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# Strengthening Laboratory Capacities for Diagnosis of Neglected Tropical Diseases A Training Course

Public Health Laboratory Ivo de Carneri (PHL-IdC)  
Pemba, Zanzibar - United Republic of Tanzania  
10-21 June 2019



FONDAZIONE  
IVO DE CARNERI ONLUS  
Per la promozione dei piani di lotta alle  
malattie parassitarie nei Paesi in via di sviluppo  
e l'incremento degli studi di Parasitologia



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## IVO DE CARNERI

*Ivo de Carneri (Cles, Trento, 1927 - Milano, 1993), full professor of human parasitology at the University of Pavia, Italy, dedicated his research career and field work to studying diseases the World Health Organization (WHO) refers to as “neglected”, which affect areas in the Global South. One of these is the Zanzibar Archipelago in Tanzania.*

*Here, on Pemba Island, in 1988, on behalf of the Italian Development Cooperation, Professor de Carneri participated in a fact-finding mission on the campaign against schistosomiasis. His report concluded that there was a need to set up a centre for parasitic and infectious diseases surveillance.*

*That proposal was taken up by the Foundation that bears his name and turned into an operative reality: the Public Health Laboratory Ivo de Carneri (PHL-IdC).*

*In the low income economies, like once in the Western countries, poverty is at the basis of several diseases. This is why the Ivo de Carneri Foundation, alongside public health actions, has carried out interventions for the environmental, social and economic improvement of Pemba Island.*

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Milan, December 2019

*The results achieved by the Ivo de Carneri Foundation would not have been possible without the generous support of the many people and institutions that, in various ways, have contributed to them.*

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# 1. NEGLECTED TROPICAL DISEASES: AN INTRODUCTION

## 1.1 WHO and NTDs

The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations (UN) system. Among its functions, the following three are key:

- **Normative guidance** (developing guidelines, setting norms and standards)
- **Technical support** (strengthening health programmes and systems at country level)
- **Advocacy and resource mobilization** (matching country needs and partners' interests)

WHO's Department of Control of Neglected Tropical Diseases is responsible for coordinating the three above functions with regard to neglected tropical diseases (NTDs) in coordination with sister units in WHO Regional and Country Offices.

## 1.2 What are the NTDs?

The NTDs are a **very diverse** group of conditions. They have bacterial, viral, parasitic, fungal and also a non-communicable origin as in the case of snakebite envenoming, which was added to the NTD portfolio in 2017.

However, in spite of their diversity, they all share a geographical and social environment: they are mainly prevalent in tropical areas, and they mainly affect the poorest sectors of the resident populations.

An additional characteristic is that many NTDs are vector-borne or have an animal reservoir, a fact that entails complex transmission cycles, and justifies the need for inter-sectoral approaches to their control and elimination.

A typical feature of NTDs is that they are often **overlooked** by national and international health agendas, although they are associated with a significant burden of disease.

Factors contributing to their neglect include that NTDs:

- Are associated with poverty and disadvantage
- Affect population with low visibility and little political voice
- Cause disfigurement, stigma and discrimination

- Do not "travel" widely
- Have limited drug market perspectives

All the above contributes to limited interest by private companies, research institutions, donors and also Ministries of Health and other public actors. All this in spite of an important burden in terms of both morbidity and mortality, and of the fact that they can be controlled, prevented and in some cases eliminated by effective and feasible interventions.

Assessing NTDs' burden of disease is a complex issue and no current estimate is satisfactory. In 2015, it was estimated that NTDs were at least responsible for 25 million DALYs, that is, 1% of the total burden of disease afflicting humanity, although with large variability from country to country. A more reliable, operational estimate indicates that every year approximately **1.5 billion people require interventions against NTDs** (treatment and others).

In order to respond to the question "what are the NTDs", WHO has established a formal process and fixed criteria to recognize a disease as a "new" NTD. As mentioned, snakebite envenoming was the last addition (in 2017), following a favourable recommendation by the WHO Strategic and Technical Advisory Group on NTDs; the recommendation was followed by WHA Resolution (WHA71.5) one year later, and by the launch of the global strategy in 2019. Adding snakebite envenoming to the NTD portfolio has resulted in a major increase in the NTD estimated burden of disease, as this condition alone is responsible for 6-8 million DALYs.

The 20 NTDs (or groups of NTDs) currently recognized by WHO include:

**Helminth infections:** lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiasis, dracunculiasis (Guinea-worm disease), taeniasis/cysticercosis, echinococcosis, food-borne trematodiasis

**Protozoan infections:** leishmaniasis, human African trypanosomiasis (sleeping sickness), Chagas disease

**Bacterial infections:** Buruli ulcer, leprosy, trachoma, yaws

**Viral infections:** dengue fever, rabies

**Fungal infections:** mycetoma, chromoblastomycosis and other deep mycoses

**Ectoparasitic infections:** scabies

**Non-communicable diseases:** snakebite envenoming

### 1.3 Strategies to tackle NTDs

WHO currently recommends **five strategic approaches** to tackle the burden of NTDs. The first two pertain to the health sector, the other three focus on inter-sectoral approaches:

**1. Preventive chemotherapy:** the large-scale distribution of medicines to entire population groups, usually implemented through community delivery platforms

**2. Individual case-management:** the patient-foc-

used diagnosis, treatment and follow-up, usually delivered through the primary health care platform

### 3. Vector control

### 4. Veterinary public health

### 5. Water, sanitation and hygiene

The first two strategic approaches largely entail the administration of medicines to people, for preventive or curative purposes. This is made possible by the existence of large-scale donations made by pharmaceutical manufacturers to WHO or directly to countries. Such donations have made it possible to administer 1.7 billion treatments to 1 billion people in need through preventive chemotherapy, and to diagnose and manage over 462,000 people through individual case-management, both in a single year (2017 data).

The following table shows current donation programmes:

Company	Medicine	Disease
Bayer	nifurtimox suramin	human African trypanosomiasis, Chagas human African trypanosomiasis
Eisai	diethylcarbamazine citrate	lymphatic filariasis
EMS (Brazil)	azithromycin	yaws
Gilead Sciences, Inc.	liposomal amphotericin B	visceral leishmaniasis in south-east Asia and east Africa
GlaxoSmithKline	albendazole	lymphatic filariasis, soil-transmitted helminthiasis
Johnson&Johnson	mebendazole	soil-transmitted helminthiasis
Merck	praziquantel	schistosomiasis
Merck & Co., Inc.	ivermectin	onchocerciasis, lymphatic filariasis
Novartis	MDT (rifampicin, clofazimine, dapsone) clofazimine triclabendazole	leprosy leprosy fascioliasis and paragonimiasis
Pfizer	azithromycin	trachoma
Sanofi	eflornithine melarsoprol pentamidine	human African trypanosomiasis human African trypanosomiasis human African trypanosomiasis

## 1.4 NTDs in the global development agenda

Above we have mentioned that advocacy is one of WHO's key functions. With regard to NTDs, WHO succeeded in ensuring that this group of diseases is explicitly included in the Sustainable Development Goals (SDGs) that are shaping the global development agenda between 2015 and 2030. That was not the case with the Millennium Development Goals (MDGs, 2000-2015), although it was assumed that NTDs were part of the "other diseases" mentioned in MDG6.

Among the 17 SDGs, SDG3, the "health SDG", is the one most relevant to NTDs. Target 3.3 states: "By 2030, end the epidemics of AIDS, tuberculosis, malaria **and neglected tropical diseases** and combat hepatitis, water-borne diseases and other communicable diseases". Notably, indicator 3.3.5 calls for a decrease in the population requiring NTD interventions. Target 3.8 ("achieve universal health coverage (UHC)") is also highly relevant as NTDs add the "equity dimension" to efforts leading to increase UHC coverage. As NTDs thrive among resource poor sectors of societies ("neglected populations"), reaching them with health services will show that the UHC scope has been met.

Nevertheless, because of the inter-sectoral nature of NTDs and of the strategies required to

tackle their burden, all SDGs are in fact related to NTDs (SDG1: no poverty; SDG2: zero hunger; SDG4: quality education; SDG6: clean water and sanitation, and so on).

## 1.5 Normative directions and acknowledgment processes

Developing **normative guidance** is another key function of WHO. Over the past decade, major efforts have been made to harmonize and standardize the approach to tackle the NTD burden, progressively moving from a vertical, disease-specific approach to a horizontal one, centred on delivery platforms and integrated within the health system.

Two main reference documents guided such effort: the NTD Roadmap 2012-2020, which was launched in 2012 and provided milestones and goals to be achieved by 2015 and 2020; and WHA resolution 66.12, adopted in 2013, the first one addressing all NTDs at a time, and committing countries to accelerate NTD control interventions. Such efforts were mirrored by the "London declaration on NTDs" which was signed by several partners and donors during a ceremony in London in 2012.

WHO is currently leading efforts to develop a new NTD Roadmap which will guide actions between 2021 and 2030. The new Roadmap is expected to be launched in October 2020 and be



endorsed by a dedicated WHA resolution. It will contain overarching goals, disease-specific targets and cross-cutting indicators.

Public-health targets set by WHO for NTDs are diverse: from the most to the least ambitious we can mention eradication (interruption of transmission at global level), elimination (interruption of transmission at country level), elimination as a public-health problem (elimination of morbidity and/or reduction of transmission), and control (reduction of morbidity). Each NTD is currently listed under a specific target, which may change in the new Roadmap.

For some of the diseases targeted for eradication and elimination as a public-health problem, WHO has established official administrative processes that enable the acknowledgement of such achievements by countries.

A certification process is currently in place for dracunculiasis and yaws (target: eradication); a verification process is in place for onchocerciasis (target: elimination); and a validation process is in place for lymphatic filariasis, trachoma and visceral leishmaniasis (target: elimination as a public-health problem).

To date, several countries have successfully completed the acknowledgment processes for one or more diseases.

## 1.6 NTDs and diagnostics

Availability of suitable diagnostics is essential to enable the implementation of NTD interventions in the field. The definition of the best diagnostic tool will depend on its intended use: for clinical practice (individual-level diagnosis) or for community-level assessments (mapping, monitoring & evaluation/impact assessment, decision to stop mass treatment interventions, post-intervention surveillance leading to acknowledgment of public-health targets, post-target surveillance).

Within the above contexts, two main dimensions can be considered: **specificity and sensitivity** are important for individual-level diagnosis, while their importance in community-level assessments increases with the decrease of transmission/prevalence; **access** is another key element which can be affected by easiness of conduction of the test, its “field friendliness”, its being point-of-care (e.g. dipstick or card), and the level of the health system at which it needs to be made available.

In addition, because of the role of vectors and animal reservoirs in transmission of several NTDs, diagnostics play a role in measurement of infection in non-human hosts, notably to provide additional or confirmatory evidence that transmission has been interrupted.



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## 2. A 10-DAY PRACTICAL COURSE

### 2.1 Introduction

The Public Health Laboratory Ivo de Carneri (PHL-IdC) (<http://www.phlidc.org>), in Pemba, Zanzibar, United Republic of Tanzania, has been a WHO Collaborating Centre for neglected tropical diseases (NTDs) since 2005. It operates under the aegis of the Ministry of Health, Zanzibar.

PHL-IdC's activities include assisting relevant health programmes to implement disease control strategies, undertaking operational research and strengthening capacities of health staff. It also provides the local population with routine services for selected laboratory tests. To date, PHL-IdC has been actively involved in organizing various international training courses and workshops in tropical medicine and global health.

In order to enhance the capacity of laboratory personnel on the diagnosis of selected NTDs, including providing a leadership role in research and monitoring & evaluation of infectious disease programmes, PHL-IdC – in collaboration with the Ivo de Carneri Foundation (<http://www.fondazionecarneri.it/en/>) and support from the World Health Organization (<https://www.who.int>) – is organizing this training course on diagnosis of schistosomiasis, soil-transmitted helminthiasis, lymphatic filariasis, onchocerciasis, leprosy, dengue fever, rabies and diarrhoeal diseases, with a focus on good laboratory practice (GLP), notably quality assurance (QA), quality control (QC) and adherence to standard operating procedures (SOPs).



### 2.2 Course objectives

The objective of the course is to build capacities on field-applicable laboratory procedures intended to diagnose NTDs in endemic countries. The training will be directed to laboratory personnel either based in such countries, or willing to get familiar with laboratory practice in a tropical setting. Specific objectives include:

- To provide training to laboratory personnel on execution of diagnostic testing (specimen collection, sample preservation, storage, processing and disposal) regarding schistosomiasis, soil-transmitted helminthiasis, lymphatic filariasis, onchocerciasis, dengue fever, leprosy and rabies; and to provide an orientation on diagnosis of diarrhoeal diseases;
- To orientate participants on the importance of GLP with the focus on QA/QC;
- To ensure that participants familiarize themselves with and are able to develop standard operating procedures (SOPs) for performance of laboratory techniques (microscopic methods and rapid-diagnostic test) for the above-mentioned diseases.

### 2.3 Methodology

The training course will focus on plenary sessions, practical sessions with hand-on-experience, and field work. Expected outcomes include:

- Strengthening of participants' capacities in the following areas:
  - Laboratory diagnosis of schistosomiasis
  - Laboratory diagnosis of soil-transmitted helminthiasis
  - Laboratory diagnosis of lymphatic filariasis
  - Laboratory diagnosis of onchocerciasis
  - Laboratory diagnosis of dengue fever
  - Laboratory diagnosis of leprosy
  - Laboratory diagnosis of rabies
  - Laboratory diagnosis of diarrhoeal diseases
- Orientation of GLP with emphasis on QA/QC
- Preservation of specimen for further testing, including molecular techniques

- Storage of prepared slides for QC
- Safe disposal of laboratory waste
- Preparation of SOPs
- Strengthening of networking among laboratory staff working on NTDs
- Reinforcement of the network of laboratories and research centres working on NTDs

## 2.4 Trainers and facilitators

The course will rely on PHL-IdC's expertise as well as on knowledge drawn from a range of different institutions in the United Republic of Tanzania and abroad. Facilitators and trainers will be both locals and foreigners, from higher education and research organizations.

## 2.5. Venue and course duration

The course will take place at the Public Health Laboratory Ivo de Carneri (PHL-IdC), P.O. Box 122, Wawi, Chake-Chake, Pemba, Zanzibar, United Republic of Tanzania (<http://www.phlidc.org>).

The duration of the course is 10 working days (2 x Monday to Friday), from 10 to 21 June 2019.

## 2.6 Eligibility and priority

Laboratory personnel already working in NTDs or willing to deepen their knowledge in this area of work are invited to apply. The course is open to all nationalities, but priority will be given to applicants based in NTD-endemic countries.

## 2.7 Course registration fee and sponsorship

With the aim of encouraging participation, no course registration fee will apply. Selected participants are, however, expected to cover costs related to travel, accommodation and meals.

A limited number of all-inclusive sponsorships is available, for which expenses related to travel, accommodation and meals will be fully covered.

If you are interested in obtaining a sponsorship, please mention it when you apply.

## 2.8 Course schedule

Time	Day-1 (10/6/19)	Day-2 (11/6/19)	Day-3 (12/6/19)	Day-4 (13/6/19)	Day-5 (14/6/19)	15 and 16/6/2019	Day-6 (17/6/19)	Day-7 (18/6/19)	Day-8 (19/6/19)	Day-9 (20/6/19)	Day-10 (21/6/19)	
8.30-9.00 am	Registration	Practical session: Kato-Katz, MacMaster and Mini-Flotac	Bacterial culture-2 (Preparation of culture media)	Antimicrobial susceptibility testing	Visit Leprosy Centre: collection of samples	Weekend break	Schisto diagnosis	Rabies. Introduction to diagnosis: principles, diagnostic flowchart. Presentation of the WHO laboratory manual. Sample collection technique. DFAT: sample smearing technique and slide fixation	Practical: LF microfilariasis detection and filariasis test strip	Collection, preservation and storing of biological samples 1	Collection, preservation and storing of biological samples 4	
9.00-9.30 am	Introduction			Good Laboratory Practice; Quality assurance; Quality control			Practical schisto					
9.30-10.15 am	Official Opening of the training course											
10.15-10.45 am	Tea break	Tea break	Tea break	Tea break	Tea break		Tea break	Tea break	Tea break	Tea break	Tea break	
10.45-11.45 am	Introduction to the course	Diarrhoeal Diseases (concept)	Bacterial culture-3 (Sample processing and bacterial isolation)	Good Laboratory Practice; Quality assurance; Quality control	Visit Leprosy Centre: collection of samples	Weekend break	Dengue, Chikungunya and Zika diagnostics - best sample, cross reactivity and potential pitfalls	Rabies. DFAT: staining, interpretation of results and troubleshooting. Demonstration of LFD tests: principles, interpretation of results and actions to be taken	Practical: LF microfilariasis detection and filariasis test strip	Collection, preservation and storing of biological samples 2	Post test	
11.45-12.45 pm	Introduction to NTDs and their diagnosis			Quality control								
12.45-2.00 pm	Lunch	Lunch	Lunch	Lunch	Lunch		Lunch	Lunch	Lunch	Lunch	Lunch	
2.00-3.00 pm	Copromicroscopic Tests: Kato-Katz, MacMaster	Diagnosis of Diarrhoeal Diseases: Bacterial culture-1 (theoretical concept)	Bacterial culture-3 (Sample processing and bacterial isolation); Antimicrobial susceptibility testing	Good Laboratory Practice; Quality assurance; Quality control	Introduction to leprosy diagnosis	Weekend break	Flavivirus surveillance using pan-Flavi PCR; seroprevalence by IgG ELISA; PRNT (concepts); how to evaluate kits for local epidemiology	Onchocerciasis: diagnostic principles	SOP Preparation	Collection, preservation and storing of biological samples 3	Closure of the training course	
3.00-4.00 pm	Mini-Flotac			Leprosy: an overview; Guidelines for the diagnosis, treatment and prevention of leprosy; Antimicrobial resistance in leprosy								Practical: slit-skin smear; microscopy examination (AFB staining and reading)
4.00-5.30 pm				Mycobacteria - overall (concepts)								

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## 2.9 Facilitators and participants

### 2.9.1 Facilitators

Name	Topic	Country & Institution	E-mail
1 Mr Jaffar Sufi	Diarrhoeal disease	Tanzanian	mgumilasufi@gmail.com
2 Dr Davide Ianniello	STH diagnosis- Mini-Flotac	University of Naples Federico II, Naples, Italy	davide.ianniello@unina.it
3 Dr Shaali Ame	STH diagnosis- KK, McMaster, Schisto	Tanzania Public Health Laboratory Ivo de Carneri (PHL-IdC), Wawi Chake Pemba	shaaliame@yahoo.com
4 Mr Henry S. Bishop	LF, SOP, Storage and preservation of samples	Division of Parasitic Diseases and Malaria, Centers for Disease Control and Prevention, Atlanta, GA, USA	hsb2@cdc.gov
5 Dr Tesfaye Kassa	Leprosy	Department of Medical laboratory Sciences and Pathology, Jimma University, Jimma, Ethiopia	ktes36@gmail.com
6 Dr Erwin Cooreman	Leprosy	Global Leprosy Programme, World Health Organization Regional Office for South-East Asia, New Delhi, India	cooremane@who.int
7 Dr Paola de Benedictis	Rabies	Istituto Zooprofilattico Sperimentale delle Venezie, Legnano, Padova, Italy (Italian health authority and research organization for animal health and food safety)	pdebenedictis@izsvenezie.it
8 Dr Yee Ling LAI	Dengue and other arboviral infections	Environmental Health Institute, National Environmental Agency, Singapore	LAI_Yee_Ling@nea.gov.sg
9 Dr Lee Ching NG	Dengue and other arboviral infections	Environmental Health Institute, National Environmental Agency, Singapore	NG_Lee_Ching@nea.gov.sg
10 Dr Anthony Luyai	GLP/QC/QA onchocerciasis	Expanded Special Project for Elimination of NTDs (ESPEN), WHO/AFRO, Ouagadougou, Burkina Faso	luyaia@who.int
11 Mr Andrew Majewski	GLP/QC/QA	Task Force for Global Health, NTD Support Center, Decatur, GA, USA	amajewski@taskforce.org
12 Said M. Ali	Introduction to the course	Tanzania Public Health Laboratory Ivo de Carneri (PHL-IdC), Wawi Chake Pemba, Tanzania	said@phlIdC.org
13 Dr Albis Francesco Gabrielli	Introduction to NTDs; capacity building for NTDs	Department of Control of NTDs, WHO/HQ, Geneva, Switzerland	gabriellia@who.int
14 Mr Ashok Mooloo	Information and communication	Department of Control of NTDs, WHO/HQ, Geneva, Switzerland	mooloa@who.int

## 2.9.2 Participants

Name	Sex	Country
1 Asma Iddi Makame	F	Zanzibar
2 Mwadini Fresh	M	Zanzibar
3 Kali Abdullah Omar	M	Zanzibar
4 Asya Gharib Haji	F	Zanzibar
5 Husna Mbugi	F	Tanzania m.
6 Masunga Malimi Chille	M	Tanzania m.
7 Naima Hassan Mkingule	F	Tanzania m.
8 Roman Stephen	M	Tanzania m.
9 Yusuph Mgya	M	Tanzania m.
10 Moura Ngoi	M	Tanzania m.
11 Sindew Mekasha Feleke	M	Ethiopia
12 Su'ado Mohamed Abdullahi	F	Somalia
13 Abbas Ahmed Adam	M	Somalia
14 Sanfo Moussa Sounkalo	M	Burkina Faso
15 Wilson Sebit John Ladu	M	South Sudan
16 Byagamy Jon Paul	M	Uganda
17 Murebwayire Clarisse	F	Rwanda
18 Philip Leakey Odida	M	Kenya
19 Gugu Tsabedze	F	Swaziland
20 Negar Bizhani	F	Iran
21 Karuna Rameshkunar	F	India
22 Endang Soares da Silva	F	Timor-Leste
23 Maria Dolores de Jesus da Costa	F	Timor-Leste
24 Gianluca Zaffarano	M	Italy
25 Arianna Rubin	F	Italy
26 Marianna Marangi	F	Italy
27 Damiano Larnè	M	Italy



## 3. OPENING SPEECHES AND MESSAGES

Public Health Laboratory Ivo de Carneri (PHL-IdC) Pemba  
10th June 2019

### 3.1 Honourable Minister of Health, Hamad Rashid Mohamed

Dear invited guests, dear course organizers (WHO, PHL-IdC, MoH, IdCF), dear facilitators, dear participants, dear all,

First of all, I would like to thank all of you for taking your time to attend this very important training conducted here at the Public Health Laboratory Ivo de Carneri in Pemba.

On behalf of the Ministry of Health of Zanzibar, I wish to express our sincere thanks to the World Health Organization (WHO) and the Ivo de Carneri Foundation, which, in collaboration with PHL-IdC and the Ministry of Health (MoH) of Zanzibar, have organized this international training event at the PHL-IdC. And thank you for having invited me to officiate the opening ceremony.

I also would like to give a warm welcome to our friends and colleagues from other countries. I hope that you will take the opportunity to be here, to enjoy our spice island and the hospitality of our hosts: the management staff of PHL-IdC, MoH and the Ivo de Carneri Foundation - Zanzibar Branch.

Dear participants, a number of training courses on neglected tropical diseases (NTDs) have been conducted at PHL-IdC for the last 15 years, but this is the first workshop dedicated to strengthening laboratory capacities for diagnosis of NTDs to be organized in Zanzibar with WHO's support.

The WHO has realized the importance of conducting this training with the objective of orienting you in understanding different diagnostic methods to detect organisms associated with NTDs, so that patient care can be effectively delivered, progress of control programmes monitored and their impact evaluated.

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Dear participants, I am proud that this training is happening in Pemba Island, where NTDs are endemic. The Government of Zanzibar has made an enormous effort in controlling, and where possible, attempting eliminating some of the NTDs - such as trachoma, schistosomiasis and lymphatic filariasis (LF), which are endemic in our country.

To mention few of those efforts: the Government has implemented a 5-year (2012-2017) project to assess better interventions which can lead to elimination of schistosomiasis. During that period, the prevalence of schistosomiasis was reduced from 8,3% to 1,7%. This is a tremendous achievement. A further project on schistosomiasis is continuing with Chinese Government's support in a pilot area, and preliminary reports indicate that the prevalence of schistosomiasis has been further reduced from 8% to below 0,6% in less than one year. Plans are underway to scale-up this project to cover all shehias of Zanzibar. The LF intervention project has also reduced the prevalence in the islands from 17% to below 5%. Under WHO support, a pre-transmission assessment survey has taken place this year to assess progress towards LF elimination.

Dear participants, I know that this training involves laboratory experts and other health practitioners from different countries including Italy, Mozambique, Ethiopia, Somalia, Burkina Faso, South Sudan, Eritrea, Swaziland, India, Uganda, Rwanda, Kenya, Iran, USA, Singapore, Switzerland and the host country Tanzania. So, I believe you will use this opportunity to create a network between different participating laboratories with the aim of sharing knowledge and experience in detecting infectious diseases, especially NTDs.

Dear participants, hookworm infections affect almost half of sub-Saharan Africa's poorest populations including 40-50 million school aged children and 7 million pregnant women, in whom they are a leading cause of anaemia. Schistosomiasis is the second most prevalent

NTD after hookworms (192 million accounting for 93% of the world number of cases) and is possibly associated with increased horizontal transmission of HIV/AIDS. 46 to 57 million cases of lymphatic filariasis and 37 million cases of onchocerciasis are also widespread in sub-Saharan Africa, representing a significant cause of disability and reduction in the region's agriculture productivity.

The Revolutionary Government of Zanzibar aspires to have a high quality of life for its people, ensuring access to quality and affordable health services as the prime strategy in realizing a "health nation". Health needs increased access to quality diagnostic methodologies. This is why we are happy and motivated by your presence here in this international training.

I suggest that you may establish a diagnostic information system whereby technicians could learn from each other and exchange the results by "e-lab".

Dear participants, I am confident that during these two weeks you will be able to better understand the beauty of our country and our people, and have the opportunity to practice in the lab and visit transmission sites: an experience that will help you once back in your countries.

Therefore, especially for our colleagues who might be visiting Africa for the first time, I wish this will not be only a fruitful professional stage, but also an unforgettable experience of life.

Finally, let me end by wishing you a very productive and enjoyable experience in Zanzibar.

I declare this training workshop on NTD laboratory diagnostics officially open.

*Karibuni sana.*

### **3.2 WHO Liaison Officer for Zanzibar, Ghirmay Andemichael**

Honourable Hamad Rashid Mohamed Minister of Health;

Ms Asha Ali Abdulla Principal Secretary, Ministry of Health;

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Directors and senior officials from the health sector and other sectors;

Ms Alessandra Carozzi de Carneri, President of the Ivo de Carneri Foundation,

Mr Said Ali, Chief Executive Officer, PHL-IdC,

Mr Yahya al-Sawafy, Representative from Ivo de Carneri Foundation,

WHO colleagues,

Distinguished facilitators and participants,

Members of the Media,

Ladies and gentlemen,

*Aselam Aleykum!*

Good morning!

First of all, I thank the almighty God for providing us with this opportunity to come together to learn and strengthen our capacity to diagnose Neglected Tropical Diseases in the African region and beyond.

I want to express my sincere thanks to the Honorable Hamad Rashid Mohamed, Minister of Health of Zanzibar, for his interest and support, and convey my appreciation for the opportunity to say a few words on behalf of WHO.

As you know, threats posed by Neglected Tropical Diseases, or NTDs, and their impact on individuals, families, communities and populations are substantial. This diverse group of diseases affect more than 1 billion people in 149 countries, costing developing economies billions of dollars every year.

These diseases are called “neglected” because they thrive in communities:

- where health systems are weak;
- where access to safe water and sanitation is limited;
- where vector control programmes are not implemented, thus causing high levels of morbidity and mortality.

Since 2006, WHO has prioritized the prevention, control, elimination and eradication of these diseases through five well defined public approaches.

These are:

- detection and management of affected individuals;
- mass treatment of populations living in endemic areas;
- vector control;
- veterinary public health services;
- provision of safe water, sanitation and hygiene.

These public health approaches need multi-sectoral engagement and we count on you, Honourable Minister, to harness other sectors engagement in combating NTDs and other public health problems in Zanzibar.

Member States together with WHO and other partners have been able to make unprecedented progress against many NTDs through optimal use of these approaches, and 45 countries are projected to have eliminated at least one NTD by 2020. WHO is also working to eradicate at least two of them - yaws and guinea-worm disease.

WHO’s task in defeating these diseases of poverty is being made possible thanks to the support of Member States, foundations, stakeholders, partners and pharmaceutical companies that donate medicines mainly through WHO, providing wider access to free treatments to hundreds of millions of people every year. In Zanzibar alone from 2013-2018, WHO has donated 3.014.680 tablets worth 2.786.860 USD for combating and ultimately eliminating NTDs from the islands. This support does not include the tripartite (MoH, WHO and Chinese Government) schistosomiasis elimination project in Pemba and other technical and financial support for NTD program (LF-TAS, digitalizing NTD information and others).

World Health Assembly Resolution 66.12, adopted in 2013, as well as resolutions of the WHO Regional Committee for Africa, and national resolutions related to NTDs, all point to the need to work together and to provide interventions that have direct implications to achieving universal health coverage, ensuring health for all, and “leaving no one behind”.

The opening of today’s workshop takes place as we gear-up to uphold WHO’s ambitious goal of reaching the “triple billion” by improving the

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lives of mostly poor people through sound preventive services; by addressing existing needs by increasing coverage of essential health services; and by addressing emergencies through a timely and efficient response.

All this cannot happen without ensuring the presence of adequate capacities in the field. In this regard, strengthening diagnostic practices, and notably laboratory practices, is a key prerequisite to achieve “health for all”. Improving the skills and sharing knowledge with and among laboratory personnel is a fundamental step towards stronger and more resilient health systems, which is the long-term objective of any WHO effort.

This training is therefore part of such wider effort that WHO and its partners are putting in place. The purpose of this training is to provide all of you 27 participants from 17 countries with an opportunity to share and gain experience, supported by experienced facilitators to update your knowledge and skills in the diagnosis of NTDs.

I am fully confident that you will greatly benefit from this course and return to your respective countries and regions to share what you have learned.

I am also pleased to note that the level of expertise gained in Zanzibar in the fight against NTDs allows today one of its institutions, the PHL-IdC, to host this workshop. Therefore, allow me to commend the Revolutionary Government of Zanzibar and particularly, the MoH, for organizing this important workshop.

In this regard, I am confident that the high-level Government commitment and leadership, the readiness of various sectors to work together, and the excellent collaboration and partnership we have in Zanzibar, will enable us to control and ultimately eliminate NTDs from our islands.

Distinguished participants, ladies and gentlemen,

I assure you of the firm and continued support of WHO in your quest to build strong and resilient health systems. Through political will, partners’ commitment and reinforced capacities, all together,

we will be able to eliminate NTDs from our Islands, from Africa and from the world.

I wish you every success and a pleasant stay on Pemba Island.

*Ahsanteni sana!*

Thank you.

### **3.3 Message of the Ambassador of Italy to Tanzania, Roberto Mengoni**

A very warm good morning to all participants and lecturers of the course *Strengthening Laboratory Capacity for Diagnosis of Neglected Tropical Diseases*, organized by the Public Health Laboratory Ivo de Carneri.

I am very pleased to give a very warm welcome also to the organisers and representative of the Ministry of Health of the Revolutionary Government of Zanzibar.

I am sorry not be with you, as tonight we will celebrate at the Italian Residence the Republic Day, which remembers the foundation of the Italian Republic in 1946.

I have been following the work and projects realized by Ivo de Carneri Foundation for the past three years I have been in Tanzania. I had also the pleasure to visit the Laboratory and attend the closing ceremony of a past course on public health. I am happy to see that Ivo de Carneri Foundation is continuing its activities. The Embassy is committed to support the initiatives of the civil society organizations in the country, and to promote them to the authorities.

Italians have been working in Tanzania for decades now, and Italian organizations have acquired a very deep knowledge of the country especially on health matter. We have several NGOs active on HIV prevention, nutrition, rehabilitation of people with disabilities; missionaries built hospitals across the country, and the Italian research institute “Lazzaro Spallanzani” from Italy has been working on infectious diseases since many years, especially in Dodoma region. I am happy that Italy is present also in Pemba, an island that sometimes is overshadowed by its more famous sister island of Unguja.

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I think it is highly important to remember the importance of this Laboratory for the public health in the archipelago and across the region. Medical research can be done here and findings can be immediately used for a better health of the population.

I wish all participants and lecturers a very good work and for Ivo de Carneri Foundation, I am looking forward to meeting you again soon.

### **3.4 President of the Ivo de Carneri Foundation, Alessandra Carozzi de Carneri**

Goodmorning, everybody!

I want to bring the greetings of the Ivo de Carneri Foundation to the opening of *this Strengthening Laboratory Capacity for the Diagnosis of Neglected Tropical Diseases* to be held at the PHL-IdC for the next two weeks.

I thank very much the Honourable Minister of Health who, with his presence, wanted to highlight the value of this training on NTDs and the role on it of the PHL-IdC at national and international level.

I thank very much the WHO representatives who conceived and organized it with the close and almost daily collaboration of the representatives of the PHL-IdC.

In Africa but also in Europe we still face problems with the diagnosis of Neglected Tropical Diseases so this training will be, for all the attendees, a special opportunity for learning, debating, discussing and bring back to their countries knowledge and new contacts first of all the contacts with the PHL-IdC, which has a long life in the field and this is also the core of the mission of the Ivo de Carneri Foundation.

Finally, I want to convey my special thanks to AICU, the Italian Association in the name of Carlo Urbani, a well-known microbiologist and WHO representative, who died for SARS in Bangkok in 2003.

At the end of these few words I want to wish to the attendees a very successful, productive training and a nice stay in Pemba!

## **4. FINAL COURSE EVALUATION**

On the last day of the course, participants were asked to fill an evaluation form with the aim of rating the overall quality of both teaching sessions and logistics arrangements for the workshop.

Participants especially appreciated the diversity of the modules offered by the course (formal presentations, practical sessions in the laboratories, and the field visit to the leprosy centre), as well as the competence and expertise of the facilitators. Trainees also commended the efforts and passion dedicated by the organizers to ensure an appropriate transfer of knowledge to the trainees. Participants notably enjoyed the friendly atmosphere of all sessions and the informal interactions with the facilitators, both during and after “working hours”. On a less academic note, the creation of a WhatsApp group and the traditional food served at the PHL-IdC’s cafeteria were also much appreciated by everyone.

The number of participants was judged too high for the facilities and the equipment offered by the PHL-IdC, and the time allocated to practical lab sessions too short. Some participants rated the accommodation in local hotels not satisfactory, and expressed complaints about the limited wifi connectivity in both the PHL-IdC and the hotel.

Suggestions made by trainees included the need to dedicate more time to peer-to-peer teaching and learning, through horizontal exchange of experiences among participants. Almost all trainees would have appreciated longer and more in-depth modules, more practical sessions and additional field visits, underlying that the course duration should have been extended to a third week. The suggestion was also made to add a pre-test and a post-test for participants, to assess individual knowledge before and after the workshop.

Finally, everyone conveyed the need to repeat the workshop at regular intervals to maximize dissemination of up-to-date information on laboratory diagnosis of neglected tropical diseases.

The above points were noted by the organizers, who expressed commitment to consider all suggestions and take action accordingly.



## ACRONYMS

AICU: Associazione italiana Carlo Urbani  
 DALY: Disability-Adjusted Life Year  
 GLP: Good Laboratory Practice  
 IdCF: Ivo de Carneri Foundation  
 MDG: Millennium Development Goal  
 MoH: Ministry of Health  
 NTD: Neglected Tropical Disease  
 PHL-IdC: Public Health Laboratory Ivo de Carneri  
 QA: Quality Assurance  
 QC: Quality Control  
 SDG: Sustainable Development Goal  
 SOP: Standard Operating Procedure  
 UHC: Universal Health Coverage  
 WHA: World Health Assembly  
 WHO: World Health Organization

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