Endorsed by AHC 4 on 25 June 2025
Endorsed by SOMHD on 21 July 2025

SUMMARY REPORT

Development and Implementation of the Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States

Contents

1. Background

In the ASEAN community, food safety is also an important topic for economic and socio-cultural sectors leading to an involvement of several sectoral working groups in food safety activities. This includes the ASEAN Health Cluster 4 Ensuring Food Safety (AHC4) under the ASEAN Senior Official level on Health Development for the ASEAN Health Ministers' mission working to promote a healthy and caring ASEAN Community, where the people achieve maximal health potential through a healthy lifestyle, have universal access to quality health care and financial risk protection; have safe food and healthy diet, live in a healthy environment with sustainable inclusive development where health is incorporated in all policies. To meet this mission, the AHC4 is responsible for promoting access to safe food and strengthening food safety risk analysis under the 5-year work programme with four strategies. Under the work programme, several activities have been conducted, including the development and implementation of the Regional Guide to Develop and Strengthen the National Pesticide Residue Monitoring Programme in ASEAN Members States which is led by Thailand and co-led by Malaysia.

This activity was initiated in 2018 under the endorsement of the 3rd AHC 4 meeting to assist ASEAN Member States (AMS) in developing guidance on risk-based monitoring and surveillance programmes. Since different food hazards pose different risks to public health, a well-designed programme for monitoring and surveillance based on concerned perspectives is essential for competent authorities not only to conduct evidence-based management but also to allocate resources effectively. Consequently, controlling food safety using these proactive measures can ensure consumer health protection, increase ASEAN consumers' trust in food safety, as well as support the achievement of the ASEAN Post-2015 Development Agenda. Therefore, the main objectives of this project are to 1) develop guidelines/manuals for monitoring and surveillance programmes for different food hazards and 2) strengthen the capacities of competent authorities to further apply these guidelines for a more effective national monitoring and surveillance programme. In addition, the results of implementing the risk-based monitoring and surveillance can be shared with other member states to improve control measures based on scientific evidence for better consumer health protection which is the main outcome of this project.

From 2018 to 2025, this activity was successfully conducted under financial support and collaboration with the FAO Regional Office for Asia and the Pacific and ASEAN secretariats. The

issue of pesticide residues in fresh fruit and vegetables was selected by all AMSs as one common hazard based on the risk categorization. Then, the Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States was developed and shared with other AMSs. Furthermore, the survey was conducted using an online questionnaire to analyze the current implementation of the risk-based monitoring programme and the key success factors of implementing this Regional Guide. Therefore, this report will summarize all key activities and outputs of this project.

2. Summary of key activities

In this section, the key activities and outputs from the project are summarized. This project was conducted under the second strategy "Minimize capacity gaps among national food control systems through capacity building" of the 5-year work programmes: 2016-2020 and 2021 – 2025. Key activities and outputs of the entire project are presented in three sub-sections (Figure 1).

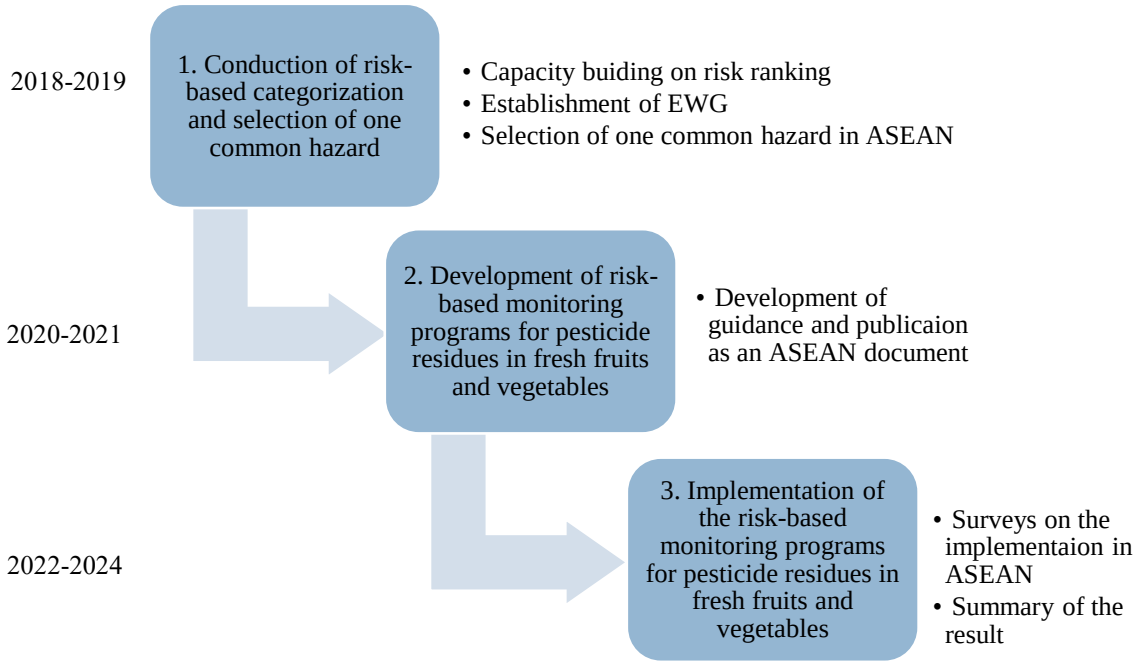


Figure 1. Summary of the project milestone

2.1 Conduction of risk-based categorization and selection of one common hazard in the ASEAN

In principle, a risk-based monitoring programme depends on different types of hazards and food communities. A risk-based approach in ranking food hazards should be applied during

the initial step for developing any monitoring programmes, whereas various risk-ranking tools are available based on the data availability. To understand the risk-ranking tool and apply it to identify one common hazard which is mostly concerned by all AMS, the regional training course on "Capacity building on risk categorization for ranking risk of ASEAN food hazards for developing the risk-based monitoring protocol for food safety" from 23 to 25 April 2019 in Bangkok, Thailand with technical and financial supports from the FAO and Thai Food and Drug Administration (Thai FDA). 34 participants from food safety competent authorities in ten ASEAN countries attended the three-day training course with the objective of becoming effective at applying risk categorization for ranking food safety hazards. The workshop enabled participants to discuss which approach ASEAN would apply for risk categorization for ranking of ASEAN food safety hazards, which further be used for developing the ASEAN risk-based monitoring procedure for one ASEAN common hazard.

Accordingly, the Electronic-Working Group (EWG) was established to discuss and select one common hazard in ASEAN based on the principle of risk categorization. Term of Reference (TOR), action plan, and list of EWG members were endorsed by the Fourth meeting of AHC4 in 2019 before conducting activities to accomplish the task mentioned in the TOR. In the first step of the action plan, a possible list of chemical and microbial hazards/food combinations based on the screening criteria (severity of the impact on health, prevalence and level of contamination, and level of exposure) was proposed. As a result of the first step, 10 of each chemical and microbial hazard/food combinations were listed before conducting the next step. In the second step, proposed chemical and microbial hazards/food combinations were scored for the scoring risk characterization based on the FAO guidance on Food Safety Risk Management: Evidence-informed policies and decisions. The multiple factors for the scoring risk characterization included public health concerns, economic concerns, food security, socio-cultural concerns, and consumer perception to identify the top five of each chemical and microbial hazard/food combination.

From the scoring result, the top five of each chemical and microbiological hazard/food combinations were identified. Examples of high scores for chemical hazards/food combination include pesticide residues in fresh vegetables and fruits, aflatoxins in nuts and nut products, and mercury contaminants in raw fish. Apart from chemical hazards, microbiological hazard/food combinations, such as *Salmonella* spp. in raw eggs and raw chicken meats, *Vibrio cholerae* and

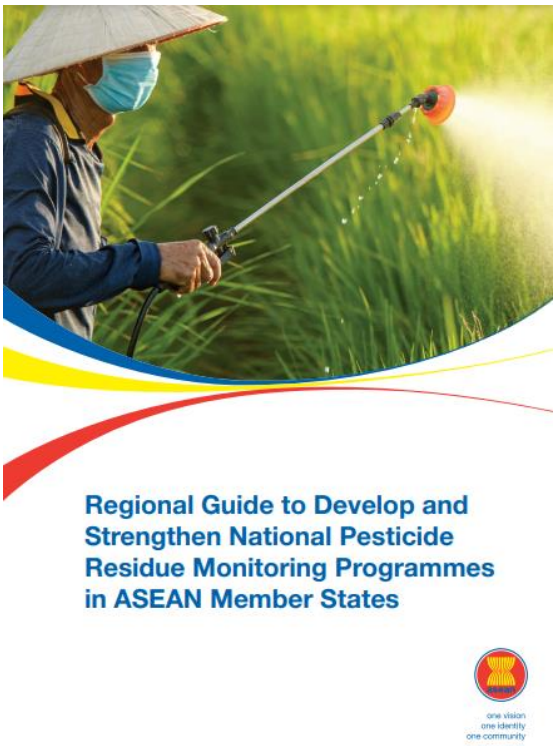
Vibrio parahaemolyticus in fishery products, *Clostridium perfringens* in raw meats were highly scored. In the last step, feasibility factors for selecting one common hazard based on the top five of each chemical and microbial hazard/food combinations were conducted. The feasibility factors were developed based on the FAO guideline and agreed upon by the EWG, such as availability of infrastructure, political concerns, and availability of technical assistance. From the feasibility factors, one common hazard was identified as pesticide residues in fresh vegetables. In consultation with the EWG and the AHC4 approval, the development of the risk-based monitoring programme covered both fresh vegetables and fresh fruits.

Summary of risk-based categorization and selection of one common hazard in the ASEAN is presented in the appendix 1.

2.2 Development of risk-based monitoring programmes for pesticide residues in fresh fruits and vegetables

In the second phase of this project, the development of the Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States was started after finalizing one common hazard as agreed by the AHC4. With the financial and expert support from the FAO, the Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States was developed based on international principles and best practices as general practices and will be further implemented by each member state. Since national monitoring systems in ASEAN are diverse, an in-depth situation analysis of the ASEAN countries in terms of their capacities and knowledge levels was conducted. In addition, the draft guide was revised and finalized by AHC4 in which Thailand and Malaysia were the lead and co-lead countries.

This Regional Guide is aimed to assist the ASEAN countries in developing the basis for countries to implement effective pesticide residue monitoring systems which are in line with the overall framework of the ASEAN Food Safety Policy. Therefore, the Regional Guide provides practical solutions and management options for countries at different capacity levels to develop or strengthen effective pesticide residue monitoring systems. The Regional Guide, hence, was endorsed by the 15th AHMM Meeting in May 2022 before publication on the ASEAN website in 2023 (Figure 2). It is noted that this ASEAN guide is not intended to be a full or binding statement. The application of this guide at the national level is based on the current situation, capacities and resources of each ASEAN Member State.



The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967. The Member States of the Association are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.
The ASEAN Secretariat is based in Jakarta, Indonesia.

For inquiries, contact:
The ASEAN Secretariat
Community Relations Division (CRD)
70A Jalan Sisingamangaraja
Jakarta 12110, Indonesia
Phone : (62 21) 724-3372, 726-2991
Fax : (62 21) 739-8234, 724-3504
E-mail : public@asean.org

Catalogue-in-Publication Data

Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States
Jakarta: ASEAN Secretariat, January 2023

632.95
1. ASEAN – Food Safety – Pesticide Residue
2. Health – Policy – Programme

ISBN 978-623-5429-18-2 (PDF)

9 786235 429182

ASEAN: A Community of Opportunities for All

Photo credit cover : BELL KA PANG/Shutterstock.com

Figure 2. Publication of the Regional Guide to Develop and Strengthen National Pesticide Residues Monitoring Programmes under the AHC 4 work programme.

The main objective of this guide is to reinforce the capacities of relevant authorities of ASEAN Member States in the area of monitoring and surveillance. This guide also enhances scientific and risk-based data to develop evidence-based food safety risk management measures related to pesticide residues. The Regional Guide provides different types of monitoring programmes, such as compliance programmes, exported food monitoring programmes, imported food inspections, and emergency incident response to further adapt to different situations. Moreover, principal elements for developing the national monitoring and surveillance programme are listed, such as policy endorsement, sample collection plan, logistic planning for samples, information management system, analytical laboratories, traceback investigation, and reporting system. The output from developing/strengthening and implementing the national monitoring and surveillance programme can fulfil the ultimate goal of ensuring food safety across this ASEAN region.

2.3 Implementation of the risk-based monitoring programmes for pesticide residues in fresh fruits and vegetables.

Under this stage of the project, under this stage of the project, Thailand as the lead-country developed two surveys and circulated to AMS to collect AMS's responses on the current implementation of their national pesticide residue monitoring programme (NRMP) or pesticide residues monitoring/surveillance plan (RMP). Then, the data was analyzed based on the principle and key elements of the risk-based monitoring programme in the Regional Guide to evaluate the effectiveness of the NRMP/RMP as well as to provide recommendations for better implementation of NRMP/RMP at the national and regional levels. For the first round of the survey, the questionnaire consisting of 23 questions was disseminated to AMS during September 2023 to collect general information on the current NRMP/RMP and relevant factors with the development and implementation of the NRMP/RMP based on the national perspective. Besides, questions regarding the utilization of the Regional Guide and suggestions for further improvement were included. Regarding the first survey circulation, all AMS responded to the questionnaire, however, only nine AMS (n = 9) having own NRMP/RMP can responded to all questions. Thus, all data from these nine AMS was collected for analysis.

After collecting responses from the first-round survey, the second questionnaire consisting of 13 questions was developed to refine the information on the development of the NRMP/RMP, such as key factors used in developing NRMP/RMP, main factors contributing to the improvement of laboratory capabilities, capacity building needs, etc. The second round of survey was conducted on September 2024 by circulating to all AMS for their responses. In this survey, all ten AMS (n = 10) gave responses and the data was combined with the first-round survey for analysis. Questions in both surveys were asked by multiple choices (both multiple selection and single selection), 5-Likert scales (5 = the most difficult, 1 = the least difficult), and open-ended questions to ensure that essential information was comprehensively collected. Questionnaires of both surveys are presented in the appendix 2.

Result of both surveys was evaluated into three sections based on the principle and components of the risk-based monitoring programmes in the Regional Guide as follows:

Section 1: Current status and prerequisite elements of the national pesticide residues monitoring/surveillance plan (NRMP) in AMS.

Pesticide residue monitoring programmes exist in all AMS with different approaches. Most of the AMS currently develop and conduct NRMP/RMP for fresh fruits and vegetables, while only

one AMS responded that the testing of pesticide residues from plant origin is conducted instead of the finished commodities due to limitation of capacities and resources. Among AMS who have their own NRMP/RMP, various types of programmes are in place to serve different purposes as recommended in the Regional Guide. The survey found that the NRMP/RMP for import food inspection programmes, compliance programs and exported food monitoring programs are mainly implemented (89%, 78% and 67%, respectively) as shown in Figure 3. This can be confirmed that most of AMS classified themselves as both importing and exporting countries (89%), so the NRMP/RMP for these specific purposes are conducted to ensure the pesticide residue levels in fresh fruits and vegetables meet the national requirement and importing country requirement.

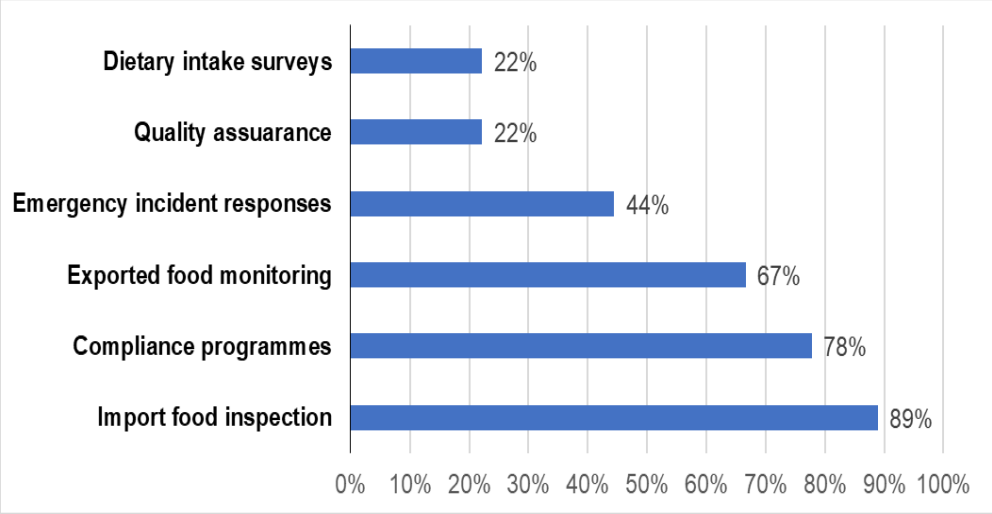


Figure 3. Types of NRMP/RMP for fresh fruits and vegetables in AMS.

The survey also asked AMS about key prerequisite elements of their NRMP/RMP. From the recommendations of the Regional Guide, major prerequisite elements for developing and implementing the monitoring programme include government endorsement, financial resources, external factors (e.g., trade sensitives, pesticide use patterns, etc.), and technical requirements, especially standards or regulations for MRLs. The result presented that government endorsement through the consultation process with relevant stakeholders is regularly conducted for developing the NRMP/RMP in each AMS. The main stakeholders include agricultural agencies, followed by trade, health agencies, industry sectors, and consumer organizations (Figure 4). The funding allocation for implementing the NRMP/RMP is mainly from government sectors (100%), while

one AMS indicated that the industry sector and trade sector (importers and exporters) are also responsible for funding support, apart from the government.

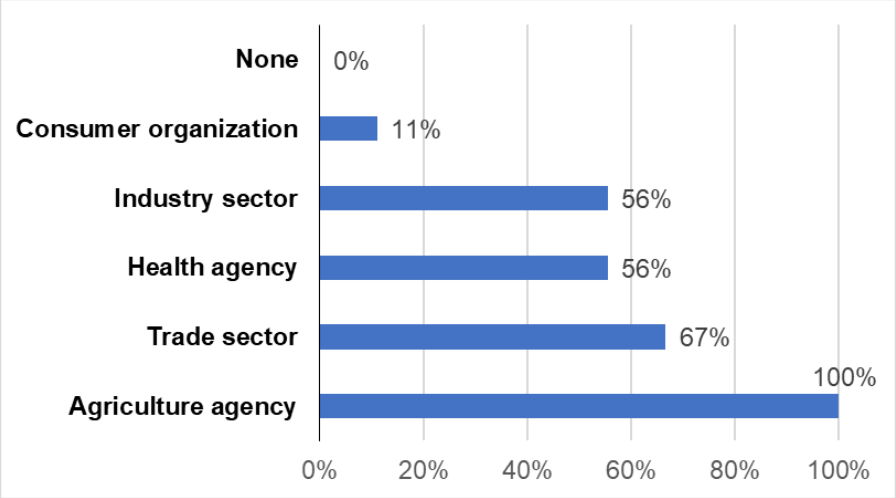


Figure 4. Key stakeholders in the consultation process for the government endorsement in AMS.

External factors and technical factors related to prerequisite elements of the NRMP/RMP were also analyzed based on the survey results. All AMS mainly consider relevant external factors, such as trade sensitives (100%), public concerns without reliable information (44%), and pesticide use patterns (56%). Moreover, technical aspects like differences in MRLs, pesticides and commodities between importing and exporting countries are mainly concerned. The Codex MRLs are mostly adopted for setting MRL requirements (56%), while some national MRLs differ from codex standards based on the scientific evidence, domestic consumption, and food testing system in each AMS.

Section 2: Development and implementation/strengthening of the compliance programme in AMS.

Apart from common elements in section 1, the particular technical and operational requirements should be considered, such as risk profiles of relevant pesticide-commodity combinations, sample collection plan, laboratory capacities, information management, traceability system, and reporting. Result of the surveys was evaluated and summarized into four areas as follows:

(i) Programme consideration: risk profiles

The survey presented that most AMS (about 80%) apply risk profiles of pesticide-commodity combinations which are specific to national circumstances for developing their own NRMP/RMP. Moreover, several factors were considered in the risk profiling process to prioritize and develop the monitoring programme as recommended in the Regional Guide. The survey revealed that major factors include the availability of budget (100%), laboratory and capability (89%), commodity volume (78%), risks of pesticides (78%), and consumption data (67%). Other relevant factors, such as importing country requirements, consumer concerns, frequency of importation, and compliance of importer/exporter, etc. were also considered (33%) (Figure 5).

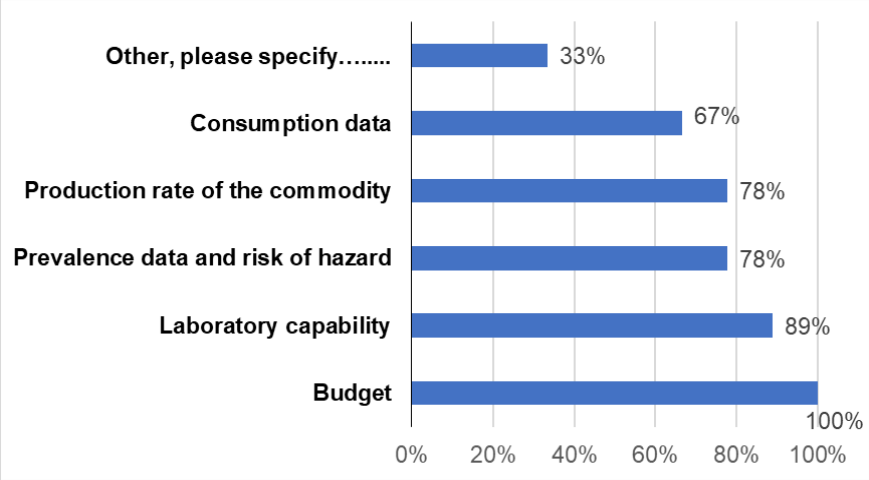


Figure 5. Key factors for prioritization and development of NRMP/RMP in AMS.

Focusing on prioritizing commodities, All AMS (n = 10) identified top-five factors mainly used for consideration as (1) import volume; (2) export volume; (3) consumption volume; (4) non-compliant commodities with the registered pesticides; and (5) non-compliant commodities with the unauthorized pesticides. Other factors such as incident/rapid alert reports and production volume were sometimes included. Apart from the commodities, selecting types of pesticides should be based on relevant factors as suggested in the Regional Guide. Two major factors were identified by All AMS (n = 10) to apply for the development of NRMP/RMP, namely (1) history of non-compliant pesticides (by exceeding limits of the registered pesticides and detection of authorized pesticides); and (2) analytical capability. Otherwise, factors such as the importing country's regulation and characteristics of pesticides were additionally considered.

(ii) Sample collection plan.

The survey found that more than 60% of the AMS (n = 9) have incorporated a targeted sampling plan in the development of NRMP/RMP for the compliance approach. This may be caused by the prioritizing factors which include the history of non-compilant pesticide residues. The targeted sampling plan is recommended by the Regional Guide to be considered with the random sampling approach to have concrete evidence for high residue detection and determination of the possible sources of these exceeding residues. Furthermore, the targeted sampling plan is applicable for implementation in AMS due to the limitation of budget availability. The survey also asked for good practices for logistic planning which is one of the important elements in the Regional Guide. Most of the AMS regularly identify authorized/official sample collectors who are trained before performing the sample collection. About 80% of AMS (n = 9) informed that the sampling programme is included in their regular training curriculums for official inspectors. Moreover, 67% of the respondents (n = 9) officially make advance notice of attendance at a farm, pack-house, market or other sampling locations prior to sample collection. This is a good practice as recommended by the Regional Guide.

(iii) Laboratory and testing capabilities.

For the ability of the laboratory testing, 67 % of AMS (n = 9) responded that capability for testing of all kinds of pesticide residues is not necessary. This may result from a limitation of the resources and the implementation of the risk-based monitoring programme. In contrast, other respondents still considered that the testing ability of all types of pesticide residues is essential to get comprehensive information for developing or improving NRMP/RMP, particularly when there was a lack of information on pesticide uses. For analytical laboratories, more than half of the AMS (about 56%) had contracted analytical laboratories for performing pesticide residue programmes and these laboratories are accredited and complied with the ISO/IEC 17025. The contracted analytical laboratory is also recommended by the Regional Guide to ensure the maintenance of sample integrity. Moreover, the survey asked AMS about the application of commodities and pesticide analytical screens under different types of monitoring programmes. AMS responded that both targeted and non-targeted pesticide testing were applied in monitoring programmes for domestic, imported and exported commodities (Figure 6). 80 % of AMS (n = 10) used both targeted and non-targeted pesticide testing for both imported and domestic agricultural commodities. For the exported commodities, however, half of the respondents (50%) applied

targeted pesticide testing and the other half used non-targeted pesticide testing. This may depend on the requirements of importing countries.

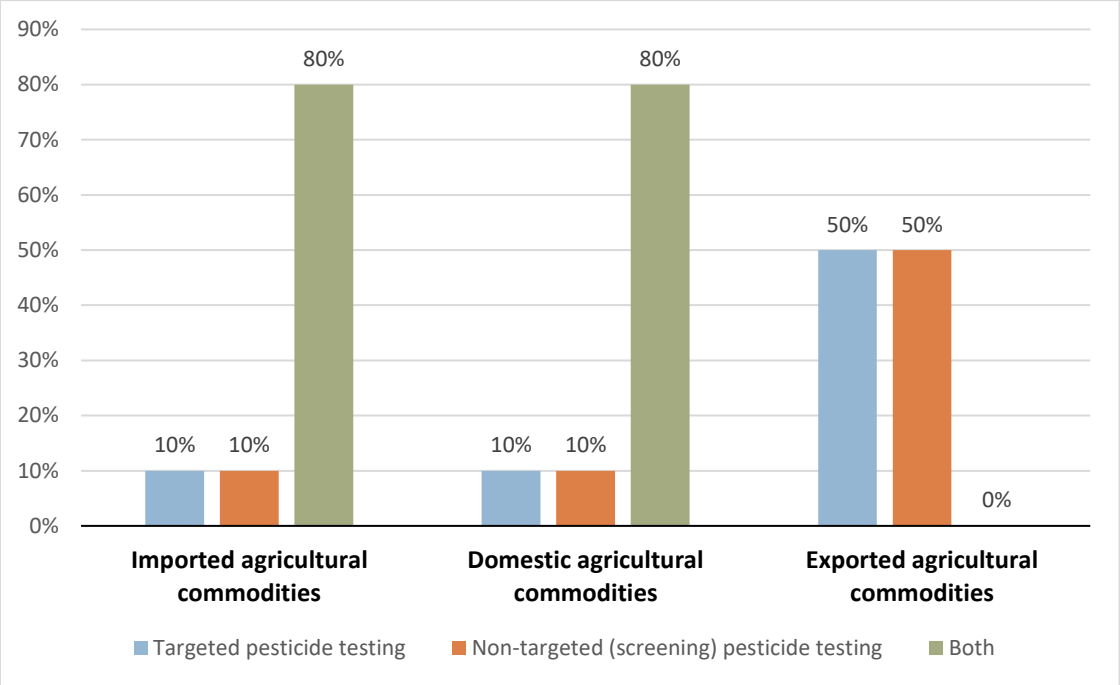


Figure 6. Application of commodities and pesticide analytical screen under different types of monitoring programmes in AMS.

Since laboratory capability is one of the critical issues to develop/strengthen NRMP/RMP, improvement of the laboratory performances can support the effectiveness of the NRMP/RMP implementation. Hence, AMS (n = 10) were asked to rank five important factors which are the most necessity for this improvement. The result showed that the most essential factor is the number of analytical apparatuses, so increasing number of the analytical apparatuses and relevant facilities is necessary to support developing NRMP/RMP. The second important factor is a training programme for analysts, followed by number of performing analysts, number of accredited laboratories, and number of the new detection methods. Enhancing number of analysts who are well trained, increasing number of accredited laboratories which cover analytical methods and scopes, as well as increasing new testing methods based on novel research and development can assist the improvement of laboratory capability for implementing the NRMP/RMP. Besides, other factors were also specified by respondents, such as an increase in cooperation or exchange of

technical knowledge among AMS, financial support on instrument maintenance and operation cost, etc.

(iv) Information management, traceability system, and reporting.

The information management system (IMS), traceability system and reporting of the compliance/non-compliance are also suggested by the Regional Guide to be included in the development and implementation of the risk-based monitoring programmes for pesticide residues. From the survey, AMS (n = 9) applied several IMS, such as a paper-based system coupled with an Excel spreadsheet (56%); a web-based system (33%); and a paper-based system (11%). These different systems may be based on available systems in each AMS. In case an analytical report shows non-compliance, all AMS (100%, n = 9) responded to conduct a traceback investigation to find out a root cause and further revise control measures, if necessary.

However, the rapid investigation is still limited which affects the effective implementation of the NRMP/RMP in AMS. The survey, then, asked the respondents to rank the most principal factors to improve traceback investigation. All respondents (n = 10) prioritized appropriate electronic tools, such as IT systems or data-collecting software are the most necessary factor to support the investigation. Hence, insufficient electronic systems for data collection and management obstruct rapid traceability. Next, collaboration including data linkage among responsible agencies is the second key factor which influences the traceback investigation. Since many AMS have multi-sectoral agencies working in food safety, the lack of an effective mechanism for collaboration and data linkage affects fast traceability. Other main factors which are ranked by the respondents included the lack of well-defined procedural manuals, insufficient number of laboratories, and insufficient staff working on the traceback activities. Focusing on import food inspection, a major factor influencing rapid investigation is the difficulties to trace back from the food product to the farm in the country of origin. Furthermore, a limited number of officials to implement the NRMP/RMP was also raised as one of the factors for traceback improvement.

For the reporting of NRMP/RMP in AMS, about 67% of these respondents (n = 9) provide channels to publish the monitoring results, especially the result of compliance programmes based on national regulations (70%, n = 10). While, the full report of NRMP/RMP including results of both screening and analytical tests is sometimes published (40%, n = 10). 20 % of the respondents

presented that the reporting of the result from monitoring programmes for pesticide residues is not yet published.

Section 3: Utilization of the Regional Guide and additional suggestions.

In the last section, the survey was designed to ask respondents about how the Regional Guide assists AMS to develop and implement NRMP/RMP for pesticide residues in fresh fruits and vegetables and what are the most difficult parts to follow in this Regional Guide. Moreover, the recommendations for improving the Regional Guide as well as their suggestions on the capacity needs among AMS in risk-based monitoring activities were asked. About 78% of the AMS (n = 9) agreed that this Regional Guide is useful (45% agreed and 33% strongly agreed), while some AMS (22%) were neutral to the usefulness of this Regional Guide. For the benefits of implementing NRMP/RMP based on this Regional Guide, AMS (n = 10) agreed that the results of their NRMP/RMP programs help in developing and improving food safety measures (80%), supports in developing a national policy on the agricultural safety (70%), and improves more targeted monitoring plans for pesticide residues as the risk-based approach (60%).

In addition, implementing this Regional Guide into national programs can improve the resource allocation and revision of regulations or requirements for pesticide use and their residues. This Regional Guide provides risk-based practices in monitoring/surveillance programmes so that the result can support policymakers to revise the national plan and regulations effectively. For example, most of AMS (70%, n = 10) responded that the revision of pesticide residue regulations is regularly done when necessary, such as data availability, budget availability, public health impacts or concerns, and updated Codex standards. Therefore, the results of NRMP/RMP based on this Regional Guide can fully support the risk managers with scientific-based evidence to decide on revisions of regulations and relevant control measures to increase consumer trust in food safety.

For the recommendations on revision of the Regional Guide, all AMS (n = 10) confirmed that this guide is comprehensive information and not necessary to revise or improve in the current circumstance. However, most AMS are faced with fully implementing the Regional Guide at the national level. The survey presented that respondents (n = 9) ranked the difficult parts of the Regional Guide to implement at the national level as shown in Figure 7. The most difficult part is the traceback investigation, followed by funding arrangement, partner agreement, the scope of the monitoring programme, commodity prioritization, pesticide screen, and capacity of analytical

laboratories. Some limitations are explained in the second section and this result can be considered by AMS and AHC 4 for further improvement.

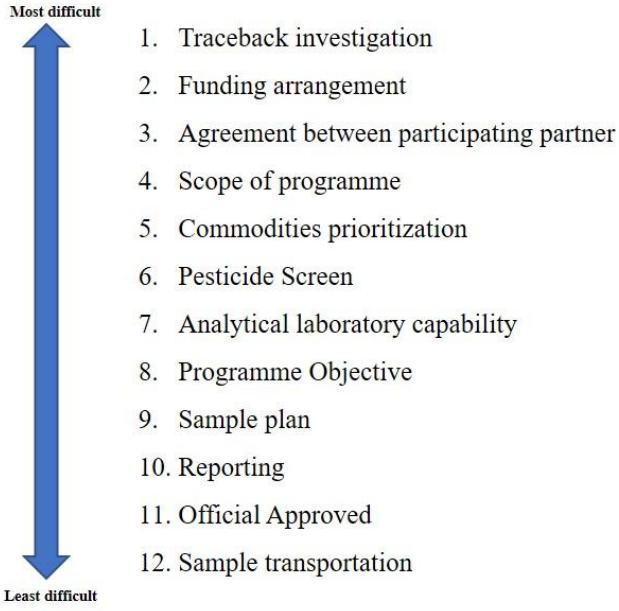


Figure 7. Ranking the difficult parts of the Regional Guide for national implementation in AMS

Lastly, some recommendations to strengthen the implementation of NRMP/RMP through capacity needs were listed by the AMS as follows:

- Data interpretation and evaluation of monitoring results for risk assessment or MRL establishment;
- Training for technical performances (i.e., field sampling, sample transportation, sampling techniques);
- Capacity for laboratory performance;
- Exchanging of technical information and collaboration among ASEAN;
- Strengthening of traceability system.

Moreover, the harmonization of food safety measures and control procedures of pesticide residues for fresh fruits and vegetables within the ASEAN region and specific instruction of risk-based monitoring programmes for particular crop/food combinations in ASEAN was proposed to be strengthened in ASEAN.

In the conclusion of the survey on implementing the risk-based monitoring programmes for pesticide residues in fresh fruits and vegetables, most AMS currently implemented NRMP/ RMP programmes with different purposes, mainly the import food inspection programme. Common elements, such as government approvals, resourcing/funding considerations, and assessment of program and technical parameters are generally considered to develop and strengthen the NRMP or RMP programmes. The stakeholder consultation is also included in the process of developing NRMP/RMP programmes in AMS, however, the budget availability is mainly from the government sector. From the survey evaluation, most AMS work consistently with the Regional Guide to develop or strengthen the risk-based monitoring programme and put their efforts into improving the NRMP/RMP programmes. Most AMS also take actions on traceback investigation and reporting to publish and maintain safe food for consumers. On the other hand, many elements of developing and implementing the NRMP/RMP programmes are still insufficient, such as limitation of budget availability, limitation of available apparatus for the analytical laboratory, lack of modern IT technology for data collection and management, and insufficient traceability system. Apart from hardware and software obstacles, human resources and their performance are also prioritized for improvement. These limitations influent the effective implementation of risk-based monitoring programmes at both national and regional levels.

Limitations of the surveys were also addressed in this report. Firstly, the surveys were conducted during the COVID-19 pandemic, so the data collection was applied by online questionnaires which may increase the response biases. Secondly, The data analysis for the first-round survey was conducted from nine AMS due to limitation of implementing the NRMP/RMP programmes in one AMS. The result of this report may not fully represent as the whole ASEAN region. Finally, the limitation of the onsite interviews, some questions were not fully clarified which may have influenced the understanding of the respondents.

3. Summary and recommendations

In summary, this project completely achieved the regional target under the AHC4 work programme to serve as a common guide for minimizing capacity gaps in monitoring of pesticide residues among the national food control systems in the ASEAN region. This project provided a comprehensive process from the risk categorization, developing the Regional Guide, conducting

the survey to analyze the implementation of this Regional Guide into each AMS, as well as finding the additional gaps for further improvement. Many stages of this project attempted to include communication and participation activities among AMS, ASEAN secretariats, and external experts, such as workshops, consultations, and information exchanges. We believe that these activities help to increase understanding of principles for the development/implementation of the risk-based monitoring programme as well as to share the experience of each member state which is an alternative way to minimize the gap of food control measures in AMS.

In the first step of the project, a chemical hazard from pesticide residues in fresh fruits and vegetables was selected as the common hazard in the ASEAN region. The method of risk categorization is based on the FAO guideline so it is a good practice for all AMS to apply this international guideline for prioritizing the food risks based on multi-factors consideration. This practice can further apply in each AMS to identify major risks for taking actions and resource allocation effectively. For the second step, the Regional Guide was developed with technical support from FAO and external experts. The Regional Guide covered principles and key elements for developing risk-based monitoring programmes. Moreover, the guide provides comprehensive types of monitoring programmes which are fit for different purposes of the implementation. AMS can consider and follow this Regional Guide to develop or strengthen their national monitoring programmes under the risk-based approach. This Regional Guide also recommends key factors to be considered for developing and implementing the monitoring programme based on resource availability and national circumstances. Hence, diversities of AMS situations are already addressed in the Regional Guide for a flexible application. In the last stage, online surveys were conducted to evaluate the current implementation of risk-based monitoring programmes in AMS based on the Regional Guide. It can be concluded that most of AMS have developed and conducted the national pesticide residues monitoring/surveillance plan (NRMP) and/or pesticide residues monitoring/surveillance plan (RMP) for fresh fruits and vegetables with different types of programmes. Key factors from the Regional Guide are generally considered for developing and implementing the monitoring programme. However, neither all principles nor elements of the Regional Guide are fully applied due to various limitations in AMS. Hence, continuous discussion and information sharing on the implementation among AMS may reduce implementation gaps.

The recommendations for effective implementation of the risk-based monitoring programmes in ASEAN are also addressed as follows:

1. A prioritizing method of pesticide-commodity combination should be regularly applied in both stages of developing and evaluating the monitoring programme. The prioritization is not only to ensure that the programme is in line with the risk-based approach but also to support effective implementation under the limitation of budget availability, which is one of the major challenges in AMS.

2. Effective collaboration of multi-stakeholders in the development and implementation of risk-based monitoring programmes should be strengthened. For example, the participation of key stakeholders in developing the risk-based monitoring programme should be enhanced. The mechanism of collaboration, such as data management, trackback investigation, and communication among the stakeholders should be clearly addressed.

3. Facilities for laboratory services, modern data management and communication tools should be provided. These elements assist the effectiveness of implementing a monitoring programme and enhance rapid actions for non-compliant products to increase consumer trust in food safety.

4. Capacity buildings and training programmes for officials are still needed, especially for laboratory performances, sampling techniques, investigation and traceability techniques.

5. Since different risks may need different measures for effective control measures, this Regional Guide focuses on the chemical risks from the pesticide residues used in fresh fruits and vegetables. Development of the risk-based programme for other chemical hazards, such as contaminants or food additives, as well as other health risks such as pathogens may need different principles and guidelines to implement. Hence, this project can be a model for consideration to develop other Regional Guide for specific types of health risks.

AHC4 has endorsed Singapore's Concept Note on the Three-year Pilot Project on the Monitoring of Dietary Exposure of Pesticide Residues from Leafy Vegetables among ASEAN Member States in 2025. The execution of the proposed 3-year ASEAN pilot project would provide further thrust for routine implementation of the Regional Guide to Develop and Strengthen National Pesticide Residues Monitoring Programmes. In particular, through the range of capacity building activities proposed under the 3-year project, it would help address the gaps and inadequacies identified through the two rounds of survey, related to risk profiling and prioritization, planning and execution of national pesticide residues monitoring programme including sampling, laboratory testing, data analysis, dietary risk assessment and policy recommendations.

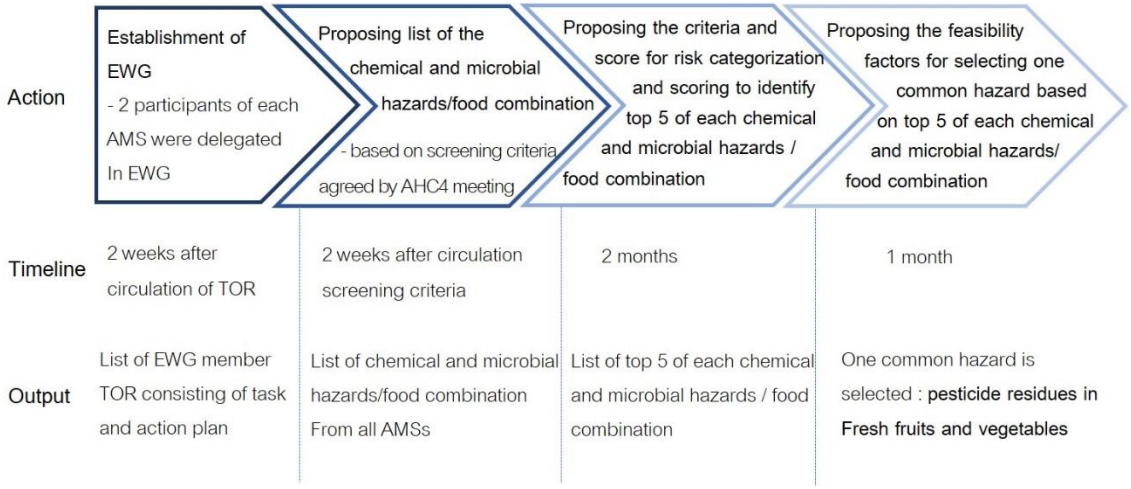
Appendix

Appendix 1: Short summary of risk-based categorization and selection of one common hazard in the ASEAN for developing guidance on risk-based monitoring and surveillance programmes

To select one common hazard, the criteria and factors for selection are based on the FAO Guidance materials entitled "Food Safety Risk Management: Evidence-informed policies and decisions, considering multiple factors" and experiences from the FAO Regional training course on "Capacity building on risk categorization for ranking risk of ASEAN food hazards for developing the risk-based monitoring protocol for food safety" held during 23 - 25 April 2019 in Bangkok, Thailand. This regional workshop is conducted under the FAO Project: GCP/RAS/295/JPN and collaboration with ASEAN Health Cluster 4.

In this step, The Electronic Worgking Group (EWG) was established based on the Fourth meeting of ASEAN Health Cluster 4: Ensuring Food Safety held during 26-28 June 2019, Nha Trang, Viet Nam in order to work on selecting one common hazard in ASEAN under the phase II of the project on development of guideline/manual for monitoring and surveillance programme for food hazards which is one of Monitoring and Surveillance activities under the 5-year work programme (2016-2020) of the AHC4. Term of Reference (TOR) and list of EWG member were adopted before conducting activities addressed in the action plan to accomplish the task mentioned in the TOR.

From the action plan and timeline for EWG working together for selecting one common hazard, the result of each step can be summarized as following figure



Step 1: Proposing list of the chemical and microbial hazards/food combination

Screening criteria

In the fourth meeting of ASEAN Health Cluster 4: Ensuring Food Safety held during 26-28 June 2019, Nha Trang, Viet Nam, Thailand as the lead country of this activity proposed screening criteria for listing common interest of chemical and microbial hazards/food combination among ASEAN region. The meeting agreed with this screening criteria and proposed Thailand to provide explanation in detail to EWG member. The screening criteria agreed by AHC4 is as below;

Criteria	Example for the Evidence
Severity of the impact on health (i.e. death/hospitalization, severe consequences) / Toxicity data (Chemical)	Report/ incident of illness or outbreak
Prevalence and level of contamination	Report/ record of the rejection or record of post-market monitoring programme
Level of exposure (consumption data)	Consumption data/ number of product importation or production

Criteria and examples of evidence described from above table are lesson learnt from the FAO Regional Training Workshop "Capacity building on risk categorization for ranking risk of ASEAN food hazards for developing the risk-based monitoring protocol for food safety" held 23-25 April, 2019 in Bangkok, Thailand as well as the FAO guidance materials regarding "Food Safety Risk Management Evidence-Informed Policy and Decisions, Considering Multiple Factors". From above screening criteria, each AMS was requested to send the data for five of both chemical and microbiological hazard/food combinations based on criteria and evidences shown in the table. The criteria and evidence supported can be based on one or two or three for selecting the issues. After circulation of the screening criteira, list of summaries on chemical and microbiological hazard/food combinations from responding AMSs are collected and circulated to EWG member for acknowledgement and consideration for the next step of work.

Step 2: Proposing the criteria and score for risk categorization and scoring to identify top 5 of each chemical and microbial hazards / food combination

Criteria and score for risk categorization

Thailand as lead country of this activity proposed draft of criteria and weight score for risk categorization developed based on the FAO guidance on Food Safety Risk Management: Evidence-informed policies and decisions, considering multiple factors.

From discussion and comments from EWG member, especially from Malaysia, Singapore and Thailand, the final draft of criteria and weight score for risk categorization and prioritization as follows;

1. Primary objective:

To conduct risk categorization is to develop an ASEAN-level monitoring programme (including sampling guidelines) for post-market products for common hazards based on risk-prioritized food-hazard combinations for both chemical and microbiological hazards.

2. Set of criteria and weight score for risk categorization

Decision factors	Criteria	Scale for weight score (A)			Weight (B) (Total = 1)	Total Score (A) x (B)
1. Public health concern	Qualitative level of risk to public health by	Multiple categories: Low, Medium, High			0.2	
		Low (=0)	Medium (=1)	High (=2)		
	- Incident rate (number of illness/100,000/year) ***(For both microbiological and chemical hazards)***	0-10	11-100	>100		
	- Level of severity of health outcome impact (1) for acute effects ***(For microbiological hazard only)***	Mild diarrhea, nausea, vomiting	Fever, diarrhea, nausea, vomiting Repeat episodes of diarrhea <u>or</u> <u>ADI/PTDI/PTWI established</u>	Hospitalization cases of diarrhea and consequence after episode (e.g. HUS) including death cases	0.2	
	(2) for chronic effects ***(For chemical hazard only)***	No symptoms, <u>or</u> no safety concern/ ADI not specified		Detect disease / Hospitalization cases <u>or ADI/PTDI-PTWI not established due to safety concern /carcinogenic</u>		

Decision factors	Criteria	Scale for weight score (A)			Weight (B) (Total = 1)	Total Score (A) x (B)
	- Consumption (per capita, annual, number of servings)	Low (=0)	Medium (=1)	High (=2)	0.2	
2. Economic concern	Volume of trade* by either: - Volume of import - Volume of domestic markets	Monetary scale / volume of trade 0-33% (=0)	34-66% (=1)	66-100% (=2)	0.1	
3. Food security concern	Implication to food supply and security by - Chronic malnutrition - Reduction of food availability	Degree of connection: Yes (=1), No (=0)			0.1	
4. Socio-cultural concerns	Characteristic level by - Impact on vulnerable groups in society (young, elderly, immunosuppressed, poor) - Impact on different gender - Religious/cultural sensitivities and dietary preferences about consumption of particular	Degree of impact: Significant impact (=1), No impact (=0)			0.1	
5. Consumer perception	Perception level by - Perception of severity of health outcome - Degree to which risk is perceived to be controlled by the individual consumers - Degree to which risk is perceived to be controlled by regulators	Perception level/Exist: Yes (=1), No (=0)			0.1	

Remark:

* For calculation or estimate economic concern based on Volume of trade, method of calculation is explained as follows: by

Volume of import = Total import volume of specific food (from annex 1) x 100%

Total import volume of food (HS code 16-22)

The percentage of Volume of import can be average from 3 to 5 years, if information is available.

Volume of domestic markets = Total domestic volume of specific food (from annex 1) x 100%

Total production volume of such specific food

From the scoring result, top five of each chemical and microbiological hazard /food combination were identified and further used for consideration against feasibility factors.

Step 3: Proposing the feasibility factors for selecting one common hazard based on top 5 of each chemical and microbial hazards/ food combination

The feasibility factors were developed based on the FAO guideline and agreed by EWG for scoring to find one common hazard. The feasibility factors were agreed as follows;

Factor	Criteria of scale 0 (none), 1 (low), 2 (medium), 3 (high)
1. Availability of infrastructure to address the food safety problem 1.1 Existing regulations or standards or guidelines	
1.2 Laboratory capacity	
1.3 Implementing in the annual monitoring/surveillance plan (including human and Budgets)	
2. Addressing priorities by the policy	
3. Availabilities of technical assistance to support (experts and technical information)	

Result of identifying one common hazard from responding AMSs is summarized based on the scoring high ranks of hazard/food combination from categorization and prioritization with possible feasibility factors based on their national consultation. From this result, one common hazard was identified as pesticide residues in fresh vegetables and EWG agreed to develop a monitoring manual for both fresh vegetable and fresh fruits. This EWG work with one-common hazard selection was reported and agreed by the Fifth Meeting of AHC4 meeting in 2020.

Appendix 2: Questionnaires for the first and second round surveys

1. **Quesionnaires for the first-round survey**

Survey of implementation of Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States

This survey is conducted according to the work program 2021-2025 of ASEAN Health Cluster 4 Ensuring Food Safety with the intention to support ASEAN member states to develop/strengthen their own National Pesticide Residue Monitoring Program (NRMP)/pesticide residues monitoring/surveillance plan (RMP). The purpose of the survey is to collect the information from AMS regarding the developing/strengthening NRMP/RMP and recommendations for improving the guideline. Therefore, the activities and experiences collected from the survey could be shared and the recommendations could be used for further improvement of the Regional Guide.
This survey is consisted of 23 questions. We do appreciate your time and effort.
Thank you for your support.

General Information

Member States

☐ Brunei Darussalam
☐ Cambodia
☐ Indonesia
☐ Lao PDR
☐ Malaysia
☐ Myanmar
☐ Philippines
☐ Singapore
☐ Thailand
☐ Vietnam

Contact Person (Name-Surname)

_____

Position

_____

Organization

_____

Address

_____

Phone number/ Tel.

_____

E-mail

_____

Q1: Does your country have national pesticide residues monitoring/surveillance plan (NRMP) or pesticide residues monitoring/surveillance plan (RMP)?

☐ Yes *(skip Q1.2 and 1.3)*

☐ No *(proceed to question 1.2 and 1.3)*

Q1.1: Please select which plan you implemented? (You can select more than one answer)

☐National pesticide residues monitoring/surveillance plan (NRMP)

☐Pesticide residues monitoring/surveillance plan (RMP)

(proceed to question 2)

Q1.2: What are your activities for consumer safety regarding pesticide residues?

_____

Q1.3: What supports do you might need for developing your NRMP/RMP?

_____

(*Proceed* to e*nd the survey)*

Q2: What types of pesticide residue monitoring programme do you implement?
(You can select more than one answer)

☐Compliance programmes ☐Import food inspection

☐Quality assurance ☐Dietary intake surveys

☐Exported food monitoring ☐Emergency incident responses

Q3: Regarding your programmes, which stakeholders have been involved in consultation process? (You can select more than one answer)

☐Agriculture agency ☐Trade sector

☐Health agency ☐Consumer organization

☐Industry sector ☐None

Q4: Which stakeholder is the main financial supporter/funder for your NRMP/RMP? (You can select more than one answer)

☐Government Sector

☐Industry Sector

☐Trade Sector

Q5: Do you consider your country as ....?

☐Exporting country *(please answer question 5.1 only)*

☐Importing country *(please answer question 5.2 only)*

☐Both importing and exporting country (*please answer question 5.1 and 5.2*)

☐Not importing and exporting country (self-dependent) *(please proceed to question 6)*

Q5.1: If you consider yourself as an exporting country, what criteria do you use to consider in setting MRL for your programme?

☐Codex MRL for all kinds of commodity

☐Lowest MRL of all importing country for each commodity

☐Lowest MRL and highest violation rate of imported food testing system

Q5.2: If you consider yourself as an importing country, do you have an imported food testing system (e.g. testing program at border, sampling plan according to history of compliance and food type etc.)?

☐Yes

☐No

Q6: Public health concerns are often used for setting up objectives of NRMP/RMP. However, it might be driven by the unreliable information or non-science based evidence. Do you also consider this particular issue while determining the objective of NRMP/RMP?

☐Yes

☐Sometimes

☐No

Q7: When pesticides are concerned for export monitoring programme, do you need to consider for both commodity and a range of pesticide residue which are sensitivity to trade?

☐Yes

☐No

Q8: When assessing pesticide risks, do you concern about variable of use patterns and pest pressures?

☐Yes

☐No

Q9: Do you adopt all Codex MRL?

☐Yes

☐No

Q10: Do you use risk profiling <u>specifically</u> for your country for developing NRMP/RMP?

☐Yes

☐No

Q11: When developing pesticide monitoring programme, which factors do you consider?
(You can choose more than one answer)

☐Prevalence data and risk of hazard

☐Consumption data

☐Production rate of the commodity

☐Laboratory capability

☐Budget

☐Other, please specify _____

Q12: Which types of sampling plan do you implemented when you develop <u>initial plan</u> for monitoring of compliance programme?

☐Targeted sampling

☐Random sampling

Q13 From this list, please choose the <u>top five</u> most difficult aspects to implement as from the Regional Guide. (5 = the most difficult, 1 = the least difficult)

Aspect	5	4	3	2	1
Programme Objective					
Official Approved					
Funding arrangement					
Agreement between participating partner					
Scope of programme					
Commodities prioritization					
Pesticide Screen					
Analytical laboratory capability					
Sample plan					
Sample transportation					
Traceback investigation					
Reporting					

Q14: Do all sample collectors received training before performing sample collection?

☐Yes

☐No

Q15: Do you have training providers/training programmes related to sampling program?

☐Yes

☐No

Q16: Do you make advance notice of attendance at a farm, pack-house, market or other sampling location prior to sample collection?

☐Yes

☐No

Q17: Do you think is it necessary for NRMP/RMP to have an ability for testing of all kinds of pesticide?

☐Yes *(Please answer question 17.1)*

☐No

Q17.1 If yes, please provide the reasons:

_____

Q18: Which information management system (IMS) do you use for data management?

☐Paper-based system

☐Web-based system

☐Paper-based system coupled with excel spreadsheets

Q19: Do you have contracted analytical laboratory for performing pesticide residue programme?

☐Yes *(Please answer question 19.1)*

☐No

Q19.1: If yes, Shall it require to be accredited for testing particular commodity and pesticide residues?

☐Yes

☐No

Q20: If you have compliance programme, in case MRL exceedance, do you need to investigate for cause of the problem?

☐Yes

☐No

Q21: Do you have channel(s)/mean(s) to publicly report the results of NRMP/RMP?

☐Yes

☐No

Q22: Do you think this guide is useful to support/help developing/strengthen NRMP/RMP?

	1	2	3	4	5	
Strongly disagree						Strongly agree

Q23: Do you have any recommendations /suggestions for additional information that should be added to this guide?

_____

_____

_____

_____

End of the survey

2. Questionnaires for the second-round survey

Survey of Implementation of Regional Guide to Develop and Strengthen National Pesticide Residue Monitoring Programmes in ASEAN Member States (Round 2)

This survey is conducted according to the work program 2021-2025 of ASEAN Health Cluster 4 Ensuring Food Safety with the intention to support ASEAN member states to develop/strengthen their own National Pesticide Residue Monitoring Program (NRMP)/ pesticide residues monitoring plan (RMP). In 2023, the first round of the survey and its results were completed, and the ASEAN Health Cluster 4 noted the information on the activities and experiences of each member state related to this Regional Guide. Therefore, this survey aims to collect additional information from ASEAN member states, as well as to gather recommendations and possible capacity building needs among ASEAN member states. The collected activities, experiences, and recommendations will be shared in the 8th AHC4 meeting.
Remark Thailand would like to kindly ask AMS to provide only **one answer** from each AMS which will closely represent the current situation of your country.

Email

_____

Section 1 General information

Member States

☐ Brunei Darussalam
☐ Cambodia
☐ Indonesia
☐ Lao PDR
☐ Malaysia
☐ Myanmar
☐ Philippines
☐ Singapore
☐ Thailand
☐ Vietnam

Contact Person (Name-Surname)

_____

Position

_____

Organization

_____

Section 2 Questions on the implementation of the Regional Guide

Please noted that

NRMP = National Pesticide Residue Monitoring Program

RMP = Pesticide residues monitoring plan

Remark Thailand would like to kindly ask AMS to provide only **one answer** from each AMS which will closely represent the current situation of your country

1. What factors that will be used in prioritizing/selecting the commodities in developing of NRMP and RMP? (You can select more than one choice)

If "Other" were chosen, please specify.

☐Production volume

☐Import volume

☐Export volume

☐Consumption volume

☐Commodities that frequently found with excess MRL of registered or authorized pesticides

☐Commodities that frequently found with unregistered or unauthorized pesticides

☐Commodities that usually use several types of pesticides

☐Information from rapid alert system

☐Other, please specify_____

2. What factors that will be used in prioritizing/selecting the pesticides in the developing of NRMP and RMP? (You can select more than one choice)

If "Other" were chosen, please specify.

☐History of non-compliance in case of excessive use of registered pesticides or the use of unregistered or unauthorized pesticide that for used on a specific commodity

☐Characteristic of the pesticide e.g. pesticide with high residue potential etc.

☐Analytical capability

☐Importing country's regulations (Export-focused residues)

☐Toxicity studies on the pesticide residues

☐Other please specify _____

3. According to the findings of the last survey, most member states said that the most significant obstacles in implementing NRMP/RMP results was traceback investigation. Based on the issues outlined below, please rank the issues by their necessity toward improving the traceback investigation for your country.

Please rank (1 = the lowest necessity and 5 = highest necessity)

and please specify if you may want to suggest other factors that may contribute.

Obstracle	1	2	3	4	5
Insufficient personnel to conduct the traceback activities					
Insufficient or lack of appropriate electronic tools for tracing back information e.g. IT system or data collecting software.					
Insufficient number of laboratories to perform analytical activities					
Collaboration between responsible agencies (Inter-departmental consultation) including data linkage between responsible agencies					
Lack of a well-defined procedural manual to guide operational activities					

3.1 please specify if you may want to suggest other factors that may contribute.

_____

_____

_____

4. From the last survey results, the key factor which most AMS concerns while developing NRMP/RMP was laboratory capability.

Please rank the issues by their necessity in improving the laboratory capabilities for your country, apart from the budget?

Please specify if you may want to suggest other factors that may contribute.

Issue	1	2	3	4	5
Increase the number of laboratories which cover analytical methods and scope					
Increase the number of capable laboratory officers in performing analytical methods					

Issue	1	2	3	4	5
Increase the number of the analytical apparatus to support the needs for developing NRMP/RMP					
Increase regular and appropriate training for the laboratory officers					
Increase research and development new detection methods for the pesticide residues					

4.1 please specify if you may want to suggest other factors that may contribute.

_____

_____

_____

5. What kinds of pesticide testing that your country use in the implementation of NRMP and RMP *in case of imported agricultural commodities*?

☐Targeted pesticide testing

☐Non-targeted (screening) pesticide testing

☐Both

6. What kinds of pesticide testing that your country use in the implementation of NRMP and RMP *in case of domestic agricultural commodities?*

☐Targeted pesticide testing

☐Non-targeted (screening) pesticide testing

☐Both

7. What kinds of pesticide testing that your country use in the implementation of NRMP and RMP *in case of exported agricultural commodities?*

☐Targeted pesticide testing

☐Non-targeted (screening) pesticide testing

☐Both

8. What issues do you think should be published from the result of the NRMP or RMP to the general public? (You can select more than one choice)

If "Other" were chosen, please specify.

☐Full report of NRMP or RMP e.g. compliance report, and screening results of the pesticide detected in the agricultural commodities etc.

☐Compliance report of the agricultural commodities in accordance with prescribed regulation (e.g. passed/ failed)

☐None

☐Other please specify _____

9. From the results of your counties' NRMP/RMP, what are the practical solutions that has been implementing in your country (You can select more than one choice)

If "Other" were chosen, please specify.

☐Develop/improve food safety measures accordingly such as revising regulation on the safety standards/regulations of agricultural commodities etc.

☐Support in developing policy on agricultural commodities

☐Improve a more targeted surveillance plans on pesticide residues

☐Improve resources allocation

☐Revise list of approved pesticide and conditions of use

☐Other please specify _____

10. What is the frequency of the MRL revision of pesticide residues regulation? (You can select more than one choice)

If "Other" were chosen, please specify.

☐Every year

☐Every two years

☐Every three years

☐When necessary, e.g. availability of the data or budget, reported fatality, domestic concerns, a revision of the Codex MRLs etc.

☐Other please specify _____

11. Do you agree that this guide is useful to support/help developing/strengthen NRMP/RMP?

☐Strongly disagree

☐Disagree

☐Neutral

☐Agree

☐Strongly agree

12. Do you think this guide need to be revised or modified to better accommodate AMS applications?

☐Yes; then please provide the recommendations for improvement in Q 12.1 below

☐No

12.1 If yes, please suggest on how to improve the information provided in each topic of the guide below?

_____

_____

_____

13. Regarding the developing or implementation of the NRMP/RMP, what are the capacity-building needs that AMS is interested in addressing?

_____

_____

_____

End of survey