World Health Organization

Report of the fifth annual meeting of the network of Buruli ulcer PCR laboratories in the WHO African Region

Accra, Ghana, 23–25 October 2023

World Health Organization

Report of the fifth annual meeting of the network of Buruli ulcer PCR laboratories in the WHO African Region

Accra, Ghana, 23–25 October 2023

Report of the fifth annual meeting of the network of Buruli ulcer PCR laboratories in the WHO African Region, Accra, Ghana, 23–25 October 2023

ISBN 978-92-4-009567-0 (electronic version)

ISBN 978-92-4-009568-7 (print version)

Suggested citation. Report of the fifth annual meeting of the network of Buruli ulcer PCR laboratories in the WHO African Region, Accra, Ghana, 23–25 October 2023. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at https://iris.who.int/.

This publication contains the report of the fifth annual meeting of the network of Buruli ulcer PCR laboratories in the WHO African Region and does not necessarily represent the decisions or the policies of WHO.

Cover image: A laboratory technician performing PCR tests on samples collected from patients in Lebanon. 2022 © WHO / Natalie Naccache

Report design and layout by Big Mouth Gets.

Contents

Acknowledgements

The World Health Organization (WHO) gratefully acknowledges the participants of the fifth annual meeting of the network of Buruli ulcer PCR laboratories (BU-LABNET) in the WHO African Region held at the Noguchi Memorial Institute for Medical Research in Accra, Ghana, on 23–25 October 2023.

The meeting was organized by the Noguchi Memorial Institute for Medical Research, the Pasteur Centre of Cameroon (CPC) and the WHO Global Neglected Tropical Diseases Programme (WHO/NTD), supported by the Anesvad Foundation and American Leprosy Missions.

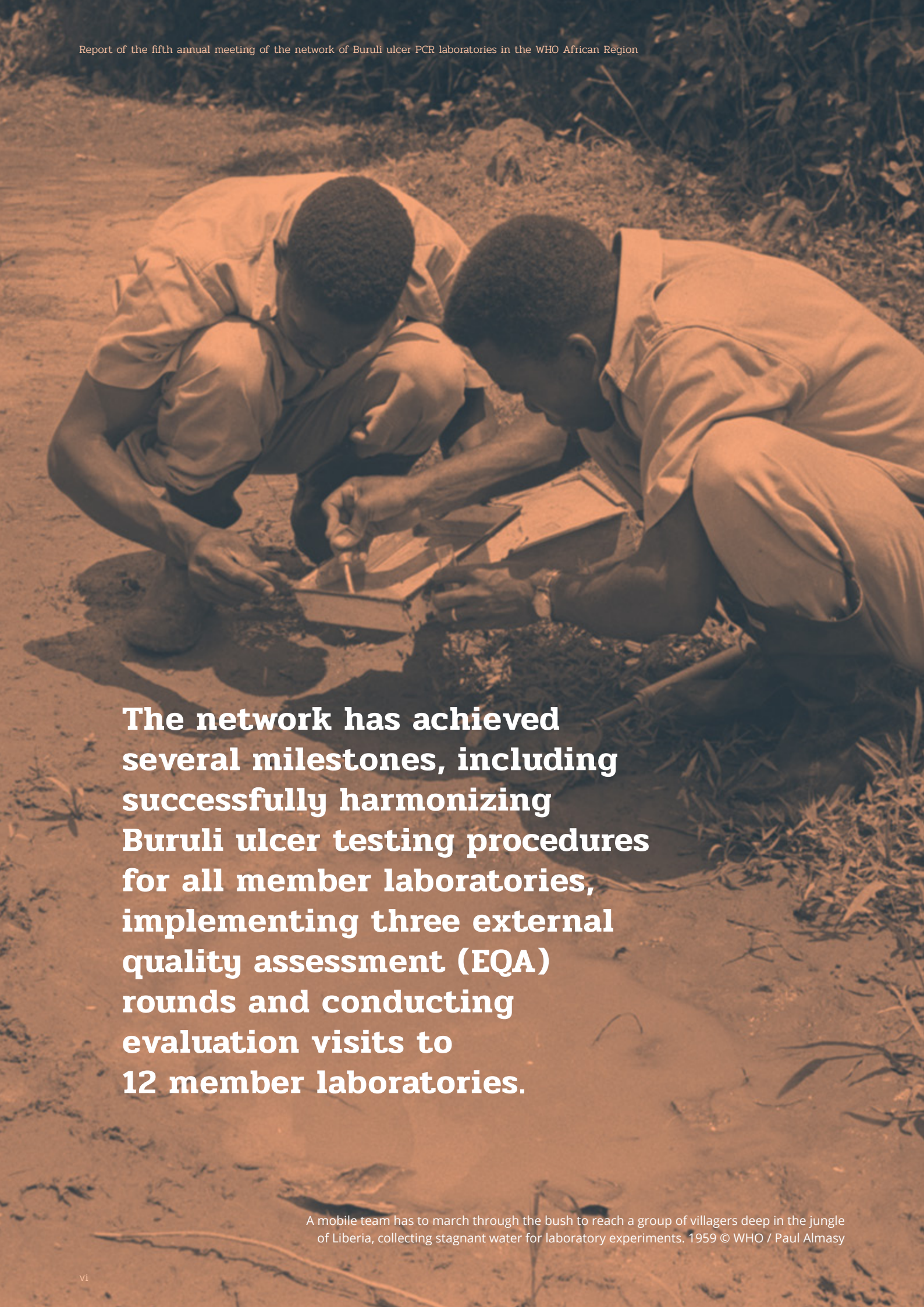
The report was prepared by Mr Hycenth Numfor and Dr Sara Eyangoh (BU-LABNET Coordinating Centre, CPC), and reviewed by the participants and the BU-LABNET advisory board. Dr Kingsley Asiedu and Dr Priya Pathak (WHO/NTD) provided technical oversight.

Funding for the meeting was provided by the Anesvad Foundation and American Leprosy Missions.

Examining nodules/ lumps on the skin of children in Mali, WHO African Region. 1970 © WHO / Pierre A. Pittet

Abbreviations and acronyms

BU-LABNET	Buruli ulcer laboratory network
CPC	Pasteur Centre of Cameroon
EQA	external quality assessment
ITM	Institute of Tropical Medicine
NMIMR	Noguchi Memorial Institute for Medical Research
NTD	neglected tropical disease
PCR	polymerase chain reaction
SOP	standard operating procedure
WHO	World Health Organization



The network has achieved several milestones, including successfully harmonizing Buruli ulcer testing procedures for all member laboratories, implementing three external quality assessment (EQA) rounds and conducting evaluation visits to 12 member laboratories.

A mobile team has to march through the bush to reach a group of villagers deep in the jungle of Liberia, collecting stagnant water for laboratory experiments. 1959 © WHO / Paul Almasy

1. Introduction

The fifth meeting of the Buruli ulcer laboratory network (BU-LABNET) for the WHO African Region was held at the Noguchi Memorial Institute for Medical Research (NMIMR) at the University of Ghana in Accra on 23–25 October 2023. The aim of the meeting was to broaden the network's initiatives. Preliminary work involved integrating laboratory testing for skin NTDs other than Buruli ulcer, such as cutaneous leishmaniasis, mycetoma, leprosy and yaws, while extending the network's reach to encompass additional laboratories. The 3-day recorded meeting *(1)* received statements from network partners (section 2), presentations *(2)* from various stakeholders (section 3), parallel working groups sessions and workshops (section 4), and recommendations and actions to be taken in 2024 and beyond (section 5). The meeting agenda is attached as Annex 1 and the participants are listed in Annex 2.

An adolescent boy fishing in Korhogo, Côte d'Ivoire, where environmental and socio-sanitary vulnerability factors contribute to the transmission of NTDs. 2015 © WHO / TDR / Andy Craggs

1.1 Background

BU-LABNET was established in 2019 under the auspices of WHO *(3)*. The network comprises 12 laboratories from nine endemic countries (Benin, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Gabon, Ghana, Liberia, Nigeria and Togo) and includes external experts. It is supported by WHO, American Leprosy Missions (United States of America), the Anesvad Foundation (Spain) and the Raoul Follereau Foundation (France).

The main objective of the network at the time of its establishment was to improve diagnosis of Buruli ulcer with polymerase chain reaction (PCR) among member laboratories using standardized testing protocols and involving external quality assurance programmes. The short-term goal was to include other skin-related NTDs in the same molecular platform. Skin-related NTDs (skin NTDs)[1] all require similar detection and case-management approaches, which present opportunities for integration, increased cost–effectiveness and expanded coverage.

The network has achieved several milestones, including successfully harmonizing Buruli ulcer testing procedures for all member laboratories, implementing three external quality assessment (EQA) rounds and conducting evaluation visits to 12 member laboratories *(4)*. Partners support the network by donating PCR reagents and consumables to member laboratories for routine testing.

With the easing of the coronavirus disease (COVID-19) restrictions, the fourth annual meeting was held in person in Yaoundé, Cameroon on 24–26 October 2022 *(5)* after 2 consecutive virtual meetings in 2020 and 2021.

1.2 Meeting objectives and expected outcomes

Dr Sara Eyangoh (BU-LABNET Coordinator) presented the objectives and expected outcomes of the meeting. She appreciated the presence of all participants and looked forward to a fruitful meeting.

The overall objective of the meeting was to review progress since the last meeting in 2022 *(5)* and identify ways to implement integrated control and management of skin diseases in line with the WHO road map for neglected tropical diseases 2021–2030 ("the road map") *(6)* and the strategic framework for integrated control and management of skin NTDs ("the skin NTD framework") *(7)*, a companion document to the road map.

The specific objectives of the meeting were:

- to review progress in implementing the recommendations of the last (fourth) meeting;
- to propose activities for integrating skin NTDs other than Buruli ulcer onto the PCR platform;
- to review and adopt the draft harmonized PCR procedures for other skin NTDs;
- to discuss communication and advocacy for promoting the network; and
- to plan activities for 2024.

The ultimate vision is to achieve skin health for all *(7)*.

[1] Buruli ulcer, cutaneous leishmaniasis, leprosy, lymphatic filariasis, mycetoma, chromoblastomycosis and other deep mycoses, noma, onchocerciasis, post-kala azar dermal leishmaniasis, scabies and other ectoparasitoses, yaws.

2. Welcome and opening ceremony

The opening ceremony was moderated by Dr Charles Quaye (NMIMR), who began proceedings by introducing the esteemed guests. Mr Samuel Befi (United Nations security associate) then provided a comprehensive security briefing.

2.1 Welcoming remarks

Professor Dorothy Yeboah-Manu (Director, NMIMR) extended a warm welcome to all attendees and emphasized the importance of collaboration: "Where we find one skin NTD, we find another, so there is no need for us to work in silos. Working together, we will be able to leverage the limited resources available to improve the health of our people."

Professor Alfred Edwin Yawson (Dean, University of Ghana Medical School), representing the Provost of the College of Health Sciences, officially inaugurated the meeting. He highlighted the enduring challenges faced by many African nations due to socioeconomic conditions, underscoring the significance of a network that strengthens coordination mechanisms and addresses neglected tropical and epidemic-prone diseases.

Dr Sofonias Getachew Asrat (Officer-in-Charge and WHO Representative for Ghana) conveyed WHO's commitment to supporting the network's expansion to other neglected tropical diseases (NTDs) and affirmed the Organization's ongoing commitment to providing essential technical guidance and tools for control and elimination of NTDs.

Dr Anthony Adofo Ofosu (Deputy Director-General, Ghana Health Service) emphasized the pivotal role of laboratories in generating clinical and monitoring data that are essential to understanding NTD prevalence and detecting drug resistance. He stressed the significance of a network that facilitates sharing of expertise and collaboration, enhancing the capacity of individual laboratories in supporting NTD control, elimination and eradication programmes.

Concluding the opening ceremony, Professor Yawson delivered final remarks, encapsulating the spirit of collaboration and shared commitment that characterized the proceedings.

2.2 Opening statements by network partners

Representatives of partner organizations associated with the network made opening statements highlighting their contributions.

2.2.1 Anesvad Foundation

Ms Marlen Eizaguirre emphasized integration as a key priority of the Foundation's strategic plan and underscored the importance of collaboration between laboratories and national programmes. She urged network members to maintain ambition, congratulating all on their accomplishments and encouraging continued efforts.

2.2.2 American Leprosy Missions

Dr Sundeep Chaitanya Vedithi conveyed the Missions' congratulations to the network for its successes. He reiterated their commitment to integrated case detection and treatment of skin NTDs, pledging financial and technical support to the network's coordination activities.

2.2.3 Raoul Follereau Foundation

Dr Estelle Marion explained the Foundation's role in supplying reagents to member laboratories. She expressed satisfaction with the smooth execution of this activity over the past 4 years and affirmed the Foundation's enthusiasm for the integration vision.

3. Presentations

3.1 Skin NTDs in Ghana: Buruli ulcer, leprosy and yaws

Dr Nana Konama Kotey (National Programme Manager, yaws eradication and Buruli control, Ghana) provided an update on the situation in Ghana. Activities include case search activities, supportive supervision and monitoring, strengthening of the health system with logistics and infrastructure, providing technical support and mentoring. During 2015–2023, there has been a positive trend in the number of Buruli ulcer cases, peaking in 2018 with 793 suspected cases and 248 positive cases. The situation is similar for yaws during the same period, with a peak of 17 056 cases; 1606 detected through rapid diagnostic tests (RDTs) and 758 through dual path platform testing in 2022. Dr Kotey then presented the current burden of the diseases by region and district. Challenges include capacity strengthening, data inconsistencies, funding and logistics for implementation; there are plans to address these by adapting integrated approaches.

Dr Benedict Quao (National Programme Manager, leprosy elimination, Ghana) presented the update on the leprosy situation in Ghana. The number of leprosy cases has steadily reduced from 1569 cases in 2000 to 277 cases in 2022: the target is to achieve zero paediatric cases by 2030.

Epidemiology and surveillance of these diseases was covered in the question and answer session during the discussion that followed the presentations.

A mother and child participating in an integration programme in Ghana. 2023
© WHO / Fanjan Combrink

3.2 Role of the laboratory in achieving the road map targets

Dr Isra Cruz (Carlos III Health Institute, Spain) provided an overview of current diagnostic tests for skin NTDs and stressed the necessity of strengthening laboratory capacity. He highlighted the importance of access to diagnostics in addressing public health needs, emphasizing their role in accurate treatment at patient and community levels and in data-driven interventions at the programmatic level. Despite their significance, diagnostic services have limited investment; this poses challenges, particularly in low-income countries, and results in incorrect diagnoses for a majority of patients. Dr Cruz also discussed challenges and solutions in integrating diagnostics, including tailored training, technical support, advocacy and funding. He underscored the need for multiplex platforms to facilitate disease mapping and differential diagnosis. In conclusion, he emphasized the importance of empowering laboratory personnel to improve NTD diagnosis.

3.3 WHO skin NTD working groups

Dr Kingsley Asiedu (WHO/NTD) presented the WHO skin NTD working groups, which were established after the first global meeting on skin-related NTDs in Geneva in March 2023. The working groups were created to support WHO's work in:

- catalysing implementation of the skin NTD framework *(7)* in the context of the road map;
- advocating to increase the visibility of skin NTDs by identifying gaps, opportunities and impact on affected people and resource mobilization;
- promoting research to accelerate progress towards the road map targets for 2030;
- fostering technical and strategic collaborations within and beyond the NTD network to ensure coherence and maximize impact; and
- sharing experiences across diseases to support an integrated approach to control and management of skin NTDs.

Dr Asiedu emphasized the significance of aligning efforts with the targets set in the road map *(6)*, the potential role of BU-LABNET within the Diagnostics and Laboratory Support working group, and its importance in enhancing diagnostic capabilities and laboratory support. He highlighted disease-specific and cross-cutting areas of registration, revealing notable disparities in the number of registrants.

Dr Sundeep Chaitanya Vedithi (American Leprosy Missions) presented the update for the diagnostics and laboratory support working group. The aim of the working group is to develop a platform for communication that provides guidance and builds capacity for research, development and implementation of priority diagnostics and effective treatment solutions for integrated management of skin NTDs and monitoring of their impact. He also talked about the terms of reference of the group as well as planned activities, which include identification of relevant stakeholders and experts, landscape analysis and gap assessment, and presentation of findings to the WHO Diagnostic Technical Advisory Group for Neglected Tropical Diseases.

3.4 BU-LABNET

Dr Sara Eyangoh (BU-LABNET Coordinating Centre) provided an update on BU-LABNET activities since the last meeting in 2022. Key milestones registered in 2023 include building capacity of personnel in some network laboratories, shipping reagents to member laboratories and implementing the third round of the EQA programme. Laboratory diagnostic improvement was demonstrated by the gradual increase in EQA performance from 89.69 % in 2021 to 98.69% in 2023. The main challenges raised were coordination with national BU control programmes for sample transfer, funding and implementation of collaborative studies, and communication of network activities to enhance visibility.

3.5 Member laboratories

Mr Numfor Hycenth (BU-LABNET Coordinating Centre) updated the meeting on the BU PCR activities of the 12 member laboratories (including two other unofficial laboratories) and trends from 2020 to 2023. It was observed that although the number of samples tested during this period gradually increased (from 1511 tests in 2020 to 2470 tests in 2022), the positivity rate declined (from 31% in 2020 to 22% in 2022). The main follow-up actions and perspectives going forward include developing an online reporting system using version 2 of the District Health Information System (DHIS2) platform for skin NTDs and updating the reporting data to include the numbers of patients tested.

3.6 Discussion on the needs and challenges of member laboratories

The discussion on needs and challenges of the network member laboratories was initiated by Dr Eyangoh. She reported that the findings from the online survey were sent to each member laboratory to identify priority needs and challenges. The main priorities noted by the laboratories were human resources, reagents for NTD testing, consumables and equipment maintenance. The main challenge was collection and transfer of samples to the laboratories for testing.

A disinfection team wearing Personal Protective Equipment (PPE) in the Democratic Republic of the Congo. 2019 © WHO / Christopher Black

3.7 Kenya Medical Research Institute

Dr Ruth Nyangacha presented the diagnostic capacity of the Institute and its mission. Capacities related to skin NTDs include sample collection, analysis and storage, PCR and capacity-building, and control activities for scabies, cutaneous leishmaniasis and tungiasis.

3.8 Harmonization of procedures for leprosy, cutaneous leishmaniasis and yaws

Dr Sara Eyangoh explained that the main objective of harmonization is to ensure the use of the same reagents by comparing BU reagents with those used for these integrated diseases. The expected outcome is to reduce the number of reagents used and adopt affordable, easy to use reagents that do not require the cold chain for shipment to the laboratories.

Dr Serges Tchatchouang (BU-LABNET Coordinating Centre) reported on the status of yaws. He presented the CPC and the molecular platform for PCR testing. In addition to CPC, the molecular diagnosis of yaws and *Haemophilus ducreyi* is currently performed by the NMIMR in Ghana and in Cote d'Ivoire by the Pasteur Institute. Amplification yields of DNA were evaluated and compared using the master mix currently used for yaws/*Haemophilus ducreyi* PCR and the BU PCR master mix; the HOT FIREPol Probe Universal Master Mix (used for BU real-time PCR) offers good results for yaws amplifications as well. DNA extraction for yaws/*H. ducreyi* samples demonstrated similar yields with GenoLyse and Xpedite.

Dr Estelle Marion (French Institute of Health and Medical Research/Inserm) provided the update on leprosy. She presented the institution and the team, and also the epidemiology of leprosy. In 2022, 5.1% of relapse cases tested showed rifampicin resistance, with 2% in new cases. Evaluation was done in Benin and Cameroon. DNA extraction and real-time PCR were performed using GenoLyse and the Xpedite kit; sensitivity of amplification obtained in Pobè, Benin and CPC was high. Generally, reagents for DNA extraction and qPCR for BU evaluated for leprosy work similarly. She added that if resistance to rifampicin was detected, the sample should be sent to a supranational laboratory for confirmation.

Dr Javier Moreno (Instituto de Salud Carlos III) introduced the institution and the team working on cutaneous leishmaniasis before presenting the update. The Instituto de Salud Carlos III has been a designated WHO collaborating centre for cutaneous leishmaniasis since 1997. Both visceral and cutaneous disease are endemic in Spain. Each year, the centre receives about 1000–2000 samples for confirmation of which around 200–600 are positive cases. It has evaluated DNA extraction using GenoLyse, Xpedite kits and Qiagen, and the BU PCR master mix on cutaneous disease. Results showed that GenoLyse and the Xpedite kit worked well for DNA extraction for cutaneous leishmaniasis samples; however, the HOT FIREPol Probe Universal master mix (used for BU real-time PCR) did not offer good results at the moment, hence the need for optimization to improve sensitivity. The evaluations are summarized in Table 1.

Table 1. Summary status of procedure harmonization activities

Disease	Country performing evaluation	Status of harmonization/Next steps
Buruli ulcer	Benin and Angers (France)	Evaluation with the Xpedite and GenoLyse kit completed, pending analysis of results.
Yaws/*Haemophilus ducreyi*	Cameroon and London (United Kingdom of Great Britain and Northern Ireland)	Dry samples from the field required to validate the extraction method.
Leprosy	Benin, Cameroon and Angers (France)	More field samples needed to finalize detection of resistance.
Cutaneous leishmaniasis	Spain	Evaluation to be continued with the Xpedite kit, with probable probe redesign.
Mycetoma	Netherlands (Kingdom of the)	Evaluation to be started.

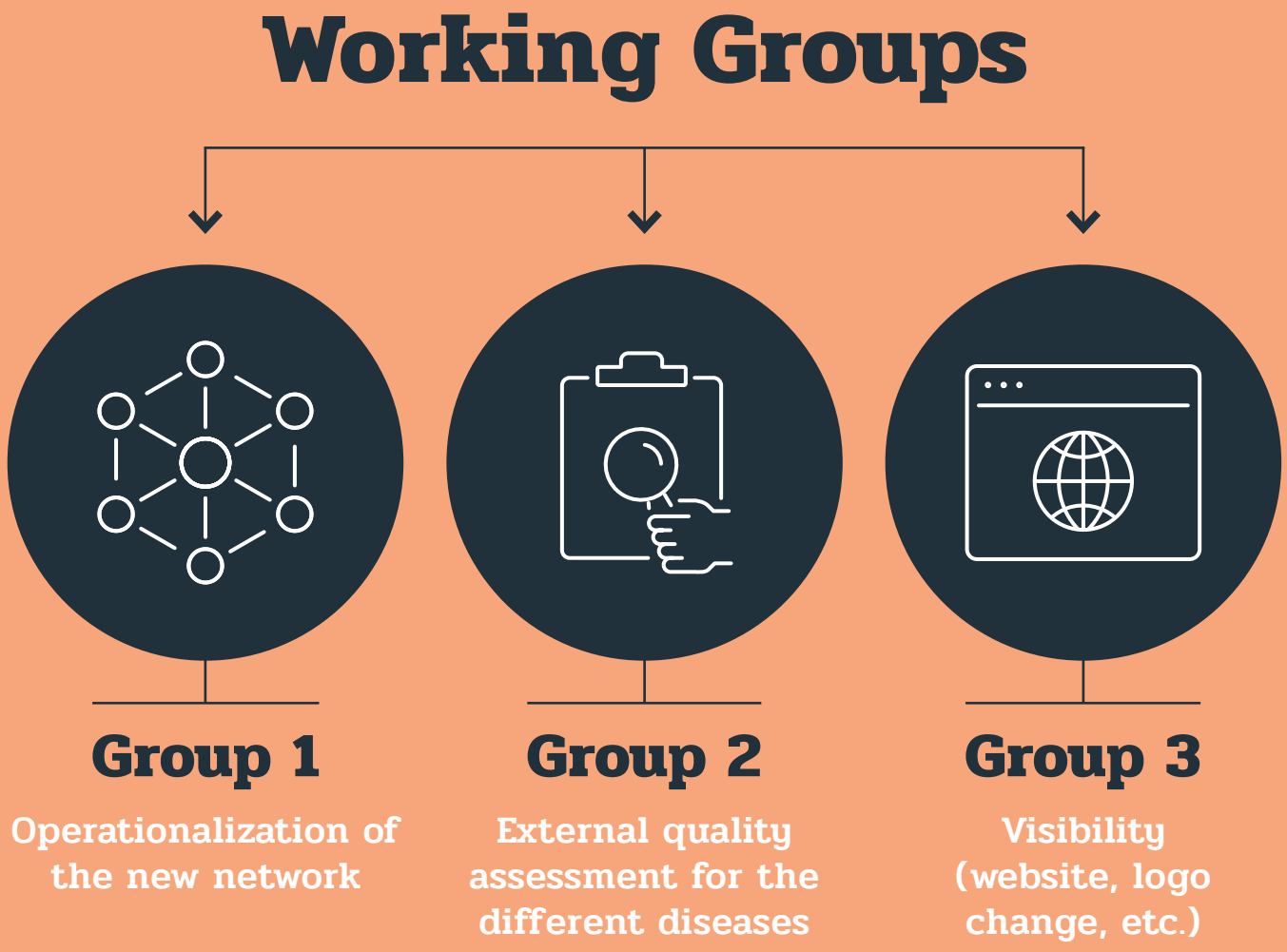
Commenting on the harmonization presentations, Dr Asiedu suggested that as different diseases have different sample collection techniques, it would be useful to have a table showing for each disease the sample type, transport media, capacity of personnel to collect samples, and materials for sample collection. He reiterated that the turnaround time of results should be considered important for patient care. Dr Wendy van de Sande (Erasmus MC) presented on the "Development of a point-of-care diagnostic test for mycetoma in Africa". She described the progress of work on mycetoma in 2023, indicating the possibility of performing PCR on grains obtained through fine-needle aspiration and isolating DNA from grains using the Biomeme and Xpedite assays.

3.9 From BU-LABNET to Skin NTD LABNET: next steps for integration

This meeting marked a pivotal milestone in the fight against Buruli ulcer and other skin NTDs in the WHO African Region, and the transition of the network from BU-LABNET to Skin NTD LABNET.

Before the meeting, three working groups were created and participants asked to sign up for any of the groups (Fig. 1). Dr Asiedu provided an overview of the transition. He emphasized that the role of the laboratory was to confirm cases and deliver results, whereas national programmes were responsible for public health activities and for help in collecting and transporting samples to the laboratory.

Fig. 1. Skin NTD LABNET working groups

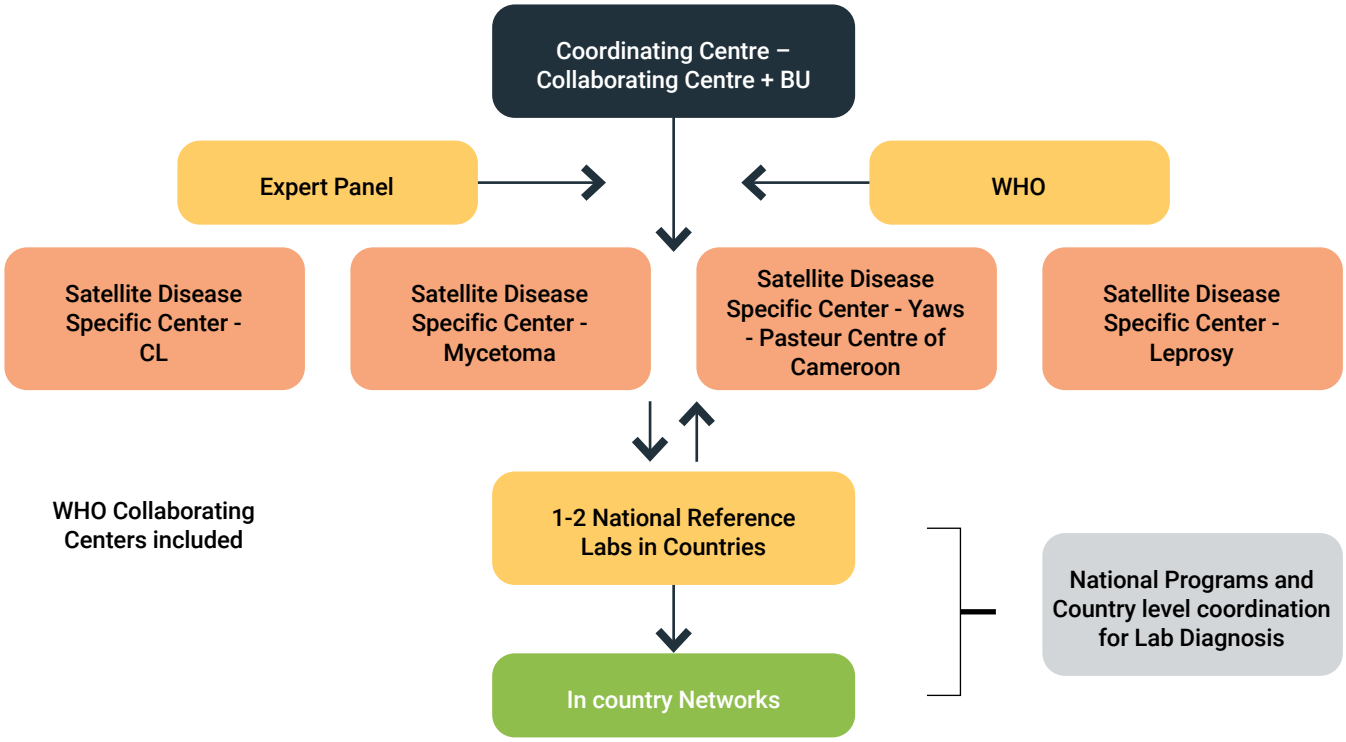


The aim of these working groups was to discuss and develop a clear road map of activities for the transition to Skin NTD LABNET for discussion and consensus by all meeting participants. At the end of the group discussions, each group representative presented the outcomes of their discussion to the plenary. The session was concluded by Dr Sundeep Chaitanya Vedithi.

3.9.1 Operationalization

Working Group 1 discussed the organization of the new network and proposed an organigram with single or multiple coordinating centres (reference laboratories) for the different diseases (Fig. 2). Dr Vedithi chaired the discussion.

Fig. 2 Proposed Skin NTD LABNET organigram



The working group recommended that:

- each satellite centre should be responsible for harmonizing diagnostic procedures;
- satellite centres should manage EQA;
- satellite centres should provide support for human resource as needed;
- the network should anticipate a change in the operational budget given its extension to other skin NTDs and laboratories;
- the selection process of each satellite centre should be discussed in detail. At the minimum, the laboratory in question should possess the necessary capacity to confirm cases of any of the integrated skin NTDs;
- the advisory board and expert panel should include representatives for each of the diseases; and
- national programmes should collaborate with the laboratories for sample collection and transfer.

3.9.2 External quality assessment

Working group 2 discussed the organization and implementation of EQA. Professor Michael Marks (London School of Hygiene & Tropical Medicine) chaired the discussion.

The working group recommended that:

- EQA for the different diseases should be implemented by the different reference institutions, but be coordinated by CPC;
- an African laboratory should take the lead in organizing EQA;
- EQA should ideally be implemented using viable organisms, although this would not be possible for all diseases and use of plasmids should be considered; and
- consideration should be given to implementing a drug resistance EQA especially for yaws.

Daily life in Korhogo, Côte d'Ivoire, where socio-economic and environmental factors contribute to the prevalence of NTDs. 2015 © WHO / TDR / Andy Craggs

3.9.3 Visibility

Working Group 3 brainstormed ways of improving communication among the network through the existing website and social media handles. Ms Jessica Mussro (American Leprosy Missions) chaired the discussion.

The group recommended to:

- hire a communications manager;
- establish a media committee, ideally with 4–6 members jointly responsible for updating the website and maintaining social media (once a week);
- develop communication guidelines for the network to include research, projects and resources;
- change the current website to make it more appealing; and that
- members of the network should contact relevant individuals in national programmes and health ministries regarding adding the network link and relevant information to their websites.

The general discussion session that followed included voting for the new network logo (Fig. 3). Logo 1 was adopted.

Fig. 3. Approved logo for Skin NTD LABNET

4. Working session

4.1 Harmonizing diagnostic procedures for cutaneous leishmaniasis, leprosy and yaws/*Haemophilus ducreyi*

The group on harmonized diagnostic procedures discussed and arrived at a consensus on how to develop the harmonized procedures for each of the diseases to be integrated (Table 2).

Table 2. Summary of discussion and next steps for harmonizing disease activities

Disease	Discussion and next steps
Cutaneous leishmanisis	- Optimize the qPCR procedure to use the same reagents. - Prepare SOPs. - The SOPs for sample collection will be ready before the end of 2023. - Evaluate the procedure with samples from Ghana. - Expected time: 1 year - The EQA prototype is not yet ready.
Leprosy	- SOPs are ready, but the SOP sample collection should be improved to specify the type of samples to be collected. - Collaborate with countries/national programmes. - Start the surveillance system for antibiotic resistance monitoring. - Use skin snip to collect leprosy samples and wound swabs for the other diseases. - Develop EQA for leprosy.
Mycetoma	- Evaluate the GenoLyse kit and the Solis BioDyne master mix. - Design a multiplex mycetoma assay. - Expected time: 1 year - Collect samples in Senegal; connect with the national programme and conduct training on how to get correct samples. - Disseminate the SOP for sample collection from the MRC laboratory in Sudan with the mycetoma laboratory in the Netherlands (Kingdom of the): - The EQA prototype is not yet ready.
Yaws	- Validate the extraction method on dry swabs: new samples needed. - Evaluate the SOPs with a second team. - Design a multiplex qPCR assay. - Use plasmid as a positive control. - Make the SOPs available in 6 months if evaluation is done on two sites. - Consider how to monitor resistance as a second step. - Conduct work within 1 year. - The EQA prototype is ready.

EQA: external quality assessment; MCR: Mycetoma Research Centre; qPCR: quantitative (real-time) polymerase chain reaction; SOP: standard operating procedure

4.2 Improving communication in the network and strengthening collaboration between laboratories and national programmes

The group provided feedback and recommendations on communication and laboratory strengthening.

4.2.1 Communication

- Improve communication with national programmes.
- Provide training in sample collection.
- Pursue opportunities to attend meetings of national or regional scientific associations to present the network's activities and enhance its visibility.
- In collaboration with national programmes, consider opportunities for corporate fundraising to ensure sustainability of the network. Also consider hiring a fundraiser manager to pursue opportunities for the group.
- With the transition to a new name, it is opportune to hire a communications manager.

4.2.2 Collaboration

- Include the laboratory team in any project at planning stage to ensure that laboratory aspects are fully included (capacity-building, reagents, etc.).
- Include laboratory aspects in projects (partners).
- Include programme managers in the expert group of the Skin NTD LABNET organigram.
- Involve the laboratory team in periodic meetings with national programmes.
- Scale up interventions beyond the districts targeted by partners.
- Decentralize sample collection.
- Build capacity for health workers in primary health-care centres as a continuous process given staff mobility.
- Transport samples from the field to the national programme and then to the laboratory.
- Collaborate with other programmes to transport samples (e.g. polio and TB).

4.3 Research

Professor Richard Phillips (Kwame Nkrumah University of Science and Technology) began the session with an update on research in skin NTDs: challenges and opportunities. He explained that research efforts to date have focused on four major thematic areas, namely:

- Disease transmission, active case surveillance, epidemiological modelling and adopting technology in mapping and other innovations to advance knowledge of disease transmission;
- Diagnostics: case confirmation and community-based surveillance;
- Case management: pilot testing of new treatment strategies, exploring the untapped potential of herbal medicine or local remedies, and possible educational campaigns on disease prevention strategies based on the current state of knowledge of the risk factors in Africa;
- Anthropological work to uncover the true socioeconomic burden of the disease and the ripple effects on households, mental stability of affected persons, stigma and discrimination.

4.4 Discussion on strengthening collaborative research studies within the network

The main expected outcome of the discussion was to target possible collaborative studies that the network laboratories could be part of. The session was led by Professor Lydia Mosi (University of Ghana). The following possible resistors and assistors to collaborative studies within the network were presented.

4.4.1 Resistors

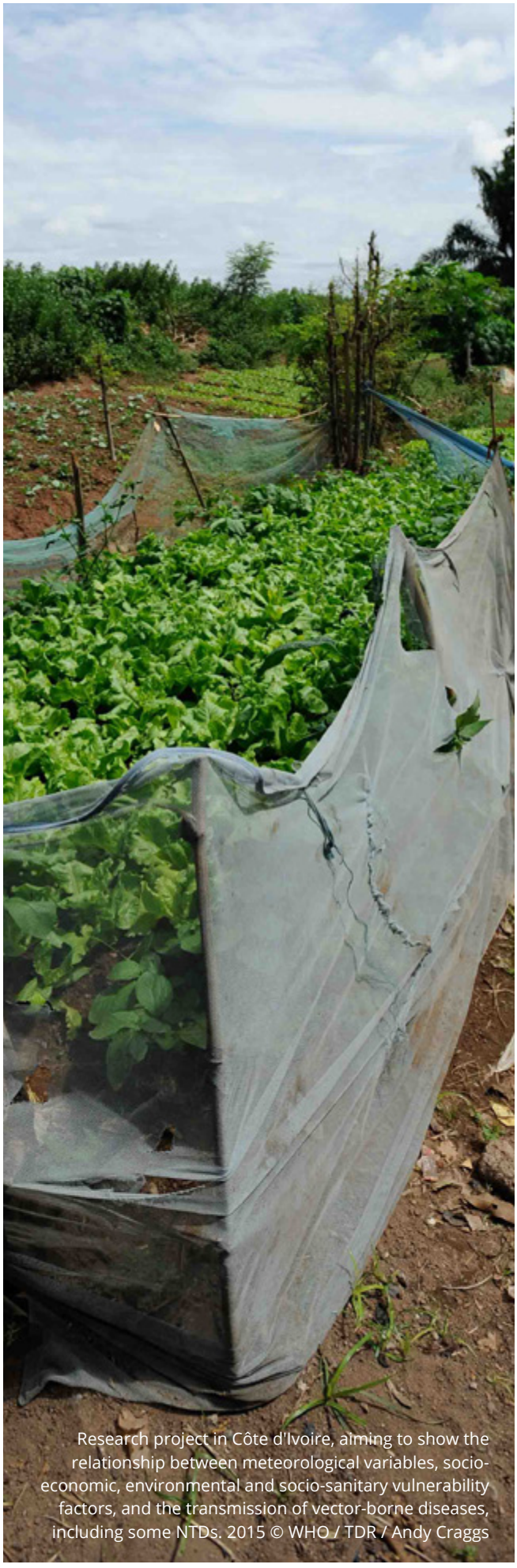
- Lack of funding;
- Clear direction on who can undertake the research and where the research should be done; by all or restricted to research laboratories;
- Harmonization and sharing of protocols.

4.4.2 Assistors

- EQA;
- The strength of the network is its longstanding history in the field, both in obtaining samples and in laboratory analysis or processing of theses samples for confirmation.
- The network provides an incredible opportunity to apply for research funding to drive our activities as a unit with cross country impact; it means we can collectively address research issues at a larger scale rather than working in silos.
- Facilitation of research activities by national programmes (e.g. assisting with seeking ethical clearance and coordination of sample transfers from the field sites to the research laboratories.

4.4.3 Feedback

- Develop a list of key focus areas.
- Remember that funding is key; adding new skin NTDs comes with more funders.
- Understand that language, geographical and cultural barriers exist and we should work to overcome these. Socio anthropological studies and teamwork are needed; we should put patients first.
- Include medical personnel in national programmes and share information with medics and community health workers.
- Model Benin's good community-based surveillance in other countries.
- Prepare a questionnaire to undertake a SWOT analysis of each member of the network.
- Generate a list of priority questions from all possible research areas.
- Involve national programmes in all research activities.
- Pair strong laboratories with weaker ones during research activities to collectively build capacity across the network.



Research project in Côte d'Ivoire, aiming to show the relationship between meteorological variables, socio-economic, environmental and socio-sanitary vulnerability factors, and the transmission of vector-borne diseases, including some NTDs. 2015 © WHO / TDR / Andy Craggs

5. General recommendations and activities to be carried out in 2024 and beyond

5.1 For the Coordinating Centre

- Prepare new terms of reference for Skin NTD LABNET.
- Develop a clear, budgeted work plan for integrating new diseases within the network:
  - to harmonize each new PCR(s) for each disease; and
  - establish EQA for each disease
- Finalize the organigram of the new network and prepare draft terms of reference for the satellite centres, advisory board and expert panel including national programme managers.
- Coordinate harmonization of standard operating procedures and implementation of EQA for the new diseases.
- Coordinate activities to improve visibility through a communications strategy.
- Establish a procedure for including new laboratories in the network.
- Develop training tools for skin NTD diagnostics.
- Encourage collaborative research studies (prioritize topics of research and capabilities/ laboratories).

5.2 For member laboratories

- Improve collaboration with national control programmes.
- Maintain commitment and engagement in the network and implement harmonized standard operating procedures for the new diseases.
- Continue to participate in EQA.
- Maximize opportunities for calls for submissions according to research priorities.
- Actively participate in collaborative research studies.

5.3 For national Buruli ulcer control programmes

- Improve collaboration with the laboratories.
- Organize training of trainers/refresher courses for technicians or health workers who are responsible for collecting and transporting samples.
- Explore how to integrate transport of skin NTD samples with other national sample transfer systems such as those for polio and TB.

5.4 For partners

- Support the Coordinating Centre to achieve its objectives for integration (development of standard documents on diagnostics and EQA, visibility and coordination of scientific studies).
- Support sample collection from the national programme in collaboration with laboratories.
- Support the Coordinating Centre to identify suitable funding sources and requests for proposals to sustain network activities.

5.5 For WHO

- Revise the Memorandum of Understanding between WHO and CPC to include the new name of the network and the new terms of reference.
- Advocate for engagement with partners and funding bodies.
- Enhance collaboration between national programmes and laboratories.
- Compile and share a database of the skin NTD programme structure and details of the coordinator/programme manager in each country.

6. Closing remarks

After the customary exchange of courtesies, the meeting was closed.

References

Fifth BU-LABNET annual meeting 2023. In: Buruli ulcer (BU) Labnet [video recording] (https://www.youtube.com/playlist?list=PLxLC0k8G1p6nC1Ym_s_pdwqfJILVoyfcU, accessed 9 May 2024).

Fifth annual BU-LABNET documents. In: Dropbox [Log in or sign up required] (https://www.dropbox.com/scl/fo/inc030jhpwp0yhyb0v8wu/h?rlkey=lofocwd9o9xaxm6qcdwi0d0kl&dl=0), accessed 9 May 2024).

First meeting of the network on Buruli ulcer PCR laboratories in the WHO African Region, Centre Pasteur du Cameroon, Yaoundé, 21–24 October 2019. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333592).

Marion E, Hycenth N, Vedithi SC, Robbe-Saule M, Donkeng V, Ganlonon L-M, et al. A combined effort of 11 laboratories in the WHO African region to improve quality of Buruli ulcer PCR diagnosis: The "BU-LABNET". PLoS Negl Trop Dis. 2022;16(11): e0010908. https://doi.org/10.1371/journal.pntd.0010908

Fourth meeting of the network on Buruli ulcer PCR laboratories in the WHO African Region, Centre Pasteur du Cameroon, Yaoundé, 24–26 October 2022. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240077911).

Ending the neglect to attain the sustainable development goals: a road map for neglected tropical diseases 2021–2030. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/338565).

Ending the neglect to attain the sustainable development goals: a strategic framework for integrated control and management of neglected tropical diseases. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/355448).

Annex 1. Agenda

Day 1: Monday, 23 October 2023
Chair: Dr Kingsley Asiedu

Time	Plenary	Presenter
08:30–09:00	**In-person registration and Zoom login by online participants**	**All participants**
09:00–09:30	Administrative and security announcements	NMIMR and WHO Country Office
09:30–10:40	Opening ceremony	Dr Charles Quaye
10:40–11:30	**Group photograph and coffee break**	**All**
11:30–11:40	Objectives and expected outcomes of the meeting	Dr Sara Eyangoh
11:40–12:00	Brief statements by BU LABNET partners	Anesvad Foundation American Leprosy Missions Raoul Follereau Foundation
12:00–12:10	Skin NTDs situation in Ghana – Buruli ulcer and Yaws	Dr Nana Konama Kotey
12:10–12:20	Skin NTDs situation in Ghana – Leprosy	Dr Benedict Quao
12:20–12:40	Role of the laboratory in achieving the WHO NTD road map for 2021–2030: activities of the WHO Diagnostic Technical Advisory Group	Dr Isra Cruz
12:40–13:00	Update on WHO skin NTD Working Groups	Dr Kingsley Asiedu Dr Sundeep Chaitanya Vedithi
13:00–13:30	Discussions	All
14:30–14:50	Update on BU-LABNET activities since the last meeting in October 2022	Dr Sara Eyangoh
14:50–15:10	Activities of member laboratories and trend from 2020 to Sept 2023	Mr Numfor Hycenth
15:10–16:10	Discussion on the needs and challenges of the network member laboratories	Dr Sara Eyangoh
16:30–17:00	Conclusions for day 1	Professor Pheabian Akinwale

Day 2: Tuesday, 24 October 2023
Chair: Prof. Dorothy Yeboah-Manu

Time	Plenary	Presenter
09:00–09:30	Brief summary of day 1 and introduction of day 2	Rapporteurs/Chairperson
09:30–09:45	Brief introduction of KEMRI	Dr Ruth Nyangacha
Session: Integration of other skin NTDs		
09:45–10:00	Introductory talk: PCR harmonization of other skin NTDs onto the BU platform	Dr Sara Eyangoh
10:00–10:20	Progress updates on harmonization results for Yaws	Dr Serges Tchatchouang Professor Michael Marks
10:20–10:40	Progress updates on harmonization results for Leprosy	Ms Ganlonon Line-Marlène Dr Estelle Marion
10:40–11:00	Progress updates on harmonization results for Cutaneous Leishmaniasis	Dr Javier Moreno
11:00–11:15	Development of a point-of-care diagnostic test for mycetoma in Africa	Dr Wendy van de Sande
11:30–12:00	General discussions and next steps	Dr Estelle Marion
12:00–12:20	Introductory talk: Moving from BU-LABNET to Skin NTD LABNET	Dr Kingsley Asiedu
13:30–15:00	Transition from BU-LABNET to Skin NTD LABNET – Next steps for integration	Experts and network laboratories
15:00–15:45	Presentation from the working groups (BU-LABNET to Skin NTD LABNET)	All Dr Sundeep Chaitanya Vedithi Experts and network laboratories
16:05–16:30	General discussions and next steps	
16:30–17:00	Conclusions for day 2	Dr Jacqueline Halatoko
17:00–18:00	Tour of the NMIMR advanced research laboratory	All

Day 3: Wednesday, 25 October 2023
Chair: Professor Solange Kakou Ngazoa

09:00–09:30	Brief summary of day 2 and introduction of day 3	Rapporteurs/Chairperson
Parallel working session		
09:30–10:30	- Workshop on harmonized diagnostic procedures for; - Yaws/*H. ducreyi* - Cutaneous Leishmaniasis - Leprosy - Improvement of communication in the network - Strengthening collaboration between laboratories and national programs	Disease experts/network laboratories/partners
11:00–11:30	Presentation from the working groups	Group representative
Research session (Oral presentation: 10 min presentation + 5 min questions)		
11:30–11:45	Introductory talk: update on research in skin NTDs: challenges and opportunities	Professor Richard Phillips
11:45–12:00	Insights of molecular epidemiology in understanding the ecology and transmission mode of *Mycobacterium ulcerans*	Dr Estelle Marion
12:00–12:15	Overview of skin NTDs in yaws endemic regions in Cameroon, Côte d'Ivoire and Ghana	Dr Serges Tchatchouang
12:15–12:30	Contribution of the BLMs4BU Consortium to BU-LABNET	Dr Emma Sáez López
12:30–12:45	Efforts to improve the fluorescent-thin layer chromatography (f-TLC) method for the diagnosis of Buruli ulcer	Dr Richard Kwamla Amewu
12:45–13:00	Laboratory diagnosis of mycetoma in Senegal: a multidisciplinary approach through satellite laboratory hubs and molecular reference laboratories	Professor Doudou Sow
14:00–14:15	Development of a real-time mycetoma recombinase polymerase amplification reaction to identify the most common causative agents of mycetoma in Africa	Dr Wendy van de Sande
14:15–14:30	Molecular detection of *Treponema pallidum pertenue* responsible for skin ulcers in people suspected of yaws in Togo	Dr Issaka Maman
14:30–14:45	Decrease of new Buruli ulcer cases: experience from two major endemic health districts in Cameroon	Dr Valerie Donkeng
14:45–15:05	Advancing point-of-care molecular diagnostics for skin neglected tropical diseases	Dr Sundeep Chaitanya Vedithi
15:05–15:45	Discussion on strengthening collaborative research studies within the network	Professor Lydia Mosi
16:05–16:45	General recommendations	CC and experts
16:45–17:15	Closing remarks	NMIMR/KCCR/MOH/GHS/WHO
17:30–18:30	Side meeting: Biomeme multiplex project	Principal Investigators

Annex 2. List of participants

BU-LABNET member countries

Benin

Ms Line-Marlène Ganlonon, Centre de Dépistage et de Traitement de l'Ulcère de Buruli de Pobè

Cameroon

Mr Jude Alexis Bondi, Buruli Ulcer Laboratory Network, Centre Pasteur du Cameroun, Yaoundé, Cameroon

Dr Valérie Flore Donkeng Donfack, National Reference Laboratory for Tuberculosis and Buruli ulcer, Centre Pasteur du Cameroun, Yaoundé

Dr Sara Eyangoh, Buruli Ulcer Laboratory Network Coordinator, Centre Pasteur du Cameroun, Yaoundé

Mr Hycenth Numfor, Buruli Ulcer Laboratory Network, Centre Pasteur du Cameroun, Yaoundé

Ms Brigitte Félicité Bana Owona, Centre Pasteur du Cameroun, Yaoundé

Mr Yannick Willy Kamdem Simo, Mycobacteriology Department, Centre Pasteur du Cameroun, Yaoundé

Dr Serges Tchatchouang, Buruli Ulcer Laboratory Network (BU-LABNET), Centre Pasteur du Cameroun, Yaoundé

Côte d'Ivoire

Dr Henri Kouakou, Institut Raoul Follereau de Côte d'Ivoire, Abidjan

Professor Elise Solange Kakou Ngazoa, Institut Pasteur de Côte d'Ivoire, Abidjan

Professor Bamba Vagamon, Institut Raoul Follereau de Côte d'Ivoire, Abidjan

Mr Konan Albert Yavo, Plateforme de Biologie Moléculaire, Institut Pasteur de Côte d'Ivoire, Abidjan

Democratic Republic of the Congo

Dr Marie José Kabedi, Institut National de Recherche Biomédicale, Kinshasa

Dr Nadine Mintsey, Institut national de Recherche Biomédicale, Kinshasa

Gabon

Mr Yann Mouangandzime, Tuberculosis Laboratory, Bacteriology, Hygiene and Biosecurity, Franceville

Ghana

Dr Anthony Ablordey, Bacteriology Department, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra

Ms Bernadette Agbavor, Skin NTD research group, Kumasi Centre for Collaborative Research, Kumasi

Ms Abigail Agbanyo, Skin NTD research group, Kumasi Centre for Collaborative Research, Kumasi

Dr Richard Akuffo Adjei, Research Scientist, Noguchi Memorial Institute for Medical Research, University of Ghana, Accra

Ms Jennifer Seyram Amedior, Bacteriology Department, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra

Dr Yaw Ampem Amoako, Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology, Kumasi

Dr Adwoa Asante-Poku, Bacteriology Department, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra

Ms Yaa Yeboaa Asare, Department of Biochemistry, Cell and Molecular Biology, University of Ghana, Accra

Dr Sofonias Getachew Asrat, WHO Representative for Ghana, WHO Country Office, Accra

Dr Michael Frimpong, Skin NTD research group, Kumasi Centre for Collaborative Research, Kumasi

Professor Lydia Mosi, Department of Biochemistry, Cell and Molecular Biology, University of Ghana, Accra

Professor Richard Phillips, Department of Medicine, School of Medicine and Dentistry, Kwame Nkrumah University of Science and Technology, Kumasi

Dr Charles Quaye, Research fellow & Quality Manager, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra

Mr Ishaque Mintah Siam, Bacteriology Department, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra

Professor Alfred Edwin Yawson, Dean, University of Ghana Medical School, Accra

Dr Dorothy Yeboah-Manu, Director, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Accra

Liberia

Ms Carmilia Johnson, National Public Health Institute of Liberia, Monrovia

Ms Vera Yatta Walker, National Public Health Institute of Liberia, Monrovia

Nigeria

Professor Pheabian Olaoluwa Akinwale, Molecular Parasitology Research Laboratory, Department of Public Health and Epidemiology, Nigerian Institute of Medical Research, Lagos

Mr Ignatius Ejiofor, St. Joseph's Hospital Adazi-Nnukwu, Anambra

Mr Timothy Ejike Nwafor, Molecular Parasitology Research Laboratory, Department of Public Health and Epidemiology, Nigerian Institute of Medical Research, Lagos

Togo

Dr Jacqueline Halatoko, Laboratoire de Biologie Moléculaire-Virologie, Institut National d'Hygiène, Lomé

Dr Issaka Maman, Laboratoire de Biologie Moléculaire-Virologie, Institut National d'Hygiène, Lomé

External laboratory experts, partners and other skin NTD experts

Dr Patrick Nsire Agana, ANESVAD, Guggisberg Street, Korlebu, Accra, Ghana

Mr Gideon Akolgo, Department of Chemistry, School of Physical and Mathematical Sciences, College of Basic and Applied Sciences, University of Ghana, Accra

Dr Richard K. Amewu, Department of Chemistry, School of Physical and Mathematical Sciences, College of Basic and Applied Sciences, University of Ghana, Accra, Ghana

Mr Thomas Azurago, Focal point, Human African trypanosomiasis/cutaneous Leishmaniasis, Ghana Health Service, Upper West Akim District, Ghana

Ms Gifty Boateng, Head, National Public Health Reference Laboratory, Ghana Health Service, Accra, Ghana

Ms Sofie Braet, Institute of Tropical Medicine, Unit of Mycobacteriology, Antwerp, Belgium

Dr Isra Cruz, National School of Public Health, Instituto de Salud Carlos III, Madrid, Spain

Professor Sow Doudou, Parasitology, Mycology and molecular biology Unit, Université Gaston Berger, Saint-Louis, Senegal

Ms Ines Egino, International Cooperation, Anesvad Foundation, Bilbao, Spain

Ms Marlen Eizaguirre, International Cooperation, Anesvad Foundation, Bilbao, Spain

Professsor Fahal Ibrahim Ahmed Hassan, Professor of Surgery, Mycetoma Research Centre, University of Khartoum, Sudan

Mr Chriso Andrew Paul Jaladi, Program Coordinator for Research & Innovation, American Leprosy Missions, Ebbw Vale, United Kingdom of Great Britain and Northern Ireland

Dr Nana Konama Kotey, National Programme Manager, yaws eradication and Buruli ulcer control programme, Ghana Health Service headquarters, Accra, Ghana

Ms Fernández Leire, International Cooperation, Anesvad Foundation, Bilbao, Spain

Dr Emma Sáez López, Mycobacterium Genetic Group, Department of Microbiology, University of Zaragoza, Zaragoza, Spain

Dr Estelle Marion, French Institute of Health and Medical Research/Inserm, Angers, France

Professor Michael Marks, Clinical Research Department, London School of Hygiene & Tropical Medicine, London, United Kingdom of Great Britain and Northern Ireland

Professor Mourad Mokni, Head, Dermatology Department, La Rabta Hospital, Tunis, Tunisia

Dr Ruth Nyangacha, Senior Research Scientist, Kenya Medical Research Institute, Nairobi Kenya

Dr Javier Moreno, Instituto de Salud Carlos III, Majadahonda, Spain

Ms Jessica Mussro, Communication Manager, American Leprosy Missions, Greenville, United States of America

Dr Delphin Mavinga Phanzu, Head, Department of Scientific Research, Institut Médical Evangélique de Kimpese, Kimpese, Democratic Republic of the Congo

Dr Benedict Quao, National Programme Manager, National Leprosy Elimination Programme, Ghana Health Service, Ankaful Leprosy General Hospital

Dr Wendy van de Sande, Department of Medical Microbiology & Infectious Diseases, Erasmus MC, Rotterdam, Netherlands (Kingdom of the)

Dr Sundeep Chaitanya Vedithi, American Leprosy Missions and University of Cambridge, United Kingdom of Great Britain and Northern Ireland

WHO

Dr Kingsley Asiedu, Prevention, Treatment and Care, WHO Global Neglected Tropical Diseases Programme, Geneva, Switzerland

Ms Adeola Bamisaiye, Consultant, Skin NTDs team, Prevention, Treatment and Care, WHO Global Neglected Tropical Diseases Programme, Geneva, Switzerland

Dr Mahoutondji Yves Thierry Barogui, Leprosy, Buruli ulcer & Yaws, Neglected Tropical Diseases, WHO Regional Office for Africa, Brazzaville, Congo

Dr Abate Mulugeta Beshah, Tropical and Vector borne Diseases, WHO Regional Office for Africa, Brazzaville, Congo

Dr Subbana Jonnalagada, Global Leprosy Programme, WHO Regional Office for South-East Asia, New Delhi, India

Dr Augustin Kadima, Tropical and Vector borne Diseases, WHO Regional Office for Africa, Brazzaville, Congo

Dr Sharmila Lareef-Jah, Medical Officer, Malaria & Vector-borne Disease Control, WHO Country Office, Accra, Ghana

Dr Felicia Owusu-Antwi, National Professional Officer Malaria/Neglected Tropical Diseases, Technical Units, WHO Country Office, Accra, Ghana

Dr Priya Pathak, Prevention, Treatment and Care, WHO Global Neglected Tropical Diseases Programme, Geneva, Switzerland

The following individuals, listed alphabetically by surname, participated online.

Kabiru Mohammed Abass
Benjamin Abuaku
Nancy Ackam
Miriam Addotey
Adebiyi Adeniran
Jonathan Kofi Adjei
David Adu
Erica Akanko
Aya Jeanne Armande Ake
Raphael Akpanya
Marlène Alaye
Justice Ohene Amofa
Richard Asamoah
Isaac Asare
Kwabena Boateng
Gisela Bretzel
Justice Danso
Emmanuel Darko
Arthur Djibougou
Edem Kojo Dzantor
Elizabeth Gyamfi
Vincent Gyang
Aminu Yunus Karim
Nancy Kinyatta
Nii Laryea
Samuel Mensah
Charles James Myers
Mary Nnankya
Samuel Ntow-Aninkora
Nathan Odame
Frederick Ofori-Appiah
Daniel Okyere
Samuel Osei-Mireku Jr
Stephen Osei-Wusu
Chandrakant Revankar
Malkin Saar
Carmen Sanchez
Isatou Sarr
Amb Prof Muharrem Shabani
Ishaque Siam
Shirley Victoria Simpson
Tamaz Tsulaia
Christian Voumard
Lidia Paulson de Almeida Voumard
Yona Yangaza
Chris Andrew Yebuah

For further information, contact:
Global Programme for Neglected Tropical Diseases
World Health Organization
20 avenue Appia
1211 Geneva 27
Switzerland

Website: https://www.who.int

9789240095670