End-of-Project Evaluation: Strengthening Antimicrobial Resistance (AMR) Surveillance and Response in the Caribbean

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The Fleming Fund

Pan American Health Organization
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Contents

Abbreviations and acronyms 7

Executive summary 9

1. Introductory note to the evaluation 14

1.1 Purpose of the evaluation 15
1.1.1 Objectives
1.1.2 Intended users

2. Background information 17

2.1 AMR in the Caribbean context 18
2.2 Project overview
2.3 Project objectives, results framework and intervention logic 19
2.4 Implementation arrangements 21

3. Evaluation methodology and tools 23

3.1 Scope 24
3.2 Evaluation criteria and questions
3.3 Methods 25
3.3.1 Analytical framework 26
3.3.2 Evidence coding, synthesis, and triangulation 28
3.3.3 Ethical considerations
3.3.4 Limitations 29

4. Key findings 31

4.1 Relevance 32
4.2 Effectiveness 34
4.3 Efficiency and economy 36
4.4 Sustainability 38
4.5 Enablers and bottlenecks 40
4.6 Cross-cutting findings 42
4.7 Unexpected intervention results 44

5. Overall assessment 46

5.1 What changed? 47
5.2 What has not changed? 48
5.3 Risk and challenge analysis 50

6. Conclusions 52

7. Lessons learned 57

8. Recommendations 61

References 67

Annexes 69

Annex 1. Project results framework review 70
Annex 2. Implementation status
Annex 3. List of stakeholders consulted 74
Annex 4. Terms of reference 76
Annex 5. Detailed evaluation tools
Annex 6. Evaluation matrix
Annex 7. Literature and documents reviewed
Annex 8. Intervention map. 78

List of tables

Table 1. Fleming Fund Phase II Results Framework 20
Table 2. Evaluation criteria and key questions 24
Table 3. Distribution of interviews by stakeholder type 26
Table 4. Summary of project intervention areas and intended results mapped against analytical components 27
Table 5. Risk and challenges analysis 50
Table 6. Project investments at a glance 73

List of boxes

Box 1. Differences in country readiness and implementation conditions 33
Box 2. Varying sustainability conditions across countries 39

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Their openness, insights, and commitment to strengthening AMR surveillance and response were essential to this evaluation and greatly enriched the quality of the evidence, analysis, and learning presented in this report.

Abbreviations and acronyms

AI	Artificial intelligence
AMR	Antimicrobial resistance
AMS	Antimicrobial stewardship
AST	Antimicrobial susceptibility testing
CARICOM	Caribbean Community
CARPHA	Caribbean Public Health Agency
CCHD	Cooperation Among Countries for Health Development
CCS	Country Cooperation Strategy
CDE	Communicable Diseases Prevention, Control and Elimination
COVID-19	Coronavirus disease 2019
DHSC	Department of Health and Social Care
ECC	Eastern Caribbean Countries
EQA	External quality assessment
GLASS	Global Antimicrobial Resistance and Use Surveillance System
HCAI	Health care-associated infections
IO	Intermediate outcome
IPC	Infection prevention and control
IQC	Internal quality control
IR	Infrared
KII	Key informant interview
LIMS	Laboratory information management system
LTO	Long-term outcome
MALDI-TOF	Matrix-assisted laser desorption/ionization time-of-flight

MDRO	Multidrug-resistant organism
M&E	Monitoring and evaluation
MMC	Mungra Medisch Centrum
NPHRL	National Public Health Reference Laboratory
ODA	Official development assistance
OECS	Organisation of Eastern Caribbean States
OECD-DAC	Development Assistance Committee of the Organisation for Economic Co-operation and Development
PAHO	Pan American Health Organization
PBE	Planning, Budget and Evaluation
PCR	Polymerase chain reaction
PPS	Pooled Procurement Service
QA	Quality assurance
QC	Quality control
qPCR	Quantitative polymerase chain reaction
ReLAVRA+	Latin American and Caribbean Network for Antimicrobial Resistance Surveillance
SEDRI-LIMS	Surveillance and Epidemiology of Drug-Resistant Infections Laboratory Information Management System
SIDS	Small island developing states
SOP	Standard operating procedure
ToC	Theory of change
ToR	Terms of reference
UNEG	United Nations Evaluation Group
UKHSA	United Kingdom Health Security Agency
WHO	World Health Organization
WGS	Whole-genome sequencing

Executive Summary

Project overview

Antimicrobial resistance (AMR) is a growing public health and health security challenge in the Caribbean. Despite strong policy commitments and the adoption of national action plans, many countries continue to face structural constraints that limit their ability to generate, analyze, and use AMR surveillance information. Common challenges include limited microbiology and diagnostic capacity, shortages of specialized personnel, fragmented information systems, constrained fiscal space, and heavy dependence on external supply chains for laboratory supplies and technologies. These challenges are particularly acute in small island developing states, where economies of scale are limited and specialized services are difficult to sustain independently.

The Fleming Fund Caribbean Regional Project was implemented by the Pan American Health Organization (PAHO) between 2024 and 2026 to strengthen AMR surveillance and response capacity across ten Caribbean countries eligible for official development assistance. Building on PAHO's longstanding technical cooperation in AMR, the project combined investments in laboratory diagnostics, workforce development, quality assurance, surveillance systems, governance, and regional collaboration. It sought to strengthen national capacities while also creating regional public goods and shared technical resources to overcome scale and sustainability constraints faced by many Caribbean countries.

At the time of the evaluation, approximately 88% of planned activities had been completed or were underway. Project investments had reached 23 laboratories and hospital sites across the Caribbean and included advanced diagnostic technologies, laboratory consumables, training activities, quality assurance systems, laboratory information initiatives, and regional technical cooperation mechanisms.

Purpose and methodology

The purpose of this end-of-project evaluation was to assess how, and to what extent, the project strengthened AMR surveillance systems and response capacities in the Caribbean, and to identify lessons that can inform future regional and global AMR programming. The evaluation assessed relevance, effectiveness, efficiency and economy, sustainability, learning and utility, and progress toward One Health objectives.

The evaluation adopted a theory-based, contribution-based approach aligned with the norms established by the United Nations Evaluation Group (UNEG) and the evaluation criteria established by the Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD-DAC). Evidence was drawn from a review of project documentation, monitoring and evaluation data, financial and asset records, strategic frameworks, and 35 key informant interviews conducted across participating countries and at the regional level. The response rate among invited stakeholders

was 92%, reflecting a high level of stakeholder engagement and providing broad geographic and institutional coverage across the scope of the evaluation. Interviewees included PAHO headquarters and country offices, ministries of health, public health laboratories, hospitals, the Caribbean Public Health Agency (CARPHA), the United Kingdom Health Security Agency, private-sector partners, and a World Health Organization (WHO) Collaborating Center. Findings were developed through systematic triangulation of documentary and interview evidence.

Key findings

- **The project was highly relevant and strategically aligned with national needs and subregional AMR agendas**
  The evaluation found that the project directly addressed priority constraints affecting AMR surveillance in the Caribbean, including diagnostic capacity gaps, workforce shortages, fragmented data systems, limited quality assurance mechanisms, and challenges in accessing laboratory supplies and technologies. The project was strongly aligned with national AMR priorities, the Fleming Fund Phase II Results Framework, the AMR strategies of PAHO and WHO, the health priorities of the Caribbean Community (CARICOM), and broader regional cooperation agendas.

  The regional implementation model was particularly relevant because many Caribbean countries face similar technical challenges but lack the scale and resources required to independently sustain all specialized AMR surveillance functions. The project therefore addressed both national priorities and regional public health needs.

- **The strongest results were achieved in laboratory strengthening**
  The project's clearest contribution was the strengthening of laboratory diagnostic capacity. Investments in automation, microbiology technologies, quality systems, reagents, consumables, and workforce development improved laboratories' ability to perform antimicrobial susceptibility testing, identify pathogens more rapidly, and generate AMR surveillance data. Across participating countries, stakeholders consistently identified laboratory strengthening as the most immediate and visible result of the intervention.

  The project also generated important operational benefits, including faster organism identification, reduced manual workload, improved workflow reliability, expanded testing capacity, and more timely availability of laboratory results. These improvements benefited not only surveillance activities but also clinical management, infection prevention and control (IPC), and antimicrobial stewardship efforts.

- **Regional cooperation generated significant added value**
  The project demonstrated the value of a regional implementation approach. Through collaboration among PAHO, CARPHA, national laboratories, suppliers, technical partners, and participating countries, the project created re-

gional public goods that extended beyond country-level investments. These included reference laboratory functions, technical support networks, regional training platforms, peer-learning mechanisms, communities of practice, and strengthened collaboration among regional institutions.

The evaluation also found evidence that the project strengthened PAHO's convening role and helped deepen collaboration between PAHO and CARPHA, creating a stronger institutional platform for future AMR initiatives in the Caribbean.

- **AMR data production improved more rapidly than data use**
  The project successfully strengthened the foundations for AMR surveillance by increasing countries' ability to generate AMR-related laboratory data. Investments in diagnostics, microbiology, quality assurance, and workforce development contributed to stronger data production and increased participation in regional and global surveillance initiatives, including Latin American and Caribbean Network for Antimicrobial Resistance Surveillance (ReLAVRA+) and the Global Antimicrobial Resistance and Use Surveillance System (GLASS).

  However, progress in data generation outpaced progress in data integration, analysis, reporting, and routine use for decision-making. Many countries continue to rely on fragmented information systems and manual reporting processes, with limited interoperability between laboratory and surveillance platforms. The evaluation found examples of AMR data informing clinical practice, IPC activities, and stewardship discussions, but these practices are applied unevenly and are not yet systematically institutionalized.

- **Sustainability prospects are positive but conditional**
  The project established an important foundation for sustained AMR surveillance through strengthened laboratory capacity, trained personnel, improved workflows, quality systems, regional support mechanisms, and stronger institutional relationships. However, long-term sustainability depends less on acquiring additional technologies and more on maintaining the systems required to keep existing capacities operational.

  Key sustainability risks identified by the evaluation include recurrent financing for reagents and consumables, maintenance and service contracts, workforce retention, interoperability of information systems, and the institutionalization of AMR surveillance within routine planning and budgeting processes. Evidence suggests that sustainability prospects are strongest where project-supported capacities have already been integrated into existing national systems and regional support structures.

Conclusion

The evaluation concludes that the Fleming Fund Caribbean Regional Project made a meaningful contribution to strengthening AMR laboratory and surveillance capacities across participating Caribbean countries. In a complex environment characterized by small health systems, uneven baseline capacity, geographic dispersion, procurement constraints, workforce limitations, and external shocks, the project successfully modernized laboratory services, expanded diagnostic capacity, strengthened technical competencies, and reinforced regional cooperation mechanisms.

The most important achievement under the project was the support provided to countries moving from AMR policy intentions toward more operational surveillance capacity. At the same time, several critical transitions remain incomplete. The region is increasingly capable of generating AMR data, but systems for interoperability, routine analysis, decision-making, sustainable financing, and multisectoral One Health implementation have not yet matured to the same degree.

Key lessons learned

- **Lesson 1.** Laboratory strengthening is most effective when delivered through integrated capacity packages that combine technology, workforce development, quality systems, supplies, and ongoing technical support.
- **Lesson 2.** Regional approaches generate greater value when shared functions such as reference laboratory support, training, and technical cooperation are supported by clear operating arrangements and coordination mechanisms.
- **Lesson 3.** AMR diagnostics and surveillance data do not automatically translate into public health action. Intentional investments in interoperability, analysis, reporting, and decision-making pathways are required.
- **Lesson 4.** Adaptive implementation capacity is essential in geographically dispersed and operationally complex settings where logistics, procurement, infrastructure, and contextual realities vary considerably across countries.
- **Lesson 5.** Workforce gains are more likely to endure when training is reinforced through mentoring, peer-learning networks, communities of practice, and mechanisms to preserve institutional knowledge.

Recommendations

1. **Strengthen regional and national AMR data systems, interoperability and surveillance intelligence.** Develop a regional roadmap for AMR data governance, interoperability and surveillance intelligence under the proposed PAHO Plan of Action on Antimicrobial Resistance 2027–2031, building on investments in WHONET antimicrobial surveillance software, ReLAVRA+, laboratory information systems and regional reporting platforms.

2. **Institutionalize sustainability of laboratory and surveillance capacities.** Support countries in transitioning project-supported capacities into sustainably financed and institutionally embedded national systems, including through sustainability planning, mechanisms under the PAHO Strategic Fund, workforce retention strategies, maintenance arrangements, and stronger procurement systems.

3. **Strengthen the routine use of AMR surveillance information for stewardship, IPC and public health decision-making.** Expand technical cooperation efforts aimed at strengthening data interpretation, analysis, reporting and use in health-related, programmatic and policy processes.

4. **Consolidate regional laboratory networks, reference functions and workforce learning mechanisms.** Strengthen ReLAVRA+, reference laboratory functions, peer-learning arrangements, technical support networks, and the role of institutions such as the Best-dos Santos Public Health Laboratory and regional WHO Collaborating Centers.

5. **Use strengthened AMR surveillance capacities as a platform for progressive One Health implementation.** Build on the human-health gains achieved through the project to advance multisectoral surveillance collaboration and the implementation of One Health objectives under the proposed PAHO Plan of Action on Antimicrobial Resistance 2027–2031.

6. **Institutionalize governance, communication and implementation management mechanisms for regional AMR initiatives.** Future regional AMR initiatives should build on the collaboration and partnerships established through the Fleming Fund project while addressing recurring coordination challenges identified during implementation. Particular attention should be given to clarifying roles and responsibilities, strengthening communication flows across levels, and improving visibility of implementation, procurement and decision-making processes for all stakeholders involved.

Introductory note to the Evaluation

1.1 Purpose of the evaluation

The purpose of the end-of-project evaluation is to assess how and to what extent the project strengthened antimicrobial resistance (AMR) surveillance systems and response capacities in the Caribbean, and to identify lessons that can inform future regional and global AMR programming.

1.1.1 Objectives

The evaluation has five specific objectives:

- To assess the **relevance** of the project's design and implementation in relation to country needs, regional priorities, and evolving global AMR agendas;
- To examine the **effectiveness** of project interventions in delivering planned outputs and plausibly contributing to intermediate outcomes;
- To analyze the **efficiency and economy** of delivery arrangements, including regional hubs, partnerships, and pooled approaches;
- To assess **sustainability prospects**, with a focus on institutionalization, financing, human resources, asset management, and regional cooperation mechanisms;
- To derive **lessons learned and good practices** relevant to the Pan American Health Organization (PAHO), the United Kingdom Department of Health and Social Care (DHSC), the Caribbean Public Health Agency (CARPHA), participating countries, and the wider AMR community.

1.1.2 Intended users

The evaluation is intended to support institutional learning within PAHO and to facilitate cross-country exchange among participating Caribbean countries and United Kingdom Overseas Territories. Findings will be shared with national AMR focal points and Ministries of Health, partners (e.g., CARPHA, United Kingdom Health Security Agency (UKHSA)), PAHO technical teams and leadership, and donors and stakeholders engaged in AMR efforts. The evaluation will inform country-level planning and decision-making on sustainability of AMR surveillance capacities, highlight transferable practices, and contribute to regional dialogue on AMR surveillance.

Background Information

2.1 AMR in the Caribbean context

Antimicrobial resistance is a critical and growing public health challenge in the Caribbean. While most countries in the subregion have adopted national action plans on AMR, implementation has been uneven due to structural constraints including limited laboratory diagnostic capacity, fragmented surveillance systems, shortages of specialized human resources, constrained fiscal space, and high dependence on external supply chains for equipment, reagents, and consumables. These challenges are compounded by the realities of small island developing states (SIDS), including limited economies of scale, geographic dispersion, exposure to natural disasters, and vulnerability to external shocks such as pandemics or global market disruptions.

Antimicrobial resistance is also a growing health security concern across the Caribbean, given the high levels of population mobility, tourism, inter-island travel, and cross-border movement of people and goods that characterize the Caribbean. Resistant pathogens can spread rapidly across national boundaries, making surveillance and response a regional public good that depends on cooperation among countries rather than exclusively national efforts. For many Caribbean countries, particularly SIDS, maintaining all specialized AMR surveillance functions independently is neither technically nor financially feasible, reinforcing the importance of subregional laboratory networks, reference functions, and shared technical resources.

Over the last two decades, PAHO's technical cooperation has strengthened AMR surveillance through several initiatives, including expansion of country participation in the Latin American and Caribbean Network for Antimicrobial Resistance Surveillance (ReLAVRA+), support for WHONET implementation, laboratory quality assurance activities, reporting to the Global Antimicrobial Resistance and Use Surveillance System (GLASS) *(1, 2)*, workforce development, and the promotion of a One Health approach to AMR containment. The Executive Committee's approval of the proposed PAHO Plan of Action on Antimicrobial Resistance 2027–2031 *(3)* further reflects the region's commitment to strengthening surveillance, prevention, stewardship, laboratory systems, governance, and multisectoral action against AMR.

2.2 Project overview

The Fleming Fund Caribbean Regional Project was designed to respond to these constraints through a regional, systems-strengthening model, building on PAHO's long-standing technical cooperation in AMR and lessons from earlier initiatives such as the Cooperation Among Countries for Health Development (CCHD) AMR pilot (2019–2021). The project aligned with key global and regional AMR frameworks, including the World Health Organization (WHO) Global action plan on antimicrobial resistance (2015) *(4)*, WHO guidance on laboratory-based AMR surveillance, the Quadripartite One Health Joint Plan of Action (2022–2026) *(5)*, and the objectives and principles of Fleming Fund Phase II.

The project also built on an established subregional AMR platform that PAHO had helped develop through years of technical cooperation with Ministries of Health, national public health laboratories, CARPHA, and regional partners. Rather than creating new surveillance structures, the intervention sought to accelerate and deepen existing efforts by strengthening laboratory diagnostic capacity, expanding participation in regional and global surveillance networks, improving data systems and quality assurance, and enhancing countries' ability to generate and use AMR information. In this regard, the project can be understood as part of a broader continuum of PAHO's technical cooperation in AMR capacity strengthening in the Caribbean, leveraging PAHO's subregional and country-level technical cooperation through Country Cooperation Strategies (CCS) and other existing mechanisms.

The project targeted 10 official development assistance (ODA)-eligible Caribbean Community (CARICOM) Member States: Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, Saint Vincent and the Grenadines, and Suriname[1]. While implementation occurred within national systems, the project explicitly emphasized regional public goods and shared capacities to overcome sustainability and scale limitations.

Implementation was led by PAHO's AMR Special Program in close collaboration with PAHO country and subregional offices, national ministries of health, national reference laboratories, and regional institutions, notably CARPHA. Barbados played a strategic role as a subregional hub for advanced diagnostics and capacity development, particularly for molecular diagnostics and whole-genome sequencing (WGS), while CARPHA supported coordination, laboratory networking, and selected training and quality-assurance functions.

2.3 Project objectives, results framework and intervention logic

The project's overarching objective is to strengthen AMR surveillance and response capacity in participating Caribbean countries through sustainable improvements in laboratory diagnostics, data systems, workforce capacity, quality assurance, governance, and preparedness mechanisms.

The project is structured around the ***Fleming Fund Phase II Results Framework***, which defines a common set of outputs, intermediate outcomes, and a long-term outcome applicable across all Phase II grants (outlined in Table 1 below). Rather than being organized into bespoke project components, project activities and work areas are designed to contribute collectively to the achievement of these result levels.

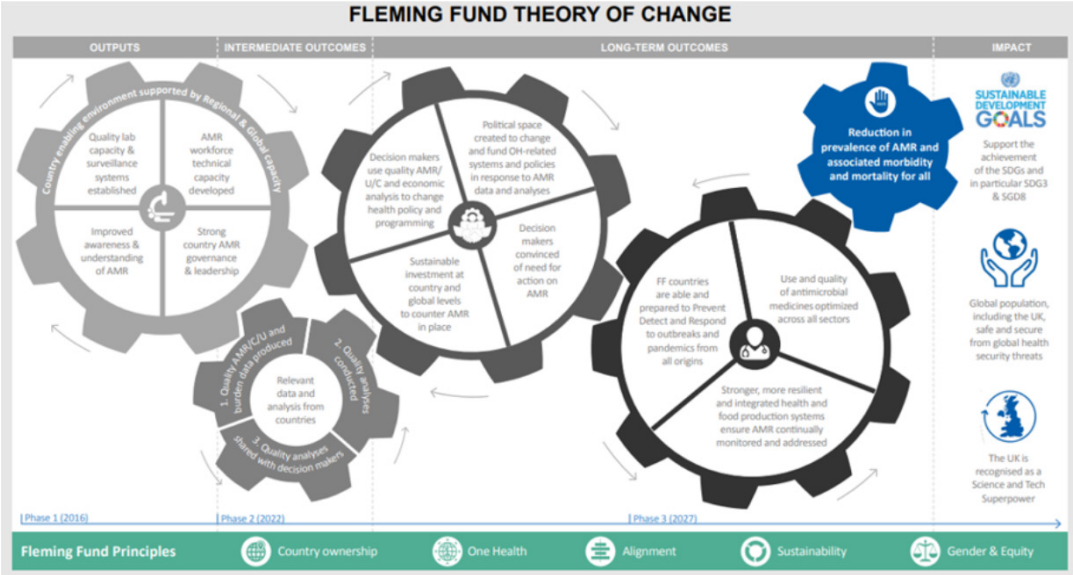
[1] Eligibility reflected Fleming Fund Phase II funding criteria, while country selection also aligned with the project's objective of strengthening AMR surveillance and laboratory capacity among SIDS with similar constraints through a regional approach.

Table 1. Fleming Fund Phase II Results Framework

Outputs	Intermediate outcomes (IO)	Long-term outcome (LTO)
Output 1: Quality laboratory capacity established and maintained	**IO1:** AMR surveillance data are produced	Sustainable national and regional investment in AMR surveillance and response systems, contributing to improved preparedness, prevention, and control of AMR.
Output 2: A competent AMR workforce developed	**IO2:** AMR surveillance data are analyzed and interpreted	
Output 3: Enhanced governance, leadership, and coordination for AMR	**IO3:** AMR surveillance data are shared and used to inform decision-making	

Project interventions, including laboratory assessments, diagnostic capacity strengthening, digitalization, quality assurance, training, governance support, and sustainability planning, are expected to contribute to these results by strengthening the production, quality, flow, and use of AMR data across human health systems. The detailed project results framework, including indicators and results, is presented in Annex 1, and specific information on project implementation status as of the date of the evaluation is presented in Annex 2.

Figure 1. Fleming Fund Phase II: theory of change



Note: AMR/U/C, antimicrobial resistance/use/consumption; FF, The Fleming Fund; OH, One Health; SDG, Sustainable Development Goal; UK, United Kingdom. *Source:* The Fleming Fund. Strengthening AMR surveillance systems in low and middle-income countries: A Change Story (2018–2022). The Fleming Fund; 2026. Available from https://media.tghn.org/medialibrary/2026/07/Strengthening_AMR_surveillance_systems_low_and_middle-income_countries_A_Change_Story.pdf

The project's intervention logic assumes that:

1. Investments in laboratory infrastructure, diagnostics, quality assurance, and workforce development will improve the availability and reliability of AMR data (Outputs; IO1);
2. Strengthened digital systems and analytical capacity will enable timely analysis, interpretation, and reporting of surveillance data (IO2);
3. Improved governance, coordination mechanisms, and stakeholder engagement will support the routine use of AMR data for policy, stewardship, preparedness, and response (IO3);
4. Sustained financing, procurement, and emergency preparedness mechanisms will help institutionalize these gains and support long-term system resilience (LTO).

Given the complex, multi-actor nature of AMR systems, these changes are expected to occur through contribution rather than attribution and to be influenced by contextual and institutional factors beyond the project's direct control.

2.4 Implementation arrangements

A diverse range of stakeholders has been involved in the design, implementation, and oversight of the project during the evaluation period. These stakeholders operate at regional and national levels and play complementary roles in technical delivery, coordination, governance, financing, and sustainability of AMR surveillance and response systems. As such, they hold differing but intersecting interests in the project's performance, results, and future direction.

At the **regional level**, PAHO served as the grant holder and technical lead, providing strategic oversight, normative guidance, and coordination across participating countries. PAHO worked in close partnership with CARPHA, which plays a central role in regional coordination, laboratory networking, and capacity strengthening. Technical partners, including UKHSA, provided specialized expertise in laboratory diagnostics, surveillance methodologies, quality assurance, and workforce development.

At the **national level**, project implementation was anchored within Ministries of Health and national and regional reference laboratories, which were responsible for operational delivery of surveillance activities, data generation and reporting, and the application of AMR evidence for policy, preparedness, and stewardship. PAHO country offices supported national partners by facilitating coordination, providing technical assistance, and ensuring alignment with regional and global AMR frameworks.

DHSC, as the donor, provided financial resources and strategic oversight, with a particular interest in accountability for results under the Fleming Fund Phase II Results Framework and in generating learning to inform future AMR investments.

In addition, the project engaged private sector actors, particularly diagnostic and laboratory technology providers, and **WHO Collaborating Centers**, which contributed specialist expertise to AMR surveillance methodologies and data systems. While these stakeholders were not responsible for project governance or implementation, their technical inputs and interactions with national laboratories are relevant for assessing diagnostic capacity, data quality, sustainability, and alignment with international standards. Their perspectives were therefore included selectively in the evaluation as part of the broader AMR ecosystem.

An overview of the principal stakeholder groups, their roles in the project, and their relevance to the evaluation is provided in Annex 3.

Evaluation and Methodology Tools

3.1 Scope

This end-of-project evaluation adopted a contribution-focused approach, using the project's intervention logic and results framework as the main theory-based reference for analysis, given the project's nature as a regional systems-strengthening intervention, in which changes in AMR surveillance and response systems are influenced by multiple actors, institutional dynamics, national capacities, regional platforms, and contextual factors beyond the project's direct control.

This exercise was guided by the United Nations Evaluation Group (UNEG) and the Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD- DAC) evaluation criteria (outlined below) *(6,7)* adapted to the Fleming Fund Phase II context and the nature of AMR systems strengthening, and used to frame the evaluation questions, organize and analyze the evidence,and guide the synthesis of findings. The methods were also aligned with UNEG norms and standards for evaluation, including independence, impartiality, credibility, utility, transparency, ethics, and use-oriented reporting.

The evaluation covered the full project lifecycle (2024–2026) and assessed performance at regional and country levels, reflecting the project's multi-country design.

3.2 Evaluation criteria and questions

Table 2. Evaluation criteria and key questions

Evaluation criteria	Main evaluation questions
Relevance	To what extent did the project respond to priority AMR surveillance and response needs at national and regional levels? How well was it aligned with the Fleming Fund Phase II Theory of Change and One Health principles?
Effectiveness	To what extent were planned outputs delivered, and how plausibly did they contribute to intermediate and long-term outcomes of the project, including strengthened laboratory capacity, workforce development, governance, and the production and use of AMR data? What intended and unintended results are evident? How effective was regional coordination and South-South collaboration?
Efficiency and economy	How efficiently were financial, human, and technical resources used? How did regional delivery modalities and partnerships influence value for money and timeliness?

Table 2. Evaluation criteria and key questions (continued)

Sustainability	What is the likelihood that capacities, systems, assets, and coordination mechanisms will be sustained beyond the project period? What risks to sustainability remain at national and regional levels?
Learning and utility	What good practices and lessons emerge for regional AMR programming, particularly in SIDS and fragile, capacity-constrained contexts? How has the project contributed to institutional learning and regional knowledge exchange and collaboration? What added value did the regional approach provide compared to purely national interventions?
Cross-cutting issues	One Health collaboration: To what extent did the project strengthen intersectoral collaboration between human, animal, plant, and environmental health sectors?

These questions consolidate and refine the more extensive set of questions included in the terms of reference (ToR) (Annex 4) and guided data collection, analysis, and reporting.

3.3 Methods

The evaluation used a mixed-methods design, combining a desk review of key project-related and strategic documents, analysis of the project results framework and monitoring and evaluation (M&E) evidence, key informant interviews, and direct observation of laboratory facilities, equipment, and operational processes. To collect primary data, semi-structured interview guides were designed for each type of stakeholder, aimed at gathering strategic information on their experience with project implementation and observed results, including the project's relevance to national AMR priorities, coordination between PAHO and partners, generation and use of surveillance data, institutionalization of capacities, sustainability risks and opportunities, lessons learned, and best practices. The specific interview guides are detailed in Annex 5.

The evaluation team conducted key informant interviews with stakeholders both virtually and in person across nine participating countries and at the regional level. Overall, 38 invitations were sent, of which 35 (92%) were successfully completed, covering the entire geographic and stakeholder scope of the evaluation. The distribution of completed interviews is shown in Table 3.

Table 3. Distribution of interviews by stakeholder type

Stakeholder	In-person	Virtual	Total
Donor	-	1	**1**
National counterparts[2]	4	-	**4**
PAHO AMR project team	-	5	**5**
PAHO Country Offices	6	4	**10**
Private sector	-	3	**3**
Public health laboratories/hospitals	6	4	**10**
Regional partners	1	-	**1**
WHO Collaborating Center	-	1	**1**
Total	**17**	**18**	**35**

3.3.1 Analytical framework

The analysis included are view of the project M&E and results framework, together with a systematic assessment of documentary and interview evidence. This process examined intended results, indicators, reported progress, and available evidence across the Phase II results chain, providing the basis for understanding the relationships between project activities, outputs, outcomes, and sustainability objectives. Building on this review, an evaluation matrix was developed to align the evaluation questions with the expected results and available evidence, providing a structured framework for data collection, triangulation, and analysis (Annex 6). Drawing on both documentary sources and key informant interviews, the matrix supported the assessment of evidentiary strength and the identification of areas requiring cautious interpretation.

Evidence was drawn from project planning and implementation documents, monitoring and reporting products, financial and asset management records, risk and sustainability documentation, relevant PAHO and WHO strategic frameworks on AMR, and interview data. Documentary evidence was used not only to validate and contextualize emerging findings from stakeholder interviews, but also to assess implementation performance, efficiency, economy, operational feasibility, risk management, and sustainability considerations. Together, these sources provided the basis for a coherent and evidence-based assessment of project achievements, contributions,and sustainability prospects. The detailed list of documents consulted and used for the evaluation analyses is presented in Annex 7.

[2] National counterparts mapped and included in the interviews and country visits were ministries of health, other national government delegates, and One Health coordinators.

The theory of change (ToC) further guided the analysis by clarifying the pathways through which project interventions were expected to contribute to strengthened AMR surveillance systems and broader system-level capacities, supporting the examination of how investments and activities were expected to translate into improvements in data production, evidence use, governance, and the sustainability of results overtime.

To organize the analysis, evidence was examined through five analytical components (Table 4), which served as complementary evaluative lenses across the project's diverse areas of intervention. These components helped structure findings, facilitate cross-cutting analysis, and assess the project's contribution to the Fleming Fund results framework.

Table 4. Summary of project intervention areas and intended results mapped against analytical components

Analytical component (evaluation lens)	Primary project work areas covered (intervention focus)	Intended contribution to Fleming Fund results framework
1. Laboratory diagnostic and surveillance capacity	Laboratory assessments; phenotypic, molecular, and whole-genome sequencing capacity; reference laboratory functions	Output 1: Quality laboratory capacity; IO1: AMR data produced
2. Digital AMR data systems and data flows	Laboratory information management system (LIMS) implementation; WHONET use; PAHO AMR platform integration; reporting mechanisms	IO1–IO3: Data produced, analyzed, shared, and used
3. Quality assurance and workforce capacity	External quality assurance; internal quality control; regional, national, and virtual training and mentoring	Output 1: Data quality assured; Output 2: Competent workforce developed
4. Governance, coordination, and data use for action	AMR coordination mechanisms; surveillance governance; reporting and feedback loops; stewardship and policy engagement	Output 3: Governance and leadership; IO3: Data used for decision-making
5. Sustainability and preparedness	Emergency response readiness; procurement and asset management; financing and transition planning	Long-Term Outcome: Sustainable AMR surveillance and response systems

3.3.2 Evidence coding, synthesis, and triangulation

After completing the evaluation matrix, the interview data were analyzed qualitatively. Evidence was coded according to the evaluation criteria, analytical components, stakeholder groups, country or regional level, type of finding, contribution pattern, strength of evidence, and corresponding Fleming Fund result level.

Qualitative coding, synthesis, and triangulation were supported by Copilot (an artificial intelligence (AI)-based tool available through PAHO's corporate Microsoft 365 environment). Interview and documentary data were organized into analytical matrices to identify emerging themes, contribution patterns, and evidence gaps, generating preliminary findings by evaluation criteria. These findings were subsequently synthesized and triangulated against the project results framework and other documentary sources. AI-supported outputs were used solely to facilitate the analytical process and were systematically reviewed by the evaluation team for further interpretation, validation, and final formulation of findings.

The resulting triangulation matrix served as an internal analytical tool to support the development of findings, conclusions, and recommendations. The analysis assessed the plausibility of the project's contribution by examining the extent to which multiple sources converged around the same results pathway, the nature of the contribution, and the influence of external factors on the observed changes.

3.3.3 Ethical considerations

The evaluation was conducted in accordance with ethical evaluation principles, including voluntary participation, informed consent, confidentiality, protection of participants' anonymity, and responsible handling of information. The methodology did not involve service users, clinical interventions, or identifiable personal or patient-level data; therefore, consultation with the PAHO Ethics Review Committee was not requested. Explicit informed consent was obtained from participants to record interview sessions for note-taking and subsequent analysis. All data collected and analyzed were safeguarded throughout the process, and findings are reported in aggregate or synthesized form, without attribution to individual interviewees.

The evaluation was managed by PAHO's evaluation team within the Planning, Budget and Evaluation Department, and was functionally independent from the project's design and implementation functions. The evaluation team retained responsibility for methodological choices, analysis, interpretation, findings, conclusions, and recommendations, consistent with UNEG principles regarding independence, impartiality, credibility, and ethical conduct.

AI-supported work was carried out in PAHO's corporate Microsoft 365 environment to support evidence organization, qualitative coding, cross-source comparisons, and the preparation of analytical matrices, while ensuring that

evaluation information remained safe within PAHO's corporate digital environment. All outputs were reviewed and validated by the evaluation team, which synthesized and interpreted the available evidence to formulate the final findings, conclusions, and recommendations.

3.3.4 Limitations

Several limitations should be considered when interpreting the evaluation findings. Mitigation measures were incorporated into the analysis to strengthen its robustness and credibility:

Availability and consistency of evidence

The availability, depth, and consistency of evidence varied across countries, stakeholder groups, and thematic areas. Evidence was generally stronger for laboratory capacity strengthening, workforce development, quality assurance, procurement and logistics, regional coordination, and sustainability planning, while it was more limited for the systematic use of AMR data in decision-making, operationalization of the One Health approach, and value-for-money assessment. These limitations were addressed through triangulation of documentary and interview evidence, a contribution-focused analytical approach, and transparent reporting of evidence gaps and uncertainties.

Timing of implementation and observation of results

Although the project was initially expected to continue through March 2027, the reduction in funding through March 2026, followed by a no-cost extension until June 2026, compressed the implementation timeline. As a result, several investments, including laboratory equipment, technical support, and data-related capacities, had been completed only shortly before the evaluation or were still being consolidated in some settings. Given the limited time for longer-term outcomes and sustainability effects to fully materialize, the analysis focused on early outcome signals and the plausibility of future contributions based on the evidence available at the time of the evaluation.

Context-specific implementation constraints

Implementation conditions differed across countries, reflecting variations in laboratory infrastructure, staffing, procurement capacity, health information systems, logistics, geography, language, and institutional arrangements. Security and access constraints in Haiti particularly limited implementation and the observation of results, while other countries experienced challenges such as weather-related disruptions, customs delays, and varying site readiness. Findings were therefore interpreted within their respective country contexts rather than assuming uniform implementation conditions.

Contribution versus attribution

Given the complexity of AMR systems strengthening and the multi-actor nature of the intervention, the evaluation adopted a contribution-focused approach. Findings therefore reflect plausible project contributions rather than attributing observed changes exclusively to the project. Systematic triangulation, the ToC, alignment with the results framework, and consistency checks across multiple sources strengthened the credibility of the analysis.

Limitations in assessing value-for-money

This exercise identified evidence of operational and health-related benefits relative to the costs incurred, specifically laboratory automation, faster organism identification, reduced manual workload, and more efficient use of staff time. However, the available evidence did not include formal health economics analyses. As a result, findings related to efficiency and economy are presented in terms of operational improvements, implementation efficiency, key cost drivers, and total cost of ownership rather than a quantified value-for-money assessment.

Use of AI-supported analytical tools

Qualitative coding, synthesis, and triangulation were supported by AI-enabled tools in PAHO's corporate Microsoft 365 Copilot environment. Potential risks of unsupported inferences or coding inconsistencies were mitigated through pilot testing, iterative refinement of analytical procedures, and systematic record-by-record verification of all AI-assisted outputs against the original evidence. The evaluation team was responsible for the final analytical judgments, formulation of findings, interpretation of evidence, and conclusions.

Key Findings

4.1 Relevance

R1. The project was highly relevant to Caribbean AMR needs in participating countries.

The evaluation found that the project responded directly to priority constraints affecting AMR surveillance and response across participating Caribbean countries. Triangulated evidence shows that countries faced uneven microbiology and diagnostic capacity, gaps in antimicrobial susceptibility testing, limited quality assurance systems, short ages of trained personnel, fragmented data systems, and recurrent challenges in accessing reagents, consumables and supplies. These issues were consistently identified as practical barriers to strengthening laboratory-based AMR surveillance and improving there liability and usefulness of AMR data.

The project was therefore relevant because it targeted the operational conditions required to translate AMR commitments and national action plans into functional laboratory and surveillance capacity.

R2. The project was strongly aligned with national, regional and global AMR priorities.

The project was well aligned with national AMR action plans, PAHO and WHO strategic frameworks, CARICOM priorities, and the objectives of the Phase II Results Framework. Its activities supported regional priorities related to surveillance, workforce development, laboratory strengthening, digital transformation, access to quality health technologies, and AMR containment. This alignment helped ensure that project investments reinforced on going national and regional efforts rather than creating parallel systems or stand-alone interventions. The project's observed areas of contribution, including diagnostic capacity, training, quality systems, data platforms, regional surveillance mechanisms, and sustainability planning, fit with in this broader strategic agenda and positioned the project as part of an ongoing agenda to strengthen AMR and health systems, rather than as a standalone intervention.

R3. The regional approach added value by creating shared technical assets and cooperation mechanisms.

The evidence shows that the project helped translate shared Caribbean AMR challenges into regional public health goods, including shared training, reference functions, peer learning, technical standards, PAHO-CARPHA coordination, supplier engagement, and access to specialized expertise. This regional design was particularly relevant for SIDS and capacity-constrained settings, where individual countries may not be able to sustain the full set of specialized AMR functions independently.

The value of the regional approach was not limited to economies of scale. It created a platform for technical exchange, access to specialized expertise, and regional coordination. However, the same evidence also shows that the regional model came with higher coordination demands, including the need to align

multiple institutions, countries, suppliers, offices, communication channels, and operational timelines.

R4. Relevance and uptake varied by country readiness and baseline capacity.

The project was relevant across participating countries, but the adequacy and uptake of support depended strongly on baseline capacity, local readiness, infrastructure, staffing, geography, language, data systems, and procurement conditions. The same regional package, therefore, functioned differently across the portfolio. In some contexts, it consolidated or upgraded existing equipment and capabilities; in others, it provided foundational support to systems that were still building core laboratory networks, sample transport arrangements, or data workflows.

Box 1. Differences in country readiness and implementation conditions

Country examples illustrate this variation: In **Belize**, project support helped re-establish regional diagnostic capacity following increased centralization of services during the coronavirus disease (COVID-19) pandemic and extend diagnostic AMR services beyond the central laboratory. In **Barbados**, the Best-dos Santos Public Health Laboratory already had a comparatively stronger baseline platform to absorb specialized investments and operate as a regional resource for diagnostics, training and technical support. In **Guyana**, the project operated in a context where laboratory networks, sample transport and infrastructure were still being built, meaning that investments played a foundational role in establishing AMR testing capacity. In **Saint Vincent and the Grenadines**, stakeholders highlighted that the country had limited or no prior capacity to undertake routine AMR diagnostic testing, making project investments an important first step toward establishing local AMR diagnostic capacity. In **Haiti**, security and access constraints limited implementation and observable results. And in **Jamaica**, communication, logistics and external shocks affected delivery pathways, including hurricane-related disruptions that affected implementation timelines and operational continuity. These examples explain why relevance was high across the region while the maturity of results varied by country and facility.

R5. Important enabling conditions remained partially addressed despite strong relevance.

Although the project addressed priority AMR needs, several enabling conditions remained only partially addressed. The most common gaps relate to: (i) laboratory information management and data systems, including LIMS implementation, interoperability, structured AMR reporting, routine analysis, and data use for

decision-making; (ii) workforce and institutional capacity, including continuous education and technical support, and (iii) sustainability and operational systems, including forecasting, procurement planning, communication channels, and long-term financing for recurrent costs. These gaps are central because they determine whether laboratory strengthening can be converted into sustained AMR surveillance and routine use of evidence.

Both interview and documentary review indicate that continued attention is needed to strengthen reporting protocols, links between laboratories and surveillance actors, data use for decision- making, recurrent training and technical support, forecasting of reagents and consumables, and financing arrangements needed to sustain project-supported capacities.

4.2 Effectiveness

E1. The project made its clearest contribution to laboratory diagnostic and quality assurance capacity.

Across the evidence base, investments in automated blood culture systems, microbial identification and antimicrobial susceptibility testing technologies, reagents and consumables, quality assurance/quality control (QA/QC) support, standard operating procedures (SOPs), workflow optimization, site preparation, and technical assistance contributed to faster organism identification, improved blood culture processing, reduced manual workload, shorter turnaround times, greater confidence in laboratory results, and expanded testing capacity. In several countries, stakeholders described these changes as among the most visible and immediate benefits of the project.

This finding is supported by strong convergence across laboratories, PAHO teams, suppliers, asset documentation, M&E evidence, and project reporting. However, the nature and scale of change varied according to baseline capacity and readiness. In some laboratories, the project introduced entirely new or substantially upgraded diagnostic capabilities; in others, it automated, modernized or strengthened existing functions.

E2. The project built operational workforce capacity through training, mentoring, and applied technical support.

The project strengthened workforce capacity and technical confidence through regional workshops, hands-on application support, on-site and virtual training, mentoring, troubleshooting, supplier-led technical assistance, and peer learning. Evidence documents training in phenotypic and genotypic methods, equipment operation, workflow adaptation, QA-related practices, and the practical use of new diagnostic platforms. These activities helped personnel use new technologies more effectively and adapt laboratory workflows to generate more reliable AMR-related results.

Importantly, workforce strengthening extended beyond formal training events. Practical support, troubleshooting, and peer learning helped laboratories move

from receiving equipment to using it effectively in routine operations. Sustaining these gains will require continued investment in refresher training, mentorship, structured communities of practice, and measures to reduce the effects of staff turnover and reassignment.

E3. The project strengthened AMR data production and created early data-to-action pathways, though these remain uneven.

The project contributed to the conditions for AMR surveillance data production by strengthening diagnostic tools, antimicrobial susceptibility testing (AST) workflows, microbiology processes, and data availability. Progress was stronger in data generation than in the subsequent steps of routine analysis, structured reporting, interoperability, and use for decision-making. The project therefore helped build the technical foundation required for AMR surveillance, although this pathway has not matured consistently across countries and facilities.

Evidence shows growing use of WHONET, supplier software, national systems, Excel-based workarounds, and platform integration efforts. However, persistent gaps remain in LIMS implementation, interoperability, dashboards, structured reporting, and regional data integration. Examples of data use were identified, including clinical reporting, infection prevention and control (IPC) follow-up, multidrug-resistant organism (MDRO) alerts, and stewardship discussions, but these practices remain uneven and are not yet systematically institutionalized.

E4. The project strengthened governance and coordination for regional AMR implementation.

The project strengthened the governance and coordination conditions needed for effective regional AMR implementation by bringing together PAHO, CARPHA, ministries of health, laboratories, suppliers, and other technical partners around a shared surveillance agenda. Evidence shows that coordination matured over time and helped resolve practical implementation needs including training, installation, troubleshooting, supplier inputs and follow-up. It also helped connect country-level activities with the broader regional AMR surveillance agenda, including CARPHA's role in the regional architecture.

At the same time, coordination was less effective where roles, responsibilities, communication channels, sequencing, data-sharing arrangements, or timelines were unclear. Although these issues did not undermine overall implementation, they contributed to delays, information gaps, and operational inefficiencies in some settings.

E5. Adaptive implementation helped respond to contextual and operational constraints.

Project implementation required continuous adaptation to the operational realities of a multi- country Caribbean intervention. The evidence shows that PAHO, laboratories, suppliers and technical partners adjusted delivery modalities, timelines, coordination arrangements and technical support practices in response to

country-specific conditions, including procurement processes, customs clearance, site readiness, infrastructure requirements, language considerations, staff availability and logistical constraints. These adaptations helped the project remain operational across diverse country settings and contributed to the delivery of key outputs despite a complex implementation environment.

Adaptive implementation was particularly important because countries entered the project with different levels of readiness. Laboratories with stronger baseline infrastructure, staffing and prior experience with automated technologies were generally able to absorb project-supported investments more rapidly; while others required additional preparation, troubleshooting, sequencing and follow-up due to developing laboratory networks, data systems or infrastructure.

Adaptive management became particularly important given the compressed implementation period following the revision of project timelines. While these adaptations helped sustain progress, they could not fully offset constraints associated with procurement delays, infrastructure gaps, staffing limitations, security restrictions, and uneven data-system maturity.

4.3 Efficiency and economy

EC1. The regional model enabled shared efficiencies and expanded technical reach across Caribbean countries.

The regional model shared expertise, regional training, partner collaboration, reference functions, and joint problem-solving across countries. This approach was particularly appropriate in the Caribbean context, where many countries face similar AMR surveillance challenges but lack the scale, specialized workforce, fiscal space or infrastructure required to sustain advanced AMR diagnostic and surveillance functions independently.

The regional approach also created favorable conditions for acquiring and deploying laboratory technologies. Stakeholders highlighted negotiated supplier agreements that included competitive pricing, installation, training, technical support, inputs, and extended warranties, beyond what is traditionally offered. These bundled arrangements strengthened the value of investments, particularly for smaller countries and laboratories that would have limited bargaining power on their own.

These efficiencies depended on strong coordination among regional and country actors, laboratories, and suppliers to align procurement, installation, training, and technical support, to ensure that project investments are translated into operational capacity in a timely manner.

EC2. Procurement, customs, logistics and site readiness shaped timeliness and efficiency.

Procurement, customs clearance, last-mile delivery, cold chain, supplier coordination, documentation, and site readiness were major determinants of implementation efficiency. These factors were especially relevant in SIDS and geographically dispersed settings, where shipping routes, clearance processes, local regulations,

supplier arrangements, and laboratory adaptations directly affected whether equipment and supplies could become operational on time. The evidence shows that implementation efficiency depended not only on centrally made procurement decisions but also on the ability to manage country-specific operational requirements and local readiness conditions.

Several practical issues that affected timeliness were identified, including delayed equipment release; rework due to incomplete readiness or logistical barriers; voltage or installation requirements; unclear handover arrangements with national providers; and the need to verify benches, air conditioning, electricity, and other pre-installation conditions before equipment could be installed or used. In several cases, these were not minor administrative details; they shaped the pace at which project-supported assets could be translated into functional laboratory capacity.

EC3. Technology improvement, automation, and local capacity strengthening generated operational efficiency gains.

Automation and advanced diagnostics generated clear operational efficiency gains, including faster organism identification, reduced manual workload, greater workflow reliability and more efficient use of staff time (fewer repetitive steps and lower manipulation time). These improvements have important clinical and public health implications because they can support earlier clinical action, more responsive IPC follow-up, antimicrobial stewardship discussions, and stronger surveillance systems.

The evaluation found strong evidence of operational value associated with these investments. In several settings, technologies introduced or strengthened through the project helped laboratories move away from more time-consuming manual procedures and improved the speed and reliability of diagnostic workflows. These gains are relevant not only for laboratory efficiency but also for the broader AMR response, since timely and reliable laboratory results are a precondition for better clinical management, detection of resistant organisms, IPC measures, and data-informed decision-making.

However, the evaluation could not make a quantified value-for-money judgment because no formal cost-benefit, cost-effectiveness or economic analysis was available. The evidence supports conclusions regarding operational benefits and efficiency gains but not quantified economic return. Long-term efficiency will also depend on recurrent costs associated with consumables, maintenance, technical support, and other total cost-of-ownership considerations.

4.4 Sustainability

S1. Project-supported assets, capacities, and partnerships provide a strong foundation for sustaining gains in AMR surveillance.

The evaluation finds that sustainability prospects are positive but conditional. The project left tangible assets, strengthened laboratory workflows, trained personnel, service arrangements, regional partnerships, and improved diagnostic

and surveillance capacities that provide a meaningful foundation for sustained AMR surveillance.

At the same time, sustainability depends on factors that extend beyond project implementation. Evidence from interviews, site visits and project documentation highlights the importance of domestic financing, recurrent procurement of reagents and consumables, maintenance arrangements, workforce retention, institutional ownership and integration into national planning and budgeting processes. Sustainability prospects appear strongest where project-supported capacities are already linked to established operational systems and regional support mechanisms. Where financing pathways, staffing arrangements, or recurrent inputs remain uncertain, continuity is likely to be more fragile.

S2. Reliable supply chains, recurrent inputs, and maintenance arrangements are essential to preserve laboratory gains.

Across the evidence, stakeholders and project documents consistently identified reagents, consumables, panels, QC materials, service contracts, maintenance, engineers, spare parts and supply chains as critical conditions for keeping diagnostic equipment and laboratory workflows operational. These issues were not presented as peripheral logistical concerns, but as practical determinants of whether strengthened laboratory capacity can continue to function after project closure.

The project reduced short-term operational risk by providing equipment, initial supplies, technical support and service arrangements that enabled laboratories to begin or continue using new technologies. This support was particularly important because many of the diagnostic platforms introduced or strengthened through the project require a regular flow of consumables, quality materials, and technical service to remain functional. Evidence from laboratories, suppliers, and project records indicates that where these inputs were available, they supported the continued use of equipment and helped laboratories translate installed assets into routine diagnostic capacity and surveillance outputs.

However, continuity remains vulnerable where recurrent procurement, forecasting, financing, or maintenance arrangements are not yet clearly established. Several stakeholders expressed concerns about how reagents and consumables will be financed once project-supported supplies are exhausted, whether maintenance and servicing can be sustained, and the ability of national procurement systems to reliably access specialized inputs. In the Eastern Caribbean in particular, stakeholders highlighted the need to align future sustainability approaches with existing procurement arrangements and pooled purchasing mechanisms already used by some countries such as the Organisation of Eastern Caribbean States (OECS) Pooled Procurement Service (PPS), in order to avoid duplication and facilitate long-term access to laboratory inputs.

The evidence also distinguishes between supplier capacity to provide products or services and the ability of countries to finance, procure, receive and

manage those inputs consistently. This makes recurrent supply and maintenance one of the most concrete operational risks to sustaining the laboratory gains supported by the project.

S3. Workforce capacity, institutional ownership, and national integration are central to sustaining project gains.

The training and technical assistance strengthened local capacities, particularly in the use of new technologies, diagnostic workflows, interpretation of results, and quality-related practices. However, it also shows that these gains are more likely to endure where trained staff remain in place, laboratory leadership is engaged, and project-supported functions are connected to routine institutional responsibilities rather than treated as temporary project activities.

The evaluation also found that small teams, turnover, reassignment, and uneven access to training may limit the diffusion of skills beyond a relatively small number of individuals in central institutions. Sustaining workforce gains will therefore require ongoing knowledge transfer, continued professional development and institutional mechanisms that help preserve capacity across the laboratory networks, despite staff changes overtime.

Box 2. Varying sustainability conditions across countries

Country evidence illustrates different levels of institutional readiness and ownership. For example, the Best-dos Santos Laboratory in **Barbados** had a stronger pre-existing platform and regional role, which helped position project-supported capacities within a broader reference and training function. In **Trinidad and Tobago**, evidence pointed to comparatively stronger sustainability conditions, including its role in regional training and reference laboratory data work. In **Guyana**, the project aligned with national AMR planning and was supported by motivated stakeholders, but implementation also took place in a context where laboratory networks, sample transport arrangements and data systems were still being developed. In **Belize**, evidence shows progress in restarting decentralized diagnostic capacity and underscores the importance of strengthening communication and coordination across the laboratory network. These examples indicate that ownership and integration were not uniform across settings, but were shaped by the maturity of national systems, laboratory leadership, workforce continuity and the degree to which AMR functions were connected to routine structures.

S4. Regional AMR reference laboratories are becoming a strategic platform for specialized surveillance capacity in the Caribbean.

The evaluation identifies regional reference laboratory functions as one of the project's most promising sustainability assets. Through institutions such as the

Best-dos Santos Public Health Laboratory, the reference laboratories in Jamaica and Trinidad and Tobago, and the broader PAHO- CARPHA collaboration, the project increased the visibility and operational relevance of regional mechanisms that can support specialized diagnostics, technical assistance, training and surveillance functions across the Caribbean.

These functions are particularly valuable in a region where many countries cannot sustainably maintain all advanced AMR capacities independently. Together, regional networks can help distribute expertise and specialized services across multiple countries. While the long-term financing, governance arrangements, utilization levels, sample referral pathways, and data-sharing protocols required to sustain the network are still evolving, the evidence suggests that the regional reference laboratory network is an important regional public good and a valuable platform for sustaining and further strengthening AMR surveillance capacity in the Caribbean.

4.5 Enablers and bottlenecks

Enabler 1. The integrated technical package was a key enabler of results.

The evaluation found that one of the most important enablers of project results was the combination of equipment, reagents and consumables, installation support, QA/QC, SOPs, site preparation, hands-on training, troubleshooting, and follow-up technical assistance. Results were strongest when these elements functioned as an integrated package rather than as separate inputs. This was particularly important because strengthening AMR diagnostic capacity required not only new technologies, but also the skills, workflows, supplies, quality systems, and technical support needed to use them effectively in routine practice.

Country evidence illustrates how this integrated package operated differently depending on local conditions. In Belize, equipment and supplies supported faster organism identification and contributed to the reactivation of decentralized diagnostic services. In Barbados, Best-dos Santos Laboratory had a stronger baseline platform and was able to use project-supported investments to reinforce its regional training and reference functions. In Guyana, the evidence points to the importance of combining technology with foundational support in a context where laboratory networks and sample transport arrangements were still developing. Across countries, the package was most effective where infrastructure, staff capacity, supplies and technical support moved together.

Enabler 2. Strategic partnerships expanded the project's technical reach and strengthened regional implementation capacity.

Collaboration among PAHO Headquarters and Country Offices, ministries of health, laboratories, suppliers, the donor, CARPHA and other technical partners helped expand the project's technical reach across diverse country settings. These partnerships facilitated access to specialized expertise, supported

procurement and installation processes, enabled technical training and troubleshooting, and linked country-level activities with the broader regional AMR agenda.

The evidence suggests that partners contributed complementary roles that strengthened implementation. PAHO's regional and country-level presence helped coordinate with national counterparts and laboratories; technical partners and suppliers supported installation, training and problem-solving; CARPHA helped link activities to the regional AMR surveillance architecture; and Country Offices played an important role in adapting implementation to national contexts. Together, these partnerships allowed the project to operate as a regional systems-strengthening intervention rather than as a set of isolated country activities.

Stakeholders also highlighted the value of regional learning, technical exchange, and joint problem- solving, while noting that even greater benefits could be achieved through clearer role definition and communication arrangements.

Enabler 3. Strong local readiness and ownership helped translate project inputs into operational AMR capacity.

The evidence indicates that laboratories with stronger baseline microbiology capacity, stable staffing, adequate infrastructure and leadership engagement were generally better positioned to absorb project-supported equipment, training and technical assistance. In these settings, investments were more rapidly translated into operational laboratory capacity and routine practice.

Conversely, where laboratory networks, infrastructure, staffing arrangements or support systems were still developing, implementation required additional preparation, troubleshooting, and follow- up. While readiness and ownership did not guarantee results, they significantly influenced the pace at which project-supported capacities became operational.

Bottleneck 1. Operational bottlenecks and external threats limited timeliness and predictability.

Procurement processes, logistics, customs clearance, site readiness and cold chain requirements, documentation, security constraints, climate shocks, and other contextual disruptions were among the main factors affecting implementation timeliness. In the Caribbean context, these were not peripheral administrative issues, but important determinants of whether equipment, supplies, training and technical support could become operational within the project timeframe.

These bottlenecks manifested differently across settings. In Haiti, security and access constraints materially limited implementation and reduced the range of observable results, while in Jamaica, hurricane-related disruptions affected implementation timelines. Other countries experienced varying combinations of procurement delays, infrastructure readiness issues, coordination challenges, or documentation requirements that affected the speed of deployment and operationalization. While these bottlenecks were often country-specific, they reflect broader regional implementation challenges.

PAHO and its partners mitigated many of these constraints through flexibility, supplier coordination, country office support, ongoing troubleshooting, and direct communication with laboratories. However, mitigation could not fully eliminate the effects of delays and contextual shocks. In some cases, bottlenecks compressed the time available for installation, training, operational use, and observation of results. This explains why some outcomes, particularly those related to routine data analysis, institutionalized data use and sustainability, were still emerging at the time of the evaluation.

Bottleneck 2. Incomplete data systems and uncertain recurrent financing were the two main bottlenecks in the transition from outputs to sustained outcomes.

The evaluation identified incomplete data systems and uncertain recurrent financing as the two main constraints affecting the transition from project-supported outputs to sustained outcomes. Stronger laboratory capacity can produce more reliable data, but those data will not routinely inform decisions unless systems for analysis, reporting, interoperability and feedback are functional. Similarly, installed equipment and trained staff can only sustain diagnostic services when recurrent supplies, maintenance, and financing are secured.

The evidence demonstrates that weak interoperability, manual data flows, LIMS gaps, limited dashboards, and fragmented reporting arrangements constrained the pathway from laboratory data generation to routine AMR analysis and use. These constraints affected not only technical reporting, but also the ability of AMR data to inform IPC, antimicrobial stewardship, committees, budgeting, or policy decisions. At the same time, limited financing for reagents, consumables, maintenance and service arrangements constrained the pathway from installed capacity to sustained service delivery.

4.6 Cross-cutting findings

X1. The project expanded the geographic reach of AMR diagnostic capacity and strengthened the potential for equitable access to epidemiological surveillance.

The project contributed to expanding or reactivating access to AMR diagnostic capacity beyond central laboratories in some settings, including regional hospitals and decentralized sites, where faster, more geographically distributed diagnostics can bring results closer to people seeking care, reduce exclusive dependence on central laboratories, and improve the representativeness of AMR surveillance. Belize provides one of the clearest examples where project support helped restart decentralized bacteriology services toward regional hospitals following COVID-19-related centralization. In this case, expanded diagnostic capacity was not only a laboratory output but also a contribution to more distributed access to AMR testing capacity.

However, access gains remained uneven where local systems were still developing the conditions needed to operationalize decentralized or regional diagnostic

capacity. In Guyana, for example, evidence indicates that laboratory networks, sample transport arrangements and infrastructure were still being strengthened, which affected the pace at which expanded capacity could translate into consistent access beyond central or reference-level services. In Haiti, security and access constraints limited the scope of implementation, and therefore the extent to which project- supported diagnostic capacity could be fully deployed or observed. These examples show that access was shaped not only by whether equipment or training was provided, but also by whether sites had the operational conditions to use those inputs consistently.

More broadly, the project created opportunities for smaller countries and peripheral laboratories by improving access to technologies, training, peer support, and regional reference functions that would be difficult to sustain independently. However, access remained differentiated because countries and facilities varied in infrastructure, staffing, supply chains, readiness, sample referral systems, communication arrangements, and continuity of services.

X2. Strengthened human health laboratory capacity positioned countries to further develop AMR surveillance with a One Health approach.

The project was strategically aligned with One Health principles, consistent with AMR's multisectoral nature, and with regional and global AMR frameworks that emphasize collaboration across the human, animal, food, agriculture, and environmental sectors. Evidence shows alignment with One Health through AMR governance structures, national committee arrangements, and selected training activities that included participation beyond human health, such as agriculture actors in regional training spaces. This indicates that One Health was present in the project's strategic framing and at selected implementation moments, helping strengthen awareness of the importance of multisectoral collaboration in addressing AMR.

Nevertheless, the project evidence is much stronger for human health laboratory capacity, diagnostics and data systems than for sustained operational integration across sectors. Most of the concrete achievements documented by the review relate to human health laboratories, equipment, AST workflows, QA/QC, training, AMR data generation, and laboratory information systems. Evidence of routine data flows, joint surveillance practices, shared analysis, or regular decision-making across human, animal, food, agriculture and environmental health sectors is more limited.

X3. The project generated or strengthened regional public goods with cross-cutting value for equity, sustainability, and resilience.

The project strengthened several regional public goods that benefit multiple countries, including regional training, reference laboratory functions, peer support mechanisms, common technical approaches, PAHO-CARPHA coordination channels, AMR surveillance capacities, and informal community-of-practice dynamics generated through regional exchanges, WhatsApp groups, troubleshooting networks, and country-to-country technical support. These regional public

goods are relevant to equity, sustainability, technical effectiveness, regional resilience, and the efficient use of specialized expertise.

These regional capacities have potential long-term benefits for equity, sustainability, resilience, and technical cooperation. However, their continued value will depend on sustained coordination, governance arrangements, financing mechanisms, and demand for services beyond the project period.

4.7 Unexpected intervention results

U1. The project strengthened interagency collaboration and created a stronger platform for regional AMR initiatives.

The project generated an important institutional result by deepening collaboration among PAHO, CARPHA, and technical partners. Through implementation, these actors strengthened working relationships, developed greater operational familiarity, and created a more practical platform for regional AMR and laboratory cooperation. This collaboration became increasingly important as the project advanced, helping to connect technical expertise, country-level implementation needs, regional coordination functions and partner support around a shared AMR surveillance agenda.

This platform may prove to be one of the project's most valuable long-term legacies, although its future effectiveness will depend on maintaining clear roles, communication channels, and coordination mechanisms. These areas point to the institutional conditions needed to consolidate and make better use of this strengthened platform in future regional AMR initiatives.

U2. Regional reference and peer-support functions became more visible and actionable.

The project increased the visibility and practical use of regional reference laboratory functions and peer-support mechanisms. This went beyond equipment delivery by strengthening recognition of a regional AMR laboratory network and creating additional channels for technical exchange. Institutions such as the Bestdos Santos Public Health Laboratory, Jamaica's national reference laboratory, and regional technical partners played increasingly active roles in training, troubleshooting, technical exchange and specialized support.

As a result, regional laboratory cooperation became more operational and tangible for participating countries, extending beyond high-level coordination into practical training, technical exchange, reference functions, and data-related support.

U3. The project strengthened PAHO's technical legitimacy and convening role in the Caribbean AMR space.

The project facilitated access to expertise, coordinated among multiple actors, supported Country Offices, linked laboratories to regional mechanisms, and con-

nected project results to broader strategic agendas. The evidence indicates that PAHO's added value was not limited to convening stakeholders; it also rested on the quality, availability and practical orientation of the technical support provided to countries and laboratories. This included guidance, troubleshooting, follow-up, facilitation of expertise, and support to translate project investments into usable laboratory and surveillance capacities.

Beyond project delivery, the project reinforced PAHO's role in supporting complex regional implementation, particularly where technical cooperation required coordination across levels of the Organization, country offices, laboratories, suppliers, CARPHA and other partners. It also reinforced PAHO's comparative advantage in connecting project-level investments with regional public health priorities and country cooperation strategies.

Overall Assessment

5.1 What changed?

The project's most significant contribution was translating longstanding AMR commitments into a more operational reality with increased functional laboratory and surveillance capacity. Across participating countries, stakeholders consistently described a transition from fragmented or uneven capacity toward stronger laboratory systems, improved diagnostic capabilities, expanded technical expertise, and increased regional cooperation around AMR surveillance.

AMR surveillance gained greater visibility and operational traction

While AMR was recognized as an important public health priority across the Caribbean, many countries faced constraints in translating policy commitments into operational surveillance capacity. The project's contribution was less about promoting AMR surveillance and more about investments in diagnostics, workforce development, data management, quality assurance, and governance to help strengthen the capacities needed to operationalize surveillance. In several countries, project activities also strengthened links between AMR surveillance, national action plans, One Health structures, and broader public health priorities.

The regional laboratory landscape was transformed

The most visible changes occurred in diagnostic capacity. Across participating countries, laboratories gained access to technologies that were previously unavailable or limited, including automated microbial identification and susceptibility testing systems, matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) platforms, blood culture systems, molecular diagnostics, and supporting QA mechanisms. These investments strengthened AMR data production and modernized microbiology services across the region.

Importantly, these gains were not confined to national reference laboratories. Evidence from Belize, Guyana and Jamaica points to a gradual expansion of diagnostic capacity beyond central laboratories, creating opportunities to bring AMR microbiology services closer to clinicians and populations. While progress remains uneven, the project contributed to a broader movement toward more geographically distributed diagnostic capacity.

Institutionalization remains at different stages of maturity

Countries entered the project from very different baselines, and their progress toward institutionalization reflects those differences. In some settings, project-supported functions have become increasingly integrated into routine laboratory operations and national AMR structures. In others, key elements remain highly dependent on project-supported inputs, technical assistance, or individual champions. Evidence suggests that ownership and integration are progressing, but they are not yet uniformly established across countries and institutions.

The population is already benefiting from faster diagnostics

Although AMR surveillance is often discussed in terms of systems and data, some of the most immediate benefits were reported at the clinical level. Stakeholders repeatedly highlighted faster organism identification, faster antimicrobial susceptibility testing, reduced manual processing, improved turnaround times, and more timely communication of results to clinicians. In Jamaica, for example, stakeholders described significant improvements in the speed of blood culture identification and reporting. Similar examples emerged from Belize, Barbados, and Guyana. In this sense, the project generated benefits that extend beyond surveillance. By improving the speed and reliability of microbiology services, it also contributed to better clinical decision-making and health care management.

Regional cooperation became stronger and more practical

The project strengthened regional cooperation in ways that extend beyond laboratory capacity alone. One of the clearest examples concerns the relationship between PAHO and CARPHA. While both institutions have long supported public health initiatives in the Caribbean, stakeholders consistently identified the project as an important catalyst for closer operational collaboration around AMR surveillance, laboratory strengthening, technical cooperation, and regional coordination.

More broadly, the project strengthened regional public goods, including reference laboratory functions, technical exchanges, communities of practice, peer-learning mechanisms, and informal technical support networks, that are particularly valuable in small island and capacity-constrained settings. Evidence suggests that these relationships may ultimately prove to be among the project's most durable outcomes.

The region is producing more AMR data

The project strengthened the foundations for AMR surveillance by improving laboratory data production. Equipment, training, quality assurance activities, and strengthening of microbiology workflows increased countries' ability to generate AMR-related information and participate in national, regional, and global surveillance initiatives. While the routine analysis, integration, and use of these data remain uneven, the region is now better positioned to build more robust surveillance systems, understand patterns, and monitor AMR trends over time than it was at the start of the project.

5.2 What has not yet changed?

While the project successfully strengthened many of the building blocks of AMR surveillance, several critical transitions remain incomplete. **The most important finding emerging across the evaluation is that progress in diagnostic capacity has out paced progress in data systems, data use, and long-term institutionalization**. In other words, the region is increasingly capable of producing AMR data, but the systems required to routinely transform those data into surveillance intelligence and public health action remain uneven.

The transition from diagnostics to surveillance intelligence remains unfinished

Across the evidence base, stronger progress was observed in laboratory capacity and AMR data generation than in routine data analysis, interpretation, reporting, and use. Many countries continue to rely on a combination of Excel spreadsheets, manual processes, laboratory-specific software, and fragmented reporting pathways. Although important progress has been made through WHONET, ReLAVRA+, laboratory information system initiatives, and regional discussions on interoperability, integrated data systems remain uneven across countries.

As a result, **AMR data are not yet consistently translated into surveillance products, stewardship initiatives, infection prevention efforts, procurement decisions, or policy discussions**. Evidence of data use exists, but it remains concentrated in specific institutions and contexts rather than being institutionalized systematically across participating countries.

The transition from human health AMR surveillance to a fully operational One Health surveillance model remains incomplete

While the project was strategically aligned with One Health principles and supported selected multisectoral engagement, most demonstrable results were concentrated in human health laboratories, diagnostics, quality systems, workforce development and AMR data generation. Evidence of routine surveillance integration, joint analysis, data sharing and coordinated decision- making across human, animal, food, agriculture and environmental sectors remained limited at the time of the evaluation. The project therefore strengthened an important foundation for future One Health surveillance, but the transition toward an operational multisectoral model remains unfinished.

Equitable access to AMR diagnostics remains uneven

The project expanded access to diagnostic capacity in several locations and strengthened regional reference laboratories that benefit smaller countries. However, access to AMR diagnostics remains uneven across the Caribbean. Many countries continue to rely heavily on centralized laboratory services lo-

cated in capital cities. Regional and peripheral laboratories frequently face constraints related to staffing, supply chains, equipment maintenance, information systems, and quality assurance. **Expanding diagnostic access beyond national reference laboratories, therefore, remains an ongoing agenda rather than a completed achievement.**

5.3 Risk and challenge analysis

The evaluation identified several risks that could affect the long-term sustainability of project- supported results. Most are not risks to the existence of capacity, but rather risks to its continued utilization, institutionalization, and expansion.

Table 5. Risk and challenge analysis[3]

Risk	Likelihood	Potential effect
Insufficient financing for reagents, consumables, maintenance, and service contracts	High	Reduced use of installed equipment; interruption of diagnostic services; degradation of surveillance capacity
Fragmented laboratory information systems and limited interoperability	High	Weak data flows, incomplete reporting, reduced ability to analyze and use AMR data
Workforce turnover and limited access to continuous training	High	Loss of technical expertise and underutilization of project-supported technologies
Weak institutionalization of AMR surveillance within routine planning and budgeting processes	Medium-high	Dependence on external support and reduced sustainability of surveillance gains
Declining regional coordination and peer-learning mechanisms after project closure	Medium	Loss of technical exchange, support networks, and regional public goods
Procurement, logistics, and supply-chain disruptions	Medium-high	Delays in obtaining reagents, consumables, spare parts, and maintenance services
Natural disasters, security constraints, and other external shocks	Medium	Operational disruptions affecting laboratory services and surveillance activities
Limited use of AMR data for stewardship, IPC, and policy decisions	Medium-high	Reduced public health value of surveillance investments

Taken together, these risks suggest that the next phase of regional AMR strengthening should focus less on acquiring additional diagnostic technologies and more on ensuring that existing capacities remain operational, connected, financed, and routinely used. **The sustainability challenge facing the region is therefore not primarily one of equipment ownership, but of maintaining the systems, workforce, financing mechanisms, and information flows required to convert laboratory capacity into sustained surveillance and public health action.**

[3] **Note:** Risk likelihood ratings are based on the evaluation team's judgment of the probability that a risk could affect the sustainability of project-supported results over the medium term, considering the consistency and strength of evidence across interviews, site visits, project documentation, and observed implementation experience. **High** indicates that the risk was widely reported, observed across multiple countries or stakeholder groups, and is already affecting or likely to affect sustainability if unaddressed. **Medium-High** indicates substantial evidence that the risk could affect sustainability, although its severity or likelihood varies across contexts. **Medium** indicates a plausible risk that was identified by stakeholders or documentation but was less widespread, more context-specific, or subject to greater uncertainty.

Conclusions

Conclusion 1. The project was highly relevant to countries' AMR needs and strategic cooperation priorities.

The project was highly relevant because it responded to priority AMR needs already recognized by participating countries and regional partners. Rather than addressing AMR as a broad policy issue, the intervention focused on the operational barriers that limited laboratory-based surveillance and response, including diagnostic capacity, quality systems, workforce, data systems, and access to critical inputs. This made the project well-positioned to support countries in moving from AMR policy commitments to more functional surveillance capacity.

The project was also strategically coherent with national AMR priorities, PAHO and WHO AMR agendas, CARICOM health cooperation priorities, PAHO, WHO and CARICOM cooperation strategies, and the Fleming Fund Phase II Results Framework. This alignment helped position the intervention within the existing regional AMR and health systems strengthening agenda, rather than as a parallel or stand-alone initiative. In this sense, the project's relevance came not only from addressing specific technical gaps but also from reinforcing broader national and subregional priorities related to surveillance, workforce development, digital transformation, access to health technologies, AMR containment and regional cooperation.

At the same time, the evidence shows that several areas remained at different stages of maturity across countries, particularly LIMS implementation, interoperability, structured reporting, routine AMR data analysis, data use for decision-making, recurrent financing, procurement planning and long-term continuity of supplies and maintenance. These remaining gaps do not diminish the project's relevance; rather, they identify the areas where continued attention is needed to consolidate the contributions already made.

Conclusion 2. The regional model created added value by expanding technical reach, strengthening reference functions, and generating regional public goods.

The regional implementation model added value by expanding technical reach and strengthening shared AMR capacities that individual countries would not easily sustain on their own. Beyond country-level outputs, the project contributed to regional public goods, including reference functions, training spaces, peer-support mechanisms, shared technical approaches, and stronger regional coordination channels. The evidence points especially to the strategic value of the emerging reference laboratory network, including Barbados, Jamaica, Trinidad and Tobago, and PAHO- CARPHA collaboration. Its long-term value will depend on whether clear operating arrangements, financing, referral pathways, data-sharing protocols and sustained demand for services support these functions.

The value of these regional functions lies in their ability to concentrate and share specialized AMR capabilities that are difficult for every country to maintain independently. Their continued usefulness will depend on governance, financing, service demand, referral arrangements, data-sharing protocols, and sustained coordination.

Conclusion 3. Investments in laboratory technology and workforce capacity generated the project's strongest and most immediate results.

The project's clearest contribution was the strengthening of laboratory diagnostic capacity across participating countries. Investments in automation, microbiology technologies, quality systems, and workforce development improved laboratories' ability to identify pathogens, perform antimicrobial susceptibility testing, and generate AMR-relevant data. These changes were among the most visible and consistently documented results across the evaluation.

The project also generated important operational benefits, including faster organism identification, reduced manual workload, more reliable workflows, and improved availability of laboratory results. These improvements have relevance beyond laboratory performance, as they can support healthcare management, infection prevention and control, antimicrobial stewardship, and surveillance activities. The evidence therefore indicates that laboratory strengthening was the intervention area where the project achieved its most immediate and observable results.

Conclusion 4. The project advanced AMR data generation, but the full data pathway remains incomplete.

The project advanced the early stages of AMR data pathways by strengthening laboratory capacity and improving the conditions for data generation. However, the transition from producing AMR- relevant data to routinely analyzing, reporting and using those data for public health decision-making remains incomplete. The evidence shows emerging examples of data use, but also indicates that LIMS gaps, interoperability limitations, manual workflows, analytical capacity, and weak feedback loops continue to limit progress toward mature intermediate outcomes.

Conclusion 5. Sustainability now depends lesson acquiring equipment and more on financing, data systems, workforce retention and institutional integration.

The evaluation concludes that an important foundation for sustained AMR surveillance was established through the provision of equipment, trained personnel, strengthened workflows, quality systems, regional support mechanisms, and enhanced diagnostic capacity. However, the principal sustainability challenge facing participating countries is no longer the acquisition of technologies or ini-

tial capacity development. Rather, sustainability now depends on whether these investments can be integrated in to routine institutional systems and supported through ongoing financing, workforce capacity, maintenance arrangements, and effective data systems.

Evidence consistently identifies recurrent supplies, maintenance services, procurement capacity, quality-control materials, technical support, and workforce continuity as critical conditions for preserving the gains achieved through the project. Installed equipment can continue generating value only if laboratories can secure reagents, consumables, spare parts, and technical service over time. Similarly, workforce gains depend on retaining trained personnel and on mechanisms to maintain and transfer knowledge despite turnover, reassignment, or staffing shortages.

The evaluation also finds that long-term sustainability is closely linked to the maturity of data systems and the integration of AMR surveillance into routine health-sector functions. Although the project strengthened AMR data production, several countries continue to face challenges with interoperability, structured reporting, routine analysis, and the systematic use of surveillance information for decision-making. Likewise, the degree to which project-supported capacities have been embedded within national planning, budgeting, governance and service-delivery arrangements varies across countries. Taken together, the durability of project results will depend less on maintaining equipment ownership and more on sustaining the systems, financing mechanisms, workforce capacity, information flows and institutional commitments required to transform strengthened laboratory capacity into routine surveillance and public health action.

Conclusion 6. The project strengthened PAHO's technical legitimacy and convening role in the Caribbean AMR space.

Beyond planned outputs, the project strengthened an institutional platform for regional AMR cooperation. PAHO's technical expertise, responsiveness, country office engagement and ability to connect laboratories, partners and regional priorities contributed to its legitimacy as a convening and technical actor in the Caribbean AMR space. This institutional legacy is relevant for future programming, while the evidence also shows that clearer information flows, roles and coordination routines would help make the platform more predictable and useful for country-level actors.

The project also deepened collaboration among PAHO, CARPHA, public health laboratories, hospitals, and other health authorities as technical partners, creating a stronger platform for future regional AMR and laboratory initiatives. This institutional legacy should be understood as a positive outcome of implementation rather than a mandatory element within the implementation framework. At the same time, the evidence shows that some information flows were less visible to focal points or local actors, indicating that future use of this collaboration platform will benefit from clearer roles, predictable communication channels, and coordination routines.

Overall conclusion

The end-of-project evaluation concludes that the Fleming Fund-supported regional project made a meaningful contribution to strengthening AMR laboratory and surveillance capacities in the Caribbean. The project operated in a complex multi-country environment marked by differences in baseline capacity, procurement systems, geography, infrastructure, workforce availability, digital maturity, and exposure to external shocks. Within that context, the project delivered relevant and valued technical support, particularly in laboratory strengthening, workforce capacity, regional coordination, and the development of foundations for AMR data production. At the same time, several outcome-level transitions, especially routine data analysis and use, long-term financing, maintenance, recurrent supplies, and multisectoral One Health operationalization, remain incomplete and require continued institutional attention.

Lessons Learned

Lesson 1. Integrated capacity packages strengthen laboratory-based surveillance systems beyond isolated initiatives.

Laboratory investments are more likely to generate public health value when they are delivered as an integrated package rather than as separate inputs. Diagnostic technologies, supplies, quality systems, workflows, staff confidence, troubleshooting and follow-up support need to work together for laboratories to produce reliable results, communicate them on time and connect them with health-related surveillance and public health decision-making. This is particularly important in settings with uneven baseline capacity, decentralized laboratory networks, or limited prior experience with automated diagnostic platforms.

Lesson 2. Regional capacity is strengthened when clear operating arrangements support shared functions.

Regional programming adds value when it creates shared functions that countries can collectively access, such as reference laboratory support, regional training, peer exchange, troubleshooting networks, communities of practice and technical coordination channels. In the Caribbean, where many countries cannot sustain all specialized AMR functions independently, these shared mechanisms can improve access to expertise and reduce duplication. Their long-term value, however, depends on clear roles, predictable communication, governance arrangements, referral pathways,data-sharing mechanisms and sustained coordination. **The evidence supports informal community-of-practice dynamics, but not the establishment of a formal institutionalized community of practice as a project output.**

Lesson 3. AMR data use requires an intentional pathway from laboratory generation to decision- making.

Stronger diagnostic capacity does not automatically lead to better data use. AMR surveillance requires a deliberate pathway that links laboratory data generation with information systems, interoperability, analysis, reporting and feedback loops for clinical, IPC, stewardship and public health users. The project improved the foundations for AMR data production, but fragmented digital systems, incomplete LIMS arrangements and limited routine analysis continued to constrain the systematic use of data for decision-making.

Lesson 4. Adaptive implementation capacity is essential in dispersed, access-constrained and operationally complex contexts.

Multi-country projects in dispersed and operationally complex settings require flexibility from the outset. Differences in country readiness, procurement systems, customs procedures, logistics, site readiness, language, staffing, security conditions and external shocks can directly affect implementation. In this project, flexibility, phased implementation, communication, country-level engagement and contingency planning helped maintain progress, while also showing that future designs need sufficient time and space for context-specific adaptation without compromising accountability and technical quality.

The transferability of this lesson depends on whether the project design allows sufficient time, flexibility, contingency planning, and country-specific adaptation while maintaining accountability and technical quality. Adaptation should not be treated as a substitute for resolving structural bottlenecks, but as a necessary capability for managing implementation in complex settings.

Lesson 5. Workforce gains require continuous learning, mentoring, and mechanisms to preserve institutional memory.

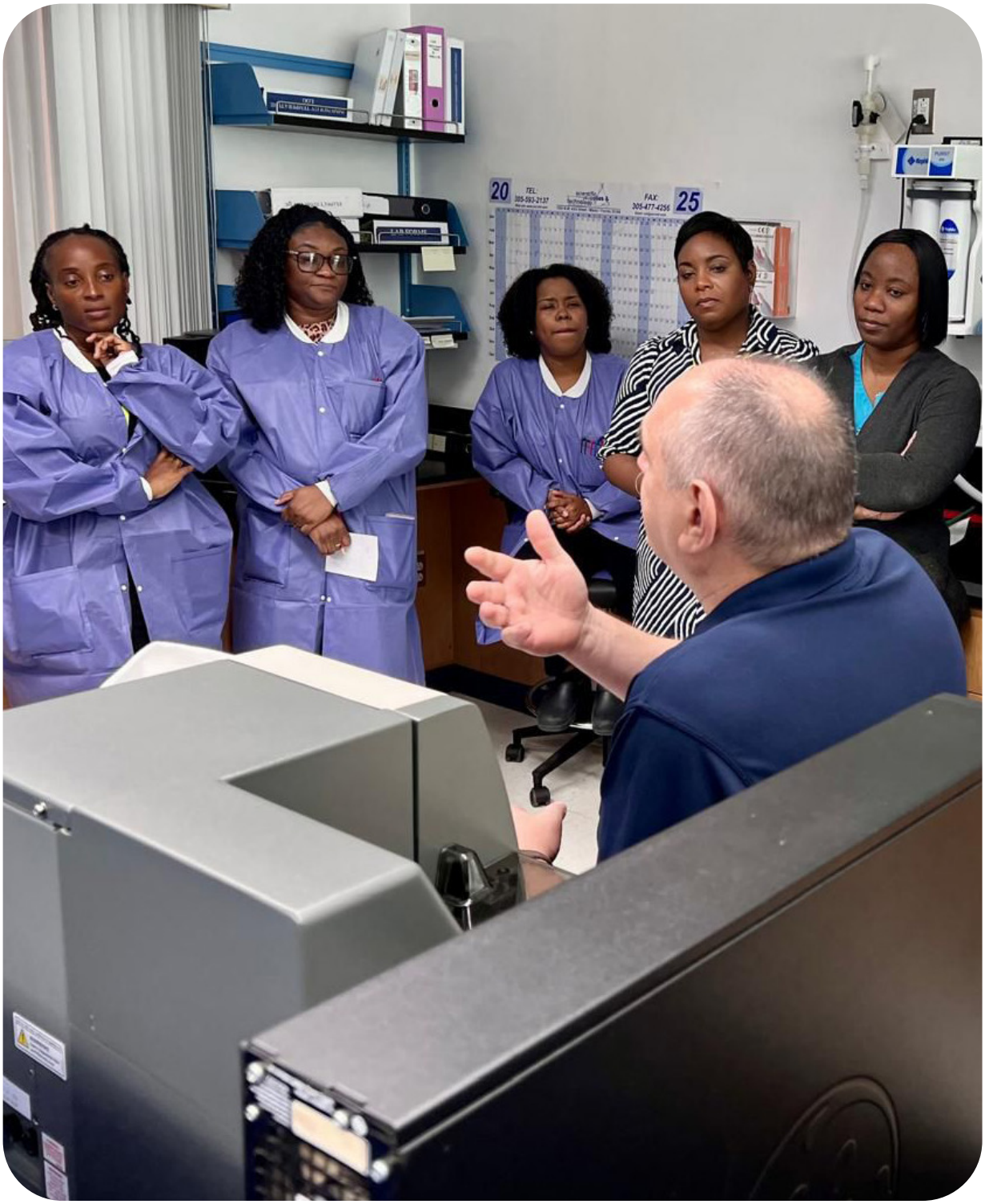
One-off training is insufficient to preserve laboratory capacity in settings with small teams, staff turnover, reassignment, or uneven access to specialized expertise. Workforce gains are more likely to endure when training is reinforced through mentoring, refresher opportunities, peer learning, and mechanisms that retain institutional knowledge. The project experience showed the importance of continuing education, feedback from laboratories, peer exchange, and accessible support channels. These mechanisms can help technical knowledge circulate beyond individual participants and reduce the risk that capacity gains remain concentrated in a small number of people.

Lesson 6. Economic evidence should be planned into projects that invest in equipment, technologies, or other major goods expected to generate operational, clinical, or public health value.

Projects that involve major investments in equipment or technologies should define from the start what economic value they expect to generate and how it will be measured. This includes baseline and follow-up information on costs, use and benefits. Although this project showed operational and healthcare management benefits from strengthened diagnostic capacity, the absence of formal economic analysis limited the evaluation's ability to quantify value relative to costs. Building economic evaluability into future projects would strengthen accountability and support investment decisions.

The transferable lesson is that projects involving procurement of equipment or technologies should define, before implementation, what economic value they expect to generate and how that value will be measured. Building economic evaluability into project design strengthens accountability, supports future investment decisions, and allows PAHO and its counterparts to better understand not only whether an intervention delivered outputs, but whether the resources invested generated meaningful operational, clinical, public health, and institutional value.

Recommendations



The following recommendations are intended to support implementation of the proposed PAHO Plan of Action on Antimicrobial Resistance 2027–2031 *(3)* and build on the capacities, partnerships and regional public goods established through the project, with particular attention to sustainability, data use, regional cooperation and progressive One Health integration.

Recommendation 1: Continue strengthening regional and national AMR data systems, interoperability and surveillance intelligence

- **Priority:** High
- **Responsible:** PAHO AMR Special Program (Communicable Diseases Prevention, Control and Elimination CDE/AMR), Evidence and Intelligence for Action in Health Department, PAHO Country Offices, Caribbean Subregional Program, in collaboration with Ministries of Health, CARPHA and national laboratories.
- **Time frame:** 1–3 years

Under the proposed PAHO Plan of Action on Antimicrobial Resistance 2027–2031, develop a regional roadmap for AMR data governance, interoperability and surveillance intelligence that builds on project investments in WHONET, laboratory information systems and regional reporting platforms while supporting country-owned surveillance systems.

Suggested actions:

- Use PAHO technical cooperation mechanisms and CCS implementation processes to support countries in strengthening laboratory information systems and their interoperability with surveillance and health information systems.
- Establish regional guidance and minimum standards for AMR data governance, data quality, interoperability, and reporting.
- Leverage ReLAVRA+ and existing regional AMR platforms to strengthen routine data exchange, benchmarking, and regional analysis.
- Support countries in developing surveillance dashboards, analytical products, and early- warning functions that translate laboratory data into actionable information.
- Promote integration of AMR data into broader surveillance modernization initiatives supported by PAHO.

Recommendation 2: Institutionalize sustainability of laboratory and surveillance capacities for AMR and other public health events through national systems and regional support mechanisms

- **Priority:** High
- **Responsible:** PAHO AMR Special Program (CDE/AMR), PAHO Country Offices, Caribbean Subregional Program, in collaboration with Ministries of Health and reference laboratories.
- **Time frame:** 2–5 years.

Support countries in transitioning project-supported capacities from externally supported assets to sustainably financed and institutionally embedded components of national laboratory and surveillance systems and prevention, control and elimination initiatives.

Suggested actions:

- Integrate sustainability planning into PAHO's country technical cooperation agenda and future AMR and CDE investments.
- Support countries in developing transition plans covering workforce continuity, supply-chain management, equipment maintenance, quality assurance and recurrent operational costs.
- Expand use of the PAHO Strategic Fund and other pooled procurement approaches to facilitate access to reagents, consumables, antimicrobial susceptibility testing supplies and quality-control materials, while recognizing and coordinating with existing subregional procurement arrangements, including OECS Pooled Procurement Service, in countries where these mechanisms are already established.
- Support the development of regional approaches for maintenance, technical servicing, and vendor support for specialized laboratory technologies.
- Incorporate economic evaluability into future initiatives involving equipment, technologies or other major goods from the formulation and planning phases to determine the relationship between the investments, the delivered outputs and the institutional value.

Recommendation 3: Strengthen the use of AMR surveillance information for stewardship, IPC and public health decision-making

- **Priority:** High
- **Responsible:** PAHO AMR Special Program (CDE/AMR), PAHO Country Offices, Caribbean Subregional Program, in collaboration with Ministries of Health and national AMR coordination mechanisms.
- **Time frame:** 1–3 years

Expand technical cooperation efforts toward strengthening the routine interpretation and use of AMR surveillance information for health-related, programmatic and policy decision-making.

Suggested actions:

- Support countries in establishing regular AMR review mechanisms linking laboratories, epidemiologists, steward ship programs, and IPC teams.
- Develop regional guidance and practical tools for translating surveillance findings into policy and programmatic action.
- Support incorporation of AMR evidence into treatment guidelines, stewardship strategies, IPC interventions, and preparedness planning.
- Use ReLAVRA+, communities of practice and regional technical exchanges to disseminate analytical approaches and lessons learned.

Recommendation 4: Consolidate regional AMR laboratory networks, reference functions, and workforce learning mechanisms

- **Priority:** Medium-High
- **Responsible:** PAHO AMR Special Program (CDE/AMR), Caribbean Subregional Program, PAHO Country Offices.
- **Time frame:** 1–3 years.

a. Consolidate the regional public goods generated or strengthened through the project, including laboratory network functions, reference roles, referral mechanisms, quality support arrangements, and technical assistance pathways.

Suggested actions:

- Strengthen and expand the role of ReLAVRA+ as the principal regional platform for laboratory collaboration, quality improvement, and AMR surveillance support.
- Formalize roles and referral arrangements among participating laboratories for specialized testing, quality assurance, and technical assistance.
- Leverage the Best-dos Santos Public Health Laboratory as a hub for laboratory excellence, workforce development and regional technical cooperation.
- Strengthen linkages with regional WHO Collaborating Centers in the region and existing regional reference laboratories to provide advanced training, testing and specialized expertise.
- Maintain regional troubleshooting and technical support mechanisms for countries adopting new diagnostic technologies.

b. Institutionalize the workforce development and peer-learning mechanisms strengthened through the project as part of PAHO's AMR and laboratory-strengthening technical cooperation, ensuring that capacity gains are maintained beyond one-off trainings.

Suggested actions:

- Maintain regional communities of practice focused on microbiology, laboratory quality systems, and AMR surveillance.
- Establish long-term mentoring, twinning and peer-support arrangements through ReLAVRA+ and partner institutions.
- Use the Best-dos Santos Public Health Laboratory and other WHO Collaborating Centers in the region as platforms for continuous professional development.
- Develop strategies to mitigate the effects of workforce turnover and preserve institutional knowledge.
- Integrate lessons learned from project implementation into future PAHO-supported laboratory strengthening initiatives.

Recommendation 5: Use strengthened AMR laboratory and surveillance capacities as a platform for progressive One Health implementation

- **Priority:** Medium
- **Responsible:** PAHO AMR Special Program (CDE/AMR), PAHO Country Offices, Caribbean Subregional Program.
- **Time frame:** 3–5 years

Use the laboratory and surveillance capacities established through the project as a practical entry point for strengthening the implementation of the One Health objectives contained in the proposed PAHO Plan of Action on Antimicrobial Resistance 2027–2031.

Suggested actions:

- Support countries through technical cooperation plans and CCS implementation processes to strengthen multisectoral AMR governance mechanisms.
- Promote pilot initiatives linking human health AMR surveillance with animal health, food safety and environmental actors.
- Facilitate regional dialogue and exchange of experience on One Health surveillance implementation.
- Integrate One Health objectives into future regional laboratory and surveillance initiatives supported by PAHO.

Recommendation 6: Institutionalize governance, communication and implementation management mechanisms for regional AMR initiatives

Future regional AMR initiatives should build on the collaboration and partnerships established through the Fleming Fund project while addressing recurring coordination challenges identified during implementation. Particular attention should be given to clarifying roles and responsibilities, strengthening communication flows across levels, and improving visibility of implementation, procurement and decision-making processes for all stakeholders involved. Evidence suggests that stronger governance and communication arrangements would help reduce transaction costs, improve predictability, and accelerate implementation in complex multi-country settings.

- **Priority:** Medium-High
- **Responsible:** PAHO AMR Special Program (CDE/AMR), Caribbean Subregional Program, PAHO Country Offices, in collaboration with CARPHA and participating countries
- **Time frame:** 1–3 years

Suggested actions:

- Define and communicate clear roles, responsibilities and decision-making pathways among PAHO technical teams, Country Offices, regional partners, laboratories, suppliers and national counterparts at the outset of future initiatives.
- Develop implementation and communication plans that provide stakeholders with regular visibility on procurement status, deployment schedules, technical support arrangements, responsibilities and key decisions.
- Maintain and strengthen the coordination practices that proved effective during implementation, including regular follow-up meetings, joint troubleshooting mechanisms, supplier engagement and country-level accompaniment.
- Establish formal mechanisms for issue escalation, troubleshooting and follow-up to facilitate timely resolution of operational bottlenecks.
- Incorporate standardized readiness assessments covering infrastructure, staffing, logistics, installation requirements and procurement considerations before deployment of specialized laboratory technologies.
- Systematically document and disseminate implementation lessons and good practices related to adaptive management, supplier coordination, regional implementation and multi-partner collaboration.

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Annexes

Order Tests
Enter Results
Print Results
View Results
After Results
Change Demographics
Change Accession
Merge Patient
Delete Patient
Delete Accession
Cumulative Report
Send Home Report
Historical Results
Reassign Accession
Graphic Report
DELL

Annex 1. Project results framework review

The file is available to access **here**.

Annex 2. Implementation status

At the time of the evaluation (May–June 2026), implementation of the project was at an advanced stage, with about 88% of planned activities completed or underway despite the shortened implementation period. The project had progressed from initial laboratory assessments and procurement activities to the installation of diagnostic equipment, workforce training, establishment of regional technical networks, and strengthening of AMR surveillance systems across participating countries.

Geographic coverage

Project activities reached laboratories and institutions across 11 countries: Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, Saint Vincent and the Grenadines, and Suriname. Technical assessment missions were conducted in nine countries and included visits to 22 institutions to assess laboratory infrastructure, biosafety, microbiology capacity, AST performance, molecular diagnostic capabilities, and readiness for AMR surveillance.

Laboratory strengthening and equipment deployment

A major focus of implementation involved procurement and installation of laboratory equipment and provision of reagents and consumables required for microbiological identification, AST, molecular diagnostics, and surveillance activities.

By the start of the evaluation, procurement and deployment activities had resulted in the delivery of:

- 17 automated microbial identification and susceptibility testing systems (VITEK®2);
- 14 automated blood culture systems (BACT/ALERT®);
- 5 MALDI-TOF mass spectrometry systems;
- 5 infrared spectrometry systems (IR Biotyper);
- 6 ultra-low temperature freezers (-80°C);
- 1 real-time polymerase chain reaction (PCR) platform; and
- Reagents,consumables, and maintenance packages associated with these technologies.

Equipment installation and training had been completed in most sites, while a smaller number of laboratories were still finalizing installation, operationalization, or advanced training activities. Overall, 23 of the planned 26 laboratories and hospital sites had been reached by project investments at the time of the evaluation.

Capacity building and workforce development

The project invested heavily in strengthening technical competencies through regional and national training activities. Face-to-face trainings conducted during 2025–2026 included:

- Regional workshops on phenotypic AMR diagnostics and on AST;
- Molecular detection of resistance mechanisms;
- WGS and bioinformatics;
- Laboratory information systems;
- AMR surveillance and data management; and
- One Health surveillance approaches.

By mid-2026, more than 100 laboratory professionals had participated in face-to-face regional training activities, complemented by approximately 120 participants across a series of virtual technical workshops and webinars covering microbiology, surveillance, quality assurance, laboratory information systems, AMR indicators, data visualization, and emerging resistance threats. Together, these activities sought to strengthen both individual technical competencies required to operate newly introduced diagnostic technologies, and the institutional capacity of laboratories to generate,manage and use AMR data for surveillance and public health action.

Data systems, interoperability and laboratory information management

The project supported several initiatives aimed at strengthening laboratory information management and AMR data reporting. Activities included:

- Deployment and strengthening of WHONET[4];
- Development of country collaboration sites on PAHO AMR Platform;
- Exploration and piloting of laboratory information systems, including Surveillance and Epidemiology of Drug-Resistant Infections Laboratory Information Management System (SEDRI-LIMS);
- Development of interoperability pathways linking laboratory information systems to WHONET, ReLAVRA+[5], CARPHA systems, and GLASS[6] reporting platforms.

[4] WHONET is a free laboratory information management and analysis software developed by the WHO Collaborating Center for Surveillance of Antimicrobial Resistance. It supports the management, analysis, and sharing of antimicrobial susceptibility testing data and facilitates reporting to national, regional, and global AMR surveillance systems.

[5] The Latin American and Caribbean Network for Antimicrobial Resistance Surveillance (ReLAVRA+) is PAHO's regional AMR surveillance network for Latin America and the Caribbean. It supports countries in generating standardized AMR data, strengthening quality assurance, facilitating technical cooperation, and reporting surveillance information at regional and global levels.

[6] The Global Antimicrobial Resistance and Use Surveillance System (GLASS) is the World Health Organization's global platform for the collection, analysis, and reporting of standardized data on antimicrobial resistance and antimicrobial use. GLASS aims to improve understanding of AMR trends and support evidence-based policy and public health action worldwide.

At the time of the evaluation, digitalization efforts remained at different stages across countries. Several countries were generating isolate-level AMR data compatible with ReLAVRA+ and GLASS requirements, while broader implementation of integrated laboratory information systems remained under development. Regional discussions were underway to advance a common vision for laboratory informatics and inter operability in the Caribbean.

Quality assurance and surveillance strengthening

The project initiated a range of activities to improve laboratory quality systems and surveillance readiness. These included:

- Participation in ReLAVRA+ quality assurance activities;
- Development of internal quality control procedures;
- Establishment of bacteriology and mycology external quality assessment (EQA) initiatives;
- Standardization of laboratory protocols and operating procedures; and
- Support for reporting to regional and global surveillance platforms.

Several countries had also begun generating isolate-level AMR surveillance data suitable for reporting through ReLAVRA+ and GLASS.

Regional collaboration and reference functions

The project placed significant emphasis on regional cooperation and network-building. Activities were implemented in close collaboration with CARPHA, UKHSA, and regional reference laboratories. Particular progress had been made in strengthening Barbados as a regional hub for molecular diagnostics, WGS, training, and technical support. Regional communities of practice, technical exchanges, and collaborative training activities were established to support peer learning and harmonization of laboratory practices across participating countries.

Sustainability planning and transition arrangements

Sustainability considerations were incorporated throughout the project design and implementation. As the project approached completion, greater emphasis was placed on consolidating sustainability measures, intended to sustain gains beyond the project period and support transition to longer-term national and regional ownership mechanisms. Key sustainability measures initiated during implementation included:

- Integration of key diagnostic supplies and technologies into PAHO's Strategic Fund procurement mechanisms;
- Multi-year maintenance and service arrangements for major laboratory equipment;
- Strengthening of regional reference laboratory functions and technical support networks;
- Development of regional communities of practice and peer-learning mechanisms;
- Establishment of quality assurance systems and standardized operating procedures;

- Continued support for open-source and interoperable laboratory information systems;
- Identification of future resource mobilization opportunities and integration of AMR surveillance activities into broader national and regional health initiatives.

The project had also defined a set of medium- to long-term sustainability objectives, including maintaining diagnostic and surveillance capacity within supported laboratories, institutionalizing AMR surveillance within national public health systems, strengthening the use of surveillance data for public health action, and promoting continued regional cooperation among Caribbean countries.

Activities underway

Although implementation was well advanced, several activities remained in progress at the start of the evaluation. These included:

- Final procurement and delivery of reagents and consumables;
- Continued installation and operationalization of equipment in a limited number of laboratories;
- Completion of laboratory information system pilots and interoperability testing;
- Development of technical guidance on AMR surveillance data analysis and use;
- Roll-out of bacteriology and mycology EQA programs;
- Follow-up molecular diagnostics and WGS support activities;
- Final regional workshops on infection prevention and control and antimicrobial stewardship;
- Sustainability planning and transition to PAHO Strategic Fund procurement mechanisms.

Table 6. Project investments at a glance

Area	Main investments
Laboratory equipment	VITEK® 2 systems, MALDI-TOF, BACT/ALERT blood culture systems, infrared (IR) Biotyper systems, quantitative polymerase chain reaction (qPCR) platform, -80°C freezers
Reagents and consumables	AST cards, blood culture bottles, molecular reagents, WGS reagents, consumables and maintenance packages
Training and workforce development	Regional and national trainings on AST, phenotypic and genotypic diagnostics, WGS, bioinformatics, laboratory information systems, surveillance, IPC and antimicrobial stewardship (AMS); virtual webinar program
Quality assurance	Internal QC strengthening, EQA programs in bacteriology and mycology,SOP development, ReLAVRA+ support

Table 6. Project investments at a glance (continued)

Data systems and digitalization	WHONET deployment, SEDRI-LIMS pilots, PAHO AMR platform collaboration sites, interoperability initiatives, support for ReLAVRA+ and GLASS reporting
Regional net-working and technical cooper-ation	Regional workshops, communities of practice, peer-to-peer learning, technical exchanges, support to regional reference laboratories, collaboration with CARPHA and UKHSA
Sustainability mechanisms	Strategic Fund integration, procurement planning, main-tenance contracts, reference laboratory strengthening, regional training networks and sustainability planning

Annex 3. List of stakeholders consulted

Stakeholder group	Institutions consulted	Role in the project	Rationale for inclusion in the evaluation
PAHO	• PAHO AMR Special Program (headquar-ters); • PAHO Caribbean Subregional Pro-gram.	Grant holder; strategic over-sight; technical leadership	Insight into project design, implementation logic, regional coordination, and alignment with global AMR frameworks
PAHO Country Offices	• Barbados/Eastern Caribbean Coun-tries(ECC) • Belize • Guyana • Haiti • Jamaica • Suriname • Trinidad and Tobago	National coordi-nation and tech-nical support	Country-level context, implementation dynamics, and national stakeholder engagement
Donor	• UKHSA	Funder and stra-tegic oversight	Accountability for results; learning for future Fleming Fund investments

Annex 3. List of stakeholders consulted *(continued)*

CARPHA	• CARPHA Executive Office, Surveillance and Disease Prevention and Control Programme • CARPHA Medical Microbiology Laboratory	Regional implementing partner	Regional laboratory networks, coordination mechanisms, and sustainability considerations
National ministries	• Guyana: Minister of Health; One Health National Coordinator; • Suriname: Ministry of Agriculture, Husbandry and Fisheries; National Public Health Bureau.	Policy leadership and stewardship	Governance, data use for decision-making, and sustainability of AMR systems

Annex 3. List of stakeholders consulted *(continued)*

National reference laboratories, hospitals and clinical laboratories	• Barbados: Best-dos Santos Public Health Laboratory; • Belize: Central Medical Laboratory; • Dominica: National Medical Laboratory; • Grenada Pathology Laboratory; • Guyana: National Public Health Reference Laboratory (NPHRL); • Linden Hospital Complex; • Jamaica: National Public Health Laboratory; • Saint Vincent and the Grenadines: Milton Cato Memorial Hospital; • Suriname: Academic Hospital; Mungra Medisch Centrum(MMC);	Technical implementation	Operational evidence on laboratory capacity, data quality, and system
Private-sector partners (diagnostics and laboratory technologies)	• BioMérieux; • Bruker; • Ryvex.	Provision of diagnostics, equipment, technical support	Appropriateness of technologies, sustainability, market and procurement considerations
WHO Collaborating Centers	• Brigham and Women's Hospital, Boston, United States of America	Normative and technical expertise	Data quality, surveillance methodologies, alignment with international standards

Annex 4. Terms of reference

The file is available to access **here**.

Annex 5. Detailed evaluation tools

The file is available to access **here**.

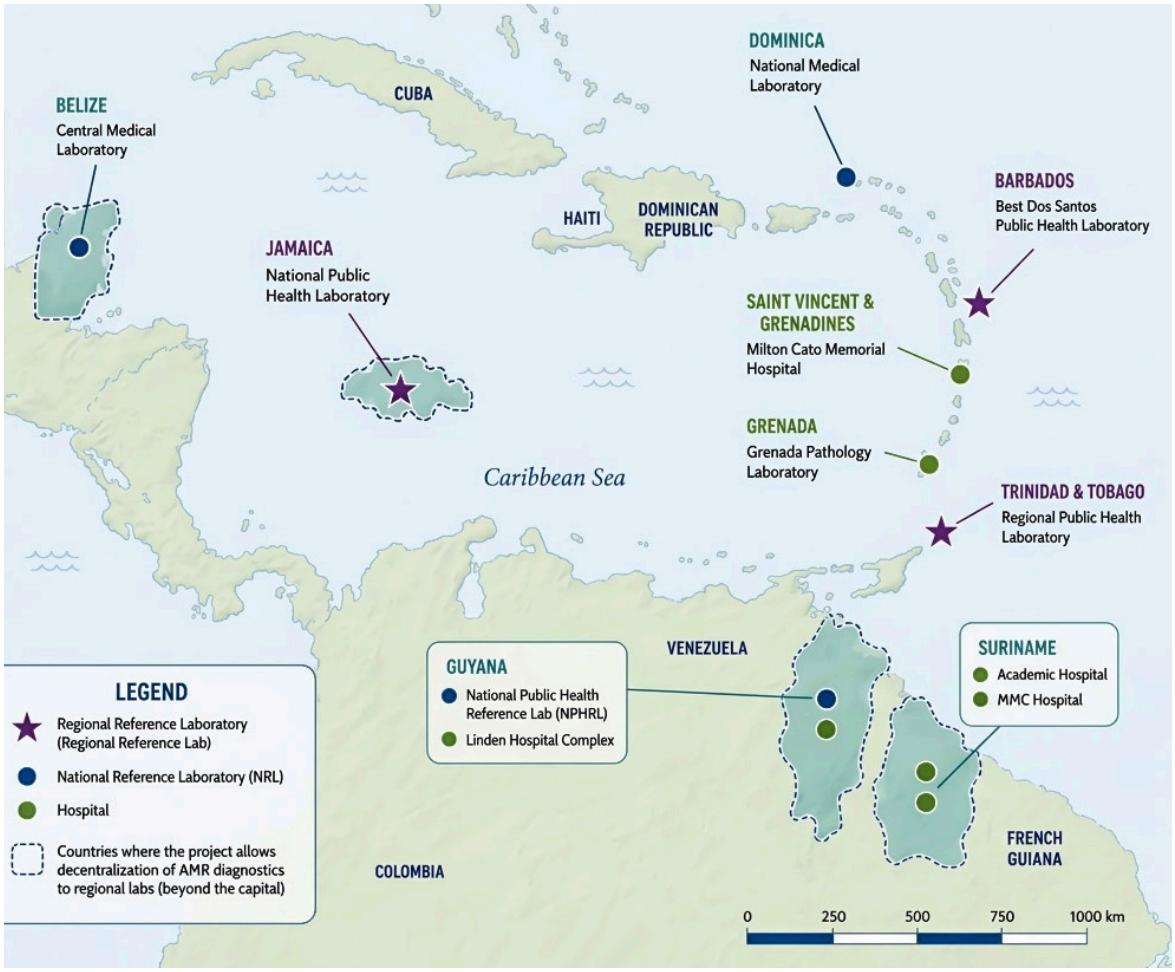
Annex 6. Evaluation matrix

The file is available to access **here**.

Annex 7. Literature and documents reviewed

	Document description	Context
1	Donor Agreement	Specifically, the project's results framework and intervention logic to the overall evaluation analysis
2	Intermediate interim reports to donor	Reports: March 2025 and October 2025, and other presentations and partial reports
3	Final interim report to donor	Last report to donor (May 2026) to review the implementation results and project contribution to the Fleming Fund framework
4	Annex to Final interim report: Progress by country	Specific annex about the progress by country to complement the main report information
5	Budgetary information about allocation and implementation	Used as part of the whole evaluation, especially the Efficiency and Economy criterion
6	Assets inventory - equipment, facilities and other goods purchased and provided	Used as part of the whole evaluation
7	Planning for Sustainability	Used as part of the whole evaluation, especially the Sustainability criterion
8	Project risks register	Fleming Fund Project Risk Analysis (April 2025)
9	Fleming Fund Results Framework	Donor Results Framework to review project's alignment and the overall evaluation analysis

Annex 7. Literature and documents reviewed *(continued)*

10	Pan American Health Organization. Plan of Action on Antimicrobial Resistance 2027–2031 [Document CE178/16]. 178th Session of the Executive Committee; 15–18 June 2026. Washington, D.C.: PAHO; 2026. Available from: https://www.paho.org/en/governance/executive-committee/178th-session-executive-committee.	Approved by the Executive Committee (Resolution CE178.R3) and forwarded for consideration by the 63rd Directing Council. Reviewed to assess the evaluation's alignment and utility for the proposed 2027–2031 regional AMR agenda.
11	World Health Organization. Global antibiotic resistance surveillance report 2025: WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS). Geneva: WHO; 2025. Available from: https://iris.who.int/handle/10665/383106.	Reviewed to assess the project's relevance and alignment with current global AMR surveillance priorities and to inform conclusions and recommendations.
12	World Health Organization. Global action plan on antimicrobial resistance 2026–2036 [Decision WHA79(19)]. 79th World Health Assembly; 23May 2026. Geneva: WHO; 2026. Available from: https://apps.who.int/gb/ebwha/pdf_files/WHA79/A79_%2819%29-en.pdf.	Reviewed as the updated global framework adopted by the 79th World Health Assembly to assess the forward-looking relevance and utility of the evaluation's conclusions and recommendations for the 2026–2036 period.
13	Pan American Health Organization. Fleming Fund Update: Regional AMR Surveillance and Coordination. Washington, D.C.: PAHO; 2026. Unpublished.	Updated summary of project implementation progress by May 2026, which could be useful for enriching evidence on implementation to inform the findings, conclusions,and recommendations of the end-of-project review.
14	Mission reports	Provided reports of field missions for tracking implementation progress, training and specific activities with counterparts and stakeholders.

Annex 8. Intervention map