
- Training of entomologist technicians
- Develop a multisectoral consultation framework involving universities, the private sector, research centres, other programmes (e.g. the malaria programme) in order to connect them to the entomological needs of the programme and involve them more

Benin, Togo

- Sufficient national capacities
- Existence of entomological research centre
- Existence of doctoral training schools in entomology
- Existence of trained human resources
- Limited support from national authorities for NTD programmes
- Availability of specific reagents and consumables
- Delay in making results available in relation to decision-making
- Difficulty of programming evaluations as part of an integrated implementation of mass distribution of medicines (Togo)
- Synchronization of evaluations with neighbouring countries
- Advocacy to mobilize resources
- Advocacy for political support of national authorities

APOC: African Programme for Onchocerciasis Control; ESPEN: Expanded Special Project for Elimination of Neglected Tropical Diseases; M&E: monitoring and evaluation; MDA: mass drug administration; MoH: ministry of health or equivalent; MoU: memorandum of understanding; NTDP: neglected tropical disease programme; OCP: Onchocerciasis Control Programme in West Africa; PCR: polymerase chain reaction; TCC: The Carter Center.

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