

Global Antimicrobial Resistance Innovation Fund (GAMRIF)

Annual Review: 2020/21

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List of Abbreviations

AMR	Antimicrobial Resistance
BBSRC	Biotechnology and Biological Sciences Research Council (UKRI)
BMGF	Bill & Melinda Gates Foundation
CARB-X	Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator
CHAI	Clinton Health Access Initiative
CONICET	National Scientific and Technical Research Council (Argentina)
CSR	Comprehensive Spending Review
CST	CARB-X Support Team
DHSC	Department of Health and Social Care (UK)
EAB	Expert Advisory Board
FIND	Foundation for Innovative New Diagnostics
GAMRIF	Global AMR Innovation Fund
GARDP	Global Antibiotic Research and Development Partnership
GHR	Global Health Research
GHS	Global Health Security
GIAA	Government Internal Audit Agency
GSK	GlaxoSmithKline
HMT	Her Majesty's Treasury (UK)
IATI	International Aid Transparency Initiative
IDRC	International Development Research Centre
IUK	Innovate UK (UKRI)
KTO	Knowledge transfer outputs
LMIC	Low- and Middle-Income Country
MOOC	Massive Open Online Course
MoST	Ministry of Science and Technology (China)
MoU	Memorandum of Understanding
MRC	Medical Research Council (UKRI)

NERC	Natural Environment Research Council (UKRI)
ODA	Official Development Assistance
PDP	Product Development Partnership
R&D	Research and Development
SDG	Sustainable Development Goals (United Nations)
SME	Small and Medium Enterprise
STI	Sexually Transmitted Infection
ToC	Theory of Change
ToR	Terms of Reference
TPP	Target Product Profile
TRL	Technology Readiness Level
UKRI	UK Research and Innovation
UKVN	UK Vaccine Network
WHO	World Health Organization
WP	Work Package

1. Summary and overview

Project title: Global Antimicrobial Resistance Innovation Fund (GAMRIF)

Project value: £50 million (£63.5 million programmed to date)

Review period: 1 April 2020 to 31 March 2021

Project's start date: July 2016

Project's end date: Phase 1 of GAMRIF ends 31 March 2022

Summary of Project Performance

Year	2019/20	2020/21
Project Score	N/A ¹	A
Risk rating	N/A	Amber-Green

Outline of project

[GAMRIF](#) was established by the 2015 Comprehensive Spending Review (CSR) settlement as a £50 million Official Development Assistance (ODA) fund to invest 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 Health² 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:

¹ N/A as the previous Annual Review had a different scoring system

² One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development. (UN definition)

- 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 achieving 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.

Since inception, GAMRIF has secured additional financing to support the GHS programme to meet financial targets through cost-effective, value for money investments that align with wider global health security priorities and GAMRIF's mandate. This has led to a total of £63.5 million being committed up to 31 March 2021.

GAMRIF works across bilateral partnerships, global initiatives, and product development partnerships (PDPs) to advance research within its scope. As of 31 March 2021, the portfolio includes 7 work packages within 3 partnership models, and 58 active research projects. An overview of the work packages is set out below, while further details can be found in Annex A.

1. Bilateral Partnerships

- Work Package 1 (WP1) - UK-China: Innovation Collaboration to tackle AMR
- Work Package 4 (WP4) - UK-Argentina: Tools to tackle AMR in the Environment

2. Global Initiatives

- Work Package 2 (WP2) - Accelerating Antibacterial Innovation with the Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator (CARB-X)
- Work Package 3 (WP3) - InnoVet-AMR: Innovative Veterinary Solutions for AMR in partnership with Canada's International Development Research Centre (IDRC)
- Work Package 7 (WP7) - Vaccine Innovation with the BactiVac Network

3. Product Development Partnerships (PDPs)

- Work Package 5 (WP5) - Innovation in AMR Diagnostic Tools with FIND
- Work Package 6 (WP6) - New Antibiotic Treatment for Drug-Resistant Gonorrhoea with GARDP / GARDP Core

Summary of progress

This review period saw the COVID-19 pandemic impact the progress of most of the research funded by GAMRIF. To mitigate the impact on research outcomes and the value for money of the investment so far, formal no-cost and costed extensions were granted to many of the GAMRIF work packages. These mitigations enabled the continued delivery of high-quality research towards the intended outcomes and impact, and ensured continued focus and available funding for research to tackle AMR in LMICs.

While the majority of the activities undertaken during this review period were concerned with mitigating the significant impact of the COVID-19 pandemic, other key achievements included:

- expanding the GAMRIF portfolio with a further 11 projects through CARB-X (WP2) and GARDP (WP6) core funding, enabling GAMRIF to fund new innovations and technologies
- leveraging a further £8.4 million in funding from partners through CARB-X (WP2) and InnoVet-AMR (WP3)
- carrying out real-world testing of innovations for the benefit of people in LMICs through UK-China (WP1) and InnoVet-AMR (WP3)
- publishing 2 Target Product Profiles (TPPs) on *Neisseria gonorrhoea* point-of-care tests through FIND (WP5) to strengthen reliable infectious disease diagnosis
- advancing innovations through the development pipeline, for example a vaccine against drug-resistant gonorrhoea initially supported through BactiVac (WP7) receiving substantial follow-on funding through CARB-X (WP2)
- taking action to ensure that innovations are affordable and accessible to LMICs by, for example, the publication of the seminal [Stewardship and Access Plan Development Guide](#) for product developers through CARB-X (WP2) and providing core funding to GARDP (WP6)
- influencing other funders to invest in underfunded and neglected areas of AMR R&D such as environmental AMR by building on, for example, the UK-Argentina (WP4) work

During this review period, GAMRIF maintained steady progress against our 4 outputs with an overall score of A (Outputs met expectation). Despite delays and substantial disruptions caused by the COVID-19 pandemic, the research portfolio grew, further funds were leveraged, research progressed, key publications were disseminated and GAMRIF influenced other funders to invest in underfunded areas of AMR R&D. GAMRIF achieved 8 out of 11 output indicator targets - the COVID-19 pandemic being the reason for not achieving the remaining 3 output indicator targets. The achievements and outputs generated in this review period demonstrate that GAMRIF is progressing well to achieve the intended outcomes and impact as set out in our [Theory of Change \(ToC\)](#)³. Evidence also indicates that GAMRIF remains a good value for money investment that will primarily and directly benefit people in LMICs.

Progress against recommendations

This section sets out the progress on the recommendations from the [Annual Review 2019/20](#).

Project Management

Recommendation 1: GAMRIF should increase risk management practices and partner communications during 2020/21 to mitigate likely impacts of COVID-19 on financial and technical delivery.

Progress: Achieved. We requested delivery partners to carry out COVID-19 impact assessments, with project-level detail. COVID-19 impact and mitigation was a standing agenda point on all delivery partner calls.

Recommendation 2: Consider opportunities to enhance GAMRIF risk management procedures, adopting best practice for identifying opportunities as well as threats. Share lessons learned across the wider GHS programme.

Progress: Achieved. GAMRIF team members attended an L&D session 'Risk Management 101' by GHS Programme Management Office (PMO) and 'China's influence on UK universities: risk vs reward' by King's College London (March 2021). Additionally, the GAMRIF Project Support Officer led a teach-in on incorporating opportunity, not just threats, into risk assessments (December 2020).

³ The Theory of Change can be found in Annex 4, p86 of the 2019/20 Annual Review

Recommendation 3: New funding and grant agreements should require open-access publications to enforce best practice for accessing information across the global research community.⁴

Progress: Achieved. Only 1 new grant agreement was established during the review period - GARDP core funding (WP6) in March 2021 - which captured open access in the grant agreement.

Finance

Recommendation 4: Ensure GAMRIF transparency information is published in a timely manner, particularly as agreements are amended, and continue to increase partner awareness of International Aid Transparency Initiative (IATI) standards and available resources to encourage and support partners to publish their data on AidStream or Devflow.

Progress: Partially met. GAMRIF fed into routine transparency updates during this review period via the GHS Programme Management Office, while reminding delivery partners of the importance of transparency (including uploading data to IATI). As a result, BactiVac (WP7) registered on IATI and AidStream (October 2020). GAMRIF met with UKRI to discuss how the Biotechnology and Biological Sciences Research Council (BBSRC) and Innovate UK could upload to the IATI (January 2021).

Recommendation 5: Closely monitor spend profile with CARB-X to better forecast product developer expenditure given on-going onboarding of developers; review historical trends to better assess forecasts.

Progress: Achieved. CARB-X (WP2) worked hard to improve their forecasting processes and financial reporting to GAMRIF. This included an updated finance tracker, monthly finance reports and increasing communication between CARB-X, GAMRIF, and the GHS Finance Lead. This aided understanding of CARB-X finance processes, terminology and GAMRIF's obligations. The first technical portfolio review of the GAMRIF/CARB-X portfolio was held in February 2021, which helped GAMRIF to understand factors influencing product developer spend.

Recommendation 6: Work closely with delivery partners to ensure their forecasts for 2020 and 2020/21 are accurate and reflect any slippages, underspends or extensions required as a result of COVID-19, to help manage against the revised 2020 spending target and ensure that 2020/21 budgets can be fully used.

⁴ Note that some of GAMRIF's delivery partners (such as UKRI) already address open access in their current standard Terms and Conditions

Progress: Partially met. Several delivery partner forecasts were adjusted as a result of the COVID-19 pandemic. Consequently, GAMRIF granted a series of no-cost and costed extensions as appropriate, which are set out in Box 1. To effectively manage underspends and spend targets, available funds were invested into existing partners, such as GARDP (WP6) in December 2020 and March 2021.

External Engagement

Recommendation 7: Implement the GAMRIF communications strategy to build the GAMRIF brand and monitor the effectiveness of communications. In doing so, utilise video material that was collected in this reporting period, but was unable to be used at opportune times due to UK pre-election period.

Progress: Achieved. A GAMRIF logo and a GAMRIF comms guidance document were finalised and shared with delivery partners in July 2020. For World Antimicrobial Awareness Week in November 2020, the GHS Communications Manager co-ordinated social media output to showcase the research under UK-Argentina (WP4). Materials used included a BBSRC video created for One Health Day 2019 and researcher interviews shared by Argentina's National Scientific and Technical Research Council (CONICET).

Recommendation 8: Develop opportunities for knowledge translation and cross-learning between partners through virtual events – or in-person events if and when possible.

Progress: Achieved. A GAMRIF virtual delivery partner event was held in July 2020. Presenters included the GAMRIF team and delivery partners. 42 people attended: Expert Advisory Board members (including the chair), the UK Special Envoy on AMR, DHSC's International Director, delivery partners from all 7 work packages, and observers from the Global AMR diplomacy team and the Fleming Fund.

Recommendation 9: GAMRIF has developed an innovative One Health R&D portfolio with unique learnings. The team could consider writing a GAMRIF-led journal publication on processes and learnings.

Progress: No progress against this recommendation was achieved during this review period. This was largely due to staffing constraints and turnover (see Section 5).

Theory of Change

Recommendation 10: Enhance and test an innovative approach to measure Technology Readiness Levels (TRLs) through end-to-end pipeline development that is comparable across a broad portfolio of innovation types.

Progress: Partially met. This recommendation was written with UK-Argentina (WP4) in mind, where the 'products' under development are policy recommendations such as agricultural best practices. These types of outputs do not fit neatly into existing recognised TRL frameworks that may work well for products such as diagnostics or therapeutics. Toward the end of this review period, GAMRIF initiated the inward secondment of an Impact and Evaluation Manager from Innovate UK who will explore this topic as part of a wider piece of work around GAMRIF outputs (see Section 8.2).

Recommendation 11: Review research outcomes in line with GAMRIF's Theory of Change (ToC) to assess progress towards the intended impact. This mapping exercise could focus on a selection of GAMRIF grants, instead of the full portfolio.

Progress: Partially met. During the review period, GAMRIF initiated the procurement of an external evaluator to conduct an interim evaluation. The Terms of Reference (ToR) were finalised and submitted to the Evaluation Quality Assurance and Learning Service (EQuALS) with the tender opening shortly after this review period (April 2021).

Recommendation 12: GAMRIF's original mandate was to invest in neglected areas of AMR R&D. Consider drawing out specific outcomes/outputs that show progress in this area and including this within the ToC.

Progress: Partially met. See progress towards Recommendation 11.

Monitoring, Evaluation and Learning

Recommendation 13: Complete an interim review of the GAMRIF programme in 2020/21.

Progress: Partially met. See progress towards Recommendation 11.

Lessons learned and recommendations

For the year ahead, GAMRIF has identified key lessons learned and recommendations. A selection of these is captured below.

Lesson learned: The impact of the COVID-19 pandemic on GAMRIF-funded activities and overall spend demonstrated the importance of robust financial forecasting. Regular reviews with delivery partners to refine financial forecasts were essential to successfully mitigate disruptions caused by the COVID-19 pandemic.

Recommendation 1: In the next review period, GAMRIF should continue to work closely with delivery partners on understanding the impact of the COVID-19 pandemic, financial forecasting, as well as refining internal financial management tools.

Lesson learned: With GAMRIF being firmly in implementation stage, this review period has demonstrated that the current [logframe](#)⁵ - developed during the inception stage - does not capture all the relevant outputs to help establish whether GAMRIF will achieve all intended outcomes and ultimate impact.

Recommendation 2: GAMRIF should therefore carry out an in-depth review of the logframe and output indicators in the next review period.

Lesson learned: The GAMRIF scientific scope was established based on recommendations from the independent Expert Advisory Board (EAB) in 2017. With the forthcoming Comprehensive Spending Review 2021 (CSR21), and in preparation for future GAMRIF programming, this review period highlighted the importance of receiving timely independent, up-to-date recommendations on potential new 'neglected and underfunded areas of AMR R&D' to direct the future scope and investment.

Recommendation 3: In advance of CSR21, GAMRIF should commission an independent gap analysis (by January 2022) to assess the current AMR R&D landscape, across the One Health approach, focussing on identifying those opportunities that will benefit people in LMICs.

⁵ The LogFrame can be found in Annex 5, p90 of the 2019/20 Annual Review

2. Theory of Change

Summary of changes

AMR is a major threat to global health, food safety and security, and socioeconomic development,⁶ jeopardising the achievement of the [2030 Sustainable Development Goals](#) (SDGs), in particular SDG1 (end poverty), SDG2 (zero hunger), SDG3 (good health and wellbeing) and SDG8 (decent work and economic growth). There were an estimated 1.27 million deaths attributable to antibacterial resistance in 2019 alone⁷. LMICs are disproportionately affected due to weaker health systems, higher infection rates and poorer access to the right treatment at the right dose at the right time. The World Bank estimated that rising drug resistance could lead to an additional 24 million people in LMICs falling into extreme poverty by 2030⁸, reversing significant socioeconomic development gains. While AMR is a 'wicked problem' which must be solved through a multi-sectoral, global response, the power of science and technology plays a crucial part. Taking a One Health approach, we urgently need accessible and affordable innovations, including therapeutics, vaccines, diagnostics and beyond to treat the world's most dangerous drug-resistant pathogens.

The GAMRIF investment ultimately aims to prevent and reduce the likelihood of public health emergencies such as disease outbreaks and AMR, whilst also enabling early detection of threats in LMICs to save lives. To achieve this impact, in the context of using science and technology, there must be an increased international focus and available funding for research to tackle AMR in LMICs. This will enable a continuous pipeline of innovations that are tested and moved up the technology readiness levels (TRL). In turn, this will improve the supply of appropriate and affordable products and tools for combatting AMR in LMICs. Finally, the translation of research evidence into policy and clinical pilot programmes can enable much needed behaviour change in industry and clinical practice in LMICs.

To achieve these outputs, GAMRIF funds high-quality research and development across the One Health spectrum to:

1. reduce the need for antibiotics through alternative medicines and vaccine development;
2. reduce use of antibiotics in farming of food-producing animals;

⁶ When the Drugs Don't Work: Antibiotic Resistance as a Global Problem. ReAct, Feb 2019

⁷ Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. The Lancet, Jan 2022.

⁸ *Ibid*

3. reduce the environmental pollution of resistant bacteria and antibiotics; and
4. improve the measurement of clinical data and its uptake into national level surveillance.

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 year.

In 2020/21, the COVID-19 pandemic impacted the progress of the majority of GAMRIF-funded research, with researchers struggling to conduct experiments due to national lockdowns, laboratory closures and other factors such as university hiring freezes. To mitigate the impact of the delays on the quality of the research outcomes and associated value for money of the investment so far, we granted formal no-cost and costed extensions to many of the work packages (see Box 1). While the research will now require more time to produce the outcomes as initially expected, minimal additional funding was granted ensuring continued cost-effectiveness of the programme. However, as the majority of the research is still underway and not yet at the stage to produce significant outcomes, it is difficult to assess the true scientific success of the GAMRIF investments and their value for money. It should be noted, however, that putting resources into halting AMR is one of the highest-yield investments any country can make, with an estimated return-on-investment between 31 and 88% ([World Bank: Drug-Resistant Infections, published March 2017](#)). The COVID-19 pandemic has furthermore illustrated how major disease outbreaks represent a significant threat to the world ([European Centre for Disease Prevention and Control, published May 2018](#)), and the immense value of investing in upstream R&D for medical countermeasures (in particular, vaccines, diagnostics and therapeutics).

Project's progress

This section details progress towards contributing to the expected outcomes and impact. It refers to the outcomes in the GAMRIF ToC and the outputs in Section 3.

As mentioned above, the COVID-19 pandemic has had a significant impact on the timeframe of the delivery of the GAMRIF outcomes. However, by mitigating the disruptions through no-cost and costed extensions (see Box 1), the GAMRIF team has enabled the continued delivery of high-quality research towards the intended outcomes and impact. Thereby, the team has ensured that there is a continued international focus and available funding for research to tackle AMR in LMICs (Outcome 1). Output indicator 1.1 further demonstrates good progress towards this outcome having leveraged a further £8.4 million from partners.

As of 31 March 2021, GAMRIF has funded 69 research projects to date, with 2 projects being terminated early due to scientific failure (CARB-X, WP2) since the inception of

GAMRIF; this represents an attrition rate of 2.9%. 58 projects are still active and on track to progress through the R&D pipeline and deliver the intended outcomes (Outcome 2). For example, as captured in Output indicator 3.1, in [January 2021, the Jenner Institute \(part of the University of Oxford\) secured up to USD 2 million from CARB-X \(WP2\) to continue to advance the development of a vaccine against drug-resistant gonorrhoea](#). The investment included USD 372,229 in ODA funding from GAMRIF, through CARB-X, and directly built on previous GAMRIF-funded research through BactiVac (WP7). Output indicator 3.1 furthermore demonstrates that research projects have carried out real-world testing, thus contributing directly to Outcome 2. For example, in this review period at least 3 projects through InnoVet-AMR (WP3) carried out real-world testing, ensuring that context-specific innovations progress through the R&D pipeline.

GAMRIF's portfolio of ODA-funded research projects has continued to grow during this review period, which is contributing to an improved and available supply of appropriate and affordable products and tools for combatting AMR in LMICs (Outcome 3). For example, as demonstrated by Output indicator 3.1, GAMRIF funded 8 new projects through CARB-X (WP2). Equally, Output indicator 4.4 captures the expansion of our partnership with GARDP (WP6), which includes the disbursement of £1 million in core funding and addition of 3 new projects to the portfolio.

Alongside ensuring that there is a continuous supply of innovations targeting LMICs, this review period saw activities that further maximise the possibility of innovations being affordable and accessible to LMICs. For example, as captured in Output indicator 3.2, CARB-X (WP2) published the seminal [Stewardship and Access Plan Development Guide](#) for product developers in March 2021. This is a publicly available document outlining the strategy for stewardship of each product, and access in LMICs, for which GAMRIF was a key advocate and contributor. As evidenced in Output indicator 4.2, FIND (WP5) published 2 Target Product Profiles (TPPs) in September 2020 for *Neisseria gonorrhoea* diagnostics in resource-constrained settings,⁹ to ensure that novel detection technologies meet the needs of the end user.

Overall, it should be noted that GAMRIF is only halfway through implementation, and therefore evidence generation towards Outcome 4 (relating to behaviour change in industry and clinical practice) is less substantial at this stage. For example, the UK-Argentina work package (WP4) addresses the behavioural change aspect of curbing AMR, but it is too early for research findings to influence decision-making. Additionally, owing to the COVID-19 pandemic, the GARDP (WP6) Phase III clinical trial of zoliflodacin, taking place in South Africa, Thailand, the Netherlands and USA, slowed down during this review period, which has delayed evidence generation.

⁹ Ferreyra, C. et. al. (2020) Developing target product profiles for *Neisseria gonorrhoeae* diagnostics in the context of antimicrobial resistance: An expert consensus. PLoS ONE 15(9): e0237424.

Despite the limited evidence on Outcome 4, and the delays experienced by many research projects as a result of the COVID-19 pandemic, the evidence for Outcomes 1-3 in this review period demonstrates progress towards the intended impact as set out in the GAMRIF ToC.

Changes to the logframe

No changes to the logframe have been made since the last annual review (2019/20).

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 number	1	Output score	A
Impact weighting (%)	30	Weighting revised since last AR?	No
Risk rating	Green	Risk revised since last AR?	No

Indicator(s) ¹⁰	Milestone for the review	Progress
1.1 The amount of resources, both funding and in-kind, leveraged for AMR research and development with a benefit for people in LMICs	Leverage (£4 million) in-kind resources from donors and partner organisations	Surpassed
1.3 Global meetings, discussions and other knowledge sharing opportunities are held and directly supported by GAMRIF, which bring together researchers from LMIC organisations	<p>≥ 30 LMIC researchers engaged</p> <p>GAMRIF supports 2 international meetings with participants from LMIC research organisations</p>	Not achieved

¹⁰ Indicators for which there is no milestone for this review period are not shown in this table

Indicator 1.1:

- The total amount leveraged from donors and partner organisations during this review period was £8.4 million. Through CARB-X (WP2), USD 10,372,971 (~£7.78 million) was leveraged, which includes funds from CARB-X co-funders (Biomedical Advanced Research and Development Authority, Wellcome Trust, and the German Federal Ministry of Education and Research) and product developer cost share. GAMRIF also leveraged funds from the Bill and Melinda Gates Foundation (BMGF) by the same mechanism, but this is not included in the £7.78 million, as it has been counted as a lump sum in the [first GAMRIF annual review \(2017 to 2019\)](#). Through the costed extension of InnoVet-AMR (WP3), GAMRIF leveraged a further CAD 927,200 (~£580,000) in co-funding from IDRC.
- The values above are in addition to in-kind contributions in the form of consortiums such as IDRC's Equality, Diversity and Inclusion workshop, and Innovate UK EDGE that works with businesses to develop commercialisation strategies, partnering and pitch training.

Indicator 1.3:

- Due to the COVID-19 pandemic, no international meetings were organised by GAMRIF. GAMRIF had hoped to support the BactiVac 3rd Annual Network Meeting during this review period. Originally scheduled 24-27 March 2020 in Kilifi, Kenya, this event has been postponed due to the COVID-19 pandemic. However, GAMRIF were able to hold a virtual delivery partner event on 10 July 2020 with 42 participants, including stakeholders from Argentina (CONICET) and South Africa (GAMRIF Expert Advisory Board, EAB).

Output 2

Enhance bilateral research partnerships that will support AMR research

Output number	2	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
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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
2.2 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 audience.	Achieved
2.3 Successful research competitions are run and as a result GAMRIF funding for bilateral partnerships is allocated to selected projects	32.94% of bilateral funding disbursed to selected research projects	Not achieved

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:

- 20 knowledge transfer outputs (KTOs¹¹) have been produced by funded projects; 3 KTOs reported from UK-China (WP1), and 17 KTOs reported from UK-Argentina (WP4). For example, the Principal Investigator of 'FARMS-SAFE: Future-proofing Antibacterial resistance Risk Management Surveillance and Stewardship in the Argentinian Farming Environment' (WP4) contributed to a Massive Open Online Course (MOOC) on '[Antimicrobial Stewardship in Veterinary Practice](#)'. At end of the review period, this MOOC had so far reached more than 4,000 learners from more than 120 countries.

¹¹ Example knowledge transfer outputs include: Book chapter; Case study; Cochrane review; Community group presentation; Conference poster; Database; Feature article; Guidelines/SOPs; Industry presentation; Invited speaker; Journal article; Journal editorial; Media article/interview; Policy brief; Press release; Project newsletter; Protocol; Social media; Toolkit; Training materials.

Indicator 2.3:

- During 2020/21, for UK-China (WP1) and UK-Argentina (WP4), 28.5% of combined programme budget was disbursed. The target wasn't achieved in this review period due to the COVID-19 pandemic, which slowed project spend. Both bilateral programmes received no-cost extensions and the funding was reprofiled.

Output 3

Support global initiatives that foster innovation in AMR research and product development, to develop knowledge and research that have benefit for LMICs

Output number	3	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	8 new projects 3 human/animal vaccines and alternatives to antibiotics are advanced to real-world testing, which includes clinical trials in humans and the development phase in animals	Achieved
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 produced to reach different audiences.	Achieved

3.3 Successful research competitions are run and as a result GAMRIF funding for global initiative partnerships is allocated to selected projects	35.93% of global initiative funding disbursed	Not achieved
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

Indicator 3.1:

- 8 new projects through CARB-X (WP2) were funded in this review period: GangaGen Biotechnologies, Helmholtz Centre for Infection Research, Lumen Bioscience, Phico Therapeutics, GlaxoSmithKline (GSK) Vaccines Institute for Global Health (Group A Streptococcus), GSK Vaccines Institute for Global Health (Salmonellosis), The Jenner Institute, University of Queensland. One project with CARB-X (WP2) - BB100, Bravos Biosciences - terminated early during this review period (September 2020). No new projects in InnoVet-AMR (WP3) or BactiVac (WP7) were started during this review period.
- At least 3 projects under InnoVet-AMR (WP3) carried out real world testing during this review period. For example, in Vietnam, the researchers are developing an immersion vaccine and will be testing its effectiveness to protect catfish from bacteria ('Polyvalent vaccine for freshwater catfish' project; WP3).

Indicator 3.2:

- GAMRIF-supported projects reported producing 103 KTOs in total; 49 KTOs from CARB-X (WP2), 50 KTOs from InnoVet-AMR (WP3), and 4 KTOs from BactiVac (WP7). For example, research from WP3 (project 109049) was explained in a poster presented to the Consultative Group for International Agricultural Research (CGIAR) Research Program on Livestock Virtual Meeting (June 2020). The poster was titled 'Bacteriophages: a viable alternative to antibiotic use in poultry farming'.

Indicator 3.3:

- During 2020/21, for CARB-X (WP2) and InnoVet-AMR (WP3), 31.04% of combined programme budget of 35.93% was disbursed. This target was not achieved due to the COVID-19 pandemic, which slowed spend. Whilst CARB-X (WP2) were able to achieve full expenditure, this severely impacted InnoVet-AMR (WP3) which received a costed extension (from both organisations), and the funding was reprofiled. No funds were disbursed to BactiVac (WP7) during 2020/21 as research projects had ended or were in their final stages.

Indicator 3.4:

- Twenty-five projects in total across CARB-X (WP2) and InnoVet-AMR (WP3) 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 also had access to project-specific assistance from the CARB-X Global Accelerator Network experts who are on hand to enhance CARB-X Product developer (PD) capacities. PDs are coached on areas such as regulatory strategy, study design and clinical microbiology. Additionally, 18 training items not associated with a particular project were reported. All 11 projects within the InnoVet-AMR (WP3) portfolio had access to training and support on scientific aspects, commercialisation aspects and intellectual property. Additionally, 40 institutional personnel across 6 projects received training on technical skills, such as DNA extractions. GAMRIF has not specifically supported any training activity provided by BactiVac (WP7), but all projects within the portfolio have access to various upskilling and capacity building opportunities, such as grant writing and comms.

Output 4

Support product development partnerships (PDPs) to develop affordable innovations that will reach commercialisation

Output number	4	Output score	A+
Impact weighting (%)	20	Weighting revised since last AR?	No
Risk rating	Amber-Red	Risk revised since last AR?	No

Indicator(s)	Milestone for the review	Progress
4.2 The number of published reports that share results from	2 new reports	Surpassed

product development towards a global audience		
4.4 Successful research competitions are run and as a result GAMRIF funding for PDPs is allocated to selected projects	14.68% of PDP funding disbursed	Achieved

Indicator 4.2:

- 3 reports on product development were published in this review period. FIND (WP5) published 2 TPPs for *Neisseria gonorrhoea* detection, co-authored with WHO, in September 2020,¹² and an interview-based market assessment on the barriers to access to new gonorrhoea diagnostics in LMICs in October 2020¹³.

Indicator 4.4:

- During 2020/21, for FIND (WP5) and GARDP (WP6), 47.68% of combined programme budget was disbursed. It is worth noting that, within the total figure, £1 million was disbursed as core funding to GARDP as a result of the expansion of the partnership for this review period. Despite COVID-19 disruptions, both FIND and GARDP managed the budgets very well, maximising their spending during this review period.

Supporting narrative

Score	Output Description
A++	Outputs substantially exceeded expectation
A+	Outputs moderately exceeded expectation

¹² Ferreyra, C. et. al. (2020) Developing target product profiles for *Neisseria gonorrhoeae* diagnostics in the context of antimicrobial resistance: An expert consensus. PLoS ONE 15(9): e0237424.

¹³ Ferreyra, C. et. al. (2020) Barriers to access new gonorrhoea point-of-care diagnostic tests in low- and middle-income countries and potential solutions: a qualitative interview-based study. Sexually Transmitted Diseases, 47(10).

A	Outputs met expectation
B	Outputs moderately did not meet expectation
C	Outputs substantially did not meet expectation

The scores for Outputs 1-4 were A, A, A and A+, respectively. These outputs are weighted 30%, 20%, 30% and 20%, respectively. Therefore, 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 4 outputs, achieving 8 out of the 11 output indicators for which a target was set, including surpassing 3 targets. This can be viewed as a significant achievement given the substantial disruption the COVID-19 pandemic has caused to our delivery partners and the funded research.

The COVID-19 pandemic was the primary reason for GAMRIF not being able to meet 3 of its output indicator targets:

- output indicator 1.3 relates to convening global events which include LMIC researchers. That GAMRIF were unable to deliver this output is disappointing but unavoidable. Virtual events with international participants would of course have been possible, but GAMRIF sought advice from delivery partners and stakeholders who advised that it was preferable to wait until in-person meetings could be held, as the level of engagement and benefit was immeasurably higher.
- output indicator 2.3 was relatively close to being achieved - 28.50% of funding was disbursed to our bilateral partnerships, compared to the target of 32.94%. This was directly due to the slowdown in global research activity.
- output indicator 3.3 was also relatively close to being achieved - 31.04% of funding was disbursed to global initiatives compared to the target of 35.93%. Again, pandemic-related disruption to research meant spend was slower than planned.

Outputs 1 to 3 have a risk rating of Green, representing confidence that these will be achieved over the lifetime of the programme. However, Output 4 ('Support product development partnerships to develop affordable innovations that will reach commercialisation') has been rated as Red/Amber, as there is no guarantee that any products will be commercialised as a result of this funding. This risk is captured in [GAMRIF's Programme Business Case](#), which explicitly states that one of our core mandates is to fund cutting-edge, innovative early-stage R&D, which is necessarily high risk/high gain. GAMRIF's diverse portfolio goes some way toward mitigating the risk to

Output 4, for example through funding PDPs such as FIND (WP5) and GARDP (WP6). As a result, if only a small fraction of funded projects results in a commercial product this will still represent good value for money overall.

Changes to the output

No changes have been made to the GAMRIF logframe since the programme inception.

Recommendations

Through lessons learned, we identified activities and practices to increase the efficiency of managing GAMRIF, as well as recommendations for the year ahead.

The impact of the COVID-19 pandemic on GAMRIF-funded activities and overall spend demonstrated the importance of robust financial forecasting. Working closely with delivery partners on refining financial forecasts, on a regular basis, was essential to successfully mitigate pandemic-related disruptions and delays. It allowed GAMRIF to take a proactive approach and respond efficiently and accordingly to the circumstances maximising the outputs and outcomes of the research projects (see Box 1) as well as spend.

Recommendation 1: To maintain a proactive and responsive approach to programming and spend, 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. For example, GAMRIF would apply a risk adjustment to forecasting.

With GAMRIF now in the implementation stage, this review period has demonstrated that the current logframe - developed during the inception stage - does not capture all the relevant outputs to help establish whether GAMRIF will achieve all intended outcomes and ultimate impact. Specific areas to improve include:

- defining indicators more clearly (for example output indicator 3.2 simply refers to "real-world testing" and "the development phase in animals")
- some achievements are counted only for some of our partnership types (for example, trials that take place under UK-China (WP4) are not captured at all, as output indicator 3.1 only relates to global initiatives)
- for output 4 no timescale is specified for the product commercialisation to occur

Recommendation 2: To ensure that the logframe captures all relevant outputs, GAMRIF should carry out an in-depth review of the logframe and output indicators in the next review period. This should specifically consider outputs monitoring of early-stage research activities. In reviewing the outputs, the reporting burden placed on delivery partners should be factored in, as there may be metrics that are of interest to GAMRIF but are too onerous for delivery partners to collect.

This review period has demonstrated that GAMRIF requires a more efficient way to collect valuable data across the 7 different work packages. For example, in order to assess GAMRIF's progress against the output indicators for the Annual Review 2019/20, the GAMRIF team had to extract data from many different types of sources (including various reports, websites and via direct communication) across the 7 work packages. This method risked missing valuable information to assess progress towards GAMRIF's intended outcomes and impact. In addition, most delivery partners use different reporting styles and templates leading to differences in the type of data collected and how they are reported. As such, to minimise the reporting and data collating burden, there is a need to harmonise data collection for all GAMRIF activities.

Recommendation 3: To increase efficiency of future data collection, without placing additional reporting burden on delivery partners, GAMRIF should streamline all data collection processes in the next review period. This should also include a review of the delivery partner reporting requirements and an exploration of the use of reporting templates to allow for efficient and comprehensive data collection whilst minimising the burden on delivery partners.

Project performance not captured by outputs

In addition to the outputs generated in Section 3, the list below highlights a few selected additional achievements from this review period.

Portfolio-approach to tackle specific AMR challenges

Through a diverse portfolio, GAMRIF has taken a three-pronged approach to fight the growing threat of drug-resistant gonorrhoea. Through FIND (WP5), we support development of a point-of-care diagnostic test. Through GARDP (WP6), we support the new, first-in-class antibiotic (in over 30 years) zoliflodacin which is in Phase III clinical trials. Through CARB-X (WP2), we provide follow-on funding for a vaccine in preclinical development which has graduated from a GAMRIF-funded BactiVac catalyst pump-priming project (WP7).

Ensuring access in LMICs

- The [Stewardship and Access Plan Development Guide](#) is a first-of-its-kind, publicly available document that sets out how product developers can ensure global accessibility to their products (including in LMICs) and how they can guide their marketing and use, so as to avoid misuse and overuse in healthcare settings. Published through CARB-X (WP2), GAMRIF was a key advocate and contributor to this document in conjunction with the other co-funders of CARB-X.
- Through GAMRIF's core funding to GARDP (WP6), we supported activities towards the scoping of [SECURE](#), a new antibiotic facility currently being considered by GARDP, WHO, Unicef and the Clinton Health Access Initiative (CHAI). This initiative seeks to maximise the sustainable access of antibiotics in LMICs at affordable prices.

Influence and advocacy

- GAMRIF and the GHS programme management office influenced IDRC's senior leadership (WP3), prompting them to prioritise and review their safeguarding policies following an InnoVet-AMR grant agreement amendment process.
- GAMRIF's partnership with BBSRC and Natural Environment Research Council (NERC) on WP4 (UK-Argentina) influenced the initiation of the NERC UK-India programme 'Tackling antimicrobial resistance in the environment from antimicrobial manufacturing waste' which runs from 2020 to 2023. This demonstrates that we are crowding in other donors to this space, including endorsing the One Health approach.
- The GAMRIF team took part in a range of external engagements over the review period, illustrating our continued advocacy for donor investment, and ongoing influence on the AMR research agenda.

3. Risk

Overall risk rating: Amber-Green

The GAMRIF risk register is reviewed quarterly by the GAMRIF team. It includes work package-specific risks as well as overarching programme risks. The overall risk rating of Amber-Green for 2020/21 reflects the potential and realised impacts of risks to programme delivery. Despite the materialisation of risks, such as the COVID-19 pandemic delaying projects within an already constrained timescale (for scientific research) and GAMRIF staff turnover, the team has adapted well to these circumstances. This was managed through increased communication with delivery partners and robust financial forecasting, enhanced corporate succession planning, and through identifying means of financial reallocation across work packages where possible. While the COVID-19 pandemic has impacted all of GAMRIF's delivery partners, the UK-China (WP1) programme of course experienced significant challenges, with one of the Chinese research teams being based in Wuhan.

GAMRIF will continue to apply an adaptive risk management process and maintain regular communication with delivery partners, whereby the programme adjusts to the changing environment and follows a plan to monitor, identify, respond and adapt.

Overview of project risk

Risk 1

Underspending against Her Majesty's Treasury (HMT) ODA target

Mitigation strategy

The GAMRIF team worked closely with delivery partners to mitigate delays due to the COVID-19 pandemic and fluctuations in spend through increasing communications and improving financial forecasting and reporting as necessary to keep track of possible delays. GAMRIF also used options offered by delivery partners to mitigate delayed spend, such as no-cost and costed extensions (see Box 1). To understand the overall financial impact on the GHS programme, GAMRIF maintained close contact with the GHS Finance Lead. Contingency spending options were also put in place and enhanced from 2019/20 through using existing delivery partners. This included for example increasing investment in particular portfolios where a strong value for money case could be demonstrated, thereby ensuring continued responsible spending of ODA and minimising the risk of underspending.

Residual risk rating

Amber

Risk 2

Critical corporate knowledge is lost with staff turnover

Mitigation strategy

GAMRIF reviewed and refreshed succession planning and the handover approach. This included encouraging best practice around information management, ensuring up-to-date welcome packs and comprehensive onboarding practices to allow for successful handovers. This was further steered by following the lessons learned from the maternity cover recruitment, such as starting recruitment processes as early as possible.

Residual risk rating

Green

Risk 3

Products fail to deliver their objectives due to scientific failure. Early-stage research and development is necessarily high risk

Mitigation strategy

GAMRIF continued to evaluate the likelihood of future success through monitoring the technical reports provided by delivery partners as well as through regular formal and ad hoc meetings. To minimise the risk of failure due to factors other than scientific ones, wrap-around support and training on, for example, product commercialisation, intellectual property (IP) and regulatory hurdles were provided to grantees through several work packages. The first (virtual) GAMRIF delivery partners event was held to enable knowledge and skill sharing amongst partners and help foster new relationships across the portfolio. While GAMRIF continues to actively seek ways to minimise the risk of product failure, overall, there was no change in this risk from the previous review period as the likelihood of scientific research failure remained the same. This is also true despite the disruption caused by the COVID-19 pandemic.

Residual risk rating

Green

4. Project management: delivery and commercial considerations

Delivery against planned timeframe

The [GAMRIF Programme Business Case \(2017\)](#) provides an illustrative timeline for activity under the work packages planned at the time of writing (WPs 1-5), with a confirmed budget of £50 million and an end date of March 2022. WPs 1-5, and the additional WPs 6-7 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. However, owing to the disruption of the COVID-19 pandemic in this review period, timelines have shifted, and outcomes will be delivered later than originally planned (see Box 1). The final work package will now end in December 2024. While the cost of the GAMRIF programme has increased minimally (through InnoVet-AMR (WP3), which required additional funding), the COVID-19 mitigation strategies have had a significant impact on the spend profile of GAMRIF and, as such, outer-year spending. The flexibility of the initial £50 million budget has accommodated the shift in the spend profile until March 2022. However, outer-year spending (after March 2022) will be covered by the new budget settled through Comprehensive Spending Review (CSR) 21.

Box 1: Summary of GAMRIF mitigations due to the COVID-19 pandemic

The COVID-19 pandemic has had a significant impact on the research funded by GAMRIF, due to lockdowns, laboratory closures, hiring freezes at universities, scarcity of certain consumables, and restrictions on shipping of samples and goods. This has resulted in delays to research activities, including costly clinical trials, field studies and data collection. With the impact on travel, international research collaborations have suffered with researchers having to identify creative solutions around knowledge sharing and exchange in the virtual environment. To mitigate disruption to the ultimate outcomes of the research, GAMRIF worked closely with delivery partners during this review period to approve no-cost and costed extensions to 6 of the 7 work packages. This ensured that planned outcomes were not compromised and that the investment to date remained good value for money.

UK-China (WP1): A no-cost extension was agreed in July 2020 and formalised through an MoU amendment in May 2021. The end date was extended from March 2022 to March 2023.

InnoVet-AMR (WP3): A costed extension (£959,350, plus CAD 927,200 from IDRC) was agreed in October 2020 and formalised through a grant agreement amendment in May 2021. The end date was extended from June 2022 to December 2023.

UK-Argentina (WP4): A no-cost extension was agreed in October 2020 but has yet to be formalised through an MoU amendment.

FIND (WP5): A no-cost extension was formalised through a grant agreement amendment in February 2021. The end date was extended from March 2021 to July 2021.

GARDP (WP6): GARDP offered a good value for money option to make use of funds available due to delayed activities elsewhere in the portfolio. As such, in this review period, GARDP was awarded an additional £1.5 million for its Sexually Transmitted Infection (STI) programme and £1 million as core funding, the latter through a new grant agreement covering 2020/21.

BactiVac (WP7): A no-cost extension was formalised in April 2020. The end date was extended from March 2020 to November 2020.

Performance of partnerships

The key GAMRIF partnerships are outlined in **Error! Reference source not found.** below.

Table 1 Performance of partnerships.

Work Package / Delivery partner	Progress
<p>UK-China (WP1)</p> <p>UK: Innovate UK</p> <p>China: Ministry of Science and</p>	<p>The partnership with Innovate UK is strong and communication and reporting is frequent and productive. However, challenges remain on the finances with slow invoicing by researchers. GAMRIF is working with Innovate UK to understand how to improve financial processes including forecasting.</p> <p>This review period has not necessitated close contact with MoST and the partnership remains formal with infrequent communication. GAMRIF mainly deals with Innovate UK as the work package is now in implementation stage and issues mostly relate to research project delivery.</p>

Technology (MoST)	
CARB-X (WP2) CARB-X / Boston University	<p>The partnership with CARB-X is strong and the monthly check-in calls remain key to ensuring a productive working relationship and good financial oversight. Although challenges with invoicing by product developers remain, by working closely with CARB-X, the forecasting and invoicing has significantly improved during this review period. This has enabled effective, nimble financial management. The CARB-X team continues to work diligently with the product developers to further improve the timeliness of invoicing. Monthly financial reporting was introduced during this review period to good effect. However, the GAMRIF team continues to work with CARB-X to improve annual reporting through tools such as templates and robust guidance.</p>
InnoVet- AMR (WP3) IDRC	<p>The partnership with IDRC is strong and the monthly check-in calls and six-monthly reporting remain key to obtaining regular updates on progress and possible forthcoming challenges. During this review period, both organisations approved a costed extension to the grant agreement as a result of the impacts of the COVID-19 pandemic. Owing to the effective working relationship between the 2 organisations, the grant agreement amendment process was constructive and open despite the challenge from DHSC to adopt significantly strengthened safeguarding clauses. This process involved much learning on both sides about safeguarding and its enforcement, and how DHSC can accommodate partners to effectively enforce strengthened safeguarding principles by taking a pragmatic and tailored approach.</p>
UK- Argentina (WP4) UK: BBSRC and NERC Argentina: CONICET	<p>While there are institutional differences in grant and financial management between DHSC and BBSRC, this review period has seen improvements in communication, including the establishment of monthly check-in calls. However, BBSRC's forecasting methodology and project-level reporting approaches continue to pose a challenge. GAMRIF continues to work closely with BBSRC to further understand their processes and how both parties can better work together to deliver our respective objectives.</p> <p>This review period has not necessitated close contact with CONICET, but the partnership remains good with productive communication as required. GAMRIF mainly interacts with BBSRC as the work package is now in implementation phase and issues mostly relate to research project delivery.</p>

<p>FIND (WP5) FIND</p>	<p>The partnership with FIND is strong and the quarterly check-in calls alongside the six-monthly progress reporting remain light touch but are important ways to obtain updates on technical progress and financial management.</p>
<p>GARDP (WP6) GARDP</p>	<p>As with FIND - and a testament to the PDP model - the partnership with GARDP is strong and the quarterly check-in calls alongside the six-monthly progress reporting remain a light touch but important way to obtain updates on technical progress and financial management. The relationship with GARDP evolved this review period to cover core funding.</p> <p>This review period saw the continuation of the Global Health Research (GHR) team's funding to GARDP for the neonatal sepsis project. With 2 separate teams within 1 UK Government department giving funds, GHR, GAMRIF and GARDP agreed that GAMRIF would remain the primary contact and relationship holder. This accommodated GARDP's request around ease of stakeholder management, but also built on lessons learned from a similar situation in previous review periods where both GAMRIF and the Fleming Fund funded FIND (WP5).</p>
<p>BactiVac (WP7) BactiVac Network / University of Birmingham</p>	<p>The partnership with BactiVac is strong with open and effective communication lines through ad hoc meetings. Reporting is effective and detailed, with project-specific interim and final reports plus overall impact metrics and financial information.</p> <p>This review period saw the continued postponing of the BactiVac 3rd Annual Network Meeting, to be held in Kenya (originally scheduled March 2020), due to the COVID-19 pandemic. Through the open and honest communication between the 2 organisations, the GAMRIF team has recognised the importance of this meeting for a growing network such as BactiVac. As such, GAMRIF continues to be supportive of this event whilst requesting regular updates.</p>

Asset monitoring and control

The GHS programme is currently developing an asset management policy. However, GAMRIF and its delivery partners have taken steps relating to asset management. For example, GAMRIF and CARB-X (WP2) have worked together to develop an ODA-relevant Equipment Disposal Form. This topic will be revisited during the year 2021/22 when 5 of our work packages conclude.

5. Financial performance

Value for money assessment

Economy

GAMRIF seeks to maximise economies of scale and leverage co-benefits from other organisations or programmes where possible. GAMRIF has invested in high risk/high gain AMR R&D, and the research now underway is potentially years away from the realisation of possible impact and benefits. Consequently, it is to be expected that there are few tangible outputs to report for this review period. Additionally, several of GAMRIF's investment opportunities are carefully selected and subject to a scoring system reviewed by subject matter experts.

During the review period, COVID-19 lockdowns at a global scale prevented GAMRIF-supported research from progressing in accordance with the original timeframe. The GAMRIF team stayed abreast of the situation by working closely with delivery partners to assess whether no-cost/costed extensions were required to ensure the continued delivery of high-quality outcomes. After a needs-assessment and careful deliberation with delivery partners, no-cost extensions were granted for WP1, WP4, WP5 and WP7. Despite the significant delays owing to the COVID-19 pandemic, it was deemed that the original amount invested into each of these work packages would continue to deliver high quality research and outcomes as long as research projects were given additional time. Separately, and as a result of significant COVID-19 impacts, a costed extension was required - and agreed upon by both organisations - for WP3. With 11 projects in 9 countries (of which 7 are LMICs), grantees experienced significant lockdowns and lab closures alongside the loss of valuable livestock. GAMRIF additional investment leveraged a further CAD 927,200 through IDRC's co-funding of the costed extension.

GAMRIF held their first delivery partner event in 2020/21. While the intent was for this event to be in-person, the COVID-19 pandemic did not permit this to happen. Instead, a half-day event was organised with delivery partners participating virtually. The event was highly successful with positive feedback from the attendees. While around £27,000 was saved as a result of the event being virtual, it also maximised attendance from partners around the globe.

Efficiency

This review period saw the initiation of CARB-X's 'cross-project opportunities', which bring added value to the whole portfolio. Through effective reallocation of available funds for Q4 2020/21, GAMRIF supported one such cross-project opportunity that focussed on enabling

product developers to test their innovations against pathogens of relevance to LMICs. This is an excellent example of where GAMRIF funds have brought additional value to a diverse portfolio of innovations, beyond the product developers that are funded by GAMRIF.

Efficient processes and practices were crucial for GAMRIF during this review period, which saw major staff changes - a new GAMRIF Project Lead and the departure of the GAMRIF Project Support Officer. Mitigations (such as phased handover) were put in place to ensure minimal disruption between the switch of the Project Leads. However, despite commencing the recruitment processes early and prioritising this activity, the departure of the GAMRIF Project Support Officer still left a business gap of 6 months before a new team member was in post. This necessitated a strong prioritisation towards essential activities, increasing the sharing of responsibilities, establishing new project management trackers and strengthening cross-team communications to ensure that GAMRIF continued to deliver core outputs. These new ways of working set a precedent for efficient teamwork, which was also applied to the recruitment of the GAMRIF Project Support Officer's successor. To maximise efficiency and to ensure that the recruitment was progressing despite competing priorities, this was undertaken in conjunction with the UK Vaccines Network (UKVN) team who were recruiting for a similar position.

As a result of the COVID-19 pandemic, many conferences were moved from 'in-person' events to virtual events. This allowed the GAMRIF team, delivery partners and grantees to attend conferences, workshops and meetings that would not normally have been possible owing to affiliated cost and travel time. This increased the efficiency of knowledge transfer, for example:

1. World One Health Congress (30 October to 3 November 2020) saw IDRC increase their sponsored registrations for early-stage researchers from LMICs
2. BIOCOM AMR Digital Conference (24-28 August 2020) saw the attendance of both GAMRIF's Scientific Research Coordinator and Head of Global Antimicrobial Resistance Strategy.

Effectiveness

The COVID-19 pandemic has demonstrated the importance of science and technology and the investment into R&D of essential medical countermeasures to curb a global infectious disease. To maximise the possibility of the outcomes from the GAMRIF investment, and ultimately curb the 'silent pandemic' of AMR, the GAMRIF team recognised the impact of the COVID-19 pandemic on the progression of the funded research. This resulted in the approval of no-cost and costed extensions of impacted work packages which was received positively by the research project teams. While these extensions will enable realisation of the intended outcomes, the GAMRIF team - together

with delivery partners - will keep tracking the probable continued impact of the COVID-19 pandemic on the research. The risk of continued adverse impact has been captured in the GAMRIF risk register which is reviewed on a quarterly basis.

GAMRIF will only be able to fully understand how well the outputs from the funded research are achieving the outcomes at a later stage in the programme. However, to increase the likelihood that outcomes will be realised, this review period saw GAMRIF evolve the relationship with GARDP to become a core funder (previous funding from the UK Government was earmarked programme funding). GARDP offers a cost-effective investment to bring products to market, including maximising sustainable access of antibiotics at affordable prices to LMIC markets. While core funding allows us to benefit from all GARDP activities in the fight against AMR, expanding GAMRIF's investment portfolio also increases the likelihood of a return on investment, while spreading the risk of failure.

To better understand the final outcomes and impact of the GAMRIF investment, the team decided that a review of the GAMRIF logframe, data capture and delivery partner reporting was required (see recommendations in Section 3.1.3). To support this activity, GAMRIF initiated the inward secondment of an Impact and Evaluation Manager from Innovate UK to DHSC (see inSection 8.2).

Equity

GAMRIF is committed to ensuring that the funded innovations reach those who most need them, whilst recognising the importance of equitable partnerships to achieve the intended outcomes. As a result, this review period saw GAMRIF strengthen the safeguarding provisions within many of the current, active grant agreements (WP3, WP6, WP7) and Memorandum of Understandings (MoUs) (WP1). In addition, the GAMRIF Project Lead attended a three-day course on safeguarding to deepen the theoretical and practical understanding of the area. Two new investments also strengthened GAMRIF's commitment to equity. The first was the donation of core funding to GARDP - part of this investment was directed towards the concept phase of the [SECURE initiative](#). This initiative is a collaboration between GARDP, WHO, Unicef and CHAI that is currently being scoped. This initiative seeks to maximise the sustainable access of antibiotics in LMICs at affordable prices. The second was the investment into a CARB-X cross-project opportunity that focussed on enabling product developers to test their innovations against pathogens of relevance to LMICs. CARB-X initiated 2 LMIC-focussed cross-project opportunities in a wider effort to bring further value to the portfolio as well as introduce product developers (including those not currently receiving ODA funding) to markets beyond high-income countries. At delivery partner level, InnoVet-AMR (WP3) further upskilled grantees on the importance of considering gender during product development, through tailored support from a veterinary expert specialising in gender equity in LMICs. Furthermore, in March 2021 CARB-X (WP2) published the first ever [Stewardship and Access Plan Development](#)

[Guide](#) for product developers. This is a publicly available document containing recommendations for how to develop a strategy for good stewardship of and appropriate access to each product in receipt of CARB-X funding. GAMRIF was a key advocate and contributor to this ground-breaking guide.

Quality of financial management

Despite the challenging impacts of the COVID-19 pandemic, GAMRIF demonstrated responsible financial delivery. As recommended in the previous annual review, GAMRIF worked closely with delivery partners throughout this review period to monitor the impacts of the COVID-19 pandemic and the resulting slowed spending - particularly as scientific research already encompasses a risk of slippage beyond the original scheduled life of the projects resulting in strong justifications for extending project timelines. Through regular and accurate forecasts, including more frequent communication, GAMRIF granted 4 no-cost extensions (WP1, WP4, WP5, WP7) and one costed extension (WP3) to ensure that the COVID-19 pandemic had minimal impact on the quality of the research and the outcomes. Although the budgets for these work packages were reprofiled across a longer term, GAMRIF fully utilised the 2020/21 HMT allocation of £15 million, and met the original budget profile of £18.4 million with £3.4 million over-profiled, as set out in our programme business case. The achieved spend rate was 126% against the original HMT allocation and 103% against the programme business case budget profile (this does not include the additional £2.5 million GAMRIF secured in 2020/21 for additional strong value for money investments into GARDP (WP6), see Box 1).

In accordance with the GAMRIF delivery model, as set out in the programme business case, available funds were reinvested across the portfolio to manage budgets whilst ensuring strong value for money investments. For example, as recommended in the previous annual review, GAMRIF worked closely with CARB-X (WP2) throughout this review period to ensure more accurate forecasting to capture any slippages. As a result, in a timely manner, GAMRIF was able to reinvest into existing product developers and a new cross-project opportunity to screen the susceptibility of all relevant CARB-X innovations against pathogens circulating in LMICs. GAMRIF also reinvested available funds from across the GHS programme in strong value for money activities supporting the continued progress against GAMRIF intended outcomes and impact. This included an additional £1.5 million to the GARDP Sexually Transmitted Infection (STI) programme (WP6) and an additional £1 million in core funding to GARDP (WP6). This demonstrates the continued value in the GAMRIF delivery model of using different types of partnerships, such as PDPs, to allow for a flexible and nimble way to mitigate changes to spend profiles and budgets.

At the start of this review period, GAMRIF's financial tracker did not allow staff to quickly extract clear and reliable information or provide the necessary financial oversight. Therefore, to further strengthen GAMRIF's financial oversight, we adapted and improved

our finance tracker to include a more detailed overview of the finances, ensuring less reliance on the GHS finance lead whilst also enabling GHS staff outside of GAMRIF to easily extract information from the system. Additionally, as COVID-19 resulted in many GAMRIF-funded activities having timelines and spend readjusted, to maintain a proactive and responsive approach to programming and spend, GAMRIF should continue to work closely with all delivery partners to understand the ongoing impact of the COVID-19 pandemic on financial forecasting. GAMRIF should continue to refine its own internal financial management tools, ensuring effective and response financial management.

Date of last narrative financial report: Annual Review 2019/20

6. Monitoring evaluation and learning

Evaluation

To ensure robust delivery, GAMRIF has several monitoring activities in place, including project indicators linked to milestones and deliverables, a logframe and a Theory of Change (ToC). However, to date, no external evaluation has been undertaken. Therefore, and as recommended in the Annual Review 2019/20, GAMRIF began commissioning an interim external evaluation in this review period. This evaluation will be completed in the next review period.

GAMRIF is a complex programme delivered through multiple partners using a variety of mechanisms. With GAMRIF being firmly in the implementation phase, the interim evaluation will focus on assessing the process and performance of GAMRIF rather than impact as most of the research is still underway. The aims and objectives of the interim evaluation will be to:

- assess whether GAMRIF has been designed and delivered in a way to maximise its impacts and meet its objectives as an R&D portfolio fund
- assess GAMRIF performance so far and whether the programme is on track to achieve its desired outcomes and impact
- identify lessons learned from implementation to date to inform programme improvement and a potential successor R&D programme

The findings of this interim evaluation will be used to inform the design of a possible successor programme ("GAMRIF 2.0") and better manage the existing GAMRIF programme throughout the extension period. The evaluation terms of reference and business case were approved in March 2021 to go out to tender for an evaluator in 2021/22. The key evaluation questions that will be answered are as follows:

- To what extent have the intended outcomes, as set out in the ToC, been observed and why? To what extent and how has the programme contributed to these outcomes?
- To what extent are the assumptions underpinning the ToC supported, and what evidence is there to update the ToC or improve the design and implementation of the programme?
- To what extent has GAMRIF been delivered according to the original design? Have any changes contributed or limited its likelihood of achieving the desired

results? Does the current design and management of GAMRIF's portfolio allow it to effectively maximise its impact and objectives?

Monitoring

There were no major changes to GAMRIF's monitoring activities during this review period. However, the team recognised that data collection and delivery partner reporting could be streamlined (see recommendations in Section 3.1.3). Additionally, the monitoring, evaluation and learning (MEL) resources changed as follows:

- In September 2020, the GHS programme recruited a new Monitoring and Evaluation Lead to guide GHS programme-wide activities and advise on project-specific activities. The Monitoring and Evaluation Lead has been an invaluable resource to draw on, in particular for the commissioning of the GAMRIF Interim Evaluation (see Section 8.1).
- In March 2021, GAMRIF made arrangements for an Impact and Evaluation Manager to be seconded to DHSC from Innovate UK, to advise on several aspects of our monitoring and evaluation strategy, including reviewing the outputs for the logframe. GAMRIF will host the secondee, who will also work closely with UKVN, the other R&D fund within the GHS programme, and the GHS Monitoring and Evaluation Lead. The final outputs from this secondment will be expected in Summer 2021 (outside this review period).

The GAMRIF work package monitoring tracker was used to stay abreast of all the reporting requirements and payment requests for the 7 delivery partners. A commercial tracker was also created to record the progress of the grant agreement and MoU extensions taking place (see Box 1). In addition to the continued monitoring of the work packages, 2 audits took place in this review period:

- In November 2020, the GARDP grant (WP6) was selected by the Cabinet Office for an audit in relation to the Cabinet Office grant standards. The audit was undertaken by the DHSC Grants Hub and evidence was submitted in November 2020 to satisfaction. The audit was officially closed in November 2020.
- In December 2020, the InnoVet-AMR grant (WP3) was selected by the Government Internal Audit Agency (GIAA) for an audit in relation to grant management, with a focus on a fraud risk assessment. The substantial audit was undertaken by GIAA and evidence was submitted by both the GAMRIF team and IDRC throughout January to March 2020/21. The audit is expected to be finalised and closed in the next review period (May 2021).

These audits highlighted the need for historic and recent documentation to be easily retrievable for any forthcoming audits as well as evaluations. It is essential for GAMRIF to maintain a robust system of storing documents including email exchanges and logging decisions.

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

Learning

GAMRIF is a complex programme consisting of several partnerships with different types of organisations. This has required GAMRIF to take slightly different, customised approaches to establishing the partnerships, in particular relating to provisions in the Memorandum of Understandings (MoUs) and grant agreements, partner payments and technical as well as financial reporting. To strengthen the efficiency of its project management GAMRIF established a repository during this review period to capture practical lessons learned from its partnerships and granting processes. This includes

1. ensuring that grant agreements or MoUs include provisions around mandating acknowledgement of GAMRIF/DHSC funding when researchers publish papers to enable GAMRIF to more easily track direct outputs
2. ensuring that delivery partners and onward grantees comply with the Nagoya Protocol and Access Benefit Sharing legislation to, for example, advocate for the importance of equitable partnerships with LMICs.

This repository was shared with UKVN to maximise the benefit and learning. These actions will also ensure that the GHS programme takes a harmonised, aligned approach to partnership building where possible.

Recommendation 5: To ensure that lessons are truly shared between the two R&D funds within the GHS programme, for the next review period, GAMRIF should hold regular meetings with UKVN to continue to share lessons and improve efficiency of programming.

The GAMRIF scientific scope, and the neglected and underinvested areas of AMR R&D, were identified based on the recommendations from the independent Expert Advisory Board in 2017. With the forthcoming CSR21, and the prospect of establishing GAMRIF 2.0, the team recognised the importance of receiving independent, up-to-date advice and recommendations on potential new 'neglected and underfunded areas of AMR R&D' to direct the scope and investment in preparation for future programming. While a gap

analysis would serve as a strategic document for GAMRIF, it could also provide the wider AMR community with an overview of the evidence base for AMR product development across the One Health approach for the benefit of people in LMICs.

Recommendation 6: 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.

Annex A: Overview of GAMRIF Work Packages and Investments as of 31 March 2021

WP	Partner	Investment	Scope	Projects	Partnership dates
WP1 UK-China: Innovation and Collaborati on to tackle AMR	Bilateral partner: MoST Delivery partner: Innovate UK in the UK and CSTEC (China Science and Technology Exchange Center) in China	£10 million from the UK Government (GAMRIF) RMB 60 million from the Chinese Government	Human and animal health Vaccines, therapeutics, alternatives to antibiotics (incl. Traditional Chinese Medicine), animal feed, diagnostics	14	Start: 1 January 2017 End: 31 March 2023
WP2 Acceleratin g Antibacteri al Innovation	CARB-X	£20 million from the UK Government (GAMRIF) USD 25 million from BMGF	Human health Vaccines, alternatives to antibiotics	16	Start: 16 May 2018 End: 31 March 2022
WP3 InnoVet- AMR: Innovative Veterinary Solutions for AMR	IDRC	£10.9 million from the UK Government (GAMRIF) CAD 10.9 million from IDRC	Animal health Vaccines, alternatives to antibiotics for livestock and aquaculture	11	Start: 14 June 2018 End: 31 December 2023
WP4 UK- Argentina: Tools to tackle AMR in the Environme nt	Bilateral partner: CONICET Delivery partner: BBSRC in the UK and CONICET in Argentina	£5 million from the UK Government (GAMRIF) Matched- resource funding from the Argentinian Government	Animal health and the environment Husbandry, surveillance, waste management	5	Start: 1 May 2018 End: 31 May 2023
WP5 Innovation in AMR	FIND	£10 million	Human and animal health AMR connectivity,	2	Start: 16 May 2018 End: 31 July 2021

Diagnostic Tools			STI diagnostics		
WP6 New Antibiotic Treatment for Drug-Resistant Gonorrhoea	GARDP	£7 million (£6 million to the STI programme, £1 million in core funding)	Human health Antibiotics against drug-resistant infections, including gonorrhoea	4	Start: 1 July 2019 End: 31 March 2022
WP7 Vaccine Innovation	BactiVac	£1 million	Human and animal health Vaccines	17	Start: 18 January 2019 End: 30 November 2020