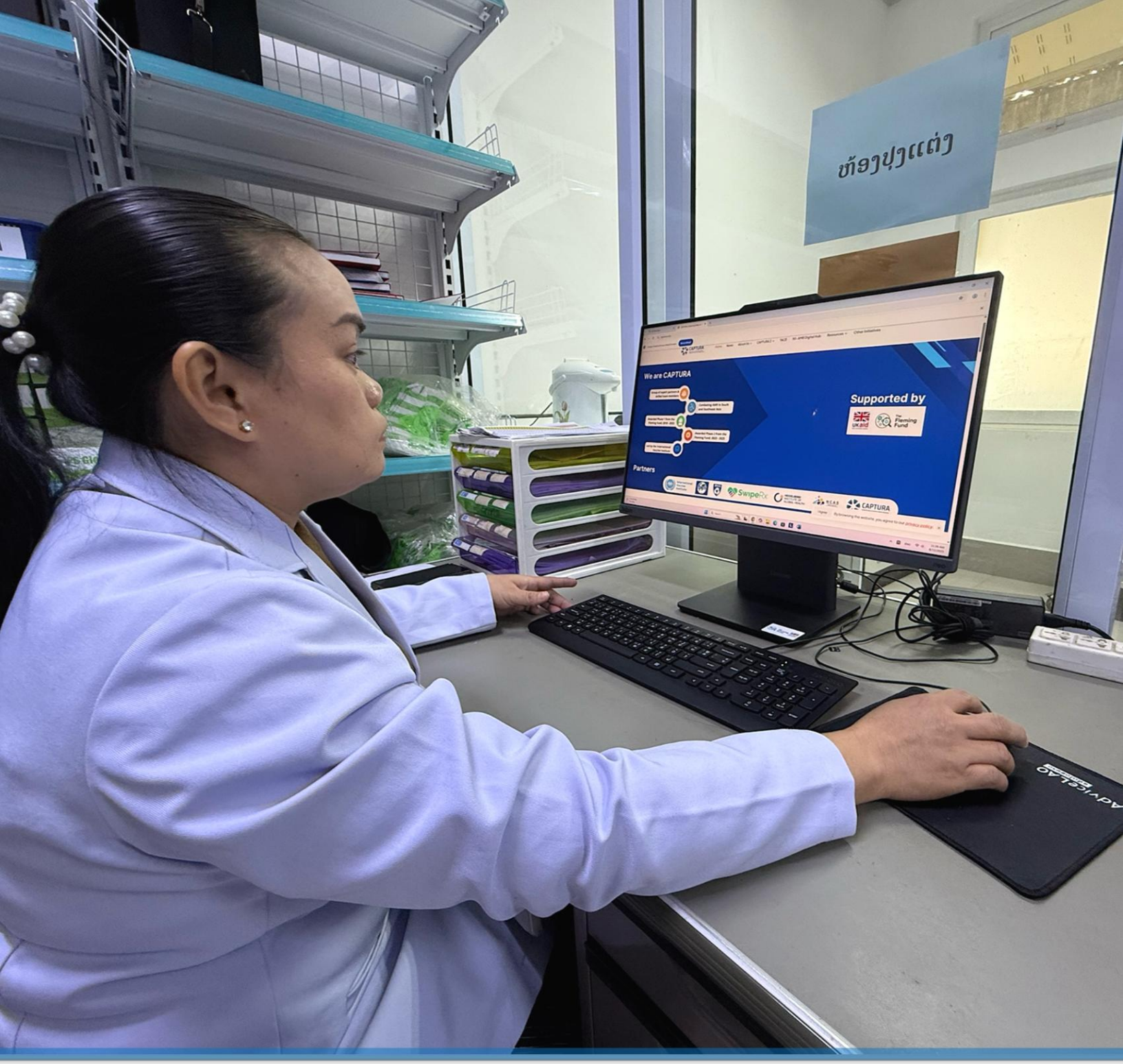

OPERATIONAL FRAMEWORK FOR SUSTAINABLE ANTIMICROBIAL USE MONITORING IN LAO PDR

Version: September 2025

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This framework is developed under the TACE/CAPTURA Regional Fleming Fund Grant, led by the International Vaccine Institute (IVI) and funded by the UK's Fleming Fund, in close collaboration with the Food and Drug Department (FDD) of Lao PDR. It was prepared jointly with the Fleming Fund Country Grantee, Fondation Merieux, to support national efforts in strengthening antimicrobial use monitoring at both national and hospital levels.

1. INTRODUCTION

1.1 Background

Antimicrobial resistance (AMR) is a global public health crisis, exacerbated by the overuse and misuse of antimicrobials. Monitoring antimicrobial consumption is a cornerstone of AMR containment efforts. In Lao PDR, such monitoring of antibiotics is embedded within the national AMR strategy, reflecting commitments to international frameworks such as the Global Action Plan on AMR and WHO surveillance guidelines.

In Lao PDR, the Food and Drug Department (FDD) under the Ministry of Health has made significant strides in monitoring antimicrobial consumption to address the growing threat of AMR. Historically, limited data and sporadic point prevalence surveys impeded systematic understanding of consumption patterns of antibiotics in the country, prompting the FDD to collaborate with WHO as early as 2017 to conduct early implementation for consumption data collection and establish a set of guidelines. Building on these efforts, the FDD, since the last few years, has a designated team to conduct antibiotic consumption monitoring, uses standardized data collection tools centered around WHO's Defined Daily Dose methodology, ensuring more accurate and consistent tracking. This structured approach has enabled Lao PDR to regularly report to WHO's Global Antimicrobial Resistance and Use Surveillance System (GLASS) and WPRACSS, which in-return help inform evidence-based policies and antibiotic stewardship interventions at both national and facility levels.

Awareness campaigns further support rational use of antimicrobials, while revised regulations and stricter inspections help curb the misuse of antibiotics in public and private healthcare settings. Collectively, these measures have solidified AMU monitoring as a critical pillar in Lao PDR's broader strategy against AMR, paving the way for sustainable improvements in public health outcomes.

1.2 Purpose of the Framework

While Lao PDR has made steady progress in antimicrobial use (AMU) monitoring over the past seven to eight years, this progress remains uneven and fragile. Much of the initial momentum was made possible through donor-funded initiatives, which have since diminished, leaving gaps in data collection, outdated tools, and uncertain staffing continuity. It is precisely for this reason that this Sustainability and Operational Framework is so timely and relevant. The aim is not only to recognize and build on past achievements, but to ensure that AMU monitoring becomes institutionalized and resilient—less dependent on external funding and more embedded within national systems. By clearly laying out practical steps and simplifying implementation, this framework seeks to make AMU monitoring more accessible, understandable, and above all, sustainable.

This short, actionable framework focuses on strengthening antimicrobial use monitoring at the medicine level at two levels:

- *National medicine level AMU Monitoring (previously called AMC National level)*
- *Hospital medicine level AMU Monitoring (previously called AMC Hospital level)*

Important shift in terminology from AMC to AMU

This framework reflects the explicit shift in terminology from Antimicrobial Consumption (AMC) to Antimicrobial Use (AMU), in line with updated WHO guidance since 2024. This change is being adopted in this document to ensure alignment with WHO's GLASS.

Updated WHO Terminology for Antimicrobial Use Monitoring
The World Health Organization (WHO) has introduced revised terminology to bring greater clarity and consistency to antimicrobial use (AMU) monitoring. Moving beyond the older terms of antimicrobial consumption (AMC) and antimicrobial use (AMU), WHO now distinguishes between medicine-level AMU (m-AMU) and clinical-level AMU (c-AMU). m-AMU refers to data on the volume of antimicrobial medicines consumed, without accompanying clinical context—essentially replacing AMC. c-AMU, on the other hand, includes data linked to clinical information such as patient diagnosis, indication, and treatment decisions. This new framing addresses previous confusion around the perceived distinction between quantity and quality of antimicrobial use and reinforces that no single metric alone can capture the complexity of AMU patterns.

This twofold approach to AMU surveillance recognizes the complementary nature of both methodologies. Medicine-level AMU (m-AMU) provides aggregated data on the types and quantities of antimicrobials consumed over time, helping detect usage trends and providing early signals for potential misuse—especially useful when correlating AMU and AMR data. Clinical-level AMU (c-AMU) goes further by offering insights into how antimicrobials are used in specific patient groups and settings, helping assess rational use and prescribing behavior. The scope of c-AMU spans health facilities, individual patients, and even households. Together, these approaches serve distinct but interlinked objectives, each with different methodological implications, and together provide a more comprehensive understanding of antimicrobial use.

Old Terminology	*New WHO Terminology*	*Description*	*Level of Measurement*
Antimicrobial Consumption (AMC)	*Medicine-level AMU (m-AMU)*	*Quantitative data on types and volumes of antimicrobials consumed, no clinical context.*	*National and hospital level*
Antimicrobial Use (AMU)	*Clinical-level AMU (c-AMU)*	*AMU data linked with clinical information (e.g., indication, diagnosis, outcomes).*	*Facility level only*

This framework is designed to institutionalize the routine, annual collection, monitoring, and analysis of AMU data in a sustainable manner, guiding stakeholders through clearly defined steps to ensure consistent implementation each year. By systematically

strengthening systems, refining data analysis, and enabling evidence-based action over time, the framework aims to build a more robust and responsive AMU monitoring process for Lao PDR. This framework provides a structured, actionable roadmap to improve AMU monitoring at national and hospital level across Lao PDR. The framework aims to guide provided short-, mid-, and long-term actions over 12, 24 months.

In consultation with the FDD, it was deliberately decided to develop this framework as a practical and operational guide, rather than as a broad national strategy. While strategic planning remains essential for long-term systems strengthening, the current need in Lao PDR is to protect and build upon the important progress already made on the ground. There is a real risk that momentum could be lost if operational gaps are not addressed and if concrete next steps are not clearly defined for hospitals and national stakeholders. This framework therefore focuses on providing hands-on, step-by-step guidance for implementation—especially tailored to the realities of hospital-level monitoring. By doing so, it supports the continuity of AMU surveillance work and offers a pragmatic path forward during this critical transition period.

It is also important to recognize that there is inherent complementarity between a strategy and an operational framework. While the terminology may differ, both are tools that contribute to achieving common goals. In this case, the decision to prioritize an operational approach was based on current implementation realities and the need for practical guidance that is immediately usable by those on the front lines of AMU monitoring. This framework does not preclude future strategic development but instead lays the foundation by ensuring that current efforts are sustained, expanded, and effectively institutionalized.

NATIONAL LEVEL ANTIMICROBIAL USE MONITORING IN LAO PDR (MEDICINE-AMU)

2. NATIONAL-LEVEL ANTIMICROBIAL USE MONITORING IN LAO PDR (MEDICINE-AMU)

2.1 A significant shift in the supply chain of antibiotics in Lao PDR

As of 2025, Lao PDR has introduced a major change in how medicines and antibiotics are procured across the country. For the first time, all provinces and five central hospitals are now authorized to purchase their own medicines directly, rather than relying solely on the central procurement system managed by the Ministry of Health. This shift was prompted by persistent delays in national tendering processes, which had contributed to shortages of essential medicines. While procurement responsibilities are being decentralized, the national FDD continues to provide oversight, ensuring that all medicines meet national standards and pricing regulations.

Previously, the FDD and the Medical Products Supply Centre (MPSC) were responsible for purchasing medicines in bulk and distributing them through a central warehouse in Vientiane. These medicines were then sent to regional and provincial warehouses before reaching hospitals, health centers, and other public facilities. At the provincial level, FDD units supported forecasting, inspected storage conditions, and monitored usage patterns. Although these functions were critical, the overall system often struggled to respond quickly to local needs, particularly in rural and hard-to-reach areas.

With the new approach, provinces and select hospitals are now taking greater ownership of the supply chain. They are responsible for identifying their own needs, procuring medicines independently, and ensuring timely availability at facility level. To safeguard quality and transparency, each province is required to establish a procurement committee that works under the supervision of the national FDD. The Ministry of Health has also issued guidance to ensure that public sector prices remain affordable and that reimbursements under the national health insurance scheme are processed without delay.

This reform represents a significant step toward improving the responsiveness and resilience of the health system. By shifting operational control closer to the point of care, Lao PDR is aiming to ensure that medicines are more consistently available and better matched to actual demand. At the same time, the national FDD remains essential in setting policy, monitoring compliance, and supporting coordination across all levels. The long-term success of this new model will depend on strong capacity at the provincial level, adequate financial resources, and continued technical support from central authorities.

In Lao PDR, private hospitals and pharmacies operate independently from the public procurement system. They typically source their medicines and antibiotics through licensed private importers and distributors, many of whom bring products in from neighboring countries such as Thailand, Vietnam, and China. Some larger private facilities also import directly, while a limited number of domestic manufacturers supply medicines locally. These private actors manage their own purchasing and logistics but must still

comply with national regulations set by the FDD, including product registration, licensing, and inspection requirements.

While private pharmacies often have more consistent stock availability than public facilities, especially during supply shortages, there are concerns around quality assurance and affordability. In some cases, unregistered or substandard products may enter the market, particularly in border areas. Moreover, private pharmacies are not integrated into the national electronic logistics management information system (eLMIS), making it difficult for the government to monitor overall antibiotic consumption and ensure rational use across both public and private sectors.

The current structure of the medicine supply chain in Lao PDR—particularly the separation between the public and private sectors—has significant implications for monitoring the availability and use of antibiotics across the country.

Because the public sector uses a centralized (now partially decentralized) procurement and distribution system, antibiotic availability in public hospitals and health centers can be monitored through tools like the electronic logistics management information system. This system allows the Ministry of Health and the national FDD to track stock levels, consumption patterns, and distribution across public facilities. However, this system does not cover the private sector, where a large share of antibiotics is dispensed.

In the private sector, which includes thousands of pharmacies and numerous private hospitals, there is no routine, standardized mechanism to collect data on antibiotic availability, sales, or use. Many private pharmacies procure antibiotics through various importers or wholesalers, and in some cases, medicines may be imported informally or sold without prescriptions. This creates large data gaps and poses challenges for national antibiotic consumption monitoring.

In practice, this means that national-level reporting on antibiotic availability and use is incomplete, with much of the private sector operating outside current monitoring frameworks. This limits the government's ability to assess total antibiotic consumption, detect misuse or overuse, and implement stewardship efforts across the whole health system.

2.1 SWOT Analysis

A SWOT analysis was conducted in collaboration with the FDD and provincial FDD sites during a workshop in September 2024. The purpose of this analysis was to establish a comprehensive understanding of the key starting points for enhancing the operationalization and sustainability of medicine AMU (m-AMU) monitoring in Lao PDR.

Since 2018, the FDD has been responsible for collecting m-AMU data at the national level, supported by training programs primarily led by the WHO and other international partners. This sustained engagement has resulted in steadily improving capacity at the central level, setting a strong foundation for further strengthening AMU monitoring. Notably, in 2023, the FDD introduced a digital tool for pharmaceutical supply chain monitoring, which has

improved tracking of imported medicines and contributed to strengthening the broader AMU framework.

At the national level, there is a designated focal point within the FDD, supported by a team of three to four staff members. Among them, one to two individuals are highly trained in m-AMU monitoring methodologies, while the others still require capacity-building to enhance their skills. In addition, the FDD has developed innovative capacity-building mechanisms, such as YouTube training videos and a WhatsApp channel, to provide ongoing guidance to staff. These efforts reflect a robust set of people and skills capable of leading national m-AMU efforts and providing technical oversight.

In contrast, the provincial FDD teams are significantly understaffed, with typically only one or two people allocated to AMU activities per site. While some provincial staff have been trained in m-AMU methodologies, many others lack the necessary skills, leading to inconsistencies in data collection and reporting. Furthermore, roles and responsibilities for m-AMU monitoring are not formally recognized in the job descriptions of provincial staff, making it challenging to allocate sufficient resources and time to these activities. This is compounded by the fact that some provincial staff work in near pro bono capacities, creating an unsustainable system prone to high staff turnover. These challenges limit the scalability and reliability of m-AMU monitoring at the provincial level.

Additionally, while m-AMU data is being collected and compiled by the FDD at the national level, limited in-depth analysis is conducted to translate this data into actionable recommendations for policies and antimicrobial stewardship measures. This gap highlights the potential to enhance national m-AMU efforts by linking data collection to decision-making processes, ultimately ensuring the data has a tangible impact on AMR containment strategies.

Finally, challenges with IT infrastructure further complicate m-AMU activities. The macro-driven GLASS AMU Excel template, provided by WHO HQ since 2017, frequently encounters errors, which the FDD staff are unable to resolve, delaying data processing and reducing reliability. This reliance on outdated tools underscores the need for modernized IT systems and dedicated troubleshooting support.

Despite these challenges, the FDD's achievements, particularly in developing digital tools and innovative training methods, combined with ongoing international support, present opportunities to strengthen AMU monitoring nationwide. Addressing key gaps, such as provincial capacity, formalizing roles, and ensuring sustainable funding, will be critical to realizing the full potential of AMU monitoring in Lao PDR.

Strengths

- *Strong coordination and leadership at the national level, with the FDD effectively overseeing AMU activities aligned with AMR strategies.*
- *Robust national expertise, including a designated focal point and a team of three to four staff members, with one to two highly trained in AMU methodologies.*

- *Development of mini training mechanisms, such as YouTube videos and a WhatsApp channel, to build capacity across staff.*
- *Introduction of a digital tool for pharmaceutical supply chain monitoring in 2023, improving the tracking of imported medicines and contributing to AMU data collection.*
- *Integration of AMU activities into routine health programs, ensuring continuity and sustainability.*

Weaknesses

- *Reliance on manual data collection methods, increasing inefficiencies and risks of errors.*
- *Outdated IT infrastructure, limiting the capacity to validate, analyze, and store AMU data effectively.*
- *Challenges with the macro-based GLASS AMU Excel template, which frequently encounters errors that FDD staff are unable to resolve.*
- *Limited provincial capacity, with only one or two staff members allocated to AMU activities per provincial site, many of whom lack proper training.*
- *Lack of formal recognition of AMU roles in provincial staff job descriptions, making it difficult to prioritize AMU work and allocate resources.*
- *Unsustainable staffing models at the provincial level, with some staff working in near pro bono capacities, increasing vulnerability to high staff turnover.*
- *Underutilization of collected data, with limited in-depth analysis being performed to inform policies or stewardship measures.*

Opportunities

- *International support for training and IT upgrades, providing resources to scale AMU activities nationwide.*
- *Engagement with the private sector, including private healthcare providers and pharmacies, to enhance data comprehensiveness and foster collaboration.*
- *Advanced data utilization opportunities, such as partnerships with academic institutions, to analyze AMU data and develop actionable recommendations for policy and stewardship.*
- *Regional and global collaboration, such as through WPRACSS and WHO HQ's GLASS AMU initiatives, to adopt best practices and align with international standards.*
- *Formalizing AMU roles and responsibilities in job descriptions, particularly at the provincial level, to enhance accountability and resource allocation.*

Threats

- *Fragmented international support, highlighting the need for reliable and annually allocated national budgets to sustain AMU monitoring efforts.*
- *Insufficient funding for IT upgrades and staffing, constraining the ability to modernize systems and expand provincial capacity.*
- *Staff turnover and sustainability risks, particularly at the provincial level, due to reliance on underpaid or pro bono staff.*

- *Delayed or problematic data management caused by recurring issues with the GLASS AMU Excel tool, hindering timely reporting and data reliability.*
- *Limited policy impact of AMU monitoring due to insufficient analysis and translation of data into actionable recommendations for antimicrobial stewardship or decision-making.*

2.2 Key needs and actions to strengthen the national-level AMU Programme (6, 12, 24, 36 Months)

One of the central objectives of this framework is to progressively strengthen the national AMU programme in Lao PDR over time. This means enhancing the core building blocks of the programme—namely, its human resources, surveillance tools, methodologies, and reporting systems. Strengthening these attributes not only improves the quality and consistency of AMU monitoring but also lays the foundation for a more resilient and sustainable programme.

The matrix below presents a step-by-step roadmap covering the next 6, 12, 24, and 36 months, outlining how to systematically improve the programme's capacity across each of these critical areas. By establishing routine structures and practices, the framework promotes greater institutionalization, making the AMU programme easier to manage, less resource-intensive, and more cost-effective over time.

The matrix is organized around phased milestones and details the key actions, expected outcomes, responsible parties, and resources needed at each stage. The FDD is expected to act as the primary steward of this process, coordinating efforts between national and provincial levels and ensuring alignment with WHO GLASS methodologies. The final column provides a summary of indicative resource needs to support effective implementation. Ultimately, this table is designed to be a practical reference tool for planning, coordination, and action, supporting the long-term sustainability and impact of AMU monitoring in Lao PDR.

Table 1: Key Needs and Actions to strengthen the national-level AMU Programme (6, 12, 24, 36 Months)

Timeline	Key Actions	Expected Outcomes	Responsible Party	Resources Needed
6 Months	• Define the clear role of provincial FDD AMU focal points with formalized roles. • Resolve GLASS AMU tool issues with WHO support. • Conduct refresher training for national and provincial FDD staff on AMU tools provided by WHO or IVI. • Disseminate this operational sustainability framework, including tools and resources.	• Provincial focal points established. • Improved IT capacity at national and provincial levels. • Reduced errors in data collection. • Framework fully disseminated and operationalized.	• National FDD, Provincial FDD, WHO, IVI	• Computers, software • WHO technical assistance. • Orientation materials. • Internet access for provincial offices.
12 Months	• Introduce the AbXuse/IVI tool for data validation • Ensure provincial FDDs are effectively using new IT equipment for AMU monitoring. • Develop SOPs between provincial and national FDD to capture procured/dispensed antibiotics across the public procurement supply chain, using the core elements of this Framework	• Provincial and national FDDs proficient in IT use and AMU tools. • Enhanced capacity for data collection and reporting. • SOP to capture data at provincial, national level operational	• National FDD, IVI, WHO, Provincial FDD	• Training modules for IT and AMU tools. • Dissemination budget for operational framework. • Supervision and monitoring budget to ensure effective IT use.
24 Months	• Ensure AMU monitoring is operational in all provinces. • Conduct annual AMU workshops to review progress, share lessons, and refine practices. • Develop an initial national AMU report or bulletin summarizing findings and recommendations.	• AMU monitoring operational nationwide. • Enhanced provincial capacity for AMU reporting. • National AMU report or bulletin published.	• National FDD, Provincial FDD, MOH	• Budget for AMU workshops (venue, travel, materials). • Templates for national AMU report/bulletin (annexed list). • Technical support for reporting.

36 Months	• *Fully implement electronic AMU monitoring systems across all provinces.* • *Conduct a national AMU assessment to evaluate effectiveness.* • *Update policies and stewardship measures based on findings.* • *Institutionalize AMU monitoring through formal roles in staff job descriptions.*	• *Reliable AMU data for national and global reporting.* • *Institutionalized AMU processes.* • *Updated policies informed by AMU data.*	• *National FDD, Provincial FDD, MOH, WHO*	• *Funding for assessment and policy workshops.* • *Job description templates for AMU roles.* • *Sustainable funding mechanisms for AMU activities.*

2.3 Annual workflow to collect, validate and analyse national-level medicine AMU data

A well-established workflow for National AMU data submission plays a critical role in ensuring timely, accurate, and complete reporting to the WHO GLASS platform. Much like a university admissions calendar, m-AMU data collection and submission typically occur at predictable intervals each year, making it essential to have a structured and clearly communicated annual workflow.

As a WHO Member State in the Western Pacific Region, Lao PDR has committed to reporting antimicrobial use (AMU) data through the Western Pacific Regional Antimicrobial Consumption Surveillance System (WPRACSS). The primary submission of national-level AMU data will therefore be made to WPRACSS, after which the data will be shared onwards to GLASS. While there may be minor differences in data collection formats or requirements between WPRACSS and GLASS, the same core AMU data will be collected and utilized to fulfill both regional and global reporting obligations. This process ensures harmonization and efficiency, while allowing Lao PDR to contribute meaningfully to both regional and international AMU surveillance efforts.

The sample workflow included in this operational framework helps all stakeholders—particularly the FDD—coordinate national AMU monitoring effectively, despite the many competing priorities faced annually by ministries, provincial health authorities, and hospitals.

An important point to note is that while submission to WPRACSS/GLASS usually occurs in October, the data being submitted corresponds to the previous calendar year. For example, AMU data officially submitted in October 2026 refers to data collected during calendar year 2025. As such, the complete cycle from initial data collection to final submission spans nearly two full years.

If data collection begins in January 2025, that data will not be officially submitted to WPRACSS/GLASS until October 2026. This extended timeline underscores the need for a robust and well-planned process, starting from strong data collection systems and staff capacity in Year 1, through to thorough analysis, validation, and reporting in Year 2.

The first year of this two-year cycle must focus on ensuring that AMU data is collected accurately, completely, and systematically. This requires effective record-keeping, the use of standardised tools, and capacity building—particularly refresher training for staff at national and provincial levels. As these systems become more established and routinized, the overall burden of data collection is expected to diminish, and the work will become easier to manage, less time-consuming, and more cost-effective over time.

In the second year, the focus shifts to data processing, validation, and submission. This includes cleaning the dataset, conducting national-level analysis, and preparing the final dataset for submission to WHO. Where applicable, countries may also produce a national AMU report or bulletin to disseminate findings locally, enabling hospitals and

policymakers to use the results to inform antimicrobial stewardship, treatment guidelines, and policy dialogue. In this way, the second year not only supports global reporting obligations but also reinforces national ownership and utility of AMU data.

Example of planning ahead using a 2-year cycle

In practical terms, this means activities must begin well in advance of the submission deadline. For instance, planning and coordination meetings in January 2025 define annual goals, assign responsibilities, and set expectations. In February 2025, data collection tools are updated and distributed to all reporting sites, followed by refresher training in March 2025 to ensure that staff are well-equipped to manage the upcoming cycle. Data collection begins in early in 2025 and will run throughout 2025.

In early 2026 the focus shifts to data processing, cleaning the data and validation, and submission.The national FDD team should support data cleaning and compilation in early 2026, followed by final validation around the April-May 2026. This sets the stage for further analysis, national reporting, and ultimately, official submission of the validated AMU data to WPRACSS/GLASS in October 2026, covering the use data from calendar year 2025.

This sequence demonstrates the importance of early planning and consistent follow-through to ensure high-quality, on-time reporting.

Table 2: Two year cycle workflow for submission of national-level AMU data to WHO GLASS

Workflow Year	Month	Key Actions	Details and Responsibilities	Responsible Party
Data Collection Year (2025)	January	Planning and coordination meetings	Set collection targets, confirm roles and responsibilities, and establish timelines for the year.	FDD Central Level
Data Collection Year (2025)	February	Distribute data collection tools and templates	Ensure all relevant staff have updated tools and templates for AMU monitoring. Confirm understanding of use.	FDD Central Level
Data Collection Year (2025)	March	Conduct refresher training for FDD staff	Provide training on AMU tools, IT systems, and troubleshooting to ensure readiness for data collection.	FDD Central Level
Data Collection Year (2025)	January–December	Conduct mAMU data collection	Conduct AMU data collection throughout the year. Ensure consistent recording and tracking of data in accordance with national tools.	FDD Central Level
Processing & Submission Year (2026)	January	Begin review of provincial data submissions	Clean and validate datasets received from the data collection year and prepare for national aggregation.	FDD Central Level
Processing & Submission Year (2026)	January–March	Data analysis and feedback sessions	Conduct full data analysis, review provincial trends, and hold meetings with relevant stakeholders to discuss key findings.	FDD Central Level, Provincial Stakeholders
Processing & Submission Year (2026)	April–June	Draft national AMU bulletin or report	Prepare report summarizing AMU trends, identifying areas for action and stewardship.	FDD Central Level
Processing & Submission Year (2026)	July–August	Final validation and WHO preparation	Resolve remaining issues, finalize submission format, align with WPRACSS/GLASS templates.	FDD Central Level
Processing & Submission Year (2026)	September	Final internal clearance of AMU data	Secure internal approval for WHO submission.	FDD Central Level

Processing & Submission Year (2026)	*October*	*Submit AMU data to WPRACSS/GLASS platform*	*Submit finalized AMU dataset covering previous calendar year data.*	*FDD Central Level*
Processing & Submission Year (2026)	*Post-Submission*	*Disseminate findings and use data for policy*	*Publish national report, share findings with stakeholders, and inform AMR stewardship policies.*	*FDD Central Level*

2.4 Tools for national-level AMU monitoring

Effective implementation of national AMU monitoring depends on the availability and consistent use of well-developed tools. Fortunately, the methodology for AMU monitoring, as guided by WHO, has remained relatively stable over the years, with core indicators and processes remaining unchanged. This stability means that once tools are developed or adapted, they can often be used for several years without requiring major modifications. This reduces the burden on national programs and allows for more sustainable integration of AMU monitoring into health system routines.

The tools listed out below present a consolidated list of key tools currently used in Lao PDR for AMU monitoring at the national level. It highlights both the core WHO-provided tools—such as the GLASS-AMU Excel Template and the ATC/DDD Index—as well as national and locally developed tools, including training modules, Essential Medicines Lists, and instructional content developed by the FDD through platforms like YouTube and WhatsApp.

In response to persistent challenges with IT infrastructure, a significant development has been the introduction and sharing of the updated WPRACSS template with the FDD. This template eliminates the need for Excel macros, thereby reducing technical errors and simplifying the process of data entry. While validation and quality checks will now be conducted directly through the WPRACSS portal, this transition is expected to streamline m-AMU data collection, mitigate delays, and enhance the overall reliability of data management.

Another key development has been the introduction (through the Fleming Fund-supported CAPTURA project) of the AbXuse tool, a web-based data collection platform utilizing the ATC/DDD methodology and fully compliant with both WPRACSS and GLASS standards. Uniquely, AbXuse is also available in Laotian, greatly enhancing accessibility for local users. The tool allows monitoring at the individual medicine level, with a comprehensive database of antibiotics already available in Lao, which could significantly accelerate the FDD's workflow or serve as a robust means of validating offline data collection processes.

This list of tools is not exhaustive, but it is a useful reference to help FDD and stakeholders track which tools are available, which are actively in use, and which may require review or updating. It also serves as a reference point for identifying gaps or areas needing further tool development.

It is recommended that at the beginning of each AMU data collection and submission cycle, the FDD conducts a systematic review of the tools to ensure they remain accurate and up to date. This becomes particularly important when there are plans to expand monitoring to additional sites, or to disaggregate data by hospital and community levels. In such cases, existing tools may need to be modified or supplemented to ensure clear guidance and methodological consistency throughout the monitoring process.

The FDD has made commendable efforts to adapt and localize internationally available AMU monitoring tools for use within the national context. However, to further strengthen implementation and ensure consistency, additional investments are recommended, particularly in the development of structured training materials, user-friendly manuals, and standardized

guidance tools. Enhancing these resources will help consolidate knowledge, reduce variability in practice, and improve the long-term sustainability of the monitoring programme.

Table 3: Tools to facilitate monitoring of AMU at national level in Lao PDR

Category	Resource Name	Description	Source/Access
WHO Official Tools	GLASS Manual on the Management of Antimicrobial Consumption Data	Comprehensive guide on using the GLASS-AMU Excel template and submitting AMU data.	WHO Manual
WHO Official Tools	GLASS Guide for National Surveillance Systems	Guidelines for monitoring AMU in hospitals and establishing national systems.	WHO Guide
WHO Official Tools	GLASS-AMU Microsoft Excel Template	Data collection and analysis tool with pre-built macros for standardization.	Download the 2023 template here
WHO Official Tools	Global Antimicrobial Resistance and Use Surveillance Report 2021	Insights into global AMU implementation, trends, and key lessons.	WHO Report
WHO Official Tools	ATC/DDD Index 2025	Standard classification system for measuring drug consumption using defined daily doses (DDD).	ATC/DDD Index
WHO Official Tools	WPRACSS data collection excel template	Template to collect m-AMU data at the national level	WPRACSS Template
WHO Official Tools	WPRACSS web portal	Web portal to submit and visualize m-AMU data (username & password required)	WPRACSS portal
National and Local Resources	Essential Medicines List (EML)	Country-specific list of essential medicines to guide AMU reporting and policy-making.	EML
WHO Official Tools	AWaRe Categorization Tool	WHO classification of antibiotics into Access, Watch, and Reserve categories for AMU analysis.	AWaRe Tools
National and Local Resources	National Training Modules	Training materials developed to build capacity in AMU monitoring and reporting.	Needs to be developed
National and Local Resources	Whatsapp Videos by FDD	Short instructional videos for AMU data collection, troubleshooting, and reporting.	Join the group here
National and Local Resources	YouTube Videos by FDD	Training content on AMU methodologies, IT usage, and GLASS-AMU template troubleshooting.	Watch the video here
National and Local Resources	AbXuse / CAPTURA data collection and monitoring tool	Medicine level and aggregated level data collection tool (compliant with ATC/DDD methodology) – in Laotian	Access the tool here

HOSPITAL LEVEL ANTIMICROBIAL USE MONITORING IN LAO PDR (MEDICINE-AMU)

3. HOSPITAL-LEVEL ANTIMICROBIAL USE MONITORING IN LAO PDR

In Lao PDR, national-level AMU monitoring is already underway, with the FDD leading the collection and submission of consumption data in line with WHO's WPRACSS and GLASS. While this national-level monitoring provides a critical overview of antimicrobial use across the country, it is increasingly recognized that medicine level hospital-level AMU (m-AMU) monitoring is essential to guide local decision-making and drive stewardship interventions where antimicrobials are prescribed and used.

3.1 Landscape Analysis: Operational realities and system readiness for hospital m-AMU Monitoring

In August 2025, the International Vaccine Institute, in close collaboration with FDD and FMX, conducted a qualitative assessment to better understand the operational landscape of antimicrobial use monitoring at hospital level. This work aimed to gather practical insights into how m-AMU monitoring is currently implemented, what systems and processes are in place, and where key opportunities exist to support institutionalization and sustainability primarily at the 22 sites currently targeted for hospital monitoring.

As part of this effort, three hospitals were visited: Setthathirath Hospital, Vientiane Provincial Hospital, and Luang Prabang Provincial Hospital. These facilities were intentionally chosen to capture the diversity of settings where m-AMU monitoring takes place. Each represents a wide range of operational contexts, distinct institutional histories, and varied resource environments. Alongside these hospital visits, in-depth discussions with the FDD offered additional insights into cross-cutting challenges and broader health system observations. Rather than comparing hospital performance or evaluating compliance, this assessment aimed to provide a snapshot of current realities at the ground level, acknowledging that hospitals throughout the country progress at different rates and encounter unique challenges.

Setthathirath Hospital: Foundational Structures with Opportunities for Greater Integration

Setthathirath Hospital, a major central-level referral facility, has taken steps to institutionalize m-AMU monitoring. The hospital uses the WHO GLASS Excel tool to collect data on antimicrobial consumption. This work is led by the pharmacy department, which includes a designated AMC focal point, a deputy director, and the head of pharmacy. However, data collection remains the primary focus, with limited use of the information for internal decision-making or clinical stewardship. Data is submitted annually to the Food and Drug Department, and while some support for analysis has been provided, it has not been consistent.

The Drug and Therapeutics Committee has been formally established since 2023, but has only met once this year. There is recognition that the committee's structure and roles need to be clarified to support more regular and impactful engagement. When drug-resistant infections arise, the hospital organizes urgent meetings, particularly in cases involving children. Many of these children have already passed through pharmacies and private clinics before being admitted, highlighting the broader pathways of antimicrobial use in the community. Although AMR and IPC awareness posters have been disseminated, the overall level of staff engagement remains limited.

A crucial aspect explored at Setthathirath Hospital pertains to the supply chain management of antibiotics and the monitoring of stocks and dispensing. Weekly reporting of antibiotic stocks is conducted, but all inventory records are maintained through paper-based systems, with no dedicated digital tracking in place. This results in frequent manual duplication of records across various units. The dispensing of antibiotics is systematically recorded and reported, while any leftover stock is not documented until the following year. Tracking of dispensing is performed separately for inpatient, outpatient, and emergency departments before being consolidated by warehouse staff; after regular hours, dispensing responsibilities shift to the emergency unit.

The hospital also has a procurement system aligned with the approved list from the Food and Drug Department, ensuring that antibiotic procurement follows national guidelines. However, daily reconciliation of stock is not yet a consistent practice, and the coding for tracking antibiotic flow is inconsistently applied. These practices underscore both the current foundations and the operational challenges in antibiotic supply chain management and stock monitoring. While there is an openness to system improvement, ongoing issues with IT infrastructure and limited staff capacity continue to impede progress.

Key observations relevant for the operational framework:

- *Data collection is regular, but internal data analysis and stewardship use are lacking and should be integrated into routine workflows.*
- *Drug and Therapeutics Committee requires clearer terms of reference and a regular meeting schedule to support decision-making.*
- *Transition from paper-based to digital systems should be prioritized, particularly for stock tracking and reporting.*
- *Capacity-building is needed for local m-AMU data interpretation and feedback to prescribers.*
- *Setthathirath is well-positioned to transition from Level B to Level C in the hospital maturity model with targeted technical support.*

Vientiane Provincial Hospital: Strengthening Practice Through Structured Support

Vientiane Provincial Hospital has made notable strides in AMU and AMR monitoring, supported by technical and financial assistance from programs such as the Fleming Fund and Luxembourg Development Cooperation. The hospital has a dedicated AMR committee and an in-house laboratory capable of resistance testing. Data on resistance patterns, including ESBL-producing E. coli and ceftriaxone-resistant Staphylococcus aureus, is reviewed through monthly and quarterly reports, with committee meetings held twice a year.

The hospital maintains a WhatsApp group to connect AMR, AMC, and IPC teams, helping to coordinate treatment approaches and monitor resistance trends in real time. This internal communication has strengthened the responsiveness of the hospital's AMU monitoring efforts and created stronger links between pharmacy and clinical teams.

Procurement is carried out by the hospital itself, using a pre-approved list from the Food and Drug Department. Hospitals may exceed their planned procurement amount by up to 15 percent without renegotiating their contracts. A team of four pharmacy staff manage antibiotic stocks,

which are tracked using the mSupply software system and QR codes. The WHO GLASS Excel tool is still completed manually for reporting.

The hospital also organizes end-of-month Drug and Therapeutics Committee meetings, where the pharmacy department reports back to the hospital board. These feedback sessions are used to discuss physician prescribing practices and review broader trends in antimicrobial use. This level of institutional engagement makes Vientiane Provincial Hospital a strong example of how committee structures and IT systems can reinforce good practice.

Key observations relevant for the operational framework:

- *Vientiane Provincial Hospital demonstrates functional maturity in m-AMU monitoring and is operating at or approaching Level D.*
- *Internal accountability structures are active and could be further strengthened through targeted quality improvement cycles.*
- *The hospital could serve as a mentoring or peer-learning site for other facilities, especially in stock management and clinical feedback systems.*
- *Linkages between AMU, AMR, and IPC are strong and should be leveraged in national capacity-building activities.*
- *There is potential for early integration of hospital-level m-AMU reporting into national dashboards or summaries.*

Luang Prabang Provincial Hospital: Building from Strong Leadership Amid Capacity Constraints

Luang Prabang Provincial Hospital has recently begun formal m-AMU monitoring activities. Leadership from the hospital director has been critical in championing these efforts, and there is strong awareness of the need to improve antimicrobial stewardship. However, implementation is still in its early stages.

The pharmaceutical department has 12 staff, who use mSupply for warehouse-level inventory and Excel sheets for small dispensing units. The WHO GLASS Excel template is not actively in use, largely due to staff turnover. Two staff who had been trained in AMU monitoring have left, and a request for refresher training remains pending.

Procurement is carried out through a public bidding process, with access to both domestic and international suppliers. The hospital maintains a five-year procurement plan, which is adjusted based on trends, usage data, and external factors such as inflation and pandemic-related disruptions. Approximately 20 antibiotics are in regular use at the facility. While expired drugs are rare, stock-outs do occur. A WhatsApp group is used to notify suppliers and coordinate stock returns.

AMU data is recorded daily and reviewed monthly to support ordering decisions. However, the hospital faces challenges in claiming reimbursements through the social security system, which affects its ability to maintain stock levels of essential medicines. There is no separation of inpatient and outpatient AMU data, and while monthly reports are printed and signed by the hospital director, these are shared only with the provincial Food and Drug Department. There is currently no formal reporting to the national level.

A quarterly meeting is held to review clinical practices, including cases of incorrect prescribing. However, there is no structured discussion on how AMU data is being used or linked to stewardship strategies. The hospital has expressed a need for further training and clearer guidance on how to advance its monitoring activities in a sustainable way.

Key observations relevant for the operational framework:

- *Luang Prabang Hospital is at an early stage of AMU maturity, likely at level B.*
- *Refresher training and mentorship are urgently needed to rebuild capacity lost through staff turnover.*
- *Integration of digital tools into dispensing and reporting should be a priority to reduce duplication and manual burden.*
- *Local reporting structures are functioning but need connection to national systems for policy feedback and benchmarking.*
- *Procurement planning is systematic and could serve as a foundation for broader stock and stewardship improvements.*

Cross-cutting observations

Many hospitals are attempting to establish internal tracking systems for antimicrobial use, with some success. In theory, all hospitals track the volume of antibiotics dispensed, most often relying on paper-based systems that are manually transferred into Excel spreadsheets for internal stock management and reporting. It is to be noted that the workflow from dispensing to reporting is inconsistent and highly dependent on individual staff capacity. In some hospitals, data flows are reasonably well-structured, with clear links between pharmacy units, stock teams, and administrative review. In others, the process is fragmented or duplicated, with limited internal feedback and no stewardship integration.

Consumption is generally tracked using a basic tally sheet provided by the FDD, and this approach is applied consistently across all medicines. While these tally sheets form a sufficient foundation for meaningful consumption monitoring, in practice, hospitals rarely progress beyond simply counting the number of units—such as tablets of amoxicillin—used. The critical next step, which would transform raw tallies into actionable insights for stewardship and planning, is seldom realized.

The Lao PDR FDD introduced the WHO GLASS AMU template to hospitals to make such standardized monitoring and analysis possible, but it is not fit for purpose at this level because it includes inherent complexities. In the context of m-AMU monitoring, hospitals are being asked to use this GLASS AMU template, but because of the inherent technical knowledge required — such as drug classification, coding, and calculation of defined daily doses— that are beyond their current capacity and arguably outside their role, which adds pressure on already limited pharmacy staff, contributing to poor data quality, frustration, and disincentives for continued monitoring. Crucially, hospitals lack not only the right tool but also the trained human resources and clear guidance to perform these tasks effectively. What is needed is a straightforward tool where hospital pharmacies can enter the number of tablets, packages, suspensions, and vials dispensed, and have it automatically generate a basic level of analysis around antibiotic consumption at the medicine level.

As a result, many important questions remain unanswered. It is still unclear how comprehensively antibiotic use is being captured at hospital level. There are likely underreported stocks, untracked dispensed volumes, and inconsistencies between pharmacy records, warehouse systems, and what gets reported to the national level. This creates a distorted picture of antimicrobial use that weakens the effectiveness of stewardship interventions and national planning.

3.2 Putting hospitals on the right track to conduct m-AMU monitoring

Encouragingly, more and more hospitals are beginning to engage in m-AMU monitoring activities. However, this work remains at an emerging stage, with only a select number of hospitals currently implementing consumption monitoring at the facility level. These efforts vary in depth, frequency, and methodological consistency. That is why this sustainability and operational framework has been developed—to provide hospitals with a clear roadmap that supports both the onboarding of new facilities into the hospital m-AMU monitoring program, and the strengthening and institutionalization of monitoring practices in hospitals already participating.

Monitoring m-AMU at hospital level allows facilities to:

- *Generate reliable and disaggregated data on antimicrobial use within departments and wards;*
- *Detect trends in overuse or misuse of key antibiotics;*
- *Support adherence to national guidelines and pharmacy formularies;*
- *Design and evaluate targeted antimicrobial stewardship interventions;*
- *And contribute to a broader national picture of antimicrobial use that informs policy and planning.*

Although hospital monitoring is not yet a formal requirement under the WHO Global Action Plan, it is a critical function of a responsive and resilient health system. This framework ensures that hospitals in Lao PDR are equipped to build sustainable AMU monitoring systems that are both contextually grounded and aligned with international standards, creating a pathway for long-term improvement in antimicrobial stewardship and containment of antimicrobial resistance.

This operational and sustainability framework takes as its foundation the official WHO methodologies for AMU monitoring at both national and hospital levels. These methodologies, developed under WHO's GLASS, provide the core structure for data collection, analysis, and submission, and have been widely adopted in countries across the world. While it is acknowledged that other tools and approaches exist for tracking antimicrobial use, this framework is explicitly aligned with WHO's standardized methodology—particularly for hospital-level consumption monitoring—as outlined in the guidance document available here.

It is important to clarify that the purpose of this document is not to serve as a comprehensive technical manual for conducting m-AMU monitoring itself, but rather to support the operationalization, sustainability, and scale-up of such monitoring activities within Lao PDR, using the WHO methodology as the principal reference point.

3.3 Participating hospitals in hospital-level m-AMU monitoring in Lao PDR

In Lao PDR, the current hospital AMU surveillance framework operates under the coordination of the FDD, which has identified and designated several public hospitals to collect antimicrobial consumption data. The primary purpose of this data collection is to contribute to national-level AMU reporting. However, the data—typically drawn from hospital pharmacy procurement or distribution records—also provides an opportunity for hospitals to analyze and reflect on their own antimicrobial use patterns.

At present, a select number reviews pharmacy records to determine the volume of antimicrobials dispensed. The number of annual admissions serves as the primary denominator, allowing antimicrobial use to be expressed in Defined Daily Doses (DDD) by hospital admissions. While this model remains basic, it lays the groundwork for further refinement and integration of hospital-level stewardship and data use practices.

Currently 22 hospitals are designated to participate in m-AMU monitoring efforts across Lao PDR with 5 at the central level and 17 at the provincial level.

Table 4: List of hospitals participating the hospital-level m-AMU in Lao PDR

No.	Location	Hospital Name
1	Central Hospital	Setthathirath Hospital
2	Central Hospital	Mahosot Hospital
3	Central Hospital	Mittapharp Hospital
4	Central Hospital	Mother and Child Hospital
5	Central Hospital	Children's Hospital
6	Provincial Hospital	Attapeu Provincial Hospital
7	Provincial Hospital	Bokeo Provincial Hospital
8	Provincial Hospital	Bolikhamxai Provincial Hospital
9	Provincial Hospital	Champasak Provincial Hospital
10	Provincial Hospital	Houaphanh Provincial Hospital
11	Provincial Hospital	Khammouane Provincial Hospital
12	Provincial Hospital	Luang Namtha Provincial Hospital
13	Provincial Hospital	Luang Prabang Provincial Hospital
14	Provincial Hospital	Oudomxay Provincial Hospital
15	Provincial Hospital	Phongsaly Provincial Hospital
16	Provincial Hospital	Salavan Provincial Hospital
17	Provincial Hospital	Savannakhet Provincial Hospital
18	Provincial Hospital	Vientiane Provincial Hospital
19	Provincial Hospital	Sainyabuli Provincial Hospital
20	Provincial Hospital	Sekong Provincial Hospital
21	Provincial Hospital	Xaisomboun Provincial Hospital
22	Provincial Hospital	Xiangkhouang Provincial Hospital

3.4 Key differences in m-AMU Monitoring: National vs. hospital level

The methodology for m-AMU monitoring is fundamentally based on the use of Defined Daily Doses (DDD) as the standard measurement unit across both national and hospital levels. However, the denominator used to express antimicrobial use differs significantly, reflecting the distinct objectives and contexts of each monitoring approach.

- *National-Level Monitoring: m-AMU is expressed as DDD per 1,000 inhabitants per day (DID). This population-based measure provides an overview of antibiotic use at the national level and supports monitoring of broad prescribing trends over time. Data is typically sourced from pharmaceutical sales, import records, or national distribution databases, allowing for macro-level tracking of antimicrobial consumption.*

- *Hospital-Level Monitoring: In contrast, hospital monitoring focuses naturally on hospital activity. This approach is designed to evaluate primarily inpatient antibiotic use and assess prescribing practices within a healthcare facility. The most appropriate denominators for hospital-level m-AMU monitoring are based on patient care activity, such as:*
    - *Bed Days (BD) – total number of inpatient bed-days during the period.*
    - *Occupied Bed Days (OBD) – excluding unoccupied beds.*
    - *Admissions (ADM) – number of patients admitted.*
    - *Discharges or Separations – number of patients discharged during the period.*

For standardization purposes, WHO recommends using either patient days, occupied bed days, or admissions (and if not available, discharges) as denominators. The choice depends on the availability of data at each hospital and the ability to separate inpatient from outpatient use. For example, a hospital focusing only on inpatient surveillance may choose patient days as its primary denominator, while another that cannot disaggregate use may opt for admissions as a practical alternative.

While this sustainability framework primarily focuses on the implementation and operational aspects of m-AMU monitoring in Lao PDR, a detailed explanation of the methodological elements, including denominator selection, lies outside its scope. However, the key concepts are outlined here to support contextual understanding. For more comprehensive methodological guidance, hospitals and stakeholders are encouraged to consult the official WHO manual available at the following link

3.5 Empowering hospitals to drive stewardship interventions through m-AMU monitoring

Each of the 22 hospitals participating in the AMU monitoring is encouraged to use their own data to improve hospital-level decision-making. With the right tools and support, hospitals can:

- *Monitor how antibiotics are being used within their facility.*
- *Track changes over time to see whether interventions, like training or new guidelines, are making a difference.*
- *Compare their performance to national averages to understand how they are doing.*
- *Use the data to improve antimicrobial stewardship practices within the hospital.*

By helping hospitals access training, data tools, and basic IT systems, the framework gives them more control and responsibility. This means that hospitals:

- *Can use their own data to make quick improvements, without waiting for national reports.*
- *Build their own skills and systems over time to improve prescribing and patient care.*
- *Take stronger ownership of m-AMU monitoring, leading to more sustainable results.*

Because not all hospitals are at the same level, the framework is designed to be flexible. It allows each hospital to develop a plan that fits their situation, with practical goals for the next 6, 12, and 24 months. This includes:

- *Setting clear steps based on their current capacity.*
- *Ensuring staff are trained and have the right tools to collect and analyze m-AMU data.*
- *Using the results to directly support better antibiotic use through stewardship programs.*

3.6 A maturity model to orient hospital m-AMU on key needs and actions

In the context of Lao PDR, hospitals participating in antimicrobial use monitoring are at varying levels of maturity. Some key hospitals have been involved in m-AMU monitoring for several years and have developed a relatively advanced understanding of data collection and reporting while analysis still remains limited across the board. Others are just beginning to engage with AMU monitoring and are still establishing the basic systems and capacities required. As such, it is important that each hospital identifies its own position along the development spectrum, reflecting its current stage of operational readiness and sustainability.

Within this framework, we present a generic overview of key actions and milestones over the next 6, 12, 24 which serves as a reference for hospitals to orient themselves and plan accordingly. Some hospitals may need to progress through all the steps outlined in this timeline, while others may already be further along and only require targeted interventions to consolidate or expand existing efforts. This table, therefore, offers a flexible planning tool to support hospital-specific action planning based on individual readiness and progress.

To guide the structured implementation and progressive strengthening of m-AMU monitoring in hospitals, this framework adopts a five-level maturity model. The model is designed to help individual hospitals orient themselves within a clear spectrum of progress and to identify the practical actions required to advance to the next level. Inspired by global evaluation mechanisms such as the WHO Tripartite AMR Country Self-Assessment Survey tool, which supports countries in assessing and improving their national AMR capabilities, this model localizes that intent to the facility level. While hospital-based m-AMU monitoring is not a mandatory component under the WHO Global Action Plan on AMR, hospitals play a vital role in the broader health system, both in terms of service delivery and as custodians of antimicrobial stewardship. Understanding the maturity level of each hospital's m-AMU monitoring system is therefore essential for national coordination, resource allocation, and long-term sustainability.

The maturity model comprises five categories:

- *Level A (None): No formal hospital system or plan exists to monitor antimicrobial use.*

- *Level B (Limited): A basic structure is in place and m-AMU monitoring activities have been initiated, although inconsistently.*
- *Level C (Developed): AMU data collection and review occur regularly, with increasing quality and institutional engagement.*
- *Level D (Demonstrated): Data is systematically analyzed and used to inform stewardship actions, prescribing guidance, and performance improvements.*
- *Level E (Sustained): AMU monitoring is routine, institutionalized, and used for continuous quality improvement, with the hospital actively supporting peer learning and national contributions.*

This model is not just a classification tool—it serves as a roadmap for operational and sustainability planning. It provides hospitals with a reference point to determine where they are today and what steps they need to take to advance. This aligns with the broader national ambition to build a sustainable, data-informed m-AMU monitoring system that supports stewardship and rational use across the country.

In the current context of Lao PDR, most participating hospitals are estimated to fall within Level B or C, with one or two leading facilities in Vientiane potentially reaching Level D within the next two years. No hospital in the country has yet reached Level E. As for the private sector, where engagement is still nascent, facilities are likely to be at Level A, highlighting the importance of inclusion and tailored support to bring all stakeholders on board in a coordinated and scalable manner.

At a validation workshop held in June 2025, several hospitals participated in a structured self-assessment process using this maturity model. This exercise enabled facilities to reflect on their current AMU monitoring practices, benchmark their progress against defined criteria, and foster collective dialogue on pathways for advancement. Through guided discussion, hospitals were able to identify their own stage of maturity and prioritize next steps for strengthening their systems.

Hospital	*Self-assessed Maturity Level (June 2025)*	*External assessment Maturity level (August 2025)*
Mahosot Hospital	*Level D – Demonstrated*	*N/A*
Setthathirath Hospital	*Level C – Developed*	*Level B – Limited*
Mittaphab Hospital	*Level B – Limited*	*N/A*
Xiengkhouang Provincial Hospital	*Level B – Limited*	*N/A*
Luang Prabang Provincial Hospital	*Level C – Developed*	*Level B – Limited*

Champasak Provincial Hospital	*Level B – Limited*	
Savannakhet Provincial Hospital	*Level C – Developed*	

Most facilities reported being at Level B or C, with Mahosot Hospital at Level D and no hospitals yet at Level E. Private sector hospitals are estimated at Level A.

3.7. Hospital-level AMU maturity framework

Category A – Maturity Level: None

At this stage, the hospital has no formal plan, structure, or assigned roles in place to monitor antimicrobial use. The key goal at this level is to initiate formal engagement with national authorities, appoint a focal point, and begin foundational preparations for future AMU monitoring.

Maturity Level	*Facility-Level Category (A–E)*	*Timeline*	*Key Actions*	*Expected Outcomes*	*Responsible Party*	*Resources Required*
None	*A - No hospital plan or system in place yet for monitoring use of antimicrobials.*	*0–6 Months*	*Facilitate issuance of official letters between FDD, Department of Hospital Services, and hospital management to initiate AMU monitoring; engage pharmacy and other relevant departments*	*Formal communication establishes commitment and coordination among key departments to begin AMU monitoring*	*FDD Central Level, Department of Hospital, Hospital Management, Hospital Pharmacy, Other Clinical Departments*	*Letter templates, orientation briefings, coordination support*
None	*A - No hospital plan or system in place yet for monitoring use of antimicrobials.*	*6–12 Months*	*Assign hospital AMU focal point, install IT equipment, and introduce basics of AMU methodology; begin staff training*	*Hospital has focal point and infrastructure in place; basic AMU understanding among staff established*	*Hospital Management, FDD Central Level*	*IT equipment, training materials, AMU introduction slides, trainer support*

None	*A - No hospital plan or system in place yet for monitoring use of antimicrobials.*	*12–24 Months*	*Conduct first pilot AMU data collection cycle at the hospital; engage national team for feedback and mentoring*	*Hospital completes its first AMU data cycle with support and receives feedback to improve future cycles*	*AMU Focal Point, FDD Central Level*	*Pilot data collection tools, mentorship plan, feedback forms*

Category B – Maturity Level: Limited

The hospital has taken initial steps to establish AMU monitoring, such as assigning a focal point and initiating sporadic data collection, but practices remain unstructured and inconsistent. The objective is to stabilize this foundation by completing a full data collection cycle and preparing for routine engagement in line with national requirements.

Maturity Level	*Facility-Level Category (A–E)*	*Timeline*	*Key Actions*	*Expected Outcomes*	*Responsible Party*	*Resources Required*
Limited	*B - Basic structure for surveillance of AMU established at hospital level, planning underway.*	*0–6 Months*	*Assess whether refresher training is needed and initiate as appropriate; verify IT capacity, staff understanding of AMU methodology, and presence of AMU focal point; reclarify roles and responsibilities with hospital management*	*Gaps in staffing, training, or systems are identified and addressed to support successful AMU data collection*	*Hospital AMU Team, Hospital Management, FDD Central Level*	*Refresher training material, coordination briefing notes, WhatsApp group support*

Limited	*B - Basic structure for surveillance of AMU established at hospital level, planning underway.*	*6–12 Months*	*Undertake AMU data collection for a full cycle with technical support if needed*	*Hospital completes full AMU data collection cycle and prepares dataset for review*	*Hospital AMU Team, FDD Central Level*	*Data collection forms, WhatsApp group technical support, follow-up checklist*
Limited	*B - Basic structure for surveillance of AMU established at hospital level, planning underway.*	*12–24 Months*	*Conduct initial analysis and validation of AMU data with support from FDD Central Level; FDD to provide feedback on results, data quality, and analysis; validation may also involve development partners such as WHO or IVI*	*Hospital collaborates with FDD and partners to improve the quality of AMU data and its interpretation for future cycles*	*Hospital AMU Team, National AMU Coordinator*	*Interpretation templates, summary briefing materials, technical mentoring*

Category C – Maturity Level: Developed

Hospitals at this level collect and review AMU data regularly and have developed some internal processes to use the data, though usage may still be limited to technical teams. The target is to strengthen inter-departmental sharing, introduce routine internal reporting, and link AMU findings to clinical and pharmacy decision-making.

Maturity Level	*Facility-Level Category (A–E)*	*Timeline*	*Key Actions*	*Expected Outcomes*	*Responsible Party*	*Resources Required*
Developed	*C - Data on antimicrobial use is being collected and*	*0–6 Months*	*Improve consistency of data collection practices and ensure use of updated AMU*	*Hospitals consistently use national tools and templates for AMU data*	*Hospital AMU Team, FDD Central Level*	*Updated data templates, refresher guidance,*

	reviewed at hospital level.		*tools; resolve any remaining IT or documentation gaps*	*collection with fewer errors or delays*		*helpdesk support*
Developed	*C - Data on antimicrobial use is being collected and reviewed at hospital level.*	*6–12 Months*	*Conduct internal review of AMU data and organize session to share findings with pharmacy, clinical, and hospital management teams*	*AMU data is reviewed across departments and used for shared learning and quality improvement discussions*	*Hospital AMU Team, Pharmacy and Clinical Departments*	*Internal report templates, meeting facilitation tools*
Developed	*C - Data on antimicrobial use is being collected and reviewed at hospital level.*	*12–24 Months*	*Regularize AMU data analysis and reporting into quarterly internal briefings; flag early signals for stewardship actions*	*Hospitals begin linking AMU data to stewardship discussions and develop hospital-specific indicators*	*Hospital AMU Team, Hospital Management*	*Quarterly reporting template, stewardship summary guide*

Category D – Maturity Level: Demonstrated

Hospitals at this level collect and review AMU data regularly and have developed some internal processes to use the data, though usage may still be limited to technical teams. The target is to strengthen inter-departmental sharing, introduce routine internal reporting, and link AMU findings to clinical and pharmacy decision-making.

Maturity Level	Facility-Level Category (A–E)	Timeline	Key Actions	Expected Outcomes	Responsible Party	Resources Required
Demonstrated	D - Hospital prescribing practices and AMU patterns are regularly monitored and reviewed.	0–6 Months	Continue internal AMU reporting and ensure quality of data summaries; review how data is informing practice	Hospital reviews and validates own data; identifies areas for improved application of findings	Hospital AMU Team, Hospital Management	Internal AMU dashboards, case summary tools, mentorship input
Demonstrated	D - Hospital prescribing practices and AMU patterns are regularly monitored and reviewed.	6–12 Months	Publish an internal AMU review report and discuss implications for stewardship with clinical teams	Hospital-led discussions link data analysis to improvements in prescribing practices	AMU Team, Clinical Leads, Pharmacy Unit	Review report format, facilitation notes, data presentation materials
Demonstrated	D - Hospital prescribing practices and AMU patterns are regularly monitored and reviewed.	12–24 Months	Use AMU findings to adapt guidelines or protocols; evaluate impact of changes with follow-up AMU review	Hospital takes action based on AMU data and begins evaluating impact on prescribing behavior	Hospital Management, Clinical Department Heads	Protocol revision guidance, follow-up data comparison template

Category E – Maturity Level: Sustained

Hospitals at this stage have institutionalized AMU monitoring as a routine hospital function and actively support other hospitals through peer learning or mentoring. The overarching aim is to maintain high-quality surveillance, adapt based on results, and contribute regularly to national policy, stewardship, and AMR control strategies. At this stage, there is no hospital in Lao PDR at this level.

Maturity Level	Facility-Level Category (A–E)	Timeline	Key Actions	Expected Outcomes	Responsible Party	Resources Required
Sustained	E - Hospital routinely collects and reports AMU data, including analysis of prescribing quality.	0–6 Months	Maintain ongoing AMU reporting cycle and identify nearby hospitals to support through mentoring or exchange	Hospital performs high-quality routine AMU reporting and begins supporting other facilities	Hospital AMU Team, Hospital Management	Peer mentoring guide, example reports, exchange coordination notes
Sustained	E - Hospital routinely collects and reports AMU data, including analysis of prescribing quality.	6–12 Months	Organize peer learning exchange or mentoring session with Level A–C hospitals in coordination with FDD	Knowledge-sharing between hospitals reinforces AMU capacity at national level	Hospital Management, FDD Central Level	Learning session materials, logistics and facilitation support
Sustained	E - Hospital routinely collects and reports AMU data, including analysis of prescribing quality.	12–24 Months	Lead a quality improvement (QI) initiative linked to AMU data and submit findings to FDD for national learning	Hospital contributes actively to national AMU learning and continuous improvement	Hospital Management, Clinical and AMU Teams	QI project templates, reporting framework, dissemination materials

3.8. AMU maturity assessment questionnaire for hospitals

Use this tool to determine your facility's current maturity level in monitoring antimicrobial use. For each "Yes", proceed to the next question. Your level is assigned at the last "Yes" response.

LEVEL A – None
1. ❓ Does the hospital have an official letter or agreement from the Ministry of Health or FDD to begin m-AMU monitoring? *2. ❓ Has a formal m-AMU focal point been assigned by hospital management?* *3. ❓ Has any form of internal orientation or communication occurred to inform staff about m-AMU monitoring?*

If all answers above are "No", the hospital is at Level A.

LEVEL B – Limited
4. ❓ Has m-AMU data ever been collected in your hospital (even partially or as a pilot)? *5. ❓ Has the assigned focal point received any training (national or internal) on AMU monitoring or use of WHO tools?* *6. ❓ Has the hospital completed at least one full round of m-AMU data collection and submitted data to national /provincial authorities?*

If answers to Questions 1–3 are "Yes" and at least one of 4–6 is "Yes", the hospital is at Level B.

LEVEL C – Developed
7. ❓ Is AMU data collection conducted regularly (e.g., annually) at your hospital? *8. ❓ Are AMU findings reviewed internally by a multidisciplinary group (e.g., pharmacy, clinical, infection control)?* *9. ❓ Are there internal records or reports showing how m-AMU findings were used to inform any hospital-level discussions?*

If Questions 4–6 are "Yes" and at least two of 7–9 are "Yes", the hospital is at Level C.

LEVEL D – Demonstrated
10. ❓ Has your hospital used m-AMU data to inform or revise prescribing practices, guidelines, or stewardship actions?

11. ❓ Are outcomes of m-AMU analysis discussed with hospital leadership and integrated into routine decision-making?

12. ❓ Does your hospital have any internal documentation showing how m-AMU data has improved practices or informed interventions?

If Questions 7–9 are "Yes" and at least two of 10–12 are "Yes", the hospital is at Level D.

LEVEL E – Sustained

13. ❓ Is your hospital conducting m-AMU monitoring as part of an established annual workplan or policy?

14. ❓ Has your hospital shared its experience or supported other hospitals (peer learning, mentoring, presentations)?

15. ❓ Are the results of AMU analysis regularly reported back to national level or incorporated in a national bulletin/report?

If Questions 10–12 are "Yes" and at least two of 13–15 are "Yes", the hospital is at Level E.

Outcome:

- *The last level for which all the criteria are met is your hospital's current AMU maturity level.*
- *If you are in between levels, the highest level for which full criteria are met should be used.*

3.9. Yearly workflow to collect, validate, analyze and report hospital m-AMU data

The yearly workflow for hospital m-AMU monitoring serves as a practical guide to help hospitals plan and implement antimicrobial use surveillance activities in a structured and sustainable manner. Unlike national m-AMU monitoring, which is tied to the international WHO GLASS submission timeline, hospital-level m-AMU monitoring is intended primarily for national and local use. This provides Lao PDR with the flexibility to define its own internal reporting cycle and calendar. In many cases, this may align with an annual government submission or internal review process, such as a national AMR stewardship workshop or a consolidated AMU report. Hospitals may also choose to follow the calendar year for ease of integration with other health reporting systems.

The objective of this workflow is to make the monitoring process more predictable and manageable, especially for hospitals operating with limited staff and resources. By clearly outlining what needs to be done each month—from planning and template distribution to data collection, cleaning, and analysis—this structure helps prevent bottlenecks and last-minute pressure. It also ensures that hospital data is well-prepared and validated ahead of any external reporting or national data consolidation.

This sample workflow, while tailored to reflect practical realities in Lao PDR, should be adapted and finalized by the FDD in close collaboration with participating hospitals. Ultimately, it is meant to support the institutionalization of AMU monitoring as a routine function—one that is accessible, actionable, and sustainable over time.

Workflow Phase	*Month*	*Key Actions*	*Details and Responsibilities*	*Responsible Party*
Preparation	*Month 1*	*Orientation and planning*	*Engage hospital leadership, pharmacy, and key departments. Assign m-AMU focal point and introduce m-AMU objectives.*	*Hospital Management, Pharmacy Dept, AMU Focal Point*
Preparation	*Month 2*	*Distribute tools and templates*	*Provide data collection templates and guidance documents; review data sources and align with hospital systems.*	*AMU Focal Point, FDD Central Level*
Preparation	*Month 3*	*Training and readiness*	*Conduct refresher training on AMU methodology, DDDs, and template use. Confirm understanding and readiness.*	*FDD Central Level, AMU Focal Point*
Data Collection	*Month 4–15*	*Collect monthly data*	*Collect AMU data from pharmacy records. Record data in standardized templates. Maintain quality and completeness.*	*Hospital Pharmacy, AMU Focal Point*

Data Review	*Month 13–15*	*Clean and validate data*	*Review collected data for gaps and inconsistencies. Cross-check with national focal points for validation.*	*Hospital AMU Team, FDD Central Level*
Analysis & Use	*Month 15*	*Analyze and use data*	*Conduct internal analysis of AMU trends. Use findings to inform hospital-level stewardship decisions.*	*Hospital AMU Team, Hospital Management*
Planning Next Cycle	*Month 15*	*Feedback and planning*	*Hold internal review sessions. Identify lessons learned. Adjust procedures and prepare for next cycle.*	*Hospital AMU Team, Pharmacy, FDD*

4. CONCLUSION AND NEXT STEPS

This Operational Framework for Sustainable Antimicrobial Use Monitoring in Lao PDR serves as a comprehensive roadmap to strengthen both national and hospital-level monitoring efforts in alignment with WHO GLASS and WPRACSS methodologies. Through a structured approach that outlines short-, medium-, and long-term actions, the framework empowers stakeholders to build institutional capacity, improve data quality, and reinforce evidence-based antimicrobial stewardship practices across the health system.

At the national level, the FDD has made commendable progress in institutionalizing AMU surveillance, but challenges remain—particularly in areas of digital infrastructure, provincial capacity, and data utilization. At the hospital level, the framework introduces a practical and adaptable model to support hospitals in varying stages of maturity. Whether initiating basic data collection or advancing to full-scale stewardship interventions, the framework allows facilities to progress at their own pace with structured support.

Looking forward, the immediate next steps include:

- *Dissemination and familiarization: The FDD should actively share this framework with relevant national and provincial stakeholders, ensuring that all actors understand their roles and responsibilities.*
- *Integration into work plans: National and hospital AMU monitoring activities should be aligned with annual health planning cycles and budget submissions to enhance sustainability.*
- *Hospital engagement: Hospitals currently engaged in AMU monitoring should use the maturity model and checklist tools provided to assess their current position and define action plans accordingly.*
- *Ongoing technical support and training: The FDD, with support from partners, should continue to provide refresher training, IT troubleshooting, and peer mentoring to reinforce implementation at all levels.*

- *Monitoring and review: Progress should be reviewed annually through coordinated national workshops or review meetings, ensuring lessons are captured and the framework remains a living, responsive document.*

As Lao PDR continues to scale and refine its m-AMU monitoring system, this framework will provide a foundation for improved surveillance, stronger stewardship, and a more sustainable approach to addressing antimicrobial resistance in both public and private health facilities.