A conceptual framework for analysing partnership and synergy in a global health alliance: Case of the UK Public Health Rapid Support Team (UK-PHRST)

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Key messages:

- Although partnerships are becoming an increasingly popular way of addressing complex global health challenges, a reality exemplified by the response to the COVID-19 pandemic and previous infectious disease epidemics, many partnerships have difficulty realising synergy.
- Analysing partnership functioning offers insights on whether, and how, collaboration works and can also assist funders and partners to improve synergy and optimise the return on their investment.

- Adding to the empirical literature on partnership functioning in global health alliances we adapted, applied and refined a framework to analyse partnership functioning in the UK Public Health Rapid Support Team (UK-PHRST), a government-academic partnership, dedicated to outbreak response and research in low- and middle-income countries.
- This practical framework and analysis approach can be used to analyse and strengthen the management of global health partnerships to realise synergy.

Authorship

PR is a Doctorate of Public Health (DrPH) candidate at LSHTM and conducted this research in partial fulfilment of the DrPH programme with supervision support provided by MH and JP. No author from a LMIC was involved in the research.

Authors contributed as follows; Conception or design of the work: PR; Data collection: PR; Data analysis and interpretation: PR, MH, JP; Drafting the article: PR; Critical revision of the article: PR, MH, JP; Final approval of the version to be submitted: PR, MH, JP.

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Conflicts of interest

PR is a DrPH candidate at LSHTM but is not directly affiliated with the UK-PHRST and conducted this research in partial fulfilment of the DrPH programme. PR currently works for the WHO health

emergencies programme (WHE). JP has previously received funding for research on epidemics from the UK-PHRST and is an advisor for the social science work of the team.

Ethics approval and consent to participate

The LSHTM ethics committee approved this research in September 2017. All study participants were volunteers, received participant information sheets informing them of the study aims and objectives, provided written consent and agreed to have their anonymized quotations included in publication.

ABSTRACT

Partnerships have become increasingly important in addressing complex global health challenges, a reality exemplified by the COVID-19 pandemic and previous infectious disease epidemics. Partnerships offer opportunities to create synergistic outcomes by capitalising on complimentary skills, knowledge and resources. Despite the importance of understanding partnership functioning, research on collaboration is sparse and fragmented, with few conceptual frameworks applied to evaluate real-life partnerships in global health. In this study, we aimed to adapt and apply the Bergan Model of Collaborative Functioning (BMCF) to analyse partnership functioning in the UK Public Health Rapid Support Team (UK-PHRST), a government-academic partnership, dedicated to outbreak response and research in low- and middle-income countries. We conducted a literature review identifying important elements to adapt the framework, followed by a qualitative case study to characterise how each element, and the dynamics between them, influenced functioning in the UK-PHRST, exploring emerging themes to further refine the framework. Elements of the BMCF that our study reinforced as important included the partnership's mission, partner resources (skills, expertise, networks), leadership, the external environment, management systems, and communication. Additional elements identified in the literature and critical to partnership functioning of the UK-PHRST included governance and financial structures adopted, trust and power balance, organisational culture, strategy, and evaluation and knowledge management. Because of

the way the UK-PHRST was structured, fostering team cohesion was an important indicator of synergy, alongside collaborative advantage. Dividing the funding and governance equally between organisations was considered crucial for maintaining institutional balance, however, diverse organisational cultures, weak communication practices and perceived power imbalances compromised team cohesion. Our analysis allowed us to make recommendations to improve partnership functioning at a critical time in the evolution of the UK-PHRST. The analysis approach and framework presented here can be used to evaluate and strengthen the management of global health partnerships to realise synergy.

INTRODUCTION

PARTNERSHIP FUNCTIONING

Within global health, partnerships involving multisectoral, multidisciplinary collaborative action are increasingly posed as a solution to complex problems, such as infectious disease epidemics and pandemics, that cannot be solved by one sector or organisation alone (Mitchell et al., 2000, Brinkerhoff, 2002, Wiggins et al., 2020). Partnerships offer the potential to capitalise on complimentary skills, knowledge and resources to achieve mutual goals and can foster more creativity and broader analyses of challenges and opportunities (Wandersman, 2005, Haugstad, 2011). In global health, partnerships are often formed between academic or private sector research organisations and public health implementing organisations to bridge the gap between research, development, and implementation, helping to create contextually adapted and more appropriate interventions. One such partnership is the United Kingdom's Public Health Rapid Support Team (UK-PHRST) which was established in 2016 to combat epidemics in low- and middle- income countries (LMICs). It is a partnership between the government agency, Public Health England (PHE), and an academic consortium led by the London School of Hygiene and Tropical medicine (LSHTM), with the University of Oxford and King's College London (KCL) as partners (London School of Hygiene & Tropical Medicine, 2016).

In global health, much is made of the form which partnerships take, whether this is public-private, north-south, or government-academic. For example, in the COVID-19 pandemic and previous epidemics, partnerships and networks have formed to better incorporate research findings into policy and ensure global equity and access to tools such as diagnostics, vaccines and treatments (GloPID-R, 2020, World Health Organization, 2020). In recent years the localisation agenda being championed in humanitarian responses sees international organisations partnering with local actors to enable them to reach more beneficiaries, create more contextually appropriate interventions and promote sustainability, particularly in protracted crises (World Humanitarian Summit, 2016). However, a growing body of literature within organisational management suggests that what really matters are the functional elements and dynamics within partnerships (Corbin, 2006, Wiggins et al., 2020).

While the field of partnership research continues to grapple with understanding *how* successful organisations collaborate, one fundamental point of consensus is that successful partnerships produce outcomes that could not be achieved by any of the partners alone, creating synergy (Brinkerhoff, 2002, Corbin, 2006, Corbin et al., 2008, Huxham, 1996, Lasker et al., 2003, Lasker et al., 2001, Vangen et al., 2013, Wandersman, 2005, Weiss et al., 2002, Corbin et al., 2018). Synergy is defined as "combining the individual perspectives, resources and skills of the partners, [so that] the group creates something new and valuable together - a whole that is greater than the sum of its parts" (Lasker et al., 2001) (p. 184). Synergy can result in more creative, diverse and practical ways of strengthening relationships with the broader environment (Lasker et al., 2001, Weiss et al., 2002). A successful partnership is thus one where "collective working arrangements are entered into with the intention to function at some higher order than the partners are capable of without one another" (Corbin, 2006) (p. 13).

The expectation that partnerships achieve collaborative advantage through synergy, is however, rarely evaluated. As partnerships can be especially challenging to manage, synergy cannot be assumed, and the innate complexity of partnerships makes them difficult to evaluate (Corbin, 2006, Mitchell et al., 2000). Other possible outcomes include that effects are simply additive, in which the collaboration does not achieve anything more than the partners would do if operating independently, or that effects are antagonistic, in which partners' resources (such as time, funds, or reputation) are depleted, without any positive outcomes (Corbin et al., 2008). All elements and dynamics of partnership functioning are potential sources of antagony, including negative leadership, poor communication, unclear roles, and mistrust, and several studies that have examined partnerships for antagony found some functioning losses (Corbin et al., 2017, Corbin et al., 2014, Corbin et al., 2008, Corbin et al., 2012, Corbin et al., 2013). Understanding negative elements and dynamics within a partnership is as important as identifying positive elements, so that they can be addressed, thus improving partnership functioning and enhancing synergy (Corbin, 2006, Corbin et al., 2008). Periodic evaluation of partnership function can therefore help identify whether the partnership is functionally viable and worthy of further investment.

While partnership has been examined by researchers from diverse disciplines and theoretical perspectives (Corbin, 2006, Huxham, 2003) there is little connection between these literatures (Lasker et al., 2003, Huxham, 2003). Although several theoretical frameworks for analysing partnerships and synergy are described in the literature, not all have been applied to evaluate functioning partnerships in global health, those that have are outlined in Table 1 (Brush et al., 2011, Butterfoss et al., 2009, Corbin, 2006, Corbin et al., 2014, Corbin et al., 2018, Corbin et al., 2008, Kegler et al., 2010, Kegler et al., 2012, Koelen et al., 2012, Lasker et al., 2001, Parent et al., 2009). Perhaps the most widely used framework for analysing partnership functioning, which has been empirically tested in health promotion programmes, is the Bergen Model of Collaborative Functioning (BMCF) (Figure 1) (Corbin, 2006, Wandersman, 2005, Corbin et al., 2014, Corbin et al.,

2008, Haugstad, 2011). The BMCF, developed in 2006 by Corbin et. al., focusses on the processes of partnership, and, unlike most others in the literature, acknowledges both positive and negative interactions and 'normalizes' negative functioning which can prompt partners to track and improve elements (Corbin et al., 2014, Corbin et al., 2008).

As a systems model with input, throughput, output and feedback components (Corbin et al., 2008), the BMCF framework defines key inputs to a partnership as its mission, partner resources (their various forms of skills, expertise and networks) and financial resources. Throughputs relate to the collaborative context which shapes how inputs interact positively or negatively as they work on the maintenance (administrative tasks) and production (relating to the collaborative mission) activities of the partnership. These inputs are further and iteratively shaped by the leadership, roles and procedures and communication practices which the organisations adopt to work together within the partnership. The outputs of the collaborative process, which may be evaluated as additive, antagony or having achieved synergy, feed back into the collaborative context, demonstrating the impact that success or failure can have on functioning and further resource acquisition (Corbin et al., 2008)

Table 1: Frameworks identified in the literature for analysing partnership functioning

Figure 1: The Bergen Model of Collaborative Functioning (BMCF)

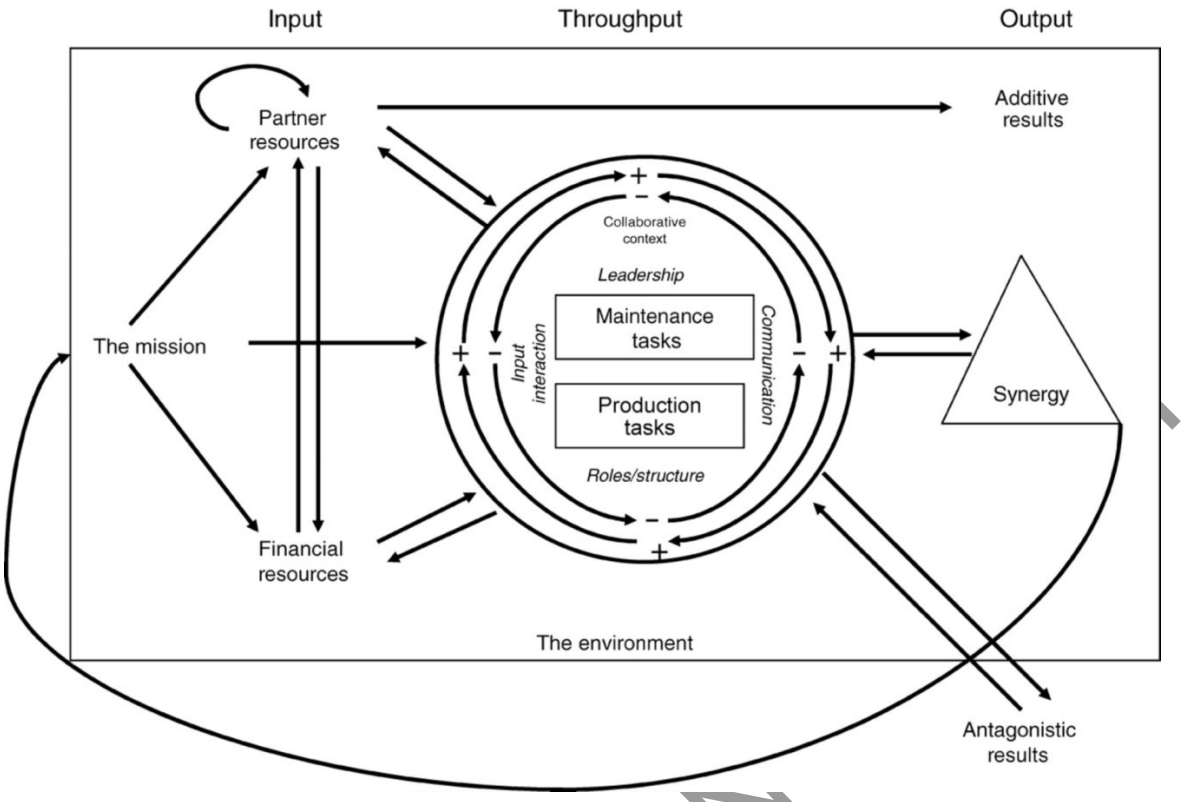

Figure 1: The Bergen Model of Collaborative Functioning (BMCF)

THE CASE – THE UK PUBLIC HEALTH RAPID SUPPORT TEAM (UK-PHRST)

The West Africa Ebola Virus Disease outbreak in 2013-16 highlighted the inadequacies of the global health community to both respond to, and conduct essential research, in complex outbreaks. In the UK, this prompted creation of the UK-PHRST (London School of Hygiene & Tropical Medicine, 2016), a standing team of public health experts, scientists and clinicians available to rapidly respond to disease outbreaks according to a triple mandate of response, operational research and capacity building. When this research began in September 2017, the UK-PHRST was transitioning from a protracted interim stage to the permanent phase of the project and was in year two of a five-year funding cycle. The Director, in position for six months, had begun development of a strategic framework to guide the long-term vision and programme of work. The permanent staff had just been recruited, some of whom had been part of the interim team. Up until April 2018, the team had

deployed seven times to respond to disease outbreaks in Ethiopia, Nigeria, Sierra Leone and Bangladesh, and had conducted various operational research projects.

In this study, we aimed to adapt, apply and refine the BMCF to analyse partnership functioning in the UK-PHRST, and to propose future application of our analysis approach and adapted framework.

METHODS

LITERATURE REVIEW AND FRAMEWORK SELECTION

To analyse partnership functioning of the UK-PHRST, we initially conducted a review of the partnership functioning literature to identify existing frameworks that could be used. We examined seven frameworks (Table 1), and because of its focus on the processes of partnership and acknowledgment of both negative and positive interactions, we chose the BMCF, a systems model, as the most appropriate framework to adapt and apply to our analysis.

ADAPTATION OF FRAMEWORK THROUGH LITERATURE REVIEW

Drawing on other findings from the literature review, we adapted the BMCF to create a conceptual framework that captured additional partnership elements we believed to be relevant for the study of the UK-PHRST.

REFINEMENT OF FRAMEWORK BY APPLYING TO THE CASE

We applied the adapted framework for analysing partnership functioning of the UK-PHRST by exploring the positive and negative elements and dynamics of the inputs, throughputs and outputs. Data from interviews with members of the UK-PHRST reinforced findings of the literature review and also allowed us to explore emerging themes to further refine the framework.

This study was part of a larger project which explored the design and early experiences of the UK-PHRST, based on review of key documents, observation of meetings, and in-depth interviews with 19

individuals. The research took place in 2017-18, during Years 2 and 3 of the five-year UK-PHRST programme of work. Interview participants included individuals involved in the conceptualisation and establishment of the partnership (3), senior management team (SMT) (3), core management and deployable team (CDT) involved in both the interim and permanent phase (5), representatives of key external stakeholders within the UK (including the Department of Health (DH), National Institute of Health and Department for International Development (DFID)) and globally (Global outbreak alert and response network - GOARN) (4) as well as members of the academic steering committee (ASC) and broader academic consortium (4).

We used a structured interview guide (Topic Guides included in Supplementary Information) and coding framework to systematically collect data on all elements included in our adapted framework. Open-ended questions and an iterative approach to data collection and analysis also enabled identification of emerging themes, which were then used to further refine the framework. Data sorting and framework analysis was facilitated by NVivo 11 software (NVivo, 2017). We performed a stakeholder analysis as part of the exploration of the external environment (Varvasovszky et al., 2000). Using responses from specific questions included in the topic guides we stratified stakeholders according to interest versus power/influence in the UK-PHRST (Figure 3 Supplementary information).

In this study, data from different sources were triangulated and validated across multiple data sources, including interviews, observations and document review, to ensure that findings were corroborated and any weaknesses in the data compensated for by the strengths of other data, thereby increasing the validity and reliability of the results.

ETHICAL CONSIDERATIONS

The ethics committee of the authors institute approved this research in September 2017. All participants were informed of the study aims and objectives using a participant information sheet and all signed consent forms.

RESULTS

We maintained the overall inputs/throughputs/outputs structure of the BMCF in our framework. Key features of the BMCF which interviews reinforced as relevant for our case study of the UK-PHRST included the importance of the mission, leadership, external environment, and communication on partnership functioning. However, we found some limitations of the BMCF which we addressed through adapting this framework (see Figure 2 and Table 2 which describes each element in our adaptation). Elements of partnership functioning previously identified as critical in the literature were combined in the original BMCF under rather opaque umbrella terms such as 'maintenance tasks', 'input interactions' and the 'collaborative context'. The latter, for example, encompassed organisational cultures and interactions between partners, including power, trust, conflict and relationships, which our interviews with UK-PHRST members emphasised as important in our case study, and we felt deserved more attention in the global health sphere, so explicitly included in our adaptation (Corbin et al., 2008). Similarly, we highlighted, and made more explicit, two key maintenance tasks that kept the UK-PHRST partnership functioning in vital, practical ways: 'management processes' and 'evaluation and knowledge management' (Corbin et al., 2008). 'Strategy' was a new feature we added to the throughputs and we included 'team cohesion' as an output because it featured as an important overall marker of UK-PHRST partnership success. Below, we present theory from the literature, and evidence from the case, justifying selection of each element included.

Figure 2: Adapted conceptual framework for analysing partnership functioning of the UK-PHRST presenting the inputs, throughputs and outputs.

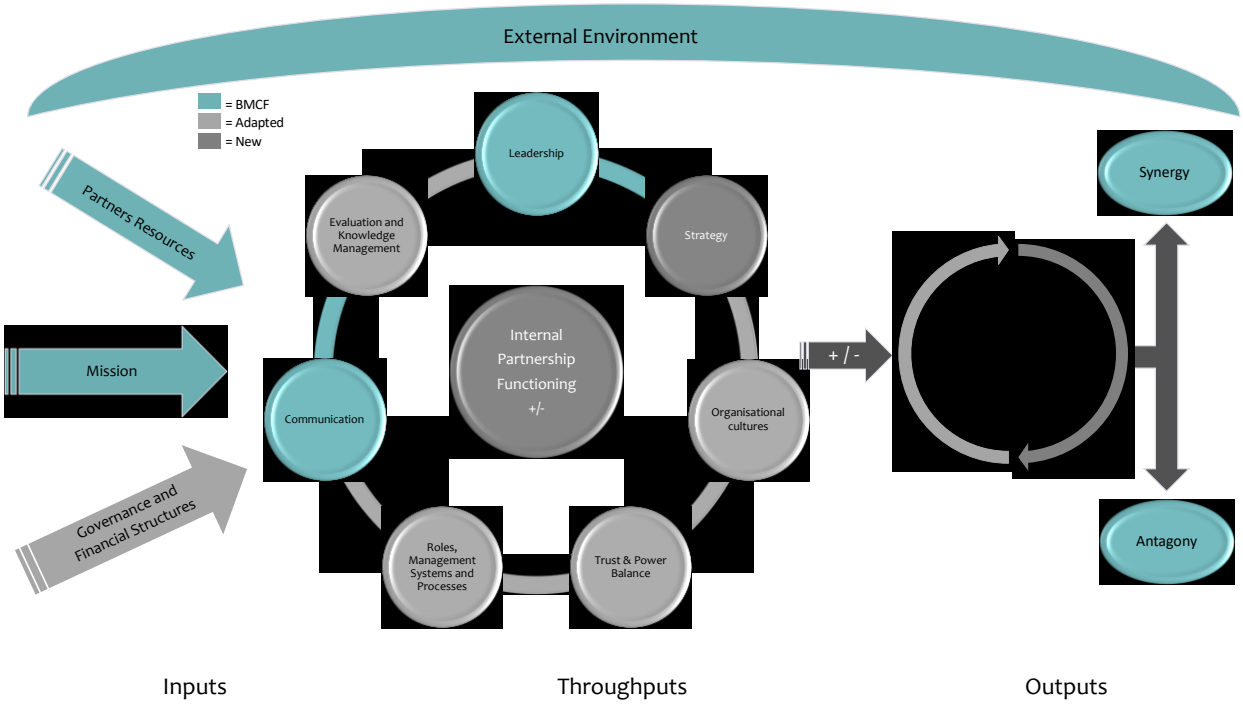

Figure 2: Adapted conceptual framework for analysing partnership functioning of the UK-PHRST presenting the inputs, throughputs and outputs.

= Elements originally from BMCF, = Elements identified through literature review and inter s, = elements emerging through case study data

Table 2: Elements of the adapted Framework: describing each of the components included in the adapted framework and their source (included in BMCF, reinforced or adapted through literature review or case study data, or emerged as key theme through case study data).

FRAMEWORK ELEMENTS REINFORCED BY THE LITERATURE AND UK-PHRST ANALYSIS

Key elements of partnership functioning which were explicit in the BMCF and reinforced by our case study included mission, partners' resources, external environment, leadership, communication and roles and management systems. More detailed supporting information on the positive and negative elements and dynamics in the partnership functioning of the UK-PHRST are elaborated in Table 3.

Table 3: Summary of the positive and negative elements and dynamics in the partnership functioning of the UK-PHRST

Mission

Mission encompasses the partnership's purpose, shared vision and aligned goals. There is general consensus that partnership mission is an important factor in uniting partners (Corbin, 2006, Corbin et al., 2018, Corbin et al., 2013, Koelen et al., 2012, Parent et al., 2009, Vangen et al., 2013). Data from our case study supported this by illuminating the central role the mission played within the UK-PHRST (Raftery et al., 2021). Both members of the team and external observers considered the team's mission to be novel in the global epidemic response context as it aimed to combine outbreak response and capacity-building with operational research in a triple mandate. Since it drew on complementary strengths of the partner organisations, this integrated mandate was considered key to its collaborative advantage (Raftery et al., 2021). The mission had some inherent weaknesses too, with many respondents reporting that it was challenging for the small team to implement as team members had to straddle all roles of researcher, responder and trainer. Overall, however, informants felt the mission was sufficiently ambitious that, if successful, it would enable the partnership to achieve synergy:

> *'I think that's a challenge but also an opportunity for us to demonstrate why it is useful to put research next to the operational aspects, and we need to rise to that challenge to do that.'*
>
> (Member of ASC involved in establishing the team).

Partners' resources

Partner resources in the BMCF include the skills, knowledge, power, commitment and connections that individuals within the institutions contribute (Corbin, 2006). Within the UK-PHRST, each partner

was seen as a leader in their respective fields able to contribute not only their time, but also substantial expertise and personal connections which were complementary.

> *'we recognised that each of the partners had a different set of skills to bring, and different interests in what the organisation we were creating would do'* (Member of ASC involved in establishing the team)

In addition, when operating overseas, the UK-PHRST could capitalise on pre-existing infrastructure, relationships and systems of the three universities' (LSHTM, Oxford, KCL) well-established overseas research centres, a significant advantage of marrying the organisations (Raftery et al., 2021).

External environment

Partnerships depend on their relationships and interactions with the broader environment in the economic, political, social, and cultural context which includes external stakeholders, governmental policies and decisions, media and public interest (Scott, 2007, Haugstad, 2011). The complex environment within which the UK-PHRST operated had a critical impact on driving its establishment, shaping its governance structures, and continued to influence the partnership functioning and strategic direction as the partnership matured and evolved (Raftery et al., 2021). For instance, the partnership needed to work within the UK Government's changing domestic and foreign governance structures, existing and emerging global epidemic response architecture, and norms and governance systems of the academic institutions involved (Raftery et al., 2021).

Key stakeholders including international and national organisations and donors such as the World Health Organization (WHO), GOARN, PHE and DFID, had a major influence on research priorities and operational aspects of outbreak response. As the majority of requests for deployments came through GOARN it was important that UK-PHRST leadership were involved in discussions driving GOARN plans and priorities. Maintaining close relationships with WHO, especially WHO's Health Emergencies Programme (WHE), allowed the UK-PHRST to influence their trainings, guidelines,

research priorities and mechanisms for outbreak preparedness and response. In addition the WHO Blueprint document (World Health Organization, 2016), which outlines global priority areas of research and development for diseases of epidemic potential, helped to guide and focus the UK-PHRST research strategy.

> *"I think the reality is most of the time we will deploy as part of a GOARN team rather than independently and bilaterally. The way they operate and the way they do things dictates a lot of what we do. But being part of this family and the discussions that go on, I think we're going to start to be in a more influential picture of actually helping to shape that direction"* (SMT member).

Interestingly, bilateral deployments arranged directly with host governments were preferred by some team members as they seemed to enable more effective implementation of the triple mandate, as approvals and administration processes were less bureaucratic, allowing them to deploy faster, act more autonomously, have more of an influence on the response and get research set up faster. However, the team's leadership ultimately reinforced the importance of integrating within the existing global architecture for outbreak response by working closely with WHO, GOARN and stakeholders and governments in affected countries. Understandably, this created some concerns around visibility and recognition as the UK-PHRST (Raftery et al., 2021).

Interest in the relatively new project within the UK, emerged in interviews as an opportunity for the UK-PHRST to achieve its mission and build synergy. Our informants were hopeful that relationships with DFID and PHE country offices could be strengthened to build the profile of the UK-PHRST, encouraging more opportunities and research collaborations in host countries. Country level presence of PHE and DFID staff presented opportunities for gathering epidemic intelligence and early warning information on emerging risks and establishing research and training partnerships. Host governments, universities and public health actors in LMIC's were identified as key stakeholders, and building relationships enhanced opportunities for implementing the mission and

promoting longer-term impact through evidence informed policy (Raftery et al., 2021). For example, a meeting held by the UK-PHRST in Freetown, Sierra Leone on "Partnering for outbreak preparedness and response" proved a successful way of engaging host governments and building awareness and relationships at a local level. These relationships with global and national institutions therefore, influenced both the impact of the UK's investment in the team, as well as the ability of the UK-PHRST to translate their expertise and the evidence they generated into policy and practice.

Leadership

Collaborative leadership with vision, strategic planning skills, the ability to build bridges between different cultures, resolve conflict and encourage open dialogue and consensus building have been shown to contribute to synergy, and was reinforced by the UK-PHRST findings (Weiss et al., 2002, Jones et al., 2011, Silvia, 2010, Corbin, 2006, Lasker et al., 2003, Mitchell et al., 2000, Lasker et al., 2001, Wandersman, 2005).The director was responsible for leadership, management, coordination, delivery, and evaluation of the UK-PHRST objectives and fostering a single cohesive team with unity of purpose (UK-PHRST, 2018). Considered a 'neutral outsider', being neither from the UK nor having worked previously for either organisation, he brought a wealth of experience in both academic and outbreak response roles. The deputy director, experienced in research and capacity building, was previously employed at LSHTM and joined the team from that institution. Both were described by our informants as excellent fits for their roles which helped to build credibility and reputation of the team both within the UK and globally, important in the dynamic context.

Vangen et al. (2006) observed that leadership must be capable of both nurturing relationships and of being directive, a view shared by the UK-PHRST leadership (Vangen et al., 2006). The leadership style of the UK-PHRST was characterised as authoritative and collaborative with the Director valuing strong direction, transparency and respect (Goleman, 2000). Staff members described the leadership as visionary and fair, valuing independence and initiative.

'I think that I do need to be directive. I think that the UK, the powers that be hired me to be a strong leader and to give this vision and form. . . But I think it's important to listen to people. I think it's also important to be very transparent and clear. I think ultimately people will respect and follow leaders that are honest and direct with them.' (Director)

When leadership creates an environment where diverse perspectives, resources, and skills can be combined in innovative and creative ways, this positively influences partnerships (Weiss et al., 2002, Corbin, 2006, Corbin et al., 2008). The UK-PHRST's leadership recognised that the team was comprised of highly skilled and experienced individuals which enabled members to be granted high levels of individual autonomy, particularly when on deployment. This was valued by team members, too:

'When we're deployed, our level of autonomy from the UK-PHRST [Leadership] is very high. Essentially, they trust us to get on with the job and do what we think is right [...] although, they're always there for advice [...]. The issues, when you're on the ground, are complex. You don't want people necessarily interfering from outside and telling you how to do your job, [if] they don't understand what the issues are.' (CDT member)

Communication

Communication, both internally and with the team's external stakeholders emerged as a crucial element of the UK-PHRST's success, however, it appeared to be under-prioritized in the early days, creating antagony. Corbin (2006) proposed that face-to-face meetings are crucial for positive functioning because they provide a forum for relationship building, which our informants highlighted as a weakness in the UK-PHRST (Corbin, 2006). Respondents reported various issues, including meetings being cancelled, email lists not being standardised and inclusive, academic partners not consistently attending meetings and meetings being too rushed and focused on reporting at the expense of any future planning.

'It's not intentional that people get missed out in certain communications. But, a lot of conversations have been held informally, and then you need to remember that people that are not based in London might not know everything. So I think there's work around that.'

(SMT Member)

A strategy for stakeholder engagement and communications was being drafted at the time of data collection, however this did not include internal communication or communication with the public, which can be a critical component of partnership dynamics at the early formational stage (Downing, 2008). At the time of data collection, the UK-PHRST did not have a designated website. There were plans to establish one, however, there were differing views and opinions about what the website should do and who should manage it, which led to inevitable stalling of progress. Further investment was required to ensure research findings were disseminated and translated to inform outbreak response policy and practice in LMIC's.

Roles and Management Systems

For optimal partnerships, roles and responsibilities need to be determined at the beginning, understanding that these may change as the partnership evolves (Frisby et al., 2004). Within the UK-PHRST, roles assigned to each of the partners matched their interests and strengths, enabling optimum contribution to the partnership. PHE managed the operational aspects of emergency deployments while LSHTM managed the research component. However, the process of operationalising the partnership was compounded by delays in the early days and the partnership agreement, governing the roles and responsibilities within the partnership, was only finalised in year two of operations (Raftery et al., 2021). By 2018, a comprehensive organogram outlining the team structure and its fit within broader organisations and the UK global health architecture had not yet been circulated. A basic organogram of the core team was available but did not detail internal lines

of authority or accountability, creating potential for conflict, confusion and compromised decision making when leadership were absent.

A key strength of the UK-PHRST was seen to be its structure of a standing, core team of experts who could deploy rapidly early in the outbreak and set up research early on in epidemics, supporting the mission (Raftery et al., 2021). However, different human resources grading systems between the two main organisations resulted in staff being on different salaries for the same job type, creating potential conflicts. Additionally, logistics and information technology (IT) on deployment was highlighted as a major challenge as the two systems did not integrate well in the field causing communication challenges on international deployments.

FRAMEWORK ELEMENTS ADAPTED THROUGH ANALYSIS OF THE UK-PHRST

Elements which were not explicit in the BMCF but essential for our case study included governance and funding structures, organisational culture, trust and power balance and evaluation and knowledge management.

Governance and funding structures

Governance refers to the structures of power and decision making between organizations in a partnership and influences the extent to which partners' perspectives, resources and skills can be combined (Lasker et al., 2001). Typically considered as part of internal 'maintenance tasks' in the BMCF, the UK-PHRST's governance structures were defined by, and imposed on, the team by the funders, and we combined governance with financial resources as an input in our adapted model. The governance and funding structures that needed to be adopted for the UK-PHRST affected the power balance and how it functioned internally, as summarised below (Raftery et al., 2021).

The UK-PHRST was funded by UK Overseas Development Assistance (ODA) with a 5-year (2016-21) budget of £20 million and the governance and funding structures enforced by the donors split reporting responsibilities equally between the two key partner organisations. An annual lump sum was issued from the Treasury to Department of Health for PHE, while for LSHTM , the team's budget was managed as a research grant overseen by NIHR. While reporting followed the same DH-PHE and NIHR-LSHTM parallel arrangement, ultimately, the UK-PHRST Director was accountable to the PHE Medical Director for delivery against the strategy and annual plans. PHE's Medical Director then reported all UK-PHRST spending to DH, which was, in turn, accountable to the Treasury for the total amount, ensuring compliance to ODA funding rules. Because of the complicated governance structures and the fact that the programme was still in the early stage of operationalisation, reporting requirements felt cumbersome and complex for many members of the SMT (Raftery et al., 2021). Some PHE representatives felt this split in financial and reporting governance added unnecessary complications. Additionally, the inflexible nature of annual ODA funding was seen as a challenge, both for implementing research, and managing the unpredictable nature of outbreak response.

Organisational culture

Organisational culture includes an organisation's expectations, experiences, philosophy, and values including written and unwritten rules, and is evident in the organisations' internal workings and interactions with the outside world (Handy, 1996). In the BMCF, organisational culture is considered part of the collaborative context, however, because of its prominence in the literature and importance in our case study, we added it to the adapted framework as a key throughput.

Organisational culture at the UK-PHRST appeared to be divided into two separate subcultures. PHE staff and structures, operated in a "role" culture which emphasised careful, logical work environments which were structured around clearly defined roles (Handy, 1996). Power in a role

culture is determined by position in the organisational structure, consequently decision-making can be slow, and the organisation is often bureaucratic and hierarchal. PHE staff were bound by a civil service code of conduct which limited public communication. The organisational culture at LSHTM, however, resembled a "task culture" which typically forms when teams collaborate to address specific problems or projects (Handy, 1996). Power within the team shifts depending on the mix of the team members and the status of the project. LSHTM, as a university, valued independence, autonomy, and freedom of speech.

> *'The London School doesn't have a hierarchical structure. There is a lot of appreciation of academic freedom that as long as you have evidence to support your views, you're free to express those views as you wish.'* (SMT member)

This research highlighted indications of a lack of understanding and potential collision of diverse organisational cultures within the UK-PHRST. The subculture divide, within the UK-PHRST, manifested as differences in work practices, communication strategies, behaviour and attitudes between civil service employees and academic staff.

> 'Then at PHE, where I see that it's a very institutional push, making sure the PHE image [is promoted], and it's a very different culture. For us, that makes no sense.' (Member of LSHTM ASC).

To mitigate the impact these differences had on UK-PHRST activities and outputs, the leadership were implementing a range of actions, which also sought to build a sense of team cohesion among individuals from different organisations. These included: team retreats to build trust and relationships; hot-desking where team members could work from other lead institutions to facilitate relationship building; issuing honorary contracts with secondary organisations to equalise individuals from different institutions; ensuring balance in representation and content in meetings; and promoting trust, transparency and mutual respect within the team.

Trust and power balance

Trust is a prerequisite for effective collaboration (Costa et al., 2001, Gray, 1989) and power balance is critical, yet there are often both real and perceived power imbalances between partners that tend to have a negative impact on trust and synergy (Corbin et al., 2008). While the UK-PHRST is defined as an equal partnership there are obvious imbalances in the way that it was set-up. Because reporting was to the UK government, which PHE already had an established relationship with, this introduced an element of bias.

> *'How do you maintain this bubble of neutrality? And, between all these pressures, it's practically impossible.... the UK-PHRST is accountable to the director of PHE, so there's already a bias.'*
>
> (Member of ASC)

According to a key member of the SMT involved in the team's establishment, the vision for the UK-PHRST emphasised equal power dynamics between lead organisations and a commitment to operating as a unified team, and this was reiterated throughout early proposals and strategic documents.

> *'the UK Chief medical officer (CMO) kept saying to us at every stage, "This must be a unified team, it's not PHE, it's not London School, it is a team.'*

Ultimately, therefore, while the parallel funding and governance structures the team adopted added complexity, key informants agreed that they were important to maintain institutional balance between organisations. In addition, the Director considered his position as a 'neutral outsider', a facilitating factor to help unite the team and build team cohesion.

Evaluation and knowledge management

Maintenance tasks in the BMCF includes activities that keep partnerships functioning in practical ways and support achievement of the mission through administrative tasks, such as evaluation and reporting (Corbin et al., 2008). Again, we explicitly included evaluation and knowledge management in our revised framework as it emerged as an important element in the functioning of the UK-PHRST.

The UK-PHRST had been learning and evolving over the two years, however, knowledge was not yet systematically gathered and integrated into decision-making in transparent ways. Post-deployment debriefs allowed the team to share valuable feedback on deployments including challenges and lessons. However, concerns were raised about the numbers of people included in debriefs, with members feeling uncomfortable disclosing politically sensitive information and experiences in large audiences, limiting the value of these processes. To evaluate and track performance against its operational objectives, the UK-PHRST used a theory of change and logic model, and a 'lessons identified' log was created following each deployment. Recommendations were generated based on mission reports and deployment debriefs to improve future deployments ensuring that lessons were learnt using these internal processes. However, feedback from external stakeholders to understand how the UK-PHRST are viewed internationally by partners and stakeholders they worked closely with, especially at field level, was not yet gathered systematically. Developing and implementing an evaluation and knowledge management strategy would ensure the team remains relevant and adaptable to global trends and priorities, and to guarantee that evidence is integrated, building synergy.

ADDITIONAL THEMES EMERGING FROM THE UK-PHRST ANALYSIS ADDED TO THE FRAMEWORK

Two additional themes emerged as important elements for the partnership functioning of the UK-PHRST, which were not explicitly or implicitly present in the original BMCF, and these were added to our final framework: strategy and team cohesion.

Strategy

An organisation's strategy sets out how the organisation will go about achieving their mission and designing and adopting a strategy often represents an opportunity for internal consensus-building

(Gray, 2004). Development of the strategic framework for the UK-PHRST ran from the end of 2017 until the final document was approved in April 2018. Many of our study participants, however, were not aware of the team's strategy and reported not being part of the planning process, implying that a process of consensus-building was not employed. This may negatively impact achievement of the team's mission in future and could also detract from team cohesion.

Team cohesion

Within the UK-PHRST, individuals from different organisations are employed solely for their work with the UK-PHRST, making team cohesion a crucial marker of partnership functioning, but also a challenging one, as described by this team member:

> *'I guess it would be easy to think of it as its own programme, its own team, but obviously it is, in practice, a collection of people from different institutions who don't normally, in their day to day jobs, work as a team, right? . . . People probably perceive it as a team, but we don't really function as a team.'* (CDT member)

To improve team cohesion, several team members described relatively simple adaptations that could be made to working practices, both in the UK, and abroad while on deployment, and to ensure cohesion between the different elements of the team's mission:

> *'One [way] is [...] deploying earlier [...] The earlier you deploy, the smaller the team, the more likely you are to be a team. . . [also,] cross-collaboration on our research projects. I think we should be trying to involve each other and collaborate with each other on those projects. . . having a base, perhaps, somewhere, where we do spend one day a week working in the same office. For example, hot-desking at PHE or school [LSHTM]. The other way is, obviously, us working [together] on academic papers.'*

Ultimately, facilitating these changes to overcome differences in organisational working practices and better align the team's mission, strategy and organisational culture, required strong leadership so the partnership could thrive and mature (Tuckman et al., 1977). To reflect this important theme,

team cohesion was combined with collaborative advantage to frame the outputs in our adapted framework, which ultimately led to either synergy or antagony.

DISCUSSION

Although partnerships are becoming an increasingly popular way of addressing complex global health challenges, a reality exemplified by the response to the COVID-19 pandemic and previous infectious disease epidemics, many partnerships have difficulty realising synergy. Analysing partnership functioning offers insights on whether, and how, collaboration works and can also assist funders and partners to improve synergy and optimise the return on their investment (Lasker et al., 2001). In this study, we sought to add to the empirical literature on partnership functioning in global health alliances by adapting, applying, and refining a framework to analyse partnership functioning in the UK-PHRST. Drawing from, and building on, the work of Lasker et al. (2001) on partnership synergy, below we propose and discuss future application of the analysis approach and framework presented here, to evaluate and strengthen other global health partnerships.

Identifying elements that impact partnership functioning

Maximising partnership synergy first requires identifying and understanding the elements and dynamics that positively and negatively influence its achievement (Lasker et al., 2001). Elements may vary between different partnership, but it is clear from the literature and through the findings of our case study, that certain factors are consistently important. Since our study was conducted, there have been two notable additions to the partnership functioning literature in global health including a revisiting of the BMCF by the author of the original framework to identify core elements that constituted positive partnership processes (Corbin et al., 2018), and a systematic review to assess the factors associated with synergistic multisector alliances in public health (Wiggins et al., 2020). Several factors from these studies were reinforced by our findings including; having a shared mission

aligned to the partners' institutional goals; leadership that inspires trust, confidence and inclusiveness; integrating trust building, communication and information sharing mechanisms; considering the impact of the external environment; and evaluation for continuous improvement (Corbin et al., 2018, Wiggins et al., 2020).

The approach we present here could be used to assist other partnerships to identify the elements important for their functioning, thus, adapting elements of the framework to be more relevant and appropriate, as the first step towards analysis. For example, in this study, the element of financial resources was adapted to "governance and financial structures", a more relevant element for the UK-PHRST. The financial resources available to the UK-PHRST were pre-defined by the donors and didn't have a major impact on partnership functioning. The way that the funding was channelled through the partnership, however, and the reporting and accountability mechanisms adopted, were an important determinant of partnership functioning, and the framework was adapted to reflect this. In other alliances, financial resources may be a more appropriate element, in which case, the framework can be revised. Regardless, our findings reinforce that joint ownership of funding and decision-making, equity between partners, and clarity and consensus on governance and decision-making processes are important for achievement of synergy (Lank, 2006, Corbin et al., 2008, Haugstad, 2011).

As a partnership matures, the elements which influence partnership functioning will likely adjust and evolve too, requiring further modification of the framework for subsequent evaluations. Within the UK-PHRST, for example, the nature of the mission is expected to evolve as experience is gained and as outcomes are achieved or redefined. In the early days the team prioritised response and operational research while capacity building plans were still being elaborated, but this focus was expected to shift as the team matures. In fact, a recent evaluation of the UK-PHRST recommended that the capacity building strategy be further refined and embedded to facilitate the team's

contribution to sustainable outcomes (ITAD, 2021). Governance structures too, may transform, and although this was incorporated as an input in our framework, future evaluations may conceptualise it as a throughput. Perspectives from the UK-PHRST suggested that team cohesion was critical and potentially a useful indicator of whether the partnership achieved synergy and for this initial analysis was added as an output to our framework. Subsequent UK-PHRST evaluations may position team cohesion as a throughput, encompassing essential elements of organisational culture, management processes, trust and power balance. In other partnerships with different structures and collaborative contexts, however, team cohesion may not be a relevant factor for partnership functioning analysis.

Periodic evaluation of partnership functioning to strengthen management and leadership

Periodic analysis of partnership functioning can help to distinguish synergy from forced collaboration and to ensure partners continuously improve practices and behaviours while achieving their mission (Lasker et al., 2001, Hovland, 2003). Assessing how partnerships are functioning at different stages of development can help build synergy by identifying and building on successes, responding to and learning from existing challenges and anticipating emerging issues (Corbin et al., 2018). Evaluation findings can also be shared with key stakeholders, both to foster collaboration, promote accountability, and to amplify support in the external environment, building synergy (Roussos et al., 2000, ITAD, 2020). The framework presented here, or an adapted version, can be used to evaluate and strengthen the management of other global health partnerships, to help realise their full collaborative advantage (Corbin, 2006, Weiss et al., 2002). By applying our adapted framework to the UK-PHRST we were able to make several recommendations to improve partnership functioning at a critical time in the evolution of the partnership, several of which were reiterated in a 2021 end point evaluation of the UK-PHRST (Raftery, 2018, ITAD, 2021).

The importance of acknowledging and reporting on both positive and negative elements and dynamics to maximize learning and improve future functioning, particularly in the early stages of

partnership formation, was reinforced by our findings (Corbin, 2006, Corbin et al., 2008, Corbin et al., 2013). Both positive and negative elements existed within the UK-PHRST, related to both the design of the team and its implementation, supporting the idea that overall success or failure is an outcome based on a complex set of dynamics (Corbin et al., 2008). While strong leadership drove establishment of, and maintained the partnership, many of the inevitable challenges of collaboration were not anticipated and emerged through the early implementation phase. Using this data to address the weaknesses, build on their successes, and leverage support within the external environment, the UK-PHRST can ensure that the partnership achieves its complex mission while continuing to expand and evolve. With funding for the UK-PHRST due to be renewed in 2022, following an initial one-year extension, demonstrating their overall added value in the wider global health landscape may be important, especially in the context of the COVID-19 pandemic and its economic consequences in the UK. The 2021 evaluation endorsed the UK-PHRST model and judged it to be increasingly relevant in the current context, highlighting opportunities to embed lessons learned during COVID-19 to improve impact and sustainability (ITAD, 2021).

The assumption that unequal distribution of power, diverse organisational cultures and lack of trust can have negative effects on partnership functioning and synergy was reinforced by our findings (Lasker et al., 2003). Within the UK-PHRST, dividing the funding equally between organisations was seen as crucial for maintaining institutional balance, however, challenges with diverse organisational cultures, weak communication practices and perceived power imbalance compromised team cohesion. While fostering diversity was one of the reasons and advantages of collaboration, it was also be a source of misunderstanding and conflict of values and behaviours (Eugenia, 2013, Vangen et al., 2013). In the case of the UK-PHRST, a unique organisational culture may develop over time as the team matures. The leadership could guide this process by consciously defining team values, building in trust-developing mechanisms and embedding a culture that supports the mission (Costa et al., 2001, Jones et al., 2011, Vangen et al., 2013). While creating a distinct entity may have

enabled the organisations to side-step these challenges, the collaborative advantage of joining the organisations would not have been realised.

The interests and power of stakeholders in the external environment can also be expected to evolve, so tracking these over time using stakeholder analysis may enable the partnership to prioritise and invest in important relationships. For example, to ensure support for and sustainability of the UK-PHRST, communication with external stakeholders and the UK public needed to be strengthened. In response to the 2021 evaluation, which reinforced the need "to deepen in-country networks and partnerships" and "to improve partners' awareness and understanding of UK-PHRST's mandate through an effective communications plan" (ITAD, 2021) (p.61 and p.62), UK-PHRST management have committed to expanding and strengthening their network of partners, employing stakeholder mapping to identify key gaps, and to taking measures to enhance effectiveness of external communication (UK-PHRST, 2021). In the context of the UK's currently depressed economy following the UK's exit from the European Union and the ongoing COVID-19 pandemic, public support for overseas aid spending is perceived to be waning, so an evolving public engagement approach also seems important. Regular evaluation can help to identify and mitigate any negative impacts of such large-scale changes in the external environment.

STUDY LIMITATIONS

This study was primarily qualitative in nature, collecting subjective information on the study objectives. Data was collected early in the establishment of the UK-PHRST, primarily during a period of transition from the interim to a more permanent phase, limiting both the number of relevant staff who could be interviewed and their experiences of the partnership. An impact analysis of the UK-PHRST activities was beyond the scope of this study. Interviews with external stakeholders, to assess how the UK-PHRST were viewed internationally by partners and stakeholders they worked closely with, especially at field level, was beyond the scope of the project, which was limited by time and

budget. Where possible, information was triangulated and/or validated to reduce bias and cover gaps, ensuring rigorous and systematic qualitative analysis.

CONCLUSION

While all partnerships, and the diverse contexts within which they operate, have unique features and relationships, it is clear that some critical elements and dynamics are observed consistently across partnerships. The UK-PHRST had some distinctive characteristics which played a role in how it functioned both internally and in relation to the external environment. It was a partnership between four pre-existing organisations but also functioned as an autonomous entity or 'team' with its own designated staff, mission, funding and leadership. Importantly, the two main partners, PHE and LSHTM, had complementary expertise, skills and experience which helped to achieve the mission, but diverse organisational cultures, systems and ways of working which created challenges, both at home and when operating in international emergency contexts. Despite the challenges, the added value of the government-academic partnership was recognised by our informants as a significant collaborative advantage.

We present a practical framework for examining partnership functioning using a qualitative, open-ended approach, to enable a more nuanced analysis. This framework and analysis approach can be used to analyse and strengthen the management of global health partnerships to realise synergy. More research is needed to test the framework with different partnership models, and to explore the influence of elements identified by our study on synergy, such as organisational culture, power balance and team cohesion.

REFERENCES

Mitchell, S. & Shortell, S. 2000. The governance and management of effective community health partnerships: a typology for research, policy, and practice. *Milbank Q,* 78**,** 241-89, 151.

Brinkerhoff, J. 2002. *Partnership for international development: rhetoric or results? ,* Boulder Co., Lynne Rienner Publishers.

Wiggins, B., Anastasiou, K. & Cox, D. N. 2020. A Systematic Review of Key Factors in the Effectiveness of Multisector Alliances in the Public Health Domain. *American Journal of Health Promotion,* 35**,** 93-105.

Wandersman, A., Goodman, RM., & Butterfoss, FD., 2005. *Understanding Coalitions and How They Operate as Organizations. In M. Minkler (Ed.), Community organizing and community building for health. New Brunswick, N.J.: Rutgers University Press.*

Haugstad, A. 2011. *Promoting public health in Norway: A case study of NGO – public sector partnership using The Bergen Model of Collaborative Functioning.* Master‟s program in the health professions: Health promotion and health psychology track, University of Bergen.

London School of Hygiene & Tropical Medicine. 2016. *UK global health team ready to respond to disease outbreaks in 48 hours. Available at: https://www.lshtm.ac.uk/newsevents/news/2016/uk_public_health_rapid_response.html. Accessed 20 Aug 2020.*

GloPID-R. 2020. *Global research collaboration for infectious disease preparedness (GloPID-R). Available at: https://www.glopid-r.org/. Accessed 20 Aug 2020*.

World Health Organization. 2020. *The Access to COVID-19 Tools (ACT) Accelerator. Available at: https://www.who.int/initiatives/act-accelerator#:~:text=The%20Access%20to%20COVID%2D19%20Tools%20(ACT)%20Accelerator%2C,tests%2C%20treatments%2C%20and%20vaccines. Accessed 20 Aug 2020*.

World Humanitarian Summit 2016. Committments to Action. Available at: https://www.agendaforhumanity.org/sites/default/files/resources/2017/Jul/WHS_Commitment_to_Action_8September2016.pdf. Accessed 20 Aug 2020.

Corbin, J. 2006. Interactive processes in global partnership: a case study of the global programme for health promotion effectiveness. *IUHPE Research Report Series (Vol. 1, pp. 70).* Bergen: University of Bergen.

Corbin, J. & Mittelmark, M. 2008. Partnership lessons from the Global Programme for Health Promotion Effectiveness: a case study. *Health Promot Int,* 23**,** 365-71.

Huxham, C. 1996. *Creating collaborative advantage. ,* London, Sage.

Lasker, R. & Weiss, E. 2003. Broadening participation in community problem solving: A multidisciplinary model to support collaborative practice and research. *Journal of Urban Health : Bulletin of the New York Academy of Medicine,* 80**,** 14-47.

Lasker, R., Weiss, E. & Miller, R. 2001. Partnership Synergy: A Practical Framework for Studying and Strengthening the Collaborative Advantage. *The Milbank Quarterly,* 79**,** 179-205.

Vangen, S. & Huxham, C. 2013. *Building and using the theory of collaborative advantage*.

Weiss, E., Anderson, R. & Lasker, R. 2002. Making the most of collaboration: exploring the relationship between partnership synergy and partnership functioning. *Health Educ Behav,* 29**,** 683-98.

Corbin, J., Jones, J. & Barry, M. 2018. What makes intersectoral partnerships for health promotion work? A review of the international literature. *Health Promot Int,* 33**,** 4-26.

Corbin, J., Chu, M., Carney, J., Donnelly, S. & Clancy, A. 2017. Understanding Collaboration: A Formative Process Evaluation of a State-Funded School-University Partnership.

Corbin, J., Fernandez, M. & Mullen, P. 2014. Evaluation of a Community–Academic Partnership: Lessons From Latinos in a Network for Cancer Control. *Health Promotion Practice,* 16**,** 345-353.

Corbin, J., Mittelmark, M. & Lie, G. 2012. Scaling-up and rooting-down: a case study of North-South partnerships for health from Tanzania. *Glob Health Action,* 5**,** 18369.

Corbin, J., Mittelmark, M. & Lie, G. 2013. Mapping synergy and antagony in North-South partnerships for health: a case study of the Tanzanian women's NGO KIWAKKUKI. *Health promotion international,* 28**,** 51-60.

Huxham, C. 2003. Theorizing collaboration practice. *Public Management Review,* 5**,** 401-423.

Brush, B. L., Baiardi, J. M. & Lapides, S. 2011. Moving toward synergy: lessons learned in developing and sustaining community-academic partnerships. *Progress in community health partnerships : research, education, and action,* 5**,** 27-34.
Butterfoss, F. & Kegler, M. 2009. The community coalition action theory. *Emerging Theories in Health Promotion Practice and Research***,** 237-276.
Kegler, M., Rigler, J. & Honeycutt, S. 2010. How does community context influence coalitions in the formation stage? A multiple case study based on the Community Coalition Action Theory. *BMC Public Health,* 10**,** 90.
Kegler, M. C. & Swan, D. 2012. Advancing coalition theory: the effect of coalition factors on community capacity mediated by member engagement. *Health education research,* 27**,** 572-584.
Koelen, M. A., Vaandrager, L. & Wagemakers, A. 2012. The Healthy ALLiances (HALL) framework: prerequisites for success. *Fam Pract,* 29 Suppl 1**,** i132-i138.
Parent, M. & Harvey, J. 2009. Towards a Management Model for Sport and Physical Activity Community-based Partnerships. *European Sport Management Quarterly,* 9**,** 23-45.
NVivo 2017. NVivo qualitative data analysis Software. Version 11.4.3 ed.: QSR International Pty Ltd.
Varvasovszky, Z. & Brugha, R. 2000. A stakeholder analysis. *Health Policy Plan,* 15**,** 338-45.
Raftery, P., Hossain, M. & Palmer, J. 2021. An innovative and integrated model for global outbreak response and research - a case study of the UK Public Health Rapid Support Team (UK-PHRST). *BMC Public Health,* 1378**,** 12-21
Scott, W. 2007. Organizations and organizing: rational, natural, and open system perspectives. *In:* DAVIS GF. & SCOTT WR. (eds.). Upper Saddle River, NJ: Pearson Prentice Hall.
World Health Organization. 2016. *The R&D blueprint for action to prevent epidemics, plan of action. Available at: http://www.who.int/blueprint/about/r_d_blueprint_plan_of_action.pdf?ua=1. Accessed 20 Aug 2020.*
Jones, J. & Barry, M. 2011. Exploring the relationship between synergy and partnership functioning factors in health promotion partnerships. *Health Promot Int,* 26**,** 408-20.
Silvia, C., & McGuire, M., 2010. Leading public sector networks: An empirical examination of integrative leadership behaviors. *The Leadership Quarterly,* 21**,** 264-277.
UK-PHRST 2018. UK Public health rapid support team four year strategic framework 2018-2021.
Vangen, S. & Huxham, C. 2006. Achieving collaborative advantage: Understanding the challenge and making it happen. *Strategic Direction,* 22.
Goleman, D. 2000. Leadership that gets results. *Harvard business review,* 78**,** 78.
Downing, J. 2008. The conception of the Nankya model of palliative care development in Africa. *Int J Palliat Nurs,* 14**,** 459-64.
Frisby, W., Thibault, L. & Kikulis, L. 2004. The organizational dynamics of under-managed partnerships in leisure service departments. *Leisure Studies,* 23**,** 109-126.
Handy, C. 1996. *Gods of Management: The Changing Work of Organizations*, Oxford University Press.
Costa, A., Roe, R. & Taillieu, T. 2001. Trust within teams: The relation with performance effectiveness. *European Journal of Work and Organizational Psychology,* 10**,** 225-244.
Gray, B. 1989. *Collaborating: finding common ground for multiparty problems,* San Francisco, Calif, Jossey-Bass.
Gray, B. 2004. Strong opposition: Frame-based resistance to collaboration. *Journal of Community & Applied Social Psychology,* 14**,** 166-176.
Tuckman, B. W. & Jensen, M. 1977. Stages of small group development revisited *Group and Organization Studies,* 2**,** 419-27.
Lank, E. 2006. *Collaborative advantage: how organizations win by working together,* Basingstoke, Palgrave Macmillan.

ITAD 2021. End-point evaluation of the UK Public Health Rapid Support Team (UK-PHRST). Available at: https://www.itad.com/knowledge-product/end-point-evaluation-of-the-uk-public-health-rapid-support-team-uk-phrst-final-report/. Accessed 27 Nov 2021.

Hovland, I. 2003. Knowledge Management and Organisational Learning: An International Development Perspective. London Overseas Development Institute.

Roussos, S. & Fawcet, S. 2000. A Review of Collaborative Partnerships as a Strategy for Improving Community Health. *Annual review of public health,* 21**,** 369-402.

ITAD 2020. Mid-point evaluation of the UK-public health rapid support team. Available at: https://www.itad.com/knowledge-product/mid-point-evaluation-uk-public-health-rapid-support-team-uk-phrst-final-report/. Accessed 27 Nov 2021.

Raftery, P. 2018. An arranged Marriage: Reflections on the partnership functioning and collaborative advantage of the UK Public Health Rapid Support Team (UK-PHRST). London School of Hygiene and Tropical Medicine.

Eugenia, B. 2013. Theoretical approaches to the organizational culture and the organizational climate: Exploratory research examples and best policies in health care services. *Journal of Human Resource Management,* Vol. 1**,** 48-58.

UK-PHRST 2021. Management response and recommendations action plan to Endpoint evaluation of the UK Public Health Rapid Support Team (UK-PHRST). Available at: https://www.lshtm.ac.uk/media/52566. Accessed: 27 Nov 2021.

DATA AVAILABILITY

The anonymised interviews conducted and analysed for this study are available from the corresponding author on reasonable request.

LIST OF ABBREVIATIONS

ASC	Academic Steering Committee
CDT	Core deployable team
CMO	Chief Medical Officer
COVID-19	Coronavirus-19
DFID	Department for International Development
GOARN	Global outbreak alert and response network
KCL	Kings College London
LMICs	Low-middle income countries
LSHTM	London School of Hygiene and Tropical Medicine
PHE	Public Health England

SMT	Senior Management Team
UK	United Kingdom
UK-PHRST	UK Public Health Rapid Support Team
WHE	WHO's Health Emergencies Programme
WHO	World Health Organization

Table 1: Frameworks identified in the literature for analysing partnership functioning

FRAMEWORK	AUTHOR, YEAR	DISCRIPTION, KEY COMPONENTS AND APPLICATION
Community coalition action theory (CCAT)	Butterfoss and Kegler, 2009	To understand the processes, structures, and outcomes experienced by effective community coalitions and to provide a roadmap for building and evaluating coalition effectiveness
Healthy alliances (HALL) framework	Koelen et al., 2012	To contribute to building successful alliances. By identifying three clusters of factors that either hinder or facilitate the success of alliances: (i) institutional factors, (ii) personal factors of participants and (iii) factors relating to the organization of the alliance, the framework represents conditions and prerequisites for successful alliances for health.
Parent and Harvey model	Parent and Harvey, 2009	A comprehensive analytical framework of sport and physical activity community-based partnerships which can be used to evaluate and track the evolution of a partnership. Includes a three-part feedback loop: the formation of a partnership between two or more organizations (the antecedents), the management of the partnership, and the partnership's evaluation, which feeds back into the antecedents and management.
The partnership framework	Kamya et al, 2017	To evaluate the health and functioning of a global health partnership. Used to analyse the Uganda's human papillomavirus (HPV) vaccine application partnership and found that the partnership was not perceived to have increased the efficiency of the process and again highlighted trust as an important element.
Partnership synergy promoting framework	Lasker et al., 2001	Defined the determinants of partnership synergy as resources, partners characteristics, relationships among partners, partnership characteristics and the external environment. Critical issues for achieving partnership synergy were the heterogeneity and level of involvement of partners, strong working relationships between partners, trust and mutual respect. Focused on the

		positive achievement of synergy and neglected to include an analysis of negative interactions which lead to antagony.
Adapted partnership synergy-promoting model	Brush et al., 2011	To guide the development and evaluation of a community–academic partnership. Argued that using a conscious and systematic approach to guide and evaluate progress is an important first step in creating a partnership, sustaining open dialogue, and developing strategies that promote trust and equalize power dynamics.
Bergen Model of Collaborative Functioning (BMCF)	Corbin et al., 2006	Focusses on the processes of partnership and its acknowledgement of both negative and positive interactions. Examines elements and dynamics of partnership functioning. Normalizes negative functioning allowing partners to track and improve interactions.

Table 2: Elements of the adapted Framework: describing each of the components included in the adapted framework and their source (included in BMCF, reinforced or adapted through literature review or case study data, or emerged as key theme through case study data)

FRAMEWORK COMPONENT	PRESENT IN BCMF	PRESENT IN OTHER FRAMEWORKS	CONTRIBUTION FROM CASE STUDY	DESCRIPTION
INPUTS				
Mission	Yes	Yes	Reinforced as critical	Purpose of partnership -encompasses the idea of a shared vision and aligned goals
Partners Resources	Yes	Yes	Reinforced as critical	The contribution of each partner to the alliance. Encompasses resources such as time, skills, expertise, reputation, personal networks and connections
Governance and Financial Structures	Financial resources only	Governance	Adapted - elements overlapped so were combined	The governance, funding and accountability policies and processes between the organizations and donors
External Environment	Yes	Yes	Reinforced as critical	The external environment within which the partnership operates. Includes stakeholders, policy context, publicity, media etc.
THROUGHPUTS				
Strategy	No	No	Emerging theme	How the team sets out to implement the mandate
Leadership	Yes	Yes	Reinforced as critical	How the team is led and managed

Organizational Cultures	Part of 'collaborative context'	Yes	Adapted – made explicit	Organizational cultures of different institutions involved
Trust & Power Balance	Part of 'Collaborative context'	Yes	Adapted – made explicit	Trust & power balance between the institutions involved
Roles, Management systems and processes	Yes as 'Roles and structure'	Yes	Adapted - reinforced as critical	How the two organizations are brought together to work as one team - includes structure and roles and responsibilities
Communication	Yes	Yes	Reinforced as critical	Communication practices and processes including exchange of information within the organisation and with the external environment
Evaluation and Knowledge management	Part of 'Maintenance Tasks'	Yes - Organisational learning	Adapted – made explicit	How the organization is evaluated, manages information and learns from experiences
OUTPUTS				
Collaborative Advantage	Implicit	Implicit	Adapted – made explicit	Added value of joining organizations
Team Cohesion	No	No	Emerging theme	Ability of the individuals from different organizations to work as a team and identify as part of the UK-PHRST
Antagony	Yes	No	Reinforced as critical	Negative outcome of the partnership
Synergy	Yes	Yes	Reinforced as critical	The ultimate positive outcome of partnership

Table 3: Summary of the positive and negative elements and dynamics in the partnership functioning of the UK-PHRST

FRAMEWORK COMPONENT	POSITIVE	NEGATIVE
Mission	Only response team globally combining triple mission	Triple mission considered challenging for team members to manage
	Small fully-funded standing team available to respond within 48hrs	On GOARN deployment part of a WHO team
	Operational research funded and prioritised	Capacity building objectives and strategies still developing and evolving
Partners Resources	Experience, expertise and knowledge available through the four organisations	No designated space where team can. work together
	Academic steering committee and just-in-time briefings to support outbreak response deployment and research projects	Insufficient capacity to deploy to multiple outbreaks simultaneously or to provide sufficient surge capacity for larger outbreaks/pandemics

FRAMEWORK COMPONENT	POSITIVE	NEGATIVE
Governance and Financial Structures	Defined funding of 20 million over 5 years designated to the team	Deployment dependent on receiving a request to deploy
	Funding and governance split to maintain institutional balance	ODA funding mechanism restrictive and inefficient for managing research projects
External Environment	Leadership viewed as experts in their field and well suited to lead the partnership	No strategy for public engagement
	Strong relationships with WHO and GOARN	No strategy to proactively engage host governments to build visibility and promote bilateral relationships
	Strong interest in the team within UK Dept of Health and PHE	Minimal engagement with UK partners beyond department of health
Strategy	Based on framework of approved joint proposal and incorporates 2016 research strategy	Strategy approved in Year 3 of 5-year project
	Planning for multidisciplinary research projects	Team not involved in development of strategy and some members not aware of existence, scope, or content
Leadership	Strong experience and leadership skills	Director travel and meeting schedule
	Director considered neutral – non-UK, non-LSHTM/PHE	Overlap of roles between Director and Deputy Director
	Director has both academic background and outbreak response expertise	Director started 1.5 years into the programme so not involved in design of project
	Deputy director involved since inception and has vast experience in research and capacity building	Need to delegate more and include SMT and CDT in decisions
	Leadership trust and encourage autonomy and initiative of team members on deployment	Directors reporting requirements and international travel time consuming
Organisational Culture	Diverse cultures which could complement each other	Potential lack of trust and understanding between lead agencies
	Strong leadership committed to promoting trust, mutual respect and equal contribution	Organisational values not clearly defined
Trust and Institutional balance	Institutional balance and equal partnership defined during establishment of the team and reiterated in organisational documents	Ultimate reporting structures are to UK government introduce bias
	Funding split between organisations	Perceived bias towards PHE because of reporting and governance
	Membership and content of meetings balanced	
Management Systems and Processes	Debriefs allow team to share valuable feedback	Debriefs too large limiting open and transparent discussion
	Funds available to set up research quickly in	IT on deployment difficult to integrate

FRAMEWORK COMPONENT	POSITIVE	NEGATIVE
	outbreaks and quick decisions from SMT	
	Honorary contracts available for staff through other institution and hot desking planned	Different staff grading systems between the two organisations
	For GOARN deployments CDT are pre-qualified team	Organogram not comprehensive to include lines of authority
Communication	SMT plan to meet every two weeks. Monthly all team meeting planned ASC meet quarterly	Meetings cancelled and lack of meetings between interim period and main phase
	Strategy for stakeholder engagement and communications in development	No actively updated website [1]
	Easy to communicate with SMT and get advice when on deployment	Email lists not consistent and inclusive
	Reports disseminated after each deployment and SITREPs during deployments	Lack of information sharing on research projects preventing opportunities to collaborate
	Support available from PHE & LSHTM communications teams	No structured discussion forum to talk about future scope and plans
Evaluation and Knowledge Management	Monitoring and evaluation framework being developed	Team not aware of evaluation metrics
	Lessons learned from deployments are integrated to inform future responses	Outputs of research projects not communicated to team and no clear plans or designated funding to facilitate research translation
	Plans at beginning of year 3 to arrange formal third-party evaluation	No knowledge and learning management strategy
	Plans to gather feedback on deployments from external stakeholders	No mechanism to strategically gather internal feedback from team members or feedback from partners and external stakeholders

[1] LSHTM maintained a webpage on the university site but this was not updated regularly

SUPPLEMENTARY INFORMATION

Qualitative Interview Guides

Objective: To gather information on the conceptualisation, mission, governance, leadership, partnership management and outbreak response and research conducted to date of the UK-PHRST.

Topic Guide 1: Vision, Mission and Conceptualisation

Vision, Mission and Conceptualisation

1. Briefly describe your role within the context of the UK-PHRST?
2. What is the vision of the UK-PHRST and how was this conceptualised?
3. Describe the mission of the UK-PHRST?
4. What was the driving force behind the conceptualisation of the programme?
5. How long did the process from conceptualisation to operationalisation take? Briefly describe the process and your role.
6. What were the milestones and challenges experienced along the way?
7. Was the partnership envisioned from the beginning, how was this envisioned to work? How does that differ from the reality?
8. How does the partnership enable or act as a barrier to the UK-RST fulfilling its mandate?

Governance, Funding and Partnerships

9. Briefly describe the organisational structure of the UK-PHRST and how it fits within the broader global health context?
10. How is the programme governed and how does it interact with other UK government departments? Dept of Health, DFID etc
11. How do you see the ethos of equal partnerships being maintained, governed and managed within the UK-PHRST?
12. How was the programme funded and what funding was received over what time period?
13. Briefly describe how funding is streamed through the programme.
14. What are the existing policies governing operations and influencing decisions around what outbreaks to respond to and what research projects are funded?
15. What do you see as the internal factors (e.g. political, policy, programs), which may impact the success of the UK-PHRST? ie. Strengths and Weaknesses

External environment and Key Stakeholder Relationships

16. What do you think are the external factors influencing the strategic direction of the programme?
17. Who are the key external stakeholders and how does the programme interact with the external stakeholders
    a. UK stakeholders and context
    b. International actors and context
    c. National governments and partners

18. How does the programme complement or integrate with the existing global health/emergency response mechanisms and organisations? . . . such as GOARN and DFID

19. What do think are each key stakeholder's INTEREST LEVEL and INFLUENCE/POWER LEVEL (low, medium or high) regarding the priorities of the UK-PHRST?

20. What do you see as the external factors (e.g. political, policy, programs), which may impact the success of the UK-PHRST? ie. opportunities and threats

Conclusion

21. Do you have anything else to add? Suggestions? Recommendations?

22. Are there other individuals or organizations you can suggest I speak with regarding the UK-PHRST?

Topic Guide 2: Leadership, Management and Partnerships

Mission, Strategy and Key priorities

1. Describe your role within the UK-PHRST?
2. What is the overall mission of the UK-PHRST programme?
3. What are the priorities of the programme related to
    a. Preparedness and response for emergencies
    b. Operational Research
    c. Training and capacity building
4. Are you aware of the strategic direction or strategic plan for the UK-PHRST and were you involved in the strategic planning process? Please describe the process.
5. What are the policies that govern decisions around what emergencies are responded to and what research projects are funded?
6. How many and what emergencies have already been responded to and why? Explain the process and decision making.
7. How is funding decided and allocated to selected projects?
    a. Emergency operations
    b. Research projects

Management, Leadership and Internal Partnerships

8. Briefly describe the organisational structure of the UK-PHRST and how it fits within the broader context?
9. What are the accountability mechanism and structures for reporting on progress and financial management?
10. How are the partnerships governed and managed with in the UK-PHRST

a. PHE and LSHTM, Oxford University, Kings College

b. LSHTM and Oxford University and Kings College

11. How is accountability ensured within the partnership?
    a. Accountability
    b. Power sharing
    c. Conflict/compatibility
    d. Trust
    e. Expectations – compliance with expected roles

12. What communications and meetings exist for collaboration and communication between organisations involved in the partnership?

13. What do you see as the internal factors (e.g. political, policy, programs), which may impact the success of the UK-PHRST? ie. Strengths and Weaknesses

14. How would you describe the leadership style used within the organisation?

15. What is your understanding/opinion of the conceptualisation as a partnership rather than a separate entity.

16. How is the partnerships governed and managed with in the UK-PHRST between two entities with very different organisational cultures, principles, protocols etc.?

Value and Sustainability

17. What do you see as the added value of the UK-PHRST?

18. What do you think have been the successes/achievements to date?

19. What do you think have been the challenges to date?

20. Do you experience challenges of the funding mechanism – lack of flexibility, annual, short term projects? How does this compare with similar programmes?

21. How is sustainability being addresses

    a. In relation to the continuation of the programme

    b. In relation to the emergency response operations?

    c. In relation to the research and capacity building components of the programme?

External environment and Key Stakeholder Relationships

22. What do you see as the external factors (e.g. political, policy, programs), which may impact (barrier/enablers) the success of the UK-PHRST? ie. opportunities and threats

23. What do you think are the external factors influencing the strategic direction of the programme?

24. Who are the key external stakeholders and how does the programme interact with the external environment?
    a. UK stakeholders and context
    b. International actors and context
    c. National governments and partners
25. How does the programme complement or integrate with the existing global health/emergency response mechanisms and organisations such as GOARN and DFID?
26. What do think are each key stakeholder's INTEREST LEVEL and INFLUENCE/POWER LEVEL (low, medium or high) regarding the priorities of the UK-PHRST?

Conclusion

27. Do you have anything else to add? Suggestions? Recommendations?
28. Are there other individuals or organizations you can suggest I speak with regarding the UK-PHRST?

Topic Guide 3: UK-PHRST Outbreak Response Operations and Research

Individuals Deployed on Emergency Response Missions

1. Briefly describe your role within the UK-PHRST.
2. Have you been deployed as part of an emergency mission? Where and what was the emergency response mission
3. Briefly describe the process involved in the deployment, did you find it efficient and effective?
4. How do you think these processes could be streamlined or improved?
5. What do you see as the challenges of the deployment?
    a. Comment on timing and length of deployments.
6. What do you see as the successes of the mission?
7. What do you see as the added value of the UK-PHRST during outbreak response?
8. What training did you receive prior to deployment?
9. Did you feel adequately supported and trained to fulfil your mandate?
10. How is sustainability being addresses in relation to the emergency response operations?
11. Please explain the training and capacity building component of the programme?

a. Please explain the concept of host centres?

Those leading operational research projects

12. Briefly describe your role within the UK-PHRST and the research project you are involved in?
13. How to you see your research aligns with the mission and strategic direction of the UK-PHRST?
14. Briefly describe the process involved in applying for funding for your research project through the UK-PHRST. Was it effective and efficient?
15. How do you think these processes could be streamlined or improved?
16. What do you see as the challenges for the project?
17. What do you see as the successes of the project?
18. What do you see as the added value of the UK-PHRST in the broader Global Health context?
19. How is sustainability being addresses in relation to the research and capacity building components of the programme?

Conclusion

20. Do you have anything else to add? Suggestions? Recommendations?
21. Are there other individuals or organizations you can suggest I speak with regarding the UK-PHRST?

Topic Guide 4: External Stakeholder Relationships

1. Briefly describe your role and your involvement with UK-PHRST.
2. What do you think are the external factors influencing the strategic direction of the programme (politics, policies, partners)?
3. Describe your organisations relationship with UK-PHRST?
4. Describe your organisations impression of and interaction with UK-PHRST.
5. How does the programme complement or integrate with the existing global health/emergency response architecture?
    a. UK stakeholders and context
    b. International actors and context
    c. National governments and partners

6. What is your organisations INTEREST LEVEL and INFLUENCE/POWER LEVEL (low, medium or high) regarding the priorities of the UK-PHRST?

7. What do you see as the external factors (e.g. political, policy, programs), which may impact the success of the UK-PHRST? ie. opportunities and threats

8. What do you see as the added value of the UK-PHRST?

9. What do you see as the internal factors (e.g. political, policy, programs), which may impact the success of the UK-PHRST? ie. Strengths and weaknesses

10. Do you believe sustainability being addresses in relation to the continuation of the programme?

Conclusion

11. Do you have anything else to add? Suggestions? Recommendations?
12. Are there other individuals or organizations you can suggest I speak with regarding the UK-RS

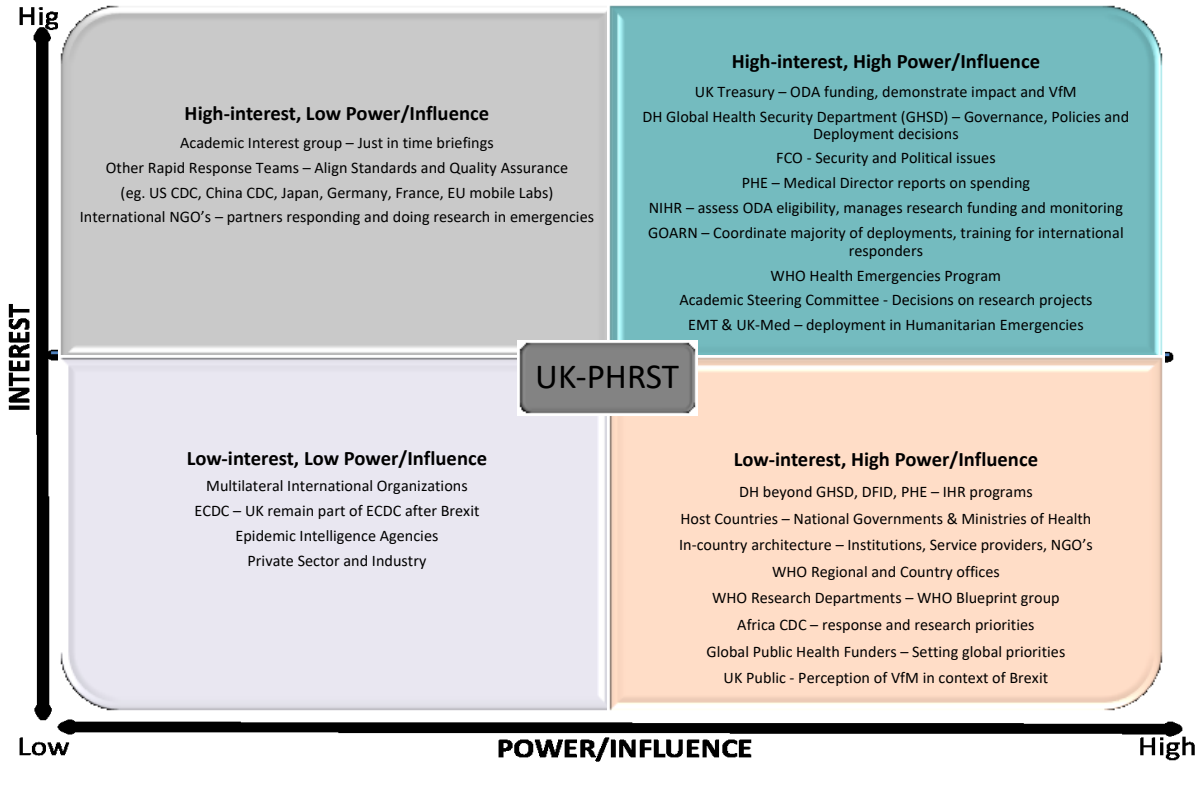

Figure 3: External stakeholder analysis of the UK-PHRST - mapping the stakeholders according to their power/influence and interest in the UK-PHRST. Important allies include those listed in high interest/high power quadrant and are highly influential relationships which will need to be managed closely. Stakeholders mapped in the low-interest, high power/influence quadrant represent highly influential players who should be engaged by UK-PHRST and relationships developed. The high-interest, low power/Influence is comprised of those considered to be interested in the UK-PHRST but currently not very powerful therefore it is important to keep these stakeholders engaged and informed as they may become more influential as the programme evolves. Likewise, those in the

low-interest, low power/influence quadrant are stakeholders who are currently at a distance, such as international non-government organisations, but should be monitored and reviewed frequently as they may become allies as the UK-PHRST develops eg. Private sector.

EU: European Union; ECDC: European Centre for Disease Prevention and Control; US CDC: United States Centre for Disease Control; Africa/ China CDC: Africa/China Centre for Disease Control; ODA: Office of development assistance; DH: Department of Health; GHSD: Global health security department; VfM: value for money; NGO: non-governmental organization; FCO: Foreign and commonwealth office; PHE: Public Health England; NIHR: National institute for health research; GOARN: Global outbreak alert and response network; EMT: Emergency medical team; DFID: Department for international development; IHR: International health regulations; WHO: World Health Organization.