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Asia Pacific Health Security Action Framework

Multi-source surveillance to support public health action and decision-making

Policy Brief

01

Key Messages

Multi-source surveillance (MSS) is a core function for facilitating public health preparedness and response.

MSS strengthens public health intelligence by systematically triangulating data across systems and sectors, leveraging existing surveillance and coordination mechanisms to enable timely, evidence-informed decision-making and supporting countries in meeting IHR (2005)[1] core capacities without requiring new systems.

MSS synthesizes complementary data into actionable insight for decision-makers.

By bringing together information across multiple systems, sectors and disciplines, MSS provides a more comprehensive understanding of public health threats, addressing the limitations of any single system in informing effective action.

Routine use (outside of emergency periods) of MSS strengthens readiness for emergencies.

Institutionalizing MSS during peacetime maintains functional, coordinated, and practiced surveillance systems, enabling rapid scale-up during emergencies while strengthening workforce readiness through routine application.

Effective MSS depends on governance, mutual interest, trust and collaboration - not just technology.

MSS can be implemented through scalable, context-appropriate approaches that build on existing systems and capacities, supported by clear roles, effective data-sharing, a skilled workforce, and sustained multisectoral coordination to ensure surveillance informs action.

Investments in MSS strengthen resilience across current and future risks.

MSS supports early detection, situational awareness, and response across multiple hazards and risks (infectious diseases, climate-sensitive hazards, and other emerging threats), thereby maximizing the value of existing surveillance systems and investments.

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Background

Multi-source surveillance (MSS) is the systematic synthesis and use of information from multiple surveillance and data sources across health and non-health sectors to generate timely public health intelligence for joint analysis, risk assessment and decision-making. It can strengthen preparedness when applied routinely and guides response during acute public health events. MSS applies a multisectoral approach by bringing together relevant sectors to provide a more comprehensive understanding of risks and support more effective public health action. MSS operationalizes collaborative surveillance[2] principles into practical approaches for data triangulation and decision-making.

The COVID-19 pandemic underscored the importance of timely, evidence-informed decision-making and the need to rapidly mobilize resources and adjust public health and social measures.[3,4] While many countries had elements of MSS, coordination and synthesis of information was often inconsistent or ad-hoc,[5] highlighting the value of regular whole-of-government approaches to systematically combine diverse data and information streams to strengthen situation awareness and decision-making.[2] Similar value has been demonstrated for dengue, avian influenza, climate-related emergencies and other public health threats.

Although MSS is often initiated during emergencies, reactive implementation is difficult to establish and sustain over time. Routine implementation is essential to ensure surveillance systems remain functional, coordinated and scalable during public health events. This includes regular data triangulation, joint risk assessment, and use of established coordination platforms to inform decisions for endemic diseases and seasonal hazards. Institutionalizing MSS clarifies roles, strengthens information sharing, and enhances cross-sector and multi-level collaboration, improving preparedness and resilience.

Recent Joint External Evaluations (JEEs)[6-9] have consistently identified gaps in timely information exchange across disciplines, sectors, and administrative levels, particularly outside emergencies. While multiple systems may exist for different purposes, strengthening coordination and linkages can improve the efficiency and collective value of existing investments, supporting more coherent intelligence and action.[10]

Countries are increasingly prioritizing MSS, grounded in a One Health approach,[11] including addressing climate-related risks.[12] MSS is implemented at national and sub-national levels, using existing systems tailored to country context. In the WHO Western Pacific Region, strengthening national MSS can also enhance regional collaboration by improving shared situational awareness, joint risk assessment and collective health security.

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Objectives and Audience

This policy brief advocates strengthening MSS as a core function, with indicative actions. It is intended for national and subnational surveillance leads and managers in the WHO Western Pacific Region, who play a key role in shaping, coordinating, and operationalizing surveillance systems across sectors.

The brief highlights the importance of multisectoral approaches, including One Health, to strengthen coordination across human, animal, environmental and other sectors. An accompanying implementation toolkit (under development) aimed at technical staff will support practical application of MSS.

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Core Public Health Objectives of Multi-source Surveillance

I. **Timely detection and characterization:** Signals from a range of sources can serve as early warning and when multiple alerts align, the certainty of an event is strengthened. This includes biological, chemical, radiological, environmental and climate-sensitive hazards. Rapid characterization of the threat - through laboratory and environmental analysis and for biological hazards, assessment of transmissibility and severity - enables timely and appropriate public health responses.

II. **Comprehensive situation monitoring and assessment:** Collection and triangulation of data from multiple surveillance systems and information sources increases confidence in understanding how events evolve. This includes monitoring hazard characteristics, transmission or exposure patterns, and impacts and contextual factors such as health system capacities, environmental conditions and other sectoral factors. Together, these inform joint risk assessments for action.

III. **Informing the use of public health interventions:** Data from multiple sources supports monitoring and evaluation of interventions, including their effectiveness, appropriateness and acceptability, and enables ongoing adjustments. MSS also informs the development and refinement of medical countermeasures, including diagnostics, therapeutics, vaccines and other hazard-specific measures, based on evolving evidence.

Where capacity exists, modelling and forecasting act as cross-cutting functions across the three objectives of MSS, using diverse data to identify emerging signals and trends, projecting how hazards may evolve and assess the potential impacts of public health interventions to support planning and prioritization of resources. These are iterative processes that are refined as new data become available with multi-source inputs enhancing model performance to support decision-making.

The MSS approach aligns with Collaborative Surveillance[2] under the WHO Global Architecture for Health Emergency Preparedness, Response and Resilience,[13] emphasizing coordination and data use across sectors to generate actionable intelligence. It also is aligned with the Mosaic framework[14] and the Step-by-Step Approach on Multi-source Collaborative Surveillance,[15] which both emphasize the need to coordinate complementary surveillance systems for a comprehensive and adaptable understanding of infectious disease threats. These frameworks complement MSS by providing strategic direction and structured approaches, while practical guidance for implementation will be further elaborated through an accompanying MSS implementation toolkit.

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Information sources and sectors engaged

Information sources

A MSS approach draws on information from multiple sectors and surveillance systems, including both surveillance data and complementary participatory and non-traditional sources. The examples below illustrate different types of data and sources and are not intended to be exhaustive or sector-specific. Countries may initially prioritize a subset of core information sources and progressively expand input over time, based on their context, including but not limited to:

Human health surveillance
- Notifiable disease surveillance
- Syndromic surveillance
- Sentinel surveillance
- Laboratory-based surveillance (including antimicrobial resistance and genomic surveillance)
- Event-based surveillance (including health facility-based and community-based)

Health system and service utilization information
- Hospital admissions
- Bed occupancy including ICU and isolation rooms
- Critical care and staffing ratios
- Outpatient consultations
- Oxygen usage including ventilators
- Excess mortality/All-cause mortality
- Vaccine coverage
- Over-the-counter medication sales
- Healthcare worker absenteeism

Animal, environmental and other sectoral surveillance and information sources
- Animal surveillance (livestock, wildlife, companion animals)
- Foodborne disease surveillance
- Vector surveillance
- Wastewater and environmental surveillance
- Environmental sampling data
- Climate and meteorological data
- Military health data
- School absenteeism data
- Disaster alert systems
- Social listening
- Contextual risk indicators e.g., animal production patterns, animal density, population mobility data and sector-specific preparedness and response capacity indicators

Studies, survey and administrative data
- Case/Outbreak investigations
- Transmission studies
- Epidemiological studies
- Clinical studies
- Community surveys
- Serological studies
- Antimicrobial susceptibility studies
- Health facility assessments
- Antimicrobial consumption data
- Population census data
- WASH surveys

Relevant stakeholders

Effective MSS requires collaboration within and across sectors and levels, tailored to the hazard and country context. Stakeholders engage through existing coordination mechanisms to share information, conduct joint analysis and risk assessment and support coordinated decision-making and cross-sectoral actions. While some sectors contribute directly to surveillance data or information generation, others play critical roles in interpreting risks, providing contextual information, and supporting decision-making and response based on MSS outputs.

Relevant stakeholders may include:

One Health
- Health
- Food and Agriculture
- Environment

Governance, security, policy and financing
- Governance and policy
- Defense and Security
- Home Affairs
- Finance
- Local government

Operational and response-enabling sectors
- Transport and logistics
- Travel and tourism
- Education
- Social Welfare
- Trade
- Information, communication and technology
- Water and other essential services

Knowledge, private sector and community actors
- Academia and research institutions
- Professional associations Private healthcare sector
- Community and civil society organizations
- Community stakeholders including underserved groups

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Key Components for Multi-source Surveillance Implementation

Foundations: Governance, Systems and Trust

Establishes the enabling environment for MSS, including governance arrangements, coordination mechanisms and data-sharing frameworks that support multisectoral collaboration. This involves defining priority hazards, leveraging existing systems, and ensuring a competent workforce, with clear roles and responsibilities across data-sharing, analysis, risk assessment and decision-making. MSS coordination is tailored to country context and may be led by the National IHR Authority or relevant public health institutions. Together, these elements enable a shift from fragmented systems to routine, secure and trusted information exchange across sectors.

Processing: Collation, Analysis and Risk Assessment

Brings together information from multiple sources to generate actionable insights through routine multisectoral review and joint interpretation. This includes data collation, triangulation, analysis and risk assessment across sectors and levels, using analytical approaches such as modelling, forecasting and, where appropriate, artificial intelligence. The output is a shared and coherent understanding of the public health situation.

Use: Decision-support tools and application

Ensures that MSS outputs are used within established coordination platforms to inform decisions, response actions and public health measures.

Learning and Improving: Monitoring and Evaluation

Supports continuous improvement through routine assessments, early, intra- and after-action reviews; and testing multisectoral coordination and information flows. A sustained learning culture is essential for maintaining MSS readiness and adaptability. Regional peer-to-peer learning and communities of practice can further support continuous improvement.

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Outputs

MSS outputs synthesize information from multiple surveillance and information sources to support decision-making by triangulating data into clear recommendations and public health actions.

Outputs may take various forms, including signal reports, dashboards, bulletins, risk assessment and briefing notes, for example, weekly arbovirus bulletins, One Health risk assessments, typhoon-related public health monitoring dashboards and respiratory pathogen situation updates. Some of these products require interpretation and synthesis through multisectoral engagement.

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Tracking Progress

Tracking progress in MSS is primarily undertaken at the country level and builds on existing monitoring and evaluation mechanisms. As MSS is intended to support national decision-making rather than regional reporting, the regional target (see below) serves as a practical indicator of progress, while leveraging existing indicators and avoiding additional reporting burden

IHR Monitoring and Evaluation:

Progress can be assessed through the IHR monitoring and evaluation framework including the SPAR (C2, C5, C4, C10, C11, C12, C14)[16] and IHR JEE (P3, P4, P5, P6, D1, D2, R1, R4, R5, PoE, CE, RE).[17] These indicators measures core capacities for multisectoral coordination, surveillance and laboratory networks.

Reviewing surveillance systems:

Surveillance systems can be reviewed and mapped using an MSS lens that examines how multiple information sources and sectors interact across the surveillance cycle.

Learning from events:

Early-action, intra-action, and after-action reviews provide practical insights into how MSS functions during real events, including detection, information sharing, joint risk assessment, and decision-making across sectors.

Testing readiness:

Simulation and tabletop exercises help test MSS arrangements and strengthen coordination and data flows.

Sector-specific and non-health sector led evaluations:

Existing frameworks such as the Performance of Veterinary Services (PVS) Pathway for animal health,[18] and non-health frameworks such as the Sendai Framework for Disaster Risk Reduction,[19] can be used to assess sectoral capacity and coordination mechanisms relevant to MSS.

A regional target to track progress:[1]

By 2031, 50% of Member States contribute two or more distinct surveillance data streams to the global arbovirus dashboard at least once per year.

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Priority Actions for Member States

These priority actions aim to embed MSS as a core preparedness function, ensuring routine, peacetime processes can be rapidly scaled during acute public health events. They are high-level actions and will be complemented by an MSS implementation toolkit (under development) to support progressive country-level operationalization.

1. Foundations: Governance, Systems and Trust

- Enhance political and multisectoral commitment by clearly articulating and advocating for the value of MSS for timely, evidence-informed decision-making through e.g., national policy briefs, high-level advocacy products, situation reports and routine reporting to decision makers
- Strengthen multisectoral governance and coordination aligned with One Health, including through formal or informal coordination arrangements, such as memorandums of understanding or other agreements, where appropriate.
- Embed MSS into National Action Plans for Health Security with context-specific preparedness and response activities aligned to national priorities and the key MSS components.
- Secure sustainable financing for MSS by integrating it into national health security and preparedness investments and leveraging existing funding mechanisms across sectors.
- Define surveillance objectives and map existing systems, information sources, and stakeholders to identify strengths, gaps and opportunities to strengthen MSS for priority hazards (including consideration of STAR profiling outcomes).[20]
- Appoint a dedicated and skilled workforce to support all components of a MSS approach e.g., Field Epidemiology Training Programmes (FETPs).
- Invest in systematic data sharing and cross-sector coordination, supported by policy, legal and governance frameworks, to enable timely outputs aligned with operational needs and available capacities.

2. Processing: Collation, Analysis and Risk Assessment

- Operationalize routine MSS to triangulate and synthesize data into decision support products, supported by clearly defined roles and workflows. This may include regular multisectoral engagement.
- Strengthen analysis and risk assessment workforce capacities to support systematic application of MSS approaches.

3. Use: Decision-support tools and application

- Translate MSS outputs into decision-making by linking analysis and risk assessment to defined actions, supported by appropriate decision-support tools and clear implementation pathways.
- Embed MSS outputs in existing coordination mechanisms (e.g. EOC), where available and appropriate, to support timely decision-making and action.

4. Learning and Improving: Monitoring and Evaluation

- Track MSS progress using multiple tools to assess improvements, identify gaps, and guide continuous system strengthening.

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