# Public Health Pesticides

## Testing Laboratory and Networks in Thailand

**ROADMAP TO WHO COLLABORATING CENTRE ; WHO CC**


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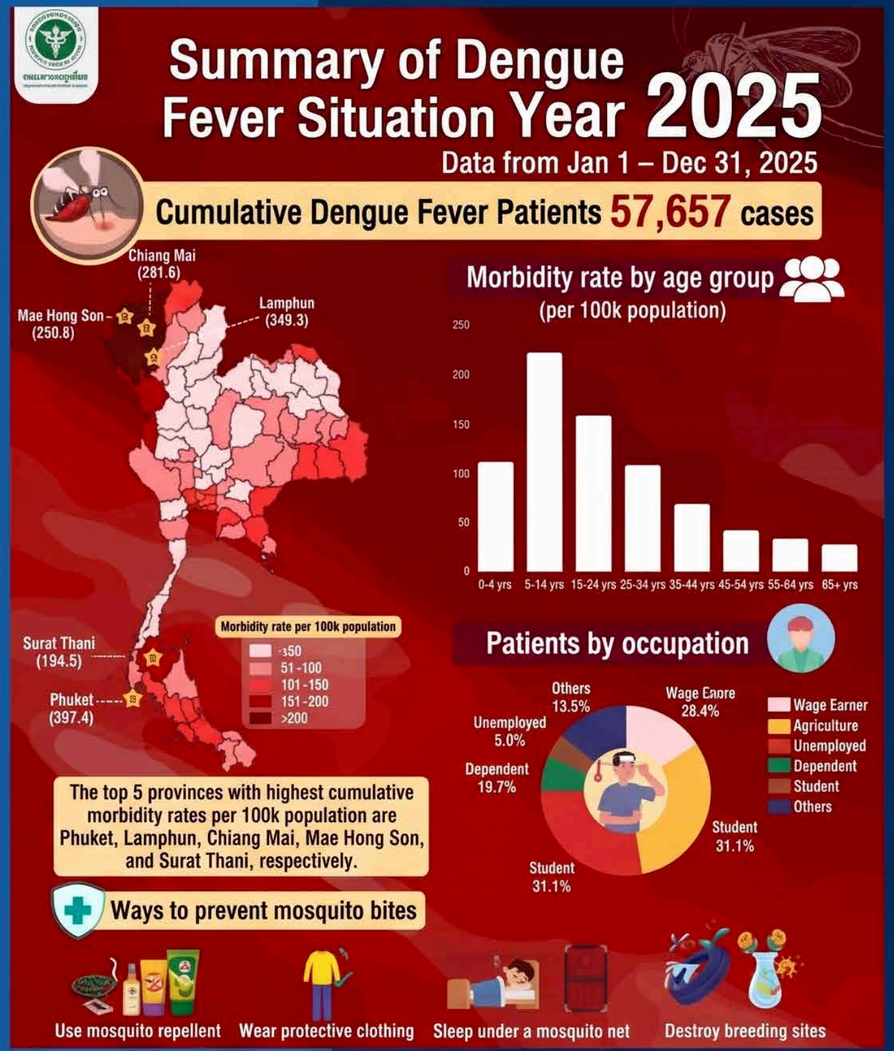
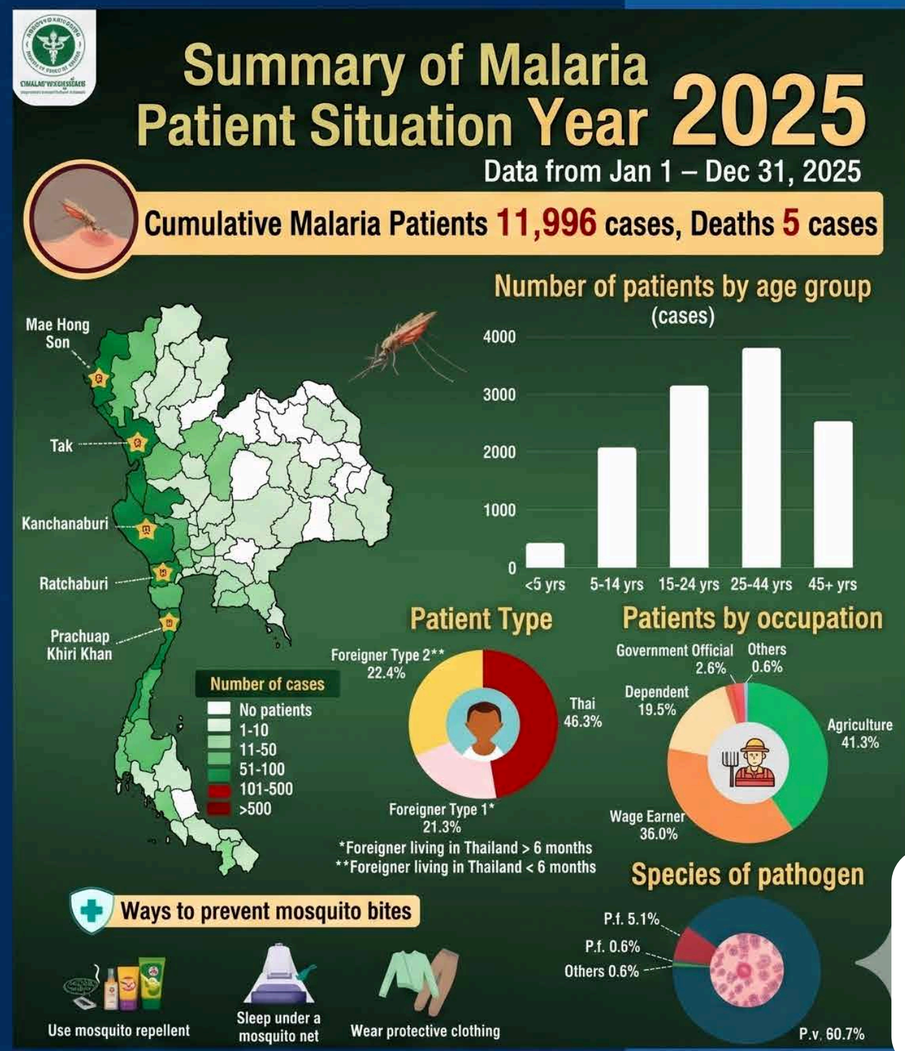
# PRESENTATION OUTLINE

1. Introduction of Public Health Pesticides and Regulation in Thailand.
2. Testing laboratories for public health pesticides in Thailand.
3. Capacity building of public health pesticide quality testing laboratories in Thailand.
4. Roadmap to WHO collaborating centers ; Quality testing of Public Health Pesticides

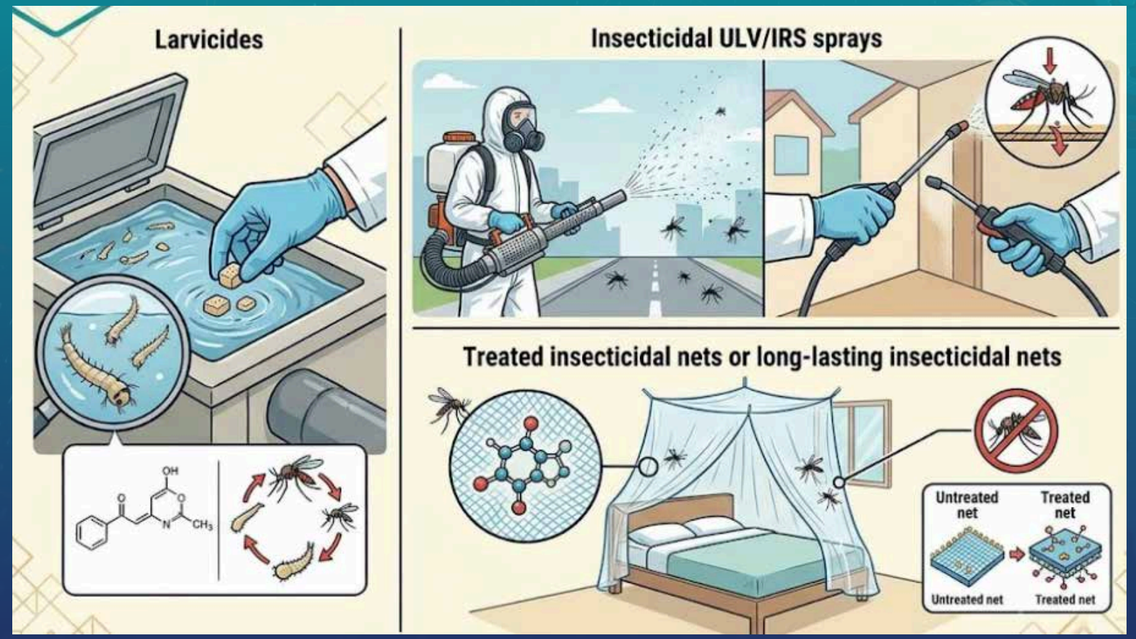
# EXAMPLE VECTOR-BORNE DISEASE SITUATION IN THAILAND

Source: Department of Disease Control



# PUBLIC HEALTH PESTICIDES




In Thailand, public health pesticides (often grouped with household pesticides) are chemicals specifically used to control pests that carry human diseases or cause public health nuisances. This distinguishes them from agricultural pesticides, which are used to protect crops.

The most common targets for public health pesticides in Thailand are disease vectors like mosquitoes (which transmit Dengue, Malaria, and Zika), rodents, cockroaches, and flies.

Common applications include:

- Space Spraying: Thermal fogging or Ultra-Low Volume (ULV)
- Larviciding
- Indoor Residual Spraying (IRS)
- Treated Nets and Long-Lasting Insecticidal Nets (LLINs)

# 6 Agencies Responsible for Regulating Hazardous Substances in Thailand

### Department of Livestock Development

Hazardous substances used in livestock, such as in animal farms, slaughterhouses, and feed processing plants.

### Department of Agriculture

Hazardous substances used in agriculture and for pest control.

### Department of Industrial Works

Hazardous substances used in industry, such as industrial chemicals.

### Department of Fisheries

Hazardous substances used in fisheries and aquaculture.

### Food and Drug Administration

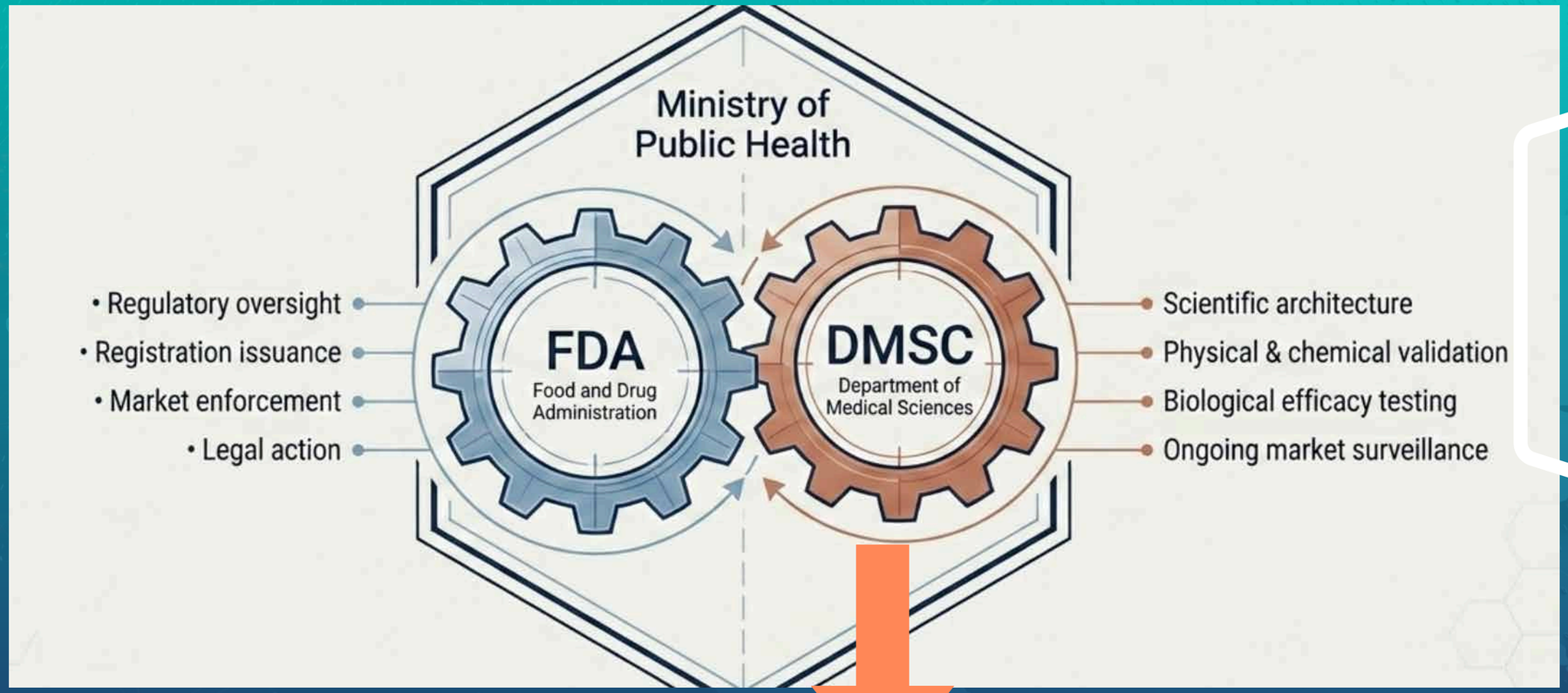
Hazardous substances used in households or for public health.

### Ministry of Energy

LPG and natural gas, specifically those used as fuel.

**Source:** Based on the Hazardous Substance Act B.E. 2535 (1992) and its amendments, referring to chemicals under the Notification of the Ministry of Industry regarding the List of Hazardous Substances, which currently includes approximately 1,600 items.

**Under Thailand's Hazardous Substance Act (B.E. 2535) and its subsequent amendments, chemical management is divided among different government agencies based on the chemical's intended use.**




**Safety testing**

**Efficacy testing**

**Bureau of Cosmetics and Hazardous Substances**

**National Institute of Health (NIH)**

# Bureau of Cosmetics and Hazardous Substances
# Department of Medical Sciences


Mission: To develop systems and establish standards for analytical testing, and to provide laboratory analytical services for hazardous materials in compliance with laws and international standards.

**Chemical Testing Laboratory**

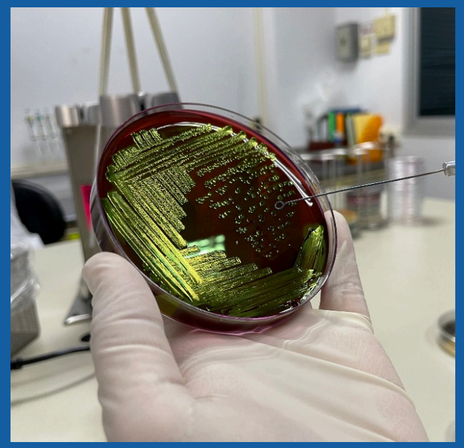
- High Performance Liquid Chromatograph-Mass spectrophotometer (HPLC-MS/MS)
- High Performance Liquid Chromatograph (HPLC)
- Gas Chromatograph-Mass Spectrometer (GC/MS)
- Gas Chromatograph (GC)
- Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
- Atomic Absorption Spectrometer (AAS)
- UV-VIS Spectrophotometer
- Ion Chromatograph
- Ion Analyzer

**Physico-chemical Testing (WHO Specification)**

- Apparent Density
- Sieving / Wet Sieving
- Dustiness
- Disintegration Time
- Emulsion Stability & Re-emulsification
- Persistent Foam
- Suspensibility
- Water Content
- Wettability
- Tablet Integrity & Attrition
- Acidity

**Biological Testing Laboratory**

- Biosafety cabinet (BSC)
- Autoclave
- Incubator
- Cleanroom
- Wireless temperature data logger



# National Institute of Health,
# Department of Medical Sciences

Mission: To develop analytical systems and establish testing standards, and to provide laboratory testing services for microbial insecticide products, chemical insecticide products, and insect control products in compliance with national regulations and international standards.

## Research and Testing Units

### Biological Research and Testing Unit

- Bioefficacy Testing of Repellent Products
- Bioefficacy Testing of Household Ant Control Products
- Potency and Efficacy Testing of Microbial Larvicides

### Chemical Insecticide Research and Testing Unit

- Bioefficacy Testing of Chemical Insecticides
- Evaluation of Thermal and Cold Foggers


# Evaluation of Quality Program for Public Health Pesticides Product in Thailand.

**Table 1:** Product testing according to the health product quality surveillance sampling plan in collaboration with the **Food and Drug Administration (FDA)**.

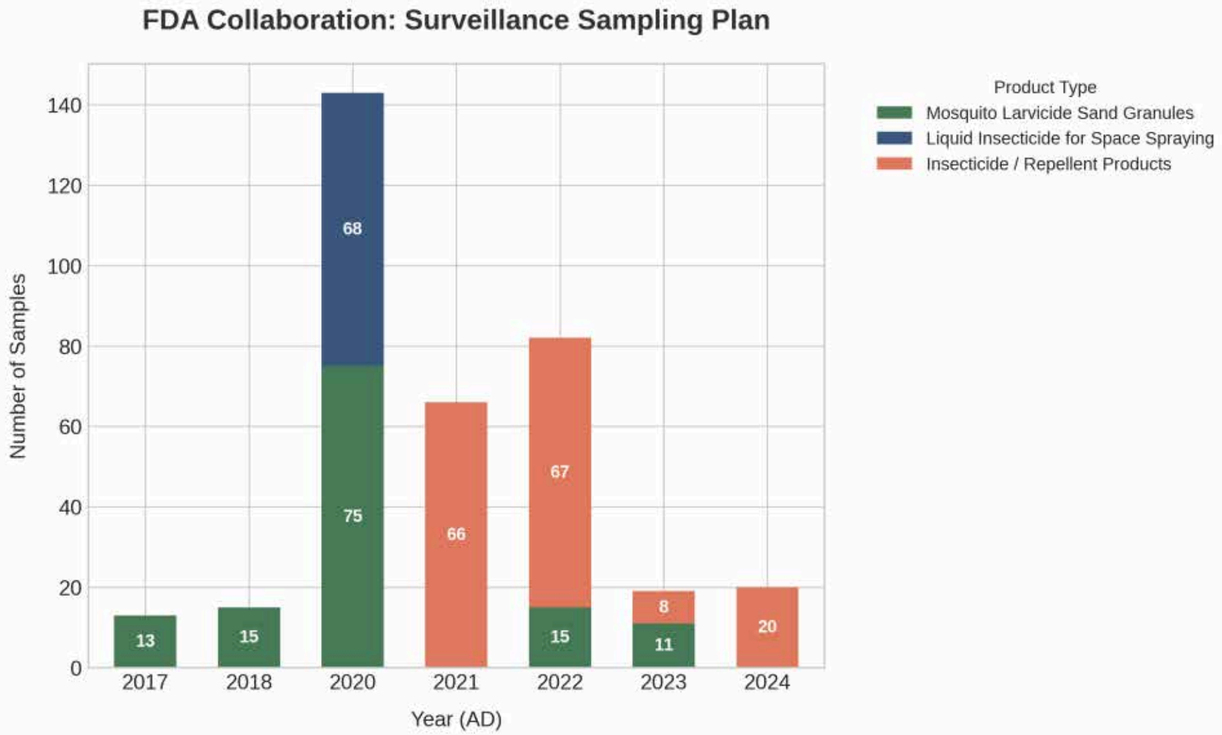
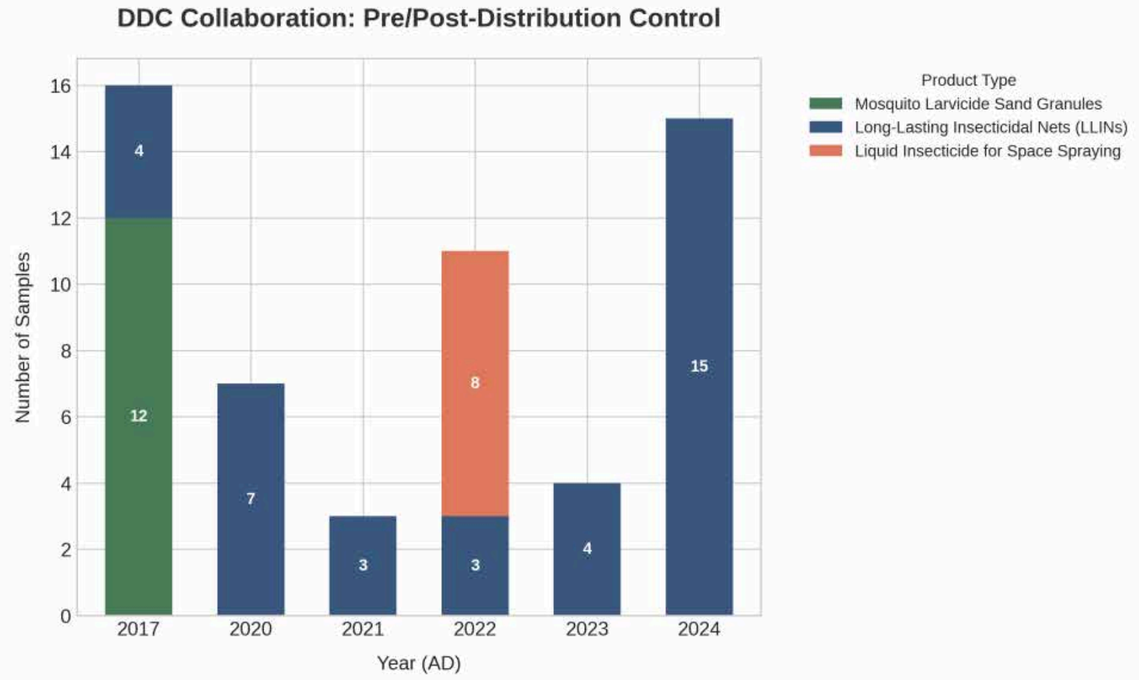



**Table 2:** Product testing received from the **Department of Disease Control (DDC)** to verify the quality of medical supplies before and after distribution for the prevention and control of insect-borne diseases.

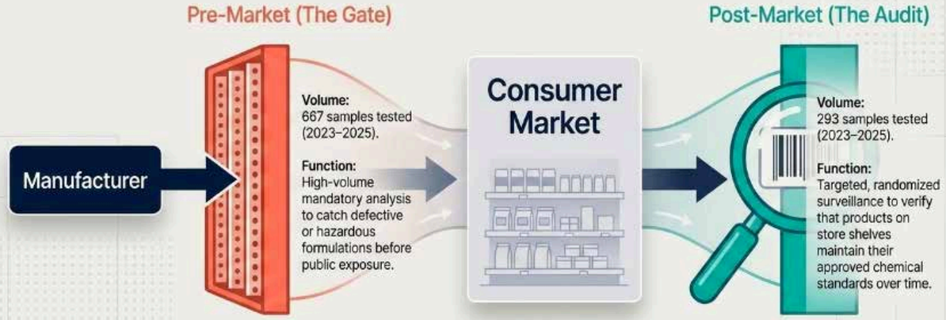


# The Safety Filter: Public Health Pesticides Surveillance

## Quality Analysis Report (2023–2025)

Data sourced from the Bureau of Cosmetics and Hazardous Substances, Department of Medical Sciences, Thailand.

## The Two-Tiered Regulatory Architecture




## Product Category Rate Matrix (2023–2025 Aggregate)

| Insecticides | Repellents | Rodenticides | Abate Sand (Larval Control) |
|---|---|---|---|
| Highest Rate | Moderate Rate | High Defect Rate | Lowest Rate |
| **Volume:** 447 Pre-Market \| 235 Post-Market | **Volume:** 180 Pre-Market \| 36 Post-Market | **Volume:** 21 Pre-Market \| 0 Post-Market | **Volume:** 19 Pre-Market \| 22 Post-Market |
| **Profile:** Consistently high failure rates. High risk of "Above Standard" toxicity. Drives the massive "Inconclusive" post-market volume. | **Profile:** Generally compliant (10-17% pre-market failure), with a mix of both too strong and too weak formulations. Perfect post-market compliance in 2024 and 2025. | **Profile:** Extremely high pre-market fallure (33% to 53%). Nearly all failures are "Below Standard," pointing pointing to severe formulation weaknesses. | **Profile:** Occasional pre-market failures (26.3% in 2023), but perfectly compliant post-market with zero failures recorded across all tested years. |

### The Scale

**960**

**Total Samples Analyzed**

Comprehensive testing across 2023–2025 targeting four high-risk pesticide categories.

### The Shield

**~26%**

**Pre-Market Rejection Rate**

Consistent failure rate caught before hitting shelves, preventing widespread hazard exposure.

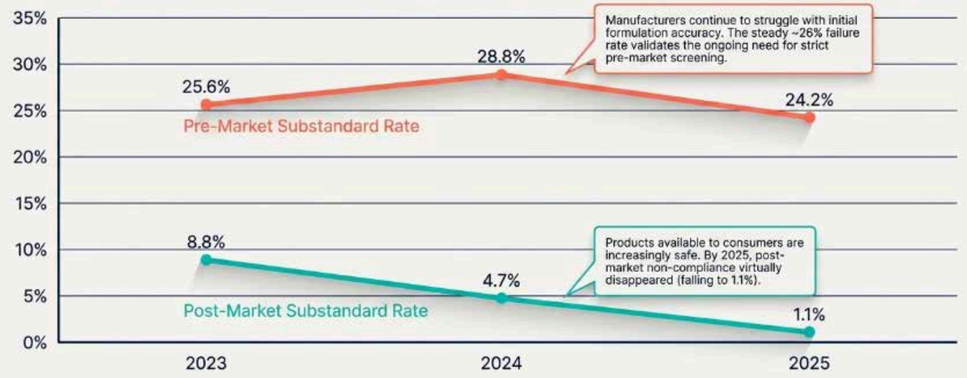
### The Improvement

**8.8% → 1.1%**

**Post-Market Failure Drop**

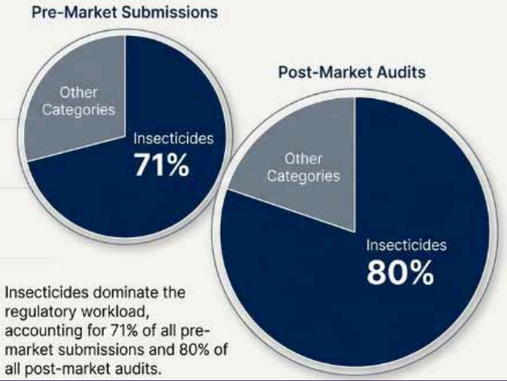
A dramatic reduction in substandard products reaching the consumer over a three-year span.

## Post-Market Compliance Surges While Pre-Market Rejections Hold Steady




## Critical Focus Area: The Insecticide Challenge

### The Scale




Insecticides dominate the regulatory workload, accounting for 71% of all pre-market submissions and 80% of all post-market audits.

### The Vulnerabilities

**High Toxicity Risk**

Insecticides are the only category that consistently fails for being "Above Standard" (too highly concentrated).

**The Grey Zone**

92% of all "Inconclusive" post-market results belong to this single category.

Regulatory resources must remain disproportionately focused here.

# WHY IS QUALITY CONTROL OF PUBLIC HEALTH PESTICIDES IMPORTANT?

**Effectiveness in disease control.**

**Safety for users and the public.**

**Reduce the occurrence of insect resistance to chemicals.**

**Complying with international requirements.**

# Testing laboratories for public health pesticides in Thailand. 2

## Pesticide formulation testing laboratories in Thailand

### Accreditation ISO/IEC 17025

**Government sector**

- Department of Medical Sciences
- Department of Agriculture

**Private sector**

- Central Laboratory (Thailand) Company Limited
- Kemfac Company Limited
- Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC)

# Public Health Pesticide Testing Laboratories in Thailand

## Challenges and Constraints

- Limited resources
- Limited standards and testing methods
- Readiness of regional laboratories
- Lack of a national proficiency testing (PT) system

## Key Gaps Identified

- No laboratory network specifically for pesticide formulation testing
- Limited use of PT results for policy-making

## Opportunities for Development

- Support from WHO and international organizations
- Integration with product quality control systems
- Becoming a Southeast Asia regional leader

# Capacity building of public health pesticide quality testing laboratories in Thailand.

3

## A CONCEPTUAL FRAMEWORK FOR DRIVING CAPACITY DEVELOPMENT OF PUBLIC HEALTH PESTICIDE TESTING LABORATORIES IN THAILAND

- Develop and expand the network of public health pesticide quality testing laboratories in Thailand.
- Enhance laboratories to meet international standards. (ISO/IEC 17025, WHO Guideline,CIPAC method )
- Support research and development of knowledge in public health pesticide quality testing.
- Drive policy initiatives and integrate with regulatory agencie
- Utilize proficiency testing processes to assess laboratory competence and plan laboratory capacity development.


# Development Program for Pesticide Laboratory Network Implementation

**2025**

### Foundation

Regional capacity building and inter-lab comparisons.

**2026**

### Methodology

Quantitative analysis standardization for Pyrethroids.

**2027**

### Standardization

Development of prototype proficiency testing samples.

**2028**

### Integration

Network-wide surveillance and integrated operations.

### Precision

Ensuring absolute accuracy in pesticide concentration analysis.

### Integration

Unified data sharing and surveillance across 4 regional hubs.

### Prevention

Using data to protect public health from ineffective or toxic products.


# GOALS

## 2025 - 2027

To establish network testing laboratories for

**Public Health Pesticides**

in 4 locations covering 4 regions of Thailand:

- **North** – RMSc 1/1, Chiang Rai
- **Northeast** – RMSc 8, Udon Thani
- **South** – RMSc 12/1, Trang
- **Central (and East)** – BCHS, Nonthaburi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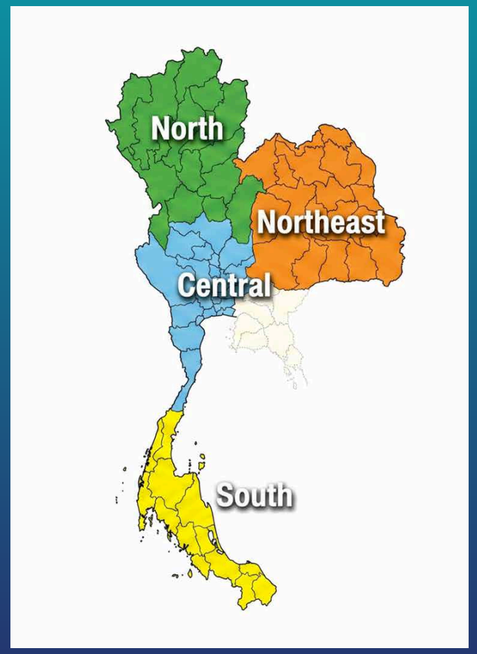

North
Northeast
Central
South


FAO/WHO Workshop on Pesticides Specification
Bureau of Cosmetics and Hazardous Substances


ศูนย์วิทยาศาสตร์การแพทย์ที่ 12




# Extending the knowledge base of laboratory network model:

## Project for the quality control of mosquito control products for public health according to WHO requirements in Chiang Rai Province, Fiscal Year 2025.

## By the Reginal Medical Science Center 1/1 Chiang Rai.

# Development of a proficiency testing (PT) program in the field of public health pesticide quality testing in Thailand.


## Using PT to develop laboratory capabilities.

- Evaluate the analytical performance of the laboratory.
- External quality assurance tool and promoting collaborative learning within the network.
- Building readiness for international standard requirements.

A PROTOTYPE FOR PROFICIENCY TESTING SAMPLES AND A PILOT PROGRAM FOR QUANTITATIVE ANALYSIS OF PYRETHROIDS IN INSECTICIDES USED IN PUBLIC HEALTH.

# Roadmap to WHO collaborating centers ; Quality testing of Public Health Pesticides

4

## ROADMAP TO WHO COLLABORATING CENTER

### QUALITY TESTING OF PUBLIC HEALTH PESTICIDES (PHPs)


- The Department of Medical Sciences is internationally recognized as the first WHO Collaborating Centre in Asia and the second in the world for testing the quality of pesticides used in public health.
- Enhance the quality of insecticides used to control and prevent outbreaks of insect-borne diseases in accordance with WHO guidelines.
- People in the country and the Asian region receive care, prevention, and control of insect-borne diseases thanks to the capabilities of laboratories recognized by the WHO for the analysis of pesticides used in public health.


### Phase 1
### 2012 - 2019

**the foundation and developing the capabilities of the laboratories.**

- Capacity building and strengthening for testing WHO Specification of PHPs
- Human capital /Facilities development
- Accreditation ISO/IEC 17025 the quality testing of WHO specification

### Phase 2
### 2019 - 2025

**Building alliances and on an international level.**

- Technical expert participation in the WHO/FAO/CIPAC joint meeting and CIPAC meeting
- CIPAC/WHO Collaborative trial of PHPs
- Knowledge sharing & workshops

### Phase 3
### 2025 - 2027

**Define a strategic plan. Demonstrate sustainability.**

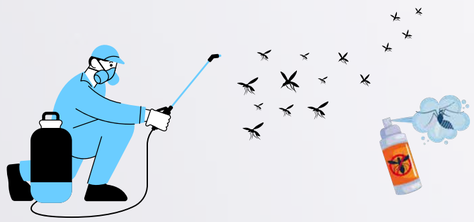
- MOU regarding quality control of PHPs between WHO-DMSc
- 6-year plan for collaboration projects
- Build Laboratories networks of PHPs cover 4 regional in Thailand

YOU ARE HERE

### Phase 4
### 2027 - 2028

**Appointment process**

- Formal WHO nomination
- Government clearance
- On site evaluation by WHO experts






# CHALLENGES AND FUTURE DIRECTIONS

## CHALLENGES

- Complexity of Chemical Substances and Analytical Methods
- Human Resource Expertise and Capacity Development
- Budget and Resource Constraints
- Changes in National and International Regulatory Requirements

## Future Directions

- Continuous Development of Proficiency Testing Samples and Programs
- Strengthening Laboratory Networks
- Application of Digital Technologies and Information Management Systems

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Department of Medical Sciences

BCHS
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# Thank you


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