



Pan American
Health
Organization



World Health
Organization
REGIONAL OFFICE FOR THE Americas



NEGLECTED INFECTIOUS DISEASES IN THE AMERICAS

SUCCESS STORIES AND INNOVATION
TO REACH THE NEEDIEST

NEGLECTED INFECTIOUS DISEASES IN THE AMERICAS:

SUCCESS STORIES AND INNOVATION
TO REACH THE NEEDIEST



**Pan American
Health
Organization**



**World Health
Organization**
REGIONAL OFFICE FOR THE **Americas**

Washington, D.C.

2016

Also published in Spanish (2016):
Enfermedades infecciosas desatendidas en las Américas. Historias de éxito
e innovación para llegar a los más necesitados.
ISBN 978-92-75-31896-6

PAHO HQ Library Cataloguing-in-Publication Data

Pan American Health Organization.

Neglected infectious diseases in the Americas: Success stories and innovation to reach the neediest.
Washington, DC : PAHO, 2016.

1. Communicable Diseases. 2. Neglected Diseases. 3. Chagas Disease. 4. Schistosomiasis.
5. Elephantiasis, Filarial. 6. Leprosy. 7. Malaria. 8. Onchocerciasis. 9. Trachoma.
10. Social Determinants of Health. I. Title.

ISBN 978-92-75-11896-2

(NLM Classification: QZ 140)

© Pan American Health Organization, 2016. All rights reserved.

The Pan American Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full. Applications and inquiries should be addressed to the Communications Department, Pan American Health Organization, Washington, D.C., U.S.A. (www.paho.org/permissions). The Department of Communicable Diseases and Health Analysis will be glad to provide the latest information on any changes made to the text, plans for new editions, and reprints and translations already available.

Publications of the Pan American Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. All rights are reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the Pan American Health Organization concerning the status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the Pan American Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the Pan American Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the Pan American Health Organization be liable for damages arising from its use.

**NEGLECTED INFECTIOUS
DISEASES IN THE AMERICAS:**

SUCCESS STORIES AND INNOVATION
TO REACH THE NEEDIEST

▲ ACKNOWLEDGMENTS

The Pan American Health Organization / WHO Regional Office for the Americas (PAHO/WHO) wishes to acknowledge and thank all of the technical specialists and other individuals, organizations, and ministries of health and other public sectors that contributed to *Neglected Infectious Diseases in the Americas: Success stories and innovation to reach the neediest*.

This document summarizes the efforts that have been made at the national and subnational level to relieve the suffering from neglected infectious diseases (NIDs) among the neediest in the Americas.

▲ CONCEPTUAL AND EDITORIAL CONTRIBUTIONS

Marcos Espinal, Director, Department of Communicable Diseases and Health Analysis, PAHO/WHO

Luis Gerardo Castellanos, Unit Chief, Neglected, Tropical and Vector Borne Diseases, PAHO/WHO

Anna Giralt Gallo, Writer, PAHO/WHO Consultant

Cristina Mañá Fernández, Communications and Knowledge Management Specialist, Communicable Diseases and Health Analysis, PAHO/WHO

Martha Idalí Saboyá, Specialist, Neglected Infectious Diseases, PAHO/WHO

▲ PHOTOGRAPHS

Joshua E. Cogan, Photographer and anthropologist

▶ PAHO/WHO TECHNICAL CONTRIBUTIONS

Maria Paz Ade y Torrent, Specialist, Malaria Prevention and Control

Steven Kenyon Ault, Ex Former Senior Advisor on Neglected Infectious Diseases

Haroldo Bezerra, Advisor, Public Health Entomology

Keith Carter, Senior Advisor on Malaria

Laura Catalá Pascual, Former Specialist, Neglected Infectious Diseases

Rainier P. Escalada, Ex Specialist, Malaria Policy and Advocacy

Gamaliel Gutiérrez Castillo, Specialist, Dengue Prevention and Control

Ana Luciañez Pérez, Specialist, Neglected Infectious Diseases

Monique Perret-Gentil, Specialist, Malaria Prevention and Control

Ana Nilce Elkhoury, Regional Advisor on Leishmaniasis

Ruben Santiago Nicholls, Regional Advisor on Leprosy

and Neglected Infectious Diseases

José Luis San Martín, Senior Advisor on Dengue Prevention and Control

Roberto Salvatella, Regional Advisor on Chagas disease

Tamara Mancero, Advisor on Communicable Diseases and Health Analysis, PAHO/WHO Office in Mexico

Mario Masana, Advisor on Communicable Diseases and Health Analysis, PAHO/WHO Office in Bolivia

Jean-Marie Rwangabwoba, Advisor on Communicable Diseases and Health Analysis, PAHO/WHO Office in Haiti

Alba Lucia Morales, Onchocerciasis Elimination Program for the Americas, Colombia

Aida Soto, National Officer for Vector Borne Diseases, Neglected Infectious Diseases, Veterinary Health, and Zoonotic Diseases, PAHO/WHO office in Nicaragua



CONTENTS

X	PREFACE
XIV	ABBREVIATIONS

1

20 **NEGLECTED INFECTIOUS DISEASES: DISEASES OF POVERTY**

28	Principal causes: poverty and other social determinants of health
29	Strategies for control and eventual elimination in the Americas
30	Landmark actions that have helped reduce the suffering caused by these diseases
36	Successes
40	Challenges

2

42 **NIDs THAT COULD BE ELIMINATED**

42	Chagas disease: the American endemic disease
53	Schistosomiasis: the disease transmitted by freshwater snails
58	Lymphatic filariasis: the “elephant leg” stigma
68	Leprosy: an ancient disease
79	Malaria: on the verge of elimination
88	Onchocerciasis: “river blindness”
96	Trachoma: the disease that blinds the poorest

3

106 NIDs THAT COULD BE CONTROLLED OR DRASTICALLY REDUCED

106 Soil-transmitted helminth infections: intestinal worms

4

116 DISEASES WHOSE BURDEN COULD BE REDUCED OF AFFECTED PEOPLE

116 Fascioliasis: the disease of the liver

126 Leishmaniasis

136 Dengue: "breakbone fever"

5

146 WAY FORWARD: POST-2015 EFFORTS TO COMBAT NIDS

150 Collaboration to combat NIDs

152 Public-private partnerships to control and eliminate of NIDs in the Americas

BIBLIOGRAPHY 154
(BY CHAPTER)



PREFACE

Dr. Carissa F. Etienne

Director
Pan American Health Organization /
World Health Organization

NEGLECTED

INFECTIOUS DISEASES

Neglected infectious diseases (NID), which include Chagas disease, fascioliasis, soil-transmitted helminthiasis, leprosy, leishmaniasis, lymphatic filariasis, onchocerciasis, plague, human rabies transmitted by dogs, schistosomiasis, congenital syphilis, neonatal tetanus and trachoma, affect the poorest of the poor. These diseases impose a nearly indescribable set of burdens on communities and individuals, not only because of the pain and suffering they cause, but also because of the loss of income and the chronic stigma and discrimination associated with their sequelae, irreversible in many cases. These can include blindness, chronic anemia, tissue loss and physical

disfigurement, and permanent disability leading affected families to an even more challenging and limited quality of life-style.

We call these diseases “neglected” because for many years they received insufficient attention, keeping millions from accessing treatment and health care, despite the fact that many treatments are often extremely inexpensive (2 to 4 US cents per dose) or even donated through the Pan American Health Organization (PAHO) and World Health Organization (WHO); and in some cases they can cure more than one NID at a time. Resolving NID through control and elimination is a public health gesture of human rights and equity, and countries of the Americas are taking the challenge seriously.

Preface photo: Children doing activities to help fight Hanseniasis disease.

Gaining a clear understanding of the public health and social impact of NID, and how to address them, including the commonly-seen coinfections (more than one NID in the same individual), requires government commitment reflected in a robust surveillance and monitoring system that provides precise information, with NID surveillance instruments integrated into wider epidemiological data collection systems operating from the field. It is equally important to ensure that laboratory test results actually confirm clinical diagnosis and are preceded by rapid screening tests available through primary health care systems to facilitate early detection and proper treatment. NID control actions should also be carried out within the context of the strategy for universal health access to health and universal health coverage, so that all at-risk populations have access to services and can receive appropriate care. Government commitment should be accompanied by sound national policies established to address the social and environmental determinants of these diseases and reduce their adverse health and economic consequences driven by stigma and discrimination.

This report shows that a number of countries of the Americas have successfully eliminated transmission of several NID in all or part of their territories, thus showing what each endemic country in the region should and can accomplish. However, for the Americas to reach the regional and global targets to eliminate more than a dozen NID, a concerted effort must be made now by every endemic country to ensure that robust public health actions reach those who need them most. Actions should be taken to treat all children at risk of contracting soil-transmitted helminth infections; protect every child and pregnant mother from the mosquito bites that transmit malaria and from other insects that transmit Chagas disease and leishmaniasis; treat efficiently and well-timed young children and family members with safe and high quality anti-NID medicines; and that all people who arrive at a hospital with leishmaniasis, schistosomiasis, fascioliasis or blinding trachoma receive proper care so they leave the hospital cured and in good health, and their families can easily follow up their progress with support of local health care units.

All of this requires a comprehensive, cross-cutting approach in which the instruments used to combat NID are combined with integrated management of vectors, field epidemiology, and primary health care. Nevertheless, such efforts will prove inadequate in the long term unless the public health sector works collaboratively with partners and stakeholders to also address the environmental and social determinants that lead to NID emergence and maintenance. A change in behavior by all people who are at risk of contracting these diseases is required, along with regulatory and social changes that create a healthy environment.



**"RESOLVING NID
THROUGH CONTROL
AND ELIMINATION IS A
PUBLIC HEALTH GESTURE
OF HUMAN RIGHTS AND
EQUITY, AND COUNTRIES
OF THE AMERICAS ARE
TAKING THE CHALLENGE
SERIOUSLY."**

We are committed to ensuring that all people have access to the health care they need, when they need it, with quality to contribute to reduce pain, suffering, impairment and disabilities. Through our work, we promote and support the right of everyone to good health. Eliminating priority neglected infectious diseases is a commitment of PAHO and its Member States which is reflected in the new Plan of action for the elimination of NID and the post-elimination actions for the period 2016 – 2022.

By bringing together countries, communities and other partners and supporters, we intend to progress more quickly and intelligently, to sustain the work that has been carried out and reach our elimination goals. I recognize our countries and their leading efforts against NID through this publication, and encourage them to give the final push for the elimination of NID, once and for all, from the Americas.

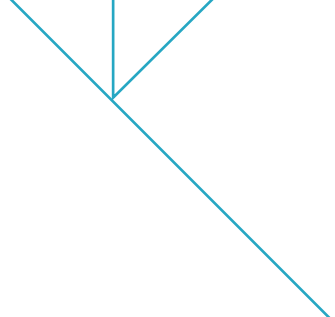




A

ABBREVIATIONS

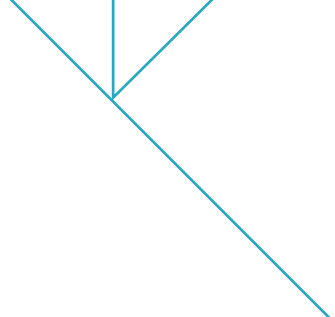
*Communities that have benefited from
NID control and eradication programs.*




AMI	Amazon Malaria Initiative (USAID)
DC	Directing Council (<i>Consejo Directivo</i>) (PAHO)
CGHDE	Leprosy and Diseases in the Process of Elimination (<i>Coordenação Geral Hanseníase e Doenças em Eliminação</i>) (Brazil)
CENCET	National Center for the Control of Tropical Diseases (<i>Centro Nacional de Control de Enfermedades Tropicales</i>) (Dominican Republic)
COMBI	Communication for Behavioural Impact (WHO disease-response methodology)
CWW	Children Without Worms (NGO in Atlanta, Georgia)
DCPO	Dana Center for Preventive Ophthalmology (Johns Hopkins University, Baltimore, MD, USA)
DEET	N,N-Diethyl-meta-toluamide (mosquito repellent) Organización Panamericana de la Salud
EMMIE	Elimination of Malaria in Mesoamerica and the Island of Hispaniola
EPI	Expanded Programme on Immunization (WHO)
GLOBAL FUND	Global Fund to Fight AIDS, Tuberculosis and Malaria
GT-dengue	International Dengue Task Force (<i>Grupo de trabajo focalizado en la lucha contra el dengue</i>)
GTMP	Global Trachoma Mapping Project



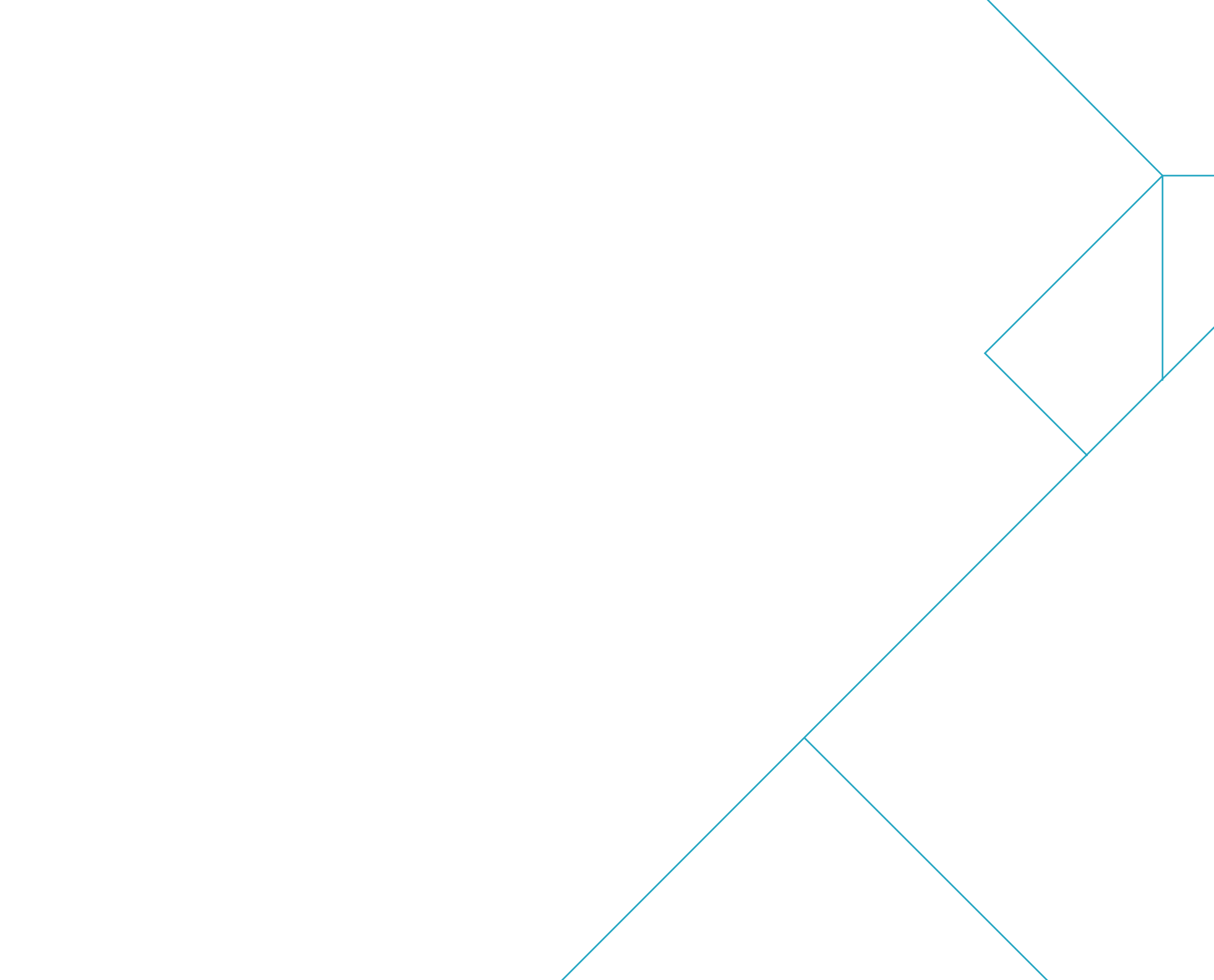
HiAP	Health in All Policies
IMCI	Integrated Management of Childhood Illness (AEIPI, in Spanish)
IMS-Dengue	Integrated Management Strategy to Prevent and Control Dengue
INLASA	National Institute of Health Laboratories of Bolivia (<i>Instituto Nacional de Laboratorios de Salud Bolivia</i>)
IPCA	Initiative of the Countries of Central America and Belize for Interruption of Vector-borne Transmission of Chagas disease by <i>R. prolixus</i> , Reduction of Household Infestation by <i>Triatoma dimidiata</i> , and Elimination of Transfusional Transmission of <i>T. cruzi</i>
IPCAM	Initiative of the Central American Countries and Mexico for the Interruption of Vector-borne and Transfusional Transmission, and Medical Care for Chagas Disease
ITI	International Trachoma Initiative
LAC	Latin America and the Caribbean
MDGs	Millennium Development Goals
MDP	Mectizan Donation Program (Merck)
NGO	Nongovernmental organization
NID	Neglected Infectious Disease (terminology used by PAHO)
NPELF	National Program to Eliminate Lymphatic Filariasis (Haiti)



NTD	Neglected Tropical Disease (terminology used by WHO)
OEPA	Onchocerciasis Elimination Program for the Americas
PAHO	Pan American Health Organization
PASC	Pan American Sanitary Conference (<i>Conferencia Sanitaria Panamericana</i>)
PHC	Primary health care
PPP	Public-private partnership
RAVREDA	Amazon Network for the Surveillance of Antimalarial Drug Resistance (<i>Red Amazónica de Vigilancia de la Resistencia a los Antimaláricos</i>)
RBM	Roll Back Malaria Partnership
RELDA	Dengue Laboratory Network of the Americas (<i>Red de Laboratorios de Dengue de las Américas</i>)
SAFE	Surgery, Antibiotics, Facial cleanliness, and Environmental improvement (WHO Strategy for Blinding Trachoma)
SDGs	Sustainable Development Goals
SEDES	La Paz Departmental Health Service
SisLeish	Regional Leishmaniasis Information System (<i>Sistema de Información Regional de Leishmaniasis</i>)
STH	Soil-transmitted helminth infection



SUS	Brazil's Unified Health System (<i>Sistema Único de Saúde</i>)
T3	Test, Treat, and Track initiative (WHO program to promote scale-up of diagnostic testing, treatment and surveillance for malaria)
TDR	Special Programme for Research and Training in Tropical Diseases (multi-agency program to combat diseases of poverty, hosted at WHO)
UHA	Universal health access initiative
UHC	Universal health coverage initiative
USAID	United States Agency for International Development
VWA	Vaccination Week in the Americas (PAHO Initiative)
WFP	World Food Programme
WHA	World Health Assembly (WHO decision-making body)
WHO	World Health Organization



CHAPTER

1

NEGLECTED INFECTIOUS DISEASES: DISEASES OF POVERTY

Neglected infectious diseases (NIDs)¹ are a set of illnesses of infectious origin that persist today in the world's poorest and most marginalized communities.

The World Health Organization (WHO) estimates that more than 1,000 million individuals suffer from one or more of these diseases and live in one of the areas associated with an elevated risk of contracting them.



Communities affected by NIDs in the Americas.

The diseases are called "neglected" because they are associated with poverty and marginality and have failed to receive either national or international attention or receive sufficient resources to address them. Moreover, they have not historically been a priority on public health or research agendas.

In the countries of the Americas, there are 14 diseases in this group (between these include: Chagas disease, fascioliasis, soil-transmitted helminthiasis, leprosy and leishmaniasis) and all constitute an obstacle to the social and economic development of affected populations, lead to stigmatization and discrimination, and have adverse ef-

fects on the individuals who contract them. Moreover, they disproportionately affect indigenous populations and people of African descent, as well as poor populations in rural and peri-urban areas, whose access to basic health services is often very limited.

In Latin America and the Caribbean (LAC) some 200 million individuals live in poverty: 47 million survive on less than US\$ 1 per day, while another 74 million live on less than US\$ 2 per day. These groups are vulnerable to contracting NIDs. A number of NIDs are also closely associated with lack of access to safe drinking water and basic sanitation. In 2012, 12% of the rural population in the Americas lacked access to safe drinking water, and 25% lacked adequate basic sanitation. Due in part to these conditions, the Americas currently bears 8.8% of the global burden of NIDs.

These diseases can be prevented, controlled, and even eliminated, provided that health services both have and use the proper tools and resources and have the commitment and support of their governments, partners, and donors.



1. WHO calls to this group neglected tropical diseases, but in PAHO's Resolution CD49.R19 it is decided that the name to use in the Americas it is Neglected Infectious Disease because not all in the list for the Region are tropical (i.e., congenital syphilis and neonatal tetanus).



The social and economic circumstances that people are born in, live in and work in, resulting from the distribution of power and resources, directly affects the spread of NIDs.

IN THE AMERICAS, NIDS (ALL EXCEPT DENGUE²)
CLASSIFIED IN ONE OF THE THREE GROUPS
BELOW ACCORDING TO THE EASE WITH WHICH
THEY COULD BE ELIMINATED OR CONTROLLED:

2

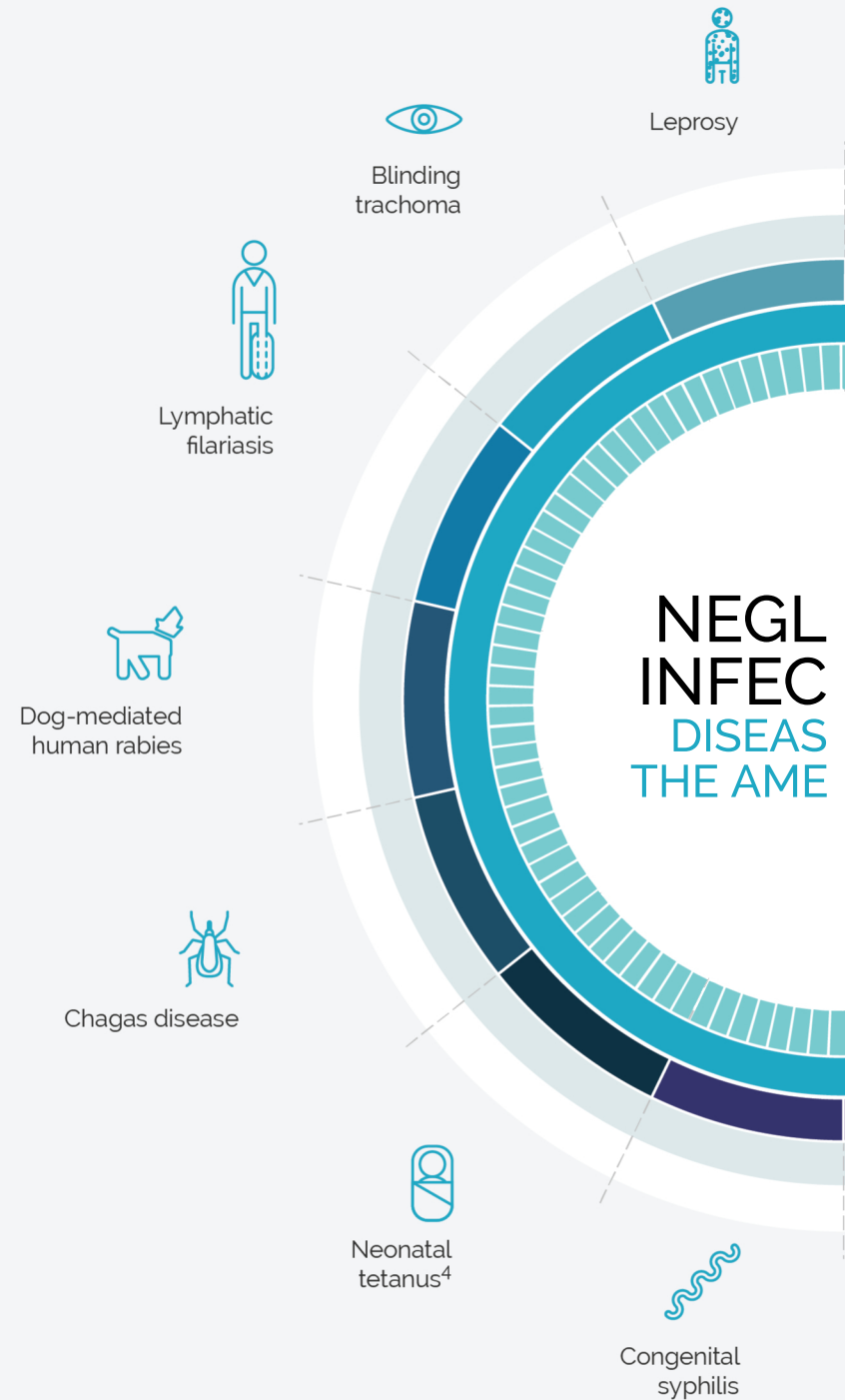
DISEASES WHOSE INCIDENCE COULD BE
REDUCED AND DETECTED CASES BETTER
ADDRESSED DESPITE THE CURRENT LACK OF
SPECIFIC CONTROL AND ELIMINATION GOALS

2

DISEASES THAT COULD BE CONTROLLED OR
DRASTICALLY REDUCED³

10

DISEASES THAT COULD BE ELIMINATED





Plague



Fascioliasis



Leishmaniasis



Schistosomiasis



Soil-transmitted helminth infections (STHs)



Onchocerciasis
(river blindness)



Malaria

NEGLECTED INFECTIOUS DISEASES IN THE AMERICAS

This publication also incorporates dengue, which is another neglected infectious diseases, despite not being part of the CD49.R19 Resolution⁵, in which the elimination of NIDs and other poverty-related infections are addressed, it is part of the list of neglected tropical diseases of WHO and is a priority for the Region.



² Although dengue is not specified in Resolution CD49.R19, it is included in PAHO's list of neglected tropical diseases, and it is a primary priority for the Americas, hence why it is included in this document.

³ In 2012, the World Health Assembly adopted a resolution to eliminate schistosomiasis. Thus, the objective for Group 2 actually applies solely to soil-transmitted helminthiasis, and schistosomiasis was transferred to "Diseases that could be eliminated" group.

⁴ This document only covers 10 of 14 neglected infectious diseases included in CD49R19 (those not covered are syphilis, human rabies transmitted by dogs, prenatal tetanus and plague).

⁵ 49th Resolution of the PAHO Directing Council CD49.R19: Elimination of neglected diseases and other poverty-related (October 2009).



BLINDING TRACHOMA

11 million of population at risk

4 countries



SOIL-TRANSMITTED HELMINTH INFECTIONS

46 million children age 1-14 at risk

24 countries



ONCHOCERCIASIS

123 192 population at risk

6 countries with **13** foci:

- **10** foci with transmission eliminated (3 verified by WHO by end of 2015)
- **1** foci with interrupted transmission
- **2** foci where transmission is ongoing



SCHISTOSOMIASIS

25 million population at risk





1,6 million of school-age children who require treatment annually

10 countries:

- **2** countries need to establish treatment
- **2** countries have low transmission
- **6** where it is suspected that transmission has been interrupted

POPULATION AT RISK, NUMBER OF CASES, DEATHS AND COUNTRIES AFFECTED PER YEAR

DUE TO NIDs
IN THE AMERICAS, 2014.

-
-  POPULATION AT RISK
 -  NUMBER OF CASES
 -  COUNTRIES AND TERRITORIES AFFECTED
 -  DEATHS PER YEAR

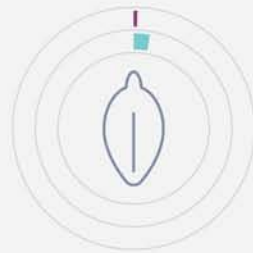
Source: PAHO/WHO



LYMPHATIC FILARIASIS

12,6 million population at risk

4 countries



FASCIOLIASIS

250 000 population at risk

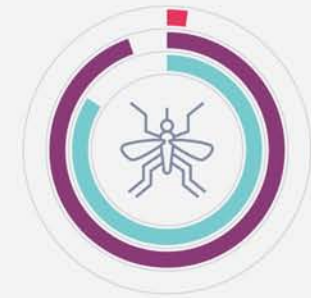
2 countries



LEPROSY

33 789 new cases

24 countries

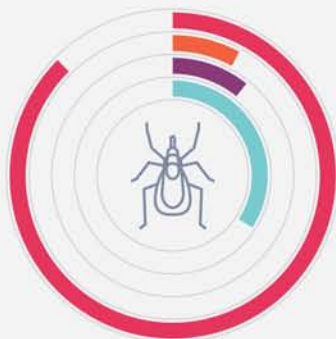


DENGUE

483 deaths per year on average in the last 15 years

562 million population at risk

51 countries y territories



CHAGAS DISEASE

14 000 deaths per year on average

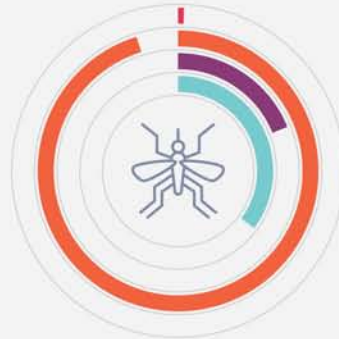
30 000 new cases per year on average

70 million population at risk

6 million infected people

21 countries

DATA
FROM 2010



MALARIA

90 deaths

390 000 cases

120 million population at risk

21 countries



CUTANEOUS LEISHMANIASIS

92 deaths

51 098 cases

240 million population at risk

16 countries



VISCERAL LEISHMANIASIS

235 deaths

3 624 cases

72 million population at risk

6 countries

PRINCIPAL CAUSES:

POVERTY AND OTHER SOCIAL DETERMINANTS OF HEALTH

Infectious diseases are closely associated with the social determinants of health (i.e., the social and economic circumstances in which people are born, live, and work) as a result of the inequitable distribution of power and resources across different levels of socioeconomic status.

In response to concerns about increasing inequities in health, WHO has highlighted various social determinants of health that need to be addressed in order to control and eliminate certain diseases, including NIDs. The recommended measures for addressing these inequities are as follows:



Reduce the poverty of endemic populations.



Improve the health of migrant populations.



Reduce the inequity cause by sociocultural and gender factors.



Reduce environmental risk factors.



Reduce disasters and conflicts in both the social sphere and the health system.



Work on an intersectoral basis to address adverse factors related to water, sanitation, and housing.

STRATEGIES FOR CONTROL AND EVENTUAL ELIMINATION IN THE AMERICAS

NIDs share certain epidemiologic and transmission-related features. Thus, several of these diseases can be found in the same geographic zones, affecting similar population groups. This creates opportunities to piggyback on interventions that 1) are part of existing public health programs, 2) are recognized by the communities, and 3) reach the affected population groups. Examples of these types of interventions are the Expanded Programme on Immunization (EPI), programs to control vector-borne and nutrition programs, Integrated Management of Childhood Illness (IMCI) program, and interventions in primary health care (PHC). Integrating new interventions with existing programs eliminates the need to create new structures and promotes more efficient use of existing ones.

PAHO/WHO recommends six integrated public health strategies to combat NIDs:



Preventive chemotherapy



Intensified case management



Integrated management of vectors



Provision of potable water and sanitation, and improved hygiene



Veterinary public health



Health education in the communities

LANDMARK ACTIONS THAT HAVE HELPED REDUCE THE SUFFERING CAUSED BY THESE DISEASES

ELIMINATING NIDS REQUIRES DECISIVE AND ACTIVE COMMITMENT BY MEMBER STATES, PARTNERS, AND ALLIES, AS WELL AS PARTICIPATION BY THE AFFECTED COMMUNITIES.

The commitments of PAHO/WHO, and landmark actions in combating these diseases over the last 25 years, are listed below.



Starting this year, **NO NEW CASES** of blindness due to onchocerciasis were reported in the Americas.



THE ONCHOCERCIASIS ELIMINATION PROGRAM FOR THE AMERICAS (OEPA) was established to provide technical assistance to countries.



The World Health Assembly approved **RESOLUTION WHA44.9**, which designated leprosy as a public health problem and set the goal of eliminating the disease worldwide.

The PAHO/WHO Directing Council approved **RESOLUTION CD35.R14**, which set the goal of eliminating onchocerciasis in the Americas.

TIMELINE

1991

1993

1995

90's
1990-1999



The goal of **ELIMINATING LEPROSY WORLDWIDE** was achieved. (leprosy as a public health problem).

THE MILLENNIUM DEVELOPMENT GOALS (MDGs) were established, with MDG 6 calling for reducing the incidence of malaria by 2015.



The WHA approved **RESOLUTION WHA51.14**, which sets the goal of eliminating the transmission of Chagas disease.



The PAHO/WHO Directing Council approved **RESOLUTION CD44.R9**, which established the Integrated Management Strategy to Prevent and Control Dengue (IMS-Dengue).



The WHA approved **RESOLUTION WHA54.19**, which calls for strong action to combat neglected infectious diseases (NIDs), including soil-transmitted helminth infections (STHs) and schistosomiasis.



THE STRATEGIC PLAN FOR MALARIA IN THE AMERICAS (2006–2010) was established with the goal of reducing and eliminating the disease.

1998

2000

2001

2003

2006

00's
2000-2009



The Pan American Sanitary Conference approved **RESOLUTION CSP27.R11**, which called for reducing the burden of malaria by at least 50% by 2010 and by 75% by 2015.

The PAHO Directing Council approved **RESOLUTION CSP27.R15** on Dengue Prevention and Control in the Americas.

The WHA approved **RESOLUTION WHA60.13** with the goal of strengthening actions for the surveillance and control of leishmaniasis.



WHO LAUNCHED THE GLOBAL PLAN to Combat Neglected Tropical Diseases by 2020.

The PAHO Directing Council approved **RESOLUTION CD48.R12**, which calls for the elimination of onchocerciasis in the Americas.

The PAHO Directing Council approved **RESOLUTION CD48/R13**, which calls for improving knowledge of vector-borne diseases.

The PAHO Directing Council approved **RESOLUTION CD49.R19**, which expressed the commitment of the Member States to eliminate or reduce NTDs by 2015 to the point where they ceased being a public health problem. This resolution established goals, indicators, and strategies for the control and elimination of Chagas disease, congenital syphilis, human rabies transmitted by dogs, leprosy, lymphatic filariasis, malaria, neonatal tetanus, onchocerciasis, plague, trachoma, schistosomiasis, and STHs.



The WHA approved **RESOLUTION WHA63.20**, which renewed the goals and strategies for the control and elimination of Chagas disease.

WHO PUBLISHED ITS FIRST GLOBAL REPORT on Neglected Tropical Diseases, which proposed a comprehensive approach to combating neglected diseases through integrated intersectoral activities.



PAHO DEFINED A STRATEGIC PLAN for the elimination and control of schistosomiasis, lymphatic filariasis, STHs, onchocerciasis, and blinding trachoma between 2010 and 2015.

The PAHO Directing Council approved **RESOLUTION CD50.R17**, which established the Strategy and Plan of Action for Chagas Disease Prevention, Control, and Care in the Americas.



The PAHO Directing Council approved **RESOLUTION CD51.R11**, with the Strategy and Plan of Action for Malaria in the Americas (2011–2015), which set the goal of reducing malaria morbidity and mortality by 75% and 25% respectively.

2007

2008

2009

2010

2011

10's
2010-2015



WHO PUBLISHED THE "ROAD MAP" to accelerate the achievement of the goals of controlling and eliminating neglected tropical diseases (NTDs) by 2020.

The partners and strategic allies of WHO (including the pharmaceutical industry) at the global level **SIGNED THE LONDON DECLARATION** on Neglected Tropical Diseases, which expresses the will to provide support by donating medicines for preventive chemotherapy, and by funding interventions, to achieve the global goals of controlling and eliminating NIDs.

The WHA approved **RESOLUTION WHA 65.21** for the elimination of schistosomiasis.

WHO's T3 (TEST, TREAT, AND TRACK) INITIATIVE was established to encourage the scale-up of country systems for the diagnosis, treatment, and surveillance of malaria.



WHO PUBLISHED ITS SECOND GLOBAL REPORT on Neglected Tropical Diseases, with recommendations on key interventions to overcome the global impact of NIDs through control, elimination, and eradication strategies.

The WHA approved **RESOLUTION WHA66.12**, with the goal of broadening interventions to combat NIDs.

The General Assembly of the Organization of American States (OAS) **APPROVED RESOLUTION AG 2810 (XLIII-O/13)**, WHICH **ENDORSED PAHO/WHO RESOLUTION CD49.R19** (see landmark action for 2009 above).



WHO PUBLISHED ITS THIRD GLOBAL REPORT on Neglected Tropical Diseases, which emphasizes the national investments needed to achieve stated goals and the need to address the NID challenge within the framework of universal health coverage (UHC).

INNOVATION TO REDUCE THE SUFFERING CAUSED BY THE NEGLECTED INFECTIOUS DISEASES

2012

2013

2015

Despite major progress in the Americas toward meeting the goals for addressing NIDs proposed in 2009, obstacles remain. The results to date provide a foundation for organizing post-2015 work (see “Way forward: post-2015 efforts to combat NIDs”), which will focus on broadening complementary initiatives such as universal health access (UHA), universal health coverage (UHC), PHC, Health in All Policies (HiAP), and the UN Sustainable Development Goals (SDGs).

Through PAHO/WHO, the countries of the Americas have access to donated medicines for control or elimination of eight NIDs: Chagas disease, fascioliasis, leprosy, lymphatic filariasis, blinding trachoma, onchocerciasis, schistosomiasis, and STHs. The donations are facilitated by WHO, through its relationships with partners, and the pharmaceutical industry, based on the 2012 London Declaration.

In 2014, 1 million nifurtimox tablets were donated for the treatment of Chagas disease, along with about 36 000 combined treatments for leprosy, 1.8 million tablets of diethylcarbamazine citrate, 12 million tablets of albendazole for lymphatic filariasis, 21.3 million antiparasitic tablets for STHs, 2,000 tablets of praziquantel for schistosomiasis, and 450 000 tablets of triclabendazole for combating fascioliasis.

SUCCESSSES



ONCHOCERCIASIS (RIVER BLINDNESS)

In 2013, Colombia became the first country in the world verified by WHO as having eliminated onchocerciasis. Ecuador followed in 2014, and Mexico in 2015. Guatemala requested verification in 2014, and results are expected in 2016. The number of individuals needing treatment for this disease declined by 93% between 2009 and 2013, while the number of foci with active transmission dropped from seven to two.



LYMPHATIC FILARIASIS

Since 2009, Costa Rica, Suriname, and Trinidad and Tobago are no longer on the list of countries with endemic lymphatic filariasis. In Brazil, Haiti, and the Dominican Republic, disease transmission has been significantly reduced, approaching the goal of elimination. The most recent data (2013) indicate that a total of 7 million individuals were treated for this disease in the Americas, principally in Haiti.



CHAGAS DISEASE

In Central and South America, 17 countries (Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Uruguay) have eliminated transmission of Chagas disease in most or many of the regions in those countries inhabited by the insect that transmits the disease. In 21 countries where the disease is endemic, screening for the disease has been carried out for 100% of blood bank donors.



BLINDING TRACHOMA

Mexico has evidence of having eliminated blindness due to trachoma, and could request validation from WHO in 2016.





NEGLECTED INFECTIOUS DISEASES

Since 2009, 17 countries have prepared comprehensive action plans to combat NIDs. Six countries have officially launched such plans: Brazil and Honduras, in 2012, for six and nine diseases, respectively; Colombia and Guatemala, in 2013, for three and six diseases, respectively; and El Salvador and Nicaragua, in 2014, for nine and six diseases, respectively.



SCHISTOSOMIASIS

Six countries and territories (Antigua and Barbuda, the Dominican Republic, Guadelupe, Martinique, Montserrat, and Puerto Rico) may have eliminated schistosomiasis transmission (further evaluation of the data is needed for confirmation), and Suriname and St. Lucia may be close to eliminating it.



MALARIA

Interest and support have successfully been increased for accelerating the elimination of malaria through new initiatives such as the Elimination of Malaria in Mesoamerica and the Island of Hispaniola (EMMIE), and the Haiti Malaria Elimination Consortium (HaMEC).



ENDEMIC MALARIA

Currently, in 14 of the 21 countries where malaria is endemic (Argentina, Belize, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, and Suriname), work is in progress on the goal of eliminating this disease.

SUCCESSSES

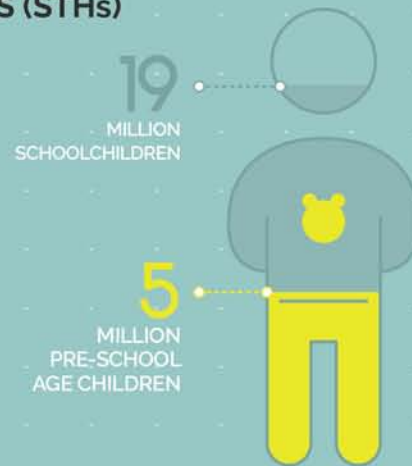
SOIL-TRANSMITTED HELMINTH INFECTIONS (STHs)

Five million preschool children and 19 million schoolchildren were dewormed for STHs in 2014 as a result of the combined work of the deworming program and the Vaccination Week in the Americas (VWA) initiative.



24

MILLION OF
CHILDREN DEWORMED



LEPROSY

Of the 35 countries and territories of the Americas, 34 have eliminated leprosy at the national level (less than 1 case per 10,000 inhabitants).



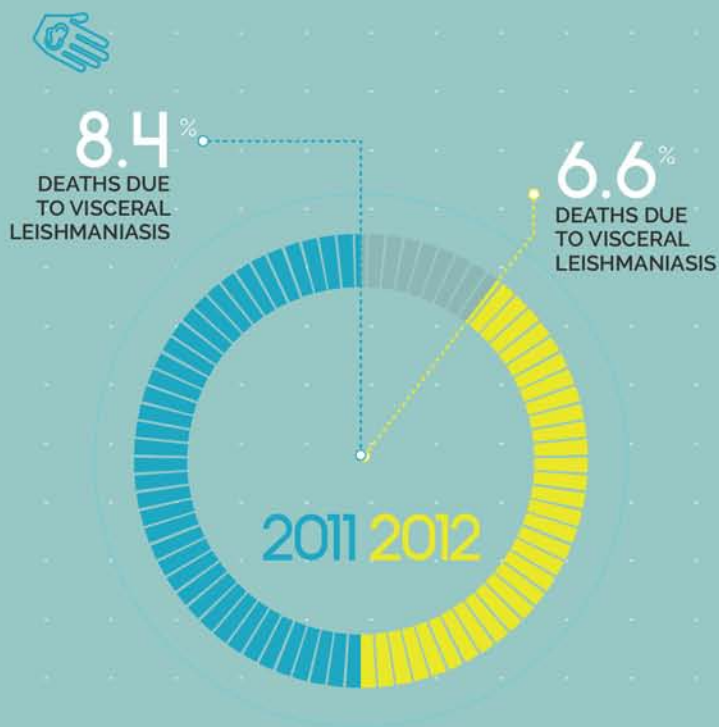
34

COUNTRIES WITH
LESS THAN ONE CASE OF
LEPROSY PER 10,000
INHABITANTS



LEISHMANIASIS

Deaths due to visceral leishmaniasis fell from 8.4% to 6.6% between 2011 and 2012. Implementation of the Regional Leishmaniasis Information System, known as SisLeish (*Sistema de Información Regional de Leishmaniasis*), has provided consolidated, up-to-date data on the epidemiologic status of the disease in the Americas. The PAHO/WHO Regional Fund for Strategic Public Health Supplies ("Strategic Fund") has facilitated countries' access to affordable, high-quality medicines for the treatment of leishmaniasis.



DENGUE

Adoption of the Integrated Management Strategy to Prevent and Control Dengue (IMS-Dengue) has made it possible for countries to improve the effectiveness of individual treatment, thereby reducing the number of deaths from dengue and achieving more timely vector control. Dengue nevertheless remains a serious problem in the Americas.



TIMELY
CONTROL



MORE
EFFECTIVE



REDUCING
DEATHS



CHALLENGES

The Americas faces many serious challenges with regard to controlling and eliminating NIDs. A final drive by the countries is needed, in the form of comprehensive, intersectoral, sustainable measures capable of protecting the health of the most vulnerable populations. Stronger political commitment to improving access to treatment and monitoring the number of people suffering from these diseases, as part of PHC and UHC initiatives, is also needed.

Health and other authorities will need to formulate and implement intersectoral policies, plans, and projects, integrated in each country's local and national context, or in the areas where these diseases are endemic, through collaboration and agreements with the affected communities and key partners. At present, the most important needs are the following:

IDENTIFY AND DISSEMINATE
information on actions and best practices to be implemented in the post-elimination phase in order to protect achievements and detect any reemergence of the diseases.



MONITOR AND EVALUATE
progress toward the goals of control and elimination, using appropriate tools such as evaluation of transmission, epidemiologic surveillance, and impact evaluation, among others.



CONDUCT OVERSIGHT AND REASSESS
the progress of the relevant plans, programs, and projects in the countries.



KEEP

senior policy staff focused on the issue of NIDs and ensure that the issue remains among the priorities of ministries of health and national governments, while sustaining long-term interest in combating this group of diseases and maintaining commitments to the necessary funding.



KEEP AND STRENGTHEN

partnerships at all levels by improving coordination and planning with strategic partners and allies.



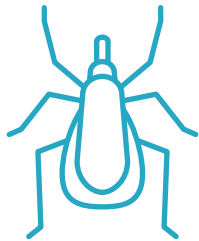
MOVE FORWARD

in developing action plans for the control and elimination of NIDs, implementing such plans locally as part of UHC and PHC.

CHAPTER

2

NID_s THAT COULD BE ELIMINATED



CHAGAS
DISEASE:
THE AMERICAN ENDEMIC DISEASE



CHRONIC
CONSEQUENCES



POTENTIALLY
FATAL



CURABLE



Chagas disease, or American trypanosomiasis, is a potentially fatal parasitic disease caused by the microorganism *Trypanosoma cruzi*.

The disease is transmitted to humans of insects popularly known by local names such as *vinchucas*, *chinchas*, *chirimachas*, or kissing bugs depending on the country. These insects feed on blood and commonly live in the cracks of poorly constructed dwellings, hiding during the day and becoming active at night, biting people while they are asleep. These insects eliminate parasites through stool, which enters the body when someone who has been bitten

Regular house visits help those affected by NIDs to adequately take the recommended medication.

instinctively scratches the bite and thus introduces feces left by the insect into the wound created by the bite, or subsequently touches another open cut/wound, an eye, or their mouth. The parasite can also be transmitted through blood transfusions and organ transplants, from mother to child during pregnancy, and by consuming food contaminated by the insects that transmit the disease.

The first symptoms of infection include headache, fever, skin lesions, inflammation of the ganglia, and ab-

dominal pain. Over time, the disease can have irreversible and chronic effects on the nervous system, digestive tract, and heart. One of the best known chronic diseases is chronic chagasic cardiopathy, characterized by alterations in heart rate and heart failure, which results in advanced stages, and enlargement of the heart that severely affects the quality of life of patients.

Treatment with benznidazole or nifurtimox can cure the disease if the drug is administered shortly after infection. If the infection is al-

ready chronic, treatment can slow its progress.

Chagas disease is found principally in Latin America, but in recent decades cases have also been diagnosed in Canada, Europe, the United States, and some countries in the Western Pacific, as infected persons migrate from endemic areas.



"ONE OF THE BEST KNOWN CHRONIC DISEASES IS CHRONIC CHAGASIC CARDIOPATHY, CHARACTERIZED BY ALTERATIONS IN HEART RATE AND HEART FAILURE, WHICH RESULTS IN ADVANCED STAGES, AND ENLARGEMENT OF THE HEART THAT SEVERELY AFFECTS THE QUALITY OF LIFE OF PATIENTS."

STATUS IN THE AMERICAS

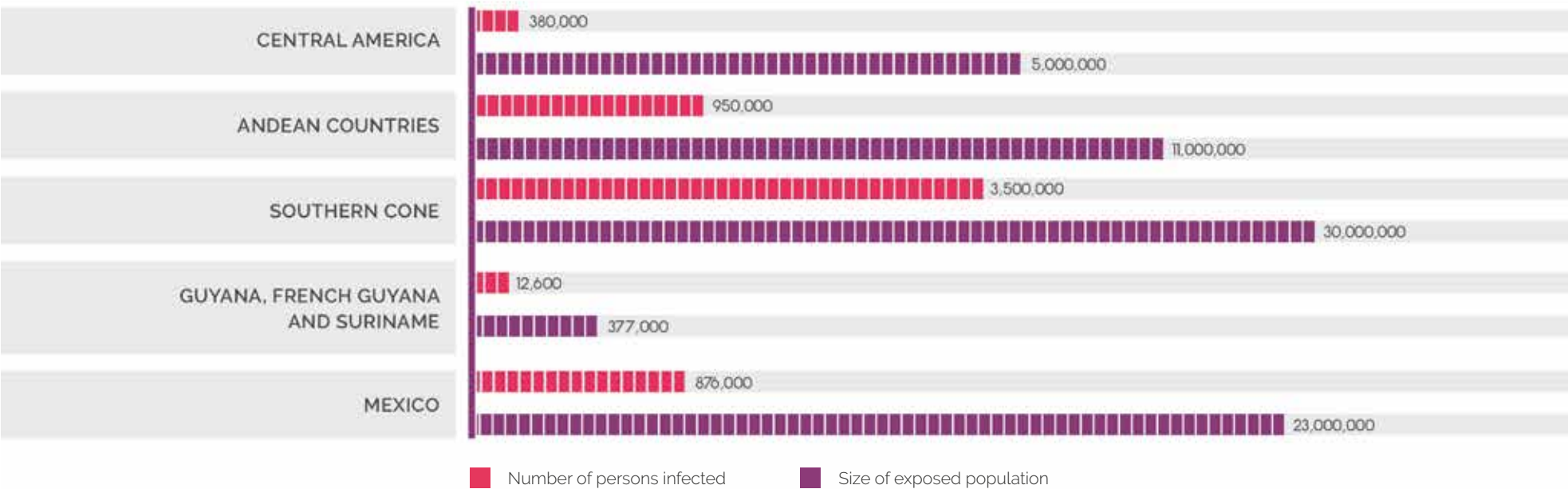
Chagas disease is the most common of all neglected infectious diseases of all in the Americas. Infection is limited to the poorest rural areas of Latin America and the Caribbean, where 80% of cases are caused by insects that transmit the disease.

The disease is endemic in 21 countries in the Americas, affecting some 6 million people annually. Each year 30,000 new cases are re-

ported, and 9,000 newborns are infected each year during pregnancy.

Currently, more than 70 million individuals in the Americas live in areas at risk of contracting the disease. Table 1 shows its geographic distribution.

Table 1. Number of persons infected with *Trypanosoma cruzi* and at risk of contracting Chagas disease, by subregion in Latin America and the Caribbean



WHY IT PERSISTS IN THE AMERICAS

The health determinants that directly affect Chagas disease involve poverty and housing conditions in the endemic areas. As long as housing does not improve, and construction materials encourage the presence of vectors and the rapid transmission of the infection, this disease will continue to be difficult to control.

MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

Efforts to combat Chagas disease must combine the elimination of transmission caused by the vector insect, to interrupt blood-borne transmission (transfusions, transplants, and congenital transmission), with control of outbreaks due to food-borne transmission.

The main prevention and control methods are as follows:

- Spraying dwellings and their surroundings with insecticides in endemic areas.
- Improving housing to prevent infestation by the vector.
- Taking personal preventive measures, such as using mosquito nets.
- Adopting universal screening of blood and organ donors.
- Establishing environmental control programs.

- Promoting hygienic practices in food preparation, transport, storage, and consumption.
- Strengthening detection programs for diagnosing and treating pregnant women and women of reproductive age.
- Strengthening perinatal programs for monitoring and tracking newborns diagnosed with Chagas disease.

The strategy for integrated control also includes diagnosis and treatment of all affected persons entering the national healthcare system.

WHO recommends benznidazole and nifurtimox for antiparasitic treatment. For acute cases, cure rates and quality-of-life benefits are high; for chronic cases, the course of the disease can be limited significantly.



▲ STEPS BEING TAKEN IN THE AMERICAS

The objectives set by PAHO/WHO are to interrupt household transmission by the principal vector, eliminate blood-borne transmission of the parasite, and provide access to treatment and care in the healthcare system by 2020.

Since the beginning of the 1990s, the affected countries have organized to actively combat Chagas disease and reach the established targets. Coordinated by PAHO/WHO, modalities of cooperation between countries known as Subregional Initiatives for the Prevention and Control of Chagas Disease were created and launched in different countries / subregions over a 12-year span (Southern Cone, 1992; Central America, 1997; Andean countries, 1998; Amazon countries and Mexico, 2004). These initiatives have significantly reduced the number of acute cases, and the household presence of the vectors that transmit the infection, in all endemic areas,

while also reducing mortality and suffering caused by the disease.

Through PAHO/WHO, the countries in the Americas receive 3,000 to 4,000 nifurtimox treatments each year (approximately 900,000 tablets). Benznidazole, which is now produced in Argentina and Brazil, can be purchased through the PAHO/WHO Strategic Fund.



Middle photo: Living conditions and quality of life are determining factors in the likelihood of contracting NIDs.



▲ SUCCESSES

By 2015, the transmission of Chagas disease by the principal vectors had been interrupted in all or part of the territories of 17 countries in the Americas: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Uruguay. Non-autochthonous species had also been successfully eliminated.

Other advances include universal screening of blood donors in the 21 endemic countries, a gradual increase in the coverage and quality of medical care for patients with the disease, universal screening, elimination of non-autochthonous vector species, and detection and treatment of congenital cases.



Determining health factors that lead directly to Chagas disease are related to poverty. Within poorly constructed houses in rural and suburban areas reside the insects that transmit the disease.

HIGHLIGHT



CENTRAL AMERICA CONQUERS AN EXOTIC VECTOR

Central America provides a success model for the coordinated fight against NIDs in the Americas. Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama have worked for more than 14 years to interrupt the transmission of Chagas disease.

The disease vector *Rhodnius prolixus* was introduced to Central America at the beginning of the 20th century (1910) when various specimens of hemipteran insects that had been brought to El Salvador for research purposes as a gift from a European university accidentally escaped from a laboratory. This dangerous species, which originated in South America, subsequently spread to all Central American countries, where it led to a large number of people becoming sick and dying and produced socioeconomic repercussions for the next 100 years.

The presence of this insect, along with the autochthonous species, generated endemic Chagas disease in the Central American subregion. In 2006, approximately 800 000 people were infected, 12 million were at risk of contracting the infection, and there were 8 500 new cases per year. By 2010, those numbers had been cut in half.

The key to success in conquering the disease in Central America was the countries' decision to work together to combat it by adopting an integrated anti-vector. As a result, in 1997 three initiatives were established into one, the Initiative of the Countries of Central America and Belize for Interruption of Vector-borne Transmission of Chagas disease by *R. prolixus*, Reduction of Household Infestation by *Triatoma dimidiata*, and Elimination of Transfusional Transmission of *T. cruzi* (IPCA).



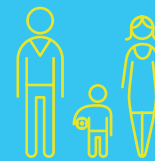
Improvement of housing to prevent infestation by the vector that transmits Chagas disease is crucial for elimination.

The integrated strategy included the use of insecticides inside and outside of dwellings, along with environmental control measures designed to modify the household environment (appropriate waste management, proper handling of livestock and pets, etc.), which, along with interventions to reduce poverty and improve social conditions, raised the quality and hygiene of rural housing, with consequent progressive control of the vector.

One of the first results was the interruption of the transmission of the Chagas disease parasite by *R. prolixus* in Guatemala in 2008, followed by similar successes in Nicaragua and Honduras in 2010, and in Belize in 2011. In El Salvador and Costa Rica, the infection was eliminated as a public health problem in 2009 and 2010, respectively.

In 2009, Mexico confirmed the elimination of the vector *R. prolixus* in Chiapas and Oaxaca, and in 2013 Mexico joined the subregional IPCA initiative, which was renamed IPCAM (Initiative of the Countries of Central America and Mexico for the Control of Vector-borne and Transfusional Transmission and Medical Care for Chagas Disease).

The successful effort by these countries, along with the cooperation of partners and allies, has held back this dangerous endemic disease, and gives grounds for optimism that other goals can be achieved, such as controlling *T. dimidiata* infestation in housing, ensuring the sustainability of universal screening of blood donors, and optimizing the quality and coverage of medical care for those suffering from the disease.



"IN 2006, APPROXIMATELY 800,000 PEOPLE WERE INFECTED, 12 MILLION WERE AT RISK OF CONTRACTING THE INFECTION, AND THERE WERE 8,500 NEW CASES PER YEAR. BY 2010, THOSE NUMBERS HAD BEEN CUT IN HALF."

CHALLENGES

While substantial progress has been made in combating Chagas disease in the last years, some countries have not succeeded in interrupting transmission in all or some of their territory. In several countries, the situation has remained stable during the past four to five years.

One of the main current challenges is to treat infected persons who have migrated to non-endemic countries.

The immediate public health goals for combating Chagas disease are as follows:

- Maintain the interest, support, and investment of the governments of the Americas in continuing to further efforts to control the disease, thus minimizing the probability of infection for future generations and improving the quality of life of all who are already infected.

- Increase the coverage and quality of medical care for Chagas disease for all patients, with an emphasis on diagnostic capacity, timely and appropriate treatment in PHC, and UHC.

- Strengthen vector control and elimination efforts and increase epidemiologic surveillance.

- Provide incentives for and maintain screening of blood and organ donors in all endemic countries.

- Prevent and treat the disease occurring through the consumption of contaminated food.



SCHISTOSOMIASIS:

A DISEASE TRANSMITTED BY
FRESHWATER SNAILS

Schistosomiasis is an NID caused by the parasite *Schistosoma mansoni*. People become infected when the parasite's larvae, which are released into water bodies by freshwater snails of the genus *Biomphalaria*, penetrate the skin when people come into contact with the contaminated water.

The clinical form of the disease can be intestinal or urogenital, but only the former is found in the Americas. The infection is characterized by abdominal pain, diarrhea, and blood in the feces and can progressively damage organs, create chronic sequelae, and, in the most advanced cases, lead to enlargement of the liver or spleen.

The disease is prevalent in tropical and subtropical regions, particularly in communities living in extreme poverty, without access to improved basic sanitation facilities or potable water. Although there are no precise figures on mortality, deaths from schistosomiasis are reported every year among children as well as adults.



TREATMENT
AVAILABLE



CURABLE



SERIOUS CASES
CAN LEAD
TO DEATH



CHRONIC

STATUS IN THE AMERICAS

An estimated 25 million people are at risk of contracting schistosomiasis in the Americas, and 90% of them are in Brazil. The other affected countries are Venezuela (which also has a high level of transmission) St. Lucia and Suriname (which have low, geographically focalized transmission). Close to 1.6 million school-age children (5–14 years old) need preventive treatment, principally in Brazil and Venezuela.

Antigua and Barbuda, Guadeloupe, Martinique, Montserrat, and Puerto Rico need an evaluation of the disease's transmission in the areas where the infection has historically been present but may have been eliminated. In 2013, a survey was conducted in the Dominican Republic to update information on the transmission of schistosomiasis, and no positive cases of the infection were found. Currently, the country is compiling all of the necessary evidence to demonstrate that transmission has been interrupted.

WHY IT PERSISTS IN THE AMERICAS

Schistosomiasis is more common in men than in women because of men's greater exposure to work activities that involve contact with contaminated water. Women who perform household work, such as washing clothes in rivers or streams, where snails can be infected by the parasite, are another at-risk group.

Population movements and migration to urban areas are introducing the disease to new areas with limited or no access to sanitation services and safe drinking water. Children are especially vulnerable to the disease due to their lack of hygiene and tendency to play in rivers or streams with vegetation and low water flow.

■ MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The objective set by PAHO/WHO is eliminate transmission of the Americas. This goal was recently modified when international specialists and countries in the Americas indicated that it would be possible to eliminate the disease by 2020 with the tools currently available.

The main battle strategy is the administration of preventive treatment on a massive scale, using the antiparasitic drug praziquantel, to achieve a minimum of 75% coverage among school-age children living in at-risk areas. In addition to this primary strategy, the following complementary interventions should be considered:

- Reducing the contamination of rivers and streams with feces and urine from infected persons, thereby controlling the snail population and interrupting the parasite's cycle of transmission. It is also important to control irrigation and agricultural practices in endemic areas, and to reduce the habitat of the freshwater snails by eliminating vegetation.
- Improving sanitation systems and access to potable water.
- Educating the community on reducing contact with contaminated water and taking appropriate action when there is contact.

■ STEPS BEING TAKEN IN THE AMERICAS

PAHO/WHO is actively involved in combating schistosomiasis, offering countries the antiparasitic drug praziquantel free of charge, along with laboratory materials and technical support for mapping; implementing activities; and conducting monitoring and evaluation in order to help eliminate the disease.

► SUCCESSES

By 2020, the Americas could be the first WHO region to successfully interrupt the transmission of schistosomiasis, provided that the four endemic countries (Brazil, St. Lucia, Suriname, and Venezuela) increase their efforts to eliminate the disease.

Notable in terms of progress to date are the following actions, by country:

- In Brazil, data on the number of people with schistosomiasis are being collected and updated in order to make adjustments to and implement specific interventions to eliminate the disease.
- In Venezuela, transmission has declined in some endemic states, and diagnosis and individual treatment with praziquantel is being practiced.
- In St. Lucia, an action plan is being updated to improve surveillance of schistosomiasis, and a national study that also incorporates STHs is in progress to determine the epidemiologic status of both of these infections and the measures that need to be adopted for their control.
- In Suriname, interventions are being intensified to eliminate schistosomiasis in the areas where cases have been detected among schoolchildren, and a plan to control the disease is being developed.



Working with communities to identify and prevent contact with the snails that transmit schistosomiasis is part of the solution.

CHALLENGES

The greatest challenge in eliminating schistosomiasis in the Americas is increasing political commitment in countries with low levels of transmission so that they intensify their efforts in this final stage of the battle. National health institutions tend to focus their energy and work on the diseases that cause the most morbidity and mortality within the country, making low-transmission diseases a secondary concern. However, if all countries give a final push to establish concrete schistosomiasis interventions, the disease could be eliminated by 2020.

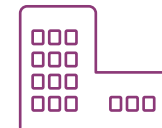
Eliminating schistosomiasis within the desired timeframe is still a realistic goal provided the following actions are taken in the short term:

- Updating information on the status of the disease in Brazil and Venezuela to help strengthen control measures with evidence-based results.
- Making adjustments in the mass administration of medicines in Brazil and Venezuela in accordance with WHO guidelines.

- Formulating a national plan in Venezuela to address NIDs, including schistosomiasis.

- Stepping up work to eliminate the disease, especially in countries with low prevalence, such as St. Lucia and Suriname.

- Compiling the information needed for Antigua and Barbuda, the Dominican Republic, Guadeloupe, Martinique, Montserrat, and Puerto Rico to move toward official verification of elimination by PAHO/WHO.



“NATIONAL HEALTH INSTITUTIONS TEND TO FOCUS THEIR ENERGY AND WORK ON THE DISEASES THAT CAUSE THE MOST MORBIDITY AND MORTALITY WITHIN THE COUNTRY, MAKING LOW-TRANSMISSION DISEASES A SECONDARY CONCERN.”

SUCCESS STORY ABOUT SCHISSTOSOMIASIS

(SEE THE SUCCESSES STORY ABOUT BRAZIL INNOVATION IN THE FIGHT NIDs IN THE UPCOMING HIGHLIGHT)



LYMPHATIC FILARIASIS: THE "ELEPHANT LEG" STIGMA



TREATMENT
AVAILABLE



PROVOKES STIGMA
AND
DISCRIMINATION



NON-FATAL



CHRONIC

Lymphatic filariasis is a chronic infectious disease that causes major disability and leads to stigma and discrimination. Human infection occurs when the filaria larva (*Wuchereria bancrofti*) enters the body through the bite of a mosquito, most often of the genus *Culex*. The larvae travel through the blood to the lymphatic ganglia, where they nest and reproduce until they become adult worms. The infection alters the lymphatic system, and can enlarge some parts of the body, principally the scrotum and legs, due to an accumulation of fluids. The disease is instantly recognizable in those whose legs are affected; the legs become so swollen that they resemble elephants' legs, which explains why the disease is also called "elephantiasis."

Unlike other diseases produced by mosquito bites, filariasis infection generally requires hundreds of bites by infected, parasite larva-bearing mosquitos.

Lymphatic filariasis is not fatal. It is usually acquired in childhood, but the most painful and disfiguring manifestations appear in adulthood, provoking rejection and social stigmatization that can lead to loss of self-esteem and reduced work opportunities, with consequent harm to the individual's economic and social circumstances.

■ STATUS IN THE AMERICAS

PAHO/WHO estimates that about 12.6 million individuals are at risk of lymphatic filariasis infection in the Americas, and 80% of them are in Haiti. The main vector for the infection in the Americas is the mosquito species *Culex quinquefasciatus*. Currently, lymphatic filariasis is considered endemic in four countries in the Americas: Brazil, the Dominican Republic, Guyana, and Haiti.

Treatment consists of massive distribution of antiparasitic drugs for five or six years among the at-risk population. Taking this drug eliminates the larvae from the blood and interrupts transmission. The drugs are donated to WHO, which provides them to the affected countries.

Only some chronically affected people develop the forms of lymphatic filariasis that cause disfigurement. Moreover, the condition can be improved or kept from deteriorating through basic self-care methods such as practicing proper hygiene in the affected parts of the body, raising the legs, treating skin infections, etc.



"PAHO/WHO ESTIMATES THAT ABOUT 12.6 MILLION INDIVIDUALS ARE AT RISK OF LYMPHATIC FILARIASIS INFECTION IN THE AMERICAS, AND 80% OF THEM ARE IN HAITI."

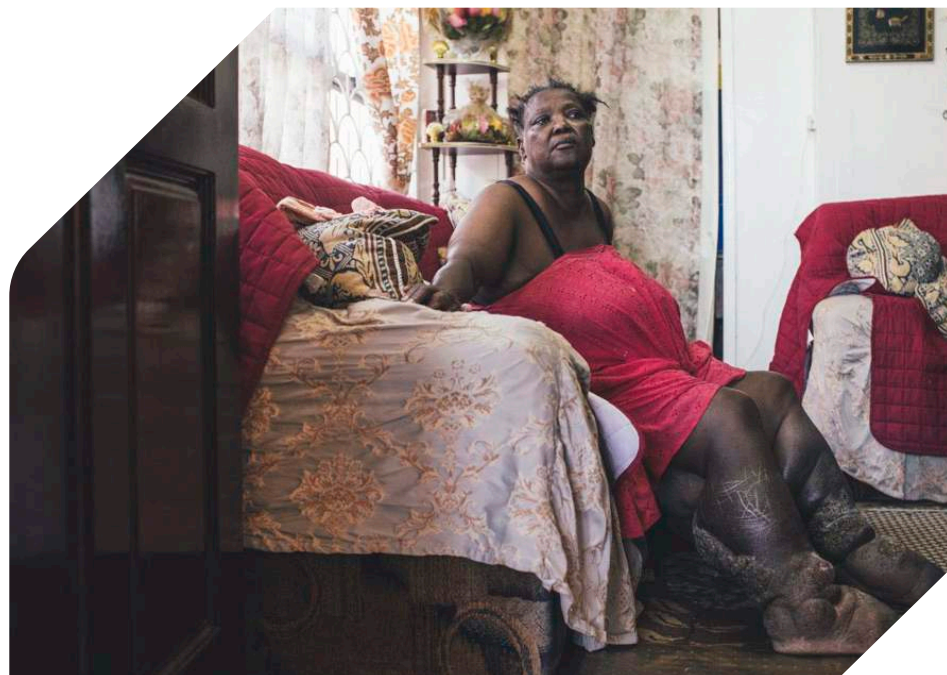
WHY IT PERSISTS IN THE AMERICAS

Construction materials and precarious housing are an important factor in exposure to the infection. Those that favor the presence and reproduction of the mosquitoes that transmit filariasis will increase the risk. Natural disasters such as Hurricane Noel, which struck the Dominican Republic in 2007 and the 2010 earthquake in Haiti which led to a cholera outbreak in 2011, all worsened conditions of those living in extreme poverty. Such disasters can result in the emergence and rapid spread of NIDs, including lymphatic filariasis. Access to potable water and basic sanitation are key in preventing transmission of the disease.



**"ACCESS TO POTABLE WATER
AND BASIC SANITATION ARE KEY
IN PREVENTING TRANSMISSION
OF THE DISEASE."**

Lymphatic filariasis can lead to deformity, which carries the weight of social stigma and discrimination.



MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The objective of PAHO/WHO is to eliminate the lymphatic filariasis as a public health problem in the Americas by 2020 while at the same time addressing morbidity and preventing the disability that the disease produces. The principal strategy for interrupting the transmission of lymphatic filariasis consists of mass administration of the antiparasitic drugs diethylcarbamazine and albendazole. These drugs must be distributed annually for at least five or six consecutive years, reaching a minimum of 65% of the at-risk population. The following complementary measures are also required:

- Implementing integrated vector control through the use of mosquito nets in the windows and doors of dwellings, and over beds, and eliminating breeding sites (e.g., by applying insecticides in open latrines).

- Offering patient care in PHC settings and providing social inclusion services for people affected or disabled by the disease.
- Implementing information and education campaigns in affected schools and communities.
- Coordinating mass drug administration with other programs, such as STH control, which also entails the use of the antiparasitic drug albendazole.



"THE OBJECTIVE OF PAHO/WHO IS TO ELIMINATE THE LYMPHATIC FILARIASIS AS A PUBLIC HEALTH PROBLEM IN THE AMERICAS BY 2020"



STEPS BEING TAKEN IN THE AMERICAS

Lymphatic filariasis is one of the five priority NIDs in the PAHO/WHO work program. WHO has approved a number of resolutions calling for interventions to eliminate the disease as a public health problem linked to extreme poverty.


Thanks to the donations of medicines and the active commitment of various international institutions and partners, PAHO/WHO has coordinated free administration of more than 12 million albendazole tablets to the affected population in the Dominican Republic, Guyana, and Haiti. It also provided 1.8 million doses of diethylcarbamazine to the Dominican Republic and Guyana in 2014.



Health teams conduct blood tests at night on persons living in areas where lymphatic filariasis is endemic.



SUCCESSES



In 2011, WHO classified Costa Rica, Suriname, and Trinidad and Tobago as non-endemic countries for lymphatic filariasis.

The chief accomplishments in the fight against the disease in the four countries that remain endemic are as follows:

- **Brazil:** Transmission has been eliminated in seven states, and coverage of mass drug administration has been increased in the single active focus, which is in the Recife metropolitan area. Transmission may be interrupted in 2016.
- **The Dominican Republic:** Interruption of transmission of the infection has been demonstrated in the principal focus, which is in the department of Barahona. In 2006, mass drug administration in La Ciénaga was halted due to the program's success in that area. The only active focus in the country is in the Eastern *Bateyes* area.

- **Guyana:** Mass drug administration was restarted in 2012. Guyana, Suriname, and Trinidad and Tobago have agreed to conduct joint surveillance in their border areas to prevent reintroduction of the disease in the latter two countries.

- **Haiti:** Despite the earthquake in 2010, Haiti succeeded in treating 4 million individuals. In 2011, mass drug administration to fight the disease reached 90% of the population for the first time, with 9 million individuals treated. Coverage remained high in 2012, reaching 8.1 million people.

- Because one of the antiparasitics administered in lymphatic filariasis interventions is also used to treat STHs, lymphatic filariasis programs have also strengthened comprehensive activities to fight STHs.

HIGHLIGHT



HAITI: TENACIOUS WARRIOR IN THE FIGHT AGAINST LYMPHATIC FILARIASIS

Given that Haiti has the highest poverty index and the worst health indicators in the Western Hemisphere, it is not surprising that the country has the highest burden of lymphatic filariasis in the Americas. "Filariasis is associated with extreme poverty," Steven Ault, Ex Senior Advisor of the PAHO Regional Neglected Infectious Diseases Program, explained. "This disease was imported from Africa during the slavery era, but as the countries in the Americas prospered, it began to disappear." Political crises, hurricanes, the devastating earthquake of 2010, and the subsequent cholera epidemic are some of the many challenges that the population of this Caribbean country has had to face in fighting lymphatic filariasis and other infections. However, Haiti's National Program to Eliminate Lymphatic Filariasis (NPELF) has been recognized as a successful model of implementation and sustainability.

The NPELF was implemented in year 2000 to interrupt the transmission of lymphatic filariasis and reduce the suffering of patients with chronic symptoms. The chief strategy for combating the disease is the mass administration of antiparasitics to the population in endemic communities, covering the entire at-risk population, with the exception of pregnant women and children less than 2 years old.

The program began as a pilot project to eliminate lymphatic filariasis by providing drugs in the coastal area of Léogâne, one of the areas most affected by the disease. Based on that experience, the program was expanded to other regions of the country, reaching almost the entire country by 2011, an achievement that has been sustained since then.

Haiti's Ministry of Public Health and Population has directed the program's technical and operational aspects, and inter-

Lymphatic Filariasis is a chronic infectious disease that causes impairment, social stigma and discrimination.

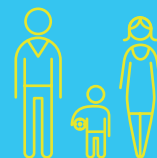


national organizations RTI, IMA World Health and the University of Notre Dame in the United States have coordinated mass drug administration.

These two organizations distribute and maintain a record of the doses of antiparasitics donated through WHO and administered in schools, churches, and other meeting places. A group of specially trained volunteers is in charge of this effort. The group is also responsible for communicating health messages to the population and organizing social inclusion workshops for affected persons. "I have seen people who can't find shoes to

fit their feet, or whose family abandoned them because of their deformity. This does not need to happen," explains Jean Frantz Lemoine, head of the NPELF.

However, representatives from IMA World Health and the University of Notre Dame agree that based on their experience in the field the greatest obstacle to eliminating the disease is insufficient funding for expanding coverage of mass drug administration, and treating chronic morbidity. "There are surgical interventions to eliminate lymphatic liquid from the scrotum. If the legs are affected, we teach them to wash them every day, as



"THE CHIEF STRATEGY FOR COMBATING THE DISEASE IS THE MASS ADMINISTRATION OF ANTIPARASITICS TO THE POPULATION IN ENDEMIC COMMUNITIES"

well as raising the legs to reduce swelling and prevent ulcerations and foul odor,” says Luccene Desir of the University of Notre Dame's Hôpital St. Croix.

Even if the transmission of lymphatic filariasis is interrupted, people with disabilities caused by the disease will still require treatment. Meeting these challenges requires committed partners, a continuing focus on fundraising, and new intervention strategies that help address other NIDs, such as STHs, at the same time.



Lymphatic Filariasis is instantly recognizable in those who suffer from its effects on the legs. Their legs swell to the point where they begin to resemble those of an elephant, hence why it is often referred to as "elephantiasis".

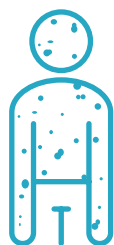


CHALLENGES

The greatest challenge to eliminating lymphatic filariasis in the Americas is integrated vector control. Hardly any national programs include this activity due to the high cost of vector-control interventions. Therefore, experts recommend coordinating vector control for multiple infectious diseases, to spread the cost across different health programs and at the same time improve the coverage of all of the interventions, as well as their frequency and sustainability.

Other important challenges in fighting the disease include the following:

- Sustaining previous accomplishments through mass drug administration, and expanding the intervention to the entire at-risk population of endemic countries, especially in Guyana.
- Developing tools to conduct surveillance after transmission has been interrupted, to prevent reintroduction of transmission.
- Strengthening and broadening integration between lymphatic filariasis elimination programs and programs designed to control STHs.
- Standardizing the processes involved in validation the elimination of lymphatic filariasis as a problem of public health so that Costa Rica, Suriname, and Trinidad and Tobago can obtain official validation.



LEPROSY:

AN ANCIENT DISEASE

Leprosy is a chronic infectious disease that develops slowly, with an average incubation period of five years, though symptoms may take 20 years to appear.

Unlike most NIDs, which are caused by parasites, leprosy is caused by a bacterium, *Mycobacterium leprae*, also known as Hansen's bacillus. It chiefly affects the skin, peripheral nerves, mucous membranes of the respiratory tract, and eyes. It is curable, and the disability it creates can be prevented if the disease is diagnosed and treated properly in the first phases of the infection. When cases are not treated during the first phase of infection, the disease, and reactions that occur as a result of it, can cause progressive and permanent sequelae, including deformities and mutilations, reduction of mobility of the limbs, and even blindness.

Leprosy is one of the oldest infectious diseases, recognized in the ancient civilizations of Egypt, India, and China, and de-



Skin and sensory examinations to the children are key in the early detection of Hansen's Disease.

scribed in Biblical texts. Throughout history, individuals with leprosy have been ostracized by their families and communities, and have suffered great stigma and social discrimination, a situation that persists in current times.

Although leprosy is not highly contagious, it can be transmitted by direct contact with body fluids from the nose and mouth. However, this only occurs through close and frequent contact with untreated sufferers.

Thanks to countries commitment, persistence, and efforts, the goal of eliminating leprosy as a public health problem at the global level was achieved in 2000, when morbidity due to leprosy dropped below 1 case per 10,000 inhabitants globally. New strategies need to be carried out to obtain those

same low case rates countrywide or within specific country territories (states, departments, etc.), confining efforts to combating the disease in communities where transmission still occurs.

The most recent available data indicate that 213,899 new cases of leprosy were reported worldwide in 2014. In that year, 81% of reported new cases were in 3 countries that reported more than 1,000 new cases per year, i.e., with the largest volume concentrated in those three: India (125,785 cases), Brazil (31,064), and Indonesia (17,025)



"THANKS TO COUNTRIES COMMITMENT, PERSISTENCE, AND EFFORTS, THE GOAL OF ELIMINATING LEPROSY AS A PUBLIC HEALTH PROBLEM AT THE GLOBAL LEVEL WAS ACHIEVED IN 2000, WHEN MORBIDITY DUE TO LEPROSY DROPPED BELOW 1 CASE PER 10,000 INHABITANTS GLOBALLY."

STATUS IN THE AMERICAS

The number of new cases of leprosy detected in the Americas dropped by 35.8% in the last decade, from 56,622 in 2004 to 33,789 in 2014. All of the countries in the Americas have succeeded in eliminating leprosy at the national level (less than 1 case per 10,000 inhabitants), except Brazil, where 1.27 persons per 10,000 inhabitants are infected. In the last five years, while a few new cases have been detected in 24 countries of the Americas, 94% of them are in Brazil.

Currently, the countries reporting more than 100 new cases per year in LAC are: Argentina, Bolivia, Brazil, Colombia, Cuba, the Dominican Republic, Ecuador, Mexico, Paraguay, and Venezuela. These figures underscore the fact that, despite the achievements, measures to control the disease must be continued to sustain progress made to date.



"IN THE LAST FIVE YEARS, WHILE A FEW NEW CASES HAVE BEEN DETECTED IN 24 COUNTRIES OF THE AMERICAS, 94% OF THEM ARE IN BRAZIL."

WHY IT PERSISTS IN THE AMERICAS

Infection is more frequent among men than among women. The reason for this discrepancy has not been identified but could be due to differences in occupational activities and forms

of exposure. Deficient housing conditions and crowding are important factors in maintaining the transmission of leprosy.

■ MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The objective agreed upon by PAHO/WHO Member States is to achieve a prevalence of less than 1 case per 10 000 inhabitants in the principal political/administrative divisions of each country (i.e., states, provinces, or departments).

The administration of treatment (polychemotherapy) is the chief intervention in the fight against leprosy, and WHO has been providing the medicines free of charge to all infected individuals in the Americas since 1995. The following complementary strategies are also being used:

- Active searching for cases among direct contacts of affected persons (those living with affected persons submit to a meticulous exam that detects signs of leprosy, principally spotty discoloration of the skin with loss of sensation).
- Improving access to diagnosis and treatment by creating accessible, flexible PHC systems for the at-risk population and for those already affected.

- Creating awareness in the communities so that suspected cases of leprosy and sufferers seek medical attention as promptly as possible.
- Combating the stigmatization and discrimination that affect people with leprosy and their families.
- Establishing prevention, early detection, and rehabilitation measures to address the disability caused by leprosy.
- Integrating leprosy care services in PHC settings, and including leprosy control program activities in the Region's comprehensive approach to NIDs.



"THE ADMINISTRATION OF TREATMENT (POLYCHEMOTHERAPY) IS THE CHIEF INTERVENTION IN THE FIGHT AGAINST LEPROSY, AND WHO HAS BEEN PROVIDING THE MEDICINES FREE OF CHARGE TO ALL INFECTED INDIVIDUALS IN THE AMERICAS SINCE 1995."

▲ STEPS BEING TAKEN IN THE AMERICAS

The great success in the global battle against leprosy has resulted in the active participation of the endemic countries, donors, and non-governmental organizations (NGOs) in implementing the strategies recommended by WHO.

In 2012, PAHO/WHO formulated an action plan for LAC to accelerate the elimination of the infection as a public health problem in the principal political/administrative subdivisions of each country, with priority lines of action consisting of the following:

- 1.** Maintaining and strengthening leprosy surveillance systems to ensure timely detection of all cases and to prevent disabilities.
- 2.** Guaranteeing good-quality medical services for leprosy sufferers as an element of PHC services.

The provision of medicines needed to treat all diagnosed leprosy cases in the Americas by WHO, free of charge, to national health authorities and national leprosy control programs.

Person living with the aftermath of Hansen's Disease.

▲ SUCCESSES

Leprosy has been eliminated as a national health problem in 34 of the 35 countries and territories in the Americas (all but Brazil). This achievement has been sustained for 14 consecutive years.

Other notable achievements include the following:

- Progressive reduction of new leprosy cases (from 56,662 in 2004 to 33,789 in 2014).
- In that same period, 45% reduction in disease prevalence (based on number of cases in treatment at the end of the year).
- Elimination of leprosy as a public health problem in the main political/administrative divisions (states, departments, and provinces) of 16 countries.
- Almost complete elimination of leprosy at the municipal level (second level of the political/administrative structure) in Colombia and Cuba.
- Political commitment by Brazil to eliminate leprosy in the near future and reduce the associated disease burden (the country has a solid program, designed for this purpose, that innovatively integrates the leprosy strategy with strategies for combating other NIDs).
- A number of countries in the Americas have recognized the importance of monitoring the elimination of leprosy, based on WHO guidelines, as a means of verifying progress toward the goal of total elimination. Some countries, such as Argentina, Brazil, and Colombia, have recently implemented this type of monitoring.



HIGHLIGHT



BRAZIL: INNOVATION IN THE FIGHT AGAINST NIDs

In 2013, Brazil's Ministry of Health began an innovative integrated campaign to improve the health of schoolchildren in the 852 municipalities where people are living in poverty and there is a high disease burden due to leprosy, trachoma blindness, and STHs. This initiative includes intestinal deworming and efforts to identify cases of leprosy and trachoma among students. The campaign is considered one of the most innovative interventions in the Americas because it integrates activities that are commonly conducted separately and simultaneously combines two strategies—the mass treatment of population groups at risk for infections such as STHs and trachoma blindness, and individual treatment of leprosy cases.

In 2011, Brazil formulated a national plan to fight NIDs, aiming to eliminate or control six diseases that affect populations that live in poverty and lack full access to the country's health services: leprosy, lymphatic filariasis, schistosomiasis, onchocerciasis, trachoma blindness, and STHs. The integrated campaign was conceived as part of that plan, and is closely linked with the government initiative "Brazil Without Extreme Poverty" (*"Brasil Sem Miséria"*) an intersectoral effort aimed at significantly reducing the number of people living in extreme poverty.

The spearhead of the campaign involved educating children about symptoms of Leprosy and how to detect them in order to enable them to recognize the disease among themselves and other members of their households.

Campaign activities included distributing a form (a "self-image sheet") to schoolchildren. The form included six simple questions that could be answered with "yes" or "no." The main question was "Do you have any spots on your skin?" If the answer was affirmative, other questions were asked regarding the

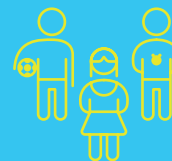
Children who are benefiting from coordinated campaigns against leprosy, trachoma, Soil Transmitted Helmentiasis and schistosomiasis.



nature of the spot. The questions were designed to help the child and parents carry out self-examination of the skin to search for initial signs of leprosy. The sheet also provided basic information about the disease and its principal signs and symptoms, including images. The content focused on the fact that leprosy is curable, and that its treatment is free of charge and guaranteed by Brazil's Unified Health System (*Sistema Único de Saúde, SUS*).

Respondents were instructed to complete the forms and return them to the schools within one week. They were then

delivered to health personnel for review. When cases were suspected, the children were referred to family health teams for medical assessment and to determine if the disease was present. When the disease was confirmed in a child, the local health teams examined the entire family for additional cases. This was a unique opportunity to detect, treat, and reduce the number of leprosy cases in the country, and it yielded excellent results, demonstrating the advantages of working in an integrated fashion, focusing interventions on students and schools.



"BRAZIL WITHOUT EXTREME POVERTY: THE SPEARHEAD OF THE CAMPAIGN INVOLVED EDUCATING CHILDREN ABOUT SYMPTOMS OF THE DISEASE AND HOW TO DETECT THEM IN ORDER TO ENABLE THEM TO RECOGNIZE THE DISEASE AMONG THEMSELVES AND OTHER MEMBERS OF THEIR HOUSEHOLDS."

"The objective of this type of campaign is early detection of leprosy, treatment to stop transmission of the disease, and prevention of permanent skin lesions," explained Rosa Castália Soares of the Brazilian Ministry of Health's General Coordination of Leprosy and Diseases in the Process of Elimination (*Coordenação Geral Hanseníase e Doenças em Eliminação, CGHDE*). The activity represented a major effort in educating teachers, parents, and

students, and the Ministry of Health took advantage of the opportunity to conduct other interventions simultaneously, including administering antiparasitics to children and searching for and treating cases of other diseases that affect them, such as blinding trachoma and schistosomiasis. The program was conducted in more than 20,000 schools in Brazil.



Health workers in the communities for early detection of leprosy.

Thanks to the campaign, nearly 3 million questionnaires were provided to public schools in 852 municipalities, and 293 cases of leprosy were detected early among children, as well as 114 additional cases among their contacts, for a total of 407 new cases detected. If not for this campaign, these cases would have been detected years later, with the consequent risk of disability and permanent physical and psychological sequelae. As part of the campaign, antiparasitics were also administered to some 3 million children. "This is the first time in 10 years that a massive deworming campaign of children in priority areas has been accomplished," Rosa explained. About 45,295 eye examinations were also conducted, in 34 municipalities of six states, detecting a total of 2,307 positive cases of trachoma blindness. Treatment was provided for 2,387 students and 1,273 of their home contacts.

"Despite the challenges, such as getting state and municipal education secretariats to collaborate with the campaign's health secretariats, the effort was worthwhile: ultimately, collaboration was excellent, and all of the school principals and teachers participated actively, in many cases conducting highly creative activities with the children," Rosa said.

In 2014, annual investment in the leprosy program by Brazil's Ministry of Health totaled approximately US\$ 7.6 million. In addition to those resources, both the state and municipal secretariats allocate Funds from their budget to the leprosy control program each year.

Brazil receives a donation of approximately 16 million doses of leprosy treatment from WHO. For the integrated campaign, the Ministry of Health also received 9.2 million parasitic tablets from WHO to treat STHs, and purchased drugs to treat blinding trachoma using its own resources.

As an additional benefit of the campaign, many of the children who participated in the program helped educate their parents, siblings, and other close relatives about the disease.



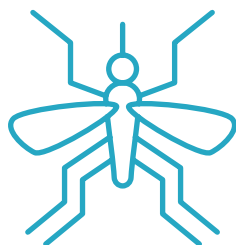
"THANKS TO THE CAMPAIGN, NEARLY 3 MILLION QUESTIONNAIRES WERE PROVIDED TO PUBLIC SCHOOLS IN 852 MUNICIPALITIES, AND 293 CASES OF LEPROSY WERE DETECTED EARLY AMONG CHILDREN, AS WELL AS 114 ADDITIONAL CASES AMONG THEIR CONTACTS, FOR A TOTAL OF 407 NEW CASES DETECTED."

CHALLENGES

The most important remaining challenge is reducing the burden of the disease even further to eliminate it as a public health problem in the main political/administrative divisions of each country, and reducing the number of new cases involving blindness or significant reduction of visual acuity, ulcers, or visible deformities/mutilations on the hands and feet.

The main lines of work are as follows:

- Sustaining political and technical commitment to and support of strategic partners and allies for the elimination of leprosy at the national and subnational levels, and ensuring the issue remains a public health priority (the latter proposition is particularly important in the current phase of eliminating the disease in the Americas).
- Developing and implementing strategies that help reduce the burden of leprosy in countries that report more than 100 new cases per year, including addressing disabilities and complications from the disease.
- Defining the measures that need to be maintained, including surveillance, in the countries that no longer report new leprosy cases.
- Defining the means of integrating medical care for leprosy in PHC systems, and doing so even in countries that report fewer than 100 new cases per year.
- Strengthening and increasing the search for, and the examination of persons with leprosy.
- Ensuring that 100% of new cases detected receive treatment, and implementing measures to monitor adherence to treatment.
- Carrying out operational activities to eliminate the stigma and social discrimination associated with leprosy.
- Integrating control of leprosy in national programs and plans designed to eliminate NIDs.
- Ensuring the availability of funds for national leprosy control programs.



MALARIA:

ON THE VERGE OF ELIMINATION

Malaria is a potentially fatal neglected disease caused by *Plasmodium* parasites. The infection is transmitted to humans through the bite of infected mosquitoes of the genus *Anopheles*. Twenty species of *Anopheles* mosquitoes transmit malaria in the Americas. The mosquitoes typically bite between dusk and dawn.

The disease appears as a febrile episode 7-15 days after a bite from an infected mosquito. In serious cases, this can lead to renal and cerebral complications. Four types of *Plasmodium* cause human malaria: *P. falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*. The most fatal type of malaria is associated with *P.*

falciparum. In the Americas, *P. vivax* is responsible for 75% of cases, and *P. falciparum* accounts for approximately 25% of cases.

Malaria is both preventable and curable. Thanks to increased prevention and control measures, its presence has diminished significantly in recent years in many endemic areas.

In 2000, the 189 member countries of the United Nations signed a commitment, as part of the Millennium Development Goals (MDGs), to reduce extreme poverty worldwide. Reducing malaria is one of the targets of MDG 6.



**"MALARIA IS BOTH
PREVENTABLE AND CURABLE.
THANKS TO INCREASED
PREVENTION AND CONTROL
MEASURES, ITS PRESENCE HAS
DIMINISHED SIGNIFICANTLY
IN RECENT YEARS IN MANY
ENDEMIC AREAS."**

STATUS IN THE AMERICAS

According to PAHO/WHO, more than 390 000 cases of malaria were reported in 2014, with 90 deaths. It is estimated that about 108 million individuals are currently at risk for contracting malaria in a total of 21 endemic countries and territories in LAC. The situation is as follows:

- Of the 21 endemic countries and territories, 15 (Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, French Guyana, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, and Suriname) have met the requirements of the 2007 WHA resolution for MDG 6 (75% reduction in malaria cases in the 2000–2015 period).
- 3 countries (the Dominican Republic, Guyana and Panama) have reduced the number of cases by more than 50%, Peru has reduced its caseload less than 25%, and all countries continue to work toward the above-mentioned goals.
- 2 of the 21 countries (Haiti and Venezuela) face a greater challenge, with a reported increase in cases during the last 14 years.

WHY IT PERSISTS IN THE AMERICAS

Young men of economically productive age who work in mining are the most vulnerable to malaria in the Americas, chiefly because they sleep without protection in areas of high malaria risk. Travelers from areas where malaria is not endemic who contract the infection are especially vulnerable to the effects of the disease.

The transmission of malaria depends in large part on climatic conditions, which can affect the number



"THE TRANSMISSION OF MALARIA DEPENDS IN LARGE PART ON CLIMATIC CONDITIONS, WHICH CAN AFFECT THE NUMBER AND SURVIVAL OF THE MOSQUITOES."

■ MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

and survival of the mosquitoes. Such climatic factors include rain, temperature, and humidity. Population groups living in areas where conditions facilitate the transmission of the disease, especially in remote and less accessible areas, and do not take measures to protect individuals and dwellings, are at greatest risk. Because the bites occur at night, when victims are sleeping, housing conditions and materials are fundamental factors in the mosquitoes' access to humans.

Malaria epidemics can occur when climate and other conditions suddenly favor transmission, in areas where the population has little or no immunity, or when people with little immunity move to areas of intense transmission, as is the case with refugees or migrant workers.

The PAHO/WHO goal is to eliminate malaria as a public health problem in the Americas. This will require reducing morbidity by more than 75%. Work is also in progress to prevent reintroduction of the disease, in countries where elimination has officially been certified, and in those that are close to eliminating the disease. WHO considers malaria eliminated in a country when no local cases are detected for three consecutive years.

The principal strategies recommended for reducing the transmission of malaria include the following:

- Good-quality diagnosis and timely treatment, which attenuate the disease, prevent death, and help reduce transmission. For a number of decades, chloroquine has been the drug of choice for malaria treatment, but *P. falciparum* is currently resistant to it in nearly all parts of the world except Central America and the island of Hispaniola. Artemisinin is a new treatment option in areas where the parasite is resistant to chloroquine; it is always administered in combination with other drugs to prevent the emergence of new resistance.

- To prevent mosquito bites WHO recommends use of mosquito nets treated with long-lasting insecticides and/or spraying of dwelling interiors with residual insecticides to prevent mosquito bites.
- Surveillance and control of the disease, by identifying where it is localized and the factors that lead to its spread.
- Use of prophylactic treatment prior to entering at-risk zones, for people traveling to areas with malaria, and prevention of mosquito bites through measures such as use of repellent and mosquito nets, although these measures do not provide complete protection from the disease but can help reduce risk.
- Strengthening PHC and integrating it with other health programs.



**"WHO CONSIDERS MALARIA
ELIMINATED IN A COUNTRY
WHEN NO LOCAL CASES
ARE DETECTED FOR THREE
CONSECUTIVE YEARS."**

▲ STEPS BEING TAKEN IN THE AMERICAS

Malaria is one of the NIDs for which a large amount of cooperation resources are available, internationally as well as locally. The last few years have seen worldwide promotion of WHO's T3 (Test, Treat, and Track) initiative, which was designed to strengthen diagnosis, treatment, and surveillance of the disease.

Through WHO's Global Malaria Programme, international experts provide independent advice to the Organization, offering policy recommendations for the prevention, control, and elimination of the disease. WHO is also cofounder and host of the Roll Back Malaria (RBM) Partnership, an initiative designed to mobilize resources to fund malaria control and elimination measures through a network of more than 500 partners.

PAHO/WHO has various agreements with governmental agencies, organizations, nonprofits, initiatives, and networks that support efforts in the Americas. Amazon Malaria Initiative (AMI); the multicountry Amazon Network for the Surveillance of Antimalarial Drug Resistance (*Red Amazónica de Vigilancia de la Resistencia a los Antimaláricos*, RAVREDA); and the Malaria Champions of the Americas.

In 2014, LAC countries with endemic malaria invested nearly US\$ 130 million in national funding to combat the disease. While this is one of the highest amounts allocated in the Americas to combat NIDs, it is still less than the US\$ 225 million required to cover annual financing needs for combating malaria.



Early attention to people suffering from malaria saves lives.

■ SUCCESSES

Thanks to the efforts in the Americas to date, the number of malaria cases in LAC has dropped by 67% and the number of deaths attributed to it has dropped by 78%. PAHO/WHO considers seven countries—Argentina, Belize, Costa Rica, Ecuador, El Salvador, Mexico, and Paraguay—to currently be in the elimination phase for malaria.

HIGHLIGHT



COUNTRIES OF THE AMERICAS CHAMPIONS IN THE FIGHT AGAINST MALARIA

Thanks to the international agreements established by PAHO/WHO, and the efforts of the countries in the Americas, the Region's performance in combating malaria has been outstanding compared with other regions of the world. Malaria success stories in the Americas include the formation of partnerships to accelerate the control and elimination of the disease, particularly since 2000, with the regional adoption of the Global Strategy to Fight Malaria initiated by the RBM Partnership in the Americas.

Since then, various initiatives and collaborations have emerged under the leadership of the AMI, which was formed in 2001. AMI's activities, along with those of RAVREDA, also formed in 2001, have contributed to reducing morbidity and mortality due to malaria by 67% and 79% respectively in the last 14 years.

These results led to expand the use of lessons learned from the experience to countries outside the Amazon area and the implementation of strategic partnerships with key partners to document resistance to conventional antimalarial drugs, ensure the availability and quality of drugs, and document and disseminate success stories, while at the same time vigorously encouraging among countries cooperation.

In the Americas, November 6th has been designated as "Malaria Day" since 2009. Activities include honoring the "Malaria Champions of the Americas" with awards and recognizing best practices and success stories in the fight against malaria.

The champions are selected from projects or organizations in the endemic countries that have demonstrated excellence in malaria activities. For example, in 2014, the Malaria Champions of the Americas prize was awarded to projects in the Dominican Republic, Honduras, and Guatemala for their accomplishments

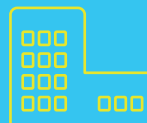


Diagnostic tests for malaria.

in preventing and controlling malaria and moving toward its elimination. These projects are examples of efforts that helped to drastically reduce the burden of malaria in the Americas in the last years. "We have taken an enormous step; we have seen a drastic reduction in the number of cases since last year," explained an official of the National Center for the Control of Tropical Diseases (*Centro Nacional de Control de Enfermedades Tropicales*, CENCET), in the Dominican Republic. "I feel happy, because malaria workers always comes to visit us, and we are spraying and implementing control measures. One always lives with fear for one's children, because

if one suffers as an adult, I don't even want to imagine what it is like for them," explains Magdalena Contreras, a resident of Dajabón, in the Dominican Republic.

Participation by the governments has also been a fundamental pillar of the effort to combat malaria, particularly with regard to funding. Between 2000 and 2012, national governments in the Americas spent US\$ 1.8 billion—91.5% percent of the total investment. External funding amounted to US\$ 166 million, most of which came from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund or GFATM) and USAID.



"BETWEEN 2000 AND 2012, NATIONAL GOVERNMENTS IN THE AMERICAS SPENT US\$ 1.8 BILLION—91.5% PERCENT OF THE TOTAL INVESTMENT. EXTERNAL FUNDING AMOUNTED TO US\$ 166 MILLION."

The political commitment of the countries in the Americas is reflected in the agreement signed in 2012 by the ministers of health of Belize, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, and Panama to support the Elimination of Malaria in Mesoamerica and the Island of Hispaniola EMMIE initiative. "The Americas have a history of leadership in public health, from poliomyelitis to measles, and malaria is another important example," said Pedro Alonso, Director of the WHO Global Malaria Programme. "The greatest advances with respect to malaria have actually taken place in the Americas. Other regions of the world will benefit enormously from experience in the Americas."

The history of success in the Americas, as a model for other regions of the world, is completed with the example of Argentina, which in 2014 officially requested that WHO begin the process of certifying the elimination of malaria throughout its national territory.



Health workers providing malaria medication.

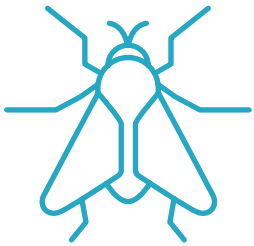
Networks of microscopists are vital for early warning detection.



▲ CHALLENGES

The greatest challenge in combating malaria in the Americas is the need to understand the importance, now more than ever, of maintaining investment in eliminating the disease in countries where the disease is endemic, if success is to be achieved. Thus, ongoing work is required to carry out the following:

- Involve partners and allies to promote the development of initiatives.
- Review and update strategic policies on dealing with emergency situations and on preventing, controlling, and eliminating malaria.
- Review insecticides being used in at-risk areas as a first step in addressing the insecticide resistance seen in mosquitoes in the last several years.



ONCHOCERCIASIS:

"RIVER BLINDNESS"



NON-FATAL



DISABLING



CURABLE

Onchocerciasis, or "river blindness," is a disease produced by the parasite *Onchocerca volvulus*. The disease vector is a black fly of the genus *Simulium* that breeds in rivers and streams with rapid water flow. Disease transmission occurs when humans get bitten by infected flies, usually in remote villages near fertile land where the population depends on agriculture. Onchocerciasis is not a fatal disease, but after living in its human host for many years, the parasite can cause intense itching, skin lesions, and serious visual disability that can result in permanent blindness when the adult parasites produce larvae that migrate to the skin, eyes, and other organs.



▲ STATUS IN THE AMERICAS

PAHO/WHO estimated that in 2009 some 500,000 individuals were at risk of contracting onchocerciasis in 13 foci in six countries in the Americas: Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela.

Latin America provides some good examples of the effort to combat onchocerciasis. At present, the area inhabited by the indigenous Yanomami population, which includes parts of Brazil and Venezuela, is the last enclave of the disease and represents the biggest challenge for the elimination of onchocerciasis in the Americas.

▲ WHY IT PERSISTS IN THE AMERICAS

The health determinants that directly favor the transmission of onchocerciasis in the last existing foci of the disease are associated with 1) the environment and 2) population movements.

The indigenous Yanomami live in an extensive area of the tropical Amazonian jungle where geographic conditions make access difficult. The communities primarily affected are nomadic indigenous populations that travel freely in the border areas. The area's logistics make interventions costly to implement and pose difficulties in providing comprehensive health care. In addition, there are internal conflicts within the population that further aggravate the problems confronting campaigns to administer medicines.

MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

STEPS BEING TAKEN IN THE AMERICAS

The objective of PAHO/WHO is to interrupt the transmission of onchocerciasis in LAC, and a set of interventions has been implemented for this purpose. The most important of these consists of mass administration of the antiparasitic drug ivermectin, with the help of the Onchocerciasis Elimination Program for the Americas (OEPA). Ivermectin has been administered at least twice a year to the target populations. The goal is to reach a minimum of 85% of the population at risk in each endemic area. In addition, surveillance measures have been implemented to detect signs of eye problems so that ophthalmologic care can be provided through the PHC system in the areas with disease foci.

Onchocerciasis is one of the five NIDs fought by regional and international institutions the longest of any diseases in the neglected group. PAHO/WHO has been committed to actively combating this infection since 1991, as reflected in a series of resolutions aimed at its elimination.

In 1993, OEPA was created to join efforts among partners and organizational allies in order to provide technical and financial assistance for national programs.

The 2012 London Declaration strengthened the Mectizan Donation Program (MDP), which since 1987 has provided the antiparasitic ivermectin free of charge to countries in the Americas affected by the disease. According to OEPA data, 38% of the program's cost has been absorbed by the six originally endemic countries (Brazil, Colombia, Guatemala, Ecuador, Mexico, and Venezuela), an investment estimated at approximately US\$ 121 million for the last two decades. Many local volunteers and public and private organizations are working with the ministries of health of the six countries to make the Americas the first region in the world free of onchocerciasis.

■ SUCCESSES

In the more than 20 years spent waging this battle, programs to eliminate onchocerciasis have experienced several victories and have become a model for successful elimination of other NIDs. Blindness from this disease is considered eliminated in the Americas as of 1995, the last year new cases were reported. By 2014, onchocerciasis had been eliminated, or its transmission interrupted, in 11 of the 13 endemic foci, and the number of individuals requiring treatment had dropped to 20,000 (from 500,000 in 2009). The current situation in the six affected countries is as follows:

- In 2013, **Colombia** was the first country in the world to receive official WHO verification of onchocerciasis elimination.
- In 2014, **Ecuador** was the second country in the world to receive official WHO verification of onchocerciasis elimination.
- In September 2015, **Mexico** became the third country in the world to receive official WHO verification of onchocerciasis elimination.
- In April 2015, **Guatemala** officially requested that WHO officially verify elimination of onchocerciasis in the country. The confirmation process is expected to take place in 2016; a successful outcome would make Guatemala the fourth country to reach this goal.
- **Venezuela** has interrupted transmission in two of its three foci:
 - **In the north central focus,** in 2013, three years of post-treatment epidemiologic surveillance were completed, and this area may be accorded elimination status;
 - **In the northeast focus,** in 2013, the post-treatment epidemiologic surveillance phase also began;
 - **In the southern focus,** WHO estimates that 9,615 individuals in 205 Yanomami communities require treatment.

- **Brazil** continues administering periodic treatment in its single Amazonian focus, which is shared with Venezuela and has an estimated 10 880 individuals eligible for treatment.

HIGHLIGHT



COLOMBIA: FIRST COUNTRY TO ELIMINATE ONCHOCERCIASIS

Colombia is proud to be the first country, not only in the Americas, but in the world, to receive official WHO verification of onchocerciasis elimination. Efforts to combat the infection were launched in 1996 in the Naicioná community—the single endemic area countrywide—with mass administration of the antiparasitic ivermectin. The community is located in the municipality of López de Micay and the affected population lives on the banks of the Naicioná River. Although the river has a small channel and is not deep, the dangerous rapids that must be crossed to reach the community make it difficult and costly to administer the drug.

Based on firsthand evidence from OEPA, antiparasitic treatment was provided uninterruptedly over a period of 12 years to 85% of the at-risk population, for a total of 23 semiannual rounds of treatment.

Those treated included a total of 1,151 individuals from Naicioná and other contiguous villages, such as Alto Chuare, Playa Grande, and mining settlements along the river.

According to OEPA, there was a “generally excellent response from the population, both to treatment and to the other community interventions that were conducted simultaneously, which included health education for mothers who were community leaders, the provision of drinking water filters, and construction of the school cafeteria.”

In addition to teaching about the disease, the intervention teams provided comprehensive education to strengthen the population's autonomy, and their ability to resolve conflicts and manage resources, to help overcome intervention obstacles in these poor communities. One example of this work was the at-

*Children free of onchocerciasis in
Naicioná, Colombia*



tempt to reestablish the concept of the *minga*, an ancestral form of collective agricultural work based on community objectives in which small family gardens are used to grow vegetables and raise chickens and laying hens. In addition to this initiative efforts were made to 1) improve sanitation and hygiene in the dwellings and communal spaces and 2) raise the quality of the drinking water, nutrition, and social relations among the inhabitants.

Colombia's Ministry of Health and Social Protection and National Health Institute participated throughout the process of eliminating "river blindness," as the disease is commonly known in the country, by providing financial, technical, and human support. As described by OEPA, an agreement was made between the Colombian government and the Hospital de Occidente, in López de Micay, "for the construction and funding of the Naicioná Health Facility, the implementation of telemedicine services, and the delivery of books with health content for the school."



"IN ADDITION TO TEACHING ABOUT THE DISEASE, THE INTERVENTION TEAMS PROVIDED COMPREHENSIVE EDUCATION TO STRENGTHEN THE POPULATION'S AUTONOMY, AND THEIR ABILITY TO RESOLVE CONFLICTS AND MANAGE RESOURCES, TO HELP OVERCOME INTERVENTION OBSTACLES IN THESE POOR COMMUNITIES."

As a result of one of the partnerships between the Health Secretariat of Cauca and OEPA, the endemic population was provided with a radiotelephone, motorized boats, and trained personnel to distribute the medicine and conduct the relevant entomologic, serologic, and parasitologic studies.

According to Colombia's National Health Institute, political will to follow PAHO/WHO guidelines was a key aspect of the program's success, along with project goals and corresponding strategies that were clearly established from the outset. The government expressed appreciation for "the organization, participation, and collaboration of the affected community," and stressed the importance of the financial support provided by OEPA, which, "along with national and departmental resources, made it possible to sustain the activities needed to eliminate onchocerciasis."

As Rogelia Riascos, a mother in the village of Naicioná, explained: "Before, we were a forgotten village, but since the program came we have progressed. Now we have water in our houses, and water filters so that we can use it without risking diarrhea; they eliminated our lice for good, and also the *raicítas* (intestinal worms). Also, now our children have a very nice school and health facility."

Children free of onchocerciasis in Chiapas, Mexico.



▲ CHALLENGES

The remaining challenge for onchocerciasis control and elimination is to interrupt transmission in the focus of the indigenous Yanomami population. However, continuing efforts must also be made to carry out the following:

- Ensure the sustainability of the goals reached, and the surveillance of foci where transmission has been interrupted.
- Sustain current level of resources needed to reach the final goals of elimination in the Americas.



TRACHOMA:

THE DISEASE THAT BLINDS
THE POOREST



NON-FATAL



DISABLING



CURABLE

Trachoma is an infectious eye disease caused by the *Chlamydia trachomatis* bacterium. The infection, normally transmitted by direct contact with the ocular or nasal secretions of an infected person, or by direct contact with materials contaminated with the bacterium, such as towels or clothes, can cause serious visual disabilities, including blindness. The disease tends to affect people living in conditions of poverty, deficient hygiene, and crowding. The later-onset, chronic complications of trachoma appear in older adults who have had multiple episodes of infectious trachoma during childhood. Active ocular trachoma in children can be treated, and there are surgical procedures to reduce visual disability and halt the progression of blindness in adults.

Considered one of humanity's oldest contagious diseases, trachoma is the leading cause of preventable blindness in the world, and it remains endemic in areas of extreme poverty in Africa, Asia, Australia, Central and South America, and the Middle East.

■ STATUS IN THE AMERICAS

According to recent PAHO/WHO data, about 11 million individuals in the Americas, 90% of them in Brazil, are at risk for infection by *Chlamydia trachomatis*.

There is evidence of trachoma in four countries in the Americas: Brazil (in about 600 municipalities); Colombia (where a focus of trachoma was recently detected in an indigenous communities in the department of Vaupés); Guatemala (in the department of Sololá); and Mexico (in the state of Chiapas).

■ WHY IT PERSISTS IN THE AMERICAS

Young and middle-aged women are the group most likely to develop irreversible visual disabilities from the disease because of their contact with children and limited access to health services. The infection chiefly affects children under the age of 10 with poor facial hygiene habits. These children are affected up to three times as often as those with good hygienic practices.

Trachoma blindness is a disease that can be prevented with sufficient access to potable water and appropriate sanitation. Facial hygiene that fails to eliminate eye secretions contaminated with bacteria, and sharing of towels by children, are factors that increase the persistence of the infection in a community.

MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The PAHO/WHO goal is to 1) reduce new cases of blindness caused by trachoma to less than 1 case per 1,000 at-risk inhabitants and 2) reduce the prevalence of active trachoma among children 1–9 years old to less than 5%.

The WHO has determined that the primary tool for combating trachoma is the strategy known as SAFE (Surgery, Antibiotics, Facial cleanliness, and Environmental improvement), which focuses on four basic measures:

- Surgery for individuals with risk of imminent blindness.
- Administration of antibiotics in affected communities to reduce the infection of children and halt transmission.
- Improvements in facial and personal hygiene to prevent

transmission in the community.

- Improvement of environmental conditions, with increased access to safe water and sanitation.

As a strategy that includes non-medical measures and concentrates on quality of life factors in disease-affected communities, SAFE is effective in interventions to fight trachoma, a disease that, like other NIDs, is closely linked to extreme poverty, low education levels, and difficulty in accessing health services.



Indigenous communities benefitting from the integral treatment conducted by trachoma elimination programs in Colombia.

▲ STEPS BEING TAKEN IN THE AMERICAS

Trachoma is a priority NID targeted by PAHO/WHO, and one of the NIDs slated for elimination.

A regional forum has been created with the four countries with disease foci (Brazil, Colombia, Guatemala, and Mexico).

Together with experts from various organizations, the four countries are collaborating to analyze the situation in the Americas and determine the best technical recommendations to eliminate trachoma blindness.

One key element of the process is the mass administration of the antibiotic azithromycin. The International Trachoma Initiative (ITI) is in charge of distributing the drug to the countries that need to administer it to all inhabitants of the communities with high prevalence of the infection. In 2013, Guatemala was the first country in the Americas to receive a donation of azithromycin (75 000 treatments). The governments of Brazil, Colombia, and Mexico obtain the antibiotic in the national market, using their own resources, and distribute it to the local health centers to administer to the populations that need it.

In addition, the Global Trachoma Mapping Project (GTMP) collaborates with the four countries to strengthen their capacity to conduct baseline surveys. This effort involves the training of local teams, the use of mobile phones to administer questionnaires, and mapping results from prevalence studies. The WHO Collaborating Centre for the Prevention of Blindness and Visual Impairment (Dana Center for Preventive Ophthalmology (DCPO) at Johns Hopkins University in Baltimore, Maryland, USA), working with PAHO/WHO, provides the four countries with support to enhance implementation of SAFE strategy measures. This involves training surgeons, conducting surveys (including a laboratory component), analyzing information for decision-making, and programming and implementing comprehensive actions to achieve the goal of elimination.

▲ SUCCESSES

Mexico was the first country in the Americas to request that WHO validate the elimination of trachoma as a public health problem in 2016. The epidemiologic studies and documentation needed for verification were completed in 2015.

Brazil, Colombia, and Guatemala are applying the SAFE strategy measures and have included trachoma blindness in their comprehensive national plans for the elimination of several NIDs. Moreover, since 2000, Brazil has implemented collective treatment in areas with the highest prevalence of the infection, principally involving indigenous populations, where

incidence of the disease is high among children. Corrective surgery is also being performed for adults with ocular lesions that can lead to visual disability and blindness. In 2012, Brazil included trachoma blindness in its integrated plan of strategic actions to eliminate NIDs countrywide. In 2012, Brazil collaborated with Colombia in training health personnel to search for and detect cases of trachoma in the area bordering the two countries.

In 2013, Brazil's Ministry of Health conducted an integrated campaign to improve the health of school children in 852 municipalities with populations living in poverty, where there was a high burden of leprosy,

trachoma, and STH. This type of integrated campaign includes eye examinations to detect trachoma in schoolchildren, as well as antibiotic treatment for positive cases and their home contacts. This campaign is an excellent example of how to incorporate interventions in programs that already exist within the school system, an experience that should be possible to replicate in other countries.

In Colombia, the first eye surgeries were conducted in 2011. Support for this came from the WHO Collaborating Centre for the Prevention of Blindness and Visual Impairment (the DCPO), where a specialized surgeon trained and



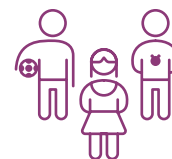


Eye examinations help identify trachoma in adults, who can then be operated on to avoid eventual blindness.

certified Colombian ophthalmic plastic surgeons who then performed surgery in affected areas in Colombia. In 2012, Colombia conducted the first round of mass medical interventions for the indigenous populations in the endemic area. This consisted of mass treatment with the antibiotic azithromycin, with the goal of providing three consecutive years of integrated actions. In 2015, epidemiologic studies to assess the prevalence of the disease were conducted in other geographic zones for which the results will be available in 2016. In this

way Colombia has begun moving toward the goal of elimination.

In 2011, an epidemiologic evaluation of blindness due to trachoma was conducted in four of Guatemala's departments and the results indicated a round of treatment was needed in the department of Sololá. The treatment took place in 2013, with coverage of more than 90%. An impact evaluation of this intervention is expected to be conducted to define the next steps needed for final elimination.



"IN 2013, BRAZIL'S MINISTRY OF HEALTH CONDUCTED AN INTEGRATED CAMPAIGN TO IMPROVE THE HEALTH OF SCHOOL CHILDREN IN 852 MUNICIPALITIES WITH POPULATIONS LIVING IN POVERTY, WHERE THERE WAS A HIGH BURDEN OF LEPROSY, TRACHOMA, AND STHs."

HIGHLIGHT



TRACHOMA BRIGADES: HEROES IN ELIMINATING TRACHOMA BLINDNESS IN CHIAPAS

Since the late 19th century, communities in the Mexican state of Chiapas have been aware of an eye disease that, in the most serious cases, produces blindness, but they did not know the name of the disease or how to treat it.

"In Maya, they call it *chalam choks*, because the direct effect is the growth of double eyelashes. Children and adults suffered dramatically from this disease, but we had neither name, solution, nor medicine for it," explained Esteban Guzmán Jiménez, Municipal President of Tenejapa.

The infection was identified as trachoma blindness, which has been endemic in 246 communities in five municipalities of the state of Chiapas—Chanal, Huixtán, Oxchuc, Tenejapa, and San Juan Cancuc—affecting a total of 146,207 individuals.

Currently, thanks to the collective efforts by government, various partners and allies, and the affected communities themselves, the country is ready to request that WHO officially validate the elimination of trachoma as a public health problem. This would make Mexico the first endemic country in the Americas to be free of trachoma.

Guzmán Jiménez celebrates "the investments that have arrived here over the last 20 years to mitigate the various factors that cause the disease," such as the lack of potable water and basic sanitation and the presence of unhealthy dwelling conditions. This indigenous leader explained how the improved quality of life in the municipality has contributed directly to reducing transmission of the disease. Improvements include making specific spaces available for sanitary facilities, and making parents aware of the importance of washing children's clothes to eliminate bacteria and forestall transmission.

Brigadiers conducting ocular exams in Chiapas, Mexico in order to detect ocular trachoma.

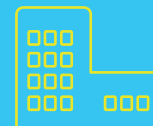


According to the Chiapas government, in 2010, more than US \$470 million was allocated to urban water supply, sewerage, and sanitation programs and activities covered under an agreement on construction and rehabilitation of potable water and sanitation systems in rural areas.

Government officials noted the "investment in public works in the areas of hydraulic and sanitation infrastructure and solid waste treatment in the municipalities where trachoma is known to be present," with more than US\$ 16 million invested to date.

Since 2004, Mexico's Secretariat of Health, in collaboration with other ministries, has adopted a series of measures to eliminate trachoma blindness in Chiapas. These measures are being implemented locally, led by a group of doctors, nurses, and technicians specially trained to combat trachoma, known as the Trachoma Brigades.

Thanks to the work of the Trachoma Brigades, there has been a reduction in the number of cases. In 2012, only 36 cases of trachoma infection in children under 9 years old were reported, and overall prevalence of trachoma blindness



"ACCORDING TO THE CHIAPAS GOVERNMENT, IN 2010, MORE THAN US \$470 MILLION WAS ALLOCATED TO URBAN WATER SUPPLY, SEWERAGE, AND SANITATION PROGRAMS AND ACTIVITIES COVERED UNDER AN AGREEMENT ON CONSTRUCTION AND REHABILITATION OF POTABLE WATER AND SANITATION SYSTEMS IN RURAL AREAS."

was less than 1 per 1,000 inhabitants—an outcome that meets the international criterion for the elimination of this condition.

Marcela Gómez, a member of the Trachoma Brigades, describes how they function, explaining that the main objective is to detect any new cases and treat existing cases by moving from house to house in each of the endemic communities. The process begins with a request to local authorities to provide treatment, and the assignment of a local guide to accompany the Brigades on their visits. The local guide also acts as an interpreter, when necessary, since most of the villages have their own language or dialect.

Gómez explains that once the Brigades are inside the home, they “conduct a family survey, followed by an ophthalmologic exam, and ending with the provision of information, in the family’s native language, promoting good health practices.”

All children with eyelid inflammation caused by trachoma receive a single dose of the antibiotic azithromycin, and adult patients in the chronic phase of the disease are made aware of the realities of the condition, to pave the way for acceptance of the need for surgery. Guillermo de la Torre, a nurse in one of the units, says it is normally the guides, or even lo-

cal authorities, who explain the benefits of surgery to the patients—mostly older adults—explaining the risk of becoming blind if they do not opt for it. “All of the treatments are free of charge for the patients. For surgery, we bring them from their house to the health unit, feed them, and accompany them home afterward,” explains de la Torre.

Both Brigade members agreed that “the best part of the program is the gratitude of the population.”

Beyond detecting cases, and providing treatment and surgery, the Trachoma Brigades explain basic personal cleanliness practices to the young children, with an emphasis on facial and hand hygiene.

“The greatest challenge was how to bring about a change of hygiene habits in the localities,” explains the nurse, “especially where access to potable water is nonexistent or difficult.”

Marcela Gómez and Guillermo de la Torre are celebrating the program’s success on the 10th anniversary of its launch, and chant the Brigade slogan (“*Con jabón, agua e higiene el tracoma previenes*”), explaining its meaning (“Where hygiene and soap and water flow, trachoma is sure to go, go, go!”).



"IN 2012, ONLY 36 CASES OF TRACHOMA INFECTION IN CHILDREN UNDER 9 YEARS OLD WERE REPORTED, AND OVERALL INCIDENCE OF TRACHOMA BLINDNESS WAS LESS THAN 1 PER 1,000 INHABITANTS."



■ CHALLENGES

The greatest obstacle to eliminating trachoma as a public health problem in the Americas is the lack of access to, and use of, safe water for personal and facial hygiene, as well as lack of basic sanitation. Education to change certain life habits is key to ensuring that the affected communities appreciate the importance of facial hygiene, adopt hygienic practices, and promote such practices in the family setting. The main actions needed to achieve elimination are as follows:

- Accelerate efforts to evaluate the impact of interventions conducted in the Guatemala focus and begin surveillance, if appropriate.
- Maintain implementation, monitoring, and evaluation of SAFE strategy components in Brazil and Colombia to meet the established intervention goals for each country.

- Maintain surveillance of trachoma in Mexico to detect possible resurgence of the disease in the country after elimination.

- Integrate interventions for combating trachoma blindness with programs in others sectors, such as water and sanitation.

- Conduct active searches for cases in countries that share borders with countries that have active foci of the disease to confirm the absence of trachoma blindness, and conduct searches in other countries in the Americas where communities lack good access to safe water and sanitation, live in extreme poverty, or have other characteristics associated with the persistence of trachoma infection capable of causing blindness.

- Incorporate care of trachoma cases in the PHC system to address the eye problems that will continue to be present after elimination is achieved. Trachoma should be part of eye health programs in the endemic countries as a means of ensuring integrated management of trachoma morbidity and preventing visual disability and blindness.

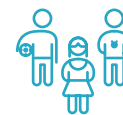
CHAPTER

3

NID_s THAT COULD BE CONTROLLED OR DRASTICALLY REDUCED



SOIL-
TRANSMITTED
HELMINTH
INFECTIONS:
INTESTINAL WORMS



PRIMARILY
AFFECTS
CHILDREN



TREATMENT
AVAILABLE



CURABLE



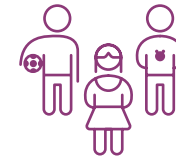
Soil-transmitted helminth infections (STHs)—produced by soil-transmitted parasites—are among the most common type of NID worldwide. They primarily affect the poorest, most marginalized communities, particularly children. Although several different helminths infect humans, the most common among those that are harmful, in descending order of frequency, are *Ascaris lumbricoides*, *Trichuris trichiura*, and the hookworms *Ancylostoma duodenale* and *Necator americanus*.

The attention given by families is crucial to diminishing the impact of NIDs

Infection occurs through skin contact with larvae, usually through the feet, or by consuming agricultural products contaminated with the parasites' eggs. The eggs, which are expelled in the feces of infected persons, require approximately three weeks to mature in the soil before becoming infectious. Children can be infected by playing in the soil and touching their mouths with their hands without washing. Direct person-to-person transmission is not known to occur.

The helminths produce a variety of symptoms, including intestinal and abdominal pain, along with diarrhea, poor vitamin A absorption, weakness, and general malaise. In addition, the infection can cause low birth weight, impede proper physical and psychomotor development in children, affect school performance and learning ability, and lead to chronic digestive bleeding and anemia. The annual worldwide death toll from STHs is about 155,000.

Children are a priority group for treating the disease, as they suffer the most severe consequences. In addition to the effects described above, some studies indicate that the intellectual coefficient of the children can be reduced by STHs and their sequelae, influencing a country's productivity in future years.



**“SOIL-TRANSMITTED
HELMINTH INFECTIONS
(STHs)—PRODUCED BY
SOIL-TRANSMITTED
PARASITES—ARE AMONG
THE MOST COMMON TYPE
OF NID WORLDWIDE.
THEY PRIMARILY
AFFECT THE POOREST,
MOST MARGINALIZED
COMMUNITIES,
PARTICULARLY CHILDREN.”**

▲ STATUS IN THE AMERICAS

STHs are the most widely distributed NIDs in the Americas, affecting 24 countries. PAHO/WHO estimates that 46 million children were at risk of contracting STHs in 2014, with 58% of them concentrated in three of the 24 affected countries (Brazil, Colombia, and Mexico), and 36% in seven other countries (Bolivia, the Dominican Republic, Guatemala, Haiti, Honduras, Nicaragua, and Peru). If interventions for control are concentrated in these 10 countries, some 43.4 million children could be dewormed annually.

■ WHY IT PERSISTS IN THE AMERICAS

■ MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The health determinants that influence the transmission of helminths are closely linked to sanitation, hygiene, and access to safe water.

Various studies demonstrate that improving these factors can drastically reduce the number of STHs. Another important health determinant is lack of education on good hygiene practices such as handwashing and personal cleanliness. The use of shoes is also vital, to keep children from being infected through contact with the soil.

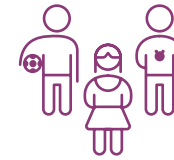
PAHO/WHO has proposed the goal of reducing STH prevalence to less than 20% among school-age children in at-risk areas in the Americas. The principal strategy used to control these infections is the mass administration of antiparasitics, covering at least 75% of the children in each risk area. If the risk of infection is more than 50%, all children 1–14 years old are treated twice a year; if the risk is less than that, only one treatment a year is administered.

WHO recommends the antiparasitic drugs albendazole and mebendazole for treatment of STHs because they are effective and cheap (US\$ 0.02–0.05 per tablet) and easy for people without medical training, such as teachers, to administer. Other anti-helminth measures include the following:

- Use of safe water to wash hands, and food, as a means of minimizing reinfection.
- Improving/increasing access to basic sanitation facilities (ventilated outhouses and septic tanks) is a basic, essential requirement for eliminating the presence of human feces, as 1 g of feces can contain up to 100 parasite eggs. Health education to promote personal and

environmental hygiene in endemic communities is key to reducing the number of infections. Once a community has access to adequate sanitation—latrines—community members must be educated on their proper use, and on the importance of handwashing, to keep families healthy.

In addition, for effective control of the disease, these measures must be carried out using an intersectoral approach.



**“EVERY CHILD NEEDS ONLY
ONE TABLET FOR COMPLETING
THE TREATMENT.”**

▲ STEPS BEING TAKEN IN THE AMERICAS

WHO provides the affected countries with the antiparasitic drugs albendazole and mebendazole free of charge. In 2014, nine countries in the Americas (Brazil, Colombia, the Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Nicaragua, and Paraguay) requested 27.5 million donated tablets from WHO, representing an increase of more than 50% over 2012, when only four countries requested tablets. The remaining countries with infection foci, such as Mexico, purchased medicine with their own resources. Mexico deworms close to 18 million children twice a year, purchasing 36 million tablets a year for this purpose, at an estimated cost of US\$ 720,000 for the medicines alone.

Once the antiparasitic drugs reach the countries, the health ministries coordinate and conduct campaigns to administer the medicine on a mass scale at the local level. In some countries, NGOs and United Nations agencies, such as the World Food Programme (WFP), join these efforts to assist in the local operation.



SUCCESSES

The most important achievement in the battle against helminths is the priority that has been assigned to this group of infections in the public health programs of the countries in the Americas, especially given the fact that deworming activities had declined in recent years. As a result, in 2009, some 32.8 million children 1–14 years old were dewormed in a total of 16 countries in the Americas, and in 2014, about 28 million were dewormed in 12 countries in the Americas. Reflecting the progress that has been achieved, 17 countries now have action plans for the disease, and the number of countries requesting donations of antiparasitics has increased.

In Belize, Dominican Republic, Haiti, Honduras, Mexico, and Nicaragua, deworming is conducted as part of the “Vaccination Week in the Americas” campaign to reach children who do not attend school, in which deworming activities were concentrated in schools.

HIGHLIGHT



PARASITE-FREE CHILDREN IN NICARAGUA

For 20 years, Nicaragua has served as an example for efforts to combat helminths. The country's Ministry of Health reaffirms this, pronouncing the country "highly committed to improving the population's health," particularly the health of children under age 15, the group at greatest risk. Nicaragua has been at the forefront of integrating various health interventions when the same population groups are being targeted (e.g., combining vaccination campaigns with administration of vitamin A). This tactic achieves more efficient use of human and financial resources and enhances the actions' sustainability.

The national health crusades or campaigns have served as the platform for these interventions, facilitating the deworming of millions of Nicaraguan children and making Nicaragua one of the countries with the longest and most sustained history in this type of action.

"Major economic and operational resources are invested in the well-being of the population, especially in helminth control," says a staff member of the country's Ministry of Health. These resources are used to train National Health Campaign personnel, an activity for which the government contributes around half a million dollars annually.

Each year, an average of 1.5 million tablets are provided to treat preschool and school-age children in 17 of the country's departments. The treatment reaches 80% of children at risk of infection from intestinal parasites. The NGO Children Without Worms (CW/W) program has been an important partner of Nicaragua's national STH control program, collaborating actively since 2008 in distributing antiparasitic drugs donated through PAHO/WHO and conducting health education activities in schools.

Barefoot children in contact with the ground where soil-transmitted helminth eggs reside contributes to the infection's continued presence amongst communities.



Under the guidance of Nicaragua's Ministries of Health and Education, and with technical support from PAHO/WHO, nearly 14,000 primary school teachers and health workers, as well as 179,000 school-children, have been trained in how to prevent infection. "These activities promote behaviors that are necessary to break the reinfection cycle," explained a CWW representative, who cited as an example of good practices the inclusion of a place on each child's vaccination card for documenting the deworming and indicating whether or not the child received the treatment.

The schools are a key partner for reaching the children and educating families on good hygiene practices, such as handwashing after playing on the ground and using shoes to keep parasites from penetrating the skin. Demonstrating the education sector's commitment to this issue, a course on personal hygiene and prevention of intestinal parasites has been included in the school curriculum. According to one teacher, a cascade type of training is used in which specialized health workers train the teachers in the preventative measures and the teachers then pass the knowledge along to students and parents.



"EACH YEAR, AN AVERAGE OF 1.5 MILLION TABLETS ARE PROVIDED TO TREAT PRESCHOOL AND SCHOOL-AGE CHILDREN IN 17 OF THE COUNTRY'S DEPARTMENTS. THE TREATMENT REACHES 80% OF CHILDREN AT RISK OF INFECTION FROM INTESTINAL PARASITES."

The community's involvement in activities to reduce intestinal parasites has been important throughout the process. In each deworming campaign, the schools undertake different group activities such as mural art competitions in which educational notebooks on hygiene are awarded as prizes.

"Mothers have called me and told me that their child woke up with a belly ache and fever and wasn't going to class," one teacher explained. "Since the deworming campaigns and educational activities, the children are more open and participate more; there is a big difference."

The Nicaraguan government and CWW agree that the major challenge in combating helminths is ensuring the sustainability of the deworming and education activities, along with improving access to hygiene and basic sanitation facilities, which continue to be the major factors associated with these infections.

■ CHALLENGES

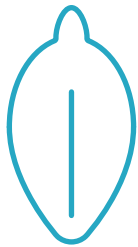
The greatest challenge in controlling this group of parasitic infections is ensuring that the 24 countries with children at risk of infection include and sustain actions to reduce morbidity caused by STHs as part of their public health agendas. To increase their effect and sustainability, these actions should be incorporated in policies for development and poverty reduction. Ongoing efforts must focus on the following:

- Improving coverage of deworming, not only for school-age children but also for younger children, pregnant women after their first trimester, and adults working in activities that put them at risk for STHs, such as farmers and miners.
- Promoting mapping of the disease's occurrence and intensity of infection to both establish baselines and oversee progress in reducing the disease in at-risk populations.
- Supporting and promoting the implementation of integrated actions to complement deworming—particularly access to safe water and improved basic sanitation facilities, as well as education on hygiene, use of shoes, and elimination of soil from dwellings.
- Promoting the integration of deworming actions, taking advantage of existing platforms such as the Integrates Management of Childhood Illness (IMCI) strategy and EPI, to increase the number of people reached by deworming.

CHAPTER

4

DISEASES WHOSE BURDEN COULD BE REDUCED OF AFFECTED PEOPLE



FASCIOLIASIS: THE DISEASE OF THE LIVER



POTENTIALLY
FATAL



TREATMENT
AVAILABLE



CURABLE



Fascioliasis is caused by parasites of the trematode family that primarily affect the liver. Infection occurs from consuming raw aquatic plants, particularly watercress, contaminated with the parasite. The two species of the parasite that cause the disease (*Fasciola hepática* and *Fasciola gigantica*) are leaf-shaped and large enough to be visible to the human eye. They are known popularly as *duelas del hígado* ("liver worms").

Learning how to identify the vector transmissions of NIDs is one of the activities learned by the community.

Fascioliasis predominantly affects animals but can also infect humans. The process involved in transmission of the infection is complex and begins with the expulsion of the parasite's eggs in the feces of infected humans or animals—mostly sheep and cattle, in the case of animals—which contaminate the water of rivers and streams. There, the eggs mature and penetrate freshwater snails, where larvae develop. They are later released and adhere to aquatic plants. Humans are infected by ingesting the raw plants.

According to WHO data, fascioliasis affects 2 million people globally, mostly in the mountainous areas of South America and in southern and eastern Asia.



**"FASCIOLIASIS PREDOMINANTLY
AFFECTS ANIMALS BUT CAN
ALSO INFECT HUMANS."**

▲ STATUS IN THE AMERICAS

Fascioliasis is one of the least documented NIDs in the Americas, so there is limited information on its geographic distribution and disease burden. However, the mountains of the Andean area are known to be the most endemic area in the world, with high rates of infection among indigenous communities. The only species of the parasite in the Americas is *Fasciola hepatica*, which is found in the northern *altiplano* of Bolivia and in Peru's northern *altiplano* and Cajamarca Valley.

▲ WHY IT PERSISTS IN THE AMERICAS

▲ MEASURES THAT CAN HELP REDUCE THE SUFFERING

The determinants of fascioliasis are associated with the eating habits of the affected communities, which include consuming aquatic plants contaminated with the parasite without first washing the plants with safe water.

The chief objective set by PAHO/WHO is controlling transmission of fascioliasis to humans. For this purpose, all affected individuals in endemic areas are treated annually with the antiparasitic drug triclabendazole, which is provided to countries in the Region free of charge through WHO. Other measures include:

- Veterinary public health activities to help contain the disease in animals.
- Efforts to educate inhabitants of endemic areas about the risks of consuming freshwater aquatic plants without washing or cooking them, and the importance of safe disposal of human feces.



Children in Bolivia being attended to by community health workers.

▲ STEPS BEING TAKEN IN THE AMERICAS

Fascioliasis is one of the most neglected NIDs in the Americas. In 2007, PAHO/WHO began distributing the drug triclabendazole to populations living in endemic areas. In Bolivia, since 2008, thousands of people have been treated each year in mass treatment campaigns, with a total of 155,000 individuals 5–59 years old treated in 2013.

Similar campaigns began in Peru in 2008. Initially, activities were only conducted in the Cajamarca area, but in 2013 they were expanded to Puno in southern Peru, an area considered high-risk for transmission of fascioliasis.

In addition to treating cases in known endemic areas in Bolivia and Peru, PAHO/WHO is promoting efforts to detect foci in other countries in the Americas.

▲ SUCCESSES

Bolivia has the world's largest program for distribution of the anti-parasitic triclabendazole, and is setting an example so that other affected areas can implement the lessons learned from its experience in the last few years.

Following Bolivia's example, Peru is broadening the search for foci in its territory in order to implement the necessary control interventions.



Animals with fascioliasis contaminate water that is used to grow water-based plants that are consumed raw by people; these are important factors in the transmission of the disease.

HIGHLIGHT



BOLIVIA: LEADER IN BATTLE AGAINST FASCIOLIASIS

Wayra can hardly remember how many times he missed school because of abdominal pain. One day, health department personnel came to his school in Tiahuanacu. "They talked to us about fascioliasis, and I took a tablet that they gave to me and all my schoolmates. Since then, they have been coming every year, and it doesn't hurt any more. Also, I know now that I have to wash the watercress well before eating it."

Certain portions of the northern *altiplano* of Bolivia have the highest rates of fascioliasis infection in the world, according to research led by, among others, the National Institute of Health Laboratories of Bolivia (*Instituto Nacional de Laboratorios de Salud*, INLASA); the University of Valencia (Spain) (the WHO Collaborating Centre on Fascioliasis and Its Snail Vectors); the University of Dublin (Ireland); and the University of Perpignan (France).

"The area in which the disease circulates extends from the city of La Paz to the areas around Lake Titicaca, at altitudes of 3,820–4,100 m—this information is consistent with the finding of cases in humans and animals," explained one of the principal partners in fascioliasis control in Bolivia at the University of San Andrés. The endemic area is essentially rural, made up of small, mostly indigenous villages and communities, where altitude and temperature facilitate reproduction of the snails and infection of the animals involved in the Chain of transmission.

The Departmental Health Service of La Paz (*Servicios Departamentales de Salud*, SEDES) emphasizes that "fascioliasis is a health problem affecting populations that live in conditions of high social vulnerability, with limited access to health services," whose "epidemiologic, socioeconomic, cultural, and environmental conditions are unfavourable."

Mass distribution of fascioliasis medication prevents much of the pain that the disease would cause to the community.



Since 2008, with support from PAHO/WHO and various partners, the Bolivian government has conducted mass annual deworming campaigns with triclabendazole. The results published in the most recent official report, in August 2012, indicate that the campaign benefited 64% of the population in 12 municipalities in the department of La Paz, through the administration of 296 234 antiparasite tablets donated through WHO. The deworming was carried out in a number of phases: first in schools, and then in concentrated groups, with the third and last

phase consisting of house-to-house visits, with help from the local authorities.

SEDES has been a key element throughout this process, reducing the incidence of the disease and the symptoms produced by the infection, educating the population, providing timely diagnostic services, offering medicines for treating isolated cases, and training laboratory technicians and doctors. SEDES expressed satisfaction that "human, material, and financial efforts have not been wasted," and applauded the "significant" reduction of fascioliasis in the northern



"THE RESULTS PUBLISHED IN THE MOST RECENT OFFICIAL REPORT, IN AUGUST 2012, INDICATE THAT THE CAMPAIGN BENEFITED 64% OF THE POPULATION IN 12 MUNICIPALITIES IN THE DEPARTMENT OF LA PAZ, THROUGH THE ADMINISTRATION OF 296 234 ANTIPARASITE TABLETS DONATED THROUGH WHO."

altiplano, where the prevalence of fascioliasis dropped from 17% in 1997 to 2% in 2013. It also reports that the treatment coverage is "good and must continue to prevent the transmission of fascioliasis," but emphasizes that there must be continuing efforts to involve the communities, to help ensure the interventions are successful.

One important consideration is the fact that the population in the endemic area is migratory, and ranges over a vast territory, making it difficult to provide treatment and determine how many people are affected.

Along with deworming, ongoing education is vital to create awareness about practices that are essential for minimizing infection, such as not using manure as a fertilizer for aquatic plants, periodically deworming livestock, and isolating the cultivation of watercress and other aquatic plants from waters contaminated by feces.

The Bolivian experience is considered an outstanding example of best practices for developing regional and global programs to combat fascioliasis. Bolivia has developed a model and is making it available to others for action in other affected areas.



CHALLENGES

The most important initial task, at present, is to ascertain how many countries have foci of infection, because the determine burden of the disease in the Americas is unknown. It is also vital to design intersectoral interventions that involve both the human and veterinary public health sectors in developing measures to control the disease among humans. Controlling the disease remains a long-term challenge and will require the following measures:

- Improving diagnosis and treatment of affected persons.
- Instituting effective veterinary health measures to contain the sources of infection in animals.
- Educating communities living in endemic areas on the proper handling and consumption of plants and vegetables that grow in fresh-water.
- Attracting the attention of ministries of health and the medical community to create awareness of this problem.



LEISHMANIASIS



1. **Visceral leishmaniasis:** Can be fatal.



2. **Cutaneous leishmaniasis:** Atypical or Ulcerated. "Diffuse cutaneous" can lead to disfigurement.



3. **Cutaneous, mucosal and mucocutaneous leishmaniasis:** Chronic and leads to disfigurement.

There exists treatment to cure all 3 types.

Leishmaniasis is a potentially fatal but curable disease caused by 22 different species of parasites of the genus *Leishmania*, of which 15 species are present in the Americas. This parasite is transmitted to humans through the bite of female insects of the *Lutzomyia* family (genus *Phlebotomus*), popularly known as *chiclera*, *asa branca*, *palomilla*, *mosquito palha*, and *torito*, among other names. The insect is active at night, and injects the parasite into humans through its bite.

The clinical presentation of the disease humans varies, as described below:

- **Visceral leishmaniasis, or kala azar**, is the most serious form, and is fatal in approximately 90% of cases if not treated with drugs and appropriate clinical management. It is characterized by prolonged fever, weight loss, anemia, and enlargement of the liver and spleen.
- **Cutaneous, mucosal and mucocutaneous leishmaniasis** are the most common forms of the disease in the Americas. The initial manifestation of this form of the disease is usually skin lesions, which gen-



**"MAKING PREVENTION
PREFERABLE TO CURE."**

erally evolve into ulcers that leave permanent scars. In its diffuse form, the disease can result in serious lesions and disfigurement similar to those produced by leprosy. It is difficult to cure, and relapses can occur after treatment. When it affects the mucosa, the disease is called mucosal (or mucocutaneous) leishmaniasis, which can partially or totally destroy the mucous membranes of the nose, mouth, and throat, as well as surrounding tissues.

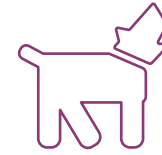
Although there are various treatment options for the different forms of leishmaniasis, the pentavalent antimonials are used most frequently and are most readily available. However, these drugs are toxic and represent a risk to patients if not properly prescribed, making prevention preferable to cure.

▲ STATUS IN THE AMERICAS

Leishmaniasis is considered a public health problem in the Americas because of the number of people suffering from it, the mortality rate, and the disease's extensive geographic distribution. Cases have been reported from the southern United States to northern Argentina (with the exception of Chile and Uruguay, where no cases have been reported). On average, 57,000 cases of cutaneous and mucosal leishmaniasis are diagnosed each year, in addition to 4,000 visceral cases, with an average of 220 deaths annually. Among visceral leishmaniasis sufferers, 6.4% are also infected with HIV, which contributes to complications and deaths due to the complexity of providing simultaneous clinical management and treatment of both infections.

Cutaneous and mucosal (mucocutaneous) leishmaniasis is currently endemic in 18 countries and territories in the Americas (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, French Guyana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, and Venezuela). Between 2001 and 2013, 75% of the nearly 743 000 cases reported were concentrated in Brazil (42%), Colombia (20%), and Peru (13%).

Historically, visceral leishmaniasis has been reported mostly in villages in mountainous areas and in some areas close to cities. In recent decades, however, urban transmission has become more frequent as a result of the insect adapting to the urban environment, and due to the presence of infected dogs inside and outside of dwellings.



“IN RECENT DECADES, HOWEVER, URBAN TRANSMISSION HAS BECOME MORE FREQUENT AS A RESULT OF THE INSECT ADAPTING TO THE URBAN ENVIRONMENT, AND DUE TO THE PRESENCE OF INFECTED DOGS INSIDE AND OUTSIDE OF DWELLINGS.”

Visceral leishmaniasis is present in a total of 12 countries in the Americas, where there were reports of approximately 45 000 cases since the last decade. Brazil has been the largest source, accounting for 96% of reported cases, while Paraguay accounted for 1.9%, Argentina for 0.3%, and Colombia for 1.3%. Foci of transmission, though smaller, were also found in Bolivia, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, and Venezuela.

▲ WHY IT PERSISTS IN THE AMERICAS

Deforestation caused by the incursion of agriculture into uninhabited zones, along with road building, hydroelectric plants, and settlements in wooded areas, contributes to the spread of habitat for these insects and to their adaptation in urban and peri-urban areas, increasing exposure to the risk of infection.

The disease is also sensitive to climatic conditions such as changes in rainfall, temperature, and humidity. The warming of the Earth and soil degradation are factors that increase risk, while deficient housing and poor sanitation in dwellings can promote the presence of the vector and facilitate its

survival. Moreover, crowded settings provide it a plentiful source of blood to feed on.



“THE DISEASE IS ALSO SENSITIVE TO CLIMATIC CONDITIONS SUCH AS CHANGES IN RAINFALL, TEMPERATURE, AND HUMIDITY.”

■ MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The PAHO/WHO objective is to control leishmaniasis by reducing the number of cases of the mucosal form of the disease and reducing mortality from the visceral form of the disease. The complexity of the disease makes it difficult to control because, in contrast to other NIDs, there is no single effective tool for interrupting transmission.

Prevention, surveillance, clinical management, and control of leishmaniasis require a combination of the following strategies:

- Early diagnosis and effective management of cases, which reduces the incidence of serious forms of the disease and prevents serious disability and death. Effective medicines for the disease are now available, and access to them is constantly improving, though obtaining a low-toxicity oral drug remains a challenge.
- Control of the insects, which helps reduce the disease's transmission, especially in and around houses.
- Environmental management, personal protection, protection of dwellings, and the use of insecticides with residual effects, which are beneficial in disease prevention and control.
- For visceral leishmaniasis, the euthanasia of infected dogs is one means of controlling the disease. However, other preventive measures, such as the use of collars impregnated with insecticides and repellents, serve to protect the animals, thereby preventing human infection. Cost-benefit studies are still needed to assess the efficacy of these measures.
- Health education and community mobilization, which are helpful in changing behavior patterns that favor infection.



■ STEPS BEING TAKEN IN THE AMERICAS

PAHO/WHO is working actively with the countries where the infection is endemic to strengthen efforts to combat the disease, while at the same time promoting research, prevention, treatment, and education activities. The Organization has covered the purchase of a series of drugs for treating leishmaniasis in its Strategic Fund to improve their accessibility to the countries. Efforts are also under way to ensure that the Fund includes rapid diagnostic tests for leishmaniasis, which reduce the risk of the visceral form of the disease becoming serious or fatal.

■ SUCCESSES

Despite the challenges that remain, the Americas can celebrate the reduction in the number of deaths from visceral leishmaniasis over the last several years, which dropped from 335 (8.4% of cases) in 2011 to 229 (6.7% of cases) in 2013. Other advances, in the area of capacity building, include the following:

Creation of the Regional Leishmaniasis Information System, "SisLeish," which has allowed for consolidation and updating of the data on the epidemiologic situation in the Americas.

Provision by PAHO/WHO of distance courses on diagnosing and treating the different types of leishmaniasis—a useful and efficient tool for strengthening the human resources responsible for providing patients with medical care.



This man in Brazil shows an early-stage wound on his arm caused by leishmaniasis.

HIGHLIGHT



INITIAL VICTORIES IN THE FIGHT AGAINST LEISHMANIASIS

A major triumph in efforts to combat leishmaniasis was achieved in 2013 with the implementation of SisLeish. That year, for the first time, the Americas had a system that allows for searching for and consolidating homogeneous, comparable, high-quality data on leishmaniasis, providing health professionals and facilitators with the epidemiologic information and analyses needed for understanding the status of the disease in the Americas, sharing information, and enabling the countries to conduct joint control activities.

SisLeish helps facilitate individual and comparative analyses of leishmaniasis at different geographic levels, and allows for periodic tracking of cases. These analytical studies have proven valuable for formulating methodology proposals and generating an adjusted stratification of the areas at risk. To date, 17 countries have joined the system, aiding efforts to control leishmaniasis and fostering its inclusion in government public health programs.

Mexico's experience with cutaneous, mucosal (mucocutaneous) leishmaniasis is particularly notable. Between 2009 and 2012, the state of Oaxaca reported an up to 26-fold increase in the number of new leishmaniasis cases. In response, Mexico orchestrated a social mobilization campaign that focused on creating awareness about the importance of timely diagnosis and treatment of new cases, training of health unit medical personnel, and efforts to increase the population's knowledge about the disease as well as its social stigma. The intervention reached the community of Matias Romero, the state's most heavily affected municipality, in the form of an intensive leishmaniasis campaign, in which education and health officials, along with the media, transmitted messages on leishmaniasis aimed at the general public.

Timely identification helps to begin treatment and to reduce the pains associated with leishmaniasis.



As a result of the campaign, which took place May 27–31, 2013, nearly 100 people with probable cases of leishmaniasis visited PHC facilities; 60 blood and tissue samples were taken; and 160 health workers were trained. The samples identified 30 cases of cutaneous leishmaniasis, and all cases received treatment. “Some lesions in cutaneous and mucosal leishmaniasis extend to the nose or mouth, and the cartilage disintegrates until a cavity is formed; these people suffer greatly from the disfigurement and the stigma associated with it, covering

their faces with handkerchiefs. With early diagnosis and treatment, this does not need to happen,” explained Ana Nilce Elkhoury, PAHO/WHO Regional Advisor on Leishmaniasis.

Colombia's efforts to combat visceral leishmaniasis are another model for fighting the disease in and around cities, where it is increasingly common as a result of the insect that disseminates it adapting to the urban environment, and the presence of infected dogs inside and outside of dwellings.

In May 2012, seven cases of visceral leishmaniasis were found in the municipality of Neiva (department of Huila), a location distinctive for harboring some 25,000 stray dogs. After the outbreak was detected, the national authorities, with the support of PAHO/WHO, led an investigation of the focus, defined the risk zone, and determined what actions to take. These efforts confirmed that the disease had been present in the infected individuals for an average of 17 months. The disease can be fatal if not treated in time; in this case the patients suffered

from fever, enlarged livers and spleens, prostration, and diarrhea. All sick individuals were hospitalized and given proper treatment. Despite the complications and strong side effects of the treatment, the patients did well, were monitored for their medical progress, and, over the following months, were cured.

In the 2012 outbreak, 72% of cases involved women living in houses with precarious conditions, such as crowding, lack of water, and lack of garbage disposal services. To help solve these problems, traps were set to catch the vector. In addition, more than 1,000 canine blood samples were collected in the area, of which 4% proved positive for visceral leishmaniasis. These strategies were complemented with vector control efforts that employed insecticides, pruning of shrubs, removal of organic material, and activities to help educate the community about the disease and how to prevent it.

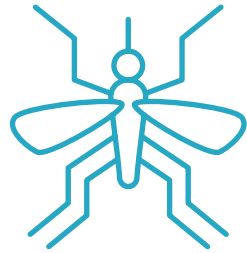
Thanks to this comprehensive package of measures, and the active participation of the population of Neiva, the outbreak was controlled and no new cases emerged in the following year.



■ CHALLENGES

The greatest challenges in controlling leishmaniasis in the Americas are the complex nature of the infection and the need for an effective means of addressing the factors that favor transmission of the disease. Achieving the latter will require the following:

- Finding effective vaccines for both humans and domestic animals.
- Appropriately managing existing insecticides and developing new insecticides that are effective against the disease's vectors.
- Establishing guidelines for reducing the vectors' contact with human beings.
- Improving the quality of information and the reporting of cases in the endemic countries.
- Enlisting the participation of relevant populations in the interventions so that they assume sustained responsibility for the efforts required to ensure that dwellings do not provide the vector with breeding and reproduction opportunities.
- Identifying areas that, though free from transmission of leishmaniasis, are vulnerable to the disease, and gaining more precise knowledge concerning the epidemiologic situation in the countries and the population groups affected.
- Promoting joint efforts among the endemic countries, and ensuring that the information used in decision-making is updated.
- Promoting the mobilization of resources and integrating action on the disease with programs to combat other vector-borne diseases.



DENGUE:

"BREAKBONE FEVER"

Dengue is an infectious viral disease transmitted by female mosquitoes of the genus *Aedes*, principally the *A. aegypti* species. Mosquitoes of this species bite during the day and their most active feeding period is during dawn and nightfall.

An infected individual can be asymptomatic or have symptoms ranging from high fever (39–40°C) to headache and aches in the eyes, muscles, and joints, as well as rash and overall malaise. Nausea and vomiting are frequent. The disease is commonly called "breakbone fever" (*fiebre quebrantahuesos*) because the muscular and bone pain is so severe that some patients feel as if their bones are breaking and can be incapacitated for days.



CAN BE
FATAL



NO SPECIFIC
TREATMENT



FOUR SEROTYPES
(DEN1, DEN2,
DEN3 AND DEN4)

Capture and identification of NID vector mosquito larva helps to better plan elimination campaigns.



Patients should be monitored for warning signs such as the appearance of bleeding from the nose and gums, lethargy, sleepiness, dizziness, intense abdominal pain, and persistent, continuous vomiting. These signs indicate the presence of the more serious forms of the disease, which can produce shock, bleeding, and organ failure, and can even be fatal. No specific treatment or vaccine for dengue is currently available, but when detected in time, and with appropriate medical care, complications and mortality are reduced.

Four distinct serotypes of the dengue virus are known (DEN1, DEN2, DEN3, and DEN4), and all are present in the Americas. Infection by one of the four serotypes confers permanent immunity for the person infected, but only for the specific serotype involved. Successive infections by different serotypes are a risk factor for the more serious forms of dengue.

In recent years, the worldwide number of cases increased, and the disease has advanced to new geographic areas, becoming a significant public health problem.



"PATIENTS SHOULD BE WATCHED FOR WARNING SIGNS SUCH AS THE APPEARANCE OF BLEEDING FROM THE NOSE AND GUMS, LETHARGY, SLEEPINESS, DIZZINESS, INTENSE ABDOMINAL PAIN, AND PERSISTENT, CONTINUOUS VOMITING."

STATUS IN THE AMERICAS

Dengue has a long history in the Americas going back more than 400 years. The first suspected cases of the disease appeared in Martinique and Guadeloupe in 1635. In 1780, Dr. Benjamin Rush wrote the first report of a case of dengue fever, which occurred in Philadelphia (USA). Since then the disease has occurred throughout the continent, with the exception of Canada, mainland Chile, and Uruguay, which do not have autochthonous transmission (although the vector mosquito is present in Uruguay).

Among world regions, the Americas reports the highest number of dengue cases. In the past 30 years, incidence has increased by a factor of 13 (from 16.4 cases per 100 000 inhabitants in 1980 to 218.3 per 100,000 in 2000–2010). Despite the increase in the number of cases, the Americas has one of the lowest mortality rates from the disease. Between 2011 and 2014, some 3 300 deaths were prevented.

It is estimated that in the Americas alone, more than 500 million people live in areas with risk of transmission of the disease. In recent years, the continent has seen numerous epidemics, including episodes in Argentina and Bolivia in 2009; Brazil in 2002, 2008, 2010, and 2013; and Honduras in 2011 and 2013.



"AMONG WORLD REGIONS, THE AMERICAS REPORTS THE HIGHEST NUMBER OF DENGUE CASES. IN THE PAST 30 YEARS, INCIDENCE HAS INCREASED BY A FACTOR OF 13 (FROM 16.4 CASES PER 100 000 INHABITANTS IN 1980 TO 218.3 PER 100,000 IN 2000–2010)."

■ WHY IT PERSISTS IN THE AMERICAS

Global warming and the climate patterns of the last several years have favored proliferation of the *A. aegypti* mosquito, even during seasons normally not expected to be favorable to the insect's proliferation.

Moreover, the disorderly and unplanned growth of many cities has provided an environment favorable to the vector's proliferation, and incorrect use of insecticides has led to the appearance of resistant mosquito populations. Precarious housing leads to the presence of mosquitoes indoors, and crowding in housing units facilitates multiple cases of contagion within a given household. Storing water in inadequate containers, such as disposable plastic containers, tires, or jars, increases mosquito breeding areas.

■ MEASURES THAT CAN HELP REDUCE THE SUFFERING OF PEOPLE AFFECTED BY IT

The PAHO/WHO objective is to control dengue in the Americas and reverse the epidemiologic situation of the last few years. Although advances have been made in research for producing an effective dengue vaccine that could eventually help reduce the impact of the disease, there is insufficient evidence to recommend any of the vaccines in development. Prevention and control depend primarily on combating the mosquitoes, an effort in which families and communities are the key components. Recommended actions in that regard are as follows:

- Prevent mosquitoes from finding water that can provide breeding places where they can deposit their larvae (e.g., containers, water tanks, buckets, barrels, flowerpots, etc.).
- Properly dispose of solid waste inside and around dwellings.
- Hermetically seal containers that store water for domestic use, and clean them weekly.
- Take steps to protect the dwelling, such as adding screens on doors and windows to prevent the entry of adult mosquitoes.

- In areas known to have active transmission, use long-sleeved shirts and long trousers to minimize skin exposure during the day, when the mosquitoes are most active; repellents with active ingredients such as DEET (N,N-diethyl-meta-toluamide), IR3535®, or icaridin can be used on the skin or clothes, adhering strictly to label instructions.
- The use of mosquito nets on beds provides good protection for individuals who sleep during the day, such as babies, older adults, and people who are ill.
- Improve community participation and mobilization to achieve effective ongoing control of the vector.

▲ STEPS BEING TAKEN IN THE AMERICAS

In 2003, the Integrated Management Strategy for dengue prevention and control (IMS-Dengue) was approved. Used by 27 countries and assessed in 22 countries, this strategy draws on various key disciplines to fight the infection (comprehensive vector control, epidemiology, environmental measures, laboratory work, patient care, and social communication). In 2008, the Dengue Laboratory Network of the Americas (Red de Laboratorios de Dengue de las Américas, RELDA) was established to bring together scientific and technical capacity in the Americas to respond to outbreaks and epidemics. RELDA also aimed to create a system for sharing reagents and providing a good-quality control system in laboratories.

In addition to ministries, agencies, and NGOs associated with the health sector, vital support has been provided by other public sectors as well as by the industry and tourism sectors, academia, and the people living in endemic communities.

▲ SUCCESSES

One major achievement is the reduction of mortality from dengue in the Americas, despite the steady increase in the number of cases.

This result is attributable to the strengthening of capacities among health personnel with regard to patient care and management. Other tangible achievements include the following:

- Creation of multidisciplinary teams trained in Communication for Behavioural Impact (COMBI), and publication and dissemination of the lessons learned in 15 countries.
- Creation and use of national guidelines for clinical patient management.
- Strengthening of national capacities for timely detection of dengue outbreaks when they emerge, as part of surveillance systems.
- Development of a simplified method for collecting information on rates of *A. aegypti* infestation, to conduct more timely mosquito control interventions.
- Improvement and updating of the technical and scientific capacity of dengue laboratories.



Teaching how to identify sources of the dengue mosquito transmission, and how to prevent them, is one of the many activities conducted with the communities.

HIGHLIGHT



WARNING SIGNS USEFUL IN REDUCING MORTALITY FROM DENGUE

An initial method of classifying the seriousness of dengue cases was developed in 1974. It distinguished three types of dengue: classic, hemorrhagic, and dengue shock syndrome.

Over the subsequent 30 years, various problems with this classification emerged. First, not all patients fit into one of the three categories. Moreover, because most cases were classified only when the disease was in its final stages, the classification did little to aid efforts to provide adequate medical care, and did not contribute to early reporting for purposes of epidemiologic surveillance.

In the search for a solution, and more precise clinical classification, the multi-agency Special Programme for Research and Training in Tropical Diseases (TDR), hosted by WHO, conducted research in a number of countries. In 2009, drawing on scientific work on diagnosis and treatment, TDR and WHO published an updated version: Guidelines for Diagnosis, Treatment, Prevention, and Control. One year later, PAHO/WHO, working with the International Dengue Task Force (*Grupo de trabajo focalizado en la lucha contra el dengue*, GT-Dengue), adapted the guidelines based on experience in the Americas and published a special edition for this continent. The project included an extensive training process for health personnel involved in the clinical care of dengue patients.

The new clinical guidelines on dengue comprise a modified classification of the severity of the disease, which has proven to have significant advantages over the original 1974 guidelines. Among the improvements are more efficient and better-quality methods of detection of cases, facilitating detection of very severe cases of the infection and thus preventing unnecessary deaths.

One focus for preventing the spread of dengue is to teach children at an early age the factors that cause the spread of diseases, and how to identify disease symptoms. Here, children are taking a class within a parlor, learning the causes of dengue and how to prevent it.



"With the new dengue classification, clinical findings on the patient have overcome my dependence on the laboratory," explained Dr. Anabelle Alfaro of Costa Rica. The new method facilitates better understanding of the disease's warning signs, and thus better detection of patients in whom the disease is evolving to a critical phase, so that adequate treatment can be provided even when laboratory results are not available. One palpable benefit of the new classification is the reduction of dengue deaths in the Americas, with approximately 3,300 deaths prevented between 2011 and 2014.

The PAHO/WHO dengue guidelines have become an essential tool for efficient and timely case management, and a second edition was published in 2016. The new edition covers additional aspects of clinical management, such as treatment of dengue in newborns, pregnant women, and older adults, as well as how to treat dengue in patients with chronic diseases. There is also a chapter on reorganizing health services in situations of dengue epidemics.



"ONE PALPABLE BENEFIT OF THE NEW CLASSIFICATION IS THE REDUCTION OF DENGUE DEATHS IN THE AMERICAS, WITH APPROXIMATELY 3,300 DEATHS PREVENTED BETWEEN 2011 AND 2014."



▲ CHALLENGES

Dengue poses one of the most demanding challenges for PAHO/WHO and the governments of the countries in the Americas due to the multiple problems involved in preventing and controlling the disease. There are three key approaches for addressing the disease:

- Promoting family and community participation to prevent and eliminate breeding places for mosquitoes, especially in and around dwellings.
- Increasing resources and expanding intersectoral efforts for mosquito control, enlisting the participation of ministries of education, tourism, and the environment, as well as local and municipal governments.
- Supporting the development and evaluation of new technologies to control and prevent the disease, including vaccination.



*Learning from experience:
The man in the orange shirt was once infected with dengue, making him
conscious of the sources of the disease. He takes it upon himself to assure
that there is no stagnant water inside his tires so that no one else can become
infected.*

CHAPTER

5

WAY FORWARD: POST-2015 EFFORTS TO COMBAT NIDs

The successes achieved in controlling and eliminating NIDs in the Americas are a result of the political commitment of the countries to improve the health and quality of life of affected communities and consequently reduce the suffering, disability, disfigurement, stigma, and discrimination that these diseases cause.



This commitment is reflected in the technical and financial efforts of the ministries of health, which, along with support from strategic partners and allies, and the participation of the affected communities, have placed the Americas in the vanguard of efforts to eliminate NIDs.

However, various challenges remain, and will require even greater political and financial commitment to reach the “endgame” (i.e., the elimination of these diseases by 2020). For example, national public health programs must

Integrated efforts directed toward population groups that are affected by various NIDs is an example of the innovation being done in the Americas.

include activities and funding designed to strengthen epidemiologic surveillance, provide an integrated approach to morbidity in the context of PHC services, conduct research, and ensure organized response to outbreaks. Local capacities must also be strengthened by training human resources; making high-quality, safe, and affordable

supplies and medicines available; integrating interventions with existing health programs and intersectoral actions; and increasing care capacities.

The eventual elimination of NIDs should be considered a starting point for efforts to bring real (sustainable) development to affected communities rather than an endpoint for health sector programs and initiatives. Recognizing that these diseases are intimately related to poverty and underdevelopment is a first step to understanding that development is essential if impoverished communities are to be freed of the social and economic

conditions that make them vulnerable to the resurgence of NIDs. Communities with good access to basic services, adequate education, health care, water, sanitation, housing, food, and jobs—which provide opportunities to overcome the chronic risks they face—will be more productive and have a higher chance of experiencing a future free of the scourge of these diseases.

The post-NID elimination era will present even greater challenges, such as improving the living conditions of affected communities to prevent reemergence of the diseases. To delay or fail to implement concrete interventions to close the

development gaps of communities previously affected by NIDs—marginalized, vulnerable, poor, neglected, and often forgotten populations in marginalized rural and peri-urban communities—would be similar to defaulting on a debt, one that must be honored if NID elimination is to be sustained.

For example, post-NID elimination, the health sector should promote work with complementary initiatives such as HiAP, PHC, UHA, and UHC to help ensure access and availability of interventions and services needed to detect, treat, and properly respond to the possible reemergence of any NID or



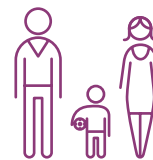
“THE POST-NID ELIMINATION ERA WILL PRESENT EVEN GREATER CHALLENGES, SUCH AS IMPROVING THE LIVING CONDITIONS OF AFFECTED COMMUNITIES TO PREVENT REEMERGENCE OF THE DISEASES.”

other disease capable of threatening populations' collective well-being. This, in turn, will require that investment of technical, technological, and financial resources be maintained at the local level, within the context of these complementary initiatives.

In addition, communities where one or more NIDs have successfully been eliminated should continue to be targeted for poverty reduction and the SDGs. These communities have benefitted from more than a decade of interventions and thus have community-based rather than institutional, installed capacity. This should be recognized and leveraged in order to move toward

achieving sustainable development. It is in these communities (the ones affected by NIDs) that complementary initiatives such as the HiAP strategy can be implemented most effectively.

The guiding purpose in post-2015 programming should be to take responsibility for eliminating NIDs in communities where these diseases persist, and to act as pioneers in the post-elimination era, while adopting comprehensive local strategies. A new "road map" for the SDGs must be drawn up, with innovation as a key element in working to free the Americas of NIDs.



"IN ADDITION, COMMUNITIES WHERE ONE OR MORE NIDS HAVE SUCCESSFULLY BEEN ELIMINATED SHOULD CONTINUE TO BE TARGETED FOR POVERTY REDUCTION AND THE SDGs."

COLLABORATION TO COMBAT NID_s



GOVERNMENT AGENCIES AND BILATERAL AND MULTILATERAL ORGANIZATIONS

The Brazilian Cooperation Agency (*Agência Brasileira de Cooperação*, ABC) and Brazil's Ministry of Health; USAID; the Japanese International Cooperation Agency (JICA); the Inter-American Development Bank (IDB); Global Affairs Canada; the Department for International Development (DFID) of the United Kingdom; the U.S. Centers for Disease Control and Prevention (CDC) Division of Parasitic Diseases and Malaria; and the Organization of Petroleum Exporting Countries (OPEC) Fund for International Development (OFID).



FOUNDATIONS AND NONPROFITS

Children Without Worms (CWW); Izumi Foundation; Global Network for Neglected Tropical Diseases (Global Network) of the Sabin Vaccine Institute (Sabin); the Sasakawa Foundation; the scientific research foundation Fundação Oswaldo Cruz (FIOCRUZ); the Global Programme to Eliminate Lymphatic Filariasis; the Neglected Tropical Diseases Support Center (NTD-SC); the Bill and Melinda Gates Foundation; the Task Force for Global Health (TFGH); the Damien Foundation; The Nippon Foundation (TNF)/Sasakawa Memorial Health Foundation (SMHF); the International Federation of Anti-Leprosy Associations (ILEP) and the American Leprosy Missions (ALM); the Instituto Lauro de Souza Lima (ILSL); the Alfredo da Matta Tropical Dermatology and Venereology Foundation (*Fundação de Dermatologia Tropical e Venereologia Alfredo da Matta*, FUAM); The Carter Center (TCC); the Lions Club International Foundation (LCIF); the former Fundación Ceguera de los Rios; the Abbot Fund; CBM (formerly known as the Christian Blind Mission); the Alwaleed Bin Talal Foundation (ABTF); the International Trachoma Initiative (ITI); the International Agency for the Prevention of Blindness (IAPB); the U.S. Pharmacopeia Convention (USP); Management Sciences for Health (MSH); the organization Links Media; and the PAHO Foundation.

Notable among the various strategic partners and allies involved in efforts to control and eliminate NIDs in the Americas are government agencies and multilateral organizations, foundations, nonprofits, universities, and other stakeholders.



UNIVERSITIES

University of Georgia (USA); Saint George's University (Grenada); The University of the West Indies (Jamaica); Case Western Reserve University (USA); Universidad Mayor de San Andrés (Bolivia); Universidad Peruana Cayetano Heredia (Peru) (for fascioliasis); University of Notre Dame (USA); McGill University (Canada); London School of Hygiene and Tropical Medicine (UK); the Liverpool School of Tropical Medicine (UK); the Economics of Lymphatic Filariasis Project at Emory University (USA); the Dana Center for Preventive Ophthalmology at Johns Hopkins University (WHO Collaborating Centre for the Prevention of Blindness and Visual Impairment) (USA); the Milken Institute School of Public Health at George Washington University (USA); and the Center for Communication Programs at the Johns Hopkins Bloomberg School of Public Health (USA).



OTHER

The contribution of the Global Fund to Fight AIDS, Tuberculosis and Malaria (Geneva, Switzerland) has been of vital importance. Over the years it has made a major investment in the countries of the Americas and contributed to drastic reductions in malaria's burden of disease.

PUBLIC-PRIVATE PARTNERSHIPS FOR CONTROL AND ELIMINATE OF NIDs IN THE AMERICAS

The work carried out by the countries to achieve and sustain the control and elimination of NIDs in the Americas has enjoyed support from public-private partnerships (PPPs) for effective interventions targeting the affected populations. These partnerships include active participation by the pharmaceutical companies, donors, NGOs, research groups, and academic institutions.

A prime example of private sector support are the donations from Merck's MDP (Mectizan Donation Program), which, since 1987, has committed to donating ivermectin (brand name Mectizan®) for however long is needed to eliminate onchocerciasis. In 2011, WHO launched a roadmap to achieve the 2020 goals for controlling and eliminating NIDs. In 2012, various partners, including the pharmaceutical companies, donors, NGOs, and other organizations, signed the London Declaration.

The London Declaration supports the WHO plan and manifests the partners' commitment to the following:

- Guaranteeing access to drugs and supplies to further the goal of controlling and eliminating a number of NIDs, including dracunculiasis, lymphatic filariasis, leprosy, African trypanosomiasis, blinding trachoma, STHs, schistosomiasis, Chagas disease, visceral leishmaniasis, and onchocerciasis.
- Conducting further research and work to develop new treatments and interventions.
- Strengthening PPPs at the national and international levels and with multilateral organizations to enhance the efficiency of initiatives.
- With the support of strong health systems, facilitating adequate funding for the countries with endemic NIDs so that they can conduct interventions capable of achieving the established goals.
- Providing technical collaboration, instruments, and resources to the endemic countries to aid efforts to evaluate and monitor their programs.



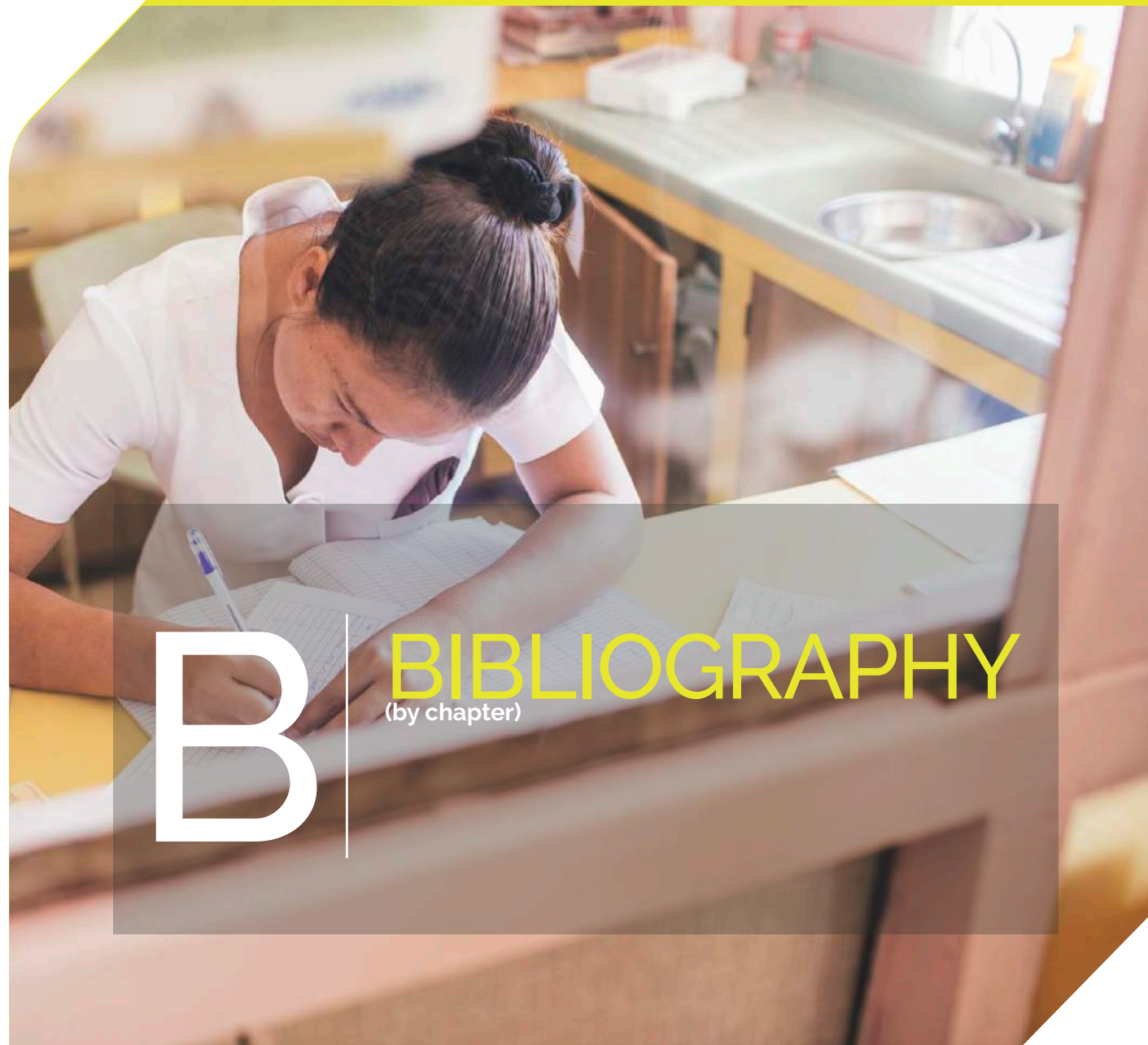
Partnerships with local community leaders helps strengthen their role in the fight against NIDs.

The countries of the Americas, through donations facilitated by PAHO/WHO, have access to drugs to treat NIDs. A number of countries receive donated albendazole and mebendazole for control of helminths (from GlaxoSmithKline (London) and Johnson & Johnson (New Brunswick, NJ)); diethylcarbamazine citrate and albendazole for lymphatic filariasis (Eisai Co., Ltd. (Tokyo) and GlaxoSmithKline); praziquantel for schistosomiasis (Merck KGaA (Darmstadt, Germany)); ivermectin for onchocerciasis (Merck & Co. (Kenilworth, NJ)); azithromycin for trachoma blindness (Pfizer (New York)); poly-chemotherapy with rifampicin, clofazimine, and dapsone for leprosy (Novartis (Basel)); nifurtimox for Chagas disease (Bayer (Leverkusen, Germany)); and triclabendazole for fascioliasis (Novartis).

PPPs strengthen the efforts of national and local governments to reduce the suffering caused by NIDs. The progress achieved to date in controlling and eliminating these diseases would not have been possible without the close collaboration of the affected communities, governments, local organizations, and numerous national and international partners.



“A PRIME EXAMPLE OF PRIVATE SECTOR SUPPORT ARE THE DONATIONS FROM MERCK’S MDP (MECTIZAN DONATION PROGRAM), WHICH, SINCE 1987, HAS COMMITTED TO DONATING IVERMECTIN (BRAND NAME MECTIZAN®) FOR HOWEVER LONG IS NEEDED TO ELIMINATE ONCHOCERCIASIS.”



B

BIBLIOGRAPHY

(by chapter)

A health provider in a primary health care facility in a rural area of Guyana.

OVERVIEW OF NIDs

1. Pan American Health Organization. Resolution CD49.R19: Elimination of neglected infectious diseases and other poverty-related diseases. 49th Directing Council, 61st Session of the Regional Committee, Washington, D.C., USA, 28 September–2 October 2009. Washington: PAHO; 2009. Available from: http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=2661&Itemid=
2. Pan American Health Organization. Control and elimination of five neglected infectious diseases in Latin America and the Caribbean, 2010–2015. Analysis of progress, priorities, and lines of action for lymphatic filariasis, schistosomiasis, onchocerciasis, trachoma, and soil-transmitted helminthiasis. Washington: PAHO; 2010.
3. Schneider MC, Aguilera XP, Barbosa da Silva Junior J, Ault SK, Najera P, et al. Elimination of neglected diseases in Latin America and the Caribbean: a mapping of selected diseases. PLoS Negl Trop Dis. 2011;5(2):e964.
4. World Health Organization. Working to overcome the global impact of neglected tropical diseases: first WHO report on neglected tropical diseases. Geneva: WHO; 2010.
5. World Health Organization. Sustaining the drive to overcome the global impact of neglected tropical diseases: second WHO report on neglected diseases. Geneva: WHO; 2013.
6. World Health Organization. Equity, social determinants and public health programmes. Geneva: WHO; 2010.
7. World Health Organization. Investing to overcome the global impact of neglected tropical diseases: third WHO report on neglected diseases. Geneva: WHO; 2015.
8. World Health Organization. Resolution WHA 66.12: Neglected tropical diseases. Sixty-sixth World Health Assembly, Geneva, 20–27 May 2013. Geneva: WHO; 2013. Available from: http://apps.who.int/gb/ebwha/pdf_files/WHA66-REC1/WHA66_2013_REC1_complete.pdf
9. Hotez PJ, Bottazzi ME, Franco-Paredes C, Ault SK, Periago MR. The neglected tropical diseases of Latin America and the Caribbean: a review of disease burden and distribution and a roadmap for control and elimination. PLoS Negl Trop Dis. 2008;2(9):e300.
10. Hotez PJ, Fenwick A, Savioli L, Molyneux DH. Rescuing the bottom billion through control of neglected tropical diseases. Lancet. 2009;373(9674):1570–5.

11. Pan American Health Organization. Communicable diseases and health analysis: health situation in the Americas: basic indicators 2014. Washington: PAHO; 2014. Available from: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=27299&Itemid=270. Accessed on 30 May 2015.

CHAGAS DISEASE

1. Pan American Health Organization. Chagas disease. Iniciativa de los Países de América Central para la Interrupción de la Transmisión Vectorial y Transfusional de la Enfermedad de Chagas (IPCA). Historia de 12 años de una Iniciativa Subregional: 1998–2010: Tegucigalpa: PAHO; 2011. (PAHO/HSD/CD/005-11). Available from: www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=15711&Itemid=

SCHISTOSOMIASIS

1. World Health Organization. Report of the WHO informal consultation on schistosomiasis in low transmission areas: control strategies and criteria for elimination. London 10–13 April 2012. Geneva: WHO; 2001. Pp. 1–51.

2. World Health Organization. Report of an informal consultation on schistosomiasis control. Geneva, Switzerland, 30 March–1 April. Geneva: WHO; 2011. Pp. 1–67.

3. World Health Organization. Meeting of the International Task Force for Disease Eradication, April 2012. Wkly Epidemiol Rec. 2012;87(33):305–9.

4. World Health Organization. Schistosomiasis: progress report 2001–2011 and strategic plan 2012–2020. Geneva: WHO; 2013.

5. World Health Organization. Prevention and control of schistosomiasis and soil-transmitted helminthiasis: report of a WHO Expert Committee. Geneva: WHO; 2002. (WHO Technical Report Series 912). Pp. 1–57.

6. World Health Organization. Elimination of schistosomiasis from low transmission areas: report of a WHO Informal Consultation. Salvador, Bahia, Brazil, 18–19 August 2008. Geneva: WHO; 2008. Pp. 1–31.
7. World Health Organization. Preventive chemotherapy in human helminthiasis: coordinated use of anthelmintic drugs in control interventions: a manual for health professionals and programme managers. Geneva: WHO; 2006. Pp. 1–74.
8. Colley DG, Bustinduy AL, Secor WE, King CH. Human schistosomiasis. *Lancet*. 2014;383(9936):2253–64. doi: 10.1016/S0140-6736(13)61949–2. Epub 2014 Apr 1.
9. World Health Organization. Assessing the efficacy of anthelmintic drugs against schistosomiasis and soil-transmitted helminthiasis. Geneva: WHO; 2013.
10. World Health Organization. Resolution WHA65.21. Elimination of schistosomiasis. Sixty-fifth World Health Assembly, Geneva, 21–26 May 2012. Geneva: WHO; 2012.
11. World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. 2nd ed. Geneva: WHO; 2011.
12. World Health Organization. Resolution WHA54.19. Schistosomiasis and soil-transmitted helminth infections. Fifty-fourth World Health Assembly. Geneva: WHO; 2001.
13. Schistosomiasis: number of people receiving preventive chemotherapy in 2012. *Weekly Epidemiological Record*. 2014;89(2):21–8.
14. Pan American Health Organization. PAHO/WHO schistosomiasis regional meeting: defining a roadmap towards verification of elimination of schistosomiasis transmission in Latin America and the Caribbean by 2020. Geneva: WHO; 2014.

LYMPHATIC FILARIASIS

1. Gabrielli AF, Montresor A, Chitsulo L, Engels D, Savioli L. Preventive chemotherapy in human helminthiasis: theoretical and operational aspects. *Trans R Soc Trop Med Hyg*. 2011;105(12):683–93.
2. World Health Organization. Preventive chemotherapy in human helminthiasis: coordinated use of anthelmintic drugs in control interventions: a

manual for health professionals and programme managers. Geneva: WHO; 2006.

3. World Health Organization. Global Programme to Eliminate Lymphatic Filariasis: progress report 2000–2009 and strategic plan 2010–2020. Geneva: WHO; 2010.
4. World Health Organization. Monitoring and epidemiological assessment of mass drug administration in the Global Programme to Eliminate Lymphatic Filariasis: a manual for national elimination programmes. Geneva: WHO; 2011.
5. World Health Organization. Lymphatic filariasis: a handbook of practical entomology for national lymphatic filariasis elimination programmes. Geneva: WHO; 2013.
6. World Health Organization. Global programme to eliminate lymphatic filariasis: progress report, 2014. Weekly Epidemiological Record 2015; 90, 489–504.
7. World Health Organization. Lymphatic filariasis: managing morbidity and preventing disability: an aide-mémoire for national programme managers. Geneva: WHO; 2013.

LEPROSY

1. World Health Organization. Leprosy elimination monitoring (LEM): guidelines for monitors. Geneva: WHO, 2000. (WHO/CDS/CPE/2000.17).
2. World Health Organization Regional Office for South-East Asia. Enhanced global strategy for further reducing the disease burden due to leprosy (plan period 2011–2015). New Delhi: WHO; 2009. (SEA-GLP-2009.3).
3. World Health Organization Regional Office for South-East Asia. Enhanced global strategy for further reducing the disease burden due to leprosy (2011–2015). Operational guidelines (updated). New Delhi: WHO; 2009. (SEA-GLP-2009.4).
4. United Nations General Assembly. Set of principles and guidelines for the elimination of discrimination against people affected by leprosy and their family members. New York: UN Human Rights Council; 2010. (A/HRC/15/30).
5. World Health Organization. WHO Expert Committee on Leprosy: eighth report. WHO technical report series no. 968. Geneva: WHO; 2012.

6. World Health Organization Regional Office for South-East Asia. Enhanced global strategy for further reducing the disease burden due to leprosy: questions and answers. New Delhi: WHO; 2012. (SEA-GLP-2012.01).
7. Pan American Health Organization. Plan of action in order to accelerate the achievement of the elimination of leprosy in Latin America and the Caribbean: lines of action to meet the goals and sustain the regional achievements from 2012–2015. Washington: PAHO; 2012.
8. World Health Organization. Global leprosy update, 2013: reducing disease burden. Weekly Epidemiological Record. 2014;89:386–400.

MALARIA

1. Pan American Health Organization. Resolution CD42.R15: Roll Back Malaria in the Region of the Americas. 42nd Directing Council, 52nd Session of the Regional Committee, 25–29 September 2000, Washington, D.C. Washington: PAHO; 2000.
2. Pan American Health Organization. Malaria surveillance indicators (2013) [Internet database]. Washington: PAHO; 2013 [updated 26 February 2015]. Available from: www.paho.org/malariastats Accessed on 15 March 2013.
3. Pan American Health Organization. Strategy and Plan for Action for Malaria. 51st Directing Council, 63rd Session of the Regional Committee, Washington, D.C., USA, 26–30 September 2011. Washington: PAHO; 2011.
4. Pan American Health Organization Regional Malaria Program. Report on the situation of malaria in the Americas 2008. Washington: PAHO; 2010. (HSD/CD/Malaria).
5. Pan American Health Organization Regional Malaria Program. Regional Strategic Plan for Malaria in the Americas, 2006–2010. Washington: PAHO; 2013. 73 pp.
6. World Health Organization. Malaria: T3: Test. Treat. Track initiative [Internet]. Geneva: WHO; 2012. Available from: http://www.who.int/malaria/areas/test_treat_track/en/
7. Carter KH, Singh P, Mujica OJ, Escalada RP, Ade MP, Castellanos LG, et al. Malaria in the Americas: trends from 1959 to 2011. The American Journal of Tropical Medicine and Hygiene 2015;92(2):302–16.

8. World Health Organization. World malaria report 2014. Geneva: WHO; 2015.
9. World Health Organization. Malaria [Internet]. Geneva: WHO; 2015 [updated 13 July 2015]. Available from: www.paho.org/malaria
10. Pan American Health Organization. PAHO: malaria. Washington: PAHO; 2014 [updated 24 April 2014]. Available from: <http://www.paho.org/campeonesmalaria/?lang=en>
11. Pan American Health Organization. Malaria Champions of the Americas Award. Washington: PAHO; 2015. [updated 22 April 2015]. Available from: http://www.paho.org/hq/index.php?option=com_content&view=article&id=1284&Itemid=1704=en Accessed on 13 July 2015.
12. Consejo de Ministros de Salud de Centroamérica y República Dominicana. Declaración- Hacia la eliminación de la malaria en Mesoamérica y la Isla de la Española en el 2020. San José, Costa Rica: XXXXVIII Reunión Ordinaria del COMISCA; 2013.

ONCHOCERCIASIS

1. Program Coordinating Committee and OEPA staff. Guide to detecting a potential recrudescence of onchocerciasis during the post-treatment surveillance period: the American paradigm. Research and Reports in Tropical Diseases 2012;3:21–33.
2. Centers for Disease Control and Prevention (CDC). MMWR Morb Mortal Wkly Rep. Progress toward elimination of onchocerciasis in the Americas: 1993–2012. 2013;62(20):405–8.
3. World Health Organization. Certification of elimination of human onchocerciasis: criteria and procedures. Geneva: WHO; 2001.
4. Sauerbrey M. The Onchocerciasis Elimination Program for the Americas (OEPA). Ann Trop Med Parasitol. 2008;102 Suppl 1:S25–9.
5. Blanks J, Richards F, Beltrán F, Collins R, Alvarez E, Zea Flores G, et al. The Onchocerciasis Elimination Program of the Americas: a history of partnership. Rev Panam Salud Publica 1998;3(6):367–74.

OCULAR TRACHOMA

1. Pan American Health Organization. Trachoma elimination in the Americas: first regional meeting of program managers. Bogotá, Colombia, 23–25 May 2011. Washington: PAHO; 2011. Available from: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=14115&lang=en
2. Pan American Health Organization. Trachoma elimination in the Americas: second regional meeting of program managers. Guatemala City, 16–18 April 2012. Washington: PAHO; 2012. Available from: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=19976
3. Pan American Health Organization. Trachoma elimination in the Americas: third regional meeting of program managers. Tocantins, Brazil, 12–14 August 2014. Washington: PAHO; 2014. Available from: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=28765
4. Mariotti SP, Pascolini D, Rose-Nussbaumer J. Trachoma: global magnitude of a preventable cause of blindness. Br J Ophthalmol. 2009;93(5):563–8.
5. World Health Organization. Status of endemicity for blinding trachoma by country (2013) [Internet]. Geneva: WHO; 2014. Available from: <http://apps.who.int/gho/data/view.main.95400> Accessed on 12 December 2014.
6. Pan American Health Organization. Trachoma Blindness Fact Sheet. Washington: PAHO; 2014. Available from: www.paho.org/trachoma
7. Miller H, Gallego G, Rodríguez G. Evidencia clínica de tracoma en indígenas colombianos del departamento de Vaupés. Biomedica. 2010;30(3):432–9.
8. Lopes Mde F, Luna EJ, Medina NH, Cardoso MR, Freitas HS, Koizumi IK, et al. [Prevalence of trachoma in Brazilian schoolchildren]. Rev Saude Publica. 2013;47(3):451–9.
9. Stocks ME, Ogden S, Haddad D, Addiss DG, McGuire C, Freeman MC. Effect of water, sanitation, and hygiene on the prevention of trachoma: a systematic review and meta-analysis. PLoS Med. 2014;11(2):e1001605.
10. World Health Organization. Trachoma control: a guide for programme managers. Geneva: WHO; 2006.
11. World Health Organization. Resolution WHA51.11: Global elimination of blinding trachoma. 51st World Health Assembly, Geneva, 16 May 1998. Geneva: WHO; 1998. Available from: <http://www.who.int/blindness/causes/WHA51.11/en/> Accessed on 12 December 2014.

SOIL-TRANSMITTED HELMINTH INFECTIONS

1. World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. 2nd ed. Geneva: WHO; 2011.
2. World Health Organization. Preventive chemotherapy in human helminthiasis: coordinated use of anthelmintic drugs in control interventions: a manual for health professionals and programme managers. Geneva: WHO; 2006.
3. Oberhelman RA, Guerrero ES, Fernández ML, Silio M, Mercado D, Comiskey N, et al. Correlations between intestinal parasitosis, physical growth, and psychomotor development among infants and children from rural Nicaragua. *Am J Trop Med Hyg.* 1998;58(4):470–5.
4. Albonico M, Allen H, Chitsulo L, Engels D, Gabrielli A-F, Savioli L. Controlling soil-transmitted helminthiasis in pre-school-age children through preventive chemotherapy. *PLoS Negl Trop Dis.* 2008;2(3):1–11.
5. World Health Organization. Technical updates of the guidelines on the Integrated Management of Childhood Illness (IMCI): evidence and recommendations for further adaptations. Geneva: WHO; 2005.
6. Pan American Health Organization. Operational guidelines for the implementation of integrated deworming: a contribution to the control of soil-transmitted helminth infections in Latin America and the Caribbean. Washington: PAHO; 2015.
7. World Health Organization. Soil-transmitted helminthiasis: number of children treated in 2014. *Weekly Epidemiological Record.* 2015; 90, 701–712.

FASCIOLIASIS

1. Pan American Health Organization/American Public Health Association. El control de las enfermedades transmisibles. XIX ed. Scientific Publication 635. Washington: PAHO; 2011.

2. World Health Organization. Report of the WHO Expert Consultation on foodborne trematode infections and taeniasis/cysticercosis. Vientiane, Lao People's Democratic Republic, 12–16 October 2009. Geneva: WHO; 2011.
3. World Health Organization. Report of the WHO Informal Meeting on use of triclabendazole in fascioliasis control. WHO headquarters, Geneva, Switzerland, 17–18 October 2006. Geneva: WHO; 2006.
4. World Health Organization. Accelerating work to overcome the global impact of neglected tropical diseases: a roadmap for implementation. Executive summary. Geneva: WHO; 2012.

LEISHMANIASIS

1. Desjeux P. Leishmaniasis: current situation and new perspectives. *Comp. Immunol Microbiol Infect Dis.* 2004;27(5):305–318.
2. World Health Organization. WHO technical report series; No. 949 - Control of the leishmaniasis: report of a meeting of the WHO Expert Committee on the Control of Leishmaniasis, Geneva, 22–26 March 2010..
3. Pan American Health Organization. Leishmaniasis: epidemiological report of the Americas. Washington: PAHO; 2015, No. 3 July.

DENGUE

1. Pan American Health Organization. Dengue: guías de atención para enfermos en la región de las Américas. La Paz, Bolivia: PAHO; 2010.
2. World Health Organization / Special Programme for Research and Training in Tropical Diseases. Dengue: guidelines for diagnosis, treatment, prevention and control–new edition. Geneva: WHO; 2009.

3. World Health Organization. Dengue haemorrhagic fever: diagnosis, treatment, prevention and control. 2nd ed. Geneva: WHO; 1997.
4. Pan American Health Organization. Dengue: number of reported cases [Internet]. Washington: PAHO; 2015. Available from: www.paho.org/dengue Accessed on 5 June 2015.
5. State of the Art in the Prevention and Control of Dengue in the Americas Meeting report; 28-29 May 2014. Washington DC. USA. Washington; PAHO 2014. Available from: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=27233&lang=en Accessed on 5 June 2015.
6. Pan American Health Organization. Resolution CD44.R9: Dengue. 44th Directing Council, 55th Session of the Regional Committee, Washington, D.C., USA, 22–26 September 2003. Washington: PAHO; 2003. Available from: <http://www1.paho.org/english/gov/cd/cd44-r9-e.pdf> Accessed on 25 February 2015.
7. Pan American Health Organization. Dengue prevention and control in the Americas: integrated approach and lessons learned. 27th Pan American Sanitary Conference, 59th Session of the Regional Committee, Washington, D.C., 1–5 October 2007. Washington: PAHO; 2007. (Resolution CSP27.R15). Available from: <http://www1.paho.org/english/gov/csp/csp27-15-e.pdf?ua=1> Accessed on 5 June 2015.
8. Alexander N, Balmaseda A, Coelho IC, Dimaano E, Hien TT, Hung NT, et al. Multicentre prospective study on dengue classification in four South-east Asian and three Latin American countries. *Tropical Medicine & International Health*. 2011;16(8):936–48.
9. Barniol J, Gackowski R, Barbato EV, da Cunha RV, Salgado D, Martinez E, et al. Usefulness and applicability of the revised dengue case classification by disease: multi-centre study in 18 countries. *BMC Infectious Diseases*. 2011;11(1):106.

525 Twenty-third Street, NW
Washington, DC 20037, USA
Tel: +1 (202) 974-3000
www.paho.org

ISBN 978-92-75-11896-2

