Multi-Source Collaborative Surveillance for Decision-Making

Advancing health systems and policy for surveillance and risk assessment of health security threats

The 17th Postgraduate Forum of Health Systems and Policies: Post-Covid Health Equity
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The Purpose of Surveillance

"Surveillance" means the systematic ongoing **collection, collation and analysis** of data for public health purposes and the **timely dissemination** of public health information **for assessment and public health response** as necessary.

International Health Regulations (2005)

The purpose of surveillance is "to empower **decision makers to lead and manage more effectively** by providing timely, useful evidence"

Nsubuga et al

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During Emergencies – Decision Makers Need to Make Decisions despite Uncertainties

Thailand expands lockdown as COVID cases continue to rise

Lockdown imposed in three more provinces as Thailand's COVID-19 cases break records for a third straight day.

Witness

Manila Lockdown: One of the longest COVID lockdowns in the world

During the COVID-19 lockdown in the Philippines, Lito wonders which is the bigger virus or hunger? Read more

MALAYSIA

Covid-19: School closures only as last resort, says Khairy

4 minute read · July 2, 2021 1:42 PM GMT+5:30 · Last Updated 2 years ago

Analysis: Indonesia looked to India on lockdown, but didn't adopt its policy

By Tom Allard

Vietnam Sharply Divided on Coronavirus School Closures

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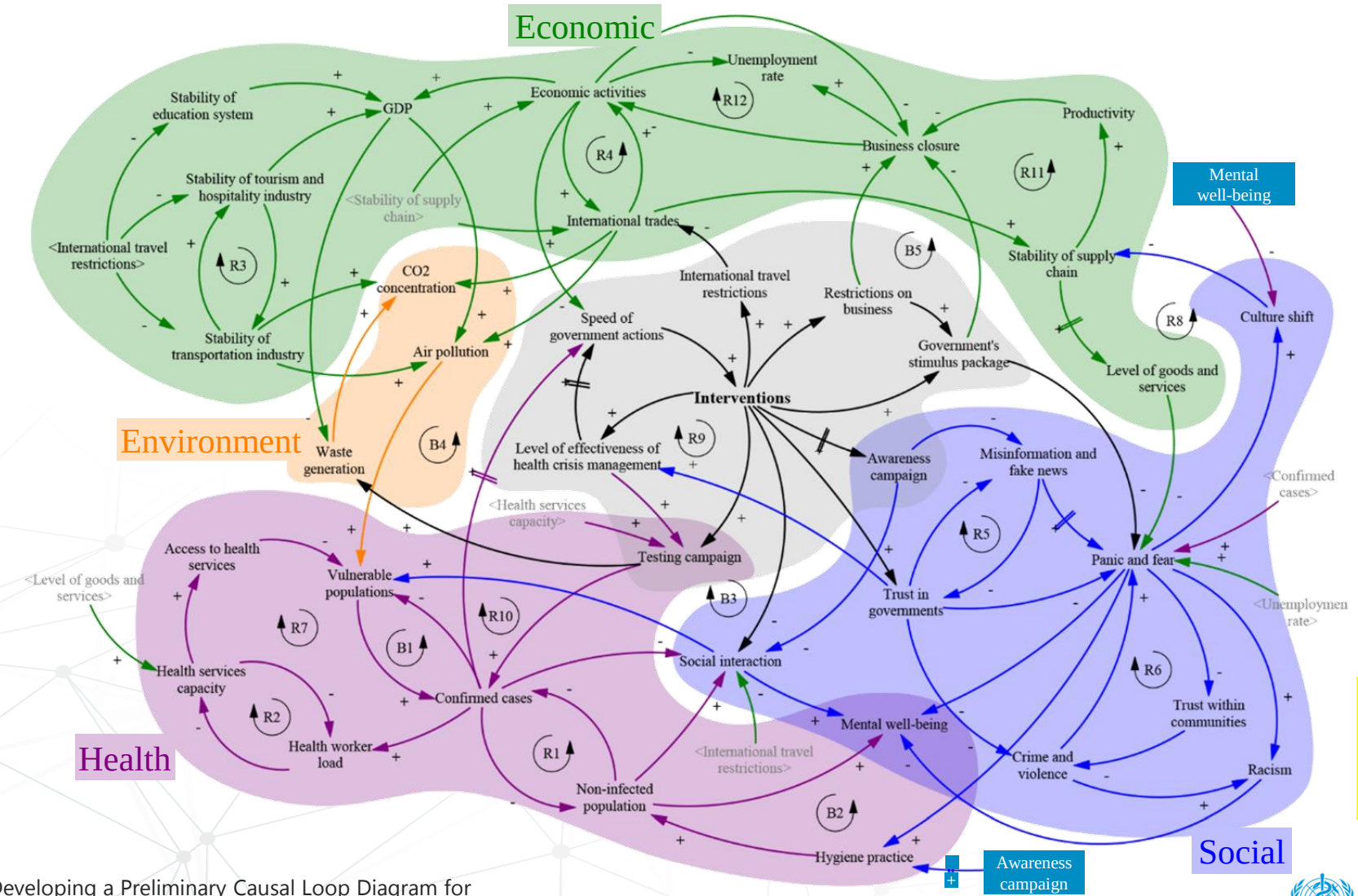
Context & Consequences are increasingly complex: COVID-19 experience



Decision still needs to be made .....

Source: Sahin O et al. Developing a Preliminary Causal Loop Diagram for Understanding the Wicked Complexity of the COVID-19 Pandemic. Systems. 2020; 8(2):20.

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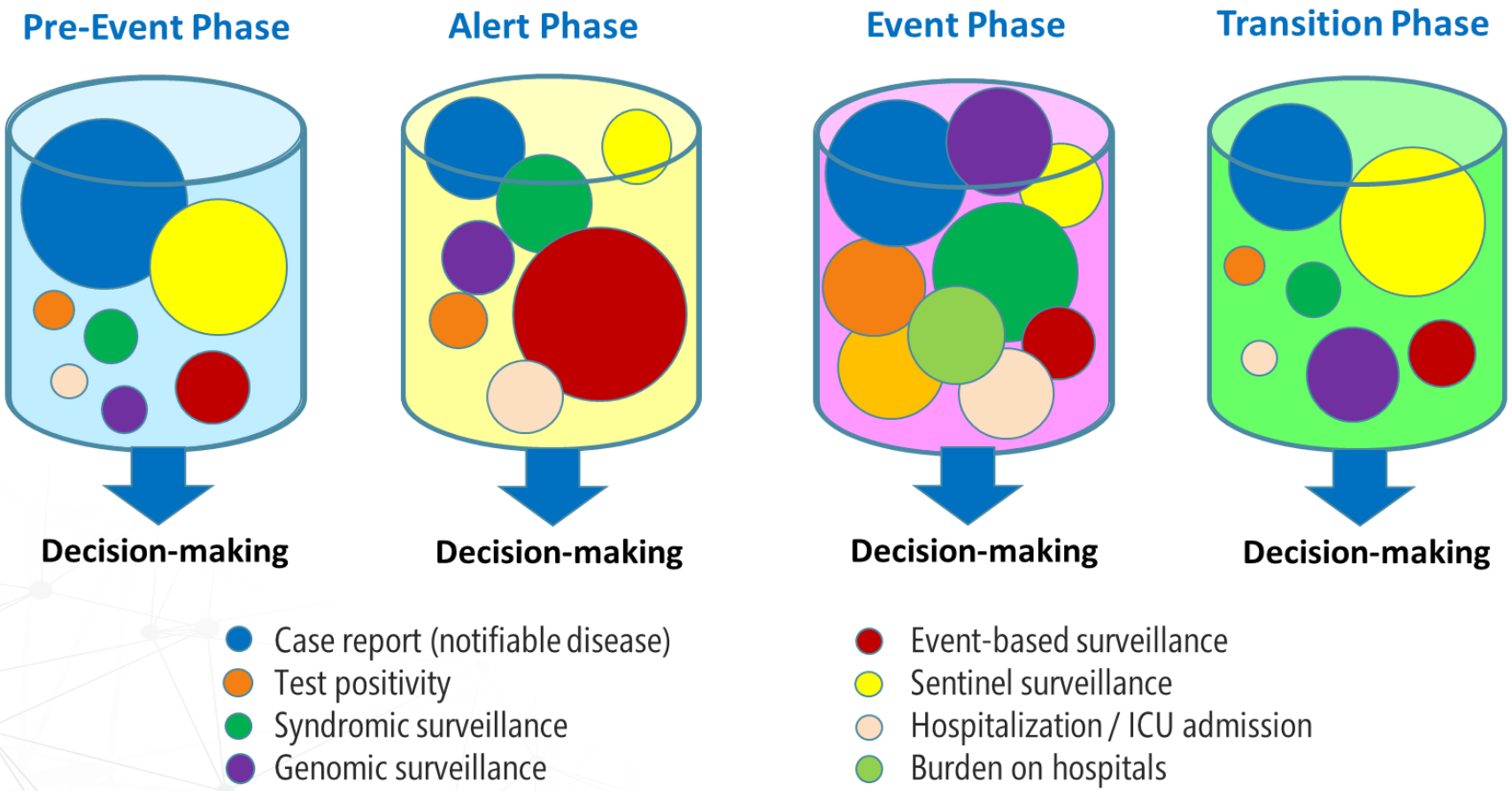
Decision makers face the barrage of questions during emergencies

No single surveillance system will be able to respond to all the information needs of decision makers

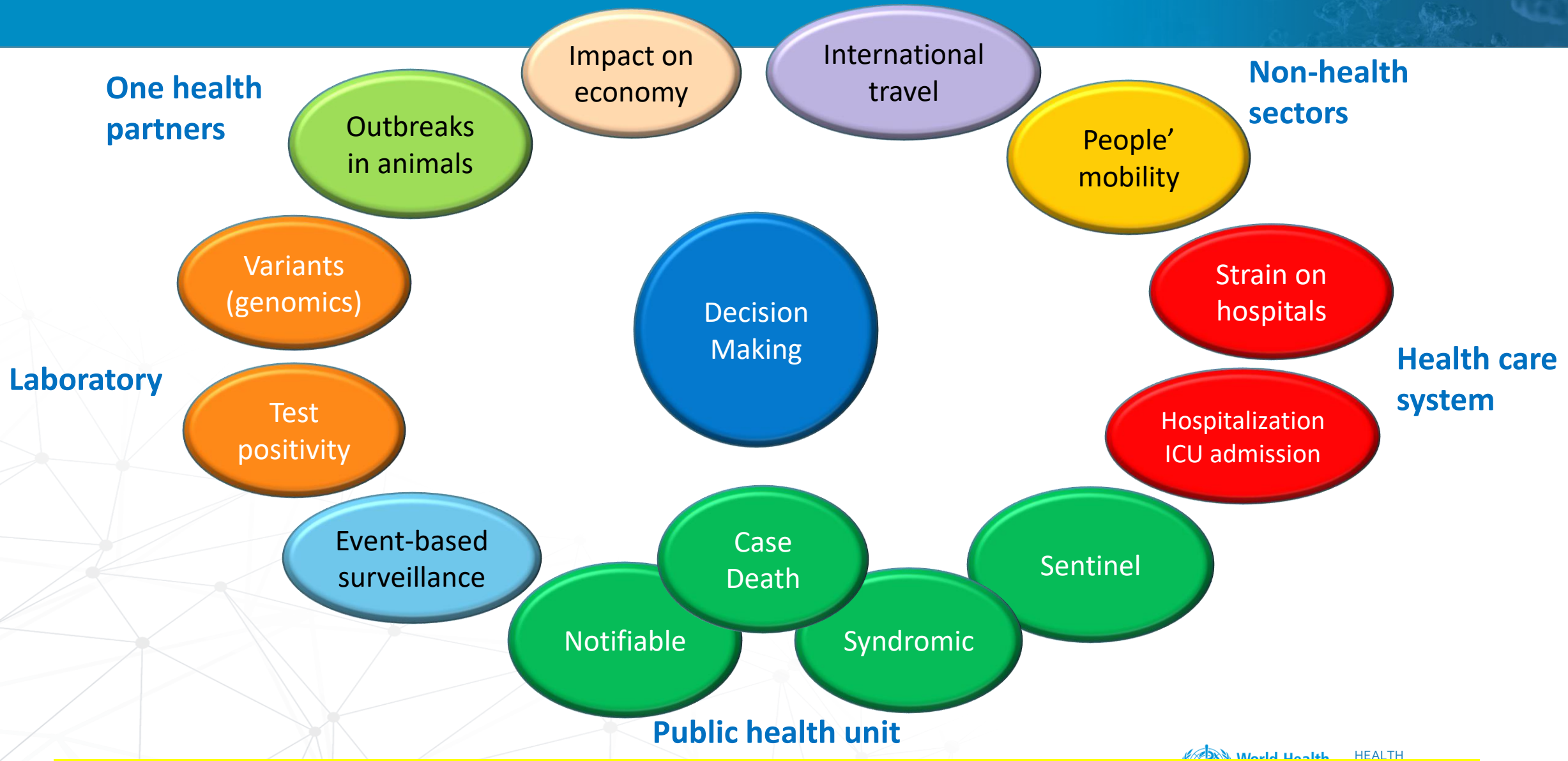
Information Needs for Decision Evolves as the Epidemic Evolves



The relative importance of surveillance systems vary over the emergency cycle

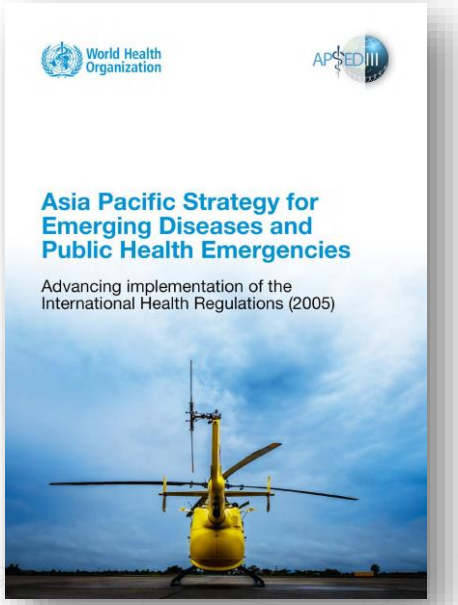
Adapted from APSED III https://apps.who.int/iris/handle/10665/259094

Decision Making Requires Multiple Information from Different Stakeholders



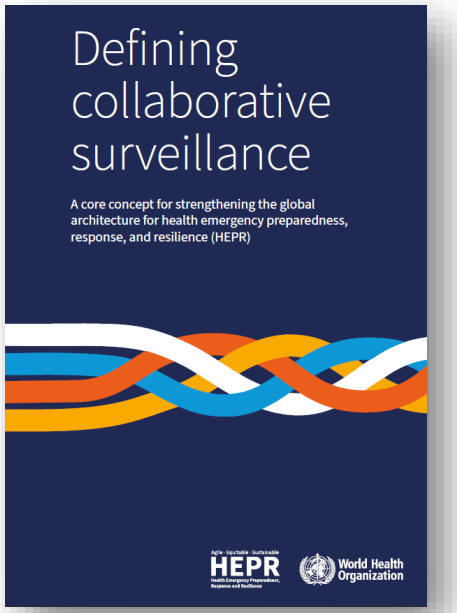
Collaborative arrangement critical for effective surveillance and risk assessment

Multi-source Collaborative Approach for Surveillance



APSED III: Multi-source surveillance (2017)

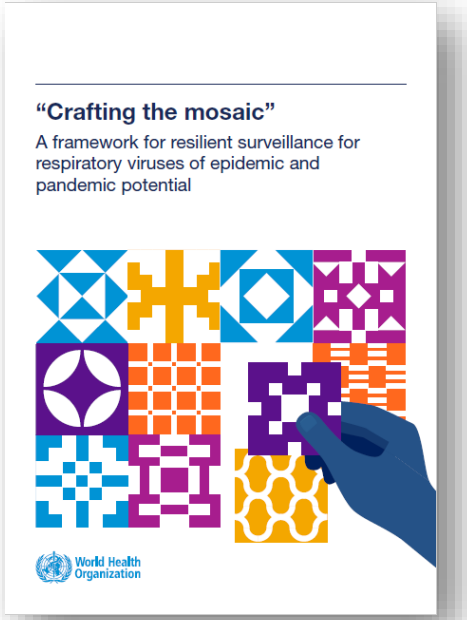
Promoted in Asia Pacific



Collaborative surveillance (2023)

As part of HEPR framework

Promotes collaborative approach



Crafting the mosaic(2023)

Focusing on respiratory viruses

WHO policy brief COVID-19 surveillance (2023)

Core surveillance activities for COVID-19

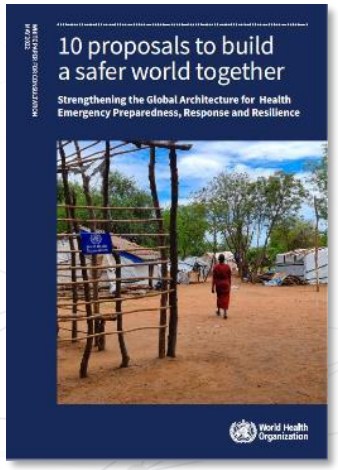
Common key message: Multi-source information needed to address complex decision making

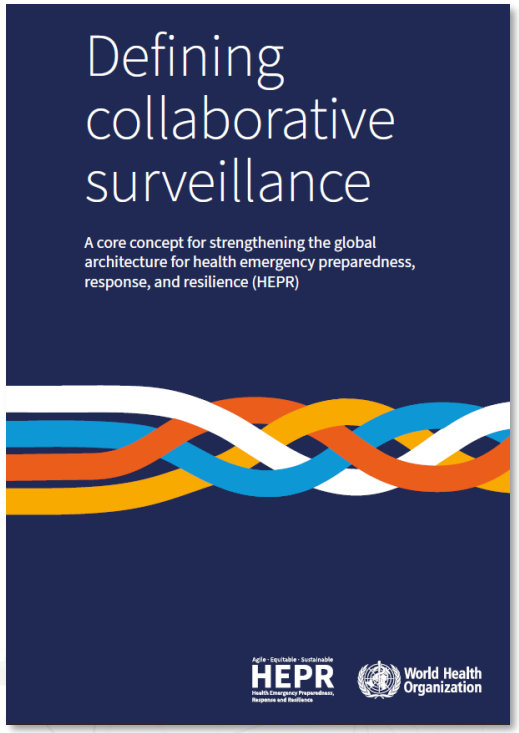
https://apps.who.int/iris/handle/10665/259094
https://www.who.int/publications/i/item/9789240074064

https://www.who.int/publications/i/item/9789240070288
https://www.who.int/publications/i/item/WHO-2019-nCoV-Policy_Brief-Surveillance-2023.1

Collaborative surveillance

Strengthening the Global Architecture for Health Emergency Preparedness, Response and Resilience (HEPR)



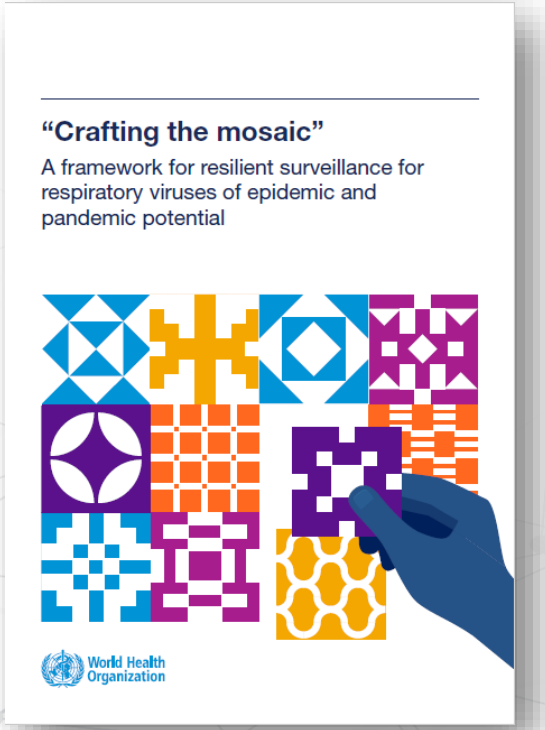


The systematic strengthening of capacity and collaboration among diverse stakeholders, both within and beyond the health sector, with the ultimate goal of enhancing public health intelligence and improving evidence for decision making

(working definition)

https://cdn.who.int/media/docs/default-source/emergency-preparedness/who_hepr_june30draftforconsult.pdf?sfvrsn=e6117d2c_4&download=true
https://www.who.int/publications/i/item/9789240074064

“Crafting the Mosaic” – Background



- Impossible to address the many **complex needs of respiratory virus surveillance** with a single surveillance system.
- Multiple systems and special studies must each be **fit-for-purpose to specific priority surveillance objectives**, and **only together can they provide all needed information to decision-makers**.
- Each surveillance system or study **fit together as “tiles in a mosaic”** that allow to see the full picture of respiratory viruses.
- **Global call for a coordinated approach** to sustainable monitoring of respiratory pathogens moving forward

https://www.who.int/publications/i/item/9789240070288

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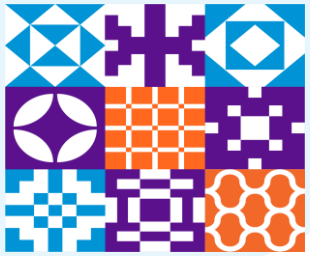
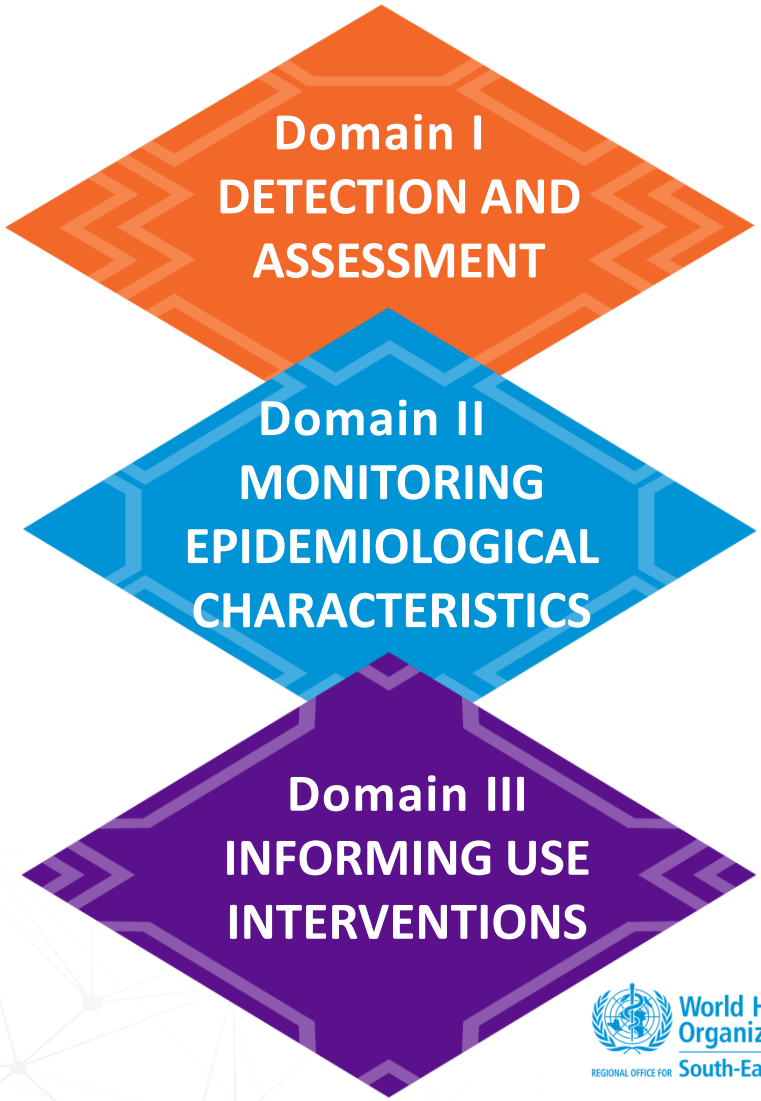
Mosaic: Vision and Surveillance Domains

Vision

A mosaic of efficient and well-coordinated surveillance systems to detect and monitor respiratory viruses with epidemic & pandemic potential



Surveillance domains



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Mosaic: Surveillance Objectives

Domain I:
Detection and assessment of an emerging or re-emerging respiratory virus

Surveillance objectives

1. Rapidly detect emerging or re-emerging respiratory virus outbreaks and other events
2. Assess transmissibility, risk factors for transmission, and extent of infection from an emerging or re-emerging respiratory virus
3. Describe clinical presentation and risk factors for severe outcomes associated with an emerging or re-emerging respiratory virus

Domain II:
Monitor epidemiological characteristics of respiratory viruses in interpandemic periods

1. Monitor epidemiologic and clinical characteristics of illness over time
2. Monitor virologic and genetic characteristics of circulating viruses
3. Monitor situation in high-risk settings and vulnerable populations
4. Monitor impact on and coping abilities of health care systems

https://www.who.int/publications/i/item/9789240070288

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Mosaic: Surveillance Objectives

Domain III:
Informing use of human health interventions

1	Monitor the impact of non-medical interventions in the population	**PHSM**
2	Provide candidate vaccine viruses for vaccine composition, production, and risk assessment	
3	Monitor vaccine coverage, effectiveness, impact, and cost-effectiveness	**Vaccines**
4	Monitor the effectiveness of antivirals and other therapeutics	**Therapeutics/resistance**
5	Monitor the effectiveness of diagnostic tests	**Diagnostics**
6	Monitor the effectiveness of clinical care pathways, including Infection, Prevention and Control (IPC)	**Clinical care/IPC**
7	Monitor adverse events to vaccines and therapeutics	**Adverse events**

https://www.who.int/publications/i/item/9789240070288

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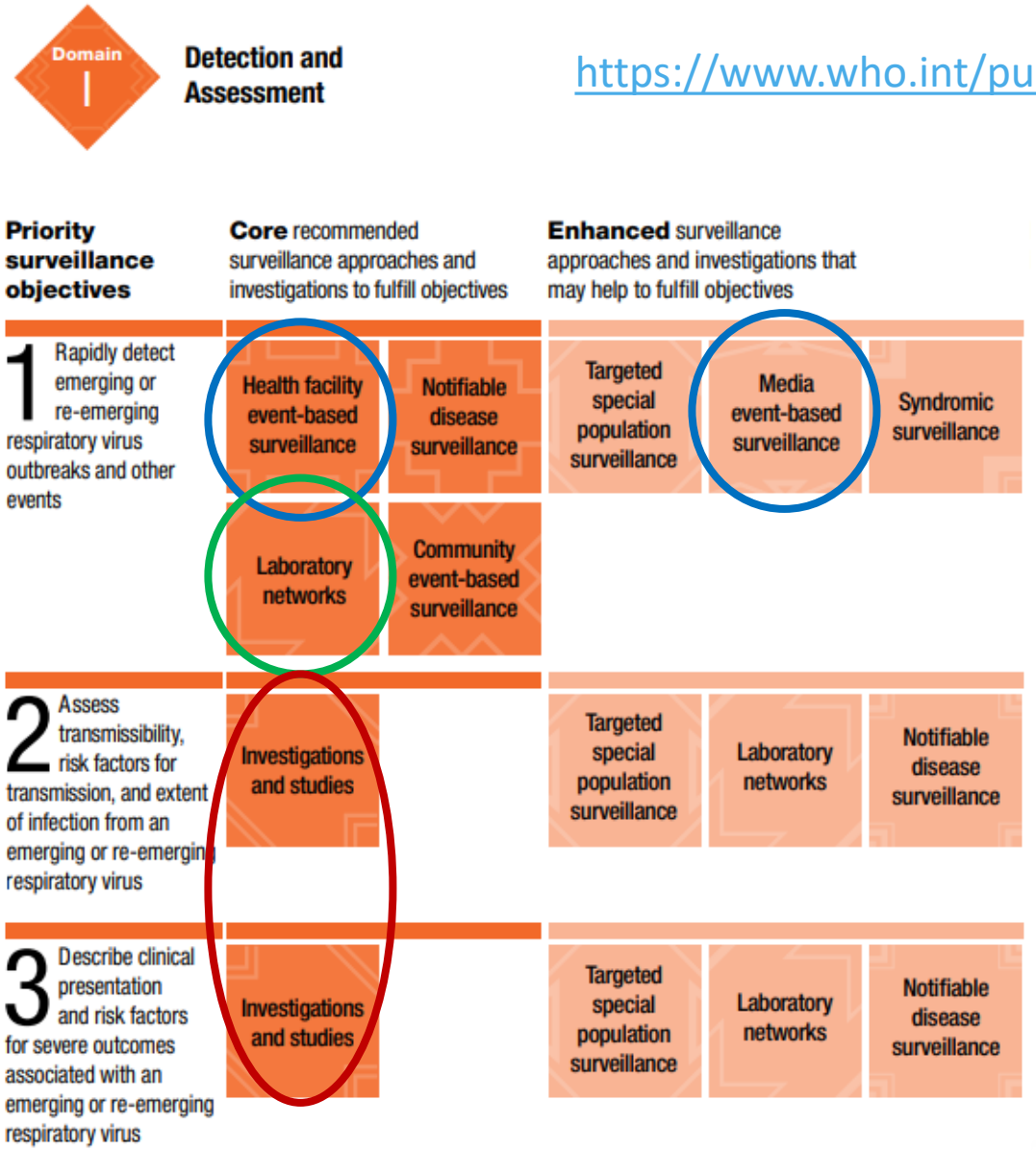
Surveillance Approaches to meet Surveillance Objectives



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Event-based surveillance

Laboratory networks

Assessment of transmissibility, severity and impact of pathogens/ variants

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Health Facility Event-Based Surveillance

Building the hospital event-based surveillance system in Viet Nam: a qualitative study to identify potential facilitators and barriers for event reporting

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Correspondence to Hien Do (email: doh@who.int)

Collaboration and trust between health care services and public health unit is the key for early detection of unusual events

Table 1. **Summary of key findings – the current situation for reporting "unusual events" from hospitals, Viet Nam, 2016**

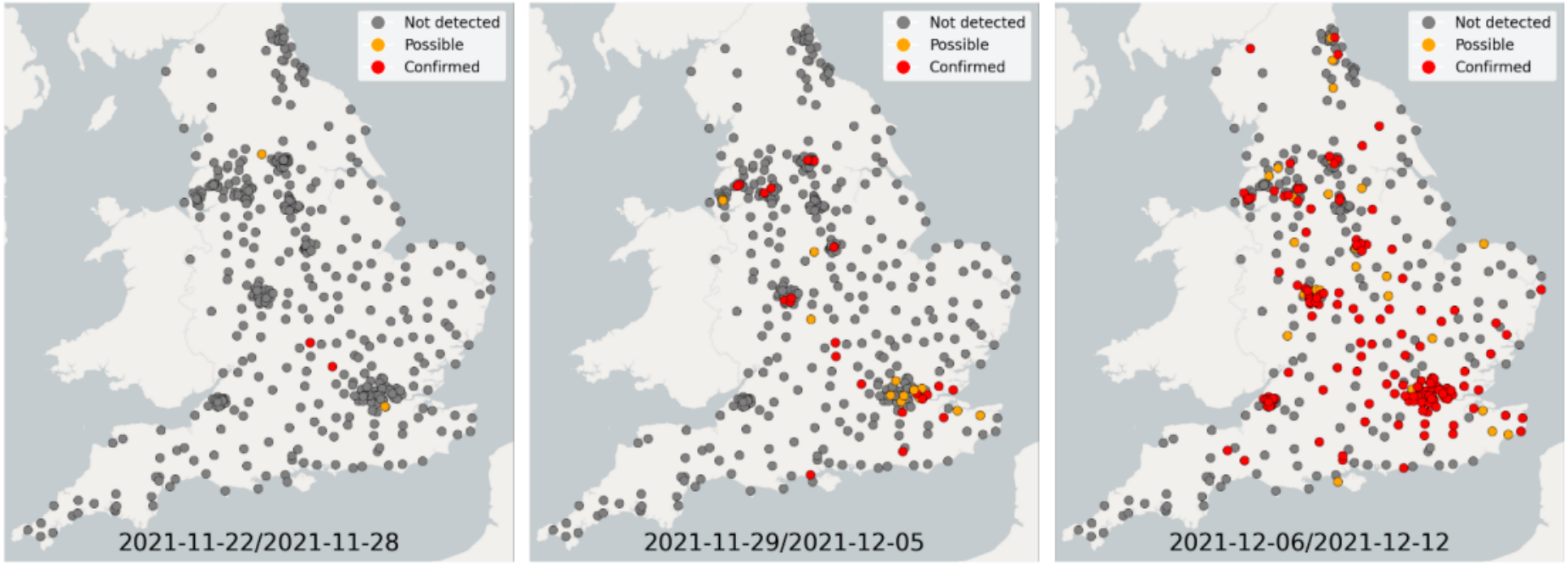
Key findings				
1. Legal framework and standard operating procedures may play an important role in guiding reporting and response.	2. An enabling environment is necessary for timely reporting and response.	3. Potential benefits exist for the curative sector to work with the preventive medicine sector.	4. Health-care providers face multiple challenges to timely reporting.	5. Extra challenges exist for signal detection and reporting from remote areas and industrial zones.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8053901/pdf/wpsar.2020.11.3-010.pdf

Waste Water Surveillance, as an Early Warning Surveillance

Figure 15. Confirmed and Possible detections of Omicron VOC-21NOV-01 (B.1.1.529) in wastewater samples collected in England, data to 12 December 2021

Supplementary data is not available.



Genomics + Environment The waste-water surveillance aims to provide **early warning** and additional evidence regarding the virus, including its presence or absence, trends in concentrations, and variants of concern or interest

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043807/technical-briefing-33.pdf

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Rapid Assessment of Transmissibility, Severity & Impact (TSI)

- Practical approach to assess TSI of emerging SARS-CoV-2 variants & emerging diseases
- Can be conducted by field epidemiologists – training modules available for FETP
- Data from simplified FFX (or similar) allows rapid assessment of:
  - Transmissibility: Secondary attack rate and Serial interval
  - Severity: Risk of severe disease and Case fatality rate
  - Impact: Vaccine effectiveness

Training workshop on rapid assessment of TSI with ASEAN plus three Network (April 2023)

Field epidemiology workforce plays critical roles in collaborative surveillance

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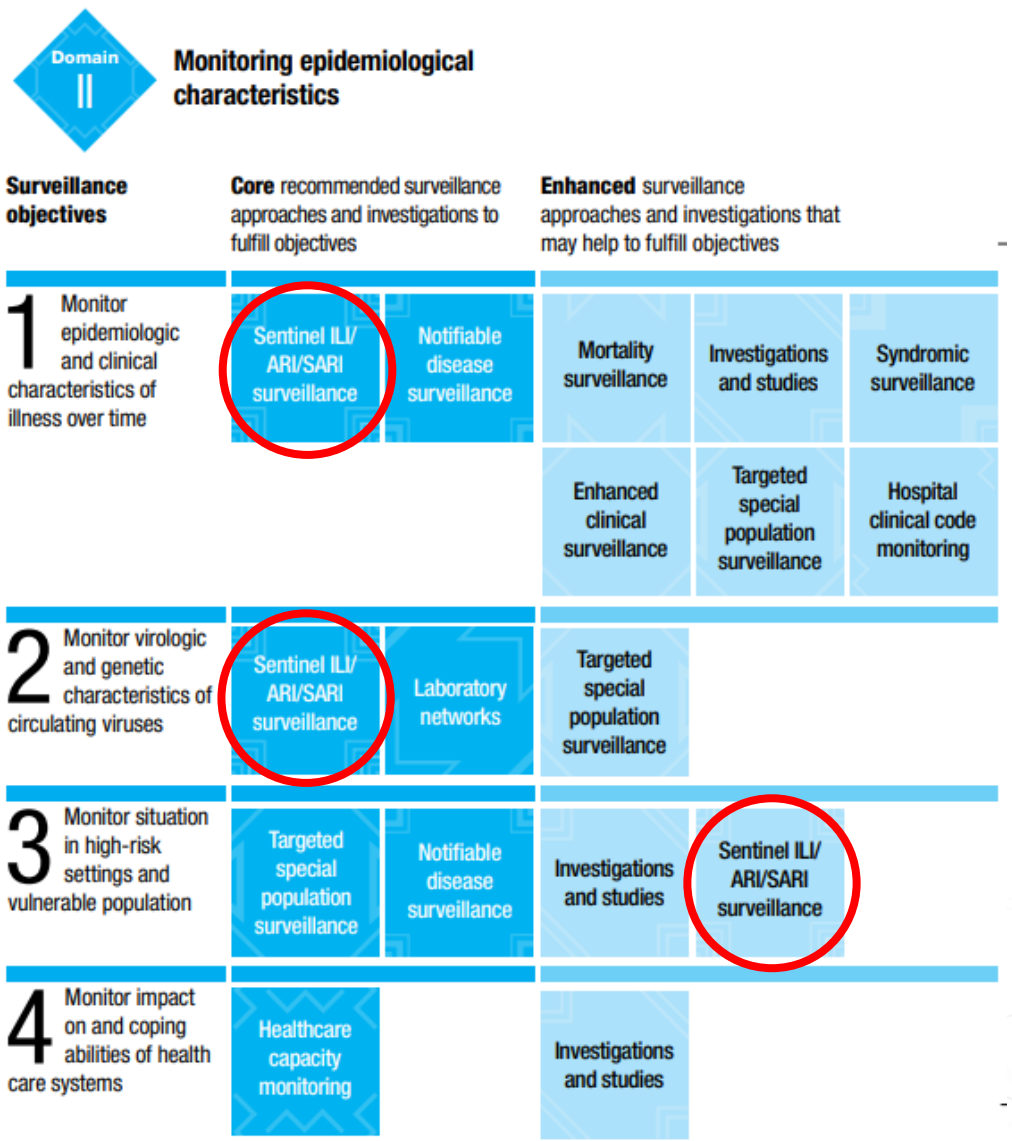
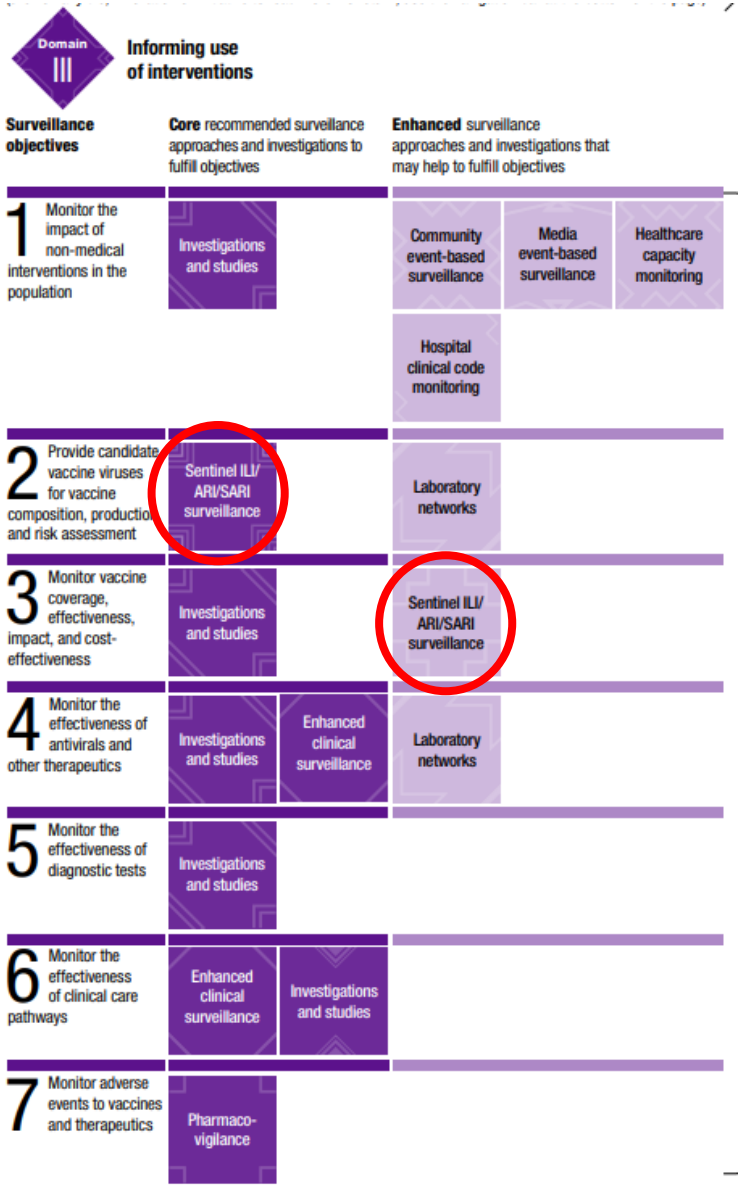
Surveillance Approaches to meet Surveillance Objectives





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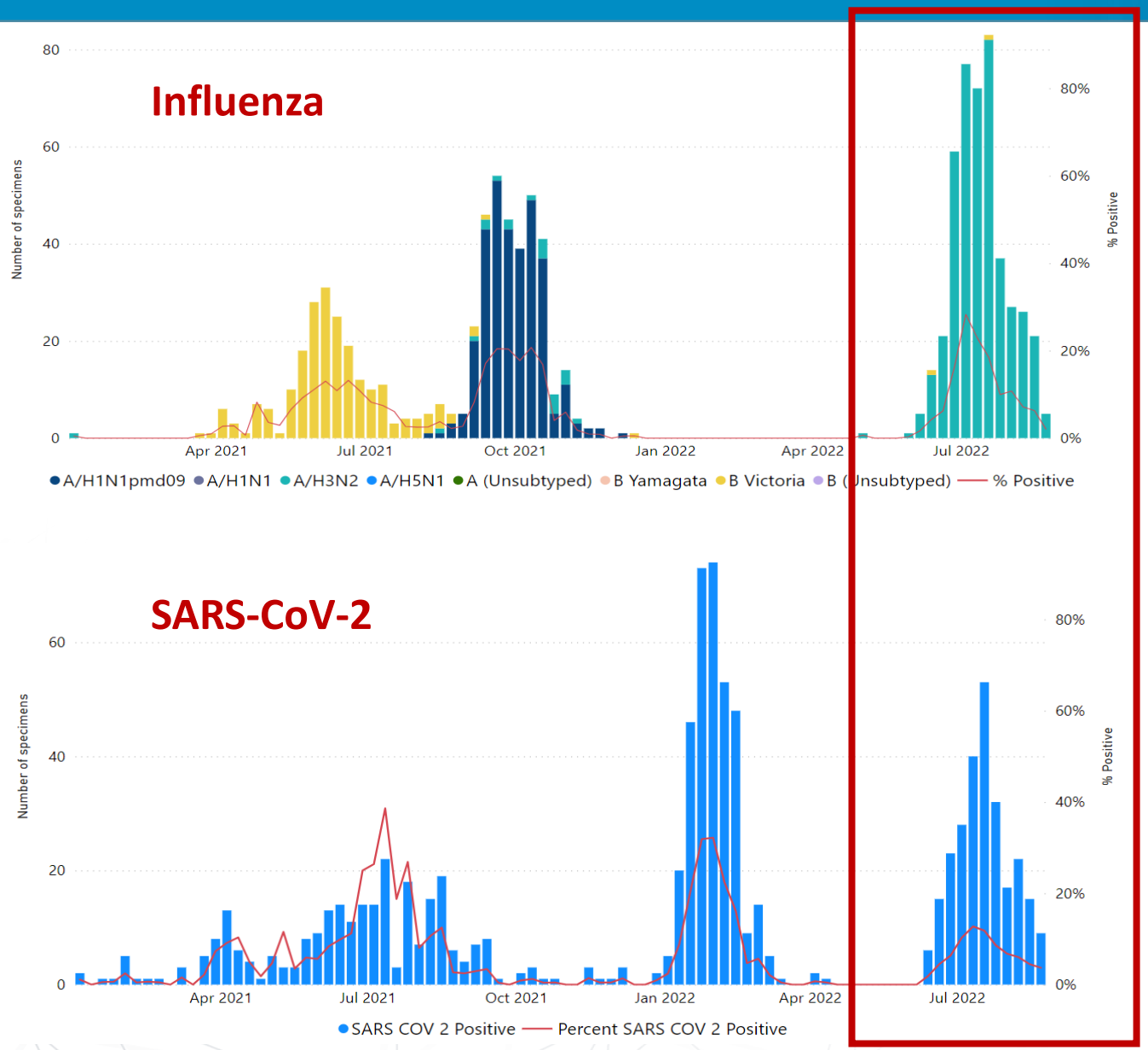
Bangladesh: Integrated Sentinel Surveillance for SARS-CoV-2 & Influenza



Courtesy: IHM/SEARO

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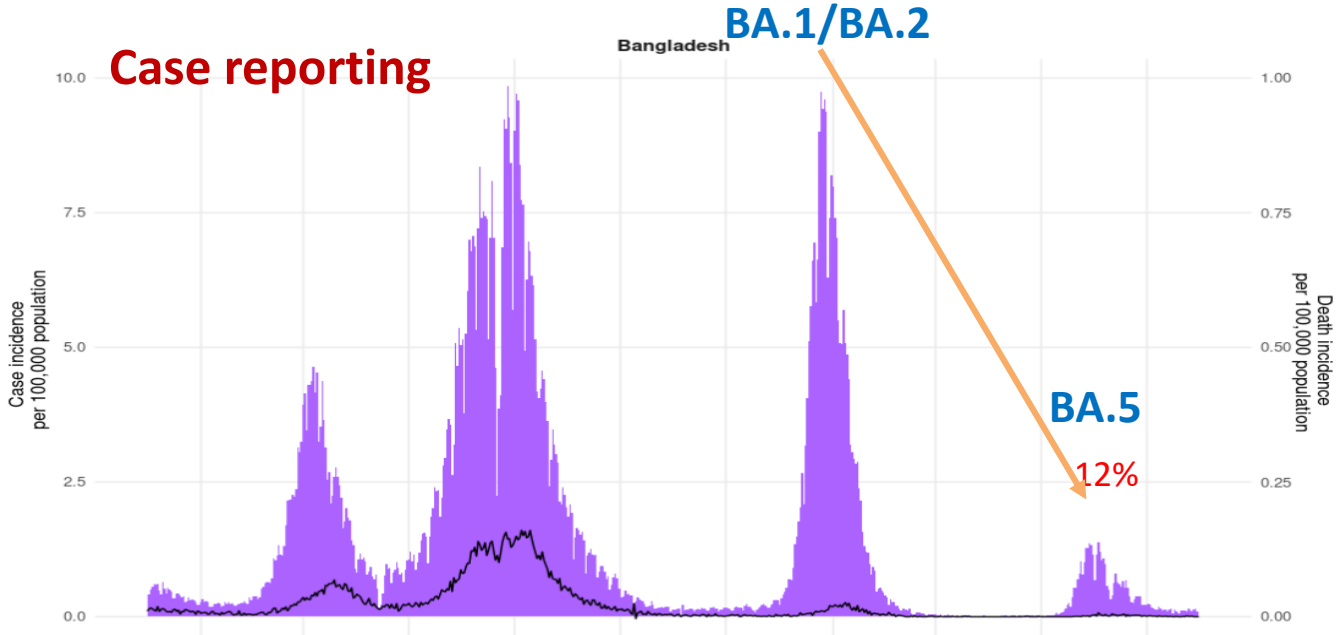
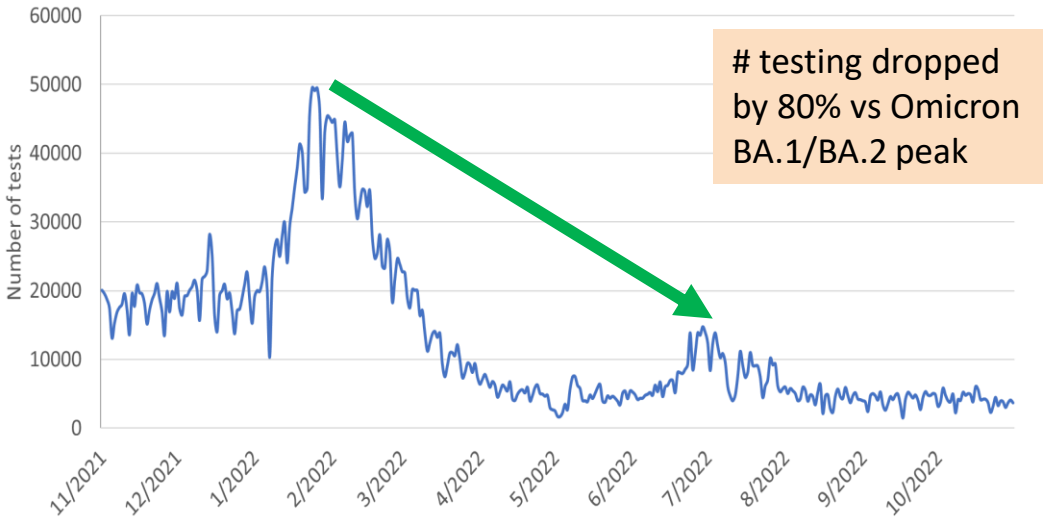
Bangladesh: COVID-19 Case Reporting & Sentinel Surveillance

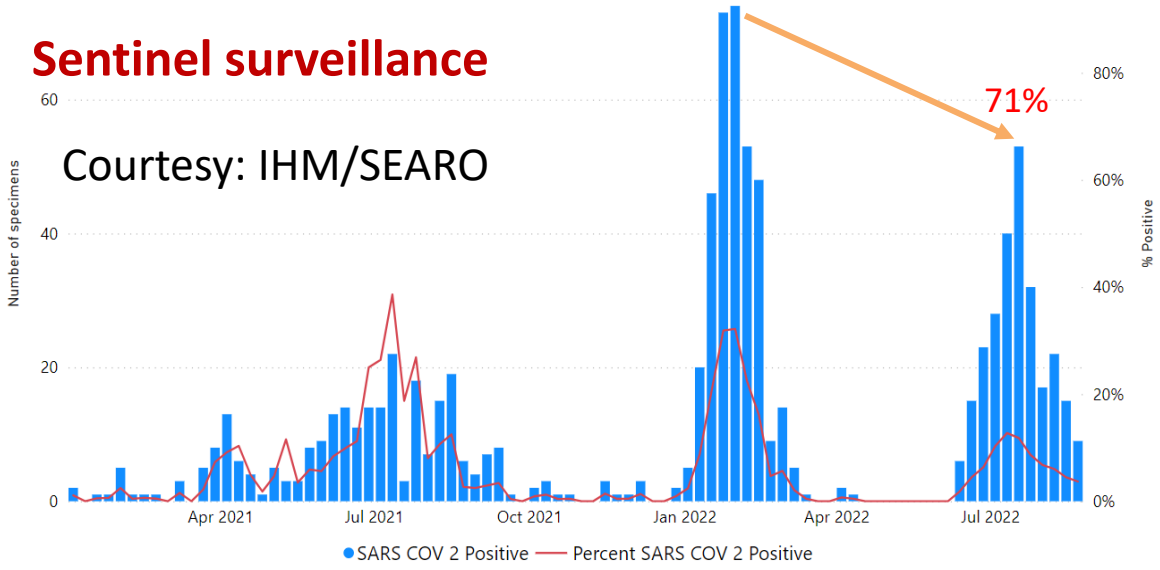
Case reporting

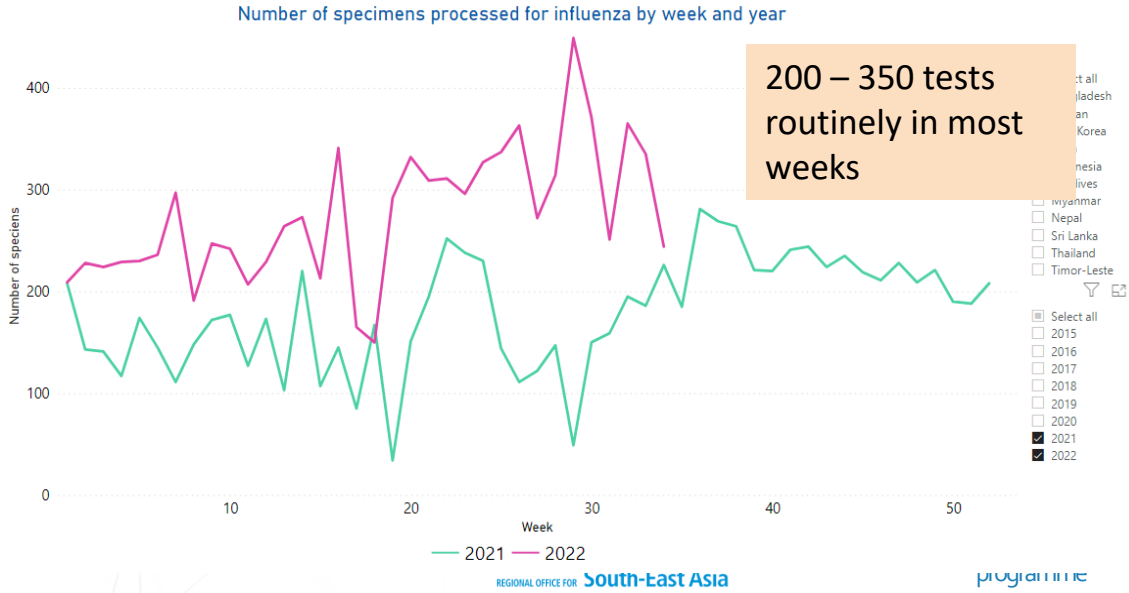




Sentinel surveillance

Courtesy: IHM/SEARO





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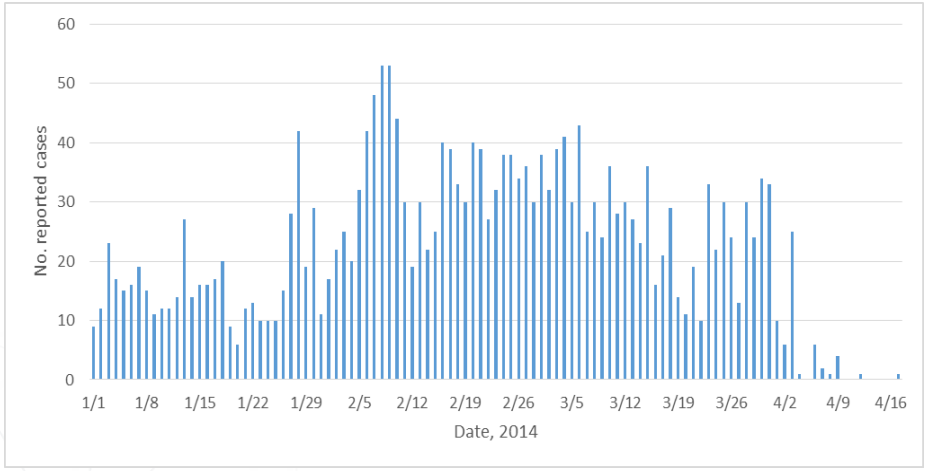
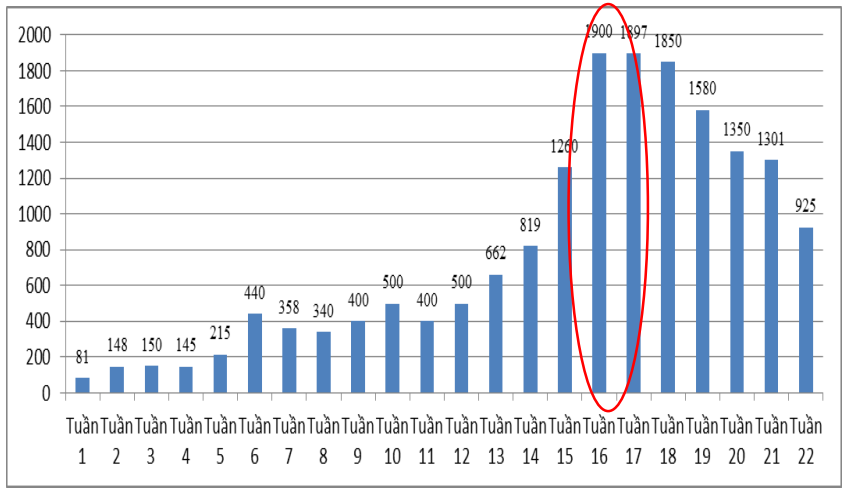
Viet Nam: Measles 2014 - Value of Multi-source Surveillance

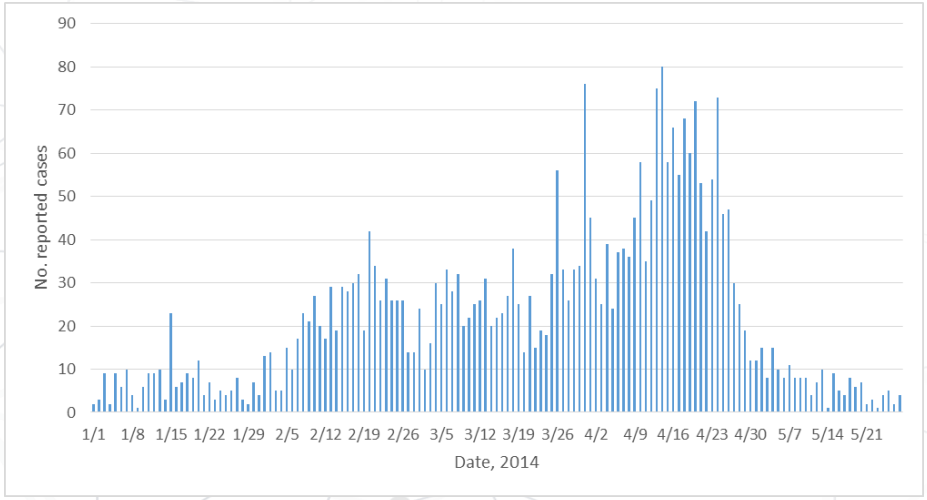
Report using Case Investigation Form

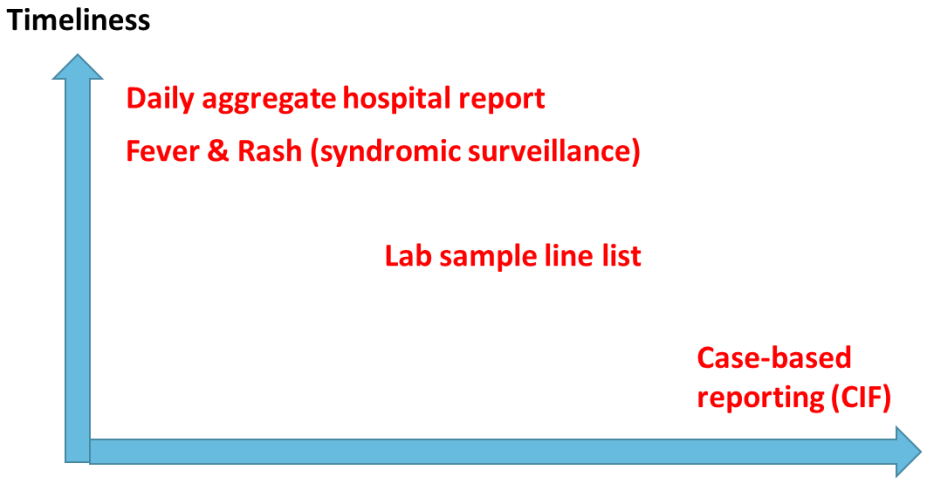


Hospital clinical case report



Laboratory data (measles positive)





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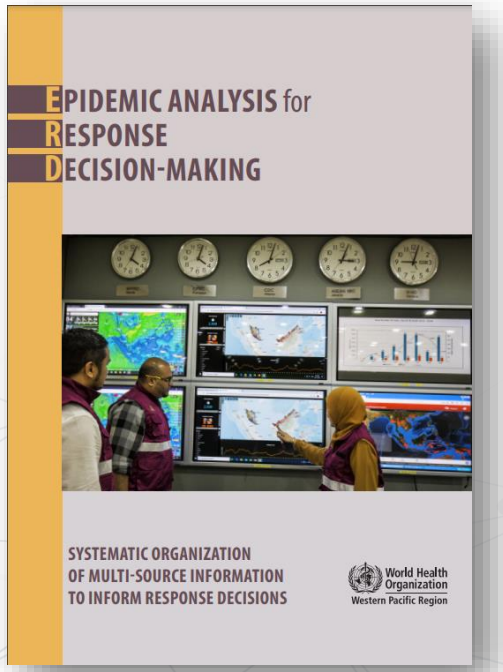
Epidemic Analysis for Response Decision Making

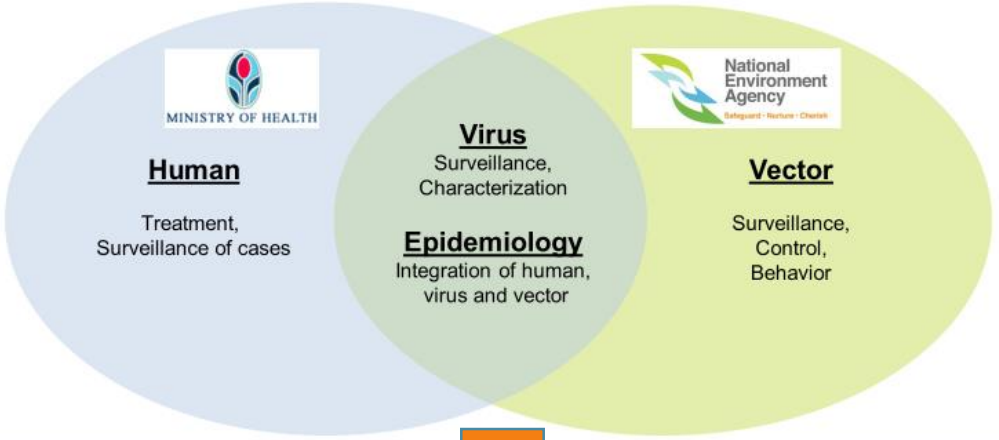


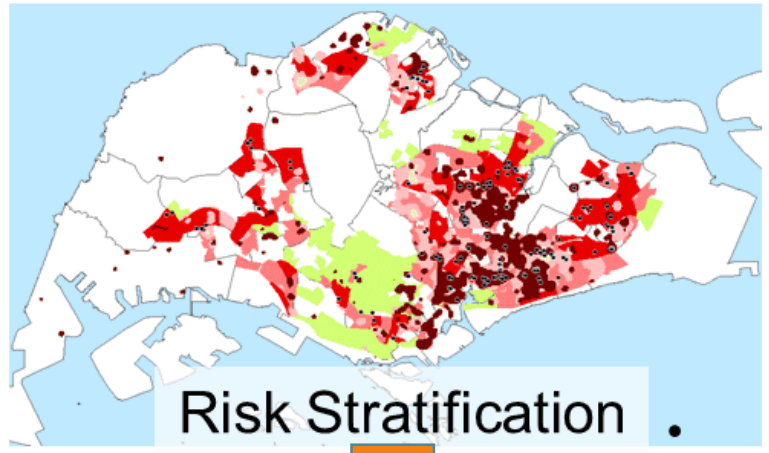
Methods to synthesize multiple sources of information focused on decision making – critical capacity for epidemiology workforce

- Start with decision options
- Translate into epidemiological scenarios
- Triangulate multiple information sources to interpret epidemiological situation
- Critically address alternative explanation
- Advise decision makers, based on epidemiological analysis

https://apps.who.int/iris/handle/10665/333046#:~:text=Epidemic%20analysis%20for%20response%20decision%2Dmaking%20(%E2%80%8EERD)%E2%80%8E,optimize%20assessment%20of%20epidemic%20situation.

Singapore: Collaborative Approach for Surveillance & Risk Assessment
to Inform Dengue Response





Case

Lab Diagnostics

Disease Notification system

Evaluation and development of new tools

Virus

Temporal and Spatial distribution of serotype

Detect emergence of new genotypes

Vector

Immatures:

Premise check for breedings

Adults:

Gravitrap s surveillance

Insecticide Resistance

Ecology

Weather paramters

Population density

Age of buildings

Extent of urbanisation

Public communications based on community alert systems

Multi-source Collaborative Surveillance - Benefits

Collaboration

Health sector partners
- Public health units
- Health care systems
- Laboratories

One Health Partners
- Animal health
- Wildlife
- Environment / eco-system

Other non-health sector partners
- Point-of-entry
- Transport
- Private sector
- Communities
- International partners

Benefits

Enable early **detection** of health security threats
- Signals → Verification

(Event- / indicator-based surveillance)

Better understand **epidemiological situation**
- Trend in cases & deaths

(triangulating various surveillance data)

Better understand **hazard/context**
- Pathogen characterizes / evolution
- Immunity / susceptibility
- Response capacities / effectiveness
- People's movements / contacts
- Climate / environment

Better informed **decision making**

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Potential Priority Actions towards Collaborative Surveillance

System design & performance

- **Priority diseases** & hazards identified.
- **Surveillance objectives** clarified
- Appropriate mix of **surveillance approaches** adopted & new data sources may be added.
- Standardized / efficient **procedures** & harmonized **tools**
- Integrated surveillance platform may be developed.
- **Digitalized information systems** with increased interoperability

Governance & coordination

- Intentional efforts in **connecting surveillance stakeholders** across systems, platforms, tools, networks, and skill sets.
- **Clear institutional arrangements and plans**, supported by strong governance structure and legislation
- **Inter-agency & inter-sectoral body** to coordinate various surveillance efforts and initiatives, and to establish procedures and platform for information sharing.

Workforce

- Further investment in **workforce development** for collecting, reporting, analyzing and disseminating data timely and with quality.
- **Ability to critically triangulate** and interpret the epidemiological data & other information
- **Workforce planning** to build adequate workforce according to competencies expected at the different administrative levels of countries.

Summary

- During emergencies, **decisions have to be made** in urgency with uncertainties.
  - Context & consequences of health emergencies are increasingly complex

- **Collaborative approach** is needed for surveillance and risk assessment to guide decision-making to manage health security threats.
  - Among health system partners, One Health partners & other non-health partners

- **Continued and intentional efforts** needed towards functional collaborative surveillance:
  - 1) system design and performance, 2) governance and coordination, & 3) workforce.


Coming
together
is a
beginning;
keeping
together
is progress;
working
together is
success.
Henry Ford

Thank you !

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