

Situational analysis of antimicrobial resistance policies and program implementation in the Philippines, 2019–2023

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ARTICLE INFO

Keywords:

Antimicrobial resistance
Philippines
Public health
One health
Policy and programming

ABSTRACT

Antimicrobial Resistance (AMR) is a pressing global threat to public, agricultural, and environmental health. In 2015, the WHO launched the Global Action Plan on Antimicrobial Resistance (AMR), emphasizing the importance of a unified One Health approach to involve all sectors in combating AMR. Member states, including the Philippines, were encouraged to develop their own national action plans. This study is an implementation review of its second iteration, the Philippine National Action Plan to Combat AMR 2019–2023 using the One Health Approach, investigating its progress, successes, and challenges. Quantitative data was collected by asking relevant government agencies to rate each activity by its level of progress; results were elucidated and validated with national policies and reports, international benchmarks, insights from key informant interviews, and technical consultations with government agencies and international organizations. Findings revealed notable progress in AMR policy development, regulation, and surveillance in the human and animal health sectors. However, the environmental sector lacks formal engagement, regulatory mandates, and surveillance capacity, limiting a true One Health approach. Other challenges remain in agricultural data collection, laboratory capacity, and inter-agency coordination at the local levels, where implementation is crucial. Local authorities lack in training, support, and technical expertise on AMR's far-reaching impacts, hindering effective enforcement and response. Recommendations include increased laboratory and staff financing, expanded surveillance infrastructure, and enhanced environmental sector participation. Additionally, integrating socioeconomic and gender considerations into AMR strategies will improve policy responsiveness. While significant milestones have been achieved, sustained commitment, cross-sector collaboration, and strengthened regulatory frameworks are critical to ensuring a more comprehensive and effective response to AMR in the Philippines. This study was funded by the European Union and the Food and Agriculture Organization of the United Nations.

1. Introduction

Antimicrobial resistance (AMR) is a global crisis driven by the misuse and overuse of antimicrobials across sectors, causing 4.7 million deaths globally [1]. Low- and middle-income countries (LMICs) bear the heaviest burden due to limited healthcare resources and fragile health systems. The Philippines mirrors these global trends, with 15,700 deaths directly linked to AMR and 56,700 associated deaths in 2019, largely

driven by widespread irrational antimicrobial use [2,3].

The spread of AMR is a complex phenomenon, driven by interconnected human, animal, and environmental pathways, as illustrated by the One Health Framework (Fig. 1). Contributing factors include weak regulatory systems, widespread self-medication, and antibiotic sales through informal sources like sari-sari stores [4,5]. Recognizing AMR's intersectionality across human, animal, and environmental health, the World Health Organization (WHO) launched the Global

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<https://doi.org/10.1016/j.oneht.2025.101255>

Received 7 June 2025; Received in revised form 20 October 2025; Accepted 21 October 2025

Available online 30 October 2025

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This study serves as a situational analysis of the current AMR policy and programming in the Philippines, assessing the implementation status of the second iteration of the PNAP to Combat AMR (2019–2023).

2. Materials and methods

Quantitative data were collected using a standardized self-assessment worksheet, which was distributed to focal point persons across implementing agencies. Each PNAP activity was rated using a stoplight classification system: green for fully implemented, yellow for ongoing with good progress, orange for initiated but requiring further work, red for not yet started, and gray for activities that were deemed forgone. Operational definitions can be found in [Table 1](#). The responses were collated, summarized, and categorized by key strategy area.



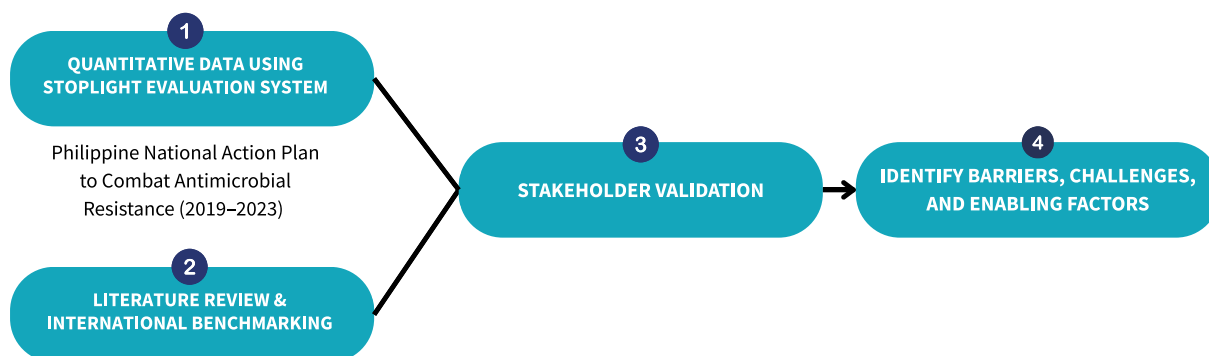


Fig. 2. Mixed-methods methodology for this study.



Fig. 3. Key Strategies of the PNAP to Combat AMR using the One Health Approach 2019–2023.

To substantiate and validate the self-assessment findings, a comprehensive desk review was conducted. This included both published and gray literature submitted by relevant agencies, advisories, guidelines, country assessments, policy documents, and administrative orders. Other relevant materials were sourced from online databases including Google Scholar, PubMed, and ScienceDirect using targeted search terms: “action plan” AND “antibiotic resistance” OR “antimicrobial resistance” AND “Philippines”; “guidelines, laws, policy, regulations” AND “Philippines”; “One Health” AND “antimicrobial use,” “antimicrobial surveillance,” “antimicrobial stewardship”. Documents without specific relevance to the key strategies or activities were excluded.

A total of ten key informant interviews and stakeholder consultations were conducted with representatives from key government agencies and technical experts involved in AMR policy implementation. Participating

agencies included stakeholders from the human, animal, and environmental sectors, following the One Health framework. Stakeholders included representatives from the Research Institute for Tropical Medicine (RITM), Bureau of Animal Industry (BAI), National Meat Inspection Service (NMIS), Bureau of Fisheries and Aquatic Resources (BFAR), Department of Environment and Natural Resources (DENR), and the Food and Drug Administration (FDA) (S1). Interviews were recorded, transcribed, and analyzed manually using a deductive thematic approach. Themes were organized and coded based on the PNAP’s seven strategic areas, with the goal of identifying enablers, implementation gaps, and opportunities for improvement.

3. Results

The Philippine government has made significant progress in

Table 1
Operational definitions for spotlight evaluation system for activities.

Color	Operational Definition
Green (Fully Implemented)	The activity has been completed as planned, with documented outputs or outcomes, and is currently operational or sustained without major gaps.
Yellow (Ongoing with Good Progress)	The activity is in progress and on track toward completion. Milestones have been met within expected timelines, with clear evidence of implementation and stakeholder involvement.
Orange (Initiated but Requires Further Work)	The activity has been initiated but lacks significant progress. Partial steps have been taken, but additional resources, coordination, or guidance are needed to move forward effectively.
Red (Not Yet Started)	The activity has not commenced. There are no initial steps taken, nor are there clear plans, timelines, or resources allocated for implementation.
Gray (Forgone or Deprioritized)	The activity has been intentionally set aside, canceled, or deprioritized. It is no longer considered part of the implementation agenda, often due to a shift in priorities, resource constraints, or strategic realignment.

combating AMR through a combination of broad and localized strategies. Across the spotlight evaluation system, Key strategies on awareness and education (KS 7) (57.9 %), multisectoral governance (KS 1) (54.5 %), and access to quality antimicrobials (KS 5) (46.7 %) mostly had activities that were rated as ongoing with good progress. “Not started” was the most common for AMR surveillance (KS 2) and rational use of antimicrobials (KS 4), with ratings of 38.4 % and 31.3 % of their respective activities. The descriptive results of the implementation status of the activities can be found in Fig. 4.

3.1. Key strategy 1 - Commit to the Philippine action plan through multisectoral engagement and accountability

The Inter-Agency Committee on Antimicrobial Resistance (ICAMR) has taken steps to expand committee representation by moving toward a unified One Health policy. This initiative, led by the health sector, seeks to formalize broader engagement across sectors and has helped bring AMR into the fold of key national strategies, such as the draft National Action Plan for Health Security (NAPHS), the National Environmental Health Action Plan (NEHAP) 2030, and the 5-Year One Health Agenda. AMR has also been included in agency-level budget plans, although most

allocations remain too limited to cover the full range of required activities.

However, implementation still faces familiar challenges. While focal persons are in place, overlapping agency mandates, low engagement from non-traditional sectors (i.e. education, trade), and frequent leadership transitions continue to hinder progress. Some agencies remain cautious about taking the lead on specific initiatives. There is also no clear monitoring and evaluation (M&E) framework, making it difficult to track implementation or hold actors accountable. Delays in document routing and approvals considering the lengthy bureaucratic processes further impede such progress.

International and regional engagement has grown in recent years, with the Philippines actively participating in initiatives such as the Tripartite AMR Country Self-Assessment Survey (TrACSS), World Antimicrobial Awareness Week (WAAW), and the UN Tricycle Project. In 2021, the country joined the Southeast Asian One Health University Network (SEAOHUN) and launched its own national chapter, the Philippine One Health University Network (PhilOHUN), to foster collaboration with universities and the private sector. These developments reflect a stronger commitment to a One Health approach, but greater coordination, clearer accountability mechanisms, and better resourcing are needed especially to ensure implementation reaches the local level.

3.2. Key strategy 2 - Strengthen surveillance and laboratory capacity

For 30 years, annual data collection and reporting for the Antimicrobial Resistance Surveillance Program (ARSP) in human health has continued. As of 2022, 100 % of all level III hospitals, 92 % of level II hospitals, and 58 % of level I hospitals have received training in Antimicrobial Stewardship (AMS). However, frequent turnover, shortage of laboratory personnel, and limited local training resources have necessitated the retraining of staff.

The Department of Agriculture’s (DA) antimicrobial resistance surveillance program in animal health covers three components: healthy animals, diseased livestock, and diseased aquatic animals. There is regular AMR surveillance of healthy animals in meat products as part of the AMR Surveillance Program and National Veterinary Drug Residue Monitoring Program with good collection of samples; however, the National Meat Inspection Service (NMIS) reported a shrinking budget for AMR-related initiatives, lack of sample collectors and analysts, and increasing costs for the procurement of needed plates and other essential materials. The methodology for AMR surveillance in diseased aquatic

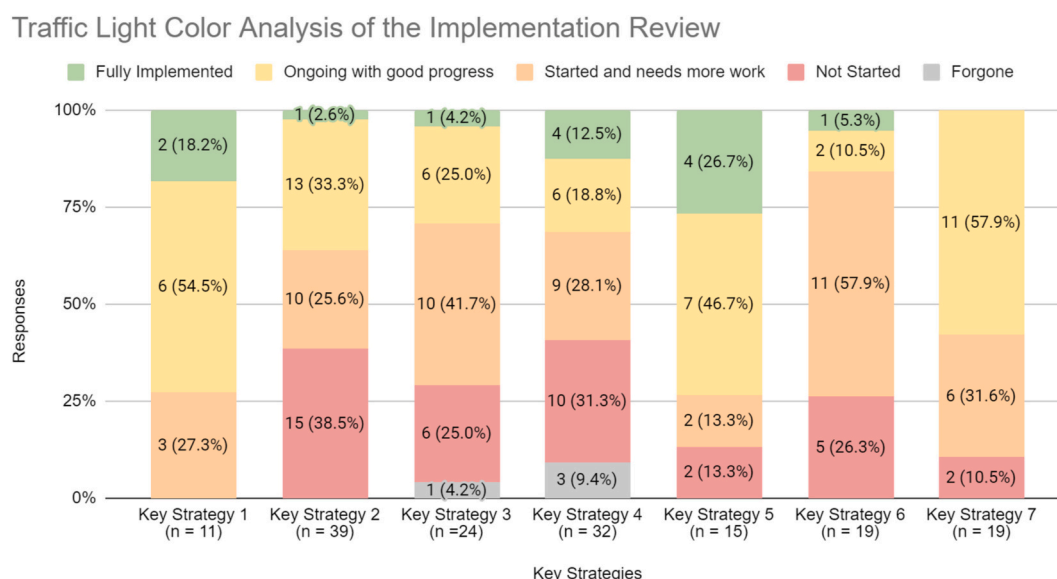


Fig. 4. Quantitative results of traffic light color analysis of the implementation review.

animals has been pilot-tested but still requires support for nationwide and downstream implementation.

A multi-sectoral lab network framework was developed by the DOH and DA, but data sharing for surveillance remains informal. No policy mandates systematic collection of price data across agencies. Farm registration by BAI and BFAR for diseased animals remains voluntary, limiting sample submissions, with many farms unaware they can submit samples. While technical staff are trained in sequencing and bioinformatics, inadequate facilities prevent meeting international standards.

3.3. Key strategy 3 - Ensure uninterrupted access to safe and quality-assured antimicrobials

The DOH has maximized online databases to make human drug information widely accessible, including the Pharmaceutical Management Information System (PMIS) for drug inventory, Drug Price Reference Index and Electronic Drug Price Monitoring System (EDPMS) for drug price transparency, and Drug Price Watch Interface for informed consumer purchasing.

One major accomplishment for this Key Strategy was establishing a memorandum of agreement (MOA) between the DOH and FDA, transferring the regulation of veterinary antimicrobial drugs from DA to FDA. While currently being finalized, this MOA delineates the jurisdiction on the licensing and regulation of veterinary vaccines and biologicals. There is, however, no system in place yet for testing by the FDA or DA that confirms quality assurance of veterinary drugs.

Veterinary antimicrobial regulations are neither as well-developed nor as well-implemented as antimicrobials for human use. Current antimicrobial batch notification mandates need revision to include more drug classes, and require Marketing Authorization Holders (MAH) to provide production and importation data. Quality assurance and safety would benefit from foreign audits and local inspections.

Fragmented supply chain data analytics and forecasting due to the involvement of various divisions in different components lead to budget misalignments and procurement issues. Public healthcare facilities would greatly benefit from centralized data sharing, including a priority list of antimicrobials to be monitored. In the animal sector, the regulation and establishment of baseline data for AMR testing in veterinary drugs are still in its early stages, with no policy on quantitative production and importation data, hampering supply chain studies for veterinary antimicrobials. 262.

3.4. Key strategy 4 - Regulate and promote the rational use of antimicrobials

Plans are underway to develop National Antibiotic Guidelines and an Antimicrobial Stewardship Program for Animal Health. However, the Department of Agriculture (DA) and the Philippine Veterinary Medical Association (PVMA) have yet to integrate existing veterinary and regional guidelines into a cohesive national framework. The implementation of guidelines for the prudent use of antimicrobials through Good Aquaculture Practices (GAQP) and Good Animal Husbandry Practices (GAHP) is ongoing but remains voluntary.

Enhanced monitoring systems, particularly at the regional level, are necessary and will require additional resources, data collectors, and personnel. Enforcement of antibiotic prescription and usage regulations exists but remains poorly implemented in the animal health sector. Notably, there is continuous monitoring of banned antibiotics through the National Residue Control Program.

The Department of Health Pharmaceutical Division has been actively coordinating with LGUs on the dissemination and implementation of policies through the National Drug Policy Compliance Officers per region. AMS training for Level 1 and Level 2 hospitals, and primary healthcare facilities, has been conducted in multiple batches, with best practices documented and shared. 183.

3.5. Key strategy 5 - Implement appropriate measures to reduce infection across all settings

Policies, organizational structures, and digital infrastructures are in place to monitor health facilities' compliance with the National IPC Policy. Facilities are incentivised to submit annual healthcare-associated infection ratings through the hospital scorecard for annual renewal of licensing. However, licensing responsibilities between HFDB, and the Health Facilities and Services Regulatory Bureau (HFSRB) need to be more delineated.

There is a need to enhance monitoring structures and policies for GAQP and GAHP as regulations for antibiotic prescription are neither strictly enforced nor is it currently required to register livestock, poultry, and aquaculture farms. Multiple guidelines in the animal sector promote the Philippine National Standard on GAQP and GAHP to enhance farm biosecurity, but the voluntary nature of these practices, limited certification uptake, and challenges in meeting certification requirements hinder widespread adoption. The Hazard Analysis Critical Control Point (HACCP) system is fully implemented in agricultural processing plants but continues to face challenges due to unclear delineation of responsibilities between the FDA and BFAR. Meanwhile, Good Manufacturing Practices (GMP) are mandated for imported feed products but remain unenforced for domestic feed mills and suppliers. 192.

3.6. Key strategy 6 - Promote innovation and research on AMR

Implementing agencies have emphasized the need for a unified AMR research agenda. Inter-agency collaboration has started; however, these efforts need to be integrated into Industry Strategic S&T Programs (ISPs) roadmaps for livestock, poultry, and aquaculture sectors. AMR research databases and IT systems remain fragmented, lacking a centralized hub. Key challenges include unclear focal points, unclear requirements for commercializing AMR research fields, limited public information, and low private sector engagement in antimicrobial R&D.

Initiatives like the iAMResponsible campaign have begun incorporating new research and data to enhance public understanding, but better AMR information dissemination is needed to broaden awareness effectively. Although efforts to update local research databases related to AMR have started through platforms like HERDIN, the absence of a centralized database limits accessibility and dissemination of critical health information.

Research prioritizing smallholder farmers' needs, such as vaccine alternatives to antimicrobials, is in progress but needs refinement. Despite these gaps, DOST has funded 22 AMR-related projects totaling PHP 435 million.

3.7. Key strategy 7 - Improve awareness and understanding of antimicrobial resistance through effective communication and education

The iAMResponsible campaign continues to be implemented but has yet to formally include BFAR, limiting its reach in the fisheries sector. Awareness of prudent antimicrobial use among agricultural stakeholders, particularly sample collectors, small-scale farmers, and business owners, remains low and is often conflated with veterinary drug residue issues.

Various educational activities, including student forums, GAHP seminars, and food safety caravans, have been deployed nationwide. Social media remains the primary communication channel, especially during Philippine Antimicrobial Awareness Week (PAAW), though efforts via television and print media are minimal due to institutional mandate constraints.

Local government units and community health departments currently lack the autonomy or capacity to develop localized information, education, and communication (IEC) materials. In human health, the integration of AMR content into academic curricula and One Health training programs has advanced. AMR education has progressed in

human health curricula and One Health training, but similar efforts in animal health and fisheries lag due to limited engagement with DepEd and CHED.

4. Discussion

The challenges described above reflect shared, systemic issues that hinder effective implementation of the national AMR response. Most importantly, limited national capacity for evidence generation has resulted in insufficient baseline data and a lack of evidence-informed policies and regulations. Although research on antimicrobial resistance has received considerable support from the Department of Science and Technology (DOST) and international partners, dissemination of funding opportunities remains poor. The absence of a unified AMR research agenda hinders strategic resource allocation. Surveillance systems and data management processes also remain fragmented, with no comprehensive and integrated system in place to monitor antimicrobial use (AMU) and AMR, particularly within the animal and environmental sectors. As a result, the severity of AMR in non-human sectors remains largely undocumented, limiting the development of targeted mitigation strategies and hindering the ability to tailor interventions to regions where they are most urgently needed.

Second, inequitable implementation of the One Health approach continues to pose a significant barrier. The environment sector, in particular, remains underrepresented due to absent institutional mechanisms, lack of AMR integration into strategic agendas, and a lack of baseline environmental data. This reflects a broader regional trend across Southeast Asia, where environmental dimensions of AMR are frequently overlooked [10–12]. Although the Department of Environment and Natural Resources (DENR) is invited to participate in the Inter-Agency Committee on AMR (ICAMR) meetings, it is not a formal member and lacks institutional mandate to formally advocate for dedicated resources for AMR planning. Strengthening the environment sector's institutional role—through mechanisms such as the integration of AMR into DENR's medium-term R&D agenda (2023–2028) and developing standardized water quality testing protocols for antibiotic resistance genes (ARGs) and antibiotic-resistant bacteria (ARBs)—is critical to operationalizing the One Health approach [13,14].

Third, implementation at the local level remains weak. While multisectoral engagement led by ICAMR has improved coordination and raised AMR's profile as a national health issue, local government units (LGUs) are frequently excluded from these efforts due to geographic remoteness, limited awareness, or insufficient institutional support. Consequently, implementation and regulatory enforcement are limited, particularly in remote or resource-constrained regions. Although regular consultations have opened channels for engagement, sustained implementation requires co-created commitments and clear delineation of agency roles that can be tailored to decentralized governance structures.

These systemic issues are further compounded by the inherently fragmented nature of bureaucracies, especially in low- and middle-income countries [10,15,16]. Government agencies operate with differing mandates, strategic plans, and budget cycles, leading to misaligned priorities that often marginalize AMR-related activities. Even when AMR is recognized as a priority, agencies are constrained by limited financial and human resources, resulting in reduced implementation capacity and increased risk of staff burnout. Addressing AMR effectively requires not only intersectoral collaboration but also recognition of the bureaucratic and resource limitations that shape the operational realities of public sector institutions. A more coherent, aligned, and strategically resourced governance structure is essential for the sustained and holistic management of AMR.

5. Conclusion

This study reviewed the current policy landscape and implementation progress of the Philippine National Action Plan to Combat AMR

2019–2023 using the One Health approach. The results highlight the strong capacity in AMR policy, regulation, surveillance, and infrastructure within human health and, more recently, the animal sector in the Philippines. While the Department of Agriculture has made significant advancements in AMR monitoring and regulation, challenges remain, including a lack of a monitoring and evaluation framework, insufficient training, and limited budget allocations for surveillance. Fragmented efforts among various DA bureaus and early-stage regulations on veterinary antimicrobial drugs further complicate the situation.

The results indicated ongoing progress with several notable milestones achieved over the past five years. Policies, plans, and mandates are well-established within the human and animal health sectors. However, full implementation requires additional resources, timely and accessible budget allocation, additional manpower, capacity building, and improved cohesive communication among local and national agencies. Strengthening the mandates for regulating and monitoring the prudent use of animal antimicrobials is crucial. The environmental sector also awaits official inclusion in the ICAMR to take a more active role in the One Health approach against AMR and begin its preparatory stages for surveillance and baseline data. Data collection protocols and methodologies need to be well-defined and established in order to have baseline data that will inform policy and mitigation efforts.

To address these cross-cutting challenges, several recommendations are proposed. Capacity building for ICAMR members, particularly in surveillance and laboratory capabilities, must be aligned with international standards and reflective of national needs. Improved coordination among national and local agencies, supported by clearly defined scopes of work with dedicated human resources, would enhance accountability and local implementation. Furthermore, a robust monitoring and reporting framework, drawing from international models, National Action Plans of Thailand [17], Singapore [18], and the FAO Action Plan on AMR [19], should be established to track progress and recalibrate strategies as needed.

As AMR risks intersect with gender, socio-economic status, and access to health services and influence both human and animal health outcomes, gender-responsive and equity-informed solutions are essential [20]. Disaggregated surveillance data, gender-inclusive training, and IEC materials tailor-fit to regional and community contexts can help ensure more effective, people-centered interventions [21]. Increasing access to information and addressing the social determinants of health, such as poverty and informal health practices, will reduce the misuse of antimicrobials and support sustainable AMR mitigation, especially among those who resort to self-medication or treatment from unregulated sources [22,23]. Finally, improving oversight of good agricultural and aquaculture practices and ensuring consistent enforcement of antimicrobial regulations across sectors will be critical in reducing resistance development and transmission [24]. While substantial progress has been made, continued efforts and enhancements are essential to fully realize the goals of the National Action Plan.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the authors did not use generative AI and AI-assisted technologies in order to write the article. The authors take full responsibility for the content of the published article.

CRediT authorship contribution statement

Sary Valenzuela: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Percival Ethan Lao:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Geminn Louis C. Apostol:** Writing – original draft, Visualization, Methodology,

Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Lea Elora A. Conda:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Lystra Zyrill A. Dayapera:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Anna Beatrice Enriquez:** Writing – original draft, Investigation, Formal analysis, Data curation. **Elaine Joyce Diaz:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Natasha Alexis Marie G. Jacinto:** Writing – review & editing, Writing – original draft. **Luh Rai Madur-etno Asvinigita:** Writing – original draft, Investigation, Data curation.

Funding

The authors declare that financial support for the research and writing of this study was provided by the European Union and the Food and Agriculture Organization of the United Nations. The publication of this study was funded by the Ateneo de Manila University.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Geminn Louis C. Apostol reports financial support was provided by European Union. Geminn Louis C. Apostol reports financial support was provided by Food and Agriculture Organization of the United Nations. Geminn Louis C. Apostol reports financial support was provided by Ateneo de Manila University Ateneo School of Medicine and Public Health. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This study would not have been possible without the support of the Department of Health - Pharmaceutical Division, under the leadership of Assistant Secretary Maylene M. Beltran and Dr. Fides Maria Aileen V. Buenafe, with coordination by the Policy, Program Development and Research Unit, including Ms. Johanna M. Abella, Ms. April Rose B. Macandog, Ms. Queenie D. Romero, Mr. Nikko T. Lim, Mr. Lorenzo P. Javier, and Ms. Amerah R. Natangcop. Technical and financial support was provided by the Food and Agriculture Organization of the United Nations – Philippines, coordinated by Dr. Michelle Balbin, Dr. Ethel Ann Yap, and Dr. Ralph Carolyn Cabug, and by the FAO Regional Office for Asia and the Pacific, with contributions from Dr. Scott Newman, Dr. David Sutherland, Ms. Natalie Kapinga; the World Health Organization, represented by Mr. Juan Paolo Tonolet, and the World Organization for Animal Health, represented by Dr. Tikiri Priyantha Wijayathilaka. We also acknowledge the contribution of the participating bureaus under the Department of Health, Department of Agriculture, Research Institute for Tropical Medicine (RITM), Food and Drug Administration (FDA); Department of Agriculture's Bureau of Animal Industry (BAI), National Meat Inspection Service (NMIS), Bureau of Fisheries and Aquatic Resources (BFAR); and the Department of Environment and Natural Resources Environmental Management Bureau (EMB).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.onehlt.2025.101255>.

Data availability

Data will be made available on request.

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