# Status of vaccine-preventable disease surveillance and integration

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Global Polio Partners Group –
Surveillance "Deep Dive – I"

Geneva

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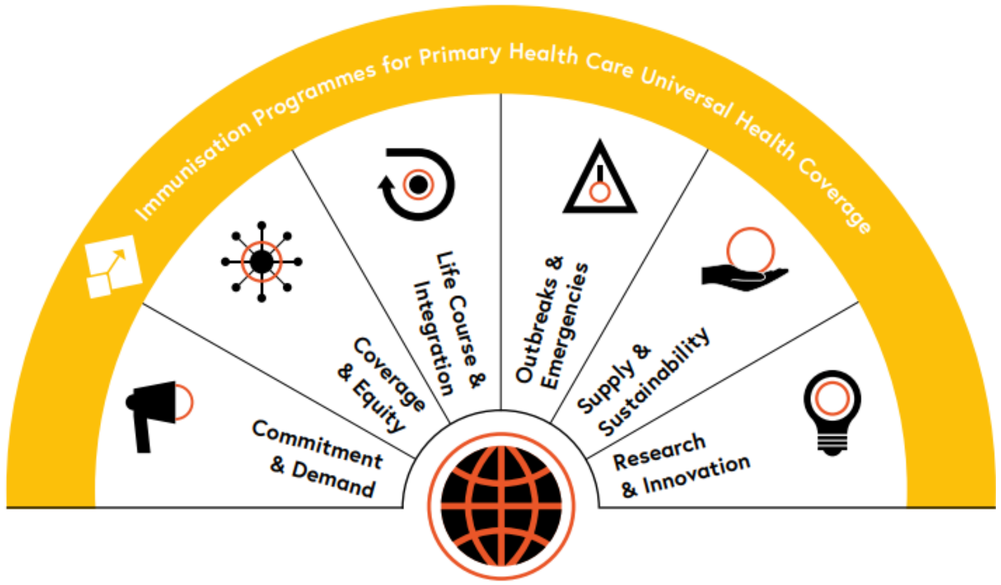
# Overview of presentation

- Concept of comprehensive vaccine-preventable disease (VPD) surveillance
- IVB's role in VPD surveillance
- Impact of COVID-19 on VPD surveillance
- Application and outputs from VPD surveillance: measles as an example
- Costing and budgeting VPD surveillance
- Polio and VPD surveillance at the regional level
- Summary and conclusion

# VPD surveillance is anchored in the Immunization Agenda 2030





## SP1 – Immunization Programs for PHC/UHC

**Objective:**

Build and strengthen comprehensive VPD surveillance as a component of the national public health surveillance system, supported by strong, reliable laboratory networks.

**Key focus area:**

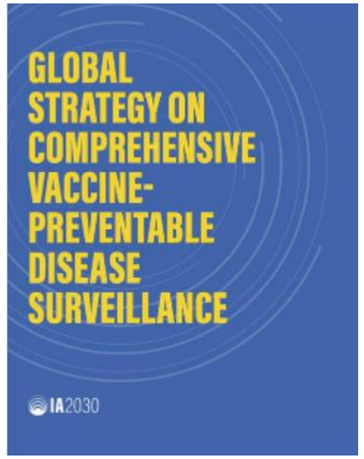
**VPD surveillance:** Increase the efficiency, responsiveness and comprehensiveness of disease surveillance (including epidemiology and laboratory capacity) in order to: encourage the introduction of vaccines; optimize immunization programs; measure the impact of vaccines; monitor disease control, elimination and eradication; and detect, investigate and respond to outbreaks. These activities **should be based on existing surveillance infrastructure, such as that for polio and measles.**

## SP5 – Outbreaks and Emergencies

**Key focus area:**

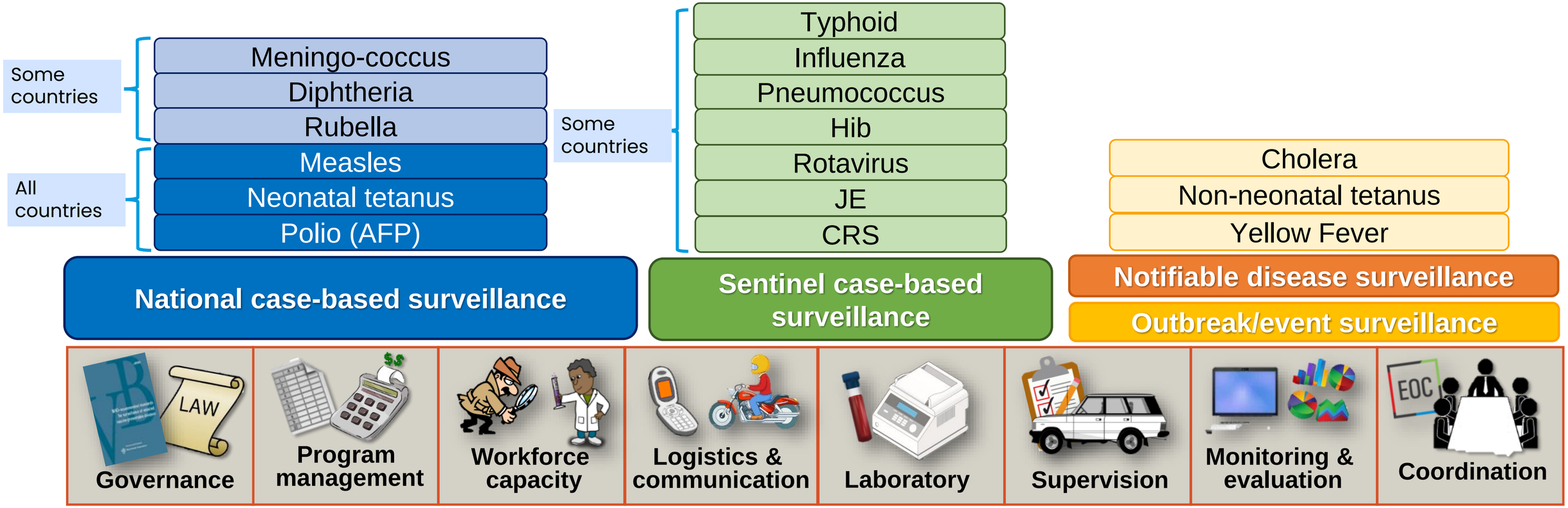
**Integrated surveillance: Rebuild national, regional and local capacity for rapid, integrated surveillance of priority and emerging infectious diseases** after an emergency or humanitarian event, maximizing opportunities to monitor and characterize multiple pathogens to ensure early detection of outbreaks. Strengthen integrated disease surveillance for epidemic-prone vaccine-preventable diseases to enhance prevention and response.

Immunization Agenda 2030 (who.int)




# Vision of Comprehensive VPD surveillance

All countries have **sustainable**, **high-quality** VPD surveillance systems, supported by strong laboratories, that detect and confirm cases and outbreaks and generate **useful data** to guide **outbreak prevention** and **response**, **immunisation program management**, and **vaccine policy** to decrease the burden of VPDs as efficiently and effectively as possible




**Surveillance support functions**

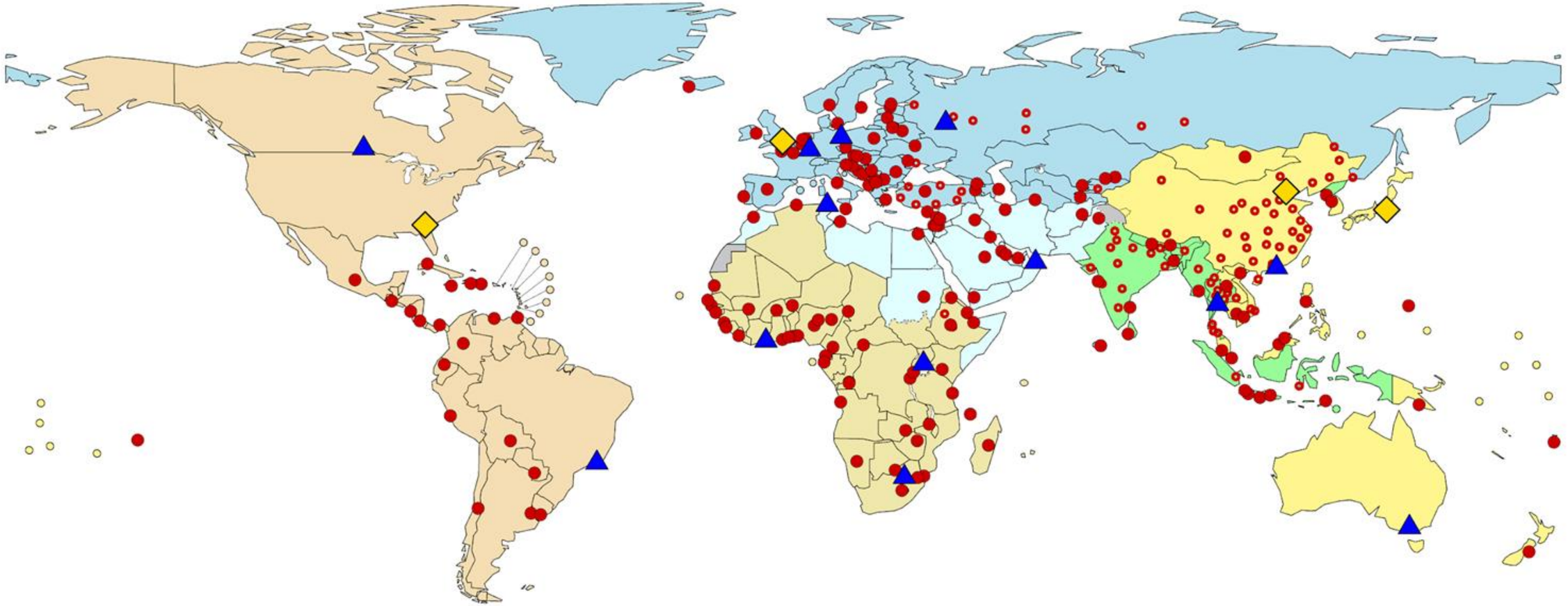


Global strategy for comprehensive Vaccine-Preventable Disease (VPD) surveillance (who.int) – published in June 2020. summarizes a strategy for VPD surveillance for 2021-2030 as part of IA2030
Diseases in dark-shaded boxes = surveillance commitment in every country. Diseases in light-shaded boxes = surveillance commitment varies by country.

# IVB’s role in VPD surveillance

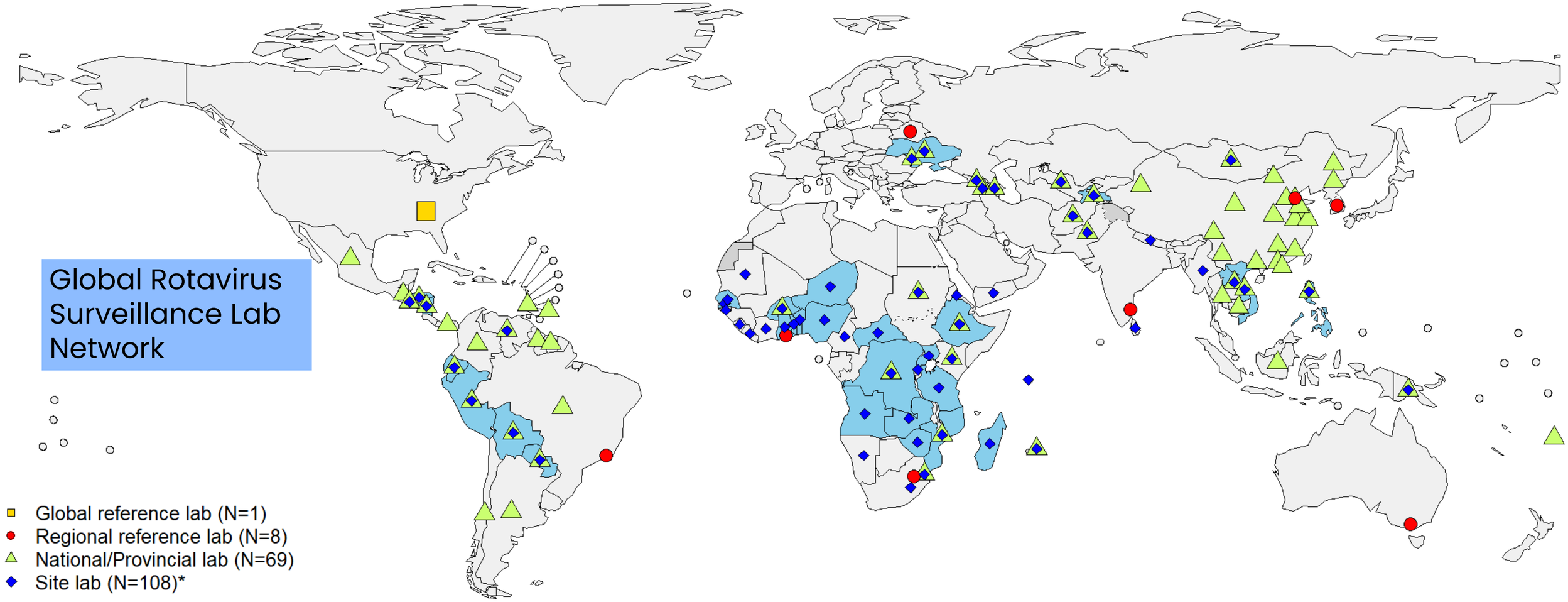
- **Leads surveillance** for pathogen-specific and syndromic diseases whose main control measure is vaccines (viral and bacterial)
  - measles, rubella, rotavirus, diphtheria, tetanus, Japanese encephalitis
  - invasive bacterial diseases, pediatric diarrhea
- Leads on **lab functions** for other outbreak-prone diseases
  - yellow fever
  - meningitis
- Develops **surveillance strategies** for diseases with newer vaccines or vaccines in development (examples)
  - typhoid
  - group B streptococcus

# Global Measles and Rubella Laboratory Network
# GMRLN – 743 laboratories and counting!
## Developed since 2000 on top of Global Polio Lab Network platform



Global surveillance lab: Yellow diamond (n=3)
Regional reference Lab: Blue triangle (n=16)
National lab: Red solid circle (n=153)
Sub-national lab: Red open circle (n=571)

# Global Rotavirus Surveillance Lab Network



- Global reference lab (N=1)
- Regional reference lab (N=8)
- National/Provincial lab (N=69)
- Site lab (N=108)*

- Countries in Global RV Network (N=33)
- Not applicable


**Data source:** Global Rotavirus Surveillance Network

0 875 1750 3500 Kilometers

**Notes:**

* Only one sentinel site laboratory plotted by country. Position of labs on the map does not always reflect their exact geographical location.

**Disclaimer:**

The boundaries and names shown and the designations used on this map do notimply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

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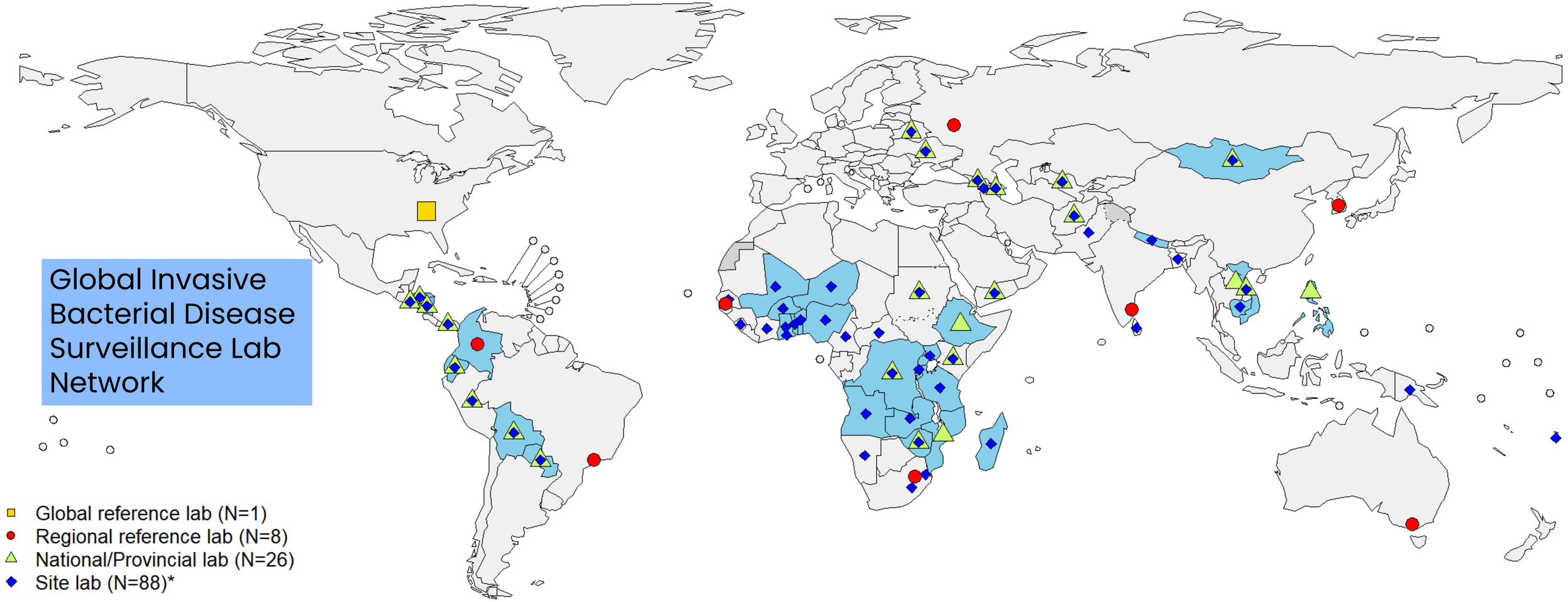
# Global Invasive Bacterial Disease Surveillance Lab Network



- Global reference lab (N=1)
- Regional reference lab (N=8)
- National/Provincial lab (N=26)
- Site lab (N=88)*

- Countries in Global IBD Network (N=30)
- Not applicable


**Data source:** Global IB-VPD Surveillance Network

0 875 1750 3500 Kilometers

**Notes:**

* Only one sentinel site laboratory plotted by country. Position of labs on the map does not always reflect their exact geographical location.

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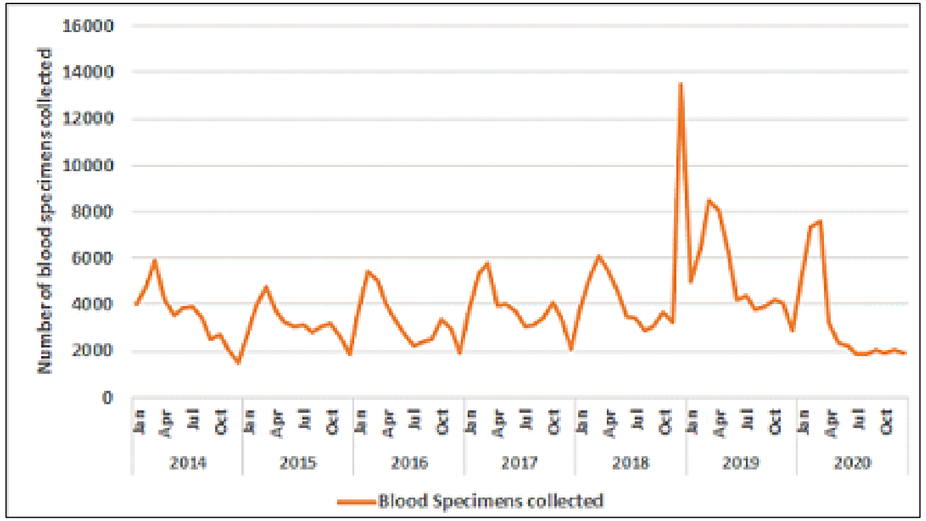
# COVID-19 impact on surveillance for polio and all other VPDs

- Surveillance officers, laboratorians, and health care workers deployed for COVID-19 response
  - Decreased human resources available for ongoing VPD surveillance activities
- Disruptions in health service delivery & changes in health-seeking behavior
- Difficulty in interpreting VPD surveillance data during pandemic
  - Hard to disentangle COVID-19 impact vs impact of COVID interventions, such as vaccination
  - True decreases in transmission of many diseases during acute pandemic phase & lock-downs

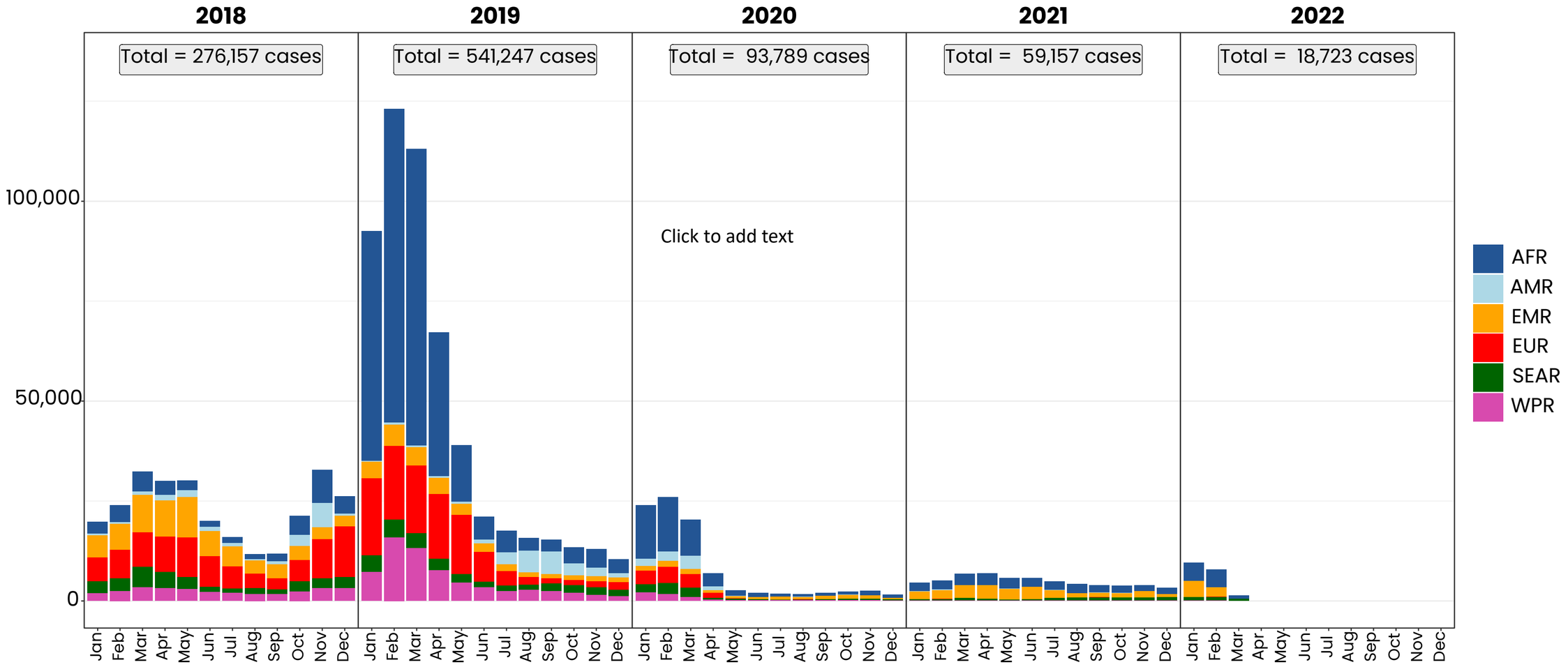



Example: monthly number of blood specimens collected from suspected measles cases for laboratory confirmation. Measles laboratory surveillance database. 2014-2020

From *Balcha Masresha et al.* The impact of the COVID-19 pandemic on measles surveillance in the World Health Organisation African Region, 2020. **PAMJ. 08 Jul 2021. 39(192)**

# Applications & outputs of VPD surveillance: measles as an example

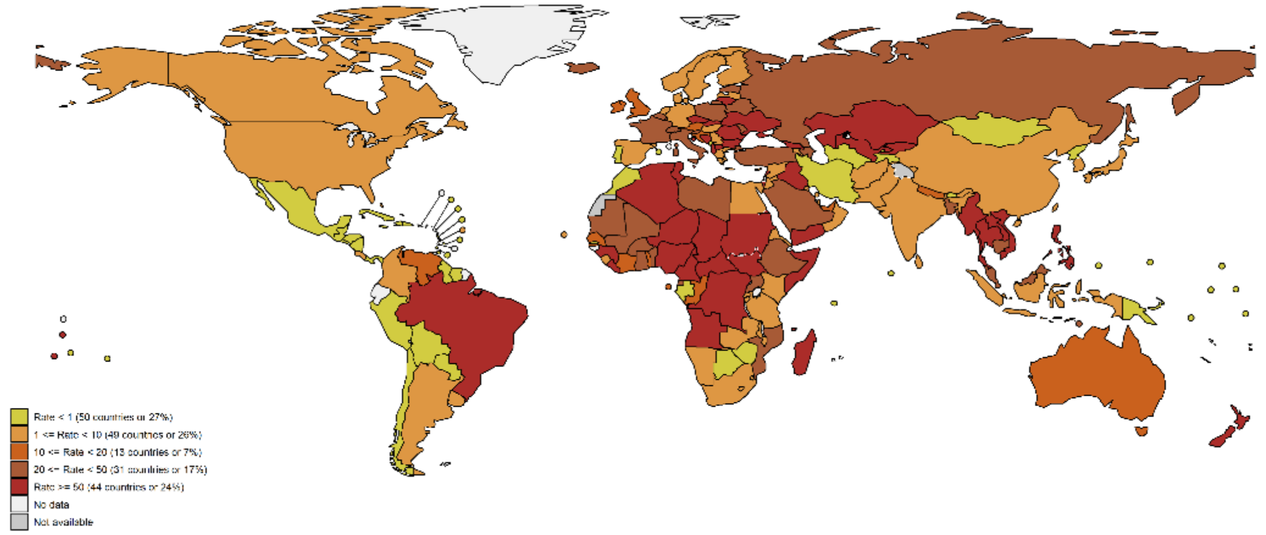
## Measles case distribution by month and WHO Region (2018-2022)



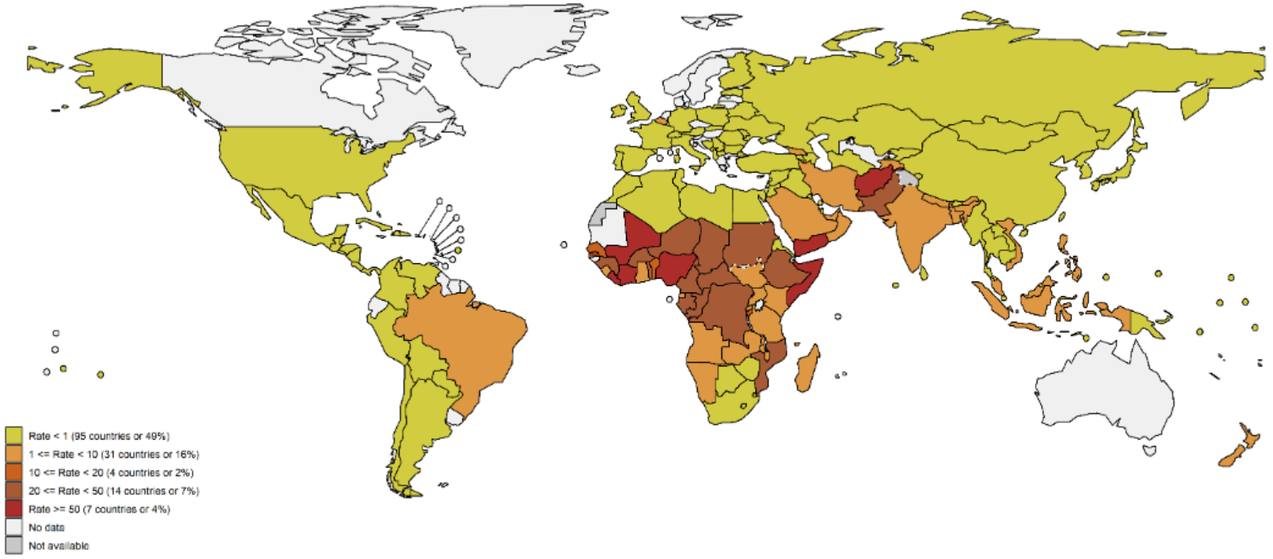

Notes: Based on data received 2022-04 - Data Source: IVB Database - This is surveillance data, hence for the last month(s), the data may be incomplete.

# Measles incidence rate per million (2019 vs 2021)

**2019**




**2021**




**Highest incidence rates**

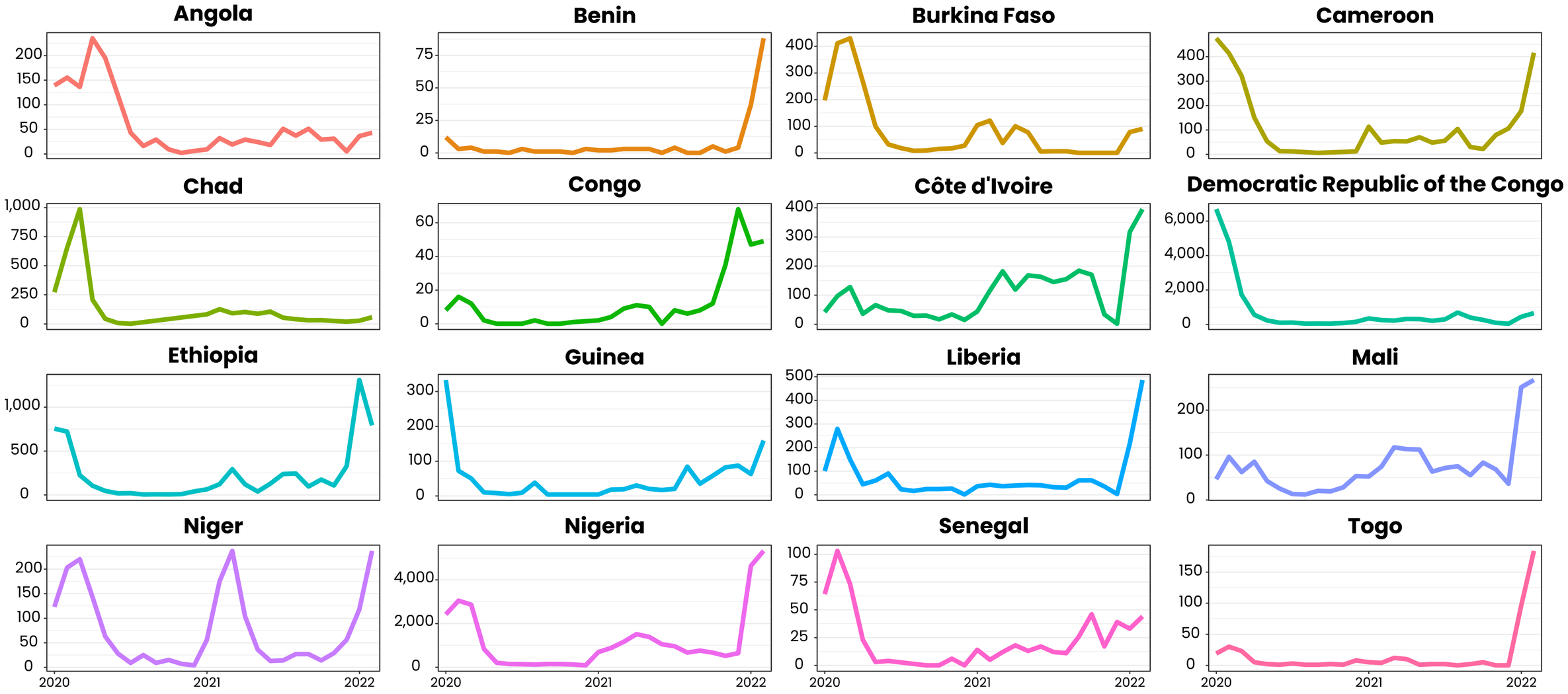
| Country | Cases | Rate |
|---|---|---|
| Madagascar | 213,291 | 7,908.66 |
| Ukraine | 57,332 | 1,303.19 |
| Georgia | 3,920 | 980.79 |
| North Macedonia | 1,884 | 904.27 |
| Kazakhstan | 13,326 | 718.33 |
| New Zealand | 2,231 | 466.44 |
| Philippines | 48,375 | 447.43 |
| Bosnia and Herzegovina | 1,401 | 424.42 |
| Tunisia | 4,674 | 399.67 |
| Central African Republic | 1,815 | 382.49 |
| Yemen | 9,335 | 320.11 |
| DR Congo** | 18,467 | 212.78 |
| Nigeria | 28,302 | 140.83 |
| Brazil | 20,901 | 99.03 |
| Viet Nam | 5,654 | 58.61 |
| India* | 10,708 | 7.84 |

**Highest incidence rates**

| Country | Cases | Rate |
|---|---|---|
| Somalia | 6,029 | 368.53 |
| Yemen | 4,340 | 142.34 |
| Liberia | 456 | 88.03 |
| Afghanistan | 3,028 | 76.01 |
| Central African Republic | 285 | 57.93 |
| Côte d'Ivoire | 1,482 | 54.78 |
| Nigeria | 10,871 | 51.42 |
| Chad | 793 | 46.88 |
| Mali | 919 | 44.06 |
| Pakistan | 9,313 | 41.35 |
| DR Congo** | 3,443 | 37.27 |
| Ethiopia | 1,947 | 16.52 |
| India* | 6,045 | 4.34 |

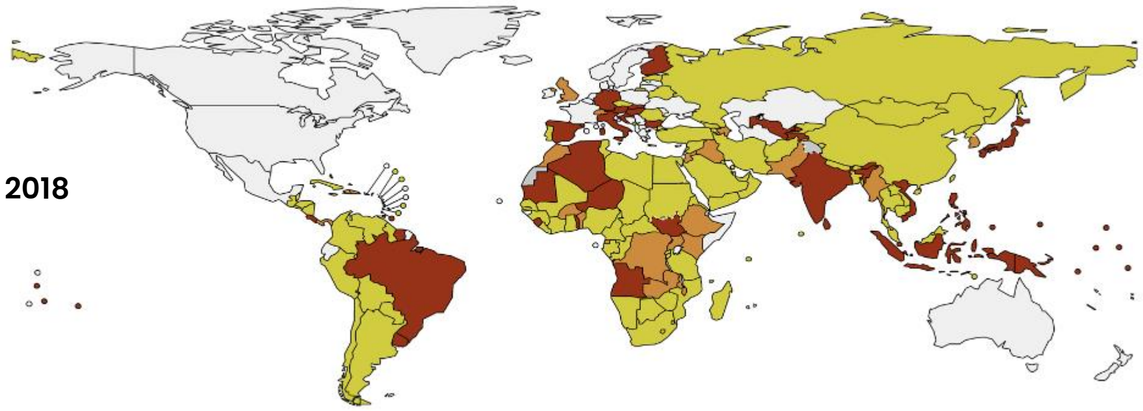
Notes: Based on provisional surveillance data received 2022-04 - Incidence: Number of cases / population * 1,000,000 - Population data: World population prospects, 2019 revision – Tables includes top 10 countries by incidence rates and top 10 countries by number of cases

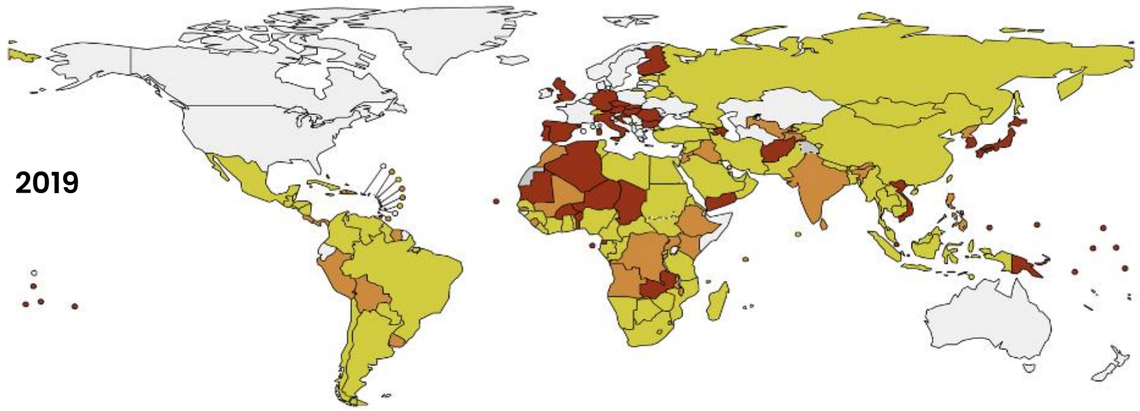
# Measles case distribution by month and country (AFRO, 2020-2022)

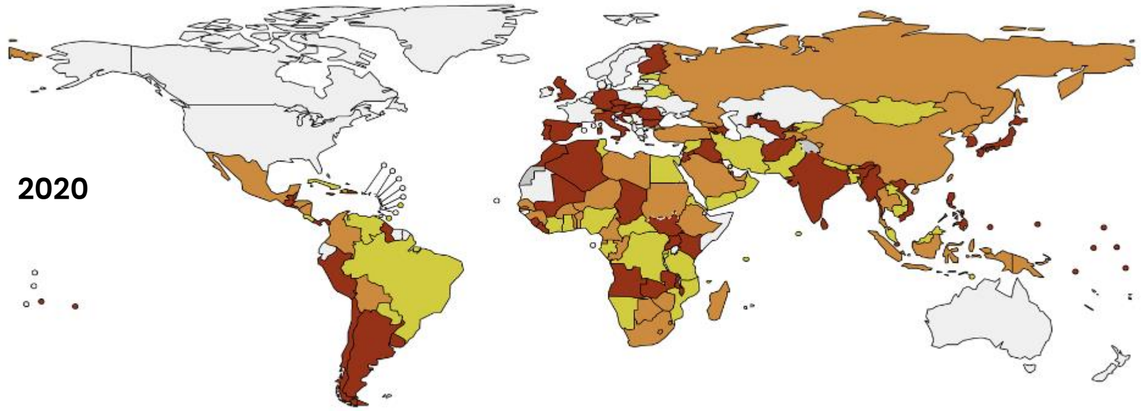


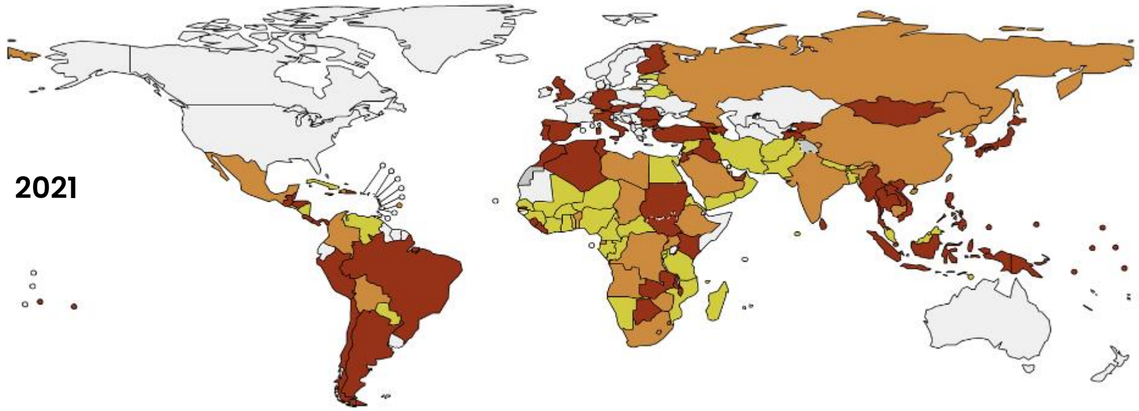

Notes: Based on provisional surveillance data received 2022-05 - Data Source: IVB Database - This is surveillance data, hence for the last month(s), the data may be incomplete.

# Surveillance sensitivity: Reporting rate of measles and rubella discarded cases per 100,000 population/2018-2021

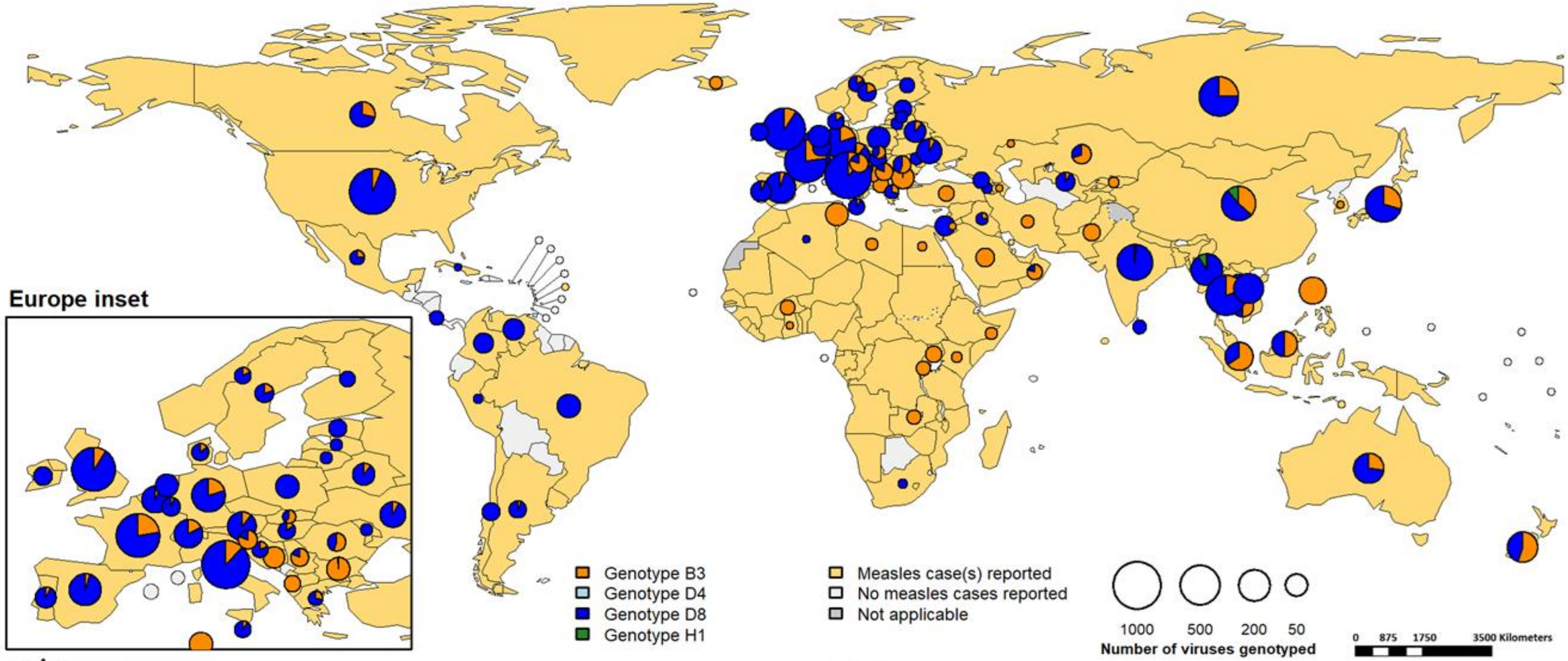




Notes: Based on provisional surveillance data received 2022-04 - Target: >= 2 discarded cases* / 100,000 population** - * Suspected cases investigated and discarded as non-measles non-rubella using laboratory testing and/or epidemiological linkage to another etiology ** World population prospects, 2019 revision

# Vaccine pressure affecting genotype diversity: Distribution of measles genotypes (2019)

*Notes: Data Source: MeaNS database (Genotypes) and IVB Database (Incidence) as of 2019-11-08 and covering the period 2018-10-01 to 2019-09-30 - Pie charts proportional to the number of sequenced viruses*

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**Map production:** World Health Organization, WHO, 2019. All rights reserved
**Data source:** IVB & MeaNS Databases

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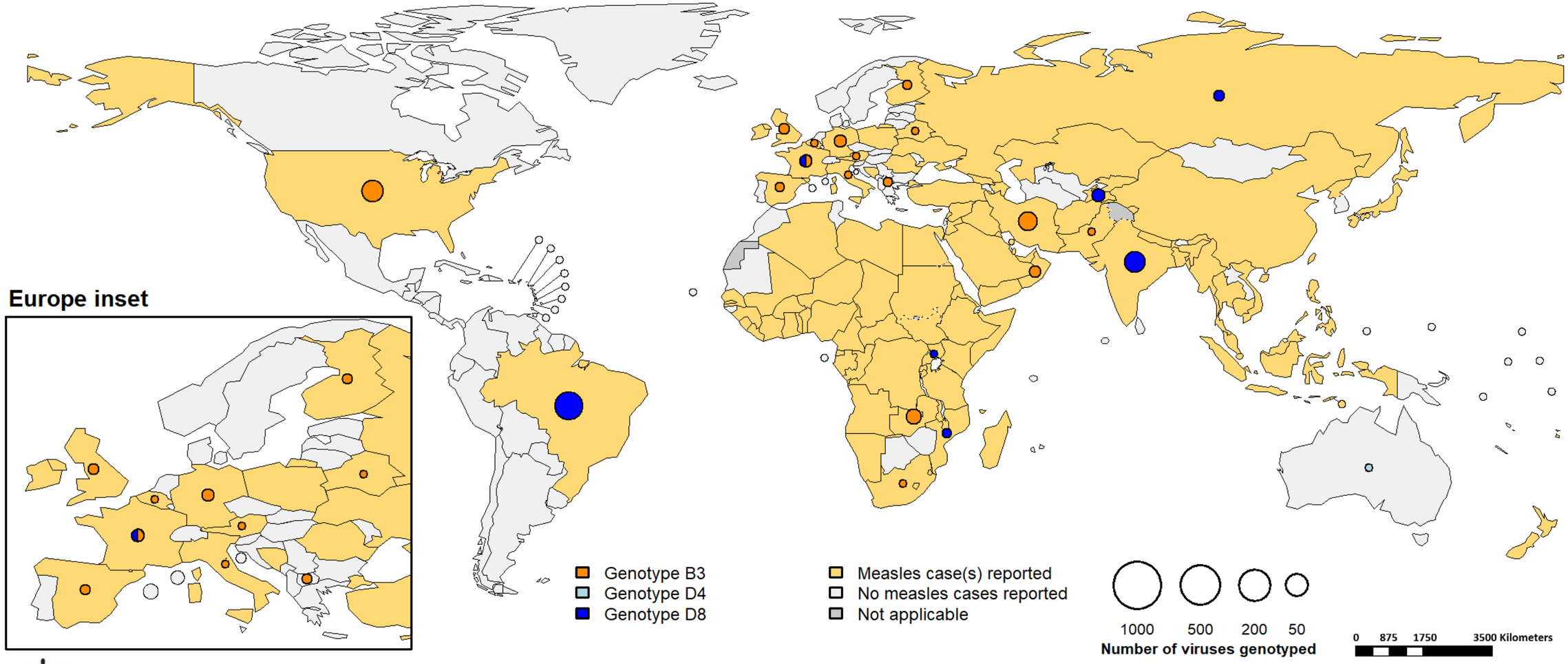
# Limited data on distribution of measles genotypes (last 12 months)

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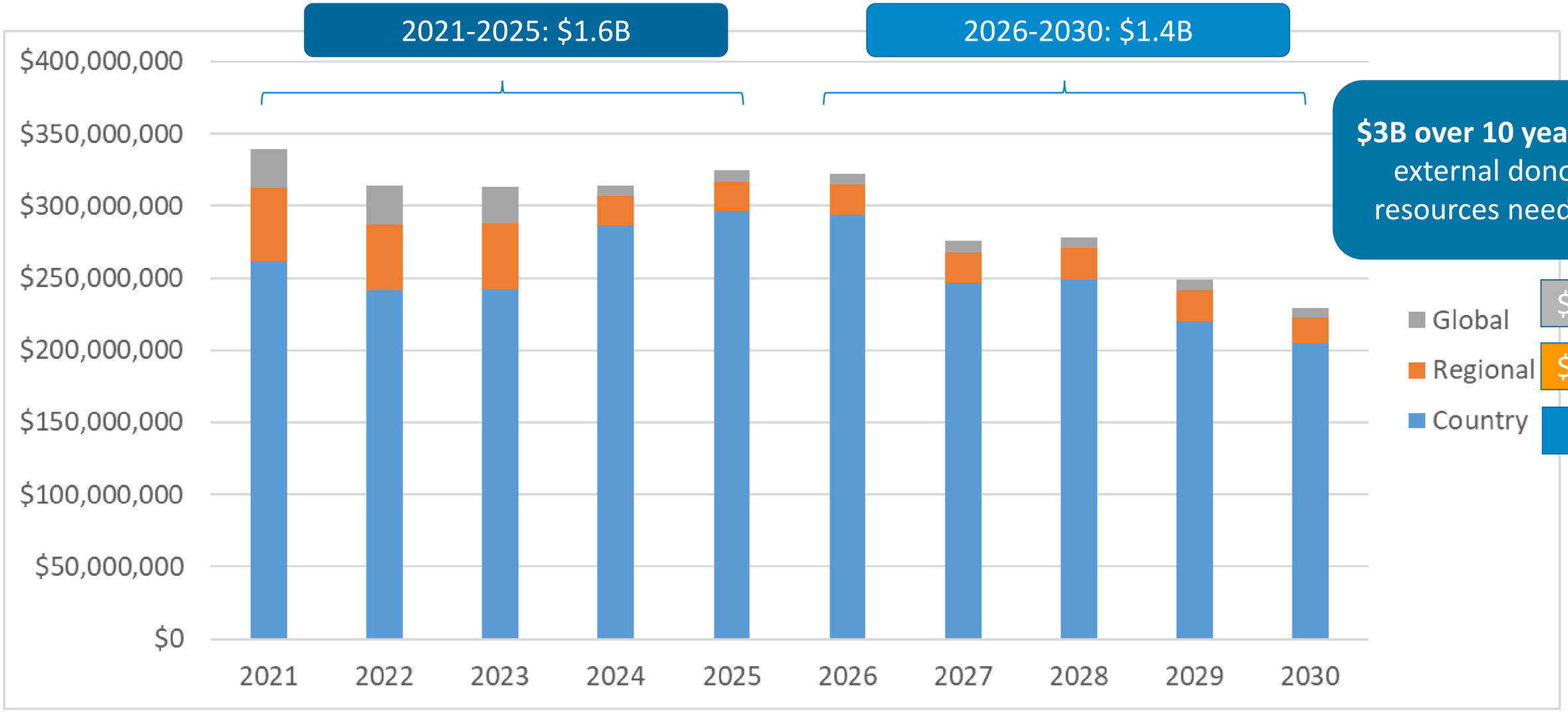
Data Source: MeaNS database (Genotypes) and IVB Database (Incidence) as of 2022-04-06 and covering the period between 2021-03 and 2022-02 - Pie charts proportional to the number of sequenced viruses

# Costing and budgeting VPD surveillance

- **Economic costs** (in collaboration with CDC and other partners)
  - Completed and published for Nepal ($4.81 mill/yr; 56% paid by govt; HR biggest cost driver)
  - Started in Ethiopia
- **Planning and budgeting tool** under development for assisting countries to budget resources for VPD surveillance
  - Will focus on domestic financial costs & be useful for future planning
- A budgeting exercise was done in 2019-20 for EFR for decade of IA2030 for VPD surveillance including polio post certification
  - USD 3 billion over the IA2030 decade (~USD 300 mill/yr on average)

# VPD surveillance external funding requirements by level, 2021-2030 (nominal US$)




**$3B over 10 years** in external donor resources needed

# Polio & VPD surveillance management at the Regional level

- Polio surveillance is part of VPD surveillance team in all regions (except EMRO)
- Integrated VPD surveillance is a crucial part of polio transition planning
  - WHO-supported polio surveillance networks are already linked with VPD surveillance
  - Polio surveillance functions should be further leveraged for VPD surveillance and immunization
- Surveillance and outbreak response for non-polio VPDs is currently often supported by polio officers and vice versa
- Both polio and other VPD surveillance mechanisms have been leveraged for COVID-19 response
- Notable: AFRO investment case for VPD surveillance 2020-2030

# Summary and conclusion

## IVB leads on VPD surveillance

- Surveillance drives optimization of immunization policy, programme, and field activities
- Polio transition fits with current vision for comprehensive VPD surveillance as part of IA2030

## Country ownership and cross-cutting collaboration within and outside of WHO will be key to success

## Financial sustainability remains an issue

- Much of VPD surveillance infrastructure is built on backbone of polio surveillance; what happens as polio funding declines?
- Few donors currently funding VPD surveillance
- Ideal is for funding to support comprehensive VPD surveillance structure; rather than pathogen-specific

## COVID-19 pandemic has been both a challenge and an opportunity

- Challenge because of constraints on fiscal space and window of opportunity with Governments to take over financial responsibility of the network in many transition priority countries
- Opportunity to demonstrate VPD surveillance networks supporting emergency response and the huge jump in lab molecular capacity in countries


# Thank you