Final Report

Mid-point evaluation of the UK Public Health Rapid Support Team (UK-PHRST)

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Results in development

Acknowledgements

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Disclaimer

The views expressed in this report are those of the evaluators. They do not represent those of UK-PHRST or of any of the individuals and organisations referred to in the report.

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List of acronyms

AFRO	WHO Regional Office for Africa
ALERRT	African Coalition of Epidemic Research, Response and Training
AMR	Antimicrobial Resistance
ASC	Academic Steering Committee
ASG	Academic Steering Group
CDC	Centers for Disease Control and Prevention
CDT	Core Deployment Team
CEPI	Coalition of Epidemic Preparedness Innovations
COMAHS	University of Sierra Leone College of Medicine and Allied Health Sciences
CREDO	Clinical Research during Outbreaks
DFID	UK Department for International Development
DHSC	UK Department of Health and Social Care
DRC	Democratic Republic of the Congo
EMRO	WHO Eastern Mediterranean Regional Office
EMT	Emergency Medical Team
EQ	Evaluation Question
EVD	Ebola Virus Disease
FCO	Foreign and Commonwealth Office
FETP	Field Epidemiology Training Programme
GHS	Global Health Security
GOARN	Global Outbreak Alert and Response Network
GPMB	Global Preparedness Monitoring Board
HMG	Her Majesty's Government
HUJRB	Befelatanana University Hospital
IATI	International Aid Transparency Initiative
ICAI	Independent Commission for Aid Impact
IHR	International Health Regulations
IOM	International Organization for Migration
IPC	Infection Prevention and Control
IPM	Institut Pasteur de Madagascar
JEE	Joint External Evaluation
KCL	King's College London
KII	Key Informant Interview
KLFU	Kenema Lassa Fever Unit

LMICs	Low- and Middle-Income Countries
LSHTM	London School of Hygiene & Tropical Medicine
MEL	Monitoring, Evaluation and Learning
MoH	Ministry of Health
MoPH	Ministry of Public Health
MRC	Medical Research Council
MSF	Médecins Sans Frontières
NAO	National Audit Office
NAPHS	National Action Plan for Health Security
NCDC	Nigerian Centre for Disease Control
NIHR	National Institute for Health Research
NPHL	National Public Health Laboratory
ODA	Official Development Assistance
PHE	Public Health England
PE&IM	Performance Evaluation and Independent Monitoring
PMT	Project Management Team
RST	Rapid Support Team
SEARO	WHO South East Asia Regional Office
SitRep	Situation Report
SMT	Senior Management Team
SOP	Standard Operating Procedures
ToC	Theory of Change
ToR	Terms of Reference
TSC	Technical Steering Committee
US CDC	United States Centres for Disease Control and Prevention
VfM	Value for Money
WHO	World Health Organization
UK-PHRST	UK Public Health Rapid Support Team

Executive Summary

Background to the evaluation

Formally launched in November 2016, the United Kingdom Public Health Rapid Support Team (UK-PHRST) is a partnership between Public Health England (PHE) and London School of Hygiene and Tropical Medicine (LSHTM), with contractual arrangements to form an academic consortium with the University of Oxford and King's College London.

UK-PHRST has a triple mandate to

"Integrate outbreak response, innovative research to generate evidence on best practices for outbreak control, and capacity building for outbreak response in ODA-eligible countries."

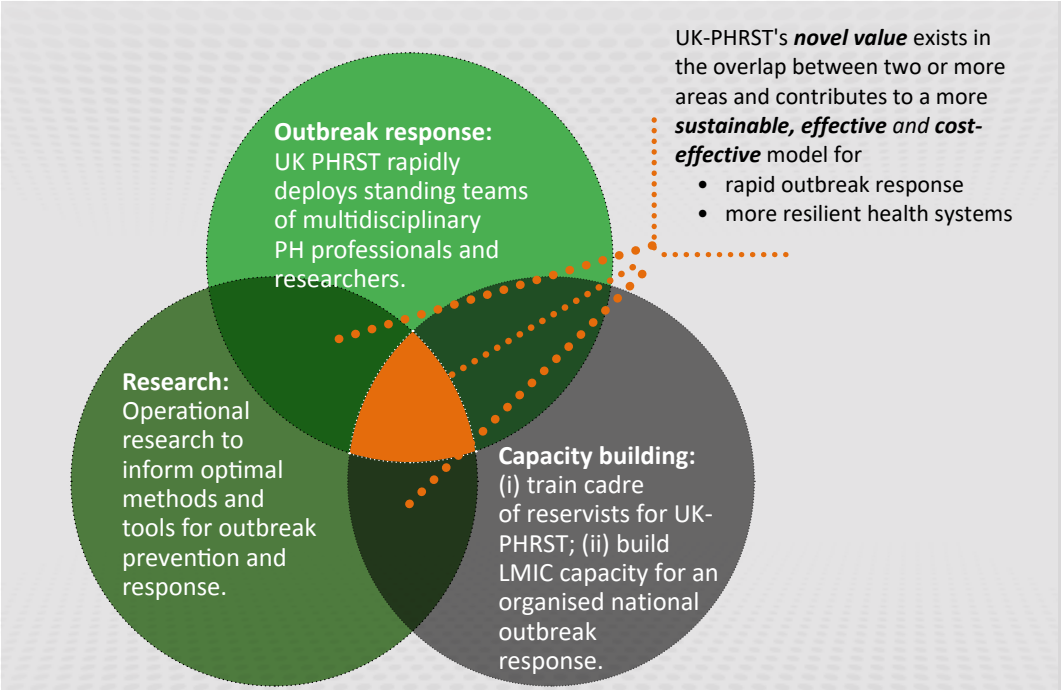


Figure 1: The UK UK-PHRST: An integrated response, research & capacity development model

Through this mandate, UK-PHRST is expected to contribute to the UK's global health security priorities (GHS) of:

1. Strong global governance and leadership
2. Strong and resilient health systems
3. Evidence-informed policy & programming and design, development & delivery of effective and accessible tools & solutions.

The purported novel value of the three integrated components is illustrated in Figure 1 above.

Background to the evaluation

Itad has been contracted by UK-PHRST to conduct an external performance evaluation and independent monitoring (PE&IM) of the programme from inception in late 2016 until March 2021. The purpose of the evaluation is to ensure independent monitoring and quality assurance of programme delivery, documentation of lessons learnt, and robust tracking of results, providing assessment of the effectiveness of official development assistance (ODA) funds.

The evaluation has a learning focus and aims to support adaptive management. Hence the strong emphasis on utilisation and dissemination of insights. In line with the principle of utilisation-focused evaluation, developed by Michael Quinn Patton, which stipulates that an evaluation should be judged on its usefulness to its intended users, recommendations have been added to the report and its executive summary only after a process of co-creation. The rationale is that recommendations co-created through a participatory multi-stakeholder consultation are more likely to be seen as relevant and feasible, and hence more likely to be followed through.

This is the mid-point evaluation report. The report has been revised upon reception of feedback from UK-PHRST and following a co-creation of recommendations workshop that took place on 17th February 2020. An end-point evaluation report is due in early 2021.

The report presents findings and conclusions from the three evaluation workstreams: Workstream 1 focusing on Design, Workstream 2 on Implementation and Workstream 3 on performance issues.

This report is based on the data collection and analysis work carried out between June and December 2019, including one country visit to Sierra Leone, and over 100 key informant interviews conducted with UK-PHRST and its stakeholders including consortium partners, the UK Department of Health and Social Care (DHSC) and Her Majesty's Government (HMG) stakeholders, National Institute for Health Research (NIHR) and other UK, international, regional and national stakeholders including the World Health Organization (WHO), Ministries of Health, Public Health Institutes and academic organisations.

Image credit: UK-PHRST Lab capacity building work at University of Sierra Leone College of Medicine and Health Sciences

1 Patton, 2013, https://wmich.edu/sites/default/files/attachments/u350/2014/UFE_checklist_2013.pdf

Evaluation key findings

Below is a summary of the main findings for each evaluation question (EQ), by workstream.

1 WORKSTREAM 1: Design: Model and Strategy

EVALUATION QUESTION 1

How appropriate is UK-PHRST's integrated model and consortium approach in contributing to improved outbreak response?

- The novel approach of combining outbreak response deployments with research and capacity building is ahead of the curve and considered valuable, but its appropriateness cannot yet be fully assessed as strategies are still evolving and implementation limited.
- The model effectively utilises and develops outbreak response specialists across different disciplines, and there are operational benefits to having a permanent team available for deployment and related research, such as increased internal and external knowledge sharing to inform and improve future outbreak response.
- The consortium approach broadens access to expertise and to existing connections and projects in low- and middle-income countries (LMICs), which has allowed UK-PHRST to build on existing positive relationships in LMICs and supported operationalisation of UK-PHRST's activities and work across the triple mandate.

EVALUATION QUESTION 2

To what extent are UK-PHRST activities relevant, strategic and appropriate in relation to UK-PHRST programme goals?

- UK-PHRST's ability to be strategic in this first phase of programming has been somewhat constrained by being a new entity formed of institutions with very different ways of working, and needing to learn and reflect on its strategy as it has evolved.
- There is still a lack of clarity and cohesion around areas of UK-PHRST's approach, particularly in relation to research and capacity building, within UK-PHRST and across its stakeholders.
- Three key areas were identified that need strengthening to ensure UK-PHRST is able to implement its triple mandate and achieve its goals: i) maintaining and developing processes to deliver strategic priorities, ii) building strategic partnerships to enable delivery of the triple mandate model, and iii) ensuring alignment with national processes such as the Joint External Evaluation (JEE) and associated National Action Plan for Health Security (NAPHS).

2 WORKSTREAM 2: Implementation: Delivery, Process and Partnerships

EVALUATION QUESTION 3

How successfully has UK-PHRST been operationalised?

- UK-PHRST's activities and outputs have largely been achieved or are on track for output milestones. For the first 18 months, UK-PHRST was in the interim set-up phase and the first deployment was conducted in April 2017. From this point onwards, UK-PHRST demonstrates ongoing progress against activities for all triple mandate areas. While deployments and research activities are overall progressing well, capacity building activities have incurred some delays.
- UK-PHRST is a highly professional, expert team, who are building a strong reputation for high-quality work in outbreak response.The consortium has not yet fully manifested a unified UK-PHRST identity, which impacts on both However, the current team model has struggled to respond to demands across the triple mandate and requests from external parties. This has had negative implications in terms of skills gaps against deployment demands, has led to differential demands upon individual team has regularly taken stock of the demands of the triple mandate model and partners' requests, and has made efforts to address some of the key challenges, with revised strategies being drafted or revised to identify UK-PHRST's priorities moving forward.
- UK-PHRST's governance and reporting structures are perceived by some core team members to be complex, and may contribute to tensions between PHE and LSHTM. Governance structures and ways of working have ensured effective oversight of research and deployment portfolios, but there has been less focus on capacity building activities. Reasons included an operational need to prioritise deployments and research activities during the early stages of the UK-PHRST, which contributed to a delay in establishing capacity building priorities for the programme, along with internal UK-PHRST governance arrangements and lack of clarity on organisational responsibilities for capacity building. Management and reporting systems have struggled to adapt and provide the necessary flexibility to deal with the high-pressure nature of UK-PHRST's work, leading to team frustrations which are further challenged by the disperse locations and regular travel schedule of key staff.
- The consortium model has conferred many benefits for UK-PHRST and is an important driver of success. Collaboration between the academic partners has been generally positive and occurs across the triple mandate, although to differing degrees. Collaboration and coordination between PHE and LSHTM as the main partners have been more challenging due to differences in organisational culture, management systems and the team's disperse physical locations. UK-PHRST has made efforts to address these challenges, although the evidence suggests this has not been entirely successful, especially in terms of internal communication between the consortium partners. The consortium has not yet fully manifested a unified UK-PHRST identity, which impacts on both internal and external relationships and communication.
- External communications have helped UK-PHRST to become more visible and respected among some key UK and international GHS stakeholders, including Global Outbreak Alert and Response Network (GOARN) and LMIC governments where they have deployed bilaterally. There are some challenges to external communications due to political sensitivities and security considerations around GHS deployments. There is opportunity during the current revision of the communications strategy to consider these challenges and improve UK-PHRST's internal joint sense of identity to further enhance visibility, ensure that the team are fully utilised, that the triple mandate can be fulfilled, and that their work is properly attributed.

2 WORKSTREAM 2: Implementation: Delivery, Process and Partnerships

EVALUATION QUESTION 4

To what extent does UK-PHRST complement or duplicate other UK ODA health security?

- Although close collaboration and alignment of activities across HMG GHS actors is widely acknowledged as important, existing mechanisms at central level do not allow for full cross-programme learning, and in general do not translate into effective communication, coordination and collaboration at country level. Similarly, there is fragmentation and lack of coordination across the various UK deployment mechanisms, and opportunities for collaboration to reduce potential duplication of efforts or inefficiencies are being missed.

EVALUATION QUESTION 5

To what extent has UK-PHRST supported coherent and collaborative national and international health activities on response?

- UK-PHRST operates within a complex international GHS landscape and is only one of numerous actors supporting LMICs in epidemic preparedness and response. UK-PHRST has built on existing collaborative partnerships and forged new ones with LMIC, regional and global actors and is seen as a reputable, highly skilled and valuable partner. However, there is still need for increased awareness and visibility of UK-PHRST and continued focus on relationship building with key stakeholders at all levels.

Image credit: UK-PHRST team photo

3 WORKSTREAM 3: Performance: Results, Sustainability and Accountability

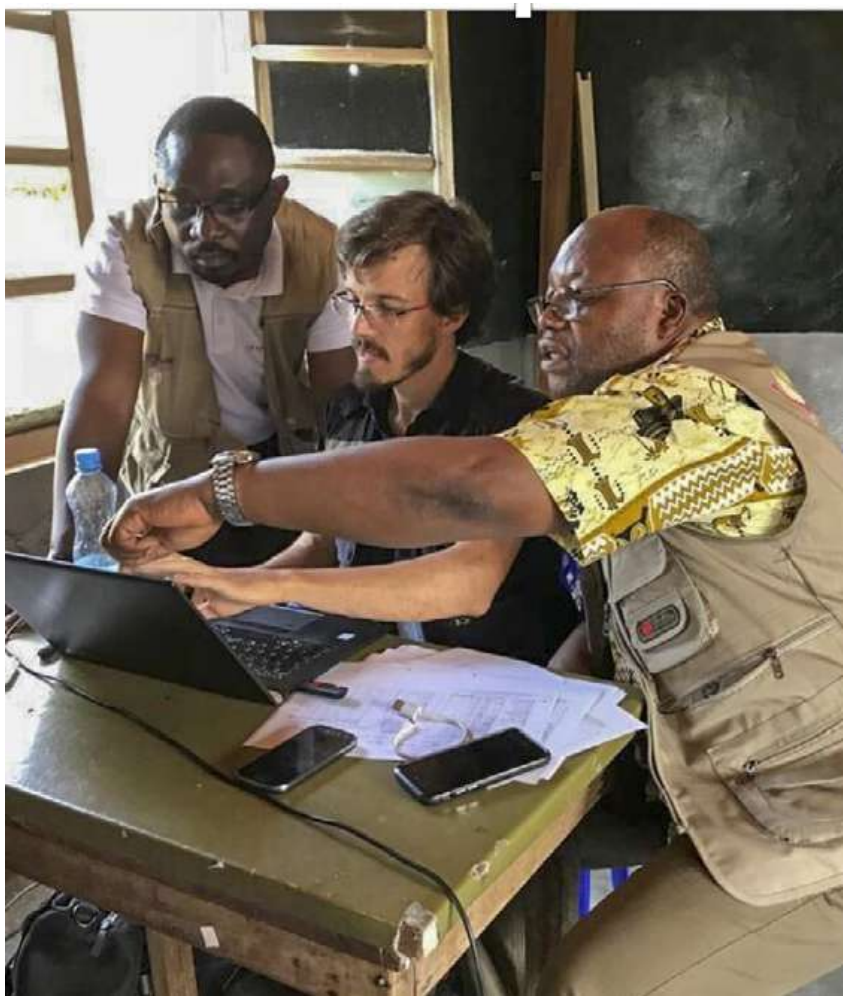


Image credit: https://www.lshtm.ac.uk/newsevents/expert-opinion/what-it-responding-ongoing-ebola-outbreak-democratic-republic-congo-and

EVALUATION QUESTION 6

What contribution are UK-PHRST's deployment, research and capacity building outputs making to achieve programme outcomes?

- As discussed in our Inception Report, we have not carried out contribution analysis at mid-point. Moreover, the current UK-PHRST Monitoring, Evaluation and Learning (MEL) framework is not adequately capturing changes at the outcome or impact level. Evidence suggests however that UK-PHRST has made a difference in terms of speed and quality of UK response to outbreaks in particular. There are also some early indications to suggest that, as a result of UK-PHRST's more rapid UK deployment, research and capacity building, in some countries and key supporting international partners' responses to outbreaks may have been strengthened. In some occasions, external factors such as politics and national rules and regulations, conflict and insecurity, and lack of a sufficient number of study subjects have sometimes hindered contribution to outcomes.

EVALUATION QUESTION 7

Are programme outputs and outcomes likely to be sustained?

- Sustainability concerns have not been adequately embedded in the UK-PHRST's strategy or implementation plans. UK-PHRST's relative reduced focus on the capacity building component in a context of limited human resources has hampered prospects for sustainability. There is no systematic action plan/needs assessment coming out of deployments and no systematic linking up with the International Health Regulations (IHR) or other capacity building initiatives. There is agreement that forming long-lasting relationships is key to increasing the chances of project outcomes being sustainable.

3 WORKSTREAM 3: Performance: Results, Sustainability and Accountability

EVALUATION QUESTION 8

To what extent has UK-PHRST followed the NAO principles of economy, efficiency and effectiveness and demonstrated VfM?

- Overall, there is adequate to good evidence to suggest that appropriate processes are in place to ensure the delivery of VfM, with further attention required in some areas.
- UK-PHRST's approach to economy has been assessed as adequate. There have been efforts to ensure that appropriate procurement processes have been implemented to ensure VfM. This has resulted in the procurement of high-quality inputs.
- In terms of efficiency, appropriate processes are in place to track absorption and measures are being considered to monitor efficiency. To date, despite some underspend, there has been strong performance against output indicators.
- As far as effectiveness, a high-level theory of change (ToC) is in place with some evidence to validate the causal pathways for the achievement of outcomes. There is, however, greater uncertainty around capacity building.
- Equity has been considered in the project design although there is little evidence that this has been translated into implementation practices where activities are designed to target vulnerable groups and promote gender equality.

EVALUATION QUESTION 9

Is UK-PHRST capturing the right data to measure results and ensure transparency and how can this be improved?

- Since developing the ToC for the purposes of this evaluation, UK-PHRST has been through a strategic review process and further revisions to the ToC may be required.
- In terms of transparency, UK-PHRST meets self-reporting International Aid Transparency Initiative (IATI) transparency standards and demonstrates improvements from 40–59% (fair) in 2017/18 to 60–79% (good) in 2018/19.
- Monitoring, evaluation and learning (MEL) systems are currently output-focused and could be strengthened to better capture evidence and measurable outcomes and impact.

Evaluation conclusions

The UK-PHRST model is still valid. The idea of combining response, research and capacity building in a readily deployable team still holds. UK-PHRST appears to be the only full-time team dedicated to outbreak response with an explicit mandate to combine deployments with research and capacity building into a single offer in the GHS landscape. Across the board, the model is still seen as unique, pioneering and essential for influencing the outbreak research agenda globally and strengthening countries' ability to respond quickly and effectively, especially considering that the Global Preparedness Monitoring Board (GPMB) recently warned that 'current efforts remain grossly insufficient' despite the progress made by the international community in preparing to face health emergencies [2].

Image credit: UK-PHRST DRC Ebola outbreak response team working with local counterparts to review outbreak data and existing tools

As discussed in the findings' session, UK-PHRST has been successful in:

- **Establishing a highly-professional and well-respected team of experts from well-respected institutions, with valuable existing connections and reputations.** In doing that, UK-PHRST have developed positive relationships with GOARN and national governments, who report improved speed and effectiveness of outbreak response when UK-PHRST are deployed. This has contributed to greater expert-readiness, albeit mainly at the level of individual experts.
- **Mobilising a permanent team focussed on outbreak response across the triple mandate, which has helped to support outbreak-related research.** This has already contributed to the global evidence base, and has enhanced learning and sharing across UK-PHRST and the broader GHS landscape, thus contributing towards better research readiness.
- **Providing invaluable access to the consortium partners' pre-existing and positive relationships with LMIC stakeholders.** They have had some success in effectively building on these existing networks to identify successful capacity building activities with the potential to contribute to greater expert readiness on the ground and potentially providing opportunity for greater sustainability of outcomes.

2 GPMB. 2019. A world at risk. Annual report on global preparedness for health emergencies. Available at: https://apps.who.int/gpmb/assets/annual_report/GPMB_annualreport_2019.pdf

The full potential benefits of the model have not materialised yet for a number of reasons:

- **Limited implementation and funding period.** Although donor funding tends to be short term, programme outcomes take time to materialise, and even more so in fields such as research and capacity building. DHSC should bear this in mind when reflecting on this first phase of the programme and planning for any subsequent phases.
- **Operationalisation of the concept of the triple mandate is still a work-in-progress.** When the programme started in 2016, there was no Business Case, ToC or logframe in place. A ToC and a logframe were only established ex-poste and the ToC is still currently under revision. The MEL system is still also under revision and key strategies, such as the research and capacity building strategies, have just recently been developed. Others, such as a sustainability strategy, are still missing.
- **Difficulties working across institutions and cultures.** Issues around governance, management and communication have limited effective coordination, collaboration and cross learning
- **Challenges around the capacity and skills of the UK-PHRST team relative to the demands of the model and requirements for individual deployments within the triple mandate model.** In a context in which contributing to outbreak responses is perceived by most as the primary mission of UK-PHRST and limited human resources, involvement in frequent and sometimes repeated deployments (such as in the case of DRC) has resulted in less focus on or delays to the other two components of the triple mandate, especially capacity building.
- **Modality of deployment:** Most requests for deployment have come from GOARN and this can limit UK-PHRST's ability to deliver a more strategic, cross-HMG UK response and/or opportunities to influence or ability to integrate research and capacity building into outbreak response.
- **Weak communication and coordination with other HMG GHS actors**. UK-PHRST's efforts to work with other HMG GHS programmes within LMICs has so far had limited success. There is still a need for more collaboration between UK deployment mechanisms to remove the risk of duplication and to build on synergies with other HMG GHS programmes, including the PHE IHR Strengthening project.
- **Tension between visibility and recognition against alignment and coordination with other actors involved in the response.** There is still limited awareness of the UK-PHRST at country level when the team is deploying through GOARN. Enhancing visibility will be dependent on longer-term investments in relationship building, particularly at the country and regional level.
- **MEL systems need strengthening in order to support measurement of progress towards desired outcomes and support learning and adaptive management.** While recognising that research and capacity building outcomes require time to fully materialise, the UK-PHRST needs to revise and strengthen the way it tracks progress against its ToC to demonstrate and ensure contribution to the desired long-term changes going forward.
- **Sustainability warrants some special attention.** Capacity building has received less focus within the triple mandate, which poses questions in terms of the sustainability of UK-PHRST's outcomes.
- **Equity considerations need to be more routinely integrated into project design and decision making.** Integrating equity and human rights considerations within UK-PHRST's operations would support greater effectiveness of interventions.

While UK-PHRST remains fairly unique, these issues are not uncommon in the international development space. The 2018 ICAI review on 'The UK aid response to global health threats'[3] highlighted 'a general need for improvements in cross-government collaboration and communication'. Tensions versus short term development funding and the challenge of building sustainability are also well documented[4], while countless organisations struggle with measuring progress and contribution towards desired outcomes. This evaluation is hopefully a good first step to take stock of what UK-PHRST has already accomplished to date and the work that remains to be done.

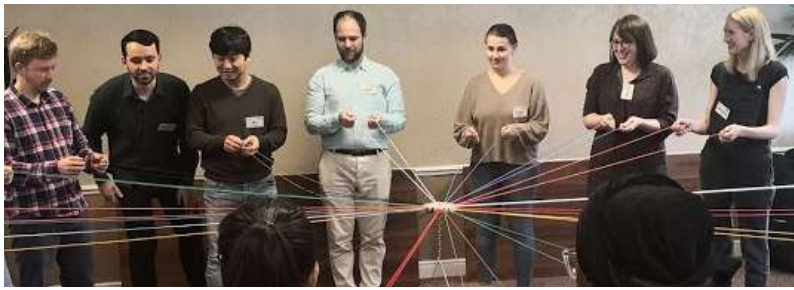


Image credit: UK-PHRST Field Deployment Course

3 ICAI. 2018. The UK aid response to global health threats. A learning review. Available at https://icai.independent.gov.uk/wp-content/uploads/GHT-review_final.pdf

4 ICAI. 2018. DFID's approach to value for money in programme and portfolio management. A performance review. Available at: https://icai.independent.gov.uk/wp-content/uploads/ICAI-VFM-report.pdf

RECOMMENDATIONS

	Recommendations	Priority actions for the remainder of this phase (until March 2021)	Consideration for future phases
	**Recommendation 1** Clearly articulate UK-PHRST's remit across the triple mandate and set out clear ways of working within the consortium and with partners.	Draft a comprehensive Operational Manual that details how UK-PHRST aims to achieve its goals within and across the three areas of its mandate (linked to UK-PHRST's ToC), governance arrangements, prioritisation criteria, partnership approaches, external and internal communications, equity (including gender) and sustainability.	Articulate a request for more human resources (either as part of the permanent CDT or for reservists) in order to be better positioned, if selected, to deliver on their ambitions.
	**Recommendation 2** Build a 'UK-PHRST identity' and tackle any tensions within the consortium that may hinder smooth collaboration and efficiency	1. Hold a team building workshop to reflect on their strengths, the benefits of working in a consortium and how team cohesion, collaboration and sense of identity can be improved. 2. Agree internally and with DHSC on the use of a UK-PHRST logo in email signatures, business cards and external communications.	1. UK-PHRST to clarify how team members are expected to represent themselves to partners in various contexts when operating under UK-PHRST, as opposed to when they are representing PHE or LSHTM in another capacity. 2. UK-PHRST to highlight the potential for enhanced career opportunities for team members in addition to those available through existing organisational routes
	**Recommendation 3** Set out, implement and monitor a communication and engagement plan to increase awareness of what UK-PHRST is and does	1. Draft and disseminate a one-pager (with a logo) on what UK-PHRST is and does (and why) and tailor it for each country 2. Draft and disseminate at least one case study that articulates UK-PHRST approach and expected contribution to programme outcomes 3. Work with DHSC and NIHR's communications departments to disseminate and amplify messages from UK-PHRST	Carry out comprehensive stakeholder mapping that could drive partner prioritisation in LMICs.
	**Recommendation 4** Find ways to collaborate more closely with other actors in the GHS space, especially across HMG programmes	Working with DHSC, reach out to DFID health advisors and PHE IHR Strengthening Project Country Leads (in PHE IHR countries) in the countries they are working or planning to working in to start sharing plans and aligning efforts	3. Assess LMICs' capacity building needs and discuss with national stakeholders where and how they can provide targeted, short-term support to longer-term capacity building activities already being implemented by national stakeholders 4. Put MOUs in place and set up "hand over" arrangements with national/ regional/international partners who could support this work in the longer term.
	**Recommendation 5** Revise current MEL systems to make sure they are fit for purpose to support learning and adaptation	1. Seek Itad's guidance on how to revise its MEL systems so that they align with its long-term vision and ToC. 2. Maximise reflection opportunities across the triple mandate 3. Review and prioritise action points from various sources as a group on a regular basis to foster both learning and accountability.	Revise MEL systems so that they track progress towards inputs, activities, outputs, intermediate outcomes and long-term outcomes of UK-PHRST engagement, with measurable indicators, baselines, targets and means of verification. The framework should ideally also capture to the extent possible unintended results, UK-PHRST's contribution and what other partners are doing that could potentially also have an impact on the same outcomes.
	**Recommendation 6** Operationalize existing commitments to promoting equity and human rights	Invest time and effort to mainstream equity and human right concerns in all it does going forward. Examples of this would be: i) carrying out analysis of gender or human rights barriers pre-deployment/research work (leveraging the social scientist's skills) and making this part of the pre-deployment briefing pack; ii) including gender-sensitive response to outbreaks as part of UK-PHRST's training curriculum and as a topic of research and capacity building; iii) collecting MEL indicators in a disaggregated fashion whenever possible and relevant; iv) including equity and human right considerations in the prioritisation criteria for deployment and research activities	

1. Overview of the report

The UK Public Health Rapid Support Team (UK-PHRST) has commissioned Itad to conduct an external performance evaluation and independent monitoring (PE&IM) of UK-PHRST from inception in late 2016 until March 2021. As part of the PE&IM, Itad has carried out a mid-point programme evaluation over the period June 2019 to March 2020 and will carry out an end-point programme evaluation over the period September 2020 to March 2021.

This draft mid-point report is based on the data collection and analysis work carried out between June and December 2019, including one country visit to Sierra Leone, and over 100 key informant interviews conducted with UK-PHRST and its stakeholders including consortium partners, the UK Department of Health and Social Care (DHSC) and other Her Majesty's Government (HMG) stakeholders, National Institute for Health Research (NIHR) and other UK, international, regional and national stakeholders including World Health Organization (WHO), Ministries of Health, Public Health Institutes and academic organisations.

The report is structured as follows:

- The remainder of Section 1 presents the background, purpose, objective and scope of the evaluation.
- Section 2 presents a summary of the evaluation approach, including the evaluation framework, data collection, analysis and synthesis methods, and limitations.
- Section 3 presents findings by each workstream in turn.
- Section 4 sets out our evaluation conclusions.
- Section 5 presents our recommendations.

This is supported by the following annexes:

- Annex 1. DHSC Global Health Security Theory of Change
- Annex 2. UK-PHRST ToC from ToR
- Annex 3. Summary of Stakeholders Interviewed
- Annex 4. UK-PHRST Evaluation Theory of Change
- Annex 5. Terms of Reference
- Annex 6. Overview of Technical Approach
- Annex 7. Evaluation Framework
- Annex 8. Documents Reviewed
- Annex 9. Approach to Data Collection
- Annex 10. Value for Money Assessment
- Annex 11. Global Health Security (GHS) Landscape Analysis
- Annex 12. Summary of Strategic Approaches for Deployments, Research and Capacity Building
- Annex 13. Outbreak Response/Deployment review
- Annex 14. Research Portfolio Review
- Annex 15. Capacity Building Portfolio Review
- Annex 16. Madagascar Plague Thematic Case Study
- Annex 17. UK-PHRST Governance Structures
- Annex 19. UK-PHRST Project Board and UK-PHRST Academic Steering Group Members

- Annex 20. DRC Ebola Thematic Case Study
- Annex 21. UK-PHRST logical framework
- Annex 22. Lassa Fever Thematic Case Study
- Annex 23. List of Deployments
- Annex 24. Detailed List of Stakeholders Interviewed
- Annex 25. Overview and Geographical coverage UK Global Health programmes
- Annex 26. Overview of the Evaluation Team
- Annex 27. Overview of Implementation of Programme Activities and Achievement of Programme Outputs

1.1. Background, purpose, objective and scope of the evaluation

1.1.1. Background to the evaluation

Rationale for UK-PHRST

The Ebola Virus Disease (EVD) outbreak highlighted the inadequacies of the global health community to both respond to and conduct essential research in complex outbreaks. The crisis led to a protracted public health emergency and further damaged the already weak health systems and economies throughout West Africa.[5]

During the outbreak, international deployment of technical staff was largely coordinated through the Global Outbreak Alert and Response Network (GOARN), which is coordinated from WHO in Geneva. GOARN consists of over 200 technical institutions and networks globally that respond to acute public health events.[6] Both the London School of Hygiene and Tropical Medicine (LSHTM) and Public Health England (PHE) were heavily involved in the EVD response as part of the UK contribution, predominantly in Sierra Leone. In addition, PHE collaborated with GOARN to provide pre-deployment trainings for international staff.

The West Africa EVD outbreak exposed fundamental weaknesses in the WHO's ability to lead, coordinate, and mobilise an effective international response to pandemic threat.[7] In response, WHO's Health Emergencies Programme was launched in 2016 with reforms influenced by recommendations arising from the EVD outbreak.[8] Consensus recommendations included: the formation of a WHO Centre for emergency preparedness and response; strengthening global disease surveillance and International Health Regulations (IHR) core capacities; and establishing better operational and policy coordination between WHO, UN agencies, and other global health partners.[9] In addition, WHO began developing the Global Health Workforce with two regional response hubs in Africa (Nairobi and Accra) and a number of countries developed national response capacity for infectious disease outbreaks and humanitarian emergencies.

In the UK, a post-Ebola report commissioned by the UK Government and Department for International Development (DFID),[10] identified a number of weaknesses in the response including a lack of research readiness and lack of expert readiness. Within the DHSC, the Global Health Security (GHS) Programme began to evolve as a consequence of the EVD crisis. In November 2015, the UK Government announced new research funding for infectious diseases including £188 million to fight diseases with epidemic potential.[11]

[5] Bausch DG., 2017.
[6] Ibid.
[7] Ibid.
[8] Gostin LO, 2016; Mackey, 2016; WHO, UN, 2016.
[9] Gostin LO, 2016; Mackey, 2016.
[10] ICAI, 2018.
[11] IDC, 2018.

At the 2015 G7 Summit in 2015, the UK Prime Minister outlined a commitment to build capacities for prevention and response to global health emergencies and the creation of the UK Public Health Rapid Support Team (UK-PHRST). Following a competitive process to secure a suitable academic partner(s), PHE and LSHTM developed a concept note and subsequently a joint proposal for a rapid outbreak response team, with Oxford University and King's College London (KCL) included as part of a broader academic consortium. The UK-PHRST was officially launched in November 2016, and towards the end of 2017, UK-PHRST transitioned to the permanent phase of the project and is now in year four of a five-year funding cycle.

UK-PHRST's Theory of Change

Through inception, Itad collaborated with UK-PHRST to develop a theory of change (ToC) from their previously existing ToC that is a fair reflection of the intervention logic, and with sufficient detail for use as the basis for evaluative judgement (Annex 4).

The UK-PHRST programme is one component of the broader DHSC GHS Programme that aims to support achievement of the Sustainable Development Goals, working towards a global population safe and secure from global health security threats, and increasing UK leadership and coordination in international partnerships. The revised ToC makes an explicit connection between UK-PHRST's key intermediate outcome of contributing to improvement in speed and quality of UK and global response to epidemics with the intermediate and long-term outcomes of the broader DHSC GHS ToC (Annex 1).

The revised UK-PHRST ToC explicitly highlights the added value of UK-PHRST's triple mandate of outbreak response, research and capacity building, and the areas of overlap between these three focal areas. At all levels, the ToC highlights the importance of early outbreak detection and response in order to reduce the risk of outbreaks becoming global public health emergencies.

At activity and output level, the ToC outlines UK-PHRST's focus on formulating the research, response and capacity building plans, infrastructure, skills, relationships and tools needed to contribute to an improvement in both UK and low- and middle-income country (LMIC) capacity to respond quickly and effectively to outbreaks. The ToC also outlines key contextual and causal assumptions that must hold in order for these outputs to lead to the desired short- and long-term outcomes.

Following finalisation of the evaluation ToC, UK-PHRST developed an outline Strategy Paper that further revised this ToC for internal purposes.[12] This will be further discussed in Section 3, but for the purposes of the evaluation, the ToC in Annex 4 should be referenced.

1.1.2. Purpose of the evaluation

In line with the Terms of Reference (ToR) of the evaluation (Annex 5), the overall purpose of the evaluation is to ensure that the UK-PHRST is having the intended impact by focusing on quality assurance and accountability and the facilitation of learning and adaptive management in order to improve programme decisions and performance. To that end, the PE&IM team will ensure **independent monitoring and quality assurance of programme delivery, documentation of lessons learnt, and robust tracking of results, providing assessment of the effectiveness of official development assistance (ODA) funds**.

1.1.3. Objectives of the evaluation

In considering performance, accountability and learning in particular, UK-PHRST specified the following objectives for the PE&IM in the ToRs (Annex 5):

- **Assess the model of UK-PHRST**, which is a novel combination of public health operational activity, research and capacity building.

[12] UK-PHRST SMT Paper (18 October 2019).

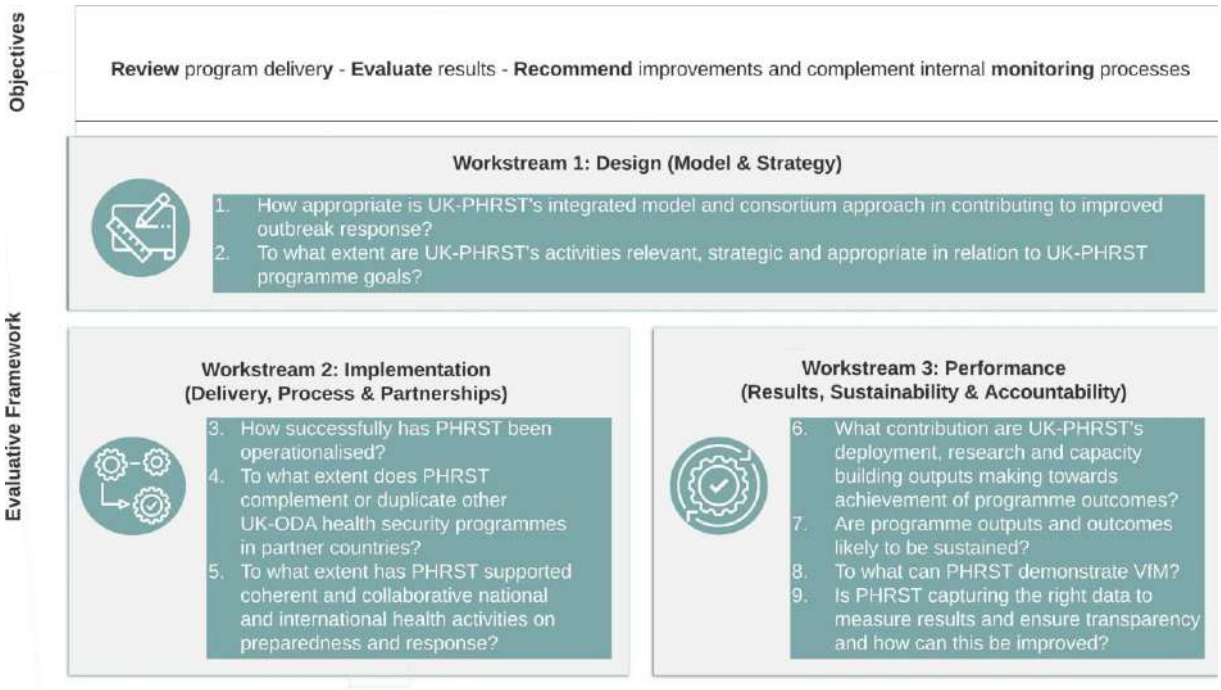
- **Examine the extent to which UK-PHRST complements other UK ODA GHS programmes** (including PHE's IHR Programme) in partner countries and regions (e.g. WHO Regional Offices for Africa [AFRO], Eastern Mediterranean [EMRO] and South East Asia [SEARO]) and supports coherent national and international health activities on preparedness and response.
- **Determine the extent to which the UK-PHRST works as a functional partnership and consortium**.
- **Assess the outputs and outcomes of UK-PHRST activities**, including utilisation, sustainability and the pathway to impact through the ToC.
- **Generate additional evidence and insights**.
- **Support the UK-PHRST to inform, facilitate and disseminate learning** from monitoring, evaluation and learning (MEL).

1.1.4. Scope of the evaluation

Programmatic focus

Based on the objectives outlined above, the evaluation is focused on nine overall evaluation questions (EQs), which fall within three broad workstreams, which form the basis of our evaluation framework and the structure of this report. As depicted in Figure 1 below, Workstream 1 focuses on design, Workstream 2 on implementation and Workstream 3 on performance. For more information on the EQs see Section 2.1.

Figure 1. Overview of evaluation framework



Temporal scope

The mid-point evaluation is focused on the period from UK-PHRST's formal launch in November 2016 to November 2019[13]. Background documents covering this entire period were reviewed, and interviews were carried out mostly during September and October 2019 (with a small number during the evaluation inception period, May – July, and also in early November). Where the evaluation has drawn upon UK-PHRST's MEL data, the period covered is up until June 2019.

[13] This includes the interim inception period while administrative frameworks were put into place and the operational period from April 2017 onwards.

Geographical scope

Given the largely responsive nature of UK-PHRST's work, the evaluation focus is on UK-PHRST's work with international and regional coordinating organisations such as WHO GOARN and other key partnerships that the UK-PHRST has developed at UK, global, regional and national level. In addition, thematic case studies on UK-PHRST's work around Lassa fever in Nigeria and Sierra Leone, the Democratic Republic of the Congo (DRC) EVD outbreak and Madagascar plague outbreak were conducted, as well as an in-country visit to Sierra Leone where UK-PHRST has undertaken numerous activities over several years.

Primary and secondary users

The primary users of the evaluation results are UK-PHRST staff at all levels, but particularly those on the Senior Management Team (SMT), and UK-PHRST Project Board Members, including stakeholders from HMG – including members of the DHSC Global Health Security Programme Board. Other primary users may include non-UK-PHRST members of the consortium organisations, such as those from wider PHE, LSHTM, University of Oxford and KCL.

UK-PHRST evaluation findings and recommendations may also be shared with secondary users including wider UK-PHRST internal stakeholders at global, regional and national levels, including those that may not have been directly involved with UK-PHRST to date. This will help to position UK-PHRST's current and future work within the global health security landscape and will be of interest to a range of other current or potential academic and/or development partners working in this area.

The mode of sharing evaluation findings and recommendations with primary and secondary audiences will be discussed following approval of the Final Mid-point Evaluation Report.

2. Technical approach

This section provides a summary of our evaluation approach, as articulated in more detail in our finalised Inception Report.[14] Annex 6 provides a graphical overview of the evaluation approach.

In line with the principle of utilisation-focused evaluation developed by Michael Quinn Patton,[15] which stipulates that an evaluation should be judged on its usefulness to its intended users, our approach ensures that the fostering of actual use of the data and evidence we generate is maintained through both internal adaptive management and external dissemination of lessons learnt and insights from the evaluation.

In line with this, an interactive workshop with key UK-PHRST stakeholders to review the evaluation findings together is planned to discuss implications and feasible actions to take to course-correct or otherwise strengthen UK-PHRST's efforts. The rationale is that recommendations co-created through a participatory multi-stakeholder workshop are more likely to be seen as relevant and feasible, and hence more likely to be followed through.

Although we trust that recommendations at end-point can helpfully inform HMG strategy for this and similar programmes in the future, we recognise that the key moment for adaptation is now, at mid-point, and we believe the proposed approach will support UK-PHRST's commitment to a strategy testing approach,[16] as set out in the ToR (Annex 5).

2.1. Evaluation questions

The finalised overall EQs as agreed during the Inception Phase are presented in Table 1c. Annex 7 provides our Evaluation Framework, which covers the EQs, sub-EQs, sources of evidence and the analytical methods we have used, by workstream. Details of the EQs/sub-EQs to be answered at mid-point and end-point are also included.

Table 1. Evaluation Questions by workstream

DESIGN (MODEL AND STRATEGY)
1. How appropriate is UK-PHRST's integrated model and consortium approach in contributing to improved outbreak response?
2. Are UK-PHRST activities relevant, strategic and appropriate in relation to UK-PHRST programme goals?
IMPLEMENTATION (DELIVERY, PROCESS AND PARTNERSHIPS)
3. How successfully has UK-PHRST been operationalised?
4. To what extent does UK-PHRST complement or duplicate other UK ODA health security programmes in partner countries?
5. To what extent has UK-PHRST supported coherent and collaborative national and international health activities on preparedness and response?
PERFORMANCE (RESULTS, SUSTAINABILITY AND ACCOUNTABILITY)
6. What contribution are UK-PHRST's deployment, research and capacity building outputs making to achieving programme outcomes?
7. Are programme outputs and outcomes likely to be sustained?
8. To what extent has UK-PHRST followed the National Audit Office (NAO) principles of economy, efficiency and effectiveness and demonstrated Value for Money (VfM)?
9. Is UK-PHRST capturing the right data to measure results and ensure transparency and how can this be improved?

[14] Itad, 2019. Inception Report. UK-PHRST: Performance Evaluation and Independent Monitoring Agent. 28 October.
[15] Patton, 2013, https://wmich.edu/sites/default/files/attachments/u350/2014/UFE_checklist_2013.pdf
[16] Booth, 2018, Adaptive Programme Management, ODI/CAI; Ladner, 2015, Working Politically in Practice, The Asia Foundation.

2.2. Data collection methods

The Evaluation Team applied four distinct data collection methods:

- **Review of existing secondary data:** The team has carried out a comprehensive and structured review of UK-PHRST documents and various external secondary data sources to: (i) refine the overarching ToC for the evaluation; (ii) establish what has happened in relation to UK-PHRST operationalisation during the period November 2016 – November 2019; and (iii) systematically extract relevant evidence from these documents for each EQ. Annex 8 provides a full list of the documents reviewed.
- **Key informant interviews (KIIs):** We have conducted over 100 interviews with key informants at the global, regional and country level, generating rich insights into all three evaluation workstreams. A full list of the stakeholders interviewed is provided in Annex 3.
- **Meeting and workshop observations:** Six stakeholder meetings or workshops were observed:
  - After Action Review (11 June 2019).
  - Academic Steering Group meeting (3 September 2019).
  - Project Board Meeting (4 September 2019).
  - Capacity Building Workshop (5 September 2019).
  - Research Strategy workshop (12 September 2019).
  - Meetings with GOARN and WHO in Geneva (6 November 2019).
- **Country visits:** An in-country visit to Sierra Leone was undertaken.

A graphical representation of our data collection approach can be found in Annex 9.

2.3. Data analysis and triangulation

To analyse and code data from the above sources, we used the qualitative analysis software (Dedoose).[17] Using software for analysis, instead of the evidence matrices proposed in the Inception Report, enabled more nimble and multi-layered analysis including:

- Joint analysis of secondary data and data from interviews.
- Thematic case study analysis.
- Focal area reviews: review of deployments, capacity building and research portfolio.

This approach helped to ensure the analysis process comprehensively considered all relevant data collected by the evaluation, thereby reducing the risk of evaluation bias and improving the robustness of findings.

Additional data analysis techniques, not using the software package, included:

- **Value for Money analysis:** In addition to the above analyses, separate Value for Money analysis has been carried out, including benchmarking of UK-PHRST salaries compared to the costs of using external consultants, and analysis against OECD criteria of Effectiveness, Efficiency, Economy and Equity (Annex 10).
- **Global Health Security landscape analysis:** We conducted a landscape analysis of other global and regional stakeholders working on outbreak response and associated research and/or capacity building activities in order to further refine our document review and key informant interviews (Annex 11).

As outlined in our Inception Report, Contribution Analysis will not be conducted until the end-point phase of our evaluation, after a longer implementation period.

All data collected and analysed through Dedoose was then triangulated across data sources and stakeholder groups and the strength of evidence assessed, based on the level of triangulation that was

[17] https://www.dedoose.com/.

possible within each area of analysis. This helps to convey to readers in a systematic way the robustness of the findings that we have presented. Table 2 presents our approach to ranking the strength of evidence. This ranking is used throughout the findings section of this report.

Table 2. Strength of evidence for UK-PHRST monitoring and evaluation

Rank	Justification
1	Evidence comprises multiple data sources (both internal and external) (good triangulation), which are generally of decent quality. Where fewer data sources exist, the supporting evidence is more factual than subjective.
2	Evidence comprises multiple data sources (good triangulation) of lesser quality, or the finding is supported by fewer data sources (limited triangulation) of decent quality but that are perhaps more perception-based than factual.
3	Evidence comprises few data sources across limited stakeholder groups (limited triangulation) and is perception based, or generally based on data sources that are viewed as being of lesser quality.
4	Evidence comprises very limited evidence (single source) or incomplete or unreliable evidence.

2.4. Limitations

The key limitations experienced during the Mid-point phase of the evaluation can be summarised as follows.

Difficulty of arranging interviews with key stakeholders, especially those at global and national level. Arranging interviews with stakeholders at all levels who are extremely busy and/or who may either not have had any recent interaction with the UK-PHRST team or any at all was very challenging. Securing interviews with specific groups of stakeholders was particularly challenging:

- **WHO/UN global stakeholders:** Relevant WHO and other UN stakeholders based in Geneva are extremely busy and continued to be involved in the DRC Ebola response during the data collection period. This resulted in extremely limited response despite support from UK-PHRST and a visit by the evaluation Team Leader to WHO headquarters.
- **DRC Ebola national stakeholders:** Even with UK-PHRST management team support, arranging interviews with these stakeholders was incredibly difficult as the DRC Ebola outbreak was still ongoing during our data collection phase.
- **National stakeholders:** Due to the short-term nature of these deployments and the comparatively long space of time that had elapsed since UK-PHRST's activities, challenges arranging interviews and recall issues were experienced with national stakeholders involved in Madagascar, Bangladesh and other early deployments. Many claimed they had never heard of UK-PHRST or recalled individuals but were not aware they were part of UK-PHRST.

Particular evaluation sub-questions generated limited data due to limited relevant background documents and limited responses from key informants in this area. Evaluation sub-questions that posed the most significant challenges were those related to equity and transparency.

Difficulty assessing the progress of implementation against the UK-PHRST logframe utilising the existing monitoring, evaluation and learning framework. This has proven to be a limitation for Workstream 3 in particular, but also Workstream 2. The analysis of results at mid-point relies largely on the qualitative data generated through our KIIs and – to a lesser extent – on document review.

Changes to research and capacity building strategies were in progress until the end of our data collection period. When exploring issues relating to research and capacity building in the KIIs, the forthcoming strategy document was frequently mentioned. As strategy development was still in progress, we were not able to access a draft of the document until early October 2019, which made it challenging to explore in more depth during discussions prior to this date whether the strategy was aligned with aspirations.

Inability to generate percentage response for logframe indicators on increasing capacity. The Inception Report noted that UK-PHRST's monitoring spreadsheet refers to the following indicators to be measured by the mid-point external evaluation: *"At least 50% ODA country partner institutions report an increase in*

capacity for detection, prevention and control of outbreaks" and *"At least 50% of international partners report increased capacity through support from UK-PHRST."* While we included questions to capture this data in the KIIs, it was not possible to generate a useful percentage result from the data obtained because only a small number of respondents felt able to give a binary response to this question. It is suggested that UK-PHRST keeps a database of email addresses from all country and international partners to enable an online survey at end line.

3. Evaluation findings

3.1. Workstream 1: Design (Model and Strategy)

This section explores the design of UK-PHRST with an overview of its origins and rationale, followed by an assessment of the appropriateness of the model, the triple mandate approach, and the strategic approach that underpins its implementation.

3.1.1. Appropriateness of the triple mandate model and consortium approach to improved outbreak response

EQ 1 How appropriate is UK-PHRST's integrated model and consortium approach in contributing to improved outbreak response?

EQ1.1 To what extent has UK-PHRST met its mandate of integrating outbreak response, research and capacity building functions?

EQ1.2 What are the advantages/disadvantages/value added of bringing the three functions and institutions together?

High-level finding **EQ 1 (including sub-EQs)**	The novel approach of combining outbreak response deployments with research and capacity building is ahead of the curve and considered valuable, but its appropriateness cannot be fully assessed at this time as strategies are still evolving and implementation limited. The model effectively utilises and develops outbreak response specialists across different disciplines, and there are operational benefits to having a permanent team available for deployment and related research, such as increased internal and external knowledge sharing to inform and improve future outbreak response. The consortium approach broadens access to expertise and to existing connections and projects in LMICs, which has allowed UK-PHRST to build on existing positive relationships in LMICs and supported operationalisation of UK-PHRST's activities and work across the triple mandate.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

This section explores the perceived value at this early stage of implementation of UK-PHRST's design including the triple mandate model combining deployments with research and capacity building as well as the integration of a multi-disciplinary team across a number of institutions. It was not possible at this mid-point phase of the evaluation to do a robust assessment of the appropriateness of the triple mandate and consortium approach as strategies for delivery of the programme were still under revision.

> *"The model shouldn't change but it will take a lot of hard work to achieve it"* (HMG GHS stakeholder)

The novel approach of combining outbreak response deployments with research and capacity building is ahead of the curve, with broad agreement that it is valuable to work across the triple mandate. However, because strategies are still evolving, there was limited evidence to judge the appropriateness of the design or the strategy in terms of delivering the intended outcomes and impact. The integrated components of the UK-PHRST's triple mandate are designed to combat outbreaks of infectious diseases with short-, intermediate-, and long-term benefits.[18] The combination of reinforcing activities included: supporting rapid investigation and response to disease outbreaks at the source; conducting rigorous research to generate an evidence base for best practice to aid epidemic preparedness and response;

[18] Four-Year Strategic Framework 2018-2021 (6th February 2018). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756910/UK-PHRST_Strategic_Framework.pdf

building the UK's cadre of public health reservists and capacity for an improved national response to disease outbreaks; and contributing to supporting implementation of the IHR. These activities were seen to be strategic and *"more than the sum of [their] parts"*.[19] Furthermore, the model acknowledges the implicit nature of capacity building in this area of work and by mandating it, makes explicit its importance in terms of strengthening LMIC outbreak response capacity. Across the board, there was support for this model – seen as unique, pioneering and essential for influencing the outbreak research agenda globally and strengthening countries' ability to respond quickly and effectively. However, strategies to effectively deliver the triple mandate model are still evolving and implementation time is limited and so, at this point, no judgement can be made on whether the model has been appropriately designed in order to successfully deliver the intended outcomes and impact.[20]

The consortium model effectively utilises and develops outbreak response specialists across different disciplines and provides enhanced opportunities for development, testing and sharing of new and innovative approaches that have potential for strengthening broader outbreak response. Bringing together multi-disciplinary specialists to support outbreak response across multiple domains, share learning and take forward new tools and innovations was seen as an exciting approach with the potential to strengthen key areas of outbreak response. Multiple members of the Core Deployment Team (CDT) can deploy together to support different aspects of the outbreak response such as epidemiology, microbiology and case management, which facilitates a more cohesive response and the development of synergies. As a result, UK-PHRST is seen to be well positioned to develop, test and take forward innovative approaches.

There are perceived operational benefits to having a permanent core deployment team available who continue to work on outbreak-related research between deployments. This includes the ability to deploy more rapidly, and the ability to share learning from deployments and research across the team and with the broader GHS sector to inform and improve future outbreak response. Although numerous organisations deploy personnel to support outbreak response, most deploy individuals from across their organisation and do not have a dedicated CDT who work together and whose primary purpose is to support outbreak response. By working across the triple mandate, between deployments the team can share learning and work on research and do not need to be taken out of other jobs to be deployed, thus enabling a speedier response by experts at the cutting edge of their field. Furthermore, they would be well positioned to share learning, innovation and effective tools both within the team and across the broader sector and to feed this into future response. Having breaks between deployments to work on research or capacity building was seen as a sustainable model not placing too much pressure on the CDT.

The consortium model brings together valuable, complementary expertise from the different institutions and provides broader access to existing connections and projects in LMICs. This has allowed UK-PHRST to build on existing positive relations/reputations in LMICs, which has supported operationalisation of UK-PHRST's activities in LMICs and helped to support their efforts to work across the triple mandate. Many stakeholders recognised the relative strengths and expertise of LSHTM and PHE, and ultimately saw great benefit in having this diversity and complementarity of disciplines within the consortium. PHE, LSHTM, KCL and University of Oxford each bring pre-existing infrastructure, partnerships, and connections overseas, which have been a significant advantage during UK-PHRST's early activities. Through these connections, UK-PHRST is able to source and utilise specialist expertise that might be required to support the CDT during a response. For example, having clinicians from the University of Oxford as part of the deployment team to the Madagascar plague outbreak was beneficial to the effectiveness of the response and also in terms of realising the triple mandate through the successful initiation of research during the outbreak (see Box 1, Madagascar Case Study). Additionally, the partners bring reputation and legacy projects to the table, which have enabled UK-PHRST to work across the triple mandate and bilaterally before its reputation had been established. For example, in Sierra Leone, both KCL and PHE already had established relationships with Connaught Hospital and Ministry of Health and Sanitation through the KCL Sierra Leone partnership and PHE Resilient Zero projects respectively, and UK-PHRST has built on LSHTM's and KCL's pre-existing capacity building work with University of Sierra Leone College of Medicine and Allied Health Sciences (COMAHS).

[19] Ibid.

[20] A revised strategy paper has been shared with the Project Board but is yet to be approved.

Box 1 – Madagascar plague case study summary (see Annex 16 for full case study)

What did the UK-PHRST set out to do?

UK-PHRST deployed two epidemiologists (from PHE) and a case management expert (from University of Oxford) to a pneumonic plague outbreak in Madagascar in 2017. Their aim was to support surveillance activities, strengthen health information management, and support case management activities. UK-PHRST was among the first international responders on the ground, and it worked closely with Ministry of Public Health (MoPH), Institut Pasteur de Madagascar (IPM), and Befelatanana University Hospital (HUJRB).

How did things play out in practice?

The UK-PHRST team quickly contributed to the epidemiological systems already in place and supported the establishment of faster surveillance and data analytical processes. UK-PHRST also supported IPM in establishing a cutting-edge plague data management system ready for independent management of future outbreaks. In order to investigate widespread reports of confirmed plague patients presenting with atypical symptoms, UK-PHRST established a research study in collaboration with MoPH, IPM and HUJRB to investigate the pneumonic plague case definition and atypical symptoms.

How did the triple mandate play out?

UK-PHRST provided technical support and capacity building across several domains, thus demonstrating its expertise, initiating new relationships and capitalising on existing ones. Early and sustained discussions with WHO/GOARN and MoPH established the value of implementing research to investigate the pneumonic plague definition during the outbreak, which provided valuable insights for future epidemics**.**

What worked particularly well?

The WHO/GOARN deployment enabled UK-PHRST members to be deployed directly to where their expertise was most valuable, swiftly integrate with in-country institutions and immediately begin contributing to clinical case management, surveillance and outbreak data management.

Expedited approval of the research, including funds, by NIHR & DHSC was critical for establishing a rapid research study during the outbreak. This, combined with the swift integration of the team and trust-building with in-country institutions, allowed for the development of a collaborative research protocol with national ownership.

UK-PHRST's flexibility with research funding to IPM supported a subsequent large externally funded plague trial in collaboration with members of UK-PHRST. Residual funds from the UK-PHRST rapid research study were reallocated to a pilot study in preparation for a longer-term research collaboration funded by DFID and Wellcome Trust under a £1.6 million grant.

What were the challenges?

Setting up a research protocol during an epidemic proved difficult, especially without an established outbreak research culture, a contractual research mandate, or proof of concept. Logistical challenges are common. Research agendas are a sensitive area of discussion when building new relationships, especially in a high-stress environment.

How aligned was UK-PHRST's contribution to the programme outcomes?

UK-PHRST's work in Madagascar closely aligned with the programme's intended outcomes. Most of the multidisciplinary skills of RST members were effectively utilised to identify, prevent and control the plague outbreak, to build operational capacity as well as to produce research that improved the speed and quality of response efforts and secured external funding for a large-scale treatment trial.

What is there to be learnt?

The Madagascar intervention demonstrates that UK-PHRST can effectively contribute to technical support that transitions into research without disrupting the response. It also showed that research during an epidemic can add value to the response itself. However, this is contingent on the strong relationships with national government and in-country partners. Pre-designed protocols would reduce delays and be of benefit in the future.

3.1.2. Relevance and appropriateness of UK-PHRST's strategic approach in relation to the programme's goals (EQ2)

EQ 2 To what extent are UK-PHRST activities relevant, strategic and appropriate in relation to UK-PHRST programme goals?

EQ 2.1 Are the processes in place for prioritising/determining activities undertaken appropriate?

EQ 2.2 Are activities: a) necessary, and b) sufficient to contribute to programme goals?

EQ 2.3 What assumptions underpin the intervention logic and have they been upheld?

EQ 2.4 Are activities aligned to IHR/JEE/other relevant national and international policies?

High-level finding **EQ 2 (including sub-EQs)**	UK-PHRST's ability to be strategic in this first phase of programming has been constrained by being a new entity and needing to learn and reflect on its strategy as it has evolved. There is a lack of clarity and cohesion around areas of UK-PHRST's approach, particularly in relation to research and capacity building, within UK-PHRST and across its stakeholders. Three key areas were identified that need strengthening to ensure UK-PHRST is able to implement its triple mandate and achieve its goals: i) strategic processes; ii) partnerships; and iii) alignment with processes like the Joint External Evaluations (JEEs).	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

This section describes UK-PHRST's overall strategic approach and explores aspects of UK-PHRST's strategic approach identified by respondents that need strengthening to ensure that UK-PHRST achieves results. For more detailed exploration of the strategic approach for each component summary tables are provided in Annex 12 and detailed analyses are provided in Annex 13, Annex 14, and Annex 15.

UK-PHRST's ability to be strategic in this first phase of implementation has been constrained by being a new entity and needing to learn and reflect on its strategy as it has evolved. In the first phase of implementation, building UK-PHRST's capability to rapidly deploy a multi-disciplinary team was prioritised, with less strategic focus on research and capacity building. UK-PHRST is involved in an ongoing and consultative process of reviewing its strategic approach, building on its original strategic plan – developing further the research and capacity building components to facilitate synthesis across the triple mandate.[21,22] This initial implementation phase has raised critical questions for UK-PHRST that are being explored as its profile builds and the value of its novel triple mandate approach is further recognised globally. Questions being explored as part of the strategy process include a review of what capacity building activities can feasibly be delivered during response/research. For a detailed analysis for each triple mandate focal area, Annex 13, Annex 14, and Annex 15.

There is a lack of clarity and cohesion around areas of UK-PHRST's identity and approach, within UK-PHRST and across its stakeholders. There are differing perspectives and understanding of UK-PHRST's identity and offer across the consortium, resulting in a broadly recognised lack of cohesion across the team and with wider stakeholders. Lack of cohesion has contributed to delays in moving forward on revising UK-PHRST's strategy for the individual components of the triple mandate and the triple mandate as a whole and the effective delivery of the mandate so far. See Sections 3.2.3 and 3.2.4 for detailed discussion on challenges around cohesion and the implications.

UK-PHRST is working to finalise a more strategic approach to their research agenda, which should counteract previous concerns across stakeholders around lack of consensus and direction. UK-PHRST's research agenda has evolved from rapidly approved and short-term "quick win" research projects during UK-PHRST's inception phase to a more strategic approach outlined in the overall *UK-PHRST Strategic Framework* published in February 2018. Despite this evolution, many stakeholders across partner

[21] A revised strategy paper has been shared with the Project Board but is yet to be approved.
[22] No plans for expansion or revision of the deployment strategy outlined in the overall Strategic Approach were mentioned by stakeholders.

institutions still perceived the research agenda to be driven by individuals' interests at the time of data collection, and they recommended a comprehensive assessment of the evidence base to identify gaps and priorities before future research is undertaken.

> *"The appointment of the new research lead will be helpful in building a programme of research and consulting with partners about topics and getting a broader consensus around priorities – it is still somewhat driven by individual interest rather than a clear assessment of gaps in knowledge in responding to outbreaks in LMICs..." (HMG GHS stakeholder)*

The recently drafted revised Research and Capacity Building strategy paper (not yet approved as of October 2019) appears to have moved this process forward. See Boxes 3 and 5 and Annex 14 for more details.

The revised strategy for research and capacity building reflects on UK-PHRST's experiences so far and proposes a way forward with a more explicit integration of the components of the triple mandate to optimise the model and capacity within the team.[23] A series of approaches designed to overcome the challenges UK-PHRST has experienced so far in implementing its strategy are proposed, and research and capacity building activities are reframed within two workstreams. There is an emphasis on sharing knowledge and best practice, and on building preparedness to undertake research during outbreaks. The strategy sets out a number of "enablers" to implementing the strategy, which are closely aligned with the evaluation findings.

These include: developing relationships with, and knowledge of, equivalent partners in LMICs, who hold their own national remit to respond to outbreaks in LMICs (see Section 3.2.7); creating and sharing information, knowledge, learning and networks (see Section 3.2.5); maintaining and developing processes to deliver strategic priorities (see Workstream 2, Section 3.2); building and maintaining a skilled workforce; and developing a culture where research and capacity building activities are seen as an integral part of outbreak response where team members work together to deliver interdisciplinary work (see Box 3 and Annex 14 for Research Portfolio Summary).

Having processes that support effective operationalisation of UK-PHRST's triple mandate and consortium model and alignment with the Strategic Goals and Theory of Change was identified as key. A number of key mechanisms or processes were identified that, if strengthened, would improve UK-PHRST's ability to fulfil its Strategic Goals[24] (see Box 2), in addition to the development/ refinement of the strategies previously outlined. These included: broadening the academic consortium; developing internal structures to support research question generation before, during or after a response; processes to share research ideas across the team and with partners to support joint working; processes to facilitate rapid release of funds to support research during response; exploring different approval processes for deployment requests; and process to facilitate research and capacity building during deployments.[25] Work is under way to strengthen mechanisms like the UK-PHRST Technical Steering Committee (TSC) (formerly known as the Academic Steering Group or Committee [ASG]) and team meetings in line with this. See Section 3.2.4 on governance and management and internal communications.

In terms of activities at the strategic level, the critical importance of building strategic partnerships to enable delivery of the triple mandate model was broadly acknowledged, but the current lack of a UK-PHRST partnership strategy setting out a clear way forward to support this was raised by multiple stakeholders. While there are many examples of UK-PHRST applying a strategic approach to building partnerships, a lot of partnership building has been ad hoc and reliant on individual connection. More strategic examples include recent meetings with GOARN in Geneva to build understanding and alignment; with DFID and the PHE IHR strengthening project in Sierra Leone to foster potential opportunities to work together; and with the Nigerian Centre for Disease Control (NCDC) to strengthen global capacities for

[23] UK-PHRST SMT Paper (14 October 2019).
[24] Four-Year Strategic Framework 2018-2021
[25] Ibid.

outbreak prevention and control. Developing a more formalised "partnership strategy" with clear roles for the team was recommended (see Section 3.2.4).

> *"Part of the issue is that the response is reactive but the purpose behind the RST is quite strategic… so being clear about who the stakeholders are and what the strengths of our relationships are and where RST should focus its efforts within the UK and internationally is really important. We shouldn't restrict to a specific set of priority countries – should apply generic thinking around criteria like - LMIC countries, where it is in the UK government's interest to be building relationships, where PHE/LSHTM has already developed programmes, a need to go where the diseases are" (UK-PHRST Consortium stakeholder)*

Box 2: UK-PHRST's Strategic Goals

UK-PHRST's Strategic Goals are:

1. Continuing and expanding their role in providing rapid technical support to outbreaks in ODA-eligible countries; offering expertise and tools to streamline and optimise outbreak response, while interfacing and integrating more closely with other HMG actors engaged in global public health.
2. Growing the research portfolio from numerous independent projects to a more cohesive approach for maximum synergy.
3. Actively exploring, strengthening and developing innovative tools and approaches to be incorporated and validated in the field to optimise outbreak response.
4. Expanding horizons and building bridges to broad UK-wide technical and research expertise to develop a base for enhanced human and financial resources.
5. Developing a comprehensive and cohesive overseas training portfolio to develop a cadre of skilled personnel for outbreak response and research in ODA-eligible countries.

Strategic thinking on how UK-PHRST should engage and ensure alignment with national JEEs and connected National Action Plans for Health Security (NAPHS) is currently limited. Ensuring alignment of UK-PHRST's work with broader systems that support efforts to meet IHR requirements was acknowledged as important. Although the deployment component of UK-PHRST's work is reactive and (largely) short-term, UK-PHRST through the integration of research and capacity building components, does have longer-term objectives that should link with these national plans.

3.2. Workstream 2: Implementation (Delivery, Process and Partnerships)

This section presents findings on the implementation of UK-PHRST over the last three years and explores: progress against activities and outputs; the human resourcing model; governance and funding structures and reporting mechanisms; consortium partnership arrangements; internal and external communication; and how UK-PHRST works with the UK GHS and country, regional and global level health security landscape including partnership, alignment and coordination. Findings from EQ3.8 (internal and external factors that impacted on activities and outputs) are integrated throughout this section and the findings as a whole.

Box 3 – Research portfolio summary (see Annex 13 for full case study)

Evolution of the UK-PHRST research portfolio

The nature and objectives of UK-PHRST's research activities have evolved since the original proposal. During the initial inception phase, there was a focus on short-term research projects, literature reviews and protocol development. The 2018 Strategic Framework defined the intended function of UK-PHRST's research team as conducting research when not 'occupied by the outbreak response'. By July 2019, five strategic research priorities had been identified, primarily based on individual interest areas and existing thematic expertise. Twenty-five research studies have been initiated, spanning all five strategic themes, with funding for each theme varying from 8% (mental health) to microbiology-related studies (32%).

A revised research strategy was under consideration as of October 2019 which integrates research, capacity building and response under two new workstreams:

Workstream 1 - Informing and supporting response: What is best practice in outbreak response and how do we share this?

Workstream 2 - Research in response: How can we facilitate research in outbreaks of infectious diseases to improve response?

How did the triple mandate play out?

There are many examples of research linked to outbreak response, although research activities have often not taken place during an active deployment due to the operational challenge of establishing a research study in an outbreak response.

Capacity building in terms of training research team counterparts in methods and analysis is generally integrated to UK-PHRST research activities, although this is sometimes in an implicit way rather than an explicit part of study design**.** Research studies have trained in-country stakeholders across a broad range of topics and skill sets. Others have opportunistically incorporated capacity building by organically assessing needs and implementing on-the-job training in partnership with in-country stakeholders.

There are many examples of the triple mandate model delivering in terms of longer-term relationships and additional opportunities for applied research. In Madagascar, UK-PHRST was granted a further £1.6 million because of the relevance of their pneumonic plague study. In Sudan, relationship building led to additional requests for training and capacity building and sparked a collaboration for future research opportunities. Likewise, the relationship with Africa CDC led to a direct request to develop improved evidence-based approaches to mental health in outbreak settings.

Challenges and Implications moving forward

Many research projects experienced delays in set-up and implementation often due to deployment activities, waiting for ethical and other forms of approval, as well as time spent building trusting relationships with in-country partners. Despite this, the peer-reviewed and published evidence-base of data around outbreaks has rapidly increased as a result of UK-PHRST research activities. However, UK-PHRST can do more work to close the gap between evidence, dissemination, and action at national and global/regional levels in order to influence and improve policies and practices.

UK-PHRST has not yet fully harnessed the multidisciplinary skillset of the research team, as although the portfolio as a whole reflects all disciplines, there have been no formal interdisciplinary studies which have capitalised on the full expertise available. Furthermore, some team members have not been utilised as often as others for research activities, as a result of their area of expertise being more regularly requested and/or due to having the necessary language skills for the deployments that have arisen. Many stakeholders suggested that it could be strategically valuable to open up UK-PHRST's research funding to a wider pool of institutions to broaden the available expertise available and strengthen UK-PHRST's research reputation.

3.2.1. Progress of UK-PHRST in delivering activities and outputs (EQ3.1)

EQ 3 How successfully has UK-PHRST been operationalised?

EQ 3.1 To what extent have planned programme activities been implemented and programme outputs achieved?

High-level finding **EQ3.1**	The UK-PHRST activities and outputs have largely been achieved or are on track for output milestones. For the first 18 months, UK-PHRST was in the interim set-up phase and the first deployment was conducted in April 2017. From this point onwards, UK-PHRST demonstrates ongoing progress against activities for all three components of the triple mandate. While deployments and research activities are overall progressing well, capacity building activities have incurred some delays.	The findings are supported by multiple data sources of lesser quality, or the finding is supported by fewer data sources of higher quality (moderately good triangulation)

Assessing progress against EQ 3.1 has proven difficult utilising the existing MEL framework (see Section 3.3.1 for more details). UK-PHRST's logframe identifies impact, outcome and output level indicators with milestones, against which progress is assessed as part of Annual Reviews. In addition, individual activities at outcome and output level have also been outlined and progress assessed on a quarterly basis as part of UK-PHRST's ongoing internal monitoring.

UK-PHRST has "achieved" or "exceeded" most output milestones to date. For the period November 2016 – June 2018 these findings are mainly based on the Annual Review report.[26] For the project years 2018/19 and 2019/20 (to date), these findings are based on analysis of UK-PHRST's internal MEL spreadsheets against the project logframe. Main achievements were developing partnerships and finalising a Joint Proposal between PHE and LSHTM; initiating capacity building/training in West Africa through delivery of a Masters of Public Health course in Sierra Leone and bursaries for short-term training in the UK; developing the UK International Emergency Public Health Register and recruitment of a full-time team, all while undertaking deployments.

For year 3 (2018/2019), there is evidence that the project met and exceeded most of the agreed milestones and deliverables. Project delivery was RAG rated Amber/Green[27] with both deployment and research demonstrating progress from 2016/2017. Apart from capacity building outputs (output 3.1 and 3.3), all outputs were achieved.

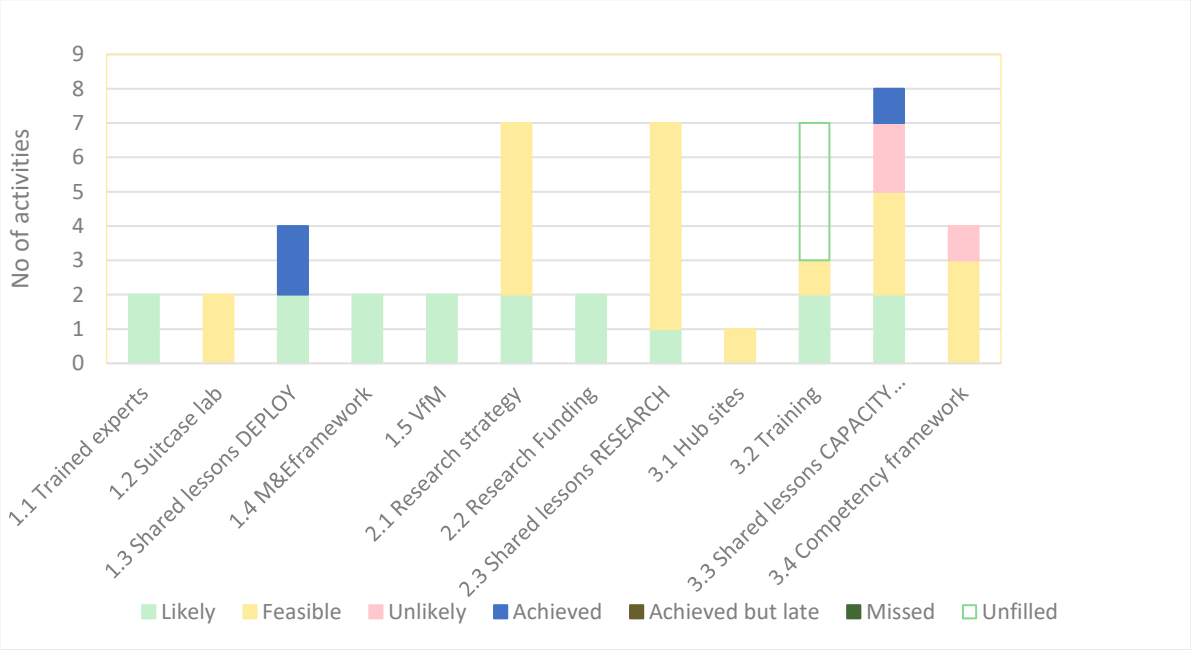
For year 4 (2019/2020), our analysis indicates UK-PHRST is mostly on track with implementing the activities against output milestones (see Figure 3). Gradual and continuous improvement in performance is demonstrated by the GHS programme RAG A to RAG G.[28] Most progress has been made on deployments, with 100% of activities achieved or on track. Capacity building demonstrates slowest progress (65%) and 15% of activities are reported to be "unlikely to be achieved".

Deployment milestones

All deployment milestones were achieved and/or exceeded in 2018/19 and are well on track (likely and feasible) for 2019/2020. To date, UK-PHRST has conducted 13 deployments with a total of 1,491 person-days in the field from April 2017 till June 2019.[29] Most deployments were supporting epidemiology and surveillance with a total of 651 person-days skewed by UK-PHRST's ongoing support on EVD in DRC. See Box 4 overleaf and Annex 13 for more details.

[26] Annual Review Report, published 5 Nov 2018.
[27] UK-PHRST Annual Review 2018/2019.
[28] 2018/19 - GHS programme reporting.
[29] UK-PHRST Annual Action Review. PowerPoint slideshow, 11 June 2019.

Figure 2. UK-PHRST activity progress against outputs, implementation 2019/2020

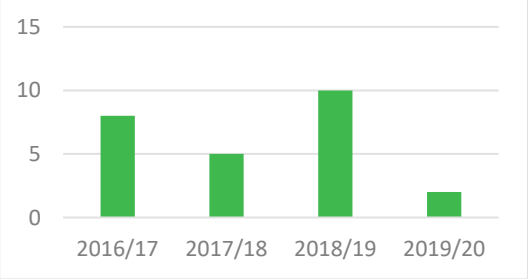


Research milestones

All research milestones were met in 2018/19 and are on track (likely and feasible) for 2019/20 (to date), but the number and nature of research studies moving forward will be contingent on the revised research strategy.

A total of 25 research projects have been funded by the UK-PHRST to date, of which seven are ongoing and all research milestones have made significant progress. Seventeen studies were published (n=11) or submitted (n=6) in peer-reviewed journals in 2018/19. LSHTM has been the host institution for most research, followed by Oxford University. There is no clear trend in terms of the numbers of research projects each year, and the currently being finalised new research and capacity building agenda should provide clarity on the nature, scope and duration of UK-PHRST's research projects moving forward, which will also have an impact on the number of studies in future years. See Box 3 and Annex 14.

Figure 3. UK-PHRST Research projects per annum 2016-2019



Capacity building milestones

Capacity building milestones have been partially achieved, but UK-PHRST is currently revising its capacity building strategy and approach. There are some unlikely-to-be-achieved outputs, while others are well on track for 2019/2020. Some outputs have been revised; for example, initially, the intention was to have three capacity building hubs globally (West and East Africa, and one in Asia). However, this approach has been revised and regional hubs are no longer planned, with more focus on establishing partnerships without the need to have a physical base. There were also delays in developing the competency framework for training staff in LMIC. UK-PHRST is currently revising its capacity building strategy which is expected to address some of these under-achievements. See Box 5 and Annex 15.

Box 4 – Deployments summary (see Annex 13 for full case study)

How aligned was the UK-PHRST contribution to UK-PHRST's vision/model/goals?

UK-PHRST has the required skills, systems and processes in place, but deployments have not always been aligned with the original rapid 'quick in and out' model. Longer deployments have contributed to programme goals, but raise concerns about the sustainability of the current human resourcing model.

What has UK-PHRST delivered in this area?

UK-PHRST has deployed 13 times to a range of outbreaks across eight different countries at the time of the evaluation. Over half of deployments have been through WHO GOARN, but with several bilateral deployments and one UK-EMT deployment also taking place. Team members typically deploy for six weeks at a time and work on a rotational basis, with the duration, size and expertise of the deployment team varying in line with needs.

How did this work in practice?

The work of UK-PHRST during deployments is seen to be outstanding and they have built a reputation as a reliable, innovative, rapidly deployable and highly skilled team. *'I get feedback from [GOARN] that the quality and abilities of the RST during response and ability to understand politics and epidemiology has been outstanding and in DRC is showing itself to be really valuable'* (HMG GHS Stakeholder)

UK-PHRST is seen to provide tailored, specialised inputs which often involve developing, testing or applying innovative or cutting-edge tools. There is also evidence of knowledge transfer and an increase in operational and surge capacity as a result of deployments. However, there is scope for a more planned approach to capacity building to ensure sustainability and further integration of research to build on UK-PHRST's successes so far.

What were the challenges?

Sustained involvement in an outbreak places considerable demands on human resources, particularly those with research or other institutional commitments to deliver, which could threaten the sustainability of the model. Also, there is an imbalance in the number of requests for different disciplines across the team, which creates tension within UK-PHRST and raises questions of whether the team composition is appropriate. Deployments through GOARN are perceived by some to limit their ability to engage in research and capacity building activities.

What are the implications moving forward?

UK-PHRST's deployments were seen to be beneficial in terms of achieving their goals. However, developing a framework for characterising different types of deployments (for example, taking into account the differences between GOARN and bilateral deployments, and the expected duration of the deployment) would help them to identify clearer objectives and have a more strategic approach.

There is scope to strengthen processes to maximise opportunities for linking research and capacity building with deployments: this is recognised as crucial to providing a more effective, sustainable and collaborative response. Potential avenues for this include exploring pathways to facilitate research during outbreaks with WHO and the GOARN Research Working Group.

Strengthening communications and learning within UK-PHRST and with other HMG GHS actors and stakeholders, and building strong relationships with country partners, is also critical and will also support the triple mandate and longer-term sustainability.

To maximise VfM, UK-PHRST should continue to strategically review team composition based on demand and experiences, explore options for overcoming the limitations of a 6-week deployment and raise awareness of the breadth of expertise currently available within the team.

3.2.2. Appropriateness of the human resourcing model and balancing competing demands (EQ 3.2, 3.3)

EQ 3.2 Is the human resourcing model appropriate in terms of capacity, expertise and ability to effectively deliver across the triple mandate?

EQ 3.3 Are research plans sufficiently flexible for research to stay on course despite deployments?

High-level finding **EQ 3.2, 3.3**	UK-PHRST is a highly professional, expert team, who are building a strong reputation for high-quality work in outbreak response. However, the current team model has struggled to respond to demands across the triple mandate and requests from external parties. This has had negative implications in terms of skills gaps against deployment demands, has led to differential demands upon individual team members, and has resulted in some delays and reduced focus on research and capacity building work. The team has regularly taken stock of the demands of the triple mandate model and partners' requests, and has made efforts to address some of the key challenges, with revised strategies currently being drafted to identify UK-PHRST's priorities moving forward.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

UK-PHRST is a highly professional and extremely experienced team developing an outstanding reputation in the field of outbreak response. While on deployment, the CDT carry out highly skilled activities fairly independently, working mainly through (and accountable to) GOARN/WHO. UK-PHRST is seen as a valuable and trusted entity, very well aligned with the priority pillars of GOARN and WHO. Staff exhibit a diverse range of skills and are seen as highly qualified, professional and politically astute. Evidence from the limited number of stakeholders interviewed highlighted the quality and abilities of UK-PHRST as a response organisation, and staff were praised for their ability to understand both the sensitive politics and the scientific requirements of an outbreak response.

The ambitions of UK-PHRST are not matched by the available human resources. It is a small team with ambitious aspirations given the triple mandate of research, deployment and capacity building, which is an ever-present challenge to fulfil. There is general consensus among internal stakeholders that UK-PHRST has not been able to deliver fully across the triple mandate, mainly due to practical constraints of workload and insufficient team capacity. Deployment has taken precedence over research and capacity building, and even within outbreak response there are limitations on what the team can deliver because of its relatively small size. For example, it would not be easy to conduct multiple concurrent deployments at the current level of human resources, although this was trialled with simultaneous deployments to Nigeria and DRC in 2019.

> *"Either we do less, and we accept and government accepts that we do less, or we have to grow the team to be able to deliver"* (UK-PHRST internal stakeholder)

Developing a balanced and manageable workload in terms of the triple mandate is challenging, especially given the unpredictable nature of outbreak response and the difficulties in prioritising research and capacity building during an outbreak. Due to the largely unpredictable nature of outbreaks, the team do not know in advance when they will be deployed or for how long, but are expected to deliver research and capacity building activities in the interim periods. The previously outlined challenges around the frequency with which different CDT members are deployed means that research and capacity building portfolios within, for example, the social science and microbiology disciplines have flourished while those focal areas in, for example, epidemiology, are at risk of slippage due to deployment commitments. The recruitment of additional Research Assistants and Fellows has worked well, although recruitment delays have caused knock-on delays, for example with the Lassa fever research in Sierra Leone. The appointment of the LSHTM Research Coordinator has been a success for maintaining research activities in the face of emergency deployments.

It is important to note that this and the previous finding contrasts with the generally positive picture in terms of delivery against the logframe (see Section 3.2.1 and also Section 3.3.6 (MEL Systems) for further discussion).

The current team model used by UK-PHRST is not flexible enough to respond to demands, which are mainly identified by external parties. This has had negative implications in terms of both skills gaps against deployment demands and differential demands upon individual members within the team.

Multiple members of the CDT regularly deploy together to support different aspects of the outbreak response, which facilitates coherence and the development of operational synergies. However, the team have not deployed as a whole, and have mostly acted as additional support to GOARN or other outbreak response teams rather than at a strategic level as part of a broader UK response effort. In the evaluation Theory of Change (Annex 4) developed with UK-PHRST in July 2019, no assumptions identified this as a potential challenge. This highlights the importance of regularly reviewing the risks and assumptions to UK-PHRST's progress towards outcomes and impact.

Overall, CDT team members with epidemiology, data science, infection prevention control, and clinical expertise have been valued and requested the most, especially for GOARN deployments. Some team members and expertise, such as social science and logistics, have been severely under-utilised, either due to lack of perceived need/requests from GOARN or LMIC governments for this kind of expertise, lack of clarity within the outbreak response landscape about how these skills could be best used, or lack of, for example, essential language skills in the relevant team members (the latter is being partially addressed with all CDT members taking French lessons).

There are potential tensions and frustrations among the team and how they are able to ensure balance in their work across the triple mandate. Depending on the skill sets possessed, this arises from the strain on those regularly deployed who struggle to maintain their research portfolio or make space for capacity building activities, or among those who have been forced to focus on other areas of the triple mandate due to lack of suitable deployment requests. Potential issues are increased when CDT members with managerial responsibilities are regularly deployed. In addition, the majority of the UK-PHRST staff including CDT members and management report working above and beyond contractual hours, which generates a false picture of the capacity required to actually deliver the programme.UK-PHRST has a specific focus on responding to outbreaks of infectious diseases, and so does not have in-house expertise in areas such as water sanitation and hygiene (WASH) or chemical or radiological hazards[30]. It was also identified that there is no gender, equity and/or human rights expertise within the core deployable team. This is highlighted as a skillset that is necessary to be able to effectively mainstream a gender, equity and human rights-sensitive approach to response, research and capacity-building. This could be in the form of an existing member of the CDT such as the Social Scientist, who would also have specific expertise and experience in this area and could thus brief other UK-PHRST CDT members as necessary prior to activities taking place.[31,32]

The use of reservists was seen as critical in the DRC outbreak in terms of expertise and additional capacity. Some UK-PHRST Internal Stakeholders felt that reservists had been under-utilised in terms of supporting deployment activities, which could have freed up CDT members to consider research and capacity building opportunities. The CDT members are well versed at navigating the politics and establishing trusted relationships required when working as part of a broader response effort or negotiating approval for a research study. It was also suggested by a range of stakeholders including GOARN that UK-PHRST should recruit a CDT member of the team with explicit expertise in programme

[30] During the midpoint report review process, it was confirmed by the GHS Delivery Board that there are no plans for the function of the UK-PHRST to move beyond response to infectious disease outbreaks.

[31] If no opportunity arises to recruit a CDT member with these skills in addition to other key CDT skills, then one or more existing members of the CDT could be provided with training in this area.

[32] A learning brief accompanying this evaluation will set out the rationale for adopting such an approach, review what other Global Health actors are already doing to mainstream these issues into their work and provide a compendium of existing resources / tools that are available on this topic that UK-PHRST may be able to adapt and build.

management, coordination and using data for decision-making, as these are critical but under-represented skills in deployments as a whole.

The team has regularly taken stock of the demands of the triple mandate model and partners' requests, and has made efforts to address some of the key challenges highlighted above, with revised strategies currently being drafted to identify UK-PHRST's priorities moving forward. There have been efforts to build shared understanding and increase capacity to deliver across the triple mandate with the current team, including strategy away days, and capacity building and research strategy workshops. Some expansion of the team and development of in-house expertise has also taken place, with the recent appointment of the Capacity Building Coordinator and appointment of a Training Manager (see Strategy Section 3.1 and Annex 15), which indicates efforts to at least partially address some skills gaps with the team. Some measures have also been taken to address the overall limited bandwidth of the current team, with all research projects encouraged to consider and factor in suitable staffing capacity to mitigate the impact of a key member of their project being deployed. Despite these efforts, it is clear from all stakeholders that there will always be inherent limitations to UK-PHRST's ability to work across the triple mandate in line with the size and expertise of the team, but the revised strategies under development aim to provide clarity on UK-PHRST's priorities within their limitations.

Box 5 – Capacity building summary (see Annex 15 for full case study)

UK-PHRST's capacity building activities to date

UK-PHRST has engaged in various capacity building activities including formal trainings, workshops, education programmes and ad hoc, informal on-the-job activities that have taken place as part of outbreak response and/or research projects.

How aligned were capacity building activities to the original model proposed?

The objectives have remained broadly the same, but the actual nature of how these objectives have been fulfilled is still evolving. The UK-PHRST's original objective was to train public health reservists that could be readily deployed and build capacity in-country to improve outbreak response. The 2018 UK-PHRST's Strategic Framework no longer included capacity building through UK-PHRST reservists, although this continues to take place. The need for a revised approach was debated at various fora from May–October 2019 and a "UK-PHRST Research and Capacity Building Revised Strategy Outline Paper" was shared with the SMT in October 2019.

What were the challenges?

Several challenges were highlighted by all stakeholders. These were mainly linked to the short-term nature of deployments, limited capacity to conduct capacity building activities while conducting deployment or research, and limited remit to conduct capacity building when not explicitly included in ToRs. Concerns were also raised on the overall sustainability of UK-PHRST's capacity building work and on how to effectively measure outcomes and impact.

What worked particularly well?

Overall evidence on the effectiveness of UK-PHRST's capacity building activities was limited, although feedback was positive: for example, UK-PHRST's work with COMAHS in Sierra Leone was highly valued. The quality of the content delivered and the contribution to more sustainable capacity building in-country was highlighted.

How did the triple mandate play out?

Capacity building activities occurred to various extents in almost every outbreak and research project, but were not systematically documented or monitored. Deployments provided numerous opportunities for the provision of ad-hoc training and mentoring activities, especially in the longer-term deployments in Sierra Leone and DRC. Research activities included both planned and informal on-the-job trainings.

What are the implications moving forward?

There is urgent need to finalise UK-PHRST's updated capacity building strategy in terms of what capacity building activities are being offered, where, and how. The following enablers that reinforced effective and sustainable capacity building interventions across stakeholders were identified:

- The value of building on existing in-country relationships previously established by PHE and LSHTM. The work in Sierra Leone is seen as the most effective as it has built on the previous PHE Resilient Zero [Ebola] project in-country and on pre-existing partnerships, ensuring that the work being done complements rather than duplicates activities of other stakeholders.
- The importance of developing positive, ongoing relationships with stakeholders. The activities in Sierra Leone and in DRC have been effective thanks to the extended time UK-PHRST spent in-country, enabling trusted and durable relationships. Globally, UK-PHRST has also developed a positive relationship with WHO GOARN, which has resulted in multiple deployments.

3.2.3. Appropriateness of the governance structures, funding structures and reporting mechanisms (EQ3.4)

EQ3.4 How appropriate are the governance structures of this model, including funding arrangements and reporting, and how could they be strengthened?

High-level finding **EQ3.4**	UK-PHRST's governance and reporting structures are perceived by some core team members to be complex, and may contribute to tensions between PHE and LSHTM. There are missed opportunities for HMG cross-GHS programme fertilisation of learning. Governance structures and ways of working have ensured effective oversight of the research portfolio, but appear to have contributed to a relative lack of focus on capacity building activities. Management and reporting systems have struggled to deal with the high-pressure nature of UK-PHRST's work, leading to team frustrations which are further challenged by the disperse locations and regular travel schedule of key staff. HMG financial systems as they stand are not swift or flexible enough for the unique needs of a rapid support team.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

Governance and reporting structures

A full overview of UK-PHRST's governance structures can be found in Annex 17, and details of current members in Annex 19. Findings related to these structures are presented below.

Current individual and institutional lines of reporting and accountability limit alignment between UK GHS programmes and have strained relationships between PHE and LSHTM.

Current PHE project reporting lines are not optimal for supporting alignment and learning between GHS ODA programmes within the UK context. All GHS programmes report to the Director of Global Public Health at PHE, with the exception of UK-PHRST, which reports directly to the level above, PHE's Health Protection and Medical Director. We understand that there were particular reasons for this at the time the arrangements were put into place, but this may now warrant review. There is also a missed opportunity for IHR project leads to be on the UK-PHRST board and vice versa to improve coordination.

In terms of institutional reporting lines, the intent was that PHE and LSHTM be co-equal lead partners within the consortium. Although the overall budget is split between LSHTM and PHE in an attempt to support institutional balance between the two main consortium partners**,** the current level of investment in internal communications within UK-PHRST is insufficient to mitigate this. This often results in LSHTM stakeholders feeling like "unequal partners" and sometimes uninformed about feedback from GHS Programme Board.

Feedback on UK-PHRST from the GHS Programme Board has not always been shared by the UK-PHRST SMT with the wider team. This has limited opportunities for collaboration, cohesion and learning from and across the broader GHS programme. Several key informants mentioned that they were unaware of the regular formal feedback from GHS Programme Board to date on the UK-PHRST programme, and little was known at core team level of the GHS Programme Board's perception of programme progress. UK-PHRST has since reflected on the requirement to increase internal communications within the team when senior staff attend HMG meetings and feedback to the team. While the need for improved internal communications was accepted, the UK-PHRST team shared that they would welcome increased engagement and constructive input on programme outputs (e.g. End of Mission Reports and research publications) from the GHS Programme Board and wider HMG colleagues:

> *"We're funded by DHSC - it has to come from them really; what are they looking for? Are they happy with what's happened? Do they need to change anything? What are the*

funding opportunities? Do they want to expand or reduce the funding? All of those questions come from the funders really." (UK-PHRST internal stakeholder)

Perceptions surrounding organisational responsibilities for the different areas of the triple mandate and ways of working appear to have contributed to a relative lack of focus and clarity on capacity building within the triple mandate. There was apparent confusion amongst some stakeholders around both institutional and activity-based responsibilities and reporting lines within UK-PHRST. While UK-PHRST as a whole has overall responsibility for all of its strategies and activities, there was a perception by some stakeholders that outbreak response was overseen by PHE, and research and capacity building were overseen by LSHTM. This was further compounded by the operational need to prioritise deployments and research activities during the early stages of the UK-PHRST; and contracts and partnership agreements, which do not explicitly outline where responsibility for reporting against capacity building activities lies[33,34]. There was overall a broad consensus that capacity building had received less attention. Other factors that were mentioned by stakeholders as having contributed to this included the nature of LSHTM as an academic institution; the focus of the ASG on research only at the time with no equivalent committee for capacity building activities; and the fact that many capacity building activities are outputs of research and outbreak response activities rather than separate.

The UK-PHRST Academic Steering Group (ASG) has provided expert technical oversight of research, supervising work in progress and providing independent scientific approval of research proposals, before the GHS Delivery Team check for compliance with ODA requirements. The ASG (which is now within the TSC) have been a central expert function for UK-PHRST's research portfolio but the group has not been meaningfully included or kept informed on broader decisions. Many ASG members were unhappy at not being kept abreast of the discontinuation of the interim deputy director of research position. The ASG was being reformed at the time of evaluation, with a clarified role, strengthened scrutiny, and to include more external representation from LMIC and women. The ASG to date has been an independent scientific advisory group, without accountabilities for research implementation. There is a potential now for the group to take a more macro strategic perspective on where UK-PHRST's research work as a whole can influence outbreak response. It appears that efforts in this area are already taking place, as the revised Research Strategy explicitly outlines how UK-PHRST intends to reframe its research work in order to better influence outbreak response (see Annex 14 for more details on the revised strategy).

Management

Management and reporting systems have struggled to deal with the high-pressure nature of UK-PHRST's work which has led to frustrations for management, CDT and support staff.

UK-PHRST staff operate under high pressure with conflicting demands on their time, which impacts on compliance with project management and reporting mechanisms, which several stakeholders said needed improvement. Some personnel management issues have caused problems and contributed to staff retention issues, although this is improving. There have been some reported instances of poor planning, for example budgets not costed properly, and insufficient use of project management tools and reporting systems for activity and progress tracking at LSHTM. This is now being addressed by senior management and it will be key for each team member to understand their roles and responsibilities along strategic lines. Some UK-PHRST internal stakeholders also felt frustrated by internal delays that led to higher costs incurred, for example with late flight bookings.

[33] UK-PHRST (2017), Research Contract Between Secretary of State for Health and LSHTM: UK-Deployment and research reporting arrangements are explicitly outlined. In comparison, capacity building is only mentioned in passing, with LSHTM expected to support PHE with an initial scoping exercise.

[34] UK-PHRST (2017), Partnership Agreement between PHE and LSHTM: The Partnership Agreement between PHE and LSHTM makes no reference at all to capacity building activities.

While stakeholders acknowledge that regular travel by key UK-PHRST staff including SMT members is essential to delivery of the programme, it creates challenges in terms of ensuring effective team management, knowledge sharing and cohesion. Having a disperse team spread across multiple offices, with SMT members regularly travelling (often concurrently), has created various challenges both in terms of effective delegation and communication, and many UK-PHRST Internal Stakeholders expressed the need for more visible and accessible senior leadership.

> *"It is difficult to encourage team ethos because people are away. You don't feel like a coherent team and you don't build rapport. Some people work great together. It is not easy when [key SMT members are] hardly around – [they] need to be more visible."* (UK-PHRST internal stakeholder)

Funding structures

More needs to be learnt and operationalised to ensure rapid and flexible responses to emergencies by UK-PHRST within a financial approval system that is designed on the assumption of predictability of funding needs, managing fiduciary risk and ensuring value for money. Setting up rapid research in an insecure environment and getting security sign-off is complicated and takes a long time. There have been obstacles to setting up research projects quickly, due to iterative stages of proposal development, ethical review procedures and Academic Steering Group (now Technical Steering Committee) approval. Proposals are then reviewed by the GHS Delivery Team for process and contractual compliance within 15 working days (often expedited sooner and with conditional approvals) and funds approved. Iterative development of proposals has sometimes resulted in a lag of up to two months from the original proposal submission, which can have a knock-on effect on the ability to spend funds within the ODA budget cycle. The team shifted their approach to implement a rolling cycle of research that could minimise delays, rather than a twice-annual call for research proposals.

Several stakeholders felt that the GHS Delivery Team system in place for completing compliance checks on research proposals impacted on the speed with which UK-PHRST can set up research during deployments, although no specific examples of this were shared or found. These bespoke systems were set up in collaboration between LSHTM and GHS Delivery Team and several internal stakeholders mentioned improvements and efficiencies in the relationship and reporting mechanism between LSHTM and GHS Delivery Team. The GHS Delivery Team stated that they have always been open to a more flexible approach if asked to consider.

3.2.4. Consortium partnership working and internal communication (EQ 3.5, 3.6)

EQ3.5 To what extent does UK-PHRST work as a complementary and coordinated partnership between the consortium partners?

EQ3.6 How effective are internal communication processes within the consortium and how can they be improved?

High-level finding **EQ3.5, 3.6**	The consortium model has conferred many benefits for UK-PHRST and is an important driver of success. Collaboration between the academic partners has been generally positive and occurs across the triple mandate, although to differing degrees. Collaboration and coordination between PHE and LSHTM as the main partners has been more challenging due to differences in organisational culture, management systems and the team's disperse physical locations. UK-PHRST has made efforts to address these challenges; however, the evidence suggests this has not been entirely successful, especially in terms of internal communication between the consortium partners. The consortium	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

	has not yet fully manifested a unified "UK-PHRST", which impacts on both internal and external relationships and communication.	

Effective collaboration

The diversity and complementarity of disciplines that the consortium partnership brings has enabled UK-PHRST to deliver "more than the sum of its parts" (see Section 3.3.1), but some stakeholders feel that further expansion of the academic consortium would enhance UK-PHRST's research footprint.

> *"PHE wouldn't be able to deliver or support on a portfolio of research work in the same way that a leading academic institution can. Equally LSHTM definitely doesn't have the operational systems, security systems and so on to deliver on the deployment side of things. In that respect the RST wouldn't be able to function with its three-part mandate without having a strong collaboration between PHE and LSHTM or two similar organisations."* (UK-PHRST internal stakeholder)

Some internal and wider consortium stakeholders worried that limiting UK-PHRST funding to the current three academic institutions limits access to different expertise, networks and resources and risks the programme becoming a divisive entity on the UK stage. Research partnerships with UK academic institutions outside of the consortium to date have been rare, with just one research project being undertaken in partnership with an external partner at the time of writing (Liverpool School of Tropical Medicine).

The academic partners collaborate well together and with PHE. LSHTM and PHE are perceived by stakeholders as the primary partners, although Oxford colleagues are involved in central decision-making processes. In the original proposal for UK-PHRST, it is stated that "RST will be a collaboration between PHE and an academic consortium led by LSHTM with partners at University of Oxford and King's College London".[35] Some UK-PHRST internal stakeholders mentioned a level of frustration experienced by some of the Oxford team, who report not being viewed as an equal partner. It is not clear if this indicates a lack of knowledge of the original proposal, or a belief that governance arrangements should be updated. The KCL partnership has been slightly more peripheral, explained, by some stakeholders, by not having staff on the CDT and the fact that the mental health research workstream has been less central to outbreak response activities to date.

There has been regular collaboration across institutions on deployments, but less so on research, with the portfolio dominated by research projects led by single institutions. Out of the 25 research studies that have been initiated to date, the vast majority have been led by single institutions. UK-PHRST's metagenomics research included sequencing carried out by PHE and University of Oxford completing the bioinformatics. Internal stakeholders report a strong ability to adapt and learn as a consortium, as well as a good degree of informal collaboration, for example liaising with each other around research methodologies and protocol development.

> *"Some of the communications between us as a partnership could have been clearer early on but also inevitably with these multi-partner complex things there's a certain amount of emergence and then dealing with the implications of things. Decisions that were made earlier and actually you need to adapt them. To be adaptable is quite good, and I think we've all been adaptable for this initiative."* (UK-PHRST academic partner)

Challenges to effective collaboration and communication

Effective collaboration and cohesion between the lead partners has been challenged by differences in organisational culture, management systems and challenges around communication and the team's

[35] UK Public Health Rapid Support Team Memorandum of Understanding and Proposal.

disperse physical locations. UK-PHRST has made efforts to address these challenges, but the evidence suggests this has not been entirely successful.

Stakeholders highlighted an overall culture divide between PHE and LSHTM reflecting different institutional agendas, hierarchies, dynamics, and ways of working, which proved especially challenging in the initial years of UK-PHRST's operationalisation as the team learnt to navigate drastically different institutional cultures, processes, and expectations in the absence of an effective strategy for managing these potential tensions from the start.

> *"We weren't getting a clear, joined up agenda. There was a turf war between organisations and personalities in the organisations. There wasn't a proper approach for connecting the different parts of the organisation."* (HMG GHS stakeholder)

A lack of team cohesion has been compounded by the team's wide physical dispersion across multiple offices even when in the UK. This has led to team members at PHE and LSHTM working in siloes, in different departments, delivering fairly independent bodies of work. Some team members defined themselves as a "*team of one*". Cohesion is starting to be actively fostered and deliberate team building efforts are under way with recent away days and reinvigorated attention to team dynamics:

> *"One thing we talked about at the away day is this broader sense of team. We have three teams, Oxford, PHE and LSHTM. There is a clearer sense of identity within the organisations than between them. We're physically separate and creating the stronger sense of team is a work in progress"* (UK-PHRST internal stakeholder)

Internal communications have not effectively engaged and informed stakeholders and are a missed opportunity for unifying team members across the consortium under "One UK-PHRST". Logistical challenges around data sharing and security across institutions and political sensitivities around the materials being shared create a challenging environment for effective internal communications.

Regular meetings are scheduled to enable effective cross-consortium working, transparency and knowledge sharing. This includes monthly meetings of the UK-PHRST Academic Steering Group (TSC), quarterly meetings of the UK-PHRST Project Board (PB), fortnightly meetings of the UK-PHRST Senior Management Team and monthly Full Team Meetings. The Senior Programme Manager attends regular meetings with both KCL and University of Oxford, and Oxford colleagues regularly attend monthly meetings in person. There is a bi-weekly phone call between Oxford and LSHTM programme management.

Despite the regular meetings outlined above, team meetings are reported to have an unengaging format, and SMT meetings are frequently cancelled due to senior management travel schedules, which delays decisions. While regular, formal, and informal lines of communications, and synergistic collaborations between the consortium institutions are becoming more normalised, many stakeholders cite internal communications as an area where renewed and consistent efforts are required to ensure transparent communications, mend long-standing tensions and foster team cohesion. There is widespread motivation within UK-PHRST for more meaningful communications, and many stakeholders provided suggestions for improvement.

PHE and LSHTM hold different perspectives of UK-PHRST's vision, identity, and "customer", while there is a degree of resistance among LSHTM counterparts to UK-PHRST being a UK government asset. For LSHTM the programme sits within the global public health sphere and the "customers" are government and public health institutions in LMIC. PHE perceive DHSC to be the "customer" and sees UK-PHRST's mandate as part of the HMG GHS agenda. There are some concerns and anxieties among colleagues from LSHTM around maintaining the independence and neutrality of academic work while being ultimately accountable to the UK government.

3.2.5. External communication (EQ3.7)

EQ3.7 To what extent does UK-PHRST effectively externally communicate its activities and impact?

High-level finding EQ3.7	External communications have helped UK-PHRST to become more visible and respected among some key UK and international GHS stakeholders, including GOARN and LMIC governments where they have deployed bilaterally. There are some challenges to external communications due to political sensitivities and security considerations around GHS deployments. There is opportunity during the current revision of the communications strategy to consider these challenges and improve UK-PHRST's internal joint sense of identity to further enhance visibility, and ensure that the team are fully utilised, that the triple mandate can be fulfilled, and that their work is properly attributed.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

UK-PHRST's external communications, along with their excellent work, have ensured that UK-PHRST is becoming a well-known and recognised source of expertise among HMG and international GHS stakeholders. The work of UK-PHRST is becoming very well known among GHS stakeholders, such as GOARN and Africa CDC, and UK-PHRST has been invited back for bilateral deployments in Nigeria, for example. UK-PHRST's work resonates with the public and there is lots of media interest in outbreaks and UK-PHRST's work, which is beneficial for UK-PHRST recognition and future funding prospects. In terms of public awareness, the UK-PHRST Director carries out TV and media interviews, and there is plenty of positive media coverage. LSHTM and PHE press releases are produced mainly around deployment activities. UK-PHRST's work in DRC has been praised and well promoted among UN agencies and operational stakeholders via email distribution lists. Some stakeholders expressed being uncomfortable with the media spotlight, and sought to manage expectations and not glamorise the work of UK-PHRST.

UK-PHRST's triple mandate and full core deployable team offering have not been actively promoted sufficiently so that all staff are well utilised. There is recognition among most stakeholders that much more can be done to increase the frequency and scope of communication, to present and inform more widely UK-PHRST's expertise and remit across deployment, research and capacity building. The targeted advocacy efforts of the Director in high-level meetings are seen to be critical in promoting awareness of UK-PHRST to potential partners in LMICs, including promoting currently under-utilised expertise such as the CDT logistician and social scientist. Much of the capacity building work is not well articulated, to DHSC or other potential recipients of UK-PHRST support. Many internal and external stakeholders expressed a real need for UK-PHRST to better translate their work to policy makers in order to achieve strategic change and begin to influence the macro level global response. Harnessing the role that the Foreign and Commonwealth Office (FCO) and DFID might play in promoting UK-PHRST in-country to governments, championing their achievements and brokering relationships for bilateral support are seen to be important by many UK-PHRST team members.

UK-PHRST is now in a strong position to demonstrate the positive effects of integrating the triple mandate and to advocate for the value of conducting research during outbreaks. Stakeholders explained that UK-PHRST has carried out tried-and-tested examples of integrating research and capacity building to deployment and outbreak response, which should now be at the forefront of discussions with other public health actors and WHO. Lessons learnt are being tracked internally but not yet shared widely and up the chain to the central governance groups in WHO, in order to strategically influence outbreak response.

Although UK-PHRST's activities are high in profile and well respected, there is opportunity to improve their external visibility and internal joint sense of identity to further enhance communications and ensure that UK-PHRST's work is properly attributed. There is no official UK-PHRST "brand": UK-PHRST lacks a logo and some consortium stakeholders voice a lack of joint sense of identity, which affects UK-PHRST's visibility to external partners and means that some of UK-PHRST's work is not attributed to UK-PHRST as an entity. UK-PHRST's deployment contribution in the past has been conflated with GOARN, PHE, and LSHTM identities, and in-country partners sometimes could not distinguish between PHE IHR

Strengthening project and UK-PHRST. The UK-PHRST microsite on the LSHTM main site took six months to establish, and many internal stakeholders were frustrated at the inability for the team to have their own site and logo. Some stakeholders reflected that the lack of UK-PHRST "brand" is bound up in the blurred identities experienced by UK-PHRST core staff split between PHE and LSHTM institutions, with differing ideas about being a global health initiative or HMG government asset.

> *"We discussed a lot communication internal and external and we feel these are areas we need to improve. With publications there isn't often a launch event – about our research – I'm not aware of them – these may not be happening as often as we like. One of the things we touched on a lot at the away day is of visibility of RST – especially around our leading role in outbreak research. This isn't known about as much as deployment."* (UK-PHRST internal stakeholder)

Academic papers, conference abstracts and posters have been published by UK-PHRST, but there have been fewer examples of active knowledge dissemination and communications to ensure policy relevance and application of UK-PHRST's research. The team have produced blogs, public reports and academic papers, and conducted workshops, conference presentations, and delivered the MOOC (Massive Open Online Course). Stakeholders expressed a need for dissemination and learning events, and better sharing across institutions. The GHS Delivery Team play a role in framing research outputs to make them policy relevant and accessible, but it remains difficult to know the effect of UK-PHRST's research dissemination on policy and practice. Internal stakeholders noted that UK-PHRST could do more to articulate where their work has led to further collaborations or research that others are taking forward, and be clearer on UK-PHRST attribution.[36]

> *"One thing that we probably can be better is capturing when the work that we've done or the expertise that we've provided has led to other pieces of research or other outputs."* (UK-PHRST internal stakeholder)

There are political sensitivities around GHS communications which UK-PHRST take into consideration, especially when CDT members have been deployed as part of GOARN. There have been instances where public reports about the UK-PHRST's inputs caused friction for the team on the ground. There are both security considerations, as well as political sensitivities in working with many other agencies in a collaborative effort. Previous mistakes were made where insensitive imperialist language was used in a press release, framing UK-PHRST as "*riding to the rescue*" rather than supporting in-country activities. Stakeholders explained that external communications led by in-country partners are much more effective, such as the NCDC newsletter that was circulated flagging their work on Lassa fever in Nigeria. The press teams at PHE and LSHTM have both adapted and learnt from these early experiences. Some sensitive issues since then have been deftly handled and communicated well, such as UK-PHRST's work in Pakistan with more reflection and context.

> *"It may look great for DHSC, or for our individual institutions to have the RST 'riding to the rescue' but actually that doesn't really go over very well. It's also not true. But of course, it makes great headlines and makes people... I understand why it's done but I think we have to be very, very careful."* (UK-PHRST internal stakeholder)

The original communications strategy is currently being revised to better synergise with the revised research and capacity building strategies. A communications strategy was originally developed two years ago and a communications steering group exists but internal stakeholders were unsure of its relevance and

[36] Seale, Anna (2019, 14th October) UK-PHRST Research and Capacity Building Revised Strategy Outline Paper.

activities. PHE and LSHTM external communications counterparts are now working with much greater alignment.

> *"Changes are being made. At the start there were separate LSHTM and PHE messages. Now we have more integrated communication (representatives from both partner organisations turn up and they speak in one voice). But there could still be a lack of alignment in the message – issues with separate locations and with research being heavily led by LSHTM."* (HMG GHS stakeholder)

3.2.6. UK-PHRST and the UK ODA health security programme landscape (EQ4)

EQ 4 To what extent does UK-PHRST complement or duplicate other UK ODA health security?

EQ4.1 How effective are the mechanisms in place in the UK and at country level to ensure a coordinated/complementary UK response?

EQ4.2 In what ways has UK-PHRST augmented, complemented or duplicated pre-existing arrangements for deployment from the UK and other UK ODA-GHS programmes in partner countries?

This section explores how effectively UK-PHRST coordinates with other UK ODA GHS actors at country level.

High-level findings EQ 4 (including sub-EQs)	Although close collaboration and alignment of activities across HMG GHS actors is widely acknowledged as important, existing mechanisms at central level do not allow for full cross-programme learning, and in general do not translate into effective communication, coordination and collaboration at country level. Similarly, there is fragmentation and lack of coordination across the various UK deployment mechanisms, and opportunities for collaboration to reduce potential duplication of efforts or inefficiencies are being missed.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

Please see Annex 25 for an overview of HMG's broader GHS landscape and UK-PHRST's place within this landscape.

Beyond HMG, within the UK there are numerous other academic, private sector and civil society organisations which engage in emergency preparedness and response, research and health system strengthening activities in LMICs. We did not find evidence of any systematic mapping of who these other UK actors are by UK-PHRST and how they relate to the UK-PHRST's work, which is likely to limit the UK-PHRST's ability to fully engage, coordinate and collaborate with other relevant UK actors. See Annex 11 for a summarised GHS landscape analysis of both UK, global and regional GHS actors.

How well does the UK-PHRST coordinate with partners at country level?

The need for close collaboration and alignment of activities among HMG GHS actors is widely recognised as being mutually beneficial and to yield opportunities for cross-fertilisation and synergies between the programmes. Integration of HMG activities in the areas of prevention, detection and response into an overall health system strengthening approach is broadly acknowledged as vital for overall sustainability of their GHS work, and UK-PHRST's work is seen as a core component of this work. However, there is broad consensus that UK-PHRST does not fully appreciate where it fits within the overall UK GHS landscape and that it and other HMG GHS actors need to be seen to be acting as one. Both DFID and the FCO are advocating for a one HMG approach to align GHS work in accordance with the broader HMG GHS approach. PHE has proactively worked to develop its relationship with DFID and the FCO, with a view to working collaboratively with countries across health topics. DFID and PHE have developed a joint action plan with WHO AFRO to facilitate coordination between TDDAP and PHE's IHR programme in Ethiopia, Nigeria and

Sierra Leone, in recognition of the potential of the TDDAP framework and funding to complement PHE's technical work on IHR.[37] The UK-PHRST could similarly collaborate with other HMG actors.

Existing mechanisms for coordination and engagement at HMG central level do not allow for full cross-programme learning, and do not translate into effective communication, coordination and collaboration at country level.

The DHSC GHS Programme Board provides a mechanism for high-level coordination between the different HMG GHS actors as it includes representation from the UK-PHRST, DFID and PHE GHS programmes; however, UK-PHRST technical staff are frequently absent from meetings due to travel. The PHE IHR Strengthening project and UK-PHRST project are not represented on each other's project boards, although the Director of Global Public Health, with oversight of both programmes, does sit on both boards. The intended joint monthly meetings between the UK-PHRST and IHR programmes do not happen regularly.

These existing high-level coordination mechanisms do not appear to be effectively translating to country level, as LMIC-based stakeholders across DFID, some PHE and other HMG offices highlighted limited knowledge of the purpose, role and work of the UK-PHRST, and often insufficient and/or ineffective communication of UK-PHRST's deployments and other activities. However, more positive examples do exist: for example, in Sierra Leone UK-PHRST joins the monthly DFID GHS call, has given a presentation to DFID health advisors explaining who they are and what their offer is, and has proactively notified DFID and the FCO when they are going on deployments.

Several key informants reported a lack of clarity around how DFID country offices should engage with, and what they can expect, from UK-PHRST. There was lack of clarity around whether UK-PHRST could share epidemic intelligence with DFID when deployed through GOARN, as during GOARN deployments the UK-PHRST report to WHO not HMG. Lack of involvement in UK-PHRST briefings at the start or end of deployments, and lack of any a priori discussions to identify areas of potential collaboration were seen as obstacle to DFID's ability to have informed ongoing discussions with in-country government stakeholders. DFID stakeholders shared that they would like to be able to draw on UK-PHRST's expertise in epidemiology during outbreaks and for there to be more systematic intelligence sharing between the two organisations, and across HMG, including during GOARN deployments.

Examples of good coordination and engagement exist, although these appear to be at least partly down to individual initiative and circumstance. In DRC the prolonged and repeated EVD outbreak deployments facilitated good collaboration between DFID and UK-PHRST. This included calls between UK-PHRST's Director and in-country focal points, face-to-face meetings, participation in DFID's Ebola Emergency Response Team meeting, sharing of situation reports and regular communication by email (see Box 6). This information sharing reportedly improved over time, facilitated in part by the co-location of DFID and UK-PHRST personnel in Goma. In Sierra Leone, UK-PHRST coordinated with both DFID and PHE to conduct a rapid needs assessment for the mudslide response. In Nigeria, the UK-PHRST laboratory specialist reportedly adopted a One HMG communications approach and included PHE IHR, DFID and the High Commissioner in discussions on laboratory training. Consequently, the UK-PHRST and IHR projects collaborated to deliver training on next generation sequencing, which aligned with their respective project objectives. Also, in Nigeria, PHE IHR Strengthening project were included in planning for the logistics training, which dovetailed with the PHE IHR Strengthening project objectives. Furthermore, PHE IHR Strengthening project and the UK-PHRST have collaborated to support Africa CDC in capacity building activities.

There have also been issues with, and a lack of clarity around, the UK-PHRST access to the One HMG Overseas platform (the UK government's mechanism for providing in-country logistical support for bilateral deployments), which may weaken the UK-PHRST operationally. The UK-PHRST has a bilateral agreement with the platform for the provision of corporate services such as accommodation, transport and security. For both bilateral and GOARN deployments, "*HMG would retain ultimate duty of care and consular responsibility for the team while in-country.*" During some deployments (for instance those to

[37] DFID Tackling Deadly Diseases in Africa Annual Review 2018.

Nigeria),[38] the UK-PHRST has relied on third party organisations to provide transport for the mission. This is not One HMG compliant and means UK-PHRST fall outside HMG duty of care, a concern for DFID, the FCO and the UK-PHRST. This was the case for the 2019 UK-PHRST deployment to Nigeria, which coincided with Nigerian elections and related suspension of FCO visits to the country and access to FCO vehicles. Furthermore, the UK-PHRST was not able to access the platform for the deployment of a mobile laboratory to an operational field site, and instead had to rely on an external vendor for logistical support. The UK-PHRST was also declined a security briefing for a deployment to Sierra Leone, due to confusion about who would be responsible for their duty of care. Accessing the FCO systems for security, duty of care and transport would benefit the UK-PHRST and would make them stronger operationally.

Alignment with other arrangements for deployment from the UK

There is a fragmentation and lack of coordination across the various UK deployment mechanisms, and opportunities for collaboration are being missed. Closer collaboration and alignment between deployment organisations would be beneficial to the overall UK response and to the UK-PHRST.

A number of parallel UK deployment systems are in operation in addition to UK-PHRST, including UK-Med (the medical arm of the UK Emergency Medical Team [EMT]), the PHE field service (primarily when UK-PHRST cannot meet deployment requests), and the public health agencies of Scotland, Wales and Northern Ireland (who continue to deploy through GOARN). In addition, Imperial College London has recently launched J-Idea,[39,40] the Abdul Latif Jameel Institute for Disease and Emergency Analytics, which is described as a rapid response research centre which aims to rapidly respond to emergencies including epidemics and humanitarian disasters by using data analytics and modelling to help contain outbreaks. This may overlap somewhat with the UK-PHRST.

UK-Med and UK-PHRST have a common mandate and they both offer emergency response capacity in case management, Infection Prevention and Control (IPC) and laboratory diagnostics. It was originally envisaged that both teams would collaborate closely and routinely deploy together to humanitarian emergencies, with UK-PHRST providing public health support to UK-Med. Key informants report that this close collaboration has not occurred and both teams largely operate in parallel. Deployment of persons from parallel organisations is causing confusion on the ground as partner countries find it difficult to distinguish between UK-Med, the UK-PHRST and PHE. Since its inception, UK-PHRST has only deployed with UK-Med once, to support an outbreak of diphtheria in Bangladesh. Even within this deployment, opportunities for collaboration between the teams were missed. For instance, UK-Med was not included in the resulting diphtheria research project, despite their interest. The suboptimal collaboration may in part be due to the fact that DFID is the coordinating body for the UK EMT and the DHSC is the coordinating body for UK-PHRST.

3.2.7. UK-PHRST and the broader GHS landscape at country, regional and global levels (EQ5)

EQ 5 To what extent has UK-PHRST supported coherent and collaborative national and international health activities on response?

High-level findings **EQ 5 (including sub-EQs)**	UK-PHRST operates in a complex international GHS landscape and is one of numerous actors supporting LMICs in epidemic preparedness and response. UK-PHRST has built on existing collaborative partnerships and forged new ones with LMIC, regional and global actors and is seen as a reputable, highly skilled and valuable partner. However, there is still need for increased awareness and visibility of UK-PHRST and continued focus on relationship building with key stakeholders at all levels.	The findings are supported by multiple data sources of lesser quality, or the finding is supported by fewer data sources of higher quality (moderately good triangulation)

[38] Nigeria End of Mission reports (UK-PHRST).
[39] https://www.imperial.ac.uk/jameel-institute/
[40] https://www.imperial.ac.uk/news/193428/rapid-response-research-centre-predict-prevent/

UK-PHRST is one of several organisations that support outbreak deployment, capacity building and research during outbreaks in LMICs. WHO is the most important global coordinating partner, with offices in 150 countries, and is highly influential at country and international level. WHO frequently takes a leading role in coordinating activities during outbreaks through its coordinating mechanism GOARN, especially in countries with lower capacity, and especially for complex outbreaks. GOARN also provides a supporting infrastructure to respond to outbreaks in insecure environments, where the risk and impact of outbreaks is often greatest. For these reasons GOARN is, and will likely continue to be, one of the most important access points for UK-PHRST to deploy to outbreaks. Regional actors in Africa, such as Africa CDC, are playing an increasingly important role, and as they expand and develop their capacity, they may become an important access point for in-country bilateral relationship building to facilitate deployments, research and capacity building. Numerous other countries and agencies also operate in this area and the number of players is increasing. The most important of these is US CDC, although numerous other actors, such as Médecins Sans Frontières (MSF)/Epicentre, also deploy. There are also numerous other actors and networks conducting research during outbreaks. These include the Coalition of Epidemic Preparedness Innovations (CEPI),[41] the African Coalition of Epidemic Research, Response and Training (ALERRT)[42] and the Pan-African Network for Rapid Research, Response, Relief and Preparedness for Infectious Diseases

Epidemics (PANDORA-ID-Net).[43] UK-PHRST recognises the importance of integrating within existing global coordinating mechanisms so as to avoid the creation of a parallel system.[44,45,46] In addition to these global and regional stakeholders, when working in-country, UK-PHRST will also inevitably engage with a wide range of local stakeholders including Ministries of Health (MoH), national public health agencies, hospitals, laboratories, universities and local NGOs and CSOs.[47]

External engagement and working relationships with health actors at country, regional and global level (EQ5.1, EQ5.2, EQ5.3)

EQ5.1 How effective is UK-PHRST's external engagement with key strategic health actors nationally, regionally and globally?

EQ5.2 How effective is the joint UK-PHRST/DHSC/DFID/HMG engagement with WHO HQ, GOARN and WHO AFRO and how could this be improved?

EQ5.3 How effective are UK-PHRST's working relationships with GHS programmes from other organisations and how could they be improved?

Coordination with national and international actors during deployments works well, although it is, to some degree beyond the control of UK-PHRST. During deployments, UK-PHRST, along with other international actors, is typically integrated within the incident management infrastructure and may operate across several response pillars, including surveillance, epidemiology, case management, IPC and logistics.[48,49,50] Overall coordination is usually managed by national or WHO leads, and the effectiveness of that coordination depends on the abilities of the pillar lead, rather than on UK-PHRST. Key informants report that on the rare occasions when coordination has not worked well and where there has been some duplication of effort (such as for surveillance activities during the response to the Sierra Leone mudslides), UK-PHRST has acted to promote coordination through relationship building with other actors and through highlighting the issue during coordination meetings. UK-PHRST is also working with GOARN to develop leadership skills for outbreaks, which may go some way to improving coordination efforts on the ground.

[41] https://cepi.net/
[42] https://www.alerrt.global/
[43] https://www.pandora-id.net/.
[44] UK Public Health Rapid Support Team Memorandum of Understanding and Business Case.
[45] UK UK-PHRST Strategic Framework.
[46] UK-PHRST Implementation Plans 2018 and 2019.
[47] UK UK-PHRST Annual Review 2018.
[48] End of mission report, Sierra Leone, 2017.
[49] End of mission report, Nigeria, 2018 and 2019.
[50] End of mission report, Madagascar, 2017.

Box 6 – DRC Ebola case study summary (see Annex 20 for full case study)

What did UK-PHRST set out to do?

UK-PHRST has been supporting WHO-GOARN's response to the Ebola outbreak continuously since May 2018. As part of their support, UK-PHRST established an epidemiological analytical data cell to provide routine and advanced analyses for the strategic coordination of the response.

How did things play out in practice?

By November 2019, UK-PHRST had deployed 16 multidisciplinary specialists and expanded their focus to accommodate partners' analytical demands. The cell reported daily on the progress of the outbreak and helped a range of key actors to target resources more efficiently.

How did the triple mandate play out?

Although it was not a defined output or priority of the deployment, some opportunities for capacity building did organically present themselves, for example in training people on how to develop various tools. In relation to research, the ongoing work on the J&J Ebola vaccine trial, with UK-PHRST's Director as Co-PI, is an exciting development with great potential to influence and shift Ebola strategy and policy.

What worked particularly well?

PHRST's analytical cell's operation led to improved, evidence-based decision-making. Their work gained space in the field as the outbreak evolved and has the potential to be part of WHO's future outbreak responses. The flexibility of the team compared with other organisations in terms of their ability to operate on-the ground, even in higher security contexts, was a major advantage over other organisations and was essential to effective partnerships and progress.

What were the challenges?

Ensuring appropriate skills across those deployed was a major challenge because of the specialist skills required and limited number of French-speaking team members. Without an effective capacity building approach on-the-ground, over-reliance on the same people will continue to be an issue. More generally, the response faced various contextual challenges including security and political instability.

How aligned was UK-PHRST's contribution to programme outcomes?

UK-PHRST's work in DRC is closely aligned with the programme outcomes as their innovative tools and specialised inputs led to a high-quality response. As the work of the cell progressed and became more established, the analytical data began to influence decision making, but more work is needed to improve communication with stakeholders to further support evidence-informed policy and programming.

What are the implications?

Translating outputs into outcomes is the key bottleneck for UK-PHRST's success. Raising awareness of the developments in outbreak analytics during and after the outbreak is critical to ensuring that these developments are adopted more broadly and contribute to a strengthened response.

There was scope to strengthen the use of the analysis to inform management decisions. The need to strengthen processes and human resources to enable strategic, evidence-based decision making was highlighted in order to further increase the impact of the cell's work.

Reconciling rapid response with capacity building to improve sustainability is important, but places considerable demands on human resources, and raises issues in terms of programmatic feasibility. This is a key area of UK-PHRST's strategy that needs further refinement.

There is a need to strengthen information flow between global health actors and UK-PHRST to ensure more clarity on how these actors can benefit from UK-PHRST's expertise during outbreak responses, and enable UK-PHRST's contribution to key outcomes to be enhanced.

UK-PHRST's activities are highly regarded by in-country actors and have resulted in bilateral deployments and ongoing collaborations in several settings, although more could be done to actively engage local staff. UK-PHRST's extensive capacity building work in Sierra Leone led to the development of strong relationships with the MoH and as a result UK-PHRST was invited at an early stage through a bilateral deployment to support the MoH in their response to a mudslide in 2017. A meningitis deployment to Nigeria in 2017 through GOARN led to two subsequent bilateral deployments to support response to Lassa fever outbreaks, and the development of an ongoing programme of Lassa fever research. Although the work of the UK-PHRST is highly regarded and appreciated, there is a need to strengthen engagement with district level staff, to understand better the local structures and to give district level staff a more hands-on role in the work to build their capacity so they can learn by doing. Improved processes for ensuring that research is country-led rather than led by the UK-PHRST and its consortium partners were also recommended.

UK-PHRST has effectively utilised and built on pre-existing consortium partner relationships with key actors in LMICs (see Section 3.1.1).

The contribution of UK-PHRST is highly regarded by GOARN, in particular for the high level of technical expertise that it offers. GOARN has repeatedly invited UK-PHRST to deploy to outbreaks and in particular the UK-PHRST has been an important contributor to the EVD response in DRC through its deployments through GOARN. Overall, UK-PHRST was the fourth biggest source of deployed personnel for GOARN in the past year, and the second biggest source in the previous six months.[51] GOARN appreciates the high levels of expertise of the UK-PHRST, particularly in the areas of data analytics and IPC, where there is a shortage of experts, as well as their high availability for rapid deployment. For the EVD outbreak in DRC, UK-PHRST has led the operation of the data analytics cell and is widely recognised for its innovative use of forecasting and cost-effectiveness modelling which has informed strategic decision making and the approach to the outbreak response. Furthermore, the ability of the UK-PHRST to provide continuity of support to the data analytics cell over a prolonged period of time through rolling deployments is reportedly highly appreciated by GOARN. There is a lack of awareness among GOARN staff of the UK-PHRST's triple mandate and how the UK-PHRST is supposed to work.

There were suggestions from several stakeholders that engagement with GOARN could be improved to lobby for increased and more effective realisation of the triple mandate. GOARN deployments are seen as being more restrictive than bilateral deployments, and less favourable for the realisation of the triple mandate due to the use of generic ToRs that do not include research or capacity building activities, and also due to concerns by front-line decision makers that these activities may interfere with the outbreak response. However, despite the complexities of the DRC EVD outbreak, other organisations did conduct a number of social science research projects[52] and research was also conducted during the 2018 outbreak in Equateur province,[53] demonstrating that even in these complex environments research is possible. The Director of the UK-PHRST is a member of the GOARN Steering Committee and is the Co-Chair of the GOARN Research Working Group[54] and several internal UK-PHRST and HMG GHS stakeholders suggested that he could advocate on behalf of the UK-PHRST to enable them to engage in research and capacity building during an outbreak.

Complementarity to other (non-UK) health security initiatives (EQ5.4)

EQ 5.4 Does the work of UK-PHRST complement or duplicate similar initiatives from other countries/organisations?

Across the GHS landscape, UK-PHRST appears to be unique in having a full-time team dedicated to outbreak response and with an explicit mandate to combine deployments with research and capacity

[51] UK-PHRST/GOARN meeting, Geneva, November 2019.
[52] https://www.who.int/risk-communication/social-science-research-for-ebola/en/.
[53] Ousman K, Kabego L, Talisuna A, et al. The impact of Infection Prevention and Control (IPC) Bundle Implementation on IPC Compliance during the Ebola Virus Outbreak in Mbandaka/Democratic Republic of the Congo: A Before and After Design. BMJ Open 2019;9:e029717. doi: 10.1136/bmjopen-2019-029717.
[54] UK-PHRST Annual Review 2018.

building into a single offer to partner countries. The African Union,[55] European Union[56] and Japan International Operation Committee[57] all deploy public health teams to support health emergencies. These teams are drawn from across agencies and not solely dedicated to emergency response, nor do they have a mandate to conduct research and capacity building. US CDC, through its Global Disease Detection Programme,[58] supports outbreak response, capacity building and research, but these activities are not integrated and are not conducted by a single team. Deployed personnel are drawn from across US CDC, are usually deployed for a maximum of six weeks, and are restricted in terms of where they can operate, often being confined to working at the national level, in contrast to UK-PHRST who can work at the district level and in less secure environments. The closest entities that we have identified to the UK-PHRST are: i) Outbreak Research Team of the Institute of Tropical Medicine, Antwerp[59] (whose primary remit is research); ii) the German Epidemic Preparedness Team, SEEG,[60] (who support outbreak response and capacity building but do not have a specific remit for research); and iii) Epicentre[61] (an agency of MSF who provide field epidemiology, capacity building and research support to MSF). The general consensus among respondents is that the UK-PHRST is unique in terms of its ability to: i) deploy quickly and early; ii) deploy to the subnational level and to less secure environments; iii) offer continuity of support via rolling deployments; iv) deploy a multidisciplinary team across multiple response pillars; v) provide exceptional levels of technical expertise, particularly in niche areas such as data analytics and IPC; and vi) tap into extensive and multiple networks through the consortium partners.

> *"The multi-pronged approach is unique because some come in just for research or capacity building or whatever and so this is the first programme using this approach that I have seen – although in most of our partners coming to do research we emphasise that they should do capacity building too."* (LMIC UK-PHRST stakeholder)

3.3. Workstream 3: Performance (Results, Sustainability and Accountability)

This section explores UK-PHRST's performance to date in terms of results at outcome level against the current project logframe impact and outcome indicators, and across the different areas of the triple mandate. This is followed by a review of contextual factors that affected progress towards outcomes and unintended outcomes of UK-PHRST's activities. Finally, the sustainability, transparency and value for money of the programme (against the OECD criteria of effectiveness, efficiency, economy and equity) have been assessed, and an evaluation of the current MEL system used by the programme is provided. As outlined in the limitations section (Section 2.4) and in the evaluation Inception Report, the findings in Workstream 3 have been constrained by the lack of evidence available because this is the mid-point evaluation.

3.3.1. Progress against programme outcomes (EQs 6.1 – 6.2)

EQ 6 What contribution are UK-PHRST's deployment, research and capacity building outputs making to achieve programme outcomes?

EQ 6.1 To what extent have programme goals (desired outcomes and impact) been achieved?

EQ 6.2 How has UK-PHRST contributed to, or is likely to contribute to, these outcomes and intended impact?

High-level findings	As discussed in our Inception Report, we have not carried out contribution analysis at mid-point. Moreover, the current UK-	Evidence comprises multiple data

[55] https://reliefweb.int/report/democratic-republic-congo/african-union-deploy-more-experts-response-ebola-crisis-drc.
[56] https://ec.europa.eu/echo/what-we-do/civil-protection/european-medical-corps_en.
[57] https://www.jica.go.jp/english/our_work/types_of_assistance/emergency.html.
[58] https://www.cdc.gov/globalhealth/healthprotection/gdd/what-we-do.html.
[59] https://www.itg.be/E/outbreak-research-team.
[60] https://www.giz.de/en/worldwide/40435.html.
[61] https://epicentre.msf.org/en/acceuil.

EQ 6 (including sub-EQs)	PHRST MEL framework is not adequately capturing changes at the outcome or impact level. Evidence suggests however that UK-PHRST has made a difference in terms of speed and quality of UK response to outbreaks in particular. There are also some early indications to suggest that as a result of UK-PHRST's more rapid UK deployment, research and capacity building in some countries and key supporting international partners' responses to outbreaks may have been strengthened. Some external factors such as politics and national rules and regulations, conflict and insecurity, and lack of a sufficient number of study subjects have sometimes hindered contribution to outcomes. Internal factors that have influenced delivery and progress, such as for example limited human resources, are dealt with under Workstream 2.	sources (good triangulation) of lesser quality, or the finding is supported by fewer data sources (limited triangulation) of decent quality but that are perhaps more perception-based than factual.

Contribution analysis of UK-PHRST's contribution to the desired outcomes and impact has not been conducted for the mid-point evaluation. Given the fact that the programme was formally launched in November 2016, and it then went through an intensive and complex start-up phase, and the fact that research and capacity building initiatives notoriously take quite a long time to materialise into tangible outcomes, it was decided during the inception phase to wait until the end-point to assess contribution as it was seen to be too early to express a judgement on the extent to which UK-PHRST has contributed to the desired outcomes and impact as presented in the logframe (see Annex 21).[62]

Furthermore, the current UK-PHRST MEL framework is not adequately capturing changes at the outcome or impact level. While UK-PHRST has been tracking progress towards planned activities through the MEL spreadsheet and progress towards the logframe milestones as part of the annual reviews, the data available to date are largely activity-based and cannot therefore be used to assess contribution towards the desired long-term results. Furthermore, measuring contribution to outcomes and impact is known to be challenging in outbreak response given the number of actors involved and the unprecedented nature of outbreak response, entailing a lack of baseline data and related difficulties in measuring morbidity and mortality. Consequently, results will be explored in more depth as part of our end-point evaluation using contribution analysis (as set out in the Inception Report).

Outcome indicator 1 (Change in UK response to outbreaks in speed and quality)

Evidence from our KIIs and document review suggest that UK-PHRST has made a difference in terms of speed and quality of UK response to outbreaks in particular. Although the monitoring data does not currently capture the exact timing from request to deployment nor data on the quality of the response, a large number of interviewees referenced the speed and quality (in terms of expertise of the CDT) of UK-PHRST's support to response through deployments, including key deployment stakeholders such as GOARN. CDT members are ready to deploy with all the required trainings.[63] The most significant contributions of the UK-PHRST programme to improved speed and quality of the response highlighted by KIIs are discussed in Box 8.

Outcome indicator 2 (ODA-eligible countries and key supporting international partners response to outbreaks strengthened through more rapid UK deployment, research and capacity building)

While it is not possible to robustly assess progress against this indicator at this time, there are early indications to suggest that as a result of UK-PHRST's more rapid UK deployment, research and capacity building, in some countries and key supporting international partners' responses to outbreaks may have been strengthened. In Sierra Leone, there are several examples that point towards strengthened outbreak

[62] Ibid.
[63] Basic and advanced security training through the United Nations Department Safety and Security, the SAFe® and SAFe+® agile training, and the deployment course developed by UK-PHRST.

response capacity for Sierra Leone, mostly in relation to improved diagnostic capacity and increased trained skilled personnel. For example, UK-PHRST microbiologists worked alongside ministry of health staff and doubled the culture diagnostics capacity for enteric testing including cholera, dysentery and salmonella. UK-PHRST also supported several other capacity building initiatives in Sierra Leone at COMAHS university (see Box 5 and Annex 15 for details). In Nigeria, repeated UK-PHRST deployments, both through GOARN and bilateral, have probably contributed to achievements in improved Lassa fever case definitions and case investigation that will strengthen the national surveillance system and will therefore better inform response. See Box 8 and Annex 22 Lassa Fever Thematic Case Study.

UK-PHRST research has the potential to inform capacity building needs which in turn result in the development of well-aligned capacity building projects. For example, in Sudan, in collaboration with the Federal and State Ministries of Health, Karary University, Kassala University, Kassala Public Health Laboratory, the National Public Health Laboratory (NPHL) and clinicians from Kassala Hospitals, UK-PHRST implemented a study on the aetiology and clinical characterisation of a severe undifferentiated febrile illness in an outbreak. While the study concluded that Crimean-Congo haemorrhagic fever was an important but not the sole cause of the outbreak, it also highlighted important gaps in outbreak preparedness, surveillance and response in the country. This fostering of relationships led to additional requests for training and capacity building in specific epidemiological and laboratory techniques that will likely strengthen in-country gaps on outbreak response.

Box 7 – UK-PHRST contributions to improved speed and quality of the response

- **UK-PHRST brings innovative and cutting-edge technology with potential to improve early and rapid pathogen detection.** For example, testing the usefulness of the Oxford MinION to rapidly detect human avian influenza viruses in Cambodia in collaboration with Institute Pasteur, LSHTM and University of Oxford. Stakeholders are confident this can develop in-country ability to sequence, which will aid early outbreak detection.

- **UK-PHRST's advanced statistical modelling and forecasting is informing the epidemic approaches and strategies in the DRC EVD outbreak** (see Annex 20). UK-PHRST is working with WHO on these tools which provides an opportunity for adoption at a higher level. In addition, UK-PHRST played a role in advancing phase III clinical trials of the J&J EVD vaccine trail in DRC. Depending on the result of this trial, this level of research will result in more data on this second Ebola vaccine, which could pave the way for another approved tool to fight future EVD epidemics.

- **UK-PHRST has demonstrated that research can be undertaken during a short-term outbreak.** For example, in Madagascar, UK-PHRST set up a prospective cohort study to better describe the clinical characterisation of pneumonic plague. Though the study enrolled only a small number of patients, because the outbreak was of short duration, the results still provide useful insights to strengthen treatment practices on plague and long-term research collaborations were forged. See Annex 16, Madagascar case study.

- **UK-PHRST research has already been published and contributed to the global research agenda around outbreak response, although research is ongoing and there is insufficient evidence at this stage to say if UK-PHRST's research will inform outbreak response at a strategic level.** Lassa fever research in both Sierra Leone and Nigeria (see Box 8 and Annex 22) is expected to help the understanding of Lassa fever prevalence and immunity which in turn will strengthen global evidence to improve control measures. The research on the use of the ELISA assay testing in collaboration with NCDC will simplify testing and will increase understanding of prevalence and immunity in Lassa fever endemic zones which is essential in developing prevention such as vaccines. In addition, the pharmacokinetics and pharmacodynamics studies on Lassa fever treatment is expected to provide more evidence to improve treatment dosages and is expected to broaden the evidence base on how to reduce Lassa fever related mortality and morbidity.

At an international level, GOARN reports improved response capacity as a result of deploying UK-PHRST members due to high levels of expertise and professionalism, and effective logistical processes.

UK-PHRST has become an integrated and highly regarded part of the GOARN response. GOARN staff interviewed commended UK-PHRST as being the "timeliest", as bringing the "highest level of expertise", as having effective deployment and security clearance processes, and as forming good working relationships with other responders and partner organisations on the ground.

Outcome indicator 3 (Minimum target of UK-PHRST deployments in response to appropriate requests for support with outbreaks and/or public health emergencies)

UK-PHRST has been successful in conducting a minimum of five deployments per annum in response to appropriate requests for support with outbreaks and/or public health emergencies (Outcome indicator 3). They responded to five deployments in 2017/18, six deployments in 2018/19 and two deployments since the start of programme year 2019/20 (a detailed list of deployments per country, the role, and the weeks per deployment can be found in Annex 23). We note, however, that demand for deployments is inherently unpredictable. UK-PHRST might hence consider revising the indicator.

3.3.2. Unintended consequences and results (EQ6.3)

EQ 6.3 What evidence is available to suggest unintended consequences and results beyond the logframe indicators?

Our analysis of data collected under the mid-point evaluation did not reveal any unintended consequences or results. This might relate to the relatively short length of implementation or the fact that the current MEL spreadsheet is not capturing this aspect. We expect to be in a better position to answer this sub-question at end-point.

3.3.3. External factors affecting results (EQ6.4)

EQ 6.4 What impact have contextual factors had on programme results?

Politics and national rules and regulations can delay response. Import of laboratory equipment and reagents into the Philippines, for instance, was delayed and resulted in extra costs. This was due to a lack of understanding of the national import regulations before shipping the goods. Furthermore, obtaining ethical clearance in countries like Ethiopia and Madagascar was reported to be difficult or slow.

Conflict and insecurity negatively impact outbreak control efforts. In North Kivu (DRC), insecurity has limited movement and occasional staff strikes halted the IPC work in the Ebola treatment centres. The context of displaced populations, community distrust in health systems, and the widespread recourse to traditional medicine prevents responders from accessing communities, identifying hotspots and EVD contacts. Political sensitivity in Sudan hampered efforts to improve diagnostic capacity in undifferentiated febrile illness, particularly in Darfur.

The lack of a sufficient number of study subjects negatively impacts research outcomes. In Sierra Leone there was a lack of Lassa fever cases for the studies to continue and work was therefore moved to Nigeria. The clinical characterisation of pneumonic plague research in Madagascar was initiated near the end of the epidemic, also resulting in very few case inclusions. While small sample size studies can still provide valuable insights, results might not be statistically significant.

Box 8 – Lassa fever case study summary (see Annex 22 for full case study)

What did UK-PHRST set out to do?

The UK-PHRST was deployed to Nigeria on a bilateral basis to support unusually severe seasonal outbreaks of Lassa fever in 2018 and 2019 and in parallel, set out to establish a programme of Lassa fever research in Sierra Leone using existing links in the country.

How aligned was the UK-PHRST contribution to the programme outcomes?

The work of the UK-PHRST in Nigeria will help to increase the speed and quality of response to Lassa fever outbreaks, will enhance capacity for outbreak detection, prevention and control, and will support the earlier detection of potential threats. It will also strengthen the global evidence base for the identification, treatment and control of Lassa fever.

How did things play out in practice?

UK-PHRST provided multidisciplinary support to the Nigerian outbreak which resulted in strong collaborative links with NCDC including an ongoing programme of research; in contrast, contextual issues in Sierra Leone hampered the successful implementation of the research programme.

How did the triple mandate play out?

The Nigerian deployments proved to be an effective way to strengthen a country's capacity for outbreak response, led naturally to the identification of knowledge and capacity gaps, and provided opportunities to develop collaborations for addressing those gaps through research and capacity building activities, which are of direct relevance to the control of the outbreak.

What worked particularly well?

The integration of outbreak response, research and capacity building into a single model led to significant synergies which will go some way to enable sustainable health system strengthening, in particular in Nigeria where it will help Nigeria to meet their requirements under the International Health Regulations.

What were the challenges?

Contextual factors in both Nigeria and Sierra Leone impacted on UK-PHRST activities in the countries. Earlier in 2019, the deployment to Nigeria was delayed due to security concerns raised by the FCO regarding the national elections. In Sierra Leone, the community distrust and low level of engagement harmed the research programme.

What is there to be learnt?

Combining outbreak response, research and capacity building into a single package, implemented through a multidisciplinary consortium approach via bilateral deployments enables a highly effective, agile and synergistic approach; however, there is scope to further capitalise on this.

3.3.4. Sustainability in programme design

EQ 7 Are programme outputs and outcomes likely to be sustained?

EQ7.1 Were appropriate sustainability aspects embedded into the UK-PHRST programme design?

EQ7.2 What evidence is there that UK-PHRST short-term scoping research projects have led to long-term research collaborations between UK and other partners?

EQ7.3 To what extent are the project outcomes likely to continue after the project?

High-level findings EQ 7 (including sub-EQs and EQ 8.8)	Sustainability concerns have not been adequately embedded in the UK-PHRST's strategy or implementation plans. UK-PHRST's relative lack of focus on the capacity building component has hampered prospects for sustainability. There is no systematic action plan/needs assessment coming out of deployments and no systematic linking up with IHR or other capacity building initiatives. There is agreement that forming long-lasting relationships is key to increasing the chances of project outcomes being sustainable.	Evidence comprises multiple data sources (good triangulation) of lesser quality, or the finding is supported by fewer data sources (limited triangulation) of decent quality but that are perhaps more perception-based than factual.

Sustainability concerns have not been embedded adequately in UK-PHRST's strategy or implementation plans. Evidence from document review and interviews shows that UK-PHRST does not have a solid strategy in place to guarantee programmatic and financial sustainability, nor a plan to monitor sustainability actions. In 2016, implementation started without a Business Case, ToC or logframe in place. A ToC and a logframe were only established *ex post*. There are no formal procedures for exit/transition plans in place for UK-PHRST deployment, research or capacity building efforts. Moreover, the rapid and reactive nature of some of UK-PHRST's work (such as short deployments and one-off workshops) do not easily lend themselves to contributing to long-term sustainable outcomes without reinforcement through research, capacity building and partnerships.

UK-PHRST's reduced focus on the capacity building component has hampered prospects for sustainability. While the UK-PHRST was conceived to combine as much as possible response, research and capacity building, a relative lack of focus on the last two components, and of capacity building in particular, has resulted in missed opportunities to contribute to the sustainability of programme outcomes (see 3.1 and Annex 15).

There is no systematic action plan/needs assessment coming out of deployments and no systematic linking up with PHE IHR Strengthening Project or other capacity building initiatives. Evidence from KIIs indicates that needs assessments are not routinely carried out as part of UK-PHRST deployments and there is often no handover or action plan developed to set out how local capacity could be strengthened between/after deployments. With the possible exception of Sierra Leone with KCL, there is little evidence of a systematic process of handover of capacity building activities to organisations and programmes better placed to carry out capacity building activities – such as CDC or PHE IHR Strengthening project (although active only in a small number of countries) – after the team has left.

There is tacit agreement, however, that effective dissemination of information and forming long-lasting relationships is key to increasing the chances of project outcomes being sustainable. The UK-PHRST has improved prospects for sustainability by:

- **Working with other stakeholders and host countries to ensure funding is secured locally and is also looking at how to diversify sources of funding for long-term research projects.** As the Madagascar case study illustrates, for example, collaborations with Institut Pasteur, MoH, Joseph Befelatanana Hospital have been developed there with a view to implement a randomised controlled clinical trial of ciprofloxacin monotherapy as treatment for bubonic and pneumonic plague that is being approved/considered for funding by DFID and the Wellcome Trust.
- **Developing longer-term strategic partnerships that will be sustained beyond the project funding.** Examples include ongoing work with the college of medicine in Sierra Leone, in Sudan with the Federal Ministry of Health, and with NCDC. In Sierra Leone, for instance, support to relevant Masters and Bachelors programmes is cited as a good example of a sustainable approach, building capacity within the country, plus building local partnerships to support these activities to continue. Five BSE students work in Connaught Hospital laboratory so they are already using skills developed through the virology module.

- **Fostering good relationships and trust with a range of national authorities and institutions can result in further bilateral deployments and long-term research and capacity building partnerships that can improve in-country outbreak response.** In Sudan, for instance, UK-PHRST established valuable networks with the federal and state level authorities and the existing Rapid Response Teams, which resulted in a long-term research collaboration. Thanks to the trust built with a range of Sudanese institutions and actors, UK-PHRST was able to carry out regional workshops further promoting regional outbreak response partnerships. This networking resulted in requests for specific capacity-building assistance in epidemiology and microbiology. The NPHL VHF department also requested an "informal" assessment on biosafety and quality assurance in December 2017 (see section 3.2.4 and Annex 16).
- **Creating and sharing of Global Public Goods such as open access tools to be used in outbreak response.**

3.3.5. Value for Money: Economy, Efficiency, Effectiveness and Equity (EQ8)

EQ 8 To what extent has UK-PHRST followed the NAO principles of economy, efficiency and effectiveness and demonstrated VfM?

High-level findings EQ8 (including sub-EQs)	Overall, there is adequate to good evidence to suggest that appropriate processes are in place to ensure the delivery of VfM, with further attention required in some areas. UK-PHRST's approach to economy has been assessed as adequate. There have been efforts to ensure that appropriate procurement processes have been implemented to ensure VfM. This has resulted in the procurement of high-quality inputs. In terms of efficiency, appropriate processes are in place to track absorption and measures are being considered to monitor efficiency. To date, despite some underspend, there has been strong performance against output indicators. As far as effectiveness, a high-level ToC is in place with some evidence to validate the causal pathways for the achievement of outcomes. There is, however, greater uncertainty around capacity building. Equality has been considered in the project design although there is little evidence that this has been translated into implementation practices where activities are designed to target vulnerable groups and promote gender equality and human rights.	Evidence comprises multiple data sources (good triangulation) of lesser quality, or the finding is supported by fewer data sources (limited triangulation) of decent quality but that are perhaps more perception-based than factual.

A scorecard approach was used to measure VfM. Table 3. Summary of evidence against each element of the VfM scorecard (EQ8)presents a summary of evidence against each element of the scorecard while the entire scorecard can be found in Annex 10. Given the cross-cutting nature of VfM, findings have been integrated as much as possible in the respective sections of the report. The remainder of the section presents a summary of the evidence against each of the 4 Es in DFID framework[64] – that is, Economy, Efficiency, Effectiveness and Equity.

[64] https://www.gov.uk/government/publications/dfids-approach-to-value-for-money-vfm

Table 3. Summary of evidence against each element of the VfM scorecard (EQ8)

Scorecard element	Quality of VfM evidence	Commentary on quality of VfM evidence
1. Relevance and robustness of VfM measures in place	Little	Project documents mention the concept of VfM and the "four Es" framework and discuss how VfM will be addressed. However, there are few VfM indicators in the logframe or Monitoring, Evaluation and Learning plan.
2. Ability of leadership, management and oversight structures to support implementation	Adequate	Management and reporting systems have struggled to deal adapt and provide the necessary flexibility to deal with the high-pressure nature of UK-PHRST's work, leading to team frustrations which are further challenged by the disperse locations and regular travel schedule of key staff. HMG financial systems as they stand are not swift or flexible enough for the unique needs of a rapid support team.
3. Strategies and measures adopted to enhance delivery and mitigate risk	Good	There is adequate/good evidence of strategies and measures adopted to enhance delivery and mitigate risk.
4. Approach to procurement and cost containment	Adequate	There have been efforts to ensure that appropriate procurement processes have been implemented to ensure VfM. This has resulted in the procurement of high-quality inputs. There is some concern that PHE/LSHTM systems/processes are not adept at procuring items in partner countries.
5. Efficient use of resources and inputs by UK-PHRST interventions	Good	Appropriate processes are in place to track absorption and measures are being considered to monitor efficiency. Measures to improve flexible programming will support efficiency. To date, despite some underspend, there has been strong performance against output indicators.
6. Validation of Theory of Change causal pathways	Good	A high-level ToC is in place with some evidence to validate the causal pathways for the achievement of outcomes. There is, however, greater uncertainty around capacity building.
7. Equity of programme design and approach	Little	Equity has been considered in the project design although there is little/no evidence that this has been translated into implementation practices where activities are designed to target vulnerable groups and/or overcome identified barriers.
8. Sustainability of programme activities	Adequate	Although there is evidence of the project design incorporating sustainability considerations, related activities have not been explicitly prioritised. There are no sustainability strategies or plans in place.
OVERALL VfM ASSESSMENT	**Adequate – Good**	Overall, there is adequate to good evidence to suggest that appropriate processes are in place to ensure the delivery of VfM, with further attention required in some areas, particularly to put VfM measures in place and ensure equity is addressed.

Economy

EQ8.1 Have inputs (e.g. staff, consultants, raw materials and capital) of an appropriate quality been purchased at the best possible price?

EQ8.2 What is the relative cost of a readily deployable core team (costs including salaries, training, occupational health and backfilling reservists) compared with the costs of hiring external consultants?

UK-PHRST academic service providers were selected through competitive tender processes and against VfM criteria, although subsequent contracts are not structured to incentivise cost containment or performance. The service provider selection process was facilitated by the NIHR Central Commissioning Facility on behalf of DHSC, with VfM criteria used to assess proposals by an independent selection panel. Stakeholders have widely reflected that high-quality service providers were selected through this process. The analysis does, however, suggest that the resulting contracts have not been structured to incentivise cost containment or performance against output or outcome indicators or to deliver high-quality services. Rather, contracts are structured to incentivise high levels delivery volume, which some stakeholders have also reflected may give the impression of being the primary concern. Qualitative evidence suggests that in some instances this may have led to suboptimal spending choices.

The procurement of project goods and services can be problematic. Project documentation states that PHE and LSHTM's *"well established, government standard and externally audited procurement policies and procedures that ensure that the delivery of the UK-PHRST will be cost effective and will deliver good VfM"*. However, stakeholders have raised concerns that PHE and LSHTM systems and processes are not always adept at procuring items in and to partner countries, particularly when responding at short notice to outbreak emergencies. For instance, high logistics costs, such as import and export taxes and exchange rate fluctuations, are common. The establishment of supplier networks in countries can work to reduce prices and reduce disruption, such as in Sierra Leone.

The benchmarking analysis suggests that the model of hiring a full-time core deployable team is comparable to the cost of hiring reservists, but generates important benefits to the identity of the UK-PHRST project and services to improve the overall quality of services provided. Staff costs across the range of core deployable team positions (including provision for overheads) were compared with the average price paid by PHE for reservists (which was translated into an annual cost for the same number of full-time equivalent positions) with a negligible difference in overall cost. Some stakeholders reflected that the arrangement whereby staff are employed on a full-time basis for a project that is in essence in place to deploy experts for rapid outbreak response, as needed, is expensive as compared to hiring external consultants for individual assignments. Other stakeholders suggested, which we are minded to agree with, that these costs are more than offset by the additional benefits generated by full-time staff engaging in research and capacity building activities when not on deployment, as well as the benefits associated with having highly skilled staff that are familiar with the project objectives that are able to deploy promptly.

Efficiency

EQ8.3 To what extent did actual spending deviate from the intended spending?

EQ8.4 Efficiency (as part of VfM)

Efforts to measure and monitor efficiency are focused on budget utilisation. Budget execution is monitored regularly, with the UK-PHRST SMT meeting regularly to review and discuss budget-related issues. This close look at their portfolio finances enables joint reporting of financial information across the entire UK-PHRST and streamlines further action across all partners (PHE, GHS Delivery Team). It is, however, unclear if/how: programme management costs are tracked and reported at aggregate and intervention level; and if the unit costs of activities are analysed in relation to the outputs achieved (particularly in light of the issues with the MEL system noted elsewhere).

The model for allocating human resources across programme areas appears to work well, while the shifting of financial resources between these areas is expected to improve efficiency. The model for using a core deployable team to conduct research alongside and around deployment, drawing on Field Epidemiology Training Programme (FETP) Fellows and Reservists to provide additional capacity appears to ensure efficient use of staff time. Approval has been granted by DHSC to reallocate resources across deployment and research activities, including transferring funds between partners, to better align to resource needs and ensure that all project objectives can be met. It is understood that there has previously been a lack of flexibility to do this, which has negatively impacted on budget absorption (particularly in the areas of UK-PHRST staff costs, equipment, research, and training and development) and overall efficiency.

Considerable savings have been realised against travel-related budget lines through the GOARN deployments as these costs have been incurred by WHO.

To date, despite some underspend, there has been strong performance against output indicators. In the first year of UK-PHRST, interim arrangements were put in place while a long-term framework was developed and a director recruited. This created a functional administrative framework and core deployable team which enabled the completion of 5 deployments and initiation of 10 research projects. Since the Strategic Framework was agreed, the project has continued to be highly productive, with strong deployment capacity (including with a Reserve Cadre now in place) and a range (16) of research projects and capacity building activities being implemented.

Effectiveness

EQ8.5 and EQ8.6 Effectiveness (as part of VfM)

Overall, the analysis suggests that the UK-PHRST is likely to be effective. The UK-PHRST project is designed to facilitate improved preparation for and response to public health threats, with stakeholders widely reflecting that, in line with the ToC: deployment activities are in response to an identified need and are evidence based, therefore likely to make a meaningful contribution to response efforts; and research activities are also likely to support improved preparation and response. Project documentation also confirms that in some instances deployment and research activities have made a positive contribution to project outcomes.

There is, however, greater uncertainty around the effectiveness of capacity building activities, with some mixed evidence on whether the project activities are sufficiently building capacity to improve country stakeholders' abilities to prepare and respond. In our view, this reflects a lack of implementation in this area rather than the effectiveness of the interventions *per se*.

Equity

EQ8.7 What is the UK-PHRST impact as regards equality and human rights?

Equity has been considered in the project design although there is little/no evidence that this has been translated into implementation practices where activities are designed to target vulnerable groups and/or overcome identified barriers. All UK-PHRST interventions are designed to comply with and champion the applicable laws of England and Wales related to equity and the promotion of human rights. More specifically, project documentation confirms that the UK-PHRST will:

- Incorporate an awareness of the political complexity surrounding the implementation of human rights in all decision-making processes.
- Not discriminate or support any discrimination of persons holding a protected characteristic.
- Proactively support and develop local mechanisms to reinforce human rights through capacity building and research endeavours.
- When possible, disaggregate epidemiological data collected during outbreaks and research by gender to show regard for gender differences in disease incidence and outcomes (including, where possible, social consequences of infection).
- Take all opportunities to monitor and evaluate the effect of outbreaks of infectious disease as well as its own actions on the equity and human rights of residents of LMICs where it operates. This may include prospective assessment of the impact of an intervention on vulnerable groups.

These considerations are not routinely integrated into project design and decision making. For instance: evidence of analysis of gender or human rights barriers conducted for deployment/research activities is lacking, and the prioritisation criteria for deployment and research activities does not appear to include equity considerations; MEL indicators are not disaggregated; gender, equity and human rights-sensitive response to outbreaks is not part of UK-PHRST's training curriculum, etc. Rather, UK-PHRST teams have

reported a lack of understanding of how to operationalise these principles and there appears to be a general sense that the nature of the work UK-PHRST does in LMIC countries is sufficient to achieve equity.

3.3.6. Transparency, Theory of Change and MEL systems

EQ 9 Is UK-PHRST capturing the right data to measure results and ensure transparency, and how can this be improved?

Strength of evidence EQ9 (including sub-EQs)	Since developing the ToC for the purposes of this evaluation, UK-PHRST has been through a strategic review process and further revisions to the ToC may be required. In terms of transparency, UK-PHRST meets self-reporting IATI transparency standards and demonstrates improvements from 40–59% (fair) in 2017/18 to 60–79% (good) in 2018/19. MEL systems are currently output-focused and could be strengthened to better capture evidence and measurable outcomes and impact.	Evidence comprises few data sources (limited triangulation) and is perception-based, or generally based on data sources that are viewed as being of lesser quality.

Strengthening the Theory of Change (EQ9.1)

EQ 9.1 Is UK-PHRST's current ToC measuring the right things to ensure that programme outcomes are captured? How can it be strengthened?

Since developing the ToC for the purposes of this evaluation, UK-PHRST has been through a strategic review process and further revisions to the ToC may be required. As part of the revised research and capacity building strategy (Oct 2019, not yet approved), the evaluation ToC developed in July 2019 (Annex 4) was slightly revised. This highlights the need for the ToC to be reviewed as part of an ongoing, collaborative process over the next phase of implementation as the implementation plan is developed to support the new strategy and the MEL framework updated to reflect this. This will enable coherence between the ToC, the logical framework, the MEL framework and the implementation plan. Itad can facilitate a structured process to review the new ToC's alignment with the revised strategy, implementation plan and evaluation findings/recommendations, at the start of the end line evaluation as agreed with UK-PHRST.

As it stands, the evaluation ToC captures well the different levels of results and the assumptions underpinning their approach. Suggested modifications to the ToC include improving representation of the relationships between the three components, which is currently depicted with three overlapping circles. While all triple mandate domains are inherently interlinked, capacity building cuts across research and outbreak response, as demonstrated by the majority of UK-PHRST work during deployments and research activities. In addition, the ToC could more comprehensively display the different intervention levels (country – regional – global) to strengthen the linkages where UK-PHRST needs to more effectively engage or network. Further integration of a partnership strategy into the ToC could also be included – or indeed a separate ToC for partnerships developed.

Transparency (EQ9.2)

EQ 9.2 What evidence of transparency is available?

UK-PHRST meets self-reporting IATI transparency standards and demonstrates improvements from 40–59% (fair) in 2017/18 to 60–79% (good) in 2018/19. The following was described as the evidence of progress that contributed to the increased score.[65] UK-PHRST has shared a number of key documents to feed into the transparency process. UK-PHRST remains committed to increasing the IATI score further and is working on submitting the Annual Review (2018–19), the 2019–20 Implementation plan and the end-of-mission reports. Evidence from interviews also shows that, as part of their transparency commitments,

[65] UK-PHRST Annual Review Report 2017/18, UK-PHRST Annual Review Report 2018/19.

after some delays in getting the necessary approvals in place, UK-PHRST will soon make public their contract, mission reports, and research outputs among other documents.

External reporting requirements are mostly implemented,[66] and include Quarterly Highlight Reports and the Annual Review Reports to the GHS Delivery Team, weekly Situation Reports (SitReps) to GHS Programme SRO[67] during deployments, and End of Mission Reports to the same. Annual Research Projects Progress Reports are shared with GHS Delivery Team and the Academic Steering Committee (ASC). Many of these reports are further disseminated to HMG stakeholders, the Chief Medical Officer, NIS, DFID, and UK EMT. While several UK sources raised concerns that external communication is not streamlined enough, and that information sharing on research has been poor and not always transparent in the beginning of the project, evidence from in-country and international partners (WHO/GOARN) reports were in general positive, stating UK-PHRST has been transparent and proactive in sharing information, data and reports, including the lessons identified log and the Accident, Incident and Near Misses Reporting Tool.

MEL systems (EQ9.3)

EQ 9.3 Are suitable MEL systems in place to adequately capture results and how can they be improved?

MEL systems are currently output-focused and could be strengthened to better capture evidence and measurable outcomes and impact. For MEL purposes, UK-PHRST currently relies on a process and output-focused spreadsheet that does not capture evidence and measurable outcomes and impact. This internal MEL framework developed in October 2018 measures programme progress against milestones on a quarterly basis. Most monitoring is limited to processes and activities. While this has been useful to UK-PHRST's SMT in tracking activity implementation progress, it lacks meaningful evidence to inform programme adjustment, outcomes and impact. In addition, the spreadsheet has many incomplete sections, some inaccuracies, several poorly formulated indicators and causal links are at times weak. The current framework is not sufficiently and/or objectively measuring or demonstrating evidence of UK-PHRST's contribution to outcomes and impact. As it stands, it also provides an overly positive picture of progress against the logframe compared with other evidence gathered by the evaluation (see Section 3.2.2).

There is some evidence available to demonstrate results and performance through other review/reporting mechanisms but this is not collected in a systematic way. Annual Review reports, implementation reports, end-of-mission reports and research tracking reports, a "lessons identified" log, deployment debriefs, After Action Review reports, Action Review Workshops, project board meetings, TSC meetings, away days, and regular CMT and SMT meetings, and so on, provide valuable information on UK-PHRST's performance. However, not all are implemented routinely – e.g. UK-PHRST has produced only one After Action Review report in June 2019[68] covering all deployments to date rather than reviews for each deployment.

[66] UK-PHRST Four-Year Strategic Framework 2018-2021.
[67] Senior Operational Officer.
[68] UK-PHRST After Action Review, 11 June 2019.

4. Conclusions and implications

This section presents an assessment of the strengths and weaknesses of UK-PHRST to date in delivering against the objectives that the programme was designed to address.

UK-PHRST originated from the lessons and insights of the West Africa Ebola outbreak. Between 2013 and 2016 an Ebola outbreak killed more than 11,000 people, bringing *"a new level of urgency to the issue of global health threats",*[69] in particular those around lack of "research readiness" (since Ebola had not been prioritised as a disease, research on vaccines, treatments and diagnostics was originally lagging behind) and "expert readiness" (an insufficient number of staff with the required expertise was readily available to be deployed at the onset considering the magnitude of the outbreak).[70]

UK-PHRST was developed as part of a wider HMG GHS Programme with a key broad objective to keep the global population, including the UK, safe and secure from GHS threats (see Annex 1). Within this broader GHS programme, the key outcome that UK-PHRST aims to achieve is for the UK and global response to epidemics to improve in speed and quality (see Annex 4). UK-PHRST's model aimed to achieve this through the "triple mandate" combining outbreak response, research and capacity building in a consortium of institutions made up of PHE and experienced academic institutions with LSTHM as the main academic partner. The aim of the triple mandate and consortium model is to utilise a multi-disciplinary team to: i) improve the speed of outbreak response through effective deployment of a team of experts; ii) enhance the evidence base and thus improve the effectiveness of UK and global response efforts; and iii) provide relevant and effective capacity building to enhance the ability of LMIC-based stakeholders to identify and respond to outbreaks.

The UK-PHRST model is still valid. The idea of combining response, research and capacity building in a readily deployable team still holds. UK-PHRST appears to be the only full-time team dedicated to outbreak response with an explicit mandate to combine deployments with research and capacity building into a single offer in the GHS landscape. Across the board, the model is still seen as unique, pioneering and essential for influencing the outbreak research agenda globally and strengthening countries' ability to respond quickly and effectively, especially considering that the Global Preparedness Monitoring Board (GPMB) recently warned that *"current efforts remain grossly insufficient"* despite the progress made by the international community in preparing to face health emergencies.[71]

As discussed in the findings' session, UK-PHRST has been successful in:

- **Establishing a highly-professional and well-respected team of experts from well-respected institutions, with valuable existing connections and reputations.** In doing that, UK-PHRST have developed positive relationships with GOARN and national governments, who report improved speed and effectiveness of outbreak response when UK-PHRST are deployed. This has contributed to greater expert-readiness, albeit mainly at the level of individual experts.
- **Mobilising a permanent team focussed on outbreak response across the triple mandate, which has helped to support outbreak-related research.** This has already contributed to the global evidence base, and has enhanced learning and sharing across UK-PHRST and the broader GHS landscape, thus contributing towards better research readiness.
- **Providing invaluable access to the consortium partners' pre-existing and positive relationships with LMIC stakeholders**. They have had some success in effectively building on these existing networks to identify successful capacity building activities with the potential to contribute to greater expert readiness on the ground and potentially providing opportunity for greater sustainability of outcomes.

The full potential benefits of the model have not materialised yet for a number of reasons:

[69] ICAI. 2018. The UK Aid Response to Global Health Threats. A Learning Review. Available at: https://icai.independent.gov.uk/wp-content/uploads/GHT-review_final.pdf
[70] Ibid.
[71] GPMB. 2019. A World at Risk. Annual Report on Global Preparedness for Health Emergencies. Available at: https://apps.who.int/gpmb/assets/annual_report/GPMB_annualreport_2019.pdf

- **Limited implementation and funding period**. Formally launched in November 2016, the programme then had to go through a set-up phase, with the first deployment conducted in April 2017. As a result, despite already being in the fourth year of funding, the duration of programme implementation is just over two years to date. Although donor funding tends to be short-term, programme outcomes usually take time to materialise, and even more so in fields such as research and capacity building. DHSC should bear this in mind when reflecting on this first phase of the programme and planning for any subsequent phases.
- **Operationalisation of the concept of the triple mandate is still a work-in-progress**. When the programme started in 2016, there was no Business Case, ToC or logframe in place. A ToC and a logframe were only established *ex post* and the ToC is still currently under revision. The MEL system is still also under revision and key strategies, such as the research and capacity building strategies, have just recently been developed. Others, such as a sustainability strategy, are still missing.
- **Difficulties working across institutions and cultures.** Although working in a multi-disciplinary consortium has its benefits, it has taken time to develop effective relationships between the main partners, especially given differences in organisational culture, management systems and the team's disperse physical locations. Issues around governance arrangements, management and communication have served to limit effective coordination, collaboration and cross-learning. They have also compounded challenges with the capacity of the small UK-PHRST team and have resulted in a relative lack of focus on capacity building activities.
- **Challenges around the capacity and skills of the UK-PHRST team relative to the demands of the model and requirements for individual deployments within the triple mandate model.** In a context in which contributing to outbreak responses is perceived by most as the primary mission of UK-PHRST and limited human resources, involvement in frequent and sometimes repeated deployments (such as in the case of DRC) has resulted in relative lack of focus on or delays to the other two components of the triple mandate, especially capacity building. Limited human resources have also meant that UK-PHRST has not been able to respond to all deployment requests. Resourcing issues to be addressed include: over-reliance on key individuals leading to potential for burn-out; challenges delivering across all components of the triple mandate; and challenges with ensuring there is space to develop multi-disciplinary cohesion and cross-team communication when pulled in so many directions.
- **Modality of deployment.** Most requests for deployment have come from GOARN and this can limit UK-PHRST's ability to deliver a more strategic, cross-HMG UK response and/or opportunities to influence or ability to integrate research and capacity building into outbreak response.
- **Weak communication and coordination with other HMG GHS actors.** UK-PHRST's efforts to work with other HMG GHS programmes within LMICs have so far had limited success. There is still a need for more collaboration between UK deployment mechanisms to remove the risk of duplication and to build on synergies with other HMG GHS programmes, including the PHE IHR Strengthening programme.
- **Tension between visibility and recognition against alignment and coordination with other actors involved in the response**. While the fact that the UK-PHRST routinely deploys as part of GOARN (hence as WHO staff) improves chances for the response to be well coordinated, this has an impact on UK-PHRST image and visibility. As a result, there is still limited awareness of the UK-PHRST at country level when the team is deploying through GOARN. As UK-PHRST continues to build on its reputation, increasing understanding of the added value of the triple mandate and UK-PHRST's offer amongst key actors in the UK, globally, regionally and at country level is required. Enhancing visibility will be dependent on longer-term investments in relationship building, particularly at the country and regional level (Ministries of Health, National Public health Institutes and research institutes, as well as academic institutions and key regional organisations such as Africa CDC, WHO AFRO and international organisations such as GOARN).
- **Current MEL systems do not fully support measurement of progress towards desired outcomes, and hence need strengthening in order to support learning and adaptive management.** While recognising that research and capacity building outcomes require time to fully materialise, the UK-PHRST needs to

revise and strengthen the way it tracks progress against its ToC to demonstrate and ensure it contributes to the desired long-term changes going forward.

- **Sustainability warrants some special attention.** Of the three areas of the mandate, capacity building has been less of a priority, which poses questions in terms of the sustainability of the outcomes UK-PHRST has worked towards.
- **While there is commitment on UK-PHRST's side to incorporate equity and human right concerns in its operations, equity considerations are not routinely integrated into project design and decision making.** While UK-PHRST works by definition with vulnerable people (that is "vulnerable" to the consequences of disease outbreaks), this is not equivalent to promoting gender, equity and human rights through its work. Integrating equity and human rights considerations within UK-PHRST's operations would not only be a matter of principle, but also make interventions more effective by taking into account, for example, the health seeking behaviours of different groups and how different groups are affected by a specific disease outbreak.

While UK-PHRST remains fairly unique, these issues are not uncommon in the international development space. The 2018 ICAI review *The UK aid response to global health threats*,[72] for instance, already highlighted "a general need for improvements in cross-government collaboration and communication". Tensions versus short-term development funding and the challenge of building and measuring sustainability are also well documented[73], while countless organisations struggle with measuring progress towards desired outcomes and establishing contribution. This evaluation is hopefully a good first step to take stock of what UK-PHRST has already accomplished to date and the work that remains to be done.

[72] ICAI, 2018. The UK Aid Response to Global Health Threats. A Learning Review. Available at: https://icai.independent.gov.uk/wp-content/uploads/GHT-review_final.pdf

[73] ICAI, 2018. DFID's Approach to Value for Money in Programme and Portfolio Management. A Performance Review. Available at: https://icai.independent.gov.uk/wp-content/uploads/ICAI-VFM-report.pdf

5. Recommendations

This section presents the evaluation recommendations, which have been co-created by Itad and UK-PHRST SMT members, along with stakeholders from the broader GHS programme, . Following submission of the mid-point evaluation report in January, the Evaluation Team facilitated a co-creation workshop on 17 February 2020. The workshop involved review of the priority evaluation findings and conclusions, and interactive discussions on the feasibility and utility of potential options for moving forward. These options have been used by the Evaluation Team to frame the recommendations presented below. As such, while the recommendations are those of the Evaluation Team, it is intended that these reflect the views and priorities of the evaluation users.

Given the limited implementation time remaining, many of the issues highlighted in this report should be taken into account when designing and planning for the next phase of the programme. As of March 2020, less than 13 months of programme implementation time remain. It is important to acknowledge that, while UK-PHRST can refine some of its systems and processes in the current funding period, there is not sufficient time left for any radical shifts during this phase of implementation. Conclusions and recommendations originating from the mid-point evaluation should therefore also be fed into the design of the next phase.

The remainder of the section presents six high-level recommendations that the Evaluation Team proposes for UK-PHRST to take forward, discussing for each what priority actions can be taken forward during the current phase and what considerations that funders and implementers should take into account when designing and planning for subsequent phases. See the table overleaf for an overview.

Recommendation 1 – Clearly articulate UK-PHRST's remit across the triple mandate and set out clear ways of working within the consortium and with partners.

- It is essential for UK-PHRST's SMT to clearly define its scope of work given the limited implementation time remaining and human resource constraints.
- There is thus a need to define what the triple mandate means in practice for UK-PHRST and its stakeholders, especially within capacity building.
- Moreover, while a lot of work is already underway within UK-PHRST to update strategies and test out new approaches (such as in the case of Sudan), there is currently no single document which details UK-PHRST's ways of working, internally or externally.
- **For the current phase,** we therefore suggest that the SMT prioritises drafting of a comprehensive Operational Manual to clarify ways of working both internally and externally. This manual should outline at an operational level:
    - How UK-PHRST aims to achieve its goals within and across the three areas of its mandate (linked to UK-PHRST's ToC).
    - Governance arrangements between and across institutions and across the triple mandate.
    - Prioritisation criteria to make the most of limited time and human resources
    - An outline of approaches to partnerships, external and internal. communications, gender, equity, human rights and sustainability.
    - Clearly defined roles, responsibilities and lines of accountability of individuals and institutions, which are all aligned with the objectives and ways of working of UK-PHRST going forward.
- **Looking towards the next phase,** UK-PHRST SMT might want to articulate a request for more human resources (either as part of the permanent CDT or for reservists) in order to be better positioned, if selected, to deliver on their ambitions.

Recommendation 2 – Build a "UK-PHRST identity" and smooth over any tensions within the consortium that may hinder collaboration and efficiency.

- As previously outlined, despite being operational for almost three years, the team still lacks a unified sense of identity. This has contributed to poor visibility in LMICs and compounded the difficulties of working across different institutions, cultures and locations.
- This in turn has limited opportunities for effective coordination, collaboration and cross learning.
- **For the current phase,** we have identified three priority actions in this area:
  - The SMT should arrange a team-building workshop to reflect on UK-PHRST's strengths, the benefits of working in a consortium and how team cohesion, collaboration and sense of identity can be improved and cross-institutional differences set aside.
  - Agreement with DHSC on the design and use of a UK-PHRST logo for use in email signatures, business cards and external communications. Due to the consortium nature of UK-PHRST, we consider it paramount to have a logo available in order to strengthen the team sense of identity and belonging, as well as improve external awareness of the UK-PHRST.
  - The SMT should consider how governance structures such as the Technical Steering Committee and the Project Board could be revised to support UK-PHRST sense of identity.
- **Looking towards the next phase,** it should made clear to anyone working for, or joining, UK-PHRST what the expectations in terms of identification with UK-PHRST and related career opportunities (as opposed to the standard academic route for instance).

Recommendation 3 – Set out, implement and monitor a communication and engagement plan to increase awareness of what UK-PHRST is and does.

- External awareness of UK-PHRST is still limited. In our view, UK-PHRST should put in place, disseminate and regularly monitor an external communication and engagement plan.
- **For the current phase**, immediate actions under this plan might include working with PHE and LSHTM's Communications leads to:
  - Draft and disseminate a one-pager (with UK-PHRST logo) on what UK-PHRST is and does (and why) and tailor it for each country UK-PHRST is approaching.
  - Draft and disseminate an evidence-based case study that articulates UK-PHRST's approach, how it has adapted over time and expected contribution to programme outcomes.
  - Work with GHS Delivery Team communications experts to disseminate and amplify messages from UK-PHRST, such as the above-mentioned case study or the so-called "Sudan approach" that is currently being piloted. This would help to manage expectations in LMICs (in terms of the triple mandate), raise awareness on and visibility of UK-PHRST and potentially increase bilateral deployments requests.
- **Looking towards the next phase,** we recommend that UK-PHRST carry out a comprehensive stakeholder mapping to help drive partner prioritisation in LMICs.

Recommendation 4 – Find ways to collaborate more closely with other actors in the GHS space, including across HMG programmes.

- There is a need for strengthened collaboration to remove the risk of duplication and to build on synergies with other GHS programmes, within and beyond HMG. This is particularly important in terms of UK-PHRST's approaches to capacity building and sustainability (given the short-term nature of deployments and the lack of permanent physical presence in LMICs).
- **For the current phase**, we recommend working with DHSC to build stronger links at country and regional levels with the PHE IHR Strengthening Project, DFID country offices and organisations like Africa CDC, US CDC, China CDC and academic institutions. This would help to create more opportunities for effective and sustainable capacity building activities in LMICs.

- UK-PHRST could first of all assess LMICs' capacity building needs (with reference to JEE and NAPHS reports) prior to and during their engagement in-country.
- This could be followed by discussions with national counterparts (typically national public health institutes) and other national GHS stakeholders about where and how UK-PHRST would be able to provide support in these areas.
- They could then agree how UK-PHRST could provide targeted, short-term support to longer-term capacity building activities already being implemented by national stakeholders (such as national public health institutes).
- At the same time, UK-PHRST could help them to identify and connect with national, regional or international partners who could support these and other activities in the longer term.
- Putting MOUs in place and setting up "hand over" arrangements with partner organisations would support operationalisation and sustainability of UK-PHRST's work in these countries.

- **Looking towards the next phase,** in the shorter-term, UK-PHRST should build on existing efforts and reach out to DFID health advisors and PHE IHR Strengthening Project Country Leads in the countries they are working or planning to working in to start sharing plans and aligning efforts.
  - In the longer term, UK-PHRST should ensure that the previously mentioned partnership building activities are taken into account in the design and implementation of the next phase.

Recommendation 5 – Revise current MEL systems to make sure they are fit for purpose to support learning and adaptation.

- UK-PHRST MEL systems should be revised, as they currently do not fully support measurement of progress towards desired outcomes, nor learning and adaptation.
  - This is important to instil a model of mutual accountability for results, to ensure resources are optimally used to achieve the intended results, and to provide an evidence base on the results achieved to date, which will be important when advocating for future funding.
- **For the current phase**, UK-PHRST should seek guidance on how to revise its MEL systems so that they align with its long-term vision and ToC. Further emphasis should also be put on the "learning" part of the MEL framework.
  - Reflection opportunities, such as the After Action Reviews, should be maximised across the triple mandate and action points from various sources should be monitored, reviewed and prioritised as a group on a regular basis to foster both learning and accountability.
- **Looking towards the next phase,** the MEL system should track progress towards inputs, activities, outputs, intermediate outcomes and long-term outcomes of UK-PHRST engagement, with measurable indicators, baselines, targets and means of verification.
  - The framework should ideally also capture to the extent possible unintended results, UK-PHRST's contribution and what other partners are doing in countries where it operates that could potentially also have an impact on the same outcomes.

Recommendation 6 – Operationalise existing commitments to promoting equity and human rights.

- Although this area was not prioritised during the co-creation workshop, we suggest that UK-PHRST invests time and effort to mainstream equity and human rights concerns in all it does going forward .
- **Starting during the present phase**, this could include:
  - Carrying out analysis of gender, equity or human rights barriers pre-deployment/research work (leveraging the social scientist's skills) and making this part of the pre-deployment briefing pack.
  - Including gender, equity and human right-sensitive response to outbreaks as part of UK-PHRST's training curriculum and as a topic of research and capacity building.

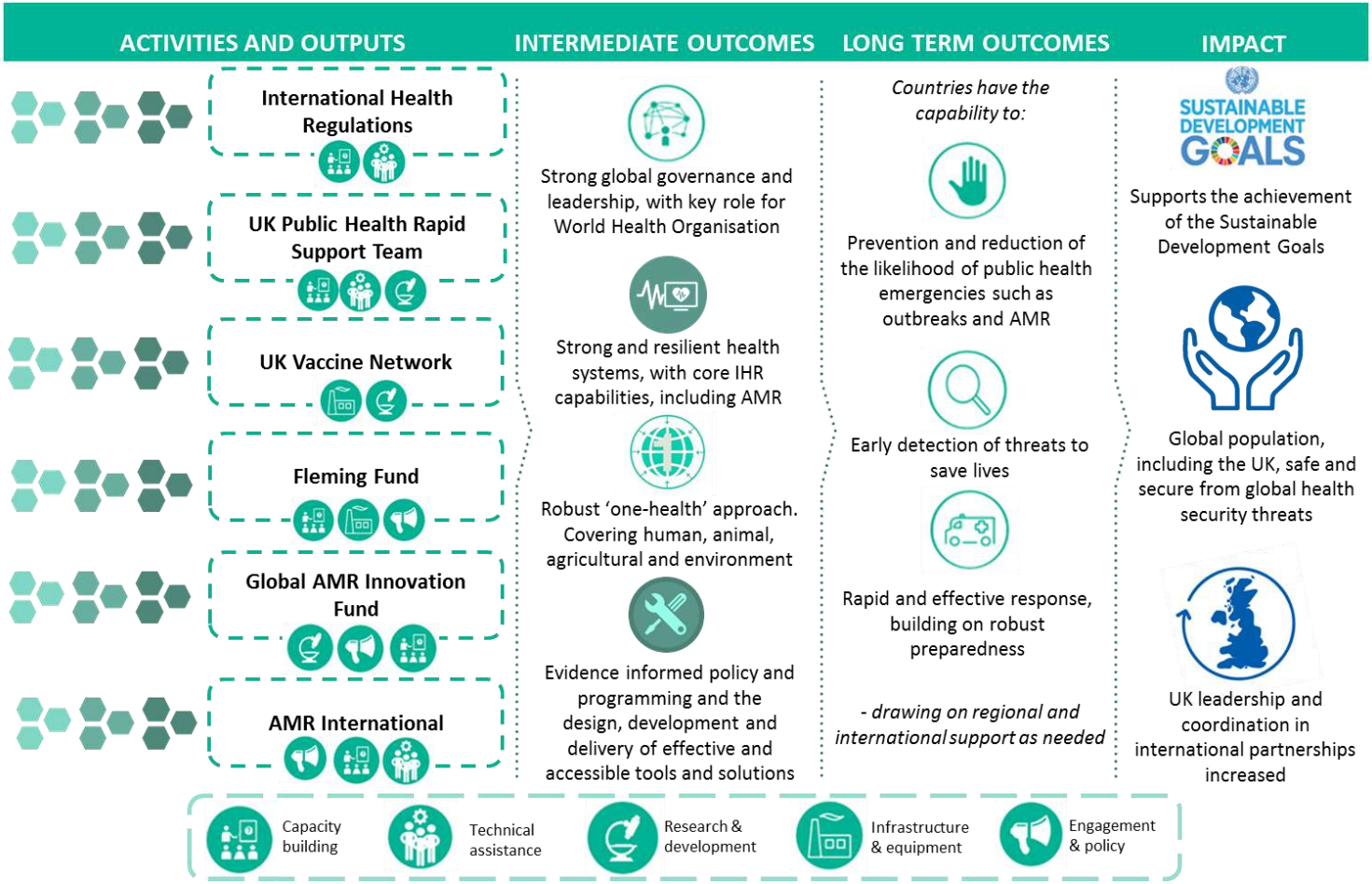
- Collecting MEL indicators in a disaggregated fashion whenever possible and relevant.
- Including equity and human rights considerations in the prioritisation criteria for deployment and research activities.

Summary Recommendations

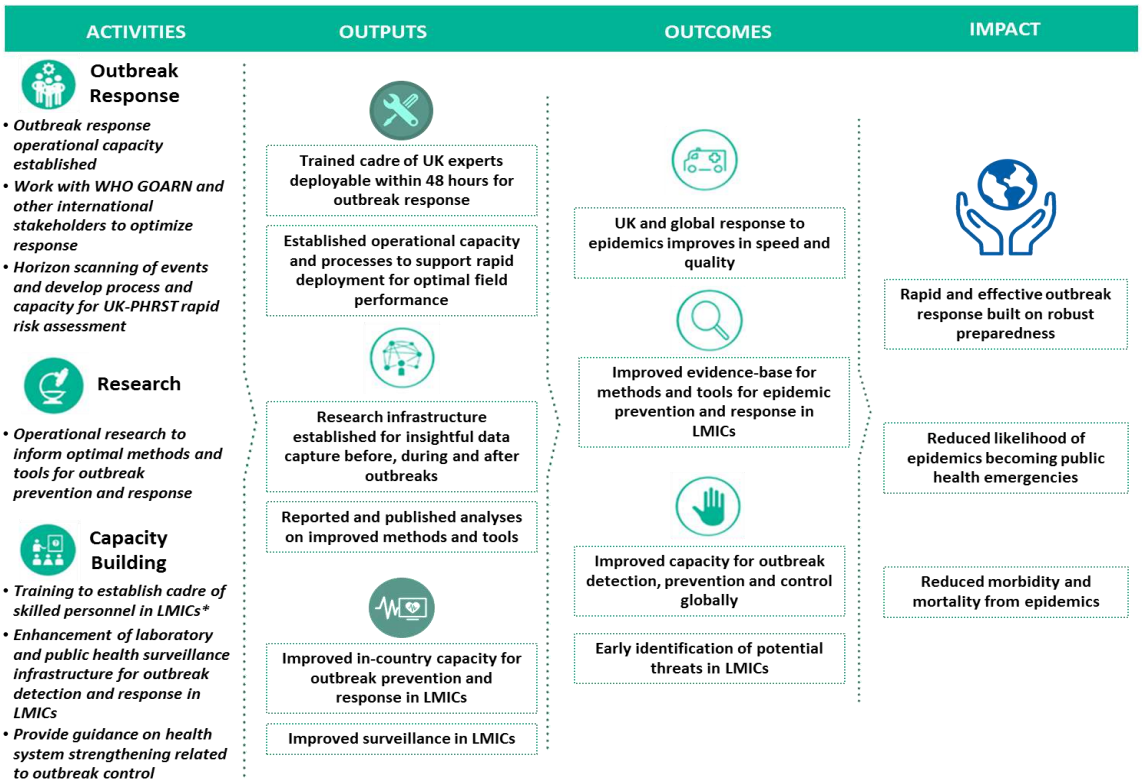
	Recommendations	Priority actions for the remainder of this phase (until March 2021)	Consideration for future phases
	**Recommendation 1** Clearly articulate UK-PHRST's remit across the triple mandate and set out clear ways of working within the consortium and with partners.	Draft a comprehensive Operational Manual that details how UK-PHRST aims to achieve its goals within and across the three areas of its mandate (linked to UK-PHRST's ToC), governance arrangements, prioritisation criteria, partnership approaches, external and internal communications, equity (including gender) and sustainability.	Articulate a request for more human resources (either as part of the permanent CDT or for reservists) in order to be better positioned, if selected, to deliver on their ambitions.
	**Recommendation 2** Build a 'UK-PHRST identity' and tackle any tensions within the consortium that may hinder smooth collaboration and efficiency	3. Hold a team building workshop to reflect on their strengths, the benefits of working in a consortium and how team cohesion, collaboration and sense of identity can be improved. 4. Agree internally and with DHSC on the use of a UK-PHRST logo in email signatures, business cards and external communications.	5. UK-PHRST to clarify how team members are expected to represent themselves to partners in various contexts when operating under UK-PHRST, as opposed to when they are representing PHE or LSHTM in another capacity. 6. UK-PHRST to highlight the potential for enhanced career opportunities for team members in addition to those available through existing organisational routes
	**Recommendation 3** Set out, implement and monitor a communication and engagement plan to increase awareness of what UK-PHRST is and does	4. Draft and disseminate a one-pager (with a logo) on what UK-PHRST is and does (and why) and tailor it for each country 5. Draft and disseminate at least one case study that articulates UK-PHRST approach and expected contribution to programme outcomes 6. Work with DHSC and NIHR's communications departments to disseminate and amplify messages from UK-PHRST	Carry out comprehensive stakeholder mapping that could drive partner prioritisation in LMICs.
	**Recommendation 4** Find ways to collaborate more closely with other actors in the GHS space, especially across HMG programmes	Working with DHSC, reach out to DFID health advisors and PHE IHR Strengthening Project Country Leads (in PHE IHR countries) in the countries they are working or planning to working in to start sharing plans and aligning efforts	7. Assess LMICs' capacity building needs and discuss with national stakeholders where and how they can provide targeted, short-term support to longer-term capacity building activities already being implemented by national stakeholders 8. Put MOUs in place and set up "hand over" arrangements with national/ regional/international partners who could support this work in the longer term.
	**Recommendation 5** Revise current MEL systems to make sure they are fit for purpose to support learning and adaptation	4. Seek Itad's guidance on how to revise its MEL systems so that they align with its long-term vision and ToC. 5. Maximise reflection opportunities across the triple mandate 6. Review and prioritise action points from various sources as a group on a regular basis to foster both learning and accountability.	Revise MEL systems so that they track progress towards inputs, activities, outputs, intermediate outcomes and long-term outcomes of UK-PHRST engagement, with measurable indicators, baselines, targets and means of verification. The framework should ideally also capture to the extent possible unintended results, UK-PHRST's contribution and what other partners are doing that could potentially also have an impact on the same outcomes.
	**Recommendation 6** Operationalize existing commitments to promoting equity and human rights	Invest time and effort to mainstream equity and human right concerns in all it does going forward. Examples of this would be: i) carrying out analysis of gender or human rights barriers pre-deployment/research work (leveraging the social scientist's skills) and making this part of the pre-deployment briefing pack; ii) including gender-sensitive response to outbreaks as part of UK-PHRST's training curriculum and as a topic of research and capacity building; iii) collecting MEL indicators in a disaggregated fashion whenever possible and relevant; iv) including equity and human right considerations in the prioritisation criteria for deployment and research activities	

Annexes

Annex 1 DHSC Global Health Security Theory of Change



Annex 2 UK-PHRST ToC from ToR

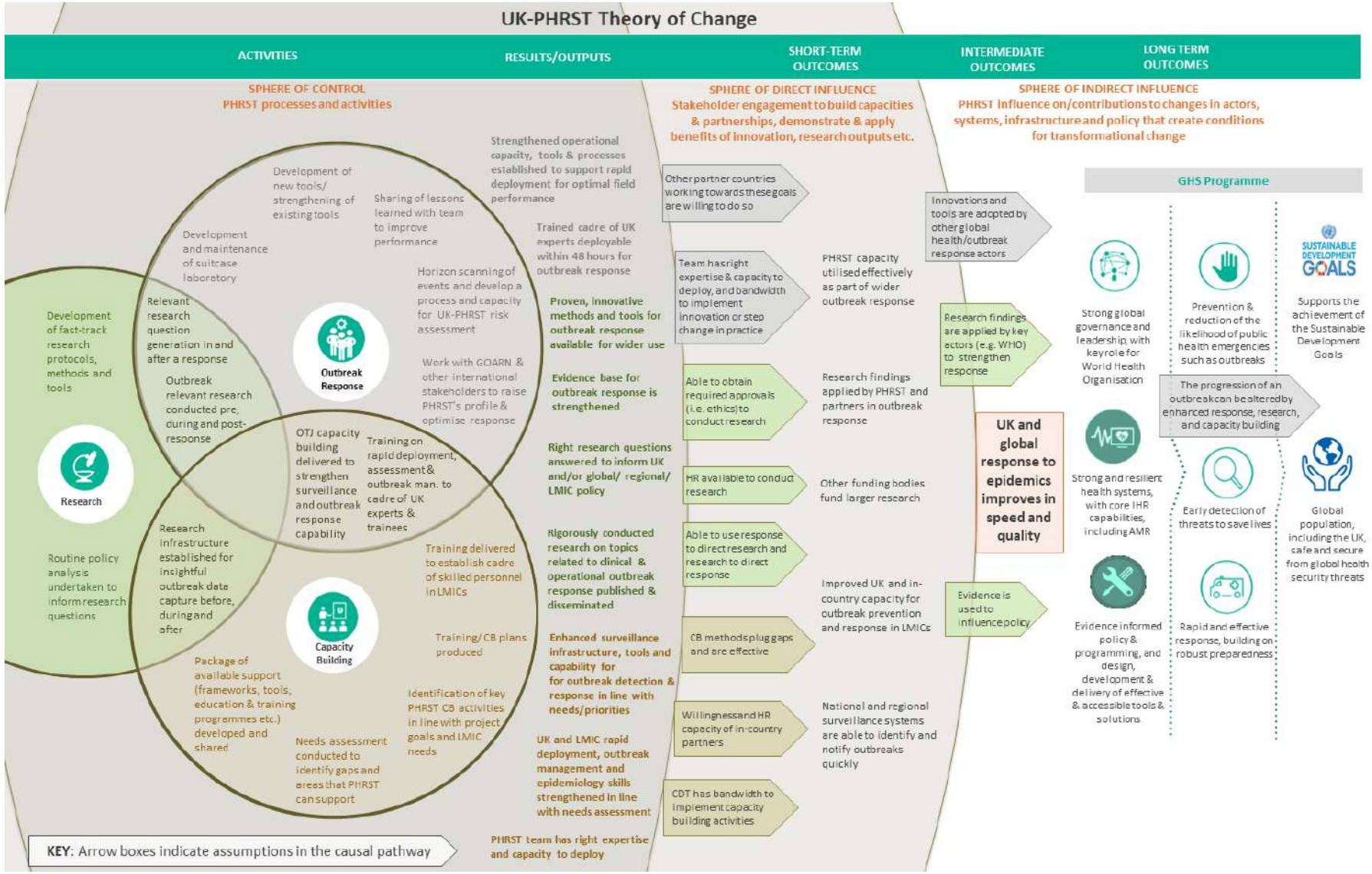


Annex 3 Summary of Stakeholders Interviewed

Category of Key Informant		Total Informants Interviewed	
UK-PHRST UK-Based Stakeholders	UK-PHRST Staff	**21**	**64**
	UK-PHRST Reservists	**6**	
	UK-PHRST Project Board Members	**5**	
	Other UK ODA GHS Programmes	**11**	
	GHS Experts within consortium	**9**	
	UK Research Collaborators	**12**	
Regional/International Stakeholders	Regional partners (WHO, Africa CDC etc.)	**3**	**7**
	International partners (WHO, US CDC etc.)	**4**	
LMIC-based Stakeholders	Sierra Leone	**10**	**29**
	Nigeria	**7**	
	DRC	**4**	
	Madagascar	**5**	
	Ethiopia	**1**	
	Bangladesh	**0**	
	Rwanda	**0**	
	Sudan	**1**	
	Philippines	**1**	
GRAND TOTAL			***100***

Note: Some key informants, especially key UK-PHRST staff, were interviewed more than once

Annex 4 UK-PHRST Evaluation Theory of Change



Terms of Reference

The UK Public Health Rapid Support Team Programme

Performance Evaluation and Independent Monitoring Agent

January 2019

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[74] The UK-PHRST is a joint collaboration between Public Health England and the London School of Hygiene and Tropical Medicine, with academic partners University of Oxford and King's College London.

Contents

Acronyms

AFRO	World Health Organisation Regional Office for Africa
ASC	Academic Steering Committee
CDC	U.S. Centers for Disease Control and Prevention
CDT	Core Deployable Team
DFID	Department for International Development
DHSC	Department of Health and Social Care
EVD	Ebola Virus Disease
FMoH	Federal Ministry of Health
GOARN	Global Outbreak Alert and Response Network
GHS	Global Health Security
HMG	Her Majesty's Government
IATI	International Aid Transparency Initiative
IHR	International Health Regulations
KPI	Key Performance Indicator
LMICs	Low- and Middle-Income Countries
LSHTM	London School of Hygiene & Tropical Medicine
MEL	Monitoring and Evaluation
ODA	Overseas Development Assistance
PHE	Public Health England
SEARO	World Health Organisation Regional Office for South-East Asia
PE&IM	Performance Evaluation and Independent Monitoring
UK-PHRST	United Kingdom Public Health Rapid Support Team
WHO	World Health Organization

1 Introduction

This document sets out Terms of References for a performance evaluation and independent monitoring (PE&IM) to support ongoing independent monitoring of programme delivery for the UK Public Health Rapid Support Team (UK-PHRST), including documentation of lessons learnt, and a mid- and end-point[75] programme evaluation. The document should be read in conjunction with the UK-PHRST Strategic Framework (Annex A), logframe results framework (Annex B), Monitoring, evaluation and learning (MEL) Framework (Annex C), UK-PHRST Intellectual Property Agreement (Annex D), and overarching Global Health Security Programme MEL Strategy (Annex E). Distinction of MEL responsibilities between UK-PHRST and the PE&IM agency are outlined below.

2 Background

A review of the World Health Organisation (WHO) emergency response following the 2013-16 West African Ebola virus disease (EVD) epidemic acknowledged the need for a global rapid response capability that could prevent public health events from escalating by reducing morbidity and mortality and related financial and security consequences.[76] At the 2015 G7 Conference, the UK government announced the UK's commitment to help build the capacities required for countries to prepare for and respond to public health threats to prevent them from becoming global health emergencies. As part of this commitment, the UK created the UK-PHRST, funded by UK Official Development Assistance (ODA) with a 5-year (2016-21) budget of £20 million (i.e. £4 million per year). The programme has a triple mandate to integrate outbreak response, innovative research to generate evidence on best practices for outbreak control, and capacity building for outbreak response in ODA-eligible countries. Working with partners, the UK-PHRST will prevent outbreaks from becoming public health emergencies, reduce mortality and morbidity, and ultimately make the world safer from outbreaks of infectious diseases (Figure 1).

Formally launched in November 2016, the UK-PHRST is a partnership between Public Health England (PHE) and the London School of Hygiene & Tropical Medicine (LSHTM), with contractual arrangements to form an academic consortium with the University of Oxford and King's College London. The UK-PHRST is funded by the Department of Health and Social Care (DHSC). The UK-PHRST is linked to diverse infectious disease monitoring systems, identifying situations where the deployment of specialist expertise can mitigate these threats. When required, the UK-PHRST rapidly deploys on behalf of the UK Government a standing team of multidisciplinary public health professionals and researchers in countries that are eligible for ODA-funded assistance, which generally supports low- and middle-income countries (LMICs).[77] However, the UK-PHRST's remit extends beyond simply responding to outbreaks, in addition seeking to identify and address the underlying causes. The UK-PHRST objectives are to:

- Within ODA-eligible countries, support rapid investigation and response to disease outbreaks at the source, with the aim of stopping a public health threat from becoming a health emergency
- Conduct rigorous research to aid epidemic preparedness and response and improve future response
- Generate an evidence base for best practice in disease outbreak interventions within ODA-eligible countries
- Train a cadre of public health reservists for the UK-PHRST who could be rapidly deployed to respond to disease outbreaks

[75] For the purposes of the PE&IM, the end-point is considered 2021, which is the conclusion of the UK-PHRST's initial five-year funding period. As it is the HMG intention to build long-term capacity for outbreak response, follow-on funding and continuation of the UK-PHRST programme is anticipated, although not guaranteed.

[76] Bausch DG. West Africa 2013 Ebola: From Virus Outbreak to Humanitarian Crisis. *Curr Top Microbiol Immunol.* 2017;411:63-92

[77] Although not completely overlapping, most ODA-eligible countries can also be characterised as LMICs and, for simplicity, will be referred to as such in this document.

- Build capacity in-country for an organised and rapid national response to disease outbreaks and contribute to supporting implementation of International Health Regulations (IHR)

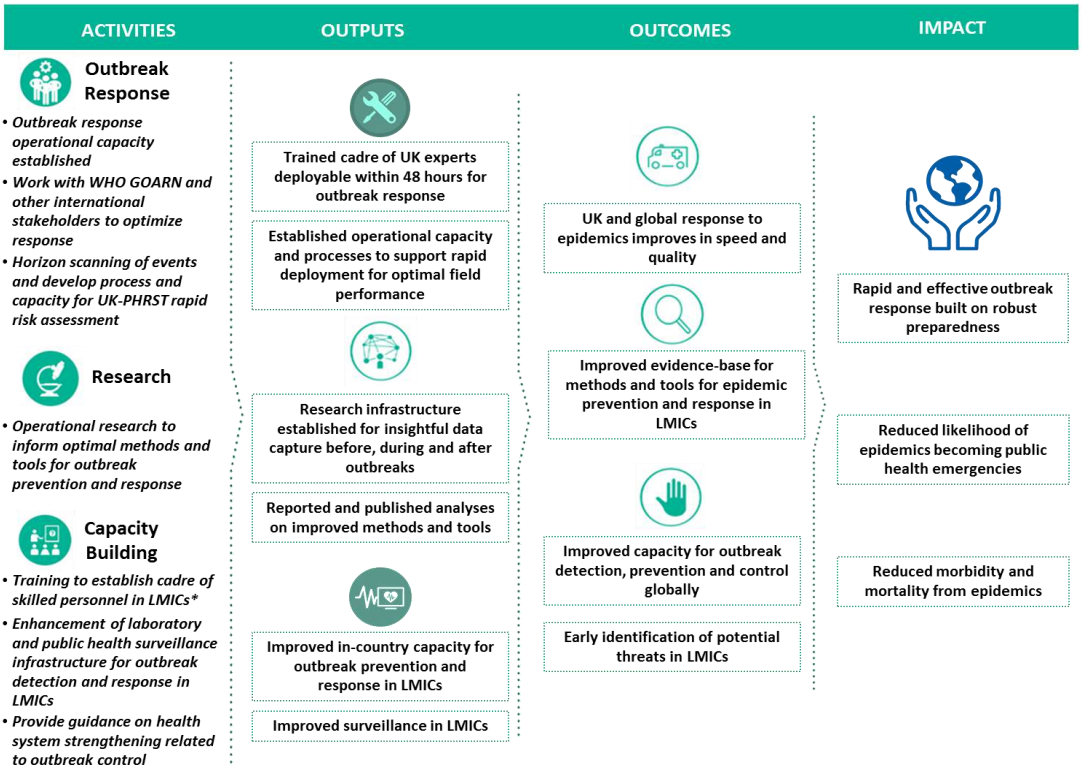


Figure 1: UK-PHRST Theory of Change

The UK-PHRST functions as one key component of the UK's broad programme and commitment to global health, which builds on the commitments set out in 'Health is Global'[78], aligning with the principles set out in the 2015 UK Aid Strategy of tackling global challenges in the national interest[79]. The UK-PHRST will contribute to the UK's global health priorities of strengthening global health security (GHS), including supporting health diplomacy, contributing to global health and development, supporting learning and the evidence base for global action and mitigating the impact of health crises on commerce and prosperity, with all actions underpinned by research and innovation. Key policy principles include strengthening the capacity of global health institutions, such as WHO, and maximising the synergy and effectiveness of UK Aid investments, ensuring that the contribution of the UK to GHS is visible, credible, effective and of high impact. The UK-PHRST supports the Paris Declaration principles for making aid more effective, including respecting partner country leadership (*ownership*), using a country's own institutions and systems and strengthen capacity development (*alignment*), *harmonisation* of donor organisation activities, and *mutual accountability* for development results.[80]

Given the need to rapidly establish the UK-PHRST, interim arrangements were put in place to create a functional administrative framework and core deployable team (CDT) for the first year of the UK-PHRST while a permanent structure was being developed and a permanent director recruited. The interim period ended and the UK-PHRST became operational in April 2017. To

[78] Health is Global: An Outcomes Framework for Global Health 2011-15. HM Government, 2011. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/215656/dh_125671.pdf

[79] UK Aid: Tackling Global Challenges in the National Interest. HM Treasury and Department for International Development, 2015. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478834/ODA_strategy_final_web_0905.pdf

P5

[80] The Paris Declaration on Aid Effectiveness. Organisation for Economic Cooperation and Development (OECD), 2005 https://www.oecd.org/dac/effectiveness/34428351.pdf

P6

date, the UK-PHRST has engaged in eight outbreak responses (in Ethiopia, Nigeria, Sierra Leone, Madagascar, Bangladesh and The Democratic Republic of the Congo), is executing more than 15 research projects, and has contributed to numerous training and capacity building endeavours in Sierra Leone, Uganda, Ethiopia, and elsewhere. Building on this interim activity, the UK-PHRST is now progressing toward increasing field engagement and establishment of the permanent infrastructure for UK-PHRST maintenance and growth.

The UK-PHRST is intended to bring both domestic and international benefits, including:

- Strengthened UK public health capacity and enhanced workforce with greater global awareness, experience and outbreak response capability
- Enhanced career pathways related to combating outbreaks and infectious diseases, with resultant increased experience, technical capacity, and leadership skills of UK personnel, enhancing UK ability to both deploy internationally and at home to future outbreaks and public health emergencies
- Increased resilience within the UK since experts can also be available to respond and support public health incidents nationally when not deployed elsewhere
- Improved preparedness and resilience against potential public health events of international concern in LMICs, also contributing to the strengthening of IHR
- Promotion of British skills, resources and a proactive role in addressing global health challenges, including international training
- Reduction of risk of future economic and health disruption from unrecognised or uncontrolled outbreaks
- Building the UK's resilience to global threats through strengthened international networks that provide advance notice of threats and can elicit an early response

A programme of both internal and external MEL of the UK-PHRST is planned to assess performance, accountability and learning against objectives to achieve optimal UK-PHRST programme delivery. It is also a requirement of all ODA-funded projects.

1. Performance Evaluation and Independent Monitoring Objective

The UK-PHRST requires an external partner to provide a critical and constructive review of programme delivery, recommend improvements, evaluate results and complement the UK-PHRST internal monitoring processes. This should be done in line with the UK-PHRST MEL Framework (Appendix C).

In considering performance, accountability and learning in particular, the PE&IM should:

i. Assess the model of UK-PHRST, which is a novel combination of public health operational activity, research, and capacity building

ii. Examine the extent to which UK-PHRST complements other UK ODA health security programmes (including the PHE Global Health IHR Programme) in partner countries and regions (e.g., AFRO, EMRO and SEARO) and supports coherent national and international health activities on preparedness and response

iii. Determine the extent to which the UK-PHRST functions as a functional partnership and consortium

iv. Assess the outputs and outcomes of UK-PHRST activities, including utilisation, sustainability, and the pathway to impact through the Theory of Change

v. Generate additional evidence and insights

vi. Support the UK-PHRST to inform, facilitate and disseminate learning from MEL

The **purpose** is to ensure that the UK-PHRST is having the intended impact by focusing on quality assurance and accountability and the facilitation of learning and adaptive management in order to improve programme decisions and performance. The PE&IM will ensure independent monitoring and quality assurance of programme delivery, documentation of lessons learnt, and robust tracking of results, providing assessment of the effectiveness of ODA funds.

2. Recipient

The recipients of the PE&IM are UK-PHRST and the DHSC GHS Team.

3. Scope

The PE&IM agency is expected to conduct a mid- and end-point evaluation of the performance and results of the triple mandate of UK-PHRST. The mid-point is expected to be undertaken in the first quarter of 2019/20 financial year (April-June 2019), with a report at the end of this quarter. The end-point evaluation is expected to be completed by March 2021.

The PE&IM agency will need to analyse raw data as part of the evaluation. The UK-PHRST team has set up its own internal monitoring system to ensure that programme data are captured, managed and analysed. Internal monitoring is measured against the UK-PHRST implementation plan. The UK-PHRST logframe (Annex B) describes data sources for project performance and results, and includes assessment of higher-level impact. The UK-PHRST will continue to record progress against the logframe and implementation plan quarterly, and produce annual internal evaluations in April/May (in line with the DHSC annual review). The data available from this monitoring varies as regards completeness, validity and reliability. The PE&IM is not expected to replace the UK-PHRST internal monitoring system but rather will complement and support it. In addition, the PE&IM will provide additional review that
processes are adequate and make recommendations for their strengthening and completeness.

The PE&IM agency will need to construct systems and strong relationships with a broad range of stakeholders, based on mutual respect, to ensure sharing of data and insights regarding the UK-PHRST. In particular, key actor interviews and surveys of health professionals working alongside UK-PHRST for response, receiving UK-PHRST training and working in partner institutions collaborating to develop capacity, are likely to be informative for evaluating the programme and assessing sustainability.

The PE&IM agency is expected to explore the scope for joint evaluation or obtain wider input into the design of the evaluation, for example, from in-country agencies involved in outbreak response or research, during the design phase. Building ownership in the evaluation will contribute to the overall aim of strengthening in-country systems and approaches.

The PE&IM agency is expected to support the dissemination of learning from the evaluations, including at international meetings and conferences.

Division of Responsibilities Between UK-PHRST and the PE&IM agency

UK-PHRST

UK-PHRST is responsible for programme implementation and will conduct its own internal MEL. UK-PHRST will collect data on their implementation activities and lessons learnt, with documentation of contribution of programme activities towards outputs and outcomes. This will be based on quarterly monitoring and annual internal evaluations in April/May, in line with the DHSC annual review.

PE&IM agency

The PE&IM agency is responsible for the mid- and end-point evaluation of UK-PHRST. This includes primary data collection and analysis, as well as review and validation of data and reports collected by UK-PHRST in the course of programme delivery, required for the independent MEL of programme results. The independent PE&IM is to ensure documentation of lessons, robust tracking of results and quality assurance of delivery. Any subcontracting of programme implementation by UK-PHRST should be considered within the evaluation of the UK-PHRST programme implementation, including consortium partners (University of Oxford and King's College London). The PE&IM should collaborate with the DHSC GHS MEL team, which works across GHS programmes.

Evaluation Questions

The UK-PHRST has developed a set of evaluation questions under each objective, to be addressed as part of both the mid- and end-point evaluations. The PE&IM agency should provide an overview of how they propose to answer these questions in the bid, relating to the objectives. The PE&IM agency is invited to refine the proposed questions and to pose additional questions. The final set of questions will be agreed as early as possible during the design phase.

i. Assess the model of UK-PHRST, which is a novel combination of public health operational activity, research, and capacity building:
   - To what extent has the UK-PHRST met its mandate of integrating outbreak response, research and capacity-building functions?
   - What are the advantages, disadvantages and value added of bringing together outbreak response, research and capacity building across the UK-PHRST's mandate?
   - Do short-term deployment demands override research plans?
   - Are research plans sufficiently flexible for research to stay on-course despite deployments?
   - How effective are the governance structures of this model and how could they be strengthened (to include advantages/disadvantages of funding arrangements and associated reporting)?

ii. Examine the extent to which the UK-PHRST complements other UK ODA health security programmes (including the PHE Global Health IHR Programme) in the partner countries and regions (e.g. AFRO, EMRO and SEARO) and supports coherent national and international health activities on preparedness and response:

   - To what extent does UK-PHRST complement or duplicate other UK ODA-funded health programmes in partner countries (including the PHE Global Health IHR Programme)?
   - In what ways has the UK-PHRST augmented, complemented or duplicated pre-existing arrangements for deployment from the UK?
   - How effective is the joint UK-PHRST/DHSC/DFID/HMG engagement with WHO HQ, GOARN and WHO AFRO, and how could this be improved?
   - How effective are UK-PHRST working relationships with GHS programmes from other organisations, and how could they be improved?

iii. Determine the extent to which the UK-PHRST serves as a functional partnership and consortium:

   - What are the advantages and disadvantages of the partnership and consortium approach (PHE, LSHTM, University of Oxford and King's College London)?
   - To what extent does the UK-PHRST work as a complementary and coordinated partnership between PHE and LSHTM?
   - To what extent does the UK-PHRST work as a complementary and coordinated consortium with the University of Oxford and King's College London?

- How effective are the internal communication processes and what are the potential areas for improvement?

iv. Assess the outputs and outcomes of UK-PHRST activities, including utilisation, sustainability and the pathway to impact through the Theory of Change:

- Has the UK-PHRST achieved the intended outputs and outcomes?
- Is the UK-PHRST Theory of Change an appropriate tool and valid as a reflection of the programme's impact?
- Does the evidence for the UK-PHRST outcomes suggest that the programme is having its intended impact?
- What evidence is there that UK-PHRST short-term scoping research projects have led to long-term research collaborations between UK and other partners?
- How have the conceptualisation and design of the programme (Theory of Change and business case/work plan), programme implementation and external contextual factors contributed to programme results or limited delivery of results?
- To what extent have relevant programme outputs been used and contributed added value during the programme?
- To what extent have UK-PHRST activities been sustainable and led to long-term change (for example, evidence may include co-developed plans, and adequacy of workforce and funding)?

v. Generate additional evidence and insights:

- What evidence is available to suggest programme results beyond those that can be ascertained from logframe indicators alone?
- How and how effectively has the UK-PHRST acted as a conduit for wider engagement in national, regional and global health security development activities, including partnerships/collaborative working with national public health institutes (NPHIs), Ministries of Health, and international networks and organizations such as GOARN and WHO?
- To what extent has the UK-PHRST followed the NAO principles of Economy, Efficiency and Effectiveness and demonstrated value for money (see Section 2.4, Appendix C, UK-PHRST Framework for MEL)?
- What is the cost-effectiveness of a readily deployable core team (costs including salaries, training, occupational health and backfilling of reservists), compared to the costs of hiring external consultants?
- What data is available to support evidence of transparency (see Table 1, Appendix C, UK-PHRST Framework for MEL)?
- What is the UK-PHRST impact as regards equality and human rights? (See Section 13, Annex A for more detail on the expectations and how to measure)
- How can MEL data collection by UK-PHRST be improved (this includes more efficient data collection mechanisms, new appropriate indicators for inclusion in MEL, in line with the strategy testing approach)?
- To what extent does the UK-PHRST effectively communicate its activities and impact externally?

The PE&IM agency should complete evaluation reports at mid- and end-point at a minimum, answering all of the agreed evaluation questions. The PE&IM will make recommendations in order to strengthen programme delivery, particularly at the mid-point where there is still scope for programme adaptation. The mid-point evaluation is designed to be learning-focused, to inform programme adaptation for the final phase of the programme.

The evaluation needs to take into account the flexibility of programming due to it offering a rapid response function.

Geographic Focus

The PE&IM agency will need to be able to provide assurances than it can cover the triple mandate of UK-PHRST (response, research, capacity building) and travel to countries where there has been a recent UK-PHRST response (minimum two countries), where collaborative research is being undertaken (minimum two countries), and where there is a focus on capacity development (minimum two countries). The Suppliers will be responsible for their own duty of care and will need to be able to operate independently in these countries. The geographic focus of all UK-PHRST activity is ODA-funded LMICs. To date, the UK-PHRST has responded to outbreaks in Ethiopia, Nigeria, Sierra Leone, Madagascar, Bangladesh and The Democratic Republic of Congo. Though evident in all of these countries, to date focus in capacity building has been in Sierra Leone, Uganda and Ethiopia. More detail on the where UK-PHRST operational research is focused can be found on the website (https://www.lshtm.ac.uk/UKUK-PHRST#research), which is updates regularly. The PE&IM agency should propose which countries they will focus on and provide justification for this decision.

4. Methodology

The PE&IM agency should provide an overview of their proposed methodology in the bid, including how it is appropriate to the objectives. Further detail on appropriate methodologies can be refined and agreed between the UK-PHRST and PE&IM agency as early as possible during the design phase. The proposed PE&IM should include a range of methods including (but not limited to) consideration of the following:

- Appropriate qualitative and quantitative methods to ensure proper triangulation of information and avoid data gaps during analysis and reporting
- Adaptive monitoring, evaluation and learning processes
- Valid methods of data collection, acceptable to an international public health audience, using innovative approaches where necessary
- Direct feedback on the programme from a representative cross-section of stakeholders, including programme beneficiaries, and UK and LMIC organisations
- An analysis of the operating environment and opportunities and challenges this presents
- Involvement of programme implementers and partner agencies in MEL development through a process of consultation and constructive feedback
- Potential for the use of analytical approaches, such as contribution analysis and/or a case study approach (for in-depth evaluation in a sample of countries)
- The use of evaluation criteria that cover relevance, effectiveness, efficiency, impact and sustainability

Experimental approaches are unsuitable to evaluation of this type of programme.

The programme covers different interventions in different country contexts, including where fluency in other languages, or translators, may be required. Appropriate approaches will have to be utilised that allow conclusions to be drawn. The UK-PHRST expects the PE&IM to contact all key stakeholders for interviews, to check information and to fill in any knowledge gaps.

Bidding agencies should clearly outline the methods, data sources, frequency of visits, etc. under each of the objectives (Section 3).

5. Outputs

Design Report and Work Plan (Within First Three Months)

Bids from tenderers should set out initial plans for the design report, to be completed within three months of the contract being signed (the design phase), including:

- Evaluation purpose and approach
- Evaluation questions and framework
- Detailed methodology for data collection and analysis
- Evaluation deliverables and work plan
- Governance
- Assessment of risks and vulnerabilities to the programme and potential mitigation activities
- Project management, including communications plan, progress monitoring, risk management and resource plan
- A costed and time-bound communication and dissemination plan

A consultation will be held with UK-PHRST to finalise the draft design report. The PE&IM agency will conduct meetings/workshops with UK-PHRST and partners to refine the plan during the start-up phase, and throughout the programme lifetime.

Evaluation Deliverables

- A risk matrix identifying the main risks and challenges for the MEL and how these will be mitigated (within the first three months and reviewed on a six-monthly basis)
- A delivery chain risk map that should, where possible, identify all partners involved in the delivery of PE&IM (within the first three months and reviewed on a six-monthly basis)
- Convening of meetings with UK-PHRST and partners, commencing with a start-up meeting to agree an MEL plan; thereafter on the findings of assessments (six-monthly in year one, annual thereafter, aligned to the reporting cycles, including annual reviews in April)
- Review of the UK-PHRST internal MEL products and processes, including the Theory of Change, logframe and monitoring tool, including a set of recommendations for improvements (e.g. new indicators; methods of data collection)
- Annual reports to feed into the annual reporting cycle of the UK-PHRST programme (April 2019, April 2020, April 2021), to include internal monitoring activities against the implementation plan
- Succinct summary papers and recommendations for programme governance and reviews (in line with the meetings convened above and ad hoc requirements)
- Support to the UK-PHRST to disseminate the learning from the evaluations, including at international meetings and conferences
- Mid-point evaluation report (by end of Quarter 2, 2019/20 financial year)
- End-point evaluation report

This is not an exhaustive list. The UK-PHRST welcomes suggestions by bidders on other MEL components that would be useful to ensure the UK-PHRST programme is effectively implemented.

6. Performance Management

This contract will be results-based. An output-based deliverables schedule will be agreed between UK-PHRST and the PE&IM agency based on the delivery of high-quality products and strategies outlined in the Terms of References.

UK-PHRST will manage performance and provide payment to the Supplier based on satisfactory delivery of outputs and key performance indicators (KPIs). Twenty per cent of personnel fee rates for each output will be linked to the delivery of time-bound quality outputs and KPIs. The payment for KPIs will be reduced if the quality is not satisfactory, following standards agreed by the Supplier and UK-PHRST. KPIs will not be allowed to be deferred except under exceptional circumstances specifically agreed with PHE. The contract will use a hybrid approach of payment

and Suppliers should include a proposed hybrid payment mechanism in their bids, clearly linked to the outcomes and deliverables of the programme. This should include proposed KPIs, milestones and an element of input-based payments to be agreed with UK-PHRST. Suppliers should detail their proposed approach and provide supporting narrative. The PE&IM agency will be responsible for managing their own and all subcontractors' performance and tackling poor performances. They will be required to demonstrate strong commitment towards transparency, financial accountability, due diligence of subcontractors and zero tolerance to sexual misconduct, corruption and fraud.

7. Constraints and Dependencies

- The PE&IM agency should have a good contextual understanding of the geographies and UK-PHRST programme components, with a strong practical capability of assessing data and programme quality.
- The PE&IM will need to have good relationships and the capacity to engage with country partners. Suppliers are responsible for their own duty of care.
- There is a risk to the supplier that they will not be able to access the full range of stakeholders as planned.
- Data quality is a challenge as the nature of the UK-PHRST work means that results cannot be obtained by simply accessing reliable, validated datasets. The supplier will need to be competent to collect and analyse a variety of raw and varied primary data sources.

8. Contract Management

UK-PHRST will monitor the PE&IM agency's performance through progress update meetings every six months, during which results will be reported by the Supplier, in addition to formal annual performance reviews. The contract, through PHE, will allow for formal review points after the three-month start-up phase and at the programme mid-point, based on overall performance. Performance will be assessed according to delivery and quality of reports and progress against the work plans, with timely recommendations to feed into adaptive programming. PHE reserves the right to terminate the contract subject to programme performance and this will be set out in the contract. The UK-PHRST Programme Manager at PHE will be the key point of contact with the Supplier, supported by a wider programme team, including the UK-PHRST LSHTM Programme Manager and UK-PHRST Director.

9. Data Ownership

All data and metadata are owned by UK-PHRST. Bidders should ensure that all data are rigorously documented. Data will be shared between PHE and LSHTM and all sub-contractors according to the intellectual property agreement (see appendix).

10. Risks and Challenges

The Supplier will be required to provide a risk register as part of the design report that will be monitored and updated on a six-monthly basis. Risk management should cover external context, delivery, safeguards, operational, fiduciary and reputational risks.

11. Fraud

The Supplier will be required to set out their fraud mitigation strategies, including internal risk management and reporting systems. An annual audit will be required. In advance of any release of funds, Suppliers will be required to produce a delivery chain risk map which should identify all downstream partners (funded and non-funded) involved in the delivery of this evaluation. At a minimum, this should include details of the name of all downstream partners and their functions, funding flows (amount, type) to each delivery partner, high-level risks involved in programme

delivery, mitigating measures and associated controls. The delivery chain map will be reviewed every six months with PHE.

12. Finance

PHE will conduct a due diligence review of the Supplier prior to disbursement of funding. The Supplier will be responsible for conducting due diligence on all subcontractors. The PE&IM agency and any subcontractors will be required to submit a six-monthly financial report to accompany the six-monthly performance reports. These should provide a clear and detailed breakdown of activities against the work plan, fees and expense at HQ and country level.

13. Assets

If the PE&IM agency procures assets, PHE will require a comprehensive asset register. A decision on the assets from PHE, arrived at through an asset disposal plan, will be required at the end of the programme.

14. Skills and Experience

It is essential that the PE&IM agency (with any subcontractors) combine expertise relevant to all outputs in the following areas:

- Strong experience of various quantitative and qualitative PE&IM methodologies and ability to develop and use novel methods when necessary
- Experience in undertaking Monitoring, evaluation and learning of large programmes with multiple components and partners leading to programme adaption
- Experience and operational mobility in the countries/regions of operation and in the aid sector
- Experience of working with national governments/international and regional bodies in LMICs, especially in sub-Saharan Africa and Southeast Asia
- Ability to call on a range of experts as needed to address specific requirements
- Ability to present complex issues in a clear and accessible way
- Ability to incorporate flexibility and innovation into MEL design and approach
- Understanding of political economy, risks, and opportunities for any relevant countries and regions where a case study is proposed, or the ability to access expertise in countries selected during the design phase
- Experience in MEL of operational research
- Economic and value for money analytical skills
- Audit-type skills for analysis of programme management data
- Ability to bring together a wide range of partners for lesson learning and evidence uptake by a range of partners
- Experience evaluating peer-reviewed publishing
- Expertise in data disaggregation and analysis for illustrative and learning purposes
- Facilitation skills to share learning and communicate course correction between stakeholders
- Expertise in public health for at least one team member

If appropriate, UK-PHRST would consider a consortium approach to obtain the necessary skill mix, recognising that the programme combines expertise in broad and diverse realms, including research, MEL, and auditing. The UK-PHRST programme also aims to develop local capacity. The PE&IM bidders should demonstrate use of local capacities and demonstrate how these capacities will be developed.

15. Logistics and Procedures

The Supplier will be responsible for all logistical arrangements for themselves and members of the team. During the start-up phase, the PE&IM will need to elaborate on how it will meet the

requirements in collaboration with UK-PHRST and partners. All relevant expenses should be covered by the contract budget (actuals only).

Suppliers should lay out how they propose to hire both core and contract staff to deliver the overall contract and for how many days a year. The UK-PHRST would expect a full-time staff member working on this for a significant proportion of her or his time to ensure coordination, consistency, timely reporting and to provide a regular point of contact with PHE (including travel to London at short notice). Should any key staff member(s) for delivery of the PE&IM leave the agency, UK-PHRST should be involved in the recruitment process for replacement staff. Other staff should be based in logical locations that will enable and facilitate effective fulfilment of this contract, including based in or travelling to countries where the UK-PHRST programme operates. This may involve a process of negotiation.

The Suppliers will propose learning/sharing opportunities (based on other convened events where possible) with costings.

16. Reporting

The reporting officer is the Director of UK-PHRST. All reports should be copied to the UK-PHRST Deputy Director of Research (based at LSHTM), the PHE Programme Manager and LSHTM Programme Manager. For day-to-day matters, the UK-PHRST PHE Programme Manager should be contacted (unless a delegate is named). The DHSC GHS team will receive the final mid- and end-point reports.

The PE&IM agency will provide six-monthly narrative reports on results assessment accompanied by a financial report, risk matrix and delivery chain-mapping updates. The PE&IM agency will meet UK-PHRST on a six-monthly basis to discuss the reports and completion of deliverables prior to payment. These reports will be shared with UK-PHRST programme partners and regular meetings will be convened at least every six months to discuss results and findings.

The Supplier will provide annual reports to feed into the annual reporting cycle of the UK-PHRST programme. The annual report should be as specific as possible on recommendations for improved programme delivery. The timing of the annual reports will be clearly articulated by UK-PHRST in the PE&IM design phase.

The Supplier will provide a high-quality final report summarising the learning, evidence and clear recommendations resulting from the programme to inform public health preparedness programmes going forward. A high-quality interim version of the report should be available at completion of the UK-PHRST programme. Final payment will be made upon satisfactory agreement of the final report with UK-PHRST, including any independent assessment required.

As set out above, the PE&IM agency will submit financial monitoring bimonthly, with detailed financial reports at least every six months. Where possible, the PE&IM agency will aim to spend 90% of the financial year spend between April-December.

17. Communication

In agreement with the UK-PHRST, documents and findings may be published and shared more widely in order to be made available to a broader public audience. The PE&IM agency should clearly set out its lesson learning and dissemination approach in its communication plan to be agreed in consultation with UK-PHRST. Suppliers are expected to agree this plan with partners at the start-up meeting; this should then be developed into a costed and time-bound communication, evidence and dissemination strategy.

18. Timeframe

The Supplier will be mobilised during the first quarter of 2019/20 (Apr-Jun 2019). A mid-point evaluation should be conducted in Q2 2019/20 (Jul-Sep 2019). The UK-PHRST programme end date is March 2021, with final evaluation to be submitted at this date. More detailed milestones will be submitted in the proposed work plan and agreed after tender.

19. Budget

A maximum budget of £600,000, including any taxes, for the evaluation has been set. This total budget should cover all fees and expenses including travel. Bidders are invited to demonstrate what they could deliver within the allocated budget while maintaining excellent value for money and delivering high quality work. Payments will be made in two stages: the first following production of the mid-point report and the second after production of the final report.

20. Duty of care

The Supplier is responsible for the safety and well-being of their personnel and all third parties affected by their activities under this contract, including appropriate security and safeguarding arrangements. They will also be responsible for the provision of suitable security arrangements for their domestic and business property**.**

21. Transparency

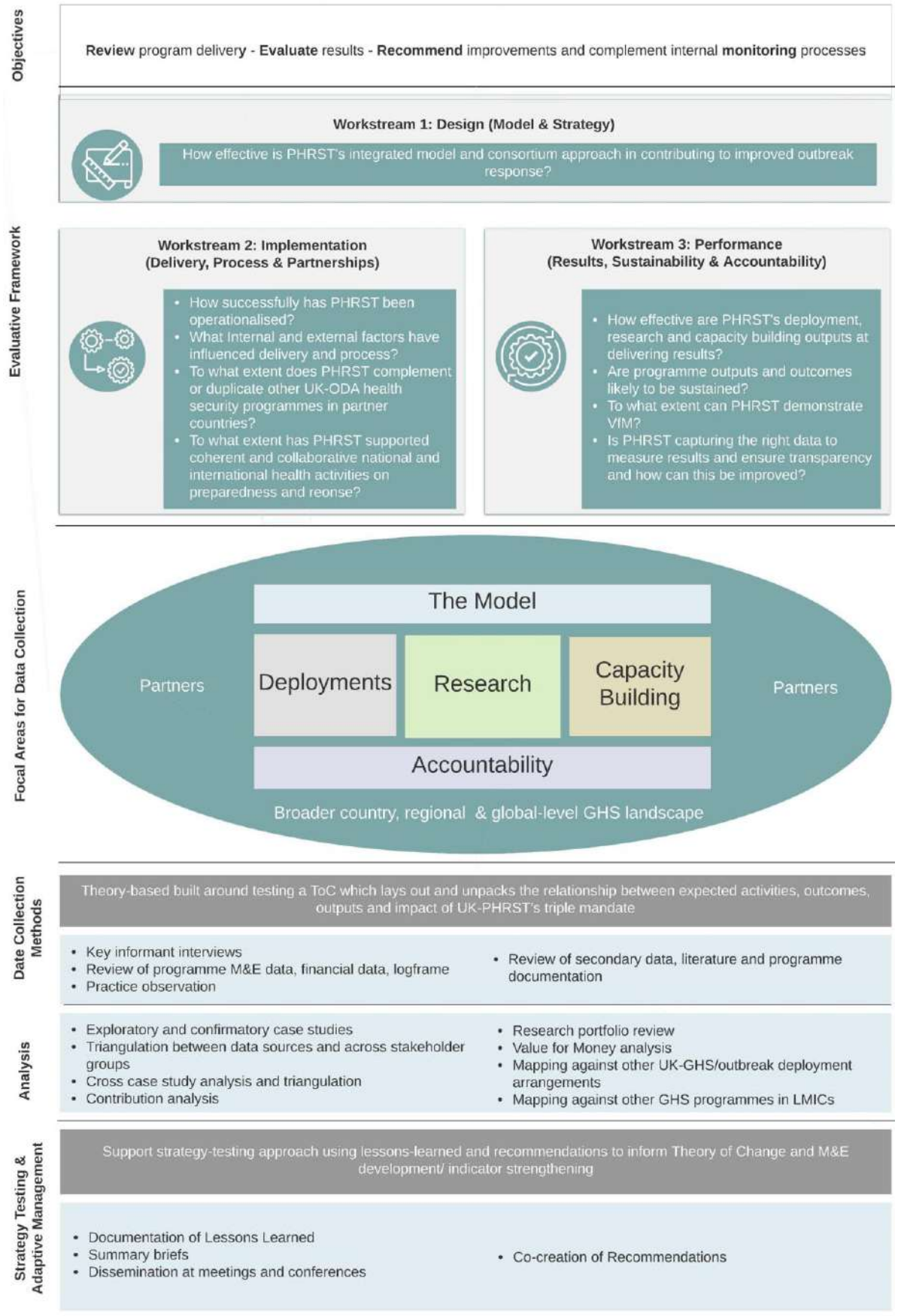
PHE requires Suppliers receiving and managing funds to release open data on how this money is spent in a common, standard, re-usable format, and to require this level of information from immediate subcontractors, sub-agencies and partners. It is a contractual requirement for all Suppliers to comply with this and to ensure that they have the appropriate tools to enable routine financial reporting, publishing of accurate data, and to provide evidence of this to PHE. Further information is available from http://www.aidtransparency.net/

22. Ethical Principles

Proposals and tenders to conduct research or evaluations should include consideration of ethical issues. Treatment of ethics will be included in the assessment of bids. In practice, this will involve:

- Considering whether external ethics approval is needed
- Ensuring that the research will not cause harm to participants
- Ensuring that participation is voluntary
- Ensuring that confidentiality is protected
- Taking account of international and local legislation
- Ensuring that research and evaluation designs respect gender and cultural sensitivities
- Ensuring that data are stored securely and safely
- Ethical and transparent publication of research findings
- Protecting the independence of research and evaluation
- Seeking to ensure participation of marginalised groups.

Annex 6 Overview of Technical Approach



Annex 7 Evaluation Framework

Workstreams	Evaluation questions	Sub-questions	Focus at mid-point and end-point	Indicative criteria for judging performance	Data collection approaches	Analytical approaches
1- Design (Model and Strategy)	EQ 1 How appropriate is UK-PHRST's integrated model and consortium approach in contributing to improved outbreak response?	1.1 To what extent has UK-PHRST met its mandate of integrating outbreak response, research and capacity building functions?	▪ Core focal area for mid-point and end-point	▪ Evidence of integration of the triple mandate components ▪ Evidence of value-added of model by comparison with a counter factual (discussed in KIIs) ▪ Alignment with programme's ToC	▪ KIIs ▪ Document and literature review	▪ Triangulation between data sources and across stakeholder groups ▪ Exploratory and confirmatory case studies
		1.2 What are the advantages/disadvantages/value added of bringing the three functions and institutions together?				
	EQ 2 To what extent are UK UK-PHRST activities relevant, strategic and appropriate in relation to UK-PHRST programme goals?	2.1 Are the processes in place for prioritising/determining activities undertaken appropriate?	▪ This will be explored at mid-point (EQs 2.1 and 2.3) and end-point but conclusions may be limited at mid-point for EQ 2.2 due to programme implementation period being short	▪ Alignment with programme's ToC ▪ Evidence of effective processes for ensuring work is strategic, aligned to ToC/logframe and that process of prioritisation occurs based on this ▪ Alignment with IHR/JEE/other relevant national and international policies	▪ KIIs ▪ Document review	
		2.2 Are activities: a) necessary, and b) sufficient to contribute to programme goals?				
		2.3 What assumptions underpin the intervention logic and have they been upheld?				
		2.4 Are activities aligned to IHR/JEE/other relevant national and international policies?				
2. Implementation (Delivery, Process and Partnerships)	EQ 3 How successfully has UK-PHRST been operationalised?	3.1 To what extent have planned programme activities been implemented and programme outputs achieved? 3.2 Is the human resourcing model appropriate in terms of capacity, expertise and ability to	▪ All EQs will be explored at mid-point and end-point. This area is critical for mid-point as it will provide	▪ Alignment with programme's ToC ▪ Activities are delivered according to plans/ToRs	▪ KIIs ▪ Document review ▪ Practice observation	▪ Triangulation and cross-case study analysis ▪ Exploratory case studies

Workstreams	Evaluation questions	Sub-questions	Focus at mid-point and end-point	Indicative criteria for judging performance	Data collection approaches	Analytical approaches
		effectively deliver across the triple mandate? 3.3 Are research plans sufficiently flexible for research to stay on course despite deployments? 3.4 How appropriate are the governance structures of this model, including funding arrangements and reporting, and how could they be strengthened? 3.5 To what extent does UK-PHRST work as a complementary and coordinated partnership between the consortium partners? 3.6 How effective are internal communication processes within the consortium and how can they be improved? 3.7 To what extent does UK-PHRST effectively externally communicate its activities and impact? 3.8 What internal and external factors have influenced delivery and process?	utilisation focused lessons learned to strengthen delivery and increase efficiency	▪ Partnership functions effectively ▪ Coordination and communication across the programme/partners ▪ Regular, quality joint planning and consultation within UK-PHRST and with other stakeholders is in place ▪ Resources are available to fulfil expected workplans ▪ Evidence of factors influencing delivery and process		▪ Research portfolio review
	EQ 4 To what extent does UK-PHRST complement or duplicate other UK ODA health security programmes in partner countries?	4.1 How effective are the mechanisms in place in the UK and at country level to ensure a coordinated/complementary UK response? 4.2 In what ways has UK-PHRST augmented, complemented or duplicated pre-existing arrangements for *deployment* from the UK and other UK ODA-	▪ 4.1 Will be explored at mid-point and end-point ▪ 4.2 Will be explored at mid-point only	▪ Assessment of UK-PHRST offer in context of other UK ODA GHS programmes ▪ Assessment of coordination mechanisms	▪ KIIs ▪ Document review ▪ Practice observation	▪ Cross-case study analysis and triangulation ▪ Mapping of pre-existing arrangements for deployment/ other UK

Workstreams	Evaluation questions	Sub-questions	Focus at mid-point and end-point	Indicative criteria for judging performance	Data collection approaches	Analytical approaches
		GHS programmes in partner countries?				ODA-GHS programmes
	EQ 5 To what extent has UK-PHRST supported coherent and collaborative national and international health activities on response?	5.1 How effective is UK-PHRST's external engagement with key strategic health actors nationally, regionally and globally? 5.2 How effective is the joint UK-PHRST/DHSC/DFID/HMG engagement with WHO HQ, GOARN and WHO AFRO and how could this be improved? 5.3 How effective are UK-PHRST's working relationships with GHS programmes from other organisations and how could they be improved? 5.4 Does the work of UK-PHRST complement or duplicate similar initiatives from other countries/organisations?	▪ This will be explored at mid-point to enable recommendations to be generated for the next phase of implementation on how external engagement and working relationships can be strengthened but a more in-depth analysis of performance will be possible at end-point based on the longer period of implementation	▪ Effective joint planning and consultation with other stakeholders is in place for UK-PHRST/joint-UK ▪ UK-PHRST awareness of and alignment with preparedness and response landscape: Joint External Evaluation (JEE), IHR systems development, other GHS actors/programmes ▪ Effective communication, coordination and relationship development with other GHS programmes/organisations	▪ KIIs ▪ Document review ▪ Practice observation	▪ Triangulation across stakeholder interviews and cross-case study analysis ▪ Mapping of GHS programmes in countries
3. Performance (Results, Sustainability and Accountability)	**EQ 6** What contribution are UK-PHRST's deployment, research and capacity building outputs making to achieve programme outcomes?	**6.1** To what extent have programme goals (desired outcomes and impact) been achieved? **6.2** How has UK-PHRST contributed to, or is likely to contribute to, these outcomes and intended impact? **6.3** What evidence is available to suggest unintended consequences and results beyond the logframe indicators?	▪ Due to limited available data it will be difficult to answer these EQs at mid-point but they will be fully explored at end-point ▪ At mid-point, we will review monitoring data, make	▪ Activities are on track ▪ Evidence of results for each component at country, regional or global levels are defined, tracked and recorded ▪ Gaps in anticipated results identified	▪ KIIs ▪ Document review ▪ Review of MEL data	▪ Case studies ▪ Contribution analysis

Workstreams	Evaluation questions	Sub-questions	Focus at mid-point and end-point	Indicative criteria for judging performance	Data collection approaches	Analytical approaches
		6.4 What impact have contextual factors had on programme results?	recommendations on the results framework and ToC	▪ Evidence of unintended results/consequences in countries identified ▪ Assess contribution made by UK-PHRST to containing disease outbreaks		
	EQ 7 Are programme outputs and outcomes likely to be sustained?	**7.1** Were appropriate sustainability aspects embedded into the UK-PHRST programme design? **7.2** What evidence is there that UK-PHRST short-term scoping research projects have led to long-term research collaborations between UK and other partners? **7.3** To what extent are the project outcomes likely to continue after the project?	▪ 7.1 and 7.2 will be explored at mid-point and end-point ▪ It won`t be possible to draw strong conclusions for 7.3 until end-point	▪ Programme activities, design and operationalisation promote sustainability ▪ Evidence of exit strategies/transition plans ▪ Country stakeholders report improved capacity in outbreak response related activities/research ▪ Non-UK-PHRST sources of funding are available for research	▪ KIIs ▪ Document review	▪ Triangulation of data sources and across stakeholder KIIs ▪ Research portfolio review
	EQ 8 To what extent has UK-PHRST followed the NAO principles of economy, efficiency and effectiveness and demonstrated VfM?	Economy: **8.1** Have inputs (e.g. staff, consultants, raw materials and capital) of an appropriate quality been purchased at the best possible price? **8.2** What is the relative cost of a readily deployable core team (costs including salaries, training, occupational health and backfilling reservists)	▪ VfM analysis will be undertaken at mid-point and end-point	▪ Prices paid for quality inputs exceed expectations/reference prices ▪ Output targets are met in line with allocated budget and the ratio between programme expenditure and outputs achieved increases over time	▪ KIIs ▪ Document and financial data review ▪ Review of MEL data	▪ VfM analysis ▪ Case study analysis

Workstreams	Evaluation questions	Sub-questions	Focus at mid-point and end-point	Indicative criteria for judging performance	Data collection approaches	Analytical approaches
		compared to the costs of hiring external consultants? Efficiency: **8.3** To what extent did actual spending deviate from the intended spending? **8.4** EQ 3 **Effectiveness:** **8.5** EQ 1 **8.6** EQ 6 Equity: **8.7** What is the UK-PHRST impact as regards equality and human rights? Sustainability: **8.8** EQ 7		▪ Outcome targets are met/exceeded, the ratio between outputs and outcomes achieved increases over time, qualitative assessment suggests that the programme has made a meaningful contribution to outcomes achieved ▪ The benefits of grant/program activities are fairly distributed among those in need ▪ There is strong potential for programmatic gains to be fully sustained over time		
	EQ 9 Is UK-PHRST capturing the right data to measure results and ensure transparency and how can this be improved?	6. **9.1** Is UK-PHRST's current ToC measuring the right things to ensure that programme outcomes are captured? How can it be strengthened? **9.2** What evidence of transparency is available? **9.3** Are suitable MEL systems in place to adequately capture results and how can they be improved?	▪ Logframe and monitoring system will be reviewed at mid-point and end-point and recommendations developed with UK-PHRST	▪ Availability of quality data ▪ Availability of financial information ▪ Availability of programme documentation ▪ Alignment of performance measurement tools (logframe, ToC, programme monitoring) with each other and with programme results/model	▪ Review of logframe, monitoring system ▪ KIIs ▪ Review of financial data	

Annex 8 Documents Reviewed

Documents Received from UK-PHRST

After Action Reviews

- UK-PHRST (2019) *After Action Review meeting for completed deployments*.
- UK-PHRST (2019, 11th June) *After Action Review* (slide set).
- UK-PHRST (2019, 11th June) *After Action Review*.

Annual, ICAI and government reviews

- House of Commons (2016, 19th April), International Development Committee Ebola, Responses to a public health emergency: Government Response to the Committee's Second Report of Session 2015–16. Sixth Special Report of Session 2015–16.
- Independent commission for aid impact (2018, January), The UK aid response to global health threats. A learning review.
- UK Public Health Rapid Support Team Annual Review (2018, 5th November), Global Health Security Programme.
- UK Public Health Rapid Support Team Annual Review 2018-2019 (2019, September), Global Health Security Programme.

Financial Documents and Budgets

- UK-PHRST (n.d.) Value for Money (VfM) and delivery approach.
- UK-PHRST (2018-19) Year End Budget Reconciliation and Forecast, with PHE.
- UK-PHRST (2018-19) (no date) Year End Budget Reconciliation and Forecast, without PHE.
- UK-PHRST (2018-2019) Research Year 3 Supplementary revised budget Sierra Leone and Nigeria.
- UK-PHRST (2019, 8th October) Operational Research Master Sheet.

Monitoring Spreadsheets

- UK-PHRST, Monitoring Spreadsheet (2019, June-September)
- UK-PHRST, Monitoring Spreadsheet (until 2019, 20th May)
- UK-PHRST, Monitoring Spreadsheet (until 2019, March)
- UK-PHRST, Monitoring Spreadsheet (2019, October-December)
- HPMD Operational Risk Registers Quality Review (2018)
- UK-PHRST, Q2 Final Score
- UK-PHRST, Risk Register (2019-2020)

MoUs and Related

- Owo Federal Medical Centre (2019, 28th March) Supplementary Letter of Support.
- Memorandum of Understanding between the Department of Health and Public Health England, Public Health Strategy (PHS) (2017, 26th January)
- Research Contract Between Secretary of State for Health and London School of Hygiene and Tropical Medicine (2016, 23th December).
- Memorandum of Understanding on the ASEAN Power Grid Memorandum of Understanding on the ASEAN Power Grid
- Sponsorship Agreement between The London School of Hygiene and Tropical Medicine and The College of Medicine and Allied Health Sciences (2019, 16th January).
- Bilateral Agreement: Foreign and Commonwealth Office (FCO) and Public Health England (PHE). In-country corporate services support to the UK Public Health Rapid Support Team (RST) (2016, 16th November).

- UK Rapid Response Team (2015) Invitation to Submit Application.
- Ihekweazu, C. (2019, 29th April) Letter of Support, Nigeria Centre for Disease Control, Office of the Director General.

Implementation Plans

- UK-PHRST (2018-2019) Implementation Plan.
- UK-PHRST (2019-2020) Implementation Plan.

Strategy Documents

- UK-PHRST (2017, 6th February) Four-year strategic framework 2018-2021.
- Seale, Anna (2019, 14th October) UK-PHRST Research and Capacity Building Revised Strategy Outline Paper.

Blog posts

- Hornsey, E. (2019, 30th January) Disease Detectives: Responding to the public health challenge of the Rohingya crisis. Retrieved from: https://publichealthengland.exposure.co/disease-detectives-responding-to-the-public-health-challenge-of-the-rohingya-crisis
- Knight, M. (2019, 11th April) Disease Detectives: The role of a field logistician in international disease outbreaks. Retrieved from: https://publichealthmatters.blog.gov.uk/2019/04/11/disease-detectives-the-role-of-a-field-logistician-in-international-disease-outbreaks/
- Le Polain, O. (2019, 8th July) What is it like responding to the ongoing Ebola outbreak in the Democratic Republic of Congo and deploying to emergencies? Retrieved from: https://www.lshtm.ac.uk/newsevents/expert-opinion/what-it-responding-ongoing-ebola-outbreak-democratic-republic-congo-and
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- Squires, N. (2018, September 4th) Global health - what it means and why PHE works globally. Retrieved from: https://publichealthmatters.blog.gov.uk/2018/09/04/global-health-what-it-means-and-why-phe-works-globally/

Deployment-related documents, including end of mission and situation reports

- Deepl (n.d.) Professional Position Description - Clinical Management Officer.
- Drum Cussac (2019, 30th October) Country Travel Advice Report on Bangladesh.
- GOARN (2017, April 7th) Request for Assistance: Acute Watery Diarrhoea Syndrome in Ethiopia.
- Government of Sierra Leone, Ministry of Health and Sanitation, Office of the Chief Medical Officer (2017, August 17th) Request for the Deployment of the United Kingdom Public Health Rapid Support Team.
- Public Health England (2018) Global public health operating framework. Section C: Travelling and overseas operation. How we work overseas.
- RSA, Healix International, Drum Cussac (n.d.) Worldwide medical & security assistance.
- Terms of reference. Strengthening preparedness activities in the DRC and nine at risk countries for EVD outbreak: Angola, Burundi, CAR, Republic of Congo, DRC, Uganda, Rwanda, South Sudan, Tanzania, Zambia. (n.d.).
- UK-PHRST (26 Apr 2018), End of Mission Report – Rohingya Refugee Crisis, Bangladesh

- UK-PHRST (2 Jan 18), End of Mission Report – Increased risk of water-borne disease outbreak post-landslide and flooding events in Sierra Leone.
- UK-PHRST (2 Jan 18), End of Mission Report – Lassa Fever Outbreak in Nigeria
- UK-PHRST (2 Jan 18), End of Mission Report – Plague in Madagascar.
- UK-PHRST (10 Jan 19), End of Mission Report – Support with EVD Preparedness in Rwanda
- UK-PHRST (31 Jan 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (07 Feb 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (12 Feb 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (19 Feb 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (28 Feb 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (04 Mar 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (05 Apr 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (10 May 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (21 May 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (05 Jun 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (01 Jul 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (07 Aug 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (21 Aug 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (28 Aug 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (04 Sep 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (25 Sep 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (02 Oct 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (09 Oct 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (16 Oct 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (18 Oct 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (23 Oct 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (06 Nov 19) Situation Report on EVD in Democratic Republic of The Congo.
- UK-PHRST (2019, October) 'Deployees Handbook'.
- UK-PHRST (n.d.) Cross-government notification form, Outbreak of Ebola virus disease in the Democratic Republic of Congo (DRC).
- UK-PHRST (n.d.) Cross-government notification form, Outbreak of Ebola virus disease (EVD) in the Democratic Republic of Congo (DRC). Request from Rwanda.
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- UK-PHRST (n.d.) UK-PHRST pre-travel Checklist.
- UK-PHRST, DRC Ebola outbreak, Summary of UK-PHRST support 2017-2019.
- WHO (n.d.) Professional Position Description - Case Management.
- WHO (n.d.) Professional Position Description - Clinical Management Officer.
- WHO (n.d.) Professional Position Description - Epidemiologist (subnational).
- WHO (n.d.) Professional Position Description - Information Management.
- WHO (n.d.) Secondment, Strategic Coordinator, Health Information Pillar, Ebola IMS/IMST.

Capacity Building-related documents

- Chereau, F. (2019) Referencing in research writing. Lecture and discussions for MPH students at COMAHS.
- College of Medicine and Allied Health Sciences, University of Sierra Leone (January 2019) Masters in Public Health, Curriculum Review Outcomes.
- COMAHS (n.d.) Training Needs Assessment of Department members.

- London School of Hygiene and Tropical Medicine (2017, June) Bursary Evaluation Form on Course in Essentials of Clinical Trials.
- Nov, I. D. (2015, 19th November) UK Rapid Response Team Information Day, Department of Health.
- Salehian, S. (2018) Mendeley: organise your references.
- UK-PHRST (2015) Department of infectious disease epidemiology, Course Syllabus - Epidemiology and control of communicable diseases.
- UK-PHRST (2018, 11th-15th November) UK-PHRST Field Deployment Course. Final Evaluation Report.
- UK-PHRST (2018, 24th -25th September) Partnering for Outbreak Preparedness and Response. Freetown, Sierra Leone. Meeting Report.
- UK-PHRST (2018, July) BSc capacity building exercise in Sierra Leone.
- UK-PHRST (2018, September-October) Overseas visit report, visit to Sierra Leone to teach at Masters in Public Health.
- UK-PHRST (2019, July) BSc in Medical Laboratory Science Course, Capacity building exercise in Sierra Leone (General Virology Module).
- UK-PHRST (January 2019) Overseas visit report, Visit to Sierra Leone to deliver a curriculum review workshop.
- UK-PHRST (n.d.) 'Microbiology Course Participant Responses'.
- UK-PHRST (n.d.) Bursary Evaluation Form on Short Course on Vaccine epidemiology
- UK-PHRST (n.d.) Capacity Building Plans 2019-2020
- UK-PHRST (n.d.) Capacity Building Workshop Agenda.
- UK-PHRST (n.d.) Mendeley introductory video.
- UK-PHRST, Government of Uganda, Uganda Virus Research Institute (UVRI) and MUI (2019, February) Partnering for Outbreak Preparedness and Response: Research and Capacity Building Collaboration in East Africa. Meeting Report

Research-related Documents

- Ashcroft, J. (2019) Research Project Progress Report. Identification by TaqMan array card system and MinION sequencing of co-circulating pathogens that are clinically indistinguishable from Lassa Fever during seasonal Lassa virus outbreaks in Nigeria: a retrospective study.
- Ashcroft, J. (2019) Short Term Research Project Proposal. Identification by TaqMan array card system and MinION sequencing of co-circulating pathogens that are clinically indistinguishable from Lassa Fever during seasonal Lassa virus outbreaks in Nigeria: a retrospective study.
- Ashcroft, J. W. and Macpherson, C. C. (2019) 'The complex ethical landscape of biobanking', The Lancet Public Health, 4(6), pp. e274–e275. doi: 10.1016/S2468-2667(19)30081-7.
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- Beck, A. (2017) Research project progress report. A mixed methods investigation of the training of Sierra Leonean responders to the Ebola Virus epidemic to provide CBT to fellow health workers suffering from common mental health problems.
- Beck, A. (2019) Research Project Progress Report. What works in response to psychosocial aspects of Ebola? A systematic review to inform collaborative research with Africa CDC in The Democratic Republic of Congo.
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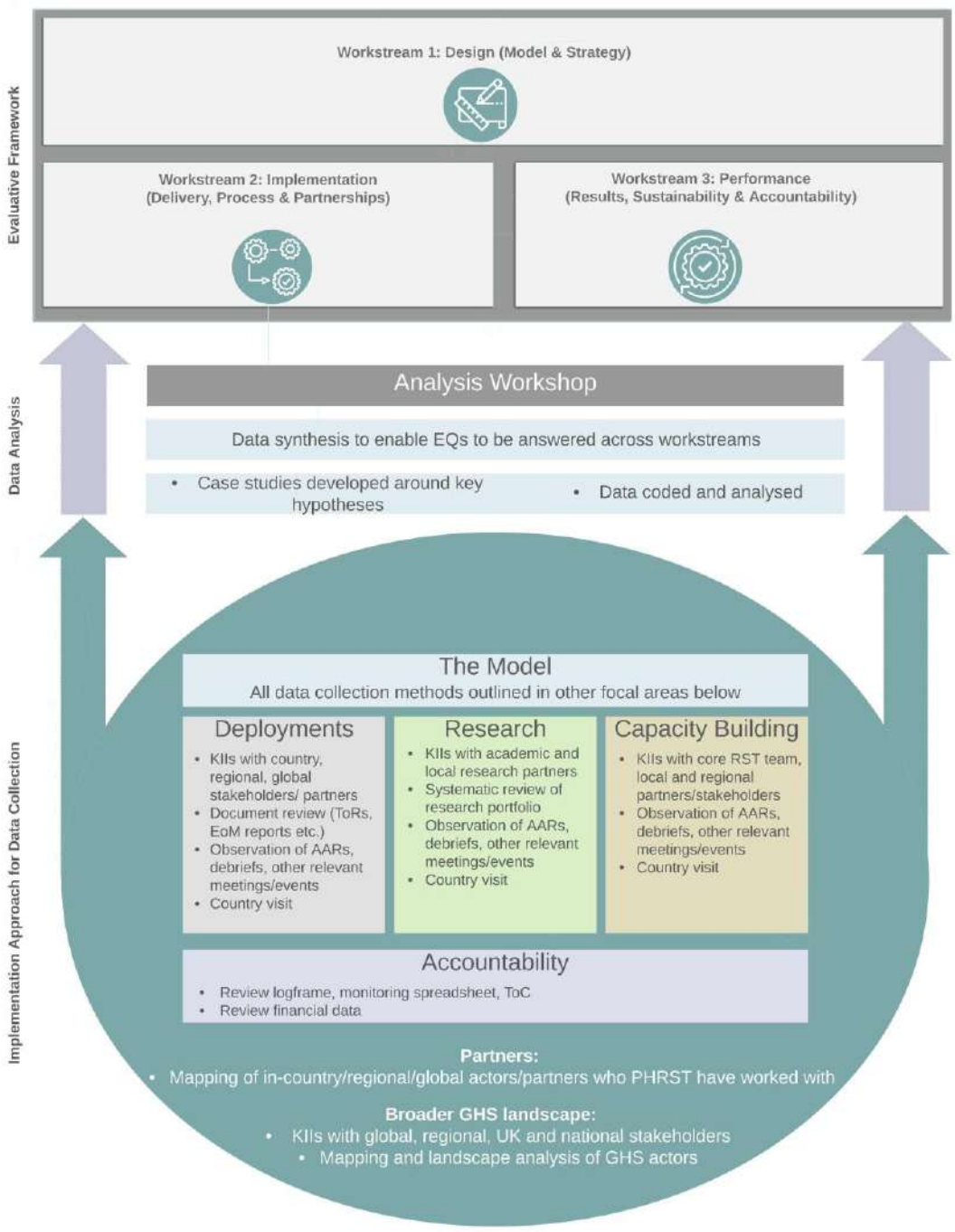
Annex 9 Approach to Data Collection



Annex 10 Value for Money Assessment

VfM Scorecard

VfM component	Scorecard Element	Quality of VfM evidence	Commentary on quality of VfM evidence
VfM processes supporting multiple/all VfM components	1. Relevance and robustness of VfM measures in place	No	
	2. Ability of leadership, management and oversight structures to support implementation	Little	
	3. Strategies and measures adopted to enhance delivery and mitigate risk	Adequate	
Economy	4. Approach to procurement and cost containment	Good	
Efficiency	5. Efficient use of resources and inputs by UK-PHRST interventions	Strong	
Effectiveness	6. Validation of Theory of Change causal pathways		
Equity	7. Equity of programme design and approach		
Sustainability	8. Sustainability of programme activities		
	OVERALL VfM ASSESSMENT	**Adequate**	

Ranking the quality of evidence

Ranking of evidence quality	Definition
No	There is no reference to the VfM criteria
Little	Some reference to the VfM criteria, but evidence is indirect or vague.
Adequate	Concepts appear to be relatively well understood and programmes have made a reasonable effort to include them in programme design and implementation, but the concepts have not been fully articulated or implemented.
Good	The programme appears to have a clear understanding of the VfM concepts, and this is reflected in a detailed approach to ensuring they are included in programme design. In some cases, evidence of follow-through may be weak.
Strong	Used where programmes have clearly understood the VfM concepts, the programme approach to ensuring VfM for the criteria is clearly articulated and there is evidence that the concepts have been mainstreamed and are being implemented and updated (as necessary) throughout programme implementation.

Overall completed scorecard

Scorecard element	Quality of evidence	Commentary on quality of VfM evidence
1. Relevance and robustness of VfM measures in place	Little	Project documents mention the concept of VfM and the 'four Es' framework and discuss how VfM will be addressed. However, there are few VfM indicators in the logframe or Monitoring, evaluation and learning plan.
2. Ability of leadership, management and oversight structures to support implementation	Adequate	Management and reporting systems have struggled to adapt and provide the necessary flexibility to deal with the high-pressure nature of UK-PHRST's work, leading to team frustrations which are further challenged by the disperse locations and regular travel schedule of key staff. HMG financial systems as they stand are not swift or flexible enough for the unique needs of a rapid support team.
3. Strategies and measures adopted to enhance delivery and mitigate risk	Good	There is adequate/good evidence of strategies and measures adopted to enhance delivery and mitigate risk.
4. Approach to procurement and cost containment	Adequate	There have been efforts to ensure that appropriate procurement processes have been implemented to ensure VfM. This has resulted in the procurement of high-quality inputs. There is some concern that PHE/LSHTM systems/processes are not adept at procuring items in partner countries.
5. Efficient use of resources and inputs by UK-PHRST interventions	Good	Appropriate processes are in place to track absorption and measures are being considered to monitor efficiency. Measures to improve flexible programming will support efficiency. To date, despite some underspend, there has been strong performance against output indicators.
6. Validation of Theory of Change causal pathways	Good	A high-level ToC is in place with some evidence to validate the causal pathways for the achievement of outcomes. There is, however, greater uncertainty around capacity building.
7. Equity of programme design and approach	Little	Equity has been considered in the project design although there is little/no evidence that this has been translated into implementation practices where activities are designed to target vulnerable groups and/or overcome identified barriers.
8. Sustainability of programme activities	Adequate	Although there is evidence of the project design incorporating sustainability considerations, related activities have not been explicitly prioritised. There are no sustainability strategies or plans in place.
OVERALL VfM ASSESSMENT	**Adequate – Good**	Overall, there is adequate to good evidence to suggest that appropriate processes are in place to ensure the delivery of VfM, with further attention required in some areas, particularly to put VfM measures in place and ensure equity is addressed.

Evidence and ranking by scorecard component

Scorecard Component 1 - Relevance and robustness of VfM measures in place

Evidence to suggest that processes are in place to ensure future VfM		
Programme documents mention the concept of VfM and the 'four Es' framework and discuss how VfM will be achieved. However, there are few VfM indicators in the logframe or MEL plan. • Economy: (1) Cost savings are tracked and reported regularly. (2) It is unclear if/how programme management costs are tracked and reported at aggregate and intervention level. (3) It is unclear if/how specific cost drivers are identified and analysed. • Efficiency: (1) Budget execution is monitored. (2) It is unclear if the unit costs of activities are analysed in relation to the outputs achieved. • Effectiveness: The MEL system (i.e. the logframe and as reported through the Annual Reviews) monitors the trajectory towards outcomes and impact, although it is unclear how data will be collected against these indicators and how/whether UK-PHRST's contribution to progress can be analysed. The Strategic Framework includes a goal to develop "metrics and systematic methods of evaluation to enable more objective assessment of the effectiveness of outbreak response measures"'. No progress as yet. • Equity: There are no indicators included in the logframe focused specifically on equity, human rights and/or gender.		
Overall assessment of evidence quality	**Little**: Project docs mention the concept of VfM and the 'four Es' framework and discuss how VfM will be addressed. However, there are few VfM indicators in the logframe or MERL plan.	**No** **Little** **Adequate** **Good** **Strong**

Scorecard component 2 - Ability of leadership, management and oversight structures to support implementation

Evidence to suggest that processes are in place to ensure future VfM
• Following some project management issues during the first year of implementation, new reporting templates and financial forecasting processes are in place and the Strategic Framework sets out how the overall programme will be implemented and governed. This has high-level approval and includes roles, responsibilities and lines of accountability, which are understood. • There have been some issues with UK-PHRST's co-management between two principle partners. These issues have been identified and measures implemented to enhance team building and ensure that the UK-PHRST functions as a cohesive unit. • Governance structures are complex but well established to manage risk and promote VfM: • PMT is comprised of PHE and LSHTM staff and meets project implementers/stakeholders weekly (with monthly in-person meetings).

- PMT reports budget absorption, implementation progress and risks fortnightly to the SMT, comprised of lead personnel and administrators from both PHE and LSHTM.
- SMT reports budget absorption, implementation progress and strategically important risks quarterly to UK-PHRST Project Board (chaired by the UK-PHRST Director and comprised of staff from all implementing orgs and UK gov).
- An Academic Steering Group comprised of a group of expert scientists from participating UK-PHRST as well as external UK institutions engages through Project Board to guide research activities.
- The Project Board presents quarterly financial and highlights reports and an annual review report to the GHS Programme Board (chaired by DHSC SRO and comprised of key programme partners, e.g. DHSC, PHE, DFID). GHS Programme Board holds the UK-PHRST Director to account for delivery of the UK-PHRST project.
- The GHS Programme Board reports to the Cross-Government ODA Ministerial Group.
- The Global Health Oversight Group and Chief Medical Officer also provide strategic direction.

- The 2018/19 AR notes “governance with senior level engagement both internally and externally” has been strengthened

Overall assessment of evidence quality	**Adequate**: Management and reporting systems have struggled to adapt and provide the necessary flexibility to deal with the high-pressure nature of UK-PHRST’s work, leading to team frustrations which are further challenged by the disperse locations and regular travel schedule of key staff. HMG financial systems as they stand are not swift or flexible enough for the unique needs of a rapid support team.	**No** **Little** **Adequate** **Good** **Strong**

Scorecard component 3 - Strategies and measures adopted to enhance delivery and mitigate risk

Evidence to suggest that processes are in place to ensure future VfM
• A 'thorough and systematic' risk management structure is in place to ensure that risks identified, assessed and mitigated within acceptable levels. This distinguishes between: Strategic risk (risks to the effective delivery of the UK-PHRST): A risk register is reviewed and updated on a quarterly basis. The GHS Programme Board are kept informed about key risks and mitigation measures and, when risks cannot be resolved at the UK-PHRST level, added to the GHS Programme risk registers as appropriate. Operational risk (risks relating to staff safety and security during deployment): Deployment decisions require approved and a comprehensive health, safety and security orientated risk assessment. This risk assessment is country and outbreak specific and focuses on protecting the health and wellbeing of deployed UK-PHRST staff members. To the extent possible, mitigating measures are adopted in advance of travel and communicated to deploying individuals as part of their induction, training and briefing processes. The risk assessment is approved and signed off by the UK-PHRST Director. • We understand that the Project Director is ultimately responsible for risk management, although the PMT owns the risk, alongside the research leads for individual activities. • Risks are identified through weekly project calls between the PMT and activity leads, with those posing more substantial risk elevated to the SMT. The SMT reports strategically important risks to the UK-PHRST Project Board, which as above reports to the GHS Programme Board . • Our qualitative evidence, including the evidence presented in the 2018/19 AR, suggests that these processes work well to identify and manage risk, with some examples of where new processes have been introduced to effectively mitigate risk. • Separate processes are in place to manage fiduciary and fraud risk.

Overall assessment of evidence quality	**Good**: There is adequate/good evidence of strategies and measures adopted to enhance delivery and mitigate risk.	**No**
		Little
		Adequate
		Good
		Strong

Scorecard component 4 - Approach to procurement and cost containment

Evidence to suggest that processes are in place to ensure future VfM
Implementing partner contracts • PHRST was established through an external, national competitive tender process facilitated by the NIHR Central Commissioning Facility on behalf of DHSC, designed to ensure VfM. More specifically:

- UK academic institutions were invited to tender applications for those "who wish to collaborate with PHE to submit an application for a UK Rapid Response Team".
- An independent selection panel reviewed applications and made recommendations to DHSC in January 2016
- A Joint Proposal between PHE and the chosen academic partner, LSHTM, was signed by the Parliamentary Under-Secretary of State for Public Health in July 2016, providing a basis for the UK-PHRST to proceed.

- PHE and LSHTM contracts are not structured to incentivise cost containment, performance against output or outcome indicators or deliver high-quality services. However, high-quality service providers have been selected.
- Rather, contracts are structured to incentivise high levels of delivery volume, . For instance, there is no flexibility to carry funds over from one year to another. This is a condition of ODA funding and applies to all ODA related delivery.

There is some evidence that this has led to poor use of funding (e.g. purchase of a £300k mobile lab for deployments but only used for research, given GOARN already have these available).

Other

- Procurement of project goods and services is through PHE and LSHTM's "well established, government standard and externally audited procurement policies and procedures that ensure that the delivery of the UK-PHRST will be cost effective and will deliver good VfM". However, our qualitative evidence suggests that PHE/LSHTM systems are not always adept at procuring commodities in project countries.
- HMG-approved costing models are used to ensure backfill for the deployment of personnel away from normal duties.
- All research proposals are reviewed by the ASC and SMT for scientific rigour and feasibility, and by the GHS Delivery team for alignment with overall UK-PHRST objectives and budget.
- All travel costs are incurred against standard civil service and ODA guidelines protocols.

Overall assessment of evidence quality	**Adequate**: There have been efforts to ensure that appropriate procurement processes have implemented to ensure VfM, with evidence that this has resulted in the procurement of high-quality inputs. There been is some concern that PHE/LSHTM systems/dd are not adept at procuring items in partner countries.	**No**
		Little
		Adequate
		Good
		Strong

Scorecard component 5 - Efficient use of resources and inputs by UK-PHRST interventions

Evidence to suggest that processes are in place to ensure future VfM
Processes for tracking absorption/efficiency • SMT meets every two weeks to discuss activities and review finances, including allocation of the non-staffing budgets between different activities. This enables joint reporting of

financial information across the entire UK-PHRST, with the Senior Programme Manager, based at PHE, having overall responsibility to report all financial activity.

- The UK-PHRST Director and Senior Programme Manager take an overview of the financial position across both partners and ensure that a combined finance report covering all items of expenditure is completed on a quarterly basis and submitted to the SMT for their information and action where appropriate.
- PHRST provides quarterly financial reports to GHS Delivery Team, indicating actual spend, any re-profiling of spend and the planned spend for the following period.
- Measures have recently been put in place to balance resource allocation between deployment and research activities to ensure all project objectives can be met, and also to use any surplus funds (including by transferring funds between partners), which is designed to improve absorption. We understand that inability to do this has previously been an issue.

Early reflections of programme efficiency

- Given the need to establish the UK-PHRST quickly, interim arrangements were put in place to create a functional administrative framework and core deployable team for roughly the first year of the UK-PHRST while a long-term framework was being developed and a full-time director recruited. With this in place, even in this first year, 5 deployments were completed and 10 research projects initiated.
- With a longer-term Strategic Framework in place, the project has continued to be highly productive, with strong deployment capacity (including with a Reserve Cadre now in place) and a range (16) of research projects and capacity building activities being implemented.
- Absorption has been low (83%) while virtually all outputs reported in the logframe have been achieved. Areas with substantial underspend include UK-PHRST staff costs, equipment, research, and training & development.
- The model for using a core deployable team to conduct research alongside and around deployment, drawing on FETP Fellows and Reservists to provide additional capacity appears to ensure efficient use of staff time.
- The deployment through GOARN has meant that travel expenses have been covered by WHO creating savings for the UK-PHRST project.

Overall assessment of evidence quality	**Good:** Appropriate processes are in place to track absorption and measures are being considered to monitor efficiency. Measures to improve flexible programming will support efficiency. To date, despite some underspend, there has been strong performance against output indicators.	**No**
		Little
		Adequate
		Good
		Strong

Scorecard component 6 - Validation of Theory of Change causal pathways

Evidence to suggest that processes are in place to ensure future VfM

- The project ToC was defined through extensive stakeholder consultation, with the logframe & MEL system including indicators to measure progress along it.
- The project is designed to facilitate improved preparation for and response to public health threats. Stakeholders widely reflect that UK-PHRST:
    - Deployment activities are in response to an identified need and are evidence based, making a meaningful contribution to response efforts.
    - Research activities are also widely regarded as being likely to support improved preparation and response. The selection of a number of pathogens for specific focus was made to fill research needs and ensure alignment with priorities of other research funders.
    - However, there is some mixed evidence on whether the project activities are sufficiently building capacity to improve country stakeholders' ability to prepare and respond. A coordinated capacity building strategy is currently in development with input from the full UK-PHRST team.
- Project documentation confirms that in some select instances deployment and research activities have made a positive contribution to outcomes (e.g. Sierra Leone, Aug. 2017; Madagascar, Oct. 2017; use of diagnostic patient swabs to sequence human avian influenza following research).
- A 'lessons identified' log is created during each deployment, with the aim of capturing areas relating to the deployment process that the team recognised could be strengthened to improve efficiency/effectiveness.
- As such, overall, we support the view that the programme is operationally effective and on track to achieve its short-, medium-, and long-term objectives, albeit with greater uncertainty around capacity building.

Overall assessment of evidence quality	**Good**: A high-level ToC is in place with some evidence to validate the causal pathways for the achievement of outcomes. There is however greater uncertainty around capacity building.	**No**
		Little
		Adequate
		Good
		Strong

Scorecard component 7 - Equity of programme design and approach

Evidence to suggest that processes are in place to ensure future VfM
• The UK-PHRST is designed to be compliant with the applicable laws of England and Wales related to equality (e.g. Equality Act 2010, Public Sector Equality Duty, 2014 Gender Equality Act, 1998 Human Rights Act). The UK-PHRST 'will not only have due consideration for its moral and legal obligations in relation to equality and human rights, but will seek to be a champion in their promotion'. More specifically: • An awareness of the political complexity surrounding the implementation of human rights will be incorporated in all decision-making processes.

- PHRST will not discriminate or support any discrimination of persons holding a protected characteristic. When there is an objective justification that targeted interventions are required to support the most vulnerable in the course of carrying out UK-PHRST objectives, specific groups may be included or excluded from activities. Any targeted interventions will aim to reduce health inequalities.
- Capacity building and research endeavours will seek to proactively support and develop local mechanisms to reinforce human rights, in co-operation with national staff, making the utmost effort to avoid discrimination; reduce health inequalities related to gender, race or ethnicity; and support marginalised communities and individuals. When possible, epidemiological data collected during outbreaks and research will be disaggregated according to gender to show regard for gender differences in disease incidence and outcomes (including, where possible, social consequences of infection).
- PHRST will take all opportunities to monitor and evaluate the effect of outbreaks of infectious disease as well as its own actions on the equality and human rights of residents of LMICs where it operates. This may include prospective assessment of the impact of an intervention on vulnerable groups.

- However, our review of the project documentation and qualitative data suggest that these considerations are not routinely integrated into project design and decision making. For instance, we have seen no analysis of gender or human rights barriers conducted for deployment/research activities, and our review of the prioritisation criteria for deployment and research activities does not include equality considerations; MEL indicators are not disaggregated; etc.

Overall assessment of evidence quality	**Little**: Equality has been considered in the project design although there is little/no evidence that this has been translated into implementation practices where activities are designed to target vulnerable groups and/or overcome identified barriers.	**No**
		Little
		Adequate
		Good
		Strong

Scorecard component 8 - Sustainability of programme activities

Evidence to suggest that processes are in place to ensure future VfM
The UK-PHRST is designed to ensure that project outcomes can continue to be realised beyond the project in a number of ways: • Deployments: The prevention of outbreaks has a sustainable benefit to country populations. • Research: Where research is put into routine use this has an ongoing and sustainable benefit. • Capacity building: Enhancing the capacity of country stakeholders to manage outbreaks independently and progress towards the overall aim of LMIC self-sufficiency serves to improves sustainability prospects.

The UK-PHRST also seeks to improve prospects for sustainability by:

- Working with other stakeholders and host countries to ensure funding is secured locally.
- Developing strategic partnerships, such as through networks of technical experts, that will be sustained beyond the project funding that can provide ongoing support.
- Our qualitative data collection suggests that while the first two workstreams have been prioritised, capacity building activities have not, which is a critical limitation to future programmatic sustainability. We understand that this is partly a function of capacity building activities being seen as separate from other workstreams, despite there being an intention for integrated working between workstreams.
- A sustainability strategy, including a plan to monitor sustainability actions, would support improved planning to ensure that programme benefits can be sustained in the medium- to long-term, and that responsibilities and funding sources can be transitioned over time in a phased and planned manner.

Overall assessment of evidence quality	**Adequate:** Although there is evidence of the project design incorporating sustainability considerations, related activities have not been explicitly prioritised. There are no sustainability strategies or plans in place.	**No**
		Little
		Adequate
		Good
		Strong

Annex 11 Global Health Security (GHS) Landscape Analysis

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
African coaLition for Epidemic Research, Response and Training (ALERRT)	19 Partner Organisations from 13 countries (9 African and 4 European)	Grant from European and Developing Countries Clinical Trials Partnership (EDCTP); United Kingdom National Institute for Health Research (NIHR)	Regional		Y	Y	1) To establish a clinical research network that can design and rapidly implement ICH-compliant, high quality, large-scale, multi-site clinical studies in preparation for and response to outbreaks in sub-Saharan Africa 2) To establish a laboratory network with the capabilities to provide integrated support to clinical research in preparation for and response to outbreaks in sub-Saharan Africa 3) To develop and implement a scalable, GCP-compliant, robust data management/ICT infrastructure suitable for resource-poor settings in sub-Saharan Africa 4) To establish a 'response framework' that alleviates administrative, regulatory and ethical bottlenecks and ensures ALERRT can act swiftly to initiate research 5) To enhance and maintain the operational research capacity of the ALERRT network by developing and implementing a training and capacity development programme 6) To ensure that the actions of the network are relevant to, accepted and supported by local communities and that the results of the networks' efforts have a sustainable impact on health through improved clinical practice and public health policy 7) To establish ALERRT as a sustainable sub-Saharan Africa network that is linked to international networks and that synergises with, and contributes to, global health-security efforts
African Field Epidemiology Network	AFENET (AFENET operates in 31 African countries) - a network of FELTPs	US CDC, USAID	Regional	Y	Y		The network's goal is to strengthen field epidemiology and public health laboratory capacity to contribute effectively to addressing epidemics and other major public health problems in Africa.
African Network for Influenza Surveillance and Epidemiology (ANISE)	US CDC	US CDC	Regional		Y	Y	Generate and disseminate data on the burden and epidemiology of influenza in Africa; Share and promote use of standardized surveillance methods in the region Coordinate and provide laboratory and epidemiologic support for the

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
							continued surveillance of seasonal influenza and for the detection of pandemic strains
African Volunteer Health Corps (AVoHC)	African Union (AU) and Africa CDC	African Union	Regional	Y	Y		Support regional responses to severe disease outbreaks
CEPI	Global Partnership of different organisations	National governments, BMGF, Wellcome, World Economic Forum	Global	No	Y	Y	To accelerate the development of vaccines against emerging infectious diseases and enable equitable access to these vaccines for affected populations during outbreaks.
Emergency Disaster Relief	JICA (Japan International Cooperation Committee)	JICA	Global	Y			
Emergency Response Programme	Bill and Melinda Gates Foundation (BMGF)	Bill and Melinda Gates Foundation	Global	Y	Y	Y	To reduce suffering and save lives in regions affected by natural disasters, disease outbreaks, and complex emergencies.
Emerging Pandemic Threats 2 Program	USAID	USAID	Global	Y	Y	Y	a) minimize the global impact of existing pandemic influenza threats, particularly from the H5N1 highly pathogenic avian flu; and b) pre-empt the spill over, amplification and spread of future pandemic threats.
Emerging Pandemic Threats Program	USAID	USAID	Global	Y	Y	Y	a) minimize the global impact of existing pandemic influenza threats, particularly from the H5N1 highly pathogenic avian flu; b) pre-empt the spill over, amplification and spread of future pandemic threats.
Epicentre	MSF	Epicentre is mostly (around 80%) funded	Global	Y		Y	To evaluate the health of the population and contribute to defining the priorities for action;

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
		through MSF's public fundraising.					To analyse the contexts of interventions through field epidemiological activities such as population surveys, surveillance, and investigation of epidemics; To support innovation related to prevention, medical care in the field, strategies and medical policy through research projects and clinical trials; To do research and provide field-based evidence to strengthen MSF's advocacy position promoting access to effective and quality care; To train MSF staff, other professionals, actors and decision-makers in the health sector for an effective response in complex situations.
Epidemic Preparedness	PATH	Various foundations, US Government	Global		Y		To identify, develop, and scale up the next wave of affordable, effective health solutions."
Epidemic Response Anthropology Platform (ERAP)	Social Science in Humanitarian Action/IDS/LSHTM	UK ODA	Global			Y	To promote evidence on the social dimensions of epidemics in different contexts and to improve the way this evidence is used in response planning.
Epidemics and Other Health Emergencies	WHO		Regional		Y		To strengthen the capacities of countries and the region in epidemic disease surveillance, prevention, response

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
Field Epidemiology Training Program (FETP)	US CDC	US CDC	Global	Y			Increase our ability to detect and respond to threats. Address the severe worldwide shortage of skilled epidemiologists. Build critical relationships with other countries.
Fleming Fund	UK Department of Health and Social Care	UK ODA	Global		Y	Y	To get data relevant to antimicrobial resistance (AMR) in the hands of decision makers. To support countries generating the data they need to inform policies and practices which will optimise the use of antimicrobial medicines. To fund a range of initiatives in low and middle income countries with the aim of increasing the quantity and quality of data available so we can better understand the scale and scope of AMR.
German Epidemic Preparedness Team (SEEG)	GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit)	German Federal Ministry for Economic Cooperation and Development (BMZ)	Global	Y	Y		In the event of an outbreak of disease with epidemic potential, the partner countries of German development cooperation are better able to prevent the spread of disease at an earlier stage.
Global Approach to Biology in Response to Infectious Epidemics in Low-Income Countries (GABRIEL)	Consortium	Bioaster Microbiology Technology Institute; BIomerieux; CIRI; COMPARE; EVAG; Global Influenza Hospital Surveillance Network; ISARIC; ZIKAPLAN; AMP; BMGF BIOCENTRIC; EU; QIAGEN	Global		Y	Y	To develop the research capacity of local laboratories in infectious disease-sensitive areas in developing countries. The role of these laboratories is to provide epidemiological surveillance, conduct research and improve training.

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
Global Disease Detection Programme (GDD)	US CDC	US CDC	Global	Y	Y	Y	Outbreak Response: Improving the timeliness and reliability of outbreak investigations and responses; Pathogen Discovery: Advancing public health knowledge through innovative research into the epidemiology and biology of emerging infections and through identifying novel threats before they spread; Training: Building capacity and improving the quality of epidemiology and laboratory science through training; Surveillance: Strengthening surveillance systems that are capable of detecting, assessing, and monitoring the occurrence and public health significance of infectious disease threats over time; Networking: Enhancing collaboration through shared resources and partnerships
Global Health Security - Fogarty International Centre	NIH	US Government (US Department of Health and Human Services)	Global		Y	Y	
Global Health Security Program	CDC	US Government	Global	Y	Y		To help partner countries meet their commitments under the IHR "We build on the work already being done in countries to be as efficient and effective as possible. We promote mutual strategies, research, and policies to ensure that our partner countries are well prepared to respond to disease threats, wherever they might begin."
GloPID-R (Global Research Collaboration for Infectious Disease Preparedness)	29 partner organisations from across the globe, including DFID, BMGF, Medical Research Council, and the Wellcome Trust	All partner organisations	Global		Y	Y	Facilitate the exchange of information; Address scientific, legal, ethical and financial challenges; Implement a 'One Health' approach with close cooperation between human and animal health researchers; Establish a strategic agenda for research response; Connect infectious disease research networks; and involve developing countries

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
GOARN	WHO		Global	Y	Y		Combating the international spread of outbreaks; ensuring that appropriate technical assistance reaches affected states rapidly; contributing to long-term epidemic preparedness and capacity building.
IHR Strengthening Programme	PHE	UK ODA funds	Global		Y		Supports the establishment of strong national public health systems to lead and coordinate timely and effective prevention, detection, response and control of public health threats.
Innovative Medicines Initiative (IMI)	EU, EU Pharmaceutical Industry	European Union, European Federation of Pharmaceutical Industries and Associations	Global			Y	Improve the current drug development process Develop diagnostic and treatment biomarkers for diseases clearly linked to clinical relevance and approved by regulators; Reduce the time to reach clinical proof of concept in medicine development Increase the success rate in clinical trials of priority medicines identified by WHO; Develop new therapies for diseases for which there is a high unmet need, such as Alzheimer's disease and limited market incentives, such as antimicrobial resistance; Reduce the failure rate of vaccine candidates in phase III clinical trials through new biomarkers for initial efficacy and safety checks.
INTEGRATED RESPONSE TO PUBLIC HEALTH EMERGENCIES IN NIGERIA (IRPHEN)	US CDC/Pro-Health International	US CDC	National		Y		

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
ISARIC (International Severe Acute Respiratory and Emerging Infection Consortium)	Consortium partners: https://isaric.tghn.org/about/isarics-membership/	Wellcome Trust, UK ODA, Bill & Melinda Gates Foundation	Global			Y	Prevent illness and deaths from infectious diseases outbreaks. Provision of the operational capabilities to conduct clinical research, whenever and wherever needed, is the role that ISARIC aspires to have, by its members and for its members.
Mining big data for early detection of infectious disease threats driven by climate change and other factors	European Commission	European Commission	Global			Y	Strengthening EU preparedness against (re-)emerging infectious diseases threats enabling the digital transformation of health and care while underpinning the European One Health action plan against antimicrobial resistance and contributing to achieving Sustainable Development Goals
MSF Response in Epidemic and Pandemic Emergencies	MSF	MSF (charitable organisation, fundraising)	Global	Y			To react swiftly once an outbreak is identified and ensure that the number of people at risk is quickly reduced.
Outbreak Response	International Rescue Committee	Range of institutional grants	Global	Y	Y		To help people whose lives and livelihoods are shattered by conflict and disaster to survive, recover, and gain control of their future.
Pan-African network for rapid research, response, relief and preparedness for infectious diseases epidemics (PANDORA-ID-Net)	Republic of Congo/UCL/INMI	European and Developing Countries Clinical trials Partnership (EDCTP)	Regional	Y	Y	Y	Rapid response: Support development of robust 'ready to go within 48-72 hours' PANDORA-ID-NET trained outbreak rapid response teams that can appraise, evaluate and conduct public health research in each of the four African regions. Capacity Development: Develop capacity to conduct research, evaluate and appraise (multi-disciplinary, operational, anthropological, social science, basic science, translational clinical, clinical trials, implementation research) Training: Develop younger generation scientists, healthcare workers, laboratory personnel, clinical trialists, ethicists, and social scientists to take leadership of public health research into emerging infections and the One Health portfolio in all African regions

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
							Advocacy: Engage and fully involve politicians, policy makers and global public health agencies at the highest level during all stages of our programme.
PIP (Pandemic Influenza Preparedness)	WHO	Vaccine manufacturers pay an annual partnership contribution to WHO	Global		Y	Y	The sharing of influenza viruses that could cause a pandemic, and access to capacity-development and products such as vaccines.
PREPARE (Platform for European Preparedness Against (Re-)emerging Epidemics)	EU	EU funded: European Commission's FP7 Programme	Global	Y		Y	To build Europe's capacity for rapid clinical research responses to severe ID outbreaks with epidemic potential, specifically by initiating large-scale pan-European clinical research studies.
Prevent Epidemics	Resolve to Save Lives	Bloomberg Philanthropies, the Bill & Melinda Gates Foundation, Chan Zuckerberg Foundation.	Global		Y		Resolve to Save Lives is committed to making the world safer from epidemics.
Regional programme support to pandemic prevention in the ECOWAS region (RPPP)	GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit)	German Federal Ministry for Economic Cooperation and Development (BMZ) and European Union (EU)	Regional	Y	Y		Output A: In the ECOWAS Region, the communication of health risks due to infectious diseases which takes gender and One Health aspects into account has improved. Output B: The communication and coordination between ECOWAS institutions and specialized agencies, NCIs and partners in the field of disease control has been strengthened. Output C: The human resources of the ECOWAS Commission, WAHO, RCSDC and the NCIs in disease control are strengthened. Output D: The digitalized disease outbreak management and surveillance system in Nigeria and Ghana has been enhanced.

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
Ross Fund	DFID and DHSC	UK ODA	Global		Y	Y	Develop, test and deliver a range of new products (including vaccines, drugs and diagnostics) to help combat the world's most serious diseases in developing countries, especially diseases that have epidemic potential, such as Ebola.
SORMAS	HZI (Helmholtz Centre for Infection Research)		Global		Y		Improve infectious disease control and management by applying control measures in a timely manner and to verify disease cases; Ensure availability of validated real time surveillance data which would in turn lower the disease burden through enabled contact tracing while monitoring of potential future cases; Offering easy-to-use, multifunctional mobile health (mHealth) and electronic health (eHealth) applications, which provides real-time data availability and compatibility with standard surveillance systems
Strengthening the National Laboratory System and the emergency preparedness capacity of the DRC.	JICA (Japan International Cooperation Committee)	JICA and partners (bilateral funding)	National		Y	Y	To strengthen the infectious disease control of the country by improving the research and training function of the institute
Support to Pandemic Preparedness in the East African Community (EAC) region	EAC (East African Community) Secretariat and GIZ	German Federal Ministry for Economic Cooperation and Development	Regional		Y		Provision of technical expertise and builds capacity with the overall aim of strengthening EAC in its coordinating and advisory role for the Partner States in pandemic preparedness.
Tackling Deadly Diseases in Africa	DFID	UK ODA	Regional		Y	Y	To save lives and reduce the impact of disease outbreaks on African populations.

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
The Australian Partnership for Preparedness Research on Infectious diseaSe Emergencies (APPRISE)	APPRISE is an Australia-wide network of experts involved in medical, scientific, public health and ethics research from institutions across the nation.	National Health and Medical Research Council (Australia).	National (research)			Y	Establish a sustainable multidisciplinary research team across Australia to perform high-quality and high-impact infectious disease emergency response research – the team should have strong links to national and international networks Develop a research strategy for the emergency response to infectious diseases across clinical, laboratory and public health domains – the strategy should be guided by ongoing consultation with stakeholders; Generate and execute the best evidence for the emergency response through capacity-building and training and effective communication with frontline health workers, policy makers and consumers
The Joint Initiative on Epidemic Preparedness (JIEP)	Wellcome and DFID (joint collaboration)	Wellcome/ UK ODA	Global			Y	To prevent future epidemics and improve the response to ones that are already happening, there needs to be evidence, knowledge and the right tools. The Joint Initiative on Epidemic Preparedness aims to help provide these.
The Mexican Emerging Infectious Disease Clinical Research Network – La Red	Network between The National Institutes of Allergy and Infectious Diseases (NIAID), USA and the Mexican MoH					Y	
UK Public Health Rapid Support Team	PHE and LSHTM	UK ODA	Global	Y	Y	Y	Rapidly investigate and respond to disease outbreaks at the source, with the aim of stopping a public health threat from becoming a health emergency Conduct rigorous research to aid epidemic preparedness and response Generate an evidence base for best practice in disease outbreak interventions within LMICs Train a cadre of public health reservists for the UK-PHRST who could be rapidly deployed to respond to disease outbreaks

Programme name	Lead organisation	Main Funder(s)	Scope	Triple Mandate Coverage			Key Programme Goals/Objectives
				D	CB	R	
							Build overseas capacity for an improved and rapid national response to disease outbreaks and contribute to supporting implementation of International Health Regulations
UK Vaccine Network: Investments in vaccines for diseases that have epidemic potential	UK Vaccine Network, Department of Health and Social Care	UK ODA	Global			Y	Supports the government to identify and shortlist targeted investment opportunities for the most promising vaccines and vaccine technologies that will help combat infectious diseases with epidemic potential, and to address structural issues related to the UK's broader vaccine infrastructure.
UNICEF Health Emergencies Preparedness Initiative (HEPI)	UNICEF		Global		Y	Y	Ensure that countries experiencing health emergencies have access to the supplies/vaccines etc that they need
WHO Health Emergencies Programme	WHO	National governments, GAVI, Bill and Melinda Gates Foundation, European Commission, Development Bank Group	Global	Y	Y		All countries are equipped to prevent and control risks from high-threat infectious hazards All countries assess and address critical gaps in health emergency risk management capacities, including those under the IHR 3) Global surveillance and early warning systems rapidly detect and assess the risk of new public health events 4) Populations affected by health emergencies have access to essential life-saving health services and public health interventions 5) National health emergency programmes are supported by a well-resourced and efficient WHO Health Emergencies Programme

Annex 12 Summary of Strategic Approaches for Deployments, Research and Capacity Building

<table>
<tr><th colspan="3">Deployments (see Annex 13)</th></tr>
<tr><th colspan="3">Summary of strategic approach</th></tr>
<tr><td colspan="3">• Prioritising deployments in the first phase of implementation has paid off as UK-PHRST has established its reputation with key partners for rapid deployment of highly skilled and well-regarded experts.
• UK-PHRST's strategy to deployment can be described as flexible and reactive, driven by requests from GOARN, MoH and UK EMT to deploy.
• RST's rapid in and out approach has evolved into rolling deployments with staff rotation.
• RST has established a multi-disciplinary team and mobile lab capability.</td></tr>
<tr><th colspan="3">Summary of challenges/implications</th></tr>
<tr><td colspan="3">• Full, or large proportion of multi-disciplinary team not deployed together
• Some plugging gaps rather than more strategic level deployments
• Able to contribute more to achieving outcomes through longer-term rotational deployments
• Imbalance in number of requests across different disciplines, with some not deployed
• Mobile laboratory capability used for research purposes but not yet deployed</td></tr>
<tr><th>Outcomes</th><th>Assumptions*</th><th>Summary of findings</th></tr>
<tr><td rowspan="2">Short-term outcome: UK-PHRST capacity utilised effectively as part of wider outbreak response

Intermediate outcome: UK and global response to epidemics improves in speed and quality</td><td>Other partner countries working towards these goals are willing to do so</td><td>To increase willingness of countries to work with UK-PHRST there needs to be a more focused strategy for building relationships in focal countries and with focal partners. There is evidence that this is already under way.</td></tr>
<tr><td>Team has right expertise & capacity to deploy, and bandwidth to implement innovation or step change in practice</td><td>See HR section for more detail.
Skills well-matched with requirements of WHO GOARN with exceptions listed in section 3.2
Bandwidth to implement innovation or step change a challenge – 6-week deployments do not allow bedding in of new tools, processes or systems. Sustained deployments on rotational basis over time do enable this e.g. DRC, but this raises questions about sustainability due to demands on team members and potential delays to other commitments.</td></tr>
</table>

**Intermediate outcome level/direct sphere of influence only, i.e. outputs into outcomes. Not included assumptions underpinning achievement of long-term outcomes outside of direct sphere of influence*

Research (see Annex 14)
Summary of strategic approach
• Perceived to be driven by individual's interests, pre-existing relationships and need to spend budget in first phase. • More recently, feedback suggests that research is becoming more informed by front-line needs, more aligned with other areas of work and more integrated across the triple mandate. • Key strategic questions that UK-PHRST has been grappling with include: how do we contribute beyond more traditional academic-based research programmes? • The revised strategy focuses on two workstreams resulting in a transformed approach with a more explicit integration of the components of the triple mandate to optimise the model and capacity within the teams. • Workstream 1: what is best practice in outbreak response and how do we inform this? [Action research in response; Sharing UK-PHRST experience; Supporting development where needs identified] • Workstream 2: Research in response: How can we facilitate research in outbreaks of infectious diseases to improve response? [Pilot studies in response; pre-positioned protocols for response; collaborative interdisciplinary research] • Study proposals are reviewed by the Academic Steering Group. In the first phase of UK-PHRST, with pressure to spend funds, the majority of proposals submitted were approved.

Implications/challenges:		
• Limited opportunities to undertake research during an outbreak • No contemporaneous interdisciplinary studies using the breadth of expertise of the team have been undertaken either in or out of response • Developing an implementation plan for new strategic approach will help ensure research contributes beyond more traditional academic-based research programmes • Need to improve process for determining which research proposals should be funded now there is more pressure on funds – TSC currently being reviewed		
Outcomes	**Assumptions**	**Summary of findings**
Short-term outcome: Research findings applied by UK-PHRST and partners in outbreak response	Able to obtain required approvals (i.e. ethics) to conduct research	Overall UK-PHRST has been successful at obtaining approvals but has experienced delays.
	HR available to conduct research	The pressure of ongoing deployments has made it challenging for some team members to deliver research.
Intermediate outcome: UK and global response to epidemics improves in speed and quality	Able to use response to direct research and research to direct response	There are examples from Sierra Leone, Madagascar, Sudan but not to the extent anticipated due to a range of factors including: difficult to undertake research during outbreak especially when working as part of WHO response, communication between UK-PHRST members across specialities not as strong as they could be so opportunities missed, more trusted relationships at country level with MoH and partners required.

Capacity building (See Annex 15)

Summary of strategic approach

- From a strategic perspective, capacity building has not received the same level of attention as the other parts of the triple mandate, resulting in a lack of clarity around UK-PHRST's approach, their aspirations and offer, priorities or indeed in a collective understanding of key terminology.
- Some of UK-PHRST's activities are legacy projects and do not align with the ToC/results framework, for example, supporting the MPH library in Sierra Leone.
- Key strategic questions that UK-PHRST has been grappling with include: How can UK-PHRST add value beyond support for traditional education and training activities? How can response better support capacity building?

Implications/challenges:

- While a lot of good work has been undertaken in this area overall, the variety and scope of activities reflect a primarily opportunist and reactive approach to different needs.
- This presents challenges in terms of coherence of understanding and activities, sustainability, the measurement of impact and the degree to which activities and their outcomes meet UK-PHRST's strategic objectives and support the needs of in-country partners to develop response capacity.
- A clearer offer for CB will help facilitate discussions with partners to better integrate this into other activities.
- Pursuing opportunities with partners to build capacity in new tools and systems in preparation for an outbreak is seen to be critical if outcomes are to be sustained (e.g. new data analytics developed in DRC).

Outcomes	Assumptions	Summary of findings
	CB methods plug gaps and are effective	Difficult to assess because clear approach not articulated or measured routinely. Some positive feedback from stakeholders in this area e.g. contributions to the BSE and MPH programmes in Sierra Leone.
Short-term outcome: Improved UK and in-country capacity for outbreak prevention and response in LMICs **Intermediate outcome**: UK and global response to epidemics improves in speed and quality	Willingness and HR capacity of in-country partners	In-country stakeholders were willing to take part in capacity building activities, but there was some evidence to indicate that time/capacity for this outside of their normal activities was limited within HR-constrained institutions or within the context of an outbreak. The capacity building activity perceived as most successful and sustainable, the MPH programme in Sierra Leone, was limited by the number of scholarships available and the limited financial capacity of students to enrol without financial support.
	CDT has bandwidth to implement capacity building activities	Although this is often implicit in deployment activities, it is not part of the ToR on a WHO mission, which means limited bandwidth to build capacity. It is felt that there have been missed opportunities to build capability – especially to develop capacity of African/country partners.

Annex 13 Outbreak Response/Deployment review

Deployments Review		
High-level finding	UK-PHRST has prioritised deployments in the first phase of implementation ensuring that key relationships and systems/processes are in place to enable rapid deployment by suitably skilled specialists. Deployments are seen to be highly effective with positive feedback from stakeholders. Deployments have typically been longer than originally anticipated with some members of the team deployed for many weeks over the last two years. This has resulted in highly valuable outputs but raises questions about the sustainability of the resourcing model. Stronger integration of research and capacity building is required to translate outputs into outcomes.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

What has UK-PHRST delivered in this area?

UK-PHRST has been extremely effective, building up a team of experts, supported by a comprehensive training programme for deployment, who have been deployed rapidly, multiple times across a range of contexts. The UK-PHRST's core team is capable of being deployed within 48 hours of a request being approved and includes the following domains of expertise for deployment: microbiology; epidemiology; infection prevention and control; clinical case management social science; data science and logistics. The team have deployed to eight countries and the range of outbreaks has included Ebola, Lassa fever, diphtheria, acute watery diarrhoea, meningitis, pneumonic and bubonic plague, cholera and typhoid. Deployments have included preparedness and response. Most of the deployments were through GOARN (6), with the remainder being bilateral (4) and through UK EMT (1). GOARN is coordinated by the WHO, and GOARN deployments support outbreak response activities led by the WHO, a UN agency. As the UK is a member of the UN, UK-PHRST deployments through GOARN are part of the UK response. UK-PHRST is willing to deploy to the subnational level and to less secure environments, where help is often needed most, but where other international players, such as the CDC do not deploy.

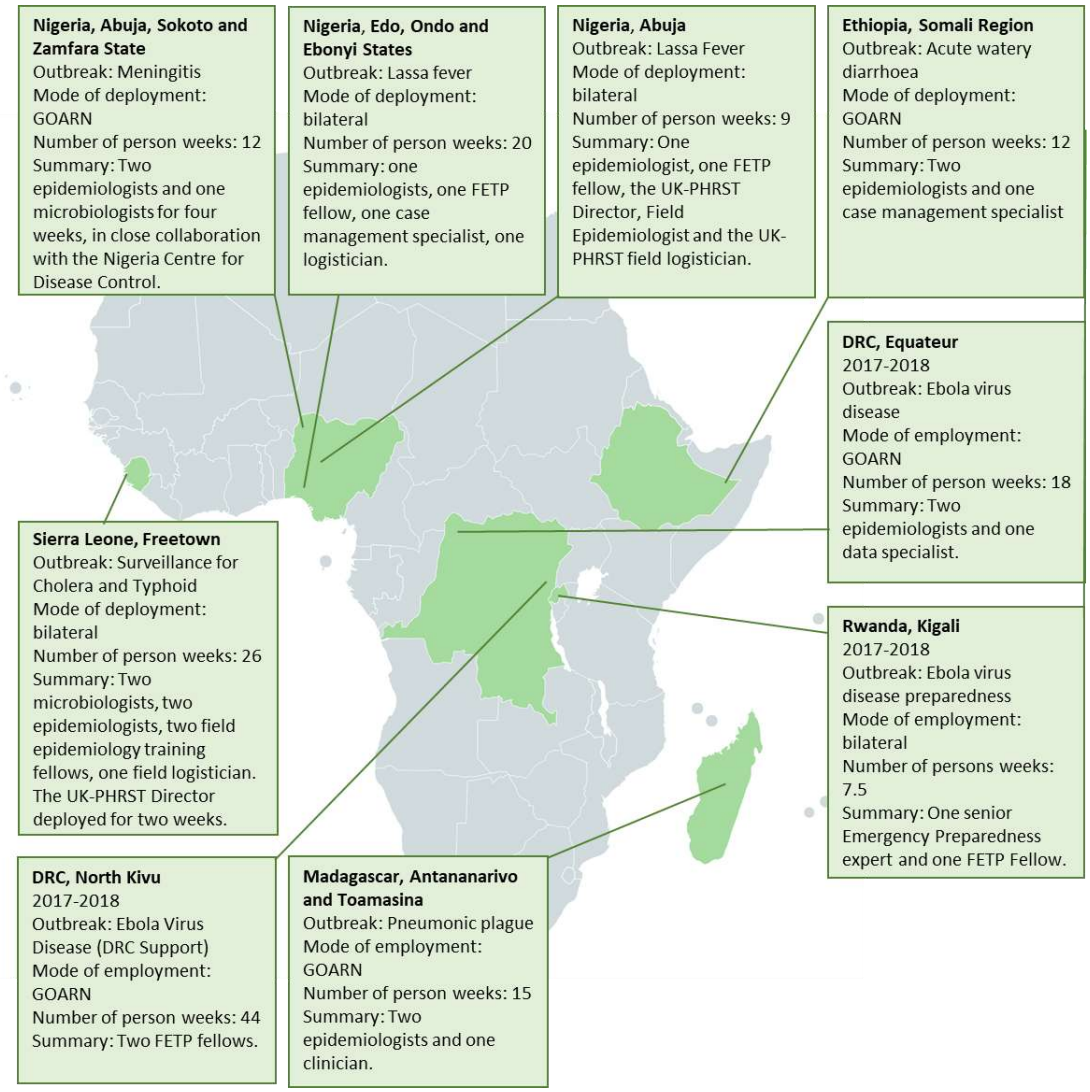
The team deploy for 6 weeks at a time and work on a rotational basis as needed. The shortest length of deployment was 9 person-weeks (Bangladesh diphtheria [UK EMT] and Nigeria Lassa fever [Bilateral with Nigeria CDC]) and the longest is 135+ weeks (DRC) (still ongoing), with the average length being 17 person-weeks. Most deployments involved 4 or fewer UK-PHRST members, with only two involving more (Sierra Leone [7], DRC [17]). The most frequently deployed CDT members are the epidemiologists and data scientists.

How did this work in practice?

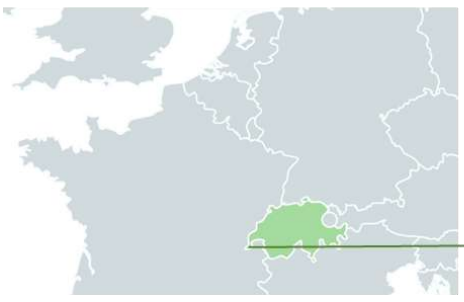
The work of UK-PHRST during deployments is seen to be outstanding and UK-PHRST has built a reputation with key actors as reliable, rapidly deployable and highly skilled. UK-PHRST is viewed as providing appropriately skilled experts who work in a coordinated and effective way with others. Certain members of the team have built such a strong reputation that they have been requested by name multiple times and in strategic roles.

> *"I get feedback from [senior people at WHO, GOARN] saying that the quality and abilities of the RST as a response organisation and ability to understand politics and epidemiology has been outstanding and in DRC is showing itself to be really valuable"* (HMG GHS Stakeholder)

It was also acknowledged that their systems and processes for briefing and preparing teams before deployment are exceptional, and that there are other teams (internally and externally) who would benefit from having access to this.


Nigeria, Abuja, Sokoto and Zamfara State
Outbreak: Meningitis
Mode of deployment: GOARN
Number of person weeks: 12
Summary: Two epidemiologists and one microbiologists for four weeks, in close collaboration with the Nigeria Centre for Disease Control.
Nigeria, Edo, Ondo and Ebonyi States
Outbreak: Lassa fever
Mode of deployment: bilateral
Number of person weeks: 20
Summary: one epidemiologists, one FETP fellow, one case management specialist, one logistician.
Nigeria, Abuja
Outbreak: Lassa Fever
Mode of deployment: bilateral
Number of person weeks: 9
Summary: One epidemiologist, one FETP fellow, the UK-PHRST Director, Field Epidemiologist and the UK-PHRST field logistician.
Ethiopia, Somali Region
Outbreak: Acute watery diarrhoea
Mode of deployment: GOARN
Number of person weeks: 12
Summary: Two epidemiologists and one case management specialist
DRC, Equateur
2017-2018
Outbreak: Ebola virus disease
Mode of employment: GOARN
Number of person weeks: 18
Summary: Two epidemiologists and one data specialist.
Sierra Leone, Freetown
Outbreak: Surveillance for Cholera and Typhoid
Mode of deployment: bilateral
Number of person weeks: 26
Summary: Two microbiologists, two epidemiologists, two field epidemiology training fellows, one field logistician. The UK-PHRST Director deployed for two weeks.
Rwanda, Kigali
2017-2018
Outbreak: Ebola virus disease preparedness
Mode of employment: bilateral
Number of persons weeks: 7.5
Summary: One senior Emergency Preparedness expert and one FETP Fellow.
DRC, North Kivu
2017-2018
Outbreak: Ebola Virus Disease (DRC Support)
Mode of employment: GOARN
Number of person weeks: 44
Summary: Two FETP fellows.
Madagascar, Antananarivo and Toamasina
Outbreak: Pneumonic plague
Mode of employment: GOARN
Number of person weeks: 15
Summary: Two epidemiologists and one clinician.


Cox's Bazar, Bangladesh
Outbreak: Diphtheria
Mode of deployment: UK-EMT
Number of person weeks: 9
Summary: One field epidemiologist, one Infection, Prevention and Control Nurse and one Filed Epidemiology Training Fellow
Outbreak: Surveillance for multiple diseases
Mode of deployment: GOARN
Number of person weeks: 18
Summary: Two epidemiologists and one Infection, Prevention and Control Nurse.


Geneva, Switzerland (WHO HQ)
Outbreak: Ebola virus disease (DRC support)
Mode of deployment: GOARN
Number of person weeks: 10
Summary: Two FETP fellows.

UK-PHRST is able to mobilise rapidly in comparison with other actors with an average of 8 days from the date of agreement to deploy to the date the deployment started.[81] For the deployments to Bangladesh (diphtheria) and Madagascar (pneumonic and bubonic plague), the team was on the ground within 24 hours of agreement to deploy. This demonstrates that the systems and processes are in place to enable rapid deployment. The primary cause of delay was obtaining visas.

The inputs provided by UK-PHRST are seen to be tailored and specialised and involve developing, testing and/or applying innovative or cutting-edge tools. There are many examples from across the deployments of UK-PHRST's tailored and specialist inputs with implementation of cutting-edge techniques and tools in the field resulting in adapted guidance and existing practice. For example, in Sierra Leone, in response to the mudslide and risk of cholera, the team provided specialist inputs on water-borne pathogens, strengthening of Early Warning and Response and set-up of an enteric pathogens laboratory. During the outbreak they introduced more advanced laboratory diagnostic tools and this was further supported by a research study on effective diagnostics and laboratory outbreak capability for gastrointestinal pathogens (including validation of the Film Array and Biofile). The work of UK-PHRST through the analytic cell in DRC has resulted in some cutting-edge data analytic tools (see case study).

There are many examples of integration of research and outbreak response activities, although most research activities have not taken place during an active deployment. In Madagascar, UK-PHRST rapidly strengthened surveillance, data systems and case management through a multidisciplinary deployment team. A priority and strategic research need was identified resulting in a research study implemented during the outbreak response period, which influenced treatment protocols and delivered external funding for a large trial. In general, UK-PHRST has utilised the capacity available within the team to conduct research outside of deployment that can strengthen outbreak surveillance and response, such as bio-banked sample sequencing in Cambodia and the example above from Sierra Leone. See Annex 13 for more details.

There is evidence of transfer of knowledge and an increase in operational and surge capacity as a result of deployments but embedding more sustained outbreak response capability is more challenging. Ensuring sufficient bandwidth to engage in the acute operational needs of emergencies, while still retaining the capacity to conduct research and capacity building in response to the needs of the outbreak, is a challenge. The short-term nature of deployments and the demands of immediate response activities limits time available to embed skills and learning. Furthermore, when deployed through GOARN, capacity building activities are generally not included as part of the ToRs. See Annex 15 (Capacity Building Portfolio Review).

What were the challenges?

Sustained involvement in an outbreak places considerable demands on human resources, particularly those with research or commitments within their institutions to deliver, like teaching, grant generation, etc., and could threaten sustainability of the model. Burn-out was raised as an issue as well as the pressure placed on individuals trying to juggle competing demands. There was also concern that a heavy deployment burden could impact progress of other activities.

There is an imbalance in the number of requests for different disciplines across the team. This has created tension within the team and raises questions about whether the team composition is appropriate. Building the profile of the team and continuing to raise awareness among partners of the range of specialisms available to deploy is seen as critical.

How aligned was the UK-PHRST contribution to UK-PHRST's vision/model/goals?

[81] This includes available data from 8 deployments including Ethiopia, Nigeria (multiple), Sierra Leone, Bangladesh (multiple) and Madagascar.

UK-PHRST has the skills, systems and processes in place to deploy as intended, but the way it has been deployed has not always aligned with the original model. This relates to the modality of deployment, length of deployment, activities during deployment and utilisation of resources when deployed.

Deploying through GOARN and less bilaterally influences the autonomy of RST's mandate and team approach. Being deployed through GOARN as part of a broader WHO response has resulted in less opportunity for multidisciplinary deployments, drawing upon a bigger team and working strategically as part of a UK response. There are also concerns that UK-PHRST 'plugs gaps' as part of a WHO response rather than fully utilising the depth of speciality and experience of its team. There is also less demand for certain disciplines like logisticians, microbiologists and social scientists from GOARN which has implications for the team, if most deployments continue to be through GOARN. Most critically, it is felt that deploying through GOARN limits opportunities to undertake capacity building or to pursue research needs.

> *"Being strategic relies on relationships with UK government departments – I am not sure we have an option – if what we end up doing is simply being an extra pair of hands of people with specialist skills – then we won't have been successful. It is fundamental to the thinking behind RST that we are going out and responding, but what we are fundamentally about is in doing that response we are generating new evidence and research and enabling countries themselves to respond. It is really important that we don't end up where we are just offering extra pairs of hands to be managed by GOARN and WHO and their response…".*(HMG GHS Stakeholder)

Sustained involvement in outbreaks has contributed to programme goals, but is at odds with the original rapid 'quick in and out' model. Sustained presence in DRC for more than a year has enabled the team to build trust and established relationships, as well as embedding cutting-edge innovations. It has, however, raised concerns about the sustainability of the human resourcing model and feasibility of achieving the programme goals with less sustained input at country level.

> *"When the RST was set up it was seen as a rapid response no longer than 6 weeks and we have had people in DRC for over 135 weeks because we've had 17 staff who are racking up the weeks deployed – which is not what was envisaged – this is not entirely inappropriate but there are some questions we need to think about…".*(HMG GHS Stakeholder)

UK-PHRST has invested in a mobile laboratory, which has not yet been deployed in an outbreak. This mobile (suitcase) laboratory has been deployed in part to support research studies but has not been deployed through GOARN, who typically deploy Euro Mobile Labs. In a bilateral deployment, this laboratory would be a valuable asset and is therefore considered to be important equipment for UK-PHRST to have at their disposal. Importing the laboratory requires specialist logistical support. UK-PHRST has only recently contracted a supplier to provide this expertise. Work is under way to raise awareness that UK-PHRST has this equipment to deploy, including UK-PHRST participation in a working group on developing standards for mobile laboratories with GOARN and engaging with Africa CDC, who plan to establish a mobile laboratory for Africa.

What is there to be learnt and what are the implications moving forward?

Arriving quickly after the recognition of an outbreak was seen to be beneficial in terms of achieving UK-PHRST's objectives. This both enabled activities to commence rapidly but also for UK-PHRST to play a more strategic role and access critical information early on to enable better targeted activities. In a bilateral deployment, inclusion of research staff from the outset was recommended to identify research needs and set up protocols.

Developing a framework for characterising different types of outbreak response deployments would help establish the objectives for each deployment. It was acknowledged that the scope, scale, context and complexity of deployments differ considerably and that what can be achieved in one type of deployment may not be possible in another. Developing a framework for analysis considering factors such as c*ontext* (capability that already exists, range of partners), *type of outbreak, political and social context, modality of deployment, human resources required, potential for integrating research and capacity building* would help to identify clearer objectives and a more strategic approach – especially in relation to potential for integration of research and CB and building relationships with partners to support sustainability.

There is a need to strengthen information flow between other HMG actors, such as DFID, and UK-PHRST during deployments. A lack of clarity around how other HMG partners on the ground should engage with, and/or utilise RST's expertise, during a response was reported. **UK-PHRST** is viewed as a *precious resource* that could be drawn upon further by other UK actors to strengthen the UK's contribution to a response. Actors were unclear on how the relationship with UK-PHRST should work when UK-PHRST is deployed by GOARN and working under the WHO umbrella. As a result, opportunities to benefit from RST's expertise were largely restricted to large coordination meetings with many actors present and ad hoc informal meetings when in the same location.

More generally, there is a need to strengthen information flow between other HMG actors, such as DFID, UK EMT and other UK ODA GH programmes, and RST. Building stronger links with DFID in-country advisors is seen as important in terms of acting as a gateway to more bilateral and strategic deployments – as evidenced by RST's links with PHE and DFID in Sierra Leone. UK-PHRST should work closely with other UK government departments and programmes to ensure UK-PHRST plays a strategic part in a broader UK response effort. Working closely with DFID/FCO counterparts will help build understanding of UK-PHRST and how UK-PHRST and the UK government may be able to influence the response. DFID should also be part of the discussions to build RST's strategy in relation to capacity building. Furthermore, for UK-PHRST to contribute to its longer-term outcomes of evidence-informed policy and programming, strengthening the flow of information from UK-PHRST to DFID is required and would be welcomed by DFID. Additionally, to encourage further opportunities for collaboration, UK-PHRST and UK EMT should meet routinely on a quarterly basis.

There is scope to strengthen processes for ensuring that opportunities for integrating research and capacity building into deployments or from deployments are maximised, for example strengthening specific internal structures to support research question generation before, during or after a response and processes to share research ideas across the team and with partners to support joint working.

UK-PHRST should continue to work with GOARN's Research Working Group and WHO to explore pathways to facilitate research during outbreaks. The Director's role on the GOARN Steering Committee is one mechanism for achieving this.

Capacity building is recognised as crucial to providing a more effective, sustainable and collaborative response, but more thinking is required to articulate RST's approach and aspirations within the different contexts in which it works. Where possible UK-PHRST should leverage on the team's capacity to bring in additional human resources during outbreaks, in addition to the minimum requirements for the outbreak, to undertake training activities or contribute to specifically setting up research (see Annex 13).

Building relationships with local partners to support sustainability is critical. There are strong examples, such as in Sierra Leone, of established and trusted relationships supporting research and enabling effective capacity building. Continuing to work in this way, to identify and handover to other partners, including linking with wider networks (AFENET, TEPHINET, ACDC, GOARN), and to develop handover/transition plans to support this will promote sustainability of UK-PHRST's outputs.

Strengthening processes to enable learning after deployments and ensure this is shared internally and with all key stakeholders is also seen to be critical. Following each deployment, a multi-agency debrief, or After Action Review, was suggested in addition to the existing operational feedback already in place. This should include review the technical activities as well as the operational. UK-PHRST do not systematically get feedback from partners they work with after a response – it was also suggested that this should happen routinely and could be used to strengthen their MEL data.

To ensure the UK-PHRST team achieves VfM and is utilised to its full potential, UK-PHRST should continue to strategically review team composition based on demand and experiences so far. UK-PHRST should continue to strengthen UK-PHRST's internal capacity to deploy (CDT, reservists, FETP fellows), especially in areas of expertise most frequently requested, including bolstering existing domains of expertise through the Reserve Cadre and expertise in partner countries. UK-PHRST could consider the bringing a 'One Health' expert with environmental health and/or veterinary specialisms, WASH, risk communication and/or coordination specialists and/or a PM/coordination/data into action expert (G7/G6 level person) to the team. UK-PHRST and HMG stakeholders agreed that working with partners to ensure that those skills that have been under-utilised through deployments so far (e.g. microbiologists, social scientist, logistician) are deployed more in future is important demonstrate the value of a multi-disciplinary response and strengthening team relationships.

RST should further explore options for overcoming the limitations of a 6-week deployment period. The 6-week deployment period was seen to be a limitation by GOARN – although working on a rotational basis helped overcome this challenge. Ensuring that country leads selecting deployees through GOARN are aware of the rotational approach (e.g. used in DRC) is important, as this could act as a barrier to UK-PHRST being selected.

UK-PHRST should raise awareness of the breadth of expertise currently available within the team. This should be targeted at a wide range of key stakeholders including GOARN and other global, regional and local partners. When deployed through GOARN, although operating as part of a WHO response effort, UK-PHRST should use the deployment as an opportunity to raise awareness of their unique offer with key actors.

Annex 14 Research Portfolio Review

Research Portfolio Review		
High-level finding	PHRST's body of research has been structured around key themes but not quite strategically focused according to priorities and needs of external stakeholders. Some of UK-PHRST's research has influenced response activities and vice versa, while capacity building has generally been informally integrated to research activities. The demands of the triple mandate have often caused delays in research timelines. Research outputs such as academic papers have been produced rapidly, but efforts are now needed to transform evidence so that it may strategically influence global outbreak response.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

Has the UK-PHRST research portfolio developed along the lines envisaged in the original proposal?

The nature and objectives of the research activities have developed and evolved since the original proposal through several stages of revisions. The original MOU states that the objectives were to "Conduct rigorous research to aid epidemic preparedness and response, and improve future response" and "Generate an evidence base for best practice in disease outbreak interventions within ODA-eligible countries"**.** The five disciplines included in the UK-PHRST are Epidemiology and population sciences, Patient-centred research, Microbiology and laboratory sciences, Social sciences and community engagement, and mental health and wellbeing.

During the interim inception period, research activities focused on short-term research projects which could act as 'quick wins' and support programme establishment, such as literature reviews and protocol development. UK-PHRST members at LSHTM likewise capitalised on existing relationships with in-country academic partners to identify research opportunities that could be swiftly operationalised.

The Strategic Framework[82] (February 2018) elaborated and clarified the intended function of research within UK-PHRST activities, defining that CDT and collaborators will conduct research relevant to the prevention, detection and response to infectious disease outbreaks, when not "occupied by outbreak response". This Framework also set out three components of the research portfolio: research during outbreaks, research in the immediate wake of outbreaks, and a long-term research agenda to be conducted outside of outbreaks. It references the strategic value of early phase outbreak research and the role of pre-designed research protocols for rapid implementation.

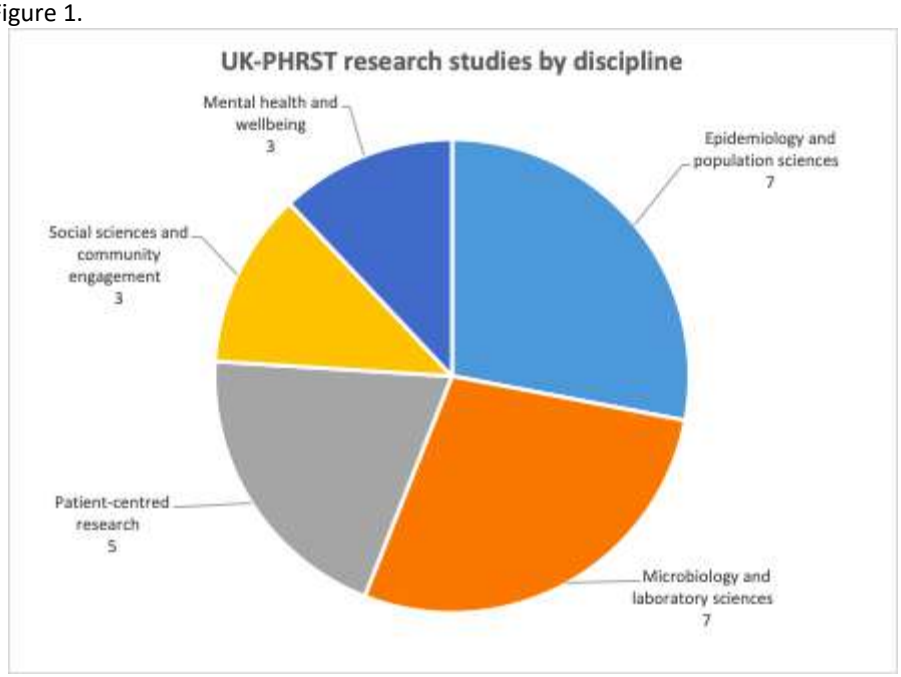
Between January 2018 and July 2019, the research portfolio was redefined into five strategic themes with working groups, with anticipated integration of the five UK-PHRST disciplines across these five thematic areas.

(1) Community approaches to outbreak response (social science and mental health),
(2) Data capture methods and enhanced data sharing and analytics
(3) Approaches to respiratory transmission outbreaks
(4) Multidisciplinary research on Lassa in Sierra Leone
(5) Evaluating field diagnostics and genomics.

Twenty-five research studies have begun under the UK-PHRST spanning all five strategic themes, although some disciplines received more funding than others, for example microbiology (32%) and epidemiology (25%) compared with social science (15%) and mental health (8%). Over half of all studies (n=14) have been within Epidemiology and population sciences or Microbiology and laboratory sciences disciplines (Figure 1).

[82] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756910/UK-PHRST_Strategic_Framework.pdf

Figure 1.



The five strategic priorities of the research portfolio were primarily based on individual interest areas and existing thematic expertise. The five thematic areas of work played to the strengths of UK-PHRST and TSC areas of expertise which allowed research projects to be swiftly operationalised at the start of the programme due to known contacts and an existing knowledge base. Many stakeholders observed that it would be more appropriate at this stage in the programme to consult with partners and build a consensus around externally relevant priorities, based on an assessment of knowledge gaps in outbreak response in LMIC.

There are many examples of integration of research and outbreak response activities, although most research activities have not taken place during an active deployment. There are understandable challenges in establishing research studies while deployed in an outbreak response capacity. Furthermore, the Strategic Framework set the expectation that research should be carried out when CDT members are not "occupied by outbreak response". In general, UK-PHRST has utilised the capacity available within the team to conduct research outside of deployment that can strengthen outbreak surveillance and response, such as bio-banked sample sequencing in Cambodia. The Madagascar pneumonic plague is a strong example of UK-PHRST embedding a research study within outbreak response. But there are likewise important examples of research studies producing evidence for the long-term research agenda during 'peace-time'. Research has been undertaken in a collaborative manner with a range of in-country partners, although some concerns were raised that the team must take necessary steps to meaningfully include all collaborators, making sure counterparts outside of UK-PHRST are involved beyond the protocol and ethical review stages and included fully in analysis.

Capacity building in terms of training research team counterparts in methods and analysis is generally integrated to UK-PHRST research activities, although this is sometimes in an implicit way rather than an explicit part of study design. Research studies have trained in-country stakeholders across a broad range of topics and skill sets. For example, social science research skills for fieldworkers, echocardiography and ultrasound for clinical health workers, safety and quality assurance training for laboratory staff, and training for Ministry of Health colleagues in epidemiology and laboratory skills. Other studies have opportunistically incorporated capacity building, organically assessing needs, and implementing on-the-job training through carrying out the essential research activities in partnership with in-country stakeholders.

Many research projects experienced delays in set-up and implementation often due to deployment activities, waiting for ethical and other forms of approval (such as consent waivers), as well as time spent building trusting relationships with in-country partners. Recruitment of research support at the UK-based academic institutions also caused delays to research studies. Delays and backlogs are adequately reported through the GHS Delivery Team progress reports and presented at TSC, which facilitates a discussion of implications on milestone achievements and generates advice on realistic revisions to research proposals. TSC is also a forum for troubleshooting and gathering advice/support for expediting activities in the face of delays. Deployment activities affected certain research studies – mainly within the epidemiology and data science themes – although this became less problematic as the UK-PHRST appointed a research coordinator and co-PIs were more commonly included in proposals. Deployment absences were sometimes compensated with in-kind support from colleagues internal and external to the UK-PHRST team. CDT researchers reflected that a flexible approach to budgets, milestones and deliverables has enabled them to complete research studies despite such hurdles.

The UK-PHRST research has not yet fully harnessed the multidisciplinary skillset of the team
The portfolio of research as a whole reflects the range of disciplines within the UK-PHRST, however, there have been no formal interdisciplinary research studies formally capitalising on the full extent of expertise within the team. Team members within microbiology and epidemiology disciplines have collaborated together most frequently, and studies across different disciplines have at times been dovetailed to produce a more substantial programme of work. The Lassa fever research programme is one primary example of research that bridges clinical, behavioural, microbiological and epidemiological disciplines in Sierra Leone and Nigeria. Informal discussions about methodologies, tools and ways to follow up on study findings are common between team members and across the academic consortium members.

Research expertise within the UK but outside of the UK-PHRST consortium has not yet been effectively harnessed. There are mixed opinions as to whether the original concept meant for UK-PHRST to fund proposals by academic institutions outside of the consortium, and only one study to date has been funded in this way, put forward by Liverpool School of Tropical Medicine. Many stakeholders suggested that it would be strategically valuable to open up UK-PHRST research funding to a wider pool of institutions, not only to tap into specific expertise lacking in the CDT and grow the portfolio of research, but also to strengthen the UK-PHRST as an institution backed by a greater proportion of UK academia.

Rapid availability of data and publication of evidence through peer review has been achieved, but more could be done to transform evidence to influence deployment, policy and practice. Evidence has been generated across all research pillars and in many different settings. As of September 2019, a total of 36 academic papers and conference abstracts have been submitted for peer-reviewed publication and presentation. The vast majority of these have already been published, of which 25 articles are available online free-of-charge on the LSHTM-hosted UK-PHRST website.[83] The UK-PHRST has published through academic journals, text books and blogs. In 2018 alone, the team had 24 different publications and many were rapidly produced. Academic manuscripts are generally finalised swiftly as part of a rapid approach to data availability; some UK-PHRST researchers developed manuscripts for journal publication within four months of the start of the study. Some research studies have already influenced national policy and practice, but more work is needed in closing the gap between evidence, dissemination, and action at national and global/regional levels. Country-level examples include the Dengue fever research in partnership with the Philippines Research Institute for Tropical Medicine contributed to revised clinical practice guidelines, and the Madagascar plague research informed revised treatment protocols and a large trial in ciprofloxacin mono therapy.

How is the approach to research adapting and developing?

[83] https://www.lshtm.ac.uk/UKPHRST#publications

A revised research strategy is under consideration as of October 2019 which integrates research, capacity building and response under two new workstreams. The SMT paper dated October 2019 set out a revised strategy for research and capacity building. It proposed a transformed approach to research and capacity building activities with a more explicit integration of the components of the triple mandate and intentionally optimising the model and capacity within the team. Future research activities have been reframed within two workstreams.

Workstream 1: Informing and Supporting Response sets out UK-PHRST's strategic focus to undertake action research[84] while deployed in a response context, sharing the programme's experience, and supporting development needs, in order to contribute to best practice in outbreak response. This formalises UK-PHRST's role and experience in pioneering outbreak response techniques and innovative approaches and provides a focus for the research work in this area that needs to be influencing operations, policy and practice (as per the original objective to "generate evidence for best practice in disease outbreak interventions").

Workstream 2: Research in Response outlines the strategic focus to carry out pilot studies in response, develop pre-positioned research protocols for response, and produce more collaborative interdisciplinary research. The Workstream 2 research activities are designed to facilitate rapid research in outbreaks of infectious diseases to improve response through enabling swift research set-up practices, rapid research needs appraisals, and targeted pilot research studies. This strategic direction amplifies and formalises UK-PHRST's integration of research and capacity building for interdisciplinary work within outbreak response. The strategy document highlights the need for a culture change away from the current hierarchy of priorities within response, research and capacity building, so that the triple mandate can be actualised across all of UK-PHRST's work. It should deliver a body of research work contributing to the original objective of carrying out "research to aid epidemic preparedness and response, and improve future response".

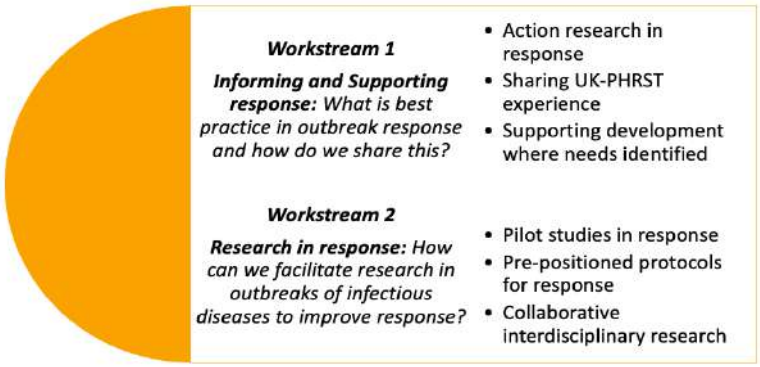


Figure 3: Work streams for supporting outbreak response through research and capacity building, optimising benefit from the UK-PHRST tripartite model.

Does the triple mandate of the UK-PHRST in practice support the development and funding of more applied research?

There are many examples of the triple mandate model delivering a dividend in terms of longer-term relationships and additional opportunities for applied research. The standout example of externally funded research stemming from a UK-PHRST original research study is in Madagascar, whereby UK-PHRST's pilot study into pneumonic plague has led to a successful application for a further grant of £1.6 million through DFID/Wellcome funding. The original research opportunity was developed rapidly into a

[84] Baum F, MacDougall C, Smith D. Participatory action research. J Epidemiol Community Health. 2006;60:854-7.

research study as a result of UK-PHRST and Institute Pasteur collaborating during the outbreak with UK-PHRST staff on deployment [see Madagascar case study]. However, there are smaller yet significant examples such as with partners in Sudan, where careful relationship building has led to additional requests for training and capacity building in specific epidemiological and laboratory techniques as well as cementing active collaboration for future research opportunities. Likewise, the relationship with Africa CDC led to a direct request to develop improved evidence-based approaches to mental health in outbreak settings.

Annex 15 Capacity Building Portfolio Review

Capacity Building Portfolio Review		
High-level finding	Ensuring sustainability of capacity building activities while incorporating them with deployments or research activities has been challenging for multiple reasons. UK-PHRST's capacity building strategy needs to be revised to ensure that activities are sustainable and measurable, and that UK-PHRST's capacity building offer is shared with all relevant stakeholders.	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

UK-PHRST's capacity building activities to date:

UK-PHRST's capacity building activities to date have been a combination of more formal trainings, workshops and education programmes (see Table 4) and more ad hoc, informal on-the-job capacity building activities that have taken place as part of outbreak response and/or research activities.

Table 4. UK-PHRST Capacity Building Activities to date

• **Funded and provided expertise to Clinical Research during Outbreaks (CREDO) curriculum, developed and piloted in collaboration with WHO/Tropical Diseases Research (TDR)**
• **Developed field courses on outbreak response with MRC Gambia and Institut Pasteur de Dakar**
• **Assisted Sierra Leone College of Medicine & Allied Sciences (COMAHS) in developing a MSc in Public Health Programme including.**
• **Delivered Outbreak preparedness and Response module at COMAHS**
• **Delivered General Virology module at COMAHS**
• **Developed of public health library at COMAHS**
• **Trained local hospital staff in Sierra Leone on research protocols in the context of clinical research**
• **Delivered two-day epidemic response team (ERT) training programme sponsored by Africa CDC**
• **Delivered two-day 'train the trainer' training on 'Outbreak logistics & Supply chain Management' in collaboration with Nigeria CDC**
• **Developed of Monkeypox Capacity Building project to set up long-term sequencing capacity at Nigeria CDC**
• **Facilitated two regional meetings with key stakeholders on capacity building and research needs in Sierra Leone and Uganda, co-hosted by the Uganda Virus Research Institute (UVRI),**
• **Delivered one-week workshop on Public Health Information services in Humanitarian crisis for WHO AFRO, Dakar.**
• **Created and launched Epidemic Response Anthropology Platform (ERAP) website**
• **Facilitated Social Science Epidemic Preparedness Workshop and launch of West African Social Science Epidemic Response Network**
• **Conducted baseline learning needs assessment of Africa CDC Epidemic Response Team. Being repeated among ERT and African Volunteer Health Corps (AVoHC) to provide a baseline for capacity-building planning**
• **Provided technical and financial support to the development of a Massive Open Online Course (MOOC) in Disease Outbreaks in LMICs)**
• **Supported operational research and manuscript writing training for partners involved in the response to the Rohingya refugee crisis in Cox's Bazar, Bangladesh**
• **Designed and delivered one-day face-to-face bespoke Infection Prevention and Control training package for newly appointed IPC nurses (7 in total) working in IOM supported primary health facilities in Kutapalong Rohingya refugee camp, Cox's Bazar, Bangladesh**
• **Delivered first face-to-face WASHFIT training course (3 days) for and with health partners operating in Cox's Bazar district.**
• **Delivered 3-day workshop on 'Developing a strategic agenda around outbreak & humanitarian data collection & analytics' which produced a joint strategic roadmap for data analytics in humanitarian health emergencies**

What were the challenges?

The challenge of conducting effective capacity building activities as part of deployments and/or research activities was highlighted by all stakeholders. Challenges were associated with the short-term nature of deployments which provided limited time to focus on anything beyond immediate response activities in order to build the necessary relationships to make such training effective or sustainable. This was compounded with limited capacity among UK-PHRST personnel to conduct capacity building activities in addition to their deployment or research responsibilities. A further challenge was the nature of deployments through GOARN, which were seen as further limiting opportunities to conduct capacity building due to ToRs not explicitly covering capacity building work, and political sensitivities around who UK-PHRST is representing on these deployments and its ability to build the necessary relationships for effective capacity building. Capacity building as part of research activities was again seen as challenging, but often happened implicitly as the needs of research studies demanded ad hoc training of research and clinical staff in-country.

Concerns around how to effectively measure the outcomes and impact of capacity building activities were raised by UK-PHRST and other HMG stakeholders. This was especially highlighted around the more ad hoc capacity building activities that have taken place during deployments or as part of research studies, and also related to perceived lack of clarity within the UK-PHRST team about who is responsible for doing and overseeing capacity building work. This was highlighted as an area that needed work, and is reflected in the October 2019 Strategy Outline Paper.[85]

The overall sustainability of UK-PHRST's capacity building activities to date and whether there was a suitable plan in place to improve sustainability was raised as a key concern. This was seen as being connected to the difficulty around building the required relationships during short-term deployments and research trips to make activities more likely to be sustainable and the difficulty of assessing capacity building needs in advance when it is unknown which countries UK-PHRST will be deployed to.

Other examples of challenges with limited evidence were more focused on the overall model within which UK-PHRST is delivering its capacity building work. There was a perceived lack of clarity over which organisation is responsible for capacity building within UK-PHRST and whether the focus of UK-PHRST's capacity building is on UK and/or LMIC stakeholders.

What worked particularly well?

Overall evidence on the effectiveness of UK-PHRST's capacity building activities was limited; however, UK-PHRST's work with COMAHS in Sierra Leone was seen as positive across UK-PHRST, wider HMG and academic stakeholders in Sierra Leone. The value of these activities was seen as the quality of the content delivered and the fact that they were enabling formal accreditation for students within an established academic structure, and thus contributing to more sustainable capacity building in-country. Despite this, some logistical concerns were raised around students' limited finances and the limited reach of the bursaries provided.

There was insufficient evidence to provide assessment of the effectiveness of UK-PHRST's other capacity building activities to date. There was limited evidence that the Infection Prevention and Control activities in Bangladesh were seen as effective. Attempts to interview stakeholders within Bangladesh were largely unsuccessful which is one key reason for limited evidence in this area.

What is the relationship between capacity building and other parts of the triple mandate?

[85] PHRST95 Strategy Outline Paper 14.10.19.docx

Capacity building activities occurred to various extents in almost every outbreak and as part of almost every research project but were not systematically documented or monitored. Evidence of training records documenting who was trained, how many were trained, what the training covered, perceived effectiveness of training or similar were largely absent or ad hoc in nature.

Deployments provided numerous opportunities for the provision of ad hoc training and mentoring activities. This has been seen mostly in UK-PHRST's longer-term deployment in Democratic Republic of Congo and as an extension of their initial flood response deployment in Sierra Leone. For example, in DRC, training and mentoring has included both local and WHO staff covering topics such as Infection Prevention and Control; data analysis and reporting; and good clinical practice training for HCWs.[86] Informal capacity building activities in Sierra Leone complemented the formal COMAHS MSc and BSc support, and included hands-on laboratory training at Connaught Hospital.

Capacity building in terms of training research team counterparts in methods and analysis is generally integrated to UK-PHRST research activities, although sometimes this is in an implicit way rather than an explicit part of study design. Research studies have explicitly trained planned for in-country capacity building activities stakeholders across a broad range of topics and, skill sets, and stakeholders. For example, social science research skills for fieldworkers, echocardiography and ultrasound for clinical health workers, safety and quality assurance training for laboratory staff, and training for Ministry of Health colleagues in epidemiology and laboratory skills. Other studies have implicitly incorporated capacity building, organically assessing needs, and implementing on-the-job training through carrying out the essential research activities in partnership with in-country stakeholders. Certain study methodologies such as systematic reviews do not readily lend themselves to on-the-ground capacity building. This is reflected in the lesser degree with which those UK-PHRST research studies have been able to report capacity building activities.[87]

How aligned were capacity building activities to the original model proposed?

The objectives of the capacity building activities have remained broadly the same since the original proposal, but the proposed and actual nature of how these objectives have been fulfilled are still evolving.

UK-PHRST's original MOU states that the objectives of the capacity building mandate were to *"Train a cadre of public health reservists for [UK-PHRST] who could be readily deployed to respond to disease outbreaks"* and *"Build capacity in-country for an improved and rapid national response to disease outbreaks and contribute to supporting implementation of the IHR".*

Capacity building activities during UK-PHRST's inception period were focused on development of pre-deployment and deployment training courses for UK-PHRST deployable team members and developing and piloting training in Clinical Research During Outbreaks (CREDO) in collaboration with WHO/Tropical Diseases Research (TDR).

[86] PHRST149_ Ebola Deployment Sitrep 09-Oct-19.pdf
PHRST155_Ebola Deployment Sitrep 25-Sep-19.pdf
PHRST153_Ebola Deployment Sitrep 21-Aug-19.pdf
PHRST159_ Ebola Deployment Sitrep 05 June 2019.pdf
PHRST159_ Ebola Deployment Sitrep 05 June 2019.pdf
PHRST158_Ebola Deployment Sitrep 1-Jul-2019.pdf
PHRST154_ Ebola Deployment Sitrep 23-Oct-19.pdf

[87] PHRST51_RST3_01 Research Project Progress Report (to April 19)_FINAL.docx
PHRST60_UK PHRST Research Portfolio statement May 2019.docx
PHRST59_RST3-01 Supplementary Research Proposal.docx

UK-PHRST's Strategic Framework[88] (Feb 2018) no longer featured capacity building of the UK response through UK-PHRST reservists as part of the explicit capacity building strategy, although this continues to take place. The overseas capacity building strategy within this Framework outlined the importance of developing an agreed competency framework for training of staff in LMICs; identification of training needs against this framework; followed by mapping of capacity building partners and development of specific capacity building plans to complement any similar initiatives in place and ensure value for money.

All of this was planned to take place within the context of regional research and training hubs (within East Africa, West Africa and Southeast Asia), with an acknowledgement that deployments are not an ideal environment for stable and sustainable capacity building to take place. It was envisaged that the competency framework would be agreed during the first year of UK-PHRST implementation and that mapping of stakeholders and the beginnings of relationships around the first regional hub in East Africa would be in place by the end of Year 2 of implementation. However, by early 2019, discussions within the UK-PHRST Senior Management Team highlighted a number of challenges to the proposed hub approach, including limited resources and the risk of raising partners' expectations to levels that could not be met.[89]

The need for a revised capacity building approach was discussed at various fora from May to October 2019, including at the evaluation Theory of Change Workshop, SMT meetings and at a UK-PHRST capacity building workshop held in October. The ad hoc and opportunist nature of capacity building activities to date was highlighted, and a "UK-PHRST Research and Capacity Building Revised Strategy Outline Paper" was shared with the SMT in October 2019. This paper re-directed focus as follows:

- **The importance of capacity building of UK-PHRST's staff for deployments** via briefings and trainings, and **how this training programme could be formalised and then shared with partner institutions and networks in order to build capacity for effective outbreak response**.
- **Provision of technical and other appropriate training in outbreak response and research in line with needs identified by partners.**
- **Support for skill development in-country alongside UK-PHRST's research and response work.**

<u>What is there to be learnt and what are the implications moving forward?</u>

There is urgent need to finalise UK-PHRST's updated capacity building strategy in terms of what capacity building activities are being offered, where, and how. The recently issued Strategy Outline paper is an important step in this process, but further work is required to ensure that capacity building activities are coherent with and complement both HMG and other partners' activities in-country. Sensitising both UK-PHRST and external stakeholders to what UK-PHRST is offering in terms of capacity building is seen as important to UK-PHRST, wider HMG and other global, regional and national stakeholders. Ensuring that UK-PHRST has capacity to deliver the offer outlined in this strategy is key to ensuring that activities are effective and sustainable.

Within the limited capacity building activities so far, the following enablers were identified that supported more effective and sustainable capacity building interventions across stakeholders:

[88] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756910/UK-PHRST_Strategic_Framework.pdf

[89] In the original UK-PHRST proposal (submitted December 2015), it was proposed that there would by three "overseas research and training centres" in Nepal, Sierra Leone and Uganda. At each site funds were allocated for a full-time administrative assistant, 2 full-time research assistants (1 at each centre to be paid for by LSHTM in years 1 and 2), office costs, mobile phones, laptop computers and printers. We budgeted for establishing one overseas research and capacity-building centre in year 1, a second in year 3 and a third in Year 5. Given the UK-PHRST resources and staff available, it was not feasible to develop a physical hub with a permanent presence, and thus the value of having a UK-PHRST hub in the region was unclear. The limited resources and the broad mandate of the UK-PHRST necessitates that our role in capacity-building cannot be comparable to institutions such as WHO and Africa CDC, and resources should be targeted where most valuable and it was not felt that developing a hub was such an area. In addition, having a hub without permanent staff present might build partner expectations that could not be met. This change has had an impact on the capacity building and teaching work.

The value of building on existing in-country relationships previously established by PHE and LSHTM: The work in Sierra Leone is seen as being the most effective capacity building activity by UK-PHRST to date as it has built on the previous PHE Resilient Zero [Ebola] project in country and on pre-existing partnerships between LSHTM and also King's College London with academic stakeholders in-country.[90] Despite this, there is need for continued focus on relationships with HMG and other stakeholders in-country to ensure that the work being done complements rather than duplicates that being done by other stakeholders.

The importance of developing positive, ongoing relationships with stakeholders: The more formal capacity building activities in Sierra Leone and the ad hoc capacity building activities in DRC have both been made possible and more effective because of the length of time that UK-PHRST has been active in the country. This has facilitated positive, longer-term relationships with national stakeholders, which has helped to build UK-PHRST's reputation as a trusted partner with valuable expertise.[91] At the global level, UK-PHRST has also developed a positive relationship with WHO GOARN, which has resulted in multiple deployments especially in DRC. Multiple stakeholders identified a potential opportunity to build on this to identify ways to build capacity building work into GOARN deployments.

[90] PHRST124_Overseas visit report_SL_April2018.docx
PHRST126_ResearchCapacity building (Container Lab) visit SL_Jul2019.docx
PHRST123_Overseas visit report_SL_Oct2018.docx
PHRST133_Overseas visit report MPH_SL_Jan2019.docx
PHRST73_UK_PHRST_Annual_Review_2018.pdf

[91] PHRST126_ResearchCapacity building (Container Lab) visit SL_Jul2019.docx
PHRST127_ BSc capacity building exercise_SL_Jul2018.docx
PHRST217_BSc Capacity Building Report_SL_July2019.docx
PHRST130_Partnering for Outbreak Preparedness and Response_Meeting Report_Sept2018.pdf

Annex 16 Madagascar Plague Thematic Case Study

This case study evaluates the hypothesis that UK-PHRST conducts strategic research in priority areas that is well aligned with the broader disease outbreak research agenda and has influenced practice and/or policy. This case study describes a strong example of the triple mandate working in practice and UK-PHRST's ability to implement research during an outbreak. UK-PHRST rapidly strengthened surveillance, data systems and case management through a multidisciplinary deployment team. A priority and strategic research need were identified resulting in a research study implemented during the outbreak response period, which influenced treatment protocols and delivered external funding for a large trial.

High-Level Finding	UK-PHRST can effectively contribute to case management technical support that transitions into research without creating disruption to response. Research during an epidemic can add value to the response itself. However, this is entirely contingent on the support of national government and partners/relationships with in-country partners.	The finding is supported by multiple data sources of lesser quality, or the finding is supported by fewer data sources of higher quality (moderately good triangulation). Given the limited number of interviews with in-country partners the case study does not comprehensively explore UK-PHRST's working relationships with its partners on the ground.

What did the UK-PHRST set out to do?

An outbreak of highly transmissible pneumonic plague in Madagascar escalated to epidemic proportions in the second half of 2017. There was a marked increase in the number of cases of plague compared with the seasonal norm and many cases were being identified in densely populated urban areas including the capital Antananarivo.

At the request of the WHO/GOARN, the UK-PHRST rapidly deployed two epidemiologists and a case management expert clinician as part of the international response. UK-PHRST was among the first international responders on the ground. The UK-PHRST arrived in country on 4 October 2017, at the very beginning of the international response to the outbreak, with logistics for the deployment arranged within 48 hours of the decision. UK-PHRST was deployed to (i) support surveillance activities, (ii) strengthen health information management, and (iii) support case management activities. UK-PHRST had several roles providing support to many key partners in the epidemic response effort including: the Ministry of Public Health (MoPH) information management team in epidemiological surveillance and analyses; Befelatanana University Hospital (HUJRB) in case management, infection prevention control, and development of clinical study protocols; and to the Institut Pasteur de Madagascar (IPM) epidemiological unit with information management, data processing and analysis, routine outputs, performance monitoring, and advanced analyses.

How did things play out in practice?

The UK-PHRST team quickly contributed to epidemiological systems already in place and supported the establishment of faster surveillance and data analytical processes. They added value to the surveillance and response work, performing data analysis and reporting to the MoH daily. They advised best practice for fast sample transportation, strengthened diagnostics and provided technical assistance to documentation, protocols, quality assurance.

UK-PHRST supported IPM in establishing a cutting-edge plague data management system ready for independent management of future outbreaks. UK-PHRST ran a detailed portfolio of response work and set up laboratory confirmation, data management, cartography (spatial analyses), and clinical case management.

> *"It was the quick set up, in terms of data entry and analysis that was valuable. Before we didn't do daily info sharing. They helped get over the workload and supported capacity building for our teams. We were overwhelmed."* (LMIC UK-PHRST Stakeholder)

Activities were taking place in an overwhelming environment as the epidemic was reaching unprecedented levels. At times the response team were receiving over 100 samples a day for analysis. As part of a collaborative effort, the UK-PHRST undertook epidemiological field assessments, and contributed to the revision of treatment protocols, the creation of triage algorithms, and development of enhanced diagnostic strategy or differential diagnostics. UK-PHRST members reviewed guidelines and case definitions and identified many questions unanswered on the clinical profile.

During the outbreak, there were widespread reports of confirmed patients presenting with atypical symptoms, and the response teams discussed the difficulty in distinguishing cases of pneumonic plague from other respiratory disease. In collaboration with MoPH, IPM and HUJRB, UK-PHRST established a research study to investigate the pneumonic plague case definition and atypical symptoms, Dr Alex Salam (core deployable team member, University of Oxford) set up a prospective cohort study of patients admitted to pneumonic plague treatment centres.

How did the triple mandate play out?

The technical support and capacity building that UK-PHRST provided across several domains demonstrated UK-PHRST's expertise and established trustful relationships and positive connections. From these well-integrated vantage positions, UK-PHRST was able to capitalise on existing relationships and work meaningfully with in-country public health and clinical experts to understand evidence gaps and define appropriate research questions. UK-PHRST was able to collaborate with MoPH, HUJRB and IPM in the outbreak response through the WHO/GOARN deployment. Several UK-PHRST members worked on the ground in outbreak response for 2 months and formed an integral part of the surveillance. Furthermore, UK-PHRST team included not just epidemiologists but also one of the few clinicians deployed via WHO/GOARN.

> *"If you have a team that just parachutes in then you get a reputation for this. We will have a worldwide reputation for doing both of these things. Because of the way we're set up it enables positive relationships to be built. So, for example the work in Madagascar, case definitions during an outbreak is absolutely essential and this wouldn't normally happen – we were in apposition to do this. And this has enabled further research and capacity building to go on after the outbreak."* (UK-PHRST Internal Stakeholder)

Sustained discussions at the start were necessary to persuade WHO/GOARN & MoPH of the value of implementing the research study during a live outbreak. UK-PHRST needed to negotiate with WHO/GOARN as the case management expert had deployed under a GOARN contract. Additionally, both WHO and MoPH were uncomfortable with introducing research, as the primary priority was the outbreak response and saving lives. Naturally, most professionals required to establish such a research partnership were preoccupied with urgent outbreak response activities.

> *"The Madagascar research that we did during the outbreak required a lot of quite sustained pressure to get it done, not within the UK-PHRST but externally with WHO actually. So we need to be quite resilient to get that done. And actually I think it was quite successful and it did get done and had some quite interesting outcomes but also facilitated a research culture going forward locally and a clinical trial.*
>
> *Maybe it's just a feeling but we were busy, and we had to take time to discuss with them. But we were overwhelmed, busy and stressed. We were busy, and RST arrives and it disturbed a little our work. But still their work has helped us."* (LMIC UK-PHRST Stakeholder)

UK-PHRST organised meetings to design the study, visited hospitals, and coordinated closely with the different study partners. Partners agreed on the objectives and characterisation of the clinical study. UK-PHRST drafted the research protocol in a participatory way with IPM epidemiologists and HUJRB clinical specialists. Part of the research design process involved capacity building and training in clinical research methods.

> *"Setting up the study wasn't easy. There were a lot of discussions about the protocol and the ethical approval took a long time. So we lost time and by the time it was approved the epidemic was pretty much over. So we enrolled only few cases in the study. Still we believe the study will provide added value that might be important for plague."* (UK-PHRST Internal Stakeholder)

PHRST's multidisciplinary skillset provided important capacity and additional value through the case management expert. Through working on medical rounds, he raised questions and discussed the relative merits of the diagnostics and clinical symptomatology. Many Malagasy clinicians confirmed there was a crucial lack of understanding of the clinical presentation of pneumonic plague cases in Madagascar. The clinical discussions also stimulated a revision of the treatment protocols, replacing streptomycin with ciprofloxacin after the outbreak subsided.

> *"RST was one of the few clinicians. Most people were epidemiologists. This is also necessary but you also need clinicians during such epidemic. We had many problems in terms of diagnostic and laboratory and case management, so RST gave us the means to understand better the clinical questions and challenges about Plague case management. There are still many unresolved questions about plague and I think RST helped us with some of this.*
>
> *Plague cases are discriminated and there is a lot of stigma and the fact you work, improve the life of such people, has an impact on equality and equity. Epidemic response does not focus on patients, and RST, they don't consider patients, they treat epidemics. A lot of patients were suspects, even if later on they were PCR negative, we had to treat all suspected cases as confirmed cases. Plague creates stigma. RST, clinicians, have shown initiative to also see the epidemic from a human point of view."* (LMIC UK-PHRST Stakeholder)

A research study was rapidly set up (within three weeks), including funding and ethical approval. From this informed position UK-PHRST developed a research study to fill a critical research need. The aim of the study was to prospectively characterise the clinical presentation of pneumonic plague and to investigate several hypotheses with regards to apparently atypical presentations. During an epidemic there is usually no time, capacity or funding to consider answering pertinent clinical questions, but with UK-PHRST integrating research and capacity building to the response model, it was possible to disburse funds in a matter of days. Other grant-makers solicited at the time were not able to mobilise research funds quickly enough. Despite this rapid implementation, the outbreak tailed off shortly after the study began, limiting the capacity to enrol patients. Although a small number were eventually recruited to the study, the research still provided valuable insights for future epidemics in Madagascar and elsewhere.

What worked particularly well?

The WHO/GOARN deployment enabled UK-PHRST members to swiftly integrate with in-country institutions and to immediately begin contributing to clinical case management, surveillance and outbreak data management. The collaboration between diverse international and national partners brought the outbreak under control. Deployed directly to where their expertise was most valuable, UK-PHRST team members worked quickly to expedite best practice in outbreak management and performed capacity building and training where needed. Trustful relationships were quickly brokered, through demonstrable expert support, good communication and transparent dialogue. These relationships

allowed for discussions with partners to identify priority research needs which led to the collaborative development of a research protocol.

> *"We strengthened differential diagnostics. Also the sample transportation is now clear for us and we now know. Also how to work quick… we learnt that from them. Also in terms of documents, protocols, quality assurance, they adopted a different vision on this and we learnt from this….[UK-PHRST team member] was an integral part on leading the surveillance, he was the core of it all. He set up data systems, did the analysis during the Plague outbreak. He was based in Pasteur and I saw him on a daily basis. He's a very strong epidemiologist and we don't often get access to such expertise in Madagascar. He set up data management systems, did the daily data entry with the Pasteur epidemiology team. He worked with the national Pasteur team and also trained them. He led the epidemiological surveillance for the epidemic. His data and analysis were transferred every day to the MoH."* (LMIC UK-PHRST Stakeholder)

Expedited approval of research project and funds by GHS delivery Team, and UK-PHRST team in London were critical for establishing a rapid research study during the epidemic outbreak. The study identified that widespread personal use of antibiotics by patients had affected the utility of the diagnostic tests in use, and confirmed that there was a need for validation of the clinical case definition of pneumonic plague. The research study produced evidence valuable for Madagascar as well as many other countries that are plague endemic.

> *"In this case for Madagascar what worked well is we were able to expedite the internal process in terms of internal approval and get broad agreement that this was something that fitted into our remit from members of our TSC and then the permission was granted very rapidly from the government side as well…Yes, this model is very important. When you are in an epidemic where we believe we know the disease but we don't, to have this capability to do research. Here in Madagascar we have regularly plague and we think we understand the disease but there are still many questions on the clinical profile."* (UK-PHRST Internal Stakeholder)

A no-cost extension was granted by UK-PHRST for IPM to reallocate residual funds to a pilot study in preparation for a large externally funded trial to optimise plague treatment, in collaboration with the University of Oxford members of UK-PHRST. By the end of the funding cycle, IPM had not yet spent all allocated funds. The longer-term (42 months) research collaboration was only possible due to the rapid research study implemented during the plague outbreak and is externally funded by DFID and Wellcome Trust under a £1.6 million grant. The UK-PHRST's approach was explicitly to support and advise during deployment through GOARN, while navigating the need/opportunity to conduct important outbreak research. Once the observational study was completed and the feasibility study had begun, UK-PHRST took a back-seat role, ensuring ownership of the ongoing research was held by Malagash partners.

What were the challenges?

It is complicated and challenging to operationalise a research study protocol during an epidemic, when most public health, government, and clinical capacity is rightly focused on the primary aim of outbreak response. Setting up research protocols takes time and can be seen as disruptive when people are busy, stressed, overwhelmed. This is especially difficult when there is not an established outbreak research culture, no contractual research mandate, and no proof of concept. It requires diplomacy, and it is highly beneficial to have pre-existing relationships. The UK-PHRST team on deployment were likewise extremely busy providing technical support to controlling the epidemic itself, and carrying out clinical care activities, and capacity building.

> *"People are busy and it's about prioritising. Of course it is valuable to integrate research in epidemic response but you need the resources to manage it and make it happen. [UK-PHRST team*

> *member] was overwhelmed at times…and also had to initiate the research set up."* (UK-PHRST Internal Stakeholder)

Difficulties in acquiring the necessary research approvals and ethical clearance are compounded during an epidemic. This is in part because of the focus on outbreak response, but also because outbreak research requires working with vulnerable groups and obtaining research ethics clearance for vulnerable groups is more difficult. Trust-building and relationship building is also taking place in a high-stress environment. The research agenda is a sensitive issue with many stakeholders naturally wary of international agents' motivations and the fear of missing out. Brokering trusting relationships and establishing meaningful partnerships is fundamental, but challenging, with competing priorities and preoccupation with urgent care or outbreak activities. UK-PHRST needed to articulate the value and need of integrating research to response efforts without compromising the primary agenda which is outbreak response and saving lives.

The research study encountered many challenges from the inception period onward. There was very little time to produce an accurate costings analysis. This was overcome by having flexibility in the overall budget, and an agreed understanding with the GHS Delivery Team that the actual costs might deviate from projected costs once the project was under way. By the time the observational study was operationalised, the number of pneumonic plague cases was declining. Setting up the database through remote technical support via the University of Oxford meant that they communicated through Skype, with database testing at both ends. There were slow diagnostics due to logistical, transport and access problems. Samples from rural areas often took 3 weeks to reach the laboratory. Once at the laboratory the results were processed within 12 hours. However, communicating results back to the rural clinics to inform patient treatment was another lengthy process.

> *"We didn't answer to all the questions because the epidemic was short but still, with the data we have of the few patients only we have had interesting elements coming out of this study and lessons for the future. This approach is very very important…It's because of access problems. It took sometimes 3 weeks to get the samples especially from the rural areas. Logistics are slow and challenging. And also once the results were released it took ages to get the result back to the clinics to inform patient treatment. The delays were due to logistics, transport and poor administration and communication. It's not our lab that is slow. Once we have the sample, we have the result in 12hrs."* (LMIC UK-PHRST Stakeholder)

Managing an outbreak of pneumonic plague in an urban setting presented numerous challenges and required a coordinated response from multiple agencies (MoH, WHO and partner organisations). This meant that UK-PHRST was a small part of a big response effort, and had to mitigate anxieties around the research study from many agencies. There were some reports on the long discussions on case definitions and treatment protocols while in theory this already existed in Madagascar.

How aligned was the UK-PHRST contribution to the project outcomes?

PHRST's work in Madagascar led to improved identification, prevention and control of plague, through outbreak response efforts and from the strategic research studies, which closely aligns with research and deployment outcomes in the Theory of Change. UK-PHRST's capacity was rapidly and effectively utilised to respond to the plague outbreak through technical support, operational capacity building, and research, which improved the speed and quality of response efforts.

Madagascar's national surveillance systems were improved through the support of UK-PHRST who set up new data management and reporting systems, as well as a telephone hotline to identify and notify outbreaks. Sample transportation, diagnostics, and quality assurance were all strengthened through UK-PHRST capacity building during deployment.

Some but not all of UK-PHRST multidisciplinary capacity was utilised, although the inclusion of clinical case management expertise in the deployment team was fundamental for identifying urgent research needs. This research informed revised national guidelines in case management and secured external funding for a large-scale trial to optimise plague treatment, with implications across many other countries affected by plague.

What is there to be learnt?

UK-PHRST demonstrated that research can be set up during outbreaks without interrupting the outbreak response, and that this will add value to the response itself. But it is entirely contingent on the support of national government and partners/relationships with in-country partners. The work in Madagascar illustrates the potential of the UK-PHUK-PHRST to rapidly conceive of and implement research during an outbreak while still prioritising epidemic control activities. The success of the observational study hinged on swift establishment of research questions, fast approvals for funding via the GHS Delivery Team, and careful negotiation/articulation of the relative value of carrying out research during outbreaks, creating minimal disruption to important epidemic response efforts. Pre-designed protocols would reduce delays and be of benefit in the future. Plague is not well-researched and also not isolated to Madagascar and so there is potential benefit for other populations through the plague research.

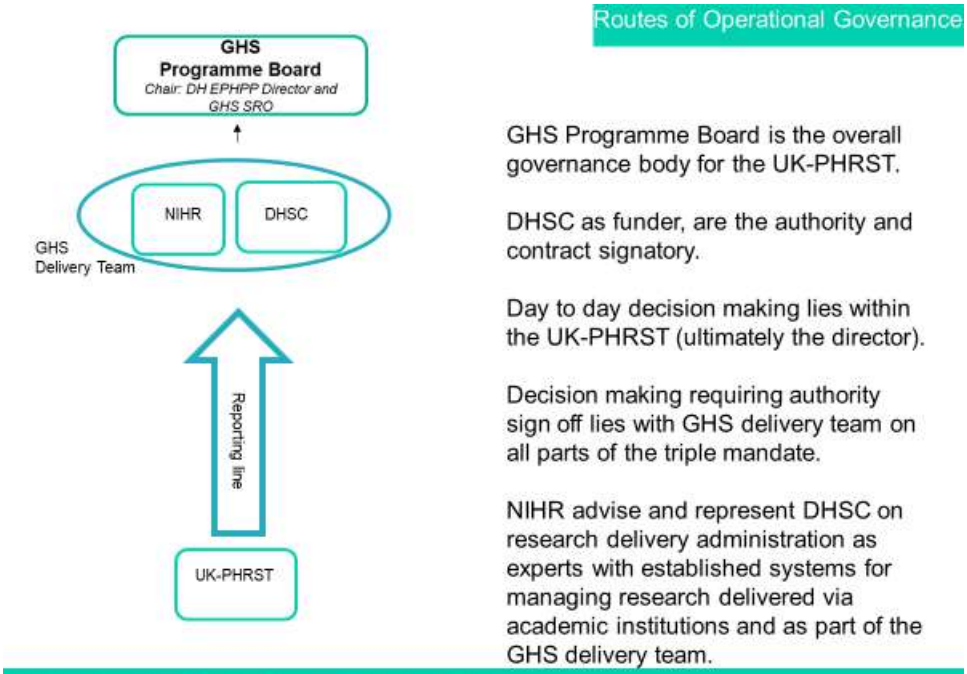
While UK-PHRST sells itself mainly on supporting epidemiology surveillance and lab during deployment, the Madagascar intervention demonstrates how UK-PHRST can also contribute to case management technical support that transitions into research. Outbreak management is a multidisciplinary effort and so requires a multidisciplinary response. It was important to provide capacity across the different domains of outbreak response. UK-PHRST facilitated the development of an outbreak research culture.

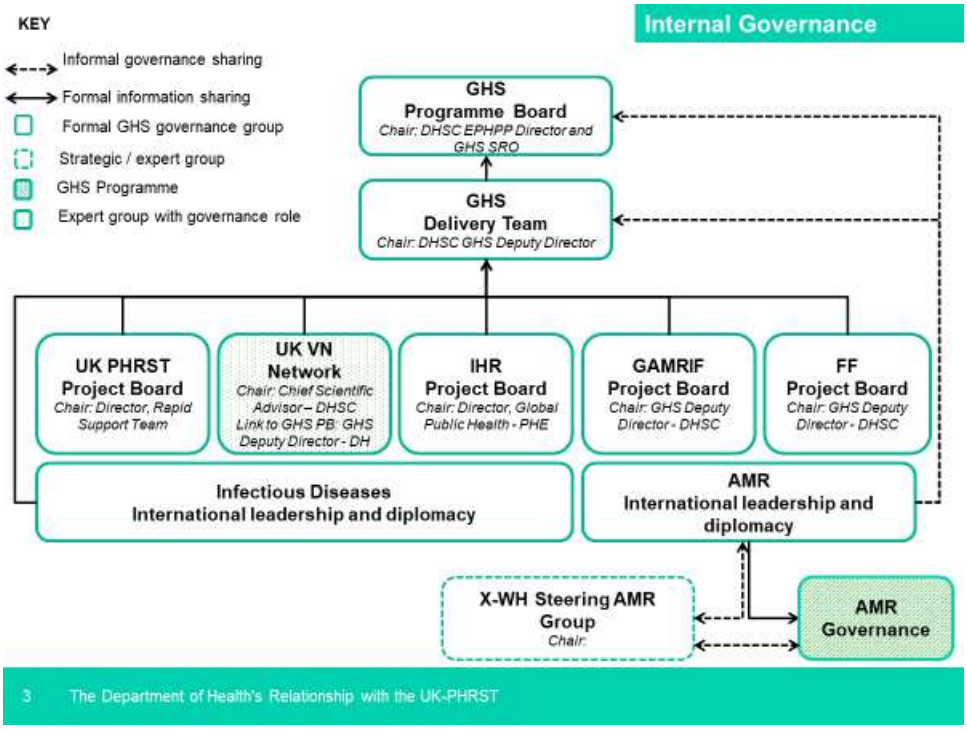
Annex 17 UK-PHRST Governance Structures

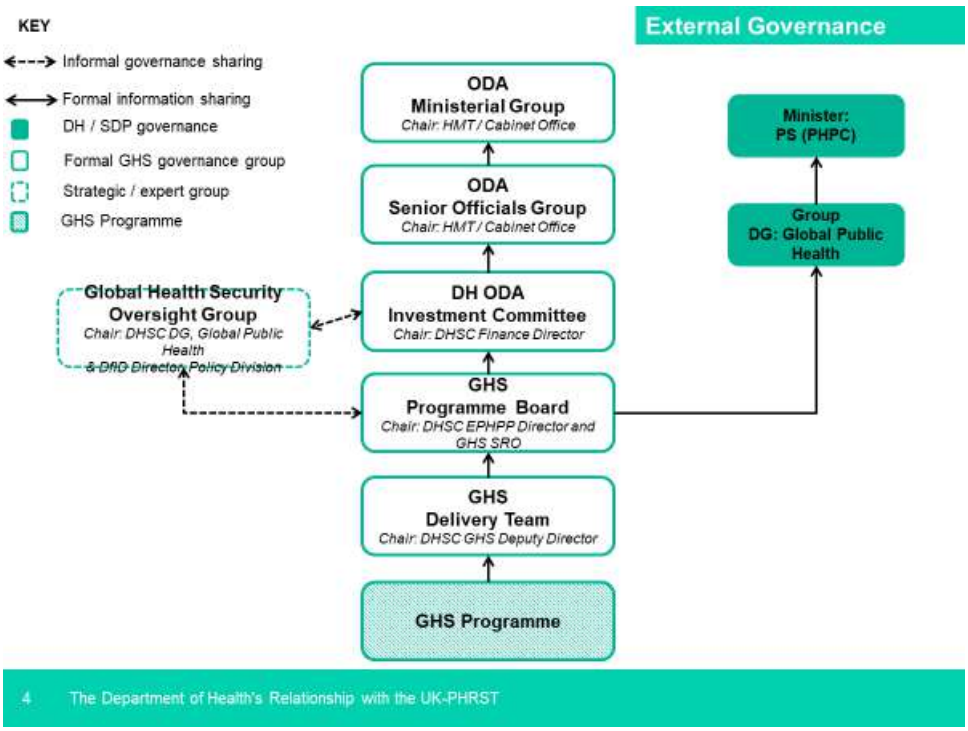
- The Project Management Team (PMT) is comprised of PHE and LSHTM staff and meets project implementers/stakeholders weekly (with monthly in-person meetings).
- PMT reports budget absorption, implementation progress and risks fortnightly to the SMT, comprised of lead personnel and administrators from both PHE and LSHTM.
- Senior Management Team (SMT) reports budget absorption, implementation progress and strategically important risks quarterly to UK-PHRST Project Board (chaired by the UK-PHRST Director and comprised of staff from all implementing orgs and UK gov) .
- A Technical Steering Committee (TSC) comprised of a group of expert scientists from participating UK-PHRST as well as external UK institutions engages through Project Board to guide research activities.
- The Project Board presents quarterly financial and highlights reports and an annual review report to the Global Health Security (GHS) Programme Board (chaired by DHSC SRO and comprised of key programme partners, e.g. DHSC, PHE, DFID). GHS Programme Board holds the UK-PHRST Director to account for delivery of the UK-PHRST project and provides feedback on delivery.
- The GHS Programme Board reports to the Cross-Government ODA Ministerial Group.
- The Global Health Oversight Group and Chief Medical Officer also provide strategic direction.

See Annex 19, UK-PHRST Project Board and UK-PHRST Academic Steering Group Members, for most up-to-date list of members of these two governance committees

Annex 18 GHS Programme Governance Structures






KEY
Informal governance sharing
Formal information sharing
DH / SDP governance
Formal GHS governance group
Strategic / expert group
GHS Programme
External Governance
ODA
Ministerial Group
Chair: HMT / Cabinet Office
ODA
Senior Officials Group
Chair: HMT / Cabinet Office
Global Health Security
Oversight Group
Chair: DHSC DG, Global Public Health
& DfID Director, Policy Division
DH ODA
Investment Committee
Chair: DHSC Finance Director
GHS
Programme Board
Chair: DHSC EPHPP Director and GHS SRO
GHS
Delivery Team
Chair: DHSC GHS Deputy Director
GHS Programme
Minister:
PS (PHPC)
Group
DG: Global Public Health
4 The Department of Health's Relationship with the UK-PHRST

Annex 19 UK-PHRST Project Board and UK-PHRST Academic Steering Group Members

Project Board Members

Name	Job title and organisation
Daniel Bausch (Chair)	Director, UK-PHRST
Anna Seale	Deputy Director of Research (LSHTM), UK-PHRST
Olivier le Polain	Deputy Director of Operations (PHE), UK-PHRST
Susan Ismaeel	Programme Manager, UK-PHRST
Mike Rogers	Assistant Director, Infrastructure and Faculty, NIHR CCF
Helen Tomkys	Head of Global Health Security Preparedness Global and Public Health Group, DHSC
Ursula Wells	Section Head, Research Programmes, DHSC
John Simpson	Medical Director, UK-Med
Neil Squires	Director, Global Public Health, PHE
Isabel Oliver	Deputy Director – Field Service, National Infection Service, PHE
Charlotte Watts	Chief Scientific Adviser, DFID
Jonathan Barden	Humanitarian and Civil-Military Advisor/UK EMT Project Manager The Conflict, Humanitarian and Security Department (CHASE) - DFID
Stuart Wainwright	Deputy Director - International Resilience, Civil Contingencies Secretariat
Nicola Walsh	Head of Network Team, Operations Unit, FCO
Tony Stewart	Senior Epidemiologist Global Outbreak Alert and Response Network (GOARN)
David Heymann	Head and Senior Fellow, Centre on Global Health Security at Chatham House & Professor of Infectious Disease Epidemiology at LSHTM
Devolved Administrations representatives	• Northern Ireland – Anne Kilgallen • Wales– Mariana Dyakova • Scotland – Andrew Riley

Technical Steering Committee (TSC) members

Name and Institution	Area of expertise
Dr Anna Seale (LSHTM/PHE)	Chair, Deputy Director for Research, UK-PHRST
Prof. Daniel Bausch (LSHTM/PHE)	Director, UK-PHRST
Dr Olivier le Polain (LSHTM/PHE)	Deputy Director for Operations, UK-PHRST
Dr Richard Amlôt (PHE)	Behavioural Sciences
Prof Miles Carroll (PHE)	Microbiology
Prof John Edmunds (LSHTM)	Epidemiology/Modelling
Prof Judith Glynn (LSHTM)	Epidemiology
Prof Ian Goodfellow (University of Cambridge)	Microbiology/Virology
Prof Martin Hibberd (LSHTM)	Microbiology
Prof Peter Horby (University of Oxford)	Infectious Diseases/Clinical
Dr Isabel Oliver (PHE)	Epidemiology/Infectious Diseases
Dr Shelley Lees (LSHTM)	Social Science
Prof Rosanna Peeling (LSHTM)	Microbiology/Diagnostics
Dr Cathy Roth (DFID)	Infectious Diseases
Dr James Rubin (KCL)	Mental Health
Dr Ian Walker (PHE)	Mental Health
Prof Jimmy Whitworth (LSHTM)	Infectious Diseases/Epidemiology

Annex 20 DRC Ebola Thematic Case Study

Strength of evidence	The findings are supported by multiple data sources of lesser quality, or the finding is supported by fewer data sources of higher quality (moderately good triangulation). Given the limited number of interviews with partners the case study does not fully explore RST's working relationships with its partners on the ground.

This case study explores the hypotheses *that UK-PHRST plays a critical role in a collaborative effort by providing essential specialist expertise identified and deployed through an effectively coordinated outbreak response*. It explores the broader outbreak response landscape within which UK-PHRST operates. It reviews the activities undertaken by UK-PHRST and how they evolved, how UK-PHRST worked with other actors and the potential sustainability of outputs and lessons learnt.

What did the UK-PHRST set out to do?

UK-PHRST has supported the response to two consecutive Ebola Virus Disease (EVD) epidemics, one in Equateur Province (May–July 2018), and the ongoing large outbreak which has affected the Eastern provinces of North Kivu and Ituri since August 2018. The UK-PHRST rapidly deployed the expertise requested by the WHO GOARN in order to strengthen its response operations in-country, saving lives in DRC, curtailing national spread and reducing the risk of international spread.

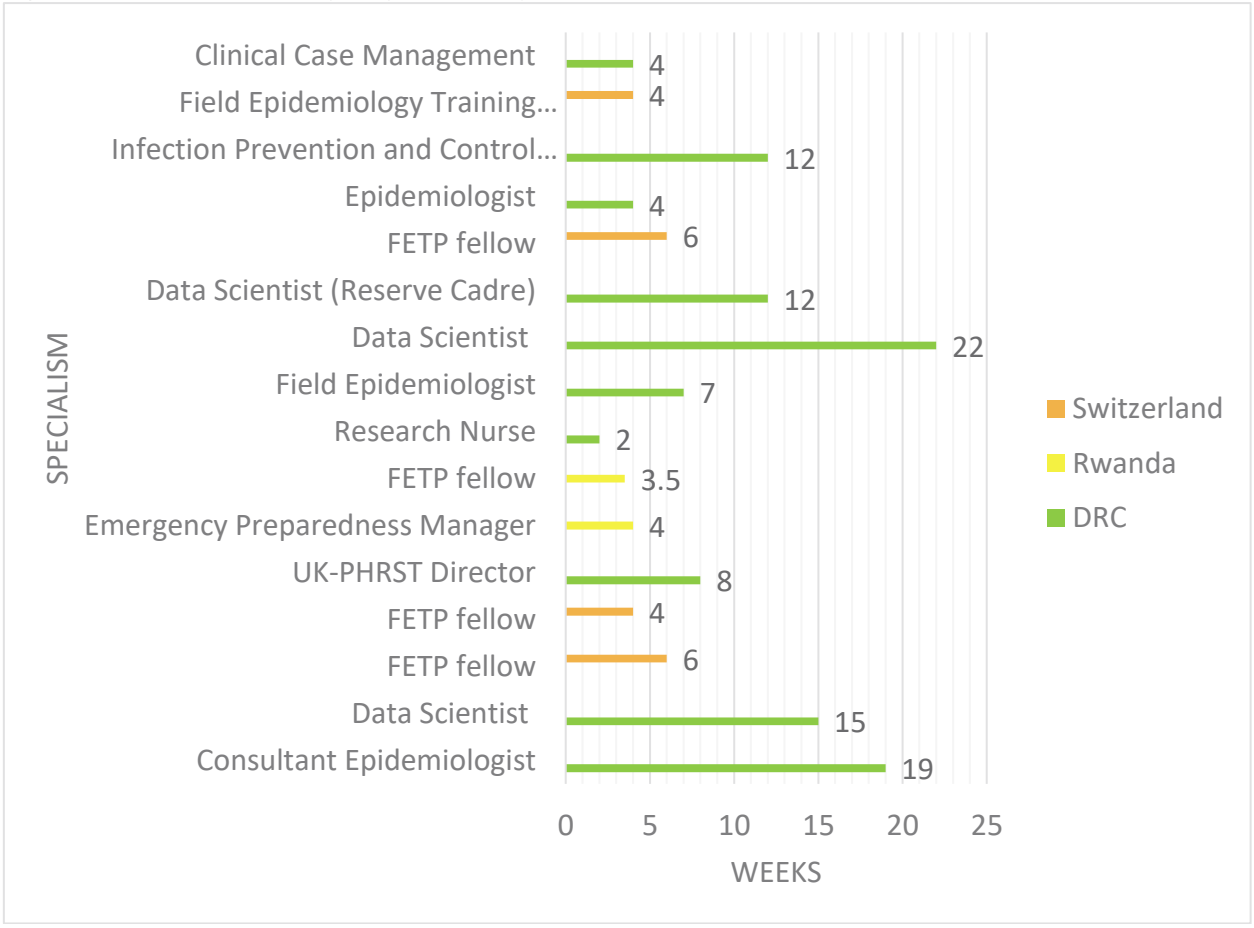
Initially, three UK-PHRST epidemiologists were on the ground for about six weeks in Equateur province from May to July 2018 working with the World Health Organization (WHO) on an Ebola outbreak that was rapidly brought under control, with a total of 54 cases reported. Within a week of that outbreak being declared over, another Ebola outbreak was declared in North Kivu in Eastern DRC, along the border with Uganda**.**

UK-PHRST is part of a very large national and international response and has played a critical strategic and coordination role in establishing an epidemiological analytical cell, which provides routine and advanced analyses for the strategic coordination of the response. This work is still ongoing, with the Deputy Director in Geneva working with WHO as the Strategic Coordinator for Epidemiology with the Health Information Team, and with others deployed to DRC. Many members of UK-PHRST have since been deployed to various locations across DRC and Geneva through GOARN to continue to work with the analytical cell as well as, more recently, supporting other areas of work such as IPC and clinical case management.

How did things play out in practice?

From the initial request for three epidemiologists, UK-PHRST has since deployed 16 specialists with a range of skills sets including epidemiology, data analytics, surveillance, clinical case management, IPC and research over a total period of more than 133 weeks (see Figure 1). The work has expanded from its initial epidemiological focus to a larger analytical remit fielding demands from multiple partners. It has involved curating, collating, compiling and analysing surveillance, patient and operational data, from the early warning system in place – also called 'alert' system – to contact tracing and so on.

Figure 1: Number of weeks per specialism by location, for DRC EVD outbreak, 2018/19 and 2019/20



UK-PHRST, through their work in the Analytical Cell, is seen to have played a *pivotal* role in the outbreak, providing daily data reports to the SitRep and for a range of actors from policy level (donors, senior Ministry officials, etc.) to local level coordinators to report on progress and help target resources and activities more effectively. The data analytics developed are cutting edge and this work directly contributed to steering the epidemic response strategy, for example by forecasting where new cases would occur, and with cost effectiveness analysis of response strategies to help target resources, geographies and activities. UK-PHRST will continue to develop data systems through deployments and remote support so they can be rolled out in other contexts during future outbreaks.

UK-PHRST members have worked with other partners to strengthen the surveillance and health information architecture, including collection and quality of data, and to analyse and translate data into relevant public health information. They focused initially on strengthening data and reporting mechanisms, developing ad hoc solutions to make best use of available data and have meaningful information to interpret, while simultaneously working on existing surveillance systems and establishing new ones, including response-specific tools, where needed. This has involved working closely with WHO and the DRC Ministry of Health but also other partners including UNICEF, Médecins Sans Frontières and the World Food Programme.

UK-PHRST also played a technical advisory role to the design and set-up of EVD treatment centres (ETCs) strengthening IPC measures while maintaining the human component of patient care. They contributed to layout of ETCs, design of patient flow (suspected vs confirmed cases) inside ETCs, IPD, etc.

How did the triple mandate play out?

While the primary focus of the deployments has been on strengthening surveillance and epidemiological analyses through improved data tools and systems, there has been some scope for building human capacity along the way. Although capacity building has been integrated into UK-PHRST activities, this has been an implicit part of their work rather than an explicit part of the ToR issued by WHO GOARN. UK-PHRST's potential contribution in this area is seen to be constrained by the parameters of the ToR from WHO GOARN, the small UK-PHRST team deployed and mainly by the challenge of embedding capacity sufficiently when busy responding to an outbreak.

> *"We trained people to develop the tools but because we developed them on the fly there was limited scope for CAPACITY BUILDING– we can teach people to drive safely but they won't be racing anytime soon and they certainly won't be able to repair the car if it stops working!"* (UK-PHRST Internal Stakeholder)

It was felt by some that this has been a missed opportunity to build more capacity within Africa to use the data systems – particularly among African epidemiologists colleagues, for example, from Africa CDC or FETPs by working alongside analysts/data scientists during the response. Back-to-back rolling deployments with a routine presence on the ground and handovers built in to ensure continuity could have made a more concerted effort to build capacity in the new tools, systems and processes possible. Achieving capacity building outcomes are seen as more achievable when the duration of an outbreak is sustained, and considerable investment of UK-PHRST team members is anticipated over time. Also, having a less experienced member of UK-PHRST, like FETPs, working alongside senior experts, could have provided an opportunity to provide more capacity building. For example, in Geneva, there have been four FETPs from the UK working alongside more senior experts. That said, it was acknowledged that effectively building capacity during the outbreak would have required a substantial increase in the number of individuals available with appropriate skills.

> *"The easiest way for this to happen is that WHO push for this – that they say that we see the value of having someone here to build capacity – it has been predominantly led by foreigners – Europeans rather than Africans – we should make it more Africa owned – it should be part of our role to say we recognise there is a gap here – and we should be pushing for this. African colleagues need to be GOARN'S partners, so we need to identify them and provide training and be mentors while they're there. There has been ad hoc training from RST but it hasn't been systematic – it when you have time, on the side, but not enough to make someone competent – it needs a strategy – we are handing over to each other – you need to have someone who can go in with this specific role."* (UK-PHRST Internal Stakeholder)

Some felt that once the outbreak is over, there should be longer-term investment in building the capability of local partners like WHO, MoH and other GOARN partners in these innovative tools. Furthermore, it is recommended that UK-PHRST pursue discussions with key actors post-outbreak to explore potential approaches for building in capacity building opportunities during future outbreaks. As a member of the GOARN steering committee, UK-PHRST is seen to be well-placed to raise these issues:

> *"RST could try to build in capacity building for African epis/data analysts into GOARN deployments, but maybe not through the normal mechanism. This would be a good approach and would build in sustainability. If they [WHO] come back and say it is not possible then RST can say 'You're not looking to build capacity of people from Africa CDC? Why not?"* (Global/Regional GHS Stakeholder)

In relation to research, the Johnson & Johnson Ebola vaccine trial, being implemented by the Department of Clinical Research at LSHTM, UK-PHRST's Director as a co-PI, is an exciting development with potential to influence and radically shift EVD strategy and policy.

What worked particularly well?

The outbreak leadership used the analytical cell as a critical resource. Another key success was seen to be the leadership utilising the analysis to influence the response. At a high-profile meeting with the national government, the Incident Manager (IM) referred to the analytical cell as "*the brain of the response*".

> *"He [the IM] would come to us as IM and ask questions about the outbreak and I could come back him with results and we would discuss it and then I could see this translating into action straight away. The current leader of the cell is also very good – he has a very open mind set about data analysis in general and understands the need for it"* (UK-PHRST Reservist/FETP)

The MoH lead stated that "*this response, for the first time is driven by science"* in reference to the work of the analytical cell. It was felt that the data analytics led to better decision-making as the outbreak evolved: "*Their work helped turn information into action"* (UK-PHRST Reservist). Furthermore, requests for analysis exceeded capacity, indicating a huge demand for the information provided by the cell.

The work of UK-PHRST as part of the analytical cell has the potential to leave a legacy. It is felt that the data system and tools developed during the outbreak have gained new ground in this area and taken forward important innovations and improvements that should be adopted more broadly. It is hoped that WHO will take forward these innovations to be used in future outbreaks. The ongoing deployment of the Deputy Director in Geneva could help contribute to this.

UK-PHRST was deployed into higher security contexts and operated in a safe way. This flexibility, beyond what other key organisations, like CDC, offered was extremely helpful to the overall response and enabled critical work to be taken forward effectively.

Being on the ground at the coordination level in Goma was essential to enabling effective partnership and progress in this area of work. Having data scientists at the field level, rather than working remotely, enabled assessments of data quality, understanding of factors contributing to data quality or blockages in the system. Being able to interact with all the key actors and partners in the cell or in epidemiologic/surveillance pillars including WHO, MSF, UNICEF, CDC as well as being able to understand their data needs, integrate data from all pillars of the response and respond to requests for analysis from other partners like OCHA, the WB, DFID and WFP, was critical to ensuring optimum utilisation of the data in the response. An example of how effectively the partners worked together is when a sub-group was set up called the Epi Centre Research Group involving UNICEF, IFRC, WHO, MoH, MSF which met twice a week to discuss current analytical needs and to undertake collaborative analysis in response to these needs.

> *"Every Wednesday is the donor meeting and then we would meet on Thursday after that meeting. The MoH are critical in this because they have an overview of the response and what they want to know and then MSF who are more focused on the clinical side, so they might have specific interests, as would UNICEF on social science – they try to line up the quantitative epi research with the social science research. So they would try to present on one theme from all perspectives – this was great – for the social science they have to do primary data collection – so we had the epi data inform the questions that the social science team would go out and ask – like delays for admission to treatment."* (UK-PHRST Internal Stakeholder)

The prolonged and repeated deployments to the country to support the EVD outbreak facilitated good collaboration between DFID and the UK-PHRST. This included calls between the UK-PHRST Director and in country focal points, face-to-face meetings, participation in DFID's Ebola Emergency Response Team meeting, sharing of information and situation reports and regular communication by email. This sharing of information was reportedly not happening early on in the outbreak and evolved over time, facilitated in part by the co-location of DFID and UK-PHRST personnel in Goma.

What were the challenges?

Ensuring appropriate skills across those deployed. Taking forward this work required a specialised and scarce skillset using highly experienced statisticians with programming skills, fluent in French and prepared to work in an outbreak.

> *"There is currently a very strong misunderstanding about what a data scientist is. People say they are data scientists but there are many different profiles behind that – some will be very good statisticians, some are coders, some are modellers, some can develop scripts to analyse data for themselves – to be good at analysis is one thing – but to then develop systems and software that can work on computers in a way that can be maintained for the next 10 years by other people is a completely different level."* (UK-PHRST Reservist)

Partly as a consequence of the above as well as limited handovers, analyses Standard Operating Procedures (SOPs) were not followed creating a number of issues in analysis reports. Work has been undertaken since to upload data flows and introduce a peer review process to prevent this in the future. **The response is reliant upon these highly skilled people returning to continue the work**. Ensuring continuity of specialists has placed a deployment burden on the team, beyond what was anticipated, over many months.

> *"There is one caveat to this work – we need people who can use the software – this is why we keep going back because we know how to use it – a certain level of capacity is needed in the field to run it and this is a barrier to entry. If we want to use this approach in the future we need to make sure the capacity building is present and integrated – so it isn't just specialist people flying in who can use it – it needs to be accessible – we need to provide the training as part of the response so it is sustainable. This could be done remotely as well as on-the-job. We need people to have a basic level of understanding of the software through training outside of an outbreak – so if you plan well and bring people up to speed on this outside of an outbreak then they can roll with it straightaway – and someone needs to decide this is a good system and it has value and so we want to invest in it in non-outbreak periods."* (UK-PHRST Internal Stakeholder)

More generally the outbreak response has faced a wide range of complex contextual challenges including protracted civil conflict and political instability, bringing significant security and other challenges to the response. This has included attacks on front-line workers, poor infection control practices in health facilities, mistrust in the government, and the response impacting community engagement and difficulties tracing contacts.

How aligned was the UK-PHRST contribution to the programme outcomes?
Outputs: Trained cadre of UK experts deployable within 48 hours for outbreak response, strengthened operational capacity, tools and processes established to support rapid deployment for optimal field performance.
S/T outcome: UK-PHRST capacity utilised effectively as part of wider outbreak response. Improved UK and in-country capacity for outbreak prevention and response in LMICs.
Assumptions: Innovations and tools are adopted by other global health/outbreak response actors.
Intermediate outcome: UK and global response to epidemics improves in speed and quality.
Assumptions: The progression of an outbreak can be altered by enhanced response, research, and capacity building.
L/T outcome: Evidence informed policy & programming, and design, development & delivery of effective and accessible tools and solutions.

UK-PHRST's contribution to the outbreak in DRC is closely aligned with the deployment specific components of the Theory of Change. It demonstrates that (sustained) input from trained and experienced specialists in an outbreak can contribute to the uptake of innovations and tools leading to an enhanced response. UK-PHRST routinely deployed rapidly and delivered a high-quality response and the

tools and solutions developed are seen to be sustainable, with potential for adoption by key actors like WHO for future outbreaks.

As the work of the cell progressed and became more established there are examples of the analytics impacting on decision making. For example, UK-PHRST has contributed to improving surveillance by developing a system for raising alerts and feeding this back to the surveillance teams to develop solutions. Critical data has been provided in terms of predicting needs and targeting resources, for example, estimates of numbers of beds needed based on anticipated cases. Modelling undertaken by UK-PHRST as part of the Strategic Resource Planning process (SRP4) resulted in recommendations to place teams in areas likely to be affected with cases before the cases emerged. This was calculated to be the most cost-effective approach and the World Bank injected more resources to the response to support this. In addition, there are numerous examples of more ad hoc analysis provided to support partners such as developing visual transmission chains in Butembo. That said, it is felt that the Analytical Cell should focus ongoing efforts on strengthening communication between coordination and the field to further support evidence-based decision-making.

Despite the high number of people deployed through UK-PHRST, this did not provide an opportunity to deploy across all disciplines available within UK-PHRST. For example, UK-PHRST's microbiology expertise was offered to GOARN but the Institute Pasteur was selected.

What is there to be learnt?

Translating outputs into outcomes is the key bottleneck for UK-PHRST success. Raising awareness of the developments in outbreak analytics both during the response, through the various structures of the response, and beyond the outbreak is critical to ensuring that these developments are adopted more broadly and contribute to a strengthened response.

> *"The analytical cell has evolved in a really good way - a real partnership approach on deciding how things could be done and moved forward. Olivier was instrumental in setting this up – he was pushing for this and was doing a lot of the analysis. Then Thibault streamlined it – and developed some amazing products to facilitate analysis – it is outstanding. If it isn't used in future outbreaks that is the real shame. Making sure that the translation of this work to affect real change is the hardest part – so making sure people are talking to each other and understand how they can benefit from it and ensuring that the structure is available at every level is critical."* (UK-PHRST Internal Stakeholder)

There was scope to strengthen the use of the analysis to inform management decisions. Strengthening both processes and human resources to enable decision making based on the data at a strategic level was seen to be required, especially earlier on in the response. It was felt that bringing in additional skills in data translation to the response, to support translating analysis into action would have increased the impact of the work of the cell.

> *"RST were given a slot to present at the end of these lengthy sessions and they were presenting exactly the right type of information but was only given a short amount of time at the end of the meeting and there was no energy left to discuss what the analysis showed and the implications for the response and actions needed. There was a mismatch between the information they produced and how that linked to a management arrangement that would convert that into decision making."* (HMG GHS Stakeholder)

Reconciling rapid response with capacity building and sustainability can be challenging. UK-PHRST's achievements in DRC required a sustained presence over more than a year, with multiple people deployed for many weeks at a time. This enabled the team to build trust and established relationships as well as developing and embedding sustainable solutions. This sustained involvement in an outbreak is at odds

with the original conception of a rapid in and out model. If this type of approach is required in order to deliver UK-PHRST's anticipated results (see ToC) then this raises several issues in terms of design and sustainability of the model.

> *"When the RST was set up it was seen as a rapid response no longer than 6 weeks and we have had people in DRC for over 135 weeks because we've had 17 staff who are racking up the weeks deployed – which is not what was envisaged – this is not entirely inappropriate but there are some questions we need to think about…."* (HMG GHS Stakeholder)

Sustained involvement in an outbreak places considerable demands on human resources, particularly those with research or commitments within their institutions to deliver, like teaching, grant generation, etc. Burn-out was raised as an issue as well as the pressure placed on individuals trying to juggle competing demands.

> *"For people who are halfway between academic and out in the field – there can't be the same pressure on them in terms of training and capacity building in country should count towards teaching allocation – I can't count any of my capacity building or teaching hours during outbreak for RST towards this. If RST wants to build up that kind of resource and carry this forward, then they need to think about how to make it sustainable for their staff moving forward. Others at RST share this position but they know it is tricky – a big undertaking to achieve change within institutions."* (UK-PHRST Reservist)

Furthermore, ensuring sufficient bandwidth to engage in the acute operational needs of emergencies, while still retaining the capacity to conduct research and capacity building in response to the needs of the outbreak, is a challenge: "*response/saving lives will always come first*" [GHS55].

There is a need to strengthen mechanisms for information flow between other HMG actors, such as DFID, and UK-PHRST during an outbreak. A lack of clarity around how other HMG partners on the ground during a response should engage with and/or utilise UK-PHRST's expertise was reported. UK-PHRST was viewed as a *precious resource* that could be drawn upon further by other UK actors to strengthen their contribution to a response. However, other actors were unclear on how the relationship with UK-PHRST should work when UK-PHRST is deployed by GOARN and working under the WHO umbrella.

Annex 21 UK-PHRST logical framework

ORGANISATION NAME: Public Health England							
PROJECT NAME: UK Public Health Rapid Support Team							
IMPACT	**Impact indicator 1**		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
Improved outbreak response through enhanced operational effectiveness, evidence-based research, and capacity building at global, regional and country levels, to reduce morbidity and mortality and the likelihood of outbreaks becoming public health emergencies	Change in level of implementation of eight core capacities for surveillance and response as defined by IHR in UK-PHRST partner countries	**Planned**	N/A	N/A	Increase by one level implementation in two core capacities in one UK-PHRST ODA-eligible partner country within the period of collaboration with UK-PHRST	Increased by one level implementation in two core capacities in two UK-PHRST ODA-eligible partner countries within the period of collaboration with UK-PHRST	Increased by one level implementation in two core capacities in three UK-PHRST ODA-eligible partner countries within the period of collaboration with UK-PHRST
		Achieved					
OUTCOME	**Outcome indicator 1**		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
UK and partner ODA-eligible countries' response to outbreaks strengthened through improved response, research and capacity building	Change in UK response to outbreaks in speed and quality	**Planned**	-UK-PHRST responds to >50% of appropriate requests within 48h of approval with appropriate skill mix	UK-PHRST responds to >50% of appropriate requests within 48h of approval with appropriate skill mix	UK-PHRST responds to >66% of appropriate requests within 48h of approval with appropriate skill mix	UK-PHRST responds to >75% of appropriate requests within 48h of approval with appropriate skill mix	UK-PHRST responds to >90% of appropriate requests within 48h of approval with appropriate skill mix
		Achieved					
	Outcome indicator 2		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**

	ODA eligible countries and key supporting international partners response to outbreaks strengthened through more rapid UK deployment, research and capacity building	**Planned**	N/A	N/A	>50% of ODA country partner institutions (e.g. national public health institutes, Ministry of Health) reporting increase in capacity for detection, prevention and control of outbreaks (interim evaluation) including after UK-PHRST deployments; >50% of international partners (WHO/GOARN, other UK-PHRST) reporting increased capacity through support from UK-PHRST	N/A	>80% of ODA country partner institutions (e.g. national public health institutes, Ministry of Health) reporting increase in capacity for detection, prevention and control of outbreaks (final evaluation) including after UK-PHRST deployments; >80% of international partners (WHO/GOARN, other Rapid Response Teams) reporting increased capacity through support from UK-PHRST
		Achieved					
	Outcome indicator 3		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Minimum target of UK-PHRST deployments in response to appropriate requests for support with outbreaks and/or public health emergencies	**Planned**	Target 4 deployments	Minimum 5 deployments	Minimum 5 deployments annually	Minimum 5 deployments annually	Minimum 5 deployments annually
		Achieved					
Output 1	**Output indicator 1.1**		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
More effective UK response to outbreaks, including established operational capacity and processes to support rapid deployment for optimal field performance and assess VfM	Trained cadre of UK experts (epidemiology, laboratory, social science, clinical management, infection prevention and control, data science, logistics, research)	**Planned**	≥ 80% of core team in post and ready for deployment; draft reservist development plan; 33% (2/6) FETP fellows trained and available to deploy	≥ 80% of core team in post and ready for deployment; training needs of reserve cadre identified, logistics of contracts considered; 33% (2/6) FETP fellows trained and available to deploy	≥ 95% of core team in post and ready for deployment; 12 reservists recruited; 67% (4/6) FETP fellows trained and available to deploy	≥ 100% of core team in post and ready for deployment; ≥ 15 additional reservists recruited; 67% (4/6) FETPs trained and available to deploy	100% of core team in post and ready for deployment; full team of reservists; 100% (6/6) FETP fellows trained and available to deploy

	deployable within 48h for outbreak response. Training includes UNDSS basic security, UNDSS advanced security, induction, SAFE, SAFE+, and deployment course	**Achieved**					
	Output indicator 1.2		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Laboratory capacity supported in response through development of a 'suitcase laboratory' for deployment in ODA-eligible countries	**Planned**	N/A	Procurement of case lab equipment completed	Field test of case laboratory in UK	Deployment of case laboratory in at least one ODA-eligible country	Deployment of case laboratory in at least two ODA-eligible countries
		Achieved					
	Output indicator 1.3		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Sharing of lessons learnt from deployment within the team to continuously improve performance	**Planned**	N/A	All deployments with formal debrief and lessons learnt; response rota for incidents on deployment established	All deployments with formal debrief and lessons learnt; procedure for on-call response to incidents, accidents or near-miss developed	All deployments with formal debrief and lessons learnt; procedure for on-call response to incidents, accidents or near-miss adapted/updated to respond to lessons learnt	All deployments with formal debrief and lessons learnt; procedure for on-call response to incidents, accidents or near-miss adapted/ updated to respond to lessons learnt
		Achieved					
	Output indicator 1.4		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Monitoring framework developed and implemented into operational processes	**Planned**	N/A	NA	Monitoring framework developed	Monitoring (internal) completed quarterly	Monitoring (internal) completed quarterly
		Achieved					
	Output indicator 1.5		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**

	VfM assessed through benchmarking salaries and training costs of those deployed (including backfilling of reservists) against hiring external consultants	**Planned**		Net benefit	Net benefit	Net benefit	Net benefit
		Achieved					
Output 2	**Output indicator 2.1**		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
Research to build an evidence-base for optimum prevention and response conducted before, during and after outbreaks. Knowledge sharing and external funding to maximise benefit	Research infrastructure established (strategy, protocol development, tools)	**Planned**	N/A	Research strategy established; ≥ 1 research protocol developed/adapted to guide early, mid- and end-of-outbreak investigation; review of existing tools started	Implementation of research strategy; ≥ 2 research protocols developed/adapted to guide early, mid- and end-of-outbreak investigation; review of existing tools completed	Development and undertaking of >1 cross-disciplinary research project in line with strategy; >3 research protocols developed/adapted to guide early, mid and end of outbreak investigation; >1 impact case study of a tool developed/ adapted or in use	Development and undertaking >2 cross-disciplinary research projects in line with strategy; ≥4 research protocols developed/ adapted to guide early, mid- and end-of-outbreak investigation; >1 impact case study of a tool developed/ adapted, or in use
		Achieved					
	Output indicator 2.2		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**

	External funding to build on the UK-PHRST platform	**Planned**	N/A	≥1 funding applications submitted (to complement UK-PHRST budget) for research or capacity building projects from external sources (named UK-PHRST investigator included)	≥2 funding applications submitted (to complement UK-PHRST budget) for research or capacity building projects from external sources (named UK-PHRST investigator included)	≥3 funding applications submitted (to complement UK-PHRST budget) for research or capacity building projects from external sources (named UK-PHRST investigator included)	≥4 funding applications submitted (to complement UK-PHRST budget) for research or capacity building projects from external sources (named UK-PHRST investigator included)
		Achieved					
	Output indicator 2.3		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Knowledge sharing through presented and published analyses of evidence on optimal approaches to outbreak response	**Planned**	N/A	Research projects commenced; >3 presentations on UK-PHRST or its work at meetings and conferences where audience includes key stakeholders	>3 articles or abstracts submitted for publication or international presentation; >6 presentations on UK-PHRST or its work at meetings and conferences where audience includes key stakeholders	>6 articles or abstracts submitted for publication or international presentation >9 presentations on UK-PHRST or its work at meetings and conferences where audience includes key stakeholders	>15 articles or abstracts submitted for publication or international presentation >12 presentations on UK-PHRST or its work at meetings and conferences where audience includes key stakeholders
		Achieved					
Output 3	**Output indicator 3.1**		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**

Improved capacity for prevention, detection and control of outbreaks in ODA-eligible countries	Change in surveillance capacity in hub sites in ODA-eligible countries	**Planned**	Engagement with key stakeholders in ODA-eligible countries	Engagement with key stakeholders in ODA-eligible countries; potential hub sites visited to support capacity for improved prevention, detection, and control in ODA-eligible countries; West African hub site identified and capacity development plan made; implementation commenced	East African hub site identified and capacity development plan made; implementation commenced	South-east Asia hub site identified and capacity development plan made; implementation commenced	Capacity of three hub sites developing toward independent response capability
		Achieved					
	Output indicator 3.2		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Change in trained personnel for outbreak prevention, detection and response in ODA-eligible countries	**Planned**	N/A	Training supported in ≥1 ODA-eligible country	Training supported in ≥1 ODA-eligible country with >75% of participants meeting learning outcomes	Training supported in ≥2 ODA-eligible countries with >75% of participants meeting learning outcomes	Training supported in ≥3 ODA-eligible countries with >75% of participants meeting learning outcomes
		Achieved					
	Output indicator 3.3		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**
	Change in capacity through sharing knowledge with key stakeholders in-country	**Planned**	N/A	N/A	Annual UK-PHRST workshop with partners in an ODA-eligible country	Annual UK-PHRST workshop with partners in an ODA-eligible country	Annual UK-PHRST workshop with partners in an ODA-eligible country
		Achieved					
	Output indicator 3.4		**Milestone 1 - Year 1**	**Milestone 2 - Year 2**	**Milestone 3 - Year 3**	**Milestone 4 - Year 4**	**Target - Year 5**

	Development of a competency framework for training of staff in LMICs	**Planned**	N/A	Competency framework agreed upon by all collaborative institutions	Competency framework agreed upon by any new partner with whom UK-PHRST engages for capacity development in LMICs	Competency framework agreed upon by any new partner with whom UK-PHRST engages for capacity development in LMICs	Competency framework agreed upon by any new partner with whom UK-PHRST engages for capacity development in LMICs
		Achieved					

Annex 22 Lassa Fever Thematic Case Study

This case study evaluates the hypothesis that *Integrating outbreak response, innovative research to generate evidence on best practices for outbreak control, and capacity building ensures a sustainable, effective and cost-efficient model for rapid outbreak response and more resilient health systems*. The case study aims to examine the interaction between the programme design, how it is delivered and the context in which it is delivered, to enable lessons to be learnt.

Strength of evidence	The finding is supported by multiple types of data sources of generally strong quality (good triangulation)

What did the UK-PHRST set out to do?

The UK-PHRST set out to support countries to strengthen their capacity for Lassa fever control through (i) in-country deployments to support outbreak response, (ii) the development of a cross-cutting multidisciplinary programme of Lassa fever research, and (iii) in-country capacity building.

The UK-PHRST deployed to Nigeria (a Lassa fever endemic country) on a bilateral basis to support unusually severe seasonal outbreaks of Lassa fever in 2018 and 2019 and in parallel set out to establish a programme of Lassa fever research in Sierra Leone using existing links in the country. In 2018 a multidisciplinary team comprising an epidemiologist, case management expert, logistician and field epidemiology training programme (FETP) fellow deployed to support the Nigeria Centre for Disease control (NCDC) to strengthen surveillance, data management and epidemiological analyses; to support case management; to strengthen supply chain management; and to help with the development of a Lassa fever research agenda. In 2019, an epidemiologist, FETP fellow and logistician deployed to provide epidemiological and logistical support. In Sierra Leone, the UK-PHRST established a research collaboration with the Kenema Lassa Fever Unit (KLFU) to conduct a series of studies on Lassa fever.

How did things play out in practice?

The UK-PHRST provided multidisciplinary support to the Nigerian outbreak which resulted in the development of strong collaborative links with the NCDC including an ongoing programme of research; in contrast, contextual issues in Sierra Leone have hampered the successful implementation of the research programme there.

In Nigeria, the UK-PHRST worked within the Emergency Operations Centre (EOC), under the direction and coordination of the NCDC, where they supported the work of the surveillance, data management, case management, research and logistics pillars. During the deployments, the UK-PHRST supported measures to strengthen the collection, management, analysis, use, interpretation and presentation of surveillance and outbreak data. This included the development of Standard Operating Procedures (SOPs) and tools for case finding and investigation, for contact tracing, for the management and analysis of data and for the generation of epidemiological reports. They supported data analyses that provided information on transmission patterns, priority areas to be targeted with control measures and on population subgroups and geographic areas with higher mortality rates. As part of the case management pillar, they supported a wide range of activities including the review of treatment guidelines, the development of case record forms, an investigation tool for healthcare associated infections, clinical management guidance and protocols for ribavirin use. Support was also given to improve the use of case definitions and discharge practices and for the conduct of a mortality analysis and adult referral pattern audit. The UK-PHRST logistician supported the strengthening of supply chain management procedures at the NCDC, for instance by introducing procedures for forecasting and inventory management of

commodities. These procedures are still being used and have reportedly resulted in long-term improvements to logistics management at the NCDC. Following their deployment in 2018, they were invited to return to support the response again in 2019.

In Sierra Leone, the UK-PHRST attempted to set up a number of studies which have run into problems with implementation. The UK-PHRST set up a study to develop and evaluate a diagnostic oral fluid assay for Lassa fever, a clinical study to investigate cardiovascular function and ribavirin pharmacokinetics and pharmacodynamics in Lassa fever patients, and a social science study to investigate health care seeking behaviour among Lassa fever patients. Due to the low number of Lassa fever cases presenting to the KLFU for care, the studies in Sierra Leone have not reached their recruitment targets. Two of the studies implemented in Sierra Leone (the clinical study and a study to develop an oral fluid assay) have expanded to Nigeria as there are currently an insufficient number of Lassa fever cases presenting to KLFU to enable the associated research questions to be answered.

How did the triple mandate play out?

The Nigerian deployments proved to be an effective way to strengthen a country's capacity for outbreak response; led naturally to the identification of knowledge and capacity gaps; and provided opportunities to develop collaborations for addressing those gaps through research and capacity building activities, which are of direct relevance to the control of the outbreak.

The Nigerian deployments led to the identification of a wide range of research questions, and opportunities for capacity building which will help to strengthen Nigeria's capacity for Lassa fever control. Actioned research studies arising from the deployment include a study to investigate groups, geographic areas and symptoms associated with delayed presentation for care among Lassa fever cases. The purpose of the study is to identify targets for health promotion activities in order to encourage early care seeking in future outbreaks and reduce the Lassa fever mortality rate. The deployments provided opportunities for capacity building in the areas of epidemiological analyses, interpretation and reporting, data management, case management, laboratory diagnostics and logistics. These capacity building activities have reportedly led to sustained improvements in workforce practices in Nigeria. Support was given at the national level, but also, critically, at the subnational level.

Table 5. Lassa fever research projects implemented in Nigeria and Sierra Leone

	Discipline	Title	Country
1	Clinical	Cardiovascular function and ribavirin pharmacokinetics and pharmacodynamics in Lassa fever: a prospective cohort study	Sierra Leone & Nigeria
2	Clinical	How can we improve case management of Lassa fever? A prospective study of cardiovascular function and ribavirin pharmacokinetics and pharmacodynamics.	Nigeria
3	IPC	A Mixed Methods Analysis of Personal Protective Equipment and Infection Prevention Control Policies for Lassa Haemorrhagic Fever in Nigeria. To produce evidence-based, effective, affordable and sustainable advice for Nigeria CDC guidelines	Nigeria
4	Microbiology	Identification by TaqMan array card system and MinION sequencing of co-circulating pathogens that are clinically indistinguishable from Lassa fever during seasonal Lassa virus outbreaks in Nigeria: a retrospective study	Nigeria
5	Microbiology	Development and testing of an innovative oral fluid serology assay to identify past infection with Lassa fever Virus	Sierra Leone & Nigeria
6	Social science	Promoting earlier presentation of patients with Lassa fever: Health seeking behaviour and Lassa fever admissions in Sierra Leone	Sierra Leone
7	Epidemiology	Factors associated with time to presentation to a healthcare facility for Lassa fever cases, Nigeria 2018 to 2019	Nigeria

8		A prospective cohort study of Lassa fever patients in Sierra Leone: establishing a partnership for future multidisciplinary Lassa fever research" (ID EPIDZK3812)	Sierra Leone

What worked particularly well?

The integration of outbreak response, research and capacity building into a single model led to significant synergies which will go some way to enable sustainable health system strengthening, in particular in Nigeria where it will help the International Health Regulations (IHR) to be met.

The implementation of the research programme in both Nigeria and Sierra Leone has facilitated front-line capacity building, particularly in the area of laboratory diagnostics and clinical research. The UK-PHRST sequencing project was used to support a successful application by the NCDC to the Global Fund for the provision of laboratory sequencing equipment. The UK-PHRST trained NCDC laboratory staff on the use of this equipment as part of the sequencing project, and the project plans to donate a small amount of equipment to the national Lassa fever reference laboratory to enable them to conduct their own sequencing for future projects. In addition, as part of this project, the UK-PHRST conducted training on the basics of sequencing, and its use during outbreaks, as well as biosecurity and biosafety training. The sequencing project may inform revisions to the Nigerian National Lassa Fever Testing Algorithm. The results of the project may also inform the strengthening of the Lassa fever case definition in Nigeria. The UK-PHRST laboratory research in Nigeria will strengthen national laboratory surveillance and biosecurity capacity, which will help Nigeria to address a number of gaps identified by the Joint External Evaluation (JEE). As part of the implementation of the clinical research studies in Nigeria, local clinicians are being trained on clinical research methodologies to enable them to develop the skills necessary to independently lead clinical research. Similar trainings and capacity building have happened in Sierra Leone.

What were the challenges?

Contextual factors in both Nigeria and Sierra Leone impacted on UK-PHRST activities in country. The 2019 deployment to Nigeria was complicated by coinciding with national elections. Due to security concerns, the FCO imposed restrictions on travel to Nigeria during the elections which delayed the deployment.

Issues around community distrust, sub-optimal engagement of local partners and other contextual factors impacted on the implementation of the research programme in Sierra Leone. The 2015 Ebola epidemic in Sierra Leone has adversely impacted on public trust and care-seeking behaviour at the KLFU. The number of admissions to the unit has declined to such a low level that the UK-PHRST was only able to recruit a couple of patients into their research studies. MSF opened a new hospital in Kenema and were supposed to refer adult patients to the KLFU for treatment, but so far the MSF hospital is treating paediatric patients only and so referrals are not occurring.

How aligned was the UK-PHRST contribution to the programme outcomes?

The work of the UK-PHRST in Nigeria will help to increase the speed and quality of response to Lassa fever outbreaks in Nigeria, will increase capacity for outbreak detection, prevention and control, and will support the earlier detection of potential threats in Nigeria. It will also strengthen the global evidence base for the identification, treatment and control of Lassa fever.

The work of the UK-PHRST has led to the development and strengthening of tools and processes for Lassa fever identification, prevention and control. Strengthening the Lassa fever case definition and the process for case investigation will support with case identification and will increase the sensitivity of the

Lassa fever surveillance system. Strengthening processes for data reporting, analysis and for the generation of epidemiological reports will increase the completeness and timeliness of the provision of surveillance data and the usefulness of that data to identify and respond to outbreaks and to inform Lassa fever control measures. Identification of high-risk groups and high-risk geographic areas for Lassa fever will enable the targeting of control measures which should help to reduce Lassa fever related morbidity and mortality. Strengthening national capacity for laboratory sequencing of infectious diseases will enable Nigeria to monitor a wider range of pathogens and will facilitate the earlier detection of potential health threats. Strengthening procedures for the use of personal protective equipment, and for IPC will help to reduce healthcare associated infections.

What is there to be learnt?

Combining outbreak response, research and capacity building into a single package, implemented through a multidisciplinary consortium approach via bilateral deployments enables a highly effective, agile and synergistic approach; however, there is scope to further capitalise on this.
The multidisciplinary consortium design of the UK-PHRST and its ability to work directly with countries has conferred several advantages that have strengthened their performance in country. The UK-PHRST has supported outbreak response, research and capacity building activities across a wide range of domains, including logistics. Deploying though a bilateral agreement to Nigeria enabled the UK-PHRST to arrive up to two weeks earlier than their counterparts deployed through GOARN, to work directly with Nigerian staff, and to respond directly to the needs of the NCDC. Consortium members have leveraged their involvement in other projects and networks to support the work of the UK-PHRST. For instance, the UK-PHRST teamed up with the PHE IHR project to deliver laboratory trainings in next generation sequencing, which was necessary for both the implementation of the Lassa fever project and the IHR project's work on monkeypox.

In order to most effectively address identified research questions and capacity building needs, the UK-PHRST will need to tap into wider networks and a broader skills base. Many identified research questions have not yet been implemented as research projects. It is likely that the large volume of research questions identified during the Nigerian deployments is beyond what the core deployment team could realistically implement on their own. Both Nigerian deployments identified a series of research questions and capacity building needs relating to zoonotic infection, environmental transmission routes and zoonotic surveillance, which would require input from currently unrepresented disciplines such as One Health experts, specialists in zoonotic and environmental epidemiology and ecologists.

Sustainable and long-term capacity building often requires ongoing input and support over a longer timeframe; this longer-term support does not necessarily need to be provided by the UK-PHRST but may require the forging of stronger collaborative links between other UK and international actors to ensure that opportunities for capacity building are taken. A data management SOP developed during the first deployment in 2018 was not fully implemented and required updating to reflect changes and gaps in surveillance reporting processes. This necessitated further support from the UK-PHRST during the second deployment, to revise the SOP, to provide training and to support implementation at the subnational and national level. During the second deployment, the PHE IHR team, who are present in Nigeria, were identified as potential partners who could provide ongoing support to the NCDC to help them develop exceedance thresholds for their Lassa fever surveillance data, and this piece of work was passed on to them. This was done on an informal basis, at the initiative of the deployment team, rather than through any formal mechanism for ensuring longer-term in-country follow-up.

The UK-PHRST research programme in Nigeria has developed considerable opportunities for capacity building and for demonstrating the value of the UK-PHRST, although this has yet to be fully exploited. For some of the research studies, Nigerian counterparts were given opportunities to comment on research protocols and to support ethics application; however, there is further scope to give them a more active role in research activities. In particular they could be given a more hands-on role in protocol

development and data analysis which would strongly support in-country capacity building for research. The study to investigate delayed presentation for care seeking will be used to inform targeted activities to promote care seeking for Lassa fever among groups at higher risk of severe outcomes. The impact of these health promotion activities could be evaluated by repeating the study in the next Lassa fever season. This could potentially demonstrate the impact of the UK-PHRST activities on Lassa fever morbidity and mortality and demonstrate the value of doing research during outbreaks.

Annex 23 List of Deployments

	Country	Outbreak	Date of agreement to deploy	Date of deployment	Date of end of deployment	Number deployed	Mode of deployment	Team members deployed	Brief summary
1	Ethiopia	Acute Watery Diarrhoea	13.04.2017	19.04.2017	16.05.2017	3	GOARN	• Hilary Bower (senior epidemiologist) • Alex Salam (case management) • Thomas Waite (consultant epidemiologist)	A Request for assistance from GOARN was responded to by UK-PHRST with two epidemiologists and one case management specialist deploying for four weeks. This was in response to an outbreak of acute watery diarrhoea in the Somali region of Ethiopia.
2	Nigeria	Meningitis	28.04.2017	04.05.2017	01.06.2017	3	GOARN	• Helen Maguire (senior epidemiologist) • Maria Saavedra-Campos (field epidemiologist) • Jason Busuttil (microbiologist)	The UK-PHRST deployed two epidemiologists and one microbiologist for four weeks to support the meningitis outbreak in Nigeria. This was via a request from GOARN in close collaboration with colleagues from Nigeria Centre for Disease Control.
3	Sierra Leone	surveillance for cholera and Typhoid	18.08.2017	20.08.2017	28.09.2017	7	bilateral	• Benedict Gannon (Microbiologist) • Maria Saavedra-Campos (Epidemiologist) • Sonal Shah (Microbiologist) • Hilary Bower (Epidemiologist) • Matt Knight (Logistician) • Hikaru Bolt (FETP Epidemiologist)	Following heavy rains and a mudslide in Freetown, there was an increased risk of water-borne disease outbreaks. The Government of Sierra Leone contacted HMG/UK-PHRST directly to support enhanced disease surveillance and laboratory operation. The UK-PHRST deployed a team of seven public health experts (two Microbiologists, two epidemiologists, two field epidemiology training fellows and one field logistician). The UK-PHRST Director deployed to provide senior coordination for two weeks.

								• Monique Pereboom (FETP Epidemiologist) • Daniel Bausch (UK-PHRST Director - Coordination)	
4	Madagascar	Pneumonic and bubonic plague	03.10.2017	04.10.2017	08.11.2017	3	GOARN	• Olivier le Polain de Waroux (Epidemiologist) • Alex Salam (Clinical Case Management) • Hilary Bower (Epidemiologist)	The UK-PHRST deployed to Madagascar in October and November 2017 through GOARN in support of the response to an outbreak of pneumonic plague affecting primarily two large urban centres, Antananarivo (the capital) and Toamasin, a coastal town. The UK-PHRST arrived in country at the very beginning of the international response to the outbreak and deployed for five weeks. Two epidemiologists and one clinician were deployed to support the Epidemiology & Surveillance and Clinical Management response pillars respectively.
5	Bangladesh	Diphtheria	15.12.2017	16.12.2017	19.01.2018	3	UK EMT	• Emilio Hornsey (Senior Infection Prevention and Control Nurse) • Ashley Sharp (FETP Epidemiologist) • Anna Kuehne (Field Epidemiologist)	The UK-PHRST deployed to Bangladesh with the UK EMT through DFID. This was as part of the international response to an outbreak of diphtheria that was occurring in the Rohingya refugee camps South of Cox's Bazaar. The UK EMT deployed at the same time as other international teams were scaling up their capacity to respond to the crisis. One Field Epidemiologist, one Infection, Prevention and Control Nurse and one Field Epidemiology Training Fellow were deployed for between one and four weeks.

6	Bangladesh	surveillance for outbreak response (multiple diseases)	22.01.2018	01.02.2018	20.03.2018	3	GOARN	• Olivier le Polain de Waroux (Senior Epidemiologist) • Emilio Hornsey (Senior Infection Prevention and Control Nurse) • Anna Kuehne (Field Epidemiologist)	The UK-PHRST deployed to Bangladesh in February and March 2018 at the request of GOARN/WHO to support the response to a large diphtheria outbreak in the refugee camps in Cox's Bazar, as well as the wider needs for IPC, surveillance, public health information and outbreak response in the context of the humanitarian crisis. Two epidemiologists and one Infection, Prevention and Control Nurse were deployed for between five and seven weeks.
7	Nigeria	Lassa fever	22.02.2018	27.02.2018	31.03.2018	4	bilateral	• Hilary Bower (Epidemiologist) • Elizabeth Smout (FETP Epidemiologist) • Alex Salam (Clinical researcher/case management specialist) • Matt Knight (Logistician)	At the request of the Nigerian Government, via the Nigeria Centre for Disease Control (NCDC), the UK-PHRST deployed a team consisting of an epidemiologist, FETP fellow, case management specialist and a logistician. The Terms of Reference were to support field-level interventions in case management, surveillance, case investigation and to supply logistics in the three hotpot states of Edo, Ondo and Ebonyi and capital-level data analysis and intervention strategy. The team deployed for a total of 5 weeks.
8	DRC (Equateur)	Ebola Virus Disease	Unknown	28.05.2018	10.07.2018	3	GOARN	• Olivier le Polain de Waroux (Senior Epidemiologist) • Hilary Bower (Epidemiologist) • Patrick Keating (Data Scientist)	Following a request for assistance issued by GOARN, UK-PHRST deployed a team to Equateur province, DRC to support the development and strengthening of early warning systems, contact tracing activities, active case finding, teaching, training, data management and analysis.

9	Rwanda	Ebola Virus Disease (preparedness)	16.11.2018	21.11.2018	20.12.2018	2	bilateral	• Daniel Kitching (Emergency Preparedness Manager) • Matt Edmunds (Field Epidemiology Training Fellow)	In collaboration with the UK Emergency Response Department, UK-PHRST deployed a senior Emergency Preparedness expert as well as FETP Fellow to Kigali. This was in response to a WHO request for assistance with establishment of an Emergency Operations Centre.
10	Geneva (WHO HQ)	Ebola Virus Disease (DRC support)	Unknown	10.12.2018	2.2019	2	GOARN	• Nicola Love (FETP fellow) Rebecca Hams (FETP fellow)	UK-PHRST (FETP fellows) deployed to provide analytical and data management support to the incident management team (IMST) in WHO HQ Geneva on the ongoing Ebola Virus disease outbreak in North Kivu, DRC
11	DRC (North Kivu)	Ebola Virus Disease	Oct-18	04.08.2018	*Ongoing as of October 2019*	multiple	GOARN	• Daniel Bausch (UK-PHRST Director) • Olivier le Polain (Senior Epidemiologist) • Fanny Chereau (Field Epidemiologist) • Thibaut Jombart (Data Scientist) • Annelies Gillesen (Research Nurse) • Patrick Keating (Data Scientist) • Christopher Jarvis (Data Scientist, Reservist) • Alex Salam (Case Management) • Emilio Hornsey (IPC) • Hilary Bower (Field Epi)	A series of UK-PHRST deployments through GOARN to support the MoH and WHO response to the Ebola virus disease outbreak in North Kivu. UK-PHRST Deputy Director of Operations led the team approach. This included responding to the needs in the field, coordination and management of the analytical cell and epidemiological analytical strategy. UK-PHRST personal were identified and brought in as required to support the epidemiological analytical cell.

12	Nigeria	Lassa fever	Feb-19		20.02.2019	20.03.2019	3	bilateral	• Matt Knight (Field logistician) • Nastassya Chandra (FETP Epidemiologist) • Hikaru Bolt (Reserve Epidemiologist)	In collaboration with the Nigerian Centre for Disease Control, UK-PHRST deployed one epidemiologist, one FETP fellow and the UK-PHRST field logistician to Nigeria in response to epidemic level transmission of Lassa virus.
13	Bangladesh	Acute Watery Diarrhoea	Nov-19				1	GOARN	• Joseph Timothy (Field Epi Reservist)	*No further information available at time of reporting*

Annex 24 Detailed List of Stakeholders Interviewed

Type of Stakeholder		Organisation Name	Job Title/Role	Name	Further Details
UK-based GHS Stakeholders	UK-PHRST Staff	PHE	Director, UK-PHRST	Daniel Bausch	
		PHE	Programme Manager	Susan Ismaeel	
		LSHTM	Programme Manager	Thom Banks	
		PHE	Deputy Director, Operations and Senior Epidemiologist	Olivier LePolain	
		LSHTM	Deputy Director for Research	Anna Seale	
		LSHTM	Social Scientist	Hana Rohan	
		LSHTM	Epidemiologist	Hilary Bower	
		LSHTM	Data Scientist	Patrick Keating	
		PHE	Senior/Lead Microbiologist, UK-PHRST	Ben Gannon	
		PHE	Field Logistician	Matt Knight	
		PHE	Epidemiologist	Fanny Chereau	
		PHE	Co-director, UK Field Epidemiology Training Programme	Dr Thomas Waite	
		University of Oxford	Clinical Researcher	Alex Salam	
		University of Oxford	Research Nurse	Annelies Gillesen	
		PHE	FETP scientific coordinator	Ioannis Karragiannis	
		PHE	IPC Specialist	Emilio Hornsey	
		LSHTM	Scientist	Sonal Shah	
		LSHTM	Programme Officer	David Hucks	
		PHE	Operations Manager	Katie Carmichael	
		PHE	Logistics Manager	Lizzie McFarland	
		PHE	Communications lead	Laura Woodward	
	UK-PHRST (Reservist) and FETP Cohort	PHE	Microbiologist (Reserve)	Laura Campbell	
		PHE	Field Epi (Reserve)	Hikaru Bolt	
		LSHTM	Modeller and analyst	Thibaut Jombart	

		PHE	FETP 2017 Cohort	Elizabeth Smout	
		PHE	FETP 2017 Cohort	Matt Edmunds	
		PHE	FETP 2018 Cohort	Nastassya Chandra	
	GHS Delivery Team	NIHR	Senior Programme Manager, Global Health	Nicola Commander	
		NIHR	Assistant Director, Infrastructure and Faculty, NIHR CCF	Mike Rogers	
		DHSC	Head of Programme Management Office, Global Health Security	Fran Walker	
		DHSC	Head of GHS Preparedness	Helen Tomkys	
		DHSC	GHS Policy Lead	Jacqueline Chivers	
		DHSC	Global Health Security Deputy Director	Nick Adkin	
	UK-PHRST Project Board Members	LSHTM	Former Deputy Director of Research, UK-PHRST	Prof Jimmy Whitworth	
		PHE	Deputy Director - Field Service, National Infection Service	Isabel Oliver	
		DFID	Chief Scientific Adviser, DFID	Charlotte Watts	
		DFID		Jonathan Barden	
		PHE	Emergency Preparedness Manager, National EPRR Team	Daniel Kitching	
		DFID	GHS policy lead for DFID	Daniel Carter	
		DFID UK	Humanitarian Advisor, HSOT	Phillipa (Pip) Millard	
	Other UK-PHRST Consortium Partner GHS Stakeholders	PHE	Emeritus Medical Director	Paul Cosford	
		PHE	Director Global Public Health	Neil Squires	
		PHE	Head of Global Health Security	Tina Endericks	
		PHE	Consultant in Global Public Health	Ebere Okereke	
		Chatham House		Brian McCluskey	
		LSHTM		Peter Piot	
		PHE	National Infection Service	Sharon Peacock	
		PHE	Director: Research, Translation & Innovation	Prof Miles Carroll	
		PHE	Consultant Senior Epidemiologist	Dr Bernie Hannigan	

	Other UK GHS	UK- MED	Outbreak Response	Rachel Fletcher	
	UK research collaborator	Inst. of Development Sciences	Research fellow	Annie Wilkinson	
		DFID		Dr Cathy Roth	
		KCL	Senior Lecturer, Psychology of Emerging Health Risks	Dr James Gideon Rubin	
		LSHTM	Professor of Infectious Disease Modelling	Dr Karl Blanchet	
		LSHTM	Professor of infectious disease epidemiology	Professor John Edmunds	
		LSHTM	Chair of Emerging Infectious Diseases	Prof Judith Glynn	
		LSHTM	Professor of Diagnostics Research	Prof Martin Hibberd	
		LSHTM		Prof Rosanna Peeling	
		University of Oxford	Professor of Emerging Infectious Diseases and Global Health	Peter Horby	
		University of Oxford		Lyndsey Castle	
		University of Oxford		Emmanuelle Denis	
Regional and International GHS Stakeholders	Regional PH Organisation	AFENET	AFENET (logistics and travel)	Gana Chinyere	
		PHE	PHE IHR Coordinator, Africa CDC	Ashley Sharp	
		Africa CDC	Project Officer. Contact for the Africa CDC	Dr Sheila Shawa	
	UN/WHO International	WHO Headquarters	Health Emergency Officer, Medical Epidemiologist	Dr. Margaret Lamunu	
		WHO GOARN	Technical Officer	Armand Bejtullahu	
		WHO GOARN	Senior HR Lead	Kathryn Ochieng	
		WHO GOARN	Public Health Consultant	Jeremy Kiff	
		WHO	Director Health Emergency Information & Risk Assessment	Oliver Morgan	
		WHO	Team Leader, Learning Solutions and Training (LST)	Philippe E. Gasquet	
LMIC-based or focussed key informants	Other GHS related programmes (UK ODA-funded)	PHE IHR Programme	Country Lead & Senior Public Health Advisor	Ṣọla Aruna	Nigeria
		PHE IHR Programme	Country Lead & Senior Public Health Advisor	Martin Muita	Sierra Leone
		PHE IHR Programme	Country Lead & Senior Public Health Advisor	John Forde	Ethiopia
	UN/WHO national	WHO Madagascar	WHO Representative and Incident Manager	Dr. Charlotte Ndiaye	Madagascar

	UN/WHO national	WHO Sierra Leone	Previous WHO Laboratory Lead Sierra Leone	Dr Ekaete Tobin	Sierra Leone
		DFID Nigeria	Health Advisor DFID in Nigeria	Chris Lewis	Nigeria
		DFID DRC	Health Advisor in DRC	Annette Luker	Congo DRC
		DFID - Sierra Leone	Team Leader for Basic Services, Human Development	Penny Walker-Robertson	Sierra Leone
		DFID DRC	DRC Ebola Response Humanitarian adviser – Ebola Team Whitehall UK	Jean Francois Briere	Congo DRC
		DFID DRC	Senior lead on Ebola - Africa Division, DFID London	Saul Walker	Congo DRC
		DFID Mozambique	Humanitarian Operations Manager, Humanitarian & Stabilisation Operations Team	Nigel Young	Mozambique
	National Government	Befelatanana Hospital	Plague Response Contact	Dr Mihaja	Madagascar
		Ministry of Health & Sanitation, SL	Director, Kenema Government Hospital Lassa Ward	Donald Grant	Sierra Leone
		Ministry of Health & Sanitation	MOHS Clinical Lab Director	Dr Zikan Koroma	Sierra Leone
		Ministry of Health & Sanitation	Surveillance Pillar - Department Lead	Charles Kiembe	Sierra Leone
		Ministry of Health & Sanitation	Deputy Chief Medical Officer, Public Health	Dr. Thomas T. Samba	Sierra Leone
	National PH Organisation	Pasteur Institute	Directeur de la Veille Sanitaire et de la Surveillance Épidémiologique	Ratsitorahina Maherisoa	Madagascar
		Pasteur Institute	Directeur	Andre Spiegel	Madagascar
		Pasteur Institute		Dr Rindra	Madagascar
		Nigerian CDC	CEO Nigeria CDC	Dr Chikwe Ihekweazu	Nigeria
		Nigerian CDC	Senior Laboratory Technical Advisor	Anthony Ahumibe	Nigeria
		Nigerian CDC	Epidemiologist - Lassa outbreak lead 2019	Chioma Dan-Nwafor	Nigeria
		Pasteur Institute		Minoarisoa Rajerison	Madagascar
	LMIC Academic Partners	KCL Sierra Leone Partnership	Head of Department- Community Health	Abdul Karim Mbawah	Sierra Leone
		KCL Sierra Leone Partnership	Previous Country Director - end 2018	Daniel Youkee	Sierra Leone

		University of Sierra Leone - College of Medicine and allied Health Sciences (COMAHS)	Vice- Chancellor	Foday Sahr	Sierra Leone
		University of Sierra Leone - College of Medicine and allied Health Sciences (COMAHS)	Coordinator (BSc Med Lab sciences) and Senior Lecturer, Laboratory Science and Chemical Pathology	Isatta Wurie	Sierra Leone
		Connaught Hospital	BSc Student	Sorie Samura	Sierra Leone
		University of Khartoum	Dean of Medical Laboratory Sciences at Karary University Khartoum and Deputy Director of the National Public Health Laboratory of Sudan.	Mubarak el Karsany	Sudan
		Royal Institute of Topical Medicine in Philippines	Researcher at Research Institute for Tropical Medicine	Ava Kirsty Sy	Philippines

Annex 25 Overview and Geographical coverage UK Global Health programmes

The UK-PHRST is a UK government asset and is one of several actors that comprise the overall HMG GHS programme; as such, UK-PHRST operates within the broader landscape of UK actors working to strengthen epidemic preparedness and response in LMICs. The HMG GHS programme is a series of projects on health system strengthening, rapid response and the development of medicines and vaccines to tackle emerging health threats that is funded by the Department of Health and Social Care (DHSC). In addition to the UK-PHRST, the DHSC funds five GHS programmes. These include the International Health Regulations (IHR) Strengthening project, the Fleming Fund, the UK Vaccine Network project, the Global AMR Innovation Fund, and AMR International.[92] Of these projects, the IHR Strengthening project and the Fleming Fund support front-line health system strengthening activities in LMICs, they engage in activities which are similar to the UK-PHRST and they have a footprint in countries where the UK-PHRST currently works or could potentially work.

DFID is a highly influential actor in international development and Global Health and has a strong in-country presence in multiple LMICs. DFID runs a series of bilateral and regional programmes and also has development partnerships across more than thirty countries in sub-Saharan Africa, the Middle East and Central and South Asia (see Annex 11).[93] DFID funds the Tackling Deadly Diseases in Africa Programme (TDDAP), which is supporting the development and use of Integrated Disease Surveillance and Response systems, including event-based surveillance and the development of functional public health emergency operations centres and in-country rapid response teams (at national and district level) in eligible low- and middle-income countries. DFID is a member of the UK Emergency Medical Team (EMT) (along with UK-Med, the UK Fire and Rescue Services and Humanity and Inclusion). The UK EMT deploys teams to humanitarian crises, including infectious disease outbreaks, at 24 hours' notice.

Overview of DFID bilateral and regional programmes, development partnerships and TDDAP priority countries

Bilateral programmes	Regional programmes	Development partnerships	TDDAP eligible countries (priority countries in bold)
Afghanistan, Bangladesh, Democratic Republic of Congo, Ethiopia, Ghana, Indonesia, Iraq, Jordan, Kenya, Kyrgyzstan, Lebanon, Liberia, Malawi, Mozambique, Myanmar, Nepal, Nigeria, Occupied Palestinian Territories, Pakistan, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, Syria, Tajikistan, Tanzania, Turkey, Uganda, Yemen, Zambia, Zimbabwe	Africa Regional, Caribbean, Middle East and North Africa, Overseas Territories, Sahel	China India South Africa	Algeria, Angola, Benin, Botswana, Burkina Faso Burundi, Cape Verde, **Cameroon**, Central African Republic, **Chad,** Comoros, Congo, Republic of the Congo, Democratic Republic of the Congo, **Cote d'Ivoire,** Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, **Mali,** Mauritania, Mauritius, Morocco, Mozambique, Namibia, **Niger**, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Tunisia, **Uganda,** Zambia, Zimbabwe

Overview of DHSC funded GHS Programmes of most relevance to the UK-PHRST

[92] UK-PHRST strategic framework document.
[93] https://www.gov.uk/government/organisations/department-for-international-development

DHSC funded GHS Programme	Target countries	Programme overview
International Health Regulations Strengthening Project [94]	Ethiopia, Nigeria, Sierra Leone, Pakistan Zambia and Myanmar	Strengthening of national public health systems to facilitate timely and effective prevention, detection, response and control of public health threats. Development of sustainable institutional linkages, long-term partnerships and professional relationships at country and regional level.
Fleming Fund[95]	Burkina Faso, Ghana, Nigeria, Senegal, Sierra Leone, Eswatini, Malawi, Kenya, Tanzania, Uganda, Zambia, Zimbabwe, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Timor-Leste, Indonesia, Laos, Papua New Guinea, Vietnam	The Fleming Fund will support over 30 countries in developing the tools and policies needed to tackle antimicrobial resistance (AMR), and will have established sustainable surveillance systems in 23 countries. The project involves strengthening of lab systems and surveillance systems.

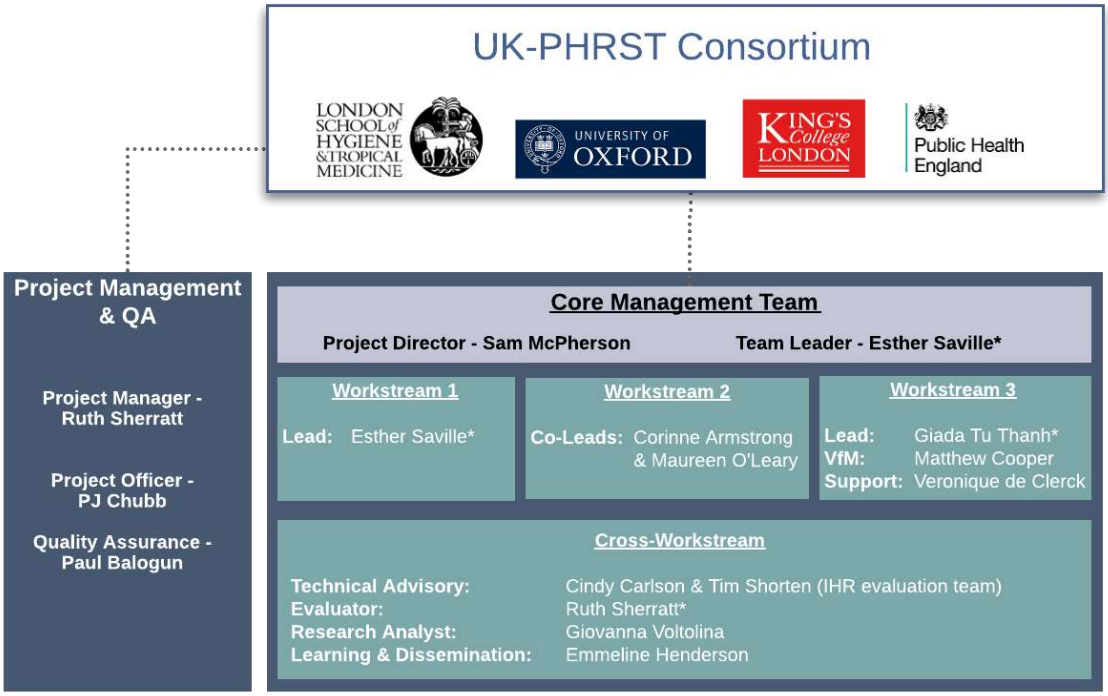
[94] Department of Health and Social Care, International Health Regulations Strengthening Project Annual Review, Global Health Security Programme, 05 November 2018.
[95] https://www.flemingfund.org/.

Annex 26 Overview of the Evaluation Team

The team has a relatively simple management structure.

Core team members and their responsibilities are summarised in Figure 4 and Table 6 below.

Figure 4. Evaluation Team



** See table below for details on changes to roles with effect from 1st January 2020 as a result of Esther Saville leaving the evaluation*

Table 6. Team members and responsibilities

	Responsibilities
Esther Saville *Team Leader and Workstream 1 Lead until 31 Dec 19*	• **Overall management of the evaluation** • Ensure that all aspects of the evaluation are delivered on time and meet quality standards • Lead on data collection and analysis related to design, model and strategy
Ruth Sherratt *Project Manager Cross-workstream Evaluator, and Workstream 1 Lead from 1 Jan 2020*	• Overall management of the evaluation • Working with the team leader to ensure deliverables are submitted to a high quality and by deadline • Cross-workstream evaluator and support • Look at the effectiveness of the UK-PHRST model and approach • Look at the relevance of UK-PHRST activities to the desired goals • Co-leading on data collection and analysis for the deployments/outbreak response focal area • Leading analysis related to capacity building
Corinne Armstrong *Workstream 2 Co-lead*	• Leading on the analysis of the implementation arrangements and processes employed by UK-PHRST, including enabling and constraining factors that affect programme effectiveness and impact • Co-leading on data collection and analysis related to the capacity building focal area
Maureen O'Leary *Workstream 2 Co-Lead*	• Leading on the analysis of the implementation arrangements and processes employed by UK-PHRST, including enabling and constraining factors that affect programme effectiveness and impact • Co-leading on data collection and analysis related to the capacity building focal area
Giada Tu Thanh *Workstream 3 Lead, and Team Leader from 1 Jan 2020*	• Lead on analysing the performance of UK-PHRST, the effectiveness, sustainability and accountability of UK-PHRST's activities • Lead data collection and analysis related to the research focal area

	Responsibilities
Veronique du Clerck Workstream 3 Evaluator	• Support with analysing the performance of UK-PHRST, the effectiveness, sustainability and accountability of UK-PHRST's activities • Co-leading data collection and analysis in this workstream, especially in relation to accountability
Matthew Cooper *VfM lead*	• Leading on VfM component under Workstream 3: Performance
Cindy Carlson	• Provide input from the PHE IHR Strengthening Project evaluation
Tim Shorten	• Provide input from the PHE IHR Strengthening Project evaluation

Annex 27 Overview of Implementation of Programme Activities and Achievement of Programme Outputs

Deployments activity progress against logframe outputs

1.1 OUTPUT INDICATOR: Trained cadre of experts (epidemiology, laboratory, social science, clinical management, infection prevention and control, data science, logistics, research) deployable within 48h for outbreak response. Training includes UNDSS basic security, UNDSS advanced security, induction, SAFE, SAFE+ and a deployment course		
Year 3 Milestone: ≥ 95% of core team in post and ready for deployment; 8 reservists recruited; 67% (4/6) FETP fellows trained and available to deploy 4/6 FETP trained ready to deploy at 48h notice within 6 months of start date	ACHIEVED AND EXCEEDED	100% of Core Deployment Team in post and ready for deployment (10/10). First phase of recruitment to the UK-PHRST Reserve Cadre was completed in 2018/19: • 75% of reservists in post and ready for deployment (9/12) • 100% of FETP in post and ready for deployment (13/13) Nov 2018, a five-day bespoke residential deployment training course took place for the first time attended by reservists, FETP and CDT
Year 4 Milestone: ≥ 100% of core team in post and ready for deployment; > 15 additional reservists recruited; 67% (4/6) FETPs trained and available to deploy	LIKELY	

1.2 OUTPUT INDICATOR: Laboratory capacity supported in response through development of a "suitcase laboratory" for deployment in ODA-eligible countries		
Year 3 Milestone: Field test of case laboratory in the UK	ACHIEVED	Flight case laboratory ready for deployment and tested in the UK. However, deployment has not happened in 2018/19 due to the absence of a formal request
Year 4 Milestone: Deployment of flight case laboratory in at least one ODA-eligible country A fully operational container laboratory capable of performing outbreak diagnostics, research and capacity building activities	FEASIBLE	Multi-agency overseas trial postponed to FY5 - Q1/2. Deployment dependent on GOARN or bilateral requests Delay to siting of laboratory due to slow progress on negotiation and completion of formal agreements – Container laboratory strategy agreed internally with UK-PHRST – visit in July to agree/modify strategy to align with MoHS

1.3 OUTPUT INDICATOR: Sharing of lessons learnt from deployment within the team to continuously improve performance		
Year 3 Milestone: All deployments with formal debrief and lessons identified; procedure for on-call response to incidents, accidents or near-miss developed.	ACHIEVED	Achieved for all deployments undertaken
Year 4 Milestone: All deployments with formal debrief and lessons learnt; procedure for on-call response to incidents, accidents or near-miss adapted/updated to respond to lessons learnt	ACHIEVED LIKELY	

1.4 OUTPUT INDICATOR: Monitoring framework developed and implemented into operational processes		
Year 3 Milestone: Monitoring framework developed	ACHIEVED	Monitoring framework developed. Review of the logframe (Oct 2018) and implementation plan developed as per monitoring framework
Year 4 Milestone: Monitoring (internal) completed quarterly	LIKELY	Quarterly monitoring completed against the implementation plan and reported to the Project Board Implementation plan reviewed at 6 months (Sept/Oct 2019)

1.5 OUTPUT INDICATOR: Value for money assessed through benchmarking salaries and training costs of those deployed (including backfilling of reservists) against hiring external consultants		
Year 3 Milestone: Net benefit	ACHIEVED	Completed
Year 4 Milestone: Net benefit	LIKELY	Value for money assessment conducted as part of the mid-point external evaluation ongoing

Research activity progress against logframe outputs

OUTPUT INDICATOR 2.1 Research infrastructure established (strategy, protocol development, tools)		
Year 3 Milestone: Implementation of research strategy; > 2 research protocols developed/adapted to guide early, mid- and end-of-outbreak investigation; review of existing tools completed	ACHIEVED	Research strategy outlined as part of overall UK-PHRST strategy. Five priority research themes identified and research underway in all 5 themes.
Year 4 Milestone: Development and undertaking of >1 cross-disciplinary research project in line with strategy; >3 research protocols developed/adapted to guide early, mid and end-of-outbreak investigation; >1 impact case study of a tool developed/adapted or in use	LIKELY FEASIBLE	**In progress:** Review of TSC membership and recruit additional members Monthly minuted meetings of the TSC shared with the GHS Delivery Team. Revisions to ToRs being made with strategy discussion planned 5+ operational research projects underway 7+ operational research projects underway

		Further 3 new operational research proposals to be undertaken >80% of budget already allocated for 2019/20
OUTPUT INDICATOR 2.2 External funding to build on the UK-PHRST platform		
Year 3 Milestone: >2 funding applications submitted (to complement UK-PHRST budget) for research or capacity building projects from external sources (named UK-PHRST investigator included).	ACHIEVED	• Application to Wellcome for the Research Tool for Collaborative Social Science in Epidemics • Application to Resolve To Save Lives for Positive Deviance Study on Outbreaks
Year 4 Milestone: >3 funding applications submitted (to complement UK-PHRST budget) for research or capacity building projects from external sources (named UK-PHRST investigator included).	LIKELY	4 externally funded research projects completed: • Modelling of vaccine interventions for epidemic diseases (NIHR, PI John Edmunds, ends March 2021) • Anthropology of vaccination for outbreaks (NIHR, PI Shelley Lees, Jimmy Whitworth Co-I, ends March 2021) • Electronic data tools for outbreaks (NIHR, PI Chrissy Roberts, Jimmy Whitworth Co-I, ends March 2020) • African Coalition for Research and Clinical Trials in Outbreaks (EDCTP, PI Peter Horby, Jimmy Whitworth lead for LSHTM, ends March 2022) 1 new application in progress: • Rapid response molecular diagnostics for Crimean-Congo Haemorrhagic Fever

OUTPUT INDICATOR 2.3 Knowledge sharing through presented and published analyses of evidence on optimal approaches to outbreak response		
Year 3 Milestone: >3 articles or abstracts submitted for publication or international presentation; >6 presentations on UK-PHRST or its work at meetings and conferences where audience includes key stakeholders	ACHIEVED	
Year 4 Milestone: >6 articles or abstracts submitted for publication or international presentation >9 presentations on UK-PHRST or its work at meetings and conferences where audience includes key stakeholders	LIKELY FEASIBLE	**In progress:** • ≥6 articles published, all with submitted manuscript available online • ≥9 presentations given to audiences including practitioners and policy makers • ≥3 manuscripts or abstracts with findings that can be used to inform outbreak investigation and response • Publications with open access • Deposition of all publications on prepublication websites

		• UK-PHRST publications linked to/from the LSHTM website • Evidence of research used to inform practice internally/externally or guide national/international recommendations (impact)

Capacity building activity progress against logframe outputs

3.1 Change in surveillance capacity in hub sites in ODA-eligible countries		
Year 3 Milestone: East African hub site identified, and capacity development plan made; implementation commenced	PARTIALLY ACHIEVED	Milestone to be reviewed as decision not to develop an East Africa hub but instead work through networks. Capacity building activities, through the strengthening of lab capacity, training at COMAHS, and research in Kenema have all led to increased preparedness and response capacity.
Year 4 Milestone: Milestone not updated in the logframe from the old one *'South-east Asia hub site identified and capacity development plan made; implementation commenced'*	LIKELY FEASIBLE	**In progress** • Training supported in at least two ODA-eligible countries in west Africa with at least 75% of participants meeting learning outcomes; Teaching and training and workshops conducted in Sierra Leone at COMAHS and University of Sierra Leone • Training and workshops conducted in other west African countries, including Nigeria and The Gambia • Assessment of needs and opportunities for UK-PHRST contribution to building capacity • Training and workshops conducted in east African countries (e.g. Uganda, Sudan) • Assessment of needs and agreement of contribution of UK-PHRST to Africa CDC training programme • Participation in Africa Technical working group on training and support to build and act on a competency framework • Adapt the UK-PHRST Field deployment course and run a pilot in an ODA-eligible country
3.2 Change in trained personnel for outbreak prevention, detection and response in ODA-eligible countries		
Year 3 Milestone: Training supported in >1 ODA-eligible country with >75% of participants meeting learning outcomes	ACHIEVED	Country-specific training provided in three ODA-eligible countries with additional training provided through networks (WHO AFRO, Africa CDC).

Year 4 Milestone: Training supported in >2 ODA-eligible countries with >75% of participants meeting learning outcomes	LIKELY FEASIBLE UNFILLED	**In progress** • Training continued and expanded at selected institutions in west African countries, Sierra Leone at COMAHS, Sierra Leone University, Nigeria and The Gambia. • Training initiated at selected key institutions in east Africa to meet learning (e.g. Uganda, Sudan) • Training supported at Africa CDC • Adapt the UK-PHRST Field deployment course and run a pilot in at least 1 ODA-eligible country

3.3 Change in capacity through shared knowledge with key stakeholders in-country and globally		
Year 3 Milestone: Annual UK-PHRST workshop with partners in an ODA-eligible country	ACHIEVED ONGOING	Ongoing. Two workshops undertaken in 2018/19, including one in Sierra Leone with West African institutions and one in Uganda with East African institutions.
Year 4 Milestone: Annual UK-PHRST workshop with partners in an ODA-eligible country	ACHIEVED LIKELY FEASIBLE UNLIKELY	**In progress:** Network and skills building workshops in ODA-eligible countries Explore establishing regional capacity and network activities in clinical research and genomic sequencing • Support sustainable development of the Epidemic Response Anthropology Platform • Conduct 2 network building workshops of Social Scientists to enhance regional capacity • Assessment of opportunities for developing regional CREDO and/or sequencing capacity building workshops Teaching on outbreaks enhanced at LSHTM especially for distance learning • Roll out of Massive Online Open Course (MOOC) on Outbreaks in LMICs and advertised on LSHTM website • Contribute to existing modules at LSHTM to enhance teaching on outbreak detection, prevention and response Develop proposal for training in ODA-eligible countries

3.4 Development of a competency framework for training staff in LMICs		
Year 3 Milestone: Competency framework agreed upon by any	NOT ACHIEVED	Not achieved. Start during year 4.

new partner with whom UK-PHRST engages for capacity development in LMICs		
Year 4 Milestone: Competency framework agreed upon by any new partner with whom UK-PHRST engages for capacity development in LMICs	FEASIBLE UNLIKELY	**In progress:** Review existing competency frameworks, determine skills gaps and training required for ODA-eligible countries • Conduct at least one training workshop in a key ODA country with at least 75% of participants meeting learning outcomes • Training Needs Assessment report written • Competency framework reviewed and signed off by key stakeholders (UK-PHRST, GOARN, NCDC, etc.) • Training workshop report and evaluation