



INTERNATIONAL
CENTRE FOR
**ANTIMICROBIAL
RESISTANCE**
SOLUTIONS

Solutions for integrating antimicrobial resistance (AMR) into global challenges – Incorporating climate change strategies into AMR intervention and implementation research projects

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1 ICARS Overview

ICARS partners with low- and middle-income countries (LMICs) in their efforts to reduce drug-resistant infections, providing both funding as well as technical expertise on intervention and implementation research projects across the One Health spectrum to national partners. ICARS works in partnership with LMIC ministries and other research institutions to respond to antimicrobial resistance (AMR) challenges identified in country by co-developing and funding tailored solutions with LMIC governments and researchers, who then implement interventions on the ground, building on AMR National Action Plans through context-specific and cost-effective solutions for sustainable scale-up. As part of this mandate, ICARS also works with subject matter experts, the Quadripartite and other organisations and AMR partners nationally, regionally and globally to better understand the influence of local social and economic contexts that influence intervention and implementation research projects on AMR. For more details visit: <https://icars-global.org/>.

2 Overview

AMR and climate change

Climate change (CC) is impacting human health, animal health, food, plant and environment eco-systems in numerous ways, and many of these lead to the development of AMR. Changes in environmental conditions will lead to an increase in the spread of bacterial, viral, parasitic, fungal, and vector-borne diseases in humans, animals and plants (IPCC, 2018ⁱ). While the linkages between the climate crisis, rising temperatures, infection spread and AMR are emerging and complex, the evidence base is still relatively limited (Watts et al., 2018ⁱⁱ, MacFadden et al., 2018ⁱⁱⁱ, Magnano et al., 2023^{iv}). This is particularly true for livestock and aquaculture systems in LMICs where the dual threat of increasing AMR and the climate crisis will have significant impacts (World Health Organization, n.d.^v).

For both the climate crisis and AMR, the returns on investing in containment and mitigation are expected to far outweigh the costs (Rupasinghe *et al.*, 2024, ^{vi}). However, more multidisciplinary research is needed to develop a robust and actionable evidence base on the impacts of the climate crisis on AMR in different scenarios and settings, and to investigate how the climate agenda and measures on the ground can become more AMR specific and sensitive. This is also one of the key messages from the Global Leaders Group on AMR: *'More financing, political advocacy and coordinated global action are needed to better understand and respond to the converging threats of AMR and the climate crisis before it is too late.'* (Global Leaders Group on Antimicrobial Resistance, 2021^{vii}).

Global animal production will rise over the next decades to meet increasing demand for animal-sourced foods. Livestock production is crucial for global food

systems and poverty reduction, supporting the livelihood of nearly 1.3 billion people. Climate change, especially global warming, will impact all livestock systems — grazing, mixed farming, and industrialized — differently. Livestock's contribution to greenhouse gas emissions varies by production system, necessitating context-specific adaptation and mitigation strategies. These may include breeding for disease and heat tolerance, new technologies, improved management, mixed crop-livestock systems, nutritional interventions, better water quality and harvesting, improved housing, enhanced manure management, alteration of livestock diets or feed additives and more effective disease and weather monitoring (FAO, 2017^{viii}). High-risk areas for climate change, where most animal meat is produced, include South America, the Sahel, Sub-Saharan Africa, the Arabian Peninsula, South and Southeast Asia (Kummu *et al.*, 2021^{ix}, FAIRR Initiative, 2022^x). These regions are projected to have high and increasing antimicrobial use in livestock (Mulchandani *et al.*, 2023^{xi}). This underscores the need for collaborative strategies to address AMR and climate change, focusing on the most vulnerable areas and communities.

Equally important is the role of aquaculture (the farming of aquatic organisms) in meeting the growing global food demand. Aquaculture is the fastest-growing food production sector globally and is key to food security in many LMICs (FAO, 2024^{xii}). However, climate change affects global temperatures, sea levels, rainfall patterns, disease spread and algae blooms, all of which impact the aquaculture industry, particularly in coastal regions in Asia and Small Island Developing States. Aquaculture producers are also using high amounts of antimicrobials and AMR has been reported in all the top five global aquaculture producing countries; China, India, Indonesia, Vietnam, and Bangladesh (Schar *et al.*, 2021^{xiii}). The hotspot areas for climate change and AMR are anticipated to show a similar overlapping pattern for aquaculture and similarly calls for integrated strategies that can mitigate the dual threats of climate change and increasing AMR.

3 The scope for this request for proposals (RFP)

ICARS has launched the project “Solutions for integrating AMR into global challenges”, which is funded by the UK's Department of Health and Social Care (DHSC) as part of its Global AMR Innovation Fund (GAMRIF), through Canada's International Development Research Centre (IDRC), and with co-funding from ICARS. The project is a comprehensive organizational initiative designed to address the interlinked global challenges of AMR and climate change within livestock and aquaculture production systems. The key objective is to identify and evaluate AMR mitigation and climate-smart practices and technologies that can be adapted and implemented across diverse LMIC settings.

To achieve this, a scoping review will be conducted to summarise and synthesise evidence from a wide range of documents, including peer-reviewed journal articles, working papers, grey literature, and relevant websites, in order to provide direction for future research priorities.. Additionally, the scoping process will involve online and face-to-face roundtable discussions, community dialogues and will convene the project's Action Group of Experts (AGE) to gather insights, discuss findings, and identify knowledge gaps and recommendations for future research collaborations on AMR and climate change.

4 Purpose of this RFP:

The purpose of this RFP is to request proposals from research institutions or consortium on how they intend to carry out the scoping review of knowledge and implementation gaps to collaboratively address AMR and climate change in livestock and aquaculture systems. The scoping review should explore and evaluate existing AMR and climate-smart interventions, practices, technologies and policies applicable to various livestock and aquaculture production systems. It will focus on understanding how climate-smart measures can effectively mitigate AMR across different LMIC settings, particularly in food-producing terrestrial animals (cattle, pigs, poultry) and coastal and inland aquaculture systems.

5 Scope:

The scoping review is expected to:

- Compile knowledge on the links between climate change and AMR, with a focus on if and how climate change associated changes such as rising temperatures, flooding, drought, and other climate-related factors influence infection prevalence and intensity, infection prevention and control, antimicrobial use and antimicrobial resistance in livestock and aquaculture systems globally.
- Provide evidence of climate change causing shifts in the geographic distribution of fish and livestock. As a result, regions that are currently high-production areas may shift to new locations. These shifts could lead to production moving to regions where antimicrobial use (AMU) practices are either more responsible or more problematic, potentially exacerbating issues related to AMR.
- Assess climate-smart practices and technologies enhance or counteract AMR mitigation strategies across different settings and livestock and aquaculture production systems in High Income Countries (HICs) and LMICs.

- Provide an overview of the presence or absence of national or regional policies, including National Action Plans (NAPs) and frameworks addressing climate change and AMR, with a particular focus on LMICs, and identify potential areas for synergy between these efforts. Scope evidence on successful business models and delivery systems for collaborative AMR mitigation and climate-smart measures and the economic and trade implications of these with a focus on LMICs.
- Identify knowledge gaps and research needs in the context of collaboratively addressing AMR and climate change in livestock and aquaculture systems in LMICs.
- Provide recommendations for collaborative research directions to enhance the effectiveness of AMR mitigation strategies in the face of climate change.

6 Expected Outcomes:

The selected research institution/group will be responsible for:

- Conducting a comprehensive review of existing literature and resources related to AMR, climate change adaptation and mitigation, practices, technologies and policies following the detailed scope listed above. The outcome of this review should be published in a reputable journal.
- Preparing, organising and facilitating at least three online round table discussions and four face-to-face community dialogues to discuss findings and gather input from stakeholders (e.g researchers, policy makers, farmers etc.), as well as capturing and analysing data generated from these. In addition, it will include organizing an on-site 2-day meeting for the Action Group of Experts (AGE) to discuss the findings of the scoping review and develop the RFP for country projects. This includes all the associated logistics necessary for the AGE to travel and participate in-person such as:
 - Site selection & negotiation, including rental cost negotiation.
 - Managing event timeline commitments and deadlines throughout the process.
 - Travel and stay coordination. This will include
 - supporting visa processes;
 - purchasing flight tickets for attendees (economy class airfare and the most cost-effective flight option that also offers convenient travel and arrival times);
 - arranging travel insurances;
 - arranging hotels of a suitable quality, security and payment (must comply with ICARS travel policy; max. \$145 USD per night);
 - arranging meals for participants; and

- and arranging on-site transportation.
- Managing costs for participant subsistence, transportation and other participant incidentals.
- Managing the registration of participants.
- Engaging with third-party suppliers for food, beverage and translation services.
- Organising equipment for events (furnishing, and necessary equipment like presentation tools *e.g.* beamer, flip charts, whiteboard), seating arrangements, and audio-visual equipment. Additional tasks may include, but are not limited to, the printing of materials, creation of name, badges, and preparation of evaluation forms.
- Maintain a detailed budget spreadsheet, including separate tracking of the event organizer's fees and vendor-related costs, and manage invoices for all workshop expenses.
- Manage submission of all invoices to ensure payments can be made in a timely manner.
- Providing a final report with the identification of knowledge gaps, and recommendations for future research and collaboration.
- Draft and submit at least one manuscript to a peer review journal on the findings from the scoping review.

7 Collaboration and Support:

The selected research institution/group will:

- Collaborate closely with the Action Group of Experts to ensure the scoping review addresses the most critical aspects of AMR and climate change.
- Receive guidance and support from ICARS advisors to facilitate the successful completion of the project.
- Participate in regular meetings and events organized by ICARS to share progress, challenges, and lessons learned.

8 Timeline, Budget and Management Arrangement

8.1 Timeline

- Request for applications published by 2nd September 2024
- Questions to ICARS to be submitted no later than 27 September 2024 to this email address: cc_amr@icars-global.org
- Proposals to be submitted by 1 October 2024
- Review and selection of proposal by 15 October 2024
- Contracting, incl. grant amendment: October 2024
- Implementation period: November 2024 – April 2025

8.2 Project Budget

This project has a maximum budget available of 65,000 USD which includes the organization of the 2-day in-person meeting excluding travels, per diems, meals and accommodation for the AGE members. Additional funding will be provided for the travel, per diems, meals and accommodation for the AGE members. The completed budget for this RFP should not include these costs but should include the human resource needed for these activities. A separate budget would be developed with the selected institution to accommodate any other onsite related costs. The selected research institution/group will receive funding to conduct the scoping review and support the organization of the round table discussions and community dialogues. The funding will cover expenses related to data collection, analysis, and reporting, as well as logistical support for the community dialogues.

8.3 Eligibility and Selection Criteria:

Applicants should demonstrate:

- Demonstrated knowledge and expertise in AMR, climate change, and livestock/aquaculture production systems, and systematic reviews methods as well as evidence of peer-reviewed publications.
- Experience in conducting scoping and/or systematic reviews and facilitating multi-stakeholder discussions. Applicants are expected to explain the anticipated statistical methodology to be used.
- The ability to work effectively in LMIC settings and engage with diverse stakeholders.
- Capacity to facilitate the organization of meetings and in supporting logistics and travel arrangements as mentioned in expected outcomes above.

8.4 Legal compliance and knowledge translation

The successful institutions will be required to comply with the grant conditions, including organizational policies, of the offering institution. ICARS and IDRC policies including the code of ethics and professional conduct and the anti-bribery, fraud and corruption policy, are publicly available on the following websites:

- <https://icars-global.org/icars-policies/>,
- <https://www.idrc-crdi.ca/en/about-idrc/transparency>

The ICARS grant agreement template can be requested by email: cc_amr@icars-global.org

Following the ambitions of open science, researchers involved in this project must ensure that science and society can be made aware of the information about the project as early as possible in the research process.

8.5 Submission Guidelines:

Interested institutions/groups should submit a detailed proposal outlining their approach to the scoping review, including a work plan, budget, and timeline. Proposals should also include information on the team's qualifications and relevant experience.

8.6 Additional Requirements

8.6.1 Submitting institution

Proposals must be submitted by a single institution or a consortium of institutions. In the case of a partnership/consortium, one proposal should be submitted of behalf of all partners.

The lead institution must be a university or other research institution (public or private) based in a LMIC region according to the DAC List of ODA Recipients (<https://www.oecd.org/content/dam/oecd/en/topics/policy-sub-issues/oda-eligibility-and-conditions/DAC-List-of-ODA-Recipients-for-reporting-2024-25-flows.pdf>), and where the project and community dialogues would be implemented. Involvement of high-income country-based personnel or institutions must be clearly justified and may not be allocated more than 10% of the budget.

The lead organisation must:

1. Be a registered legal entity in that LMIC and be willing and able to enter into a contractual agreement, as the Commissioned Organisation, with ICARS. The successful institutions will be required to comply with the grant conditions of ICARS.
2. Demonstrate equity, diversity, and inclusion in the project team.
3. Have submitted a completed application as per the guidance in this RFP. We will be unable to accept incomplete applications and those submitted after the end date.

It should be noted that profit-making organizations and international organisations (including United Nations Organizations or any international academic/non-profit/for-profit institution) are not eligible as the lead research institution for this project. However, they can be collaborators bringing their own funding or in-kind contributions. We define an international organization as an entity that originates from a formal treaty, is funded by international donor

countries, and whose object is to operate internationally. Also, as only a single institution will receive the fund disbursement from ICARS, we expect that the lead organization will disburse funds to partner institutions. Additionally, we expect partnership contracts to be signed between the lead institutions and all partner institutions within the first six months of the project.

8.6.2 Project team required expertise

ICARS expects the core project team to reflect the disciplines required to conduct a thorough scoping review and write a manuscript on the findings, organize round table discussions, community events and the AGE meeting. Also, gender consideration should be demonstrated. As such, proposals that show the following skills-sets are encouraged:

- climate change and AMR research;
- assessing heterogeneity and publication bias;
- systematic review design and execution;
- data extraction and quality assessment;
- clear reporting of findings;
- scoping review methodologies ;
- literature search strategies;
- data extraction and charting;
- participatory research;
- stakeholder engagement;
- quality and relevance assessment;
- project management;
- collaboration and communication;
- ethics and compliance;
- policy-related research experience;
- ability to deliver high quality outputs;
- publish manuscript(s) and data generated in open access journals and databases; and
- Other expertise relevant for this RFP
-

8.6.3 Budget guidance

The project budget should include the following categories at minimum:

- a. Salaries and Fees (including estimated number of billable days to complete the work and rates for project team members).
- b. Local travel and subsistence.
- c. Project activities
- d. Dissemination costs, including all costs related to knowledge translation and dissemination Indirect costs: (e.g. Audit, Overheads, etc) should be limited to 15% of the direct costs. Maximum overhead rates will be 15%.

If a co-applicant research institution, university or partner stakeholder has an actual overhead/indirect cost rate that is lower, the lower rate will apply, and the institution/university/stakeholder should not increase the funding request to the maximum overhead rate allowed. Co-applicant research institutions or universities and partner stakeholders are required to provide documentation if they have a general overhead/indirect cost rate.

The actual overhead awarded in a grant budget may vary up to the maximum overhead rate and is based on a case-by-case decision depending on factors including, but not limited to, the type of research project, the level of administrative effort required, the overall grant size and the extent of sub-awards.

e. Contingency

For flexibility, a contingency of maximum of 5% of the direct costs can be included. It will be possible to use this amount for the cost of items directly related to the project that were encountered in the process of project implementation and that were unforeseen in the process of budget preparation. These costs should not include items that otherwise should be absorbed by the project overhead. Utilisation of the contingency must be communicated and agreed with ICARS during project implementation.

f. Audit

The annual and the final accounts must be externally audited, and the audit is to include the entire set of project accounts, including the accounts of every partner institutions/stakeholder. The maximum amount to be used for audits is 2000 USD for the project duration. The funds for audit are earmarked. Additional expenses will not be accepted but must be borne by the research institution responsible for the financial reporting. The audit expenses are not subject to overhead.

9 Proposal review criteria

Proposals will be reviewed based on the following criteria:

1. Fit to the scope of the RFP.

The application:

- Delivers an approach that supports the key objectives and results required.
- Demonstrates a robust logic that clearly links research questions, methodologies, activities, outputs and outcomes.

2. Clarity and a focused approach

The application:

- Has a feasible and clearly defined approach to understand the interconnections between AMR and climate change.
 - Has a strong methodology to deepen the understanding of the interlinkages of AMR and climate change in the defined context.
 - Provides a justified budget aligned to the scale and scope of the proposed project.
3. Competence and strength, including equity and diversity of the research collaboration.

The application:

- Clearly promotes intersectoral partnerships and processes between researchers.
- Demonstrates skills/expertise/experience/location of the team that are relevant to the proposed scope and activities.
- Demonstrates ability to manage the funds and produce required deliverables in compliance with the grant conditions, including ethical guidelines, standards and principles.
- Has considered potential solutions to address the gaps that emerge – both barriers and best practices (positive and negative)

10 How to apply

Interested projects should complete the questions in the attached Word document template provided.

All applications will be reviewed, and successful candidates will be notified within 14 days regarding the status of their application. Please note that only one proposal will be awarded this grant.

Applicants are to bear all costs associated with submitting their proposals. Also, ICARS reserves the right to not select any application.

Proposals should be emailed to cc_amr@icars-global.org no later 1 October 2024.

11 Contact

For any specific questions related to this request for applications, please reach out to Dr. Sunday Ochonu Ochai and Dr. Kristina Osbjer cc_amr@icars-global.org.

ⁱ **IPCC (Intergovernmental Panel on Climate Change)**. 2018. *Global Warming of 1.5° C. An IPCC Special Report on the impacts of global warming of 1.5° C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Geneva, IPCC. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf

ii *The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come* Watts, Nick et al. *The Lancet*, Volume 392, Issue 10163, 2479 – 2514

iii MacFadden, D.R., McGough, S.F., Fisman, D. et al. Antibiotic resistance increases with local temperature. *Nature Clim Change* 8, 510–514 (2018). <https://doi.org/10.1038/s41558-018-0161-6>

iv **Magnano San Lio, R., Favara, G., Maugeri, A., Barchitta, M. & Agodi, A.** 2023. How antimicrobial resistance is linked to climate change: an overview of two intertwined global challenges. *International journal of environmental research and public health*, 20(3): 1681.

v <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

vi **Rupasinghe, N., C. Machalaba, T. Muthee, & A. Mazimba.** 2024. *Stopping the Grand Pandemic: A Framework for Action. Addressing Antimicrobial Resistance through World Bank Operations*. Washington, DC, World Bank. License: CC BY 3.0 IGO.

vii Global Leaders Group on Antimicrobial Resistance. 2021. Antimicrobial resistance and the climate crisis. Information note.

viii **FAO.** 2017. *Livestock solutions for climate change*. Rome.
<https://openknowledge.fao.org/server/api/core/bitstreams/0d178ab7-b755-4eb2-a6cd-05ba1db35819/content>

ix **Kummu, M., Heino, M., Taka, M., Varis, O. & Viviroli, D.** 2021. Climate change risks pushing one-third of global food production outside the safe climatic space. *One Earth*, 4(5): 720-729.

x **FAIRR.** 2022. *Food systems and livestock production under climate change: the IPDD's sixth assessment*.
<https://www.fairr.org/policy/issue-briefings/food-systems-and-livestock-production-under-climate-change>

xi **Mulchandani, R., Wang, Y., Gilbert, M. & Van Boeckel, T.P.** 2023. Global trends in antimicrobial use in food-producing animals: 2020 to 2030. *PLOS Global Public Health*, 3(2): e0001305.

xii **FAO.** 2024. *The State of World Fisheries and Aquaculture. Blue transformation in action*. Rome.
<https://doi.org/10.4060/cd0683en>

xiii **Schar, D., Zhao, C., Wang, Y., Larsson, D.J., Gilbert, M. & Van Boeckel, T.P.** 2021. Twenty-year trends in antimicrobial resistance from aquaculture and fisheries in Asia. *Nature Communications*, 12(1): 5384.