Summary

imPACT Review Report

Indonesia

June 2025

Summary

Following a request received from the Minister of Health of Indonesia in November 2023, an imPACT Review was conducted from 15 July 2024 to 24 July 2024 by the Programme of Action for Cancer Therapy (PACT) of the International Atomic Energy Agency (IAEA), the World Health Organization (WHO), and International Agency for Research on Cancer (IARC). The imPACT Review was organized within the framework of the WHO-IAEA Joint Programme on Cancer Control. A team of international experts, nominated by the IAEA, WHO and IARC, held technical discussions with key stakeholders, and visited the principal cancer facilities in the country.

Main findings

1. Cancer burden

Indonesia has the world's highest smoking rate among adult males (65%), contributing to lung cancer being the most common cancer in men, as reported by IARC's GLOBOCAN 2022. The report recorded 38 904 new lung cancer cases and 34 339 deaths in men that year. Other prevalent cancers in men include colorectal (35 676 cases; 19 255 deaths), liver, nasopharynx and prostate. Among women, breast cancer leads (66 271 cases; 22 598 deaths), followed by cervical (36 964 cases; 20 708 deaths), ovarian, colorectal and lung cancers.

Childhood cancer, especially acute lymphoblastic leukaemia (ALL), presents a significant challenge in Indonesia, with an incidence rate of 2.5–4.0 per 100 000 children and an estimated 2 000–3 200 new cases annually. This cancer burden underscores the critical need for enhanced childhood cancer care infrastructure and early detection programmes.

High cancer mortality in Indonesia is attributed to late diagnoses (70% of cases are diagnosed at advanced stages), limited cancer care facilities and socioeconomic challenges. Access to treatment is further constrained by healthcare worker shortages (fewer than 1 000 oncology specialists) and inadequate rural healthcare infrastructure

2. Health system overview

Indonesia's health services are managed by the Ministries of Health (MoH), structured at central, provincial and district levels. Primary health centers (*puskesmas*) deliver comprehensive care and serve as referral hubs, while public hospitals provide secondary and tertiary services. Since 1999, health service management has been

decentralized, with provincial and district governments overseeing public hospitals, while private clinics and hospitals primarily serve urban areas. The MoH focuses on regulation and supervision, with private facilities subject to accreditation and licensing. Many healthcare professionals work across both sectors.

Indonesia's health system faces funding constraints and uneven insurance coverage. The national health insurance scheme (JKN – *Jaminan Kesehatan Nasional*), launched in 2014, covers 83% of the population with comprehensive benefits, but approximately 70 million, mostly in the informal sector, remain uninsured. The MoH oversees the National Essential Medicines List (DOEN), which includes 484 drugs provided free under the JKN programme. Some non-listed drugs require private purchase. Pharmaceutical procurement is decentralized, supported by the e-Catalogue system, with government-set price ceilings ensuring availability.

Decentralization has fragmented Indonesia's Health Information System. Recent initiatives, including the 2024 Digital Health Transformation Strategy and SATUSEHAT platform, aim to unify data systems and enhance interoperability. New regulations mandate integration into a national system to improve data access and decision-making.

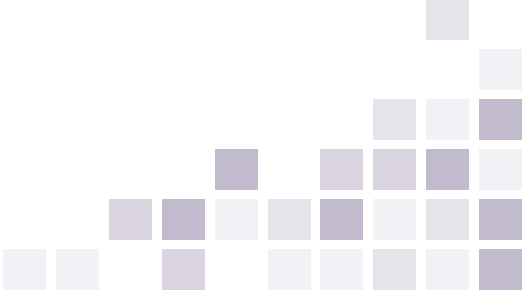
Indonesia has a healthcare workforce shortage, with only 0.7 physicians (compared to 2 physicians in the region) and 4.17 nursing/midwifery personnel per 1 000 people as of 2021. Most doctors are concentrated in urban areas, while remote regions face staffing challenges. Incentives aim to attract workers to underserved areas, particularly in eastern provinces.

3. National cancer control planning and governance

The 2024–2029 National Cancer Control Plan (NCCP) was endorsed in October 2024, following the imPACT Review and based on preliminary recommendations. This comprehensive plan addresses all critical aspects of cancer control and was developed with input from key stakeholders. The Ministry of Health has been tasked with its implementation.

To ensure the plan's success, it is essential to establish realistic implementation timelines and clearly define responsibilities. Expected results or outcomes should be outlined, and metrics for evaluating progress must be identified and assessed at regular intervals. Additionally, an implementation action plan should be developed alongside the NCCP. This plan should detail specific cancer control strategies, associated timelines and the metrics for tracking progress.

A National Cancer Control Committee should oversee the time-bound implementation of the NCCP and the imPACT review recommendations. Strengthening the Cancer Section within the Non-Communicable Diseases (NCD) division of the MoH and ensuring adequate funding for the NCCP are critical to achieving its objectives. The successful implementation of the NCCP will significantly enhance cancer control efforts in Indonesia and should be prioritized at the highest levels of government.



4. Registration and surveillance

To guide effective cancer-related policy decisions, planners require accurate, population-based data on cancer burdens. However, Indonesia relies on estimates from neighbouring countries due to a lack of comprehensive local data. Indonesia's cancer registration system originated as a pathology-based registry in 1970 and was expanded in the 1990s to include hospital-based cancer registries (HBCR). The system's current objective is to achieve national, population-based coverage. The MoH oversees the system, coordinating efforts through regional cancer registries established across various provinces. In 2023, the MOH broadened the scope of population-based cancer registries (PBCRs) as part of the introduction of the national health information system (SATUSEHAT).

The Dharmais Cancer Hospital serves as the central hub for coordinating data collection, quality control and reporting for the national cancer registry. Despite significant advancements, challenges remain, such as incomplete data linkage with vital registration systems like mortality records and inconsistencies in reporting from private hospitals and pathology laboratories.

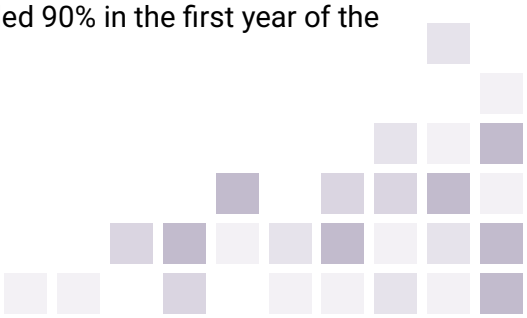
To address specific needs, the Indonesian Paediatric Cancer Registry (IP-CAR) was introduced to focus on childhood cancer data. Recent investments in digital transformation, particularly through the SATUSEHAT platform, aim to integrate patient medical records nationwide and improve the efficiency of data collection.

A recent evaluation by IARC revealed that Indonesia's data did not meet the minimum standards required for inclusion in Cancer Incidence in Five Continents report (volume XII). This assessment underscores ongoing issues with data completeness and quality. Sustained efforts are essential to enhance data accuracy and coverage, ensuring evidence-based national cancer control planning.

5. Prevention

Cancer is a significant public health concern in Indonesia, with high prevalence of risk factors such as tobacco use, unhealthy diets, physical inactivity and low fruit and vegetable consumption. Tobacco use is the leading preventable cause of cancer, with 65.5% of men being current smokers. Despite not ratifying the Framework Convention on Tobacco Control, Indonesia has implemented components of the WHO-recommended MPOWER strategy, including monitoring tobacco use, protecting people from tobacco smoke and raising taxes on tobacco products. Dietary habits have shifted towards processed foods, contributing to obesity-related cancers. Physical inactivity is increasing, particularly in urban areas, and alcohol consumption, though low, still impacts cancer risk. Various healthy lifestyle campaigns, such as GERMAS and CERDIK, promote healthier living, but their effectiveness remains unclear due to limited data on health literacy and campaign impact.

Indonesia has implemented HPV vaccination since 2016, with nationwide rollout completed in 2023. The programme targets girls in 5th and 6th grades, with plans to include boys by 2028. The coverage for the first dose exceeded 90% in the first year of the



national launch. Hepatitis B vaccination targets newborns, with 88.3% coverage at birth and 83.0% for the third dose in 2023. Shifting to a one-dose HPV vaccination schedule, as recommended by WHO, could simplify logistics, reduce programme costs and improve vaccination coverage, making it easier to reach more children and accelerate the elimination of cervical cancer.

6. **Early detection**

There is an integrated breast and cervical cancer screening programme in Indonesia targeting women aged 30 to 69 years using Clinical Breast Examination (CBE) and Visual Inspection with Diluted Acetic Acid (VIA) as the screening tests. There are plans to introduce HPV detection-based screening (along with VIA) using existing laboratory equipment. As per protocol, VIA positive women are to be assessed for ablative therapy at the primary clinics and offered cryotherapy, if eligible. VIA positive women not eligible for cryotherapy and all the CBE positive women are to be referred to the hospitals for further assessment. Taking the advantage of wide availability of ultrasound machines at the primary health centres, breast probes are being supplied to the centres to add breast ultrasound as a screening tool along with CBE. There are plans to introduce screening for colorectal (using FIT) and lung cancer for high-risk population (using LDCT).

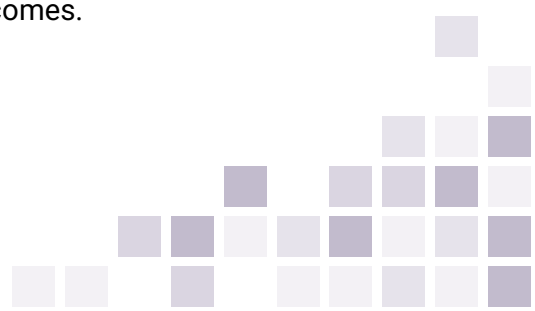
Screening uptake is moderate to low across the provinces. There is wide variability in VIA and CBE positivity across the districts/cities, highlighting the urgent need for refresher training and more providers to be trained. Compliance of screen positive women is unacceptably low and there is no organized system of tracking the screen positive women to ensure their treatment. Low screening participation and low compliance to treatment are due to multiple reasons. Lack of awareness, myths and misconceptions around cancer and low priority of preventive health are combined with system level barriers such as non-availability of services, cost of transport and fear of wage loss.

The quality assurance mechanism of the programme requires significant improvement with strengthening of existing health information systems (ASIK at the primary clinics and SATUSEHAT at the hospitals) and creating a functional linkage between them, developing a quality assurance protocol with prioritized key performance indicators, and having a team responsible for continued monitoring and supervision of the programme.

Key priority recommendations for improving cancer screening include strengthening community mobilization activities, investing in training of screening service providers, rationalizing screening and management protocols (e.g., avoid co-testing with VIA and HPV test) and ensuring high quality of the programme through improved data collection.

7. **Diagnostic imaging and nuclear medicine services**

Radiology and nuclear medicine are integral to cancer management, providing essential services such as X rays, mammography, CT, MRI and advanced nuclear imaging techniques like SPECT and PET/CT, as well as theranostic applications. These technologies enable early detection, precise staging, personalized treatment planning and therapy monitoring, significantly improving cancer care outcomes.



Indonesia's major teaching hospitals, including RSUPN dr. Cipto Mangunkusumo, Rumah Sakit Kanker Dharmais in Jakarta, RSUP Dr. Hasan Sadikin in Bandung, and RSUP Dr. Kariadi in Semarang, serve as primary referral centres. These institutions are equipped with comprehensive radiology and nuclear medicine services, including PET/CT, with plans to expand cyclotron-based radiopharmaceutical production in the near future.

Since the 2018 imPACT review, Indonesia has made significant strides in expanding radiology and nuclear medicine services. The government has increased the availability of SPECT/CT equipment in key hospitals across major provinces and recently introduced PET/CT services at RSUPN dr. Cipto Mangunkusumo (July 2024). Efforts to enhance accessibility include installing medical cyclotrons to support nationwide F-18 FDG distribution and exploring non-FDG tracers for advanced cancer staging.

However, challenges persist. Limited imaging equipment relative to growing demand leads to prolonged waiting times for CT, MRI and RAI therapy, often spanning weeks. Restricted isolation facilities further hinder timely RAI treatments. While service hours have been extended, more resources and infrastructure are necessary to meet the rising demand.

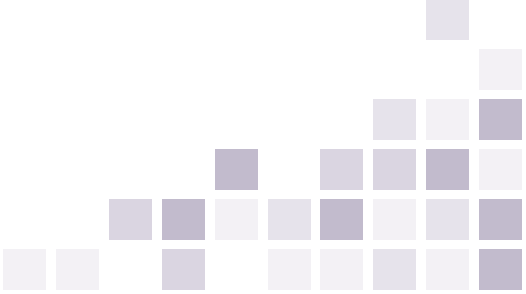
Continued progress requires addressing regional disparities by expanding insurance coverage, improving infrastructure and technology distribution, and increasing human resource training. While significant advancements have been made in cities like Jakarta, Bandung and Semarang, extending accessibility to underserved regions remains a priority for optimizing cancer care in Indonesia.

8. Pathology and laboratory diagnosis

Pathology services in government hospitals in Indonesia are staffed by highly skilled pathologists who collaborate effectively with one another and with treating physicians. The country employs an integrated laboratory model, where pathologists and laboratories across various subspecialties are co-located and function as a unified group. For complex cases or advanced testing, pathologists use a referral system that operates from local to regional (Type B) and national level (Type A) hospitals.

Dharmais Cancer Center hosts a large team of cancer-specific pathologists and offers the most comprehensive laboratory testing in the country. However, its role as a referral centre for Type A hospitals is not yet fully established. In contrast, pathology services in private hospitals are largely separate from those in government hospitals, with limited interaction between the two sectors.

All government hospitals visited report consistent year-over-year growth in cancer specimen volume. However, there is a widening gap in the number of trained technicians and pathologists needed to meet this rising demand. Since the 2018 imPACT review, progress has been made in several areas, including standardizing and improving training curricula for pathologists and technicians, expanding cytology services at numerous locations, decentralizing pathology diagnosis and testing and developing a referral network to enhance service delivery.



9. Medical oncology

The rising incidence of cancer has necessitated significant expansion of medical oncology services over the past five years, accompanied by the implementation of several critical initiatives. These efforts include the establishment of medical oncology fellowship training programmes to bolster the oncology workforce. Presently, approximately 160 medical oncologists are supported by a multidisciplinary team comprising specialized pharmacists, nurses and other healthcare professionals. However, the adoption of standardized treatment guidelines and multidisciplinary patient care varies across institutions. While some hospitals utilize local guidelines adapted from international standards, their application is inconsistent.

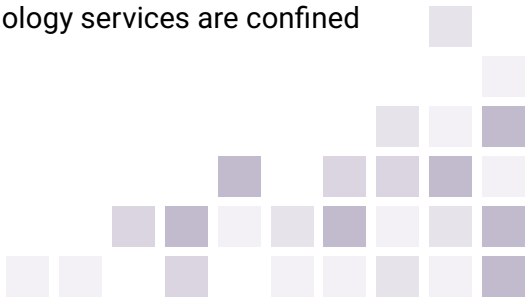
Quality cancer care is further hindered by challenges such as drug shortages and financial constraints, particularly for newer therapies. Screening services, including mammography, are not covered by national insurance, contributing to delays in diagnosis and treatment initiation. Although chemotherapy and hormonal therapies are available, access to advanced therapies, such as targeted agents and immunotherapies, is often limited to individuals with private insurance or the ability to pay out-of-pocket. Onco-fertility and survivorship programmes remain inaccessible to many patients, as this care is not covered under the health insurance.

Research efforts in oncology are similarly constrained, with most studies being retrospective and few prospective or interventional studies conducted due to financial and infrastructural limitations. To enhance the quality and equity of cancer care, it is imperative to improve national treatment guidelines, promote multidisciplinary care models and invest in research infrastructure. These measures would ensure more consistent and effective cancer care.

10. Surgical oncology

Cancer surgery in Indonesia is performed by a diverse range of specialists, including surgical oncologists, general surgeons and specialty-based surgeons. While access to surgical care in urban areas is generally adequate, significant geographic disparities persist, with remote regions often relying solely on general surgeons. The country currently has 286 formally trained surgical oncologists, whose distribution remains uneven across provinces. Training programmes are available at eight university-affiliated centres, with plans underway to expand these programmes to non-university hospitals. However, the limited availability of operating theatres contributes to prolonged waiting times, which can range from one to four months.

Multidisciplinary team care (MDT) is not yet widely implemented, with the exception of leading hospitals such as Dharmais National Cancer Center and Cipto Mangunkusumo Hospital. Even in facilities where multidisciplinary tumour boards (MDTBs) are conducted, their application is inconsistent across specialties and not universally accessible to all patients. The absence of standardized national treatment guidelines further exacerbates variability in care and delays in treatment initiation. Breast conservation therapy remains limited, and advanced minimally invasive surgical techniques require further development and broader adoption. While essential support services, including anaesthesia, pathology and intensive care, are generally available, interventional radiology services are confined to major urban canters.



Research activity in the field of cancer surgery is constrained by systemic challenges, including the lack of protected time for research, heavy clinical workloads and inadequate funding and mentorship. As a result, few surgeons and oncologists engage in prospective clinical or translational research. Addressing these barriers by fostering research at institutional and national levels, providing funding and mentorship opportunities, and incentivizing clinician participation in research could significantly improve the research landscape. Additionally, opportunities for surgeons to enhance their skills—particularly through international training programmes, professional conferences and workshops—are limited and should be expanded to ensure continued professional development.

11. Radiation oncology

Access to radiotherapy services in Indonesia has significantly improved, with government hospitals remaining the primary providers of radiation treatment. In 2023, it was estimated that nearly 400 000 Indonesians had cancer, and over 200 000 of these patients required radiotherapy. However, combined reports from Indonesia's 57 radiotherapy centres, equipped with 96 external beam radiotherapy machines, indicated that only 30 000 patients received radiotherapy in 2023. This represents about 8% of all cancer cases and 15% of the estimated need. A notable finding of these reports was the lower-than-expected actual radiotherapy utilization rate at hospitals with radiotherapy units, which stood at 20%, significantly below the optimal rate of 55%. This highlights the need for a better multidisciplinary approach and a more streamlined referral process. Although waiting times for radiotherapy have decreased compared to the past five years, 22% of centres still report waiting times longer than a month.

Indonesia faces a high burden of advanced stages of breast, cervical and nasopharyngeal cancers, which require multimodal treatment. There is a need to institutionalize multidisciplinary clinics for optimal treatment. While the establishment and coverage of national health insurance have brought major improvements in access to cancer care, the reimbursement policy does not encourage the use of advanced treatment techniques like IMRT/VMAT[1], or comprehensive treatment packages based on evidence-based guidelines. Significant out-of-pocket expenses still hinder the completion of planned treatments. In government hospitals, conformal radiotherapy, including IMRT, is standard practice. An increasing number of centres are capable of image-guided radiation therapy (IGRT) and stereotactic techniques, but the lack of specialist medical physicists remains a barrier. This issue is being addressed through ongoing training programmes.

HDR brachytherapy is available in many radiotherapy centres, primarily for cervical cancer, with a national preference for modern Cobalt-60 sources due to their less frequent replacement needs. The University of Indonesia, in conjunction with hospitals like Cipto Mangunkusumo, trains radiation oncologists, and there are plans to expand hospital-based residency programmes. Advanced training for medical physicists has also been initiated. A long-term plan for scaling up the radiotherapy workforce is needed, involving active discussions with major stakeholders to ensure alignment and efficient use of investments in equipment and optimal utilization.

[1] IMRT – Intensity-modulated Radiotherapy; VMAT – Volumetric Modulated Arc Radiotherapy

The quality assurance programme, including routine QA and QC checks, is verified programmatically and dosimetrically during periodic BAPETEN (safety regulator) visits, which are mandatory for re-credentialing and license extension of centres. Several radiotherapy centres participate in IAEA postal dosimetry. Under Indonesian leadership, an IAEA Technical Cooperation Project (RAS6017) is promoting the adoption of QUATRO audits in the region.

12. Childhood cancer

With more than 12 400 children expected to be diagnosed with cancer each year, there are vital opportunities to improve outcomes for children with cancer throughout Indonesia. Currently, just over 2 200 children with cancer per year are diagnosed and registered in the hospital-based network including the major, nationally designated national referral centres, suggesting crucial opportunities to strengthen diagnosis and referral. Of those diagnosed and registered with curable childhood cancers, many suffer from preventable treatment failure, including not completing curative therapy (experiencing treatment abandonment from lack of systems support for the typical treatment over months, or receiving inadequate supportive care), while others suffer from early relapse (receiving therapy that is too little, and/or too late).

Four national referral centres currently see more than 200 newly diagnosed children with cancer each year (RSUPN Dr. Cipto Mangunkusumo and RSK Kanker Dharmais in Jakarta, RSUP Dr. Hasan Sadikin in Bandung, and RSUP Dr. Sardjito in Yogyakarta). As noted in the 2018 imPACT review, gaps observed in cancer control, such as in surgical oncology, may be exacerbated for children. Observed contributory factors that persist include ongoing limitations in specialized training, lack of incentives and support for coordinated multidisciplinary care decision-making, and limited use of data and evidence to inform management decisions at the point-of-care. Encouragingly, leadership and commitment from the MoH and across multiple sectors have facilitated progress, including remarkable efforts towards the first Paediatric National Cancer Control Plan, and access to pharmacy, nutrition and anaesthesia resources in many settings.

Childhood cancer is highly curable and generally not preventable or screened; therefore, the focus should be on timely, cost-effective and quality diagnosis and treatment to prevent morbidity and mortality. Population-based screening for childhood cancer (identifying asymptomatic disease in children who appear healthy) is not recommended in any setting as there is no evidence of positive impact on children and misdirect resource use. Early diagnosis is not the same as screening. Early diagnosis focuses on appropriately identifying cancer at the first sign or symptom. While early diagnosis is important for improving outcomes, the system must be equipped to respond to increasing patient needs. Cancer services in Indonesia are still largely fragmented despite the MoH Decree mandating service delivery to be closer to the community.

National referral centres through multidisciplinary collaborations can benefit from leveraging shared resources and expertise to provide centralized reviews for specialized services, e.g. specialized pathology for brain tumours' subclassification. Cross-learning locally and internationally can present opportunities to improve practice, particularly in systematic evidence-based decision-making. A culture of quality, continuous quality improvement, and patient safety at the national level across all centres would be a tremendous asset.

The existence of multiple data systems needs to be streamlined and integrated to facilitate data utilization in improving quality of care. To tackle the significant issues of under-diagnosis, lack of data and poor coordination for children receiving care at various institutions, it should be considered making childhood cancers notifiable or reportable conditions. While data is being collected, there is no transparency in data usage and no routine analysis or use of outcome data to guide decision-making.

The National Essential Medicines List has yet to fully include those in the WHO Essential Medicines List for children with cancer. Continuous collaboration with the National Food and Drugs Administration (BPOM) and Indonesia's Paediatric Oncology professional group (Indonesian Paediatrician Association (IDAI)'s Paediatric Haematology/ Oncology Working Group) is critical to ensure essential medicines for childhood cancer. Additionally, establishing a national Essential Diagnostics list aligned with the WHO Essential Diagnostics List is vital to guide procurement and enable coherent packages of diagnostics and treatment, ensuring sufficient and aligned workforce and infrastructure capacity and allocation. Realignment of health insurance benefit package and reimbursement scheme with essential diagnostics and therapies is crucial for sustainability. While civil society organizations (CSOs) are key in supporting patients and families during the entire care continuum, coordination among CSOs is needed to reduce duplication of efforts and increasing transparency.

13. Palliative care and survivorship

Indonesia's palliative care landscape is evolving, with recent policy amendments aiming to integrate high-quality palliative care into the healthcare system. Despite this, there are significant gaps in implementation, including the absence of a clear action plan, defined stakeholder responsibilities and a robust data monitoring system. The need for palliative care is substantial, with over a million individuals requiring services, particularly those with terminal illnesses like advanced cancer. However, coverage remains inadequate, with less than 1% of terminally ill cancer patients receiving palliative care. Hospital-based services are limited, primary healthcare lacks formal palliative care and home care services are minimal.

The country faces a severe shortage of trained professionals and infrastructure, with only one fully operational palliative care unit at Dharmais Cancer Hospital. Coordination among stakeholders is challenging, and there are significant gaps in education and training for healthcare professionals. The recent policy mandates the integration of palliative care but lacks detailed planning and resources for effective implementation. Addressing these issues, including improving opioid availability and expanding training programmes, is crucial for enhancing palliative care services in Indonesia.

14. Radioactive material security consideration

Indonesia has ratified the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment. The legislative and regulatory framework for radiation safety and nuclear security includes the National Nuclear Energy Law 10/1997 that establishes Badan Pengawas Tenaga Nuklir (BAPETEN) as the national regulatory body for safety and security. The Government Regulation no.45/2023 (supersedes Government

Regulation no. 33/2007) outlines legal and regulatory framework for radiation safety and security. The nuclear security recommendations on radioactive materials in use and storage and associated facilities are established in this Regulation 45/2023 and in the Regulation of the Head of the Nuclear Energy Supervisory Agency No 6/2015.

The Regulations of the Nuclear Energy Supervisory Agency No 6/2023 establishes the requirements for the operators to implement and periodically test and verify performance of a security system; implement security management measures, addressing access control, trustworthiness, information protection, preparation of a security plan, training and qualification, accounting, inventory and event reporting, based on the graded approach.

The Indonesia' Integrated Nuclear Security Sustainability Plan (INSSP) was approved in 2012. This plan identified and consolidated Indonesia' nuclear security needs into an integrated document that includes the necessary nuclear security improvements. It also provides a customized framework for coordinating and implementing nuclear security activities carried out by the country, the IAEA and international partners. An INSSP review mission was implemented in 2017. The implementation plan was developed and covered assistance in the areas of authorization and inspection for the security of radioactive material. The next review mission is planned for June 2026.

Indonesia has participated in the meetings of the Working Group on Radioactive Material Security (2018, 2019, 2021, 2022). Indonesia has established a strong collaboration programme with the IAEA on nuclear security. Indonesia will be a beneficiary country for the IAEA project on 'Regulatory Infrastructure Development Project (RIDP) for the Asia-Pacific region'. This particular IAEA technical assistance supports countries in establishing or enhancing their national regulatory infrastructure for radiation safety and security of radioactive material. The project includes expert missions, regional and national training programmes, and advisory missions, all aimed at establishing or enhancing regulatory frameworks, building competences to exercise core regulatory function and setting up management system for regulatory bodies.

Key priority recommendations

National cancer control planning and governance

- Following the NCCP endorsement, develop an implementation action plan, with concrete plans for each of the cancer control strategies of the NCCP, with defined activities, responsible stakeholders for its implementation, timeframe and budget in line with the ongoing investment plan in the health sector supported by the major development banks.
- Create a National Cancer Control Committee with representation from all stakeholders to oversee the implementation of the NCCP and the progress in imPACT review recommendations.
- Ensure adequate allocation of funds based on cancer-specific investment cases to support each of the initiatives under the NCCP implementation action plan.

Cancer registry and surveillance

- Establish coordination and accountability mechanism to support development of the National Cancer Registry system. Specific actions:
  - Creation of a National Cancer Registry Advisory Committee, including terms of reference for its scope of work.
  - Designation of a lead institution for the National Cancer Registry (Dharmais Hospital/MoH affiliated).
  - Development of a national plan for the establishment and scale-up of PBCRs.
  - Create permanent registry staff positions, with professional career pathways and appropriate renumeration.
  - Ensure regular trainings for the registrars.
  - Ensure regular meetings to review data analysis and data quality procedures.
- Prioritize establishment of 1–2 PBCRs for proof of concept. Specific actions:
  - Select the area/region for the PBCR.
  - Develop Standard Operating Procedures (SOP) for the PBCR and disseminate throughout Indonesia.
  - Provide dedicated staff, infrastructure, and sustainable funding.
- Integration with the National Health Information System Platform (SATUSEHAT). Specific actions:
  - Ensure data collected in the SATUSEHAT and those proposed in the national cancer registry to be consistent with international standards.
  - Ensure that data collected in both systems are the same and reduce variables collected in line with international standards.
  - Develop procedures to ensure consolidation of data for a single patient.
  - SATUSEHAT is a source for the PBCR, and not a tool to replace the registry.

- Integrate mortality data and develop a follow-up system for these data at PBCR. Specific actions:
  - Develop agreements on the methodology to exchange data with the vital registrars/registration offices.
  - Develop procedures for reporting and tracing Death Certificate Only (DCO) cancer cases.

Prevention

- Switch from two to a single dose of HPV vaccination as recommended by the WHO Strategic Advisory Group of Experts (SAGE) on Immunization at its meeting in April 2022, and subsequently endorsed by WHO.[2,3] The single dose recommendation has been supported by the Gavi Board.[4] Experts often express concerns that efficacy of single dose will wane over time. There is robust evidence from an IARC trial to demonstrate that there has been no waning of efficacy even 15 years after vaccinating 10–18-year-old girls with Gardasil.[5,6] Due to the high-quality evidence base supporting the use of single-dose HPV vaccine, the WHO includes in their recommendations the off-label use of a single-dose regimen as an alternative to a multi-dose schedule.[7] Even if the efficacy of a single dose schedule wanes to 80% at 20 years (though unlikely), having a single-dose schedule would still be cost-effective.[8] The vaccine doses and resources saved can be better utilized for catch up vaccination and vaccinating boys. An IARC study has shown that single-dose vaccination with catch-up was more impactful than two-dose vaccination without catch-up.[9,10]
- Strengthen the IEC activities around vaccination:
  - Identify the regions with low coverage. Organize focus group discussions (FGDs) with the parents of adolescent girls to better understand their concerns. Continue and improve coordination with UNICEF, WHO, CSOs and other local stakeholders (including media). Design targeted education and communication plan. Learn from other vaccination programmes.
  - Develop a crisis communication strategy in the line of similar strategy prepared by the WHO country office for polio vaccination programme.[11]
  - Once developed, the crisis communication strategy should be widely disseminated across all policy-makers service providers and other stakeholders.

[2] From a public health perspective, the use of a single dose schedule can offer substantial benefits that outweigh the potential risk of a lower level of protection if efficacy wanes over time, although there is no current evidence of this. www.who.int/publications/i/item/who-wer9750-645-672

[3] Based on the recommendation, 56 countries (including high HDI countries like the UK, Australia, Ireland, Brazil, Argentina etc.) out of 137 countries with known vaccination schedule have single dose in their national programme. www.who.int/teams/immunization-vaccines-and-biologicals/diseases/human-papillomavirus-vaccines-(HPV)/hpv-clearing-house/hpv-dashboard

[4] www.gavi.org/types-support/vaccine-support/human-papillomavirus

[5] Vaccine efficacy against persistent HPV 16/18 infections reported in 2024 is 92.0% (95%CI 87.0-95.0), 94.8% (95%CI 90.0-97.3) and 95.3% (95%CI 90.9-97.5) for a single (N=3022), two (N=2311) and three (N=2172) doses respectively, without any significant difference between the dose groups. IARC unpublished data. JNCI In Press

[6] There was no waning of vaccine efficacy at 15 years compared to the vaccine efficacy of a single dose we reported at 10 years follow up (95·4% (95% CI 85·0-99·9). Lancet Oncol. 2021;22(11):1518-1529. doi:10.1016/S1470-2045(21)00453-8.

[7] It is well known that science often moves faster than label updates and the WHO has previously made off-label recommendations when the evidence supports it. Previous vaccine examples of WHO off-label recommendations include pneumonia conjugate vaccine and hepatitis A vaccine.

[8] *BMC Med* 21, 313 (2023). https://doi.org/10.1186/s12916-023-02988-3

[9] www.thelancet.com/journals/lanonc/article/PIIS1470-2045(22)00543-5/fulltext

[10] A summary of the evidence related to a single dose, including a fact sheet and frequently asked questions can be found at www.path.org/who-we-are/programs/center-for-vaccine-innovation-and-access/single-dose-hpv-vaccine-evaluation-consortium

The recent article 'A prospective cohort study comparing efficacy of 1 dose of quadrivalent human papillomavirus vaccine to 2 and 3 doses at an average follow up of 12 years postvaccination' presents additional evidence of the efficacy of HPV single-dose vaccination.

[11] The WHO guideline on developing such a communication strategy is available at www.who.int/publications/i/item/WHO-IVB-16.02

Early detection (pathology and laboratory services)

- Increase coverage of existing early detection efforts through enhanced community mobilization efforts. Offer early detection services to all eligible women attending *puskesmas* for various community health services, including child immunization. Put up prominent displays at the Puskesmas advertising the programme. Consider financial incentives for providers and facilities. Broaden insurance coverage for screening to hospitals. Establish a regular channel of communication and coordination between the programme and the NGOs interested to conduct awareness campaigns.
- Increase the number of provincial and national coordinators as well as Puskesmas in charge to monitor VIA positivity (too low at present; expected to be around 5%). Ensure regular refresher training for all midwives and clinicians (preferably once a year) on VIA and CBE and monitor VIA and CBE positivity along with other KPIs. Too dilute acetic acid may be responsible for low VIA positivity. Replace 6% acetic acid with glacial acetic acid that the midwives can dilute to 5% concentration.
- Use ultrasound machine to triage the CBE positive women rather than as a screening technique. Ensure regular refresher training for providers on both CBE and ultrasound.
- Use HPV detection as a stand-alone test rather than combining with VIA. Use either the existing COVID-19 test platforms after repurposing and validating them or the existing GeneXpert machines at the Pueskesmases. Revise the management algorithm of HPV positive women to make it aligned with the latest WHO guidelines (2021).
- Review the existing information systems (ASIK and SatuSehat) and make appropriate modifications to ensure that they are linked across the service delivery points and are capable of measuring different KPIs for screening programmes.

Diagnosis (pathology and laboratory services)

- Expand hospital-based training programmes in pathology, including an oncology-specific pathology fellowship at Dharmais Cancer Center.
- Expand digital pathology camera and/or scanner implementation at district and regional hospitals to enable referral and quality control.
- Review and possibly modify customs procedures and clearance guidelines to promote easier and continuous supply of necessary diagnostic laboratory reagents.
- Evaluate and possibly modify health insurance policy to allow for reimbursement for expanded immunohistochemistry panels for diagnosis and molecular testing.

Diagnosis (Diagnostic Imaging and Nuclear Medicine)

Radiopharmaceutical development (cyclotron expansion)

- Re-examine and update the proposed cyclotron distribution mapping to reflect clinical demands per site and geographical location. It is highly recommended that Hassan Sadikin Hospital and Dharmais Hospital upgrade to at least 16MeV (or more) medical cyclotron to include targets, synthesis modules, appropriate hotcells and QA/QC equipment for the production of F-18 and at least additional targets such as C-11, N-13, Ga-68, Cu-64/61 and Zr-89. These will ensure Indonesia has access to non-FDG tracers for cancer management and introduce emerging cyclotron tracers for improved patient outcomes.

Nuclear medicine diagnosis (PET/CT hybrid imaging)

- Review current reimbursement guidelines for the F-18 FDG PET/CT study. The current reimbursement of one PET/CT scan per lifetime may be adjusted based on the cancer patient's clinical indication and not individual accessibility to this technology. The recommendation includes the majority of cancer patients to receive at least two F-18 FDG PET/CT studies: one during staging and the second during response to treatment.

Nuclear medicine therapy

- Access to I-131therapy is restricted depending on the facility (waiting list up to 12 months) for thyroid cancer. Increase the number of isolation rooms/wards to accommodate the demand for RAI for appropriately indicated cases (as per current American Thyroid Association/European Thyroid Association and local guidelines) and explore possible partnerships with private hospitals to utilize their isolation rooms to minimize waiting time for thyroid cancer cases awaiting RAI ablation therapy

Radiology

- Reduce waiting time for diagnostic radiology procedures, especially CT and MRI indications by increasing the equipment. Increased staffing should follow this increase in equipment.

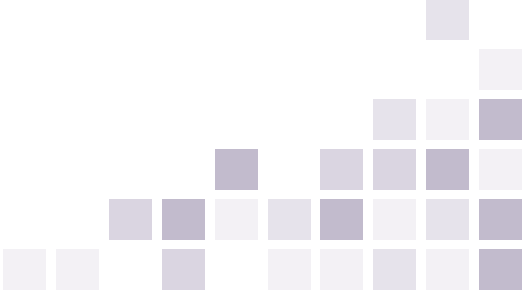
Treatment

General

- Initiate a national dialogue to adapt existing high-quality evidence-based clinical practice guidelines and develop an implementation strategy for guidelines, including mechanisms for monitoring of adherence and to establish standards of care. Apply international treatment guidelines, like the resource stratified NCCN/ASCO, NICE or NCG guidelines, for breast, lung, cervical, colorectal and paediatric cancers, to the Indonesian context. Alternative options need to be developed that are feasible for the resource levels.
- Standardize processes to ensure that initial treatment decision making and planning is undertaken by a multidisciplinary tumour board for most patients.
- Streamline referrals from one healthcare system to another with initiation or continuation of treatment without delays.
- Perform baseline and regular audits and determine which patients are seen by which discipline and whether treatment regimen is adherent to guidelines.

Medical oncology

- Increase medical oncology workforce: consider discussions with the ACGME to determine who would be eligible for medical oncology fellowship training.
- Define the components of a true multidisciplinary patient care system as well as multidisciplinary team meetings and agree that all patients would need to be seen and treated by all members of the team who are experts in their respective areas.



Surgical oncology

- Ensure mandatory discussion of treatment decisions in multidisciplinary tumour boards.
- Expand the cadre of trained surgical oncologists (and some to become trainers) with medium-term fellowship (2 to 4 weeks) or longer-term fellowship (6 to 12 months) at cancer centres in Indonesia.
- Establish databases in all cancer facilities on surgical procedures, where data on quality measures such as waiting times for surgery, perioperative mortality and complication rates, surgical margin positivity, lymph node yield, are systematically collected and analysed.

Radiation oncology

- Streamline the cancer patient referral system to reduce delays in treatment and properly distribute workload/waiting times. Provisions should also be made for special referrals in case of contingencies such as equipment failures.
- Rationalize reimbursement for optimized choice of treatment technique and efficient care workflow, allowing for better treatment outcomes. Restrictive reimbursement policies such as single treatment activity per day or lack of separate reimbursement policy for different and more advanced radiotherapy techniques, should be re-evaluated, as they can be harmful.
- Continue scale-up of radiotherapy access and treatment within the framework of a comprehensive national cancer control programme. In addition to short-term expansion plans, a medium- and long- term vision/plan should be developed and communicated across stakeholders to ensure alignment and optimal delivery in light of increasing cancer incidence.

Childhood cancer

- Establish governance and implementation mechanisms for national cancer control planning inclusive of children's needs, including programme staff for integrated childhood cancer control and national technical working groups for multisector problem-solving that involve childhood cancer clinicians, researchers and civil society organizations (CSOs) advocates with lived experiences.
- Establish and equip 4–6 centres of excellence (COE) with core multidisciplinary staff, essential diagnostics and therapies, alongside mechanisms for coordinated centralized reviews, referral, care and follow-up of children with cancer as part of a national network in collaboration with the Indonesian Paediatricians Association (IDAI)'s Paediatric Haematology/Oncology Working Group.
- Strengthen, standardize and scale up harmonized multidisciplinary childhood cancer treatment approaches. Standardize routine multidisciplinary team meetings and document consensus treatment plan and timing, especially when coordinating across services, e.g. chemotherapy, surgery and radiation therapy.
- Establish mechanisms for routine data analysis and data use at the point-of-care to promote care quality, patient safety, survival and quality of life, building hospital-based and population-based childhood cancer registration network efforts via ChildGICR and St. Jude's resources. Establish a National Research Working Group within IDAI, consisting of key centres providing care for children with cancer including national specialty centres, to improve national policies and outcomes and have Indonesia be recognized in global research.

- Leverage international platforms and resources for childhood cancer capacity development and collaborations, including opportunities to participate in WHO Global Initiative for Childhood Cancer. Define roles and responsibilities of CSOs as part of a national network providing services for patients and families to reduce duplication and increase transparency and access.

Palliative care

- Establish a senior MoH officials team to supervise and monitor health policy document on palliative care (HK.01.07/Menkes/2180/2023), outlining strategies and measures to integrate palliative care into all levels of the healthcare system, ensuring universal access.
- Create a national platform for palliative care with representatives from all relevant stakeholders.
- Revise the insurance scheme to increase the reimbursement limit, cover home-based care and opioid costs at the public health centres.
- Integrate palliative care into all oncology specialty pre-service and in-service training programmes.

The WHO–IAEA–IARC joint activities on cancer control

In March 2009, WHO and IAEA signed arrangements at the Director-General level to implement a Joint Programme on Cancer Control. The main purpose of this arrangement is to coordinate activities and resources to provide evidence-based and sustainable support to comprehensive cancer control programmes, particularly in low- and middle-income countries. The imPACT Review is carried out as a comprehensive assessment of national cancer control capacities and needs. It is a partnership effort between the International Atomic Energy Agency (IAEA), the International Agency for Research on Cancer (IARC) and the World Health Organization (WHO). Where relevant, other partners are involved, such as the Union for International Cancer Control (UICC) and the United Nations Office on Drugs and Crime (UNODC). The IAEA Division of Programme of Action for Cancer Therapy (PACT) is responsible for coordinating the imPACT Reviews and for mobilizing the resources for their implementation.

Click here to read more about the imPACT mission to Indonesia: Indonesia Launches New National Cancer Control Plan Building on Review Mission Recommendations | IAEA

IAEA

World Health Organization

International Agency for Research on Cancer
World Health Organization

25-02459E

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