



Department
of Health &
Social Care

Global Antimicrobial Resistance Innovation Fund (GAMRIF)

Annual Review 2021/22

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Abbreviations list

Abbreviation	Term
AMR	Antimicrobial Resistance
BBSRC	Biotechnology and Biological Sciences Research Council (UKRI)
CARB-X	Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator (USA)
CHAI	Clinton Health Access Initiative (USA)
CSR	Comprehensive Spending Review
CST	CARB-X Support Team
DHSC	Department of Health and Social Care (UK)
FIND	Foundation for Innovative New Diagnostics (Switzerland)
GAMRIF	Global AMR Innovation Fund (UK)
GARDP	Global Antibiotic Research and Development Partnership (Switzerland)
GHR	Global Health Research
GHS	Global Health Security
HMT	Her Majesty's Treasury (UK)
ICARS	International Centre for Antimicrobial Resistance Solutions (Denmark)
IDRC	International Development Research Centre (Canada)
IUK	Innovate UK (UKRI)
KTOs	Knowledge transfer outputs
LMIC	Low- and Middle-Income Country
MEL	Monitoring, Evaluation and Learning
MoST	Ministry of Science and Technology (China)
ODA	Official Development Assistance
PCR	Project Change Request
PD	Product Developer
PDP	Product Development Partnership
R&D	Research and Development
ToC	Theory of Change
TPP	Target Product Profile

Abbreviation	Term
TRL	Technology Readiness Level
UKVN	UK Vaccine Network
VFM	Value for Money
WP	Work Package

1. Summary and overview

Project Title: Global Antimicrobial Resistance Innovation Fund (GAMRIF)

Project Value (full life): £63.5 million

Review period: 1 April 2021 to 31 March 2022

Project Start Date: July 2016

Project End Date: Phase 1 of GAMRIF ended 31 March 2022 (some legacy projects continue with costed and no-cost extensions)

Summary of Project Performance

Year	2020	2021	2022
Project Score	N/A	A	A
Risk rating	N/A	Amber-Green	Amber

1.1 Outline of project

[GAMRIF](#) was established by the 2015 Comprehensive Spending Review (CSR) settlement as a £50 million Official Development Assistance (ODA) fund. GAMRIF invests in underfunded and neglected areas of early-stage, innovative research and development (R&D) that address antimicrobial resistance (AMR) for the benefit of people in low- and middle-income countries (LMICs). GAMRIF is a [One Health](#) fund that invests in product development research across human, animal and environmental health. The fund supports high-quality research from around the world that has the potential to lead to tangible innovations that will help to prevent, detect and/or treat drug-resistant infections in resource-poor settings. GAMRIF's specific aims are to:

- establish international research partnerships and support research competitions that fund innovation and development of new technologies and interventions to tackle AMR
- leverage investment from other partners and donors to support sustainable financing in AMR R&D
- establish research partnerships using a One Health approach

- fund projects that will develop solutions specifically for LMICs, where the burden of AMR is greatest

Through these objectives, GAMRIF advances the aim of the Department of Health and Social Care's (DHSC) Global Health Security (GHS) programme to prevent and reduce the future burden of AMR in LMICs, while also supporting improved disease detection and response.

1.2 Summary of progress

To note: GAMRIF 1.0 refers to the programme established in CSR15 that ran from July 2016 to March 2022 (along with projects within this timeline that received extensions for beyond March 2022); GAMRIF 2.0 refers to the second phase of the programme, currently being planned.

This review period took place in the context of continued COVID-19 disruption globally and was the final year of GAMRIF 1.0 programming. Despite this disruption limiting some projects, such as Argentina undergoing a significantly long lockdown which led to the need to extend our bilateral partnership, GAMRIF launched 2 additional work packages (WP): an implementation research pilot project with the International Centre for Antimicrobial Resistance Solutions (ICARS, WP8), and a market-shaping pilot project with the Clinton Health Access Initiative (CHAI, WP9). These achievements enabled the continued delivery of high-quality innovative research with ongoing focus and funding for product development to tackle AMR in LMICs. Other key achievements included:

- Leveraging £56.5 million from additional funders to increase the impact of work on AMR
- Investing a further £4.5 million in funding to the Global Antibiotic Research and Development Partnership (GARDP) (WP6) to develop new treatments for drug-resistant infections, diversifying our portfolio and bringing cumulative UK investment in GARDP to £19 million. Through this additional funding, GAMRIF supported the development of new treatments for drug-resistant infections, including the new, first-in-class antibiotic (in over 30 years) Zoliflodacin which is in Phase III clinical trials.
- Downstream partner projects producing 162 knowledge transfer outputs (KTOs); increasing awareness of AMR and raising the profile of GAMRIF research
- Numerous projects funded through the Combatting Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator (CARB-X) have increased their Technology Readiness level. For example, Amicidin- β , a novel biological therapeutic, has

progressed towards clinical trials and manufacturing as well as [Target Product Profile](#) (TPP) development with LMIC expert engagement. This therapeutic will be used in LMICs to target infections caused by common operations, such as C-sections.

Referring to Annex 1, the overall score for the programme is A for this review period (Outputs met expectation). During this review period, GAMRIF maintained steady progress against the 3 outputs, achieving 7 out of the 8 output indicators for which a target was set, including surpassing 2 targets (Annex 1). For example, 24 training and capacity building activities took place within GAMRIF's Global Initiatives projects against a target of 10, more than doubling this.

Case Study: Foundation for New Innovative Diagnostics (FIND) *N. gonorrhoeae* diagnostic

With the support of GAMRIF funding, FIND (WP5) is developing a new, low-cost lateral flow test to identify *N. gonorrhoeae*, the bacteria responsible for gonorrhoea infections for use in low- and middle-income countries (LMICs).

The [UK Government's 2016 Antimicrobial Resistance \(AMR\) Review](#) recommended that no antimicrobial should be prescribed without performing a rapid diagnostic test to prove its need. This is still a long way off in practice, particularly in LMICs where access to diagnostics remains very poor.

Gonorrhoea is particularly prevalent in LMICs (Africa has the highest incidence worldwide) and management is largely based on patients' symptoms. To ensure that current and new antibiotics are used responsibly and to prevent incorrect, inadequate or excess prescribing, it is essential to have low-cost, rapid diagnostics.

Such a test could be used at the point of care in LMICs and would allow antibiotics to only be prescribed for patients confirmed to have gonorrhoea. This would mean patients get the correct treatment more quickly, reducing their ability to transmit further, and reducing the overprescribing of antibiotics, therefore protecting their utility for the future.

FIND carried out research into barriers to access for this diagnostic in LMICs, allowing it to be specifically designed to suit the settings it will be used in. This included the need to be quick and easy to carry out (without requiring laboratory capacity) and low cost. As the burden on gonorrhoea is greatest in LMICs and women are specifically affected, they will benefit the most from this new diagnostic.

As of April 2022, the most advanced and promising product is a low-cost rapid diagnostic test that has been developed and verified and is ready for transfer to manufacture.

1.3 Progress against recommendations

This section sets out the progress on the recommendations from the [Annual Review 2020/21](#).

Finance

Recommendation 1/20-21: GAMRIF should continue to work closely with all delivery partners to understand the ongoing impact of the COVID-19 pandemic on financial forecasting, as well as refining its own internal financial management tools.

Progress: Achieved. GAMRIF has held either monthly or quarterly catchups with delivery partners to proactively manage progress as GAMRIF 1.0 concludes, has granted additional funding where appropriate, and has approved no-cost and costed extensions where needed to ensure Value for Money (VFM) following COVID-19 delays. GAMRIF also made use of new internal financial tools such as an invoice tracker to complement the main finance tracker, which improved budget management by tracking all outgoing WP spend. GAMRIF will continue to develop financial management tools in GAMRIF 2.0 - see recommendation 11/21-22.

Theory of Change

Recommendation 2/20-21: GAMRIF should carry out an in-depth review of the [logframe](#) and output indicators in the next review period.

Progress: Partially Achieved. GAMRIF commenced planning with the GHS Monitoring and Evaluation and Learning (MEL) lead for an updated logframe to inform GAMRIF 2.0 in the next review period. This was not fully achieved in this review period as we prioritised the development of the GAMRIF 2.0 business case, which will inform the final iteration of the new logframe. This will ensure our objectives for GAMRIF 2.0 remain relevant and allow accurate monitoring as we continue to fund the most promising research to tackle AMR.

Recommendation 3/20-21: GAMRIF should streamline all data collection processes in the next review period.

Progress: Achieved. GAMRIF developed an Annual Review reporting template that was issued to all 9 delivery partners for Annual Review data collection, enabling the delivery partners to populate and return with ease. This revised process seems to have been well

integrated by delivery partners, although we will continue to work with them to ensure our requests for information are clear, proportionate and purposeful. The template has had a positive impact on the GAMRIF team's ability to complete this annual review.

Monitoring

Recommendation 4/20-21: For the next review period, GAMRIF should further refine its internal file share system, including holding dedicated information management meetings and upskilling the team on good information management practices.

Progress: Achieved. GAMRIF held information management meetings during this review period and are continuing to refine these practices. This ensured improved information management, and ease of navigation for new starters, saving time and increasing efficiency.

Learning

Recommendation 5/20-21: GAMRIF should hold regular meetings with UKVN to continue to share lessons and improve efficiency of programming.

Progress: Achieved. GAMRIF and the UK Vaccine Network (UKVN) have held fortnightly meetings to share lessons and improve efficiency of programming between the 2 R&D projects within the Global Health Security portfolio. The GAMRIF and UKVN Programme Officers also have regular catchups to discuss programme management practices (such as processing programme finances) which are particularly beneficial where the 2 projects share delivery partners.

Recommendation 6/20-21: For the next review period, GAMRIF should commission an independent gap analysis to assess the current AMR R&D landscape, and thereby identify neglected and underfunded areas of AMR research.

Progress: Achieved. GAMRIF commissioned an independent gap analysis through the consultancy, Ecorys. This helped GAMRIF make evidence-based funding decisions when planning for GAMRIF 2.0. The gap analysis covered 6 study areas: diagnostics, therapeutics, and vaccines ("human health"), and plants, environmental contamination, and animal health. A final report provided the results, findings, and observations of the gap analysis.

Case study: Using an independent gap analysis to inform GAMRIF 2.0's priority research areas

GAMRIF commissioned an objective review of the AMR landscape to judiciously allocate funds between AMR research themes.

GAMRIF can only fulfil its remit of funding neglected areas of research if it has objective, up-to-date evidence describing what those areas are. Therefore, in 2021, GAMRIF procured a consultant to conduct a gap analysis to assess the current AMR R&D landscape and thereby identify underfunded areas.

Following an extensive review of the literature, 36 key informant interviews, and an expert survey (55 respondents), the gap analysis provided valuable recommendations for allocation of GAMRIF 2.0 funds. Research areas were ranked against the following criteria: i) Alignment with the National Action Plan on AMR, and the Global Action Plan on AMR ii) Potential for impact in LMICs iii) Whether the research areas were currently neglected/underfunded and iv) Alignment with GAMRIF's Theory of Change.

The findings support GAMRIF 2.0 continuing to fund early-stage R&D, and to protect that investment with innovation support. The gap analysis suggested supplementing the portfolio with some lower risk research opportunities ('low-hanging fruit', such as repurposing existing products), and funding research that would identify and tackle barriers to market that might exist for the products GAMRIF invest in.

1.4 Major lessons and recommendations

For the year ahead, GAMRIF has identified key lessons learned and recommendations. A selection of these is captured below and the remainder are embedded throughout the report. This learning can be used in the development of GAMRIF 2.0, ensuring that the programme continues to have the desired impact and fills a vital gap in the AMR pipeline.

Lesson Learned: External evaluations are important to be able to understand objectively if a programme met its targets and achieved its outcomes; this was last reviewed during the interim evaluation.

Recommendation 1/21-22: GAMRIF will commission an independent evaluation to understand the longer-term successes of the programme, including the impact, and learn lessons that can inform the ongoing management of GAMRIF 2.0.

Lesson Learned: An in-depth review of the logframe and Theory of Change (ToC) highlighted areas for change, including cross-cutting principles, such as gender and climate impact, which apply across the entire programme. These changes will need to be aligned with the data collection tools used by GAMRIF 2.0 to ensure that GAMRIF is able to evidence success, while maintaining ease of reporting for delivery partners.

Recommendation 2/21-22: GAMRIF should finalise the new logframe and ToC prior to the launch of GAMRIF 2.0 and share this with delivery partners. GAMRIF should ensure delivery partners are aligned with this during GAMRIF 2.0 grant and Memorandum of Understanding (MoU) negotiations and can report against these indicators in their quarterly reporting.

Lesson learned: Multiple WPs require high levels of input from GAMRIF which means a high level of oversight is needed from GAMRIF's small team. Streamlining work packages should allow for improved project management.

Recommendation 3/21-22: Within the next year GAMRIF 2.0 should explore options to streamline WPs, whilst ensuring overall objectives are still met.

2. Theory of Change and Logframe

2.1 Summary of changes

The GAMRIF [ToC](#) remains logical in its pathway to achieving the outcomes and impact that the fund was designed to achieve, and the assumptions remain valid. As such, no changes have been made to the ToC this review period despite the delays caused by the pandemic (details to mitigate this are clarified in section 6.1). As mentioned in section 1.3, the team also began a review of the ToC, but we are awaiting final approval of the GAMRIF 2.0 business case to inform the final iteration of this and the accompanying [logframe](#).

2.2 Project's progress

During the last review period GAMRIF has continued to progress well towards expected outcomes. 2021/22 was originally GAMRIF 1.0's final year of funding, but due to the impact of COVID-19, such as particularly long lockdowns as was the case in Argentina, some projects are still ongoing, having received costed (WP 3) and no-cost (WP1 and WP4) extensions.

The independent interim report by Ecorys showed that GAMRIF has progressed well on Output 1. GAMRIF has leveraged an additional £56.5 million overall and influenced existing product development organisations, such as the CARB-X, GARDP, and FIND, towards stronger LMIC focus and collaborations. For example, GARDP leveraged almost USD 3.3 million from organisations based across the world, ranging from Japan to the South Africa.

GAMRIF's portfolio has continued to grow, contributing to an improved supply of promising appropriate and affordable products and tools for combatting AMR in LMICs (Outcome 2). As of 31 March 2022, GAMRIF has funded 82 projects in total across the One Health spectrum. This is through a combination of new projects with existing partners, such as 10 new projects through BactiVac (WP7), and 2 additional WPs (ICARS (WP8) and CHAI (WP9)). Many of these projects have progressed up the technology readiness levels (TRL (Annex 2)) towards real-world testing. The new ICARS project involved real-world testing and 3 projects through FIND progressed to phase I, II and IV clinical trials respectively, demonstrating Output 3.1. Funded through CARB-X, GSK Bio's iNTS-TCV, a paediatric vaccine, received a safe-to-proceed letter from the Belgian regulators to commence a first-in-human program. The initial study will evaluate safety and immunogenicity in healthy adults in Belgium, followed by a similar study in Malawi.

The bilateral partnerships have yielded good technical results, showing successful collaboration between researchers in the UK and Argentina and the UK and China. Both of the bilateral partnerships have received no-cost extensions which meant that targets for investment were not met within this annual review period. However, knowledge translation outputs have been successfully generated which will impact country relationships and AMR awareness, satisfying Outcome 3. The interim evaluation found that GAMRIF had facilitated a significant and positive step forward for the relationship between the UK and Argentina. The inclusion of these bilateral partnerships therefore allows for GAMRIF to be a lever with which to continue diplomatic work in the future. GAMRIF 2.0 should aim to learn lessons from these partnerships and ensure the optimum political impact can occur through any future bilateral funding streams.

Evidence generation towards the ToC outcome relating to behaviour change in industry and clinical practice is ongoing. The new ICARS WP (WP8) will help inform this by informing national policies for pork farms in Columbia and regional knowledge translation of project results. Similarly, the CHAI WP (WP9) aims to assess the potential for market shaping strategies to address policy, implementation and supply-side barriers to access.

3. Detailed output scoring

Output 1

Foster international partnerships to increase attention and leverage funding towards AMR research and innovations for the benefit of people in LMICs.

Output score: B

Impact weighting (%): 30%

Weighting revised since last AR? No

Risk rating: Green

Risk revised since last AR? No

To note: indicators with no milestones for this review period have not been included.

Indicator(s)	Milestone for the review	Progress
1.3 Global meetings, discussions and other knowledge sharing opportunities are held and directly supported by GAMRIF, which bring together researchers from LMIC organizations	≥ 30 LMIC researchers engaged GAMRIF supports two international meeting with participants from LMIC research organisations	Delayed

Indicator 1.3 - As international travel was still restricted at the start of this review period, no international meetings with participants from LMIC research organisations were organised or supported by GAMRIF. GAMRIF had hoped to support the BactiVac Third Annual Network Meeting during this review period. Originally scheduled 24 to 27 March 2020 in Kilifi, Kenya, this event was postponed due to the COVID-19 pandemic. GAMRIF is planning on supporting BactiVac and other conferences which have been postponed when global travel restrictions are lifted.

Although GAMRIF did not engage directly with downstream LMIC researchers, the team received regular updates from delivery partners to ensure visibility.

Further advocacy was achieved by the GAMRIF project lead attending the World AMR Congress in Washington DC in November 2021. This was an invaluable opportunity for post-pandemic face-to-face networking and raising awareness of GAMRIF's work.

Lesson learned: As GAMRIF 1.0 is coming to an end, there are learning opportunities from across the programme. In the context of a pandemic and given the number of delivery partners and downstream grantees, GAMRIF has not yet had an opportunity to convene all its key stakeholders to meet together. It would be beneficial to bring together these different streams to discuss lessons learnt and research outcomes and create networking opportunities for future partnerships.

Recommendation 4/21-22: GAMRIF should plan to hold a learning event within the next year, to bring together delivery partners and downstream grantees to ensure all learning opportunities are fully captured and facilitate networking between researchers based in different countries.

Output 2

Enhance bilateral research partnerships (UK-China (WP1) and UK-Argentina (WP4)) that will support AMR research

Output score: A

Impact weighting (%): 20%

Weighting revised since last AR? No

Risk rating: Green

Risk revised since last AR? No

Indicator(s)	Milestone for the review	Progress
2.1 The number of bilateral research projects between researchers from the UK and a bilateral partner that receive funding towards an agreed upon project	19 Projects (Continued)	Achieved 19 Projects
2.2 The number and range of knowledge translation outputs (KTOs) produced by funded projects	Increasing number of knowledge translation products are produced. A variety of products are products to reach different audiences.	Achieved 56 KTOs produced
2.3 Successful research competitions are run and as a result GAMRIF funding for bilateral partnerships is allocated to selected projects	27.36% of bilateral funding disbursed to selected research projects	Achieved 25.77% Bilateral funding disbursed

Indicator 2.1 - 19 projects in total have received funding towards an agreed upon project: 14 projects under UK-China (WP1) and 5 projects under UK-Argentina (WP4).

Indicator 2.2 - 56 knowledge transfer outputs (KTOs) have been produced by funded projects; 29 KTOs reported from UK-China (WP1), and 27 KTOs reported from UK-Argentina (WP4). Examples of this include WP4 researchers giving a talk on how to predict AMR from whole genome sequencing and its implications on diagnostic microbiology to an audience of hospital registrars and consultants, and collaborative UK-China journal articles being published.

Indicator 2.3 - During 2021/22, for UK-China (WP1) and UK-Argentina (WP4), 25.77% of combined programme budget was disbursed. Despite continued impacts of the COVID-19 pandemic, and WP4 pausing project payments in Q2, which slowed project spend, the milestone was deemed to be achieved due to the negligible percentage difference in progress vs milestone. WP4's projects received no-cost extensions until March 2024, and some of WP1's projects either received no-cost extensions or had funding moved into FY22/23 via project change requests (PCRs).

Lesson learned: The political impact of and ability to influence through bilateral partnerships within GAMRIF 1.0 has been difficult to gauge. There may be potential to enhance this by continuing to ensure that the most relevant stakeholders from both the partner country and within DHSC (AMR diplomacy team, Fleming Fund etc) and the wider UK government are involved when setting up new partnerships for GAMRIF 2.0.

Recommendation 5/21-22: GAMRIF should perform thorough landscape analysis and ensure alignment with relevant UK government teams and departments to inform future impactful bilateral partnerships under GAMRIF 2.0.

Output 3

Support global initiatives (CARB-X (WP2), InnoVet-AMR (WP3) BactiVac (WP7), ICARS (WP8) and CHAI (WP9)) that foster innovation in AMR research and product development, to develop knowledge and research that have benefit for LMICs

Output score: A+

Impact weighting (%): 30%

Weighting revised since last AR? No

Risk rating: Green

Risk revised since last AR? No

Indicator(s)	Milestone for the review	Progress
3.1 The number of research projects within global initiatives that receive funding towards an agreed upon project	3 human/animal vaccines and alternatives to antibiotics are advanced to real-world testing (level 4, Annex 2), which includes clinical trials in humans and the development phase in animals	Surpassed 8 projects advanced to real-world testing
3.2 The number and range of knowledge translation outputs produced by funded projects	Increasing number of knowledge translation products are produced. A variety of products are products to reach different audiences.	Achieved 162 KTOs produced
3.3 Successful research competitions are run and as a result GAMRIF funding for global initiative partnerships is allocated to selected projects	26.45% of global initiative funding disbursed	Achieved 24.21% global initiative funding disbursed

Indicator(s)	Milestone for the review	Progress
3.4 The number of research projects that have participated in training, capacity building or mentorship as a part of carrying out their research program	10 projects participate in training, capacity building or mentorship	Surpassed 24 projects participated in training, capacity building or mentorship

Indicator 3.1 - As GAMRIF expected this to be the last year of phase one, the key performance indicator (KPI) was set to measure the number of funded projects within our global initiatives portfolio that had reached a stage where they could be tested in the real world. Real world was defined as level 4 in the TRL Table (Annex 2). At least 8 projects have reached this milestone, well exceeding the KPI of 3 that was originally set. These include BactiVac projects developing a vaccine against plague and a phage cocktail for chickens against Salmonella spp.

Indicator 3.2 - GAMRIF-supported projects reported producing 162 KTOs in total; 89 KTOs from CARB-X (WP2), 54 KTOs from InnoVet-AMR (WP3), 13 KTOs from BactiVac (WP7), 4 KTOs from ICARS (WP8) and 2 KTOs from CHAI (WP9). These ranged from social media posts to journal articles and expert panel presentations. For example, a journal article by a researcher funded through BactiVac, with a researcher from Vietnam involved in the project was [published in Fish and Shellfish Immunology](#).

Indicator 3.3 - During 2021/22, for CARB-X (WP2), InnoVet-AMR (WP3), BactiVac (WP7), ICARS (WP8) and CHAI (WP9), 24.21% of combined programme budget was disbursed. This was deemed to have been achieved due to the negligible percentage difference to the milestone. Whilst CARB-X (WP2) were able to achieve full expenditure, InnoVet-AMR (WP3) received a costed extension (from both organisations), and the funding was reprofiled. For BactiVac, this review period saw 10 new projects approved and the 2 new WPs, ICARS (WP8) and CHAI (WP9) achieved full expenditure.

Indicator 3.4 - Twenty-four projects in total across CARB-X (WP2), InnoVet-AMR (WP3) and ICARS (WP8) participated in training, capacity building or mentorship. All 14 projects within the CARB-X (WP2) portfolio had routine quarterly meetings with their dedicated CARB-X Support Team (CST). Each CST includes subject matter experts selected specifically to meet the needs of each project. Product developers (PDs) also had access to project-specific assistance from the CARB-X Global Accelerator Network experts. PDs are coached on areas such as regulatory strategy, study design and clinical microbiology.

All 11 projects within the InnoVet-AMR (WP3) portfolio had access to training and support on scientific aspects, commercialisation aspects, intellectual property and quality assurance. BactiVac (WP7) did not report any specific training, but all projects within the portfolio have access to various upskilling and capacity building opportunities, such as grant writing and communications as part of their membership of the BactiVac network.

4. Project performance not captured by outputs

Given COVID-related project delays from GAMRIF's Product Development Partnerships (PDPs) with FIND and GARDP, and thanks to the project team's ability to adapt to changing circumstances, GAMRIF successfully disbursed an additional £4.9 million to the PDPs. This represented excellent Value for Money as both PDPs had clear workplans and deliverables that aligned well with GAMRIF's overall objectives. As a result, GAMRIF are progressing towards developing affordable innovations that will reach commercialisation

Although not directly measured in GAMRIF's ToC or logframe, gender and equity are areas of importance to the team. The GAMRIF project team have worked with delivery partners such as InnoVET-AMR and ICARS (supported by funding from other sources) who have incorporated these values in their project level work. In December 2021 these delivery partners ran 3 roundtable discussions on gender and AMR. InnoVet-AMR has a Performance Monitoring Framework which contains a specific indicator to measure gender considerations, as well as sex-disaggregated data. Additionally, a gender consultant advises research projects, ensuring innovations are context-specific to maximise uptake. For GAMRIF 2.0, the team will consider ways to encourage all delivery partners to consider gender and equity as part of grant making and monitoring.

Recommendation 6/21-22: GAMRIF should consider capturing gender and equity data in GAMRIF 2.0 and ways in which GAMRIF 2.0 can impact on these cross-cutting issues.

A variety of new trackers were put in place to improve project management during this last annual review period. A new invoice tracker was developed with the support of the GHS finance lead and a Power BI (project management tool) dashboard was set up for easy reviewing of the portfolio.

In line with new granting standards, Fraud Risk Assessments were created for all GAMRIF WPs, including actions such as spot checks and increasing asset checks, thereby ensuring an increased level of protection for GAMRIF and DHSC.

Recommendation 7/21-22: GAMRIF should further strengthen their work around fraud prevention, including working with delivery partners to mitigate any potential for fraud to ensure taxpayers' money is being spent effectively and to remain a reputable aid spender.

5. Risk

5.1 Overall risk rating

Overall Risk Rating: Amber

The GAMRIF team undertakes quarterly internal reviews of the GAMRIF risk register. The risk register includes WP-specific risks, as well as overarching programme risks, some of which could be considered inherent (i.e., the risk of scientific failure, which will always apply for early-stage R&D). Despite the materialisation of risks such as a reduction in DHSC's aid budget, GAMRIF only receiving a 3-year spending settlement with 2 years at risk (making it difficult to fund research, which is longer term in best practice), and GAMRIF staff changes, GAMRIF adopted mitigations to successfully manage these risks. GAMRIF will continue to apply an adaptive risk management process and maintain regular communication with delivery partners, adjusting the programme to the changing environment and following a plan to monitor, identify, respond, and adapt.

5.2 Overview of project risk

Risk description: Underspending against UK Government ODA target

Mitigation strategy: The GAMRIF team worked closely with both the GHS finance lead and delivery partners to mitigate any project delays and associated underspends. Underspends were managed through establishing new partnerships with ICARS (WP8) and CHAI (WP9), which were novel research areas for GAMRIF. The team also repurposed within CARB-X (WP2) to cover Portfolio Accelerator Tools and by frontloading to PDs and gave greater funding to GARDP (WP6). This ensured continued responsible spending of ODA, reduced risks of underspending and provided greater Value for Money (VFM) for the UK taxpayer.

Residual risk rating: Amber

Risk description: Loss of institutional knowledge due to staff turnover

Mitigation strategy: GAMRIF underwent changes to staffing during this review period. During this time the team encouraged best practice around information management, prioritisation and induction. The team also created tools such as a how-to guide for financial processing and 'AMR 101' sessions for new staff.

Residual risk rating: Green

Risk description: Products fail to deliver their objectives due to scientific failure

Mitigation strategy: Early-stage research and development is by nature high risk. GAMRIF continued to evaluate the likelihood of future success through monitoring technical reports provided by delivery partners, using their scientific advisor's advice, as well as through regular and ad hoc meetings. GAMRIF also continued to support the GHS International AMR team in their work on reimbursement funding models, alongside providing funding for innovation support services, such as the CARB-X Global Accelerator Network. Scientific failure is within the accepted programme portfolio risk appetite as this will provide lessons learned for future research.

Residual risk rating: Amber

6. Project management

6.1 Delivery against planned timeframe

The [GAMRIF Programme Business Case \(2017\)](#) provides an illustrative timeline for activity under the WPs (WPs 1 to 5 at the time of writing), with a confirmed budget of £50 million and an end date of March 2022. WPs 1 to 5 and the additional WPs 6 to 9 that were subsequently added to the GAMRIF portfolio were on track in the previous review period to end and deliver outcomes in accordance with the timeline set out in the Programme Business Case (PBC).

GAMRIF 1.0 has now concluded its investments in CARB-X (WP2), GARDP (WP6), BactiVac (WP7), ICARS (WP8) and CHAI (WP9).

Due to the previously mentioned delays caused by COVID-19, GAMRIF agreed to extensions where these were justified and appropriate.

IDRC received a costed extension in the previous annual review period to extend the grant from June 2022 to December 2023 and is on track to meet this new timeframe.

UK-China (WP 1), UK-Argentina (WP 4) and FIND (WP5) all received no-cost extensions. FIND received an extension to September 2022, UK-China to March 2023 and UK-Argentina to March 2024. All 3 WPs are on track to meet these new extensions. However, this means that some projects will not be completed within the initial timeframe and GAMRIF will have to wait to evaluate the final outcomes and impact of GAMRIF 1.0.

The initiation of work on the PBC for GAMRIF 2.0 should allow the fund's second phase to launch as GAMRIF 1.0's extended projects come to a close, ensuring continuity. While GAMRIF 2.0 will maintain the unique selling point– as the only One Health AMR R&D for the benefit of people in LMICs – strategic changes to widen the scope (thematic areas, stage of research and type of research) may be incorporated to ensure that GAMRIF responds to the current unmet needs within the AMR R&D ecosystem. This will also maximise opportunities to leverage additional international cooperation and funding into AMR R&D for the benefit of people in LMICs to help ensure value for money (VfM) through high additionality and improved sustainability. As part of this work, the GAMRIF team is on track for the new ToC and logframe to be completed and embedded in the grant negotiation process for GAMRIF 2.0.

6.2 Performance of partnerships

In this review period, communication with delivery partners was strong, with frequent and productive reporting. The GAMRIF team informed delivery partners of key milestones, such as the CSR21 settlement, once updates were pertinent to share. GAMRIF undertook monthly programme management calls with IUK, CARB-X, IDRC and the Biotechnology and Biological Sciences Research Council (BBSRC), and quarterly calls with the remaining delivery partners. This style of communication proved effective in disseminating project updates and challenges.

Partnerships with both FIND and GARDP have been effective, and the quarterly check-in calls alongside the six-monthly progress reporting remained a light-touch but important way to obtain updates on technical progress and financial management. Due to the strong working relationship, GAMRIF allocated GARDP an extra £4.5million for core funding during this review period (details in section 1.2).

Global Initiative partnerships with CARB-X, IDRC and BactiVac have likewise remained successful, with the latter launching 10 new projects in this review period. The grant agreement amendment process with IDRC was constructive and open despite the need for IDRC to adopt significantly strengthened safeguarding clauses to align with DHSC requirements. This process involved learning on both sides about how DHSC can accommodate partners to effectively enforce strengthened safeguarding principles by taking a pragmatic and tailored approach.

Recommendation 8/21-22: GAMRIF should strengthen their work with partners around safeguarding, emphasising the importance of awareness and relevant training for all employees and grantees. This should include routine reporting mechanisms and ensuring a zero-tolerance approach to safeguarding policy breaches.

GAMRIF's 2 bilateral partnerships, UK-China and UK-Argentina, have produced good research outputs, but this has not necessitated close contact with the Chinese or Argentinian government funding counterparts. GAMRIF has primarily liaised with the delivery partners, IUK and BBSRC, as the work package is now in implementation stage and issues have mostly related to project delivery. The GAMRIF team will be taking forward lessons from this when planning GAMRIF 2.0 (detailed in section 3.2.1).

Some challenges with financial reporting remain, such as with BBSRC temporarily pausing project payments, and IUK experiencing delayed invoicing by downstream researchers and uncertainty over forecasting. GAMRIF worked closely with both delivery partners to understand how to improve financial processes (further details in section 7.2).

The 2 new work packages with ICARS and CHAI enabled GAMRIF to fund pilot implementation and market shaping research, moving beyond GAMRIF's traditional R&D.

For a relatively small £50k sum of investment, ICARS took on a great deal of work to comply with DHSC granting procedures. However, ICARS reported the due diligence process was beneficial for their own organisational development as they become an independent entity. Likewise, the pilot project with CHAI has helped them solidify their position as a key global health partner within the AMR ecosystem.

GAMRIF also worked with the consultancy firm Ecorys which delivered the gap analysis and interim evaluation. Commissioning these reports allowed the GAMRIF team to identify opportunities for GAMRIF 2.0 and provided useful evidence for the business case. However, both contracts required a larger amount of project management from the GAMRIF team than expected, with outputs being delayed, in some cases significantly. GAMRIF has provided feedback to Ecorys so appropriate lessons can be learned by all parties.

Recommendation 9/21-22: For the next review period and in the development of GAMRIF 2.0, GAMRIF should use the gap analysis and interim report findings to ensure their work continues to be as effective as possible and targets areas of greatest need. This will also ensure VFM from the external reports.

6.3 Asset monitoring and control

GAMRIF did not have an asset management policy during this review period but contributed to the GHS development of a new programme-wide policy.

Recommendation 10/21-22: GAMRIF will strengthen their asset management approach in the context of the new DHSC assets policy and ensure this is embedded (where applicable) in new grant agreements for GAMRIF 2.0.

7. Financial performance

7.1 Value for Money

Economy

GAMRIF seeks to maximise economies of scale and leverage co-benefits from other organisations or programmes where possible, while investing in high risk/high gain AMR R&D. GAMRIF ensures optimal success for its high-risk investments by working through 9 different delivery partners, who are all leaders in their fields, across the One Health landscape.

When planning for GAMRIF 2.0, where delivery partnerships established under GAMRIF 1.0 can still demonstrate that they represent the best mechanisms, we will seek to continue these. Where new delivery partnerships are required, we will work with DHSC commercial and grants hub colleagues to ensure direct awards are only made following sufficient market analysis. GAMRIF will continue to require an element of competition – either when selecting delivery partners or downstream grantees – in all its WPs.

Although GAMRIF successfully added 2 new WPs during this review period, the time taken to set these up - for both GAMRIF and the respective delivery partner - was quite significant compared to the amount of funding allocated to the projects.

Recommendation 11/21-22: GAMRIF should consider following a minimum financial threshold for new WPs to ensure VFM.

Efficiency

Efficient processes and practices were crucial for GAMRIF during this review period, which saw staff changes in GAMRIF and the wider GHS programme, putting the team's ability to manage programme delivery at risk. Mitigations, such as thorough new starter inductions, prioritisation of essential activities, sharing of responsibilities, monitoring of deadlines and strengthening cross-team communications were put in place to ensure that GAMRIF continued to deliver core outputs. These new ways of working set a precedent for efficient teamwork.

As a result of the COVID-19 pandemic, many conferences were moved from in-person events to virtual events, allowing for greater knowledge transfer outputs and training and capacity building opportunities but removing the benefit of face-to-face interactions and 'corridor conversations'. In this review period, restrictions had begun to ease globally, allowing some in-person engagement, such as GAMRIF's Project Lead and Scientific &

Research Coordinator visiting Copenhagen, Denmark, to meet ICARS and representatives of the Danish Ministry of Health, raising the profile of GAMRIF's work.

This review period also saw GAMRIF use a new Power BI dashboard to visualise our investments to date. It enables examination of spending and project details through metrics such as geographic footprint, proportion of vaccine, therapeutic and diagnostic investments and One Health breakdown. This enabled the team to extract detailed and tailored information quickly.

The external gap analysis showed that there is still a lack of funding globally for innovations to tackle AMR, especially in environment and animal health and for human health R&D in LMICs. This highlights the importance of GAMRIF continuing to fund projects in these areas to address this gap.

Effectiveness

Ecorys' interim evaluation found that GAMRIF is effective and is fulfilling its objectives. Funding from other governments and foundations has been directly and indirectly leveraged, through multi-donor working and influencing a greater focus on addressing the needs of LMICs.

GAMRIF 1.0 will only be able to fully understand how well the outputs are achieving the higher-level outcomes and impact at a later stage. The longer-term impacts of GAMRIF funding are difficult to assess. These impacts depend on overcoming the risks of market failure associated with AMR and the challenges of introducing innovative technologies into low-resourced markets, as highlighted in the interim evaluation. However, to increase the likelihood that outcomes will be realised, this review period saw an increase in funding to GARDP, allowing for wider investment opportunities into activities beyond the GARDP Sexually Transmitted Infection programme and therefore expanding the GAMRIF investment portfolio.

To ensure effective monitoring and evaluation, GAMRIF secured an Impact and Evaluation Advisor on loan from Innovate UK for 3 months and undertook a Theory of Change workshop. Further details on this are in section 8.

Equity

GAMRIF is committed to ensuring that its funded innovations reach those who most need them, whilst recognising the importance of equitable partnerships to achieve the intended outcomes. The gap analysis showed that more technology-related R&D needs to be conducted in LMICs, something that has been pioneered by our partners IDRC and InnoVet in particular. Furthermore, despite significant progress, LMICs still struggle with

access to the most basic vaccinations due to their poor overall health systems, insufficient supply chains, and inadequate data management systems.

GAMRIF's model of delivery partners working with downstream researchers allows LMIC representation in this small research field. For example, BactiVac were involved in numerous conferences throughout this review period where LMIC researchers were represented.

As mentioned in section 4, some delivery partners have started to focus on gender and equity within their projects.

Moving forwards with the reviewing of the logframe and ToC and the launch of GAMRIF 2.0, the team will ensure areas of equity (such as gender equity) are embedded within GAMRIF 2.0.

7.2 Quality of financial management

Throughout this review period, GAMRIF demonstrated responsible financial delivery. Although the impacts of the COVID-19 pandemic were not as severe as the previous review period, GAMRIF continued to work closely with delivery partners to factor in project timelines and ensure maximum VFM was achieved. Through regular forecasting, frequent communication, and adherence to programme objectives, GAMRIF granted 7 project change requests (PCRs) to IUK for the UK-China project (WP1) and signed a costed extension (WP3). This shifted £504,531 into the GAMRIF budget for financial year 2022/23 for WP1, and £959,350 for WP3.

GAMRIF used the majority of the 2021/22 HMT allocation of £15 million and met the budget profile from the original business case of £13.6 million. The achieved spend rate was 94% against the HMT allocation (this does not include the additional £4.5 million GAMRIF secured from the GHS ODA budget for additional investment into GARDP (mentioned in section 1.2).)

This review period saw 3 GHS finance leads between September 2021 and January 2022, a high risk to loss of corporate knowledge. To mitigate this, the GAMRIF team increased ownership of their finances and supported the finance lead who started in January 2022 with the development of a GHS wide financial tracker. The GAMRIF team also continued to refine its own internal financial management tools, such as developing an invoice tracker to enable both GAMRIF and GHS staff to quickly extract clear and reliable evidence and data of outgoing spend across each quarter and WP.

However, during this review period there were some difficulties aligning financial reporting methods with IUK. Both DHSC GHS team and IUK simultaneously experienced changes in their finance leads. UKVN were having similar issues so a combined solution will be

worked on to prevent duplication and ensure IUK have an aligned way of reporting to the different teams they work with at DHSC.

Recommendation 12/21-22: GAMRIF should strengthen their work with the GHS programme management office and UKVN to develop thorough financial management that can be used across the WPs.

Date of last narrative financial report: Annual Review 2020/21

8. Monitoring Evaluation and Learning

8.1 Evaluation

The interim evaluation focussed on assessing the process and performance of GAMRIF rather than impact, as most of the research was still underway. It found that GAMRIF is highly relevant to global AMR priority needs and has to date been effective and is fulfilling its objectives. It also found that GAMRIF has also placed the UK in an active leadership role in supporting transnational AMR R&D efforts, fulfilling political manifesto commitments.

The evaluation process and contract management required a higher level of input from the GAMRIF team than expected and the initial timeline for the final report has had to be extended as a consequence. At the time of writing this annual review, drafts of the report have been shared but it has not yet been finalised and published by the external provider.

8.2 Monitoring

To ensure effective delivery, GAMRIF has several monitoring activities in place, including project indicators linked to milestones and deliverables, a logframe and a Theory of Change (ToC).

As discussed in section 2.1, GAMRIF will be developing a new logframe and ToC to inform the monitoring of GAMRIF 2.0. This will be shared with delivery partners for GAMRIF 2.0 to ensure alignment and allow them to understand the overall aims of GAMRIF and their place within the programme in its entirety.

Delivery partners provide written reports to GAMRIF and regular meetings are in place to ensure projects are on track. A new invoice tracker was developed with the support of the GHS finance lead to ensure thorough financial monitoring. A new reporting form was also developed for collecting evidence for this annual review. This made the process more efficient for GAMRIF as it meant all necessary information was collected in one place. Moving forwards with GAMRIF 2.0, this can be improved by ensuring delivery partners report against the logframe (where appropriate) in their regular written reports to prevent duplication of effort.

8.3 Learning

GAMRIF undertook a Theory of Change workshop with the GHS MEL lead and Global Health Economist. This allowed the team to reflect on successes and limitations of the

original ToC and logframe and put learning into practice to update both in preparation for GAMRIF 2.0.

To better understand the final outcomes and impact of the GAMRIF investment, IUK seconded a part-time Impact and Evaluation Advisor to GAMRIF for 3 months where a deep dive was undertaken into KPIs to measure GAMRIF progress. From this GAMRIF was able to identify KPIs that we might want to take forwards with GAMRIF 2.0.

The independent gap analysis contributed to GAMRIF learning around the current AMR R&D landscape and helped identify underfunded areas in AMR research. This showed that there is still a significant evidence gap across all AMR R&D areas within LMICs. This provides evidence for the importance of continuing the work GAMRIF and the wider DHSC AMR teams do.

As part of GAMRIF's reflection and based on feedback received throughout the programme, GAMRIF is taking the time to review the delivery model, number and type of partnerships before finalising the GAMRIF 2.0 structure (see recommendation 3/21-22).

GAMRIF is planning on holding a phase one delivery partner wrap-up event, which will be an opportunity to solidify and share learning across the portfolio (see recommendation 4/21-22). This will be a useful forum in which to share successes and raise difficulties, with workshops in key areas to support learning, create networking among grantees across the One Health landscape, and link up between programme areas.

Annex 1: FCDO Project Performance Scale

This report assesses the project and output scores against the following FCDO scale:

Score	Output Description
A++	Outputs substantially exceeded expectation
A+	Outputs moderately exceeded expectation
A	Outputs met expectation
B	Outputs moderately did not meet expectation
C	Outputs substantially did not meet expectation

Annex 2: Technology Readiness Level

Definitions and scale

This table is used for delivery partners and downstream researchers to score the technology readiness level of their product in an objective way. It allows us to score how far along the pipeline the product is and how close to commercialisation and manufacturing.

TRL	Veterinary products	Drug discovery	Vaccines	Diagnostic tests	Technology (such as a mobile phone app)	Policy/guideline/ intervention
1	Discovery	High-throughput screening	Ideation Need identified, Basic principles observed and reported (Scientific research begins to be translated into applied research and development)	Basic principles observed	Scientific research begins to be translated into applied R&D	Formulate strategy, define scope (eg species, region)
2	Challenge Model	Hit-to-lead	Proof of Principle Epidemiologic study, Research ideas developed, hypothesis formulated and protocols developed (Initial level in vitro studies, Development of working Cell Bank)	Technology concept formulated	Practical concepts or applications are formulated	Assess current state of affairs, including collect data on antimicrobial use, understand current regulations

TRL	Veterinary products	Drug discovery	Vaccines	Diagnostic tests	Technology (such as a mobile phone app)	Policy/guideline/ intervention
3	Proof of concept	Lead optimisation	<p>Proof of Concept demonstrated</p> <p>Hypothesis testing and initial proof of concept (PoC) is demonstrated in a limited number of in vitro models and limited in vivo efficacy studies (Formulation development, complete in-house testing of the formulated vaccine by in vitro model studies and In vivo efficacy in limited number of animals)</p>	Experimental proof of concept	Analytical studies to predict the performance of separate elements of the technology in appropriate context; lab-based studies to physically validate that the analytical predictions are correct	Collate existing scientific data (eg AMR prevalence), and/or generate data (eg AMR prevalence)
4	Exploratory development	Preclinical development	<p>Proof of concept established</p> <p>Efficacy & safety of vaccine candidate is demonstrated in a defined animal model (Results of serological studies in different animals at preliminary level and efficacy in defined in</p>	Technology validated in lab	Basic technological components are integrated to establish that they will work together.	Draw together scientific understanding with economic, social, geographic context, to formulate draft policy/practices.

TRL	Veterinary products	Drug discovery	Vaccines	Diagnostic tests	Technology (such as a mobile phone app)	Policy/guideline/ intervention
			vivo model, Manufacturing and QC release of vaccine for Studies, Scale up Development)			
5	Analytics	Clinical development Phase 1	<p>Early stage validation</p> <p>Pre-clinical studies, including GLP efficacy, acute and chronic toxicity, all the studies mandatory for safe exposure to humans such as repeat dose toxicity (RDT) and safety in animal model producing sufficient data for DCGI application for clinical trials</p>	Technology validated in relevant environment	Basic technological components are integrated with reasonably realistic supporting elements, so they can be tested in a relevant environment	Assess cost/benefit of policy/practice.
6	Full development	Clinical development Phase 2	<p>Early stage validation (continued)</p> <p>Material produced in GMP facility of clinical trials. Phase I Clinical trials done and results & safety of the vaccine candidate reviewed by DCGI for approving Phase II Clinical</p>	Technology demonstrated in relevant environment	Representative model or prototype system	Refine policy/practice

TRL	Veterinary products	Drug discovery	Vaccines	Diagnostic tests	Technology (such as a mobile phone app)	Policy/guideline/ intervention
			trials			
7	Field trials	Clinical development Phase 3	Late stage Validation Phase II Clinical trials completed and data reviewed by DCGI and Phase III Clinical trial plan approved	System prototype demonstration in operational environment	Prototype near or at planned operational system	Apply policy/practice on small scale pilot on University farm, for example
8	Regulatory submission	Regulatory submission	Pre-commercialisation Phase III Clinical trials completed successfully. DCGI approves the vaccine and provides commercial manufacturing license for market introduction	System complete and qualified	Technology system in its final form	Apply policy/practice on small scale pilot on farm

TRL	Veterinary products	Drug discovery	Vaccines	Diagnostic tests	Technology (such as a mobile phone app)	Policy/guideline/ intervention
9	Stewardship	Clinical development Phase 4	Commercialisation and post market studies Commercial launch of the new vaccine, Post marketing studies and surveillance (Phase IV clinical trial)	Actual system proven in operational environment	Technology system in its final form and in full [commercial] deployment	Policy/practice in full deployment

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