



Policy Brief

STRENGTHENING LABORATORY CAPACITY FOR EFFECTIVE INFECTIOUS DISEASES DETECTION AND RESPONSE IN INDONESIA



AUSTRALIA INDONESIA
HEALTH SECURITY
PARTNERSHIP

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Background

Laboratories play a critical role in identifying and responding to health threats, providing an essential first line of defence in times of crisis. Their capabilities and level of preparedness can therefore determine a nation's ability to withstand the impacts of such events. This is particularly true in Indonesia, where environmental, demographic, and social characteristics make the nation a hotspot for disease outbreaks.

Laboratories contribute to Indonesia's health security through the provision the following functions:

- **Disease detection and diagnosis:** Laboratories are responsible for the detection, differential, and definitive diagnosis of infectious diseases of outbreak potential. To do this, various diagnostic tools and techniques are used to identify and characterise pathogens, and in doing so help inform public health responses. To function at an optimal level, capacity to collect and test specimens using the right equipment in a timely manner is essential.
- **Surveillance and monitoring:** Laboratories also play a critical role in disease surveillance and monitoring. By analysing samples collected from patients, animals, and the environment, laboratories can detect outbreaks, monitor disease trends, and identify potential new public health threats.
- **Vaccine development:** Laboratories are involved in the development and testing of vaccines, including those used in response to outbreaks. They help ensure that vaccines are safe and effective, and that they meet regulatory standards.
- **Emergency response:** In the event of a public health emergency or outbreak, laboratories are responsible for rapidly identifying the pathogen causing the outbreak and providing timely information to public health officials to inform response efforts.

For administrative and biosecurity reasons, human and animal health laboratories are managed separately in Indonesia. While managed separately it is critical that human and animal health facilities coordinate and that diagnostic intelligence generated is shared to ensure timely, effective, and efficient epi-zoonotic disease detection and control. To do so is in keeping with Indonesia's commitment to a 'One Health'¹ approach to managing of emergent disease threats, such as those posed by avian influenza, Coronavirus, and anthrax. The Government of Indonesia reiterated this commitment during its recent presidency of the G20.

AIHSP-INDOHUN laboratory assessment

The Australia Indonesia Health Security Partnership (AIHSP)² joined forces with the Indonesia One Health University Network³ (INDOHUN) in 2021 to assess the availability of essential laboratory services and the quality of laboratory

¹ 'One Health' is an integrated, unifying approach to balance and optimise the health of people, animals, and the environment and, in doing so results in greater capacity to prevent, predict, detect, and respond to global health threats. The approach mobilizes multiple sectors, disciplines, and communities to work together to address root causes of these threats.

² The Australia Indonesia Health Security Partnership (AIHSP) aims to increase national health security in Indonesia so that women, men, and communities are less at risk from emerging infectious diseases, thereby contributing to Australian, regional, and global health security, as well as supporting sustainable economic development and food security in Indonesia.

³ INDOHUN is a network of Indonesian higher education institutions that aims to promote multi-disciplinary collaboration in human, animal, and environmental health sectors in Indonesia. We do this by building institutional and individual capacity, advocating for collaboration-supportive policies, conducting research and community outreach, and creating a platform for academicians, stakeholders, scientists, communities, and professionals to work together to address regional and global issues concerning One Health.



management systems across Indonesia. Survey and observational methodology were used for the assessment. Surveys and observations were conducted in 103 laboratories in four provinces: Central Java, DI Yogyakarta, Bali, and South Sulawesi. 101 laboratories were government run and two were private. The vast majority (~83%) were diagnostic laboratories. 14% were national, 19% provincial, 60% city/district hospital, and 7% puskesmas-level facilities.

Despite the important role diagnostics play in ensuring national health security, the study found that laboratories in Indonesia are, in general, under resourced and underprepared to detect new and reemergent infectious diseases. The study raised four broad areas of concern. These were:

- **Policies and procedures to manage laboratory processes, inter-laboratory specimen transfer, workplace health and safety, and bio-risks need updating.** This is especially relevant for laboratories at the periphery of the health system where support services (e.g., routine quality assurance inspections) are infrequent. Routine laboratory process monitoring and auditing (as per the MOH standards) is required.
- In some facilities, **essential laboratory equipment (such as essential personal-protective equipment, biosafety cabinets, pH meter, digital scales, real-time polymerase chain reaction machines, and next generation sequencers required to perform tests and ensure safety are not fit for purpose or are missing.** Biological agent inventory, storage, and monitoring is inadequate.
- The **laboratory workforce's skill level is, in some laboratories, rudimentary.** This is in part due to lack of foundational and continuing education opportunities, and competency monitoring processes.
- **Laboratory information systems are manual and disconnected,** leading to inefficiency, poor data quality, and an inability to collate, interpret and communicate information for both clinical care and policy decision-making.

Recommended policy responses to these challenges are presented below.

Policy recommendations

1. **There is a pressing need to review the minimum standards and accreditation requirements for laboratories operating at different levels of the health system. Minimum standards and accreditation requirements should reflect best practice and be supported by robust routine quality assurance monitoring programs.**

To guide laboratory strengthening, minimum service standards are required. These minimum standards ought to consider the physical infrastructure, stock, workforce, and administrative requirements that are needed to ensure laboratory services are of sufficient quality and safety. Minimum standards ought to align with routine quality assurance monitoring programs and – ultimately – the national laboratory accreditation scheme. Routine monitoring to ensure compliance with national accreditation standards ought to be implemented and used as a tool to identify and remedy weaknesses.

2. **There is urgent need to improve the vertical integration of laboratories operating at different levels of the Indonesian health system.**

Streamlined pathways and data flows between laboratories operating at different levels of the health system will improve the timely, efficient, and cost-effective referral of patients, transfer of specimens, and sharing of knowledge and resources. Addressing the gaps and inconsistencies in the policies and operational procedures



that are in place is crucial to streamlining laboratory service delivery. Systems that support vertical integration will inevitably enhance laboratories' function during emergencies. Indonesia's investment in digital health information systems may be leveraged to improve the integration of laboratories across the country.

- 3. To protect laboratory staff from harm (including laboratory-acquired infections) and to protect the public and the environment from exposure to harmful materials (including infectious agents) urgent action is required to improve laboratory biosafety practices.**

Biosafety measures ensure that laboratory personnel, the public and the environment are protected from accidental exposure to infectious agents and hazardous materials. This includes access to safe and appropriate equipment, the use of personal protective equipment, proper handling and disposal of biological materials, adherence to protocols for preventing accidental exposure, and response processes in the event of an exposure. Regulations and standards that govern biosafety need revision. They ought to be designed to meet international standards while also being feasible within laboratories' operating contexts. Staff up-skilling, mentoring, and monitoring will be required.

- 4. Collection, collation, and analysis of data from both animal and human laboratory services, as part of a One Health approach to risk management, are essential to improve the Indonesian government's ability to detect and respond to new and emerging zoonotic disease threats. Conducting the collation and evaluation process at the local level will help ensure timely detection and responses to these disease threats.**

To prevent outbreaks of zoonotic diseases, it is crucial to have robust surveillance and intelligence generation and therefore essential that mechanisms to collect, collate, and analyse data from both animal and human laboratories are established and supported. This is in keeping with the One Health approach and emphasises the interconnectedness of human and animal health, and the environment. Puskesmas and Puskesmas, with technical support from relevant jurisdictions are well placed to lead localised data collation and intelligence generation.

- 5. To address deficits in laboratory staff skills, it is essential to deliver training, in-service, and mentoring programs that are tailored to needs. Staff competency monitoring should be integrated into routine laboratory quality assurance processes and be made a requirement for accreditation.**

Laboratory workforce development is crucial for several reasons. First, laboratory personnel are essential in the diagnosis, monitoring and control of infectious diseases, and play a vital role in identifying disease outbreaks, analysing samples, and providing accurate and timely results to guide disease management and control. Second, laboratory workforce development is essential for advancing scientific research and innovation. This, in turn, can lead to the discovery of new treatments and interventions that can improve health outcomes. Third, laboratory workforce development is critical for strengthening health systems and ensuring that laboratory systems are integrated into overall health system functions. Finally, a skilled laboratory workforce can also have broader economic and social benefits. Skilled laboratory personnel can play a role in building public trust in laboratory services, improving health outcomes, and promoting social and economic development.



6. Exploring the use of digital technology is recommended to enhance laboratory data collection, storage, management and sharing. This strategy may support digital inter-laboratory referrals, data sharing and specimen tracking. Leveraging digital technology can improve the continuum of care offered across the health system and over time, and provide valuable evidence for public health and health service decision-making.

Digital health information systems allow healthcare providers to efficiently manage patient data, including medical histories, laboratory test results, and treatment plans. They allow information to be accessed and shared across health systems, improving coordination, efficiency and the continuity of patient care. They help reduce manual processing errors and improve patient safety. Digital technology may be used in laboratories to support automated and more accurate analysis. This can speed up diagnosis and reduce delay in the delivery of treatment or the instigation of public health responses. Furthermore, digitised laboratory information systems can be integrated with digital health information systems, allowing the seamless sharing of laboratory results with healthcare providers. This integration can help to improve the overall quality of patient care.

This policy brief was prepared based on the results of a survey conducted by the Australia Indonesia Health Security Partnership (AIHSP) in collaboration with the Indonesia One Health University Network (INDOHUN) in 2021 to assess the availability of essential laboratory services and the quality of management systems across Indonesia.

The Government of Australia neither endorses the views contained within this publication nor vouches for the accuracy or completeness of the information.

For more information

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