



**Organización
Panamericana
de la Salud**



**Organización
Mundial de la Salud**

OFICINA REGIONAL PARA LAS **Américas**

9th Scientific Regional Conference of TEPHINET

New strategies and challenges for an integrated response

**Opportunities for Innovation:
Integrated surveillance of communicable diseases
in the Americas**

Luis G. Castellanos, MD, PhD, MPH
Pan American Health Organization – PAHO
Regional Office of the World Health Organization – WHO
Department of Communicable Diseases and Health Analysis

www.paho.org/neglecteddiseases





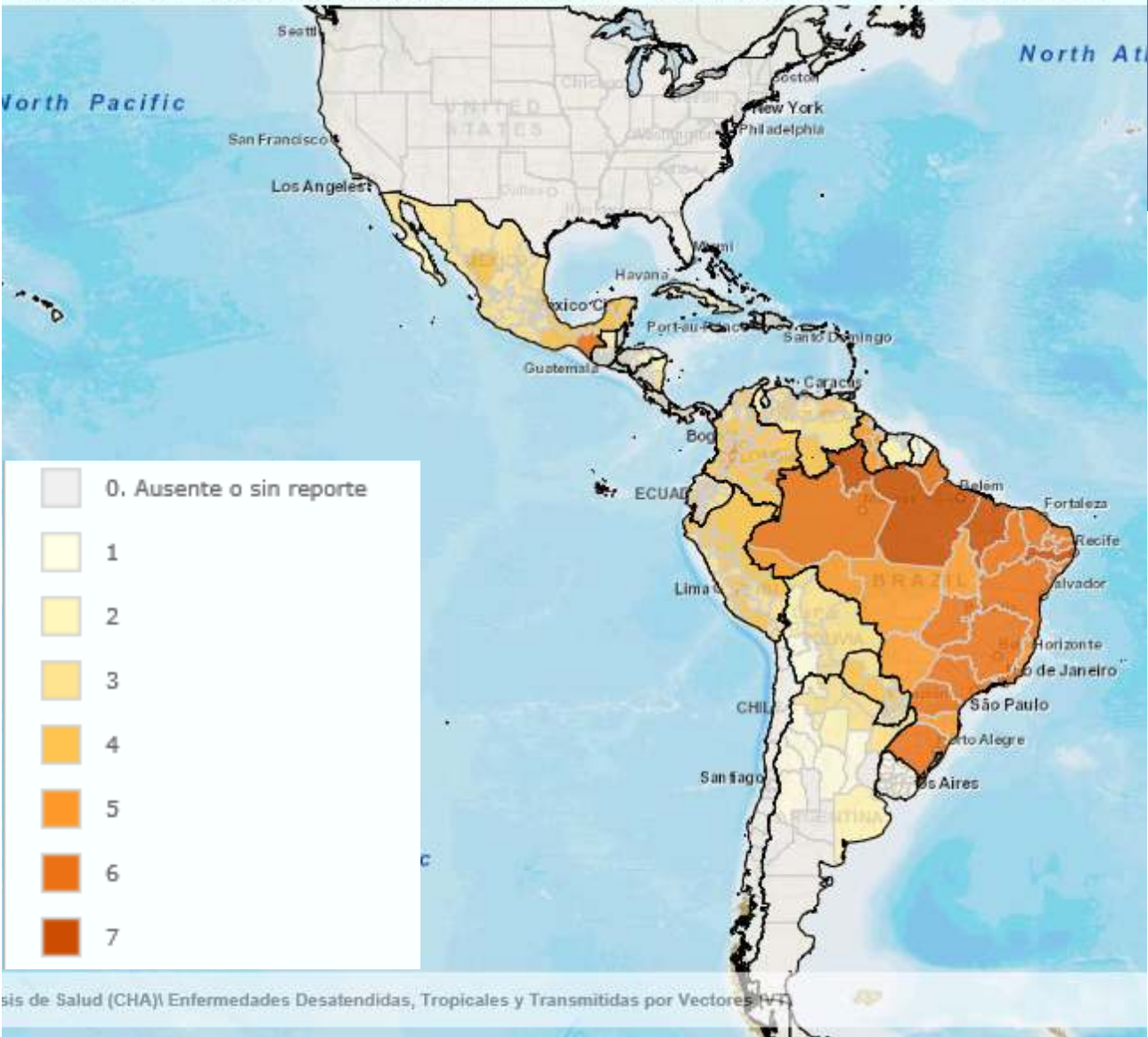
Current challenges in doing surveillance of communicable diseases in the Americas

Too many!



Goal	WHO/NTD (Roadmap and Resolution WHA66.12-2013)	PAHO/NID (Resolution CD55.R9-2016)
Elimination (9)	<ul style="list-style-type: none"> • African trypanosomiasis • Chagas disease • Schistosomiasis • Lymphatic filariasis • Onchocerciasis • Leprosy • Rabies transmitted by dogs • Blinding trachoma • Yaws 	<p>Interrupt or eliminate (8)</p> <ul style="list-style-type: none"> • Trachoma • Chagas disease • Rabies mediated by dogs • Leprosy • Taeniasis/cysticercosis • Lymphatic filariasis • Onchocerciasis • Schistosomiasis
Control (7)	<ul style="list-style-type: none"> • Buruli ulcer • Taeniasis/cysticercosis • Echinococcosis • Foodborne trematodiasis • Dengue • Soil-transmitted helminths (<i>ascaris, trichuris, uncinarias</i>) • Leishmaniasis 	<p>Prevent, control and reduce the burden (5)</p> <ul style="list-style-type: none"> • Cystic echinococcosis/hydatidosis • Fascioliasis • Human plague • Leishmaniasis • Soil-transmitted helminthiasis <p>Assess the regional epidemiological situation (8)</p> <ul style="list-style-type: none"> • Brucellosis • Buruli ulcer • Ectoparasitic infections • Selected fungal infections • Myiasis • Strongyloidiasis • Venomous snake bite and arthropod bite poisonings

Distribución y sobreposición geográfica de las EID - Número de enfermedades (2013-2015)



Number of NID overlapping at the first subnational level in the Americas

Foci of onchocerciasis, schistosomiasis, lymphatic filariasis, trachoma, STH, leprosy, Chagas disease and leishmaniasis



Overlapping Vector-Borne Diseases (VBD) in the Americas, 2016



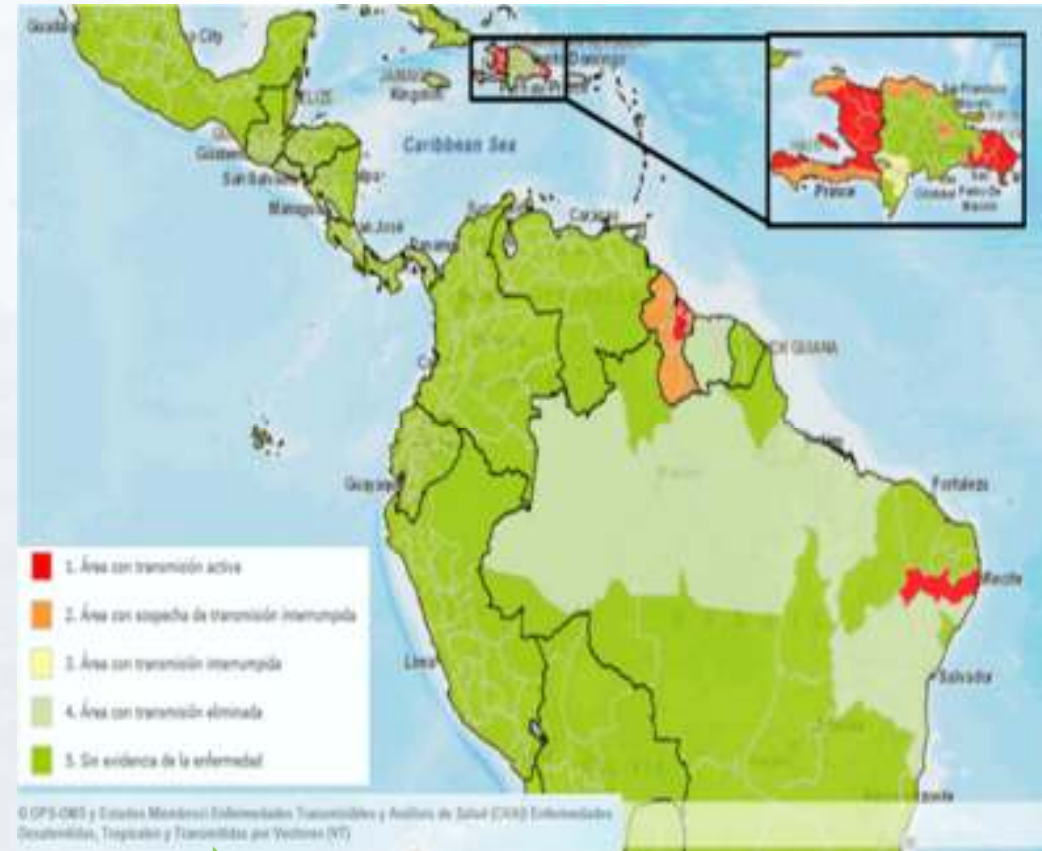
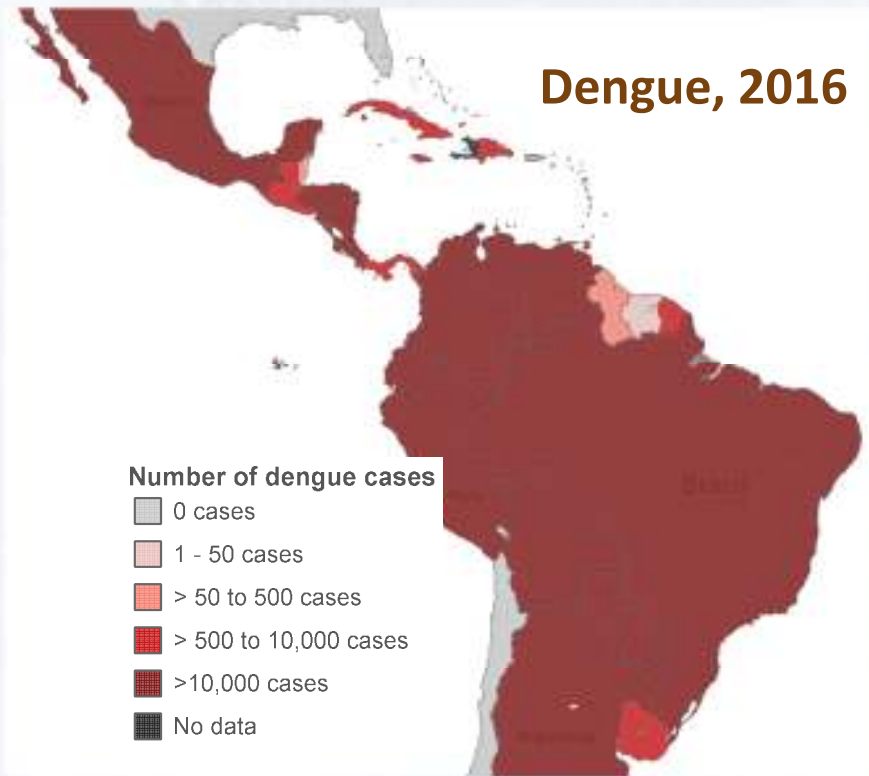
Countries \ territories with presence of vector-borne diseases

Country	Total	Dengue	Chikungunya	Zika	Yellow Fever	Malaria	Chagas Dis.	Leishmania	Onchocerci.	Plague	Lymphatic	Schistosom.
Brazil	11	●	●	●	●	●	●	●	●	●	●	●
Ecuador	9	●	●	●	●	●	●	●	●	●	●	●
Venezuela	9	●	●	●	●	●	●	●	●	●	●	●
Bolivia	8	●	●	●	●	●	●	●	●	●	●	●
Guyana	8	●	●	●	●	●	●	●	●	●	●	●
Peru	8	●	●	●	●	●	●	●	●	●	●	●
Suriname	8	●	●	●	●	●	●	●	●	●	●	●
Argentina	7	●	●	●	●	●	●	●	●	●	●	●
Colombia	7	●	●	●	●	●	●	●	●	●	●	●
French Guiana	7	●	●	●	●	●	●	●	●	●	●	●
Guatemala	7	●	●	●	●	●	●	●	●	●	●	●
Mexico	7	●	●	●	●	●	●	●	●	●	●	●
Panama	7	●	●	●	●	●	●	●	●	●	●	●
Paraguay	7	●	●	●	●	●	●	●	●	●	●	●
Costa Rica	6	●	●	●	●	●	●	●	●	●	●	●
Dominican Republic	6	●	●	●	●	●	●	●	●	●	●	●
El Salvador	6	●	●	●	●	●	●	●	●	●	●	●
Honduras	6	●	●	●	●	●	●	●	●	●	●	●
Nicaragua	6	●	●	●	●	●	●	●	●	●	●	●
Belize	5	●	●	●	●	●	●	●	●	●	●	●
Haiti	5	●	●	●	●	●	●	●	●	●	●	●
Saint Lucia	4	●	●	●	●	●	●	●	●	●	●	●
Trinidad and Tobago	4	●	●	●	●	●	●	●	●	●	●	●
United States of Ame.	4	●	●	●	●	●	●	●	●	●	●	●
Anguilla	3	●	●	●	●	●	●	●	●	●	●	●
Antigua and Barbuda	3	●	●	●	●	●	●	●	●	●	●	●
Aruba	3	●	●	●	●	●	●	●	●	●	●	●
Bahamas	3	●	●	●	●	●	●	●	●	●	●	●
Barbados	3	●	●	●	●	●	●	●	●	●	●	●
Bonaire, Saint Eustati.	3	●	●	●	●	●	●	●	●	●	●	●
British Virgin Islands	3	●	●	●	●	●	●	●	●	●	●	●
Cayman Islands	3	●	●	●	●	●	●	●	●	●	●	●
Curacao	3	●	●	●	●	●	●	●	●	●	●	●
Dominica	3	●	●	●	●	●	●	●	●	●	●	●
Grenada	3	●	●	●	●	●	●	●	●	●	●	●
Guadeloupe	3	●	●	●	●	●	●	●	●	●	●	●
Jamaica	3	●	●	●	●	●	●	●	●	●	●	●
Martinique	3	●	●	●	●	●	●	●	●	●	●	●
Puerto Rico	3	●	●	●	●	●	●	●	●	●	●	●
Saint Barthelemy	3	●	●	●	●	●	●	●	●	●	●	●
Saint Martin	3	●	●	●	●	●	●	●	●	●	●	●
Saint Vincent and the	3	●	●	●	●	●	●	●	●	●	●	●
Sint Maarten	3	●	●	●	●	●	●	●	●	●	●	●
Turks and Caicos Isla.	3	●	●	●	●	●	●	●	●	●	●	●
United States Virgin I.	3	●	●	●	●	●	●	●	●	●	●	●
Bermuda	2	●	●	●	●	●	●	●	●	●	●	●
Cuba	2	●	●	●	●	●	●	●	●	●	●	●
Montserrat	2	●	●	●	●	●	●	●	●	●	●	●
Saint Kitts and Nevis	2	●	●	●	●	●	●	●	●	●	●	●
Uruguay	2	●	●	●	●	●	●	●	●	●	●	●
Chile	1	●	●	●	●	●	●	●	●	●	●	●
Total		50	48	46	13	21	21	19	5	5	4	4

Communicable Diseases and Health Analysis (CHA) \ Neglected, Tropical and Vector Borne Diseases (VT) & Epidemic Alert and Response, and Water Borne Diseases (IR)
 Data sources: PAHO-CHA-CD Annual country reports to PAHO. Country or Territory reporting VT in the Americas between 2000 -2016 <http://www.paho.org/cd>, \ PAHO-CHA-IR. Epidemic Alert and Response, and Water Borne Diseases (IR) Reports from Member States \HR NFFs and/or through Member States websites 2000-2016 <http://www.paho.org/cd>.
 For specific data sources and definitions please review the individual disease maps in other pages of this interactive report (UPPER TABS). Interactive report produced by: PAHO/CHAIR

Communicable diseases and NID in the Americas

Different patterns on geographical distribution



Specific foci in specific geographic areas of four countries (except of Haiti)



Lymphatic filariasis

Communicable diseases and NIDs in the Americas

Different surveillance strategies

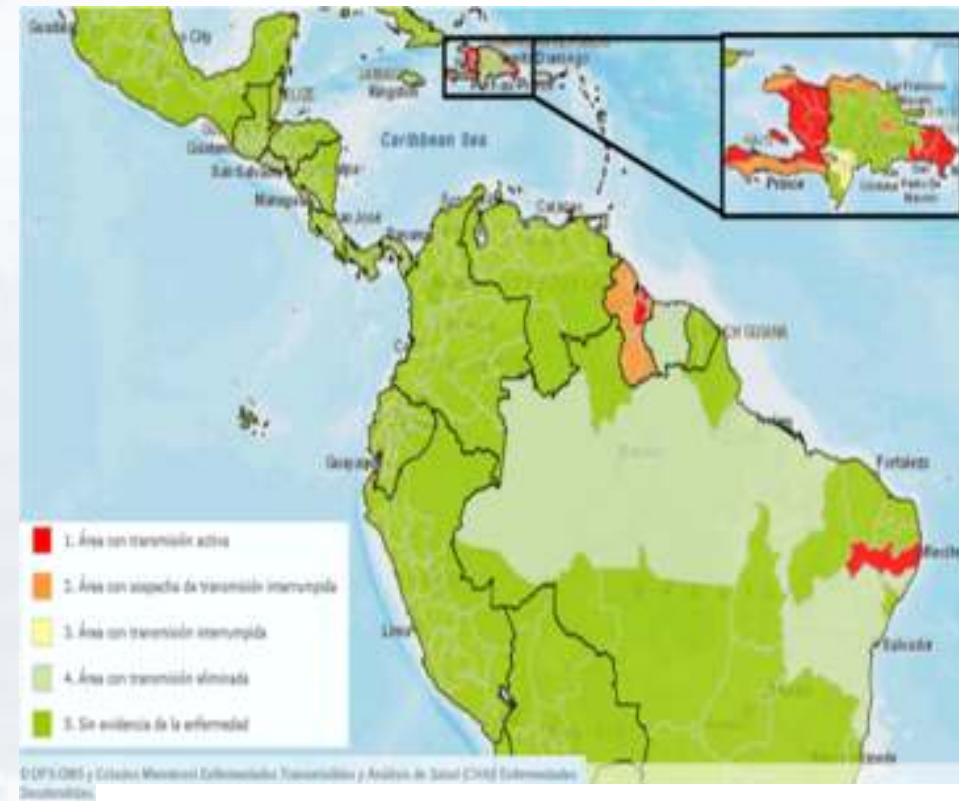
Notification of individually diagnosed cases

Dengue

Number of dengue cases

- 0 cases
- 1 - 50 cases
- > 50 to 500 cases
- > 500 to 10,000 cases
- >10,000 cases
- No data

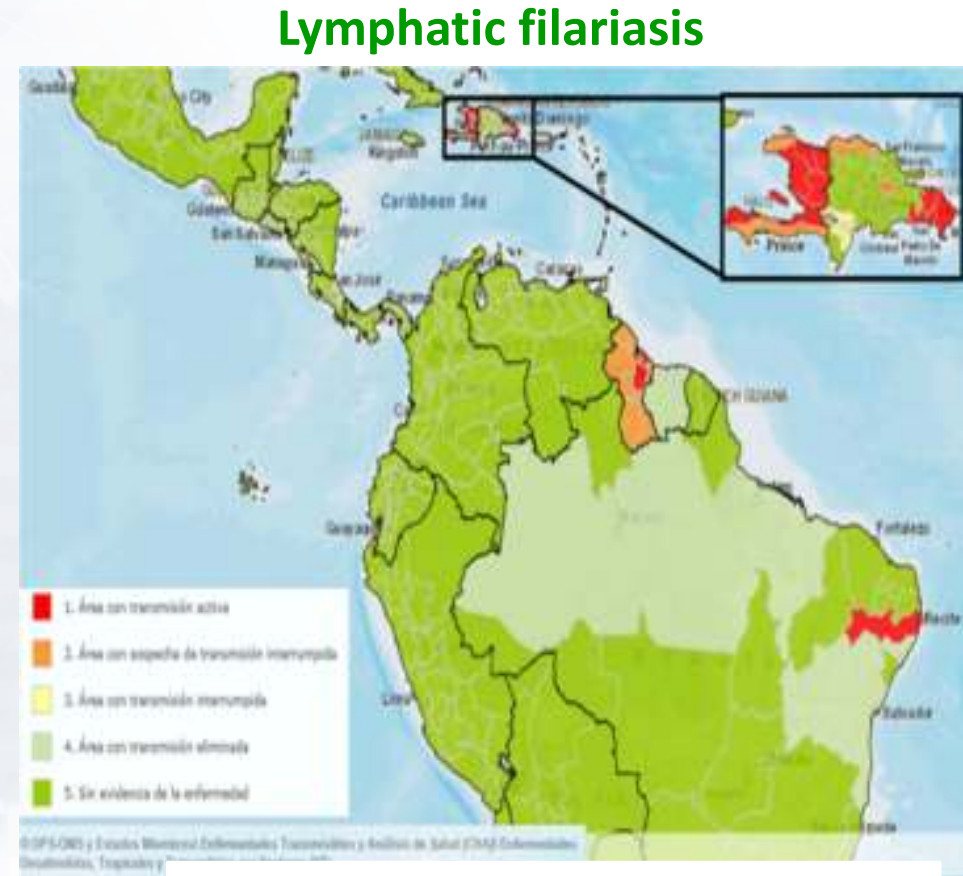
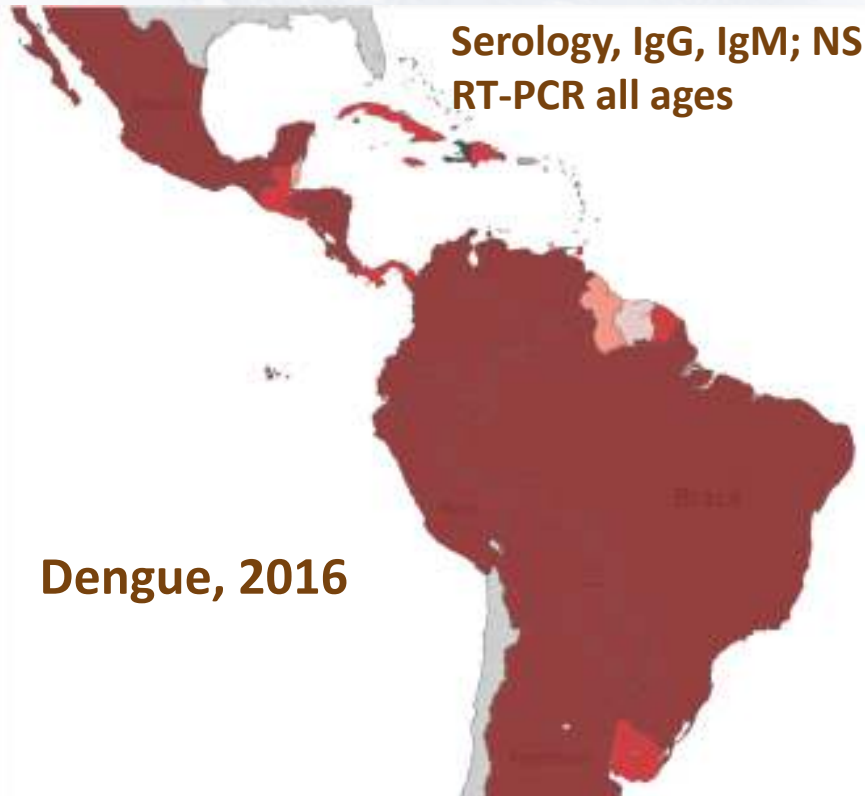
Lymphatic filariasis



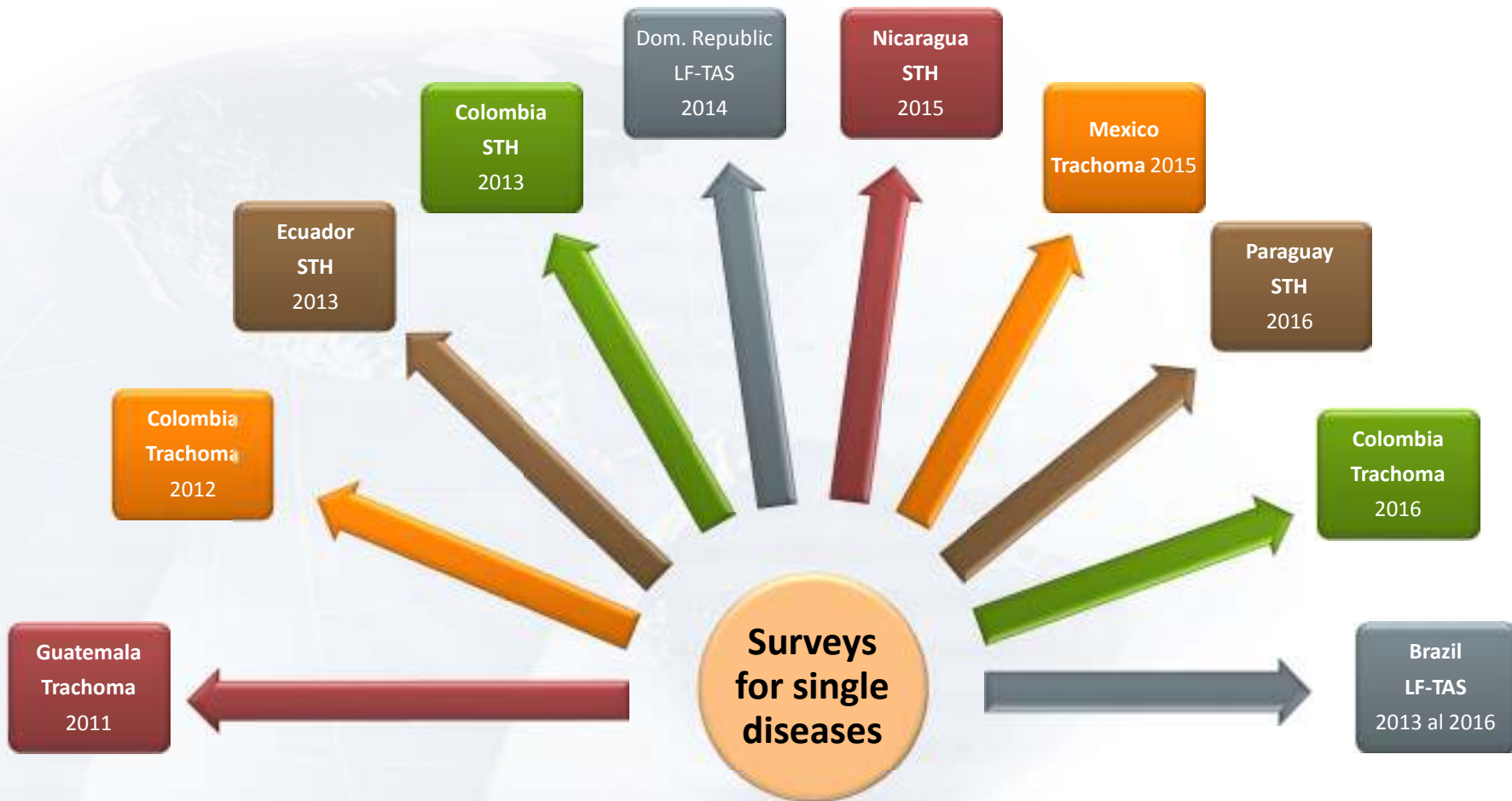
Population based surveillance: baseline, sentinel surveillance, transmission assessment surveys (TAS)

Communicable diseases and NIDs in the Americas

Different lab testing (samples, tests, people)



Microfilariae, Ag by ICT, peripheral
blood, >5 years as part of surveys



Challenges:

Higher costs for only one disease; surveys are carried out in rural remote areas (**longer time**)); target populations may be affected by other NID or communicable diseases (**missed opportunities**)



The attempt of doing integrated surveillance of NID in the Americas

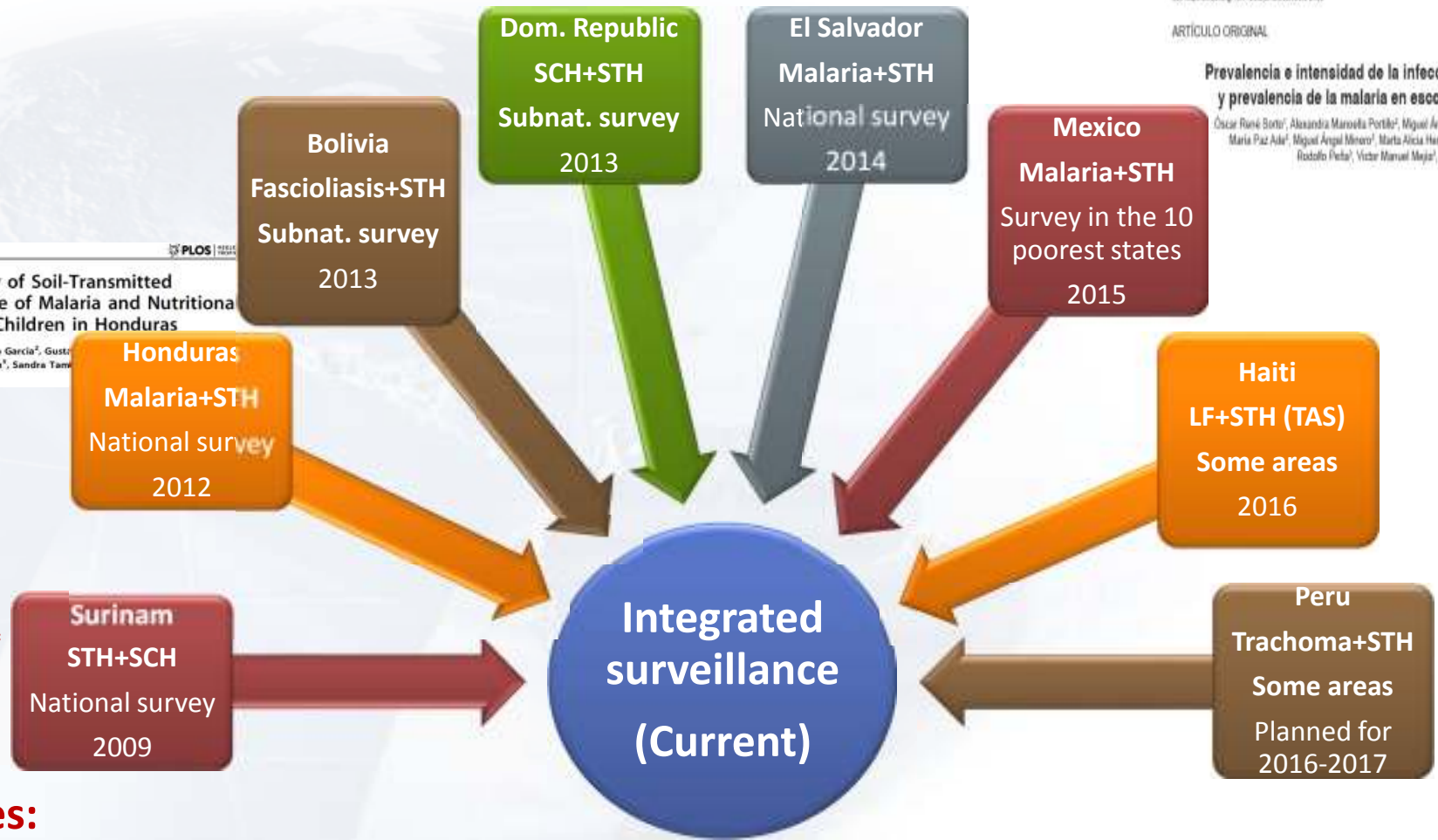


Organización
Panamericana
de la Salud



Organización
Mundial de la Salud
ORGANIZACIÓN MUNDIAL DE LA SALUD
Américas

OPEN ACCESS: Freely available online
PLOS ONE
Prevalence and Intensity of Soil-Transmitted Helminthiasis, Prevalence of Malaria and Nutritional Status of School Going Children in Honduras
Rosa Elena Mejía Torres^{1*}, Dora Nelly Franco García², Gustavo Adriana Hernández Santana³, Prabhjot Singh⁴, Sandra Yanet Mirian Yolanda Paz⁵



Challenges:

On planning, training of field teams, collection of different samples (peripheral blood, feces, eye swabs), transportation, paperwork (formats to be filled), location of laboratories, time and cost of processing and availability of results

Doing surveillance of NID... **TODAY**

Disease	Targeted group for surveillance (age groups)	Sample size (N)	Lab test	Type of sample	Location of lab processing	Location where individuals can be identified for surveillance
LF	> 5	TAS: 1300 - 1900	Microfilariae Ag by ICT	Peripheral blood	On site	Community
HTS	10-14	1500 - 2500	Kato Katz	Feces	On site	Schools
Chagas	0-5 and 7-14	Specific for each study (under 15)	Serology	Serum	Central/Referral laboratory	Schools and communities
SCH	10-14	1500 - 2500	Kato Katz	Feces	On site	Schools
Trachoma	1-9 and >15	1222 of 1 to 9	Ocular examination PCR identification of bacteria	Eye swab	On site and PCR in central or referral lab	Community



Serology-based surveillance

An opportunity for improvement



Organización
Panamericana
de la Salud



Organización
Mundial de la Salud
ORGANIZATION OF
AMERICAS

- 
- * Improve timing**
 - * Improve accuracy of results**
 - * Decrease costs ...**

in public health surveillance

Single integrated surveillance method - **Multiplex**

Serology-based test

- Supported by a CDC technical team effort
- Luminex technology for **simultaneous serological detection of antibodies for several diseases in a single test**
- Panel of antigens that can be used in multiple epidemiological scenarios

Changes the dynamic of surveillance

- From traditional surveillance of disease based on detection of cases or deaths, **to innovative surveillance based on the population's susceptibility and immune response** (no need to wait for 1st case)

Will increase efficiency and effectiveness of the health system response

- Knowing serological profiles of several diseases in specific target populations living in specific geographical areas.
- **Countries can establish interventions according to susceptibility and immunity, considering time, place and person**
- Allows the monitoring of public health interventions: vaccination, water, sanitation, etc.
- To detect re-introduction of diseases already eliminated

Scenarios for integrated epidemiological surveillance using Multiplex

Areas with a silent or incomplete epidemiological profile

- Serological surveillance to establish epidemiological situation (base lines)
- **And further design and implement actions and interventions according to the profile**
- Example: hard to reach areas and populations.. Amazon basin, Chaco Region

Areas with fragile epidemiological surveillance systems

- Serological surveillance to improve quality of data
- Monitor/assess the epidemiological situation
- **And further improve surveillance and implement interventions**
- Countries with priority infectious diseases overlapping in geographic areas (NID, VBD, WBD, VPD)

Areas with epidemiological surveillance systems working well, and good public health interventions in place

- Serological surveillance to evaluate impact of interventions
- **And making decisions based on results**
- Example: Prevention, control and elimination of NID, VBD, VPD, etc.

Areas with diseases in the post elimination phase

- Serological surveillance to detect re-introduction or re-establishment of a disease; to support surveillance of other events and interventions
- **To anticipate risks and implement actions accordingly**
- Example: in the Americas: Oncho, Tracoma, LF, Schisto, Malaria, VPD, etc.

Taking advantage of an integrated surveillance in the Americas

4 countries have expressed interest in using Multiplex to improve surveillance for communicable diseases, NIDs, and to evaluate some public health interventions like - EPI

CDC is committed to technical assistance, transferring of knowledge and technology as well as support for implementation

In a first phase, countries will **test the test**: specific epidemiological scenario and antigens

Assess\Select antigens that are of interest in the Americas: dengue, measles, polio, CHIK, CHAGAS, malaria, etc. Close cooperation between CDC, PAHO and countries

Countries will develop capacity to produce and increase panels and composition (Ag)



**Organización
Panamericana
de la Salud**



**Organización
Mundial de la Salud**

OFICINA REGIONAL PARA LAS **Américas**