Genomic Surveillance Regional Networks for Epidemic and Pandemic Preparedness and Response

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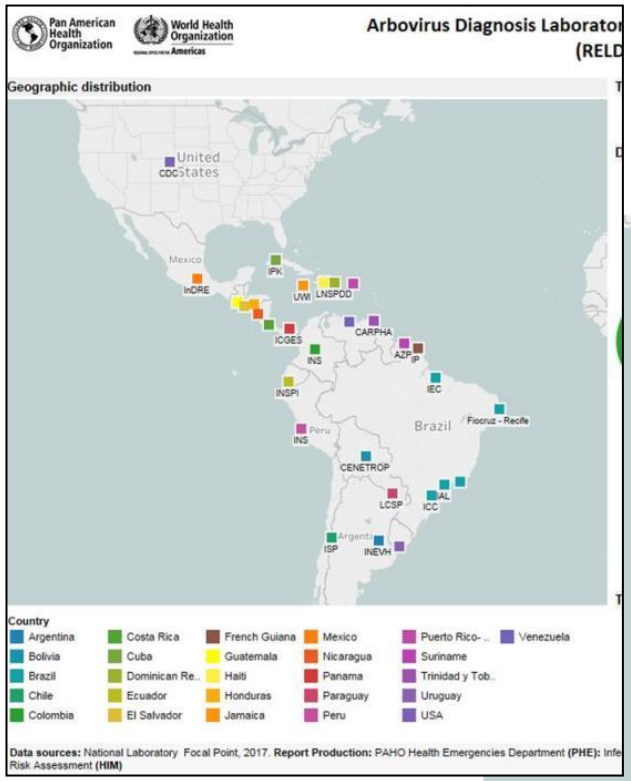
Health Emergencies Department
PAHO

16 May 2024

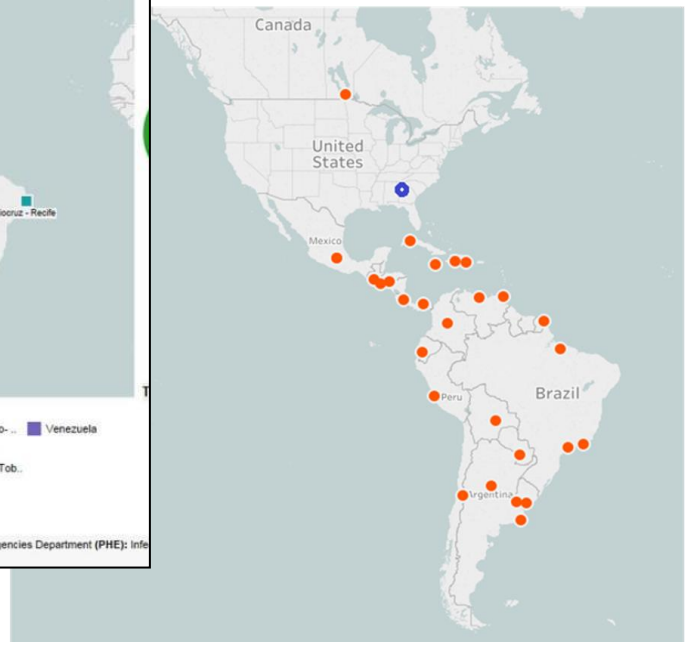
Regional Meeting
Human Genomics for Health:
Enhancing the Impact of Effective Research

Several networks in the PAHO Region support viral diseases surveillance and response

RELDA



SARInet

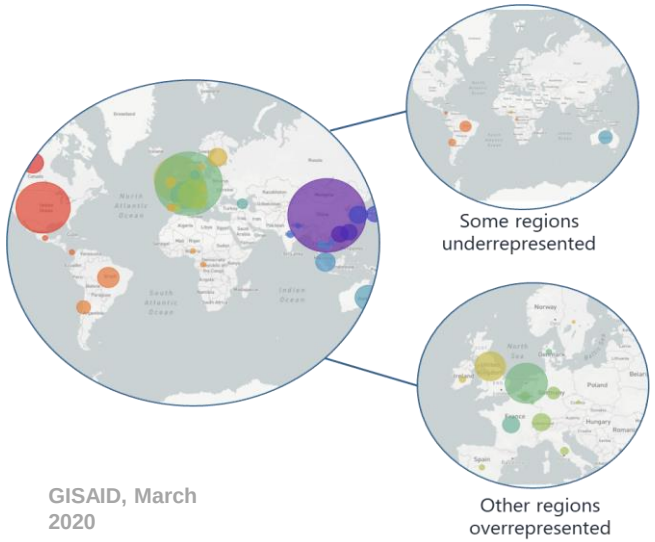


RELDA (Arbovirus Laboratory Network)
SARInet (NICs and other NPHLs)
CariPHLN
Virored

PAHO/WHO Collaborating Centers
CDC, Fort Collins, USA
CDC, Atlanta, USA
InDRE, Mexico
IPK, Cuba
INEVH, Argentina
IEC, Brazil

March 2020: establishment of the regional SARS-CoV-2 genomic surveillance network COVIGEN

2020



GISAID, March 2020

2024

Situation A. **Sequencing capacity already established at country level**
→ PAHO, together with Reference Labs, provides protocols, reagents, training & analysis when required

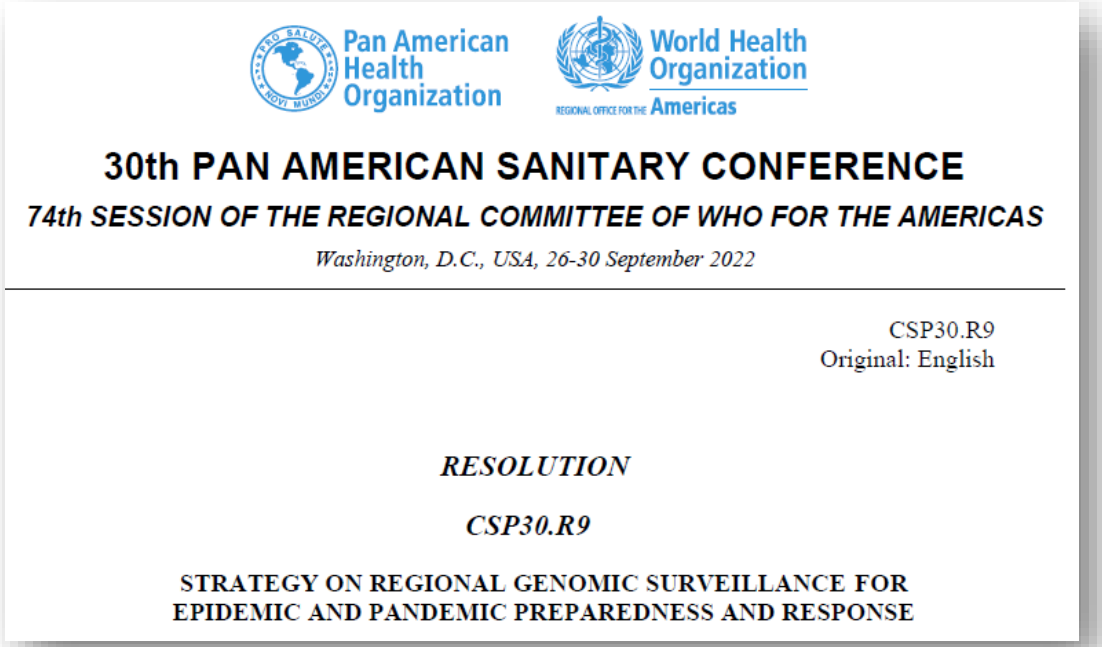
Situation B. **Limited or no capacity for sequencing at country level**
→ Shipping of samples to any of 8 seq reference labs

PAHO

2022: Strategy on regional genomic surveillance for epidemic and pandemic preparedness and response

Process

May 2022: Draft strategy, consultation with Member States
June 2022: Executive Committee recommends adoption of the Strategy by the Pan American Sanitary Conference
Sept 2022: Adoption by the Pan American Sanitary Conference



Pan American Health Organization

World Health Organization
Americas

30th PAN AMERICAN SANITARY CONFERENCE

74th SESSION OF THE REGIONAL COMMITTEE OF WHO FOR THE AMERICAS

Washington, D.C., USA, 26-30 September 2022

CSP30.R9
Original: English

RESOLUTION

CSP30.R9

STRATEGY ON REGIONAL GENOMIC SURVEILLANCE FOR EPIDEMIC AND PANDEMIC PREPAREDNESS AND RESPONSE

Strategic lines of action

a) Expand and consolidate a **regional genomic surveillance network of public health, animal health, and environmental health laboratories** for early detection and monitoring.

b) Strengthen **technical capacity** for genomic sequencing, including in bioinformatics.

c) Strengthen genomic data **reporting**, including linkages to case data, and its
integration with public health systems.

d) Build capacity and **define best practices** for the **use of genomic data** in the response to outbreaks, epidemics, and pandemics.

Aligned with WHO Global GS Strategy

The Regional Strategy provides the framework to promote integration and enhance sustainability

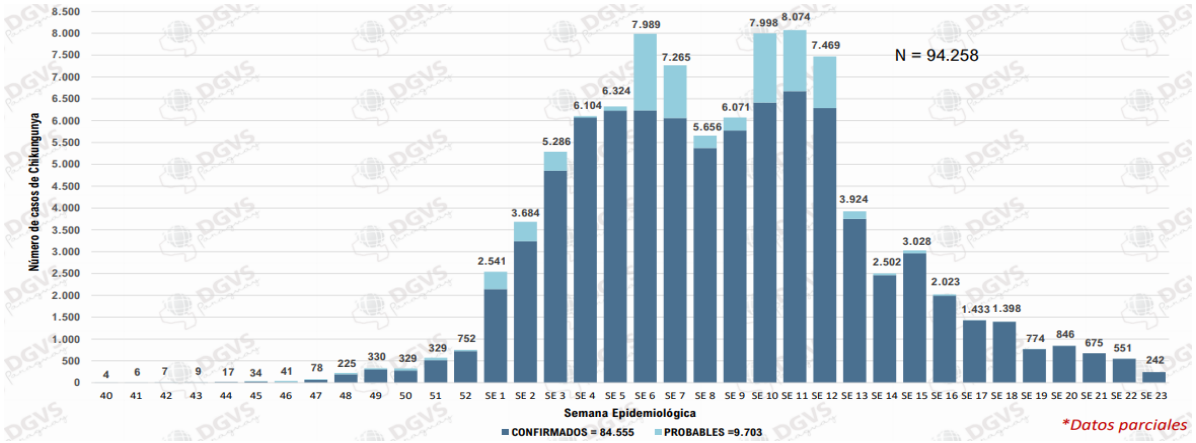
PAHOGen
PAHO Genomic Surveillance Regional Networks

Same sequencing *platforms*

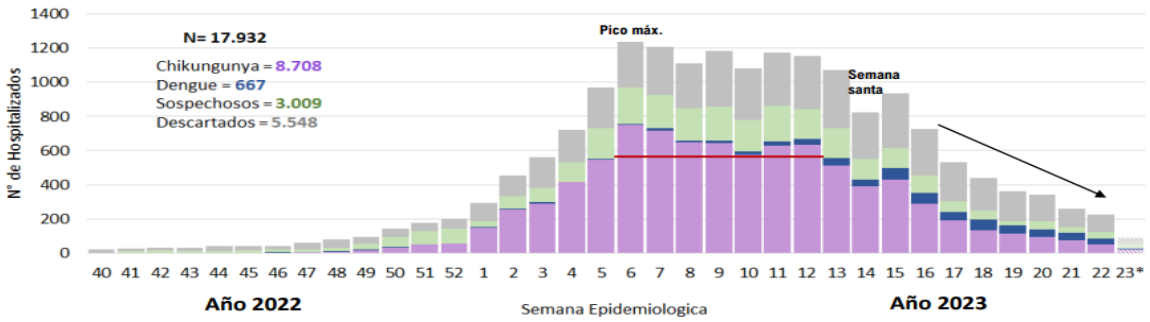
Different surveillance systems

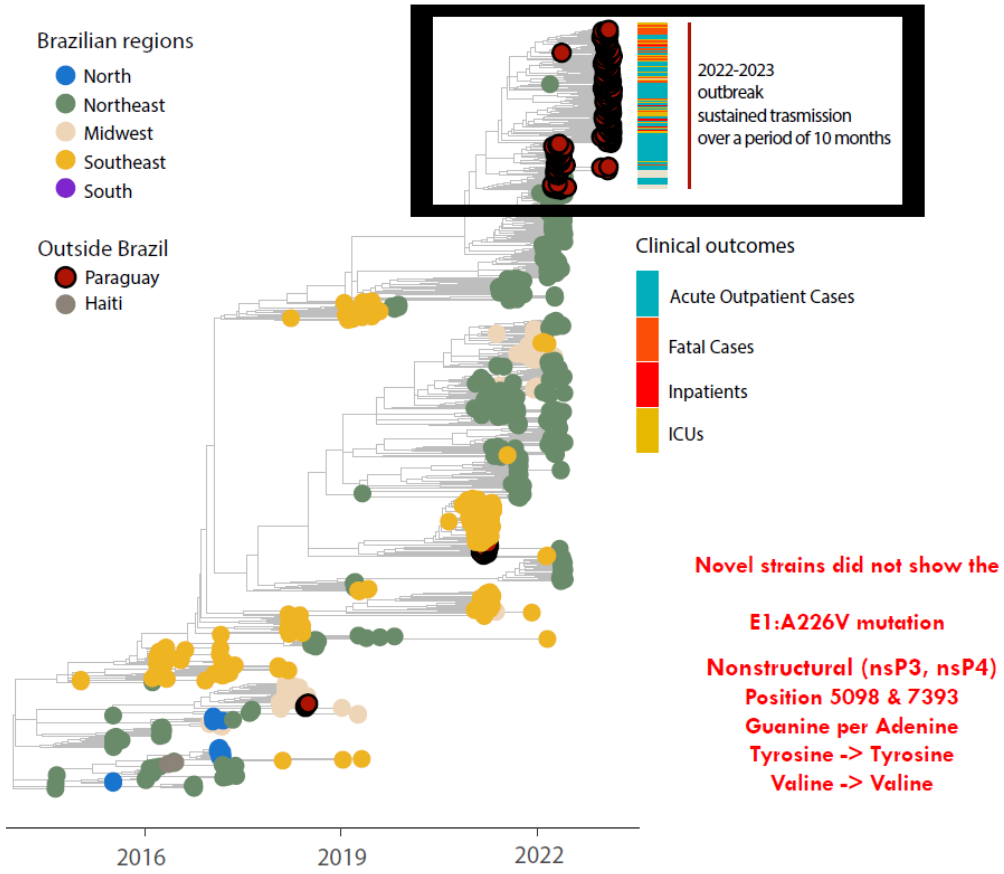
Expanding the scope – Chikungunya in Paraguay

cases



hospitalizations





Novel strains did not show the

E1:A226V mutation

Nonstructural (nsP3, nsP4)
Position 5098 & 7393
Guanine per Adenine
Tyrosine -> Tyrosine
Valine -> Valine

- What is the circulating genotype?
- Is the mutation associated with increased transmissibility by *Aedes albopictus* present?
- Genetic basis for the perceived increase in severity and CFR?

- *East/Central/South African (ECSA) genotype*
- *E1 protein A226V mutation was not detected*
- *No evidence. Two synonymous mutations at positions 5098 and 7393 in the nsP3 and nsP4 genes were detected.*

Dengue in the Americas

DENV-2, Cosmopolitan genotype, 2019-2022

RESEARCH LETTERS

Emergence of Dengue Virus Serotype 2 Cosmopolitan Genotype, Brazil

Marta Giovanetti, Luiz Augusto Pereira, Gilberto A. Santiago, Vagner Fonseca, Maria Paquita García Mendoza, Carla de Oliveira, Laise de Moraes, Joilson Xavier, Stephane Tosta, Hegger Fristch, Emerson de Castro Barbosa, Evandra Strazza Rodrigues, Dana Figueroa-Romero, Carlos Padilla-Rojas, Omar Cáceres-Rey, Ana Flávia Mendonça, Fernanda de Bruycker Nogueira, Rivaldo Venancio da Cunha, Ana Maria Bispo de Filippis, Carla Freitas, Cassio Roberto Leonel Peterka, Carlos Frederico Campelo de Albuquerque, Leticia Franco,

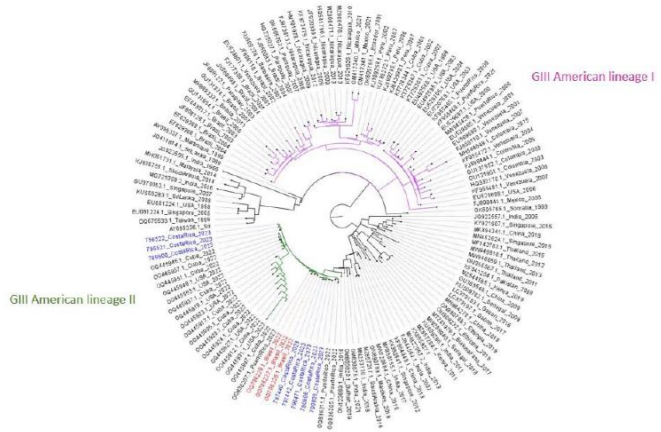
family (genus *Flavivirus*) and is transmitted by *Aedes aegypti* and *Ae. albopictus* mosquitoes (*1*). DENV has caused a substantial global economic and public health burden and numerous mild to severe epidemics in the Americas, particularly during recent decades (*1*). DENV can be divided into 4 antigenically distinct serotypes (DENV-1–4), which have an interserotype nucleotide variability of ≈30% (*2*). Each serotype is further subdivided into phylogenetically distinct genotypes often named according to their geographic origin, even though some DENV serotypes have spread to other regions (*2*). According to epidemiologic reports, recent dengue epidemics in Brazil and South America were mainly driven by the circulation of DENV-1 and DENV-2 serotypes (*3*,*4*). DENV-2 contributed substantially to dengue-related

- Peru
- Brazil
- CDC Dengue Branch

DENV-3, Genotype III, American lineage II (2023)

Instituto Costarricense de Investigación y Enseñanza en Nutrición y Salud
Centro Nacional de Referencia Virología

Figura 4 Análisis filogenético para dengue virus serotipo 3 (DENV-3) genotipo III, Costa Rica



- Costa Rica
- Honduras
- Nicaragua
- Dominican Republic

Cholera in Haiti and DR

- Haiti
- Dominican Republic
- Costa Rica

Training at CNGB (Argentina) facilitated by PulseNet Latin America and the Caribbean

Some challenges…

- Limited **access** to (or higher pricing of) equipment (incl. installation and maintenance), reagents, and supplies in Latin America and the Caribbean
- **Quality** of the reported data is fundamental but external quality assessments are not available or expensive
- **Bioinformatics/data analysis** capacity remains a gap in our public health workforce
- How to ensure the generated sequence information is fit-for-use and used?
  - "*Sequencing*" is not "*Genomic Surveillance*"
  - The objectives of genomic surveillance are pathogen- and context-specific and guidance on sample selection and sequencing methods need to be defined accordingly
  - Coordination between laboratory systems, epidemiological surveillance, and health care providers should be a priority (*information systems*)
- How to ensure sustainability as more investment and resources are required (in the context of competing priorities)?

Some potential solutions…

- Advocacy
- Pooled procurement at national and regional level
- Workforce training and development
- Networking
  - Build on existing networks when possible
  - Promote bilateral and multilateral collaboration within a regional framework
  - Act at subnational, national, regional, and global levels
  - Involve different sectors (public health, animal health, academia, forensics…)
  - Share protocols, knowledge, experiences, best practices

Acknowledgements

PAHOGen Regional team

Jairo Mendez, Juliana Leite, Leticia Franco, Isabel Chinen, Maria Almiron, Roberto Melano, Marcelo Galas, Pilar Ramon, Mariela Martinez, Priscila Born, Ximena Terrazas

Country Offices

Reference laboratories and CCs

National laboratories

Funders

United States Government
US CDC
Rockefeller Foundation
Wellcome Trust

Thank you