Independent External Review of EPI-VPD surveillance in Thailand

1–8 September 2025

World Health Organization
South-East Asia Region

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> ***"The guiding principles of Thailand's National Immunization Programme are to provide equitable, high-quality and safe immunization services to all individuals across all life stages. Recognized as both an essential health service and a fundamental right, vaccines are delivered free of charge to maximize preventive health benefits throughout the life-course."***

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The success of the review is owed to the collective efforts of all stakeholders, including government agencies, international partners, academic institutions and civil society organizations. Their commitment to strengthening immunization and VPD surveillance in Thailand is commendable.

WHO looks forward to continued collaboration with all partners to implement the recommendations of this review and to advance the goal of equitable, high-quality immunization services for all.

Acronyms

AEFI	Adverse Events Following Immunization
AFP	Acute Flaccid Paralysis
BCG	Bacillus Calmette–Guérin (vaccine)
BMA	Bangkok Metropolitan Administration
CIP	Cataloguing-in-Publication
CMU	Community Medical Unit
CRS	Congenital Rubella Syndrome
DDC	Department of Disease Control
DDS	Digital Disease Surveillance
DGCD	Division of General Communicable Diseases
DHO	District Health Office
DMSc	Department of Medical Sciences
DoE	Division of Epidemiology
DQA	Data Quality Assessment
EPI	Expanded Programme on Immunization
FDA	Food and Drug Administration
FETP	Field Epidemiology Training Programme
HDC	Health Data Centre
HIS	Health Information System
HPH	Health-Promoting Hospital
HRH	Human Resources for Health
HPV	Human Papillomavirus Vaccine
IEC	Information, Education and Communication
IFRC	International Federation of Red Cross and Red Crescent Societies
IPV	Inactivated Poliovirus Vaccine
JEE	Joint External Evaluation
JRF	Joint Reporting Form
LG	Local Government
LGO	Local Government Organization
MCH	Maternal and Child Health
MICS	Multiple Indicator Cluster Survey
MIC	Middle-Income Country
MNTE	Maternal and Neonatal Tetanus Elimination
MoI	Ministry of Interior
MoPH	Ministry of Public Health
NCIRS	National Centre for Immunization Research and Surveillance
NCL	National Control Laboratory
NHSO	National Health Security Office
NIP	National Immunization Programme
NITAG	National Immunization Technical Advisory Group
NRA	National Regulatory Authority
NVC	National Vaccine Committee
NVI	National Vaccine Institute
ODPC	Office of Disease Prevention and Control

OPV	Oral Poliovirus Vaccine
PAB	Protection at Birth
PAO	Provincial Administrative Organization
PCU	Primary Care Unit
PHO	Provincial Health Office
PQS	Performance, Quality and Safety (WHO standard)
PRS	Programme and Financial Support
RRT	Rapid Response Team
SBCC	Social and Behavior Change Communication
SEAR-ITAG	South-East Asia Regional Immunization Technical Advisory Group
SIA	Supplementary Immunization Activities
SOP	Standard Operating Procedure
TAO	Tambon Administrative Organization
Td	Tetanus and Diphtheria Toxoid
UHC	Universal Health Coverage
UNICEF	United Nations Children's Fund
VDP	Vaccine-Derived Poliovirus
VMI	Vendor Managed Inventory
VPD	Vaccine-Preventable Disease
VVM	Vaccine Vial Monitor
WHO	World Health Organization
WR	WHO Representative
VHVs	Village Health Volunteers

Executive summary

The Ministry of Public Health (MoPH) of Thailand, in collaboration with the World Health Organization (WHO) Regional office for South-East Asia, conducted an extensive external review of the Expanded Programme on Immunization (EPI) and vaccine-preventable disease (VPD) surveillance on 1–8 September 2025. The review aimed to assess the current state of immunization and VPD surveillance programmes and provide recommendations for strengthening these critical health services to achieve national, regional and global goals and targets.

The review team, comprising experts from various fields – including from the United Nations Children's Fund (UNICEF), the International Federation of Red Cross and Red Crescent Societies (IFRC) and the National Centre for Immunization Research and Surveillance (NCIRS) – conducted a thorough examination through extensive desk reviews of programme data and documentation, site visits and interviews with key stakeholders. The team visited national programmes and seven provinces, including two districts in each province, observed immunization sessions and interviewed caretakers and mothers in the community.

Key findings from the review highlighted the strengths of Thailand's National Immunization Programme (NIP), including its legislative basis, good programme coverage and effective vaccine security management. The programme has achieved significant milestones, such as the elimination of maternal and neonatal tetanus and no wild polio virus since 1997.

However, the review also identified several challenges, including low vaccination coverage in some provinces and population groups; the risk of disease importation from neighboring countries and the spread of transmission; and suboptimal surveillance leading to late detection of disease threats. The review emphasized the need for improved coordination mechanisms, better understanding of programme coverage and enhanced syndromic surveillance systems.

The review concluded with an overall set of recommendations to strengthen the immunization and surveillance programme in the main report as well as recommendations for each of the thematic areas and for provinces visited in the respective section in the Annexes.

The overall recommendations include:

1. **Strengthening syndromic surveillance for VPDs:**
    - » Engage clinical staff in "syndromic" VPD surveillance, starting with the largest referral hospitals.
    - » Develop appropriate surveillance job aids; ensure regular orientation of the clinical staff and regular coordination between epidemiologists and clinical staff.
    - » Ensure that cases meeting syndromic/case definitions can have samples taken by health workers in line with guidelines and without requiring medical prescriptions.
    - » While screening records for reporting of suspected cases, institute mechanisms to screen for "signs and symptoms" of reportable syndromes, not just for International Classification of Diseases (ICD) codes.

2. **Improving coverage:**
    - » Evaluate efforts to improve vaccine coverage in southern Thailand by 2025 to derive lessons on which approaches are working, and which are not.
    - » Analyze and prioritize provinces with less than 90% reported coverage for measles vaccines and urgently develop tailored coverage improvement plans with a focus on measles- and rubella-containing vaccines.
3. **Inclusive reporting:**
    - » Form a task team to investigate how inclusive reporting of vaccinations (i.e. reporting of all vaccinations provided, regardless of the provider) can be improved.
    - » Until a more inclusive reporting system is in place, the MoPH must rely on regular coverage surveys to develop a better understanding of coverage.
    - » Conduct specific surveys for high-risk groups, including migrant populations in Bangkok and other provinces with high migrant populations, using specific sampling types, e.g. respondent-driven sampling, to ensure effective representation of high-risk groups.
    - » Specific plans to address gaps in coverage should be developed based on the findings of surveys and case investigations
4. **Managing decentralization:**
    - » The National Communicable Disease Committee and the National Vaccine Committee should engage the MoPH and the Ministry of Interior (MoI) to ensure that oversight mechanisms for immunization and VPD surveillance programmes are active in every province.
    - » Provincial communicable disease committees, as mandated under the Communicable Disease Act, should have immunization and VPD surveillance programme performance as a standing agenda item.
    - » Standard immunization programme performance indicators should be developed and incorporated into the "key performance indicators of the decentralized administrative units by MoI" to enable provinces to effectively monitor immunization programme performance.
    - » Conduct a study on the impact of decentralization, aiming to provide policy-level recommendations, optimize the benefit of "decentralization" in the health sector and report to the National Communicable Diseases Committee and the National Vaccine Committee.
    - » At the national level, the MoI and the MoPH could discuss and agree on strategic policy matters, in particular the clarify role and responsibilities of each stakeholder and disseminate accordingly. (the MoPH holds responsibilities in setting PH policies, targets and supervision, while the MoI conducts service delivery).
    - » At the provincial level, existing mechanisms should maintain close collaboration and regular dialogue to ensure participatory governance and actively engage key stakeholders, particularly the NHSO. The NHSO's financial mechanisms can serve as a strategic tool to guide operations towards achieving health objectives.

5. **Enhancing programme oversight:**

   - Ensure regular meetings of the National Vaccine Committee and the National Immunization Technical Advisory Group (NITAG) to provide high-level programme oversight and strategic direction.
   - The National Immunization Programme and the VPD Surveillance Programme need to develop "macroplans" on monitoring and supervision at all levels in order to ensure optimal implementation of activities with regular feedback and feedforward mechanism (reporting to the NITAG/National Vaccine Committee and the Provincial Communicable Diseases Committee).

The conclusions and recommendations aim to strengthen Thailand's immunization and surveillance programmes, addressing both current challenges and future risks. Agreed recommendations could be prioritized by the national programme as well as provinces and a joint action plan could be developed for their timely implementation.

1. Introduction

The Expanded Programme on Immunization (EPI) is one of the most successful public health interventions globally. It has been designed to ensure delivery of vaccines that prevent numerous life-threatening diseases to populations in need, particularly vulnerable groups such as infants and children. Despite the significant progress achieved, immunization programmes continue to face challenges, including gaps in vaccine coverage, outbreaks of vaccine-preventable diseases (VPDs) and emerging public health threats. Regular reviews of EPI-VPD surveillance systems are, therefore, essential to ensure that they remain adaptive, effective and resilient to emerging challenges.

Thailand's EPI and VPD surveillance programme is one of the country's most advanced public health initiatives. Evidence demonstrates that Thailand achieved maternal and neonatal tetanus elimination (MNTE) prior to 1999, and it has maintained polio-free status since 1997. Furthermore, data indicate that Thailand has made good progress towards rubella elimination, with a significant decline in the number of cases over time and evidence of high population immunity.

Despite this strong performance, subnational variations in vaccination coverage and VPD surveillance performance persist, preventing the country from achieving elimination- or eradication-level surveillance standards for priority VPDs including polio, measles and rubella. Low vaccination coverage in some provinces, particularly in the southern region, poses risks of disease spread within the country. The uncertain vaccination status of internal and external migrant groups could lead to sustained transmission and spread of diseases. Similarly, neighboring countries with population movements in and out of Thailand have experienced outbreaks of various pathogens, posing a significant risk of VPD importation. Suboptimal VPD surveillance at various subnational levels may lead to late detection of disease threats.

In 2024, to strengthen Thailand's capacity for the early detection of significant VPDs, the South-East Asia Regional Immunization Technical Advisory Group (SEAR-ITAG) recommended a comprehensive review of the country's VPD surveillance system.[1] This review will inform the development of plans to enhance the system's effectiveness. SEAR-ITAG further advised conducting post-MNTE validation assessments every five years to ensure sustained progress.

Thailand last conducted an EPI-VPD surveillance review in 2014, focusing on immunization programme performance and VPD surveillance outcomes. This review resulted in improvements in vaccination coverage and surveillance performance. However, the COVID-19 pandemic in 2020 disrupted these gains, leading to declines in immunization coverage and VPD surveillance performance, ultimately contributing to outbreaks of pertussis and measles in 2024.

[1] Meeting report of the Fifteenth Meeting of SEAR-ITAG, available at https://iris.who.int/handle/10665/379829.

Objectives

The primary objectives of the EPI and surveillance review were:

1. **Immunization systems strengthening**: Assess the current performance of EPI in terms of vaccine coverage, service delivery, equity and access, and the linkages between immunization programmes and broader primary health care systems for sustainable health outcomes.
2. **VPD surveillance and outbreaks**: Evaluate the effectiveness of VPD surveillance systems in detecting and responding to VPD events and outbreaks, including cross-border collaboration for identification, detection and synchronized response to VPD threats across borders.
3. **Priority VPD-specific initiatives**: Conduct risk assessment for polio-free status, review the progress towards measles and rubella elimination, and assess the maternal and neonatal tetanus elimination status post-validation.
4. **Provide evidence-based recommendations** for further strengthening EPI coverage, VPD surveillance and outbreak response and to priority disease-specific initiatives – sustain polio free status, measles and rubella elimination, and MNT elimination.

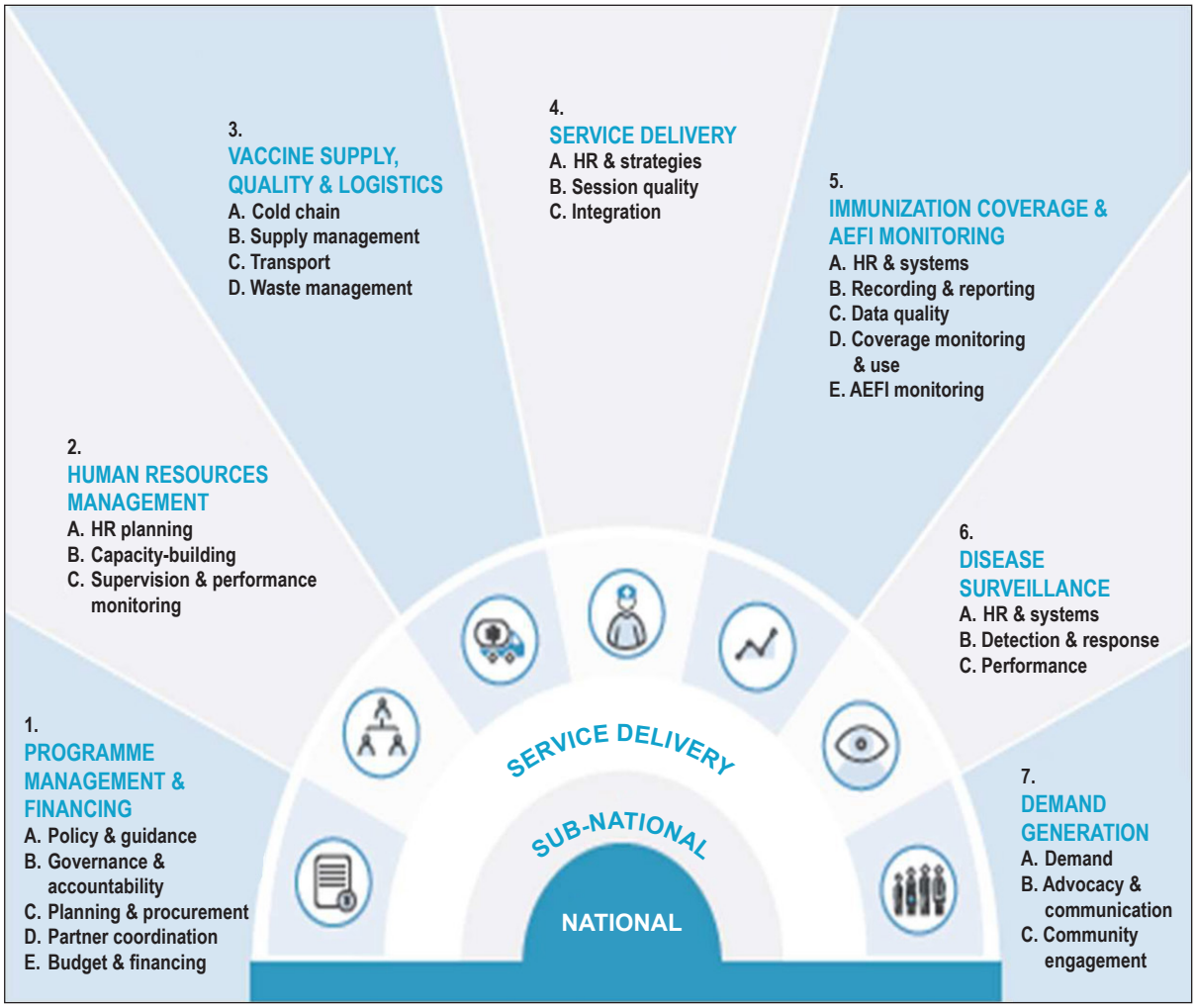
Methodology

Review scope

The review covered seven thematic areas in addition to the disease-specific initiatives on polio eradication, measles and rubella elimination, and MNTE:

- programme management and financing;
- human resource management;
- vaccine supply, quality and logistics;
- service delivery;
- immunization coverage and AEFI monitoring;
- disease surveillance; and
- demand generation.

Fig. 1. Thematic areas identified for EPI-VPD surveillance review in Thailand



These seven areas had had 26 subcomponents for review, as outlined in the figure above.

The review adopted a mixed-method approach, incorporating both quantitative and qualitative data assessment. The following methodologies were used:

- desk review: analysis of existing EPI data, immunization coverage surveys, surveillance reports and programme documents;
- stakeholder consultations: interviews and focus group discussions with key stakeholders, including national and subnational health authorities, immunization programme managers, health-care providers, community leaders and beneficiaries;
- field assessments: site visits to health-care facilities to observe service delivery, cold chain management and data collection processes;
- data analysis: use of immunization and surveillance data to conduct trend analysis and identify gaps in coverage, surveillance sensitivity and timeliness; and
- engagement of national and local stakeholders in participatory workshops to validate findings and prioritize recommendations.

Data collection approach

The main approaches for collecting information involved conducting interviews, making observations and reviewing data, documents and reports. Tools included:

- questionnaires, using a mix of categorical and open-ended questions; categorical questions were needed to facilitate comparisons across teams;
- interview guides, mainly open-ended to facilitate in-depth exploration of topics; and
- observation checklist used to record information obtained through observation, such as of a vaccination session, laboratory or cold store.

Field visit sites

Seven provinces from among six regions were selected, with one team deployed for each province. Provinces were selected based on four criteria, namely vaccination coverage, VPD surveillance, cross-border population movement and the presence of high-risk groups.

In each province, the team visited the Provincial Health Office (PHO), two district health offices (DHOs)/hospitals, two health centers and one community. The provinces visited were:

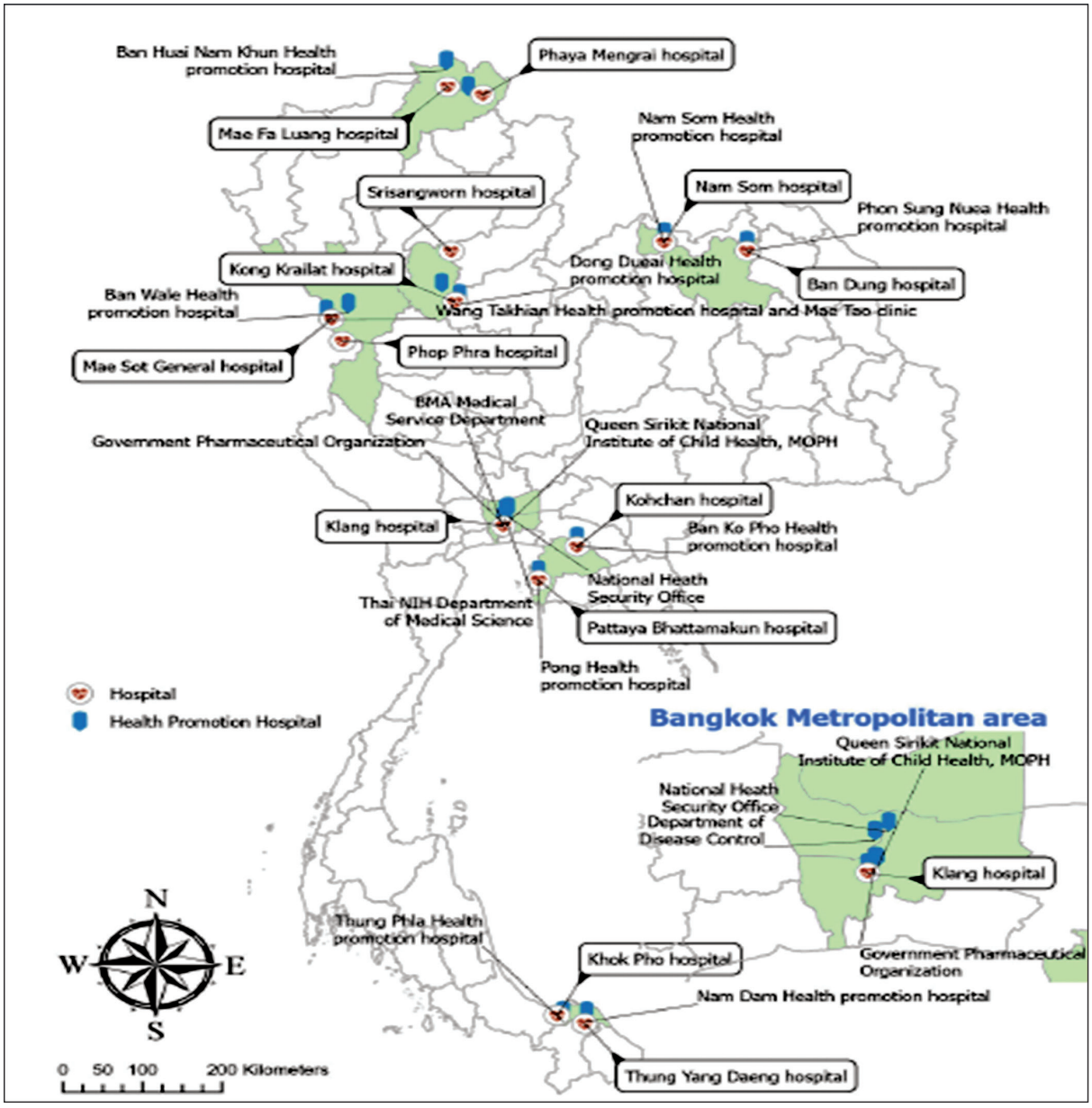
1. Bangkok Metropolitan Administration area (BMA);
2. Chiang Rai [border area to Myanmar and Lao People's Democratic Republic (Lao PDR) in the Northern Region];
3. Chonburi (non- border area in the Eastern Region);
4. Pattani (Deep South in the Southern Region);
5. Sukhothai (non-border area in lower northern Thailand);
6. Tak (border area to Myanmar in the Northern Region); and
7. Udon Thani (non-border area in the Northeastern Region).

Within each province, one well-performing and one less well-performing district health office/ hospital were selected for review. Within each district, one health facility was selected for review.

A total of 10 recently delivered women were also interviewed in each of the provinces to review protection at birth (PAB) for tetanus.

The map below shows the areas visited during the review. A list of the places visited during the review along with the team members is provided as an annex.

Fig. 2. Places visited by EPI-VPD surveillance review teams in Thailand, 2025



2. National Immunization Programme

Overview

Thailand's National Immunization Programme (NIP), initiated in 1974, was designed to combat widespread vaccine-preventable diseases (VPDs) through a centralized system led by the Ministry of Public Health (MoPH). The Programme's early successes – most notably no wild polio virus detected since 1997, Maternal Neonatal Tetanus Elimination prior to 1999 and substantial reductions in other VPDs – established it as a cornerstone of public health in Thailand.

In the early 2000s, sweeping health system reforms transformed NIP's management. The National Health Security Act of 2002 shifted vaccine financing, procurement and supply responsibilities to the newly established National Health Security Office (NHSO), while the MoPH concentrated on policy, strategy, technical guidance and oversight. This restructuring secured sustainable funding for vaccines within Thailand's universal health coverage (UHC) system.

Today, NIP is guided by the National Vaccine Security Policy and Strategic Plan (2023–2027), with the overarching goal of ensuring that "everyone in Thailand has equitable access to high-quality, affordable vaccines". The Plan is built on four strategic pillars: advancing resilient and adaptive immunization systems; strengthening vaccine research and manufacturing; developing human resources for vaccine security; and improving the capacity of national vaccine stakeholders. These pillars aim to uphold NIP's commitment to delivering safe and high-quality immunization services free of charge to all residents, supporting the view of vaccines as both an essential health service and a right.

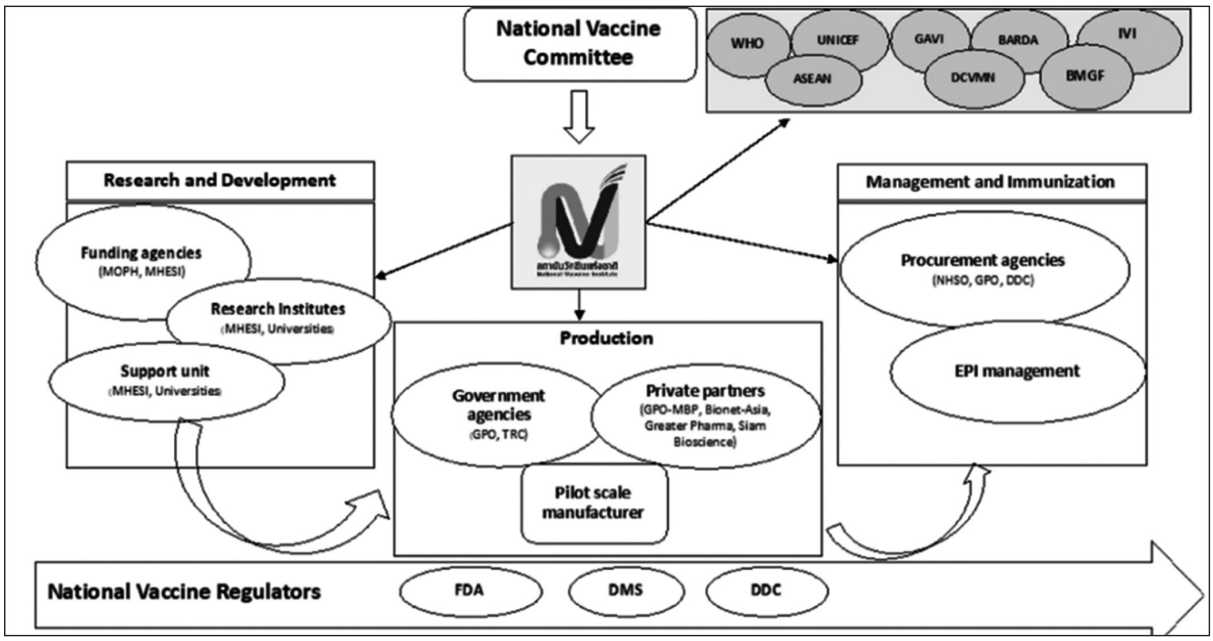
NIP is dedicated to maintaining Thailand's polio-free status; meeting global and regional targets for eliminating diseases such as measles and rubella; and achieving immunization coverage goals at every administrative level. A life-course approach is being adopted, with new adult immunization initiatives complementing established childhood programmes.

Decision-making for vaccine adoption and technology integration is rooted in evidence, reinforcing the Programme's alignment with broader health and sustainable development objectives. Over time, NIP has become more integrated, with expanded involvement from various government departments and partners, supported by improved logistics and surveillance systems.

Significant legislative reforms since the last review in 2014 have further strengthened NIP. The Communicable Disease Act (2015) enhanced disease surveillance and enabled multisectoral collaboration at the provincial level. The Vaccine Security Act (2018) established the National Vaccine Institute (NVI), promoting national self-reliance in research, production and quality assurance. The COVID-19 pandemic tested and reinforced these systems, expanding cold chain logistics and mobilizing communities, but it also highlighted emerging challenges such as vaccine hesitancy.

The NVI now acts as the central coordinating body for vaccine research, workforce development and equitable access, besides serving as the secretariat to the National Vaccine Committee (NVC). The National Immunization Technical Advisory Group (NITAG) supports the NVC with independent expertise and evidence-based recommendations, guiding policy and evaluating NIP performance.

Fig. 3. Relationship between NVI and potential partners concerning vaccine security in Thailand



NIP structure

Thailand's NIP operates through a well-coordinated network of stakeholders at the policy, strategy and operational levels. At the policy level, the NHSO manages UHC and immunization financing; the Department of Disease Control (DDC) oversees NIP policies; and the NVI directs vaccine security policies. This structure ensures streamlined planning and policy execution towards national immunization objectives.

On the operational front, NIP is divided into service delivery and vaccine management. Hospitals and health-promoting hospitals (HPHs) are responsible for providing immunization services, supervised by the Office of the Permanent Secretary (OPS). DDC, through its regional offices, monitors and evaluates these providers, although oversight gaps remain for facilities affected by decentralization and those outside the MoPH.

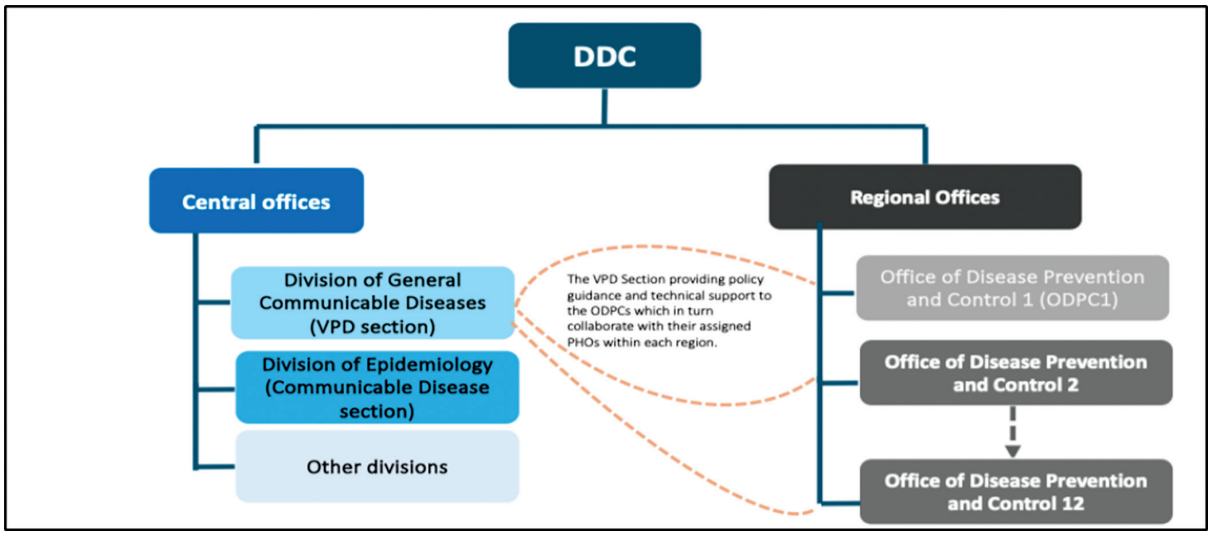
Vaccine management includes procurement, supply chain logistics, cold chain maintenance and quality assurance. The NHSO handles routine vaccine purchases, while the DDC manages emergency and outbreak-response vaccines, with ongoing gaps in access for migrant populations. Supply and distribution are managed through the Vendor Managed Inventory (VMI) system by the NHSO and the Government Pharmaceutical Organization (GPO), with technical support from the DDC during disruptions. The Food and Drug Administration (FDA) serves as the National Regulatory Authority (NRA), while the Department of Medical Sciences (DMSc) acts as the National Control Laboratory to guarantee vaccine safety and quality.

NIP's leadership rests with the DDC, supported by other technical departments, and is implemented through health facilities and hospitals in collaboration with local governments. Regional disease control offices and provincial health offices (PHOs) play pivotal roles in translating central policies into provincial and local practices. The involvement of local governments and other sectors has grown, further strengthening NIP implementation and reach.

NIP management under the DDC and in collaboration with partner agencies

Within the DDC, NIP is overseen by the Vaccine-Preventable Diseases (VPD) Section, which operates under the Division of General Communicable Diseases (DGCD). The VPD Section acts as the main programme manager and works alongside the DDC's regional offices, known as the offices of disease prevention and control (ODPCs 1–12). Together, they supervise, provide technical support and offer policy guidance to PHOs. The VPD Section also partners with the Division of Epidemiology (DoE) for monitoring VPDs and tracking adverse events following immunization (AEFIs). It collaborates with the DMSc for laboratory surveillance. Additionally, the VPD Section works closely with the NHSO on vaccine management and planning for new vaccine introductions, and with the FDA on AEFI surveillance and the process of including vaccines in the National List of Essential Medicines.

Fig. 4. Management structure of NIP and VPD surveillance in Thailand, 2025



Evolution and organization of the VPD Section

In 2017, the DDC designated VPDs as a priority area, which led to the elevation of the VPD Section to an informal division-level structure in order to strengthen its role as the NIP manager. However, during the COVID-19 pandemic in 2021, the Division of VPD was restructured and merged back into a section under the DGCD.

Since 2021–2022, the Section has been restructured under new leadership into four functional clusters: outbreak response (epidemiology, procurement and risk communication); immunization services (network coordination, routine immunization and new vaccine introduction); disease elimination and eradication (aligned with international commitments); and planning and strategies (data systems, monitoring and evaluation, adverse event monitoring and political advocacy). In addition to these clusters, each officer is also assigned responsibility for a specific vaccine.

Offices of disease prevention and control: ODPCs (known as the Regional Disease Prevention and Control Office)

ODPCs serve as the operational bridge between central authorities and provinces, ensuring policy implementation, coordinating with local agencies and monitoring performance in collaboration with the VPD Section, which provides technical guidance and standards. Each of Thailand's 12 ODPCs oversees several provinces and employs 100–300 staff members across specialized areas, with VPDs

managed under communicable diseases. Although each ODPC designates an EPI manager, this role often competes with other priorities. Sustained training, capacity-building and technical support from the VPD Section are, therefore, essential. Close collaboration between ODPCs and the VPD Section is critical to strengthening Thailand's immunization programme.

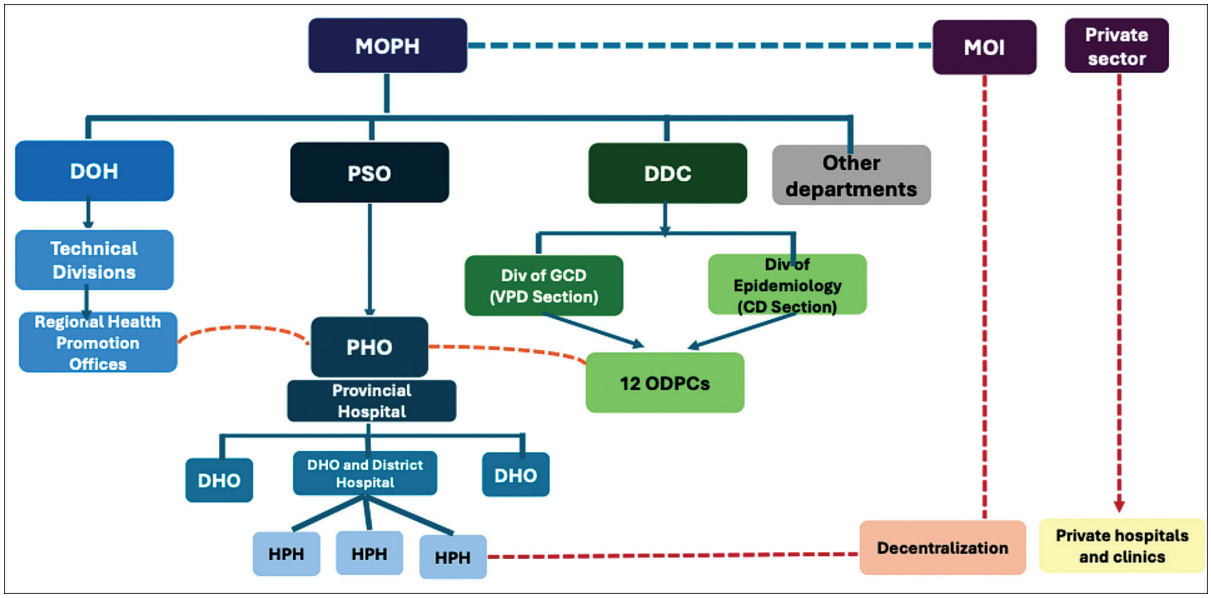
Public health administration at the provincial level

At the provincial level, PHOs oversee health policies and coordinate with DHOs, which cascade policies to service providers, including provincial, district and subdistrict hospitals. Within PHOs, VPD control is housed under the Communicable Disease Division, but EPI managers often handle multiple responsibilities alongside other high-priority tasks.

The PHOs must also coordinate with the regional offices of certain departments, such as the ODPC of the DDC and the regional health promotion centers of the Department of Health (DoH). These regional offices deliver their own policies directly to the provinces, but such directives are often not fully integrated at the central level, leading to fragmented implementation and additional workload for provincial authorities who must reconcile overlapping or competing priorities.

The private sector, including hospitals and clinics, supports national disease surveillance by providing disease data under the Communicable Disease Act B.E. 2558. However, vaccine coverage information from private providers is still not incorporated, resulting in a gap that prevents a complete assessment of immunization outcomes throughout the health system.

Fig. 5. Institutional linkages across ministries, departments, regional offices and provincial administrations, Thailand, 2025



Decentralization

Decentralization in the health sector began with the Decentralization Act of 1999, which aimed to transfer certain public health responsibilities, budgets and staff from the central government to local government organizations (LGs), such as Provincial administrative organizations (PAOs) and Tambon administrative organizations (TAOs). The primary goals were to increase flexibility, responsiveness and community participation in health service delivery.

3. National VPD Surveillance Programme in Thailand

Overview

Thailand's communicable disease surveillance system, established in the 1970s with the Division of Epidemiology (DoE), Field Epidemiology Training Programme (FETP) and EPI, created a nationwide reporting network that enabled significant progress in controlling VPDs. Initially using postcard notifications for 14 diseases, the system evolved into the digital R506 platform, further enhanced during the COVID-19 crisis. In the 2000s, surveillance and rapid response teams (RRTs) and expanded epidemiology training boosted capacity across all administrative levels.

The Communicable Disease Act B.E. 2558 (2015) decentralized authority and extended reporting to private providers, strengthening coordination via the National Communicable Disease Committee. Regular internal and external evaluations, including the 2022 joint external evaluation (JEE), confirm Thailand's robust preparedness, with the COVID-19 pandemic driving real-time digital reporting and expanded laboratory capacity for timely VPD outbreak response.

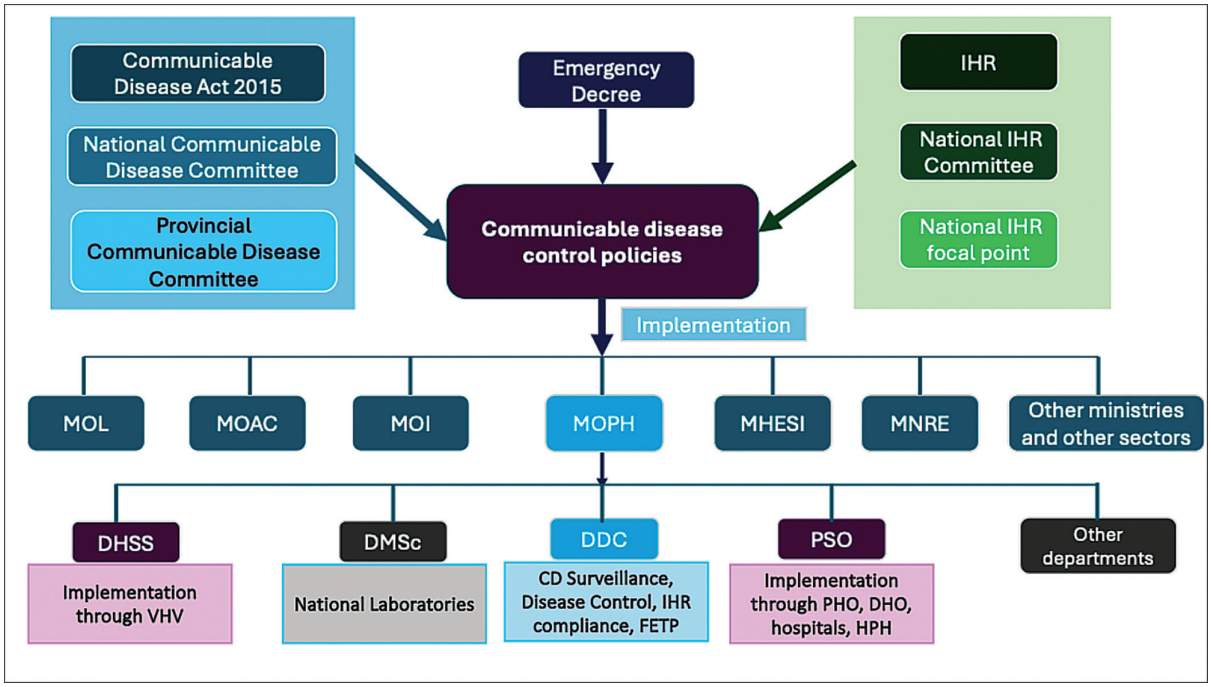
Governance

Thailand manages communicable diseases through key laws and committees. The Communicable Disease Act B.E. 2558 (2015) and the Emergency Decree on Public Administration in Emergency Situations allow coordinated national and provincial responses, including surveillance, quarantine and emergency actions. The International Health Regulations (2005) [IHR (2005)] Committee ensures compliance with global standards and reporting. The Vaccine Security Act (2018) guarantees vaccine supply and readiness in emergencies. After the COVID-19 pandemic, Thailand updated its laws to improve emergency management and strengthen disease control systems.

Policy and strategy

Thailand's Communicable Diseases Surveillance, Prevention and Control Action Plan (2023–2027) sets the National Strategy for disease prevention, emergency readiness and response. Guided by the Communicable Disease Act and global standards, the Plan strengthens governance, surveillance and workforce skills through five priorities: robust policies, improved infrastructure, better emergency preparedness, workforce development and effective risk communication. These efforts work together to ensure coordinated health security across all levels of government.

Fig. 6. Governance system for surveillance programme in Thailand, 2025



Financing

Thailand funds its population health services and IHR (2005) activities mainly through the government budget for the MoPH and related agencies. Key legal and strategic frameworks guide this financing. In emergencies, agencies can use the Central Fund; extra resources were raised during the COVID-19 crisis through bonds and loans. Additional support comes from sources such as the Thailand Research Fund, the NVI, community funds and international partners, helping strengthen preparedness and response at all levels.

Structure of VPD surveillance system and roles of key stakeholders

Thailand's VPD surveillance is a key part of the national communicable disease system, coordinated across several levels. The DDC leads efforts, while its DoE sets policies and standards, and oversees workforce training through the FETP. The Division of Disease Control in Emergencies manages event-based surveillance. The Division of General Communicable Diseases (DGCD) provides policy direction and enforces the Communicable Disease Act. The NVI supports vaccine security, especially during emergencies, as guided by the Vaccine Security Act.

The ODPCs bridge national policies to provincial actions, while the Department of Medical Sciences (DMSc) ensures laboratory quality. Provincial health offices (PHOs) handle surveillance and outbreaks locally, with district and subdistrict teams responding to incidents and escalating larger outbreaks to central teams. This layered approach keeps Thailand's VPD surveillance system effective and responsive.

The current Digital Disease Surveillance System

Thailand's upgraded Digital Disease Surveillance (DDS) System monitors communicable and noncommunicable diseases nationwide. Managed by the DoE, DDS uses APIs for efficient data

collection, analysis and sharing, replacing the older R506 system. The DDC integrates indicator- and event-based surveillance across all administrative levels, using artificial intelligence (AI) for screening, automated alerts and dashboards for early outbreak detection and disease-specific modules for conditions such as malaria, tuberculosis and VPDs.

Key system components include:

- Data collection: Hospitals, primary health centers and sentinel sites report electronically through the R506 indicator-based system and event-based platforms. Community and village health volunteers (VHVs) can also submit alerts via mobile apps, web forms, phone or email.
- Verification: Situation analysis teams (SATs) at each administrative level validate and confirm unusual events, outbreaks or critical cases before inclusion in the national database.
- Data flow: Data move hierarchically from subdistrict to district, provincial, regional and national levels, with feedback loops and real-time access for authorized users at each tier.
- Central analytics and visualization: A central data warehouse with tools such as Tableau enables visualization of trends, resource allocation and situational updates for decision-making.
- Data security: Layered access controls, automated and manual validation, and strict patient privacy safeguards maintain data integrity.

VPD-specific surveillance integrates multiple platforms and data sources:

The R506 system serves as the backbone for nationwide indicator-based reporting, capturing data from both public and private health care facilities. Complementing this, disease-specific systems, such as the Measles Elimination (ME) platform, incorporate laboratory confirmation and vaccination status, ensuring more comprehensive disease monitoring. Event-based surveillance (EBS) collects alerts from VHVs, subdistrict health facilities and sentinel sites, further broadening the scope of surveillance. Centralized integration platforms bring together laboratory results, indicator-based reports and event-driven data, enabling advanced analytics, mapping and effective outbreak response.

Additionally, mobile applications and automated reporting tools play a crucial role in improving the timeliness of case detection and investigation for diseases such as measles, diphtheria, rubella and polio. By integrating these components, Thailand's DDS architecture provides real-time, multisource surveillance, significantly enhancing the country's ability to detect outbreaks early, respond rapidly and make informed decisions at every level of the health system.

Fig. 7. Data collection, data environment and data integration pipeline of the Digital Disease Surveillance System, Thailand, 2025

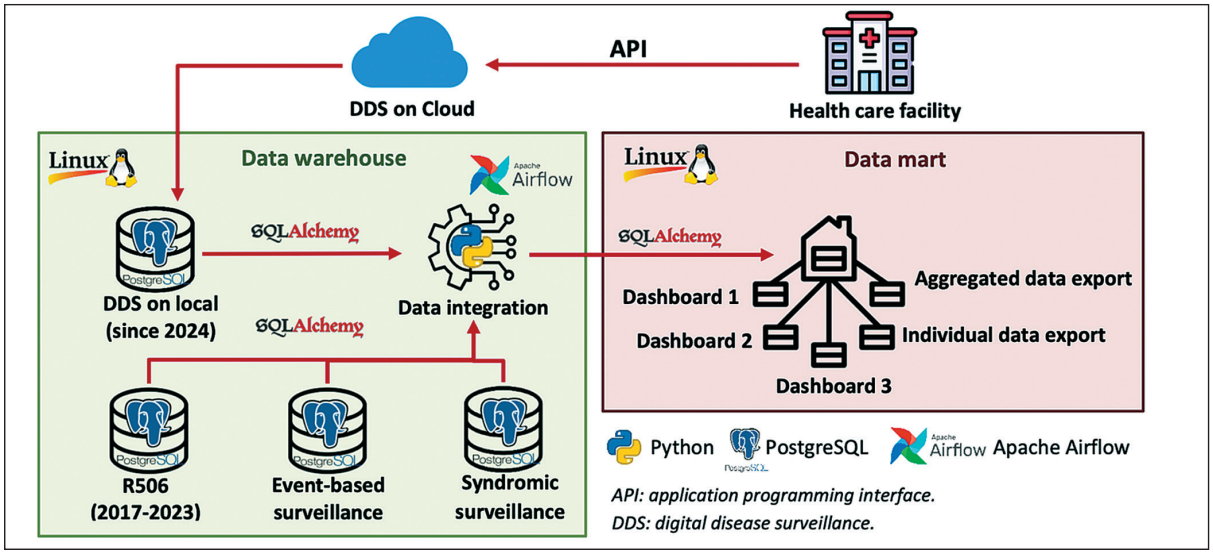
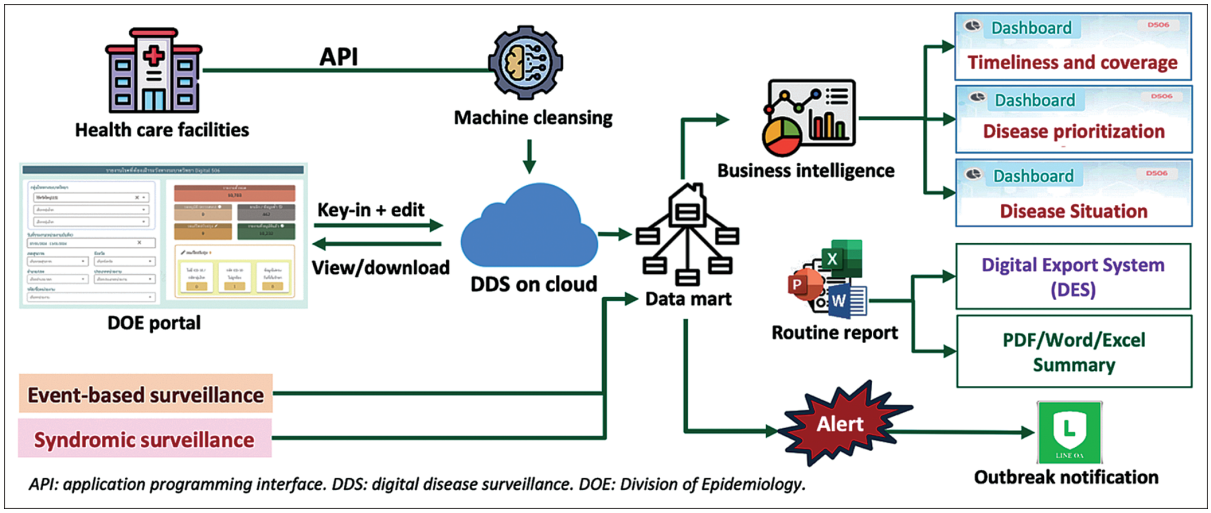


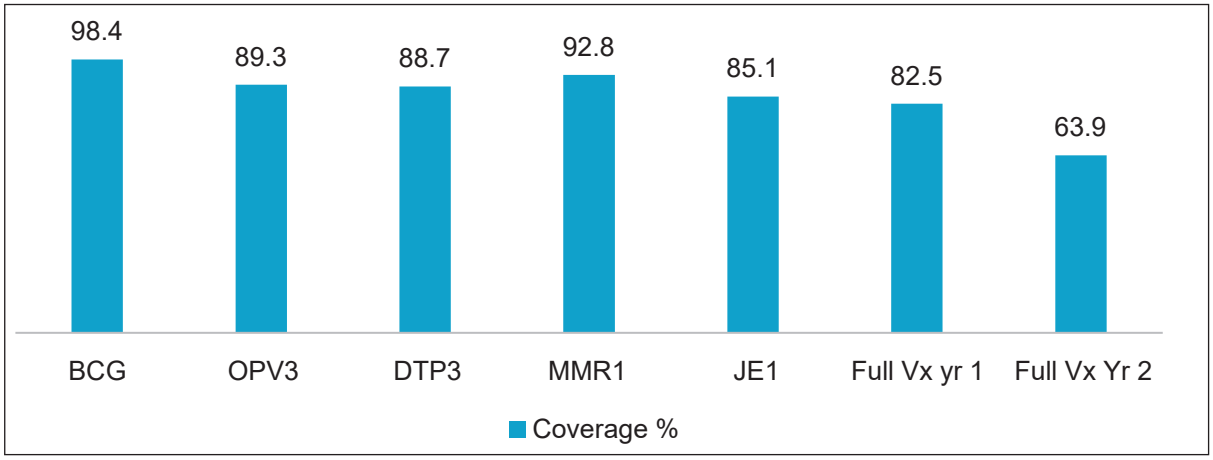
Fig. 8. Data analysis, interpretation and dissemination pipeline of Digital Disease Surveillance, Thailand, 2025



4. Key Findings

The National Immunization Programme (NIP) is overseen by the Ministry of Public Health (MoPH), Thailand, with technical guidance from the Department of Disease Control (DDC), the National Health Security Office (NHSO) and the National Immunization Technical Advisory Group (NITAG) called as Advisory Committee on Immunization Practices (ACIP). The Programme aims to reduce morbidity, mortality and disability from VPDs, maintaining high childhood vaccine coverage (>90%) for over 40 years. Recent years have seen the introduction of new vaccines [inactivated poliovirus vaccine (IPV), human papillomavirus vaccine (HPV), a combination vaccine for diphtheria, tetanus, pertussis, hepatitis B and *Haemophilus influenzae* type b (DTP-HB-Hib), rotavirus vaccine, adult doses of diphtheria and tetanus toxoid (dT), seasonal influenza vaccine for high-risk groups, acellular pertussis vaccine (aP) administered during pregnancy and pilot pneumococcal conjugate vaccine (PCV)].

Fig. 9. Vaccination coverage rates for various antigens, MIC Survey, Thailand, 2022



Source: National Statistical Office of Thailand. 2023. *Thailand Multiple Indicator Cluster Survey 2022, Survey Findings Report*. Bangkok, Thailand: National Statistical Office of Thailand.

Vaccine procurement is centralized and fully funded by the Thai government, with no external financial support. Routine immunization vaccines are funded by the NHSO as part of the UHC package; vaccines for health-care workers and outbreak control are funded by the DDC; and campaign vaccines are jointly funded. The Programme uses a pooled procurement approach and emphasizes cost-effectiveness and prioritization. The VMI system minimizes shortages and wastage. Challenges include transportation and temperature control in remote areas and risk of shortages due to global supply chain disruptions.

Immunization services are delivered through a network of primary health care (PHC) units, hospitals, outreach teams and private sector partners. VHVs play a crucial role in demand generation and follow-up, especially in remote and border areas. Partnerships with universities, NGOs and local authorities help address workforce shortages and extend coverage.

VPD surveillance: Thailand's DoE oversees the national VPD surveillance system, which uses both indicator-based and event-based methods. The system tracks various diseases, including those required by law, using integrated digital platforms for rapid reporting and analysis. Reporting has

shifted from paper to digital dashboards, covering hospital laboratories, sentinel sites and individual case detection for infectious, chemical, radiation and injury-related events.

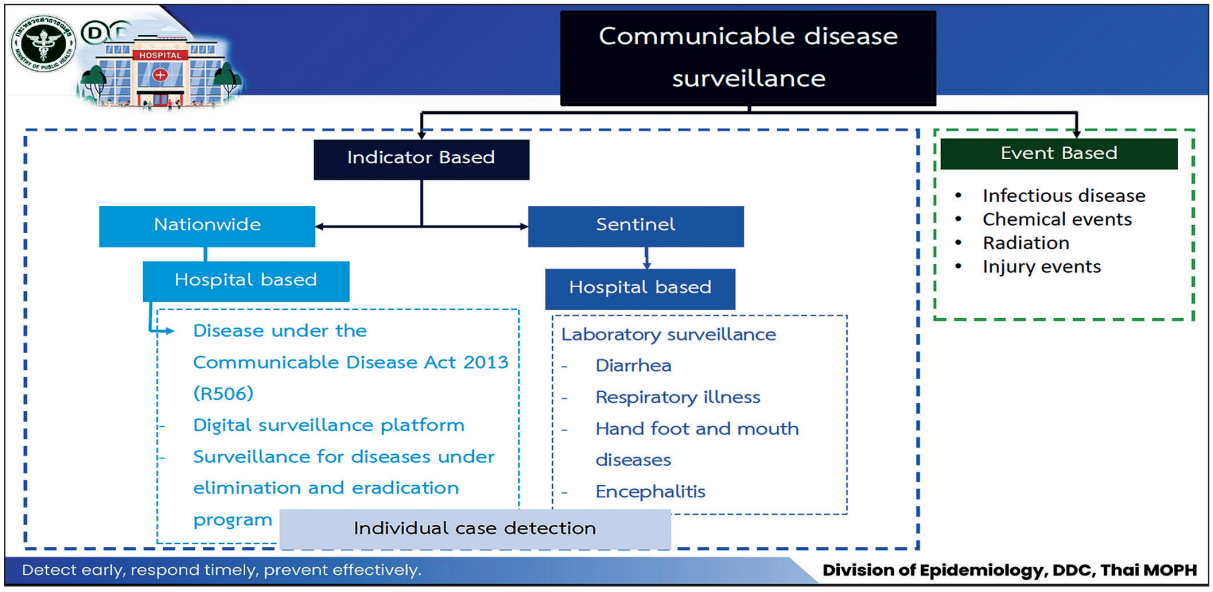
The surveillance system is governed by a strong legal framework and is overseen at national, provincial and district levels by designated committees and health officials. Surveillance programmes target polio, acute flaccid paralysis (AFP), measles, rubella, congenital rubella syndrome (CRS), all vaccines provided through RI in Thailand are included in the surveillance system and adverse events following immunization (AEFIs).

Polio and AFP surveillance require zero reporting of AFP cases in children under 15 years of age, with regular data submissions, monitoring both case detection and vaccination coverage, and utilizing laboratory testing and wastewater surveillance to improve identification. Measles and rubella surveillance involves laboratory testing including genotyping test , specimen collection and detailed case classification, with protocols for rapid investigation in the event of an outbreak. CRS cases are monitored separately through sentinel hospital surveillance, ensuring accurate detection and reporting.

Thailand has maintained its polio-free status, sustained MNTE status, reduced measles outbreaks in 2025 and kept other VPDs such as rubella, pertussis, and diphtheria at low or sporadic levels in 2025. The country also collaborates regionally for cross-border health security. Strengths of the system include its clear legal authority, strong coordination across administrative levels and alignment with IHR (2025).

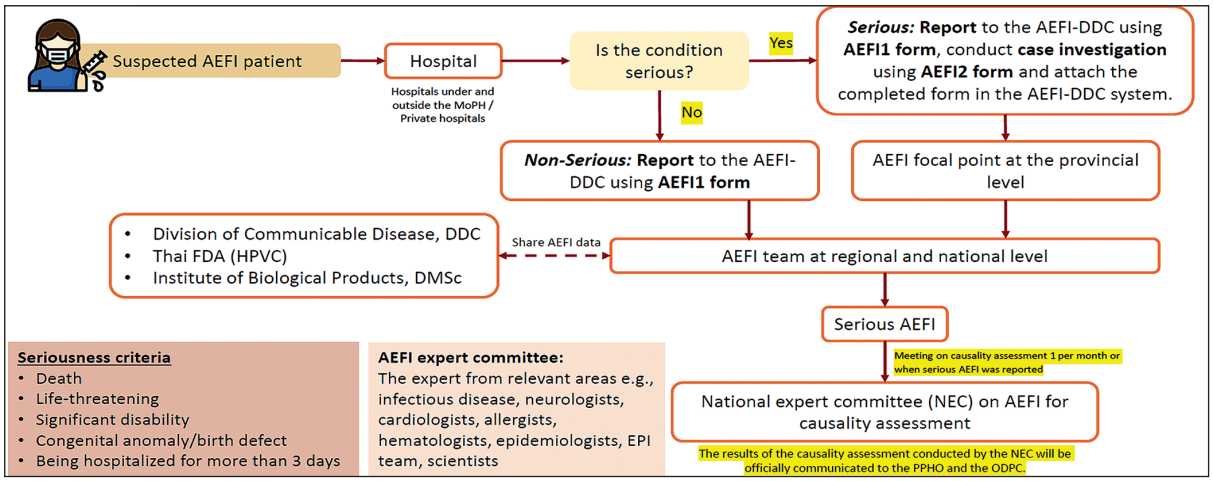
Challenges remain. These include reliance on clinical diagnosis over syndromic surveillance; difficulties in sample collection and transport; complex multilevel coordination; resource constraints in remote areas; and enforcing reporting compliance. Moving forward, priorities include investing in training and capacity building; improving data integration; increasing public participation; updating regulations; and strengthening international collaboration to maintain and enhance VPD surveillance and response.

Fig. 10. Flowchart of communicable disease surveillance in Thailand, 2025



Additionally, the AEFI programme monitors and classifies notifiable events through both passive and event-based systems, with a national expert committee responsible for causality assessment of reported incidents.

Fig. 11. Flowchart of AEFI surveillance in Thailand, 2025



Thailand's surveillance systems for VPDs demonstrate high performance in certain key areas. The AFP surveillance programme consistently achieves high levels of completeness and timeliness in reporting. However, challenges remain, as rates of non-polio AFP detections and the follow-up of reported cases have not consistently met national targets in recent years due to lack of implementation of the syndromic approach to VPD surveillance and less awareness about country's global and regional commitments on VPDs elimination and eradication.

Table 1. AFP surveillance performance indicator for Thailand, 2022 to June 2025

Indicators	Target	2022	2023	2024	2025 (As of June)
AFP rate (per 100 000 population under 15 years)		0.96	1.77	1.7	0.8
Non-Polio AFP rate (per 100 000 population under 15 years)	≥2/100 000	0.68	1.67	1.58	0.61
Completeness of weekly zero reporting	≥90%	99.52	99.04	98.01	96.82
Timeliness of weekly zero reporting	≥80%	99.52	99.04	98.01	96.82
AFP cases with 2 stool specimens collected at least 24 hours apart and within 2 weeks of onset	≥80%	61.62	71.75	70.3	76.92
Case investigation within 48 hours after notification	≥80%	96.97	96.61	96.36	97.44
Follow up 60 days after onset	≥80%	52.53	41.89	31.13	28.99

For measles and rubella, the surveillance system is effective in promptly initiating investigations and collecting specimens from suspected cases, reflecting robust response capabilities. Despite these strengths, there are ongoing gaps, particularly in implementing syndromic approach to VPD surveillance, resulting in difficulty in maintaining optimal reporting rates as well as ensuring that specimens are collected and received by laboratories within the recommended timeframe. These areas fall short of established targets, indicating opportunities for further improvement.

Table 2. Performance surveillance indicators for measles and rubella in Thailand, 2022 to June 2025

Indicators	Target	2022	2023	2024	June 2025
Reporting rate of non-measles non-rubella cases at national level	≥2/100,000	0.28	0.91	3.48	1.03
Proportion of suspected cases with adequate investigation initiated within 48 hours of notification	≥80%	97.99	98.08	99.18	96.52
Proportion of second administrative level units reporting at least two non-measles non-rubella case per 100 000 population per 12 months	≥80%	2.60	14.29	31.17	14.28
Proportion of specimens received at the laboratory within 5 days of collection	≥80%	75.81	77.40	71.52	68.90
proportion of suspected cases with adequate specimen collection for detecting acute measles and/or rubella infection collected and tested in a proficient laboratory	≥80%	99.53	86.85	62.98	78.03
Proportion of laboratory-confirmed outbreaks with specimens adequate for detecting measles virus which is collected and tested in an accredited laboratory	≥80%	No outbreak	100 (1/1)	21.95 (45/205)	25 (3/12)

In terms of outbreak response, Thailand has well-established protocols in place for rapid investigation and control of outbreaks involving diphtheria, pertussis, neonatal tetanus, measles and rubella. These protocols are available across all administrative levels, providing opportunity for swift public health action to contain and manage VPD outbreaks. However, implementation remains suboptimal.

Table 3. Summary of strengths of key thematic areas of the review, Thailand, 2025

Area	Strengths
Policy and governance	Policy framework (Communicable Diseases Act; Vaccine Security Act; strong national/provincial commitment, decentralized adaptation, reliable funding; NITAG at the national level; Provincial Communicable Diseases Committee
Human resources	Adequate staffing, VHV network, on-the-job training, high community trust
Vaccine logistics	Reliable cold chain, no stockouts, effective supply chain,
Service delivery	RI Service coverage expanded nationwide through subdistrict level health facilities (Health Promoting Hospital), Life-course vaccination, school-entry checks, electronic tracking, inclusive access
Data and monitoring	Multiple data sources available for triangulation , electronic systems, AEFI monitoring are in place with AEFI expert committee available at 12 regional health regions.
Demand generation	High vaccine acceptance, effective information, education and communication and behavior change communication (IEC/BCC), social media engagement
Surveillance and outbreaks	Integrated system, RRTs in place, legal framework, annual trainings

Programme risks and Challenges

The review identified several risks and challenges, including low vaccination coverage in some provinces and population groups; the risk of disease importation from neighboring countries; and suboptimal surveillance leading to late detection of disease threats. The review emphasized the need for improved coordination mechanisms, better understanding of programme coverage and enhanced syndromic surveillance systems.

A. Major risks

Endemic transmission: Low vaccination coverage in some provinces, including in the Southern Region, allows continued endemic transmission of VPDs and raises the risk of disease spread within the country. The uncertain vaccination status of internal and external migrant groups could also lead to sustained transmission and endemic spread of diseases. The country continues to have high transmission of measles and other VPDs, despite high coverage, indicating pockets with low population immunity for VPDs.

Table 4. Reported numbers of priority VPDs in Thailand, 2015–June 2025

Indicator	2015	2020	2023	2024	2025
Sustaining polio free status	0	0	0	0	0
# confirmed cases					
Measles	156	14	27	5423	414
Rubella	28	9	12	29	7
Congenital rubella syndrome		0	0	1	0
Neonatal tetanus	1	0	0	1	1
Diphtheria	20	8	2	5	3
Pertussis	18	13	361	804	37

Potential importation: Neighboring countries with population movements in and out of Thailand have experienced outbreaks of various pathogens, posing a significant risk of VPD importation. The risk is evident from the recent reporting of vaccine-derived poliovirus in Lao PDR and Myanmar, as well as outbreaks of other VPDs, such as measles, in Cambodia, Myanmar and Lao PDR. Thailand also receives a high number of international visitors from countries where VPDs, including polio, remain endemic.

Suboptimal surveillance leading to late detection of disease threats: The surveillance performance indicators for AFP, and for rash and fever, do not meet global standards resulting in late detection of or missing VPD cases, events and outbreaks.

Given the experience of outbreak in neighbouring countries, there is a significant risk that Thailand may experience the importation of a circulating poliovirus in the near future; it may go undetected due to suboptimal implementation of syndromic approach for VPD surveillance.

B. Key programmatic challenges

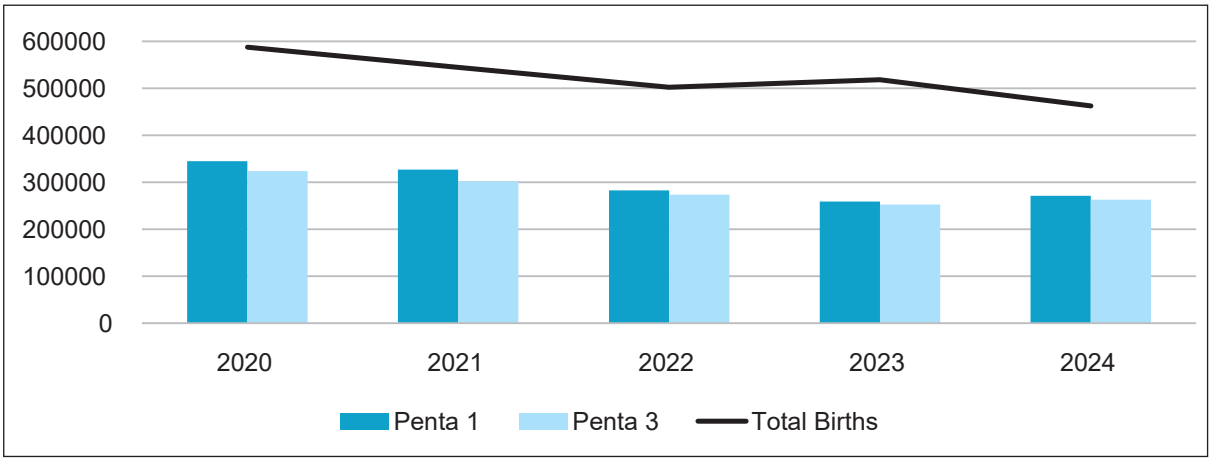
(1) **Uncertainty regarding true programme coverage:** Administrative coverage, calculated for routine vaccines, represents only a portion of the target population (birth cohort of 462 240 vs EPI target of 259 872 in 2024). True coverage of a significant proportion of the population, including migrant populations, is not captured by current reporting processes – it remains unknown. The current reporting systems are not inclusive of immunizations

carried out by a range of service providers, including many private practitioners. This greatly limits the capacity of the national programme to identify coverage gaps and develop realistic plans to address them.

(2) **Surveillance issues:** Incomplete implementation of syndromic surveillance for AFP and rash and fever is the result of an incomplete understanding of syndromic surveillance and tis rational on the part of many clinicians and surveillance officers. Thus, surveillance indicators for AFP and rash and fever do not meet global standards. Challenges persist in obtaining and transporting samples from suspected cases, as it is often assumed that a clinician's prescription is required. Moreover, clinicians are not attuned to prescribing tests for syndromic surveillance. Risk assessment for polio has highlighted the probability of missing transmission and the need to enhance AFP surveillance, and the same challenge applies to measles and rubella surveillance.

(3) **Declining birth rates**: The rapidly decreasing birth rate in Thailand may influence operational workflows and the monitoring of service delivery. Accurate analysis of programme coverage will be vital to determine whether reduced activity levels are attributable to lower birth rates or challenges within the programme itself. Additionally, estimation of the denominators for EPI and disease control initiatives, as well as outbreak response efforts, is likely to be affected.

Fig. 12. Coverage of DTPCV1 and DTPCV3 in numbers compared with total births in the country, 2020–2024



(4) **Decentralization of health staff and facilities:** Decentralization is reshaping the immunization landscape. Currently, about half of all health-promoting hospitals (HPHs) have been handed over to provincial administration organizations (PAOs). Progress in decentralization has been inconsistent, impacted by regulatory hurdles, varying levels of preparedness and coordination difficulties. The transfer of health centers to local governments has, in some cases, improved local management autonomy and enabled services to be tailored more flexibly to community needs. Currently, about half of HPHs are under the management of PAOs.

While this transition has the potential to enhance immunization service delivery if executed effectively, inadequate planning or ambiguous responsibilities could jeopardize immunization achievements. It is critical to clearly delineate the oversight, quality assurance and technical support roles of the MoPH and its related agencies to sustain high immunization rates.

At this juncture, concerns persist regarding possible fragmentation of the health system and duplication of infrastructure. While the central MoPH is expected to retain a leading role in policy, technical support and oversight, the private sector and local governments are playing an increasingly significant part in surveillance and service delivery. The role of the MoPH (DDC, regional teams and PHO) in monitoring immunization programme delivery and providing technical support requires clear definition. The current coordination mechanisms mandated under the Communicable Disease Act (provincial communicable disease committees) are not fully functional in provinces visited and may not be taking on the role of monitoring immunization and surveillance performance.

Here is a summary of the perceptions of health workers on HPH management under the MoPH compared with PAO. This summary is based on interviews and field visits comparing HPHs managed by the MoPH and those transferred to the PAOs:

	MoPH	PAO
Principle	Health as a basic right, not for profit, health service is a public good.	The PAO perceives health services in commercial terms, rather than as essential public services in instances visited by the team.
Policy/target	Vaccine coverage targets are set in accordance with scientific evidence and global benchmarks.	Sets lower targets to encourage practical and feasible progress, based on the lowest performance level.
Budget	The budget is lower but flexible. Before decentralization, budget administration was supported by the DHO.	The budget is higher, but the process is complex, with strict audits and administrative responsibilities falling on the health center.
Staff strength	4–5?	7–11 (increased number of administrative staff)?
Investment	HR training	Information system (My PCU), surroundings and interior decor of health facilities, data logger for improved cold chain management
Career path	Promotion opportunities for professional staff are limited by structural bottlenecks; there is a scarcity of available positions.	Professional-level staff enjoy more promotion prospects to senior roles while operational staff experience limited salary progression.
Revenue	The hospital's revenue is declining because the NHSO pays health centers/ HPHs directly based on their activities. This shift exacerbates the hospital's financial instability, further worsening its fiscal situation.	Health centers/HPHs have significantly increased their revenue through their health activities/ local matching funds from the NHSO and the PAO. However, expenditure remains low due to concerns over complex regulations and strict audits under the PAO.
Public health activities	The ministry has implemented all activities that are designated as policy priorities in public health.	The PAO frequently emphasizes activities with greater financial returns, while deprioritizing important but complex or low-paid tasks.

As demonstrated by the table, in practice, the roles of different partners under decentralization remain unclear, with persistent gaps in data integration and cross-sector coordination. Although PAOs command larger budgets and offer scope for innovation to HPHs under their administration, their tendency to prioritize financially rewarding activities over complex, preventive or lower-revenue services threatens could weaken core public health functions such as immunization.

5. Conclusions

The review of Thailand's National Immunization Programme (NIP) highlights a well-established and resilient system, underpinned by strong legislative frameworks, centralized procurement and high coverage rates for childhood vaccinations. The Programme has achieved significant milestones, such as the elimination of maternal and neonatal tetanus and the sustained polio-free status since 1997. There has been significant progress towards rubella elimination as well. The Programme's integration of new vaccines, robust partnerships with both public and private sectors, and use of digital platforms for surveillance and reporting underscore its adaptability and commitment to public health.

Village health volunteers (VHVs) and collaborative efforts with universities, NGOs and local authorities have also been instrumental in extending outreach, particularly to underserved and high-risk populations. Despite these strengths, the system continues to face challenges in maintaining optimal coverage in low-performing provinces and among migrant and high-risk groups such as peri urban population in the metropolitan cities, ensuring consistent data integration and optimizing the outbreak response protocol implementation

The surveillance system operates within a legal framework and is managed at national, provincial and district levels by designated committees and health officials. Surveillance programmes focus on polio, acute flaccid paralysis (AFP), measles, rubella, congenital rubella syndrome (CRS), all VPDs under RI and adverse events following immunization (AEFIs). Polio and AFP surveillance requires zero reporting of AFP cases in children under 15, regular data submissions, monitoring of both case detection and vaccination coverage, and use of wastewater surveillance to support identification efforts. Measles and rubella surveillance incorporates laboratory testing, specimen collection and detailed case classification, with established protocols for rapid investigation during outbreaks. CRS cases are tracked separately through sentinel hospital surveillance to support accurate detection and reporting.

Persistent challenges include reliance on clinical diagnosis instead of syndromic surveillance; difficulties in sample collection and transportation; coordination across multiple levels; resource limitations in remote areas; and challenges in ensuring reporting compliance. Future priorities involve training and capacity building; improving data integration; increasing public engagement; updating SOPs and guidelines for PD surveillance; and enhancing international collaboration to maintain and strengthen VPD surveillance and response capabilities.

Nonetheless decentralization and shifting management responsibilities to local government organizations have introduced new complexities, including unclear roles, fragmented reporting and variable prioritization of immunization activities. Local entities' tendency to focus on financially rewarding services at the expense of essential but less lucrative public health functions presents a risk to the sustainability of immunization achievements. It is imperative to clearly define oversight and support roles, strengthen coordination mechanisms, and prioritize inclusive, accurate coverage monitoring. Addressing these issues will be key to sustaining Thailand's progress in disease prevention and ensuring equitable immunization coverage nationwide.

6. Recommendations

The external independent review team, following extensive desk review and field visits, concludes and recommends the following key areas of work for consideration and prioritization by the National Immunization and VPD Surveillance Programme as well as to key stakeholders .

1. Surveillance:

Engage and orient clinical staff in syndromic VPD surveillance, starting with the largest referral hospitals. Develop appropriate syndromic surveillance job aids and ensure regular orientation of the clinical staff and regular coordination between epidemiologists and clinical staff.

Ensure that cases meeting syndromic/case definitions can have samples taken by health workers in line with national guidelines and without requiring medical prescription.

While screening records for reporting suspected cases, institute mechanisms to screen for "signs and symptoms" of reportable syndromes, not just for ICD codes.

2. Improving coverage:

Evaluate efforts to improve vaccine coverage in southern Thailand by the end of 2025 to derive lessons on which approaches are working, and which are not.

Analyze and prioritize provinces with less than 90% reported coverage for measles vaccines and URGENTLY develop tailored coverage improvement plans with a focus on measles- and rubella-containing vaccines.

3. Inclusive reporting:

Form a task team to investigate how inclusive reporting of vaccinations can be improved.

Until a more inclusive reporting system is in place, the MoPH must rely on regular coverage surveys to develop a better understanding of coverage.

Conduct specific surveys for high-risk groups, including migrant populations in Bangkok and other provinces with high migrant populations, using specific sampling types, e.g. respondent-driven sampling.

Specific plans to address gaps in coverage should be developed based on the findings of surveys and case investigations

4. Managing decentralization:

The National Communicable Disease Committee and the National Vaccine Committee should engage the MoPH and the MoI to ensure that oversight mechanisms for the immunization and VPD surveillance programmes are active in every province.

Provincial communicable disease committees, as mandated under the Communicable Disease Act, to consider having immunization and VPD surveillance programme performance as a standing agenda item.

Standard immunization programme performance indicators should be developed and incorporated into the "key performance indicators of the decentralized administrative units by MoI" to enable provinces to effectively monitor immunization programme performance.

The National Immunization TAG/ACIP should invite participation of appropriate officials of the MoI in all TAG meetings.

Conduct a study on the impact of decentralization aiming to provide policy-level recommendations, optimize the benefit of decentralization in the health sector and report to the National Communicable Disease Committee and the National Vaccine Committee.

5. Enhancing programme oversight:

Ensure regular meetings of the National Vaccine Committee and NITAG to provide high-level programme oversight and strategic direction of NIP and VPD surveillance programmes.

National immunization and VPD surveillance programmes including provinces and districts need to develop a "macroplan" on monitoring and supervision to ensure optimal implementation of activities with regular feedback and feedforward mechanism (reporting to NITAG/National Vaccine Committee, Communicable Disease Committee).

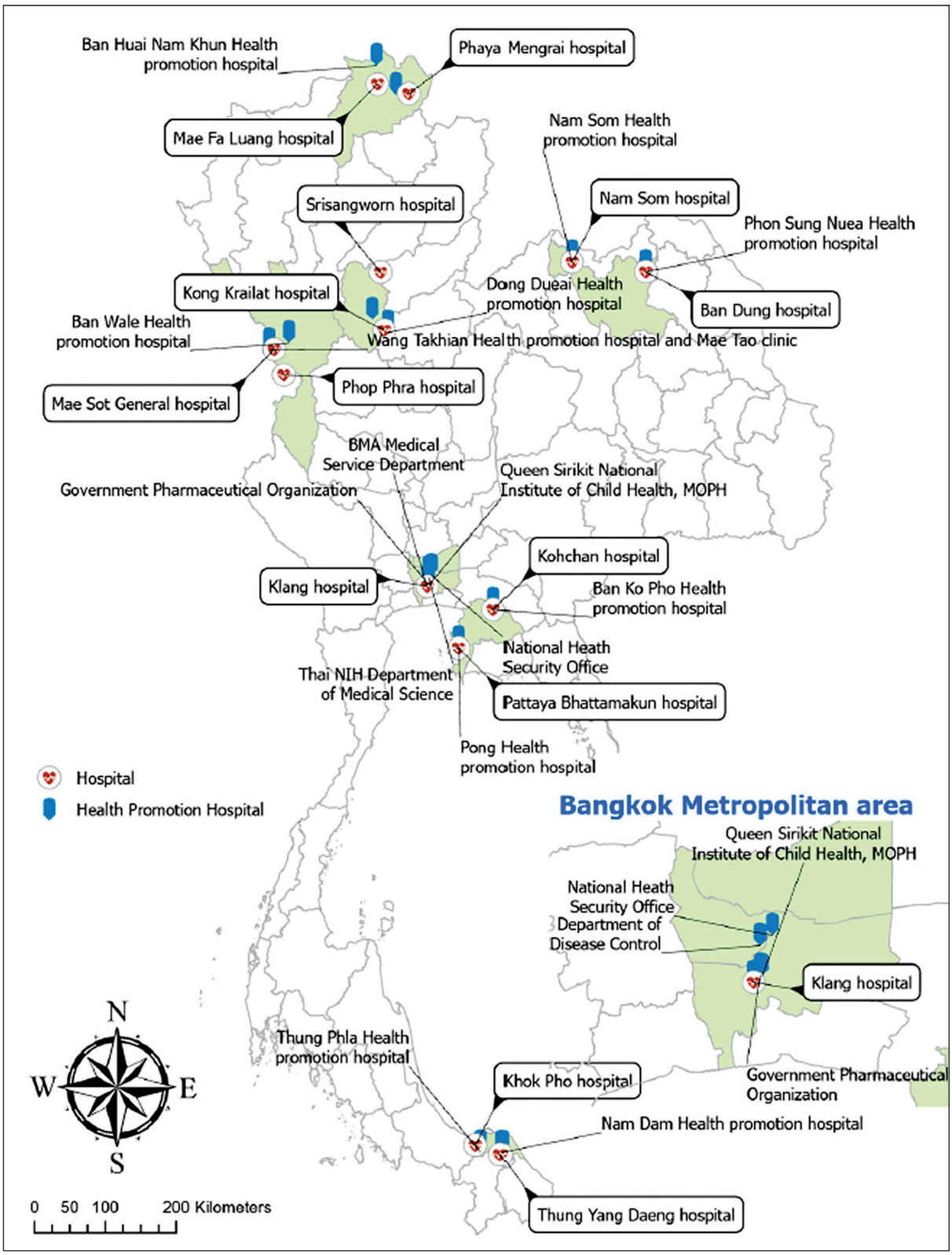
The external independent review team proposes the National Immunization and VPD Surveillance Programme as well as to key stakeholders to prioritize the recommendations based on local context and resources and develop joint time-bound action plans to implement the prioritized recommendations.

Annexes

Annex 1. Timelines for review

Date	Activity
15 July	Finalization of concept notes and preliminary completion of search for reviewer
20 July	Concurrence from the MoPH and the WHO Country Office for Thailand on concept note
29 July and weekly	Weekly call with the WHO Country Office for Thailand and MoPH focal points to assess preparations and progress
31 July	Internal WHO approval processes completed
10 August	Team lead and all reviewers on board
15 August	Draft review tools developed and shared with reviewers
20 August	Virtual meeting of all reviewers to finalize the tools and methodology for review
29 August	All contractual processes completed
31 August	All reviewers arrive in Bangkok.
1 September	F2F Meeting of reviewers in Bangkok. Briefing to the WHO Representative (WR), WHO Country Office for Thailand; briefing meeting for reviewers and MoPH officials
2–5 September	Field visit
6–7 September	Report writing
8 September	Debriefing meeting: 1) WR, WHO Country Office for Thailand, 2) MoPH and stakeholders
9 September	All international reviewers depart.
31 October	Draft report with action plan completed

Annex 2. Places visited



Annex 3. Review team members

Independent external review team members

SL. No.	Participant name	Representation	Province assigned	Thematic area Lead	co-Lead
1	Dr Chris Maher	Team Lead	Bangkok	Programme management	HR management/ VQM
2	Dr Sudhir Joshi	WHO-SEARO	Bangkok	Polio	Service delivery
3	Dr Kumnuan Ungchusak	Independent expert	Bangkok	Service delivery	
4	Dr Sudhir Khanal	Review Coordinator	Chiang Rai	MNTE	Measles and rubella
5	Dr Ted Xuanchen Tao	NCIRS	Chiang Rai		Demand generation
6	Dr Ridwan Gustiana	UNICEF	Chonburi	Vaccine supply, quality and logistics	Demand generation
7	Dr Attaya Limwattanayingyong	Independent expert	Pattani	HR management/ VQM	Programme management
8	Dr Ann Burton	NCIRS	Pattani	Coverage and AEFI monitoring	VPD Surveillance
9	Prof Shahina Tabassum	Chair SEA-RVC	Sukothai	Measles and rubella	
10	Dr Sushma Bhusal	IFRC	Tak	Cross-border issues	Vaccine supply, quality and logistics
11	Dr Raveesha Mugali	WHO Country Office for Myanmar	Tak		Sub-area cross-border issues
12	Dr Buddhika Manesh	MOH Sri Lanka	Udon Thani		Coverage and AEFI monitoring
13	Dr Mick Mulders	WHO HQ	Udon Thani	VPD surveillance and laboratories	
14	Dr Dijana Spasenoska	WHO HQ	Virtual	Virtual support	

MoPH and DDC officials

No	Province visited	Name	Position	Organization
1	Central level/ Bangkok	Dr Pawinee Doungngern	Medical Officer, Senior level	Division of Epidemiology, DDC, MoPH
2	Central level/ Bangkok	Miss Ketsuda Sijuk	Public Health Technical Officer, Professional level	NIP Section, Division of Communicable Diseases, DDC, MoPH

No	Province visited	Name	Position	Organization
3	Central level/ Bangkok	Ms Sarinya Chaiya	Public Health Technical Officer	Division of Epidemiology, DDC, MoPH
4	Chiang Rai	Dr Chayanit Mahasing	Medical Officer, Professional level	Division of Epidemiology, DDC, MoPH
5	Chiang Rai	Miss Jirawan Weruwanaruk	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
6	Chiang Rai	Miss Kanyaphat Titla	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
7	Sukothai	Miss Piyaporn Phokham	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
8	Sukothai	Miss Thanaporn Thumrongluk	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
9	Sukothai	Miss Panita Kumphon	Public Health Technical Officer, Practitioner level	Division of Epidemiology, DDC, MoPH
10	Tak	Dr Thanaphon Yisankhun	Medical Officer, Professional level	Division of Epidemiology, DDC, MoPH
11	Tak	Miss Pornnapa Makkasan	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
12	Chonburi	Miss Prangnapitch Wihanthong	Public Health Technical Officer, Professional level	Division of Epidemiology, DDC, MoPH
13	Chonburi	Miss Phornphimon Thongkhum	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
14	Chonburi	Miss Apinya Wiriyaboorana	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
15	Udon Thani	Ms Mananya Prasertsook	Public Health Technical Officer, Senior professional level	NIP Section, Division of Communicable Diseases, DDC, MoPH
16	Udon Thani	Mr Rittichai Jaipong	Public Health Technical Officer, Practitioner level	Division of Epidemiology, DDC, MoPH
17	Pattani	Mr Wirat Ponlead	Public Health Technical Officer, Practitioner level	NIP Section, Division of Communicable Diseases, DDC, MoPH
18	Pattani	Miss Jirapa Chimmanee	Public Health Technical Officer, Practitioner level	Division of Epidemiology, DDC, MoPH
19	Pattani	Miss Arunothai Pathan	Public Health Technical Officer	NIP Section, Division of Communicable Diseases, DDC, MoPH

No	Province visited	Name	Position	Organization
20	Udon Thani	Ms Itsayanan Wongcheangsree	Foreign Relations Officer	Office of International Cooperation, DDC, MoPH
21	Chonburi	Ms.Ravikarn Boonyapradub	Foreign Relations Officer	Office of International Cooperation, DDC, MoPH
MoPH regional-level teams				
1	Tak	Ms Puthita Phoomee	Public Health Technical Officer, Practitioner level	Office of Disease Prevention and Control Region 2 Phitsanulok Province
2	Tak	Ms Maneekarn Kaewkumpang	Public Health Technical Officer, Practitioner level	Office of Disease Prevention and Control Region 2, Phitsanulok, MoPH
3	Sukothai	Ms Somchit Boonchaiya	Public Health Technical Officer, Professional level	Office of Disease Prevention and Control Region 2, Phitsanulok. MoPH
4	Sukothai	Ms Phannita Khomsom	Registered Nurse, Practitioner level	Office of Disease Prevention and Control Region 2, Phitsanulok, MoPH
5	Chiang Rai	Mrs Pornpimon Balamee	Public Health Technical Officer, Practitioner level	Office of Disease Prevention and Control Region 1, Chiang Mai, MoPH
6	Chiang Rai	Miss Jutatip Yasamut	Public Health Technical Officer, Practitioner level	Office of Disease Prevention and Control Region 1, Chiang Mai, MoPH
7	Udon Thani	Ms Wisakha Panyasai	Registered Nurse, Professional level	Office of Disease Prevention and Control Region 8, Udon Thani, MoPH
8	Udon Thani	Ms Pattanan Panta	Public Health Technical Officer, Practitioner level	Office of Disease Prevention and Control Region 8, Udon Thani, MoPH
9	Chonburi	Mrs Montriya Unteamsom	Registered Nurse, Senior professional level	Office of Disease Prevention and Control Region 6, Chonburi
10	Chonburi	Miss Sasiwimon Siriruck	Registered Nurse, Professional level	Office of Disease Prevention and Control Region 6, Chonburi

No	Province visited	Name	Position	Organization
11	Chonburi	Miss Kanjana Jeknok	Public Health Technical Officer, Professional level	Office of Disease Prevention and Control Region 6, Chonburi
12	Pattani	Miss Arissarawan Suknaowarat	Public Health Technical Officer, Professional level	Office of Disease Prevention and Control Region 12, Songkhla
13	Pattani	Mrs Nalinee Chuaydamrong	Public Health Technical Officer, Senior professional level	Office of Disease Prevention and Control Region 12, Songkhla
14	Bangkok	Miss Supattra Ninsiri	Registered Nurse	Institute for Urban Disease Control and Prevention, DDC, MoPH
MoPH provincial level/BMA				
1	Udon Thani	Ms Wilaiwan Komkham	Public Health Technical Officer, Senior professional level	Udon Thani Provincial Health Office
2	Udon Thani	Mr Vachira Rattanapet	Public Health Technical Officer, Professional level	Udon Thani Provincial Health Office
3	Sukothai	Ms Sumali Kaeonoei	Public Health Technical Officer, Professional level	Sukhothai Provincial Health Office
14	Sukothai	Ms Supaporn Wongti	Public Health Technical Officer, Professional level	Sukhothai Provincial Health Office
15	Chonburi	Dr Krit Sakulpat	Provincial Chief Medical Officer	Chonburi Provincial Public Health Office
16	Chonburi	Dr Wisith Pholsawat, MD	Deputy of Provincial Chief Medical Officer	Chonburi Provincial Public Health Office
17	Chonburi	Mr Withak Withaksabut	Public Health Technical Officer, Senior professional level (Head of CDC Division)	Chonburi Provincial Public Health Office
18	Chonburi	Miss Sunida Nilda	Public Health Technical Officer, Practitioner level	Chonburi Provincial Public Health Office
19	Chonburi	Miss Benjamas Klahan	Public Health Technical Officer, Practitioner level	Chonburi Provincial Public Health Office
20	Chonburi	Mr Teerachot Buntong	Public Health Technical Officer	Chonburi Provincial Public Health Office
21	Pattani	Mrs Sripoh Dulkladet	Public Health Technical Officer, Professional level	Pattani Provincial Public Health Office
22	Pattani	Miss Nisulaida Nisoh	Public Health Technical Officer, Professional level	Pattani Provincial Public Health Office

No	Province visited	Name	Position	Organization
23	Bangkok	Miss Laddawan Eiamlaor	Public Health Technical Officer, Senior professional level	Office of Public Health Communicable Diseases, Health Department, BMA
24	Bangkok	Miss Pattiya Wichayapong	Medical Doctor, Practitioner level	Office of Public Health Communicable Diseases, Health Department, BMA
25	Bangkok	Mr Nititat Kaentao	Public Health Technical Officer, Practitioner level	Office of Public Health Communicable Diseases, Health Department, BMA
26	Bangkok	Mr Tawat Boonnuam	Public Health Technical Officer	Office of Public Health Communicable Diseases, Health Department, BMA
27	Bangkok	Miss Jittranut Srising	Public Health Officer	Office of Public Health Communicable Diseases, Health Department, BMA
28	Tak	Mrs Rakdao Methakunchat	Registered Nurse, Professional level	Tak Provincial Health Office
29	Tak	Mrs Pimthip Netsuwan	Public Health Technical Officer, Practitioner level, Tak Provincial Health Office	Tak Provincial Health Office
30	Chiang Rai	Mr Wiwat Ngoenthae	Public Health Officer, Senior level	Chiang Rai Provincial Health Office
31	Chiang Rai	Miss Pattra Sangsomboon	Public Health Technical Officer, Practitioner level	Chiang Rai Provincial Health Office
WHO Thailand Staff				
1	Overall support and Pattani	Ms Aree Mounsgookjarean	National Processional Officer (EPI and VPD surveillance)	WHO Thailand
2	Overall support	Ms Watchareeporn	Programme Assistant (EPI and VPD surveillance)	WHO Thailand
3	Sukothai	Ms Korboon Petchueanrong	National Professional Officer (Compliance)	WHO Thailand
4	Tak	Ms Preechaya Srithep	Programme Assistant (WHE and CDS)	WHO Thailand
5	Chonburi	Ms Thanatporn Rawanghet	National Professional Officer (PRS and FGL)	WHO Thailand

Annex 4. Selected thematic reports

A. National Immunization Programme management

Strengths

Policy and governance

The National Immunization Programme (NIP) is anchored by strong governance and a comprehensive legal framework, ensuring effective programme delivery and alignment with national standards. These structures facilitate coordinated decision-making, accountability and collaboration across various sectors and levels of the health system.

One of NIP's key strengths is its commitment to evidence-based policymaking, relying on local data and research to guide the introduction of new vaccines – even in the face of financial constraints typical of middle-income countries. Additionally, NIP provides a robust platform for broadening immunization coverage throughout all stages of life, with specific policies in place to ensure access for migrant populations.

Finance

A major strength of Thailand's NIP lies in its sustained reliance on domestic financing, which reinforces national ownership and ensures long-term sustainability within the framework of UHC. In addition, the programme may benefit from a diversity of funding partners that provide not only financial contributions but also social and intellectual capital.

Structure of the Programme and roles of key stakeholders

NIP engages a range of partners, each bringing their own expertise to support the achievement of its goals.

NIP management under the DDC

Regional offices are a cornerstone of NIP, designed to complement the central leadership. With experienced staff and strong supervisory support, they can sustain core functions and service delivery, providing stability and resilience when central capacity is stretched.

Public health administration at the provincial level

NIP benefits from established structures such as provincial communicable disease committees, which serve as effective platforms for multisectoral collaboration. In some provinces, immunization is prioritized within local policies, and the Provincial Health Office (PHO) demonstrates the ability to integrate immunization activities across sectors and mobilize additional funding sources beyond standard government allocations. This operational flexibility and strong local leadership enhance the Programme's resilience and effectiveness.

Experienced staff at provincial, district and community levels play a crucial role in sustaining strong immunization programme performance and fostering local innovation. Their expertise and

capacity help maintain programme momentum even when central leadership is limited, ensuring continued progress and adaptability within local contexts.

Challenges and the way forward

Policy and governance

Challenges	The way forward
1. **The absence of a clear, action-oriented implementation strategy** Despite strong policy directions outlined in the National Vaccine Security Policy and Strategic Plan (2023–2027), especially in the Strategic Pillar 1, progress has stalled. This is primarily due to the absence of a clear, action-oriented implementation strategy. For greater impact, a comprehensive plan is needed.	1. The DDC to develop a clear, action-oriented implementation strategy that aligns with national priorities, clearly defines the roles of responsible stakeholders and specifies funding sources.
2. **At both central and provincial levels, the roles of the MoPH and the MoI require clear definition at the junction of decentralization.** » Clarification is needed for the role of the MoPH (DDC, Inspector General Office, regional teams (ODPCs?(and Provincial Health Offices) in policy development, monitoring immunization programme delivery and providing technical support, and the role of the MoI in service delivery and outreach. » Both ministries should leverage their strengths. **(challenge or** recommendation**?)** Regular policy dialogue (between MoPH and MOI?) is essential through both existing national mechanisms and informal ones. (challenge or recommendation?) » A study on the decentralization situation and its impact on disease control and NIP is crucial as a key input for policy-level recommendations.	2. To optimize decentralization, the MoPH and the MoI should partner using existing coordination mechanisms and engage in regular policy dialogue to clarify roles, adjust strategies, and align goals, ensuring responsive and effective programme implementation. 3. The National Communicable Disease Committee (NCDC) and the National Vaccine Committee (NVC) should engage the MoPH and the MoI to ensure that oversight mechanisms for the immunization and VPD surveillance programmes are active in every province. 4. Provincial communicable disease committees (PCDCs), as mandated under the Communicable Disease Act, should have immunization and VPD surveillance programme performance as a standing agenda item. 5. The DDC, the NVI and academic partners should support the study on decentralization's impact on disease control and NIP, presenting results to the NVC and the NCDC to inform policy, encourage multisectoral collaboration and guide development of operational guidelines for effective implementation.

Challenges	The way forward
3. **Oversight and national-level and provincial performance monitoring of NIP remain inadequate.** » Ongoing monitoring for NIP, with regular reporting to the NVC through NITAG, provides critical policy guidance, **helps address** high-level barriers and fosters multisectoral collaboration. Challenge? » Although NITAG has a clearly defined mandate for monitoring programme performance and sets the agenda for evaluation, a thorough and comprehensive review is still needed to provide valuable input for its consideration.	6. The DDC, along with the NVI, should conduct routine, independent monitoring of NIP, including national and subnational indicators, submitting findings to NITAG, the NVC and relevant committees to guide continuous improvement. This should be established as an annual agenda. 7. The DDC, in partnership with the NVI, to ensure NITAG ToR and functions are consistent with the Operational Guidance for National Immunization Technical Advisory Groups 8. PCDCs should regularly review immunization and VPD surveillance performance, adjusting frequency based on programme outcomes and emerging threats.
4. Despite Thailand's strong policy commitment to providing vaccines for migrants, increased inflows due to regional instability present immediate and long-term challenges. Meeting these needs requires quick actions and sustainable funding to protect migrants without overburdening the immunization system.	9. The NVI and the DDC should rapidly deploy both immediate and long-term vaccination strategies for migrants impacted by border conflicts and civil unrest while strengthening collaboration with civil society and international partners to streamline efforts and mobilize additional resources. 10. WHO and international partners should actively support Thailand's deployment of both urgent and long-term vaccine strategies. This includes mobilizing resources and strengthening collaborative frameworks to ensure effective, equitable access to vaccination and public health services for all migrants in Thailand.

Finance

Challenges	The way forward
1. A key challenge for the immunization programme is managing rising vaccine costs, broadening coverage across all age groups and ensuring ongoing system improvements. » To address these pressures, the current funding model must be expanded through more diverse and innovative financing approaches, such as utilizing research grants, earmarked taxes and community-based contributions while keeping robust government support.	1. The DDC in partnership with the NVI shall add a comprehensive financial strategy as an element of the implementation strategy mentioned in bullet » The financial strategy should leverage multiple funding sources by diversifying financial streams and maintaining strong state commitment.
2. There is an urgent need to evaluate and develop new financing mechanisms to support vaccine provision for migrants, addressing both immediate needs and ensuring long-term sustainability.	2. The NVI, in collaboration with the DDC and WHO, should lead a study to identify innovative financing mechanisms that can address immediate vaccine needs for migrants and support long-term sustainability. These solutions should avoid placing additional constraints on the immunization system and be integrated with broader health services and basic rights initiatives across other sectors.

Challenges	The way forward
3. There is a growing number of middle-income countries (MICs) worldwide, many of which struggle to access vaccines due to segmented markets and prohibitively high prices. Unlike low-income countries, which benefit from global initiatives such as **Gavi, the Vaccine Alliance** and the Medicines Patent Pool (MPP), MICs lack dedicated support mechanisms and remain vulnerable to vaccine inequity.	3. WHO engaging with global health partners and Member States should **develop targeted mechanisms to strengthen** vaccine **access for MICs** while upholding principles of country ownership, self-reliance and sustainability. This may include expanding the eligibility for existing international support programmes, ensuring greater transparency in vaccine pricing and facilitating cooperative procurement arrangements to enhance bargaining power.

Structure of the programme and roles of key stakeholders

Challenges	The way forward
1. While the DDC, NVI and NHSO each bring vital expertise to NIP, gaps in coordination and unharmonized decision-making, combined with differing institutional priorities, risk slowing policy implementation and limiting vaccine access. » These differences arise because each agency emphasizes distinct objectives – for example, one may prioritize cost-effectiveness, another public health impact, while another operational feasibility. Without alignment, these varying priorities can create delays in consensus, reduce efficiency and hinder timely introduction of new vaccines or strategies for high-risk populations.	1. Establish an informal/formal coordination mechanism between the DDC, the NVI and the NHSO with clear procedures for joint decision-making, harmonized priorities, shared vaccine forecasting, procurement, management, fully integrated data systems and routine strategic planning sessions at both leadership and technical levels.

NIP management under the DDC

Challenges	The way forward
1. As a standard good practice following restructuring –particularly since most VPD Section staff are new – a thorough reassessment should be conducted. This review should evaluate clarity of roles, coordination within and across clusters and partners, and staff development opportunities to ensure the structure delivers on its purpose, supports integrated strategies and strengthens the team's capacity to provide effective technical leadership for NIP.	1. The DDC by the VPD Section shall **conduct a comprehensive outcome assessment of the VPD Section's** restructuring**.** This should review role clarity within and across clusters, assess whether the structure fosters integrated and coordinated work, and evaluate mechanisms for professional development.

Public health administration at the provincial level

Challenges	The way forward
1. Coordination mechanisms mandated under the Communicable Disease Act (PCDCs) are not fully functional or actively engaged in all provinces and may not be taking on the role of monitoring immunization and surveillance performance including in the context of decentralization.	1. PCDCs, as mandated under the Communicable Disease Act and other provincial-relevant mechanisms, should be a main platform to monitor immunization and VPD surveillance programme performance in the context of decentralization and emerging threats (refer to bullets 4, 8 under 'The way forward').

B. Human resource and capacity-building

Overview of human resources for health (HRH) and immunization workforce

Thailand has made significant advances in expanding its health workforce through a variety of strategies, but the delivery of health services remains challenged by ongoing shortages, uneven distribution and heavy workloads. With only 3.5 doctors and 15.6 nurses per 10 000 people, Thailand remains well below international standards set by the Global Strategy on HRH 2016 (44.5 per 10 000), with the most acute shortfalls affecting rural regions and primary care – the main point of contact for immunization and other crucial health services.

Notably, the immunization workforce is inseparable from the general health workforce, as staff are responsible for both vaccination and a broad spectrum of preventive and clinical services. Maintaining high immunization rates, therefore, depends on strengthening human resources for health (HRH) overall, especially at the primary care level.

To tackle workforce shortages in rural areas, Thailand has adopted a comprehensive set of recruitment and retention initiatives. These include increasing training opportunities for health professionals; implementing admission programmes targeted at rural students; mandating rural services for new graduates; and offering a mix of financial and non-financial incentives to encourage long-term retention. Tailored education and training programmes for rural health staff have further supported a more equitable distribution of the workforce, improving access to essential health services, such as immunization, for underserved communities.

Within the immunization sector, high staff turnover remains a pressing HR issue. Immunization work is particularly complex and demanding, with ambitious targets that require extra effort, compared with other roles. The retirement of seasoned staff, coupled with weak mentorship and succession planning, has resulted in many central, regional and provincial EPI teams being led by relatively inexperienced managers. Addressing these challenges necessitates a strategic investment in workforce development, including structured capacity-building, mentorship and succession programmes, to secure the long-term effectiveness and sustainability of Thailand's immunization efforts.

Thailand's accomplishments in UHC over the past decade are highlighted by high coverage rates and a strong commitment to investing in HRH. From 2014 to 2020, the number of doctors, nurses and midwives increased by 30%, enabling broader service delivery. The Primary Health System Act of 2019 reinforced community-based and primary care networks, while village health volunteers (VHVs), who have earned international recognition, played a vital role in reaching communities, especially during the COVID-19 pandemic and as part of the immunization workforce.

UHC has been driven by annual evaluations, budget increases and expanded coverage, with recent emphasis on urban health. Reforms in health professional education have improved both the quality and availability of training, and collaborative strategies have engaged civil society and global partners in health initiatives.

Despite these advances, key challenges persist in rural and primary care settings still suffer from workforce shortages, with most health professionals concentrated in urban tertiary hospitals. Demographic changes, emerging diseases and a growing burden of noncommunicable diseases (NCDs) are placing increased demands on health workers. Continued improvement in HRH management, especially for frontline and community-level staff, remains essential.

Policy and strategies

Primary Health Care Act 2019: The country's Primary Health System Act (2019) aims to strengthen primary health care (PHC) as the foundation for UHC and to ensure equitable access to quality health services nationwide. The law formalizes the district health system as the main entry point for care and mandates policy attention to both infrastructure and health workforce development. The Act is overseen by a National Primary Health Care Committee, which is tasked with establishing strategies, guiding policy decisions, planning health workforce requirements and resolving system-related challenges.

HRH strategies: Over the past decade, Thailand has implemented a structured HRH strategy to support UHC and strengthen the health system's responsiveness. The approach has combined workforce planning, education reform, equitable deployment, and incentives to address shortages and maldistribution.

In 2024, the Cabinet approved the 10-Year Health Workforce Reform Strategy in 2024, anchored on four pillars:

- Accelerate development of sufficient health personnel, covering production, development, promotion and regulation.
- Build an integrated, area-based public health system with coordinated public–private collaboration.
- Support health services with strong economic competitiveness.
- Strengthen governance and management of the health workforce.

Human resources for immunization

a) Central level: VPD section under the Division of General Communicable Diseases

From a human resources perspective, the reclassification of the VPD Unit from a division to a section has led to changes in resource allocation and staff composition. The section currently consists of 20 government employees and three temporary staff members, most of whom, including the Chief, have less than five years of experience in VPD and programme leadership roles. One of the employees has more than five years of relevant experience, while another has over 20 years; the remaining 17 hold operational-level positions.

Many staff members joined during the pandemic and were mainly involved in emergency response activities instead of comprehensive NIP management. Consequently, the workforce exhibits recent onboarding, varying levels of institutional memory, and areas for further development in planning, skills transfer and mentorship. In the past five years, five senior professionals with over 10 years of expertise have left, indicating ongoing considerations related to retention and workforce development. This situation highlights opportunities for structured career development, targeted training and effective succession strategies within immunization workforce management.

b) Regional level: Office of Disease Prevention and Control (ODPC)

Regional VPD and immunization programme teams generally have approximately four staff members dedicated to VPD surveillance and immunization programme implementation. These employees may

also take on responsibilities related to other communicable disease surveillance and associated tasks, which can result in a broader distribution of focus beyond core immunization duties.

Workforce development data show that of the 12 regional ODPCs, five NIP manager positions are held by staff with less than five years of experience and without senior supervision or formal mentorship. In one of the ODPCs, the EPI lead is an early-career professional with one year of experience and no senior oversight. These staffing characteristics indicate areas where expertise and opportunities for knowledge transfer and career progression are limited. This situation may impact performance and continuity in immunization programme management at the regional level, highlighting the importance of structured human resource planning, comprehensive onboarding, skill enhancement and succession management strategies.

c) Provincial, district and subdistrict level

EPI managers are represented at provincial, district and subdistrict levels; however, they frequently manage multiple responsibilities. Decentralization has led to ambiguity regarding human resource roles between the MoI and the MoPH, particularly at the subdistrict level. Despite the absence of current workforce data specific to immunization, ongoing operational challenges persist, including high turnover rates and retirements in the absence of an effective supervision system.

At the service delivery level, physicians are often occupied with outpatient and acute care duties, resulting in limited availability for preventive tasks such as immunization counselling and oversight. Nurses, who are primarily responsible for immunization activities, experience significant shortages within primary care settings and must contend with heavy workloads and multitasking demands, thereby restricting their capacity for vaccine management, follow-up and adaptation to new cold chain technologies.

Pharmacists are increasingly involved in vaccine administration in both hospital and community pharmacy environments, with over 40% indicating interest in vaccinator roles; nevertheless, they face obstacles stemming from unclear policy directives and insufficient immunization-specific training. Furthermore, VHVs – exceeding one million individuals – play an essential role in outreach, coverage monitoring and community engagement. To remain effective, they require continuous training to stay current with advancements in immunization practices, communication methodologies and data management systems.

Core functions, competencies and emerging needs of NIP managers and workforce

The success of NIP relies on a multitiered workforce – from national to community levels –working collaboratively to achieve high coverage rates, tackle vaccine hesitancy and sustain programme resilience. With increasing complexity arising from new vaccine introductions, advanced cold chain technologies and digital tools, clearly defined roles and competencies are critical. The following table summarizes the principal roles, key skills and emerging needs across all levels, underscoring priorities for workforce development, capacity-building and effective coordination necessary to uphold Thailand's immunization successes.

Table. Roles, skills and pressing needs of NIP across the health system

Level	Core roles	Key skills/competencies	Dynamic/pressing needs
National (DDC, NVI, NHSO, national committees)	Policy leadership, strategic planning, financing, guideline development, partner coordination	Strategic leadership, policy analysis, multisectoral coordination, financing and procurement, advocacy, data interpretation for national planning	Capacity to integrate new vaccine cost-effectiveness analyses; advanced data systems for forecasting and procurement; digital platforms for nationwide coverage monitoring; leadership in vaccine confidence strategies
Regional (ODPCs, regional offices)	Oversight, technical support, supervision of provinces, data analysis	Supervisory skills, data quality assurance, evidence synthesis, training facilitation, technical guidance	Advanced use of digital dashboards for real-time coverage and surveillance; capacity to analyze large datasets to guide support; application of predictive analytics for outbreak preparedness
Provincial (PHOs)	Operational planning, coordination of districts, M&E, outbreak response	Programme management, logistics coordination, data validation and analysis for decision-making, advocacy with governors/PAOs	Skills in using integrated digital health information systems; managing data for planning in decentralized contexts; linking vaccine coverage data with health outcomes; using e-learning for data training
District (DHOs, hospitals)	Service delivery oversight, supervision of health centers, community engagement	Routine service monitoring, staff supervision, outbreak response, basic statistical analysis of coverage gaps, engagement with local leaders	Competence in using digital tools for real-time reporting; analyzing stock and coverage data to improve microplanning; targeted vaccine hesitancy interventions informed by local data
Subdistrict (health-promoting hospitals, health center**rs**)	Direct vaccine delivery, community mobilization, record keeping	Technical vaccination skills, cold chain maintenance, accurate data entry, reporting and use, community communication	Use of mobile apps for coverage tracking; electronic immunization registries; ability to interpret local data for planning outreach; digital refresher training
Village health volunteers (VHVs)	Household-level mobilization, tracking of children & migrants, health education	Community trust building, interpersonal communication, basic data collection and reporting, rumor management	Training in simple digital data tools (apps, chat platforms) for household tracking; use of infographics to present data to communities; capacity to flag trends in vaccine hesitancy or missed vaccinations

Capacity-building

The National Vaccine Security Policy and Strategic Plan B.E. 2566–2570 (2023–2027) places strong emphasis on capacity-building as a foundation for self-reliance and public health resilience. This approach promotes investment in training, recruitment and development for vaccine scientists, manufacturing staff, regulatory experts and the wider immunization workforce.

The NVI coordinates with the DDC, ODPC and provincial health offices to deliver diverse, structured training programmes – both in-person and online – specifically designed for EPI staff. These programmes standardize immunization practices, foster ongoing skill development and incorporate

local experts to address regional needs. Such collaboration reflects a commitment to strengthening workforce competencies.

Thailand has established a comprehensive EPI training curriculum covering essential topics: immunology; vaccination schedules; catch-up guidelines; VPD management; administration techniques; cold chain logistics; adverse event monitoring; and use of digital tools such as the Child Vaccination Tracking Registry. Additional initiatives include training-of-trainers programmes, the "Guru Vaccine" knowledge-sharing platform and government-supported academic training.

However, training activities often remain fragmented and disconnected from broader human resource planning, lacking systematic needs assessments. Key areas – such as addressing vaccine hesitancy and enhancing communication skills – are insufficiently covered. Budget constraints further limit the ability of regional and provincial health offices to maintain these programmes. To address these issues, a coordinated, sustainable approach is needed, linking capacity-building with ongoing HR planning and continuous skill development to meet both current and future demands. A forward-looking plan is essential to ensure the immunization workforce is prepared with advanced technical, analytical and communication skills.

Strengths in HR and capacity-building

1. Strong national commitment and investment in HRH: Thailand has made significant progress in expanding its health workforce, with a 30% increase in the number of doctors, nurses and midwives in 2014–2020, supporting broader UHC and immunization goals.
2. Multitiered workforce for immunization: NIP relies on staff from national, regional, provincial, district, subdistrict and community levels, including over one million VHVs, ensuring outreach and coverage even in remote areas.
3. Structured capacity-building initiatives: Thailand has developed comprehensive EPI training curriculums covering immunology, vaccination practices, cold chain logistics, adverse event monitoring and use of digital tools. Platforms such as "Guru Vaccine", training-of-trainers programmes and academic-led sessions strengthen knowledge transfer.
4. Policy frameworks supporting workforce development: The Primary Health Care Act (2019) and the National Vaccine Security Policy and Strategic Plan (2023–2027) provide clear mandates for strengthening human resources, integrating immunization into broader health workforce planning, and promoting self-reliance and sustainability.
5. Evidence-based, multisectoral coordination: National, regional and provincial teams collaborate with academic partners and civil society to guide programme implementation, ensuring technical oversight, supervision and data-driven decision-making.

Challenges

1. Persistent workforce shortages and uneven distribution: With 3.5 doctors and 15.6 nurses per 10 000 population, gaps are most severe in rural areas and at the primary care level, limiting immunization service delivery and preventive care.
2. High turnover and loss of institutional memory: Many immunization staff members are recent recruits with limited experience, particularly at central and regional levels, while senior personnel retire or leave, reducing mentorship and succession capacity.

3. Fragmented training and capacity-building efforts: Existing initiatives are often implemented in isolation without integration into broader HRH planning or systematic needs assessments, limiting their effectiveness in addressing emerging challenges such as vaccine hesitancy and communication skills.
4. Complexity of decentralized roles: Ambiguities in responsibilities between the MoPH and local authorities (PAOs) at subdistrict and district levels complicate supervision, planning and coordination.
5. Evolving technical demands: The introduction of new vaccines, advanced cold chain technologies, digital tools and data management requirements necessitates updated technical, analytical and communication skills across all levels of the workforce.
6. Financial constraints: Reductions in government training budgets and limited dedicated funding for ongoing workforce development impede systematic capacity-building, particularly at regional and provincial levels.

The way forward/recommendations

The NVI and the DDC should develop a 10-year human resource for immunization and capacity-building plan, incorporating the following priorities:

1. Integrate with broader HRH planning: Embed recruitment, retention, capacity-building and succession strategies for immunization staff within overall health workforce planning, with clearly defined roles, responsibilities and accountability at all levels.
2. Strengthen training programmes: Establish a systematic, forward-looking capacity-building framework covering core immunization skills and emerging needs, including digital tools, data management and analysis, cold chain technologies, vaccine hesitancy communication and leadership development.
3. Enhance mentorship and succession: Implement structured mentorship, coaching and career pathways to retain institutional knowledge and cultivate experienced leadership at central, regional and provincial levels.
4. Sustain VHV engagement: Provide incentives and capacity-building opportunities to adapt VHVs to new technologies, digital tools and community communication needs, while supporting their role under decentralized systems.
5. Secure sustainable funding: Mobilize dedicated resources – both domestic and through partnerships – to ensure ongoing training, retention incentives and capacity-building activities, particularly for rural and primary care staff.
6. Adopt data-driven workforce management: Utilize integrated data systems to monitor staffing, performance, coverage gaps and skill needs, supporting evidence-based decisions for workforce allocation and targeted training.
7. Expand task-sharing: Enable pharmacists and other cadres to contribute to immunization delivery through structured training and policy support.
8. Prepare for future challenges: Build adaptive capacity to address emerging diseases, new vaccine technologies and evolving population health needs, ensuring a resilient workforce capable of sustaining high coverage.

C. Coverage and AEFI

Immunization coverage in Thailand

Despite Thailand's overall strong performance in immunization, there is low vaccination coverage in some provinces and population groups, resulting in endemic transmission of VPDs, especially measles in southern provinces. Coverage is also suboptimal in some northern and northeastern provinces, leading to the risk of potential spread of disease to other parts of the country. Coverage is particularly uncertain for migrant groups (both internal and external) leading to possibilities of sustained transmission and spread within Thailand.

Current coverage trends

- **Nationally**: Routine immunization coverage remains relatively high (often >85%–90%), though it fell during the COVID-19 pandemic and has been slowly recovering since then.
- The 2022 Multiple Indicator Cluster Survey (MICS) found national averages of above 90% for BCG and MMR1 but below 90% for other antigens.
- Coverage in Pattani province is among the lowest in the country with only 54% of children fully immunized by age one, dropping to 41% by age three. The problem is well noted at provincial and central levels, but progress in addressing the low coverage has been mixed. (what does it mean?
- Based on JRF subnational data,[2] Thailand has a **target population of 417 957** children under one year, with an estimated **7.97% of this population being zero-dose** (i.e. children who have not received DTP1), translating to approximately **33 311 zero-dose children** nationwide.
- Sub nationally, the **southern provinces of Pattani, Narathiwat and Yala** show the lowest DTP1 coverage rates (69.5%, 77.6% and 79.7% respectively) and the highest dropout rates between DTP1 and DTP3 (ranging from 17%–29%). **Roi Et** and **Pathum Thani** show relatively higher DTP1 coverage (around 85%) and minimal or negative dropout rates, indicating better completion of the DTP series.
- In terms of absolute numbers, **Pattani, Narathiwat and Yala** also account for the **largest number of zero-dose children**, reflecting both coverage and population effects. Pattani alone contributes nearly **3000 zero-dose children**.
- The current reporting systems are not inclusive of immunizations carried out by a range of service providers, including many private practitioners. This greatly limits the capacity of the national programme to identify coverage gaps and develop realistic plans to address them.
- Migrant and mobile populations are often excluded from official denominators due to mobile in nature, further distorting coverage estimates – particularly in provinces with large proportions of migrants – and masking pockets of low coverage.
- Coverage for several vaccines has declined post-COVID-19, with incomplete recovery to pre-pandemic levels

2 **Data Source: WHO/UNICEF Joint Reporting Form (JRF) – subnational data for Thailand**

Top five provinces with lowest DTP1 coverage in %	Province name	DTP1 coverage in %	DTP3 coverage in %	Dropout [(DTP1–DTP3)/DTP1]
1	Pattani	69.5	49.6	29%
2	Narathiwat	77.6	57.6	26%
3	Yala	79.7	66.5	17%
4	Roi Et	84.7	86.1	-2%
5	Pathum Thani	85.0	85.3	0%

Measurement of coverage

- **Administrative reporting**: Coverage is primarily assessed through the **Health Data Centre (HDC)** system, based on doses administered (numerator) divided by the target population registered and stayed in the areas responsible by public health facilities in 76 provinces excluding Bangkok (denominator).
- **Denominators**: The target population including under-one population is estimated from a range of sources that may vary by province.
  - » Administrative coverage calculated for the routine vaccines represents only a portion of the target population (birth cohort of 462 240 vs EPI target of 259 872 in 2024), and true coverage of a significant proportion of the population, including migrant populations, is not captured by current reporting processes and is unknown.
  - » MoI birth registration data (updated mid-year) is one source. However, late registration of births may lead to undercounting of infants, artificially inflating coverage rates. For example, this concern was noted in **ODPC Region 12**, where the under-one denominator appears low compared with older age groups. This could be explored in other provinces.
  - » The target population may also be estimated based on service users recorded in the HIS, supplemented by reports from village health workers; however, this may miss people who do not access services and/or are highly mobile or irregular migrants.
- **Survey data**: Thailand previously used **30-cluster coverage surveys** to validate administrative data, the last survey was conducted in 2018. . A new national survey is planned for **2026**.
- **Levels of monitoring**: Coverage is monitored at national, regional, provincial and district levels, but subdistrict (HPH)-level monitoring is reportedly not as strong. For example, while data are submitted at this level, there is limited review, analysis, or follow-up action.
- **Dropout rates** (e.g. Penta 1→Penta 3; Penta 3→MCV1) are not routinely assessed.
- The rapidly decreasing birth rate in Thailand can potentially impact workflows relating to immunization and the monitoring of service delivery. Better understanding of programme coverage will be essential to understand whether lower activity figures are a result of lower births or programme issues. Furthermore, estimation of denominators for EPI and disease control activities, and for outbreak response, will be impacted.

Accuracy and limitations of reported coverage

Thailand's strong immunization infrastructure is undermined by persistent **data quality challenges**:

- **Uncertainty in target population denominators**
  - Administrative coverage calculated for routine vaccines represents only a portion of the target population (birth cohort of 462 240 vs EPI target of 259 872 in 2024), and true coverage of a significant proportion of the population, including migrant populations, is not captured by current reporting processes and is unknown.
  - Migrants and late birth registrations are excluded from the denominator, which likely results in overestimation of coverage.
- **Fragmented and complex data systems**
  - **Bangkok Metropolitan Administration (BMA)** data are not fully integrated into national systems.
  - Diverse data platforms (HDC, local hospital systems, paper records, vaccination books, surveys) result in incomplete data collation, producing gaps and sometimes underestimated coverage.
  - Provincial PHOs and many service units face limitations in coordinating with IT teams to manage, correct and verify data before submission to the HDC.
  - Provincial administrative offices do not have access rights to the HDC, preventing them from monitoring data in the HDC reporting system. As a result, they must create their own data systems to utilize the information and submit it to the HDC.
  - **Private sector reporting** is incomplete, especially in urban areas such as Bangkok.
- **System functionality and usability**
  - The **My PCU system** has replaced earlier programmes across health-promoting hospitals transferred to POAs. While useful, it requires additional administrative support and training. District-level staff are needed to troubleshoot problems and provide guidance.
  - Accessing immunization data in the HDC for populations registered in other provinces remains a bottleneck, affecting synchronization of electronic immunization registers. The lack of a system linking immunization service delivery in public and private hospitals creates limitations and necessitates manual synchronization, which can compromise data quality.
  - Variables in national systems are **not standardized** (e.g. OPV3 vs DTP-HepB-Hib), creating confusion and limiting comparability with international standards.
  - **Personal data protection regulations** prevent HPHs from extracting child-level data (e.g. names), hindering active follow-up of defaulters.

Recommendations

- **Reassess denominators**: Review under-one population estimates, including late birth registrations and migrant children, to improve denominator accuracy.
- **Conduct data quality assessments (DQAs):** Ensure systematic evaluation of data flow, integration, and accuracy across all levels, including the HDC and facility systems.
- **Strengthen surveys**: Resume regular coverage surveys, with inclusion of all groups (migrants, urban poor, border populations), to validate administrative data; include specific

measures to get an adequate sample migrant population, such as respondent-driven sampling.

- **Improve systems interoperability**: Advance digital transformation with a "once-and-done" approach to link BMA, HDC and private sector systems, ensuring standardized variables aligned with immunization schedules.
- **Enhance subdistrict action**: Build capacity at the HPH level to review, analyse and act on data, not just report upwards.
- **Dropout monitoring**: Institutionalize tracking of series completion (Penta, MCV) and act on gaps.
- **Dedicated administrative support**: Provide trained staff at the district level to troubleshoot and support **My PCU** and other digital platforms.
- **Policy adjustments**: Review data protection policies to balance privacy with operational needs, enabling frontline workers to follow up on unimmunized children.
- **In line with recommendations of Thailand's internal review, increase vaccine coverage to meet benchmarks** through relevant laws, such as the Communicable Disease Act B.E. 2558, Vaccine Security Act B.E. 2561 and Primary Health Care Act B.E. 2562 (with accompanying MoPH regulations and penalties).
- **Conduct proactive communication** with relevant agencies and the public on the importance of routine vaccines.
- **Develop a comprehensive vaccine information system** covering all health-care facilities (consider DDS, PHR) and establish unified data-sharing channels with other agencies.
- **Make routine vaccine coverage a local performance indicator**, as it is a fundamental aspect of public safety against outbreaks.
- **Targeted interventions in low-coverage areas**: Scale up outreach and other proven actions that have raised coverage in high-risk provinces such as Pattani; institutionalize innovations such as **Twin-Village Immunization Days** (reported in Tak province) for synchronized service delivery.

In summary: Thailand maintains strong immunization coverage overall, but coverage is uneven (very low in places such as Pattani) and data quality issues – particularly denominator uncertainty, fragmented systems and weak dropout monitoring – limit the accuracy of reported coverage and thus the ability to target interventions effectively.

D. Adverse events following immunization

Background AEFI monitoring and reporting system.

Thailand's AEFI reporting system is guided by formal national guidelines developed by the Thai Department of Disease Control (DDC) and the Thai Food and Drug Administration (FDA). The system uses standardized reporting forms – AEFI Forms 1 and 2 from the DDC and the online adverse event (AE) report form from the FDA's Health Product Vigilance Centre (HPVC) – which include all core variables recommended by WHO. Both the DDC's Division of Epidemiology and the FDA's HPVC operate online AEFI reporting platforms (the AEFI-DDC system) to facilitate timely data entry and review. Importantly, the two agencies share AEFI data across their respective databases, ensuring coordinated national monitoring and joint analysis of vaccine safety.

AEFI reports in Thailand come from multiple sources coordinated by the DDC and the FDA. The DDC's Division of Epidemiology receives reports from health facilities (public and private hospitals, including the Social Medicine Division) as well as from provincial and regional health offices. The FDA's HPVC gathers reports from government and private hospital pharmacy departments, marketing authorization holders (MAHs), such as vaccine manufacturers or distributors, and consumers. This multisource approach enables comprehensive monitoring of vaccine safety across the health system.

The HPVC plays a central role in monitoring, analysing and assessing AEFIs. It collaborates closely with the Division of Epidemiology, Department of Disease Control, to collect and evaluate AEFI reports, and ensure appropriate investigation and response. The HPVC provides safety data and analysis to the Thai FDA and national committees to guide vaccine safety decisions. It also contributes to global safety surveillance by sharing AEFI reports with WHO's VigiBase and exchanging information with international partners. In addition, the HPVC coordinates across national and external organizations, strengthens the AEFI surveillance network, and supports system improvements through initiatives such as the Situation Awareness Team (SAT) and the development of sampling and monitoring plans for vaccine safety.

Role of the AEFI Advisory Committee in Thailand

The AEFI Advisory Committee in Thailand serves as the national expert body responsible for reviewing, analysing and providing guidance on AEFIs. Its primary roles include:

- **causality assessment:** reviewing serious or unusual AEFI cases to determine the likelihood of a causal relationship between the vaccine and the reported event, following WHO-recommended methodologies.
- **technical advice:** providing expert recommendations to the DDC, the Thai FDA and the MoPH on vaccine safety issues and appropriate responses.
- **oversight and coordination:** supporting national AEFI surveillance by ensuring consistent standards for case investigation, data interpretation, and reporting.
- **capacity-building:** advising on training needs and improving the capacity of provincial and regional investigation teams (SAT/JIT); and
- **communication:** contributing to evidence-based communication on vaccine safety to health authorities and the public.

In essence, the committee ensures that AEFI data are scientifically reviewed and interpreted, helping maintain public confidence and informed decision-making on immunization safety in Thailand.

Thailand's AEFI reporting and response performance.

According to WHO global guidance on AEFI surveillance and vaccine safety monitoring:

- Countries should report **at least ten serious AEFI cases per 1 000 000 population per year** as a minimum benchmark for a well-functioning surveillance system.[3]
- **100% of serious AEFI cases** (e.g. deaths, hospitalizations, life-threatening or disabling events) should be investigated to confirm details, identify potential causes, and rule out programmatic or coincidental factors.
- At least 80% of investigated serious AEFI cases should undergo a formal causality assessment, ideally conducted by a national expert committee using WHO's structured causality assessment algorithm.

These standards ensure that countries maintain a responsive, evidence-based vaccine safety monitoring system and contribute effectively to global pharmacovigilance.

Thailand is currently not meeting these targets, with only 1.35 and 0.85 serious AEFIs reported per 1 000 000 population in 2023 and 2024, respectively. While all of these were investigated, causality assessment was completed on only 20% and 9% in 2023 and 2024 respectively (though many were found to be ineligible as they did not meet the criteria for serious AEFIs). Of the eligible serious AEFIs, 51% underwent causality assessment in 2023 and 26% in 2024. Causality assessments could not be completed in eligible cases primarily due to unavailable or incomplete medical records.

Provincial-level vaccine safety and AEFI management

Most provinces visited had AEFI surveillance and response systems in place, though the application varied between provinces. The system involved:

1. systematic pre-vaccination screening for contraindications prior to vaccination;
2. 30-minute post-vaccination observation period for children;
3. active AEFI surveillance conducted by VHVs in certain provinces, districts and subdistricts; in some locations, this was reportedly taking place on days 1, 3, 7, 14 and 30 after vaccination, e.g. Pattani; however, the findings from these efforts not consistently recorded or analyzed;
4. vaccine vials kept for seven days post-vaccination in case of AEFI reporting and investigation;
5. AEFIs being reported but with a particular focus on monitoring serious cases through passive reporting to the DDC or the Thai FDA; and
6. risk communication responses established for serious AEFIs.

Overall, Thailand's AEFI reporting is below expected levels, indicating the need for improved detection, reporting and collation. Different provinces demonstrated strengths and areas for improvement. In Sukhothai, staff demonstrated a strong understanding of the guidelines, and they follow them appropriately. Follow-up after each vaccine does not stop after 30 minutes of observation.

3 This figure is not an expected incidence rate of vaccine reactions but an indicator of the sensitivity and performance of national AEFI reporting.

Instead, VHVs conduct home visits, showing great commitment to safety. Health personnel have been trained on related topics, including resuscitation, which prepares them for serious AEFIs and emergencies.

In Chiang Rai, AEFI monitoring was found to be suboptimal, with unclear roles in causality assessment and inadequate documentation of follow-up. In Udon Thani, the LINE-App is used for AEFI reporting with the support of volunteers, enabling effective communication and diligent follow-up throughout the process. However, there was a lack of detailed information on non-severe AEFIs and underreporting of AEFIs was noted.

Recommendations

1. Systematic assessment of the capacity of clinics to detect, respond and report AEFIs is recommended, e.g. the availability of AEFI kits, including protocols for management, adherence to protocols for reporting and staff training.
2. Timely completion of causality assessment and prompt communication of the conclusions for severe AEFI cases should be ensured to prevent misinformation.
3. It is recommended that the data collected by VHVs on AEFIs be collated and analyzed in order to get a better picture of the incidence of adverse reactions following immunization.
4. Regular drills and reviews should be conducted in each province for responses to AEFIs, including crisis communication; these will help clarify roles and responsibilities and identify further support needed, and can be used to update the protocol.
5. Strengthening key capacities to enhance the quality, coordination, and responsiveness of Thailand's vaccine safety monitoring system:
    (a) The main capacity-building needs for DDC staff include AEFI surveillance, investigation, and causality assessment.
    (b) For HPVC staff, the key needs include data analysis, risk and signal management for medicines, adverse event reporting, and causality assessment.

E. Vaccine supply, quality and logistics

General findings

Across the reviewed provinces, Thailand's Immunization Programme demonstrates a strong foundation in vaccine supply and logistics, with most areas maintaining adequate cold chain infrastructure and consistent vaccine availability. The use of digital tools, such as the Vaccine Management Information (VMI) System and electronic temperature monitoring devices, is becoming increasingly common, contributing to improved stock management and enhanced oversight of the cold chain.

However, several systemic challenges persist. These include the use of non-WHO Performance, Quality and Safety (PQS)-certified equipment, inconsistent forecasting methods that often exclude migrant populations and fragmented data systems that hinder integration of private sector contributions. Training gaps among vaccine handlers and occasional stockouts – particularly of adult or IPV vaccines – were also reported. These issues collectively impact the efficiency, equity and resilience of the vaccine supply chain.

Province-specific findings

In **Chiang Rai**, the cold chain and supply chain systems are generally reliable, with no reported stockouts of routine EPI vaccines. However, temporary shortages of adult vaccines were noted, and inconsistencies in vaccine forecasting and procurement practices were observed across health facilities. Equity concerns persist for non-Thai populations, while private sector reporting remains inconsistent.

Chonburi maintains strong vaccine management practices, but the province was affected by a national IPV stockout in 2024. A significant concern is the widespread use of domestic refrigerators and vaccine carriers that do not meet WHO-PQS standards, particularly at subdistrict hospitals. Although temperature monitoring is robust, the diversity of devices and software used creates operational challenges. Training gaps among vaccine handlers, especially in shake tests and ice pack conditioning, were also identified.

With regard to **Tak**, the province benefits from sufficient cold chain capacity and real-time temperature monitoring. The VMI System supports digitalized stock management, and a pull-based shipment model helps reduce wastage. However, vaccine forecasting relies heavily on historical data and does not adequately account for migrant populations, leading to underestimation and stockouts. The continued use of non-WHO PQS-certified refrigerators and delays in vaccine delivery, including a two-month IPV shortage in 2024, were also reported.

Udon Thani demonstrates strong cold chain monitoring and contingency planning, ensuring continuity of care from antenatal to child stages. Nonetheless, occasional delays in vaccine stock replenishment and sporadic power outages at health facilities present logistic challenges that could compromise vaccine integrity.

In **Sukhothai**, decentralized vaccine management and procurement through the VMI System are functioning effectively. The province adheres to national standards for cold chain storage and transport. However, there is a risk of premature equipment failure, underscoring the need for regular assessments of cold chain infrastructure.

Bangkok and **Pattani** did not provide detailed findings specific to vaccine logistics in the reviewed document, although broader systemic issues, such as data integration and surveillance, were noted.

General recommendations

1. **Adopt effective vaccine management (EVM) framework**: Institutionalize EVM assessments to monitor and improve vaccine supply chain performance at all levels.
2. **Standardize cold chain equipment**: Replace all non-WHO PQS-certified refrigerators and vaccine carriers, particularly in subdistrict and rural facilities, to ensure compliance with international standards. This includes introducing new freeze-free cold boxes and vaccine carriers for distribution and immunization services, which reduce the risk of freezing vaccines during distribution and service delivery. Standardization of the use of remote temperature monitoring devices in the province, district and health facility levels would improve the temperature monitoring system in the country.
3. **Improve forecasting systems**: Develop and implement systematic forecasting, and procure SOPs that incorporate real-time population data, if possible, including migrants and mobile populations, to reduce the risk of stockouts. Additionally, it is recommended to procure WHO PQS-prequalified vaccines with vaccine vial monitors (VVMs) for all routine immunizations.
4. **Enhance training for vaccine handlers**: Provide regular refresher training on cold chain management, including shake tests, ice pack conditioning and use of electronic monitoring devices.
5. **Reduce digital health fragmentation, strengthen private sector integration**: mandate and support the inclusion of private sector data in vaccine stock estimation and reporting systems to improve accuracy and equity.

Province-specific recommendations

- **Chiang Rai**: Address inconsistencies in vaccine forecasting and procurement; integrate private sector data into stock estimation systems.
- **Chonburi**: Replace domestic fridges and non-compliant carriers; standardize temperature monitoring tools and provide targeted training for vaccine handlers.
- **Tak**: Update forecasting models to include migrant population data; replace non-compliant cold chain equipment and plan for outbreak response immunization.
- **Udon Thani**: Improve stock replenishment systems and invest in backup power solutions for health facilities.
- **Sukhothai**: Conduct regular assessments of cold chain equipment to prevent premature failure and ensure reliability.

F. Immunization service delivery

Thailand's health-care system provides extensive services – both basic and life-course vaccination – primarily through a vast network of government and private facilities for Thai citizens and migrants free of charge, while private hospitals offer vaccines commercially. Despite overall good quality and equity, challenges remain in reaching missed populations, maintaining vaccine delivery priority, and coordinating between public and private providers.

Strengths of the system

1. **Broad coverage and different types of facilities:** The country has a high number of health-care units that offer basic vaccination services (12 antigens), ensuring widespread access.
    (a) Government hospitals: As of 2024, the MoPH operates 905 hospitals, including regional, general and community hospitals that serve every district. Additionally, around 9768 public health units (subdistrict health-promoting hospitals) cover every subdistrict,
    (b) University and BMA hospitals: An additional 15 medical schools are run by the Ministry of University Affairs, and the BMA manages 11 general hospitals in the capital.
    (c) Private hospitals and clinics: There are approximately 370 private hospitals, with most located in Bangkok and other large cities. These large hospitals provide life-course vaccination, but the 24 800 private clinics provide only some specific antigens, such as tetanus.
2. **Free, integrated services:** Vaccines under EPI are a mandatory and free service component at all government hospitals and health centers. These services are integrated into well-baby clinics, which operate on a fixed weekly or monthly schedule. Parents receive a "well-baby record book" with the national immunization schedule to track their child's vaccinations. Although most vaccinations are clinic-based on a fixed date each week or month, some outreach vaccinations are carried out in schools or special settings or events, such as influenza and HPV.
3. **Migrant worker services:** Legally employed migrant workers and their families, numbering around 3.34 million as of early 2025, are eligible for vaccination services similar to those available for Thai citizens. The MoPH also offers a co-pay health insurance card for undocumented migrants, providing them with medical care and vaccinations. Approximately 550 000 of these cards have been sold, with an additional 60 000 for accompanying individuals.
4. **International organization and nongovernmental organization services** for displaced populations in some special provinces, such as in Tak, Chiang Rai and Mae Hongson: several international organizations and NGOs provide clinical care and vaccination with interpretation. The services include clinic based as well as outreach activities.
5. **Role of VHVs:** There are 1.04 million registered VHVs, who serve as a link between health services and the community. These health volunteers help the target population receive vaccination and track defaulters as well. There are also special migrant volunteers in areas which have well-established migrant communities.

Key challenges

1. Suboptimal catch-up activities: While guidelines exist for identifying and following up on children who miss vaccinations through calls or home visits, this process is not fully functional in some areas that show low coverage. This is often due to lack of staff members, who oversee the programme, inadequate supervision and fragmentation of the programme due to decentralization.
2. Low prioritization: Vaccination performance is not a key performance indicator for the MoPH. The ministry's focus is on other indicators, such as the maternal mortality ratio and age-appropriate development milestones in preschoolers. This lack of emphasis means administrators tend to prioritize other areas. At the delivery unit, the staff strength for administering vaccinations is adequate, but the number of staff members who oversee the programme and solve problems is insufficient.
3. Private vs public services: Private hospitals also provide basic and life-course EPI vaccines, but these are not free. While no official data exist, it is believed that the proportion of basic EPI vaccinations provided by private hospitals is not high, except in the Bangkok Metropolitan Area, where, unofficial data suggest, they account for 20%–30% of vaccinations. However, the information on vaccination, such as the number of children and the number of complete doses, is currently not shared by private providers. Supervision and quality control on the coverage and safety of immunization are also not well established.

Recommendations

To improve immunization services, it is recommended that:

1. the DDC include the coverage of complete vaccination for children under two years of age as a key performance indicator for the MoPH as well as the MoI;
2. the EPI at the national level identifies low-vaccine coverage provinces and work with them to plan and conduct effective catch-up activities or supplementary immunization activities (SIAs) for missed children; and
3. each PHO coordinate with the private sector and local authority through the Provincial Communicable Disease Control Committee to share information, initiate supervision and conduct human resources training to improve vaccine service delivery.

G. VPD surveillance

Thailand's Division of Epidemiology, Department of Disease Control, leads the national effort to detect, respond to and prevent VPDs. The surveillance system covers a wide range of diseases and integrates both indicator-based and event-based approaches. The system has evolved from paper-based reporting to a fully digital platform, enabling timely data submission, analysis and dashboard visualization. Surveillance includes communicable diseases under the Communicable Disease Act, hospital-based laboratory surveillance, event-based surveillance and sentinel surveillance for specific diseases. Individual case detection is used for infectious, chemical, radiation and injury events.

Structure

Thailand's VPD surveillance system is established under a comprehensive legal framework that defines the responsibilities and powers of national, provincial and local authorities. The system is overseen by a National Communicable Disease Committee, chaired by the MoPH, which sets policies and guidelines. Provincial communicable disease committees, led by provincial governors, implement these policies at the local level.

In Bangkok, a separate committee operates under the Governor. At the district level, communicable disease control operation units are established, each with designated officers and health officials. The Act mandates that health-care providers, laboratories and relevant institutions report suspected or confirmed cases of communicable diseases to designated officers. Surveillance also extends to ports of entry, with coordination for international disease threats.

Key VPD surveillance programmes

- **Polio/AFP surveillance:** There is zero reporting for AFP in children under 15, with weekly and monthly reporting, vaccination coverage monitoring and wastewater surveillance.
- **Measles and rubella surveillance:** Case classification involves laboratory testing, specimen collection and reporting. Outbreaks trigger rapid investigation and response.
- **Congenital rubella syndrome (CRS):** CRS is reported separately from rubella, with sentinel surveillance in hospitals nationwide to improve detection.
- **AEFI surveillance:** Monitors AEFIs, classified as notifiable. Both passive and event-based surveillance are used, with a national expert committee for causality assessment.

Performance indicators

- **AFP surveillance:** High completeness and timeliness of reporting, but non-polio AFP rates and follow-up rates remain below targets in recent years.
- **Measles and rubella:** Investigation, initiation and specimen collection rates are generally high, but some indicators (e.g. reporting rates, specimen receipt within five days) fall short of targets.
- **Outbreak response:** There are established protocols for rapid investigation and control of diphtheria, pertussis, neonatal tetanus, measles and rubella outbreaks at all administrative levels.

Disease situation and trends

- Thailand has sustained polio-free status for several years.
- Measles cases have fluctuated, with major outbreaks in recent years, but there has been a reduction in 2025.
- Rubella has seen sporadic outbreaks, with low case numbers recently.
- Pertussis outbreaks have occurred in Deep South provinces and schools.
- Neonatal tetanus cases are isolated, often linked to home deliveries among migrant populations.
- Diphtheria incidence is low, with sporadic outbreaks and cases across age groups.

Cross-border collaboration

Thailand collaborates with neighboring countries for border health diplomacy and VPD reporting, especially in border provinces, and leverages platforms such as the Association of Southeast Asian Nations (ASEAN) and the WHO Regional Office for South-East Asia (WHO-SEARO) for cross-reporting.

Outbreak response mechanism

Rapid response teams and communicable disease control units are deployed at all administrative levels, with thousands of trained teams.

Event-based surveillance, verification, investigation and control measures are implemented, supported by VHVs.

Networking, training and evaluation

National workshops and webinars strengthen networks and update knowledge on VPDs and AEFIs, with high participation from hospitals and health offices. Retrospective case reviews are conducted annually in regions with low surveillance performance. Enhanced case notification systems improve outbreak investigation and response.

Strength

- The legal framework provides clear authority for surveillance, notification and rapid response to VPDs.
- There is strong coordination between national, provincial and local levels, ensuring a unified approach.
- Disease control officers have the authority to order isolation, quarantine, immunization and other measures to prevent disease spread.
- The system is aligned with IHR (2005), supporting Thailand's role in global health security.

Challenges

- There is a preference for clinical case diagnosis over a "syndromic approach" for VPD surveillance, largely due to limited understanding. Thus, surveillance indicators for AFP and rash and fever do not meet global standards.

- There are issues with obtaining and transporting samples from suspected cases as they need clinicians' prescriptions and clinicians are not attuned to prescribing tests for syndromic surveillance.
- Coordination across multiple administrative levels can be complex and requires effective communication.
- Sustaining adequate resources, including trained personnel and laboratory capacity, is essential, especially in remote or high-risk areas.
- Ensuring compliance with reporting requirements by all mandated parties can be difficult; enforcement is necessary.
- Maintaining vigilance and preparedness for VPDs during periods without outbreaks requires ongoing investment and public engagement.

The way forward

- Continued investment in training, laboratory infrastructure and operational resources at all levels will strengthen surveillance.
- Improving data integration across health sectors will support more timely and effective responses.
- Expanding public awareness and community participation in surveillance and immunization efforts will help close immunity gaps and improve reporting.
- Regular review and updating of regulations and operational guidelines will ensure the system remains responsive to emerging threats.
- Strengthening collaboration with neighboring countries and international agencies will enhance the ability to detect and respond to cross-border VPD threats.

H. Demand generation

Thailand's Immunization Programme demonstrates strong vaccine acceptance and high coverage, supported by a robust primary health care system and an extensive network of VHVs. Although the COVID-19 pandemic has fueled mistrust and heightened hesitancy towards certain vaccines, such as influenza, these negative effects have remained limited and are continuing to improve.

A particularly persistent challenge of high vaccine hesitancy, coupled with low vaccine coverage, exists in the Deep South (Pattani). This challenge has been long identified as well as highlighted in the previous Joint EPI and VPD Surveillance Review held in 2014. According to the annual report on monitoring of implementation of the National Immunization Programme by NITAG in 2024, social and behavior change communication (SBCC) was used to create an appropriate message to encourage parents in the Deep South raising awareness and get their children vaccinated. It was also well recognized that in the vaccine hesitancy in Deep South provinces remains a complex issue that is influenced by multiple factors.

There is an urgent need to scale up interventions that have proven effective to address these gaps and strengthen vaccine uptake, especially in the Deep South. Lessons can be drawn from successful approaches, such as the Makrut Multiyear Programme and high-performing villages in Thung Yang Dang district, Pattani province.

Strengths:

- **Strong vaccine acceptance and high coverage:** Most vaccines are generally well accepted across communities, with minimal hesitancy, contributing to high immunization rates (Chiang Rai, Chonburi, Sukhothai, Udon Thani).
- **Effective demand generation and communication:** Structured strategies, including information, education and communication (IEC)/behavior change communication (BCC) materials, maternal and child health (MCH) handbooks, school-entry vaccination requirements and proactive outreach by health volunteers, effectively raise awareness and motivate vaccine uptake (Chiang Rai, Pattani, Tak, Udon Thani).
- **Robust community engagement:** VHVs and religious leaders actively support awareness, counselling and mobilization (Chiang Rai, Pattani, Tak, Udon Thani).
- **Inclusive and modern approaches:** Use of social media platforms, multilingual materials and culturally sensitive strategies ensures access and communication for diverse populations, including migrants and ethnic minorities (Chiang Rai, Pattani, Tak).
- **Evidence-informed planning:** Research on behavioral and social drivers is used to tailor communication and engagement strategies, particularly in high-risk or vaccine-hesitant areas (Pattani).

Challenges:

- **Post-COVID-19 vaccine hesitancy and mistrust:** Post-COVID-19 misinformation and social media-driven anti-vaccine content contribute to hesitancy among caregivers and recipients, with some communities showing mistrust towards vaccines, especially the influenza vaccine (Chiang Rai, Pattani).

- **Limited communication capacity:** Health staff lack confidence in engaging vaccine-hesitant populations (Pattani).
- **Equity gaps and hard-to-reach groups:** Migrant children, non-Thai communities and other vulnerable groups are not effectively reached by current demand generation strategies, leading to missed vaccinations and perceptions of inequity (Chiang Rai, Tak, Udon Thani). There is a high level of vaccine hesitancy (30%) and vaccine refusal (10%–15%) in the Deep South (Pattani).
- **Weak private sector engagement:** The private sector is not systematically involved in demand generation for immunization, which represents a missed opportunity to expand reach, address equity gaps and support stronger uptake across diverse communities (Tak).

Recommendations:

- **Strengthen communication and counter misinformation:** Develop comprehensive, multilevel communication strategies that cover all target audiences, including policymakers, health personnel, caregivers, and families. Train health workers on effective vaccine communication and establish surveillance systems to monitor misinformation across key channels and implement timely response strategies (Pattani).
- **Leverage evidence and best practices:** Collect and use data on behavioural and social drivers of vaccine uptake to tailor interventions. Document and scale up successful community approaches, such as Makrut's integrated multiyear outreach and intensive follow-up models in high-performing villages, including engagement of religious leaders and incentives for complete vaccination (Pattani).
- **Expand workforce and partnerships:** Increase the number of migrant health volunteers by at least 20% in priority districts and provide systematic training to support awareness, mobilization, and follow-up (Tak). Consider innovative approaches, such as training adolescent girls as interpreters to overcome communication barriers. Strengthen private sector collaboration by partnering with pharmacies and clinics for vaccine advocacy and information dissemination, with regular monitoring of progress (Tak).
- **Target high-risk groups and access barriers:** Prioritize demand generation for vaccine-hesitant populations and migrants, and address practical barriers such as service distance, frequency, and access for caregivers such as grandparents. Adapt outreach strategies to local contexts at subdistrict levels to maximize effectiveness (Pattani, Udon Thani, Tak).

I. Polio

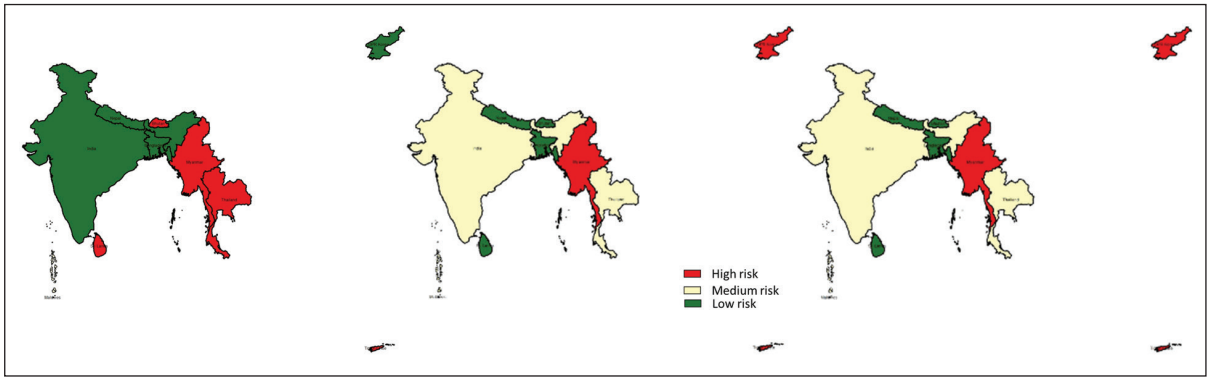
Background

Thailand's NIP is built on principles of equity, quality and safety, providing free immunization services across all life stages. The country has maintained polio-free status since 1997, supported by strong legislations, including the Communicable Disease Act 2015 and the Vaccine Security Act 2018. The country has achieved high national coverage for the third dose of oral poliovirus vaccine (OPV3) – above 90% in most provinces. These achievements reflect the government's commitment to polio eradication, public health and vaccine security.

Risk assessment

The regional risk assessment for 2025, presented to the WHO South-East Asis Regional Certification Commission for Poliomyelitis Eradication (SEA-RCCPE, indicated a moderate risk of poliovirus importation and transmission in Thailand, with a high risk of undetected transmission.

Fig. 13. Regional risk assessment, 2025 (overall, surveillance and susceptibility)



Immunization performance

In 2024, Thailand updated its polio immunization schedule to include two doses of inactivated poliovirus vaccine (IPV) at two and four months, and three doses of OPV at six months, 1.5 years and four years. The national coverage for OPV3 was 84.9% and that for IPV2 was 88%. While 39 provinces achieved over 90% OPV3 coverage and 46 provinces met the IPV2 target, gaps remain in southern border provinces such as Pattani, Yala and Narathiwat. To address these gaps, Thailand has conducted annual SIAs since 2019 in high-risk areas, targeting both Thai and non-Thai children. These campaigns have achieved coverage rates ranging between 51% and 97%, demonstrating effective outreach and coordination.

Surveillance performance

Thailand's AFP surveillance system includes 1099 reporting sites nationwide. In 2024, the non-polio AFP rate was 1.58 per 100 000 children under 15 years, below the WHO target of 2.0. Adequate stool specimen collection was achieved in 70.3% of cases. Environmental surveillance continued at eight sites, with enterovirus detection rates ranging between 28% and 38%. Retrospective record reviews in certain provinces revealed missed cases and highlighted gaps in clinician awareness.

Thailand's laboratory network remains robust, with the National Institute of Health serving as a Regional Reference Laboratory for polio, measles and rubella. The laboratory consistently meets WHO accreditation standards and maintains high performance in proficiency testing.

Conclusions

Thailand's Polio Programme has successfully maintained polio-free status for over two decades. The country has demonstrated strong government commitment, effective legislation and high national coverage. However, surveillance sensitivity and coverage in certain provinces require improvement to mitigate the risk of poliovirus importation or circulation. The decentralization of health services has introduced coordination challenges and vaccine hesitancy among some populations continues to affect coverage.

Recommendations and next steps

To strengthen and maintain the essential polio functions, Thailand should:

1. enhance surveillance by training clinical staff on syndromic approach for AFP surveillance, developing job aids and allowing sample collection without prescriptions;
2. improve coverage in low-performing areas through targeted microplans and community engagement;
3. optimize programme oversight through regular National Certification Committee meetings and strategic monitoring;
4. establish inclusive reporting mechanisms to capture data from private providers and migrant populations;
5. manage decentralization by activating oversight committees and standardizing performance indicators;
6. maintain and expand environmental surveillance and laboratory capacity; and
7. conduct regular simulation exercises to test outbreak preparedness and response.

J. Measles and rubella

Progress towards measles and rubella elimination in Thailand (as of July 2025)

Thailand has demonstrated a strong and sustained commitment to eliminating measles and rubella, with efforts dating back to 2010. The country's approach is built on five main strategies: increasing population immunity through vaccination; strengthening surveillance and laboratory confirmation; expanding laboratory networks; intensifying outbreak response; and ensuring the sustainability of elimination activities. Oversight is provided by the National Verification Committee, which coordinates with the MoPH and international partners to monitor progress and address challenges.

Immunization coverage and campaigns

Immunization coverage remains a central focus. In 2024, the coverage for the first dose of the measles–mumps–rubella (MMR1) vaccine was 87.6%, while the second dose (MMR2) reached 86.5%. Special immunization campaigns targeted high-risk groups such as prisoners and health-care workers. However, vaccine hesitancy, particularly in the southern provinces, continues to hinder efforts to achieve higher coverage. To address this, the MoPH has implemented measures to accelerate vaccination, including setting provincial performance indicators and integrating vaccination requirements with social support programmes.

Epidemiological situation

Measles: The epidemiological situation in 2024 reflects both progress and ongoing challenges. A total of 10 496 suspected cases of fever with rash or suspected measles and rubella were reported nationwide. Of these, 4397 cases were laboratory-confirmed as measles and 1026 were classified as epidemiologically linked. The overall incidence rate for measles was 8.22 per 100 000 population, with 11 reported deaths.

Most cases occurred in young children, with the highest incidence in those under one year of age and in the 1–4-year age group. Notably, over 94% of confirmed or linked measles cases were either unvaccinated or had unknown vaccination status. Geographically, the burden was highest in the southern provinces of Yala, Pattani, Narathiwat and Songkhla, where outbreaks were frequent and vaccination rates lowest. In total, 205 measles outbreaks were reported, with a significant proportion occurring in schools, hospitals and factories.

Rubella: Rubella cases have continued to decline, with only 29 confirmed cases in 2024 and no clusters reported since 2021. These cases were scattered across 13 provinces and most affected infants were under one year of age. About 62% of rubella cases had received at least one dose of a rubella-containing vaccine. There were no deaths or clusters associated with rubella during the year. For congenital rubella syndrome (CRS), 16 suspected cases were reported, with one case meeting both clinical and laboratory confirmation criteria.

Molecular epidemiology and surveillance

Thailand's surveillance system is integrated, robust, combining case-based and sentinel surveillance for CRS and utilizing real-time notification systems for measles and rubella. The surveillance system has legal binding to repot cases but is limited by lack of awareness of "syndromic approach" to fever and rash surveillance. In 2024, molecular epidemiology revealed that nearly all genotyped measles

cases were of the D8 strain, with a small number of vaccine strain and B3 cases. No wild-type rubella virus has been isolated since 2020, probably indicating interruption of transmission.

Key challenges

Despite these achievements, several challenges persist. Vaccine hesitancy remains a major barrier, especially in the Deep South, where cultural factors and misinformation contribute to low uptake. Immunity gaps are evident, particularly among unvaccinated children and hard-to-reach populations such as migrants and ethnic minorities. High turnover among health-care workers leads to gaps in knowledge and underreporting, while surveillance systems still require improvements in specimen collection and laboratory confirmation.

Recent and planned interventions

To address these issues, Thailand is preparing a national SIA for children under five, scheduled for the fourth quarter of 2025. Communication strategies are being enhanced, with increased involvement of religious and community leaders, local-language materials and the mobilization of over a million VHVs. Surveillance is being strengthened through additional training and better integration of data systems, and targeted campaigns are underway in high-risk provinces.

Outbreak response protocols have been standardized, focusing on rapid case-finding, vaccination of contacts, health education and coordination with border health authorities. However, the effectiveness of these measures is sometimes limited by vaccine refusal and logistic challenges, particularly in the southern provinces.

Conclusions

In summary, Thailand has made significant progress towards measles and rubella elimination, supported by strong national leadership, comprehensive strategies and robust surveillance. However, persistent immunity gaps, vaccine hesitancy and concentrated outbreaks in certain regions highlight the need for continued and intensified efforts to achieve the elimination goals by 2029. The country may have interrupted the transmission of rubella, and thus the National Verification Committee will need to review in depth and propose to the Regional Verification Commission to verify rubella elimination.

Recommendations and next steps

Looking ahead, Thailand's priorities include URGENTLY closing immunity gaps for measles and rubella through targeted approach and continued SIAs in areas with low population immunity, combating vaccine hesitancy with tailored advocacy and education, sustaining high-quality surveillance and providing additional support to underperforming regions. Regional collaboration with WHO and neighboring countries remains important for cross-border disease control.

K. Sustenance of maternal and neonatal tetanus elimination (MNTE) in Thailand

Status of MNTE in Thailand

Thailand achieved MNTE status before the year 2000. The country has maintained a low rate of neonatal tetanus (NT) cases, with only one reported case in 2024 and 2025 in the migrant population, and zero cases in several other years.

MNTE sustenance strategy in Thailand

The country provides three primary infant doses of tetanus toxoid-containing vaccine (TTCV) and three booster doses before adolescence. The vaccination schedule includes doses at two months, four months, six months, 18 months, four years and 12 years.

Thailand has strong surveillance systems in place, conducting annual risk assessments to identify high-risk districts for NT. The surveillance system includes case-based or aggregated surveillance for MNTE, including zero reporting. The country conducts annual NT risk analysis to identify high-risk districts and take corrective actions accordingly. The timeliness of zero reporting was 100% at all 3rd administrative units (also called provinces in Thailand) in 2024 and 2025. The country also ensures antenatal screening of pregnant women to verify tetanus vaccination status and provides vaccination, if required. There has been an increase in access to skilled health personnel at birth and clean birth/cord care practices.

Key observations

The risk assessment conducted in 2024/2025 using the WHO algorithm has identified that all provinces are at low risk of MNT.

Similarly, a rapid convenient assessment was conducted in seven provinces, where around 70 recently delivered mothers were asked about their TTCV vaccination status. The children born to these mothers were found to be protected at birth (PAB).

Protection at birth was defined as proportion of infants whose mothers had two tetanus toxoid doses during the last pregnancy or had received at least TT2 (three years of protection), TT3 (five years of protection), TT4 (10 years of protection) or TT5 (lifetime protection).

Challenges for MNTE sustenance in Thailand

1. **Vaccination coverage**: While the primary series of TTCV coverage is high, the coverage of booster doses is variable and not readily available to the programme. Ensuring consistent and widespread booster dose coverage remains a challenge.
2. **Surveillance and data review**: Although Thailand has strong surveillance systems, there is a need for continuous and rigorous data review to identify and address any potential gaps or high-risk areas.

Conclusion

Overall, Thailand continues to sustain its MNTE status through effective immunization, surveillance and maternal health programmes.

Annex 5. Province-specific reports

A. Bangkok

Context of Bangkok

Bangkok (BKK) is a massive urban conglomeration with a resident population of 5.6 to 6 million people. This population includes up to 2.8 million internal and external migrants, often referred to as the "hidden population". These migrant populations are not completely understood or tabulated, which poses significant challenges. Additionally, Bangkok experiences a very high volume of international visitors, including those from countries with known viral pathogen disease (VPD) endemicity and outbreaks.

Strengths

Despite these challenges, Bangkok has several strengths in its public health and immunization services:

- **Strong public health structure**: The city boasts high-quality personnel and facilities, including 11 major government referral hospitals, 69 health-promoting hospitals (HPHs) and over 100 private hospitals.
- **Free immunization services**: Basic immunization services are offered free of charge at public facilities, including for migrant communities. There is evidence that at least some migrant communities access these services. The Bangkok Metropolitan Administration (BMA) also provides vaccines beyond the national programme, including pneumococcal conjugate vaccine (PCV) for infants and influenza for primary school students, funded by its own budget.
- **Good immunity levels**: Indirect evidence, such as data from recent measles outbreaks, suggests that immunity levels among most children in Bangkok are good.

Issues

However, there are several key challenges that need to be addressed:

- **Ongoing VPD outbreaks**: Despite a strong system, VPD outbreaks continue to occur in Bangkok, indicating immunity gaps. Diseases such as measles, pertussis and diphtheria are still present.
- **Uncertainty in target population denominators**: There is uncertainty about the target population denominator, especially for migrants. This makes it very difficult to evaluate programme coverage and identify gaps.
- **Data integration issues**: The BMA immunization data are not reflected in the national health systems. Various data systems within Bangkok are not integrated.
- **Gaps in VPD surveillance**: The VPD surveillance system has significant gaps. Clinical staff at public and private facilities do not understand what they need to report or why.

Key recommendations

To address these issues, the following recommendations are made:

- **Integrate BKK immunization data**: Ensure that BKK immunization data is reported to the national system and make efforts to integrate reporting system with the national system .
- **Assess the immunization status of migrant communities**: Take every opportunity to assess the immunization status of migrant communities. Identify and map these high-risk groups and ensure immunization status is included in all surveys of these groups.
- **Develop specific plans for unreached groups**: Use outbreak investigations to determine why children are not being reached and develop specific plans to reach unreached groups based on these assessments.
- **Engage clinical staff in surveillance**: Specifically engage clinical staff in surveillance. As a first step, involve the staff of the major referral hospitals, and conduct seminars and sensitization sessions for clinicians and hospital management.

B. Chiang Rai

The Chiang Rai Provincial EPI is characterized by strong central commitment, established infrastructure, and effective hospital-based vaccination and surveillance systems. However, challenges related to decentralization, workforce turnover, incomplete private sector engagement and fragmented information systems persist.

1. Programme management and financing

Programme management in Chiang Rai Province benefits from strong national policy support and alignment with WHO guidelines. Decentralization has enabled local authorities to respond more effectively to community needs. There are reliable vaccine supply and financing through established mechanisms. However, the transition to decentralization has also led to unclear roles, particularly for PHOs, DHOs and HPHs. Training capacity has diminished, reporting systems are fragmented, and cross-border collaboration remains underutilized. Furthermore, there is a lack of clarity regarding financing for training and orientation of staff transferred to local government organizations (LGOs).

Recommendations: To address these challenges, it is recommended to strengthen coordination with provincial administrations for budget allocation and performance-based incentives; develop comprehensive provincial macroplans for monitoring and supervision; and establish both formal and informal cross-border mechanisms for real-time disease response.

2. Human resource management

The province maintains adequate staffing levels, supported by a robust network of health extension volunteers. There is a strong commitment to on-the-job learning and mentorship. Nevertheless, high staff turnover, especially following the COVID-19 pandemic, has reduced technical capacity and continuity. The shift of reporting responsibilities to LGOs has weakened supervision and online training methods have proven less effective than face-to-face approaches.

Recommendations: To mitigate these issues, structured monitoring, supervision and hands-on training should be implemented, with standardized staff organograms and incentives for rural postings to ensure equitable distribution and retention.

3. Vaccine supply, quality and logistics

Chiang Rai's immunization programme is supported by a reliable cold chain and supply chain, with no reported stockouts of routine EPI vaccines. Vaccine transport and waste management practices are effective, and support for migrants, as well as school-entry requirements, help boost vaccine uptake. However, temporary stockouts of adult vaccines have occurred; there are inconsistencies in forecasting and procurement across different health facilities. Equity concerns persist for non-Thai populations. Private sector reporting remains inconsistent.

Recommendations: It is essential to establish systematic forecasting and procurement SOPs and to integrate private sector data for more accurate stock estimation.

4. Service delivery

Vaccination is provided across the life-course at all health institutions, with electronic tracking systems supporting session planning and community surveys. The strong network of VHVs enhances follow-

up, while integrated services ensure efficient delivery. Hospitals achieve high early coverage for key vaccines due to high institutional delivery rates. However, there are gaps in private sector engagement, unsafe syringe practices that need review and training limitations due to decentralization.

Recommendations: Optimizing private sector involvement and ensuring systematic reporting, as well as policy support for migrant vaccination planning, are recommended.

5. Immunization coverage and AEFI monitoring

Coverage is monitored using multiple sources, including birth registries, vaccination books, community surveys and electronic systems. School-entry requirements reinforce compliance, but data fragmentation and uneven reporting hinder accurate estimation of vaccine coverage. Dropout monitoring is weak and there has been a decline in coverage for certain vaccines post-COVID-19. AEFI monitoring is suboptimal, with unclear roles in causality assessment and inadequate documentation of follow-up.

Recommendations: Integrating data quality checks into electronic systems and strengthening AEFI monitoring and follow-up are urgently needed.

6. Demand generation

Community acceptance of vaccination is generally high, supported by effective IEC tools and engagement through VHVs and social media platforms such as Line. However, vaccine hesitancy has increased post-COVID-19 due to misinformation. There is limited demand generation for non-Thai communities, who often perceive inequity in access.

Tailored communication strategies for these populations and strengthened public trust through targeted risk communication are necessary to sustain high vaccine uptake.

7. Disease surveillance

The province has an integrated surveillance system with clear SOPs and protocols for priority VPDs and outbreak response. Rapid response teams are functional at all levels and the legal framework mandates reporting of notifiable diseases. Surveillance is aligned with WHO standards; standardized reporting tools are in use. Despite these strengths, high staff turnover, misalignment with new governance structures, underused syndromic surveillance and barriers to specimen collection undermine system sensitivity. Private sector under-reporting and informal cross-border links further weaken surveillance.

Regular field mentoring, micro-learning job aids and root-cause reviews for underperformance are recommended to address these gaps.

Priority disease initiatives

1. Measles and rubella elimination

There is strong commitment at both national and subnational levels to eliminate measles and rubella, with no confirmed cases reported in the past five years. Adequate resources and outbreak response mechanisms are in place. However, coverage for MMR1 and MMR2 remains below the 95% target and surveillance performance is inconsistent.

Further in-depth review is needed to confirm cessation of transmission.

2. Polio eradication

Chiang Rai has maintained polio-free status, with no wild or variant poliovirus detected in the past five years. The province follows a strong vaccination schedule and conducts SIAs for both Thai and non-Thai populations. Nonetheless, surveillance performance indicators are not consistently met, and timely stool specimen collection remains a challenge. Conducting provincial risk assessments and strengthening AFP surveillance are recommended.

3. Maternal and neonatal tetanus elimination (MNTE)

The incidence of neonatal tetanus is low, and surveillance is sensitive, as evidenced by the detection of adult tetanus cases among migrants.

High coverage of dT vaccination during pregnancy and robust maternal care contribute to the province's sustained elimination status.

Conclusion

Chiang Rai demonstrates high coverage across all antigens, supported by digital platforms that enhance service delivery, recording and reporting. Innovative use of social media, such as Line, helps track defaulters and reduce missed vaccinations. Regular supervision, performance monitoring and data quality assurance are essential for continued progress. Consistent training, inclusive planning that involves the private sector and migrant populations, and active risk communication to rebuild public trust in vaccines are critical for sustaining and advancing immunization achievements.

The Chiang Rai Provincial EPI is characterized by strong central commitment, established infrastructure, and effective hospital-based vaccination and surveillance systems. However, challenges related to decentralization, workforce turnover, incomplete private sector engagement and fragmented information systems persist. Addressing vaccine stockouts, equity gaps for migrants and weak AEFI follow-up is urgent. Sustained progress will depend on regular supervision, integrated data systems, staff retention strategies, inclusive planning and strengthened public trust in vaccines.

C. Chonburi

The review found that Chonburi Province generally has strong immunization programmes that ensure populations, including migrants, receive vaccination services. However, there remains room for improvement in the quality, equity and overall performance of these programmes.

1. Programme management

A well-established programme structure exists at all levels, from the provincial to the community level, ensuring effective delivery of immunization services. The ongoing transfer of subdistrict health-promoting hospitals to the MoI is progressing smoothly, with no concerns raised by affected institutions. Importantly, this transition has not disrupted immunization programmes.

2. Vaccine supply, quality and logistics management

Efforts to maintain good vaccine management practices are evident at all levels. Stockouts are rare, though a national stockout of IPV for three months in 2024 did affect the province and districts. Many cold chain equipment items, such as refrigerators and vaccine carriers, do not meet WHO-PQS standards and domestic fridges are commonly used at subdistrict hospitals. There is strong adherence to temperature management practices, including the use of remote and electronic temperature monitoring devices, though the variety of devices and software creates management challenges.

Training gaps exist among vaccine handlers, particularly regarding shake tests and ice pack conditioning. Only a few vaccines, such as bivalent oral polio vaccine (bOPV) and tetanus and diphtheria toxoid (Td), have vaccine vial monitors (VVMs). The use of the electronic Logistics Management Information System (eLMIS) is notable, but fragmentation exists between stock management records and vaccine requests.

3. Immunization service delivery

Immunization services are delivered once a month at the subdistrict level and once a week at district hospitals. Despite this limited frequency, caregivers report no significant issues in accessing services. Paid VHVs play a crucial role in strengthening service delivery, particularly in defaulter tracking and social mobilization. A significant proportion of the community uses private hospitals and clinics for vaccination, but there is no system to monitor or receive reports from these private providers. While the inclusion of migrant populations in vaccination services is commendable, monitoring coverage among these groups would further strengthen the programme.

4. VPD surveillance and AEFIs

Some surveillance indicators meet targets, but improvements are needed, especially for AFP and acute fever and rash (AFR) surveillance. This includes better compliance with collecting blood samples, throat swabs and stool samples, as well as improving follow-up rates for AFP cases. Coordination with private hospitals and clinics is good, ensuring compliance with VPD surveillance requirements. Outbreak investigations and responses are conducted according to guidelines. AEFI monitoring occurs at all levels, but it is recommended that conclusions for severe AEFI cases be finalized and communicated promptly to prevent misinformation.

5. Coverage monitoring

Immunization coverage in Chonburi is reported to be high and meets targets. However, data quality issues are present at all levels and require further investigation, including an assessment of the use of the Health Data Centre (HDC) and health facility registration systems.

6. Demand generation

There is no evidence of significant vaccine demand issues in the province. Nonetheless, it is recommended that vaccine hesitancy be closely monitored and addressed as needed.

7. Digital health

Efforts to digitize health information systems are notable, including the implementation of electronic immunization and logistics information systems. However, fragmentation and interoperability issues persist across various digital applications. Accessing immunization data in the HDC for populations registered in other provinces remains a bottleneck, affecting synchronization of electronic immunization registers. The lack of a system linking immunization service delivery at public and private hospitals creates limitations and necessitates manual synchronization, which can compromise data quality.

Recommendations

To address these challenges, it is recommended to conduct a data quality assessment (DQA) to investigate and improve data quality issues. Monitoring coverage among migrant populations should be included, possibly as part of outbreak risk assessments. Regular coverage surveys should be conducted among all population groups, coordinated at the national level. Adoption of the effective vaccine management (EVM) initiative is advised to monitor and improve vaccine supply management at all levels.

Refresher training on vaccine management should be provided, especially at the subdistrict level. Standardization of cold chain equipment and use of electronic or remote temperature monitoring devices should be prioritized. Compliance with AFR and AFP surveillance indicators should be improved at hospitals. At the national level, digital transformation initiatives should focus on improving interoperability between applications and users, including public and private service providers, by adopting a "once-and-done" approach.

Conclusion

Chonburi Province demonstrates a strong commitment to immunization and VPD surveillance, with established structures and dedicated personnel. While the system is robust, ongoing improvements in data quality, digital integration, private sector engagement and coverage monitoring, especially among migrants, will be essential to sustain and enhance programme performance.

D. Pattani

Pattani, located in the border region of southern Thailand, faces a complex web of challenges that influence its health system performance. Being one of Thailand's 10 poorest provinces,[4] Pattani endures high levels of poverty; persistent effects of a low-level insurgency further complicate public service delivery. As a border region, Pattani is marked by cultural diversity with mixed Muslim (89%) and Buddhist (11%) populations and is at risk of disease importation. It is also one of the first provinces in Thailand to be at an advanced stage of decentralizing its governance structure, with implications for health system management. The area is also prone to natural disasters, predominantly flooding during the rainy season, increasing the vulnerability of the population and straining health-care resources.

Malnutrition, both acute and chronic, is becoming increasingly prevalent in certain parts of Pattani, further intensifying public health concerns. This includes notable instances of vitamin A deficiency. The province has also faced several significant VPD outbreaks in recent years. In 2024, there were 1327 reported cases of measles, with 84 more cases recorded by early September 2025. Pertussis cases numbered 200 in 2023 and 164 in 2024. Diphtheria has been reported with two cases each year in 2015, 2020 and again from 2023 to 2025. Additionally, the detection of a circulating vaccine-derived poliovirus in Malaysia in 2019 underscores the ongoing regional and cross-border health risks.

Health systems and immunization programme performance in Pattani

Pattani's health-care infrastructure includes one general hospital with 504 beds, 11 district hospitals with a combined 609 beds, 12 primary care units (PCUs), four community medical units (CMUs) and 130 HPHs, all of which have been fully decentralized and transferred to the PAO under the MoI. EPI management is marked by well-coordinated, collaborative efforts that are effectively synchronized from the Office of Disease Prevention and Control (ODPC) through to the PHO, DHOs, hospitals and HPHs.

Pattani has maintained strong multisectoral partnerships over the years, drawing support from organizations such as WHO, the National Vaccine Institute (NVI), universities and civil society organizations (CSOs). Despite these efforts, Pattani consistently records some of the lowest vaccine coverage rates in Thailand, with only 54% of children fully immunized by their first birthday, declining to 41% by the age of three.

High rates of vaccine hesitancy and refusal persist in the province; a survey indicated that 30% of respondents were hesitant and 10%–15% expressed outright refusal, creating substantial demand-side barriers to immunization, a situation that has been further complicated by the COVID-19 pandemic. On the supply side, vaccine uptake is also hindered by structural factors: immunization services are typically offered at fixed locations, such as HPHs and hospitals, only once or twice a month, depending on the local population size. This limited schedule can make it difficult for working parents and caregivers to access services.

While routine outreach is generally conducted every Friday and daily services are sometimes provided during outbreaks, the possibility for walk-in clients at certain HPHs remains limited due to vaccine supply constraints, especially for multidose vials, as Thailand is yet to implement an open vial policy.

4 Boonyamanond S, Chaiwat P (2020). Poverty and conflict in Thailand's Deep South. The Economics of Peace and Security Journal, 15(2). https://doi.org/10.15355/epsj.15.2.53.

Overview of key findings

1. Policy and strategies

Despite facing significant challenges, the Pattani PHO, PAO, provincial and district hospitals, DHO, HPHs and VHVs have demonstrated steadfast dedication to improving vaccine coverage and tackling VPDs. Although current coverage targets have not been achieved, these concerted efforts have laid a solid groundwork by enhancing team capacity, strengthening surveillance systems and improving EPI management. The team continues to adapt its strategies to local needs, incorporating innovative approaches.

EPI has been established as a key public health priority and is now at the forefront of the PAO's agenda, closely integrated with maternal and child health initiatives such as The First 1,000 Days Miracles Programme. Within the framework of decentralization, public health authorities and PAO share broad objectives to promote population well-being, but there are ongoing differences in how targets are determined. For instance, PAO has set a vaccine coverage target of 45%, considerably lower than the national goal of at least 90%, reflecting the need for realistic benchmarks while still falling short of effective disease control thresholds.

Governance is supported by the Well-being Committee, which coordinates and oversees vaccine coverage at both administrative and provincial levels, alongside other mechanisms like the Provincial Communicable Disease Committee, which contribute to VPD control and EPI monitoring. Although a consultative mechanism for joint planning during decentralization has been established, both parties are still refining their roles, resource management and funding responsibilities.

The main budget for EPI is sourced from the government via the MoPH, ODPC and PHOs to support routine activities, but funding for capacity-building remains limited. Additional financial and technical assistance has come from WHO, international agencies, NGOs and the NVI, supporting research and projects to address both demand- and supply-side barriers and improve vaccine access, such as piloting the introduction of the hexavalent vaccine with acellular pertussis component (aP). However, the decentralization process has complicated resource management and funding responsibilities; although health center revenues from PAOs, the National Health Security Office (NHSO) and local sources are rising, hospital revenues are falling. While vaccine funding is stable, allocations for capacity-building are restricted, and the complexity of PAO procedures and rigorous audits make accessing funds difficult.

The key recommendations include:

- At the national level, the MoI and the MoPH should discuss and agree on strategic policy matters, in particular the clear role and responsibilities (the MoPH holds responsibilities in setting PH policies, targets and supervision, while the MoI conducts service delivery).
- At the provincial level, existing joint mechanisms should maintain close collaboration and regular dialogue to ensure participatory governance and actively engage key stakeholders, particularly the NHSO. The NHSO's financial mechanisms can serve as a strategic tool to guide operations towards achieving health objectives.
- The planning process should clearly define the roles and responsibilities of each party as well as guidelines for resource allocation, while leveraging the strengths of each organization to complement and enhance collaborative efforts.

- Jointly seek opportunities to build partnerships and mobilize additional resources from other stakeholders.
- There should be a platform for exchanging experiences on decentralization planning with other provinces, and ongoing discussion and coordination platforms should be maintained at both policy and operational levels to ensure unified, seamless and sustainable implementation.

2. Program management

Programme management and collaboration extend throughout regional, provincial, district and subdistrict levels, with VHVs actively monitoring all children in their areas, averaging one VHV per 20 households. Innovative strategies such as the "Makrut Model" and the "Vaccine as Medicine" approach have been introduced as scalable solutions to boost coverage rates. Achievements are attributed to the prioritization of EPI as a central provincial policy, robust cross-sectoral cooperation, committed teams, skilled staff, and practices rooted in community engagement and evidence-based decision-making.

Immunization activities are evaluated annually at the provincial level and biannually at the district level, with universities providing support for broader assessments and training in line with standard immunization practices. To address demand-side challenges, persistent efforts include regular follow-ups, community awareness campaigns, involvement of religious and peer leaders and use of incentives. On the supply side, measures such as expanding service days, offering transportation for outreach and introducing vaccines with reduced adverse events – such as the pilot rollout of the hexavalent acellular pertussis vaccine – are implemented.

Targeted outreach is directed at high-risk groups and difficult-to-access communities, including attempts to persuade parents who initially refuse vaccination; however, these efforts have met limited success, with only one or two out of every 10 cases agreeing to immunize. Health centers may encounter initial difficulties utilizing their budgets due to unfamiliarity with regulations and intensive oversight, which can restrict operational flexibility.

Key recommendations include prioritizing caregivers who are easier to reach, including those who accept vaccination but have not been vaccinated and those who are vaccine hesitant. These groups represent an estimated 80%–85% of the population and may respond to a combination of interventions that address both demand- and supply-side barriers.

3. Coverage and AEFI surveillance

Monitoring immunization coverage serves as a key performance indicator at the provincial level. Coverage is typically evaluated through the HDC system, which reports the number of vaccine doses administered relative to the estimated target population. However, concerns have been expressed to the review team regarding the reliability of the denominator, as the under-one population is calculated from mid-year birth registration data provided by the MoI. While 30-cluster coverage surveys were previously used to supplement administrative records, these have not been conducted recently, though new surveys have been planned in Thailand for 2026.

Coverage oversight occurs at regional, provincial and district levels, but there is room for improvement at the subdistrict (HPH) level, where data submission is required. However, less emphasis is placed on review, analysis and follow-up action. Furthermore, dropout rates between vaccine doses

– such as from Penta 1 to Penta 3 or from Penta 3 to MCV1 – are not currently assessed in Thailand. The review team also noted particular concerns about the accuracy of the under-one denominator in ODPC region 12, as it appears unusually low compared to older age groups.

The data system currently in use is highly diverse, often leading to connectivity challenges and resulting in an underestimation of immunization coverage rates. To address these issues, it is essential for central authorities to standardize variables according to the immunization schedule – such as OPV3 and DTP-Hep B-Hib – in order to comply with international standards and enable practitioners to use the data directly and accurately. However, HPHs face limitations in extracting individual-level data due to personal data protection regulations, which hinders their ability to identify children by name and follow up on their vaccination status.

To improve data management, PAO has implemented the "My PCU" system to replace previous programmes across all HPHs. Despite its usefulness, user feedback indicates that the new system requires additional administrative support and training. Therefore, it is recommended that dedicated administrative staff at the district level be made available to provide guidance and assist with troubleshooting issues related to the new programme.

Several effective strategies have been implemented to boost immunization coverage. The "Makrut Model", designed as a multiyear initiative, centers on gaining a deep understanding of the community and its attitudes towards vaccination. This approach integrates services such as nutrition screening and immunization, carries out targeted community outreach to uncover and address reasons for missed vaccinations, and leverages the network of VHVs. As a result, coverage has reached 100%.

Additionally, the review team highlighted two villages in Thung Yang Dang district with coverage rates above 90%, attributable to dedicated follow-up by the local nurse, family counselling, involvement of religious leaders, and use of incentives such as certificates, small prizes and ceremonies celebrating complete vaccination. Both methods demonstrate significant ongoing commitment and sustained engagement on the part of community members over several years. Documenting these successful practices and sharing their lessons could help determine whether they can be replicated in other areas of Pattani.

4. AEFI

Systems for preventing, detecting and reporting AEFIs are established, with a strong emphasis on monitoring serious cases through passive reporting channels to the DDC or the Thai FDA. Safety measures include systematic pre-vaccination screening for contraindications and a mandatory 30-minute observation period for children after vaccination. In certain districts and subdistricts, VHVs conduct active AEFI surveillance on days 1, 3, 7, 14 and 30 post-vaccinations. However, the results from these activities are not consistently documented or analyzed.

At the central level, causality assessments are often hampered by incomplete clinical and laboratory data. While risk communication protocols and AEFI guidance, including reporting instructions, are in place, the review did not assess the readiness of clinics in terms of AEFI kits, protocol adherence or staff training. Additionally, it was noted that used vaccine vials are retained for seven days after administration in case an AEFI is reported during that period.

Key recommendations are as follows:

- The reported under-one population should be reviewed and adjusted to account for possible undercounting due to late birth registrations, which may lead to an inaccurate denominator and overestimated coverage rates (see data from ODPC 12).
- Coverage rates should be monitored on a monthly basis, particularly in high-risk areas with consistently low coverage, to enable timely interventions if rates begin to decline.
- Thailand's current data systems are complex and present several obstacles that hinder effective analysis and operational planning. Comprehensive studies should be undertaken to explore these data challenges, including personal data protection concerns raised by the provincial team, and to develop practical solutions.
- Data collected by VHVs regarding AEFIs should be systematically compiled and analyzed to better understand the frequency and nature of adverse reactions.
- A formal evaluation should be carried out to assess the various strategies and interventions implemented to address vaccine hesitancy in Pattani (and, if possible, in Yala and Narathiwat as well). This evaluation would help clarify which approaches have been effective or ineffective and why and could inform the scaling-up of successful methods to other areas within Pattani and beyond, where applicable.
- The PHO has requested policy support to expand access to vaccines with fewer adverse events, such as the acellular hexavalent vaccine (which also incorporates IPV and reduces the number of required injections). Additionally, increasing the supply of single-dose vaccine vials – since no multidose vial policy exists – would allow for more flexible service delivery, enabling vaccinations to take place outside of scheduled days and helping address certain supply-side barriers.

5. Demand generation

Significant efforts are underway to promote vaccine uptake among the population. Notably, coverage rates for birth dose vaccines, such as hepatitis B and BCG, are much higher compared with subsequent vaccines such as Pentavalent 1; vaccines administered during pregnancy also show greater uptake. This trend suggests a genuine concern among caregivers regarding the effects of vaccines on infants. Discussions have revealed that fear of side-effects, especially fever, remains a major barrier to vaccine acceptance, as parents and caregivers worry about needing to take time off work if their child experiences illness following vaccination. Such concerns are particularly associated with the pentavalent vaccine and have contributed to the push for introducing the acellular pertussis version of the hexavalent vaccine.

While a communication plan exists to engage target groups, its effectiveness has largely been limited to increasing awareness rather than driving behavioral change, with exceptions such as the multidimensional "Makrut Model". Communication efforts do target vaccine-hesitant groups, but many responsible staff members lack confidence in their communication skills, although some in high-risk areas have received specific training.

The spread of misinformation, fake news and inaccuracies on social media has heightened vaccine refusal. Despite extensive initiatives using various messages and influential community figures, responses are often not timely. Engagement with religious leaders has been ongoing, and research into behavioral and social drivers in the southern border provinces is available to inform strategies.

Additionally, there has been substantial community engagement, including through the network of VHVs.

Recommended actions include developing an integrated communication and resource plan that addresses all key audiences – policymakers, health-care workers, patients and families – by defining core messages, effective channels and desired outcomes. Monitor and counter misinformation using data analysis, and tailor strategies based on behavioral and social insights to address vaccine barriers. Minimize access challenges, document and expand successful religious leader outreach, adapt to local needs, draw on best practices from high-coverage communities, prioritize hesitant or receptive groups and train health-care workers in effective communication.

6. Disease surveillance

Comprehensive surveillance for VPDs is maintained across community, facility and response levels, with rapid response teams operating under standardized protocols. Outbreak responses are adapted to local circumstances and utilize the "3–1–2–3" systematic local innovation approach, which encompasses case-finding, investigation, contact tracing and targeted responses. Despite prompt investigations, the AFP surveillance rate in 2024 was 0.55 per 100 000, falling short of established standards. While measles and case investigation benchmarks have been met in recent years, continued vigilance is necessary. Routine immunization programmes are also in place for health-care personnel, supplemented by ongoing workforce development initiatives led by the DDC. Notably, the primary sources of outbreaks are often found in schools, religious institutions and similar settings.

Key recommendations:

- Hospitals should link disease control with infection control to prevent transmission and ensure syndromic approach.
- The DDC needs stronger surveillance and better diagnostics in schools, religious sites and similar places where outbreaks often occur.
- School entry vaccine checks, and catch-up programmes should be considered due to schools' involvement in VPD outbreaks.

E. Tak

Key findings

1. Governance and financing

Tak Province benefits from an established health structure with clear organograms and defined management lines at every service delivery level. Provincial and subdistrict administrative organizations jointly supervise and monitor immunization policy implementation. Coordination with schools, community leaders, and VHVs ensures children are monitored for immunization coverage. However, budget and human resource allocations do not account for the additional workload related to migrant populations, resulting in non-inclusive EPI planning and resource distribution.

Private sector providers are not required to report immunization data, leading to incomplete programme monitoring. Recommendations include establishing a Provincial EPI Steering Committee with representation from all stakeholders, developing a sustainable financing strategy, and mandating private sector participation in immunization coverage reporting and VPD surveillance.

1. Human resources for immunization

EPI teams in Tak demonstrate effective leadership, dedication and high technical capacity. Personnel are well-trained and motivated, and maintain regular communication, including use of the VMI system. However, there is a persistent shortage of health-care personnel, especially for non-Thai (migrant) populations. Migrant Health Volunteers (MHV)s is essential for reaching migrants, but sustainable mechanisms for their remuneration and retention are lacking. It is recommended to conduct annual workforce gap assessments, strengthen recruitment and retention efforts, and establish a formal remuneration and incentive system for VHVs and MHVs.

2. Vaccine supply chain and logistics

The province has sufficient cold chain space and equipment, managed effectively with a real-time temperature monitoring system. Digitalized, district-level vaccine stock management via the VMI System is efficient and a pull-based shipment system reduces wastage. However, vaccine forecasting relies mainly on previous year's data and does not sufficiently account for migrant needs, risking underestimation.

The widespread use of non-WHO PQS-certified refrigerators poses risks; there have been delays in vaccine delivery and notable stockouts, such as a two-month IPV shortage in 2024. Recommendations include replacing non-compliant cold chain equipment, conducting quarterly forecasting workshops with updated population data, and planning for outbreak response immunization and catch-up campaigns.

3. Service delivery and coverage

Immunization is provided through fixed, outreach and mobile sessions, covering all health system levels. Vaccines are administered according to national guidelines. AEFI monitoring is systematic. Burmese interpreters are available at key sites to facilitate migrant access; waste management follows guidelines. However, limited session frequency at some facilities risks missed opportunities. Migrants face barriers such as language differences, transportation constraints and legal concerns. Budget reductions have affected service delivery, especially in refugee camps, and the private sector is largely

excluded from reporting and surveillance. Recommendations include reviewing and adjusting session frequency, conducting quarterly microplanning for zero-dose and under immunized children, and integrating private sector facilities into the EPI network.

4. Monitoring and equity

All nine districts provide monthly coverage reports. The province has maintained high vaccination coverage (≥90%) for most antigens. School-based campaigns are consistent, and a digitalized registration system supports multilingual data recording. Vaccines are free for non-Thai populations at public hospitals. However, official target population data exclude migrants, inflating coverage rates, and planning remains based solely on the Thai population. Recommendations include revising denominators to include migrants, automating allocations based on revised data and institutionalizing Twin-Village Immunization Days for synchronized outreach.

5. VPD surveillance

VPD surveillance guidelines, SOPs and annual workplans are in place, with timely reporting and ongoing training for staff. Surveillance activities have resumed post-COVID-19, with active case search and cross-border data sharing. However, data for frequently migrating foreigners are often incomplete, and national targets for AFP and measles/rubella surveillance are not met. Recommendations include expanding the surveillance network to private providers, recruiting and training new migrant health workers, and requiring monthly cash register audits.

6. Community engagement and demand generation

Some facilities have structured demand generation strategies, with multilingual materials and inclusive health workers. However, tracking migrant children remains a challenge and communication tools are not consistently deployed for new migrants. The private sector is not actively engaged in demand generation. Recommendations include expanding the MHV workforce, strengthening private sector engagement, conducting ethnographic studies to inform strategies and training adolescent girls as interpreters.

Key achievements and areas for improvement

Tak Province has maintained high vaccination coverage for most antigens, remains polio-free, and has achieved maternal and neonatal tetanus elimination. Ongoing vaccine supply to migrant-serving clinics and strong partnerships with donors and partners support health services for migrants. However, consistent coverage of migrant populations, achieving surveillance indicators for AFP and measles/rubella, and improving cross-border collaboration remain priorities. Continuous surveillance of migrant populations, engaging the private sector in surveillance and training health workers are essential actions.

Conclusion

To achieve true immunization equity and protect every child, including migrants and the most vulnerable, Tak Province must act on data-driven, targeted improvements across service delivery, surveillance and resource allocation. The province has strong foundations, but closing gaps for all communities is essential for sustaining high coverage and preventing future outbreaks. As stated in the review, "The true measure of any society can be found in how it treats its most vulnerable members."

F. Sukothai

Key findings

1. EPI management and immunization coverage

Strengths:

Community engagement and stakeholder coordination remain strong in Sukhothai Province, supported by effective proactive communication and high demand for vaccines among adults. Multiple communication channels – both formal, such as official announcements, and informal, such as LINE groups, Facebook, loudspeakers and door-to-door visits by VHVs – are utilized, ensuring systematic follow-up on immunization coverage.

At the well-baby and vaccine clinics, a child's vaccination records are first checked, followed by a growth and development assessment by health-care staff. Professional nurses then administer the vaccines, ensuring both safety and quality. After the vaccination, the child is observed for 30 minutes to monitor for any potential adverse reactions. Finally, before they leave the facility, they receive paracetamol syrup, vitamins and iron supplements.

Challenges:

Limited microplanning at the district and subdistrict levels remains a persistent challenge. Staff members often lack the time to participate in comprehensive training sessions due to their heavy workload. Moreover, there is a recognized need for more frequent training opportunities on MMR elimination, polio eradication, MNTE and EPI at all levels, with an emphasis on adapting the training content to be tailored to local context, ideally informed by a structured needs assessment.

2. VPD surveillance

Strengths:

Sukhothai's surveillance system for VPDs demonstrated several key strengths. The programme begins its monitoring early by providing antenatal education to expectant mothers, recognizing their crucial role in protecting their children. This effort, combined with consistent vaccination programmes, has resulted in high vaccine coverage (> 95%) in most areas. Regular supervision from both central and regional levels ensures consistent quality across the programme. A significant achievement of this system is that no cases of maternal and neonatal tetanus have been reported in the province since 2019. This success underscores the programme' s effectiveness and its strong commitment to public health.

Challenges:

Several challenges complicate the VPD surveillance programme. The current data and information system has two major weaknesses. Family relocation makes it difficult to track a child's vaccination status and fragmented records from private clinics are not integrated into the national database. To solve this, better integration of private clinic records is needed. Additionally, despite high vaccination coverage, the movement of people between districts remains a risk factor for disease spread. Finally, a high turnover among epidemiology staff disrupts local knowledge and trust, weakening coordination and posing a risk to the continuity of surveillance efforts.

3. Vaccine supply and logistics

Strengths:

Vaccine supply and logistics are well organized in Sukhothai. Vaccine management is decentralized: hub hospitals support district hospitals and health centers, reducing workload for smaller facilities. Procurement through the Vendor Management Inventory (VMI) system is efficient and no vaccine stockouts were observed during the review.

2Cold chain storage and transport practices meet national standards, with clear responsibilities and regular monitoring.

Challenges:

Although vaccine stockouts are generally infrequent, a national shortage of IPV occurred in 2024, lasting for a few weeks, which temporarily affected the province's IPV immunization efforts during that period.

Even with regular maintenance, critical cold chain equipment, such as refrigerators, thermometers, cold boxes and other devices, can malfunction prematurely before their expected service life. This poses a risk for vaccine quality. To prevent such disruptions, it is essential to conduct periodic assessments of equipment status and proactively plan for timely replacements to ensure the continuous reliability and effectiveness of the immunization programme.

4. Data management and information systems

Strengths:

Data management and information systems in Sukhothai showed strong practices. Staff demonstrate strong knowledge and awareness of reporting systems and understand the importance of accurate data. Backup personnel are assigned during emergencies, ensuring continuity. Diligent double-checking of data prior to entry into the official system reduces errors. In some districts, local teams have developed customized databases as backup, tailored to their specific needs.

Challenges:

There are several challenges in data management and information systems, including risks of misconception within the Digital Disease Surveillance (DDS) system, such as deletion of suspected cases that later turn out to be negative instead of updating the cases. This practice hides the fact that surveillance is functioning as intended. Issues also arise with data reporting that is not yet real-time, limiting timely response. Additionally, the presence of local customized databases highlights limitations in the central system. To address this, regular user feedback surveys and system updates are needed to make the national system more practical and user-friendly.

5. AEFI surveillance

Strengths:

Sukhothai has robust AEFI surveillance in place. Staff demonstrate a strong understanding of the guidelines and follow them appropriately. Follow-up after each vaccine does not stop after 30 minutes of observation. Instead, VHVs conduct home visits, showing great commitment to safety. Health

personnel also receive training on related topics, including resuscitation, which prepares them for emergencies. These strengths contribute to an effective approach to AEFI surveillance.

Challenges:

Small facilities face specific constraints, with limited space and equipment and lack of specialist staff. To address this, a structured consultation system with referral hospitals is needed, ensuring that local staff can access expert advice when needed. Additionally, regular drills and reviews should be conducted to reduce risks and strengthen preparedness for actual AEFI events. These measures are essential to ensure that operational challenges are identified and addressed efficiently, supporting the continuity and effectiveness of programme initiatives.

5. Programme management and coordination

Strengths:

Programme management and coordination showed a strong foundation in Sukhothai. Strong linkages exist between the community, local authorities and health sector partners, helping to reinforce programme management and coordination. Provincial outbreak response plans are clearly outlined with comprehensive SOPs, ensuring a well-prepared approach. The health workforce demonstrates well-defined roles, competence and commitment, further supported by the innovative "Three Doctors" model – VHVs, nurse or public health staff and doctors – which reinforces both community outreach and readiness.

Challenges:

Several challenges impact programme management and coordination. There is limited availability of detailed microplans at district and subdistrict levels, and heavy workloads often reduce staff opportunities for refresher training. Additionally, outbreak response plans are not always fully contextualized as available resources. Moreover, frequent turnover in key staff also disrupts continuity, institutional memory and community trust.

6. Outbreak preparedness and response

Strengths:

Sukhothai has a clear provincial outbreak response plan with comprehensive SOPs, ensuring preparedness and strong guidance for action. Staff at all levels demonstrate strong knowledge, clearly defined roles and high motivation. Effective coordination between support teams and investigation teams fosters a reliable response system. The innovative "Three Doctors" model further enhances outreach and preparedness, strengthening the overall capacity of the programme.

Challenges:

There is a pressing need for localized outbreak response plans at both district and subdistrict levels. Additionally, it is essential to provide local staff with training in operational planning, simulation exercises and risk assessment to ensure readiness. These improvements would enable faster, more effective responses at the community level to emerging health challenges.

G. Udon Thani

1. Programme management and financing

Strengths:

There are several notable strengths in programme management and financing. Regular review sessions are conducted for communicable diseases, with written feedback provided to improve practices. Budget allocation covers not only vaccine procurement but also non-vaccine necessities, ensuring comprehensive support for the programme. Furthermore, the system clearly identifies target groups, including migrant children, and allocates finances accordingly.

Challenges:

Currently, there is no dedicated act for immunization and supervision of immunization activities occurs less frequently than ideal. Additionally, inconsistencies have been observed in the process of obtaining parental consent, which contributes to challenges in programme execution.

2. Human resource management

Strengths:

Collaboration between doctors, nurses, pharmacists and volunteers is strong. There is an established system for recruiting volunteers that includes a reward mechanism to encourage participation.

Challenges:

A shortage of doctors and nurses persists due to competing priorities within the health-care system. Additionally, gender bias is evident among health volunteers (more women than men?) , presenting further challenges to effective human resource management.

3. Vaccine supply, quality and logistics

Strengths:

Continuity of care is maintained across both antenatal and child stages, supported by robust cold chain monitoring and contingency plans that ensure vaccine quality and readiness in various circumstances.

Challenges:

Occasional delays in vaccine stock replenishment, coupled with sporadic electric power outages at health facilities, continue to present logistic challenges for immunization efforts.

4. Service delivery

Strengths:

Vaccines are also provided to institutions outside the MoPH, with efforts made to integrate immunization activities with other health services to enhance overall health-care delivery.

Challenges:

The frequency of vaccination sessions and the level of staff knowledge of specific aspects remain important considerations for effective service delivery.

5. Immunization coverage and AEFI monitoring

Strengths:

The LINE app is utilized for AEFI reporting with the support of volunteers, enabling effective communication and diligent follow-up throughout the process.

Challenges:

There is a lack of detailed information on non-severe AEFI and underreporting of AEFIs remains an issue.

6. Disease surveillance

Strengths:

Rapid delivery of investigation reports and use of ICD coding in outbreak control are notable strengths within disease surveillance, supporting efficient response and management of public health events.

Challenges:

Challenges within disease surveillance include complexities of AFP contact tracing as well as difficulties in meeting surveillance indicators.

7. Demand generation

Strengths:

There is no hesitancy towards EPI vaccines and community awareness is actively promoted by volunteers.

Challenges:

A notable challenge in demand generation is its lack of targeted outreach to specific population groups.

Summary

Key achievements include comprehensive community mobilization, integration of health services and achieving vaccination coverage targets. Areas for improvement include strengthening AEFI detection and data linkage and increasing the frequency of reviews and supervisions.

Thailand's Expanded Programme on Immunization (EPI) and vaccine-preventable disease (VPD) surveillance system underwent a comprehensive external independent review in September 2025, led by the World Health Organization and key partners. This report highlights Thailand's remarkable achievements—such as sustained polio-free status, elimination of maternal and neonatal tetanus, and high routine immunization coverage—while candidly addressing persistent challenges like subnational coverage gaps, surveillance gaps, risks from cross-border disease importation, and the complexities of decentralization.

The review draws on extensive field visits, stakeholder interviews, and data analysis across seven provinces, offering actionable recommendations to strengthen syndromic surveillance, improve inclusive reporting (especially for migrant and high-risk groups), and enhance programme oversight at all levels. With a focus on equity, resilience, and innovation, this report provides a roadmap for Thailand to sustain immunization gains and respond effectively to emerging public health threats

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